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HIGH- AND LOW-TEMPERATURE THERMAL TECHNOLOGIES

Thermal treatment is usually not the least costly treatment alternative, but it is one of the most acceptable and permanent available. Compared to land disposal, it offers immediate destruction, limited liability, and mobility, which minimizes the impact on local neighborhoods.

Thermal treatment of soils contaminated with organics provides immediate destruction of the organics and a non-putrescible residual. When the thermal destruction system has been shut down and removed from the site, there is no longer liability. This compares favorably with other disposal methods, where contaminated materials may accumulate for years before destruction is complete. The issues of complete destruction of organics and limited liability makes thermal treatment a favored option for the treatment of many waste accumulations. By the end of 1989, remediation by thermal destruction was initiated or completed at over 30 NPL sites throughout the country.

What is Thermal Treatment?

The heating of soil or other material to a temperature where organics are released is termed "thermal treatment." There are two basic types of thermal treatment technologies in use for onsite applications: incineration and low-temperature desorption. Dozens of firms market technology services based upon the application of these thermal destruction systems.

Incineration uses two firing chambers. In the first, or primary, combustion chamber, the feed (material to be treated) is raised to a temperature in excess of 1,200°F. Organics are released from the feed to the exhaust gas stream and pass to a secondary combustion chamber. In the secondary combustion chamber, the organics are fired and burn out, turning to carbon dioxide and water vapor An air-emissions control system is normally provided after the secondary combustion chamber to remove soils or other particulate from the exhaust gas and to remove acid gases (such as hydrogen chloride) that may be generated from chlorinated organics or other materials in the feed.

Low-temperature desorber systems are those thermal treatment units that have been developed for feeds contaminated with volatile organic compounds (VOCs), which vaporize at a temperature of less than 160°F. The feed is heated, and VOCs are driven off. Some organic/soil mixtures will release organics at temperatures below 800°F. The organics are either collected for reuse, absorbed out of the gas stream, condensed, or incinerated.

The main difference between incineration and low-temperature desorption is the temperature required in the primary chamber of the system for effective release of organics from the contaminated feed. When VOCs predominate, low-temperature desorption may be the preferred thermal system.

Incineration Systems

Most onsite incineration systems use a rotary kiln as the primary chamber, such as the IT Corporation (Irvine, California), the John Zink (Tulsa, Oklahoma), and the Vesta (Ft. Lauderdale, Florida) systems, which are all competitive systems. The primary combustion chambers of these systems are horizontal rotating cylinders lined with refractory material. Supplemental fuel is fired at one end of the kiln to bring the unit up to operating temperatures and to maintain these temperatures during operation. Another type of primary combustion chamber that is used is the conveyor furnace. OH Materials (Findlay, Ohio), Westinghouse/Haztech (Decatur, Georgia), and U.S. Waste Thermal Processing (Fontana, California) use these units for onsite incineration. Waste is placed on a conveyor belt that passes under electric heating elements or burners fired with natural gas, propane, or fuel oil. After the 40- or 50-foot-long conveyor belt passes through the furnace chamber, the waste feed will have burned out to an ash. Each of these primary chamber systems discharges to a secondary combustion chamber where the organics in the off-gas are destroyed. Destruction is normally achieved at relatively high temperatures (from 1,800°F to 2,200°F) maintained for a period of 1 to 2 seconds.

Another type of transportable incinerator in use is the circulating fluid-bed combustor, manufactured and operated by Ogden Environmental Systems (San Diego, California). Waste discharges into a bed of sand or limestone through a high-velocity air stream. This system has a single combustion chamber through which the waste circulates for approximately 60 seconds With a retention time this long, it has been found that a relatively low temperature can be used for destruction. For instance, while many chlorinated organic compounds require a temperature of 2,200°F and 2 seconds residence time for effective destruction, the same level of destruction can be obtained with a temperature of from 1,300°F to 1,600°F with the 60-second retention time. The decrease in operating

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temperature significantly decreases the operating cost (supplemental fuel cost) of the system. Not all wastes, however, are applicable for destruction in a fluid-bed incinerator. In situations where constituents of the waste have relatively low melting points (temperatures), such as sodium or calcium salts, melting can occur within the chamber. When this occurs, the fluidization necessary for this process will not develop.

Thermal Desorbing Equipment

Chemical Waste Management (Oakbrook, Illinois) has developed a low-temperature thermal desorber that uses a rotary dryer as its primary chamber. Waste is fed to the dryer, which is externally heated Volatiles discharged from the waste are drawn off through condensers, where the condensable organics present in the off-gas condense are removed from the system. A wet scrubber, filters, and carbon drums in the exhaust-gas discharge system will also remove materials from the exhaust, resulting in a clean discharge to the atmosphere.

The low-temperature thermal treatment system developed by Weston (West Chester, Pennsylvania) heats contaminated soil in a primary chamber equipped with a series of screws. Hot oil circulates through the screws to heat the soil and release the VOCs present. The VOCs discharged to the gas stream pass through an afterburner for destruction. The gas stream then goes through an air-emissions control system, which includes a baghouse, carbon filters, and a condenser, to remove residual carbon and other particulates in the gas stream.

Mobility

Most of the thermal systems marketed for soil remediation are transportable systems. They are typically brought to the site by 15 to 50 trailers. The systems typically include process equipment; a mobile laboratory; fuel, water, water-treatment and wastewater tanks; personnel safety equipment; and other service and support service equipment and materials. The entire system usually requires from 4 to 12 weeks for erection. Likewise, dismantling takes at least a month in most cases. At least one manufacturer of incineration systems, Vesta, designed its equipment specifically with mobility in mind. They place the primary and secondary combustion chambers of an incinerator on one truck trailer body, as well as the scrubber, induced draft fan, exhaust stack, and system controls. This system, which has a throughput rated at a 2000-lb/hr of dry soil, can be operating within two days of arrival at a site.

Generally, a transportable system is designed for use for no less than six months whereas a mobile system can be set up immediately and can be used economically for relatively small amounts of contaminated materials.

REMEDIAL ACTION CONTRACTING AUTHORITY

Authority and responsibility to contract for remedial action (RA) is vested in the contracting party. For most RAs, the contracting party will be a state working under a cooperative agreement; the Bureau of Reclamation or U.S. Army Corps of Engineers under an interagency agreement or an ARCS firm under a contract. The contracting party must formally designate a person as the "contract manager/officer/administrator (CM/O/A)" with the authority to enter into, administer, modify, change, or terminate contracts and make related determinations. The CM/O/A may delegate, in writing, some authority to another person (such as a resident engineer) to act as their representative.

Only the CM/O/A or an authorized representative can issue an oral or written change to the RA contractor or increase the amount or duration of the contract. Unfortunately, certain acts or the failure to act by EPA or by unauthorized representatives of the contracting party may lead to increased RA costs and delays, resulting in constructive changes and contractor claims. A constructive change has the effect of prescribing new or different work at additional time or cost without a formal change order or supplemental agreement. A contractor claim is a demand by the RA contractor for extra money, a time extension, or a contract change that has previously been disputed or not acted upon by the CM/O/A.

EPA and the contracting party can prevent constructive changes that result from:

- Nondisclosure of technical information
- Actions by those with apparent, not real, authority
- Disregard for the privity of contract between a contracting party and its contractor or between a prime contractor and its subcontractors
- Directing a manner of performance not specified in the RA contract or directing the means and methods to be used by the RA contractor
- Defective plans and specifications or impossibility of contractor performance
- Unreasonable delay in review or approval of contractor submissions and requests

EPA and the contracting party can mitigate some causes of contractor claims, such as:

- Interference by other contractors or unauthorized representatives
- Cumulative effect of contract modifications and EPA-caused delays
- Untimely or unfairly addressed problems
- Inadequate inspection and construction management
- Differing site conditions
- Inadequate responses to time extensions and delay costs

To reduce the frequency, cost, and impact of constructive changes and contractor claims, EPA and the contracting party must:

- Maintain RA schedules
- Rapidly resolve project problems
- Respond to the CM/O/A in a timely manner
- Communicate frequently with the CM/O/A, not directly with the RA contractor
- Require a quality assurance/quality control program during remedial design and RA
- Require reviews of the plans, specifications, and contract documents with regard to bids, construction, claim prevention, operation, and value engineering

For advice and technical assistance on constructive changes and contractor claims, contact Thomas A. Whalen, P.E., in DCMB at FTS or (202) 475-9755.

FEMA TERMINATES SUPERFUND RELOCATION SUPPORT

The Federal Emergency Management Agency (FEMA) requested in a letter to the director, Office of Emergency and Remedial Response (OERR), that its role in the Superfund relocation program be terminated.

FEMA, under Executive Order #12580, was granted the authority to carry out all relocations. In its letter, FEMA indicated that its increased workload, resulting from recent natural disasters such as the Loma Prieta earthquake and Hurricane Hugo, had strained its resources. OERR thanked the Agency for its work in Superfund and agreed to the termination, with the condition that FEMA fulfill all interagency agreements currently in effect and assist EPA in any emergency situations, as necessary, through the end of this fiscal year. However, until the Executive Order is amended through the Office of Management and Budget, FEMA will still be responsible for the health-based relocations. EPA-HQ and FEMA are working together to amend the Executive Order and to effect a possible redelegation in the interim.

Currently, the Emergency Response Division is exploring alternatives for use in emergency relocations. The options being evaluated include the U.S. Army Corps of Engineers (USACE), Emergency Response Contractors, or EPA-HQ. The Division will be in contact with the Regions once a new procedure is established.

There are cases where an emergency relocation, which is a temporary action as defined in CERCLA, may become a permanent relocation (for example, Times Beach and Forest Glen). In these situations, the remedial action at the site (operable unit) is the permanent relocation of the affected population.

When the Region anticipates a permanent relocation, EPA-HQ must be advised. All acquisitions must be approved by the Assistant Administrator, Office of Solid Waste and Emergency Response, with advance concurrence from the Office of the General Counsel. In addition, the Facilities Management and Services Division is the only authorized EPA component that may accept and hold property on behalf of the Agency. Therefore, it must be involved early in the acquisition process to ensure that the acquisition regulations are followed. USACE will assist EPA in permanently acquiring property and relocating all residents during the remedial action phase of a project.

For additional information regarding the permanent relocation procedure, please refer to the Quick Reference Fact Sheet 9355.5-01/FS, "Real Estate Acquisition Procedures for USACE Projects," dated February 1990.

If an emergency temporary relocation is anticipated, please contact Elizabeth Zeller, Emergency Response Division, at FTS or (202) 382-7735. For additional information regarding permanent relocations, please contact Jo Ann Griffith, Hazardous Site Control Division, at FTS or (202) 475-6704.

COST RECOVERY FOR U.S. ARMY CORPS OF ENGINEERS' SUPERFUND PROJECTS

The Superfund program is entering its second decade of operations. There have been significant developments during the first 10 years and public awareness of EPA activities has grown dramatically. The number of Superfund sites also continues to spiral upward.

Administration of the ever-expanding Superfund program has become increasingly complex and expensive. Accurate and efficient recordkeeping is stressed because these elements have proven essential to successful cost recovery.

Uniform standards for retention of the EPA Superfund records were lacking in the early years, making retrieval of historical records difficult and time-consuming. The resulting delays in production of cost-recovery packages for the Department of Justice proved costly. In 1986, Computer Sciences Corporation (CSC) was issued a work order to develop and implement a nationwide program for Superfund records management to aid in Superfund financial documentation.

EPA is now advocating cost documentation standards for other federal agencies participating in the Superfund program. In January 1989, the Superfund Accounting Branch issued a publication titled "Guidance for Federal Recordkeeping" that outlines these standards.

Because of their involvement in the Superfund program, the U.S. Army Corps of Engineers (USACE) was the first federal agency to adopt standard recordkeeping procedures. In the fall of 1989, CSC was selected to assist USACE with the development and implementation of their internal program for Superfund records management.

Working at selected USACE disbursing offices, CSC staff will review USACE Superfund cost documentation dating back to the inception of the program. Two sets of files to justify expenditures will be established. One set, the Superfund original files, will contain original Superfund financial documents. A second set of files, the site files, will contain documented costs on a site-specific basis. The files will be periodically reconciled to ensure that EPA and USACE records are correct and accurate. This structure, often called the "active files project," has proven successful in EPA cost-recovery actions because it combines three key elements of cost recovery: availability, completeness, and accuracy.

CSC's first task was the development of a project plan, an outline of the comprehensive plan of action. CSC traveled to the USACE facilities in Omaha to interview selected personnel and to become familiar with specific documentation and USACE financial systems. CSC then produced a procedures manual. The project started up in the Omaha financial offices during the final week of March 1990.

The USACE cost documentation project was initiated in Omaha because of the concentration of cost information at this facility. The next phase will involve CSC teams traveling to selected USACE disbursing offices to process Superfund financial records and establish original and site-specific files for USACE projects. A CSC team was established in Boston to initiate the cost recovery documentation effort for all east coast USACE offices.

There are many parallels between the two CSC efforts. There are many variables and unknowns. The exact volume of USACE documentation is unclear; processing time is uncertain. The logistics involved in retrieving years of historical records is staggering. Space constraints are anticipated at most USACE facilities.

Arrangements for long-term storage of the Superfund cost documentation are

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not final The nationwide scope of both projects complicates management· CSC and EPA have learned that uniformity in the effort is unrealistic, that there must be some allowance for local variance. Project control of both efforts will be a function of EPA Headquarters, with local operating units each retaining some degree of autonomy.

This effort is truly a partnership between EPA and USACE. EPA has funded contractor support and provided guidance on cost-recovery requirements. USACE is providing CSC with office space, equipment, supplies, and ongoing technical assistance.

For additional information, please contact Cdr. William Zobel, Design and Construction Management Branch, at FTS or (202) 382-2347, or Ms. Anne Wohlleban, CSC Project Manager, at 703-538-7234.

COMPILATION OF BID TABULATIONS FOR POST-SARA REMEDIAL ACTION START SITES

The Design and Construction Management Branch (DCMB) of the Hazardous Site Control Division is in the process of compiling all available bid tabulations (bid tabs) for federally funded post-SARA remedial action start sites. The purpose of this project is to provide EPA's regional and headquarters Superfund staffs with a tool for determining the validity of bids they may receive for future remedial actions.

There were 87 federally funded post-SARA remedial action start sites that were considered for inclusion in this compilation. These comprise a subset of the 178 sites where remedial actions had started by the October 17, 1989, SARA deadline. This list was later expanded to include both first and subsequent post-SARA RAs. Of these 87 sites, the bids for 18 FEMA or ERCS (relocation or "removal") sites were incompatible with this study. DCMB has compiled 42 of the remaining bid tabs and is distributing copies of the bid tab compilation package to each Superfund Regional Branch Chief. Each Region will receive a copy of the bid tab compilation package. Any other parties desiring the bid tab compilation package will receive copies upon request (contact DCMB: distribution will be limited to EPA personnel). Updates will be distributed to the Regions periodically as more bid tabs become available.

The bid tab compilation package will include a printout of each bid tab, two floppy disks containing a bid tab data base and the software for processing the bid tabs, and a user's manual for the software. The printouts will contain the following information for each site: basic site data, key technological words that correspond to the selected remediation technologies, date of bid opening, project status, dollar volume of change orders to bid, contracting agency, site narrative, line item costs and descriptions from the engineer's bid, the awarded bid, as well as the lowest, second lowest, third lowest, and highest bids received. The report options available in the software allow the user to run summary reports or detailed reports for each bid tab (the detailed reports will include the same information in the printouts). The reports can be selected by site name, region, or key technological word (i e., remediation technologies). The user can edit the bid tabs or add new ones to the system as needed.

Although this bid tab compilation project can offer no bottom-line guide for what are acceptable unit prices or construction costs, it does offer insight as to what bids have been accepted as fair and reasonable for specific sites. Variances in size and geographical characteristics of sites, remediation technologies, or experience of the contractors will complicate any summary or general analysis of bid tabs and will not be included in this bid tab compilation package; DCMB is,however, considering such an analysis in the future.

DCMB appreciates any suggestions, questions, or comments concerning this and future presentations of the bid tabs. Contact Chris Watling of DCMB at FTS 382-3901, or commercially at 202-382-3901.

EPA TRACKING THE "200" RA STARTS

The Comprehensive Environmental Response, Compensation, and Liability Act mandated 175 substantial and continuous, physical onsite remedial actions (RA) to begin by October 16, 1989. EPA met that target with 178 first RA starts. The second part of that mandate requires EPA to initiate RAs at an additional 200 sites within the 24-month period immediately following.

The Office of Emergency and Remedial Response (OERR) performed an initial search of CERCLIS and identified approximately 183 projects where RAs could be started before October 17, 1991. Of those projects cited as possible "200" starts, 78 are currently listed as Fund-lead, with the remaining 105 projects listed as PRP sites.

Because of cutbacks in funding, projects slated for RA dollars in this fiscal year (FY) were ranked through a process that was based on the imminence and risk level at each of the sites. Because of budget and FTE limitations, EPA is expected to achieve only 127 RA starts by the October 1991 deadline. However, OERR will continue to monitor the progress of the RA completions through the 1991 deadline. Current projections indicate that there will be additional projects, where the designs have been completed, that will be eligible for funding. It is EPA's goal to queue 200 projects that meet the criteria for receiving RA funds.

If you have any questions, please contact Ms. Jo Ann Griffith, Design and Construction Management Branch, at FTS or (202) 475-6704.

ABOUT THE UPDATE

For comments, ideas, submissions, or questions about the *Update*, please contact Jo Ann Griffith, Design and Construction Management Branch, at FTS 475-6704 or commercially at (202) 475-6704 For copies, contact EPA's Public Information Center at FTS 8-382-2080 or (202) 382-2080, or write to EPA Public Information Center, U S Environmental Protection Agency, 401 M St S W , Washington, D C. 20460