Office of Solid Waste
and Emergency Response
Technology Innovation Office
Washington, DC 20460

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EPA/540/2-91/011, No.2 June 1992

EPA Vendor Information Form

To be completed for participation in the:

Vendor Information System for Innovative Treatment Technologies (VISITT) Version 2.0

NOTE: You may submit data electronically instead of typing or writing responses on the enclosed Vendor Information Form. Each Form is accompanied by one 3.5" IBM-compatible diskette. If you need additional diskettes, call the VISITT Hotline.

Completion of this form is voluntary. Any questions, call VISITT Hotline: 800/245-4505 or 703/883-8448.

EPA/540/2-91/011
Number 2
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To be completed for participation in the:

U.S. Environmental Protection Agency
Office of Solid Waste and Emergency Response
Technology Innovation Office
Washington, DC 20460

Printed on Recycled Paper

A Letter to Technology Vendors

One of this country's greatest challenges is cleaning up its many hazardous waste sites. The nature and extent of contamination varies widely at these sites, and it is becoming increasingly clear that acceptable and cost-effective remedies will require the expedited development of new treatment technologies. EPA established the Technology Innovation Office (TIO) within the Office of Solid Waste and Emergency Response to promote greater development and use of these new remediation methods.

A serious obstacle to technology development and use is the lack of readily available and current technology information. To address this problem, TIO has developed an automated database - the *Vendor Information System for Innovative Treatment (VISITT)* - for use by state, federal, and private sector professionals responsible for cleanup of hazardous waste sites. *VISITT Version 1.0*, which we made available this June, contains detailed information on the availability, performance, and cost of 155 innovative technologies offered by 97 vendors. The database is available free of charge to the public, and we announced its availability to over 17,000 people who have expressed an interest in remediation technologies.

Although we've made a good start, we know that the initial version of *VISITT* did not include some of the companies in this growing industry. This booklet describes the types of technologies that we are including in the database. If you offer one of these technologies, I encourage you to complete the *Vendor Information Form* in Appendix D, and submit it by the October 1, 1992 deadline. Submittals received by that date will be considered for inclusion in the second release of *VISITT* in early 1993.

EPA believes that *VISITT* offers an unprecedented opportunity for developers and vendors of innovative treatment technologies to showcase their capabilities and to improve communication among technology developers, users, and the investment community. To fully appreciate the advantages of participating in *VISITT*, you must see it for yourself. IBM-compatible diskettes and a user manual are available free of charge from the VISITT Hotline (800/245-4505 or 703/883-8448). I invite you to order the system, and see how easy it is for a user to access information serving a wide variety of needs.

Submittal of the information requested in this form is completely optional. We do, however, urge all vendors who offer (or are developing) relevant innovative treatment technologies to respond. With your help, we expect that this cooperative EPA/industry effort will play a significant role in making new technologies available to remediate our nation's hazardous waste sites.

Walter W. Kovalick, Jr.

Walter W. Kovalick, Jr., Ph.D.
Director
Technology Innovation Office

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GENERAL INFORMATION

I. Synopsis

The U.S. Environmental Protection Agency (EPA) has recently developed an automated database, the *Vendor Information System for Innovative Treatment Technologies (VISITT)*, for use by state, federal, and private sector professionals responsible for cleanup of the nation's hazardous waste sites. *VISITT Version 1.0*, which was made available in June 1992, contains 155 innovative technologies offered by 97 vendors. IBM-compatible diskettes and a user manual are available free of charge from the VISITT Hotline (800/245-4505 or 703/883-8448).

VISITT contains information on innovative treatment technologies, those for which a lack of cost and performance data inhibit their routine use to cleanup hazardous waste sites. Exhibit 1 gives a partial list of innovative technologies eligible for

EXHIBIT 1

PARTIAL LIST OF INNOVATIVE TREATMENT TECHNOLOGIES OF INTEREST

Acid Extraction*
Adsorption - In Situ*
Air Sparging - In Situ Ground Water*
Bioremediation - General*
Bioremediation - In Situ Ground Water*
Bioremediation - In Situ Lagoon
Bioremediation - In Situ Soil*
Bioremediation - Slurry Phase*
Bioremediation - Solid Phase Bioventing*
Chemical Treatment - Dechlorination*
Chemical Treatment - Other*
Chemical Treatment - In Situ Ground Water*
Delivery/Extraction Systems*
Electrical Separation*
Magnetic Separation*
Materials handling*
Off-Gas Treatment*
Pyrolysis
Slagging - Off-Gas Treated*
Soil Flushing - In Situ*
Soil Vapor Extraction*
Soil Vapor Extraction - Thermally Enhanced*
Soil Washing*
Solvent Extraction*
Thermal Desorption*
Thermal Desorption - Off-Gas Treated*
Vitrification*
Vitrification - Off-Gas Treatment*

* Category included in VISITT Version 1.0.

inclusion in *VISITT*. The database is designed to serve as a tool to screen these technologies for remediation of contaminated hazardous waste sites, and to direct users to more complete information. The investment community may also use this database to identify potential investment opportunities.

The Technology Innovation Office (TIO) of the Office of Solid Waste and Emergency Response (OSWER) is conducting this *Second Invitation for Submittals* for developers and providers of innovative treatment technologies. The information

submitted by applicants on the *Vendor Information Form (VIF)* (Appendix D) will be considered for inclusion in the second version of the database.

EPA believes that *VISITT* offers an unprecedented opportunity for developers and purveyors of innovative treatment technologies to showcase their capabilities. Innovative technologies are undergoing rapid change, which makes it difficult to maintain current information on their developmental status and commercial availability. We anticipate that this database will play an important role in the efficient expansion of this industry by tracking this changing market and improving communication between technology developers and users.

One of EPA's highest priorities is the generation of new methods to treat contaminated soil, sludge, solids, sediments, and solid-matrix waste and to treat ground water in situ. *VISITT* applies to only innovative treatment technologies that address these media/wastes. **EPA will not accept information on the more widely available technologies: incineration, solidification/stabilization, and above-ground groundwater treatment.** Technologies must address remediation of contaminated sites, not industrial wastes generated on an ongoing basis. Nor does this database address innovative measurement, monitoring, or containment technologies.

The purpose of *VISITT* is to facilitate the increased domestic use of innovative treatment technologies. Firms that respond may be located either inside or outside the United States; however, non-U.S. firms should intend to operate commercially within the U.S.

Technologies of interest include those at any stage of development, from bench to pilot to full scale. However, EPA desires information only on those technologies that respondents intend to commercialize, rather than those on which they are conducting academic research only.

Information submitted by applicants on the *VIF* by **October 1, 1992**, will be considered for inclusion in the second release of *VISITT* in early 1993. After October 1, EPA will review applications as time and resources permit. To remain in the database, all vendors must verify or update submitted information during the update cycle.

II. Contents of This Booklet

This booklet contains three sections. General Information gives background to VISITT and this Second Invitation for Submittals. Appendix A contains instructions for completing the *Vendor Information Form (VIF)*, definitions of terms used in the form, and a key to contaminant groups. Appendix B contains the blank *VIF* to be submitted.

The *VIF* consists of seven parts, which are listed in Exhibit 2. *Part 1* must be completed in order for the vendor to be included in *VISITT*. This part contains questions on the name and location of the vendor and on the description, status, and application of the technology. *Part 2* is required for applicants with full-scale technologies; *Part 3* is required for applicants with pilot-scale technologies. *Parts 4*

EXHIBIT 2

CONTENTS OF *VENDOR INFORMATION FORM*

Part 1: General Information and Technology Overview
Part 2: Full-Scale Equipment/Capabilities
Part 3: Pilot-Scale Equipment/Capabilities
Part 4: Bench-Scale Treatability Study Capabilities
Part 5: Summary of Performance Data
Part 6: Representative Applications
Part 7: Literature and Technical References

through 7 are optional, and apply to technologies at any scale of development. Lastly, this submittal package includes an IBM-compatible computer diskette, which contains an automated version of the blank *VIF*.

III. Why Is This Database Needed?

The impetus for *VISITT* is the Agency's need to increase the availability and use of treatment technologies that can cost effectively clean up hazardous waste sites. The database provides a service to vendors who are developing and applying new technology by creating a vehicle to make known the application and performance of their technologies to the full range of users. The Agency anticipates that *VISITT* will be used by the thousands of professionals responsible for the cleanup of Superfund sites, RCRA corrective actions, State-led cleanups, Federal facility restoration programs, and remedial actions at leaking underground storage tank (UST) sites. The database allows users to screen technologies for engineering feasibility studies, and to identify vendors who provide treatability studies and cleanup services.

IV. Why Should You Participate?

EPA expects that *VISITT* will prove to be an excellent opportunity for vendors to promote their capabilities. The system allows the vendor to provide substantial information on the applicability, performance, and current use of their technologies. The database is publicly available free-of-charge on computer diskette, and EPA is studying online access. We reach cleanup personnel and investors throughout the U.S. and abroad by widely advertising *VISITT* in trade journals, at conferences, and

through direct mailings to an extensive list of potential users. Prior to the database's release, over 1,500 people requested order information.

V. What Innovative Technologies Are Eligible for Inclusion?

EPA includes only certain innovative treatment technologies in *VISITT*. These are technologies to treat the particular remedial problems identified earlier: treatment of contaminated soil, sludge, sediments, and solid-matrix wastes; and treatment of ground water in place. Innovative treatment technologies that treat off-gases generated from a primary treatment technology also are included in *VISITT*. Exhibit 1 contains a partial list of eligible innovative technologies. EPA will continue to expand this list to include additional innovative technologies submitted.

Incineration, solidification/stabilization, and above-ground groundwater treatment technologies will not be accepted. EPA recognizes that these technologies are vital to the clean up of hazardous waste sites, and that some innovative approaches utilizing these technologies are being developed and used. However, the Agency believes that, for the most part, information on these technologies is readily available and that there is a greater need to disseminate information on technologies for which there is far less information.

As noted earlier, this *VISITT* submittal also does not apply to technologies related to (1) treatment of industrial wastes generated on an ongoing basis, (2) measurement, (3) monitoring, or (4) containment.

VI. Should Confidential Business Information (CBI) Be Submitted?

Confidential business information should <u>not</u> be submitted, because EPA plans to make all submitted information available to the public. However, applicants may write "available on a case-by-case basis" as their response to those questions for which they have information, but would prefer not to make this information generally available.

Applicants are encouraged to provide "sanitized" or masked information that will allow users to review general information on a vendor's experience, without revealing confidential information. For instance, in Part 6, which details project experience, you may provide a generic industry name, such as "organic chemical manufacturer" instead of the actual site name. A lack of information may discourage users from considering the technology further.

VII. How Much Documentation is Required Regarding Performance and Other Technology Claims?

VISITT is intended to be a showcase for technology vendors. To optimize the usefulness of the data, EPA will review each submittal for clarity, completeness, and adherence to instructions. It is in the applicant's best interest to fill out each part of *VIF* as completely as possible since incomplete information may discourage users from considering the technology further.

EPA reserves the right to clarify or question information submitted. The respondent will be given the opportunity to review any substantive changes to the submittal that the Agency wishes to make, with two exceptions: (1) EPA may list Superfund sites or Federal facilities at which the vendor's technology has been used, and (2) EPA may add publicly-available references of which EPA is aware.

The Agency will not review submitted data for accuracy or quality; to do so would be too resource intensive and subjective, and would substantially delay dissemination. *VISITT* clearly states that vendors have supplied the information, and that the data have not been verified by the Agency. Applicants should expect that interested users will request additional information regarding applicability and performance of a particular treatment technology. The database contains the following disclaimer:

> Inclusion in the U.S. Environmental Protection Agency's *Vendor Information System for Innovative Treatment Technologies* does not mean that the Agency approves, recommends, licenses, certifies, or authorizes the use of any of the technologies. Nor does the Agency certify the accuracy of the data. This listing means only that the vendor has provided information on a technology that EPA considers to be eligible for inclusion in this database.

EPA includes abstracts of all references cited in Part 7 of the *VIF*, and includes the abstracts in the *Alternative Treatment Technology Information Center (ATTIC)*, an on-line service operated by EPA's Office of Research and Development. For this reason, we request that copies of references be included in the submittal.

VIII. EPA's Authority for Submittal and Burden Statement

EPA's authority for conducting this *Second Invitation for Submittals* is Section 311 of the Superfund Amendments and Reauthorization Act of 1986 (42 U.S.C. 9601 et seq.). Under Section 311, EPA may collect and disseminate information related to the use of innovative treatment technologies for remediation of hazardous waste sites.

EPA estimates that the vendor reporting burden for this collection of information will average 12 hours per response for completion of Part 1, and 28 hours for completion of the entire form. These estimates include the time applicants will require to review and maintain the data needed, and to complete and review the *VIF*. Send comments regarding this burden estimate, or any other aspect of reducing the burden, to Chief, Information Policy Branch, PM-223, U.S. Environmental Protection Agency, 401 M Street, S.W. Washington, D.C. 20460; and to Paperwork Reduction Project (OMB #2050-0114), Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, D.C. 20503.

IX. When and Where to File

EPA will review *Vendor Information Forms* received by **October 1, 1992**, for inclusion in the second release of *VISITT* in early 1993. EPA will review responses received after October 1 as time and resources permit.

Vendors already included in *VISITT Version 1.0* will be contacted by EPA to verify or update submitted information. *VISITT* participants may also submit further technologies for consideration.

Send completed VIFs and diskettes to:

System Operator, VISITT
PRC Environmental Management, Inc.
1505 PRC Drive
McLean, VA 22102

EPA may need to contact respondents for further information or to clarify information submitted, prior to inclusion in *VISITT*.

APPENDIX A
INSTRUCTIONS

INSTRUCTIONS

1. *Part 1* must be completed in its entirety in order to be considered for inclusion in *VISITT*. A clear and concise technology description is particularly important, since this may be the first information reviewed by the user.

2. Provide your Vendor Name on each page in upper right corner; you need provide Technology Type on each page only if you are submitting more than one form.

3. Applicants with full-scale technologies (Question 17a checked) must fill out *Part 2*. You may also complete this part if the technology is at pilot scale.

4. Applicants with pilot-scale technologies (Question 17b checked) must fill out *Part 3*. You may also complete this part if the technology is at full scale or bench scale.

5. *Parts 4 through 7* are optional, but it is in the applicant's best interest to complete these sections as thoroughly as possible. Incomplete information may discourage users from considering the technology further.

6. To answer *Part 1, Question 9*, refer to the definitions of Technology Types provided in Appendix B. Appendix B also contains other useful definitions of terms used in the *VIF*.

7. In *Part 7*, cite only references that you can provide with your application. If you are a participant in *VISITT Version 1.0*, you need not provide references submitted to EPA earlier.

8. You may submit responses on the computer diskette provided. A printed hard copy of the form should accompany the diskette, in case the latter is damaged in transit.

9. Submit one copy each completed *VIF*, references, and the computer diskette (if appropriate) to the **System Operator, VISITT, PRC Environmental Management, Inc., 1505 PRC Drive, McLean, VA 22102.**

10. Questions regarding the *VIF* should be addressed to the **VISITT Hotline at 800/245-4505 or 703/883-8448.**

11. EPA welcomes any comments on the contents of this form. You may provide comments in writing to the address given in No. 9, above, or by calling the VISITT Hotline.

APPENDIX B
DEFINITIONS

DEFINITIONS

I. Technology Types

Acid Extraction - This technology is used to remove hazardous metals from excavated soils and sludges through the application of an acidic solution. It is a liquid-solid extraction technology that operates on the principle that the metals of concern will be preferentially solubilized and thereby removed from the waste. Further treatment will be required of the metal-containing acid solution.

Adsorption - In Situ - In this technology, containerized adsorptive materials (for example, various organic polymers, activated carbon, and sponge material) are placed directly in ground water to remove various hazardous compounds. This technology also would include systems that drill wells and place adsorptive materials in the air space above the ground water, in order to achieve reductions of relatively volatile compounds. The use of this technology will depend to a large extent on site-specific soil and ground-water characteristics.

Air Sparging - In Situ Ground Water - This technology reduces concentrations of hazardous compounds in ground water by injecting air below the water table. The injected air creates air bubbles in the ground water. The air bubbles contact dissolved/adsorbed-phase contaminants and non-aqueous phase liquids (NAPLs) in the aquifer, causing contaminants to volatilize. The volatilized contaminants are transported by the air bubbles into the vadose zone. Removal of the contaminants transferred to the vadose zone would be accomplished by another technology, usually soil vapor extraction. The application and effectiveness of this technology will depend to a large extent on site-specific soil and ground-water conditions.

Bioremediation - General - This technology uses microorganisms to degrade organic contaminants. The microorganisms breakdown the organic contaminants by using them as a food source. End products of the degradation are typically CO_2 and H_2O. Nutrients such as phosphorous, nitrogen, or oxygen may be added to enhance the biodegradation process. The VISITT database identifies FIVE subcategories of this technology, based on the type and media treated. The technologies listed in this category are those that did not specify one of the processes listed in the subcategories or were not described in enough detail to be included into one of the four subcategories.

Bioremediation - In Situ Ground Water - The defining characteristic of this technology is an injection system (typically injection wells) to circulate microorganisms, nutrients, and oxygen through contaminated aquifers. In most instances ground water is pumped, treated to some extent, and then reinjected with additives that enhance biodegradation. Common system design consists of a central withdrawal of ground water and reinfiltration upgradient of the treated area. Biodegradation relies on contact between contaminants in the ground water and microorganisms.

Bioremediation - In Situ Lagoon - This technology is similar to Bioremediation - Slurry Phase. However, it is in situ. The target media has a considerably higher moisture content. It may be close to a slurry in consistency. The various microbes and nutrients may be added by injection, sprayed on top of lagoon and mixed or applied in another manner. In many situations the media may also be stirred or aerated to promote bioremediation. Applications for this technology would include hazardous waste sludge lagoons.

Bioremediation - In Situ Soil - The target media for this technology are subsurface soils and the vadose zone above the water table. In this technology, various microbes, nutrients and an oxygen source are injected through injection wells into the soil. In general, subsurface soil moisture is required, and soils must be relatively permeable.

Bioremediation - Slurry Phase - This technology mixes excavated soil, sludge, or sediment with water to form a slurry that is mechanically agitated in an environment (usually a tank or reactor vessel, although in situ lagoon applications are possible) with appropriate ambient conditions of nutrients, oxygen, pH, and temperature. Upon completion of the process, the slurry is dewatered and the treated material disposed.

Bioremediation - Solid Phase - In this system, excavated soils are placed in a tank, building, or on a lined treatment bed. Nutrients and other additives are tilled into the soil using conventional equipment to facilitate microbial growth. The tillage equipment may provide aeration for the soil as well. Water is provided via a sprayer or sprinkler system. The VISITT system includes composting and land farming in this category.

Bioventing - This technology combines soil vapor extraction with bioremediation. It involves a system of vapor extraction wells that induce air flow in the subsurface through air injection or through the use of a vacuum. The increased air flow increases the amount of oxygen available for microbial degradation. A nutrient solution may be injected with the air or percolated into the soil to enhance biodegradation.

Chemical Treatment - Dechlorination - This category includes any chemical treatment technology that results in the removal or replacement of chlorine atoms bonded to hazardous compounds. Further treatment of the newly formed chlorinated compounds may be required.

Chemical Treatment - In Situ Ground Water - This technology treats ground water in situ through chemical treatment technology. In this technology chemicals may be injected into the ground water to convert hazardous compounds to less hazardous compounds. This technology is different from conventional pump and treat technologies in that the ground water is treated in situ and not pumped above ground, treated, and then reinjected.

Chemical Treatment - Other - Hazardous compounds are converted to less hazardous or nonhazardous compounds through chemical reactions. The chemical reactions may be induced through the addition of other compounds or through exposure of the contaminant to light (photo-initiated reactions). Treatment technologies that fall under this classification operate at moderate temperatures and pressure.

Delivery/Extraction Systems - These technologies do not treat hazardous wastes directly but facilitate the use of other waste treatment technologies. Such technologies may provide a means of in situ treatment in cases in which such treatment previously was not feasible. Such VISITT technologies include horizontal wells and other in situ delivery systems. In cases in which the delivery and extraction technology is integrally linked to the use of a particular treatment, the technology has been placed in the same technology category as the technology to which it is linked.

Electrical Separation - The operating principle of this technology is the establishment of an electric field that will allow positive and negative ions to migrate through the contaminated material and thereby be removed. The effectiveness of this technology will depend to a great extent on the electrolytic nature of the waste.

Soil Flushing - In Situ - This technology consists of recycling substantial volumes of water through a contaminated area for the purpose of flushing hazardous waste compounds from the contaminated site. Water is injected into the soil through injection wells, flows through the contaminated soil and is extraction through extraction wells. The principal defining characteristic of this technology is the ability to essentially isolate the injected water from any aquifer, and then to recover the water for aboveground treatment. The treated water is recycled through the contaminated area. Treatment chemicals maybe added to the water to help remove the hazardous constituents of concern (for example, water can be slightly acidified to help flush toxic metals from the waste site). As is the case in air sparging in situ ground-water, the use of this technology depends to a great extent on site-specific soil and ground-water conditions.

Materials Handling - These technologies do not treat hazardous waste directly but facilitate the use of other hazardous waste treatment technologies. Such VISITT technologies include innovative technologies to dewater waste, and remove debris. In cases in which material handling technology is integrally linked to the use of a particular treatment (for example, a specialized reactor for bioremediation), the technology also has been placed in the same technology category as the technology to which it is linked.

Off-Gas Treatment - This technology is specifically designed to treat the off-gas generated by another treatment technology such as thermal desorption or soil vapor extraction. Treatment of the gases may involve a chemical reaction to convert the gases to less hazardous compounds. Other treatments may involve a physical process such as absorption of the gases onto a substrate where they can be further treated. The VISITT database contains only innovative off-gas treatment technologies.

Pyrolysis - This technology, also referred to as cracking, breaks down large hydrocarbon molecules into molecules with lower molecular weight. This is achieved in the absence of oxygen (i.e. no oxidation) by high temperature alone. The process often takes place in a fluidized bed reactor. The products of the process include low molecular weight hydrocarbons and stack gases. Catalysts may be used to promote the pyrolysis process. Some pyrolysis systems may required air emission control systems for gases generated.

Slagging - This technology applies to hazardous wastes that contain substantial concentrations of metals (approximately 5 percent or greater). This system operates in an oxygen environment at temperatures of 3900°F (2150°C) or greater. Metal compounds are converted into a molten slag. Some slagging systems may require air emission control systems for acid gas, metal vapors, and particulate. The VISITT database identifies a separate subcategory of this technology if treatment of the off-gas generated by this process was specified. Slagging technologies listed under this category did not specify any type of off- gas treatment.

Slagging - Off-Gas Treated - This technology applies to hazardous wastes that contain substantial concentrations of metals (approximately 5 percent or greater) and organic compounds. This system operates in an oxygen environment at temperatures of 3900°F (2149°C) or greater. Organics are treated by combustion or other off gas treatment technology and metal compounds are converted into a molten slag. The off gas treatment systems may consist of air emission control systems for acid gas, metal vapors, and particulates.

Soil Vapor Extraction - This technology applies a vacuum to a series of extraction wells to create an air flow through the vadose zone. Air also may be injected through injection wells to enhance air flow. As air moves through the soil, volatile contaminants move from the soil and pore water to the air. The contaminated air is withdrawn often with entrained water. This technology typically strips volatile organic compounds from the soil. Further treatment of the extracted vapors usually is required.

Soil Vapor Extraction - Thermally Enhanced - This technology typically injects hot air or steam directly into the soil to induce vaporization of various volatile and semivolatile organic compounds. Injection of the hot air or steam may occur either through injection wells or by other devices such as hollow stem augers. The vaporized compounds are extracted directly from the soil through the use of vapor extraction wells. The hot air or steam (thermal treatment) enhances volatilization of the contaminant, thus increasing removal rates and the volatilization of less volatile compounds that would not have been extracted with non-thermally enhanced soil vapor extraction. Further treatment of the extracted vapors usually is required.

Soil Washing - This ex situ technology uses water and mechanical action to remove hazardous constituents that adhere physically to soil particles. It makes use of the fact that contaminants have a tendency to adhere to the organic carbon and fine-grained soil fraction (silt and clay) as opposed to the coarse grain mineral fraction (sand and gravel). Surficial contamination is removed from the coarse fraction of the soils by abrasive scouring. The wash water may be augmented with a leaching agent, surfactant, pH adjustment, or chelating agent to help remove organics or heavy metals. The spent wash water will require further treatment and most likely will be recycled back to the treatment unit.

Solvent Extraction - Similar to acid extraction, this technology focuses on the removal of organic compounds, from contaminated material instead of on the removal of metals. This is an ex situ liquid-solid and liquid-liquid extraction that operates on the principle that the organic constituents of concern can be preferentially removed from the waste to the solvent phase. The solvent used can be varied depending on the organic compounds to be treated. As with acid extraction, the contaminated solvent solution will require further treatment.

Thermal Desorption - This technology uses heat in a controlled environment to cause various organic compounds to volatilize and thereby be removed from contaminated material. In some cases an inert gas is used to carry the desorbed organics. The processes are planned and designed to avoid combustion (that is, not conducted in the presence of oxygen) in the primary unit. This technology differs from incineration in that the temperature range is usually 300°F - 1200°F (150°C - 650°C). Higher temperatures may be used when there is no oxygen present in the desorption chamber. Constituents that are volatilized will require further control. The VISITT database identifies a separate subcategory of this technology if treatment of the off-gas generated by this process was specified. Technologies listed under this category did not specify any type of off-gas treatment.

Thermal Desorption - Off-Gas Treated - As defined here, this technology includes all thermal desorption systems that are followed by some type of off-gas treatment system such as systems that liquify and recover volatilized constituents, adsorb off-gas with carbon, use a non-flame low temperature catalytic destruction process, or use incineration (that is, destruction of organic constituents in a controlled flame combustion process).

Vitrification - This technology treats wastes containing primarily metals and high concentrations of silicates (soil-like material). This technology uses heat usually applied through electrical power to melt contaminated soils and sludges to form a stable glass and crystalline structure with very low leaching characteristics. The contaminated waste is typically heated to a range of 2900°F to 3600°F (1600°C to 2000°C) well above the soil's melting point. In some cases vitrifying agents may be added. Metals are encapsulated in the glass-like structure of the melted silicate compounds. As used here, this technology also includes systems where treated wastes are ceramic-like in nature. Constituents that are volatilized will require further control. The VISITT database identifies a separate subcategory of this technology if treatment of the off-gas generated by this process was specified. Technologies listed under this category did not specify any type of off-gas treatment.

Vitrification - Off Gas-Treated - As defined here, this technology includes all vitrification systems that include some type of off-gas treatment such as systems that liquefy and recover volatilized constituents, adsorb off-gas with carbon, use a non-flame low temperature catalytic destruction process, or use incineration (that is, destruction of organic constituents in a controlled flame combustion process). This technology is useful for wastes containing both metals and organic wastes containing high concentrations of silicates (soil-like material). As used here, this technology also includes systems where treated wastes are ceramic-like in nature. As with Slagging and Thermal Desorption, this technology may require air emission controls for acid gas, metal vapors, and particulates.

II. Other Definitions

Batch Process - Processing of the waste occurs without any waste entering or leaving the process vessel during treatment. An example of a batch treatment process would be a solvent extraction system where a fixed amount of solvent and waste are mixed for a given period of time prior to transfer to another treatment operation.

Continuous Process - Untreated and treated wastes are simultaneously introduced and discharged from the particular treatment unit operation.

Semicontinuous Process - Treatment operations are semicontinuous when 1) after the initial charge, no wastes are added to the process but some part of the waste is continuously discharge, or 2) no material is discharged from the process but wastes or treatment chemicals are continuously added for a finite period of time. An example of the former system could be a thermal desorption process where a fixed amount of waste is heated and vapors are continuously withdrawn.

Soil - Any of the various types of natural surface materials present above bedrock.

Soil Classification - As used in this form, the term is meant to describe any of five groupings of soil based on particle size. The soil groupings and associate particle size are as follows: clay (.0002 to .002 millimeters), silt (.002 to .02 mm), fine sand (.02 to .2 mm), coarse sand (0.2 to 2.0 mm), and gravel (greater than 2 mm).*[1]

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[1] Soil Survey Staff, 1975, Soil Taxonomy Handbook No. 436. U.S. Government Printing Office, p. 40 (Appendix 1).

Sludge - A semi-solid material with a moisture content typically between 2 and 20 percent. The term is used here to identify the applicability of various technologies to a material that contains significant amounts of moisture but is relatively viscous and may present some problems with regard to pumping and mixing. Examples of sludges include residuals from treatment of metal wastes and the mixture of waste/soil at the bottom of a waste lagoon.

Ground water in situ - As used here, the term "ground water" refers to subsurface water found in the zone of saturation (i.e., the fraction of the subsurface where all pore space is filled with water). Treatment of "ground water in situ" refers to treatment of ground water in place.

Technology Limitations - This term is meant to describe any contaminant, contaminant group, or waste parameter that can prohibit the applicability of a technology to a given waste, or adversely affect that technology in treating a particular waste. For example, biodegradation is inhibited by high concentration of toxic metals, and thermal desorption requires more energy in the presence of significant amounts of moisture. Other factors that may affect applicability and/or performance include soil particle size, oil and grease concentration, total organic carbon concentration (TOC), moisture content, cyanide concentration, and complex metals.

Treatability Studies - As used here, the term applies to treatment technology tests (usually at the bench or pilot scale) conducted to generate data on the untreated and treated concentrations (i.e., performance data) of various constituents, constituent groups, or pollutant parameters. These performance data are then used to assess whether a particular technology is a viable option for cleanup of actual hazardous waste sites or used to determine design parameters.

Operating Principle - These are the underlying scientific explanation for "why" a treatment technology works. For example, the operating principle of thermal desorption is that the addition of energy (in this case, in the form of heat) can cause chemicals to volatilize (i.e., go from liquid to vapor phase) and thereby be separated from the waste of concern. (Note: An explanation of "how" heat is supplied to a various chemical is a description of the various treatment operations.)

Transportable Technology - Any technology that can be moved either completely assembled or in various parts and then reassembled at a hazardous waste site is considered to be a transportable technology.

Fixed Technology - A technology that can only be used at the locations at which it is already assembled.

In situ - As used here, the term is meant to describe the treatment of hazardous wastes in the media and at the location that they are found. In situ treatment does not involve any excavation of the wastes.

Contaminant - For the purpose of this information request, any of the hazardous substances that are listed later in this appendix are considered contaminants. These are the same substances that are designated as hazardous under CERCLA at 40 CFR 302.4.

Contaminant Group - As used here, a term that applies to any of the generic names used to describe multiple contaminants that have similar chemical and/or physical properties. Two examples of contaminant groups are volatile organic compounds (VOCs) and radioactive metals.

Pollutant Parameter - Any of the terms used to describe waste characteristics as a whole as opposed to discrete groups of individual contaminants. Pollutant parameters include biochemical oxygen demand (BOD), total organic carbon (TOC), pH, and moisture content.

APPENDIX C
KEY TO CONTAMINANT GROUPS

CONTAMINANT GROUP CODES FOR HAZARDOUS SUBSTANCES LIST

Organic

- A Halogenated volatiles
- B Halogenated semivolatiles
- C Nonhalogenated volatiles
- D Nonhalogenated semivolatiles
- E Organic pesticides/herbicides
- F Dioxins/furans
- G PCBs
- H Polynuclear aromatics (PNAs)
- I Solvents
- J Benzene-toluene-ethylbenzene-xylene (BTEX)
- K Organic cyanide
- L Organic corrosives

Inorganic

- M Heavy metals
- N Nonmetallic toxic elements (As, F)
- O Radioactive metals
- P Asbestos
- Q Inorganic cyanides
- R Inorganic corrosives

Miscellaneous

- S Explosives/propellants
- T Organometallic pesticides/herbicides

Organic Contaminant Group

CAS No.		
208968	Acenaphthylene	D,H
83329	Acenaphthene	D,H
75070	Acetaldehyde	C
67641	Acetone	C,I
75058	Acetonitrile	C,K
98862	Acetophenone	D
591082	Acetyl-2-thiourea, 1	D
107028	Acrolein	C
79061	Acrylamide	D
79107	Acrylic acid	C,L
107131	Acrylonitrile	C
124049	Adipic acid	L
116063	Aldicarb	E
309002	Aldrin	E
107186	Allyl alcohol	E
62533	Aniline	D,I,L
120127	Anthracene	D,H
1912249	Atrazine	E
2642719	Azinphos-ethyl	E
86500	Azinphos-methyl	E
151564	Aziridine	C
71432	Benzene	C,I,J
98884	Benzene carbonyl chloride	B
92875	Benzidine	D
205992	Benzofluoranthene, 3,4-	H
65850	Benzoic acid	D,L
100470	Benzonitrile	A,C,I
95169	Benzothiazole, 1,2-	D,I
50328	Benzo (a) pyrene	D,H
206440	Benzo (j,k) fluorene	H
207089	Benzo (k) fluoranthene	D,H
100447	Benzyl chloride	A
56553	Benz (a) anthracene	D,H
117817	Bis (2-ethyl hexyl) phthalate	D
111911	Bis (2-chloroethoxy) methane	B
111444	Bis (2-chloroethyl) ether	B
542881	Bis (chloromethyl) ether	B
75274	Bromodichloromethane	A
74964	Bromomethane	A
1689845	Bromoxynil	E
106990	Butadiene, 1,3-	C
71363	Butanol	C
85687	Butlbenzyl phthalate	D
94826	Butyric acid, 4-(2,4-dichlorop	C,L

CAS No.		
133062	Captan	B
63252	Carbaryl	E
1563662	Carbofuran	E,F
75150	Carbon disulfide	C
56235	Carbon tetrachloride	A
78196	Carbophenothion	E
75876	Chloral	A
57749	Chlordane	E
106478	Chloroaniline, p-	B
108907	Chlorobenzene	A
67663	Chloroform	A
74873	Chloromethane	A
107302	Chloromethyl methyl ether	A
106898	Chloromethyloxirane, 2-	E
91587	Chloronaphthalene, 2-	B
95578	Chlorophenol, 2-	B
59507	Chloro-3-methylphenol, 4-	B
2921882	Chloropyrifos	E
218019	Chrysene	D,H
56724	Coumaphos	E
8021394	Creosote	H
108394	Cresol, m-	D
106445	Cresol, p-	D
98828	Cumene	C,I
21725462	Cyanazine	E
110827	Cyclohexane	C, I
108941	Cyclohexanone	C
72548	DDD	E
72559	DDE	E
50293	DDT	E
78488	DEF	C,E
333415	Diazinon	E
132649	Dibenzofuran	D
53703	Dibenz (a,h) anthracene	D,H
124481	Dibromachloromethane	A
106934	Dibromoethane, 1,2-	A
96128	Dibromo-3-chloropropane, 1,2-	A
1918009	Dicamba	E
95501	Dichlorobenzene, 1,2-	B
541731	Dichlorobenzene, 1,3-	B
106467	Dichlorobenzene, 1,4-	B
91941	Dichlorobenzidine, 3,3-	B
75718	Dichlorodifluoromethane	A
75343	Dichloroethane, 1,1-	A
107062	Dichloroethane, 1,2-	A

Organic Contaminant Group (continued)

CAS No.		
75354	Dichloroethene, 1,1-	A
156592	Dichloroethylene, cis-1,2-	A
156605	Dichloroethylene, trans-1,2-	A
120832	Dichlorophenol, 2,4-	B
94757	Dichlorophenoxyacetic acid, 2-	L
78875	Dichloropropane, 1,2-	A
542756	Dichloropropene, 1,3-	A
62737	Dichlorvos	E
115322	Dicofol	E
60571	Dieldrin	E
84662	Diethyl phthalate	D
111466	Diethylene glycol	D,I
1660942	Diisopropylmethylphosphonate	D
60515	Dimethoate	E
119904	Dimethoxybenzidine, 3,3-	D
105679	Dimethyl phenol, 2,4-	D
13113	Dimethyl phthalate	D
77781	Dimethyl sulfate	C
99650	Dinitrobenzene, 1,3-	D
51285	Dinitrophenol, 2,4-	D
121142	Dinitrotoluene, 2,4-	D
606202	Dinitrotoluene, 2,6-	D
88857	Dinoseb	E
123911	Dioxane, 1,4	C
78342	Dioxathion	E
122667	Diphenylhydrazine, 1,2-	D,H
85007	Diquat	E
298044	Disulfoton	C,E
330541	Diuron	E
84742	Di-n-butyl phthalate	D
117840	Di-n-octyl phthalate	D
115297	Endosulfan	E
959988	Endosulfan	I
33212659	Endolsulfan II	E
1031078	Endolsulfan sulfate	E
145733	Endothall	E
72208	Endrin	E
7421934	Endrin aldehyde	E
563122	Ethion	E
141786	Ethyl acetate	C
100414	Ethyl benzene	C,J
75003	Ethyl chloride	A,I
60297	Ethyl ether	C
107211	Ethylene glycol	I
110805	Ethylene glycol monoethyl ether	C,I
759944	Ethylpropylthio carbomate, S-	E

CAS No.		
122145	Fenitrothion	E
86737	Fluorene	D,H
50000	Formaldehyde	C
64186	Formic acid	L
110009	Furan	F
98011	Furfural	I,C
765344	Glycidyaldehyde	C
76448	Heptachlor	E
1024573	Heptachlor epoxide	E
118741	Hexachlorobenzene	B
87683	Hexachlorobutadieene	B
60873	Hexachlorocyclohexane, alpha-	E
60873	Hexachlorocyclohexane, beta-	E
60873	Hexachlorocyclohexane, delta-	E
77474	Hexachlorocyclopentadiene	B
67721	Hexachloroethane	B
70304	Hexachlorophene	B
110543	Hexane	C,I
1689834	Ioxynil	E
78831	Isobutanol	C
78591	Isophorone	D
143500	Kepone	E
58899	Lindane	E
121755	Malathion	C,E
108316	Maleic anhydride	E
123331	Maleric hydrazide	E
126987	Methacrylonitrile	C
67561	Methanol	C
16752775	Methomyl	E
72435	Methoxychlor	E
79221	Methyl chlorocarbonate	L
78933	Methyl ethyl ketone	C
108101	Methyl isobutyl ketone	C,I
80626	Methyl methacrylate	C
101144	Methylene bis (2-chloroaniline)	B
75092	Methylene chloride	A
23855	Mirex	E
91203	Naphthalene	D,H
100016	Nitroaniline, p-	D
98953	Nitrobenzene	D
100027	Nitrophenol, 4-	D

Organic Contaminant Group (continued)

CAS No.		
1116547	Nitrosodiethanolamine, n-	D
55185	Nitrosodiethylamine, n-	D
62759	Nitrosodimethylamine, n-	D
86306	Nitrosodiphenylamine, n-	D
930552	Nitorsopyrrolidine, n-	D
924163	Nitroso-di-n-butylamine, n-	D
615532	Nitroso-di-n-methylurethane, n-	D
99990	Nitrotoluene, 4-	D
56382	Parathion, ethyl-	E
298000	Parathion, methyl-	E
1336363	PCBs	G
608935	Pentachlorobenzene	B
76017	Pentachloroethane	B
82688	Pentachloronitrobenzene	B
87865	Pentachlorophenol	B
85018	Phenanthrene	D,H
108952	Phenol	D
139662	Phenyl sulfide	D
62384	Phenylmercurie acetate	E
298022	Phorate	C,E
75445	Phosgene	E
13171216	Phosphamidon	E
7803512	Phosphine	E
85449	Phthalic anhydride	D,E
23950585	Pronamide	D
129000	Pyrene	D,H
110861	Pyridine	C,I
91225	Quinoline	D,H
108463	Resorcinol	D
299843	Ronnel	E
57249	Strychnine	E,H
100425	Styrene	C

CAS No.		
1746016	TCDD	F
95943	Tetrachlorobenzene, 1,2,4,5-	B
630206	Tetrachloroethane, 1,1,1,2-	A,E,I
79345	Tetrachloroethane, 1,1,2,2-	A
127184	Tetrachloroethene	A
58902	Tetrachlorophenol, 2,3,4,6	B
3689245	Tetraethyldithiopyrophosphate	E
109999	Tetrahydrofuran	F,I
137268	Thiram	E
108883	Toluene	C,J
584849	Toluene diisocyanate	D
8001352	Toxaphene	E
93721	TP, 2,4,5-	E
75252	Tribromomethane	A
120821	Trichlorobenzene, 1,2,4-	B
71556	Trichloroethane, 1,1,1-	A
79005	Trichloroethane, 1,1,2-	A
79016	Trichloroethylene	A
75694	Trichlorofluoromethane	A
933788	Trichlorophenol, 2,3,5-	B
95954	Trichlorophenol, 2,4,5-	B
88062	Trichlorophenol, 2,4,6-	B
609198	Trichlorophenol, 3,4,5-	B
93765	Trichlorophenoxyacetic acid, 2-	L
933788	Trichloro-1,2,2-trifluoroethane	A,I
27323417	Triethanolamine	E
126727	Tris (2,3-dibromopropyl) phosphate	B
108054	Vinyl acetate	C
75014	Vinyl chloride	A
81812	Warfarin	E
108383	Xylene, m-	C,J
95476	Xylene, o-	C,J
106423	Xylene, p-	C,J

Inorganic Contaminant Group

CAS No.		
7429905	Aluminum	M
20859738	Aluminum phosphide	M
7440360	Antimony	M
7440382	Arsenic	M
1327533	Arsenic trioxide	M
1303339	Arsenic trisulfide	M
7440393	Barium	M
542621	Barium cyanide	M,Q
7440417	Beryllium	M
7440439	Cadmium	M
13765190	Calcium chromate	M
7778543	Calcium hypochlorite	M
1333820	Chromic acid	M,R
7440473	Chromium	M
	Chromium (III)	M
	Chromium (VI)	M
7440484	Cobalt	M
7440508	Copper	M
544923	Copper cyanide	M,Q
7720787	Ferrous sulfate	M
7439896	Iron	M
7439921	Lead	M
7439965	Manganese	M
7439976	Mercury	M
7440020	Nickel	M
7718549	Nickel chloride	M
10102440	Nitrogen dioxide	R
7789006	Potassium chromate	M
151508	Potassium cyanide	M,Q
506616	Potassium silver cyanide	M,Q
7783008	Selenious acid	M,R
7782492	Selenium	M
7440224	Silver	M
506649	Silver cyanide	M,Q
7440235	Sodium	M
26628228	Sodium azide	M
7681494	Sodium fluoride	M
7775113	Sodium chromate	M

CAS No.		
143339	Sodium cyanide	M,Q
1310732	Sodium hydroxide	M,R
7440280	Thallium	M
1314325	Thallic oxide	M
563688	Thallium acetate	M
6533739	Thallim carbonate	M
7791120	Thallium chloride	M
10102451	Thallium nitrate	M
12039520	Thallium selenide	M
7446186	Thallium (I) sulfate	M
7440291	Thorium	M
1314621	Vanadium pentoxide	M
7440666	Zinc	M
557211	Zinc cyanide	M,Q
1314847	Zinc phosphide	M
7733020	Zinc sulfate	M

Explosives/Propellants

CAS No.		
7664417	Ammonia	S
131748	Ammonium picrate	S
7773060	Ammonium sulfamate	S
460195	Cyanogen	S
2691410	Cyclotetramethylenetetranitramine	S
302012	Hydrazine	S
55630	Nitroglycerine	S
99990	Nitrotoluene, 4-	S
26628228	Sodium azide	M, S
99354	Trinitrobenzene, 1,3,5	S
118967	Trinitrotoluene	S

APPENDIX D
VENDOR INFORMATION FORM

Blank Submittal Form

NOTE: You may submit data electronically instead of typing or writing responses on this Vendor Information Form. Each form is accompanied by one 3.5" IBM-compatible diskette. If you need additional diskettes, call the VISITT Hotline at 800/245-4505 or 703/883-8448.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
VENDOR INFORMATION SYSTEM FOR INNOVATIVE TREATMENT TECHNOLOGIES (VISITT)
VENDOR INFORMATION FORM

PART 1: GENERAL INFORMATION AND TECHNOLOGY OVERVIEW

1. Date Submitted _____/_____/_____

2. Developer/Vendor Name _____

3. Street Address _____

   _____

4. City _____ State/Province _____ Zip Code _____

5. Country _____

6. a. Contact Name: _____

   b. Title: _____

7. Contact Phone ( )_____-_____ 8. Fax Number ( )_____-_____

9. **Technology Type.*** *Check one only.* Fill out a separate form for each additional technology.

- ☐ Acid Extraction
- ☐ Adsorption - In Situ
- ☐ Air Sparging - In Situ Ground Water
- ☐ Bioremediation - In Situ Ground Water
- ☐ Bioremediation - In Situ Lagoon
- ☐ Bioremediation - In Situ Soil
- ☐ Bioremediation - Slurry Phase
- ☐ Bioremediation - Solid Phase
- ☐ Bioventing
- ☐ Chemical Treatment - Dechlorination
- ☐ Chemical Treatment - In Situ Ground Water
- ☐ Chemical Treatment - Other
- ☐ Delivery/Extraction Systems
- ☐ Magnetic Separation
- ☐ Materials Handling
- ☐ Off-Gas Treatment
- ☐ Pyrolysis
- ☐ Slagging - Off-Gas Treated
- ☐ Soil Flushing - In Situ
- ☐ Soil Vapor Extraction
- ☐ Soil Vapor Extraction - Thermally Enhanced
- ☐ Soil Washing
- ☐ Solvent Extraction
- ☐ Thermal Desorption
- ☐ Thermal Desorption - Off-Gas Treated
- ☐ Vitrification
- ☐ Vitrification - Off-Gas Treated

Other: _____

* See Appendix B for definitions of technology types.

Vendor Name: _____

Technology Type: _____

PART 1: GENERAL INFORMATION AND TECHNOLOGY OVERVIEW *(Continued)*

10a. **Technology Name Assigned By Vendor.** *(If different than Question 9).*

_____

10b. Registered trademark? ☐ Yes ☐ No

11. Patents

a. Is technology patented? ☐ Yes ☐ No

b. Is patent pending? ☐ Yes ☐ No

12. **Superfund Innovative Technology Evaluation (SITE) Program.**

a. Is this technology being tested or has this technology been tested in EPA SITE **Emerging** Technology Program?

☐ Yes ☐ No

b. Is this technology being tested or has this technology been tested in EPA SITE **Demonstration** Program?

☐ Yes ☐ No

13. **Description of Technology**. In 300 words or less, describe treatment process, including scientific principle on which the technology is based; key treatment steps; unique and innovative features; whether full-scale system is/will be batch, continuous, or semicontinuous; and whether the technology is above ground or in situ. *Parts 2 and 3* allow more detail for full- and pilot-scale systems.

EXAMPLE

Description of Technology

ABC Corporation has developed an innovative solvent extraction technology (SUPER) utilizing Super Chemical as the solvent. Super Chemical is a biodegradable solvent.

The key to success of this process is Super Chemical's property of inverse miscibility; below 65 degrees F, Super Chemical is soluble in water (hydrophilic) and above 65 degrees F, Super Chemical is insoluble in water (hydrophobic). Therefore, cold Super Chemical can extract water and water-soluble compounds and warm Super Chemical can extract organic contaminants, such as PCBs, pesticides, PAHs, semi-volatile organics, and VOCs.

Within the unit, the soil is continuously washed with Super Chemical in a counter current process. The contaminants dissolve in the solution, and are removed from the soil by the counter current flow. The contaminated solvents are reclaimed in a closed-loop circuit, eliminating the need for large volumes of solvent. The clean washed soil is moved to a closed-loop dryer system, where any excess solvent is removed from the soil. When the soil exits the system, it is relatively free of organics, and dry. The collected contaminant from the solvent washing is concentrated 1,000 to 10,000 times, reducing the volume and the associated disposal costs, and is periodically pumped from the system into labeled 55-gallon drums for conventional off-site disposal.

Emissions of organic vapors to air are controlled and treated by using a carbon absorption system.

Vendor Name: _____

Technology Type: _____

PART 1: GENERAL INFORMATION AND TECHNOLOGY OVERVIEW *(Continued)*

13. **Description of Technology** ***(Continued)***.

Vendor Name: _____

Technology Type: _____

PART 1: GENERAL INFORMATION AND TECHNOLOGY OVERVIEW *(Continued)*

14. **Technology Highlights.** In 200 words or less, describe in terms of contaminants treated, performance, implementation, or cost, the key marketable features of technology, such as treatment niche and advantages over other technologies.

EXAMPLE

Technology Highlights

The SUPER solvent extraction process can treat soils, sludges, and sediments contaminated with PCBs, carcinogenic PAHs, pesticides, and VOCs at 20% to 40% of incineration costs. Treated products from the SUPER process include: water suitable for discharge, oil for recycle as fuel, and solids that can be returned to the site as backfill. The process can also reduce the initial volume of contaminated material by as much as 90%.

The SUPER solvent extraction process operates at near ambient pressures and temperatures, uses off-the-shelf process equipment, and controls air emissions. The extraction efficiency (organic removal efficiency) achieved is as high as 99%.

Solvent recovery is also greater than 99%. The process can treat up to 300 tons per day of contaminated soil. This technology is well accepted by communities because air emissions are minimized.

Vendor Name: _____

Technology Type: _____

PART 1: GENERAL INFORMATION AND TECHNOLOGY OVERVIEW *(Continued)*

15. **Technical Limitations.** In 200 words or less, describe technical limitations, such as specific contaminants, that could adversely affect applicability or performance.

EXAMPLE

Technology Limitations

The SUPER process is not applicable for metal-only, (e.g., radioactive) or other inorganic wastes, but its performance is not affected by inorganics at low concentrations. This process may require screening or crushing to 0.25 inches, and other feed preparation operations depending on the waste. The extraction efficiency of an organic contaminant will depend on its solubility in the solvent. The solvent used is best suited for PCBs and pesticides.

Vendor Name: _____

Technology Type: _____

PART 1: GENERAL INFORMATION AND TECHNOLOGY OVERVIEW *(Continued)*

16. **Other Comments.** In 200 words or less, provide additional technology information, such as technology history, status, capabilities, experience, and applicable permits obtained (e.g., TSCA, RCRA).

EXAMPLE

Other Comments

The SUPER process has been successfully demonstrated at bench scale, pilot scale, and at full scale. A full-scale SUPER unit was used to treat PCB-contaminated sludges at the BAD Oil Refining Superfund site.

Two pilot-scale units have been built. One was operated under the SITE program to treat soils and sludges contaminated with PCBs.

Bench-scale treatability studies have been conducted on contaminated soils containing petrochemical compounds, pharmaceutical compounds, pesticides, PCBs, and wood preserving wastes containing PAHs.

Vendor Name: _____

Technology Type: _____

PART 1: GENERAL INFORMATION AND TECHNOLOGY OVERVIEW *(Continued)*

17. **Technology Status.** Using the following definitions, indicate the operational status of the technology. *Check only one.*

    a. ☐ **Full scale.** Available equipment is sized and commercially available for actual site remediation. (If you select full scale, you must fill out *Part 2*).

    b. ☐ **Pilot scale.** Available equipment is of sufficient size to verify technology feasibility or establish the design and operating conditions for a full-scale system. However, it is not of the size typically used for a cleanup. (If you select pilot scale, you must fill out *Part 3*).

    c. ☐ **Bench scale or emerging.** Technology shown to be feasible through the use of bench-top equipment in the laboratory. Data from these studies cannot be used to scale up the technology to full scale.

18. **Media treated.** Check "actual" for all media that have been treated by technology. Check "potential" for all media to which technology may be applied in the future.

Actual	Potential	
☐	☐	Soil (in situ)
☐	☐	Soil (ex situ)
☐	☐	Sludge (Does not include municipal sewage sludge)
☐	☐	Solid (e.g., slag)
☐	☐	Natural sediment (in situ)
☐	☐	Natural sediment (ex situ)
☐	☐	Ground water in situ
☐	☐	Off-gas generated from a primary innovative treatment technology

19. **Contaminants and Contaminant Groups* Treated.** *Check all that may apply.* Check "actual" for all that have been treated by your technology (i.e., data exist). Check "potential" for all that the technology may be applied to in the future. Data for actual contaminants treated should be included in *Part 5*. If your technology is materials handling, delivery/extraction or you are an equipment vendor, this question may not apply.

Actual	Potential	
☐	☐	Halogenated volatiles
☐	☐	Halogenated semivolatiles
☐	☐	Nonhalogenated volatiles
☐	☐	Nonhalogenated semivolatiles
☐	☐	Organic pesticides/herbicides
☐	☐	Dioxins/furans
☐	☐	PCBs
☐	☐	Polynuclear aromatics (PNAs)
☐	☐	Solvents
☐	☐	Benzene-toluene-ethylbenzene-xylene (BTEX)
☐	☐	Acetonitrile (organic cyanide)
☐	☐	Organic acids

Actual	Potential	
☐	☐	Heavy metals
☐	☐	Nonmetallic toxic elements
☐	☐	Radioactive metals
☐	☐	Asbestos
☐	☐	Inorganic cyanides
☐	☐	Inorganic corrosives
		Miscellaneous
☐	☐	Explosives/propellants
☐	☐	Organometallic pesticides/herbicides

Others (specify): _____

_____

_____

* See Appendix C for key to contaminant groups.

Vendor Name: _____

Technology Type: _____

PART 1: GENERAL INFORMATION AND TECHNOLOGY OVERVIEW *(Continued)*

20. **Industrial Waste Sources or Site Types Treated.** *Check all that may apply.* Treatment data should be available for those sites for which "actual" is checked. (See Table A for wastes typically associated with each industry.)

Actual	Potential		Actual	Potential	
☐	☐	Agriculture	☐	☐	Munitions Manufacturing
☐	☐	Battery recycling/disposal	☐	☐	Paint/ink formulation
☐	☐	Chloro-alkali manufacturing	☐	☐	Pesticide manufacturing/use
☐	☐	Coal gasification	☐	☐	Petroleum refining and reuse
☐	☐	Dry cleaners	☐	☐	Photographic products
☐	☐	Electroplating	☐	☐	Plastics manufacturing
☐	☐	Herbicide manufacturing/use	☐	☐	Pulp and paper industry
☐	☐	Industrial landfills	☐	☐	Other organic chemical manufacturing
☐	☐	Inorganic/organic pigments	☐	☐	Other inorganic chemical manufacturing
☐	☐	Machine shops	☐	☐	Semiconductor manufacturing
☐	☐	Metal ore mining and smelting	☐	☐	Rubber manufacturing
☐	☐	Municipal Landfill	☐	☐	Wood preserving
			☐	☐	Uranium mining

Others *(specify)* _____

_____

_____

21. **Vendor Services.** Check all that apply.

☐ Equipment manufacturer
☐ Subcontractor for cleanup services
☐ Prime contractor for full-service remediation
☐ Other *(specify)* _____

Vendor Name: _____

Technology Type: _____

PART 1: GENERAL INFORMATION AND TECHNOLOGY OVERVIEW *(Continued)*

TABLE A

Contaminants/Wastes Associated With Industrial Waste Sources or Site Types

1.	Chloro-Alkali Manufacturing	:	Chlorine Compounds, Mercury
2.	Coal Gasification	:	PAHs
3.	Agriculture	:	Pesticides
4.	Battery Recycling/Disposal	:	Lead (acid)
5.	Dry Cleaners	:	Solvents
6.	Electroplating	:	Chrome, Metals
7.	Herbicide Manufacturing/Use	:	Pesticides
8.	Industrial Landfills	:	Wastes from Multiple Sources
9.	Inorganic/Organic Pigments	:	Solvents, Chrome, Zinc
10.	Machine Shops	:	Metals, Oils
11.	Metal Ore Mining and Smelting	:	Metals
12.	Municipal Landfills	:	Wastes from Multiple Sources
13.	Munitions Manufacturing	:	Explosives, Lead
14.	Paint/Ink Formulation	:	Solvents, Some Metals (Chrome, Zinc)
15.	Pesticide Manufacturing/Use	:	Pesticides
16.	Petroleum Refining and Reuse	:	Petroleum, Hydrocarbons, BTEX
17.	Photographic Products	:	Silver, Bromide, Solvent
18.	Plastics Manufacturing	:	Polymers, Phthalates
19.	Pulp and Paper Industry	:	Chlorinated Organics, Dioxins
20.	Other Organic Chemical Manufacturing	:	Organics, Metals (used for Catalyst)
21.	Other Inorganic Chemical Manufacturing	:	Inorganics, Metals
22.	Semiconductor Manufacturing	:	Degreasing Agents (Solvents), Metals
23.	Rubber Manufacturing	:	Rubber, Plastics, Polymers, Organics
24.	Wood Preserving	:	Creosote, PCP, Arsenic, Chrome, PAHs
25.	Uranium Mining	:	Uranium, Radioactive Metals

Vendor Name: _____

Technology Type: _____

PART 2: FULL-SCALE EQUIPMENT/CAPABILITIES

You must complete this part if Question 17a is checked (i.e., technology is at full scale). You may also complete this part if the technology is at pilot scale.

22. **Major Unit Processes.** In 300 words or less, describe the steps and operation of the full-scale system, including list of key components (e.g., pre- and post-processing). Provide more detail than you did in Question 13.

EXAMPLE

Major Unit Processes

Pre-Processing

- Front-End Loader and Weight Scale
- Shredder
- Radial Stacker Belt Conveyor and Surge Hopper

1. Stockpiled soil is transported to a weigh scale by a front-end loader.

2. Soil is deposited directly on a power shredding device. Classified soil with a top size of less than 2 inches passes through the shredder into the feed conveyor.

3. The feed conveyor is an enclosed radial stacker belt conveyor that is 18 inches wide and 60 feet long. The conveyor discharges into the surge hopper located above the thermal processor. The soil will be fed into the LT system at regular intervals to maintain the surge hopper seal.

Process

- Thermal Processor
- Induced Draft Fan for Vapors
- Horizontal Screw Conveyor and Ash Conditioner

1. The thermal processor houses four intermeshed screw conveyors. The function of each screw conveyor is to move soil forward through the processor and to thoroughly mix the material, providing indirect contact between the heat transfer fluid and the soil. The shafts and flights of the screw conveyors and the processor jackets are hollow to allow circulation of a heat transfer fluid (i.e., hot oil).

2. Vapors are driven off the soil and are drawn out of the thermal processor by an induced draft (ID) fan.

3. Soil is discharged from the thermal processor onto a horizontal screw conveyor and then an ash conditioner.

4. The conditioner is a ribbon flight screw conveyor. Water spray nozzles are installed in the conditioner housing to cool the discharge material and to minimize fugitive dust emissions.

Post-Processing

- Stacker Belt Conveyor and Dump Truck

1. The conditioner discharges onto an inclined stacker belt. The stacker belt conveys the wetted processed soil from the conditioner to the dump truck.

Vendor Name: _____

Technology Type: _____

PART 2: FULL-SCALE EQUIPMENT/CAPABILITIES *(Continued)*

22. **Major Unit Processes.** ***(Continued)***

Vendor Name: _____

Technology Type: _____

PART 2: FULL-SCALE EQUIPMENT/CAPABILITIES *(Continued)*

23. **Full-Scale Facility** is *(Check one only)*

☐ Transportable ☐ Fixed ☐ In situ

b. City: _____ and State: _____ of fixed facility.

24. **Number of Full-Scale Systems**

_____ Planned/in design _____ Under Construction _____ Constructed

25. **Capacity Range per Hour.**

_____ to _____ _____ (units) ☐ Not applicable

26. **Estimated Price Range**. Provide a "ballpark" estimate per unit of waste treated. Include waste preprocessing and exclude excavation, permitting and residual disposal.

_____ to _____ per _____ (units)

27. **Factors Affecting Unit Price.** With "1" being the highest, rank any of the following items that will have a significant effect on unit price. If technology is in situ, excavation and waste handling cannot affect price.

_____	Initial contaminant concentration	_____	Site preparation
_____	Target contaminant concentration	_____	Waste handling/preprocessing
_____	Waste quantity	_____	Amount of debris with waste
_____	Depth of contamination	_____	Utility/fuel rates
_____	Depth to ground water	_____	Labor rates
_____	Residual waste characteristics		

Other Factors (specify) _____

28. **Full-Scale Cleanups.**

a. If you are a subcontractor or prime contractor, give the number of full-scale cleanups initiated or completed by your firm using your technology.

_____

b. If you are an equipment manufacturer, give the number of full-scale cleanups that you know of by other firms using your technology.

_____

Vendor Name: _____

Technology Type: _____

PART 3: PILOT-SCALE EQUIPMENT/CAPABILITIES

You must complete this part if Question 17b is checked. You may also complete this part if the technology is at full scale or bench scale.

29. **Major Unit Processes.** In 200 words or less, describe steps and operation of the pilot-scale treatment system, including list of key components (e.g., pre- and post-processing) of the pilot-scale system. Provide more detail than you did in Question 13.

EXAMPLE

Major Unit Processes

Pilot-scale testing involves processing the soils or bulk soils through various operations of reduced-size equipment which when set in series would be similar to a full-scale operation. The equipment consists of the following:

1. A hopper and screen for feed preparation. Removal of tramp material and sizing, if needed.
2. Mixing or attrition tank where the prepared feed is introduced to the liquids. In the most basic scheme contaminant extraction takes place at this stage.
3. Classification circuit consisting of a sump, pump, and cyclone for separation of coarse sand, gravel, and organics from fine clays and silts.
4. If contaminant extraction requires, coarse material is subjected to a specific gravity (S.G.) separation utilizing a vessel, cyclone, or hydrosizer. Contaminant bearing organics (low S.G.) are separated from the clean, coarse (high S.G.) material.
5. Clean, coarse material is dewatered with a screen, although in full-scale operation, additional dryers (centrifuges) may be employed.
6. Contaminant bearing low S.G. organics are dewatered with a screen and collected for disposal or secondary treatment.
7. Clays and silts are flocculated in a reaction tank and gravity concentrated in a thickener or clarifier.
8. Thickened, contaminant bearing clays and silts are dewatered in a belt press and sent for disposal or secondary processing.
9. Recycled liquid from the thickening and dewatering process are collected and in some cases treated before being returned to the mixing/attrition tank.

(Continued)

Vendor Name: _____

Technology Type: _____

PART 3: PILOT-SCALE EQUIPMENT/CAPABILITIES *(Continued)*

29. **Major Unit Processes.** *(Continued)*

30. **Pilot-scale facility** is *(Check only one)*

☐ Transportable ☐ Fixed ☐ In Situ

b. City: _____ and State: _____ of fixed facility.

31. **Number of Pilot-Scale Systems**

_____ Planned/in design _____ Under construction _____ Constructed

32. **Capacity Range Per Hour.** Prorate capacity of batch processes.

_____ to _____ _____ (units) ☐ Not applicable

33. How many times have you used this technology at your facility or at other locations to conduct pilot-scale studies on actual wastes? Count studies pertaining to the same site once, regardless of the number of different wastes or tests. Do not count tests on surrogate wastes.

_____

34. Can you conduct pilot-scale treatability studies on some types of waste at your location?

☐ Yes ☐ No

At a contaminated site?

☐ Yes ☐ No

35. **Quantity of Waste Needed for Pilot-Scale Treatability Study**. Give estimated range of quantity of waste needed to test, at the pilot scale, the feasibility of this technology on a specific waste.

_____ to _____ _____ (units)

Vendor Name: _____

Technology Type: _____

PART 4: TREATABILITY STUDY CAPABILITIES (BENCH SCALE)

36. Can you conduct bench-scale treatability studies on some types of waste at your location?

☐ Yes ☐ No

37. **Number of Bench-Scale Studies Conducted.** Estimate total number of bench-scale studies conducted on actual waste from different sources or sites. Count studies pertaining to the same site once, regardless of the number of different wastes or tests. Do not count tests on surrogate wastes.

_____

38. **Description of Bench-Scale Testing Procedures.** In 200 words or less, describe the type of test that would be performed to determine feasibility of this technology for treating a specific waste.

EXAMPLE

Description of Bench-Scale Testing Procedures

In our feasibility assessment tests, we usually start with a sample of the soil to be treated, and a knowledge of the nature and level of contaminants and the effluent goals to be met. The following steps are then taken:

a. The optimal conditions for soil washing will be studied, such as pH, time, and chelating agent and concentration.

b. Various likely adsorbents are studied on a batch basis to determine which are most effective at removing the metals of interest from the chelating agent in the washing water.

c. One or more selected media are then studied on columns to determine their metal retention ability in a continuous-flow situation.

d. For the surviving adsorbent(s), the ion elution performance is then determined; after this step, one resin will have been selected as optimal for the particular task under study.

e. The selected adsorbent is then subjected to a number of charge/regeneration cycles to establish its ruggedness.

Vendor Name: _____

Technology Type: _____

PART 5: SUMMARY OF PERFORMANCE DATA

39. Summarize treatment results obtained for up to *five* specific contaminants, contaminant groups, or pollutant parameters that best represent technology performance. Data provided do not have to correspond to the projects listed in *Part 6*, but should be supported by documentation available on request.

Note:

(1) List one contaminant per page. May list contaminant more than once if different treatability ranges apply.

(2) and (3) Circle appropriate units; for concentration that were non-detect write N.D.; treated concentration should be lower than untreated concentration unless the technology is dewatering or some other volume reduction method. If a concentration range cannot be given, provide an average and note it as such.

(4) Check scale of equipment used to produce data given in (3).

(5) Check the appropriate test sample matrix.

(6) Check soil classification if appropriate. More than one classification may be checked.

(7) Briefly describe waste or media treated (e.g., 3,000 cubic yards of oily sludge, 5,000 cubic yards of solvent contaminated soil)

(8) Explain any conditions that may have impacted treated concentration achieved, such as cleanup standards, site conditions, and mode of operation.

39a.

(1) Contaminant or Pollutant Parameter: _____		
(2) Untreated Concentration Range	**(3) Treated Concentration Range**	**(4) Equipment Scale**
Units: mg/kg mg/l *(Circle one)*	Units: mg/kg mg/l *(Circle one)*	*(Check only one)*
_____ Lower Limit	_____ Lower Limit	_____ Bench
To	To	_____ Pilot
_____ Upper Limit	_____ Upper Limit	_____ Full

(5) Matrix *(Check all that apply)*	**(6) Soil Classification *(Check all that apply)***
_____ **Unsaturated Soil**	_____ **Clay (0.0002 to 0.002 mm)**
_____ **Saturated Soil**	_____ **Silt (0.002 to 0.02 mm)**
_____ **Ground Water**	_____ **Fine Sand (0.02 to 0.2 mm)**
_____ **Gas Phase**	_____ **Coarse Sand (0.2 to 2.0 mm)**
_____ **Sediment**	_____ **Gravel (greater than 2.0 mm)**
_____ **Sludge**	_____ **Not applicable**

(7) Waste Description *(10 words or less)*: _____

(8) Comments: _____

Vendor Name: _____

Technology Type: _____

PART 5: SUMMARY OF PERFORMANCE DATA *(Continued)*

39b.

(1) Contaminant or Pollutant Parameter:		
(2) Untreated Concentration Range	(3) Treated Concentration Range	(4) Equipment Scale
Units: mg/kg mg/l *(Circle one)*	Units: mg/kg mg/l *(Circle one)*	*(Check only one)*
_____ Lower Limit To _____ Upper Limit	_____ Lower Limit To _____ Upper Limit	_____ Bench _____ Pilot _____ Full
(5) Matrix *(Check all that apply)*	(6) Soil Classification *(Check all that apply)*	
_____ **Unsaturated Soil** _____ **Saturated Soil** _____ **Ground Water** _____ **Gas Phase** _____ **Sediment** _____ **Sludge**	_____ **Clay (0.0002 to 0.002 mm)** _____ **Silt (0.002 to 0.02 mm)** _____ **Fine Sand (0.02 to 0.2 mm)** _____ **Coarse Sand (0.2 to 2.0 mm)** _____ **Gravel (greater than 2.0 mm)** _____ **Not applicable**	
(7) Waste Description *(10 words or less)*: _____		
(8) Comments: _____		

39c.

(1) Contaminant or Pollutant Parameter:		
(2) Untreated Concentration Range	(3) Treated Concentration Range	(4) Equipment Scale
Units: mg/kg mg/l *(Circle one)*	Units: mg/kg mg/l *(Circle one)*	*(Check only one)*
_____ Lower Limit To _____ Upper Limit	_____ Lower Limit To _____ Upper Limit	_____ Bench _____ Pilot _____ Full
(5) Matrix *(Check all that apply)*	(6) Soil Classification *(Check all that apply)*	
_____ **Unsaturated Soil** _____ **Saturated Soil** _____ **Ground Water** _____ **Gas Phase** _____ **Sediment** _____ **Sludge**	_____ **Clay (0.0002 to 0.002 mm)** _____ **Silt (0.002 to 0.02 mm)** _____ **Fine Sand (0.02 to 0.2 mm)** _____ **Coarse Sand (0.2 to 2.0 mm)** _____ **Gravel (greater than 2.0 mm)** _____ **Not applicable**	
(7) Waste Description *(10 words or less)*: _____		
(8) Comments: _____		

Vendor Name: _____

Technology Type: _____

PART 5: SUMMARY OF PERFORMANCE DATA *(Continued)*

39d.

(1) Contaminant or Pollutant Parameter:		
(2) Untreated Concentration Range	**(3) Treated Concentration Range**	**(4) Equipment Scale**
Units: mg/kg mg/l *(Circle one)*	Units: mg/kg mg/l *(Circle one)*	*(Check only one)*
_____ Lower Limit To _____ Upper Limit	_____ Lower Limit To _____ Upper Limit	_____ Bench _____ Pilot _____ Full
(5) Matrix *(Check all that apply)*	**(6) Soil Classification *(Check all that apply)***	
_____ **Unsaturated Soil** _____ **Saturated Soil** _____ **Ground Water** _____ **Gas Phase** _____ **Sediment** _____ **Sludge**	_____ **Clay (0.0002 to 0.002 mm)** _____ **Silt (0.002 to 0.02 mm)** _____ **Fine Sand (0.02 to 0.2 mm)** _____ **Coarse Sand (0.2 to 2.0 mm)** _____ **Gravel (greater than 2.0 mm)** _____ **Not applicable**	
(7) Waste Description *(10 words or less)*: _____		
(8) Comments: _____		

39e.

(1) Contaminant or Pollutant Parameter:		
(2) Untreated Concentration Range	**(3) Treated Concentration Range**	**(4) Equipment Scale**
Units: mg/kg mg/l *(Circle one)*	Units: mg/kg mg/l *(Circle one)*	*(Check only one)*
_____ Lower Limit To _____ Upper Limit	_____ Lower Limit To _____ Upper Limit	_____ Bench _____ Pilot _____ Full
(5) Matrix *(Check all that apply)*	**(6) Soil Classification *(Check all that apply)***	
_____ **Unsaturated Soil** _____ **Saturated Soil** _____ **Ground Water** _____ **Gas Phase** _____ **Sediment** _____ **Sludge**	_____ **Clay (0.0002 to 0.002 mm)** _____ **Silt (0.002 to 0.02 mm)** _____ **Fine Sand (0.02 to 0.2 mm)** _____ **Coarse Sand (0.2 to 2.0 mm)** _____ **Gravel (greater than 2.0 mm)** _____ **Not applicable**	
(7) Waste Description *(10 words or less)*: _____		
(8) Comments: _____		

Vendor Name: _____

Technology Type: _____

PART 6: REPRESENTATIVE APPLICATIONS AND CLIENT REFERENCES

40. List up to *five* representative projects that can also serve as references. Full- and pilot-scale projects are of most importance. EPA reserves the right to add information on projects conducted for the federal government of which EPA is aware.

40a.

Site Name or Industry Type if Client Identity Confidential: _____

Location:

City _____

State/Province: _____

Country _____

Project Took Place at Site Named

_____ Yes

_____ No

At another Site (i.e., a Test Facility)

_____ Yes

_____ No

Regulatory Authority or Statute

(Check all that apply)

_____ RCRA Corrective Action
_____ CERCLA
_____ TSCA
_____ Safe Drinking Water Act
_____ UST Corrective Action
_____ State (specify): _____
_____ Other (Specify): _____
_____ Not Applicable

Application Type ***(Check only one)***

_____ Full-Scale Cleanup
_____ Field Demonstration
_____ Pilot-Scale Treatability Study
_____ Bench-Scale Treatability Study
_____ TSCA National Demonstration
_____ TSCA Research and Development
_____ EPA SITE Demonstration Program
_____ EPA SITE Emerging Technology Program
_____ Research
_____ Other (specify): _____

Media Treated ***(Check all that apply)***

_____ Soil (in situ)
_____ Soil (ex situ)
_____ Sludge
_____ Solid
_____ Natural Sediment (in situ)
_____ Natural Sediment (ex situ)
_____ Ground Water In Situ
_____ Off-gas from a primary treatment technology

Equipment Scale

(Check one only)

_____ Bench
_____ Pilot
_____ Full

Contaminant Group Treated ***(Check all that apply)***

Organic

_____ Halogenated Volatiles
_____ Halogenated Semivolatiles
_____ Nonhalogenated Volatiles
_____ Nonhalogenated Semivolatiles
_____ Organic
_____ Pesticides/Herbicides
_____ Dioxins/Furans
_____ PCBs
_____ Polynuclear Aromatics (PNAs)
_____ Solvents
_____ Benzene-toluene-ethylbenzene-xylene (BTEX)
_____ Acetonitrile
_____ Organic Acids

Inorganic

_____ Heavy Metals
_____ Nonmetallic Toxic Elements
_____ Radioactive Metals
_____ Asbestos
_____ Inorganic Cyanides
_____ Inorganic Corrosives

Miscellaneous

_____ Explosives/Propellants
_____ Organometallic pesticides/herbicides

Volume/Quantity:

_____ _____ (Units)

Person outside of company familiar with project (optional):

Name: _____ **Company:** _____

Address: _____

Project Status

Contracted:

Month _____ Year _____

In Cleanup: _____ Yes _____ No

Completed:

Month _____ Year _____

Is Literature Available on this Project? (Include citations in *Part 7*)

_____ Yes _____ No

Additional Project Information: _____

Vendor Name: _____

Technology Type: _____

PART 6: REPRESENTATIVE APPLICATIONS AND CLIENT REFERENCES *(Continued)*

40b.

Site Name or Industry Type if Client Identity Confidential: _____

Location:

City _____

State/Province: _____

Country _____

Project Took Place at Site Named

_____ Yes

_____ No

At another Site (i.e., a Test Facility)

_____ Yes

_____ No

Regulatory Authority or Statute

(Check all that apply)

_____ RCRA Corrective Action
_____ CERCLA
_____ TSCA
_____ Safe Drinking Water Act
_____ UST Corrective Action
_____ State (specify): _____
_____ Other (Specify): _____
_____ Not Applicable

Application Type ***(Check only one)***

_____ Full-Scale Cleanup
_____ Field Demonstration
_____ Pilot-Scale Treatability Study
_____ Bench-Scale Treatability Study
_____ TSCA National Demonstration
_____ TSCA Research and Development
_____ EPA SITE Demonstration Program
_____ EPA SITE Emerging Technology Program
_____ Research
_____ Other (specify): _____

Media Treated ***(Check all that apply)***

_____ Soil (in situ)
_____ Soil (ex situ)
_____ Sludge
_____ Solid
_____ Natural Sediment (in situ)
_____ Natural Sediment (ex situ)
_____ Ground Water In Situ
_____ Off-gas from a primary treatment technology

Equipment Scale

(Check one only)

_____ Bench
_____ Pilot
_____ Full

Contaminant Group Treated ***(Check all that apply)***

Organic

_____ Halogenated Volatiles
_____ Halogenated Semivolatiles
_____ Nonhalogenated Volatiles
_____ Nonhalogenated Semivolatiles
_____ Organic
_____ Pesticides/Herbicides
_____ Dioxins/Furans
_____ PCBs
_____ Polynuclear Aromatics (PNAs)
_____ Solvents
_____ Benzene-toluene-ethylbenzene-xylene (BTEX)
_____ Acetonitrile
_____ Organic Acids

Inorganic

_____ Heavy Metals
_____ Nonmetallic Toxic Elements
_____ Radioactive Metals
_____ Asbestos
_____ Inorganic Cyanides
_____ Inorganic Corrosives

Miscellaneous

_____ Explosives/Propellants
_____ Organometallic pesticides/herbicides

Volume/Quantity:

_____ _____ (Units)

Person outside of company familiar with project (optional):

Name: _____ **Company:** _____

Address: _____

Project Status

Contracted:

Month _____ Year _____

In Cleanup: _____ Yes _____ No

Completed:

Month _____ Year _____

Is Literature Available on this Project? (Include citations in *Part 7*)

_____ Yes _____ No

Additional Project Information: _____

Vendor Name: _____

Technology Type: _____

PART 6: REPRESENTATIVE APPLICATIONS AND CLIENT REFERENCES *(Continued)*

40c.

Site Name or Industry Type if Client Identity Confidential: _____

Location:

City _____

State/Province: _____

Country _____

Project Took Place at Site Named

_____ Yes

_____ No

At another Site (i.e., a Test Facility)

_____ Yes

_____ No

Regulatory Authority or Statute

(Check all that apply)

_____ RCRA Corrective Action
_____ CERCLA
_____ TSCA
_____ Safe Drinking Water Act
_____ UST Corrective Action
_____ State (specify): _____
_____ Other (Specify): _____
_____ Not Applicable

Application Type ***(Check only one)***

_____ Full-Scale Cleanup
_____ Field Demonstration
_____ Pilot-Scale Treatability Study
_____ Bench-Scale Treatability Study
_____ TSCA National Demonstration
_____ TSCA Research and Development
_____ EPA SITE Demonstration Program
_____ EPA SITE Emerging Technology Program Research
_____ Other (specify): _____

Media Treated ***(Check all that apply)***

_____ Soil (in situ)
_____ Soil (ex situ)
_____ Sludge
_____ Solid
_____ Natural Sediment (in situ)
_____ Natural Sediment (ex situ)
_____ Ground Water In Situ
_____ Off-gas from a primary treatment technology

Equipment Scale

(Check one only)

_____ Bench
_____ Pilot
_____ Full

Contaminant Group Treated ***(Check all that apply)***

Organic

_____ Halogenated Volatiles
_____ Halogenated Semivolatiles
_____ Nonhalogenated Volatiles
_____ Nonhalogenated Semivolatiles
_____ Organic
_____ Pesticides/Herbicides
_____ Dioxins/Furans
_____ PCBs
_____ Polynuclear Aromatics (PNAs)
_____ Solvents
_____ Benzene-toluene-ethylbenzene-xylene (BTEX)
_____ Acetonitrile
_____ Organic Acids

Inorganic

_____ Heavy Metals
_____ Nonmetallic Toxic Elements
_____ Radioactive Metals
_____ Asbestos
_____ Inorganic Cyanides
_____ Inorganic Corrosives

Miscellaneous

_____ Explosives/Propellants
_____ Organometallic pesticides/herbicides

Volume/Quantity:

_____ _____ (Units)

Project Status

Contracted:

Month _____ Year _____

In Cleanup: _____ Yes _____ No

Completed:

Month _____ Year _____

Person outside of company familiar with project (optional):

Name: _____ **Company:** _____

Address: _____

Is Literature Available on this Project? (Include citations in *Part 7*)

_____ Yes _____ No

Additional Project Information: _____

Vendor Name: _____

Technology Type: _____

PART 6: REPRESENTATIVE APPLICATIONS AND CLIENT REFERENCES *(Continued)*

40d.

Site Name or Industry Type if Client Identity Confidential: _____

Location:

City _____

State/Province: _____

Country _____

Project Took Place at Site Named

_____ Yes

_____ No

At another Site (i.e., a Test Facility)

_____ Yes

_____ No

Regulatory Authority or Statute

(Check all that apply)

_____ RCRA Corrective Action
_____ CERCLA
_____ TSCA
_____ Safe Drinking Water Act
_____ UST Corrective Action
_____ State (specify): _____
_____ Other (Specify): _____
_____ Not Applicable

Application Type *(Check only one)*

_____ Full-Scale Cleanup
_____ Field Demonstration
_____ Pilot-Scale Treatability Study
_____ Bench-Scale Treatability Study
_____ TSCA National Demonstration
_____ TSCA Research and Development
_____ EPA SITE Demonstration Program
_____ EPA SITE Emerging Technology Program
_____ Research
_____ Other (specify): _____

Media Treated *(Check all that apply)*

_____ Soil (in situ)
_____ Soil (ex situ)
_____ Sludge
_____ Solid
_____ Natural Sediment (in situ)
_____ Natural Sediment (ex situ)
_____ Ground Water In Situ
_____ Off-gas from a primary treatment technology

Equipment Scale

(Check one only)

_____ Bench
_____ Pilot
_____ Full

Contaminant Group Treated *(Check all that apply)*

Organic

_____ Halogenated Volatiles
_____ Halogenated Semivolatiles
_____ Nonhalogenated Volatiles
_____ Nonhalogenated Semivolatiles
_____ Organic
_____ Pesticides/Herbicides
_____ Dioxins/Furans
_____ PCBs
_____ Polynuclear Aromatics (PNAs)
_____ Solvents
_____ Benzene-toluene-ethylbenzene-xylene (BTEX)
_____ Acetonitrile
_____ Organic Acids

Inorganic

_____ Heavy Metals
_____ Nonmetallic Toxic Elements
_____ Radioactive Metals
_____ Asbestos
_____ Inorganic Cyanides
_____ Inorganic Corrosives

Miscellaneous

_____ Explosives/Propellants
_____ Organometallic pesticides/herbicides

Volume/Quantity:

_____ _____ (Units)

Project Status

Contracted:

Month _____ Year _____

In Cleanup: _____ Yes _____ No

Completed:

Month _____ Year _____

Person outside of company familiar with project (optional):

Name: _____ **Company:** _____

Address: _____

Is Literature Available on this Project? (Include citations in *Part 7*)

_____ Yes _____ No

Additional Project Information: _____

Vendor Name: _____

Technology Type: _____

PART 6: REPRESENTATIVE APPLICATIONS AND CLIENT REFERENCES *(Continued)*

40e.

Site Name or Industry Type if Client Identity Confidential: _____

Location:

City _____

State/Province: _____

Country _____

Project Took Place at Site Named

_____ Yes

_____ No

At another Site (i.e., a Test Facility)

_____ Yes

_____ No

Regulatory Authority or Statute

(Check all that apply)

_____ RCRA Corrective Action
_____ CERCLA
_____ TSCA
_____ Safe Drinking Water Act
_____ UST Corrective Action
_____ State (specify): _____
_____ Other (Specify): _____
_____ Not Applicable

Application Type ***(Check only one)***

_____ Full-Scale Cleanup
_____ Field Demonstration
_____ Pilot-Scale Treatability Study
_____ Bench-Scale Treatability Study
_____ TSCA National Demonstration
_____ TSCA Research and Development
_____ EPA SITE Demonstration Program
_____ EPA SITE Emerging Technology Program Research
_____ Other (specify): _____

Media Treated ***(Check all that apply)***

_____ Soil (in situ)
_____ Soil (ex situ)
_____ Sludge
_____ Solid
_____ Natural Sediment (in situ)
_____ Natural Sediment (ex situ)
_____ Ground Water In Situ
_____ Off-gas from a primary treatment technology

Equipment Scale

(Check one only)

_____ Bench
_____ Pilot
_____ Full

Contaminant Group Treated ***(Check all that apply)***

Organic

_____ Halogenated Volatiles
_____ Halogenated Semivolatiles
_____ Nonhalogenated Volatiles
_____ Nonhalogenated Semivolatiles
_____ Organic
_____ Pesticides/Herbicides
_____ Dioxins/Furans
_____ PCBs
_____ Polynuclear Aromatics (PNAs)
_____ Solvents
_____ Benzene-toluene-ethylbenzene-xylene (BTEX)
_____ Acetonitrile
_____ Organic Acids

Inorganic

_____ Heavy Metals
_____ Nonmetallic Toxic Elements
_____ Radioactive Metals
_____ Asbestos
_____ Inorganic Cyanides
_____ Inorganic Corrosives

Miscellaneous

_____ Explosives/Propellants
_____ Organometallic pesticides/herbicides

Volume/Quantity:

_____ _____ (Units)

Person outside of company familiar with project (optional):

Name: _____ **Company:** _____

Address: _____

Project Status

Contracted:

Month _____ Year _____

In Cleanup: _____ Yes _____ No

Completed:

Month _____ Year _____

Is Literature Available on this Project? (Include citations in *Part 7*)

_____ Yes _____ No

Additional Project Information: _____

Vendor Name: _____

Technology Type: _____

PART 7: LITERATURE AND TECHNICAL REFERENCES

41. List and attach available documentation (e.g., journal articles, conference papers, patents) that best describes technology and vendor capabilities. Avoid listing references that contain the same data. **Do not include personal references.** EPA reserves the right to add to the list other publicly available references. EPA will abstract references and include in the Alternative Treatment Technology Information Center (ATTIC) operated by the Office of Research and Development.

Author(s): _____

Title: _____

Journal/Conference: _____

Date: _____ NTIS/EPA Document Number(s): _____

Author(s): _____

Title: _____

Journal/Conference: _____

Date: _____ NTIS/EPA Document Number(s): _____

Author(s): _____

Title: _____

Journal/Conference: _____

Date: _____ NTIS/EPA Document Number(s): _____

Author(s): _____

Title: _____

Journal/Conference: _____

Date: _____ NTIS/EPA Document Number(s): _____

Author(s): _____

Title: _____

Journal/Conference: _____

Date: _____ NTIS/EPA Document Number(s): _____

APPENDIX E - INSTRUCTIONS FOR FILING BY COMPUTER DISKETTE

Mail Completed VIF Diskette and Hard Copy To: PRC Environmental Management, Inc., VISITT System Operator, 1505 PRC Drive, McLean, VA 22102

This appendix explains the use of the enclosed vendor information software package for applicants to the U.S. Environmental Protection Agency's (EPA) Vendor Information System for Innovative Treatment Technologies (VISITT). The enclosed software enables VISITT participants to complete the Vendor Information Form (VIF).

The software produces a form that looks similar to the blank form in Appendix D.

HARDWARE REQUIREMENTS

An IBM compatible microcomputer with the following characteristics is necessary to operate the enclosed software:

- DOS 3.3 or higher and Files=45 in config.sys
- A floppy disk drive for 3-1/2-inch double density diskette
- At least 640K of random access memory (RAM)
- Any conventional printer (optional)

STARTING THE SOFTWARE

Insert the disk into the appropriate disk drive. If your 3-1/2-inch floppy disk drive is drive A:, type A:, press <Enter>, then at the A: prompt, type *VENDOR*. If your 3-1/2-inch disk drive is drive B:, type B:, press <Enter>, and then at the B: prompt, type *VENDOR*. The main menu will appear on your screen.

ENTERING INFORMATION

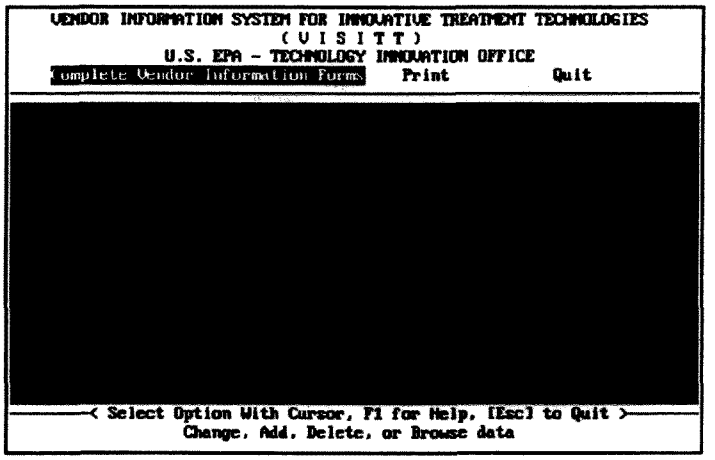
- From the main menu, you will be able to choose any of the options by using the left and right arrows on your keyboard and by pressing <Enter> while the cursor is positioned on an option you want.

- At the bottom of each screen, you will find the functions you can perform on that screen and their corresponding keys.

- The screen will prompt you when you can press the function one <F1> key for on-line help.

- The escape key <Esc> will take you back to the previous screen. The arrow keys will move the cursor to any available position on the screen.

- The function ten <F10> key selects chemicals and assigns them to the appropriate contaminant group.



Main Menu

When you are completing the information for the vendor form, you can choose one of four options: view <V>, add <A>, edit <E>, or delete <D>. These options will appear at the top of the screens and you may choose whichever is appropriate. The page up <PgUp> and page down <PgDn> keys will allow you to move within the form once <V>, <A>, or <E> is chosen. By pressing <Esc>, you will return to the viewing mode.

PRINTING FORMS

The VIF software has many print options. By moving the cursor to the print menu in the main menu, you can print the following:

- A VIF for a specific technology
- All completed VIFs
- A blank VIF

We recommend that you print out the VIF(s) for your own files, as well as for EPA submittal after completing the information.

EXITING THE SOFTWARE

If you press <Esc> to return to the VIF software's main menu, you can exit by either pressing <Q>, or <Esc> and then <Enter>.

OTHER INFORMATION

You can copy the VIF software onto your computer's hard drive by inserting the disk(s) into the floppy drive and by using the appropriate DOS copy command. This will allow you to save a copy of the software and your files.