Appendix F
Cover Letter and Permit Identification Form

Appendix G
List of Publications

Technical Manuals Relevant To
Division of Solid and Hazardous Waste Management

Bureau of Landfill Engineering Landfill Permits: includes new permits, major modifications, minor modifications, closure plans, permit renewals, transfer of ownership, minor technical reviews, annual topographic surveys, disruptions, Preliminary Environmental Health and Impact Statement, cover material requests, on-site disposal requests, ID-27 soil requests, miscellaneous technical reviews, methane venting systems.	$7.50
Bureau of Resource Recovery Incinerator Permits: includes new incinerator and Thermal Destruction Units, small scale incinerators, permit renewals, continuation of expiring permits and transfers of ownership, major modifications, minor and miscellaneous technical reviews, Preliminary Environmental Health and Impact Statement, vegetative waste composting facilities.	$5.50
Bureau of Small Facility Review: Material Recovery Facility and Transfer Station Approvals: includes transfer stations, materials recovery facilities, new permits, capacity expansion of existing facilities, major modifications, minor modifications, permit renewals, transfers of ownership, minor technical reviews, temporary certifications of authority to operate.	$6.50
Bureau of Small Facility Review: Class B Recycling Center Approvals: includes modifications, renewals, transfers of ownership	$5.00
Hazardous Waste Facility (Part B) Permit or Permit Modification	$7.50
Hazardous Waste Facility Closure Plan Approval	$3.00

To purchase a Technical Manual please write to:

Map Sales and Publications Office
PO Box 438
Trenton, New Jersey 08625-0438
(609) 777-1038

Please make check payable to Treasurer, State of New Jersey
All manuals will be sent via U.S. Postal Service, 1st class mail

Appendix H
Checklists

A. Checklist: Can Landfarming Be Used At This Site?

Environmental Protection Agency. *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites. A Guide for Corrective Action Plan (CAP) Reviewers.* EPA 510-B-95-007. May 1995.

This checklist can help you to evaluate the completeness of the CAP and to identify areas that require closer scrutiny. As you go through the CAP, answer the following questions. If the answer to several questions is no and biotreatability studies demonstrate marginal to ineffective results, request additional information to determine if landfarming will accomplish cleanup goals at the site.

1. Soil Characteristics That Contribute To Landfarming Effectiveness

Yes	No	
❑	❑	Is the total heterotrophic bacteria count > 1,000 CFU/gram dry soil?
❑	❑	Is the soil pH between 6 and 8?
❑	❑	Is the soil moisture between 40% and 85%?
❑	❑	Is the soil temperature between 10°C and 45°C?
❑	❑	Is the carbon:nitrogen:phosphorous ratio between 100:10:1 and 100:1:0.5?
❑	❑	Does the soil divide easily and tend not to clump together?

2. Constituent Characteristics That Contribute To Landfarming Effectiveness

Yes	No	
❑	❑	Are products to be treated primarily kerosene or heavier (i.e., not gasoline), or will air emissions be monitored and, if necessary, controlled?
❑	❑	Are most of the constituents readily degradable?
❑	❑	Are total petroleum constituents ≤ 50,000 ppm and total heavy metals ≤ 2,500 ppm?

3. Climatic Conditions That Contribute To Landfarming Effectiveness

Yes	No	
❑	❑	Is the rainfall less than 30 inches during the landfarming season?
❑	❑	Are high winds unlikely?

4. Biotreatability Evaluation

Yes	No	
❑	❑	Has a biotreatability study been conducted?
❑	❑	Were biodegradation demonstrated, nutrient application and formulation defined, and potential inhibitors or toxic conditions checked?

5. Evaluation of Landfarm Design

Yes	No	
❑	❑	Is sufficient land available considering the landfarm depth and additional space for berms and access?

5. Evaluation of Landfarm Design (continued)

- ❑ ❑ Are run-on and runoff controlled?
- ❑ ❑ Are erosion control measures specified?
- ❑ ❑ Are the frequency of application and composition of nutrients and pH adjustment materials specified?
- ❑ ❑ Is moisture addition needed?
- ❑ ❑ Are other sub-optimal natural site conditions addressed in the landfarm design?
- ❑ ❑ Is the site secured?
- ❑ ❑ Are air emissions estimated and will air emissions monitoring be conducted?
- ❑ ❑ Are provisions included for air emissions controls, if needed?

6. Operation And Monitoring Plans

Yes No

- ❑ ❑ Is monitoring for stormwater discharge or air quality permits (if applicable) proposed?
- ❑ ❑ Does the operation plan include the anticipated frequency of aeration, nutrient addition, and moisture addition?
- ❑ ❑ Does the monitoring plan propose measuring constituent reduction and biodegradation conditions in the landfarm soils?
- ❑ ❑ Are air, soil, and surface runoff water sampling (if applicable) proposed to ensure compliance with appropriate permits?
- ❑ ❑ Are the proposed numbers of samples to be collected, sampling locations, and collected methods in accordance with state regulations?
- ❑ ❑ Is quarterly (or more frequent) monitoring for soil pH, moisture content, bacterial population, nutrient content, and constituent concentrations proposed?

B. Checklist: Can Bioventing Be Used At This Site?

Environmental Protection Agency. *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites. A Guide for Corrective Action Plan (CAP) Reviewers.* EPA 510-B-95-007. May 1995.

This checklist can help you evaluate the completeness of the CAP and to identify areas that require closer scrutiny. As you go through the CAP, answer the following questions. If the answer to several questions is no, you should request additional information to determine if bioventing will accomplish cleanup goals at the site.

1. Site Characteristics

Yes	No	
❑	❑	Is the soil intrinsic permeability greater than 10^{-10} cm^2?
❑	❑	Is the soil free of impermeable layers or other conditions that would disrupt air flow?
❑	❑	Is the total heterotrophic bacteria count > 1,000 CFU/gram dry soil?
❑	❑	Is soil pH between 6 and 8?
❑	❑	Is the moisture content of soil in the contaminated area between 40% to 85% of saturation?
❑	❑	Is soil temperature between 10°C and 45°C during the proposed treatment season?
❑	❑	Is the carbon:nitrogen:phosphorus ratio between 100:10:5 and 100:1:0.5?
❑	❑	Is the depth to groundwater > 3 feet?[1]

2. Constituent Characteristics

Yes	No	
❑	❑	Are constituents all sufficiently biodegradable?
❑	❑	Is the concentration of Total Petroleum Hydrocarbon ≤ 25,000 ppm and heavy metals ≤ 2,500 ppm?
❑	❑	If there are constituents with vapor pressures greater than 0.5 mm Hg, boiling ranges above 300°C, or Henry's law constants greater than 100 atm/mole fraction, has the CAP addressed the potential environmental impact of the volatilized constituents?

3. Evaluation of The Bioventing System Design

Yes	No	
❑	❑	Will the induced air flow rates achieve cleanup in the time allotted for remediation in the CAP?
❑	❑	Does the radius of influence (ROI) for the proposed extraction or injection wells fall in the range of 5 to 100 feet?

---

[1] This parameter alone may not negate the use of bioventing. However, provisions for the construction of horizontal wells or trenches or for lowering the water table should be incorporated into the CAP.

3. Evaluation of The Bioventing System Design (continued)

- ❑ ❑ Has the ROI been calculated for each soil type at the site?
- ❑ ❑ Is the type of well proposed (horizontal or vertical) appropriate for the site conditions present?
- ❑ ❑ Is the proposed well density appropriate, given the total area to be cleaned up and the radius of influence of each well?
- ❑ ❑ Do the proposed well screen intervals match soil conditions at the site?
- ❑ ❑ Are air injection wells proposed?
- ❑ ❑ Is the proposed air injection well design appropriate for this site?
- ❑ ❑ Is the selected blower appropriate for the desired vacuum conditions?

4. Optional Bioventing Components

Yes **No**

- ❑ ❑ If nutrient delivery systems will be needed, are designs for those systems provided?
- ❑ ❑ Are surface seals proposed?
- ❑ ❑ Are the proposed sealing materials appropriate for this site?
- ❑ ❑ Will groundwater depression be necessary?
- ❑ ❑ If groundwater depression is necessary, are the pumping wells correctly spaced?
- ❑ ❑ Is a vapor treatment system required?
- ❑ ❑ If a vapor treatment system is required, is the proposed system appropriate for the contaminant concentration at the site?

5. Operation And Monitoring Plans

Yes **No**

- ❑ ❑ Is monitoring of offgas vapors for VOC and carbon dioxide concentration proposed?
- ❑ ❑ Is subsurface soil sampling proposed for tracking constituent reduction and biodegradation conditions?
- ❑ ❑ Are manifold valving adjustments proposed for the start-up phase?
- ❑ ❑ Is nutrient addition (if necessary) proposed to be controlled on a periodic rather than continuous basis?

C. Checklist: Can Low Temperature Thermal Desorption (LTTD) Be Used At This Site?

Environmental Protection Agency. *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites. A Guide for Corrective Action Plan (CAP) Reviewers.* EPA 510-B-95-007. May 1995.

This checklist can help you to evaluate the completeness of the corrective action plan (CAP) and to identify areas that require closer evaluation. As you go through the CAP, answer the following questions.

1. Evaluation LTTD Effectiveness

Yes	No	
❑	❑	Do soils have high plasticity?
❑	❑	Do soils contain large rocks or debris?
❑	❑	Is moisture content > 35%?
❑	❑	Is the TPH concentration > 2% by weight?
❑	❑	Are hydrocarbons highly volatile?

If the answer to any of the above questions is yes, then the soils require pretreatment.

❑	❑	Do the soils have a high concentration of humic material?
❑	❑	Do the soils have a high concentration of heavy metals?
❑	❑	Are contaminant K_{ow}s relatively high?
❑	❑	Are dioxin precursors present in the soils?

If the answer to any of the above questions is yes, then a pilot test or "test burn" should be conducted to demonstrate that LTTD is an applicable remedial technology.

❑	❑	Do the results of the pilot test indicate that LTTD is applicable?

2. Evaluation of The Practicality of Using LTTD

Yes	No	
❑	❑	Is the depth of contaminated soil 25 feet or less below land surface?
❑	❑	Is contaminated soil contained within site boundaries?
❑	❑	Is there no contamination beneath buildings or near building foundations?

If the answer to any of the above questions is no, then excavation of the soil is not practical; therefore, LTTD is not practical. Consider an *in situ* remedial technology instead.

❑	❑	Is sufficient land area available for operation of equipment and temporary storage (staging) of contaminated soil and treated soil?
❑	❑	Is the distance to an off-site facility prohibitively far?
❑	❑	Will surrounding land use permit operation of an onsite system in the neighborhood?

If the answer to any of the above questions is no, then excavated soils must be transported to an off-site facility for treatment.

3. Evaluation of The Effectiveness of Using LTTD

Yes	No	
❑	❑	Will an adequate number of *in situ* soil samples be collected and analyzed?
❑	❑	Will an adequate number of treated soil samples be collected and analyzed?
❑	❑	Has the proposed desorption unit successfully treated similar soils with similar contaminant concentration levels?
❑	❑	Is the proposed ultimate disposal of the soil (e.g., return to excavation, transport to landfill for cover) acceptable?

If the answer to any of the above questions is no, then additional information is necessary to evaluate whether LTTD is likely to be an effective remedial technology.

D. Checklist: Can Soil Vapor Extraction (SVE) Be Used At This Site?

Environmental Protection Agency. *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites. A Guide for Corrective Action Plan (CAP) Reviewers.* EPA 510-B-95-007. May 1995.

This checklist can help you to evaluate the completeness of the CAP and to identify areas that require closer scrutiny. As you go through the CAP, answer the following questions. If the answer to several questions is no, you will want to request additional information to determine if SVE will accomplish the cleanup goals at the site.

1. Factors That Contribute To Permeability Of Soil

Yes	No	
❑	❑	Is the intrinsic permeability greater than 10^{-9} cm^2?
❑	❑	Is the depth to groundwater greater than 3 feet?[1]
❑	❑	Are site soils generally dry?

2. Facts That Contribute To Constituent Volatility

Yes	No	
❑	❑	Is the contaminant vapor pressure greater than 0.5 mm Hg?
❑	❑	If the contaminant vapor pressure is not greater than 0.5 mm Hg, is some type of enhancement (e.g., heated air injection) proposed to increase volatility?
❑	❑	Are the boiling points of the contaminant constituents less than 300°C?
❑	❑	Is the Henry's law constant for the contaminant greater than 100 atm?

3. Evaluation of The SVE System Design

Yes	No	
❑	❑	Does the radius of influence (ROI) for the proposed extraction wells fall in the range 5 to 100 feet?
❑	❑	Has the ROI been calculated for each soil type at the site?
❑	❑	Examine the extraction flow rate. Will these flow rates achieve cleanup in the time allotted for remediation in the CAP?
❑	❑	Is the type of well proposed (horizontal or vertical) appropriate for the site conditions present?
❑	❑	Is the proposed well density appropriate, given the total area to be cleaned up and the radius of influence of each well?
❑	❑	Do the proposed well screen intervals match soil conditions at the site?
❑	❑	Is the blower selected appropriate for the desired vacuum conditions?

---

[1] If no, this parameter alone may not negate the use of SVE. However, provisions for use of a surface seal, construction of horizontal wells, or for lowering the water table should be incorporated into the CAP.

4. Optional SVE Components

Yes	No	
❑	❑	Are air injection or passive inlet wells proposed?
❑	❑	Is the proposed air injection/inlet well design appropriate for this site?
❑	❑	Are surface seals proposed?
❑	❑	Are the sealing materials proposed appropriate for this site?
❑	❑	Will groundwater depression be necessary?
❑	❑	If groundwater depression is necessary, are the pumping wells correctly spaced?
❑	❑	Is a vapor treatment system required?
❑	❑	If a vapor treatment system is required, is the proposed system appropriate for the contaminant concentration at the site?

5. Operation And Monitoring Plans

Yes	No	
❑	❑	Does the CAP propose daily monitoring for the first 7 to 10 days of flow measurements, vacuum readings, and vapor concentrations from each extraction vent, the manifold, and the effluent stack?
❑	❑	Does the CAP propose biweekly to monthly monitoring of flow measurements, vacuum readings, and vapor concentrations from each extraction vent, the manifold, and the effluent stack?

E. Checklist: Can Air Sparging Be Used At This Site?

Environmental Protection Agency. *How to Evaluate Alternative Cleanup Technologies for Underground Storage Tank Sites. A Guide for Corrective Action Plan (CAP) Reviewers.* EPA 510-B-95-007. May 1995.

This checklist can help you to evaluate the completeness of the CAP and to identify areas that require closer scrutiny. As you go through the CAP, answer the following questions. If the answer to several questions is no, you will want to request additional information to determine if air sparging will accomplish the cleanup goals at the site.

1. Factors That Contribute To The Vapor/Dissolved Phase Partitioning of The Constituents

Yes	No	
❑	❑	Is the Henry's law constant for the contaminant greater than 100 atm?
❑	❑	Are the boiling points of the contaminant constituents less than 300°C?
❑	❑	Is the contaminant vapor pressure greater than 0.5 mm Hg?

2. Factors That Contribute To Permeability Of Soil

Yes	No	
❑	❑	Is the intrinsic permeability greater than 10^{-9} cm^2?
❑	❑	Is the soil free of impermeable layers or other conditions that would disrupt air flow?
❑	❑	Is the dissolved iron concentration at the site < 10 mg/L?

3. Evaluation of The Air Sparging System Design

Yes	No	
❑	❑	Does the radius of influence (ROI) for the proposed air sparging wells fall in the range 5 to 100 feet?
❑	❑	Has the ROI been calculated for each soil type at the site?
❑	❑	Examine the sparging air flow rate. Will these flow rates provide sufficient vapor/ dissolved phase partitioning of constituents to achieve cleanup in the time allotted for remediation in the CAP?
❑	❑	Examine the sparging air pressure. Will the proposed pressure be sufficient to overcome the hydraulic head and capillary forces?
❑	❑	Is the number and placement of wells appropriate, given the total area to be cleaned up and the radius of influence of each well?
❑	❑	Do the proposed well screen intervals account for contaminant plume location at the site?
❑	❑	Is the proposed well configuration appropriate for the site conditions present?
❑	❑	Is the air compressor selected appropriate for the desired sparge pressure?

4. Operation And Monitoring Plans

Yes	No	
❑	❑	Does the CAP propose starting up the SVE system prior to starting the air sparging system?
❑	❑	Are manifold valving adjustments proposed during the first 7 to 10 days of operation?
❑	❑	Is monitoring for sparge pressure and flows, vacuum readings (for SVE), groundwater depth, vapor concentrations, dissolved oxygen levels, carbon dioxide levels, and pH proposed for the first 7 to 10 days of operation?
❑	❑	Is weekly to biweekly monitoring of groundwater pH and levels of contaminants, carbon dioxide, and dissolved oxygen proposed following startup?
❑	❑	Is weekly to biweekly monitoring of the effluent stack for levels of contaminants, oxygen, and carbon dioxide proposed following startup?

Appendix I
ITRC Information

ITRC Metals in Soils Team
Soil Washing Product Fact Sheet

Products

"Technical and Regulatory Guidelines for Soil Washing"
"Fixed Facilities for Soil Washing"

Description of Products

"Technical and Regulatory Guidelines for Soil Washing":

- Contains general information on the ITRC process
- Presents technical and regulatory guidelines applicable to the removal of metals and organic contaminants from soil using soil washing technologies which have been successfully demonstrated full scale
- Identifies a model demonstration for soil washing, the King of Prussia Landfill site in NJ, which can be used as a basis for development of a workplan for soil washing technologies that have not been demonstrated full scale
- Recommends a format for cost and performance reporting for full scale applications of soil washing

"Fixed Facilities for Soil Washing"

- Explores the status of the use of fixed facilities for soil washing operations in the US
- Identifies several models that show promise for the deployment of fixed facilities in the US
- Examines regulatory and market factors that led to the successful deployment of many fixed facilities in Europe

Contents of Documents

Technical and Regulatory Guidelines
Introduction
Untreated Soil Sampling
Feed Soil Limitations
Soil Treatment Verification Sampling
Soil Handling and Stockpiling
System Operating Requirements
Air Emission and Dust Control
Water Discharge Requirements
Concentrated Treatment Residue
Record Keeping
General QA/QC
Health and Safety

Fixed Facilities
Introduction
Soil Washing Background
Fixed Facilities
Existing Models for Deployment
Barriers
Conclusions

Application of Technology

- Soil washing is considered feasible for the treatment of a wide range of inorganic and organic contaminants including heavy metals, radionuclides, cyanides, polynuclear aromatic compounds, pesticides and PCBs.
- Soil washing is most appropriate when soils consist of at least 50 to 70 percent sands. Soil washing will generally not be cost effective for soils with fines (silt/clay) content in excess of 30 to 50 percent (Section 3 has more details on matrix factors).
- Typically, onsite treatment of soils using soil washing will not be cost effective unless the site contains at least 5000 tons of contaminated soil.
- Space requirements can be very variable based on the design of the soil washing system, system throughput rate, and site logistics. A 20 ton per hour unit can be sited on approximately one half acre, including staging for untreated and treated soils, however, some systems may require additional space, depending on system design.

Target Audience

"Technical and Regulatory Guidelines for Soil Washing" will be useful to state case managers, vendors, technology developers, public stakeholders, consultants, field contractors and the regulated community.

"Fixed Facilities for Soil Washing" will be useful to state and federal agency program managers, commerce agency managers, vendors, technology developers, public stakeholders, consultants, and the regulated community. It may be of interest, but may provide limited benefit to state case managers.

Relevance within Regulatory Framework

Each of these documents provides background information on the current state of soil washing technology. The technical document will be useful in enabling case managers in remediation departments to more effectively review soil washing projects. The scenarios outlined in the implementation guide provide examples of situations where the document can be used. The fixed facility document provides policy makers with alternative ideas which may facilitate the remediation of soils contaminated with metals.

Contacts

Brian Sogorka, NJDEP, (609) 633-1344
Dan Sogorka, Coleman Research Corporation, (301) 903-1531

ITRC Metals in Soils Team
Emerging Technologies Product Fact Sheet

Products

Emerging Technologies for the Removal of Metals from Soils

- Phytoremediation
- Electrokinetics
- In-situ Stabilization

Description of Products

The Emerging Technologies document presents developing technologies that show potential for the remediation of metals in soils. The document consists of three stand alone sections noted above. Each section outlines an overview of the technology, general approaches to implementation, future research and development needs, regulatory issues, costs, and public and stakeholder acceptance and concerns.

Contents of Documents

Each document contains the following sections:
Introduction
Approaches to Technology Implementation
Research & Development-Future Needs
Case Studies
Regulatory Issues
Cost
Public and Stakeholder Concerns
Conclusions

Application of Technology

Each of the technologies outlined in the Emerging Technologies document may be applicable to sites with varying degrees of metal-contaminated soils. **Phytoremediation** is the use of plants to remediate soils. The technology is most applicable at sites with low to moderate metals concentrations, relatively shallow depths of contamination, and soil media favorable to plant growth. Phytoremediation may be used as a low cost follow-up technique once contaminant concentrations have been reduced to relatively low levels. **Electrokinetics** is the use of low level electric current to mobilize contaminants within a given soil matrix. The technology is most applicable at metal contaminated sites with homogeneous, fine-grained soils exhibiting both high permeability and moisture content. Electrokinetics can treat both organic and inorganic contaminants. The technology may be most beneficial when applied to soils inaccessible for conventional technologies. **In-situ stabilization** involves the chemical and/or physical manipulation of soil properties to reduce the mobility and availability of contaminants. The technology may be applicable at any site where conventional remediation methods could be used. The use of plants and soil amendments will depend upon soil characteristics at a particular site.

Target Audience
These documents will be useful to state regulatory case managers in need of information on developing technologies. They provide regulatory concerns and insight into site and project applicability. The documents will also be helpful to vendors, technology developers, public stakeholders, consultants, contractors and the regulated community.

Relevance within Regulatory Framework
Each of these documents will be useful in providing background information on each emerging technology to state regulators. Because the technologies are in the development stage, little completed project work is available. As such, these documents provide potential regulatory concerns and operational issues that will help assess potential remedial work plans. In addition, the documents provide points of contact in state agencies knowledgeable with the technologies and pertinent issues facing state case managers. These particular technologies may be used at CERCLA, RCRA, Superfund, voluntary cleanup or Brownfield sites with metal-contaminated soils.

Potential / Intended uses of the Product
The Emerging Technologies documents are intended as educational references on developing technologies that lack completed project information. They provide guidance on site applicability, the current state of the technology, regulatory and stakeholder concerns, and preliminary cost. The information should provide state regulators with a starting point for the assessment of an emerging technology at a particular site. Furthermore, the documents may provide regulators with additional options at metal-contaminated sites where conventional technologies are not applicable.

Contacts
Dibakar Goswami - Phytoremediation (509) 736-3015
Helge Gabert - Electrokinetics (801) 538-6170
Bill Berti - In situ Stabilization (302) 451-9224
Dan Sogorka, Coleman Research Corporation, (301) 903-1531

ITRC LTTD TEAM FACT SHEET

Technical Requirements for On-Site Thermal Desorption of Non-Hazardous Soils Contaminated With Petroleum/Coal Tar/Gas Plant Wastes

Description of Product

Document that specifies minimum technical requirements for on-site thermal treatment of soil contaminated with petroleum, coal tar, or manufactured gas plant waste that is not regulated as hazardous waste. The requirements are provided in a format beginning with soil characterization and going through treatment, addressing operating parameters, performance testing and continuous monitoring. The document also suggests a format for reporting of Cost and Performance Data.

Intended Target Audience

The primary target audience is state and federal project managers who are responsible for specifying the requirements at a site for the thermal treatment of soil contaminated with chlorinated compounds. Technology vendors will also benefit from this document by knowing in advance what the requirements will be in states which have accepted (concurred with) this document.

Relevance within the Regulatory Framework

This document is not intended to address regulatory issues, (e.g., whether low temperature thermal desorbers are considered incinerators). Rather this document is intended to specify minimum technical requirements (which the concurring states agreed to) irrespective of how this type of technology is considered from a regulatory perspective.

Potential/Intended Use of the Product

This document is intended to be used by the target audience in determining what technical requirements must be achieved for acceptable use of this technology.

Product Contents/Organization

Process Findings
Introduction
Need for Public Involvement
Pretreatment Sampling
Feed Soil Limitations
Treatment Verification Sampling
Performance Test and Air Monitoring
Water Discharge Requirements
Operations Record Keeping
General QA/QC
Health and Safety
Cost and Performance Format

Points of Contact

Jim Harrington, New York, Team Leader, (518-457-0337)
Ted Dragovich, Illinois (217-524-3306)
Bal Lee, California (916-322-8036)
Tom Douglas, Florida (904-488-3935)
Chris Renda, Environmental Services Network., Technical Support (303-777-1189)

Status: Document is final (March 12, 1996). Thirteen states have concurred.

ITRC LTTD TEAM FACT SHEET
Technical Requirements for On-Site Thermal Desorption of Hazardous Solid Media Contaminated With Chlorinated Organics

Description of Product
Document that specifies minimum technical requirements for on-site thermal treatment of soil regulated as hazardous waste and contaminated with chlorinated compounds. The document does not address regulatory issues beyond the fact that the medium being treated is regulated as hazardous waste. The requirements are provided in a format beginning with soil characterization and going through treatment, addressing operating parameters, performance testing and continuous monitoring. The document also suggests a format for reporting of Cost and Performance Data.

Intended Target Audience
The primary target audience is state and federal project managers who are responsible for specifying the requirements at a site for the thermal treatment of soil contaminated with chlorinated compounds. Technology vendors will also benefit from this document by knowing in advance what the requirements will be in states which have accepted (concurred with) this document.

Relevance within the Regulatory Framework
This document is not intended to address regulatory issues, (e.g., whether low temperature thermal desorbers are considered incinerators). Rather this document is intended to specify minimum technical requirements (which the concurring states agreed to) irrespective of how this type of technology is considered from a regulatory perspective.

Potential/Intended Use of the Product
This document is intended to be used by the target audience in determining what technical requirements must be achieved for acceptable use of this technology.

Product Contents/Organization

Process Findings	Performance Test and Air Monitoring
Introduction	Water Discharge Requirements
Need for Public Involvement	Operations Record Keeping
Pretreatment Sampling	General QA/QC
Feed Soil Limitations	Health and Safety
Treatment Verification Sampling	Cost and Performance Format

Points of Contact
Jim Harrington, New York, Team Leader, (518-457-0337)
Ted Dragovich, Illinois (217-524-3306)
Bal Lee, California (916-322-8036)
Tom Douglas, Florida (904-488-3935)
Chris Renda, Environmental Services Network., Technical Support (303-777-1189)

Status: Document is final (October, 1997). Currently undergoing concurrence process.

ITRC LTTD TEAM FACT SHEET

Technical Requirements for On-Site Thermal Desorption of Solid Media and Low Level Mixed Waste Contaminated With Mercury and/or Hazardous Chlorinated Organics

Description of Product

Document that specifies minimum technical requirements for thermal treatment of solid media and mixed waste contaminated with mercury and/or hazardous chlorinated compounds. The document does not address regulatory issues beyond the fact that the medium being treated is regulated as hazardous waste. The requirements are provided in a format beginning with soil characterization and going through treatment, addressing operating parameters, performance testing and continuous monitoring. The document also suggests a format for reporting of Cost and Performance Data.

Intended Target Audience

The primary target audience is state and federal project managers who are responsible for specifying the requirements at a site for the thermal treatment of soil contaminated with chlorinated compounds. Technology vendors will also benefit from this document by knowing in advance what the requirements will be in states which have accepted (concurred with) this document.

Relevance within the Regulatory Framework

This document is not intended to address regulatory issues, (e.g., whether low temperature thermal desorbers are considered incinerators). Rather this document is intended to specify minimum technical requirements (which the concurring states agreed to) irrespective of how this type of technology is considered from a regulatory perspective.

Potential/Intended Use of the Product

This document is intended to be used by the target audience in determining what technical requirements must be achieved for acceptable use of this technology.

Product Contents/Organization

Process Findings
Introduction
Need for Public Involvement
Pretreatment Sampling
Feed Soil Limitations
Treatment Verification Sampling
Performance Test and Air Monitoring
Water Discharge Requirements
Operations Record Keeping
General QA/QC
Health and Safety
Cost and Performance Format

Points of Contact

Jim Harrington, New York Team Leader, (518-457-0337)
Ted Dragovich, Illinois (217-524-3306)
Bal Lee, California (916-322-8036)
Tom Douglas, Florida (904-488-3935)
Chris Renda, Environmental Services Network., Technical Support (303-777-1189)

Status: Document is draft (October, 1997). Currently undergoing review and comment.

Bioremediation of Petroleum Hydrocarbons

Overview

In situ Bioremediation technologies rely on the capabilities of indigenous or introduced microorganisms to degrade, destroy or reduce the toxicity of objectionable chemicals in soils or ground water. The *In Situ* Bioremediation Technology Task Group of the ITRC recognized that given appropriate conditions, ISB can remediate contaminants more cost effectively than conventional technologies.

Description of the Protocol

Use of this document is intended to offer the proponent of the demonstration multi-state acceptance of the data generated during the demonstration project. It also offers an early opportunity for tribal and community stakeholders to understand the intent of the demonstration and discuss their concerns and sensitivities with the proponent before the demonstration is in its final design. The document emphasizes the establishment of objectives, criteria and measures so that work plans can be designed consistent with those measures, and results can be verified.

This protocol presents an outline containing the essential elements the proponent of an *in situ* demonstration must address when initiating a demonstration. The outline represents a compilation of concerns gathered by the ITRC states.

Table 1 of the protocol identifies the parties responsible for verifying demonstration results and transferring those results to other states for acceptance.

In addition, as a guide to the proponent, ITRC has included examples of recommended technology-specific protocols which have been developed by industry and tested in field applications. These Technology-Specific Protocols have been evaluated by members of the ISB Group. Use of these protocols will increase the likelihood that the essential information required by the states has been included in the design of the demonstration and test plan.

Description of Class of Technologies

In Situ Bioremediation uses aerobic or anaerobic micro-organisms to degrade organic contamination by the addition of nutrients or oxygen. In situ Bioremediation includes: Bioventing (increasing the flow of air through the unsaturated zone to stimulate indigenous aerobic micro-organisms) and ground water recirculation (extraction and treatment of contaminated ground water followed by addition of nutrients, oxygen and sometimes cultured bacterial strains and re-injection). Most current applications utilize indigenous micro-organisms.

Intended User

State and Federal Regulators, consultants, PRPs and community Stakeholders

Potential and Intended Uses of this Product

The General Outline contained in this Protocol provides guidance to the proponent during

development of the initial proposal for a demonstration. The proposal should contain enough detail so that the other parties can identify the applicable regulatory requirements for the project, the innovative nature and scope of the project, the advantage this technology might have over conventional technologies and the sensitivities the participants might have with this technology. These participants include host states, participating states, proponents, tribes and community/public Stakeholders.

Potential Barriers

- Cleanup levels, and the approaches used by various jurisdictions to derive those numerical criteria, vary among state and federal agencies. Although a single set of concentration based cleanup levels cannot be developed to apply to all jurisdictions, it is recommended that a work group be established to formulate policy recommendations for changes that encourage consistency in approach, if not numerical criteria.

- Factors beyond the jurisdiction of the state regulatory agencies often dictate the type of remedial technology that is deployed. These factors include addressing the concerns of participants in real estate transactions and the financial institutions lending on such transactions, and the public's opposition and fear of a technology. These pressures often discourage the deployment of cost-effective techniques and technologies, particularly natural attenuation and bioventing, and thus reduce the potential market for affordable remedial measures.

- Natural attenuation for petroleum hydrocarbons, particularly benzene, toluene, ethyl benzene and xylene, is well demonstrated as a remedial option for ground water. For all sites where remediation is deemed necessary, particularly fuel tank sites, the appropriate agencies should evaluate natural attenuation as a remedy, referencing their agencies to consider the ITRC work-product concerning this topic and the various technical guidance documents and references now available in the literature.

Contacts: **Paul Hadley, California DTSC, T916-324-3823**
Jeff Kelley, Nebraska DEQ, T402-471-3388, deqstaff@doc.state.ne.us
Matt McDermott, South Dakota DES, T605-773-3296, mattm@denr.state.sd.us
Steve R. Hill, Coleman Research Corp, T208-375-9029, steve_hill@mail.crc.com

Appendix J
Health, Safety and Emergency Response Minimum Requirements

Health, Safety and Emergency Response
Minimum Requirements

Index

1.0 General

1.1 Description of Scope

A. Hazardous Waste Site

If the site is a hazardous waste site as defined within the meaning of 29 CFR 1910.120, the Contractor shall submit a Health and Safety Plan (HASP) to the New Jersey Department of Environmental Protection (NJDEP). The HASP must receive NJDEP approval before a notice to proceed with the site work will be granted.

B. Minimum Requirements

This document describes the minimum safety, health, and emergency response requirements for remedial activities at the site. The responsibility for development, implementation, and enforcement of the HASP lies with the Contractor and its health and safety personnel. The HASP developed by the Contractor shall include programs for accident prevention, personnel protection, medical surveillance, training, special and permit operations, excavation and trenching, spill containment, emergency responses and contingency planning, and air monitoring.

C. Compliance and Termination

Safety and health requirements shall conform to 29 CFR 1910.120, and other federal and state codes and statutes as identified by the text of this document. Controls and procedures specified herein and by the HASP may be terminated only when a Certified Industrial Hygienist determines that hazards have been eliminated. Such termination shall be effective only if approved in writing by the NJDEP.

1.2 Site Description

A. Specific Location

The site's description includes: Lot #, Block # and all other locations where work is to be conducted for this contract.

B. Supplements and Additions

The site may be described in supplementary sections. Additional details provided should be referenced and presented in listed subsections.

C. Site History

A short history of the site prior to the contracted operations should be presented, indicating industrial/ hazardous activities.

1.3 Submittals

A. Contractor Submissions to State Department of Environmental Protection

1. The Contractor shall submit three (3) copies of a HASP to the NJDEP and one (1) copy to the specified lead representative of the department for this contract.

2. The Contractor shall submit to the department four (4) copies of analytical results from any area or personnel samples that are specified in the subsections.

3. The Contractor shall submit to the department, on a weekly schedule, four (4) copies of the daily air monitoring log as specified by the NJDEP Office of Site Safety and Health (OSSH).

B. Health and Safety Plan (HASP) Approval

1. Review and approval of the HASP shall be the responsibility of the (OSSH).

2. The OSSH shall provide back to the Contractor, through the NJDEP site/construction manager, a written evaluation of the submitted HASP. Evaluation of the HASP shall be performed by comparison to the minimum requirements presented in this document and applicable state and federal statutes.

2.0 Minimum Requirements

2.1 Organizational Responsibilities

A. Key Personnel and Organizational Chart.

The Contractor must provide, at a minimum, an organizational chart and resumes of key personnel involved in all phases of the operations on site. Also, the contractor must submit the names of other personnel needed for hazardous waste site operations and emergency response, indicating their functions and responsibilities. This chart must include Senior-Level Management, Project Manager, Health and Safety Officer (HSO), Field Supervisor, and on-site Foreman Personnel; at a minimum.

B. Site Health and Safety Officer (HSO).

The Contractor must utilize a qualified individual (e.g., an industrial hygienist, safety engineer, etc.) to function as the Site HSO for the project. That individual must be responsible to the Contractor and have the authority and knowledge necessary to implement the site HASP and verify compliance with applicable safety and health requirements.

1. At a minimum, the HSO shall have the following responsibilities and authority to perform the following functions:

a. Be present at all times during site operations.

b. Have the authority to enforce the HASP and stop operations if safety and health of personnel may be jeopardized.

c. Effect evacuation of the site or work area if necessary.

d. Evaluate monitoring data to make field decisions regarding safety and health.

C. The HSO must meet the following minimum educational and experience qualifications in matters of health and safety:

1. Possess a sound working knowledge of State and Federal occupational safety and health regulations.

2. Have formal professional development training in occupational safety and health. Initial 40 Hour (or 24 hour) HAZWOPER or any other basic training necessary for general work eligibility will not satisfy this requirement.

3. Have a minimum of four (4) years experience in the environmental and health and safety services field, chemical industry, or chemical waste disposal industry, more than 50% of which must be in the area of industrial hygiene and/or environmental safety related to the site operations.

4. Have a bachelor of science degree in biology, chemistry, engineering, industrial hygiene or other related natural or physical science.

NOTE: Each graduate degree in occupational safety and health can be substituted for one (1) year of experience.

2.2 Risk or Hazard Analysis

A. Health and Safety Evaluation.

The Contractor shall perform and provide a hazard assessment for each location and the tasks to be performed.

B. Best Information Available

The assessment shall be based upon the best information available regarding the contaminants and conditions present at the site as well as the practices, tools and other equipment to be applied in the operation and shall include but not be limited to the following:

1. A preliminary evaluation of the site's characteristics performed prior to the initial site survey
2. An evaluation of the known or suspected contaminants and conditions that may pose inhalation, skin absorption/contact, exposure or ingestion hazards.
3. Material Safety Data Sheets (MSDS) provided on site for any chemicals known to be present which workers may be exposed to during site normal operations or in a foreseeable emergency.
4. An evaluation of known or potential safety hazards associated with each task
5. An overview of the following information:
    a. Size and location of the site
    b. Description of the operation and tasks to be performed
    c. Approximate duration of each operation and task
    d. Site topography, accessibility and special features (e.g., structures, tanks)
    e. Known or suspected pathways of contaminant dispersion pertinent to the operations and tasks performed
    f. Safety and health hazards expected on the site
    g. Status and capabilities of emergency response teams that shall provide assistance during site emergencies, including those providing medical treatment and transport of any contaminated injured persons.

2.3 Employee Training

A. Training Requirements for On-Site Personnel

1. Pursuant to 29 CFR 1910.120, et al, all Contractor and subcontractor employees for on-site activities must have met one of the following requirements prior to the start of operations at the site:
    a. General site workers (such as equipment operators, general laborers, and supervisory personnel) engaged in hazardous substance removal or other activities that expose or potentially expose workers to hazardous substances and health hazards shall receive a minimum of 40 hours of instruction off the site, and a minimum of three (3) days actual field experience under the direct supervision of a trained, experienced supervisor.

b. Workers on site only occasionally for a specific limited task (such as, but not limited to, groundwater monitoring, land surveying, or geophysical surveying) and who are unlikely to be exposed over permissible exposure limits and published exposure limits shall receive a minimum of 24 hours of instruction off the site, and a minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.

c. Workers regularly on site, who work in areas that have been monitored and are fully characterized indicating that exposures are under permissible exposure limits and published exposure limits where respirators are not necessary, and the characterization indicates that there are no health hazards or the possibility of an emergency developing, shall receive a minimum of 24 hours of instruction off the site and a minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.

d. Workers with 24 hours of training who are covered by paragraphs b. and c. of this section, and who become general site workers or who are required to wear respirators, shall have the additional 16 hours and two (2) days of training necessary to total the training specified in paragraph a.

e. In addition, an annual eight (8) hour minimum refresher course after the initial training shall be provided to all field (site) personnel in order to continue on-site employment eligibility.

2. On-site management and supervisors directly responsible for or who supervise employees engaged in site operations, including the on-site HSO, shall have also received eight (8) hours additional training in managing such site operations prior to the start of site activities as stipulated in 29 CFR 1910.120.

3. Employees who have been designated as responsible for responding to on-site emergencies shall have received additional training in how to respond to such expected emergencies prior to the start of site operations as stipulated in 29 CFR 1910.120.

4. Employees who have not received the required training prior to the start of site operations are not to engage in site operations until such training has been completed.

B. Employee Training Program

The Contractor shall include in the HASP a summary of the hazardous materials safety and health training program and a list of elements and topics covered.

C. Program Certification

The Contractor shall provide a written certification statement of completed training and/or acquired experience for all employees designated to engage in on-site activities. Such certification shall be endorsed by a member of top-level management, a corporate officer, or the health and safety program manager and shall be incorporated into the HASP.

D. Site Specific Training and Pre-entry Briefings

The Contractor shall provide site specific training and perform daily safety briefings that will provide an awareness of planned operations, the site-specific HASP, the form and warning properties of potential hazards, work zones, locations of emergency/safety equipment, local emergency response procedures and any changes in site characteristics, levels of protection, communications, decontamination procedures, emergency facilities and signals, and evacuation procedures.

2.4 Personnel Protection

A. Engineering and Work Practice Controls.

The Contractor must consider the need to apply engineering and/or work practice controls as a means of protecting personnel in the performance of site-specific tasks. When practicable, engineering controls shall be implemented to reduce and maintain employee exposures to or below safe levels for those tasks demonstrating known or suspected hazards. Work practice controls shall next be applied when engineering controls are impractical and shall be incorporated as site-specific standard operating procedures (SOPS) for personnel precautions and routine operations.

B. Personnel Protective Equipment (PPE) and Levels of Protection

1. The Contractor shall use personnel protective equipment (PPE) only when engineering and/or work practice controls have been deemed impractical or insufficient to protect employees during site operations.

2. The Contractor shall select PPE based on an evaluation of performance characteristics, site-specific tasks, and known or suspected hazards and shall assemble the PPE into Levels of Protection (LOP) or ensembles appropriate for the site.

3. The Contractor shall include in the HASP a list of components for each protective ensemble, the LOP selected for each task, the rationale for each task-specific selection, and any contaminant action levels to be followed in LOP decision making. This information can be presented in a block-type chart with specific references to fabric, Level of Protection, permeation, etc., in a text.

   These specific tasks requiring identification of protective clothing ensembles shall include but not be limited to:

   a. Existing Debris and Waste Removal

   b. Recovery, Injection, and Monitoring Well Construction

   c. Excavation

   d. Contaminated Soil Removal

   e. Sampling and Monitoring

   f. Dewatering

   g. Erosion and Sediment Control

   h. Operating specialized equipment, containers

   i. Confined Space and Hazardous Area Entry

4. If the Contractor's HASP provides for respiratory protection, the Contractor shall include a description of the respiratory protection program and the method of respirator fit testing employed.

5. The Contractor shall use only NIOSH/MSHA approved respiratory protective equipment. Any other PPE selected shall be in conformance with appropriate ANSI standards for that equipment.

6. The Contractor shall establish a PPE program addressing the following elements:

   a. Site hazards

   b. PPE selection

   c. PPE use and limitations

d. Duration of site operations

e. PPE maintenance and storage

f. PPE decontamination and NJDEP approved disposal

g. PPE training and proper fit

h. Donning and doffing procedures

i. PPE inspection prior to, during and after use

j. Evaluation of program effectiveness

k. Heat stress and temperature limitations

2.5 Medical Surveillance

A. Medical Surveillance Program

1. The Contractor shall have an established and implemented medical surveillance program (MSP) for employees engaged in on-site operations, if any of the following 29 CFR 1910.120(b) criteria are met:

   a. All employees who are or may be exposed to hazardous substances or health hazards at or above the permissible exposure limits, or if there is no permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year

   b. All employees who wear a respirator for 30 days or more a year or as required by 29 CFR 1910.134

   c. All employees who are injured due to overexposure from an emergency incident involving hazardous substances or health hazards

   d. Members of HAZMAT teams

2. The MSP program shall include physical examinations administered or supervised by a board-certified physician knowledgeable in internal or occupational medicine. The Contractor shall include the name and business address of the administering physician in the HASP.

3. The Contractor shall include a written description of the components of both the MSP program and the physical examination in the HASP and whether the examination is administered or supervised by the physician.

4. The Contractor shall address the need for personnel exposure monitoring and post-exposure medical screening in the HASP and include a description of those provisions.

B. Medical Records Retention

The Contractor shall retain all medical records and personnel exposure monitoring data for 30 years as described in Subpart C of 29 CFR 1910.20.

C. Fitness Certification

The Contractor shall provide written certification of the medical fitness for work of all employees designated to engage in on-site operations prior to the start of those operations. Such certification shall be endorsed by a member of senior level management, a corporate officer, or the health and safety program manager and shall be incorporated into the site HASP.

D. Heat and Cold Stress Monitoring

As dictated by seasonal conditions, the Contractor shall implement an employee heat and/or cold stress monitoring program during site operations and shall incorporate the program into the site HASP. The program shall include employee awareness of the signs and symptoms of heat and/or cold stress, preventive measures, and employee and/or environmental parameters that will be measured. The Contractor shall maintain a daily heat and/or cold stress log on all employees wearing protective ensembles on-site and shall describe the log in the site HASP.

2.6 Air Surveillance

A. Site Specific Monitoring

The Contractor shall establish and implement a site-specific air monitoring program to identify areas of elevated airborne contaminant concentrations and to determine the level of the concentrations relative to background. The Contractor shall provide the personnel, instruments, and materials necessary to perform such air monitoring and identify the individual responsible for administering the program. The program shall be included in the HASP.

1. The Contractor must incorporate the following information into the air monitoring program:

    a. Type, make, and model of instrument(s) selected for use

    b. All instrument settings for each instrument used

    c. Method of instrument calibration, including calibrant and sample calibration data sheet

    d. Manner and frequency of pre and post (or greater) field calibration checks

    The Contractor must present the frequency of air measurements and the tasks or locations to be monitored.

B. Area and Personnel Air Sampling

1. The Contractor shall examine and report to the NJDEP's satisfaction the need, or lack thereof, to develop and implement an area and personnel air sampling program during the project, based upon adequate initial Area and Personnel Air Sampling episodes, and shall include any resultant air sampling program in the site HASP.

2. Special considerations shall be given to intrusive or high-risk tasks and the potential for exposure to those performing such tasks.

3. The Contractor shall provide all necessary sampling devices, pumps, collection media, and support equipment to perform the sampling per the program. The sampling devices and pumps must bear all approvals necessary for use in combustible or flammable atmospheres.

4. The sampling devices, pumps, collection media, and any necessary support equipment shall be appropriately assembled into a sampling train, and each resultant sampling train shall be flow calibrated as a complete system before and after each day's use against a primary standard.

5. The Contractor shall maintain a daily sampling record as part of the air sampling program. The record must include, as a minimum, the following:

    a. Collection date

    b. Sample identification number

    c. Location and/or task monitored

    d. Wind speed and direction during each sample collection period

e. Duration of each sample collected, including the start and stop times of each sample

f. Ambient temperature and humidity of sampling period

g. Pre- and post sampling train flow rate checks

h. Instrument readings and calibration checks

i. Any pertinent comments

6. The laboratory selected for sample analysis must be accredited by the AIHA for the analysis required. Sampling and analytical methods of first NIOSH, then OSHA, must be used preferentially when such methods are available for the samples collected and all appropriate QA and QC provisions regarding sample collection, transport, and holding times must be followed. Sampling and health and safety protocols are presented in the NJDEP's most current *Field Sampling Procedures Manual*, (May 1992).

C. Records Retention and Data Reporting

1. The Contractor shall retain all personnel exposure sampling results and monitoring data in accordance with the requirements set forth in OSHA, Subpart C of 29 CFR 1910.20. The Contractor shall follow all other pertinent provisions of that regulation.

2. The Contractor shall submit, in writing, the analytical results from any area and personnel samples collected within 30 working days of the collection of each sample. Sample flow rates in liters per minute (lpm) and sampling periods in minutes for each sample collected must be reported with the analytical results. Sample locations or tasks and identification numbers shall also be reported.

3. The Contractor shall maintain a daily air monitoring log and include, as a minimum, the following information:

a. Monitoring date

b. Location and/or task monitored

c. Wind speed, direction, ambient temperature, and humidity

d. Instruments used including make and model and all instrument settings

e. Instrument readings

f. Pertinent comments or information

g. Results of instrument calibration checks, including date and time of each check, the calibration agent used, and its concentration, for each instrument employed.

4. The Contractor shall report verbally all data resulting from daily air monitoring to the NJDEP representative, at a minimum, at the end of the work period. If at any time the instrumentation indicates an adverse change in conditions, the HSO must notify the NJDEP representative immediately and follow up this reporting in writing by the close of business on that day.

5. The Contractor shall furnish copies of the daily air monitoring log to the NJDEP representative at a minimum, weekly, unless otherwise noted or arranged.

2.7 Site Control

A. Routine Requirements

For ongoing operations, the Contractor and/or its designee will be required to meet with the on-site NJDEP representative, when present, prior to the start of the day's activities to prepare all the

necessary paperwork and outline the day's activities. The Contractor shall also meet with the NJDEP representative at the completion of the day's activities to discuss the work performed.

B. Control of Work Zones

1. The Contractor shall be responsible for conducting operations at the site in such a controlled fashion as to reduce the possibility of contact with any contaminants present and to prevent the removal of contaminants by personnel or equipment leaving the site. The Contractor shall delineate work zones in which specific operations or tasks will occur and shall institute specific site entry and decontamination procedures at designated control points.

2. Three (3) work zones shall be established to perform this work: an exclusion (contaminated) zone, a contamination reduction zone and a support (clean) zone. A map or diagram showing the specific work zones and a description of the site control plan shall be included in the HASP. The work zone boundaries shall be revised as the work of removing hazardous materials proceeds, so as to reflect the reduced area containing hazardous materials. The revised map or diagram shall be inserted in the HASP and provided to the NJDEP representative upon adoption of each revision. The Contractor shall include any SOPs pertaining to site control in the HASP and shall incorporate plans for routine and emergency communications appropriate for the site and project.

3. The Contractor shall keep a daily site control log. The log shall include:

   a. Personnel visiting the site

   b. Affiliation

   c. Date

   d. Arrival time

   e. Departure time

   f. Purpose of visit and locations visited

4. The Contractor shall provide the NJDEP lead representative with a list of all Contractor and subcontractor personnel who are authorized to enter the site prior to the start of operations, updating the list as necessary. Authorized NJDEP personnel shall have unlimited access to the site. The Contractor shall be responsible to exclude all unauthorized entrants from the site.

2.8 Decontamination

A. Personnel and Equipment Requirements

All contaminated personnel and equipment exiting the exclusion zone must be decontaminated prior to entering the support zone. This decontamination must be performed in order to prevent contamination from being transferred into clean areas and contaminating or exposing unprotected personnel.

1. The Contractor shall develop and implement personnel and equipment decontamination procedures appropriate for the site and shall include those procedures in the site HASP. The procedures shall include the necessary equipment and number of steps to achieve the objective, provisions for any personnel protection, and a diagram outlining the steps or stations in the procedures.

2. The procedures must ensure adequate containment and removal of any decontamination solutions and spent disposable protective apparel.

3. Provisions shall be made to facilitate personal hygiene at breaks and following daily operations. Where decontamination procedures indicate shower usage and change rooms away from the exclusion zone, they shall meet the requirements of 29 CFR 1910.141 and 1926.51.

2.9 Site Standard Operating Procedures

The Contractor shall be responsible for developing and implementing all necessary SOPs for safe and healthful site operations. Such SOPs shall be incorporated into the site HASP. A copy of these SOPs and the HASP are to be on site at all times.

2.10 Contingency Planning

A. Emergency Response Plan (ERP)

Prior to the start of site operations, the Contractor shall develop and implement an Emergency Response Plan (ERP) to handle anticipated on-site emergencies.

B. Plan Updates

The ERP shall be incorporated into the site HASP as a separate section of that document and shall be periodically reviewed and, as necessary, amended to keep it current with new or changing site conditions or information.

1. The ERP shall address, as a minimum, the following:
    a. Preplanning of site operations to prevent emergencies
    b. Personnel roles and lines of authority
    c. Key personnel at the site authorized and responsible for implementing the plan
    d. Emergency recognition and control measures
    e. Evacuation routes and procedures, and the frequency of emergency drills
    f. Safe distances and places of refuge
    g. Emergency security and site control measures
    h. Decontamination measures not previously listed in the HASP and specific for all anticipated emergencies.
    i. Emergency medical treatment and first aid
    j. Emergency alerting and response procedures
    k. Site communications
    l. Site diagrams showing general layout, work zones, and prevailing weather conditions
    m. Procedures for reporting incidents to pertinent local, state, and Federal agencies
    n. A list of emergency telephone contacts including the name, location, telephone number, written directions and a route map to the nearest medical facility that will provide emergency medical services.
    o. Measures to review and follow up on site responses
    p. Emergency and personal protective equipment kept at the site for emergencies, with an equipment list and a drawing indicating their on site location.
2. Prior to start up of site operations, the contractor shall attend any and all meetings necessary with local officials and/or those responsible for local emergency management and public safety

for the purpose of coordinating the site specific ERP with any emergency response efforts that would be performed by such agencies. These agencies include but are not limited to:

a. Fire,

b. Ambulance,

c. Police,

d. Local/County health officials

C. Special First Aid/CPR Training

The Contractor shall ensure that at least one person holding up-to-date certifications (American Red Cross or equivalent) in basic first aid and CPR is present at the site during all site operations. A photocopy of the current certifications must be included in the HASP.

D. Verification of Medical Facility Preparedness

The contractor shall contact the local medical facility selected for inclusion into the ERP to ensure that said facility is willing and is capable of providing that medical support necessary to satisfy those anticipated hazards and emergencies detailed in the ERP. Material Safety Data Sheets (MSDS), product information or any technical information on hazard, exposure and treatment of anticipated/known hazards should be provided by the Contractor to the medical facility. Written verification of such contact and agreement of medical services must be detailed in the ERP, including the name and title of individual contacted, and shall be provided to the NJDEP prior to start of site operations.

E. Accident and Exposure Reports

1. The Contractor shall notify the NJDEP representative of all on-site accidents at the time of occurrence and follow up in writing within 24 hours. This notification shall include, but not be limited to, the date, time and identity of individual(s) involved in the accident, the nature of the accident, the actions taken to treat the victim(s), and the steps taken to prevent recurrence.

2. The Contractor shall notify the NJDEP representative of all person(s) exposed at the time of occurrence and follow up in writing within 24 hours. This notification shall include, but not be limited to, the date, time, and identity of individual(s) involved in the exposure, the nature of the exposure episode, what the individual(s) were exposed to, the personnel protective equipment worn during the exposure, and the steps taken to prevent recurrence.

3. The Contractor shall notify the NJDEP immediately of any incident/accident that results in death or severe injury to personnel, or of any fire or explosion or any incident that results in public disruption, media attention or closure of a roadway. After hours notification of such events shall be addressed to the NJDEP's 24 hour Action Line (609) 292-7171.

2.11 Confined Space Operations

If no confined space entry is to be made, then a statement indicating such is sufficient for this section, however, all confined spaces must be identified in the HASP.

A. Standard Operating Procedures for Confined Spaces

Should site operations include activities within confined spaces, the Contractor shall develop and implement a confined space entry program and SOPs and shall incorporate them into the HASP pursuant to 29 CFR 1910.146. If the confined space entry meets the OSHA definition of a Permit Required Confined Space Entry, then a section addressing such entries shall be included in the HASP.

B. Entry Permit System

1. The contractor shall develop and implement an Entry Permit System to ensure that the following are addressed and complied with:

   a. Identification of all confined spaces to all employees

   b. Identification of hazards in the confined space

   c. Training program

   d. A system of monitoring for atmospheric hazards

   e. A system of calibration of monitoring equipment

   f. A system of barricades, to prevent unauthorized entry

   h. A system of identifying authorized entrants, attendants, rescuers and those authorized to sign the entry permit

   i. A procedure for emergency evacuation

   j. Emergency rescue procedures

   k. Procedures to test the program to ensure effectiveness

2. Pre-entry briefings shall be held prior to initiating any confined space entries and at other times as necessary to ensure that employees are aware of the HASP provisions governing such activities and that they are being followed. The completed permit shall be made available at the time of entry to all authorized entrants, by posting it at the point of entry or by any other equally effective means, for assurance that the pre-entry preparations have been completed.

C. Inspection and Effectiveness of SOP verification

Inspections shall be conducted by the HSO or, in the absence of that individual, another qualified individual acting on behalf of the HSO as necessary to determine the effectiveness of the confined space SOP with regard to those confined spaces identified on site. Any deficiencies in effectiveness shall be corrected by the Contractor.

D. Atmospheric Monitoring for Safe Entry

The Contractor shall ensure that the HSO or, in the absence of that individual, another qualified individual acting on behalf of the HSO, shall test the atmosphere of the confined space prior to entry and during entry to ensure that all measures necessary to protect the health and safety of employees entering have been taken. Monitoring shall be appropriate for the contaminant(s) that are known or suspected of being present in the space.

E. Emergency Equipment and Rescue Services

The Contractor shall provide appropriate protective and entry equipment for all entrant personnel necessary for the Permit Required entry. On site rescue personnel must be present or off site rescue must be able to respond to the site within 3 minutes of notification. Equipment necessary for a rescue must be identified and present at the point of entry.

F. Training of Entrants, Attendants and Rescuers

The Contractor shall comply with the Federal OSHA training requirements for all personnel involved in confined space entry. A training program must be administered to all personnel involved in confined space entry before entrance can be initiated. Rescue teams shall practice at least annually at the confined space or at representative openings having the same size, configuration and

accessibility as the confined space from which an actual rescue would be performed. A record of training and authorized personnel shall be kept on-site and listed in the HASP.

2.12 Spill Containment

A. Containment Program

1. The contractor shall establish and implement a written spill containment program to handle the possibility of a spill or leakage of drummed or containerized hazardous materials involving any of the following activities:

   a. Transfer

   b. Transport

   c. Disposal

   d. Excavation

2. The contractor shall identify the following on site and off site personnel and equipment or services necessary to isolate, contain and mitigate the spill:

   a. Clean up contractor or personnel

   b. Estimate of response time of off site contractors

   c. Spill containment procedures (Diking, Overpack, etc.)

   d. Special safety precautions (fire, corrosive, radioactivity, etc.)

   e. Equipment and supplies on hand at site or readily available to respond to contain and clean up the spill

2.13 Special and Permit Operations

A. Excavations and Trenching

1. If no trenching or excavation is to be performed on site during site operations, then a statement indicating such is sufficient for this section.

2. All excavation work shall comply with 29 CFR 1926, Subpart P and other state and federal regulations governing excavations and trenching. The need to perform any excavations or trenching as part of the site operations must be described in the HASP.

3. The methods of preparing the trench or excavation must be detailed to include descriptions of sloping, shoring and guarding.

4. Proper spacing of equipment, use of barriers, means of exit, and placing of machinery and spoils must be observed.

5. Personnel working around and in trenches and excavations must be trained in such operations to assure knowledge of hazards, safe operations and procedures to be followed in the event of an emergency.

6. Avoidance of overhead electric lines, underground utilities and storage structures, and service passageways must be addressed by including drawings, measurements and descriptions in the HASP. All pertinent sections of 29 CFR 1910, Subpart S and 29 CFR 1926, Subpart K must be complied with and identified in the HASP.

7. Notifications of utilities prior to excavation and trenching per New Jersey requirements must be detailed and listed in the HASP (1-800-272-1000).

B. Hot Work

1. If no hot work is to be performed on site, then a statement indicating such is sufficient for this section.

2. The performance of Hot Work such as welding, cutting, etc. during site operations must be addressed in the HASP. A Hot Work "Permit" procedure must be included in the HASP if hot work is performed and must comply with the sections of OSHA 1910.119(k), OSHA 1910.146 and OSHA 1926.64 (k) et al as they apply to these operations.

3. All hot work procedures should be outlined and shall comply with both state and local fire codes as well as with OSHA regulations.

4. All electrical supply wiring and distribution shall comply with the local and National Electric Codes as well as any state codes and OSHA 1926.400 Subpart K, governing such installations.

5. Proper utilization and storage of flammable cutting gases and other compressed gases shall comply with the requirements of OSHA 1926.350 et al. All gas cylinders shall be secured from falling or being damaged.

Index of Health and Safety Plan Sections

Citations from NJ State codes/regulations, 29 CFR 1910.120
and other federal regulations as well as OSSH requirements

Section Number	Subject Name	Citation: Federal/NJDEP
1.1	Scope of HASP	29 CFR 1910.120
1.2	Site Description	NJDEP Contract
1.3	Submittals	NJDEP Contract
2.1	Key Personnel	(b) (1) (ii) (A)
2.2	Hazard Assessment	(b) (4) (ii) (A)
2.3	Employee Training	(b) (4) (ii) (B)
2.4	Personnel Protection	(b) (4) (ii) (C)
2.5	Medical Surveillance	(b) (4) (ii) (D)
2.6	Air Surveillance	(b) (4) (ii) (E)
2.7	Site Control	(b) (4) (ii) (F)
2.8	Decontamination	(b) (4) (ii) (G)
2.9	Site Standard Operating Procedures	(b) (1) (ii) (F)
2.10	Contingency Planning	(b) (4) (ii) (H)
2.11	Confined Space Oper. NJSA 34:1-20 et seq	(b) (4) (ii) (I)
2.12	Spill Containment	(b) (4) (ii) (J)
2.13	Special/Permit Oper.	1910.119, 1926.64 1926.350, 1910.146