SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SAUNDERS SUPPLY CO. (Chuckatuck, VA)
PHASE I/PHASE II ANALYSIS

Comments: Note the many technologies added to the original initial template.

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Institutional Actions						
Restrictions	Deed Groundwater Fencing	Y				
Capping						
Unspecified		Y				
Fixation						
Solidification	Solidification/ Stabilization	Y				
On-Site Containment						
Closure-In-Place/On-Site Encapsulation		N		Long-term effectiveness is unknown	Requires highly specialized labor and equipment; the RCRA LDRs limit the implementability of encapsulation for the same reasons discussed under implementation for solidification	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SAUNDERS SUPPLY CO. (Chuckatuck, VA)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Long-Term On-Site Landfill		N			Construction of an on-site facility that meets RCRA and/or state requirements could be difficult because of high water table, the close proximity to a public water supply, and the present use of the site as an active business	
Thermal Treatment						
On-Site Incineration	Rotary Kiln	N			Significant community opposition could be expected because of the close proximity of residential homes to the Saunders site	
	Fluidized Bed	N		Not demonstrated as an effective method for the treatment/destruction of dioxins		

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SAUNDERS SUPPLY CO. (Chuckatuck, VA)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Off-Site Incineration		N			Limited number of off-site facilities; the nearest facility that accepts dioxin materials is having difficulties securing permits for the disposal of incinerator ash. The high concentration of arsenic in the soil could present difficulties. Arsenic easily volatizes at the operating temperatures for incinerators and the emissions are difficult to remove using conventional air pollution control equipment.	
Pyrolysis		N		Not demonstrated as an effective method for the treatment/destruction of dioxins		
Vitrification		Y				
SHIRCO Infrared		Y				
Thermal Desorption		Y				

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SAUNDERS SUPPLY CO. (Chuckatuck, VA)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Other	Fixed Hearth, Multiple Hearth, Molten Glass, Molten Salt, Plasma Systems, Advanced Electric Reactor	N		Not well suited for incineration of large volumes of soil because of the small size of the system. Not demonstrated as an effective method for the treatment/destruction of dioxins. For multiple hearth, metal content in the waste stream must be limited. Molten glass is generally inappropriate for soils because of the high ash content.	Implementability of the advanced electric reactor technology would be difficult since commercial units are not available. Mobile/transportable units are not available for fixed and multiple hearth technologies. Molten glass is currently at an innovative stage.	
Biological Treatment						
In Situ Bioremediation		N		Would not achieve cleanup goals for metals and dioxins; would only be applicable to the PCP contamination, and even the effectiveness of *in situ* bioremediation for PCP would be highly questionable because of the highly variable PCP concentrations causing inconsistent biodegradation	The presence of heavy metals could be toxic to the microorganisms; the low permeability of soil would hinder the movement of water and nutrients through the soil	
Ex Situ Bioremediation		N		May be difficult to obtain the cleanup goals set by the risk assessment		
Off-Site Landfarming		N			Land disposal restrictions may prevent implementation	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SAUNDERS SUPPLY CO. (Chuckatuck, VA)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Soil/Slurry Bioreactor		N			Fine-grained nature of soils may make slurry bioreactor treatment effluent difficult to settle	
Chemical Treatment						
Dechlorination		Y				
Solvent Extraction	Chemical Extraction; also Critical Fluid Extraction	N	High capital costs High operation and maintenance costs	The complex mixture of soil contaminants may create difficulties in the selection of an effective solvent; the fine fraction of the soil may remain contaminated, and the fine particles are often difficult to separate from the solvent	Commercial availability may be limited	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SAUNDERS SUPPLY CO. (Chuckatuck, VA)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Other	Ultraviolet/ Photolysis, Stream-Enhanced Vacuum Extraction, Steam/Air Stripping, Radio Frequency	N		Would be an ineffective treatment for metals. Stream-enhanced vacuum extraction would not achieve cleanup goals for metals and dioxins. The low permeability of the soil and the heterogeneous soil conditions would reduce the overall effectiveness for PCP removal. Steam/air stripping would not achieve cleanup goals for metals or dioxins. This technology is not well demonstrated and not all the mechanisms of the technology are fully understood. Radio frequency is potentially applicable for remediation of PCP contamination. The low permeability and high clay/silt content of the soils would limit the effectiveness of this technology for or dioxins.	The availability of commercial equipment may be limited due to the emerging status of the technology for treatment of soils	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SAUNDERS SUPPLY CO. (Chuckatuck, VA)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Physical Treatment						
Soil Flushing		N		Because of the complex mixture of soil contaminants, formulation of a suitable washing fluid would be very difficult; the effectiveness of soil flushing is also limited because of the high percentage of silts and clays found in the soils (up to 30%)		
Soil Washing		N		The separated silt/clay fraction would contain much higher concentrations of contaminants than the original feed soil; concern exists about finding effective subsequent treatments		
Off-Site Options						
Off-Site RCRA Facility		Y				

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SAUNDERS SUPPLY CO. (Chuckatuck, VA)
PHASE III ANALYSIS

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Institutional Actions								
Restrictions	Y							
Capping								
Unspecified	N			No reduction in toxicity, mobility, or volume; does not satisfy the statutory preference for treatment				
Fixation								
Solidification	Y							
Thermal Treatment								
Vitrification	N			Treatability testing would be required to evaluate the effectiveness of *in situ* vitrification for destruction of organics and immobilization of inorganics	During treatment, the effectiveness of *in situ* vitrification would be difficult to monitor because it is difficult to implement adequate QA/QC procedures for an *in situ* treatment process		Requires special equipment and trained personnel; equipment is available through only one vendor	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SAUNDERS SUPPLY CO. (Chuckatuck, VA)
PHASE III ANALYSIS (Continued)

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Thermal Desorption	Y							
Chemical Treatment								
Dechlorination	Y							
Off-Site Options								
Off-Site RCRA Facility	Y							

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SELMA TREATING (Selma, CA)
PHASE I/PHASE II ANALYSIS

Comments: Key contaminants include organics (dioxins/furans, phenols) and metals (arsenic, chromium).

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Institutional Actions						
Restrictions	Long-Term Site Access Future Land Use	Y				
Capping						
Soil/Bentonite/Clay		Y				
Multi-Layer Cover System		Y				
Fixation						
Solidification		Y				
Stabilization		Y				
On-Site Containment						
Long-Term On-Site Landfill	On-Site RCRA Landfill	N	Not evaluated		Not implementable due to geological conditions of site; permeability of materials is above Title 23 citing criteria	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SELMA TREATING (Selma, CA)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Thermal Treatment						
On-Site Incineration	Rotary Kiln	Y				
	Conventional Fluidized Bed	N		No full-scale site operations with hazardous wastes have been demonstrated; fails to demonstrate the 99.99 percent DRE required under RCRA performance standards		
	Circulating Fluidized Bed	N		Fails to meet 99.99 percent DRE requirements	Requires modification of waste to meet specific processing characteristics	
Off-Site Incineration	Rotary Kiln	N	Relatively high because of transportation, packaging, and treatment expenses; not cost competitive with on-site incineration		Due to high levels of arsenic, chromium, and copper in the site soils, incineration facilities may impose restrictions on soil acceptance; soils must be packaged in containers; uncertainty exists about the processing capacity for large quantities of soil	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SELMA TREATING (Selma, CA)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Pyrolysis	Plasma Arc	N		Not a well-proven technology		
Vitrification		N		Fails to meet 99.99 percent DRE requirements; not a well-proven technology		Immobilizes both the dioxins/furans and inorganics
Wet Air Oxidation		N			Not technically feasible	
SHIRCO Infrared	Infrared Processing Systems	N		Fails to meet 99.99 percent DRE requirements		
Biological Treatment						
In Situ Bioremediation		N		Lack of demonstrated effectiveness in reducing dioxins and furans	Requires more specialized, less available equipment than other biological treatments	
Ex Situ Bioremediation		N		Lack of demonstrated effectiveness in reducing dioxins and furans		
Anaerobic Treatment	Anaerobic Digestion	N		Lack of demonstrated effectiveness in reducing dioxins and furans	Not technically feasible	
Chemical Treatment						

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SELMA TREATING (Selma, CA)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Dechlorination	Nucleophilic Substitution - KPEG	N		Lack of demonstrated effectiveness in reducing dioxins	Heavy metals in soil create a problem in handling liquids generated during the dewatering phase	
Physical Treatment						
Soil Washing		N		Fails to remove low concentrations of arsenic and chromium; lack of demonstrated effectiveness		
Aeration/Soil Venting		N			Not technically feasible	
Off-Site Options						
Off-Site RCRA Facility		Y				

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SELMA TREATING (Selma, CA)
PHASE III ANALYSIS

Comments: Key contaminants include organics (dioxins/furans, phenols) and metals (chromium, arsenic).

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Institutional Actions								
Restrictions	Y							
Capping								
Soil/Bentonite/Clay	Y				Not a permanent solution	Minimal short-term impacts	Implementability problems when combined with slurry wall	
Multi-Layer Cover System	Y							
Fixation								
Solidification	Y							
Stabilization	Y							
Thermal Treatment								
On-Site Incineration	N			Does not reduce toxicity or volume for metals	Not a permanent solution for metals		Mobile rotary kiln technology not readily available	High
Off-Site Options								
Off-Site RCRA Facility (in conjunction with on-site rotary kiln)	N			Does not reduce volume, toxicity, or mobility			Landfill capacity may be inadequate	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SELMA TREATING (Selma, CA)
PHASE III ANALYSIS (Continued)

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SOUTHERN MARYLAND WOOD TREATING (St. Mary's County, MD)
PHASE I/PHASE II ANALYSIS

Comments: Key contaminants include VOCs, PNAs, and other BNAs. The initial screening consisted of cost, technical feasibility, institutional requirements and public health/environmental issues.

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Institutional Actions						
Restrictions	Security Upgrade Monitoring (ground water, surface water, and environmental organic vapor)	Y				
Capping						
Asphalt/Concrete	Concrete	N	Relatively high cost	Questionable long-term integrity		
Soil/Bentonite/Clay	Clay	N	Less costly, equally effective materials are available for capping		May not attain ARARs	Screened out in phase II of 93 focused FS
Multi-Layer Cover System	Synthetic Membrane	N			May not attain ARARs	Screened out in phase II of 93 focused FS

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Fixation						
Solidification		N			Most cost-effective to dispose on-site and it is not possible to do so	Screened out in 93 focused FS
Stabilization		N			Most cost-effective to dispose on-site and it is not possible to do so	Screened out in 93 focused FS
On-Site Containment						
Long-Term On-Site Landfill		N	Very high cost		Requires RCRA approval, which may be difficult for on-site disposal of dioxins	
Thermal Treatment						
On-Site Incineration		Y				
Off-Site Incineration		Y				Soils would be stabilized to facilitate bulk transport
Pyrolysis	Plasma Arc, AER/HTFW, Reactor, and Electric Pyrolyzer	N		Not a well proven technology	AER cannot accept sludge-type material; electric pyrolyzer has not been tested on dioxin or PCBs	
Vitrification		Y				
Wet Air Oxidation		N		Not recommended for halogenated organic aromatics	Limited information for hazardous waste application	
Biological Treatment						
In Situ Bioremediation		Y				

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SOUTHERN MARYLAND WOOD TREATING (St. Mary's County, MD)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Ex Situ Bioremediation	On-Site Landfarming/ Composting	Y				
Chemical Treatment						
Dechlorination	On-Site APEG Treatment/ Dechlorination	N				Retained but not incorporated into a remedial action alternative
Solvent Extraction	Supercritical Extraction	N		Not a well proven technology	May not receive regulatory agency approval because it still requires extensive development	
Physical Treatment						
Soil Flushing		Y				
Soil Washing		Y				
Macroencapsulation/overpacking		N		Potential leaching problems from presence of a free liquid product; may present risks to local public health and environment		
Off-Site Options						
Off-Site RCRA Facility		N	High costs			

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SOUTHERN MARYLAND WOOD TREATING (St. Mary's County, MD)
PHASE I/PHASE II ANALYSIS (Continued)

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SOUTHERN MARYLAND WOOD (St. Mary's County, MD)
PHASE III ANALYSIS

Comments: Key contaminants at the site include PAHs and VOCs. On-site incineration was chosen because of its proven ability to fully eliminate contaminants. Because of community opposition, on-site incineration is being reconsidered.

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Institutional Actions								
Restrictions	Y							
Thermal Treatment								
On-Site Incineration	Y							
Off-Site Incineration	N						Limited off-site incinerator capacity	Highest of the alternatives considered
Vitrification	N			No reduction in volume	Not a well proven technology		Involves a degree of risk because of innovative nature; requires longer implementation period and bench/pilot scale studies	Higher than incineration

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SOUTHERN MARYLAND WOOD (St. Mary's County, MD)
PHASE III ANALYSIS (Continued)

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Biological Treatment								
In Situ Bioremediation	N				May not be as effective as thermal treatment with dioxin-contaminated soils; not a well proven technology		Involves a degree of risk because of innovative nature; low permeability of soils at the site inhibits implementation	
Ex Situ Bioremediation	N				Not a well proven technology; requires laboratory/pilot-scale studies to determine effectiveness		Involves a degree of risk because of innovative nature	
Physical Treatment								
Soil Flushing	N				Not a well proven technology		Involves a degree of risk because of innovative nature; low permeability of soils at the site inhibits implementation	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: SOUTHERN MARYLAND WOOD (St. Mary's County, MD)
PHASE III ANALYSIS (Continued)

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Soil Washing	N			No reduction in toxicity			Requires extensive design/treatability studies; uncertainties remain over the application to the contaminants	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: TEXARKANA (Texarkana, TX)
PHASE I/PHASE II ANALYSIS

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Institutional Actions						
Restrictions	Access & Deed Restrictions	Y				
Capping						
Asphalt/Concrete	Concrete	N				No reason provided
Soil/Bentonite/Clay	Soil Cover (ash burial)	Y				
Multi-Layer Cover System	Clay/RCRA Cap	Y				
Fixation						
Solidification	Solidification/ Fixation	Y				
On-Site Containment						
Long-Term On-Site Landfill	RCRA Landfill	Y				
Thermal Treatment						
On-Site Incineration		Y				Did eliminate fluidized bed, but kept in rotary kiln
Off-Site Incineration		Y				

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: TEXARKANA (Texarkana, TX)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Pyrolysis		N			Not demonstrated at pilot-scale level	
Vitrification	*In Situ* Vitrification and Plasma Arc	N			Not feasible due to extent of contamination; treatment units are not available for handling soils	
Wet Air Oxidation	Wet Air Oxidation	N				No reason provided
SHIRCO Infrared	Infrared Incineration	N				No reason provided
Thermal Desorption	Thermal Stripping	N		Will not remove non-volatiles and refectory organics		
Other	Advanced Electric Reactor and Molten Salt Incinerator	N			No units available for treating soils	
Biological Treatment						
In Situ Bioremediation	Enhanced *In situ* Biodegradation	N		Not effective for chlorinated dioxins		

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: TEXARKANA (Texarkana, TX)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Ex Situ Bioremediation	Aerobic Biodegradation	N		Not effective for chlorinated dioxins and multi-ring PAHs	Long treatment time due to limits on available land	
Anaerobic Treatment	Anaerobic Biodegradation	N		Not been successfully demonstrated on site waste types		
Chemical Treatment						
Dechlorination	Dechlorination	Y				
Solvent Extraction	Solvent Extraction	Y				
Other	Alkaline Hydrolysis and Supercritical Oxidation	N		Data on treatment of site sludges not available; has not been demonstrated on pilot scale; not proven effective against dioxins		
Physical Treatment						
Soil Washing	Soil Washing	N			Produces large volumes of sludge	Considered only in conjunction with other technologies

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: TEXARKANA (Texarkana, TX)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Off-Site Options						
Off-Site RCRA Facility	Landfill	Y				

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: TEXARKANA (Texarkana, TX)
PHASE III ANALYSIS

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Institutional Actions								
Restrictions	Y							
Capping								
Soil/Bentonite/Clay	Y							
Multi-Layer Cover System	N			Doesn't reduce T or V	Long-term maintenance required; potential for further migration exists			
Fixation								
Solidification	N			Increases volume				
On-Site Containment								
Long-Term On-Site Landfill	N						Restrictions on landfilling wood treater wastes	
Thermal Treatment								
On-Site Incineration	Y							
Off-Site Incineration	N						No identified compliant facility for wood treater wastes	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: TEXARKANA (Texarkana, TX)
PHASE III ANALYSIS (Continued)

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Chemical Treatment								
Dechlorination	N			Will not meet action levels for PAHs				
Solvent Extraction	N						Limited number of qualified vendors	
Off-Site Options								
Off-Site RCRA Facility	N						No identified compliant facilities for land disposal of wood treater wastes	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: UNION PACIFIC RAILROAD YARD (Pecatello, ID)
PHASE I/PHASE II ANALYSIS

Comments: Key contaminants include VOCs, other organics (PAHs), metals (arsenic, chromium, lead), and oils.

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Institutional Actions						
Restrictions	Deed, Future Land Use, Site Access, Air and Ground-Water Monitoring	Y				
Capping						
Asphalt/Concrete		Y				Concrete was screened out
Soil/Bentonite/Clay		N			CERCLA feasibility study guidance suggests selecting one process from each technology type (asphalt cap) to simplify the subsequent development of remedial alternatives	
Multi-Layer Cover System	Multimedia-Clay Cap	N	Higher cost than asphalt cap	Longer short-term exposure time to site workers and nearby residents than asphalt; inability to treat subsurface soils via soil flushing with the cap in place	Requires additional excavation and grading to accommodate the larger cap	Alternative technologies are available
Fixation						

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: UNION PACIFIC RAILROAD YARD (Pecatello, ID)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Solidification	Pozzolan Silicate-Based Solidification	Y				
	Cement-Based Solidification	N		Final product may be twice the weight and volume of original material; the high oil and grease content of the sludge would likely reduce the effectiveness of cement-based solidification		Other solidification processes appear better suited
Stabilization	Precipitation Polymerization	N			Precipitation — Sludge hardness might make addition and uniform mixing of precipitation agent difficult; more appropriate for liquid waste stream. Polymerization — Heavy metals and physical characteristics of sludge prevents effective solvent contact	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: UNION PACIFIC RAILROAD YARD (Pecatello, ID)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
	Organic Polymer Binding (Surface Encapsulation)	N	Other processes as effective at less cost	Surface encapsulation appears more applicable to toxic wastes requiring absolute protection from leaching; the relatively innocuous sludge under consideration does not require this type of protection	Technically complicated; not widely used	
	Thermoplastic Microencapsu-lation	N			Technically complicated; requires special equipment and well trained staff; complexity of operation and resulting cost suggest this technology is inappropriate for sludge; process is more suited to highly toxic, soluble materials such as radioactive wastes	
	Organic Chemical Fixation					Final alternative groups this technology with pozzolan silicate-based solidification

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: UNION PACIFIC RAILROAD YARD (Pecatello, ID)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
On-Site Containment						
Long-Term On-Site Landfill	On-Site Landfill Cell	Y				
Thermal Treatment						
On-Site Incineration	Rotary Kiln Fluidized Bed	Y N				
Off-Site Incineration	Rotary Kiln Fluidized Bed Multiple Hearth	Y N N	High energy costs	Poor ability to handle wastes with high ash content; not effective on solids	Not a well-developed technology	
Pyrolysis		N			Not a well developed technology	
Vitrification		N	High costs		Relatively new technology requiring special equipment and significant electrical supplies	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: UNION PACIFIC RAILROAD YARD (Pecatello, ID)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Biological Treatment						
In Situ Bioremediation	Aerobic Degradation	N		Does not address low concentration of some contaminants; may not address PAHs and chlorinated hydrocarbons to below risk levels; might increase metals toxicity and leachability; metals interfere with the process	Need additional treatment technologies to address additional problems; difficult to achieve blending because of sludge consistency	
Ex Situ Bioremediation		N		Exposes site-workers and neighbors to volatized organic contaminants; inorganic contaminants are likely to remain; produces harmful by-products; does not comply with ARARs for PAHs and metals	Metals at the site may prove toxic to the microorganisms, resulting in increased toxicity; inability to degrade PAHs and metals suggests sludge residual risk levels may remain above acceptable levels; sludge consistency presents implementability difficulties; unknown amount of time required for site remediation	Alternative technologies are available
Anaerobic Treatment		N		Range of organic contaminants which are capable of degradation through the anaerobic process is limited		
Chemical Treatment						

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: UNION PACIFIC RAILROAD YARD (Pecatello, ID)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Dechlorination		N			Difficult to contact sludge constituents with solvent	
Solvent Extraction	Solvent Flushing	N		Dense nature of sludge does not permit adequate contact		
Physical Treatment						
Soil Flushing		Y				
Aeration/Soil Venting	Soil Venting	N			Dense sludge is not permeable enough to permit vapor diffusion	
Off-Site Options						
Off-Site RCRA Facility		Y				
Off-Site Recycle/Reuse Facility		N			Process not identified which recovers useful constituents	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: UNION PACIFIC RAILROAD YARD (Pecatello, ID)
PHASE III ANALYSIS

Comments: Key contaminants include VOCs, other organics (PAHs), metals (arsenic, chromium, lead), and oils. 12 alternatives for soil and groundwater remediation were developed.

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Institutional Actions								
Restrictions	Y							
Capping								
Asphalt/Concrete	Y							
Fixation								
Solidification	N			Solidification processes increase the volume of waste	Testing required to determine risks associated with solidified sludge; adequacy and reliability of solidification is unknown until testing is complete	Solidification process could cause greater quantity of dust to become airborne	Cap may have to be removed if solidification process is ineffective or if infiltration system requires repair	
On-Site Containment								
Long-Term On-Site Landfill	N (in conjunction with not selecting solidifi-cation)						Permits to dispose sludge may be needed	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: UNION PACIFIC RAILROAD YARD (Pecatello, ID)
PHASE III ANALYSIS (Continued)

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Thermal Treatment								
On-Site Incineration	N		Test burns required to determine incineration impact on environment; must consider uncertainties associated with disposal of ash	Addresses treatment of organic contaminants but not heavy metal; metal mobility in ash may increase	Short-term process that does not involve long-term site management or monitoring; landfill management of incineration ash is required	Air pollution and landfilling of ash could cause serious environmental impacts	Delay in implementation may occur because of air pollution and landfill capacity problems	
Off-Site Incineration	N		Test burns required to determine incineration impact on environment; must consider uncertainties associated with disposal of ash		Short-term process that does not involve long-term site management or monitoring; landfill management of incineration ash is required	Air pollution and landfilling of ash could cause serious environmental impacts; vehicle transport of contaminants presents a hazard	Delay in implementation may occur because of air pollution and landfill capacity problems	
Physical Treatment								
Soil Flushing	Y							

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: UNION PACIFIC RAILROAD YARD (Pecatello, ID)
PHASE III ANALYSIS (Continued)

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Off-Site Options								
Off-Site RCRA Facility	Y							

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: UNITED CREOSOTING (Conroe, TX)
PHASE I/PHASE II ANALYSIS

Comments: No initial phase in the FS or ROD. Both the FS and ROD present 6 alternatives (no action included) that are immediately evaluated using detailed phase criteria.

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Capping						
Soil/Bentonite/Clay	Clay Cap	Y				
On-Site Containment						
Temporary On-Site Storage Pile		N				If necessary, an off-site temporary storage pile is preferable to an on-site temporary storage pile
Thermal Treatment						
On-Site Incineration	Mobile Incineration Unit	Y				
Off-Site Incineration		Y				In final selection, may be used in conjunction with critical fluid extraction, depending upon availability of incinerator

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: UNITED CREOSOTING (Conroe, TX)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Biological Treatment						
Ex Situ Bioremediation		Y				
Chemical Treatment						
Solvent Extraction	Critical Fluid Extraction	Y				
Off-Site Options						
Off-Site RCRA Facility		Y				

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: UNITED CREOSOTING (Conroe, TX)
PHASE III ANALYSIS

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Capping								
Soil/Bentonite/Clay	N	Is not a preferred form of protection because the ground water would possibly continue to be impacted		Minimal reduction in TMV	Does not achieve the same level of long-term effectiveness and permanence as the treatment alternatives because the cap requires maintenance; long-term monitoring is required			Maintenance costs would go on for an indefinite amount of time
Thermal Treatment								
On-Site Incineration	N					Potential exposure to emissions		High operation and maintenance costs

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: UNITED CREOSOTING (Conroe, TX)
PHASE III ANALYSIS (Continued)

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Off-Site Incineration	N					Increases short-term health risks because of increased handling and off-site transport of a high volume of contaminated material; potential short-term risks from increased traffic by trucks transporting the soils off-site	Impossible to implement if commercial facilities refuse to accept contaminated soils from Superfund sites because of capacity limitations; small number of facilities accept wastes	Extremely high transportation and disposal costs

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: UNITED CREOSOTING (Conroe, TX)
PHASE III ANALYSIS (Continued)

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Biological Treatment								
Ex Situ Bioremediation	N			Does not significantly reduce the toxicity of dioxins, although some reduction in PAHs would occur; volume of soils containing dioxin above human health levels would actually increase	Biological upset is possible because of environmental shocks	Increases the short-term health risks because of increased handling of excavated material over a prolonged implementation period	Difficult to implement because of space constraints	
Chemical Treatment								
Solvent Extraction	Y							
Off-Site Options								
Off-Site RCRA Facility	Y							

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: VALLEY WOOD PRESERVING INC. (Turlock, CA)
PHASE I/PHASE II ANALYSIS

Comments: Key contaminants include chromium and arsenic.

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Institutional Actions						
Restrictions	Deed	Y				
Capping						
Asphalt/Concrete		Y				Minimizes infiltration of surface water
Fixation						
Solidification		Y				
Stabilization	*In Situ* Stabilization	N		*In situ* - depends on permeability of medium and the ability to uniformly distribute the reactive injected fluid throughout the contaminated zone; not a well-proven technology		
	Ex Situ Stabilization	Y				
On-Site Containment						
Closure-In-Place/On-Site Encapsulation	Closure in Lined Cells	Y				

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: VALLEY WOOD PRESERVING INC. (Turlock, CA)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Thermal Treatment						
On-Site Incineration	Flame Reactor Incinerator	N		Still in developmental stage; not well-proven in soils containing low concentrations of chromium and arsenic		
Vitrification		N		Still in developmental stage; fine grained and silty surface soils at site decrease effectiveness	Ground water table is too shallow (4-8 feet) for vitrification	
Physical Treatment						
Soil Flushing		Y				
Off-Site Options						
Off-Site RCRA Facility		N	High costs associated with hauling		Based on land ban regulations, may not be acceptable	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: VALLEY WOOD PRESERVING, INC. (Turlock, CA)
PHASE III ANALYSIS

Comments: Key contaminants include chromium and arsenic. Soil remediation technologies were chosen with consideration given to ground water conditions.

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Institutional Actions								
Restrictions	Y							
Capping								
Asphalt/Concrete	N	Would not be protective considering assumed future land use		No direct reduction of toxicity or volume of hexavalent chromium or arsenic-impacted soil	May not be effective in the long-term considering assumed future land use (e.g. removal of cap); may not be permanent			
Fixation								
Solidification	Y							
Stabilization	Y (*ex situ*)							
On-Site Containment								
Closure-In-Place/On-Site Encapsulation	Y							

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: VALLEY WOOD PRESERVING, INC. (Turlock, CA)
PHASE III ANALYSIS (Continued)

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Physical Treatment								
Soil Flushing	N				May not be effective in the long-term		Site conditions may limit effectiveness	

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: WRIGLEY CHARCOAL (Wrigley, TN)
PHASE I/PHASE II ANALYSIS

Comments: Key contaminants include VOCs, other organics (PAHs, phenols), metals (arsenic, chromium, lead), and inorganics (asbestos). The ROD addresses interim remediation of contaminated soil, sediment, and debris, and will reduce the risks at the Primary Site and Storage Basin by eliminating the most imminent and substantial threats while permanent solutions are developed for the entire site.

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Institutional Actions						
Restrictions	Deed, Site Access	Y				
Capping						
Multi-Layer Cover System		Y				
Fixation						
Solidification	On-Site and Off-Site	Y				on-site and off-site
Stabilization		N		Would not fully immobilize low level surface inorganic contaminants; the reduction of downward contaminant migration via water infiltration would not be achieved through stabilization alone	A stabilized matrix may hinder future remedial activities at this location	
On-Site Containment						
Closure-In-Place/On-Site Encapsulation	Concrete Block Wall Construction	N			No reason given; appears that on-site storage pile was chosen instead	
Temporary On-Site Storage Pile		Y				

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: WRIGLEY CHARCOAL (Wrigley, TN)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Thermal Treatment						
On-Site Incineration		N	High costs			Rotary kiln retained
Off-Site Incineration	Waste Drums Tank Sludge, Coal Tar Wastes	Y				
Pyrolysis		N			Requires relatively sophisticated equipment	
Vitrification		N	High energy and capital intensive implement-ation			
Thermal Desorption		N		Not applicable to site contaminants (dioxins and dibenzfurans)		

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: WRIGLEY CHARCOAL (Wrigley, TN)
PHASE I/PHASE II ANALYSIS (Continued)

TECHNOLOGY	FS NAME	TECHNOLOGY RETAINED Phase I/Phase II	COST	EFFECTIVENESS	IMPLEMENTABILITY	COMMENTS
Biological Treatment						
Soil/Slurry Bioreactor		N		Not applicable to site contaminants (dioxins)		Not applicable due to the variety of contaminants and non-conformity of the soil
Chemical Treatment						
Dechlorination	Chemical Dehalogenation - KPEG	N	High costs			
Physical Treatment						
Soil Washing		N		Results in low recovery rate due to variation in waste composition and the treatment of clay soil containing semi-volatiles	Requires high degree of integrated design, including bench and pilot tests; produces hazardous wash water, which requires treatment/disposal; difficult to remove fine soil particles from washing fluid	
Off-Site Options						
Off-Site RCRA Facility		Y				

SITE-SPECIFIC DATA COLLECTION FORM
WOOD TREATER SITE NAME: WRIGLEY CHARCOAL (Wrigley, TN)
PHASE III ANALYSIS

Comments: Key contaminants include VOCs, other organics (PAHs, phenols), metals (arsenic, chromium, lead), and inorganics (asbestos). During the selection process, three alternatives were considered. Each alternative builds on the previous one, never actually eliminating technologies from consideration. Institutional actions were retained in conjunction with other technologies.

TECHNOLOGIES EVALUATED	SELECTED (Y/N)	OVERALL PROTECTION	COMPLIANCE WITH FEDERAL ARARS	REDUCTION OF TOXICITY, MOBILITY, OR VOLUME	LONG-TERM EFFECTIVENESS	SHORT-TERM EFFECTIVENESS	IMPLEMENTABILITY	COST
Institutional Actions								
Restrictions	Y							
Capping								
Multi-Layer Cover System	Y							
Fixation								
Solidification	Y							
On-Site Containment								
Temporary On-Site Storage Pile	Y							
Thermal Treatment								
Off-Site Incineration	Y							
Off-Site Options								
Off-Site RCRA Facility	Y							

WOOD TREATER SITE NAME: WRIGLEY CHARCOAL (Wrigley, TN)
PHASE III ANALYSIS (Continued)