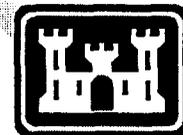


Proposed Action Memorandum
Interim Removal Action
Former Pentolite Road Red Water Ponds
Plum Brook Ordnance Works,
Sandusky, Ohio

Presented to
PBOW Restoration Advisory Board

11 September 2002



Purpose of PRRWP Action Memorandum

- Present selection of Non-Time Critical Removal Action (NTCRA)
 - Based on results of remedial investigation / feasibility study (R/FS) completed for PRRWP soils
 - Prevents human exposure to soil containing constituents of concern (COCs) at concentrations above remediation goals
 - Reduces potential ecological hazards
- Provide for public comment



Community Involvement

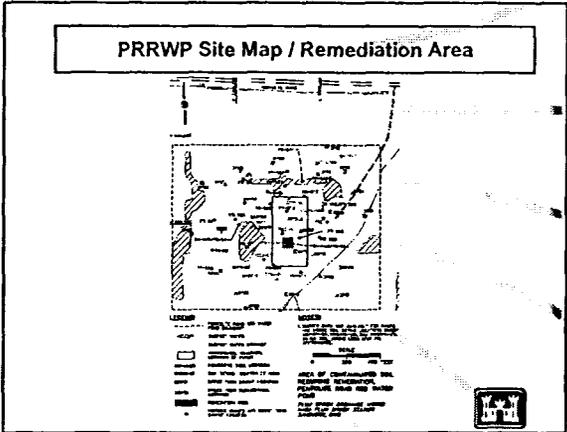
- The Action Memorandum is made available to the public for a 30-day review and comment period.
- At the end of the 30-day review period, all comments will be documented in the administrative record (AR) as well as evaluated and incorporated into the overall remediation plans, if deemed feasible by USACE.



Summary of Selected Response Action

- USACE will complete NTCRA at PRRWP, consisting of:
 - Excavation of approximately 148 CY of site soils
 - Backfill excavation with clean material
 - Ex-situ stabilization of excavated material
 - Off-site disposal of stabilized waste.
- The NTCRA may be the final response action for soils at PRRWP
 - The NTCRA will be documented in a Decision Document for PRRWP by the USACE.
 - Additional action(s) may be required if soils are determined to be a continuing source of groundwater contamination that pose a risk to human health.





Summary of PRRWP RI

- Summary of remedial investigation (RI) fieldwork
 - Field investigation conducted in 1998
 - 20 direct-push locations, 3 soil depths (0-2', 4-6', 8-10'), and groundwater sample at each DP location
 - 4 co-located surface water/sediment samples in drainage areas
- Summary of HHRA Results
 - TNT in soil accounts for almost all site-related carcinogenic risk and non-carcinogenic hazard
 - 4-A-2,6-DNT; 2,6-DNT; 2,4-DNT; and 1,3-DNB in soil slight contribution to risk and hazard

Summary of PRRWP RI (continued)

- Summary of HHRA Results (continued)
 - Surface soil (groundskeeper and indoor worker)
 - De Minimus risk and hazard
 - Total soil (construction worker and resident)
 - ILCRs are 1E-5 and 8E-4, respectively due to TNT
 - HIs are 100 and 360, respectively due to TNT
 - Risk-based remediation concentration for TNT is 12 mg/kg
 - No unacceptable HI or ILCRs associated with exposure to surface water or sediment

Summary of PRRWP RI (continued)

- Summary of SLERA results
 - Terrestrial hazard quotients (HQ) using food chain modeling
 - Soil HQs of 450, 14, 2, 3, and 1 for the marsh wren, shrew, deer mouse, raccoon, and cottontail rabbit, respectively.
 - 4-Amino-2,6-DNT maximum concentration, worst-case model does not rule out potential adverse ecological effects
- Summary of BERA (2001) results
 - Environmental media at PRRWP do not appear to present unacceptable potential for adverse ecological effects



Summary of Evaluated Alternatives

- Alternative 1 - No Action
- Alternative 2 - Excavation, Ex-Situ Stabilization, and Off-Site Disposal
- Alternative 3 - Excavation and Off-Site Disposal



Alternative 1 Details

- No Action
 - Required by NCP as baseline for comparing other alternatives
 - Does not reduce human health risks to levels considered acceptable by US EPA.
 - Does not employ removal, containment, or treatment actions that mitigate impact of source areas on receptors or other media.
 - Thus, No Action was not considered the recommended alternative.



Alternative 2 Details

- Excavation, Ex-Situ Stabilization, and Off-Site Disposal
 - Excavate approximately 148 CY of contaminated soil
 - On-site ex-situ stabilization of all excavated soil
 - Off-site disposal in non-hazardous waste landfill
 - Stabilization will immobilize TNT; however, it will not destroy, transform, or remove TNT from the soil



Alternative 3 Details

- Excavation and Off-Site Disposal
 - Excavate approximately 148 CY of contaminated soil
 - All excavated soil will be classified as a hazardous waste and shipped for disposal to an off-site Subtitle C treatment, storage and disposal facility to comply with Land Disposal Restrictions
 - None of the soil will be treated prior to disposal, thus this alternative does not reduce the toxicity or mobility of chemicals in the excavated soil



Proposed Action Description - Alternative 2

- Excavate areas where TNT concentrations > 12 mg/kg (148 CY)
- On-site chemical stabilization of excavated soil classified as hazardous waste based on TCLP testing
 - Treatability study precedes remedial action
 - 148 CY may be hazardous waste based on levels of 2,4-DNT
- Off-site disposal of excavated / stabilized soils
 - Stabilized soil tested using TCLP (1 sample per 150 tons)
 - Non-hazardous soils disposed off-site
 - Hazardous soils require further stabilization or alternative treatment
- Clean fill in excavations, graded for proper drainage, and provide appropriate vegetative ground cover



Remedial Performance of Proposed Action

- Alternative 2 is protective of human health and the environment
- Complies with Applicable or Relevant and Appropriate Requirements (ARARs)
- Permanently removes COC (TNT) from PRRWP at a concentration above remedial goal of 12 mg/kg
- Permanently reduces toxicity and mobility of contaminants
 - Volume of contaminants is not reduced
- No risk to the community or environment during implementation
- Is technically & administratively implementable
 - No engineering or regulatory restrictions prevent implementation
 - Stabilizing agents and equipment required are readily available



Proposed Action Schedule and Cost

- Alternative 2 can be implemented in 6 to 12 months
 - Prepare and review of work plans
 - Mobilization and excavation of 148 CY of contaminated soil
 - TCLP tests
 - Ex-situ stabilization of excavated soil
 - Confirmatory sampling, disposal of treated soil,
 - Backfill with clean soil, grade and re-vegetate area
 - Demobilization
- Estimated capital cost for Alternative 2 is \$130,000
 - No long-term O&M costs associated with Alternative 2



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For Risk
PBDW

**Proposed Action Memorandum
Interim Removal Action,
Former Pantolite Road Red Water Ponds,
Plum Brook Ordnance Works,
Sandusky, Ohio**

Presented to
PBOW Restoration Advisory Board

11 September 2002



Purpose of PRRWP Action Memorandum

- Present the selected response action
 - Based on results of remedial investigation / feasibility study (RI/FS) completed for PRRWP soils
 - Prevents human exposure to soil containing constituents of concern (COCs) at concentrations above remediation goals
- Provide for public comment



Community Involvement

- The Action Memorandum is made available to the public for a 30-day review and comment period.
- At the end of the 30-day review period, all comments will be documented in the administrative record (AR) as well as evaluated and incorporated into the overall remediation plans, if deemed feasible by USACE.



Summary of Selected Response Action

- USACE will complete a Non-Time Critical Removal Action (NTCRA) at PRRWP, consisting of:
 - Excavation of approximately 148 CY of site soils
 - Backfill excavation with clean material
 - Ex-situ stabilization of excavated material
 - Off-site disposal of stabilized waste.
- The selected alternative may be the final response action for soils at PRRWP
 - The NTCRA will be documented in a Decision Document for PRRWP by the USACE.
 - Additional action(s) may be required if soils are determined to be a continuing source of groundwater contamination that pose a risk to human health.



Summary of Evaluated Alternatives

- Alternative 1, No Action
- Alternative 2, Excavation, Ex-Situ Stabilization, and Off-Site Disposal
- Alternative 3, Excavation, and Off-Site Disposal



Alternative 1 Details

- No Action
 - Required by NCP as baseline for comparing other alternatives
 - Does not reduce human health risks to levels considered acceptable by US EPA.
 - Does not employ removal, containment, or treatment actions that mitigate impact of source areas on receptors or other media.
 - Thus, No Action was not considered the recommended alternative.



Alternative 2 Details

- Excavation, Ex-Situ Stabilization, and Off-Site Disposal
 - Excavate approximately 148 CY of contaminated soil
 - On-site ex-situ stabilization of all excavated soil
 - Stabilization will immobilize TNT; however, it will not destroy, transform, or remove TNT from the soil.



Alternative 3 Details

- Excavation and Off-Site Disposal
 - Excavate approximately 148 CY of contaminated soil.
 - All excavated soil will be classified as a hazardous waste and shipped for disposal to an off-site Subtitle C treatment, storage and disposal facility to comply with Land Disposal Restrictions



Proposed Action Description - Alternative 2

- Excavate areas where TNT concentrations > 12 mg/kg (148 CY)
- On-site chemical stabilization of excavated soil classified as hazardous waste based on TCLP testing
 - Treatability study precedes remedial action
 - 148 CY may be hazardous waste based on levels of 2,4-DNT
- Off-site disposal of excavated / stabilized soils
 - Stabilized soil tested using TCLP (1 sample per 150 tons)
 - Non-hazardous soils disposed off-site
 - Hazardous soils require further stabilization or alternative treatment
- Clean fill in excavations, graded for proper drainage, and provide appropriate vegetative ground cover



Remedial Performance of Proposed Action

- Alternative 2 is protective of human health and the environment
- Complies with Applicable or Relevant and Appropriate Requirements (ARARs)
- Permanently removes COC (TNT) at a concentration above remedial goal
- Permanently reduces toxicity and mobility of contaminants
 - Volume of contaminants is not reduced
- No risk to the community or environment during implementation
- Is technically & administratively implementable
 - No engineering or regulatory restrictions prevent implementation
 - Stabilizing agents and equipment required are readily available



Proposed Action Schedule and Cost

- Alternative 2 can be implemented in 6 to 12 months
 - Prepare and review of work plans
 - Mobilization and excavation of 148 CY of contaminated soil
 - TCLP tests
 - Ex-situ stabilization of excavated soil
 - Confirmatory sampling, disposal of treated soil
 - Backfill with clean soil, grade and re-vegetate area
 - Demobilization
- Estimated capital cost for Alternative 2 is \$150,000
 - No long-term O&M costs associated with Alternative 2



1.4 Community Involvement

Community relations activities are outlined in the 1990 National Oil and Hazardous Substance Pollution Contingency Plan (NCP) and Superfund Amendments and Reauthorization Act of 1986 (SARA). The objective of this program is to provide a mechanism for the communication and exchange of information among army agencies, government agencies and residences of local communities and those adjacent to Plum Brook downstream from PBOW. In January 1997, a Restoration Advisory Board (RAB), comprised of local citizens with varying backgrounds, was established to promote a two-way dialog to not only keep local citizens informed about site progress, but to also allow them the opportunity to provide input to site decisions.

In alignment with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) Section 113, USACE has developed the Administrative Records (AR) to provide documentation as to how and why decisions specific to the remediation of the site are made. To date, the investigations completed for PRRWP are as follows:

- Contamination Evaluation, IT 1991,
- Site Inspection Report, Morrison Knudsen, 1994,
- Focused Remedial Investigation, Dames & Moore, 1997
- Site-Wide Groundwater Investigation, Dames & Moore, 1997,
- Risk Assessment and Direct-Push Investigation, IT, 2000, and
- Baseline Ecological Risk Assessment, IT 2001.

The AR contains these final documents as well as all others for the PBOW site. A Red Water Ponds Area Focused Feasibility Study for Soils (FFS) report will be included in the AR once it becomes final. The reports were prepared from data collection activities and other research that form the basis for the decisions affecting the remediation process for the Proposed Alternative 2. The RAB will be briefed on all reports and will be presented with the preferred alternative on 11 September 2002. Currently, the draft FFS reports are located in the AR, located at USACE Huntington District Office (Huntington, WV). All final documents are available for public viewing at the Public Repository located at the BGGSU Firelands Library (Huron, OH).

As part of the community relations program, this Action Memorandum will be made available to the public for a 30-day review and comment period. To initiate this period and promote public understanding and awareness, a public meeting (in conjunction with the September 2002 RAB meeting) will be held to present the proposed NTCRA (Alternative 2) and tentative construction schedule. Notices announcing date, location and time of meeting will be placed in the local newspapers. At the end of the 30-day review period, all comments will be documented in the AR as well as evaluated and incorporated into the overall remediation plans, if deemed feasible by USACE.

2.0 Proposed Action and Estimated Costs

2.1 Proposed Action Description

Based on the results of the alternatives evaluation, Alternative 2, the excavation, ex-situ chemical stabilization of soil, off-site disposal of stabilized material, and backfilling using clean fill material is the preferred alternative. The proposed approach is to excavate all the areas in which the concentration of the COC in soil exceeds the RGO of 12 mg/kg. The estimated volume of contaminated soil from PRRWP is 148 cubic yards. For estimating purposes, it is assumed that the entire volume of excavated soil would be classified as RCRA hazardous waste based on 2,4-DNT concentrations. The entire excavated volume would require treatment to achieve non-hazardous waste classification prior to land disposal in a non-hazardous waste landfill.

Assuming a successful treatability study, chemical stabilization would be used to treat the excavated soil classified as hazardous waste. An on-site mix box would be used to mix stabilizing agents with the contaminated soil. A representative sample of the stabilized soil would be taken for every 150 tons of processed soil. The stabilized soil samples would be tested for hazardous characteristics and potential underlying hazardous constituents. If the TCLP test results indicate that the stabilized soil is non-hazardous and complies with LDR, it will be disposed in a non-hazardous waste landfill. If the soil does not meet the TCLP and LDR criteria, further stabilization would be needed or an alternative treatment would be required.

Since stabilization only alters the physical availability of the contaminants, using stabilized material as backfill at the site will be prohibited. Therefore, clean fill material will be placed in the excavation pits, rough graded as necessary to achieve proper drainage, and provide vegetative cover appropriate for the area.

2.2 Contribution to Remedial Performance

2.2.1 Overall Protection of Human Health and the Environment

Excavation of contaminated soil followed by treatment/disposal would permanently remove contaminated soil, thereby reducing human health risks to within levels considered acceptable by the EPA and significantly reducing the ecological hazard quotients. Stabilization of the waste would reduce the potential of the contaminants to leach to groundwater.

2.2.2 Compliance with Applicable or Relevant and Appropriate Requirements

The ARARs that need to be considered for Alternative 2 are presented in Appendix A. No location-specific ARARs (Table A-1) have been identified that need to be considered for this alternative. The remedial alternative would comply with all the action-specific

ARARs (Table A-2), specifically the regulations that deal with the TCLP test and the storage/disposal of hazardous waste.

2.2.3 Long-Term Effectiveness

This alternative would result in the permanent removal of the COC in soil that currently exceed RGO of 12 mg/kg. Human health risks caused by current (or future) human exposure to contaminated soil at the site would be reduced to within levels considered acceptable by the EPA and the Ohio Environmental Protection Agency.

2.2.4 Reduction of Toxicity, Mobility, or Volume

Alternative 2 would permanently reduce the mobility of contaminants in soil by stabilizing the COC in excavated site soil. The removal of the contaminated media from an uncontrolled release area to a secure facility designed and constructed to manage waste materials would significantly reduce the potential for the contamination to spread. Although the mass and volume of contaminated media remaining at the site would be reduced at the site, no net reductions in contaminant volume would be achieved, because the COC is transferred to another location.

2.2.5 Short-Term Effectiveness

This alternative would not pose any risk to the community or the environment during implementation. Measures would be taken to prevent excessive dust formation during excavation and stabilization activities. Remediation workers would be equipped with protective gear to prevent exposure.

The estimated time to complete this alternative is 6 - 12 months. This includes writing and review of work plans, including health and safety plans, completion of a treatability study, mobilization, excavation of 148 cubic yards of contaminated soil, ex situ stabilization of excavated soil, confirmatory sampling, off-site disposal of treated soil, backfill, and demobilization.

2.2.6 Implementability

This alternative is technically and administratively implementable. No engineering or regulatory restrictions stand in the way of implementation. The stabilizing agents and equipment needed for the remedial alternative are readily available.

2.3 Project Schedule

The estimated time to complete the alternative is 6 – 12 months. This includes writing and review of work plans, including health and safety plans, completion of a treatability study, mobilization, excavation of 148 cubic yards of contaminated soil, ex-situ on-site

stabilization of excavated soil, confirmatory sampling, off-site disposal of treated soil, backfill, and demobilization.

2.4 Estimated Costs

The detailed cost evaluations associated with the implementation of Alternative 2 at PRRWP are presented in Table 4-1 of the FFS. The estimated capital cost for Alternative 2 is \$130,000. There are no long-term O&M costs associated with this alternative. Therefore, the present value of this alternative is the same as its capital cost.

3.0 Threat to Public Health or Welfare or the Environment, and Statutory and Regulatory Authorities

3.1 Threats to Public Health or Welfare

The NCP, at 40 CFR §300.415, lists the factors to be considered in determining the appropriateness of a Removal Action. The following paragraphs of Section 300.415 of the NCP apply to the PRRWP site:

- o [Section 300.415(b)(2)(i)] - “Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants.”
- o [Section 300.415(b)(2)(ii)] - “Actual or potential contamination of drinking water supplies or sensitive ecosystems.”
- o [Section 300.415(b)(2)(iv)] - “High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate.”

A hazardous substance has been found in subsurface soil samples collected from location MW-8/PR-S14. This substance consists of TNT, a nitroaromatic compound. This hazardous substance as defined in Section 101(14) of CERCLA, 42 U.S.C. §9601(14). Concentrations of 2,4-DNT in soil indicates that the potential exists for a small quantity of material to be classified as a RCRA characteristic hazardous waste if excavation of the material occurs. The potential exists for nearby human populations to be exposed to these hazardous substances or pollutants or contaminants if not addressed by this response action.

In addition, samples collected from groundwater bearing zones indicate that these zones have been impacted by nitroaromatic contamination emanating from sources located on the site. Therefore, the COC found in soil, if not addressed by this response action, may migrate, or result in actual or potential contamination of drinking water supplies.

3.2 Threats to the Environment

Based on results of the SLERA and BERA, no further ecological investigation or remediation activities are needed.

3.3 Statutory and Regulatory Authorities

Regulatory efforts for remediation activities within PRRWP fall under the Defense Environmental Restoration Program – Formerly Used Defense Sites (DERP-FUDS) program. Because the original PBOW was acquired by DOD in 1941 for the U.S. Army Plum Brook Ordnance Works and operated under their direction until late 1945, PBOW is considered a FUDS and any contamination on the property that is a result of these activities is the responsibility of the Army under the DERP-FUDS program. This program has three major phases:

- Inventory – site identification, records review to verify DOD ownership or usage and a preliminary assessment
- Study – site inspection if required to identify contamination, engineering, evaluations and costs analyses for removal action; remedial investigation/feasibility study (RI/FS); and/or litigation, negotiation, and settlement with other parties to define and resolve DOD liability
- Removal/Remediation – engineering design, removal and/or remedial actions, and/or operations and maintenance during remediation and/or for long-term monitoring, if required.

PRRWP Alternative 2 would be covered under the removal/remediation phase.

Under the CERCLA, the President delegated authority to DOD (Secretary of Defense) for clean up of active and formerly used defense sites. In addition, the Superfund Amendments and Reauthorization Act of 1986 (SARA) Section 211 required the Secretary of Defense to carry out the DERP, who in turn delegated these authorities to USACE, thereby granting USACE the authority to conduct removal/remediation projects such as PRRWP. The legislative context of DERP includes the following: CERCLA, SARA, RCRA, the Federal Facility Compliance Act of 1992, the National Environmental Policy Act, and other environmental, safety, and occupational health laws and regulations (i.e., Clean Water Act, Clean Air Act, Toxic Substance Control Act, Safe Drinking Water Act, Occupational Safety and Health Act, endangered Species Act, National Historic Preservation Act of 1966). A detailed description of these laws can be found in the Plum Brook Site Management Plan, Part A, Section 2.0 Regulatory Framework. All ARARs that pertain to the PRRWP Alternative 2 removal action have been addressed in Section 2.2.2 and Appendix A of this Action Memorandum.

The Defense and State Memorandum of Agreement (DSMOA) Cooperative Agreement program was developed to involve states and territories in the cleanup of DOD

installation through the DERP. Ohio EPA is currently working under the DESMOA agreement to provide the necessary technical services required for remediation of PBOW PRRWP.

4.0 Expected Change in the Situation Should Action Be Delayed or Not Taken.

Delayed or no action at the site would permit continued potential risk and hazard to humans from exposure to nitroaromatic compounds in soil. Additionally, contamination from the source area could potentially migrate to groundwater and the surrounding environment, resulting in exposure to on-site and off-site receptors.

5.0 Outstanding Policy Issues

The NCP provides that in selecting a NTCRA, the alternatives must be evaluated in an engineering evaluation/cost assessment (EE/CA) which must be provided to the public for no less than a thirty (30) day comment period prior to the selection of the action. (See 40 CFR 300. 415 (b) (4) and (m) (4)). The project team has not prepared an EE/CA for this site; instead a FFS for soils at PRRWP has been prepared. This FFS is equivalent to the EE/CA and will be reviewed by the project team and Restoration Advisory Board (RAB). The RAB will be provided with the Action Memorandum during the public notification and comment and response period.

6.0 Public Notification

This Proposed Action Memorandum can be found in the Administrative Record file maintained at the USACE Huntington District located at 502 8th Street, Huntington, WV 25701 and in the Public Repository located at the BGSU Firelands Library, Huron, Ohio. The 30-day public comment period begins 11 September 2002 and ends 11 October 2002. In addition, a public meeting is to be held on 11 September 2002 to present the Proposed Action Memorandum. USACE representatives will answer questions about the removal action alternative now being proposed. Responses to comments received during the comment period will be included in the revised Action Memorandum, which will then be signed and placed in the Administrative Record. The newspaper announcement detailing date, time and location of public meeting as well as the request for public comments on the Proposed Action Memorandum will be published two weeks in advance of the public meeting (11 September 2002).

7.0 Recommendation

This Action Memorandum represents the NTCRA for soil contaminated with TNT at the PBOW's PRRWP site, in Sandusky, Ohio. This Action Memorandum was developed in accordance with CERCLA, as amended, and is consistent with the NCP. This action is based on the Administrative Record for the site.

Conditions at the PRRWP Site continue to meet the criteria set forth in Section 300.415 of the NCP for a NTCRA. I approve the selection of Alternative 2 as the NTCRA at this site.

APPROVED: _____

DATE: _____

Col. John D. Rivenburgh, District Engineer
U.S. Army Corps of Engineers, Huntington District
Huntington, West Virginia

References

- Dames & Moore, 1997. *Records Review Final Report, Plum Brook Ordnance Works, Plum Brook Station/NASA, Sandusky, Ohio for U.S. Army Corps of Engineers, Nashville/Huntington Districts*. Dames & Moore, Inc., April 1997.
- ICI, 1995. *Site Management Plan, Part B Areas of Concern, Plum Brook Ordnance Works, Sandusky, Ohio*. International Consultants Incorporated, September 1995.
- IT, 1991. *Engineering Report for the Contamination Evaluation at the Former Plum Brook Ordnance Works, Sandusky, Ohio*. IT Corporation, January 1991.
- IT, 2000. *Final Risk Assessment and Direct Push Investigation of Red Water Ponds Areas, Former Plum Brook Ordnance Works, Sandusky, Ohio, Volume 1 - Report of Findings*. IT Corporation, August 2000.
- IT, 2001. *Final Redwater Pond Areas Baseline Ecological Risk Assessment, Former Plum Brook Ordnance Works, Sandusky, Ohio*. IT Corporation, November, 2001.
- IT, 2002. *Red Water Pond Areas Focused Feasibility Study for Soil, Former Plum Brook Ordnance Works, Sandusky, Ohio*. IT Corporation, 2002.
- MK, 1994. *Site Inspection Report, Plum Brook Station, Sandusky, Ohio (prepared for NASA)*. Morrison Knudsen Corporation, 1994.
- Teledyne Isotopes, 1977. *Memorandum: Analytical Data Relating to Plum Brook Station "Red Water", written by John E. Ross*. Teledyne Isotopes, June 1977.

Appendix A

ARAR Tables

Table A-1

Location-Specific Applicable or Relevant and Appropriate Requirements Feasibility Study
 Pentolite Road Red Water Ponds Area
 Plum Brook Ordnance Works, Sandusky, Ohio
 page 1 of 4

Location Characteristics	Requirement(s)	Prerequisite(s)	Federal Citation	Ohio Citation	Alternatives Applicable	Comments
Floodplains/Wetlands						
Presence of wetlands as defined in 40 CFR 6, Appendix A, Section 4.0(j).	<p>Avoid, to the extent possible, the long- and short-term adverse effects associated with destruction, occupancy and modification of wetlands. Measures to mitigate adverse effects or actions in a wetland include, but are not limited to: minimum grading requirements, runoff controls, design and construction constraints, and protection of ecology-sensitive areas.</p> <p>Take action, to the extent practicable, to minimize destruction, loss or degradation of wetlands, and to preserve, restore, and enhance the natural and beneficial values of wetlands.</p> <p>Potential effects of any new construction in wetlands that are not in a floodplain shall be evaluated. Identify, evaluate, and as appropriate, implement alternatives actions that may avoid or mitigate adverse impacts on wetlands.</p>	Federal actions that involve potential impacts to, or take place within wetlands - Applicable	40 CFR 6, Appendix A 40 CFR 6, Appendix A 10 CFR 1022.3 (c) and (d)	NA	2, 3	Status of area as jurisdictional wetlands will be evaluated prior to remediation.

Table A-1

Location-Specific Applicable or Relevant and Appropriate Requirements Feasibility Study
 Pentolite Road Red Water Ponds Area
 Plum Brook Ordnance Works, Sandusky, Ohio
 page 2 of 4

Location Characteristics	Requirement(s)	Prerequisite(s)	Federal Citation	Ohio Citation	Alternatives Applicable	Comments
Aquatic Resources						
Within area impacting stream or any other body of water – and – presence of wildlife resources (e.g., fish)	The effects of water-related projects on fish and wildlife resources and their habitat should be considered with a view to the conservation of fish and wildlife resources by preventing loss of and damage to such resources.	Action that impounds, modifies, diverts, or controls waters including navigation and drainage activities -Relevant and appropriate	Fish and Wildlife Coordination Act (16 USC 661 et seq.)	NA	NA	Remedial activities are not anticipated to impact fish and wildlife resources.
Location encompassing aquatic ecosystem as defined in 40 CFR 230.3(c)	<p>Except as provided under Section 404(b)2 of the Clean Water Act, no discharge of dredged or fill material into an aquatic ecosystem is permitted if there is a practicable alternatives that would have less adverse impact.</p> <p>No discharge of dredged or fill material shall be permitted unless appropriate and practicable steps per 40 CFR 230.70 et seq. Have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem.</p>	Action that involves the discharge of dredged or fill material into waters of the U.S. including jurisdictional wetlands – Applicable	<p>40 CFR 230.10(a)</p> <p>40 CFR 230.10(d)</p>		2, 3	

Table A-1

Location-Specific Applicable or Relevant and Appropriate Requirements Feasibility Study
 Pentolite Road Red Water Ponds Area
 Plum Brook Ordnance Works, Sandusky, Ohio
 page 3 of 4

Location Characteristics	Requirement(s)	Prerequisite(s)	Federal Citation	Ohio Citation	Alternatives Applicable	Comments
Cultural Resources						
Presence of archaeological resources	May not excavate, remove, damage, or otherwise alter or deface such resources unless by permit or exception	Action that would impact archaeological resources on public land – Applicable	43 CFR 7.4(a)		NA	Cultural resources have not been discovered within PBOW.
	Must protect any such archaeological resources if discovered.	Excavation activities that inadvertently discover archaeological resources – Applicable	40 CFR 7.5(b)(1)		NA	Cultural resources have not been discovered within PBOW.
	Must stop activities in the area of discovery and make a reasonable effort to secure and protect the objects discovered.	Excavation activities that inadvertently discover such resources on federal lands or under federal control – Applicable	43 CFR 10.4 ©		NA	Cultural resources have not been discovered within PBOW.
	Must consult with Indian tribe likely to be affiliated with the objects to determine further disposition per 40 CFR 10.5(b)	Same as above – Applicable	43 CFR 10.4(d)		NA	Cultural resources have not been discovered within PBOW.

Table A-1

Location-Specific Applicable or Relevant and Appropriate Requirements Feasibility Study
 Pentolite Road Red Water Ponds Area
 Plum Brook Ordnance Works, Sandusky, Ohio
 page 4 of 4

Location Characteristics	Requirement(s)	Prerequisite(s)	Federal Citation	Ohio Citation	Alternatives Applicable	Comments
Cultural Resources (cont.)						
Within area where action may cause irreparable harm, loss, or destruction of significant artifacts.	Must take action to recover and preserve artifacts.	Alteration of terrain that threatens significant scientific, prehistoric, or archaeological data.	National Archaeological and Historical Preservation Act (16 USC Section 469); 35 CFR Part 65	NA	NA	Cultural resources have not been discovered within PBOW.
Endangered, threatened or rare species						
Areas harboring Endangered species	Current conditions and potential remedial activities at PBOW must not destroy or adversely critical habitat	Threatened and endangered species were identified at PBOW, but not at TNT Area A	16 USC 1531 et seq., 50 CFR 17.21, 17.31, 17.61, 17.71, 17.94, 50 CFR 402.	NA	2, 3	No endangered wildlife species identified at PRRWPs. Remediation area will be revegetated with ground cover appropriate for the area.
	May not knowingly destroy the habitat of such wildlife species.	Same as above – Relevant and Appropriate		NA	NA	No endangered wildlife species identified at PRRWPs.
	Upon good cause shown and where necessary to protect human health or safety, endangered or threatened species may be removed, captured, or destroyed.	Same as above – Relevant and Appropriate			NA	NA

- CFR - Code of Federal Regulations.
- NA - Not applicable.
- PBOW - Plum Brook Ordnance Works.
- TNT - 2,4,6-Trinitrotoluene.
- USC - U.S. Code.

Table A-2

Action-Specific Applicable or Relevant and Appropriate Requirements Feasibility Study
Pentolite Road Red Water Ponds Area
Plum Brook Ordnance Works, Sandusky, Ohio
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Action/Requirement	Requirement(s)	Prerequisite(s)	Federal Citation	Ohio Citation	Alternative Applicable	Comments
Waste Generation/Management						
Characterization of solid waste (e.g., contaminated PPE, equipment, wastewater)	Must determine if the waste is hazardous or if waste is excluded under 40 CFR 261.4; and	Generation of solid waste as defined in 40 CFR 261.2 – Applicable	40 CFR 262.11(a)	3745-52-11(a)	2, 3	Remedial activities might generate hazardous waste.
	Must determine if waste is listed under 40 CFR Part 261; or		40 CFR 262.11(b)	3745-52-11(b)	2, 3	Excavated contaminated soil is not classified as a listed hazardous waste because there is not definite documentation regarding the dates of disposal.
	Must characterize waste by using prescribed testing methods or applying generator knowledge based on information regarding material or processes used. If waste is determined to be hazardous, it must be managed in accordance with pertinent provisions of 40 CFR 261 through 268.		40 CFR 262.11(c) and (d)	3745-52-11(c) through (e)	2, 3	Remedial activities might generate hazardous waste.
Characterization of hazardous waste	Must obtain a detailed chemical and physical analysis of a representative sample of the waste(s) which at a minimum contains all of the information which must be known to treat, store, or dispose of the waste in accordance with 40 CFR 264 and 268.	Generation of RCRA hazardous waste for storage, treatment or disposal - Applicable	40 CFR 264.13(a)(1)	3745-59-07	2, 3	Remedial activities might generate hazardous waste.

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Action/Requirement	Requirement(s)	Prerequisite(s)	Federal Citation	Ohio Citation	Alternative Applicable	Comments
	Must determine if the waste is restricted from land disposal under 40 CFR 268 et seq. by testing in accordance with prescribed methods or use of generator knowledge of waste.		40 CFR 268.7	3745-59-07	2, 3	Remedial activities might generate hazardous waste.
	Must determine alternative land disposal restrictions under 40 CFR 268.49 by treating soil to 10 x UTS levels prior to land disposal.	Generation of RCRA hazardous waste for storage, treatment or disposal – Applicable	40 CFR 268.49		2, 3	Remedial activities might generate hazardous waste.
Storage						
Accumulation of hazardous waste in containers (e.g. PPE, rags, etc.)	<p>A generator may accumulate hazardous waste at the facility provided that:</p> <ul style="list-style-type: none"> • Waste is placed in containers that comply with 40 CFR 265.171 through 173 (Subpart 1); and • container is marked with the words [hazardous waste] or; • container may be marked with other words that identify the contents. 	<p>Accumulation of RCRA hazardous waste on site as defined in 40 CFR 260.10 – Applicable</p> <p>Accumulation of 55 gallons or less of RCRA hazardous waste at or near any point of generation – Applicable</p>	<p>40 CFR 262.34(a)</p> <p>40 CFR 262.34©(1)</p>	<p>3745-52-34(a)</p> <p>3745-52-34©(1)</p>	2, 3	This applies to accumulation in 55-gallon drums at or near the point of generation, before the drum is filled. Upon filling the drum, it must be moved within 3 days to a designated container storage area. Upon a drum placement in the container storage area, if a temporary storage area, it must be disposed within allowed time frame.

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Action/Requirement	Requirement(s)	Prerequisite(s)	Federal Citation	Ohio Citation	Alternative Applicable	Comments
Temporary storage of hazardous waste in containers	<p>Except noted below, a generator may accumulate(store) hazardous waste on-site for 90 days or less without a permit or without having interim status:</p> <ul style="list-style-type: none"> • A generator who generates greater than 100 kg but less than 1000 kg of hazardous waste in a calendar month may accumulate hazardous waste on-site for 180 days or less without need to meet long-term storage requirements (40 CFR 262.34(d)). • A generator who generates greater than 100 kg but less than 1000 kg of hazardous waste in a calendar month and who must transport his waste, or offer his waste for transportation, over a distance of 200 miles or more for off-site treatment, storage or disposal may accumulate hazardous waste on-site for 270 days without need to meet long-term storage requirements (40 CFR 262.34(d)) • A generator who generates greater than 100 kg but less than 1000 kg of hazardous waste in a calendar month and who accumulates hazardous waste in quantity less than 6000 kg or for fewer than 180 days (or for less than 270 days if he must transport his waste, or offer his waste for transportation, over a distance of 200 miles or more), is not required to meet long-term storage requirements (40 CFR 262.34(f)). 	A generator providing temporary storage pending off-site treatment, storage, and disposal.	40 CFR 262.34	3745-52-34	2, 3	Remedial activities might generate hazardous waste. On-site storage prior to disposal/treatment might be necessary.

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Action/Requirement	Requirement(s)	Prerequisite(s)	Federal Citation	Ohio Citation	Alternative Applicable	Comments
Requirements for temporary storage of hazardous waste in containers	Except as noted above, a generator may accumulate hazardous waste on-site for 90 days or less without the need to meet requirements for long-term storage, provided than:	Temporary storage of RCRA hazardous waste pending off-site treatment, storage, and disposal.	40 CFR 262.34(a)(1)(i)	3745-52-34(a)(1)(a)	2, 3	Remedial activities might generate hazardous waste.
Requirements for temporary storage of hazardous waste in containers (continued)	The waste is placed in containers and the generator complies with Subpart I of 40 CFR Part 265.		40 CFR 262.34(a)(2)	3745-52-34(a)(1)(a)	2, 3	Remedial activities might generate hazardous waste.
	The date upon which each period of accumulation begins is clearly marked and visible for inspection on each container.		40 CFR 262.34(a)(2)	3745-52-34(a)(2)	2, 3	Remedial activities might generate hazardous waste.
	While being accumulated on-site, each container and tank is labeled or marked clearly with the words, [hazardous waste] and		40 CFR 262.34(a)(3)	3745-52-34(a)(3)	2, 3	Remedial activities might generate hazardous waste.
	The generator complies with the requirements for owners and operators in Subpart C (Emergency Preparedness), and Subpart D (Contingency Plan), and with 268.7(a)(4) [testing and documentation for disposal]		40 CFR 262.34(a)(4)	3745-52-34(a)(4)	2, 3	Remedial activities might generate hazardous waste.
Use and management of hazardous waste in containers	If container is not in good condition (e.g., severe rusting, structural defects) or if it begins to leak, must transfer waste into container in good condition.	Storage of RCRA hazardous waste in containers – Applicable	40 CFR 264.171	3745-55-71	2, 3	Remedial activities might generate hazardous waste.
	Use container made or line with materials compatible with waste to be stored so that the ability of the container is not impaired.		40 CFR 264.172	3745-55-72	2, 3	Remedial activities might generate hazardous waste.
	Keep containers closed during storage, except to add/remove waste.		40 CFR 264.173(a)	3745-55-73(a)	2, 3	Remedial activities might generate hazardous waste.
	Open handle and store containers in a manner that will not cause containers to rupture or leak.		40 CFR 264.173(b)	3745-55-73(b)	2, 3	Remedial activities might generate hazardous waste.

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Design and operation of a RCRA container storage area (no free liquids).	Area must be sloped or otherwise designed and operated to drain liquid from precipitation, or containers must be elevated or otherwise protected from contact with an accumulated liquid.	Long-term storage of RCRA hazardous waste in containers that do not contain free liquids – Applicable	40 CFR 264.175©	3745-55-75©	2, 3	Remedial activities might generate hazardous waste.
Design and operation of a RCRA container storage area (contains free liquids)	Area must have a containment system designed and operated as follows: <ul style="list-style-type: none"> • A base must underlie the containers that is free of cracks or gaps and is sufficiently impervious to contain leaks, spills and accumulated precipitation until the collected material is detected and removed. • Base must be sloped or the containment system must be otherwise designed and operated to drain and remove liquids resulting from the leaks spills or precipitation, unless the containers are elevated or are otherwise protected from contact with accumulated liquids. • Must have sufficient capacity to contain 10% of the volume of containers or the volume of the largest container, whichever is greater. • Runoff into the system must be prevented unless the collection system has sufficient capacity to contain along with volume required for containers. 	Long-term storage of RCRA hazardous waste with free liquids – Applicable	40 CFR 264.175(a)	3745-55-75(a)	2, 3	Remedial activities might generate hazardous waste.

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Action/Requirement	Requirement(s)	Prerequisite(s)	Federal Citation	Ohio Citation	Alternative Applicable	Comments
Storage of Remediation Waste in Staging Piles	<p>A staging pile must comply with the following design criteria:</p> <ul style="list-style-type: none"> • The staging pile must facilitate a reliable, effective, and protective remedy. • The staging pile must be designed so as to prevent or minimize releases of hazardous wastes and hazardous constituents into the environment, and minimize or adequately control cross-media transfer, as necessary to protect human health and the environment (for example, through the use of liners, covers, run-off/run-on controls, as appropriate). • The staging pile must not operate for more than two years, except when the EPA grants an operating term extension under 40 CFR. 	Storage of RCRA hazardous remediation waste – Relevant and Appropriate.	40 CFR 264.554(d)(1)	NA	2, 3	Remedial activities might generate hazardous waste.

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Action/Requirement	Requirement(s)	Prerequisite(s)	Federal Citation	Ohio Citation	Alternative Applicable	Comments
Waste Treatment						
On-site treatment of RCRA hazardous waste in a NPDES treatment system	<p>Wastewater treatment units (WWTUs), as defined in 260.10, are exempt from the requirements for permitting and interim status treatment, storage, and disposal facilities, which are codified in 40 CFR Parts 264 and 265.</p> <p>All applicable hazardous waste management standards apply to the waste prior to treatment in the WWTU and to any residue generated by the treatment of the waste. In other words, solid waste resulting from the treatment of a listed waste, and solid waste resulting from the treatment of a characteristic hazardous waste in an exempt wastewater treatment unit will remain hazardous as long as the solid waste continues to exhibit a characteristic as defined in 261.3 (3) and (d).</p>	Treatment of RCRA hazardous wastewater.	40 CFR 264.1(g)(6), 251.1 (c)(10), and 270.1(c)(2)(v)	3745-54(g)(5) and 3745-65(c)(8)	2	Contact water from stabilization treatment area may require treatment prior to disposal.
Classification of local water bodies for discharge of treated waters.	Discharge quality of treated waters from the site must attain the criteria for which the segment of the water body is classified.	Point source discharge of treated wastewater.	NA	3745-1-01	2	

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Action/Requirement	Requirement(s)	Prerequisite(s)	Federal Citation	Ohio Citation	Alternative Applicable	Comments
Discharge of Toxic Pollutants identified by the State of Ohio pursuant to Section 307(a)(1) of the Federal Water Pollution Control Act.	Concentrations of identified toxic pollutants in Ohio waters shall not exceed the criteria indicated in this regulation.	Point source discharge of treated wastewater.	NA	3745-1-07	2	
Land Disposal Restrictions (LDRs)						
Land disposal restrictions (LDRs) for contaminated soil.	<p>Must comply with LDRs prior to placing soil that exhibits a characteristic of hazardous waste, or exhibited a characteristic of hazardous waste at the time it was generated, into a land disposal unit.</p> <p>Prior to land disposal, contaminated soil must be treated according to the applicable treatment standards specified according to the Universal Treatment Standards specified in 40CFR268.48 applicable to the contaminating listed hazardous waste and/or the applicable characteristic of hazardous waste if the soil is characteristic.</p> <p>Treatment standards for contaminated soils. Prior to land disposal, contaminated soil must be treated according to all standards specified in the Universal Treatment Standards specified in 40CFR268.48.</p>	Hazardous waste – 40 CFR 268.49 - Applicable	<p>40 CFR 268.49(a)</p> <p>40 CFR 268.49(b)</p> <p>40 CFR 268.49(c)</p>	<p>3745-270-49(A)</p> <p>3745-270-49(B)</p> <p>3745-270-49(C)</p>	<p>2, 3</p> <p>2, 3</p> <p>2, 3</p>	Remedial activities might generate soil contaminated by a RCRA hazardous waste.

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General Facility Requirements						
Emissions of hazardous air pollutants from remedial operations	<p>The steps necessary to indicate that the remediation systems are in compliance with the Ohio Environmental Protection Agency requirements are as follows:</p> <ul style="list-style-type: none"> • Model each new or modified source of an air toxic using the SCREEN 3 model. • Compare predicted 1-hour concentrations against 1/40 of the Threshold Limit Value (TLV). The guidance specifically calls for evaluation against the time-weighted average (TWA). TLVs published by the American Conference of Governmental Industrial Hygienist (ACGIH) and Biological Exposure Indices; Threshold Limit Values and Biological Exposure Indices, ACGIH, 1998. • If this comparison shows that the predicted 1-hour concentration is greater than 1/40 of the TLV, further assessment is required. • Applies to controlled or uncontrolled sources 	Emissions of potentially toxic air contaminants	Clean Air Act Amendments of 1990, Appendix G	3745-15 et. Seq.	NA	Remedial activities are not expected to result in the emission of hazardous air pollutants.

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Action/Requirement	Requirement(s)	Prerequisite(s)	Federal Citation	Ohio Citation	Alternative Applicable	Comments
Security system	Must prevent the unknowing entry and minimize the possibility for unauthorized entry of persons or livestock onto active portion of the facility or comply with provisions of 40 CFR 264.14(b) and (c)	Operation of long-term (>90 day) container storage -- Relevant and Appropriate	40 CFR 264.14	3745-54-14	2, 3	
General Inspections	Must inspect facility for malfunctions and deterioration, operator errors, and discharges, often enough to identify and correct any problems.	Operation of long-term (>90 day) container storage -- Relevant and Appropriate	40 CFR 264.15(a)	3745-15(a)	2, 3	
Personal Training	Must ensure personnel adequately trained in hazardous waste, emergency response, monitoring equipment maintenance, alarm system procedures, etc.	Operation of long-term (>90 day) container storage -- Relevant and Appropriate	40 CFR 264.16	3745-54-16	2, 3	
Contingency Plan	Must have a contingency plan, designed to minimize hazards to human health and the environment from fires, explosions, or other unplanned sudden releases of hazardous waste to air, soil, or surface water in accordance with 40 CFR 264.52	Operation of long-term (>90 day) container storage -- Relevant and Appropriate	40 CFR 264.51	3745-51	2, 3	Requirement for both temporary and long-term storage
	Must be at least one emergency coordinator on facility premises responsible for coordinating emergency response measures in accordance with 40 CFR 264.30 et seq.	Operation of long-term (>90 day) container storage -- Relevant and Appropriate	40 CFR 264.55	3745-55	2, 3	Contingency plan can refer to PBOW site wide, not PRRWPs area alone
Preparedness and Prevention	Facilities must be designed, constructed, maintained, and operated to prevent any unplanned release of hazardous waste of hazardous waste constituents into the environment and minimize the possibility of fire explosion. All facilities must be equipped with communication and fire suppression equipment and undertake additional measures as specified in 40 CFR 264.30 et seq.	Operation of long-term (>90 day) container storage -- Relevant and Appropriate	40 CFR 264.30-264.37	3745-54-30 through 37	2, 3	Requirement for both temporary and long-term storage of hazardous waste

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Action/Requirement	Requirement(s)	Prerequisite(s)	Federal Citation	Ohio Citation	Alternative Applicable	Comments
Closure of RCRA Container Storage						
Clean closure of RCRA container storage area	Must close the facility in a manner that: <ul style="list-style-type: none"> • Minimize the need for further maintenance • Controls, minimizes or eliminates potential hazards to human health and the environment, post-closure escape of hazardous waste, hazardous constituents, contaminated runoff or hazardous waste decomposition products to ground or surface waters or to the atmosphere; and • Complies with closure requirements of 40 CFR 264.178 	Management of RCRA hazardous waste in long-term storage (>90 days) facility – Relevant and Appropriate	40 CFR264.111	3745-66-11	NA	Long-term storage of hazardous waste (<90 days) not anticipated during remedial operations.
Monitoring and Extraction Wells						
Monitoring/Extraction well construction	Monitoring and extraction wells shall be constructed in accordance with EPA Region V Standard Operating Procedures	Installation of groundwater monitoring or extraction wells	EPA Region V SOPs		NA	No additional monitoring wells or extraction wells are anticipated
Monitoring/Extraction Well Abandonment	Monitoring and extraction wells shall be abandoned in accordance with requirements specified in EPA Region V Standard Operating Procedures.	Closure or abandonment of groundwater monitoring or extraction wells	EPA Region V SOPs		2, 3	

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Transportation of Hazardous Materials and Wastes						
Transportation of hazardous waste off-site	Must comply with the generator requirements of 40 CFR 262.20-23 for manifesting, Section 262.30 for packaging, Section 262.31 for labeling, Section 262.32 for marking, Section 262.33 for placarding, and Section 262.40, 262.41(a) for record keeping requirements and Section 262.12 to obtain EPA ID number	Off-site transportation of RCRA hazardous waste- Applicable	40 CFR 262.10(h)	3745-52-10(f)	3	Off-site disposal of hazardous waste may be part of remedial alternative.
Transportation of hazardous waste off-site (continued)	Must comply with the requirements of 40 CFR 263.11-263.31.	Transportation of hazardous waste within United States requiring a manifest – Applicable	40 CFR 263.10(a)	3745-53-10(a)	3	Off-site disposal of hazardous waste might be part of remedial alternative.
	A transporter who meets all applicable requirements of 49 CFR 171-179 and the requirements of 40 CFR 263.11 and 263.31 will be deemed in compliance with 40 CFR 263.	Transportation of hazardous waste within United States requiring a manifest – Applicable	40 CFR 263.10(a)	3745-53-10(a)	3	Off-site disposal of hazardous waste might be part of remedial alternative.
Transportation of hazardous material	Shall be subject to and must comply with all applicable provisions of the HMTA and HMR (49 CFR 171-180).	Any person, who under contract with a department or agency of the federal government, transport [in commercial] or causes to be transported or shipped, a hazardous material – Applicable	49 CFR 171.1 (c)	NA	3	Transportation of hazardous waste might be part of remedial alternative.