Shaw® Shaw Environmental, Inc.

312 Directors Drive
Knoxville, Tennessee 37923
865.690.3211
FAX: 865.690.3626

December 1, 2008

U.S. Army Engineer District, Nashville
ATTN: CELRN-EC-R (Ms. Kathy McClanahan)
110 Ninth Avenue South, Room 682
U.S. Court House Annex
Nashville, Tennessee 37203

Corrected Responses to Comments
Revised Focused Feasibility Study Addendum
TNT Area C
Former Plum Brook Ordnance Works, Sandusky, Ohio
Contract No. DACA62-00-D-0002: Shaw Project Number 119268

Dear Ms. McClanahan:

In accordance with the requirements of Delivery Order No. DX02 of Contract No. DACA62-00-D-0002, Shaw submitted the Revised Draft Focused Feasibility Study (FFS) Addendum for TNT Area C of the Former Plum Brook Ordnance Works last week (11/26/08). A former version of the Responses to Comments was mistakenly attached to this document.

Enclosed are four copies of replacements. Three copies have also been forwarded to the Huntington District. Please replace the Response to Comments at the back of the FFS Addendum with the enclosed. My apologies for the inconvenience.

Should you have any questions or require additional information regarding this submittal, please do not hesitate to contact me at (865) 694-7496.

Sincerely,

Steven T. Downey, PE
Project Manager

Enclosures

Distribution List

Name	Copies
U.S. Army Engineer District, Nashville ATTN: CELRN-EC-R (Ms. Kathy McClanahan) 110 Ninth Avenue South, Room 682 Annex Nashville, TN 37203	4
U.S. Army Engineer District, Huntington ATTN: CELRH-PM-PP-P (Mr. Rick Meadows) 502 Eighth Street Huntington, West Virginia 25701-2070	3

Response to Internal Review Comments
on the Draft Feasibility Study Addendum
TNT Area C
Former Plum Brook Ordnance Works
Sandusky, Ohio
May 2008

Note: Alternative 3, Excavation, Stabilization and Off-Site Disposal has been deleted from the document. The remedial alternatives and the section headings in the revised document have been renumbered accordingly. The responses presented below refer to the renumbered alternatives and sections as they are presented in the revised TNTC FS addendum.

Comments from Rick Waples, Regulatory, USACE-CX, (May 28, 2008).

Comment 1: **General. This reviewer had no additional comments on the revised Proposed Plan and the revisions made from the previous review were satisfactory.**

Response 1: Noted.

Comment 2: **Page ES-4. The Addendum to the Focused Feasibility Study makes a recommendation for a treatability study. An additional benefit to performing this treatability study is that a waste determination can also be made as to whether the treated soil meets the Land Disposal Regulations (40 CFR 268.40) before it is sent offsite for disposal. For example, the LDR treatment standard for a soil that is a D008, non-wastewater, is to be treated to less than 0.75 mg/l TCLP and meet 40 CFR 268.48. If the soil fails for D030 (2,4-DNT), the LDR treatment standard for a non-wastewater is 140 mg/kg (total) and meet 40 CFR 268.48. The reference to 40 CFR 268.48 is significant because it requires the soil to be treated for any underlying hazardous constituents (253 chemicals or metals) that did not necessarily make the waste a hazardous waste but once the LDRs are triggered, must be treated prior to land disposal. This does not preclude the treatment of the soil onsite or from sending the treated soil to a Subtitle D landfill, provided the LDR requirements are met. Recommend that the Executive Summary include a brief statement that the treatability study will also afford the opportunity to determine that the treatment process satisfies the LDR treatment requirements and will allow the material to be placed in a RCRA Subtitle D landfill provided it is no longer a RCRA hazardous waste.**

Response 2: The last paragraph on page ES-4 will be deleted because an alkaline hydrolysis treatability study was recently completed and the results of the study are summarized in the revised FS addendum. Major underlying hazardous constituents such as TNT, 2,4-DNT and 2,6-DNT were analyzed in the treated soil during the study. Other potential underlying hazardous constituents present in TNTC soil at lower concentrations, such as PAHs and PCBs, were not analyzed in the treated soil because the treatment was unlikely to be effective for these constituents and they have not been detected in site soil at concentrations above the alternative land disposal restriction (LDR) treatment standards for contaminated soil (40 CFR 268.49). The table below compares the maximum detected concentration of the most prominently detected

PAHs and PCBs at TNTC and the minimum required alternative LDR treatment standard for contaminated soil:

Chemical	Maximum Detected Concentration in Soil[a] (mg/kg)	Universal Treatment Standard[b] (mg/kg)	Minimum Alternative LDR Treatment Standard for Contaminated Soil[c] (mg/kg)
Benzo(a)anthracene	11.1	3.4	34
Benzo(a)pyrene	8.2	3.4	34
Benzo(b)fluoranthene	10.2	6.8	68
Chrysene	8.74	3.4	34
Fluoranthene	20.3	3.4	34
Pyrene	17.1	8.2	82
Aroclor 1254	4.875	10[d]	100[d]
Aroclor 1260	0.969	10[d]	100[d]

Notes:
[a] Concentrations from Tables 2-13 and 2-14 of the Human Health Risk Assessment (IT, 2001)
[b] 40 CFR 268.48(a)
[c] 40 CFR 268.49(c)(1)(C)
[d] Standard is applicable to total PCBs, not the concentration of individual PCB congeners the table confirms that treatment of the above underlying hazardous constituents would not be required for offsite disposal if the concentrations of these contaminants in excavated soil are similar to those detected during the remedial investigation.

Comment 3: **<u>Page 4-5, paragraph 4.3.1</u>. Recommend the last paragraph be revised to reflect that if this alternative is selected as the final remedy, the design phase will determine if the lead-contaminated soil will be sent offsite to a Subtitle C TSDF to be treated under the Alternative LDR Treatment Standards for Contaminated Soil (40 CFR 268.49) or if the TSDF will treat the contaminated soil in accordance with 40 CFR 268.40 standards.**

Response 3: The first sentence of the last paragraph on page 4-5 will be changed to: *Segregated lead contaminated soil that does not pass the TCLP test will be managed as a D008 hazardous waste. The soil will be transported to a Subtitle C TSDF for treatment (if necessary to comply with the alternative LDR treatment standards for contaminated soil) and disposal.*

Comment 4: **<u>Page 4-5, paragraph 4.3.1</u>. If the soil is not a RCRA hazardous waste, it is TSCA that regulates the disposal of the PCB contaminated waste. Many Subtitle C landfills are permitted to accept PCB waste but it is important to clarify that TSCA is what regulates PCBs that are 50 ppm or greater. Please correct this statement to indicate that PCB remediation waste that is not a RCRA hazardous waste will be disposed of at a TSCA permitted disposal facility.**

Response 4: The commenter raises a valid point. However, the discussion of PCB remediation waste on page 4-5 was erroneously included in the report. It was inadvertently retained when separating the text for sites TNTA and TNTC when these two sites were previously contained in one FS report (Shaw, 2003). The concentrations of PCBs detected in TNTC soil indicate that the excavated soil will not be a PCB remediation waste. PCBs were detected in TNTA soil above 50 mg/kg. The discussion of PCB remediation waste will be deleted from the text.

Comment 5: <u>Page 4-5, paragraph 4.3.1</u>. **No change is required to the Addendum to FFS but it is important that it is understood that if any of the soil contaminated waste is RCRA hazardous waste for D008 or D030, then the LDR requires that the soil not only meet the treatment standards for lead and 2,4-DNT, but it must also meet the treatment standards for any underlying hazardous constituents (40 CFR 268.48). PCBs although not a Federal hazardous waste, do have a LDR treatment standard of 10 mg/kg before the soil is land disposed if the 40 CFR 268.48 treatment standard is required under 40 CFR 268.40. It would be important during the remedial action to ascertain whether the treated soil meets all the treatment standards for the 200 plus chemicals.**

Response 5: The issues noted in the above comment concerning alternative LDR treatment standards for underlying hazardous constituents, including PCBs, were discussed in Section 2.5.2 of the TNTA&C focused feasibility study (Shaw, 2003). Per agreement with the USACE, the TNTC FS addendum does not present portions of the original text that do not need to be modified.

Comment 6: <u>Page 4-6, paragraph 4.3.1</u>. **The last paragraph should be revised to state: "Composted soil and untreated soil that passes the TCLP test, will be disposed offsite at an approved non-hazardous waste landfill provided all applicable LDRs have been compiled with. Lead-contaminated soil that does not pass the TCLP test will be disposed offsite at an approved and permitted hazardous waste TSDF."**

Response 6: The last paragraph in Section 4.3.1 will include the recommended changes to the text for composted soil and lead contaminated soil. Untreated soil that is not a listed hazardous waste and that passes the TCLP test is exempt from the LDR requirements because they apply to hazardous waste only.

Comment 7: <u>Page 4-11, paragraph 4.4.1</u>. **The FFS addendum makes an important statement in the first paragraph about if the soil does not comply with LDR requirements, it will be reprocessed until it complies with the regulatory requirements. The previous sentence makes the statement that the soil will be tested for hazardous characteristics. The FFS should include a brief discussion on why this soil does not meet the criteria to be identified as a RCRA K047 listed hazardous waste since it does not appear to be a potentially reactive waste. The soil does appears to have the potential to be a characteristic hazardous waste for D008 and D030 but the FFS should also explain why there is no concern of this soil containing a K-047 listed hazardous waste code.**

Response 7: The K047 listing applies to pink or red water from TNT manufacturing operations. K listed wastes are hazardous because they are from specific sources. Because soil does not meet the listing description for K047 (i.e., it is not pink/red water), the only way the listed code could apply to the soil is through the contained-in rule. In order for the K047 listing to apply to soil through the contained-in rule, there would have to be compelling evidence/documentation that pink or red water from TNT manufacturing

operations is the specific source of contamination in the soil (i.e., through a spill or release). No such direct documentation exists.

As the commenter notes above, the K047 listing is based solely on the characteristic of reactivity. There is a specific exclusion for the listing found at 40 CFR 261.3(g)(1) that applies when the waste does not exhibit the reactive characteristic. This exclusion has also been adopted in the Ohio regulations. As applied here, the exclusion means that the K047 listing would not apply to the soil if it does not meet the reactivity characteristic when generated, even if there was documented evidence of pink or red water release. Excavated soil at TNTC would need to be contaminated with significantly higher levels of TNT before it would be classified as reactive. Revising the text to discuss a potential hazardous waste listing for the contaminated soil is not recommended because the K047 code is not applicable to soil excavated from TNTC and Ohio EPA has never raised this issue.

Comment 8: **<u>Page 4-15, paragraph 4.5.1</u>. Please add the following statement to the second paragraph and second sentence. "Soil that passes the TCLP and tests and satisfies all applicable LDR requirements, can be disposed of in a nonhazardous landfill." This revision will ensure that Universal Treatment Standards for any underlying hazardous constituents have been met.**

Response 8: The recommended change will be made to the second sentence in this paragraph.

Comment 9: **<u>Page 4-19, paragraph 4.6.2 and 4.7.2</u>. Please revise the last sentence to as follows: "Treated and untreated soil that satisfies LDRs and is not a hazardous waste would be disposed of off site as a nonhazardous waste in a Subtitle D landfill." Treatment of contaminated soil is allowed on site to remove a RCRA characteristic provided the LDRs are satisfied. Therefore when the waste is generated, if it exhibits a RCRA characteristic for D008 and/or D030, the soil would not only need to be treated to meet treatment standards (non-wastewater) for D008 and/or D030, it would need to meet 40 CFR 268.48 requirements. This information must be kept in files by the generator that treated to remove the RCRA characteristic.**

Response 9: The recommended change will be made to the referenced sections.

Comment 10: **<u>Page 4-25, paragraph 4.7.1</u>. Please clarify that the when identifying TSDFs, this is not an endorsement and does preclude the use of any TSDF that is compliant with its permit and allowed to accept the waste under their permit. The requirement to contact the CERCLA offsite coordinator (40 CFR 300.440) will be followed."**

Response 10: The sections of the text that reference a particular disposal facility will be deleted. Similar changes will also be made to Sections 4.3.1, 4.4.1, 4.5.1 and 4.6.1.

Comments from Sam Bass, , Geology, USACE-CX,(May 30, 2008).

Comment 1: **<u>Proposed Plan, page 12, third column, top of page</u>. This comment was coordinated with the CX risk assessor. If the Remedial Goal (RG) was derived from a reverse risk assessment, the RG should not be used as a not-to-exceed (NTE) value. The RG should represent the allowable average residual soil concentration in the excavation. Use of the RGs as NTE values is also inconsistent with statements from Ohio EPA that exceedance of RGs would be acceptable (see response to Bass Comment #2 and text later in the same paragraph on page 12). Average or 95% upper confidence limit (UCL) concentrations should be determined using confirmation samples collected during excavations. It is inconsistent for an exceedance of an RG to be allowable for treated soil placed at the site (reference Alternative 6) while a different standard is applied to in-situ soils (no exceedance of an RG allowed). The concept of using average or 95% UCL concentrations needs to be discussed at the Proposed Plan stage to allow description of an exit strategy to be included in the Decision Document. Documenting how excavation limits will be determined can reduce the amount of costly overexcavation performed at the site.**

Response 1: Responses presented herein address only comments on the TNTC FS addendum. Comments on the TNTC proposed plan will be addressed in a separate submittal.

Comment 2: **<u>FFS Addendum, page 4-6, Section 4.3.2, first paragraph</u>. The last sentence of the first paragraph should be deleted ("As a result, additional remedial actions for soil may be required in the future"). It is inconsistent with the response to Bass comment #1 and the efficient execution of soil remedies at the site. It is not in USACE's best interest to go forward with a soil remedy that is not known to be protective of ground water when such a determination can be made at this time. This comment also applies to the fourth paragraph of Section 4.3.7 on page 4-8 of the FFS Addendum; first paragraph of Section 4.4.2 on page 4-11; fifth paragraph of Section 4.4.7 on page 4-13; the last sentence of the first paragraph of Section 4.5.2 on page 4-15; third paragraph of Section 4.5.7 on page 4-17; the last sentence of the first paragraph of Section 4.6.2 on page 4-19; fifth paragraph of Section 4.6.7 on page 4-22; the last sentence of the first paragraph of Section 4.7.2 on page 4-25; and the fifth paragraph of Section 4.7.7 on page 4-28.**

Response 2: The last 3 sentences of Sections 4.3.2, 4.4.2, 4.5.2 and 4.6.2 will be replaced with the following sentence:

The soil removal will also mitigate the migration of soil contaminants to groundwater.

The last three sentences in the first paragraph of Sections 4.3.4, 4.4.4, 4.5.4 and 4.6.4 will be replaced with the following sentence:

The removal and treatment of the most highly contaminated soil will also reduce the mass transport of soil contaminants to groundwater.

The text discussing future remedial action for protection of groundwater in Sections 4.3.7, 4.4.7, 4.5.7 and 4.6.7 will be replaced with the following more general statement:

The alternative does not preclude additional future remedial action for soil if needed.

Comments from Carol Lee Dona, Process Engineering, USACE-CX, (May 29, 2008).

Comment 1: **<u>General</u>. The Proposed Plan and related FFS Addendum submitted for review have had significant revisions so additional comments are included as well as a backcheck on the responses to the original comments on the Proposed Plan. Further comments on the responses to the original FFS comments are first, with the additional comments on the Proposed Plan and FFS Addendum following. It is noted that the FFS Addendum is a partial, revised FFS (Chapter 3 and above) so changes in the first two original FFS chapters were not reviewed.**

Response 1: No response necessary.

<u>Backcheck to Comments on Original Draft Proposed Plan</u>

Comment 2: **<u>Back check to Comments 1 and 2</u>. Responses are satisfactory if the complete language in the response to Waples Comment #4 is included. Some of the response language was found on p. 4 but the language (language not included underlined) "removal of soil to either the water table, competent shale, <u>or until soil concentrations are nondetect or virtually nondetect"</u> was not found.**

Response 2: Responses presented herein address only comments on the TNTC FS addendum. Comments on the TNTC proposed plan will be addressed in a separate submittal.

Comment 3: **<u>Back check to Comments 3-5</u>. Responses refer to changes in the FFS and/or Proposed Plan. Some of these changes have further comments below. The reviewer would like to express her appreciation at the effort that has been put into to the expansion of the alternatives and their description.**

Response 3: No response necessary.

<u>Comments on Revised Draft Proposed Plan and FFS Addendum</u>

Comment 4: **<u>Table 4</u>. The contaminants of concern specifically targeted for treatment are the explosives and lead, with secondary mention of PAHs. Also listed in Table 4 are PCBs (Aroclors 1260 and 1254). It is not clear if the PCBs need to be considered in the treatment and disposal options, and, if so, how. Please clarify.**

Response 4: The PCBs Aroclor 1254 and 1260 are included in the COC list for TNTC soil but the concentrations detected at the site are well below the 50 mg/kg that would require management as a PCB remediation waste. No special treatment or disposal options would be required for PCB-contaminated soil at the previously detected concentrations.

Comment 5: **<u>FFS Addendum Summary of Alternatives</u>. <u>Alternative 5 Description and Table 4-6</u>. The treatment train for Alternative 5 in the text appears to be first stabilization of the soil with respect to lead, followed by composting any soil above non-hazardous waste disposal requirements for explosives. The sequence in Table 4-6 appears to be opposite (first composting, then lead stabilization). Please clarify what is the sequence and revise the FFS addendum as necessary to make consistent.**

Response 5: The intended order of technology implementation is windrow composting before chemical stabilization. A discussion of windrow composting was not included in Section 4.6.1 because a detailed discussion was presented in Alternative 2. The following text will be added after paragraph 1 of Section 4.5.1 to clarify that windrow composting will be performed before chemical stabilization for soil that is contaminated with hazardous levels of both 2,4-DNT and lead:

A detailed description of windrow composting is presented in the description of Alternative 2 in Section 4.3.1. Windrow composting under Alternative 5 is similar. Please refer to Section 4.3.1 for additional details on this technology. Soil contaminated with hazardous levels of both 2,4-DNT and lead would be composted first and then chemically stabilized.

Comment 6: **<u>FFS Addendum Summary of Alternatives: Alternatives 5 and 6</u>. The treatment train for Alternative 5 appears to be first stabilization of the soil for lead, followed by composting (or the opposite sequence as illustrated in Table 4-6, see Comment 5). The treatment train in Alternative 6 appears to be alkaline hydrolysis of the explosives, followed by stabilization of any subset of the soil above non-hazardous disposal levels for lead. Please clarify the following: On p. 3-10, it states that it is not known if 1) the alkaline hydrolysis technology would be effective in treating the PAHs and 2) if the characteristics of the soil after treatment with alkaline hydrolysis "would interfere with the lead chemical stabilization process." Recommend including this uncertainty in the comparative analysis of alternatives and also in the Proposed Plan.**

a. If the treatability study testing the alkaline hydrolysis technology counter indicates its use either because of ineffectiveness with PAHs or interference with the stabilization of the lead, recommend including a contingent recommended Alternative.
b. As lead generally becomes more insoluble with increasing pH, the alkaline hydrolysis treatment may by itself stabilize the lead, particularly if additives such as potash are included. Suggest leaving flexibility in the treatment process for the sequential treatment of lead to allow consideration of treatments that could potentially beneficially use the pH increases from the alkaline hydrolysis of the explosives.
c. Alternative 5 with the lead stabilization following the composting (or the opposite sequence) appears to have the same kind of potential for the lead stabilization to interfere with the explosive composting (or vice versa).

Recommend clarifying in the FFS and Proposed Plan that the lead stabilization will not affect the sequential composting process or (vice versa).

Response 6: Chemical stabilization of lead contaminated soil is recommended after either windrow composting or alkaline hydrolysis. Sections 4.5.1 and 4.6.1 will be changed to clarify the order of implementation for Alternatives 4 and 5 (previously Alternatives 5 and 6).

a. PAHs are not effectively treated using alkaline hydrolysis. Alkaline hydrolysis should not interfere with the subsequent chemical stabilization of lead. The discussion of these uncertainties will be deleted from the text since an alkaline hydrolysis treatability study has been completed.
b. Alkaline hydrolysis is a potentially effective technology for treating soil with elevated concentrations of nitroaromatic compounds even though it is not effective for PAHs. Alkaline hydrolysis should not interfere with the lead stabilization process when lead stabilization is conducted after alkaline hydrolysis. The uncertainties associated with the potential effectiveness of alkaline hydrolysis have been managed by adding windrow composting as a contingency component of Alternative 5 (previously Alternative 6). If alkaline hydrolysis treatment is not completely effective in reducing the concentration of nitroaromatic compounds, the soil may be composted to attain remedial goals and LDR requirements for on site disposal (if not contaminated with hazardous levels of lead) or waste acceptance criteria for offsite disposal as a nonhazardous waste (if co-contaminated with lead requiring chemical stabilization).
c. The text will be modified to note that the alkaline hydrolysis treatment may help stabilize lead in the soil.
d. The revised text will clarify that windrow composting should not interfere with subsequent chemical stabilization of lead.

Comment 7: **<u>Cost Tables, Alternatives 2, 5, and 6</u>. Itemized costs for treatability studies to establish the treatment conditions for the composting, lead stabilization, and alkaline hydrolysis were not found. Please indicate, if included, where the costs are incorporated into the Tables. If the treatability study costs are not included in the costs, please revise the costs to include.**

Response 7: Treatability studies are not needed for windrow composting (nitroaromatic compounds) or Maectite chemical stabilization (lead) as these technologies were previously implemented at PBOW and their effectiveness has been established. An alkaline hydrolysis treatability study was recently completed and the results of this study are summarized in the revised FS addendum. Therefore, additional treatability studies are not needed to support remedial decision making and costs for new studies are not included in the revised cost tables.

Comment 8: **<u>General</u>. Alternatives 3 Excavation, Chemical Stabilization, and Off-Site Disposal and 4 Excavation and Off-Site Disposal do not have the apparent uncertainties that Alternative 6, the recommended alternative, has in terms of potential interference of sequential operations or lack of treating PAHs. They are only 4% and 16% higher in estimated costs. Although, as the FFS and Proposed Plan point out, there are potential cost savings that may be realized**

with Alternative 6 if the treated soil can be left on site and Alternative 4 does not have the advantage of reduction of toxicity relative to the other active alternatives, it would seen that either alternative would be a good backup alternative to Alternative 6 if the treatability studies did not indicate that Alternative 6 would work.

Response 8: Alternative 3 will be eliminated as a remedial alternative in the revised TNTC FS addendum because the technology may not comply with LDR requirements for 2,4-DNT and 2,6-DNT. See Section 3.3.4.1 of the revised document.

The uncertainty associated with alkaline hydrolysis has been managed by adding windrow composting as a contingency component of Alternative 5 (previously Alternative 6). If alkaline hydrolysis treatment is not completely effective in reducing the concentration of nitroaromatic compounds, the soil may be composted to attain remedial goals and LDR requirements for onsite disposal or waste acceptance criteria for offsite disposal at a Subtitle D landfill. It is anticipated that only a small percentage of the alkaline hydrolysis treated soil would require composting. The cost for Alternative 5 is based on the assumption that 20% of the alkaline hydrolysis treated soil will require composting. As the reviewer notes, in addition to being lower cost, Alternative 5 has a comparative advantage over Alternative 3 (previously Alternative 4) because it permanently reduces the toxicity of the treated soil.