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THE MEMPHIS DEPOT
TENNESSEE

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 509

Comment Response Table (EPA/TDEC) Interim Final Main Installation Groundwater Feasibility Study			
Page. No.	**Section No.**	**Comment**	**Response**
Reviewer: EPA (Turpin Ballard)			
	Section 4, Groundwater	The revised section is significantly improved, and finally reflects EPA guidance more closely. Because figures were not included, EPA's comments here are conditional on good correlation between text and figures, which will be determined during the final review	Comment noted.
Page 4-6, Alternative 2 -	Section 4, Groundwater	I seem to recall that we discussed monitored natural attenuation (MNA) last BCT and agreed that it is not a viable alternative, based on the MNA study results from this Spring This alternative should be called "Institutional Controls with Long-Term Monitoring (ICs w/LTM)", and should only refer to the MNA study. The time estimate to achieve MCLs is so long because the biological component of MNA would not be a very effective part of the whole package i.e., MNA will be working on the contamination, but it would be a side benefit. The real protection comes from the institutional controls (ICs), and the monitoring to ensure plume stability. Also, for MNA to be a potential remedy, it is usual to have located the source of contamination and include a strategy for responding to it in the alternative.	The name of the alternative has been changed With regard to source(s), we will emphasize that TDEC is conducting studies and would pursue potential actions off-site that should address the source(s) of TCE and PCE. Actions at DDMT will focus on the plumes inside the facility boundaries.
Page 4-6, bullet 5 (and all alternatives that have this language)	Section 4, Groundwater	What is meant by meeting the MCL at the 95% UCL? Typically, there are a set of compliance wells, and the MCLs must be met in those wells for a series of consecutive monitoring events to trigger shut-down of an active component of a remedy. However, as long as a source remains in place, the monitoring would need to continue, perhaps at a further reduced frequency (e g ., every 5 year review cycle).	Sections have been re-worded to state MCLs will be met in all wells for at least two consecutive sampling rounds before the remedy is considered complete. We don't want to buy into a long-term monitoring program that is based on potential effects of off-site sources. DDMT and its future owners will have no control over the remediation (or lack thereof) of offsite sources

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Page 4-6, Bullet 6	Section 4, Groundwater	We already went through a feasibility study. If ICs with LTM should not remain protective, one of the other alternatives from the existing FS would be selected, without necessarily going into a focused FS unless new technologies would be of more use. See 4.3.2.1 to revise language on focused FS, and any other locations in the other alternatives	Wording will state a revised ROD would be required and delete mention of focused FS.
Page 4-7, bullet 7, and all similar language in other alternatives	Section 4, Groundwater	For the active remedies with shorter time frames, I am not comfortable with stating that ICs to prevent consumptive use would remain in effect for ten years, or that access for monitoring would be guaranteed for only ten years. This needs to be left open ended to account for unknowns. CERCLA provides authority for such re-entry regardless of what the ROD says, but it makes it simpler if the ROD does not give specific dates for ending access rights and ICs.	Wording emphasizes that ICs will remain in place "until remedy is complete." Time frame for completeness is estimated to be XX years (depends on remedy) only for purpose of determining costs. Monitoring defines when remedy is complete.
Page 4-13	Sections 4.4.2, 4 5.5, and 4 5.10	With regard to short-term effectiveness, this criterion really applies to the active portion of remedy implementation. Alternative 2, which is really ICs with LTM, does not have an "active" component. Once we are into the monitoring, that is considered part of O&M. Therefore the length of time to reach MCLs should not factor into this criterion I would say that either the alternative meets the criterion because human health and the environment would not be adversely affected during implementation, or that the criterion is not a factor for this alternative for the reasons stated above. This argument can also apply to the no action alternative. By the way, it does not make sense to me that no action meets the STE criterion whereas ICs with LTM does not meet it. Please also visit section 4.5.5 and 4.5 10 and revise accordingly.	Sections have been re-written to show IC meets criterion and No Action doesn't.

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	Section 4 5 2	In terms of actual reductions in ground water contamination, the only difference between No-Action and Alternative 2 is that we monitor the progress of NA in Alternative 2. Therefore, if we say that Alternative 2 would meet ARARs, should we not mention that Alternative 1 would have the same likelihood of doing so, although because there is no monitoring we would not know when it occurred? This is a suggestion, but it seems very logical to me. The advantage of Alternative 2, obviously, is that we would be aware of any plume movement. I vote for selecting Alternative 3.	We believe that No Action cannot meet ARARs because there is potential for off-site plume migration and no controls or monitoring to protect groundwater users (remedy does not meet chemical specific ARARs). Alternative 2 has both ICs and monitoring to assure groundwater users are protected and that chemical-specific ARARs are met Comment noted.
Reviewer: TDEC (James Morrison)			
General	Section 4, Soils	Both Section 4 draft submittals for Soils and Ground Water FSs have greatly improved. Additionally, TDEC concurs with all EPA general and specific comments and will not reiterate them here. TDEC notes a potential interpretation problem with these documents. Specifically, the guidance for the FS approach used here differs somewhat from the guidance that is published in EPA's RI/FS guidance document. TDEC appreciates, and understands EPA's rationale / internal policy decision for this variance to the published RI/FS The only reason for this comment/concern is due to all of the public relation problems and the continuing community misperceptions that have occurred at the Depot. It is because of this, TDEC strongly suggests that these two FS documents contain a section each that is dedicated to clarifying / explaining:	Comment noted. Section 1 of both FSs have been rewritten to respond to this comment The subsection 1.1, has been expanded to present the successive steps (RI, RA, FS, PP, public comment, ROD) in the CERCLA process. It reads as follows: **Purpose of This Feasibility Study** This Feasibility Study (FS) represents an important step in the evaluation of a CERCLA site and selection of a remedial action. To put this report in context, the following describes the CERCLA process used to evaluate the Depot and to select a remedy to resolve environmental contamination. For the past several years, a series of investigations have been conducted at the Depot to obtain samples of soil, sediment,

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		What problems were discovered in the RI that are to be evaluated / addressed in the FS. This should only be a summary of problems that were discovered, not a reiteration of the RI. What are the intent, purpose, goal/objective, and scope of the Feasibility Study? This is a little DQO exercise that not only helps the authors and the reviewers, it also helps the public understand what we are to communicate in this document. How alternatives generated in the FSs relate to the Proposed Plans. This will help the public to understand the process better. The above points collectively should provide the public with a clearer picture of what has been accomplished, what we are considering, and what we are to later propose as the preferred remedial alternative. I know this may seem excessive and unnecessary, but this should provide the necessary transition for clarity, brevity, and coherency purposes In other words, the story is told in a way that is understandable, so that our decision / logic path can be defended when the time comes.	groundwater, and other impacted environmental media to assess the level of contamination that exists at the Depot, defining the horizontal and vertical extent of contamination in each medium The **Remedial Investigation (RI)** report (CH2M HILL, 2000a) summarizes and interprets the results of the investigations at the Depot. As part of the RI, a **Baseline Risk Assessment (BRA)** was prepared to assess the potential risks to human health and the environment represented by contaminants at the site. The baseline risk assessment incorporated EPA approved assumptions regarding exposure of affected individuals under different land use scenarios. The findings of the BRA are included in the RI report (CH2M HILL, 2000a). This **Feasibility Study (FS)** develops and presents a range of remedial alternatives to address the contaminants present at the Depot, and evaluates the probable performance of each alternative in comparison to a set of criteria established by the EPA The FS is intended to present an unbiased and non-judgmental evaluation of the selected alternative(s). In some cases, additional environmental data are collected or reassessed during the preparation of the FS in order to understand the applicability of a particular remedial technology, or to determine a better way to remediate a particular area of contamination. Following publication of the FS, the cognizant regulatory and lead agencies for the Depot (Defense Logistics Agency [DLA], EPA and TDEC will evaluate the remedies presented in the FS. A **Proposed Plan** will then be prepared documenting the remedy(s) proposed by those agencies and the rationale for the selection of the proposed remedy(s). The Proposed Plan may "pick and chose" among the evaluated alternatives for various locations at the Depot. The Proposed Plan will be presented to the Memphis community and the public, who will be offered the opportunity to comment on the proposed remedy(s). After public comments are received on the Proposed Plan, the regulatory and lead agencies will take all comments into consideration, re-evaluate their selection of proposed remedy(s) for the Depot, and publish a **Record of Decision (ROD)** documenting the final remedy(s) selected for the Depot. All public comments are presented and responded to in the Responsiveness Summary of the ROD. The remedy(s) documented in the ROD will then be implemented at the Depot.

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Reviewer: James W. Morrison, TDEC			
	General	The document follows the prescribed outline for a Feasibility Study (FS); however, it seems that the effort to streamline the document did not include enough supporting documentation for the alternative provided. Therefore, TDEC-DSF proposes the following changes to the document to improve the documentation necessary for TDEC-DSF to make an informed decision on the alternatives proposed.	
		The range of alternatives in Section 3 of the document do not seem to provide the breadth of choices needed to tackle the differing situations at the Depot. The guidance given in the EPA RI/FS manual, Section 4.2.6 states that alternatives can be one remedial process as presented in these reports or groups of processes (i e., limited access to industrial levels for FU1-5 and in-situ Remediation for FU-6 to full recreational levels) The alternatives should include at least one that brings the site back to full, unrestricted (residential) use, the no action alternative, and varying other alternatives as stated in the FS Guidance Section 4 1 3 1 This will do away with the confusing industrial and residential scenarios for each alternative presented in Section 4 and Appendix B. A summary table like Figure 4-6 in the RI/FS Guidance Manual to show what each alternative achieves also needs to be included in Section 3 of the report. Maps need to be generated in Section 3 for each alternative to show the extent of areas to be remediated by each alternative (it is confusing to look at three maps to get all of the areas affected by one alternative); colors may be used to show locations of contaminants.	The FS has been extensively revised. Enhanced Bioremediation has been included as a final alternative evaluated in Section 4. Final Alternatives 2, 3, 4 and 6 restore the site to full unrestricted use. See revised Table 4 1. Figures have been added in Sections 1 and 4.
		This approach will make sure that all avenues of remediation have been considered with the proper supporting documentation for the Proposed Plan.	

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Reviewer: Turpin Ballard, EPA			
1-9, line 10 1-10, line 7	1 2 4.1	Please provide a reference for the Wiedemeier citation in both the main body and in Appendix A. A word is missing between the and to.	Reference added to Appendix A and to Section 5.
1-11, line 34-35	1.2.5	This reasoning has been overcome by events. The tracks are being removed now, and that was always part of the depot redevelopment plan Please delete. I suggest adding existing zoning, the redevelopment plan itself, and Shelby Count well ordinances as alternate reasons.	Text has been extensively revised.
1-12, line 31-32	1.2 5 2	This statement is misleading. This can be said about every ground water contamination site. Fact remains that the areas of the plume that we are concerned about exceed MCLs and RBCs.	Concur.
	Figure 1-2	Please revisit this figure in light of May BCT discussion regarding anomalous water level at MW27	New potentiometric surface map has been added.
	Figure 1-3	The contouring is suspect here because the data points are from samples taken as much as 14 months apart. Please re-think the validity of this approach and what you are trying to say with this figure. Figure 1-5 in Appendix A purports to show the same thing, but the contours are different because it uses different data from this figure. Let's be as consistent as possible with figures, and, where different, please clearly explain the rationale for the difference.	All figures that deal with the potentiometric surface and distribution of PCE and TCE within Dunn Field and the Main Installation are consistent within the report and Appendix A. Concentrations for PCE and TCE are shown for only one sampling event per figure. Dashed lines are used to infer possible contaminated areas based on past results.
	Figure 1-7	Please revise this figure per our BCT discussions to indicate potential off-site sources as well as on-site ones. It was agreed that this is a more acceptable explanation for the recent high hits of PCE in MW47.	Figures have been revised to reflect this.
2-1, line 29-32	2.1.1	The point of compliance for ground water is established in the NCP. When the remedial action objective is to restore ground water quality, the POC is everywhere within the plume. If the State regulations allow a less stringent POC determination, they may not be ARAR in this case	Text has been revised to reflect this.

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Page 1	Table 2-3	Institutional controls include Zoning and well ordinances, but provision of an alternate drinking water supply is considered an active remedy, not an IC. Please adjust the table accordingly.	Text has been revised.
Page 2		The GRA of containment includes maintenance of a hydraulic barrier. This is a common remedial action objective at many sites where aquifer restoration is not the goal for part of the plume under a source area, such as a landfill.	This GRA is not used for groundwater at the MI
Page 3		I like the concept of in-situ air stripping - it would enhance recharge and reduce or eliminate wastewater disposal.	Final Alternative 4 employs this technology.
Page 4		For natural attenuation – because it seems to be going forward as a remedy, please note here that the results in Appendix A reduce the importance of biodegradation as an NA component.	Limitations of NA are discussed at length in the revised text.
Page 2	Table 2-4	Because of the CERCLA exemption from administrative requirements, the reason for eliminating reinjection as a means of disposal is not valid. Please revise Table 2-5 accordingly, or develop a more valid reason to screen this out.	The table has been revised.
3-2, line 18	3.1.1.3	Suggest changing this alternative here and everywhere to Enhanced Biodegradation, and explain that, based on appendix A, the natural bio processes would need assistance in order for the effectiveness of natural attenuation (as a whole) to be maximized.	The name of Alternative 3 has been changed to "Enhanced Bioremediation."
3-3, line 17-22	3.2.1	Alternatives 3 and 4 may be similar, but I don't see the same similarity in alternative 2. 3 and 4 are active remedies involving treatment. 2 is an institutional controls (IC) remedy with long-term monitoring Very different, as is even stated in section 3.3.4.2, with alternative 4 being "...much more aggressive than.. protective management"). Please change.	Text has been revised.

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Line 23-99	3 2 1	Language seems internally inconsistent. First you say air stripping may be necessary, then you say stripping would be "incidental". No analysis has been provided estimating effluent concentrations from combined well volumes for either the POTW-only option, or the stripper-to-POTW option, so this screening comparison is meaningless. PLEASE support the analysis with SOME indication that some level of conceptual design detail has been considered.	Text and tables have been revised.
3-5, line 4-6	3.3.3.1	The description of the alternative does not describe the alternative Please enumerate its elements, including the LTM and the Ics. Also, please change the purpose of this alternative to "...ensure that the contaminated ground water does not migrate significantly from its present location in order to protect down-gradient sources of drinking water (i.e , the Memphis aquifer and Allen wellfield)", prior to dissipating through natural attenuation processes." Or something like that.	Text has been revised here and in Section 4.
3-6, line 6-13	3.3.4.2	Do the data from the RI support that this alternative will be effective, i.e., is the aquifer sufficiently homogeneous to minimize channeling of air pathways?	Text has been revised to indicate problems with sparging. Pilot testing is needed to design this remedy. Spacing of sparge wells has been reduced to 15 ft for cost estimating.
3-7, line 19, 29	3.3 6 2	I think the alternative referred to here should be number 5.	Since Alternative 5 is no longer carried through FS, this sentence has been removed.
	General comments on Section 4	a Many of the deficiencies identified in my comment on chapter 4 of the Soils FS for the MI are present here as well. This was discussed in our meeting of 5/16/00, and EPA expects those resolutions to be embodied in a much-improved document, especially the individual and comparative analysis tables.	Comment noted.

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	General comments on Section 4	b. Section 4-2 should compare each alternative individually against the nine criteria after providing a clear and relatively detailed description. It is not at all uncommon to see conceptual process flow diagrams and figures illustrating the process by which the alternative remediates the contamination. Such figures would be very valuable to a community member reviewing this document. (picture=1k words). c. The individual analysis should provide a present-worth cost for each alternative. d Time to achieve remedial goals seems optimistic to me. If true, this would result in unrealistically low cost estimates. I think it is unrealistic to assume that in 5 years we could meet MCLs within the plume and not have to do any more monitoring, especially since no contamination sources have been identified either on or off-site	Text has been extensively revised. Present worth O&M costs and total costs are now summarized for each alternative in Section 4.5.7. The lifetime of all alternatives have been increased Alternative 2 now extends to 30 years and Alternatives 3, 4, and 6 are all expected to last for 10 years.
4-4, line 35 Line 37 4-5, line 1-3 line 15 line 19	4 2.2	A. Instead of "..is protected from access..." this should read "...and use of the water is currently prevented by existing institutional controls [previously listed in Section 2 1 2." B. "sells" ="wells". Period after wells Add "Addition of deed restriction at the time of transfer will add another layer of insurance that the water will not be used as long as it is unfit to drink. C. We need to discuss the status of this rule a ARAR, because it appears to be less stringent than the NCP. D I suggest 20 years as a minimum to estimate for LTM. Please adjust the cost estimates accordingly. E I think more wells than three were agreed to at the may BCT meeting.	A Alternative 2 has been redefined as Institutional Controls (IC)-Long-term Monitoring (LTM). The description of the alternative includes deed restrictions to prevent groundwater use within the MI until MCLs are achieved. B. The sentence including the typo "sells" had been removed. The following bullet has been added to the preliminary design component description: *"Deed restrictions prohibiting installation and use of production and consumptive use wells for the operational life of the remedy. The deed restrictions would also guarantee access to all monitoring wells for the life of this remedy. These restrictions may be removed at completion of the remedy."* C. ARARs are carefully described in Section 4. We believe the ARARs listed are valid.

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line 21-26 line 27-28 line 29-30		F This sampling frequency is too aggressive, given that the plume has been relatively stable during the various rounds of the RI. I suggest semi-annual for years 1-5, and annual thereafter at the discretion of EPA and TDEC, based on observed migration and concentration trends. G. Wells would be abandoned once it is determined there is no longer a need to monitor them. The cost to abandon can be estimated separately from when it occurs. H. What does this mean. What are the "statistically based closure criteria"? From where are they derived, and where are they previously listed? As far as I can tell, MCLs are the compliance levels, as established in the NCP.	D. The lifetime of the alternative has been increased to 30 years, per suggestion at May 2000 BCT meeting. E Approximately six new monitoring wells will be installed under this alternative F. The sampling frequency has been modified to semi-annual in years 1 through 5 and annual for the subsequent years. G It is specifically stated that 31 wells (which presently exist at the Main Installation of the Depot) and the 6 new monitoring wells will be abandoned at the completion of the remedial alternative. Table C-1a (detailed cost table in App C) lists the present worth cost in the assumed year of abandonment, and if abandonment occurred in year 1. H. The bullet referring to criteria required at completion of the alternative has been modified to read as: *"Groundwater concentrations would meet MCLs in all monitoring wells for two consecutive sampling periods to demonstrate completion of the remedy. The sampling schedule would therefore be subject to change due to observed trends and variability."*
4-5, line 38-39 4-6, line 1-6	4 2.3	a As I have stated in previous comment letters, protectiveness is not a relative criterion to be compared among alternatives. The remedy is protective, or it is not. Period. If not, it does not proceed through the rest of the analysis. b. See changes to the conceptual model (Figure 1-7) Ground water flow from off-site to on-site. Sparging occurs in ground water How then, can it treat VOCs before they migrate off-site? If the intention is to suggest that the VOCs are removed in ground water before it migrates through the Depot and subsequently discharges off-site, that is not clear here. If this is the case, it should be noted that there is no evidence that ground water contamination from the southwest corner is migrating off of the Depot in either the south-central boundary or the northwestern corner.	A A description of the overall protectiveness for alternatives has been summarized in Section 4 5 1 as· *"All alternatives, except No Action, are considered protective of human health and the environment."* B. The air sparging alternative is presented to treat only the most contaminated parts of the southwestern plume. NA will degrade the other plume areas. Monitoring will assure the plumes do not migrate offsite or into deeper aquifers.

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line 16 line 25-27		c See comment 16E d Suggest evaluating based on 10 years	C. Six new monitoring wells will be installed under this alternative. D. The life of the alternative has been increased to 10 years.
4-6, line 36 4-7, line 1-3 line 16 line 24-26	4.2 4	A See comment 17a B See comment 17b C See comment 16E D Suggest evaluating based on 10 years	Alternative 5 is now eliminated from consideration because of its greater complexity in comparison to Alternative 6. Therefore, this section has been removed.
4-8, line 15 line 22-23	4 2 5	a. See comment 16E b. see comment 18D	A. Six new monitoring wells will be installed under this alternative B. The life of the alternative has been increased to 10 years
4-10, line 4-8	4 3 7	Please revisit the costs in light of my previous comments on probable duration of the alternatives. This will have little impact on capital costs, but will increase the O&M costs.	All costs have been re-estimated based on the longer remedial time periods discussed above.
4-10, line 10-14	4.3.8	The State sits on the BCT and I would expect that the proposed plan will not go final without consensus of the BCT as to the remedy In practice, this is what the Superfund program as a whole has done, rather than wait until the comment period to evaluate State acceptance. Also, I am not familiar with the discussion presented in the last sentence about the State's position on various alternatives. It does not appear in the RIFS guidance, and I don't see why it is necessary	Text has been revised.
4-10, line 18-20	4.3.9	Please delete the last sentence. It appears to be an artifact of a cut/paste edit. In the preceding sentence add "...addressed in a Responsiveness Summary in the ROD."	Text has been revised .
	Figure 4-1 to 4-3	Regarding the validity of the plume contours, please see my comment above on Figure 1-3.	Comment noted.

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Reviewer: David Ladd, USGS			
Pg. 1-5, line 9-16	1.2.3.1	In this section (or somewhere applicable), please include the following disclaimer which was included in the Main Installation RI report, Section 2.5.2. *"Stratigraphic definitions used in this report are based on local interpretations of stratigraphy and may not exactly correspond to definitions in previously published reports for the Memphis region."* Please indicate that the maximum thickness of the fluvial aquifer mentioned in this paragraph (101 ft at MW22) does not include the area of "thicker" fluvial deposits near MW34 and MW38. Please also state in the last sentence in this paragraph that the uppermost clay in the Jackson Formation/Upper Claiborne Group provides a barrier to downward flow from the overlying fluvial aquifer and therefore forms the base of the fluvial aquifer *'in most areas'*. Areas where breaches in the confining unit may occur (near MW38 and MW34) are exceptions.	Text has been revised. A figure showing structure contours on the base of the fluvial deposits has been added. Text has been revised.
Pg. 1-7, lines 9-12	1.2.3.1	The authors indicate here that the low PCE concentration in MW72 (west of the high hits at PZ04 and MW47) is evidence that elevated PCE concentrations at MW47 and PZ04 are most likely from releases on the MI. Although it is possible that the contamination came from the MI, I don't think that low concentrations in one new well are enough evidence to say that the PCE in this area is not coming from an off-base source. More data would be needed before you could rule out an off-base source.	Text has been revised.
Pg. 1-7, line 43 though pg. 1-8, line 2	1.2 3 2	Absence of VOC detections in one well is not enough evidence to support that VOCs are not migrating off-site in this area (see comment above).	Text has been revised.

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Pg 1-8, lines 3-7	1 2 3 2	Please add a sentence or two here stating that it is possible that some TCE detections in the southeast part of the MI may be due to on-site sources, and that TCE and PCE in the southwest part of the MI may be from off-site sources. There really aren't enough data to strongly support the suppositions that are made here.	Text has been revised.
Pg 1-11, lines 10-12	1 2.4.2	The 'worst case scenario' concentration for PCE and TCE (10 ug/L) that was used in the calculations is not very conservative. Although the idea of a constant source of 10 ug/L to the Memphis aquifer is conservative, concentrations much greater than 10 ug/L have been detected in the fluvial aquifer throughout the MI (especially PCE concentrations in the southwest corner). I suggest using a higher concentration for the constant source to see how the results are affected.	Appendix B has been revised to explain why 10 µg/L is appropriate for the modeling exercise. Basically this is a leading edge of the plume value that would be detected in confined sand aquifer wells. This level is reasonable to use to indicate possible transport times and to determine that No Action is probably not protective.
	Figure 1-3	I'm not sure why the authors chose to depict the plume based on concentrations detected at different times I realize that it is simpler to show one single figure, but it makes much more sense to include several figures showing the plume at different time periods This would give the reader a tool to see how the plume is changing over time. For example, the high PCE concentration shown for PZ04 was detected during the 4th quarter 1998 sampling event, and the high PCE concentration shown for MW47 was detected in March 2000. It is difficult to tell from the figure to tell whether this part of the plume is migrating from the PZ04 area to the MW47 area, or whether these are two small areas of high concentrations in close proximity. This comment also applies to figure 1-4.	Figure has been revised. New figures showing plumes in 1996 and 1998 have been added.
	Figure 1-5	I believe that the legend is supposed to reference Table 1-1 (not Table 1-5)	This figure is no longer used.

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	Figure 1-7	Although the conceptual model depicted in this figure is one possible explanation, it is not necessarily the most likely explanation (see comment 3). I suggest including another figure or some statement indicating that the possibility for an off-base source has not been ruled out The note states that PCE was not detected in MW72. However, the text states in a few places that PCE was detected in the well at estimated concentrations.	This figure is no longer used
	Table 1-1, item 4, last sentence	Lack of VOC detections in one well is not enough evidence to support the statement that VOCs are not leaving the MI through the south-central portion More data is needed to further support that statement I suggest rephrasing this to state that there is no evidence to support that VOCs are leaving the MI in this area.	Text has been revised.
	Table 1-1, item 7	Even though only a small amount of PCE was detected in MW72, this is not enough evidence to state that VOCs are not moving eastward onto the MI from off-site sources (see comment 3).	Text has been revised.
	Section 4	None of the groundwater alternatives described in this section address the plume in the southeast corner of the MI. I assume this is because of the low-level detections in this area, but I suggest adding an explanation for this in the text.	Text states that NA would address the plumes not "actively" treated. Monitoring would assure the plumes do not migrate offsite or into deeper aquifers.
	Appendix A, Figure 4	It looks like the high in the potentiometric surface in the vicinity of MW67 has been removed, and a continuous trough is depicted. This is not how the trough has been depicted in other recent potentiometric surface maps of the area. Was this intentional?	The map of the water table in the fluvial deposits was modified to exclude MW-67 MW-67 is screened within the Memphis Sand aquifer. Because of the elevation of the screened interval, wells MW-18, 34, 36, 37, 38, and 43 were also removed from the revised potentiometric map. These changes have been included in all potentiometric surface maps within the FS and in Appendix A.
	Section B 2	I think that the authors meant to reference figure B-2, not B-1.	Concur.
	Section B.3.1	I don't know if 10 ug/L is a very conservative concentration to use (see comment 6) Would the results be similar if 100 or even 1000 ug/L were used?	Maximum levels at the well would change is a higher infinite source concentration is used. App B has been revised to explain why the source concentration was chosen. The level of 10 µg/L is appropriate for the purposes of the modeling.

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	Section B.3.4	Please indicate where the calculations for the PCE and TCE retardation factors in the fluvial aquifer are located in App A. Were the retardation factors calculated with TOC values obtained from groundwater samples? If so, I'm not sure that these values can be applied to retardation, since retardation is dependent upon the TOC content of the aquifer material. I don't think that PCE and TCE retardation factors for the fluvial aquifer are appropriate for transport calculations in the Memphis aquifer. Most likely, the Memphis aquifer has a lower TOC content than the fluvial aquifer. I suggest using PCE and TCE retardation factors calculated for the Memphis aquifer.	As discussed in the revised App B the values of some of the parameters in the model are estimated. The TOC level in the Memphis Sand is probably not much lower than the value of 0.04% used. BIOSCREEN calculates the retardation factor from TOC and other values: K_{OC} for PCE and TCE were taken from literature (J.H.Montgomery, Groundwater Chemicals Desk Reference 2nd ed., 1996). Soil bulk density is typically assumed to be 1.67-1.70 for sand.
	Figure B-2	I suggest adding a groundwater flow direction arrow showing that groundwater flows in the fluvial aquifer from the A side of the cross section toward the breach. It currently looks as if groundwater flows into the breach only from the A' side.	A potentiometric surface map of the water table in the fluvial deposits has been added to Section 1. This revised figure shows direction of groundwater flow, and shows flow coming toward the "breach area" from the southwest.
Reviewer: Tom Byl, USGS			
	Entire section. general comment	In general, this section on natural attenuation has greatly improved from previous reports. The techniques appear to be better. Most important, the list of parameters tested was strong enough to make some decisions. The mistakes I found were generally not in the methods or interpretation, but simple editorial mistakes. Examples follow below	Comment noted
	A-2	This list is obviously an old list from previous documents because it is incomplete. Fortunately, the investigators did more than this list indicates I would suggest updating this list to give the reader the complete list.	The list used on page A-2 contains the parameters collected during the RI Additional parameters were measured for the MNA sampling event and are specified in Table 1
	General comment throughout Appendix 1	I noticed much of the text was similar to the EPA protocols and other guidelines. The authors did a good job weaving certain paragraphs into this document. I suppose I would like to see more citations of the original work where it is appropriate However, since they are government documents, they are considered public domain.	More citations were added.

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	A-14 unnumbered table	It was good to see several methods were used to evaluate dissolved oxygen. However, it wasn't good to see such variance between methods. I think the sampling method had more influence on the final result than the method of measuring DO I can relate to this variance because I have been frustrated when I was collecting DO samples using a bladder pump. The bladder pumps tend to increase the oxygen in the sample. I would suggest using a different sample collection system if possible in the future. (I found disposable bailers work better than bladder pumps. There are several other alternatives.)	Comment noted.
	A-18 subheading Ammonia	The fixation of nitrogen by biological organisms and the reduction of nitrate to ammonia by bacteria are 2 different things The conversion of NO3 to NH3 occurs in a range of redox potential (Eh) from –100mV to +400 mV Note: this is more of an editorial comment It doesn't change the fact that low ammonia levels were found, and the final interpretation doesn't change.	Comment noted..
	A-18, and Tables 8-10, Appendix 1	It appears dissolved & suspended organic carbon were measured and not the total organic carbon (TOC) for the aquifer matrix (which would include the non-dissolved or immobile) This fact does not change the interpretation as it relates to bacterial food supply (because the BOD data verifies the conclusion that there is little food in the aquifer system). However, this same "TOC" data is used in the BIOCHLOR model to predict retardation factor, (tables 8-10). This is an inappropriate application of the dissolved OC data. For that, you need non-dissolved (immobile) TOC, because suspended or dissolved OC will actually facilitate contaminant migration by carrying it along the flow path. Dissolved OC offers a hydrophobic environment where the contaminant will be more stable while remaining dissolved in water.	Samples collected during the installation of monitoring wells within the Memphis Depot were analyzed for TOC. These TOC concentrations represent the total organic carbon for the aquifer matrix (which includes the non-dissolved or immobile carbon) and are presented in units of mg/kg. Information regarding the TOC concentrations is included in the text on pages A-19 and A-20. The same information is included as a foot note for Tables 8 through 10.

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		The use of the dissolved OC numbers in the BIOCHLOR model is a simple mistake and it PROBABLY provides a conservative estimate of TOC in the aquifer. The range of dissolved OC reported here is less than the range of TOC that I found in the same aquifer in Millington (10-30 mg/kilogram of soil). However, the aquifer is heterogeneous enough that we can't assume TOC is equal at both sites. None-the-less, the results for retardation as they apply to this site are possibly conservative.	See above comments. Site-specific TOC concentrations were used in the model.
	A 20-30 General Comment	The overall conclusion for natural attenuation at the Memphis Depot (main installation and Dunn Field) is that a small amount of natural biodegradation is occurring and that retardation is probably the most important attenuating factor. I would agree with these conclusions based on the data presented here. Whether natural attenuation is acceptable at this location is dependant upon target receptors. Will these plumes attenuate before they reach a target receptor, such as the Memphis aquifer? Final observation - the information in this report opens the possibilities for enhanced bioremediation, especially if the pump and treat option isn't able to extract the contaminant efficiently The natural attenuation data presented in appendix A demonstrate that the system has the right bacteria and hydrology to attenuate chlorinated solvents. All the system needs is the right food to make the bacteria work efficiently at biodegrading the contaminants.	The effects of NA are discussed on more detail in revised Sec 2. Calculations are presented to show that NA could require between 15 and 50 years to degrade the plumes to MCLs. Enhanced bioremediation has been carried to Section 4 as a Final Alternative and is evaluated in detail

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