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LETTER AND COMMENTS FROM U S EPA REGION I REGARDING DRAFT FINAL FEASIBILITY STUDY REPORT FOR BUILDING 82 NAS SOUTH WEYMOUTH MA
11/22/2010
U S EPA REGION I

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION I
5 Post Office Square, Suite 100
Boston, MA 02109-3912

November 22, 2010

Brian J. Helland, P.E.
BRAC Program Management Office NE
4911 South Broad Street
Philadelphia, PA 19112-1303

Re: Draft Final Feasibility Study for Building 82

Dear Mr. Helland:

Thank you for the opportunity to review the *Draft Final Feasibility Study Report for Building 82* at the former Naval Air Station South Weymouth dated September 2010. The document summarizes the site history, remedial action objectives, and develops and evaluates a series of remedial alternatives designed to remediate the site groundwater. Detailed comments are provided in Attachment A.

As discussed in EPA's comments on the *Draft Remedial Investigation Addendum for Building 82,* the following characterization objectives remain outstanding:

- Basic groundwater flow information near Building 15 (*e.g.,* head gradients, hydraulic conductivity data, flow directions, flow velocities, *etc.*)
- The role of engineered drainage and buried utilities on groundwater flow;
- Aquifer carbon content, porosity and grain-size distribution;
- Residual source strength of suspected source areas;
- Potential for connection with up-gradient B81 site via bedrock;
- Potential for undiscovered or under-characterized sources

These data gaps are primarily because the limited monitoring control points over the new areas added to the original B82 site. While EPA acknowledges that additional synoptic groundwater level information will be collected before finalizing the *B82 RI Addendum,* we should consider focused data collection in conjunction with new permanent monitoring well installations, in the near-term to expedite collecting baseline chemical and hydraulic data before implementation of any remedial pilot tests and/or full-scale remediation efforts Additional permanent monitoring control is required for all of the remedial alternatives developed for the *B82 FS* thus far, and strong consideration should be given to augmenting the permanent LTM network. These activities need not interfere with completion of the FS, but should not be delayed. EPA recommends that they be conducted on a parallel track, such as part of a pre-design investigation or pilot test program.

As noted in comments previously submitted for the *B82 RI Addendum*, more permanent monitoring well coverage in the new plume areas discovered near Buildings 15 and 41 is needed. The area deficient of permanent monitoring is roughly 500 feet in axial direction and 300 feet in the

transverse direction. As stated in EPA's comments on both the RI and FS, augmentation of the well network in this part of the site is essential.

As expressed in EPA's earlier comments on the *B82 RI* and *B82 RI Addendum*, the current monitoring network relative to Building 81 and the area near Building 15 is not sufficiently robust to eliminate an interconnection between Building 81 and the down-gradient areas via bedrock. EPA therefore recommends installation of additional bedrock control in near Building 15.

Because of the lack of permanent well coverage, the groundwater is not adequately characterized in the new plume areas near Buildings 15 and 41. Additional information is needed to better understand sources, sinks, potential preferential pathways and typical hydraulic conductivities, gradients, and groundwater velocities. EPA understands that an updated well inventory is under development and that a synoptic water level round will be conducted soon, but no new head control points will be added at this stage. EPA expects this initial comprehensive water level round to identify areas where control is weak and can be targeted in subsequent phases of work.

In addition to collecting groundwater head data, a limited amount of hydraulic conductivity data is needed near Buildings 15 and 41 to constrain the groundwater travel times so that time frame estimates for remedial alternatives can be better estimated. Slug tests should be conducted on existing and new wells installed in these areas.

A more detailed understanding of the engineered drainage system, particularly with respect to its role in groundwater flow near Building 15, is needed. Subsurface utility plans need to include all underground utilities (*e.g.,* sanitary sewer) and to provide more detail. Based on the Video Log for Storm Sewer System, there appear to be many more areas of possible groundwater/storm water exchange than previously thought. Given the considerable evidence of settling, it is necessary to re-survey invert elevations for all catch basins, manholes, *etc.,* in the study area to update the storm drain data. This information needs to be used to update the groundwater flow maps so that areas of potential groundwater exchange with subsurface utilities and associated bedding may be identified and factored into remedial efforts and associated monitoring. Since the engineered drainage system is suspected of being the origin the new TCE plumes (shallow and deep), the integrity of the engineered drainage system has implications on source area definition and remediation.

The storm sewer system is currently thought to be the source of the new shallow and deep TCE plumes. More specifically, catch basin C612 is implicated for the deep overburden TCE plume; and the storm sewer near C610, M638, C611, and M139 is implicated for the near-linear shallow overburden TCE plume. Nevertheless, a number of potential additional residual source areas are present in the area, including:

- UST-12;
- Former Oil-Water Separator (OWS) near C614;
- Floor drains/piping at Building 15;
- C613;
- USTs 9A/9B (last known location);
- Prior location for USTs 9A/9B (south of southeast corner of B15);
- Storm drain system between C608 and C609;
- Other (*e.g.,* zones of breakage or poor integrity indicated from sewer video logs

Additionally, based on an examination of the Video Log for Storm Sewer System, there appear to be more areas of possible groundwater/storm water exchange than previously thought. A more detailed map indicating all possible/likely areas of exchange is needed. Reexamination of this information should also indentify other potential release points or areas of residual contamination.

The FS makes various general estimates regarding the contaminant mass residing in the dissolved or sorbed phases. Generally, residual contaminant mass is about two times greater than the mass calculated for the dissolved phase. EPA believes that these estimates should be refined to develop a better understanding of the relative importance of contaminant mass residing in the plume areas versus the various suspected or potential source areas. In addition to installing new monitoring wells within the plume areas and within and down-gradient of suspected residual source areas, additional data should be collected on the carbon content and grain-size distribution. Lastly, EPA recommends performing a limited groundwater extraction and treatment pilot test to evaluate residual source strength. Conceptually, limited groundwater extraction could be conducted within or near a suspected residual source as well as from a location(s) entirely within the dissolved-phase portion of the plume. Influent concentrations could be monitored as a time-series. Pumping would be ceased as soon as contaminants show a significant decline, and additional time-series monitoring could serve to determine speed and degree of any rebound. If designed properly, such a test could provide valuable insights into the phase distribution of contaminants and remedial approaches.

As you know, iron, manganese, and arsenic are the most common redox-sensitive metals in the New England area. In-situ bioremediation using procedures that add carbon-rich substrate to the subsurface (*e.g.,* Alternative G-3), can result in perturbations to the redox environment. At Buidling 82, this may mobilize redox-sensitive metals such as iron, arsenic, and manganese from their more stable oxidized phases to lower valence states that are mobile in groundwater. EPA is concerned that full-scale application of enhanced bioremediation could result in a new dissolved manganese and iron plume. Further, given the relatively short flow path distances to surface water discharge locations, inter-media transfer of dissolved metals from groundwater to surface water and sediment may occur, and unforeseen risks could develop. Therefore, selection of a remedy that relies exclusively on enhanced bioremediation (*e.g.,* Alternative G-3) should be rigorously monitored to ensure that mobilized manganese or other metals do not become problematic.

As EPA has previously stated, consideration should be given to developing PRGs for the common redox-sensitive metals (*i.e.,* manganese, iron, arsenic), particularly if a remedy involving enhanced bioremediation is implemented or pilot tested. At a minimum, a PRGs should be developed for manganese in Building 82 groundwater, surface water, and sediment. Further, EPA does not agree with the manganese background value used (2,680 ug/l) and recommends that a separate site-specific background study be conducted to guide the remedial efforts. In this context, for groundwater, consideration should be given to using the risk-based PRG of 223 ug/l until a technical consensus can be reached on an appropriate site-specific background value. As discussed below, PRGs should also be developed for manganese for sediment and surface water.

Given the potential for metals mobilization, bio-fouling is possible. Remedial alternatives that rely on enhanced bioremediation (*e.g.,* Alternative G-3) need to fully consider potential additional maintenance/costs should bio-fouling become problematic.

While the current data suggest that metals in sediment are not expected to significantly impact invertebrates or other eco-receptors, remedial implementation that employs enhanced

bioremediation could change this. EPA therefore believes that PRGs for the common redox sensitive metals (*i.e.*, manganese, iron, arsenic) should be developed. A more robust monitoring scheme for surface water, sediment, and groundwater is necessary before any active phases such as field pilot testing or remedial implementation efforts, particularly those employing enhanced bioremediation.

Underground utilities need to be factored into remedial approaches and subsequent monitoring. If residual sediments in the storm sewers are responsible for the low-level shallow TCE plume, remedial efforts should address both the sediments and the groundwater. Please revise the alternatives to include specific approaches to be taken in light of underground utilities.

Please include more detail where the FS notes that a supplemental process option would be required to address manganese if enhanced bioremediation is selected. This needs to be accurately reflected in the design basis and cost estimates. Any remedial effort must not result in additional metals impacts to surface water bodies.

Of the specific alternatives offered, Alternative G-2 has several advantages. ISCO will destroy organic carbon in the subsurface (including VOCs) rather than adding additional new carbon or doing nothing. ISCO could minimize residual manganese impacts in comparison with the other alternatives. Another important advantage is that the treatment time-frames are estimated to be only one year after a single injection event. While it is challenging to predict the ultimate effectiveness of any of the remedial alternatives, with G-2 the site team will know in approximately one year whether the single injection was an effective treatment. If problems occur, they will be identified early. If rebound occurs, other options may be evaluated, and appropriate adjustments may be made. Alternative G-3 is expected to require injections about every five years for about 25 years. Even without the added uncertainly regarding potential manganese mobilization for alternative G-3, it will take 25 years for this alternative to reach an outcome that is just as uncertain as any of the other alternatives.

EPA recommends a number of actions to supplement information provided in the RI/FS. Since many of these actions are necessary for evaluation of remedial options and/or implementation of pilot testing or full-scale remediation efforts, strong consideration should be given to expediting these measures. These include:

- Inventory of permanent monitoring points near Building 15;
- Collect synoptic water levels near Building 15;
- Preparation of detailed subsurface utility plan that includes locations and elevations of all subsurface utilities;
- Comprehensive re-survey of invert elevations for all identified catch basins and manholes;
- Identify areas of potential groundwater exchange with subsurface utilities and associated bedding;
- Preparation of high resolution groundwater flow maps at scale compatible with groundwater profiling (chemistry) data;
- Construction of new hydrogeologic cross sections parallel and perpendicular to the primary flow directions and plume axes determined near Building 15 to supplement or update existing cross sections in the RI.
- Collection of site-specific hydraulic conductivity data;

Once these actions have been taken, the site team should review the data to identify areas where new wells should be installed. Consideration should be given to targeting the following areas:

- Within and just down-gradient of suspected residual source areas;
- Areas of groundwater exchange with subsurface utilities and associated bedding;
- Transverse and longitudinal control within plume areas in order to monitor potential remedial processes;
- Transect along downgradient groundwater and plume areas;
- At surface water discharge areas;

While it may be advisable to delay some of these recommendations until the remedial designs are more defined, it will be critical to install sufficient additional monitoring points so that a comprehensive set of baseline groundwater conditions (head, chemistry, *etc.*) may be collected before pilot testing or full-scale remediation.

I look forward working with you and the Massachusetts Department of Environmental Protection to select a final remedy for groundwater at Building 82. Please do not hesitate to contact me at (617) 918-1385 should you have any questions.

Sincerely,

Kymberlee Keckler, Remedial Project Manager
Federal Facilities Superfund Section

Attachment

cc: Dave Barney, USN, South Weymouth, MA
Dave Chaffin, MADEP, Boston, MA
Kevin Donovan, SSTTDC, South Weymouth, MA
Phoebe Call, TTNUS, Wilmington, MA

ATTACHMENT A

Page	Comment
p. 1-11, §1.2.7	Have samples of the sediment within the (2) 42-inch pipes been collected for chemical analysis? If not, these should be done as part of a pre-design study.
pp. 1-12 & 1-13, §§1.2.7	EPA interprets areas of elevated manganese in groundwater to be attributable to past practices and/or releases.
p. 1-13, §1.3, ¶2	Please add TCE as related to past site activities.
§1.3.1	Please update potential sources to include those identified as part of the *Building 82 Addendum*, or provide reference the *Building 82 Addendum*.
p. 1-13, §1.3.1	Although the conclusion could be correct, the rationale stated in the third paragraph for eliminating Buildings 41 and 15 as a potential source for TCE contamination is inadequate. If the source is depleted, the residual TCE concentrations at the source could be very low as the data indicate. The referenced sentence should be deleted.
p. 1-17, §1.3.2, ¶3	Based on an examination of the Video Log for Storm Sewer, there appear to be more areas of possible groundwater/storm water exchange than previously thought. Additional effort is needed to inventory these potential releases and areas of exchange with the groundwater system. The TACAN Outfall closeout report referenced in the text should be included in the references.
p. 1-18, §1.3.2, ¶3	Additional focused groundwater monitoring is needed to confirm the assumptions made about MTBE occurrence.
p. 1-19, §1.3.3, ¶1	EPA interprets areas of elevated manganese in groundwater to be attributable to past practices and/or releases.
§1.4.1	Vapor Intrusion risk will need to be revisited if groundwater plumes persist or increase. What if the MTBE detections represent the leading edge of a gasoline plume entering the site?
§1.4.2	There is a potential for low-level groundwater contamination to re-contaminate ditch sediments and surface water, particularly if carbon substrate is added to the subsurface. This issue needs to be addressed with groundwater, surface water, and sediment monitoring.
p. 2-2, §2.2, ¶5	As long-term monitoring progresses, if PCBs continue to be detected, efforts should be made to determine whether there is a correlation to PCB detections with water level conditions in the aquifer (*i.e.,* are the detections more prevalent at high water table conditions?).
p. 2-3, §2.2, ¶2	Because of the potential for manganese mobilization, manganese needs to be

	retained as a COC for surface water, sediment, and groundwater.
p. 2-4, §2.3.1	a) Add a third RAO to minimize the migration of groundwater COCs to surface water. b) Ultimately, site risk will be determined by consideration of all chemicals responsible for a risk of at least 10^{-6} to determine if the remedial goals have been achieved because daughter products of the listed COCs contribute to risk, and in some instances, to a greater degree than the listed COCs.
p. 2-7, §2.4.1, ¶4	Please discuss what measures were taken to assess potential current and future VI risks at Buildings 15 and 41.
pp. 2-8 & 2-9, §§2.4.3 & 2.4.4, and Tables 2-3, 2-4, & 2-5	Additional consideration should be given to developing PRGs (groundwater, surface water, and sediment) for the common redox-sensitive metals, particularly manganese. The risk-based groundwater PRG for manganese (223 ug/l) should be used until a technical consensus is reached regarding manganese background.
Table 2-6	Generic action-specific ARARs should not be presented in this section. Action-specific ARARs should be presented and discussed in Section 4 because the action-specific ARARs vary for each alternative. Please delete this table.
§3.1	Please explain why permeable reactive barriers (*e.g.,* ZVI wall) were omitted from the list of potential groundwater technologies/process options.
pp. 3-7 & 3-8, §3.2.3.1	Extraction wells with ex-situ treatment (*i.e.,* pump and treat) should not be prematurely eliminated as a potential remedy for VOCs in groundwater. The relatively low levels of dissolved VOCs, plume footprint areas, and resulting estimates for total contaminant mass and volume of contaminated water are within the capability of this technology. While there is some uncertainty with respect to the amount and distribution of residual (sorbed) contaminant mass, it is possible that minimal sorbed contaminant mass remains in these low-level plume regions. In this respect, pump and treat should be retained for more detailed comparison. A small scale groundwater extraction pilot test may be useful to determine the viability of extraction and treatment to attain PRGs as well as clarifying the degree to which rebound from sorbed domains may be problematic. An objective assessment of pump-and-treat needs to consider the particular circumstances of this site, which are somewhat atypical from the types of sites where pump and treat has typically not performed as expected. It is not accurate to state that pump-and-treat has a greater level of difficulty reaching PRGs as compared to other treatment technologies. In fact, all of the technologies evaluated with this FS will face the same challenges inherent to residual/sorbed contamination if this proves to be a significant problem. Ironically, if residual contamination is not significant, this site may have attributes that could allow pump and treat to be effective in a fairly short period of time. Please develop an extraction and

treatment alternative with an associated cost estimate.

p. 3-10, §3.2.4.1	The Navy appropriately notes that a supplemental process option would be required to address manganese if enhanced bioremediation is selected. However, EPA disagrees that, "manganese in groundwater would not be largely affected by bioremediation." Experience at other sites suggests that this needs to be more carefully built into the cost and process details for Alternative G-3.
Table 3-1	This table states that, "also, the storm sewers carry away contaminated groundwater." Please clarify. Are the storm sewers viewed as a part of the remedial system? EPA believes that the underground utilities are an integral part of the shallow groundwater system, and therefore need to be deliberately factored into remedial strategies and associated monitoring.
Table 3-1	It is not clear why sheet piling and permeable reactive barriers have been eliminated. It may be possible to design a fairly small PRB at the leading edge of the shallow and deep TCE plumes that could address the plumes relatively economically. The saturated thickness is relatively small at this site. Please clarify.
Table 3-1	As noted previously, groundwater extraction wells should not be eliminated without a detailed analysis. Similarly, the basis for eliminating collection trenches (permeable trench) needs additional explanation.
Table 3-1	Please retain ion exchange until a strategy for dealing with manganese is developed. Alternatives relying on enhanced bioremediation are particularly in need of addressing potential metals mobilization issues.
Table 3-1	a) EPA is not endorsing groundwater extraction; however, the FS needs to present a factual and unbiased evaluation of potential remedial options. In that context, the following comments are made: 1) The screening comment on page 2 of 6 for extraction wells states that this process option is retained for comparative purposes, but no comparison is made. Appropriate justification for not developing an alternative using groundwater extraction was not provided and therefore makes its omission arbitrary. Please include an alternative using groundwater extraction or provide a better justification to eliminate it. 2) Groundwater extraction would increase the local groundwater seepage velocity, thus reducing the time needed to distribute the reaction chemicals thus reducing the treatment time. 3) Groundwater extraction could create a hydraulic barrier to minimize the discharge of contaminated groundwater to surface water.

b) Please correct the first screening comment on page 3 of 6.

c) On page 3 of 6, there is an inconsistency between the second and fifth screening comments. If anaerobic biological treatment is retained for the reasons cited, chemical reduction should not be eliminated for those same reasons. Please correct.

p. 4-6, §4.1.3	The first paragraph should include consultation with EPA who will need to sign the Record of Decision.
p. 4-6, §4.2	The third bullet (G-3) chemical oxidation is listed as a component of this alternative, but is not correct. Please correct.
p. 4-9, §4.2.2.1	The penultimate paragraph states that PRGs would be achieved in approximately one year. Given the slow velocity of deep groundwater (9.5 feet per year) and the spacing of the injection wells (~ 20 feet), please clarify how that is possible. Also, given these conditions and the relatively short life of Fenton's reagent, please clarify how a single injection event could effectively reduce TCE to below the PRG.
p. 4-9, §4.2.2.1	All of the remedial alternatives need to explicitly describe how underground utilities will be addressed from both the remedial as well as the monitoring perspective. New wells down-gradient from existing locations where PRGs have been exceeded will need to be installed to determine remedial effectiveness. This particularly applies to areas where PRG have been exceeded are defined presently by DPT results.
p. 4-10, §4.2.2.1	Monitoring discussed under *Component 3* should also include daughter products of TCE.
p. 4-11, §4.2.2.2	The FS notes that, "...contingency action(s) may be implemented if COCs are detected in storm water or surface water at concentrations above water quality criteria...." What contingencies are envisioned? EPA believes the role of underground utilities with respect to both remediation and post remediation monitoring needs to be more comprehensively addressed.
p. 4-11, §4.2.2.2	The fourth paragraph mentions the potential need for contingency actions to address COCs migrating to surface water. Please identify the potential actions that could be taken. This comment also applies to Alternatives G-3 and G-4.
p. 4-12, §4.2.2.2	Under *Short-Term Effectiveness*, please note that this alternative would not prevent the off-site migration of contaminated groundwater. This same comment applies to Alternatives G-3 and G-4.
p. 4-13, §4.2.2.2	The first full paragraph states that natural attenuation of the balance of the plume would take up to 25 years. Given the slow velocity of deep groundwater, please specify what information supports this contention.

p. 4-14, §4.2.3.1	Additional data are needed to better constrain groundwater and contaminant transport velocities in the new plume areas.
pp. 4-15 & 4-16, §4.2.3.1	A comprehensive round of baseline sampling is needed before pilot testing or implementation of any remedial alternative. This will involve new monitoring wells in key intra-plume, cross gradient, upgradient, and downgradient areas. As noted, baseline and subsequent monitoring needs to address subsurface utilities. EPA believes the role of underground utilities - with respect to both remediation and post remediation monitoring - will need to be addressed more comprehensively.
pp. 4-17 to 4-19, §4.2.3.2	EPA disagrees that "...no adverse short-term or cross-media effects are anticipated as a result of implementing [alternative G-3]...." Mobilization of manganese and potentially other redox-sensitive metals should be anticipated, and appropriate contingencies need to be developed. Once established, a reducing zone in the aquifer may persist that could prolong the remediation time frame.
p. 4-19, §4.2.3.2	The third paragraph states that it will require up to 25 years to achieve groundwater RAO No. 2 in the treatment zone, but does not state how long it will take to achieve RAO No. 2 outside the treatment zone. Please discuss this and include supporting information.
p. 4-22, §4.2.4.2	The natural attenuation alternative is said to provide long-term effectiveness. However, the evidence for reductive dechlorination as an effective remediation process at this site is sparse given the low and infrequent detections of cis-1,2-DCE and the absence of vinyl chloride detections. Without stronger evidence indicating an effective remedial process, natural attenuation is not a viable alternative for this site.
Table 4-5, page 3 of 4	Specific approaches for dealing with manganese mobilization need to be more explicitly addressed.
Table 4-7, page 2 of 5	Specific approaches for dealing with manganese mobilization need to be more explicitly addressed.
p. 5-1, §5.1.1	EPA agrees that contingency actions may be needed if COCs are detected in surface water or storm water. Manganese mobilization is a particular concern.
p. 5-4, §5.1.6	Please edit the first sentence in the third paragraph to clarify its intent.
Table 5-1	EPA agrees that monitoring for manganese may need to continue for 30+ years. However, the length of required manganese monitoring may not be the same for all alternatives. A key distinction needs to be clearer in this table. Alternative G-2 has a much lower inherent long-term risk with respect to manganese mobilization given the nature of the remedy (oxidation) as compared to that invoked for Alternative G-3, which relies on establishing

and maintaining a reducing environment in the aquifer.

Table 5-1

a) For the comment on the first criterion for G-4, please edit to indicate that COC concentrations would persist for more than 50 years rather than for several years as currently stated.

b) For the fourth criterion for G-4, edit the text to state that treatment would not occur (same as for G-1).

c) For the Implementability comment for G-2, not just Bench-scale, but pilot scale testing would be needed to verify injection parameters and zone of influence for chemicals injected.

Appendix A

Table 4-8 lists MCLs, PRGs, and background for each chemical listed. The PRG values listed are obsolete because they are based on 2004 Region IX screening values, thereby making this table inconsistent with the remainder of the FS which presented different PRGs. The same comment also applies to Table 4-9.

Appendix D

a) On the Reagent Summary page (p. 206 of 311), the table for Alternative G-3 lists five injection points for shallow TCA/DCA. The table on page 4-15 lists seven injection points. Please correct.

b) On page 3 of 3 for Alternative G-2, the reagent cost of $1.50/gal is given for 12.5% peroxide. This should apparently be the cost for 50% peroxide. Please correct.

c) On page 4 of 8 for Alternative G-3, the table at the top of the page lists only three DPT locations for DCA, but this should apparently be seven. Please correct the discrepancy between this and the number of locations identified elsewhere in this FS for DCA for Alternative G-3.

d) On page 2 of 2 for Alternative G-3 retardation calculations (p. 224 of 311), the calculations for 1,1-DCA have intermixed shallow and deep values. Please correct the calculations.

e) On page 1 for Alternative G-4 (p. 229 of 311), please correct the mistakes in the first paragraph regarding the chemical names.

f) On page 4 of Biochlor modeling discussion, under *Source Degradation* at the bottom of the page, the method discussed for determining the source degradation term Ks is not correct. The source degradation term needs to be determined by iterative sampling of a specific well located in the source area to measure the changes in the contaminant concentration in that source area well. Consequently, the value calculated by the method indicated will not be representative of source area degradation. No data has been collected to date that could be used to reasonably estimate source degradation, thus creating a data gap for the Biochlor modeling.

g) It is not apparent what data were used to generate Figure C-5. Please clarify the basis for this graph.

h) For Biochlor Runs 1, 2, and 3, the source has been modeled as a continuous source rather than a decaying source, which appears to be more appropriate for the low level of contaminant concentrations. Please correct for consistency.

i) There is no site-specific data available that would be useful to more accurately determine first order decay coefficients for biotransformation or for source decay. Therefore, the results of the Biochlor modeling have significant inherent uncertainty that needs to be disclosed as the proposed alternatives are evaluated. However, because of the relatively low level of contaminants, it appears that these parameters may not significantly impact the remediation time.

Appendix F

The cost calculations for the active alternatives all refer to permits. Because no permits are required for on-site activities for CERCLA remedies, please clarify what permits are referenced here.