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U.S. Army Corps of Engineers
New England District

FINAL

FIRST FIVE-YEAR REVIEW REPORT FOR DEVENS RESERVE FORCES TRAINING AREA DEVENS, MASSACHUSETTS

CONTRACT DACA31-94-D-0061
DELIVERY ORDER 0009

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS

SEPTEMBER 2000

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HLA Harding Lawson Associates

DEVENS
FIVE-YEAR SITE REVIEW

RESPONSE TO COMMENTS ON THE DRAFT FIRST FIVE-YEAR SITE REVIEW REPORT FOR THE DEVENS RESERVE FORCES TRAINING AREA DEVENS, MASSACHUSETTS

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Printed On Recycled Paper

RESPONSE TO COMMENTS
ON THE DRAFT FIRST FIVE-YEAR SITE REVIEW REPORT FOR
THE DEVENS RESERVE FORCES TRAINING AREA

DEVENS, MASSACHUSETTS
SEPTEMBER 2000

Harding ESE responses to regulatory comments are organized following the format in which the agencies provided comments to the Army. Responses have been provided for each comment.

USEPA Comments dated August 22, 2000 on the Draft First Five-Year Review Report
Devens, Massachusetts

Introductory Comments (excerpted from cover letter)

1. Comment: While the draft document satisfactorily responds to the "statutory" five-year review requirements of CERCLA (in that it evaluates the eight sites at which Records of Decision (RODs) have been executed), it fails to discuss those sites at which five-year reviews are required as a matter of "policy", e.g. sites where removal actions have been conducted where hazardous substances, pollutants, or contaminants are left onsite above levels that allow for unlimited use and unrestricted exposure, e.g. AOC 50, AOC 57, SA 71, etc.). Therefore, the Army's resubmittal should, in addition to satisfactorily addressing the attached comments, address all operable units and remedial actions for which there is a CERCLA decision document (e.g. ROD, Action Memorandum, etc).

Response: Table H-1 has been provided in Appendix H of the Final Five Year Review document to summarize the history, issues and current status for all sites for which there are CERCLA decision documents or impending decision documents. In addition, Table H-2 has been provided in Appendix H detailing the current status of all sites that have been addressed as part of the Fort Devens/Devens RFTA CERCLA investigation.

2. Comment: Because five-year reviews are used to communicate the status and protectiveness of a remedy, the Army should notify and make a brief summary of the report available to the community. The summary should include, for each site, a short description of the remedial action, any deficiencies, recommendations and follow-up actions that are directly related to protectiveness of the remedy, the determination(s) of whether the remedy is or is expected to be protective of human health and the environment, and the date of the next five-year review. A copy of the final report should be placed in the information repository.

Response: The Army feels that the Executive Summary adequately addresses all of the points outlined in the USEPA's comment. The Executive Summary is available to the local community at local libraries and information repositories. In addition, PACE and several community members who serve on the RAB receive copies through normal distribution.

RESPONSE TO COMMENTS
ON THE DRAFT FIRST FIVE-YEAR SITE REVIEW REPORT FOR
THE DEVENS RESERVE FORCES TRAINING AREA

DEVENS, MASSACHUSETTS
SEPTEMBER 2000
(continued)

General Comments

1. Comment: The document should be updated, where necessary, to more accurately reflect current site conditions. It is imperative, for purposes of determining whether the remedy is functioning as intended by the decision document(s) and whether assumptions used at the time of remedy selection are still valid, that the report confirm and document current conditions of the site, the remedy, and the surrounding area. The document should be reviewed for consistent verb tenses in order to guide readers clearly through decisions and activities that have been completed, those that are pending, and those that will be approached in the future. Much of the material presented in the document is copied from predecessor documents, and this is entirely appropriate. However, it leaves some disjunctures for the reader to sort through. For example, on page 5-6, in reference to AOCs 43G and 43J, the text states, "... additional data collection and modeling is required. A work plan will be prepared ..." However, this work was carried out in the late 1990s, and is long since complete. Another example is found in section 6.3 (page 6-9), where a bullet states, "A Groundwater Monitoring Plan for the South Post will be developed... ." On the next page (6-10), it is stated that, "The Final Long-Term Monitoring Plan for the SPIA was issued in May 1997." Perhaps sections such as these can be set off by a statement such as "{Such-and-such a document] (19xx) outlined the status of the site investigation at that time:" and follow with a statement that these actions have since been completed and provide a "pointer" to the section that describes the completed actions. The scope of a five-year review is site-specific and should, therefore, reflect current, site-specific characteristics.

Response: Verb tense in Subsection 5.3.1 (pages 5-6 through 5-8) was intentionally left as future tense. Subsection 5.3.1 presents the remedy components as directly stated from the ROD (future tense) for comparison with Subsection 5.3.2, Remedy Implementation, which details the intrinsic remediation assessment program that was actually performed (past tense). As suggested in the comment, a sentence has been added at the introduction of Subsection 5.3.1 to clarify that the text describes the remedial components as presented in the ROD for comparison with the actual activities performed at the site as described in Subsection 5.3.2.

Similarly, Subsection 6.3 provides a bulleted list of components required for the selected remedy as specified in the ROD (future tense), whereas 6.3.1 details the items that have been undertaken (past tense) as required by the ROD, such as preparation of the Long-Term Groundwater Monitoring Plan. Introductory sentences similar to the sentence added to Subsection 5.3.1 have been added for clarity to Subsection 6.3 and other subsections.

2. Comment: The final report should include a table which summarizes each recommendation, the party responsible for implementation, and a schedule for completion. At a minimum, the table should identify any recommendation that needs to be addressed to achieve protectiveness as a follow-up action (an example table was electronically mailed to Dave Margolis on August 10, 2000).

Response: Please refer to the Response to USEPA Intro. Comment 1.

3. Comment: As previously discussed, the document needs to be expanded to address all operable units and remedial actions for which there is a CERCLA decision document (e.g., ROD or Action Memorandum). In accordance with recently release draft EPA guidance on the performance of five-year reviews, sites with multiple remedies or operable units should conduct a five-year review for the entire site. The document should identify and describe all source areas,

areas of contamination, operable units, and associated response action(s) and report on the remedy's ability to remain protective of human health and the environment. Because some operable units or areas of contamination may be active and some inactive, each operable unit in the review should be evaluated as appropriate to its progress in the remedial process.

Response: Please refer to the Response to USEPA Intro Comment 1.

4. Comment: The Five-Year Review includes several recommendations to drop iron from the analyte list, based on the argument that USEPA no longer regards iron as a non-cancer health-risk driver. However, there are other reasons for including iron in the monitoring program. In particular, iron is closely associated with other contaminants of concern (COCs), most notably arsenic. Iron is also a primary indicator of redox conditions in groundwater. Redox conditions, in turn, are critical to site remediation, particularly for the microbial environment important to degradation of organics, and for the stability of various inorganic phases important to the mobility of metals. Iron oxides, hydroxides, and oxyhydroxides, often present as coatings on aquifer solids, scavenge other metals. Reduction of these compounds can release the scavenged elements. If analytical results for other metals are unexpected, it often proves important to relate those results to iron concentration. Field measurements of Fe(II) (e.g., by Hach kit) should be *added* to the sampling program for sites where redox conditions are important for the mobility of other constituents, such as arsenic and manganese. Laboratory analysis for total iron is valuable, too, for comparison to the field measurement of reduced iron. In addition, because iron is often a major contributor to the total dissolved constituents, knowledge of its concentration can be useful in interpreting results for other analytes that may be affected by the presence of iron (e.g., interference effects, etc.). Finally, if geochemical modeling is to be considered at some point for sites where the fate and transport of COCs is not well understood, iron concentrations may be a necessary input. Finally, it is noted that the cost savings realized by dropping iron analysis is expected to be minimal, as inorganics analyses are typically done by spectroscopic methods (e.g., ICP) that analyze for the entire suite of metals in a single pass through the instrument, so that iron results are extracted simply as a matter of automated post-processing of the data. While iron might be dropped as a COC, its analysis and reporting should be continued.

Response: AOCs 43G & 43J: At AOCs 43G and 43J the Army is continuing to collect dissolved oxygen and oxidation-reduction potential (ORP) readings at each sampled well during long term monitoring as a means of monitoring redox conditions at the sites. A full set of intrinsic remediation assessment (IRA) parameters (nitrate, nitrite, phosphate, sulfate, sulfide, total iron, soluble iron, methane) was previously collected for 8 sampling rounds at AOCs 43G and 43J as part of the IRA. The need to again collect IRA parameters, including iron, is now triggered based upon pre-established performance standards specified in the approved Long Term Monitoring Plans for these sites. The Performance Standards require that additional field actions be implemented if MCL exceedances are detected in the sentry wells. Depending upon the degree of exceedance, one of the requirements is to sample all wells prior to the next scheduled sampling round for all IRA parameters and COCs for comparison with the Baseline Intrinsic Remediation Assessment and Intrinsic Remediation Assessment data sets. Based on the last sampling round, performance standards were not exceeded such that analysis of IRA parameters (or iron) are warranted at this time.

AOC 69W: As stated in the Draft Five-Year Review, reliance on risk assessment guidance issued by USEPA Region I in 1999 results in dropping iron as a human health COC at 69W. Therefore the Five-Year Review recommends, as an opportunity for optimization, eliminating iron from the monitoring program. USEPA General Comment #46 addresses opportunities for optimization and the continuation of iron monitoring because of additional benefits such as iron's association with arsenic and its ability to act as a primary indicator of redox conditions in groundwater.

At 69W, direct measurement of arsenic in groundwater will continue to be included in the long-term monitoring program, so including iron as a possible arsenic indicator is redundant.

As USEPA correctly states, iron's ability to indicate redox conditions can be an important consideration in determining stability of inorganic phases relating to manganese and arsenic mobility. But because manganese and arsenic will continue to be directly measured during the monitoring program, inclusion of iron is again redundant. Therefore, the Five-Year Review text will continue to state that iron, removed as a COC, will also be dropped from the monitoring program as an opportunity for optimization.

5. Comment: Interviews are conducted to identify successes and problems with remedy implementation and to develop an understanding of the site's status (e.g., integrity of access restrictions, implementation and enforcement of institutional controls, potential changes in land and resource use, community concerns, etc.). EPA recommends, therefore, that the Army expand its list of potential interviewees for the next five-year review to include some of the following parties:

organizations implementing or overseeing institutional controls;
community action groups or associations; and,
residents/businesses located on or near the site.

Response: Comment noted. As part of the next five year review the Army will consider performing interviews with relevant parties as listed in the USEPA's comment.

6. Comment: Pursuant to Section 1.8.2 of the EPA's Draft "Comprehensive Five-Year Review Guidance" dated October 1999, please revise the relevant sections in the report to indicate that the "completion date" of the five-year review is the date on which EPA issues its letter to the Army either concurring with report's findings or documenting reasons for nonconcurrence.

Response: Subsections 2.10, 3.10, 4.10, 5.10, 6.10, 7.10, 8.10 and 9.10 have been revised to reflect that the completion date is the date of the USEPA's letter of concurrence/nonconcurrence. The Army wishes to note that the former wording was derived from USEPA's Draft Five-Year Review Report Guidance (Draft "Comprehensive Five-Year Review Guidance, October 1999, Appendix B, Sample Five Year Review Report, Paragraph XI) which references a signature page. The example should perhaps be clarified/revised for consistency with the guidance Section 1.8.2. As such, the Army does not plan to prepare a signature page for this document.

7. Comment: The Five-Year Review highlights a potential issue with respect to established "background" concentrations for inorganics. In particular, it appears that the background levels of inorganics for Fort Devens were established as part of the RI investigations in the early 1990s. Since that time, a new sampling protocol has been adopted (the USEPA "low-flow" method) that is specifically intended to minimize turbidity. Thus, elements that are strongly associated with oxide coatings on particulates are minimized. This has a particular influence, then, on analyses for iron, manganese, arsenic, and other metals that are scavenged by iron oxide, hydroxide, and oxyhydroxides. A careful review of the basis for establishing background levels of inorganics is needed at this time. It should be verified that the sampling procedures used in establishing background concentrations and those used in the process of monitoring are the same, so that inappropriate comparisons are not made. In particular, if background levels were established based on samples obtained by various methods (e.g., hand bailer, a variety of pumps drawing from different levels with respect to well screens, a variety of pumping rates, etc.) that may have collected relatively high particulate concentrations, the analyses for some elements would be biased high. Later sampling by the low-flow method, if successful in reducing turbidity, would show lower concentrations, even if *dissolved* concentrations remained essentially unchanged. This can lead to a false impression of improving groundwater quality. The Five-Year review acknowledges this possibility in remarks such as that in section 6.3.2.1 (page 6-10) to the effect that the apparent drop in metals noted in results from SPIA monitoring might simply be due to the change to low-flow sampling. Elsewhere (e.g., page 5-4, § 5.2.1, ¶ 2) it is noted that iron and manganese remediation goals were set to their respective background levels because these were higher than risk-based concentrations. This may not be the case if the background levels are re-examined based on data obtained by consistent sampling methods.

Response: The comment is correct with respect to background groundwater concentrations being developed in the mid-90s using samples collected using then conventional bailer sampling methods prior to the development of the newer USEPA low-flow sampling protocol. However, low-flow sampling, which was eventually used at Devens for later sampling events was not implemented without first considerable discussion between the USEPA, MADEP, and Army regarding the same continuity issues raised in the comment. It was agreed between the Army and regulators to proceed forward using the existing background data base.

The Army believes that the current background data is representative of background conditions. Well purging and sampling techniques used for collecting background bailer-collected samples were performed with the sampling procedures specified in the Devens POP. Background data was carefully collected from 10 upgradient monitoring wells at the North, Main, and South Posts and consideration was given to total suspended solids during data review.

The Army has no plans to reestablish background conditions using low-flow protocol. If there are sites where USEPA has specific concerns regarding protectiveness because of inorganic low-flow/background consistency issues, these can be addressed on a case-by-case basis. The comment cites AOCs 43G and 43J (page 5-4) where background levels for iron and manganese were used for remedial goals. Iron at AOCs 43G and 43J is no longer a COC given that it is no longer a risk driver. The manganese background concentration used at AOC 43G and 43J is based on a conservative statistical basis of one standard deviation (68th percentile).

8. Comment: Where applicable, the "Systems Operations/O & M" discussions should be expanded to discuss the Army's institutional control inspection criteria. Specifically, the text should describe how the Army plans to monitor the integrity and effectiveness of the institutional controls and the frequency of monitoring. As the lead agency, the Army bears the responsibility for ensuring that the institutional controls are implemented, e.g. that the specific activity is not occurring. Even if implementation of the institutional controls is delegated in the transfer documents, the ultimate responsibility for monitoring, maintaining and enforcing the institutional controls remains with the agency responsible for cleanup, e.g. the Army.

Response: Implementation of institutional controls, where appropriate, will be outlined in the Land Use Control Memorandum of Agreement between the Army and the Massachusetts Development Finance Agency. This document is currently under review. Details pertaining to institutional control implementation will not be available until the Memorandum of Agreement is finalized, and therefore are not included in this Five Year Review.

Text has been added to appropriate "Systems Operations/O & M" or "Implementation of Institutional Controls and Other Measures" discussions stating that details of institutional control implementation will be provided in the Land Use Control Memorandum of Agreement. Until the time of property transfer, institutional controls will be covered under the Installation Master Plan.

Page-Specific Comments

9. Comment: Page ES-3, AOCs 43G and 43J - As previously discussed, the report recommends that iron be removed as a COC because it is no longer considered a health-risk driver by USEPA. However, because of its close association with redox conditions and the mobility of arsenic, reduced iron should be analyzed in the field, even if it is decided to drop laboratory analysis for total iron. Furthermore, the lab analysis for total iron is of value beyond assessing health risk.

Response: Please see the response to USEPA Comment No. 4.

10. Comment: Page ES-5, AOC 69W - This section should include a brief discussion of the removal action performed in January/February 1998 and acknowledge the anticipated opening of the Charter School in September 2000.

Response: The requested information has been added to the text.

11. Comment: Page ES-5, AOCs 9, 11, 40, 41 (Solid Waste) & SAs 6, 12, & 13 - The discussion should be revised to more accurately reflect current site conditions. Specifically, the landfill consolidation decision was issued on June 30, 2000 and the final five-year review report will not be issued until some time next month. In addition, the report should discuss the planned remediation strategy and schedule for the above referenced debris disposal areas.

Response: The requested information has been added to the text.

12. Comment: Page 2-10, § 2.3.2.3, ¶ 2 - The report states that "... no further annual groundwater sampling was recommended." However, no follow-up statement is made to the effect that a decision was made on this issue, along with regulatory approval. The next section (§ 2.3.3) implies that this decision has been implemented: "Groundwater sampling is complete." For completeness and clarity, the document should state here that this recommendation was finalized and approved. It is noted that this appears to be the case, based on a remark by John Regan cited on p. 2-12 (sec. 2.5). However, the current status of this issue is further clouded by the inclusion of Recommendation No. 1 (sec. 2.8) to discontinue groundwater sampling. Is this a recommendation, or is it a decision that has already been made and implemented? Please clarify.

Response: The decision was previously made that groundwater sampling was complete. The text has been clarified to reflect this. Recommendation No. 1 pertaining to groundwater sampling has been deleted.

13. Comment: Page 2-10, § 2.3.2.4 - The third sentence states, "If property transfer occurs in the future, institutional controls, if still required by the ROD, ...". Since institutional controls are currently required by the ROD, this highlighted language should be deleted. It is confusing and creates the impression that a decision is pending as to the applicability at this site. As previously discussed, the purpose of the five-year review is to evaluate the implementation and performance of the selected remedy. It is not intended to reconsider decisions made during the selection of the remedy. If the Army is proposing that a remedy needs to be changed to make it less protective, the five year review is not the place to do so.

Response: Reference to "if still required by the ROD" has been deleted as recommended. The text has been clarified within Subsection 2.7 to discuss the potential ability for institutional controls to be nullified through the Explanation of Significant Difference (ESD) process. The Army has no plans to proceed with the ESD process.

14. Comment: Page 2-12, § 2.7, ¶ 2 - As stated in the previous comment, the purpose of the five-year review is to evaluate the implementation and performance of the selected remedy. It is not intended to reconsider decisions made during the selection of the remedy. If the Army is proposing that a remedy needs to be changed to make it less protective, the five year review is not the place to do so. Consequently, suggesting that institutional controls may be rescinded, is inappropriate and should be deleted. In addition, the last sentence of this paragraph (top of page 13) refers the reader to subsection 2.8, but there is no discussion of institutional controls in this section. Please clarify.

Response: Reference to "if institutional controls have not been rescinded" has been deleted as recommended. References to Subsection 2.8 have also been corrected. The text has been clarified within Subsection 2.7 to discuss the potential ability for institutional controls to be nullified through the Explanation of Significant Difference (ESD) process. The Army has no plans to proceed with the ESD process.

15. Comment: Page 2-13, System Operations/O & M - This section should briefly discuss the Army's institutional control inspection criteria. Specifically, the text should describe how the Army plans to monitor and enforce any institutional control required to ensure the protectiveness of the remedy. As the lead agency, the Army bears the responsibility for ensuring that the institutional controls are implemented, e.g. that the specific activity is not occurring. Even if implementation of the institutional controls is delegated in the transfer documents, the ultimate responsibility for monitoring, maintaining and enforcing the institutional controls remains with the agency responsible for cleanup, e.g. the Army.

Response: Please refer to the Response to USEPA Comment 8.

16. Comment: Page 2-13, Cost of System/O & M - This information should now be available. Please include it in the final document.

Response: According to Roy F. Weston Inc. who performed the groundwater monitoring, the two rounds of groundwater sampling performed in 1998 and 1999 cost $15,000. This cost has been added to the text as requested.

17. Comment: Page 2-15, Section 2-9, ¶ 2 - This paragraph states that while specified in the ROD, deed restrictions may no longer be required due to changes in risk assessment methodology and updated analytical data (refers reader to Section 2-8). However, Section 2.8 only discusses groundwater institutional controls and not soils/deed restrictions. Please explain.

Response: References to Subsection 2.8 have been corrected.

18. Comment: Page 3-3, Table Summarizing Important Events at the Shepley Hill Operable Unit - The last item indicates that the first SHL five year review was completed in August 1998. While this document was entitled a "five year report," it's submission was required in accordance with the SHL ROD, not as statutorily-required by CERCLA and the NCP. Specifically, CERCLA § 121(c) states that the first statutory review of a site should be conducted within five years of the initiation of a remedial action that will result in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted access. The "trigger" date for this statutory review was the initiation of soil remediation activities at AOCs 42 and 52 - the Barnum Road Maintenance Yards on August 11, 1995. This item should be amended throughout the document.

Response: Although the wording on page 3-11 of the draft Five-year Review states "In accordance ... with the ROD...", the requirement was included in the ROD pursuant to CERCLA 121(c) because of pollutants remaining on site above levels that allow unrestricted use.

A statement has been added to the Introduction stating that the trigger for this five-year review is initiation of soil removal activities at AOCs 44 and 52.

19. Comment: Page 3-5, § 3.2, top of page - The fifth line down has a typo. Specifically, the word "or" between order and magnitude should be "of." Please correct.

Response: This error has been corrected.

20. Comment: Page 3-8, § 3.3.1, ¶ 2 - The Army submitted a final closure report for the landfill on March 1996. Has the State ever officially "accepted" or "approved" this report?

Response: The Army submitted a draft closure report for Shepley's Hill Landfill to MADEP in July 1995, and on February 8, 1996, MADEP provided review comments and specific recommendations to address issues of concern. Following review of the MADEP comments, the Army submitted the final closure report in March 1996 pursuant to 310 CMR 19.000 (SWET, 1996b) and the Long Term Monitoring and Maintenance Plan in May 1996 (SWET, 1996c).

21. Comment: Page 3-12, § 3.3.1, ¶ 3 - It is acknowledged here that undocumented wells may exist downgradient of the arsenic plume. Please add a caveat to this effect under Section 3.9 (Protectiveness Statement).

Response: The first paragraph of Subsection 3.9 has been edited to read as follows:

> The remedy at Shepley's Hill Landfill Operable Unit is currently protective of human health and the environment. There are no known users of groundwater along the modeled downgradient path of groundwater leaving landfill area, although the presence of undocumented wells is possible. Further, the remedy directs groundwater flow away from Plow Shop Pond.

22. Comment: Page 3-18, § 3.7, Question B - Please discuss in this section, the fact that preliminary evidence for significant bedrock fractures exist, and that such features can serve as preferential pathways for groundwater flow. In addition, bedrock itself can serve as a natural source of measurable arsenic in water.

Response: The following paragraph has been added to the discussion of Question C:

> Review of topographic maps for Shepley's Hill Landfill and vicinity shows the presence of a number of topographic features (i.e., linears) potentially indicative of bedrock fracturing. Extensive bedrock fracturing, if present, could play a role in the migration of contaminated groundwater and arsenic; however, the significance of the observed topographic features and presence of significant fractures is unproven. While some fractures undoubtedly exist in bedrock at Shepley's Hill Landfill, the majority of data indicate a competent low water yielding matrix.

The Army agrees that bedrock can be a source of measurable arsenic in groundwater, and believes that arsenic sulfides (e.g., orphiment and realgar) and iron - arsenic sulfide (arsenopyrite) are the ultimate source of arsenic at the landfill.

23. Comment: Page 3-19, § 3.7, Question C - The Army suggests that additional time is needed to assess whether arsenic concentrations will meet cleanup goals, but expresses uncertainty as to whether it can meet the cleanup objectives with the current remedy. Considering this and given the further arsenic contamination located within the landfill (e.g. N5-P1 and SHP-99-29X) and downgradient along Molumco Road, alternatives for moving ahead should be re-evaluated.

Response: This comment is consistent with the recommendation in the last paragraph of the draft Five-year Review to reevaluate the contingency remedy prior to the 2003 performance review.

24. Comment: Page 3-20, § 3.8, ¶ 4 - The report correctly observes that groundwater extraction to remediate the arsenic problem is limited in its effectiveness by continued desorption of arsenic by reducing water, possibly depleted of oxygen by interaction with the landfill waste. Extraction should be re-evaluated as a contingency remedy, as recommended. Alternatives that focus on restoration of higher redox potential in groundwater should be considered in this evaluation.

Response: Comment noted. The Army will evaluate a range of potential alternatives, including, as appropriate, in-situ remedies to raise redox potential and/or achieve containment.

25. Comment: Page 4-5, § 4.1.3, ¶ 2 - The Summary of Site Risks notes that "... downward modification of the carcinogenic risk estimates results in an estimate that is within the USEPA target risk range..." To what "downward modification" does this statement refer? As written, this is a self-evident statement (i.e., that a downward modification of risk estimates can put one comfortably within or below a target range). However, its relevance to the site and its basis in revision of particular risk-estimation procedures is not clear. Please elaborate for completeness.

Response: The risk assessment in the 63AX RI report concluded that carcinogenic risks associated with exposure to both average and maximum concentrations of arsenic in unfiltered and filtered site groundwater samples are at or slightly greater than USEPA's acceptable risk target range. Also documented in the RI report are uncertainties associated with calculations for risk caused by arsenic exposure, and the USEPA's resulting acknowledgement that arsenic risk estimates could be modified downwards as much as an order of magnitude relative to risk estimates associated with most other carcinogens. When the downward modification is applied, cancer risks associated with exposure to arsenic in groundwater at 63AX fall within the USEPA's acceptable risk target range. The requested clarification has been added to the text.

26. Comment: Page 5-4, § 5.2.1, ¶.2 - As previously discussed, the document refers to the high background levels for iron and manganese, noting that background concentrations exceed risk-based concentrations prevailing at the time of the RI/FS. This points to potential limitations of the background inorganics levels established on the basis of older sampling and analyses and comparison to results from sampling under more recent protocols.

Response: Please see response to USEPA Comment No. 7.

27. Comment: Page 5-14, §5.3.3, ¶ 1 - The statement that the IR Assessment report "... documents that Component 1 of the selected remedy will effectively remediate groundwater ..." is somewhat stronger than warranted. It would be more accurate to state that the assessment "supports the conclusion that the selected remedy will effectively remediate groundwater ..." An unequivocal statement that it *will* be effective is difficult to support.

Response: The wording has been modified as recommended.

28. Comment: Page 5-17, § 5.4 - The review of ARARs should mention the impending change in the arsenic MCL, as is done on page 3-14 for Shepley's Hill Landfill. Since arsenic remains a COC for AOC 43J (see age. 5-16) the lowering of the arsenic MCL from 50 µg/L to 5 µg/L (current USEPA recommendation) will affect remediation goals for the site, and thus should be acknowledged here.

Response: Wording with respect to the lowering of the MCL for arsenic has been added as requested.

29. Comment: Page 5-22, § 5.8, Recommendation No. 3 - The document states, "Carbon tetrachloride has already been deleted as a long-term monitoring analyte. This recommendation documents the decision." It is unclear whether this decision has received the necessary regulatory approvals. EPA recommends that this issued be placed on the agenda for the next BCT meeting.

Response: Discussion to remove carbon tetrachloride as a contaminant to be monitored has already been documented and approved in the Final Intrinsic Remediation Assessment Report dated November 1999. Reference to this documentation has been added to the paragraph entitled "Opportunities for Optimization" and, as such, has been deleted as a recommendation.

30. Comment: Page 6-4, AOC 26 - Typo. Please change "on" to "one."

Response:: The suggested change has been made.

31. Comment: Page 6-6, first sentence - Typo. Please delete the word "then."

Response: The suggested change has been made.

32. Comment: Page 6-9, last bullet - If the property is transferred, there should be institutional controls in the deed limiting use based on a reassessment of the remedy at the time of transfer.

Response: The text contained within the referenced bullet is excerpted from Section VIII (Description of the No Action Alternative) of the Final Record of Decision for the South Post Impact Area and AOC 41 Groundwater and AOCs 25, 26, and 27. The Army has no intention of transferring the SPIA; therefore, institutional controls are not included in the selected alternative.

33. Comment: Page 6-10, § 6.3.1, Groundwater Sampling Plan - Please change the third sentence to reflect the fact that the 1999 Annual report for long-term monitoring for the SPIA was released in July 2000.

Response: The suggested change has been made.

34. Comment: Page 6-11, § 6.4, ¶ 1 - As mentioned previously, the report states that there have been no changes to federal and state standards that affect the SPIA ROD. However, this section should at least refer to the impending change in the MCL for arsenic, as is done on p. 3-14 for Shepley's Hill Landfill. It was noted previously (page 6-6) that arsenic exceeds background values at AOC 26.

Response: The first paragraph of Section 6.4 has been changed to read:

ARARS were not specifically identified in the ROD. However, the ROD does state that Well D-1 will be sampled and analyzed for explosives and MMCLs/MCLs. There was a change to portions of the National Primary Drinking Water Standards 40 CFR Parts 141.11 - 141.16 and 141.50 - 141.52 and the Massachusetts Drinking Water Standards and Guidelines 310 CMR 22.0, that affects nickel. In February 1995, USEPA and the Nickel Development Institute (a nickel trade association) filed a joint motion for a voluntary remand of the nickel MCL. In the same month, the court granted the motion and vacated and remanded the MCL for nickel (0.1 mg/L). The updated USEPA Office of Water Drinking Water Regulations and Health Advisories dated October 1996 now lists the MCL for nickel as "being remanded". This means that while many water suppliers continue to monitor nickel concentrations in their drinking water, there is currently no USEPA legal limit on the amount of nickel in drinking water. USEPA is reconsidering the limit on nickel. The Commonwealth of Massachusetts followed similar action. Drinking Water Standards and Guidelines for Chemicals in Massachusetts Drinking Water issued by the MADEP Office of Research and Standards (ORS) and dated Spring 2000, lists 0.1 mg/L as a guideline with a footnote that "the MCL for Nickel has been remanded and is no longer in effect".

On June 22, 2000, USEPA proposed reducing the MCL for arsenic from 50 to 5 µg/L. Promulgation of a new standard is required by January 1, 2001; however the new standard may not be implemented for 3 to 5 years.

35. Comment: Page 6-11, ¶ 2 - The text indicates that "Results of 1997 and 1996 groundwater sampling are provided in Appendix D," but the previous page indicates that groundwater samples were collected in 1997, 1998, and 1999. Was groundwater sampled in 1996? Please include all currently available data, including 1999 sampling results (which were released last month), in the Appendix.

Response: The requested 1999 monitoring data has been provided in Appendix D. The reference to 1996 data is a typo which should read "1997, 1998, and 1999 groundwater sampling". Long term monitoring of SPIA groundwater did not start until 1997.

36. Comment: Page 6-13, § 6.7 - Please see previous comment referring to page 6-11 and the impending change to the MCL for arsenic.

Response: Please refer to the Response to USEPA Comment 34.

37. Comment: Page 7-2, , § 7.1.2 - The site history fails to mention major demolition, grading, and construction activity that has taken place in 2000, which has destroyed most previously sampled monitoring wells, and has very likely altered the site hydrology significantly. Please update.

Response: The requested information has been added to the text.

38. Comment: Page 7-6, § 7.3, ¶ 5 - The text states, "The data show that concentrations of dichlorobenzene (DCB) ... [have] decreased over time." While DCB has declined in specific locations (e.g., 32M-92-04X in AOC 32), it appears to be recalcitrant locally, having persisted at well 32MA-92-06X at concentrations of the same order of magnitude since the 1992/1993 RI. Thus, the claim made here is somewhat overstated, and neglects some more equivocal results.

Response: The chemical data has been reviewed; the cited concentration reduction claim has been removed from the text and replaced with a more equivocal assessment of monitoring results.

39. Comment: Page 7-8, § 7.4, top of page - The report again states that no "... newly promulgated standards ... were identified." The forthcoming change in the arsenic MCL should be mentioned again here, since high inorganics are likely to be persistent at this site.

Response: The requested reference to the forthcoming change in the arsenic MCL has been added to the text

40. Comment: Page 7-8, § 7.5, ¶ 4 - The document cites Mr. Chambers to the effect that construction activities "... would not affect the selected remedy" and that the construction would improve the remedy by decreasing recharge. While the *concept* of monitored natural attenuation (MNA) for the site still appears to be viable, there are certainly some effects of the construction. In particular, as discussed during our August 3, 2000 meeting, site construction has likely had a very strong impact on the site hydrology, so that siting of boundary "sentry" wells will require characterization of the newly altered flow field. Also, the historical monitoring of previously existing wells is no longer valid as a basis for establishing decline of contaminant concentrations. While the building and pavement over the site do limit infiltration, they will also inhibit the re-oxidation of the shallow groundwater, and the attendant decline of redox-sensitive inorganics such as iron, manganese, and arsenic. It is likely that these elements will remain elevated for a very long time. Please amend the report accordingly.

Response: Comment noted. As a result of discussions at the August 3, 2000 meeting, the Army intends to install initial source area groundwater monitoring wells and begin long-term monitoring. Piezometers will be installed and monitored first to characterize the newly-altered flow field. Sentinel wells will then be installed in appropriate locations to complete the monitoring locations, and long-term monitoring will continue. This information has been added to the text.

41. Comment: Page 7-9, § 7.8, ¶ 3 - The review mentions the sampling schedule for 2000, as well as possible adjustments to the sampling plan. Based on discussions during our August 3, 2000 meeting, these considerations will very likely have to be revisited in view of the changes to the site and the necessity to re-establish a monitoring well network, as well as to "re-initiate" MNA sampling.

Response: Comment noted. The Army is revisiting the site monitoring program as discussed in the response to the previous comment. Sampling is still planned for late Fall 2000. The text has been revised accordingly.

42. Comment: Page 7-9, §§ 7.7, 7.8, and 7.9 - As stated previously, these sections need to be amended to more accurately reflect current site conditions. Specifically, the text should reflect the potential impact of property development/building construction on groundwater hydrogeology as discussed during our August 3, 2000 meeting. Language should be added to include descriptions of follow-up actions needed to achieve, or to continue to ensure, protectiveness (e.g. installation of new monitoring wells to replace those destroyed or relocated by construction activities and installation of piezometers to assess current site conditions, etc.). In addition, consistent with the recently released draft five-year review guidance previously discussed, the report should include recommendations addressing implementation and maintenance of the remedy, coordination with other authorities, and a timetable for performing the actions and the parties responsible for implementation identified.

Response: The requested information has been added to the text.

43. Comment: Page 8-3, § 8.1.2, ¶ 1 - The text states that "... the underground piping ... may have acted as a conduit for contaminant migration." It may be more accurate to state that the trench and backfill, rather than the piping itself, acted as a conduit.

Response: The requested wording has been added to the text.

44. Comment: Page 8-9, § 8.4 - The review again states that no "... newly promulgated standards ... were identified." The forthcoming change in the arsenic MCL should be mentioned again here, since the ROD calls for restoration of groundwater to drinking-water standards, and arsenic is a COC here.

Response: The requested reference to the forthcoming change in the arsenic MCL has been added to the text.

45. Comment: Page 8-10, § 8.7 - Please identify the "institutional control restrictions as outlined in the ROD" and explain what they are intended to accomplish.

Response: The requested information has been added to the text.

46. Comment: Page 8-10, § 8.7, Opportunities for Optimization - please see General Comment 4.

Response: As stated in the Draft Five-Year Review, reliance on risk assessment guidance issued by USEPA Region I in 1999 results in dropping iron as a human health COC. Therefore the Five-Year Review recommends, as an opportunity for optimization, eliminating iron from the monitoring program. USEPA General Comment 4 suggests continuation of iron monitoring because of additional benefits such as iron's association with arsenic and its ability to act as a primary indicator of redox conditions in groundwater.

At 69W, direct measurement of arsenic in groundwater will continue to be included in the long-term monitoring program, so including iron as a possible arsenic indicator is redundant.

As USEPA correctly states, iron's ability to indicate redox conditions can be an important consideration in determining stability of inorganic phases relating to manganese and arsenic mobility. But because manganese and arsenic will continue to be directly measured during the monitoring program, inclusion of iron is again redundant.

Therefore, the Five-Year Review text will continue to state that iron, removed as a COC, will also be dropped from the monitoring program as an opportunity for optimization.

47. Comment: Page 9-8, § 9.3 - As previously discussed, the last paragraph should be revised to more accurately reflect current site conditions. Specifically, on June 30, 2000, the Army rendered it's decision with regards to on-site, consolidation of solid waste debris from these AOCs. A timetable for implementation of this chosen remedy should be included and the parties responsible for its implementation identified.

Response: The requested information has been added to the text.

48. Comment: Figure 9-2 - *typo:* Change "Nashus River" label to "Nashua River."

Response: The requested spelling correction has been made to Figure 9-2.

MADEP Comments dated September 18, 2000 on the Draft First Five-Year Review Report Devens, Massachusetts

Introduction Comments (excerpted from cover letter)

1. Comment: The purpose of the five year review is to determine the effectiveness of CERCLA remedies and to document any deficiencies identified during the review as well as to recommend specific actions to ensure that a remedy will continue to be protective. Therefore, the Department recommends that the draft report be expanded to include those sites that were remediated under No Further Action Decision Documents. Additionally, the final report should also contain details noting the status of AOCs 50 and 57.

Response: The requested additions have been made. Please also refer to the Response to USEPA Intro Comment 1.

2. Comment: The MADEP further recommends that a conclusion section be added to the report. Devens underlies extensive high and medium yield aquifers that serve as actual and potential sources of drinking water and several of the CERCLA regulated sites are subject to groundwater remedies or water related institutional controls. Therefore, the MADEP recommends that these conclusions provide an assessment of the overall health of the underlying aquifers. Although through necessity, the cleanup of Devens has proceeded as a stepwise process, the Department considers Devens' soil and groundwater to be an interconnected system regardless of the disparate locations of the sites. Therefore we believe that the Five Year Review process provides the Army an opportunity to both evaluate Devens groundwater on a site wide basis and to validate the effectiveness of the existing remedies.

Response: The purpose of the CERCLA five year review process is to determine whether the remedy at a site is protective of human health and the environment. The Army feels that the MADEP recommendation for an "assessment of the overall health of the underlying aquifers" at Devens is far beyond the scope of the 5-year review process. These issues have thus far been addressed on a site by site basis through the CERCLA investigation process. Sites that are subject to groundwater remedies or water related institutional controls such as AOC 69W and SPIA have provisions for monitoring for off-site migration so that actual sources of drinking water do not become threatened while the institutional controls prevent exposure from potential future sources.

Specific Comments

1. Comment: pgs 2-11 sec 2.3.3. The MADEP recommends that those sections of the installation management plan pertaining to institutional controls be added to the final report as an appendix.

Response: The sections of the Installation Master Plan which pertain to site specific institutional controls are currently under development and are therefore not available for inclusion in this document. Please also refer to the Response to USEPA Comment 8.

2. Comment: pgs 3-3 sec 3.2. The MADEP has previously noted the potential presence of leachate in the Plow shop cove adjacent to the landfill. Previous sampling results indicate high levels of Iron and manganese, typical of landfill leachate, to be present in the cove.

Response: Comment noted. The Army performed extensive surface water and sediment chemical characterization as well as sediment toxicity characterization in Plow Shop Pond and Grove Pond from 1992 through 1995. Results of these studies, reported in the Remedial Investigation Addendum Report (ABB-ES, 1993) and in the Draft Plow Shop Pond and Grove Pond Sediment Evaluation (ABB-ES, 1995c), indicate high concentrations of iron and manganese in the subject cove. In 1995, the Army designated Plow Shop Pond as AOC 72.

3. Comment: pgs 3-17 secs 3-7. SHL-9, a Group I well, which previously exhibited arsenic concentrations at less than the MCL shows that arsenic has increased to 71 ug/l based on the May 1999 groundwater analyses. This increase combined with the previously noted arsenic concentrations (DEP Comments, May 1998) indicate that Shepley's Hill groundwater has not met the cleanup goals established by the September 1995 ROD.

Response: The comment implies that the conclusion is drawn on page 3-17 that all cleanup goals have been met. This is not true; no such statement was made.

As stated on page 3-17, line 22, of the draft document, the comparison is based on November 1999 data, the most recent available when the report was drafted. Review of Table 3-2 shows that well SHL-9 has been below 50µg/L for 6 of 7 samples between 1996 and November 1999. The May 1999 concentration of 71µg/L appears to be nonrepresentative.

4. Comment: pgs 3-19 secs 3-8. The MADEP recommends that the Army include a recommendation to review both hydraulic containment and in-situ contingency remedies for the landfill.

Response: Please refer to the response to USEPA Comment No. 24.

5. Comment: pgs 7-9 secs 7-8. The MADEP recommends that the current sampling and analyses program continue to incorporate natural attenuation parameters.

Response: There are no plans to collect MNAA parameters, with the exception of the field measurements required by the USEPA Low Flow Sampling Protocol. MNAA is considered complete and future monitoring will be considered Long Term Monitoring. See response to USEPA Comment #40 regarding changes to monitoring program as a result of construction at these sites.

6. Comment: pgs 8-11 sec 8.8. The regulatory agencies agreed at the April, 2000 BCT meeting that the groundwater monitoring program would be evaluated after two years. Given the proximity of the MacPherson well Zone II to the site the monitoring program should require more than four rounds of sampling.

Response: Comment noted.

FINAL

FIRST FIVE-YEAR REVIEW REPORT
FOR
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS

CONTRACT DACA31-94-D-0061
DELIVERY ORDER 0009

Prepared for:

U.S. Army Corps of Engineers
New England District
Concord, Massachusetts

Prepared by:

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Portland, ME
Project No. 45227
Task No. 0993804

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FINAL
FIRST FIVE-YEAR REVIEW REPORT
FOR
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EXECUTIVE SUMMARY

Harding Lawson Associates (HLA) has performed the first five-year review of remedial actions for CERCLA sites at Devens Reserve Forces Training Area (RFTA). This review, completed in accordance with relevant U.S. Environmental Protection Agency (USEPA) guidance (USEPA, 1999), was performed from May 2000 through September 2000. The trigger date for performance of this five-year review was the initiation of soil remediation activities of Areas of Contamination (AOCs) 44 and 52 on August 11, 1995.

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. In addition, five-year review reports identify deficiencies, if any, found during the review, and identify recommendations to address them.

This review is required by statute and policy, and is being implemented consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan.

Comprehensive statutory reviews were performed for all sites where a CERCLA Record of Decision (ROD) has been executed. Statutory five-year reviews were performed for the following sites:

- Barnum Road Maintenance Yards (AOCs 44 and 52)
- Shepley's Hill Landfill Operable Unit (AOCs 4, 5, and 18)
- AOC 63AX
- AOCs 43G&J
- South Post Impact Area (AOCs 25, 26, 27, and 41-groundwater)
- AOCs 32 and 43
- AOC 69W
- AOCs 9, 11, 40, and 41-solid waste, and SAs 6, 12, and 13

In addition, reviews were also performed as a matter of policy for all sites for which there is a CERCLA decision document (e.g., Action Memorandum). Policy reviews were performed for the following sites:

- SA 34
- SA 35
- AREE 63 BD
- AREE 63 BE
- AREE 63 BQ
- AREE 61 Z
- AREE 63 BH
- SA 71
- AREE 63 AM
- AOC 50
- AOC 57

Results of policy reviews, in addition to summaries of the statutory reviews, are provided in Appendix H. A brief description of each site where a ROD has been executed is provided below along with a summary of findings of the statutory five-year reviews.

Barnum Road Maintenance Yards (AOCs 44 and 52). The Barnum Road Maintenance Yards are located in the northeast corner of the former Main Post, near Barnum Gate. This site consists of former vehicle maintenance yards. Contamination at the site was primarily attributed to petroleum and oil releases associated with maintenance activity. The ROD describing the selected cleanup remedy was signed in March 1995. Remedial action consisting of soil excavation, asphalt-batching of contaminated soil, repaving, and installation of a stormwater collection system was completed in April of 1996.

There were no areas of noncompliance or deficiencies noted during the review that would make the remedial actions at AOCs 44 and 52 noncompliant with the ROD. The remedy at AOCs 44 and 52 is protective of human health and the environment.

Shepley's Hill Landfill Operable Unit (AOCs 4, 5, and 18). Shepley's Hill Landfill encompasses approximately 84 acres in the northeast corner of the former Main Post at Fort Devens. Landfill operations at Shepley's Hill Landfill began at least as early as 1917, and stopped as of July 1, 1992. Landfill capping was completed in May 1993. Remedial Investigation (RI) and RI Addendum investigations performed between 1991 and 1993 (E&E, 1995a; ABB-ES, 1995b) identified potential human exposure to arsenic in groundwater as the primary risk at the site. A Feasibility Study (FS) was performed in 1995 to evaluate alternatives to reduce potential exposure risks, and in September 1995, the ROD was finalized (ABB-ES, 1995a; ABB-ES, 1995b). The selected remedy consists of landfill closure, landfill maintenance, long-term groundwater and landfill gas monitoring, institutional controls, and public information meetings. The ROD stipulates that if an evaluation of this remedy shows that it is no longer protective, groundwater extraction will be implemented to help achieve protectiveness.

There were no areas of noncompliance or deficiencies noted during the review that would make the remedial action at Shepley's Hill Landfill Operable Unit noncompliant with the ROD. Needed maintenance is identified during annual inspections and documented in the annual reports. The remedy at Shepley's Hill Landfill Operable Unit is currently protective of human health and the environment. There are no known users of groundwater along the modeled downgradient path of groundwater leaving landfill area, although the presence of undocumented wells is possible. Further, the remedy directs groundwater flow away from Plow Shop Pond.

Review of available data suggests that the remedy may have difficulty meeting 2003 interim groundwater cleanup goals. Because of this, the Army should re-evaluate the contingency remedy of groundwater extraction with subsequent discharge to the Town of Ayer publicly owned treatment works (POTW). Although groundwater extraction has the potential to contain groundwater contaminants, it will not prevent the release of arsenic from aquifer materials and would need to be performed for an indeterminate length of time. Also, it appears that the POTW would no longer be suitable for receipt of extracted groundwater. These studies should be completed prior to the 2003 assessment of risk at Shepley's Hill Landfill.

It is recommended that the Army continue with its programs of annual landfill inspections and landfill gas sampling, and semi-annual groundwater sampling with annual reporting to USEPA and MADEP. Landfill maintenance should continue as recommended in the Long Term Monitoring and Maintenance Plan and in the annual reports.

The list of parameters monitored as part of the long-term sampling program should be reviewed with the intent of eliminating parameters that have no significant site history and that do not contribute to site risks or to the understanding of groundwater chemistry. These include cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, BOD_5, and cyanide. Analysis of total organic carbon in lieu of BOD_5, would provide insight on the concentration of organic material in groundwater which is not currently available.

Samples from groundwater monitoring wells (i.e., SHM-99-31A, SHM-99-31B, SHM-99-31C, and SHM-99-32X) installed along Molumco Road north of Shepley's Hill Landfill should continue to be analyzed for arsenic, iron, manganese, and the general chemistry and field parameters monitored as part of the long-term sampling for the landfill. Samples from these monitoring wells will be used in the continuing assessment of migration of arsenic north of the landfill.

Although landfill-gas readings are within the parameters of a mature landfill and landfill-gas vents appear to be working properly, because of high landfill-gas measurements during routine sampling, the Army should assess whether subsurface migration of landfill gas is occurring.

AOC 63AX. AOC 63AX is located north of and near the western end of Patton Road on the southern portion of what was formerly the Main Post at Fort Devens. AOC 63AX formerly consisted of a large paved and fenced area; Building 2517, which at the time of the RI investigation was used as a warehouse by the U.S. Bureau of Prisons; and Building 2514, which was unoccupied. Contamination at AOC 63AX is attributed to a previously removed 1,000-gallon waste oil underground storage tank (UST) adjacent to Building 2517, and a previously removed 5,000-gallon gasoline UST adjacent to Building 2514. Several investigations, including a CERCLA directed RI, were performed at the site between 1992 and 1995. The results of the RI indicated that AOC 63AX posed no unacceptable risks to human health or the environment. Further, previous removal actions have eliminated USTs and contaminated soils that would otherwise be a continuing source of contamination. The ROD was signed in October of 1997 documenting No Further Action as the selected remedy.

There were no deficiencies or areas of non-compliance noted during this review that would make the selected remedy non-compliant with the ROD, or sufficient to warrant a finding of not protective. The selected remedy at AOC 63AX (no further action) is protective, and is expected to remain protective of human health and the environment. There are no recommendations as a result of this review.

AOCs 43G and 43J. Both AOCs 43G and 43J are historic gas stations located within the Devens RFTA. AOC 43G is located on Queenstown Road in the central portion of the former Main Post. AOC 43J is located on Patton Road at the southern edge of the former Main Post.

Contamination at both sites is attributed to releases from gasoline and waste USTs. Site investigations (SIs) and Supplemental SIs were performed between 1992 and 1994 at both sites. In June of 1996 CERCLA based RI/FS investigations were completed at both AOCs to address contaminated groundwater. A ROD was signed in October of 1996 documenting intrinsic remediation as the final selected cleanup remedy at both AOCs 43G and 43J. Specific components of the selected remedy for both AOCs include: intrinsic remediation assessment data collection and groundwater modeling, installation of additional monitoring wells, long-term groundwater monitoring, and annual data reports.

There are no areas of non-compliance or deficiencies that have been noted during the review that would make the remedial actions at AOCs 43G and 43J non-compliant with the ROD, or sufficient to warrant a finding of not protective. The remedies at AOCs 43G and 43J are expected to be protective of human health and the environment upon completion, and immediate threats are addressed. The following recommendation is made as a result of the findings of this review: Continue current remedial action activity which consists of implementing the remaining three components specified in the ROD: a long term groundwater monitoring program, annual reporting, and five-year site reviews (Component Nos. 4, 5, and 6, respectively). These components enable continued assessment for compliance with performance standards and reporting of the remedial progress. Follow performance standards established in the intrinsic remediation assessment and continue to assess for contaminant migration and remedial duration.

Long-term monitoring should continue as specified in the AOCs 43G and 43J Long-Term Monitoring Plans (SWETS, 1999a, 1999b) with the exception of the need to analyze for iron (AOCs 43G and 43J) and nickel (AOC 43J) as COCs. (Refer to Subsection 5.7). No reductions in sampled locations or in frequency are recommended at this time. The Long-term Monitoring is currently performed on an annual basis (November/December time period each year). The Army is responsible for implementation.

South Post Impact Area (AOCs 25, 26, 27, and 41-groundwater). The South Post Impact Area (SPIA) covers approximately 1,500 acres and is located within the 4,800-acre South Post section of the former Fort Devens. The SPIA is an active weapons and ordnance discharge area used by the Army, the Massachusetts National Guard, and law enforcement agencies for training purposes. Old Turnpike Road, Firebreak Road, the southern portion of Harvard Road, Trainfire Road, and Dixie Road roughly bound the area. The SPIA includes AOCs 25, 26, 27, and 41 as well as several Study Areas (SAs), and a number of firing ranges along Dixie Road and Trainfire Road that are not designated as AOCs.

The portion of the SPIA covered by the ROD encompasses the 964 acres north and west of New Cranberry Pond. This area is referred to as the SPIA monitored area. CERCLA directed RIs have been conducted for the SPIA and the associated AOCs. A ROD was signed in July of 1996 documenting No Action as the final selected remedy for the SPIA monitored area groundwater, surface water, soil, and sediment, and AOC 41 groundwater. The following components were included as part of the selected No Action Remedy: groundwater monitoring for potential contaminant migration out of the SPIA monitored area, groundwater monitoring at the individual

AOCs, sampling of monitoring well D-1, developing a Long-term Groundwater Monitoring Plan and Integrated Natural Resources Management Plan, restricting development of new drinking water sources within the SPIA monitored area, and submitting annual reports to document the results of monitoring.

There are no areas of non-compliance or deficiencies noted during this review that would make the selected remedy at the SPIA monitored area and the associated AOCs non-compliant with the ROD, or sufficient to warrant a finding of not protective. The selected remedy at the SPIA and associated AOCs is expected to be protective of human health and the environment. It is the recommendation of this review that long-term groundwater monitoring be continued as outlined in the ROD and Long-term Monitoring Plan. No changes are recommended at this time.

AOCs 32 and 43A. AOC 32 (Defense Reutilization and Marketing Office [DRMO Yard]) was used as a materials storage facility. Operational records indicate that the facility was active from at least 1964 to 1995. A former UST site (UST #13) has also been incorporated into AOC 32. This UST was used to store waste oil and was located just northeast of the DRMO Office. At the time of base closure in 1996, AOC 43A was being used as a petroleum, oils and lubricants storage area. Located across Market Street from AOC 32, this area served as the central distribution point for all gasoline and fuel at the former Fort Devens from the 1940s to base closure. AOC 43A consists of a fenced lot within a developed industrial area. A ROD was signed in February of 1998 documenting the selected remedies for AOCs 32 and 43A. Key components of the remedy at AOC 32 include excavation of contaminated soils and annual groundwater monitoring. The groundwater remedy for AOCs 32 and 43A includes establishing institutional controls, installing additional monitoring wells, collecting data to support monitored natural attenuation, groundwater modeling, performing annual long-term groundwater monitoring, and providing annual reports to regulators.

There are no areas of non-compliance or deficiencies that have been noted during this review that would make the remedial actions at AOCs 32 and 43A non-compliant with the ROD, or sufficient to warrant a finding of not protective. The remedies at AOC 32 and 43A are expected to be protective of human health and the environment upon completion; immediate threats have been addressed. There are no recommendations as a result of this review.

AOC 69W. AOC 69W comprises the former Fort Devens Elementary School (Building 215) and the associated parking lot and lawn extending approximately 300 feet northwest to Willow Brook. Contamination at AOC 69W is attributed to No. 2 heating oil which leaked from underground piping in two separate incidences; once in 1972 and again in 1978. It is estimated that approximately 7,000 to 8,000 gallons of fuel oil were released to soil from each release.

Based on the nature and distribution of contaminants, a Removal Action was undertaken in the winter of 1997 and 1998 to remove contaminated soil associated with the 1972 release. Soil was removed near the school and the 250-gallon UST. Confirmatory subsurface soil sample results from the Removal Action showed that concentrations of fuel-related contaminants still exceed Massachusetts Contingency Plan (MCP) S-1/GW-1 standards for extractable petroleum hydrocarbons (EPH) in subsurface soils immediately adjacent to the school building, but are generally low in downgradient areas (only a few concentrations in soil slightly exceeded MCP S-1/GW-1 standards). The Charter School opened in September 2000. In 1999, a Limited Action

ROD was signed. The Limited Action consists of long-term groundwater monitoring and institutional controls to limit potential exposure to contaminated soils and groundwater under both existing and future site conditions.

There are no areas of non-compliance or deficiencies that have been noted during this review that would make the remedial action at AOC 69W non-compliant with the ROD, or sufficient to warrant a finding of not protective. The selected remedy at AOC 69W is, and is expected to remain, protective of human health and the environment. It is the recommendation of this review that iron be removed as a contaminant of concern and as a sampled analyte in the Long-term monitoring Plan for AOC 69W. This recommendation is based on the USEPA Region I no longer endorsing use of the iron reference dose (RfD).

AOCs 9, 11, 40, 41 (Solid Waste), SAs 6, 12, and 13. These seven sites are all small former landfills and debris disposal areas at the former Fort Devens. SAs 6 and 12, and AOC 41 are located on the South Post. AOC 9 is located on the former North Post. AOCs 11 and 40, and SA 13 are located on the former Main Post.

SIs were conducted at SAs 12 and 13, and AOCs 9, 40, and 41 to verify the presence or absence of environmental contamination and to determine whether further investigation or remediation was warranted. Supplemental SI activities were conducted at SAs 12 and 13, and AOC 41 to address data gaps identified in the SI reports. RIs were completed at AOCs 11, 40, and 41 to further assess contaminant distribution and site risks. A Landfill Consolidation FS (ABB-ES, 1995a) was performed to evaluate options to consolidate debris from the seven landfills into a single waste disposal site. In response to comments, a Landfill Remediation FS (ABB-ES, 1997) was performed to evaluate nine debris management alternatives, including various combinations of no further action, capping in-place, and debris removal and consolidation. A ROD was issued in July 1999 which presented the selected remedial action of no further action for SA 6; surface debris and hot spot removal at SA 12, and AOC 41; debris removal and consolidation or offsite transport at AOC 9, 11, 40, and SA 13; and wetlands restoration at AOCs 9, 11, and 40. The decision to proceed with on-site consolidation was issued June 30, 2000, and a temporary (120 day) access agreement to begin construction was signed on September 15, 2000.

Because planned remediation for the debris disposal areas has not yet been implemented, observations regarding deficiency cannot be made. At present, there are no deficiencies that would prevent planned response actions from being protective of human health and the environment, nor are any expected in the future. Because planned remediation has not yet been implemented, there are no recommendations for improvements.

1.0 INTRODUCTION

Harding Lawson Associates (HLA) performed the first five-year review of remedial actions for CERCLA sites at Devens Reserve Forces Training Area (RFTA) in support of Delivery Order 0009 of Contract DACA31-94-D-0061 under the direction of the U.S. Army Corps of Engineers (USACE). This review, completed in accordance with relevant U.S. Environmental Protection Agency (USEPA) guidance (USEPA, 1999), was performed from May 2000 through September 2000. The trigger date for performance of this five-year review was the initiation of soil remediation activities of Areas of Contamination (AOCs) 44 and 52 on August 11, 1995.

1.1 PURPOSE AND SCOPE

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify deficiencies, if any found during the review, and identify recommendations to address them.

This review is required by statute and policy, and is being implemented consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

1.2 BACKGROUND

In 1991, the U.S. Department of the Army and the USEPA signed a Federal Facility Agreement (FFA) under Section 120 of CERCLA for environmental investigations and remedial actions at Fort Devens. The agreement required that site investigations (SIs) be undertaken at each study area (SA) to verify whether a release or potential release of contaminants existed, to determine the nature of the associated risk to human health and the environment, and to determine whether further investigations or response actions would be required.

In 1985, Fort Devens applied for a Resource Conservation and Recovery Act (RCRA) Part B Permit for its hazardous waste storage facility. The submission included a list of Solid Waste Management Units that showed potential for the release of hazardous substances to the environment. Under the FFA between the Army and the USEPA (USEPA and Army, 1991), these potential areas of contamination are referred to as SAs.

Argonne National Laboratory's Environmental Assessment and Information Sciences Division completed an environmental assessment in November 1988, as part of the environmental restoration of Fort Devens. The objective of the assessment was to characterize on-site contamination and provide recommendations for potential response actions. Fort Devens was placed on the National Priorities List (NPL) effective December 1989.

The results of assessment are reported in a document entitled the Master Environmental Plan (MEP) for Fort Devens, Massachusetts (Biang et al., 1992). The MEP summarizes preliminary assessment activities and provides an historical summary of the installation, discusses the geologic and hydrologic setting, discusses the nature and extent of contamination, and proposes response actions.

In 1991, the former Fort Devens was identified for closure by July 1997 under Public Law 101-510, the Defense Base Closure and Realignment (BRAC) Act of 1990. This resulted in accelerated schedules for the environmental investigations at Fort Devens. Since 1991, the U.S. Army Environmental Center (USAEC, formerly the U.S. Army Toxic and Hazardous Materials Agency) and the USACE have tasked HLA [formerly ABB Environmental Services, Inc. (ABB-ES)] to perform SIs, remedial investigations (RIs), feasibility studies (FSs), and other CERCLA-related activities for the sites addressed in this report. To a significant extent, the five-year review draws upon information collected during the previous activities performed by HLA and by other Army contractors. Previous reports generated by prior activities, containing information used during the five-year review, are referenced in this report.

The remainder of this report describes the statutory five-year reviews performed for the CERCLA sites at Devens RFTA where Records of Decisions (RODs) have been executed. Some of the sites comprise more than one SA or area of contamination (AOC) (See Figure 1-1). The sites consist of the following:

- Barnum Road Maintenance Yards (AOCs 44 and 52)
- Shepley's Hill Landfill Operable Unit (AOCs 4, 5, and 18)
- AOC 63AX
- AOCs 43G&J
- South Post Impact Area (AOCs 25, 26, 27, and 41-groundwater)
- AOCs 32 and 43
- AOC 69W
- AOCs 9, 11, 40, and 41-solid waste, and SAs 6, 12, and 13

Because some RODs have been executed relatively recently, some site remedies have not yet been implemented.

Reviews were also performed as a matter of policy for all sites for which there is a CERCLA decision document (e.g. Action Memorandum). Policy reviews were performed for the following sites:

- SA 34
- SA 35
- AREE 63 BD
- AREE 63 BE
- AREE 63 BQ
- AREE 61 Z
- AREE 63 BH

- SA 71
- AREE 63 AM
- AOC 50
- AOC 57

Results of policy reviews, in addition to summaries of the statutory reviews, are provided in Appendix H.

It should be noted that investigations and remedial actions are ongoing for the landfills (AOCs 9, 11, 40, 41, Sas 5, 12, and 13), AOC 50 and AOC 57. Schedules for the completion of work at these sites are provided in Appendix I.

2.0 BARNUM ROAD MAINTENANCE YARDS AOCs 44 AND 52 FIVE-YEAR SITE REVIEW

2.1 SITE DESCRIPTION AND HISTORY

The Barnum Road Maintenance Yards (AOCs 44 and 52) are former vehicle maintenance yards located within the Devens RFTA. The sites are situated in the northeast corner of the former Main Post on Barnum Road, approximately ½ mile southwest of the Barnum Road Gate (see Figure 1-1).

These sites were combined administratively under one ROD because of their proximity and similar petroleum releases. The bulleted items below summarize the chronology of events that is specific to the site. Refer to the Introduction for general enforcement activities at Fort Devens (i.e., initiation of a MEP, placement on the NPL, and signing of the FFA).

- **April 1985** Motor vehicle gasoline (MOGAS) release at Cannibalization Yard; visibly contaminated soils were excavated immediately.
- **July 1991** exploratory test pits were excavated for construction of a concrete spill-containment basin in the Table of Distribution and Allowances (TDA) Maintenance Yard; petroleum contaminated soils detected.
- **December 1991** Proposed spill-containment basin area excavated for construction. Contaminated soils had been removed.
- **May 1992** Waste oil Underground Storage Tank (UST) removed at the Cannibalization Yard.
- **June 1992** SI initiated at SAs 44/52
- **April 1993** SI Report issued and recommends a FS.
- **June 1993** Supplemental SI (SSI) initiated at SAs 44/52; upon completion SAs designated AOCs
- **January 1994** FS issued.
- **July 1994** Predesign field work performed
- **August 1994** Conceptual remedial design issued
- **December 1994** 65% design issued
- **March 1995** ROD signature
- **March 1995** Final design issued
- **August 1995** Remedial action work commences
- **April 1996** Remedial action work completed
- **June 1996** Remedial action Completion Report issued
- **April 1998** Groundwater Monitoring Plan issued
- **May 1998** Round 1 groundwater sampling complete
- **June 1999** Round 2 groundwater sampling complete

The total area of the Barnum Road Maintenance Yards is approximately 8.8 acres (Figure 2-1). The Maintenance Yards are bordered to the north by Massachusetts Army National Guard property, which is used for similar vehicle storage activities as the Barnum Road Maintenance

Yards. Boston and Maine Railroad property and Barnum Road border the site to the west and east, respectively. Building 3713, located south of the site, is a 6-acre building used by the Army for vehicle maintenance activities. The Maintenance Yards are fenced, now paved, and presently used for military vehicle parking.

Prior to base closure, AOC 44 was known as the Cannibalization Yard. It was an area where vehicles were stored before being dismantled for usable parts. AOC 52 was a maintenance yard where vehicles are stored while awaiting repairs. It was historically known as the TDA Maintenance Yard. Northwest of the Cannibalization Yard was a separately fenced vehicle storage yard known as the RTS (Regional Training Site) Yard. An area that was fenced-off southeast of the main portion of the TDA Maintenance Yard was known as the K-Yard. At the time of the SI, all yards were unpaved, but showed evidence of being at least partly paved at one time. In areas where pavement was visible, the pavement was generally broken-up with age if not mostly disintegrated. All four of these yards had a long and continuing history of vehicle storage; hence at the direction of the Army, they were all included as AOCs 44 & 52 and combined as one operable unit. They are referred to collectively in the ROD and this Five-Year Review as the Maintenance Yards, or the site.

The soils of the site have been exposed to possible vehicle crankcase releases over a long duration. Gasoline, motor oil, and other automotive fluids have also likely been released during vehicle dismantling operations in the Cannibalization Yard. Individual releases were not likely to have been of significant volume, but numerous releases during the period in which the yard has been used account for the soil contamination problem. The only recorded significant vehicle release was an estimated 20 gallons of MOGAS and hydraulic fluid released near the center of the Cannibalization Yard in 1985 during the cannibalization process. Approximately 4 cubic yards (cy) of visibly contaminated soils were excavated immediately and containerized by Army personnel.

Exploratory test pits were excavated for construction of a concrete spill-containment basin in the southeast corner of the TDA Maintenance Yard (Figure 2-1) in July 1991. These test pits revealed zones of petroleum contaminated soil below the surface. In November and December 1991 the 100-foot by 160-foot proposed spill-containment basin area was excavated to begin construction. Excavation continued until field screening and visual observation indicated that contaminated soils had been removed. The contaminated layer was between 8 and 12 inches thick. The soil was suspected to be an asphalt treated, gravel road base. Samples collected from the proposed basin's subgrade at the bottom of the excavation contained total petroleum hydrocarbon compounds (TPHC) concentrations ranging from non-detect to 7 parts per million (ppm).

A 1,000-gallon UST, formerly used to store waste oil, was removed from the Cannibalization Yard in May 1992. Visibly contaminated soil was stockpiled, and laboratory analysis of soil samples from the bottom and one side of the tank excavation showed TPHC concentrations of 17,600 ppm and 9,780 ppm, respectively. Although the tank was observed to be in good condition, inspection revealed that the fill pipe was improperly connected to the bung of the tank, allowing the pipe contents to leak at the connection. After over-excavation of the tank site in July 1992, residual soil TPHC concentrations ranged up to 2,700 ppm at the limits of excavation.

In 1992, the Army initiated a SI for AOCs 44 & 52. The purpose of the SI was to verify the presence or absence of environmental contamination and to determine whether further investigation or remediation was warranted. The Final SI Report was issued April 1993. In June 1993, a SSI was performed to fill specific data gaps. The SI and SSI met the requirements of a RI in defining the nature and extent of contamination at the Maintenance Yards. As a result of the SI and SSI, the Maintenance Yards SAs were designated as AOCs because of contamination detected in the unsaturated soils. A FS was issued in 1994 to evaluate remedial action alternatives for cleanup of the Maintenance Yards soils.

2.2 Remedial Objectives

A ROD was signed in March 1995 documenting asphalt batching as the final selected cleanup remedy for cleanup of contaminated surface soils and soils associated with two known releases at AOCs 44 and 52. (USAEC, 1995). Remedial action objectives (RAOs) for the selected cleanup remedy at AOCs 44 and 52 are discussed below.

- Minimize direct contact/ingestion and inhalation with surface soils at the Maintenance Yards, which are estimated to exceed the USEPA Superfund target range of one in 10,000 to one in 1,000,000 excess cancer risk for carcinogens.
- Reduce off-site run-off of contaminants that might result in concentrations in excess of ambient surface water quality standards and background concentrations in sediments.
- Reduce or contain the source of contamination to minimize potential migration of contaminants of concern which might result in groundwater concentrations in excess of the federal drinking water Maximum Contaminant Levels (MCLs).

2.3 Description of Remedy

The selected remedy at AOCs 44 and 52 addresses long-term worker exposure to contaminated surface soil, the principal known threat at the Maintenance Yards and two known release areas (a reported release of MOGAS and leakage from a former waste oil UST, herein referred to as the hot spot areas). The selected remedial alternative relies on cold mix asphalt batching soils to control site risks. The following are the major components of the selected remedy.

- Excavate surface soil (top two feet across the site),
- Excavate the two hot spot areas,
- Stockpile soils for sampling and analysis,
- Cold mix asphalt batch soils exceeding site cleanup levels of 7 ppm (average) total carcinogenic polynuclear aromatic hydrocarbons (cPAHs) and 500 ppm TPHC,
- Backfill excavations with uncontaminated stockpiled soil and then place the asphalt batched material,

- Apply a pavement wearing course,
- Expand the existing stormwater collection system,
- Perform groundwater monitoring,
- As a precautionary measure, institute the following deed restrictions:
  1) prohibit residential development/use of the Maintenance Yards;
  2) minimize the possibility of long-term (working lifetime) exposure to subsurface soils; and
  3) require management of soils resulting from construction related activities.

A summary of the individual components of the selected alternative, as presented in the ROD, is provided in Subsection 2.3.1. Discussion regarding remedy implementation and current status is provided in Subsections 2.3.2 and 2.3.3, respectively.

2.3.1 Remedy Components Specified by the ROD

The components listed above, are summarized below based on detailed description presented in the ROD.

Excavate Surface Soils. Prior to commencement of the remedial design, predesign test pits will be excavated to better predict the typical soil characteristics (color, texture, and presence of pavement) and layers containing cPAHs that may be encountered when the top 2 feet of soil is removed during remediation. This preview will enable planned optimization of soil excavation and handling activities during remedial action; improve estimates on the volume of soils that will require treatment; and provide soil gradation data for the asphalt batching design.

It is proposed that the Maintenance Yards surface soils be excavated in 6-inch layers down to a 2-foot depth, and stockpiled and sampled in 100-cy batches. Layers of other thickness may be excavated depending on the observed thickness of layers in the test pits. It is believed that layers with pavement will contain the highest concentration of cPAHs. If proven to be true from test pit results, this soil will be stockpiled separately. Soils will be initially screened for visible and olfactory evidence of waste material or overtly contaminated soils. Soils observed to contain broken pieces of pavement will be segregated as cPAH-contaminated soil in maximum 100-cy piles and kept in separate piles for analytical screening. Soils with fuel odor or evidence of petroleum contamination will also be separated from soil with no evidence of contamination. All soil to a 2-foot depth will be excavated, stockpiled and sampled regardless of physical evidence of contamination.

An air-monitoring program will be established to assess air quality during all excavation and soil handling activities. Air monitoring will ensure that total suspended particulates do not exceed predetermined action levels.

Excavate Hot Spot Areas. Trench explorations will first be performed to include or exclude the boring 44B-93-10X area as the potential MOGAS spill area. To initially identify the potential hot spot area, trenches will be excavated over 44B-93-10X. Headspace screening by photoionization detector (PID) or non-dispersive infrared spectroscopy (NDIR) Modified Method 418.1

screening on the trench sidewalls. This area will be excluded from further investigation and excavation if there is no detection of volatiles or if TPHC is not over 500 ppm.

Trenches will also be excavated over boring 44B-92-06X to initially define the extent of the hot spot area detected in this area. Headspace and NDIR screening will be performed on sidewalls and/or bottom of trench if staining is not evident. The hot spot will then be fully excavated to the approximate dimensions as determined by the trench screening and excavation will continue until laboratory analysis reveals concentrations less than 500 ppm.

The hot spot area around the waste oil UST will also be excavated. This area has been previously over-excavated and backfilled with clean soil. The clean backfill soil in the over-excavated area will be excavated, segregated and sampled to ensure clean backfill and native soil are clearly distinguished. Upon reaching native soil, excavation and sampling for TPHC will continue until laboratory analysis reveals concentrations less than 500 ppm.

Any other hot spot areas observed during the excavation of the surface soils will be excavated, segregated, stockpiled and sampled in a similar manner.

Stockpiling and Sampling and Analysis. Soils excavated from hot spot areas will be placed on, and covered with, a minimum 8-mil polyethylene tarp to prevent mixing of TPHC contaminated soils with clean soils. Surface soils will also be placed on polyethylene tarpaulins if there is potential for soil to contaminate clean soil. Stockpiling and analytical work will be done concurrently to minimize the duration that soils are left on-site.

Sampling and analysis to classify stockpiled soils from hot spot and surface soil excavations as acceptable for reuse at the site without treatment, will require collecting five soil subsamples and field compositing to yield one sample for every 100 cy of stockpiled soil or for every segregated stockpile, whichever smaller in volume. Samples from hot spot stockpiled soils will be analyzed in the field laboratory for TPHC using the Modified Method 418.1 (NDIR). Samples from surface soil stockpiled soils will be analyzed in the field laboratory for TPHC using the Modified Method 418.1 (NDIR) and for the following seven cPAHs using Modified Method 8270 by a field laboratory:

Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Chrysene
Dibenzo(a,h)anthracene
Indeno(1,2,3-cd)pyrene

All analytical samples will be screened through a No. 20 sieve at the laboratory to remove any pavement particles down to the size of coarse sand prior to performing the analysis.

Asphalt Batch Soils Exceeding Site Cleanup Levels. Stockpiled soils with contaminants exceeding an average total cPAH concentration of 7 ppm and 500 ppm TPHC, will be cold mix asphalt batched on-site. Asphalt batching site soils will immobilize the contaminants exceeding cleanup levels present in the top two feet, thus minimizing direct contact/ingestion of the soils having a carcinogenic risk. Asphalt batching the hot spot areas in the Cannibalization Yard will reduce the mobility of organic contaminants present in the highest concentrations at the site.

The cold mix asphalt batching technology is performed at ambient temperatures and entails recycling petroleum contaminated soil into a bituminous paving or road base product. Excavated soils may be processed through a crusher or screen to produce a physically uniform soil material. The soil may then be blended with other aggregate (if required because of existing soil conditions) and asphalt emulsion in a pugmill. Soil gradation results and the pavement design will dictate soil preparation needs. The finished product will be used as the base or sub-base material for parking lot construction over the Maintenance Yards.

Backfill Excavations. Excavations will be backfilled with "clean" stockpiled soil and with the soils which have been asphalt batched. Site soil will be classified as "clean" if it meets the cleanup criteria of 500 ppm for TPHC and the risk-based cleanup criteria of 7 ppm (average) for total cPAHs. This soil will be used to refill a portion of the excavated areas at the Maintenance Yards. Preferably, upon receipt of analytical results, the soil will be immediately backfilled into designated areas. If backfill areas are not available, the soil will be stored in designated piles separate from other soil for later use as on-site backfill. The asphalt batched material will then be spread and rolled to the thickness and contours to be detailed in the final design and will serve as the sub-base or base course for the paved parking lot.

Expand the Existing Stormwater Collection System. Construction of the paved parking lot at the Maintenance Yards will increase the amount of stormwater runoff during rain events. Therefore, the selected remedy will include expansion of the existing stormwater collection system including installation of additional catch basins, additional stormwater piping, and oil and grease traps as required. Additionally, potential effects on wetlands at stormwater outfalls will be investigated and, as needed, minimized by construction of detention basins and flow reducers.

Prior to the design of this system, a predesign investigation of the existing stormwater system will be performed. To enable developing a representative model of the system, information relating to the existing storm drainage system will be reviewed and field inspections will be made as necessary. The model will be used to compute the current stormwater runoff flow and predict future stormwater flow after construction of the parking lot. It will also be used as a design tool by predicting the effect of detention pond(s) and other flow restriction devices on system flows, enabling design criteria to be met. Details of the predesign investigation work and the stormwater system expansion will be provided in a predesign work plan and the remedial design respectively.

Apply a Pavement Wearing Course. A paving wearing course is a top coat of pavement that is placed over a pavement base course to provide a smooth, durable surface in high traffic areas. A pavement wearing course placed over the batched material is not a required remedial component for selected remedy. However, the Army has chosen to add a pavement wearing course for a vehicle parking surface over the asphalt batched material as an ancillary component. Addition of the wearing course will ensure the integrity of the asphalt batched material as a parking lot base for current and future property use.

Perform Groundwater Monitoring. The objective of groundwater monitoring is to provide assurance to the public and the regulatory agencies that the groundwater in the aquifer underlying the facility remains unaffected by past Maintenance Yard activities and that it has not been adversely affected by remedial activities. Sampling and analysis of groundwater from existing wells at the Maintenance Yards will be performed yearly for a period of five years upon commencement of remedial activities. Sampling will be for the same analytes tested for during the SI.

Institute Deed Restrictions. As a precautionary measure, institutional controls in the form of deed restrictions will be implemented to prevent potential circumstances which may result in risk of harm to health, safety, public welfare or the environment. These restrictions will include the following:

1) No residential development/use of the Maintenance Yards will be permitted. The quantitative risk evaluation and established cleanup level assume the property will remain zoned for commercial/industrial use.

2) Removal of the 2-foot cover or an asphaltic barrier from the Maintenance Yards will be prohibited to prevent surface soil exposure to existing subsurface soils (2-foot to 5-foot level). This deed restriction will be implemented as a precautionary measure to minimize the possibility of long-term (working lifetime) exposure to subsurface soils. This restriction will not apply to excavations undertaken in connection with construction of buildings or other structures, utilities, infrastructures or any other construction related purpose where the cover is penetrated and/or temporarily removed and protection from long-term exposure to subsurface soil is not jeopardized. To comply with this deed restriction, the 2-foot layer of cover material (which may consist of one or combination of "clean" site soil used as backfill, asphalt batched material, off-site soils/aggregate and bituminous pavement) will remain over the subsurface soil (existing 2- to 5-foot soil level) to minimize direct contact/ingestion to the present subsurface soils. The continuity of the paved surface need not be maintained providing the cover thickness of 2 feet is provided. As an alternative, a continuous and maintained paved surface which would prevent exposure to subsurface soils could be substituted for the 2-foot thick cover.

   This restriction also would not apply to excavation and use that is within the scope of any authorized response action. The deed restriction may be nullified, as approved by the regulatory agencies, should there be future evidence showing that contaminant concentrations within the 2- to 5-foot soil zone are below site surface soil cleanup levels.

3) Excavation below 2 feet at the Maintenance Yards, subsequent to completion of the remedial action established in this ROD, will require:

a) Development and implementation of a Health and Safety Plan for the work area; and

b) Development and implementation of a Sampling and Analysis Plan for management of the excavated soils in accordance with the following:

Where reuse of soil within the Maintenance Yards is intended, sampling and analysis of stockpiled soils excavated below 2 feet will follow criteria detailed in this ROD for hot spot area soils. Soils with contaminants exceeding the 500 ppm cleanup level for TPHC will be treated in a manner consistent with this ROD. Soils with contaminants below the established cleanup level may be returned to the excavation. Soil excavated below 2 feet but returned to the top 2 feet (as surface soil) must also be sampled, analyzed and, if required, treated for cPAH contaminants as detailed in this ROD.

Where reuse of soil outside the Maintenance Yards is intended, sampling/analysis and action levels for stockpiled soils excavated below 2 feet will follow criteria governed by the regulations or policies in effect for the final disposal area.

2.3.2 Remedy Implementation

Remedy implementation consisted of completion of a remedial design and the remedial action, performing groundwater monitoring, and enforcing institutional controls as general accordance with the criteria specified in the ROD. Each of these four stages are summarized below.

2.3.2.1 Design. The design was performed by ABB Environmental Services, Inc. (presently HLA) under contract with the USACE and was documented through submission of several interim deliverables. Predesign field activities commenced July 1994 in anticipation that the ROD would be signed prior to completion of the remedial design. Predesign field activities consisted of excavating test pits, evaluating the existing stormwater system and performing a site topographic survey. Details of these investigation results were submitted in the Predesign Investigation Report (ABB-ES, 1994a) that was followed by the Conceptual Design (ABB-ES, 1994b). The field test pitting, specifically the analytical test results from the Predesign Investigation are of importance for recommendations provided later in this five-year review and are discussed in greater detail below. Field reconnaissance of the drainage system and topographic survey that were performed as part of the predesign field activities are not discussed further. It is only noted that the collected data was instrumental for the detailed design of the stormwater drainage system expansion and for construction of a new detention pond.

Predesign Test Pitting and Soil Analyses. Nine test pits were excavated to better predict the typical soil characteristics (color, texture, and presence of pavement) and layers containing cPAHs to be encountered when the top 2 feet of soil is removed during remediation. This preview enabled planned optimization of soil excavation and handling activities during remedial action; improved estimates on the volume of soils requiring treatment; and provided soil gradation data for the asphalt batching design. Each test pit was excavated the full 2-foot depth. Subsamples were collected from three of four walls of each test pit and mixed to form one composite sample for each 6-inch depth increment, for a total of four composite samples from each test pit. For each pit, sampling commenced at the 18 to 24-inch depth and proceeded upwards finishing at the 0- to 6- inch depth. Soil samples were analyzed by field screening methods at ABB-ES' Wakefield laboratory. Prior to performing analytical work, soils samples were mechanically screened through a No. 20 sieve at the laboratory to remove asphalt pavement pieces larger than medium to coarse sand. Screened samples were then analyzed for cPAHs by gas chromatograph (GC) with a flame ionization detector (FID) (modified EPA Method 3550/8100) and TPH by NDIR (modified EPA Method 418.1). In addition to chemical analysis, soil samples were also collected for grain size distribution analysis to provide required data for the asphalt batching design.

A total of 36 soil samples were collected from 9 test pits. Appendix A contains a copy of Table 3-1 from the Predesign Investigation Report which presents a summary of the analytical results, including estimate concentrations below detection limits, from each of the nine test pits. Appendix A, Figure 3-2, also reprinted from the Predesign Report, shows the distribution of cPAHs and TPH by depth. Samples with an "LT" (i.e., less than detection limit) are those samples in which all individual cPAHs were below detection limits. Samples analyzed for cPAHs with listed concentrations are those that revealed one or more individual cPAH compounds above the detection limit. Listed contaminant concentrations for total cPAHs include estimated concentrations (below the detection limit) for individual cPAH compounds. Results showed that contaminants occur primarily within the top 6 inches of soil. Besides providing optimization of soil excavation and handling activities, the data also supports the belief that cPAH and TPH contaminants detected within the surface soils during the SI, are likely associated with the top layer (i.e., top 6 inches). With the exception of the UST and MOGAS spill area, contaminants appear not to have migrated deeper than 2 feet (ABB-ES, 1994a,b).

Final Design. Following approval of the Conceptual Design, ABB-ES submitted an In-Progress Review Design Submission (65 percent) (ABB-ES-1994c) in December 1994 followed by the Final Design (ABB-ES, 1995) in March 1995 for regulatory review. Portions of the specifications and drawings were revised and issued final in August 1995. Details of the design consisted of the construction components listed in the ROD and as discussed in the Subsection 2.3.2.2.

2.3.2.2 Remedial Action. The USACE contracted Roy F. Weston, Inc. to construct the selected remedy. Construction commenced on August 1995 and entailed excavating and sampling of over 30,000 cy of surface soils from the top 2 feet of the site to segregate and treat soils exceeding the cleanup level of 7 ppm for cPAH and 500 ppm for TPH. Treatment was performed by cold mix asphalt batching 11,800 cy of contaminated soils and then backfilling/compacting both the uncontaminated excavated soils and the asphalt batched material as a sub-base material in the excavation. The top 9 inches of backfilled material consisted of batched material while the bottom 15 inches consisted of uncontaminated backfilled soil. Four inches of bituminous pavement was placed over this sub-base material to complete a pavement wearing course for Army vehicle parking. During the excavation, a total of three hot spot areas were excavated below the 2-foot surface soil depth to delineate and batch contaminated soil at the UST over-excavated area and the MOGAS spill area. Sampling of soils from in-situ and stockpiles from these areas revealed TPH concentrations were below the site cleanup concentration of 500 ppm. In addition to the excavation and soil treatment, a drainage system was installed throughout the Maintenance Yards to collect surface stormwater from the newly paved surface. A detention pond was constructed to store accumulated rainfall and minimize flow at the outfall at Cold Spring Brook during heavy storm events. Also an oil/water separator was installed within the stormdrain system. Remedial construction was completed by April 1996. The Remedial Action Completion Report was issued on June 1996 (Weston, 1996).

Of particular interest to formulating recommendations within this five-year site report were the results of the surface soil sampling. Surface soils were excavated to a depth of two feet in 6-inch increments. Prior to excavation activities the site was gridded into 105 feet by 52 feet areas so that each 6-inch layer was approximately 100 cy. Soil was sampled at the frequency of one composite sample (consisting of 5 sub-samples) per 100 cy of stockpiled soils. All stockpiled soils were analyzed on-site for TPH and cPAHs using NDIR and GC/MS to determine when site cleanup goals for TPH and cPAHs were exceeded. A total of 102 samples of the 263 samples analyzed for cPAHs were at or above the cleanup level of 7 ppm, with the balance of 161 samples below the cPAH cleanup criteria. A total of 33 of the 263 samples for TPH were above the cleanup criteria of 500 ppm with the balance of 230 samples below the TPH cleanup criteria. The top 6 inch layer was contaminated with cPAHs, TPH or both. The second layer showed reduced concentrations of TPH and cPAH. Only one of the cells was excavated deeper than 24 inches because of elevated concentrations of cPAH's at the 24-inch level. Analytical data from the 24 to 30-inch depth showed reduced concentrations of cPAHs and TPH, both below site cleanup standards. Sampling results are presented in an analytical summary table in Appendix A. The analyses support the predesign sampling results that showed that contaminants occur primarily within the top 6 to 12 inches of soil and that contaminants appear not to have migrated deeper than 2 feet.

2.3.2.3 Groundwater Sampling. The USACE contracted Roy F. Weston, Inc. to prepare a work plan detailing the annual groundwater monitoring program as required by the ROD. The objective of groundwater monitoring is to provide assurance to the public and the regulatory agencies that the groundwater in the aquifer underlying the facility remains unaffected by past Maintenance Yard activities and that it has not been adversely affected by remedial activities. This work plan was issued April 1998 (Weston, 1998a) and specified that annual sampling would be performed at three existing monitoring wells G3M-92-04X, G3M-92-05X, and MNG-1 (Figure 2-2) during Spring 1998 and Spring 1999. These wells are within the Maintenance Yards (G3M-92-04X) and outside the Maintenance Yard fence and downgradient of the site (G3M-92-05X and MNG-1). The plan also specified that the groundwater samples would be analyzed off-site for Massachusetts Department of Environmental Protection (MADEP) Extractable Petroleum Hydrocarbons (EPH) and Volatile Petroleum Hydrocarbons (VPH), and lead which are pertinent analytes for the historic releases of petroleum at the site.

Sampling was performed in May 1998 and June 1999. MNG-1, located on Massachusetts National Guard (MNG) property north of the Maintenance Yards, could not be located and was believed to have been destroyed or buried during new construction in the vicinity of the well location. Analytical results for G3M-92-04X and G3M-92-05X revealed that concentrations of hydrocarbon fractions and target analytes of VPH and EPH, and the concentrations of lead did not exceed the Massachusetts Contingency Plan (MCP) Method GW-1 Standards in 1998 or 1999. All concentrations were below detection limits except that C19-C-36 aliphatic was detected at 150 micrograms per liter (μg/L) in one duplicate sample at G3M-92-05X and less than 62 μg/L in the primary sample. Details of the sampling at G3M-92-04X and G3M-92-05X are provided in the 1998 and 1999 Annual Groundwater Sampling Reports (Weston, 1998b, 1999). Analytical summary tables are reprinted and provided in Appendix A of this five-year review report. Based on the 1998 and 1999 results, no further annual groundwater sampling was recommended. These reports were reviewed and approved by USEPA and MADEP.

2.3.2.4 Deed Restrictions. There are no current or future plans for transfer of property from the RFTA at this time. Institutional control restrictions will be covered by the Installation Master Plan. If property transfer occurs in the future, institutional controls, will be incorporated into the property deed or other instrument of property transfer.

2.3.3 Current Status

This is the first five-year site review for AOCs 44 and 52. Remediation and groundwater monitoring are complete. Groundwater sampling is complete. Other than standard operation and maintenance (O&M) requirements of the drainage system and oil/water separator as detailed in Appendix Q of the Remedial Action Completion Report (Weston, 1996), there are no long term O&M needs to maintain the integrity of the remedial action.

Restrictions pertaining to soils management and other deed restrictions will be covered by the Installation Master Plan.

2.4 Applicable or Relevant and Appropriate Requirements Review

The Applicable or Relevant and Appropriate requirements (ARARs) presented in Table 19 of the ROD are reprinted and appended in Appendix A-4. These standards and regulations were current at the signing of the ROD and for the five-year site review, have been reviewed for changes that could affect protectiveness. None of the ARARs listed in Appendix A-4 have had changes since signing of the ROD that affect the protectiveness of the implemented remedial action. Several regulations were updated since the ROD, and may only have been applicable had they been in effect during actual construction activities, but no longer apply given that remedial action is complete. These updated regulations include the following:

- Appendix A of 310 CMR 7.00 Massachusetts Air Pollution Regulations, updated in 1999 and revisions pertained to emission offsets and non-attainment review.
- 310 CMR 7.18 "Volatile and Halogenated Organic Compounds" was in effect May 1, 1998; applicable to facilities that emit volatile organic compounds (VOCs), but not to the completed remedy.
- 310 CMR 30.202 section change of Provisions for Recyclable Materials and for Waste Oil was in effect May 1, 1998 but pertains only to recycling permits.

In addition, a search was performed for any newly promulgated standards which could affect protectiveness at the site. No new ARARs were identified that would affect the protectiveness of the remedy.

2.5 SUMMARY OF SITE VISIT

An HLA representative performed a site inspection of the Barnum Road maintenance yard on June 8, 2000. Conditions during the inspection were favorable with no precipitation and temperatures in the 60s.

Use of the yard remained consistent with the restrictions outlined in the ROD. The inspection did not reveal any signs of disturbed pavement or excavation within or near the maintenance yard. There was no evidence that the stormwater collection system was not performing adequately. Protective casings and monitoring wells were intact and secure.

The following individuals were interviewed as part of the five-year review:

- Jim Chambers, BRAC Environmental Coordinator, Devens RFTA
- John Regan, MADEP
- David Margolis, USACE, New England District

All personnel were interviewed on June 8, 2000 at the Devens RFTA BRAC office. None of the personnel interviewed were aware of any outstanding problems or issues regarding implementation of the selected remedy or the site in general. There have been no complaints, violations or other incidents which have required a response by any of the individuals interviewed or their respective offices. John Regan did note that there was regulatory concurrence to discontinue sampling.

Jim Chambers stated that restrictions on site use are currently covered by the Installation Master Plan. Upon transfer of the property, institutional controls will be incorporated into the deed or lease. Plans for property transfer to Mass Development are underway. Mr. Chambers also noted that the selected remedy has been effective.

2.6 AREAS OF NON-COMPLIANCE

There are no areas of non-compliance or deficiencies that have been noted during this review that would make the remedial actions at AOCs 44 and 52 non-compliant with the ROD, or sufficient to warrant a finding of not protective. This finding is based upon a review of site reports that have been prepared since the signing of the ROD, a review of ARARs triggered by the remedial action, and the findings from the site inspection and interviews.

2.7 ASSESSMENT

Question A: Is the Remedy Functioning as Intended by the Decision Documents?

HASP: Remedial action and groundwater monitoring at AOCs 44 and 52 are complete and no longer being implemented at this site. Health and safety procedures are no longer required for these activities. However, as required by the institutional controls imposed on the site, a HASP would be needed for any excavation below 2 feet at the Maintenance Yards.

Implementation of Institutional Controls and Other Measures: Plans for transfer of the Maintenance Yards from the RFTA to Mass Development are ongoing. Until the time of property transfer institutional control restrictions will be covered by the Installation Master Plan.

Remedial Action Performance: The asphalt batching of contaminated soils has been effective at immobilizing the petroleum related contaminants and has met the objectives of the remedial action (minimizing contact/ingestion and inhalation of contaminated surface soils by human receptors; reducing the probability of surface run-off of contaminants; and minimizing the potential migration of contaminants to groundwater). Groundwater monitoring has confirmed that migration of surface soil contaminants to the aquifer following the historic releases at the site or as a result of remedial activities has not occurred.

System Operations/Operation and Maintenance: Other than five-year site reviews and basic maintenance of the stormwater system, there is no current system operation and maintenance (O&M) required or being performed. Annual groundwater monitoring has been completed.

Cost of System Operations/Operation and Maintenance: Total O&M costs for the two annual groundwater sampling rounds were approximately $15,000.

Opportunities for Optimization: Remedial action activities have been completed at this site and therefore there are no proposed opportunities for optimization.

Early Indicators of Potential Remedy Failure: No early indicators of potential remedy failure were noted during the review. Groundwater monitoring results were consistent with expectations. No infractions of the deed restriction requirements were noted during the site inspection.

Question B: Are the Assumptions Used at the Time of Remedy Selection Still Valid?

Changes in Standards and To Be Considered: This five-year review identified a few changes in standards that have been promulgated since the ROD was signed. However, these standards do not affect the protectiveness of the implemented remedy. Refer to Subsection 2.4, ARARs.

Changes in Exposure Pathways: No changes in the site conditions that affect exposure pathways were identified as part of the five-year review. First, there are no current or planned changes in land use. Second, no new contaminants, sources, or routes of exposure were identified as part of this five-year review.

Changes in Toxicity and Other Contaminant Characteristics: The depth of contamination is now better defined than at the time of the ROD signing. Remedial action entailed excavating surface soils to a minimum of 2 feet. Deeper excavation of surface soils was required to a 30 inch depth to meet site cleanup criteria in only one grid square. As discussed in Subsection 2.3.2, Remedy Implementation, soil sampling results from the remedial action and predesign test pitting showed that contaminants were present primarily within the top 6 inches of soil. The data also supports that cPAH and TPH contaminants detected within the surface soils during the SI, were likely associated with the top layer (i.e., top 6 inches). Contaminants exceeding cleanup levels appear not to have migrated much deeper than 2 feet (ABB-ES, 1994a, b). A reduction or possibly a complete repeal of institutional controls may be possible given new soil analytical data that has been collected since the signing of the ROD.

The ROD currently imposes institutional controls in the form of deed restrictions that 1) prohibit residential development/use of the Maintenance Yards; 2) prohibit removal of the 2-foot cover or an asphaltic barrier from the Maintenance Yards to prevent surface soil exposure to existing subsurface soils (2-foot to 5-foot level); and 3) require soil management practices for excavation below 2 feet at the Maintenance Yards (including a HASP and Sampling and Analysis Plan). The ROD states that the deed restriction may be nullified, as approved by the regulatory agencies, should there be future evidence showing that contaminant concentrations within the 2- to 5-foot soil zone are below site surface soil cleanup levels. Identified changes in risk assessment methodologies since the time of the ROD also call into question whether the institutional controls being imposed at the site are over-protective of human health (Refer to the paragraph below entitled "Changes in Risk Assessment Methodologies").

Therefore, the risk from exposure to site soils may be reassessed using the updated soil analytical data from the remedial action (Subsection 2.7.2) and new risk assessment guidance. The institutional controls imposed at the Maintenance Yards may be revised or nullified based upon the results of this risk assessment. Institutional control revision or nullification is considered a Significant Post-ROD Change and, if implemented, will be documented through the Explanation of Significant Difference (ESD) decision process in accordance with USEPA guidance (USEPA, 1999). The Army has no plans to proceed with the ESD process.

Changes in Risk Assessment Methodologies: Identified changes in risk assessment methodologies call into question whether the institutional controls being imposed at the site are over-protective of human health. That is to say, residual contaminant concentrations in the soil below the 2-foot cover or the asphaltic barrier may not present risk exceeding the USEPA target risk range for either commercial or residential receptors. Since the signing of the ROD, USEPA Region I has adopted new guidance that affects the approach used to calculate health risks. The most significant changes in guidance are summarized as follows:

1) In accordance with USEPA Region I guidance (USEPA Region I Risk Update Number 2, August, 1994), relative potency values (also known as toxicity equivalency factors) developed by USEPA (Provisional Guidance for Quantitative Risk Assessment

of Polycyclic Aromatic Hydrocarbons, EPA/600/R-93/089) are now used to quantify carcinogenic risk from potential exposures to cPAHs.

2) The soil exposure point concentration used to quantify high-end (or reasonable maximum) exposures is the 95 percent upper confidence level on the arithmetic mean, not the maximum detected concentration.

3) Dermal exposure assessment methods have been revised based on guidance provided in "Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance (Part E, Dermal Risk Assessment), Interim Guidance. (EPA/540/R-99/005)".

As previously discussed, the risk from exposure to site soils may be reassessed using the new risk assessment guidance and updated soil analytical data from the remedial action (refer to the paragraph in this subsection entitled "Changes in Toxicity and Other Contaminant Characteristics"). Any revisions or nullification of current institutional controls that result from the risk assessment will be implemented through the ESD decision process in accordance with USEPA guidance (USEPA, 1999). The Army has no plans to proceed with the ESD process.

2.8 RECOMMENDATIONS

Remedial action is complete. There are no follow-up actions required to achieve or to continue to ensure protectiveness of human health.

2.9 PROTECTIVENESS STATEMENT

The remedy at AOCs 44 and 52 is protective of human health and the environment.

Human health is no longer at risk at AOCs 44 and 52 because surface soils that were found to contain contaminants exceeding site cleanup levels were asphalt batched. The remedy effectively prevents direct human contact with these contaminants and minimizes the probability of contaminant migration.

Although deed restrictions are specified in the ROD, noted changes in risk assessment methodology and updated analytical data would suggest that the deed restrictions may not be required (Subsection 2.7). Plans for transfer of the Maintenance Yards from the RFTA to Mass Development are ongoing. Institutional control restrictions are currently covered by the Installation Master Plan. If not nullified, the specific deed restrictions specified in the ROD will be incorporated into the property deed or other instrument upon property transfer.

2.10 NEXT REVIEW

These AOCs are statutory sites that require ongoing five-year reviews. This is the first five-year review that has been performed at either AOC. The next review will be performed within five years of the completion of this five-year review report. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for nonconcurrence.

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England District, Concord, Massachusetts; October 1998.

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3.0 SHEPLEY'S HILL LANDFILL OPERABLE UNIT (AOCs 4, 5, AND 18) FIVE-YEAR SITE REVIEW

3.1 SITE DESCRIPTION AND HISTORY

Shepley's Hill Landfill encompasses approximately 84 acres in the northeast corner of the former Main Post at Fort Devens (Figure 1-1). It is situated between the bedrock outcrop of Shepley's Hill on the west and Plow Shop Pond on the east. Nonacoicus Brook, which drains Plow Shop Pond, flows through a low-lying wooded area at the north end of the landfill. The southern end of the landfill borders the former Defense Reutilization and Marketing Office (DRMO) yard and a former warehouse area. This area is currently undergoing extensive construction as part of Devens redevelopment activities. An area east of the landfill and south of Plow Shop Pond is the site of a former railroad roundhouse. Shepley's Hill Landfill includes three AOCs: AOC 4, the sanitary landfill incinerator; AOC 5, sanitary landfill No. 1 or Shepley's Hill Landfill; and AOC 18, the asbestos cell. AOCs 4, 5, and 18 are all located within the capped area at Shepley's Hill Landfill. The three AOCs are collectively referred to as Shepley's Hill Landfill.

Review of the surficial geology map of the Ayer Quadrangle shows that in the early 1940s, the active portion of the landfill consisted of approximately 5 acres near the end of Cook Street, near where monitoring well SHL-1 is located (Jahns, 1953). The fill was elongated north-south along a pre-existing small valley containing at least two areas mapped as swamps (probably kettle holes) and lying between the bedrock outcrop of Shepley's Hill to the west and a flat-topped kame terrace with an elevation of approximately 250 feet to the east, next to Plow Shop Pond. During the landfilling operation, the valley was filled-in, and much of the kame terrace, which may have been used as cover material, was removed. Background information indicates the landfill once operated as an open burning site.

Landfill operations at Shepley's Hill Landfill began at least as early as 1917, and stopped as of July 1, 1992. During its last few years of use, the landfill received about 6,500 tons per year of household refuse and construction debris, and operated using the modified trench method. There is evidence that trenches in the northwest portion cut into previously used areas containing glass and spent shell casings. The glass dated from the mid-nineteenth century to as late as the 1920s. Based on boring logs for piezometer nests N5, N6, and N7, which were installed through the landfill cap, the approximate elevation of the bottom of the waste is estimated to be 217 and 214 feet above sea level at the deepest areas in the north end and in the central portion of the landfill, and 224 to 229 feet above sea level in the southeast portion of the landfill. Based on the boring logs, the maximum depth of the refuse occurs near piezometer N6 in the central portion of the landfill and is estimated to be about 40 feet. The average thickness of waste is not documented; however, if the average thickness were 10 feet, the landfill volume would be over 1,300,000 cy. Reports of flammable fluid disposal in the southeastern portion of the landfill have not been substantiated by observations in test pits or other research. The Army has no evidence that hazardous wastes were disposed of in the landfill after November 19, 1980. No waste hot spots or hazardous waste disposal areas were identified during RI or supplemental RI activities.

In an effort to mitigate the potential for off-site contaminant migration, Fort Devens initiated the Fort Devens Sanitary Landfill Closure Plan in 1984 in accordance with Massachusetts regulations entitled "The Disposal of Solid Wastes by Sanitary Landfill" (310 CMR 19.00, April 21, 1971). The MADEP (then the Department of Environmental Quality Engineering) approved the plan in 1985. Closure plan approval was consistent with 310 CMR 19.00 and contained the following requirements:

- grading the landfill surface to a minimum 2 percent slope in non-operational areas of the landfill and 3 percent in operational areas;
- removing waste from selected areas within 100 feet of the 100-year floodplain;
- installing a gas venting system;
- installing a low permeability cap and covering the cap with sand, gravel, and loam, and seeding to provide cover vegetation and prevent erosion; and
- implementing a groundwater monitoring program based on sampling five existing monitoring wells every four months.

The capping was completed in four phases (Figure 3-1). In Phase I, 50 acres were capped in October 1986; in Phase II, 15 acres were capped in November 1987; and in Phase III, 9.2 acres were capped in March 1989. The Phase IV closure of the last 10 acres was accomplished in two steps: Phase IV-A was closed in 1991, and Phase IV-B was closed as of July 1, 1992, although the geomembrane cap was not installed over Phase IV-B until May 1993.

Because of the large area and shallow surface slope of the existing landfill, early phases of the landfill closure were completed with a 2 or 3 percent surface slope. Slopes were increased to 5 percent in Phase IV-B. Phases I through IV-A were capped with a 30-mil polyvinyl chloride (PVC) geomembrane overlain with a 12-inch drainage layer and 6-inch topsoil layer. At the request of MADEP, the Phase IV-B cap design was modified to include a 40-mil PVC geomembrane, a 6-inch drainage layer, and a 12-inch topsoil layer. A landfill-gas collection system consisting of 3-inch diameter gas-collection pipes bedded in a minimum 6-inch thick gas-venting layer was installed beneath the PVC geomembrane in all closure phases. Gas vents were installed through the PVC geomembrane at 400-foot centers. A minimum 6-inch cushion/protection layer was maintained between the geomembrane and underlying waste. As requested by USEPA and MADEP, four additional groundwater monitoring wells were installed in 1986 to supplement the five in the original groundwater program. The Army submitted a draft closure plan to MADEP on July 21, 1995, pursuant to 310 CMR 19.000, to document that Shepley's Hill Landfill was closed in accordance with plans and applicable MADEP requirements.

AOC 4, the sanitary landfill incinerator was located in former Building 38 near the end of Cook Street within the area included in Phase I of the sanitary landfill closure. The incinerator was constructed in 1941, burned household refuse, and operated until the late 1940s. Ash from the incinerator was buried in the landfill. The incinerator was demolished and buried in the landfill in September 1967. The building foundation was removed and buried on-site in 1976.

AOC 18, the asbestos cell, is located in the section of the landfill closed during Phase IV.

Between March 1982 and November 1985, an estimated 6.6 tons of asbestos construction debris were placed in the section of the landfill closed during Phase IV-A. In 1990, a new asbestos cell was opened in the section closed during Phase IV-B, and was used until July 1992 for disposal of small volumes of asbestos-containing material.

The Army performed an RI and supplemental RI at Shepley's Hill Landfill in accordance with CERCLA between 1991 and 1993 (E&E, 1993; ABB-ES, 1993)). The RI and RI Addendum reports identified potential human exposure to arsenic in groundwater as the primary risk at Shepley's Hill Landfill. The RI Addendum Report also identified potential ecological risks to aquatic and semi-aquatic receptors from exposure to Plow Shop Pond surface water and sediments.

A FS was performed in 1995 to evaluate alternatives to reduce potential exposure risks associated with human exposure to Shepley's Hill Landfill Operable Unit groundwater, and in September 1995, a ROD was finalized (ABB-ES, 1995a; ABB-ES, 1995b). The Plow Shop Pond Operable Unit was established to evaluate actions to manage risk from exposure to Plow Shop Pond surface water and sediment. In 1995, the Army designated Plow Shop Pond as AOC 72.

The following table summarizes important events and dates at Shepley's Hill Landfill Operable Unit.

EVENT	DATE
Ft. Devens placed on NPL	December 1989
Waste disposal at Shepley's Hill Landfill ends	July 1, 1992
Landfill capping complete	May 1993
RI complete	1993
Supplemental RI complete	1993
FS complete	February 1995
ROD signature	September 1995
Long-term Monitoring and Maintenance Plan complete	May 1996
Long-term monitoring begins	November 1996
60% Extraction design complete	November 1997
First Shepley's Hill Landfill Five-year Review complete	August 1998

A more complete description of the Shepley's Hill Landfill Operable Unit can be found in the RI Addendum report, (ABB-ES, 1993), and the FS report, (ABB-ES, 1995a).

3.2 Remedial Objectives

Based on types of contaminants, environmental media of concern, and potential exposure pathways, remedial response objectives were developed in the FS to aid in the development and screening of alternatives (ABB-ES, 1995a). These remedial response objectives were developed to mitigate existing and future potential threats to public health and the environment. The response objectives for the Shepley's Hill Landfill Operable Unit are:

- Protect potential residential receptors from exposure to contaminated groundwater migrating from the landfill having chemicals in excess of MCLs.
- Prevent contaminated groundwater from contributing to the contamination of Plow Shop Pond sediments in excess of human-health and ecological risk-based concentrations.

Response objectives were not identified for surface soil, landfill gas, or leachate. The risk assessments did not identify potential risks from exposure to surface soil, and ambient air monitoring during the RI did not identify airborne contaminants. Liquid leachate was not identified during either RI or supplemental RI activities. The Plow Shop Pond Operable Unit was established to evaluate additional actions to manage risk from exposure to Plow Shop Pond surface water and sediment. The Army performed extensive surface water and sediment chemical characterization as well as sediment toxicity characterization in Plow Shop Pond and Grove Pond from 1992 through 1995. Results of these studies are reported in the Remedial Investigation Addendum Report (ABB-ES, 1993) and in the Draft Plow Shop Pond and Grove Pond Sediment Evaluation (ABB-ES, 1995c). In 1995, the Army designated Plow Shop Pond as AOC 72.

Groundwater cleanup levels for the Shepley's Hill Landfill Operable Unit were developed following the USEPA guidance documents entitled, Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual (Part B, Development of Risk Based Preliminary Remediation Goals), Interim, December 1991, and OSWER Directive 9355.0-30, Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions. This approach identified dichlorobenzenes, 1,2-dichloroethane, arsenic, and manganese as chemicals of concern (COCs) in groundwater. In addition, the baseline risk assessment identified the following COCs as exceeding MCLs or Massachusetts Maximum Contaminant Levels (MMCLs): dichlorobenzenes, 1,2-dichloroethane, arsenic, chromium, and nickel. Concentrations of lead in groundwater exceeded the federal drinking water action level. Concentrations of aluminum and iron exceeded non-risk-based federal and Massachusetts Secondary Maximum Contaminant Levels (SMCLs), while sodium exceeded the federal and Massachusetts guidelines for individuals on a sodium restricted diet.

No MCL or MMCL has been established for manganese. The ROD based the cleanup level for manganese on background concentrations because background concentrations at Devens RFTA exceeded the risk-based concentration derived from the then available reference dose (RfD) (5×10^{-3} milligrams/kilogram/day). A revised/updated RfD (4.7×10^{-2}), available when the Long-term Monitoring and Maintenance Plan was prepared, was used in the Long-term Monitoring and Maintenance Plan to calculate a revised cleanup level for manganese of 1,715 μg/L. Because background concentrations for aluminum and iron exceed their respective guideline value, cleanup levels for them were set at the background value. The cleanup level for sodium was set equal to the federal health advisory. The following table summarizes cleanup levels for Shepley's Hill Landfill Operable Unit groundwater.

CHEMICAL OF CONCERN	CLEANUP LEVEL, µG/L	SELECTION BASIS
Arsenic *	50	MCL
Chromium *	100	MCL
1,2-Dichlorobenzene	600	MCL
1,4-Dichlorobenzene *	5	MMCL
1,2-Dichloroethane *	5	MCL
Lead *	15	Action Level
Manganese *	1,715	Risk-based
Nickel *	100	MCL
Sodium	20,000	Health Advisory
Aluminum	6,870	Background
Iron	9,100	Background

* = Trigger chemical

Attainment of cleanup levels in groundwater will result in an approximate sixty-fold reduction in potential human-health risk, reflecting the approximate sixty-fold reduction in arsenic concentrations needed to attain the 50 µg/L arsenic cleanup level. Recent studies indicate that many skin tumors arising from oral exposure to arsenic are non-lethal and that the dose-response curve for the skin cancers may be sublinear (in which case the cancer slope factor used to generate risk estimates may be overestimated). It has been USEPA policy to manage these risks downward by as much as a factor of ten. As a result, the carcinogenic risk for arsenic at Shepley's Hill Landfill Operable Unit has been managed as if it were one order of magnitude lower than the calculated risk. The residual human-health risk from residential exposure to groundwater after attainment of cleanup levels (arsenic cleanup goal of 50 µg/L) is estimated to be approximately $1x10^{-3}$ (unmodified to account for the uncertainty associated with arsenic) and $1x10^{-4}$ if modified to account for the uncertainty associated with exposure to arsenic.

3.3 DESCRIPTION OF REMEDY

The ROD identified Alternative SHL-2: Limited Action to address groundwater contamination at the Shepley's Hill Landfill Operable Unit, with Alternative SHL-9 as the contingency remedy if Alternative SHL-2 proves not to be protective. Each of these alternatives includes components for the containment of landfill wastes and management of contaminant migration. The remedial components of the selected remedy are described in detail below.

Alternative SHL-2 contains components to maintain and potentially improve the effectiveness of the existing landfill cover system and to satisfy the Landfill Post-Closure Requirements of 310 CMR 19.142 to reduce potential future exposure to contaminated groundwater. Key components of this alternative include:

- landfill closure in accordance with applicable requirements of 310 CMR 19.000;
- survey of Shepley's Hill Landfill;
- evaluation/improvement of stormwater diversion and drainage;
- landfill cover maintenance;

- landfill gas collection system maintenance;
- long-term groundwater monitoring;
- long-term landfill gas monitoring;
- institutional controls;
- educational programs;
- 60 percent design of a groundwater extraction system;
- annual reporting to MADEP and USEPA; and
- five-year site reviews.

Each of these components is described briefly in the following paragraphs.

Landfill Closure in Accordance with Applicable Requirements of 310 CMR 19.000. The ROD required closure of Shepley's Hill Landfill in accordance with Commonwealth of Massachusetts regulations at 310 CMR 19.000. These regulations contain requirements for the submittal to, and approval by, MADEP of plans and supporting materials to document that landfill closure occurs according to approved plans and applicable MADEP requirements.

Survey of Shepley's Hill Landfill. The ROD required an accurate topographic survey of the ground surface at Shepley's Hill Landfill..

Evaluation/Improvement of Stormwater Diversion and Drainage. The ROD required an evaluation of stormwater diversion and drainage systems at and adjacent to Shepley's Hill Landfill. The focus of the evaluation was to include the following items of concern:

- landfill cap runoff patterns and drainage ditch flow capacities;
- potential run-under along the western edge of the landfill, particularly where the existing geomembrane cap may not have a good seal with the underlying bedrock; and
- the effectiveness of stormwater drainage systems upgradient of the landfill (i.e., at the transfer station, tire recycling station, DRMO yards, and along Market Street) at diverting run-off from potential infiltration areas upgradient of the landfill.

Landfill Cover Maintenance. The ROD required development of a Long-term Monitoring and Maintenance Plan to provided details of proposed monitoring and maintenance activities. Of particular concern were drainage of a small area of ponded water in the northwestern section of the landfill, repair of erosion areas at the north end of the landfill, annual inspection of the cover system, and landfill mowing.

Landfill Gas Collection System Maintenance. The ROD required annual inspections to monitor the Shepley's Hill Landfill gas collection system and provide any necessary repairs.

Long-term Groundwater Monitoring. The ROD required development of plans for long-term groundwater monitoring at Shepley's Hill Landfill to alternative performance and assess future environmental effects.

Long-term Landfill Gas Monitoring. The ROD required development of plans for monitoring landfill gas at landfill gas vents.

Institutional Controls. The ROD required implementation of institutional controls in the form of zoning and deed restrictions for any property released by the Army at Shepley's Hill Landfill during Fort Devens base-closure activities. The Fort Devens Preliminary Reuse Plan, Main and North Posts has proposed that Army land bordering Plow Shop Pond be zoned for open space and rail-related uses. By pre-empting residential use, these controls would help limit human exposure. In addition, the Army would place deed restrictions on landfill area property to prohibit installation of drinking water wells. This, in combination with landfill capping and long-term groundwater monitoring, would protect potential human receptors from risks resulting from exposure to contaminated groundwater. There are no current human receptors for groundwater exposure. Institutional controls would be drafted, implemented, and enforced in cooperation with state and local governments.

Educational Programs. The ROD required conduct of periodic public meetings and presentations to increase public awareness. This would help keep the public informed of the site status, including both its general condition and remaining contaminant concentrations. This could be accomplished by holding public meetings every five years coincident with the five-year site reviews for Shepley's Hill Landfill. The presentation would summarize site activities and the results of monitoring programs.

60 Percent Design of a Groundwater Extraction System. The ROD required the Army to perform predesign hydrogeologic studies and prepare a 60 percent complete engineering design for groundwater extraction and discharge to the Town of Ayer Publicly Owned Treatment Works (POTW). The 60 percent complete engineering design was to be completed before the Shepley's Hill Landfill five-year review, scheduled for 1998.

Annual Reporting to MADEP and USEPA. The ROD required annual reports to MADEP and USEPA to describe site activities and summarize results of environmental monitoring. This reporting was stipulated to satisfy the requirements of 310 CMR 19.132 and 19.142.

Five-year Site Reviews. The ROD requires the Army to perform five-year reviews to assess whether the implemented remedy is protective of human health and the environment and whether the implementation of additional remedial action is appropriate. Five-year reviews were scheduled for 1998, 2003, and 2008, based on the elapsed time following supplemental RI sampling. The ROD identified cleanup levels for 13 chemicals historically detected in monitoring wells at Shepley's Hill Landfill. Chemicals with MCLs (i.e., 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichloroethane, arsenic, chromium, lead, and nickel) and manganese were identified as trigger chemicals, exceedances of which would justify implementation of contingency remedial action.

Incremental reduction of risk rather than incremental reduction in concentration of individual contaminants was specified as a measure of progress toward attainment of cleanup levels to focus on the cleanup of arsenic, which was the primary contributor to risk. This approach prevents a situation in which failure to attain a concentration reduction goal for a minor contributor to risk (e.g., 1,2-dichloroethane) overshadows the achievement of 50 percent or greater reduction in the concentration of arsenic.

The ROD stipulated the following specific criteria for evaluating the effectiveness of the selected remedial action (Alternative SHL-2) at Shepley's Hill Landfill. The criteria for both groups of wells must be met for the alternative to be considered effective.

> Group 1 Wells. For Group 1 wells where analyte concentrations have historically attained cleanup levels, Alternative SHL-2 will be considered effective if concentrations of individual chemicals within individual wells do not show statistically significant cleanup level exceedances. To determine statistical significance, the Army will apply methods consistent with the regulations at 40 CFR 264.97, 40 CFR 258.53, and 310 CMR 30.663.

> Group 2 Wells. For Group 2 wells where chemical concentrations have exceeded cleanup levels in the past, Alternative SHL-2 will be considered effective if a 50 percent reduction in the increment of risk between cleanup levels and baseline concentrations for COCs within individual wells is achieved by January 1998, if an additional 25 percent (75 percent cumulative) is achieved by January 2003, and if cleanup levels are attained by January 2008.

As outlined in the Long Term Monitoring and Maintenance Plan (SWET, 1996c), for any monitoring well installed subsequent to 1993, not sampled during RI and supplemental RI activities, and showing exceedances of cleanup levels (i.e., a Group 2 well in the ROD), reduction of risk was not evaluated during the first five-year site review following installation. In that instance, analytical data collected between well installation and the next five-year review will be used to calculate baseline concentrations, and risk reduction will be evaluated in subsequent five-year reviews. The evaluation criteria for these wells will be a 50 percent reduction in the increment of risk between cleanup levels and baseline concentrations for COCs in each subsequent five-year review, and attainment of cleanup levels by January 2008. Monitoring wells included in the Shepley's Hill Landfill Five-year Review (SWET, 1998) are listed below and shown in Figure 3-2.

LONG TERM MONITORING AND MAINTENANCE PLAN MONITORING WELLS		
SHL-3	SHL-11	SHM-93-22C
SHL-4	SHL-19	SHM-96-22B
SHL-5	SHL-20	SHM-96-05B
SHL-9	SHL-22	SHM-96-05C
SHL-10	SHM-93-10C	

3.3.1 Current Status

This subsection compares completed and ongoing activities at the Shepley's Hill Landfill Operable Unit with the requirements of the ROD. In addition, recommendations and conclusions from the Shepley's Hill Landfill Supplemental Groundwater Report, prepared to address concerns identified in the Final Five-year Report for Shepley's Hill Landfill, are summarized.

Landfill Closure in Accordance with Applicable Requirements of 310 CMR 19.000. The Army submitted a draft closure report for Shepley's Hill Landfill to MADEP in July 1995, and on February 8, 1996, MADEP provided review comments and specific recommendations to address issues of concern. Following review of the MADEP comments, the Army submitted the final closure report in March 1996 pursuant to 310 CMR 19.000 (SWET, 1996b) and the Long Term Monitoring and Maintenance Plan in May 1996 (SWET, 1996c).

Survey of Shepley's Hill Landfill. The landfill surface was surveyed as part of post-closure activities (SWET, 1996a).

Evaluation/Improvement of Stormwater Diversion and Drainage. As part of long-term maintenance activities, the Army has performed extensive maintenance on stormwater ditches at the landfill. Significant portions of drainage ditch have been regraded and seeded or lined with rip-rap stone to reduce erosion.

Potential run-under along the western edge of the landfill was evaluated as part of the Shepley's Hill Landfill Supplemental Groundwater Investigation. Although test pits indicate that run under can occur, soils are sandy and the geomembrane cap does not fit the underlying bedrock surface snuggly, the Shepley's Hill Landfill Supplemental Groundwater Report concludes that the effect of potential run under on groundwater elevation and direction of flow is small.

Significant changes to stormwater drainage have been made or are planned for the area south of Shepley's Hill Landfill as part of Devens RFTA redevelopment activities. New segments and modifications to existing segments will discharge stormwater to settling ponds that in turn discharge predominantly away from the area upgradient of the landfill. This is not anticipated to adversely affect groundwater flow beneath the landfill.

Landfill Cover Maintenance. A Long-term Monitoring and Maintenance Plan was prepared for the Shepley's Hill Landfill Operable Unit in 1995 to outline proposed monitoring, maintenance, and reporting activities (SWET, 1996c). Since that time, the Army has performed substantial maintenance on the landfill cap to maintain its integrity and performance. These activities have been documented in annual reports (SWET, 1997a; SWET, 1997b; SWET, 1998; USACE, 1999; USACE, 2000) and have included the following activities activities as recommended in the annual reports and in the 1998 Five Year Review:

- performing annual inspections of the landfill surface;
- draining a small area of ponded water in the northwestern section of the landfill to minimize stress on the cover system and regrading to prevent future ponding;
- regrading and rip-rapping substantial portions of drainage ditches at the landfill;
- filling animal burrows;
- repairing roads; and
- mowing the landfill vegetative cover.

Landfill Gas Collection System Maintenance. The above ground portion of the landfill-gas collection system is inspected annually as part of landfill monitoring activities. The gas vents are reported in good condition, and no repairs have been required.

Long-term Groundwater Monitoring. The Long-term Monitoring and Maintenance Plan (SWET, 1996c) outlines the groundwater monitoring program at the landfill. Groundwater monitoring is performed semi-annually at 14 monitoring wells, including SHM-96-05B, SHM-96-05C, and SHM-96-22B which were installed after signature of the ROD. Table 3-1 lists analytical parameters and current analytical methods. Analytical data have been summarized and submitted to USEPA and MADEP annually (SWET, 1997a; SWET, 1997b; SWET, 1998; USACE, 1999; USACE, 2000). Appendix B contains summaries of the data collected during the long-term groundwater monitoring program.

Review of the groundwater analytical data collected in 1996 through 1999 (see Appendix B), shows the presence of VOCs in several monitoring wells at low concentrations; all reported concentrations are below cleanup levels and MCLs, however. Because arsenic is of special concern at Shepley's Hill Landfill, arsenic data are summarized separately in Table 3-2. This data is discussed further in Subsection 3.7.

Long-term Landfill Gas Monitoring. As part of scheduled monitoring activities, landfill gas samples have been collected annually from each of 18 gas vents at the landfill and analyzed in the field by direct-reading instruments. Monitored parameters are listed below.

- total VOCs (ppm)
- percent oxygen
- hydrogen sulfide (ppm)
- percent of lower explosive limit
- carbon monoxide (ppm)
- percent carbon dioxide
- percent methane

The Army has included tabulated analytical results for the landfill gas monitoring and submitted them to USEPA and MADEP annually (SWET, 1997a; SWET, 1997b; SWET, 1998; USACE, 1999; USACE, 2000). Appendix B contains summary tables of the data collected during the landfill gas monitoring program.

The purpose of the landfill gas monitoring program is to establish long-term trends with regard to landfill gas production and venting. Review of the monitoring data for 1996, 1997, and 1998, shows somewhat variable but low concentrations of target parameters. In 1999 sampling procedures were changed in an effort to obtain more representative samples. In addition, two rounds of sample collection were performed: one round during a period of falling barometric pressure and one round during a period of rising barometric pressure. The effects of the revised sampling procedure and the influence of changing barometric pressure appear clearly evident in the data; the 1999 data, particularly the data associated with falling barometric pressure, are higher than historic data. The 1999 Annual Report (USACE, 2000) showed lower explosive limits exceeding 100 percent at 16 of 18 gas vents, and methane concentrations ranged from 0.8 to 32.8 percent. These readings are within the parameters of a mature landfill (USACE, 2000).

The gas vents appear to be functioning properly. The transition from high to low atmospheric pressure facilitates venting of landfill gas to the atmosphere, while the transition from low to high atmospheric pressure retards venting to the atmosphere. A concern, however, is possible subsurface migration of landfill gas to off-site locations. If the gas vent system is functioning properly there should not be subsurface migration; however, installation of subsurface probes to monitor for landfill gas migration along the northwest edge of the landfill is recommended.

Institutional Controls. The ROD proposed institutional controls in the form of zoning and deed restrictions for any property released by the Army at Shepley's Hill Landfill. No property has been released, and therefore no institutional controls have been implemented.

Educational Programs. No public meetings have been held or presentations given on Shepley's Hill Landfill since the public meeting on the proposed plan. However, Shepley's Hill Landfill is often discussed at the Restoration Advisory Board meetings, and, therefore, concerned members of the public are kept informed of activities at the landfill.

60 Percent Design of a Groundwater Extraction System. The Army prepared a 60 percent complete engineering design for groundwater extraction and discharge to the Town of Ayer POTW in 1997 (USACE, 1997).

Annual Reporting to MADEP and USEPA. Annual reports which include a description of site activities and a summary of results of environmental monitoring have been submitted annually to MADEP and USEPA (SWET, 1997a; SWET, 1997b; SWET, 1998; USACE, 1999; USACE, 2000). This reporting satisfies the requirements of 310 CMR 19.132 and 19.142. In addition, the Army submits semi-annual groundwater analytical reports that summarize analytical data.

Five-year Site Reviews. In accordance with the schedule set forth in the ROD, the Army completed the first five-year review for Shepley's Hill Landfill in 1998 (SWET, 1998). The review summarized site activities and monitoring activities and compared achieved risk reductions to risk-reduction goals. Data presented in the review show that reductions in arsenic concentrations and corresponding risk satisfied the evaluation criteria at nine of eleven historical groundwater monitoring wells. Only monitoring wells SHL-10 and SHL-11 did not achieve risk-reduction goals. It was concluded, however, that substantial progress had been made toward achieving cleanup levels and, in light of the fact that there was no exposure to groundwater, implementation of contingency remedial action was not justified at that time. The following table summarizes the conclusions of the 1998 Five Year Review for Shepley's Hill Landfill (SWET, 1998).

SHEPLEY'S HILL LANDFILL 1998 FIVE YEAR REVIEW SUMMARY	
MONITORING WELL	**MONITORING WELL MET 1998 INCREMENTAL CLEANUP GOALS**
SHL-3	**Yes**
SHL-4	**Yes**
SHL-5	**Yes**
SHL-9	**Yes**
SHL-10	No
SHL-11	No
SHL-19	**Yes**
SHL-20	**Yes**
SHL-22	**Yes**
SHM-93-10C	**Yes**
SHM-93-22C	**Yes**
SHM-96-22B	Not evaluated, no baseline.
SHM-96-05B	Not evaluated, no baseline.
SHM-96-05C	Not evaluated, no baseline.

Data from monitoring wells installed in 1996 to fill gaps in the spatial coverage at the north end of the landfill (i.e., monitoring wells SHM-96-05B, -05C, and -22B) showed arsenic concentrations up to two orders of magnitude greater than historical values in older wells. In accordance with criteria presented in the ROD, because baseline data were not available for these new monitoring wells, they were not used in the assessment of remedy effectiveness. However, because the high observed concentrations and potential for off-site migration were of concern to the Army, USEPA, and MADEP, the Army agreed to perform supplemental groundwater investigations at Shepley's Hill Landfill to assess groundwater flow, arsenic migration, and potential exposure risk (HLA, 1999).

Shepley's Hill Landfill Supplemental Groundwater Investigation. The purpose of the Supplemental Groundwater Investigation was to support the Long Term Monitoring and Maintenance Plan for Shepley's Hill. The investigation focuses on arsenic and is intended as a tool to guide decision making concerning further investigative activities at Shepley's Hill Landfill. It is neither a baseline risk assessment nor an assessment of the protectiveness of the selected remedial action at Shepley's Hill Landfill. The Shepley's Hill Landfill Supplemental Groundwater Report presents and discusses the results of those studies (Harding-ESE, 2000).

The Army performed the following activities to further investigate the interaction of groundwater and Shepley's Hill Landfill:

- assessing the effects of precipitation runoff on groundwater levels within the landfill;
- collecting hydrogeologic data to assess groundwater flow north of Shepley's Hill Landfill;
- collecting analytical data to characterize contaminant concentrations moving away from the landfill and physical-chemical factors affecting contaminant migration;

- refining the Shepley's Hill Landfill groundwater model to further assess groundwater flow and potential contaminant transport north of the landfill; and
- re-evaluating potential human-health risks in light of new analytical data.

The Army also contacted several local and regional public health agencies in an effort to confirm the availability and use of a public water supply in the area downgradient of Shepley's Hill Landfill and to find out whether and to what extent private wells may be used in the area north of the landfill to supplement the public water supply. There are no public records of private wells downgradient of the landfill, but the presence of undocumented wells is possible.

Review of available analytical data indicates a well defined plume with elevated arsenic concentrations moving southeast to northwest away from Shepley's Hill Landfill and toward the wetland north of West Main Street in Ayer. In addition to high arsenic concentrations, groundwater in the center of the plume has a very low redox potential, high concentrations of dissolved (i.e., reduced) iron and manganese, very low to no dissolved oxygen (DO), and a chemical oxygen demand of 30 to 40 milligrams per liter (mg/L). These conditions are conducive to the continued migration of the arsenic toward the wetland.

The association of highly reduced groundwater and high concentrations of arsenic, iron, and manganese suggests that the arsenic in groundwater was released when iron and manganese oxides and oxyhydrides in the upgradient aquifer were reduced by landfill influenced groundwater. The conclusion is supported by the analytical results showing arsenic in samples from drill cuttings collected from Shepley's Hill Landfill monitoring wells.

If the reduced groundwater between Shepley's Hill Landfill and the wetland were to become oxidizing (i.e., aerobic) by mixing with oxygenated groundwater, then chemical reactions would occur in the aquifer which would result in arsenic being captured and its further migration halted. The likelihood that existing reducing groundwater conditions will change to oxidizing conditions through mixing in the aquifer is considered low, however.

The groundwater flow model suggests that most of the groundwater associated with Shepley's Hill Landfill flows north, discharging mainly to a section of Nonacoicus Brook in the wetland north of West Main Street. The pathway indicated by the model corresponds to distributions of contaminants seen in monitoring locations along Molumco Road. The Army did not collect samples to confirm the location of groundwater discharge to the wetland.

Based on available data there is no current use of, or exposure to, groundwater migrating away from Shepley's Hill Landfill, and no current human-health risk. However, to assess the potential for adverse effects if groundwater were to be used, the Army performed a brief assessment of potential risks to hypothetical residential users. Adult residential use of groundwater with arsenic at the concentrations found at Molumco Road, if it were to occur, would result in potential cancer risks of 6E-03 and non-cancer risks corresponding to an Hazard Index (HI) of 36. For a child resident, the corresponding cancer risk is 4E-03, and the HI is 110. The total resident cancer risk (child plus adult) is 1E-02. These risk levels exceed the USEPA target cancer risk range of 1E-06 to 1E-04 and target HI of 1.

An ecological risk assessment to evaluate potential ecological risks from exposure to surface water and sediments in the Nonacoicus Brook wetland north of West Main Street was not performed because no sediment or surface water data were available. Potential ecological risks from exposure to Plow Shop Pond sediments were not updated from the assessments of the RI Addendum (ABB-ES, 1993) and draft Plow Shop Pond and Grove Pond Sediment Evaluation (ABB-ES, 1995c) reports.

High concentrations of arsenic in groundwater within the footprint of the landfill and at its downgradient edge suggest that arsenic concentrations in groundwater moving away from the landfill may become higher than present concentrations. However, absorption on downgradient overburden materials may retard arsenic migration and dilution/dispersion may lower arsenic concentrations.

3.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS REVIEW

ARARs are applicable or relevant and appropriate requirements under federal or state environmental or facility siting laws that address hazardous substances, pollutants, remedial actions, locations, or other circumstances at a CERCLA site. Location-specific ARARS "set restrictions upon the concentration of hazardous substances or the conduct of activities solely because they are in special locations." Chemical-specific ARARs are usually health- or risk-based standards that limit the concentration of a chemical found in or discharged to the environment. Action-specific ARARs set controls or restrictions on activities related to the management of hazardous waste. Identified ARARs for the Shepley's Hill Landfill Operable are listed below. The standards listed below were identified as ARARs in the ROD. They were reviewed for changes that could affect protectiveness. Appendix B contains a copy of the ROD ARARs table for the Shepley's Hill Landfill Operable Unit.

Location-specific Requirements

- Floodplain Management Executive Order No. 11988, (40 CFR Part 6, App. A)(Applicable)
- Protection of Wetlands Executive Order No. 11990 (Applicable)
- Fish and Wildlife Coordination Act, (16 USC 661 et seq.; 40 CFR Part 302)(Applicable)
- Endangered Species Act, (16 USC 1531 et seq.; 50 CFR Part 402)(Applicable)
- Massachusetts Wetland Protection Act and Regulations, (MGL c. 131 s. 40; 310 CMR 10.00)(Applicable)
- Massachusetts Endangered Species Act and implementing regulations, (MGL c. 131A, s. 1 et seq.; 321 CMR 10.00)(Applicable)
- Areas of Critical Environmental Concern, (301 CMR 12.00)(Relevant and Appropriate)

Chemical-specific Requirements

- Safe Drinking Water Act, National Primary Drinking Water Standards, MCLs, (40 CFR Parts 141.11-141.16 and 141.50-191.51)(Relevant and Appropriate)
- Massachusetts Surface Water Quality Standards, (314 CMR 4.00)(Applicable)
- Massachusetts Groundwater Quality Standards, (314 CMR 6.00)(Applicable)
- Water Standards and Guidelines, (310 CMR 22.00)(Relevant and Appropriate)
- Massachusetts Ambient Air Quality Standards, (310 CMR 6.00)(Relevant and Appropriate)
- Massachusetts Air Pollution Control Regulations, (310 CMR 7.00)(Relevant and Appropriate)

Action-specific Requirements

- Resource Conservation and Recovery Act, (Subtitle D, 40 CFR 258)(Relevant and Appropriate)
- Resource Conservation and Recovery Act, (Subtitle C, 40 CFR 260, 264)(Relevant and Appropriate)
- Massachusetts Solid Waste Management Regulations, (310 CMR 19.100)(Applicable)
- Massachusetts Hazardous Waste Regulations, (310 CMR 30.00)(Relevant and Appropriate)

Location-specific ARARs identified in the ROD for the Shepley's Hill Landfill Operable Unit include regulations that protect wetlands, floodplains, and endangered species (i.e., the Grasshopper Sparrow, a state listed species of special concern); however, Alternatives SHL-2 and SHL-9 do not involve any activities anticipated to trigger wetlands or floodplain ARARs. Landfill mowing must be performed to prevent or minimize adverse effects on the Grasshopper Sparrow and its habitat.

Identified chemical-specific ARARs include federal and state drinking water standards, state surface water and groundwater quality standards, and state air quality and air pollution control regulations. The water quality standards were considered during establishment of cleanup levels and the air quality regulations are used to evaluate alternative performance and protectiveness. Standards for the contaminants of concern have not become more stringent since the signing of the ROD in October 1996. However, on June 22, 2000, USEPA proposed reducing the MCL for arsenic from 50 to 5 µg/L (65 FR 38887-38983). Promulgation of a new standard is required by January 1, 2001; however, it probably would not take effect for 3 to 5 years. The background concentration for arsenic in groundwater at Devens RFTA ranges from 1.3 to 15.2 µg/L.

The ROD identified several action-specific ARARs for the Shepley's Hill Landfill Operable Unit; the most important are the ones relating to landfill cover systems and landfill closure. The Massachusetts Solid Waste Management Regulations at 310 CMR 19.000 have been identified as applicable. USEPA Regulations for Owners and Operators of Permitted Hazardous Waste Facilities at 40 CFR 264 (RCRA Subtitle C), and USEPA Criteria for Municipal Solid Waste

Landfills at 40 CFR 258 (RCRA Subtitle D), and Massachusetts Hazardous Waste Management Rules at 310 CMR 30.000 have all been identified as relevant and appropriate.

The design of the existing cover system at Shepley's Hill Landfill was approved by MADEP in 1985 pursuant to the Massachusetts Sanitary Landfill regulations of 1971 (310 CMR 19.00). Provisions in the Massachusetts Solid Waste Management Regulations of 1990 (310 CMR 19.000) indicate that the conditions of the 1985 approval satisfy 310 CMR 19.000; therefore the existing cover is considered to comply with the applicable cover system requirements of 310 CMR 19.000. In addition, the existing cover meets the general performance standards of 310 CMR 19.000. The existing cover system also meets the performance standards of RCRA Subtitle C at 40 CFR 264.310, RCRA Subtitle D at 40 CFR 258, and Massachusetts Hazardous Waste Regulations at 310 CMR 30.000. The existing cover varies from USEPA guidance for RCRA final covers primarily in that it has a geomembrane hydraulic barrier rather than a composite hydraulic barrier. Alternatives SHL-2 and SHL-9, which rely on the existing cover, therefore comply with ARARs for cover systems. The long-term monitoring and maintenance plan is designed to comply with the applicable requirements of 310 CMR 19.000.

Action-specific ARARs for landfill post-closure requirements would be met by Alternatives SHL-2 and SHL-9. Alternative SHL-9, if implemented, would be required to meet the federal Clean Water Act General Pretreatment Requirements to discharge to the Town of Ayer POTW. Federal and state air quality regulations would be met by Alternatives SHL-2 SHL-9. Dust suppression techniques would be used, when necessary, to meet air quality regulations.

No newly promulgated ARARs or changes to ARARs have been identified that would affect the implementation of the selected remedy for the Shepley's Hill Landfill Operable Unit; however, a proposed revision to the MCL for arsenic could affect the arsenic cleanup level.

3.5 Summary of Site Visit

An HLA representative performed a site inspection of the Shepley's Landfill Operable Unit (AOCs 4, 5, and 18) on June 8, 2000. Conditions during the inspection were favorable with no precipitation and temperatures in the 60s. It should be noted that the Army performs detailed annual inspections of the landfill as part of the Long Term Monitoring and Maintenance Plan. The results of the inspections along with recommendations for follow-up maintenance action and documentation of maintenance activities performed during the previous year are reported to USEPA and MADEP annually (SWET, 1997a; SWET, 1997b; SWET, 1998; USACE, 1999; USACE, 2000).

Operation and maintenance of the landfill remained consistent with the specifications and restrictions outlined in the ROD. The inspection did not reveal any signs of disturbance on or near the landfill cap. Vehicular access to the landfill was controlled by a gate at the former DRMO yard at the southwestern corner of the landfill. The gate was closed at the time of the inspection. Tire ruts were observed adjacent to the access road that runs across the center of the landfill. The ruts were not deep enough to compromise the landfill cap. The grass over the landfill was recently mowed. Stormwater runoff appears to be effectively controlled both on the cap and to the north and east of the landfill. Monitoring well casings were intact and secured.

The following individuals were interviewed as part of the five-year review:

- Jim Chambers, BRAC Environmental Coordinator, Devens RFTA
- John Regan, MADEP
- David Margolis, USACE, New England District

All personnel were interviewed on June 8, 2000 at the Devens RFTA BRAC office. John Regan stated that the landfill cover has required repair as a result of ponding of stormwater runoff. Mr. Chambers added that the ponding was a condition that existed prior to the ROD, and repairs have been made to rectify the issue. Ponding is no longer a problem.

John Regan expressed the MADEP concern over the presence of dissolved arsenic in Shepley's Hill Landfill monitoring wells. Mr. Chambers noted that a supplemental groundwater investigation was underway to address the arsenic. Both Mr. Chambers and Mr. Regan said that the public has expressed concerns about the arsenic in groundwater.

No one was aware of any violations to the land use restrictions outlined in the ROD. Mr. Chambers stated that the Army has no plans to transfer ownership of the property.

Mr. Chambers stated that there have been minor problems caused by vehicles creating tire ruts on the landfill. As a result a greater effort has been made to keep the gate at the southwest corner of the landfill closed to prevent unauthorized access.

As a general comment, Mr. Regan said that MADEP wants to make sure that the data from the supplemental groundwater investigation definitively shows whether arsenic does or does not pose a risk to drinking water sources.

3.6 AREAS OF NON-COMPLIANCE

Deficiencies in implementation of the ROD were not identified during the five-year site review. Long-term monitoring and maintenance are being performed in accordance with the approved plan. Needed maintenance is identified during annual inspections and documented in the annual reports along with maintenance accomplished during the previous year.

Some damage has occurred to the landfill surface as result of uncontrolled vehicle access. The Army has closed access to prevent unauthorized access to the landfill. Incremental risk reduction was reviewed in 1998 in accordance with the schedule in the ROD. Difficulties in achieving cleanup goals are discussed in Subsection 3.7.

3.7 ASSESSMENT

Question A: Is the Remedy Functioning as Intended by the Decision Documents?

Implementation of Institutional Controls and Other Measures: There are no current or future plans for transfer of ownership of the property at Shepley's Hill Landfill. Therefore implementation of institutional controls is not required at this time. Controls would be implemented if property were transferred.

Remedial Action Performance: The ROD stipulates that calculation of incremental reduction of risk to evaluate remedy protectiveness and assess progress toward attainment of groundwater cleanup goals will occur at five-year intervals in 1998, 2003, and 2008. The first five-year review for Shepley's Hill Landfill was performed in 1998 (SWET, 1998). The review summarized site activities and monitoring activities and compared achieved risk reductions to risk-reduction goals. Data presented in the review show that reductions in arsenic concentrations and corresponding risk satisfied the evaluation criteria at nine of eleven historical groundwater monitoring wells; only monitoring wells SHL-10 and SHL-11 did not achieve risk-reduction goals. It was concluded, however, that substantial progress had been made toward achieving cleanup levels and, in light of the fact that there was no exposure to groundwater, implementation of contingency remedial action was not justified at that time.

The second detailed assessment of incremental risk reduction is not scheduled until 2003. However, because arsenic is the predominate contributor to risk at Shepley's Hill Landfill, review of the data in Table 3-2 enables assessment of cleanup progress. Review of that data shows that, based on November 1999 data, the cleanup goal of 50 μg/L has been maintained or met at 8 of 14 monitoring wells (see table below).

SUMMARY OF ARSENIC REDUCTION		
MAINTAINED OR ACHIEVED CLEANUP LEVEL	SUBSTANTIAL REDUCTION SINCE OCTOBER 1997	LITTLE OR NO REDUCTION SINCE OCTOBER 1997
SHL-3 SHL-5 SHM-96-05C SHL-9 SHL-10 SHM-93-10C SHL-22 SHM-93-22C	SHL-4 SHL-19	SHM-96-05B SHL-11 SHL-20 SHM-96-22B

Further, substantial concentration reductions (approximately 75 percent compared to baseline) have occurred at two monitoring wells: SHL-4 and SHL-19; suggesting strongly that monitoring wells SHL-4 and SHL-19 will meet the 2003 incremental goal. However, little or no reduction is occurring at monitoring wells SHL-11, SHL-20, SHM-96-05B, and SHM-96-22B. In fact, concentrations at SHL-11, SHM-96-05B, and SHM-96-22B have increased since the October

1997 sampling. At monitoring well SHL-20 arsenic concentrations have dropped only a few percent since 1998, and only 35 percent from baseline. The data in Table 3-2 suggest that 2003 incremental goals will not be met at monitoring wells SHL-11, SHL-20, SHM-96-05B, and SHM-96-22B. In light of the fact that the background concentration of arsenic at Devens RFTA ranges from 1.3 to 15.2 μg/L, and following review of Table 3-2, it is uncertain whether groundwater at Shepley's Hill Landfill could meet a cleanup goal corresponding to the proposed MCL of 5 μg/L.

System Operations/Operation and Maintenance (Long-term Groundwater Monitoring): Post closure monitoring and maintenance are being performed in accordance with the Long Term Monitoring and Maintenance Plan (SWET, 1996c).

Cost of System Operations/Operation and Maintenance: Yearly O&M costs for implementation of the remedy at each AOC were not available for review.

Opportunities for Optimization: The list of parameters monitored as part of the long-term groundwater sampling program should be reviewed with the intent of eliminating parameters that have no significant site history and that do not contribute to site risks or to the understanding of groundwater chemistry. These include cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, biochemical oxygen demand (BOD_5), and cyanide.

Early Indicators of Potential Remedy Failure: As discussed previously, little or no reduction in arsenic concentration is occurring at monitoring wells SHL-11, SHL-20, SHM-96-05B, and SHM-96-22B. In fact, concentrations at SHL-11, SHM-96-05B, and SHM-96-22B have increased since the October 1997 sampling. At monitoring well SHL-20 arsenic concentrations have dropped only a few percent since 1998, and only 35 percent from baseline. The data in Table 3-2 suggest that 2003 incremental goals may not be met at monitoring wells SHL-11, SHL-20, SHM-96-05B, and SHM-96-22B. Additional time is needed, however, to confirm whether arsenic concentrations will meet cleanup goals.

As discussed in the Shepley's Hill Landfill Supplemental Groundwater Report (Harding-ESE, 2000), several factors contribute to this situation. First, the association of highly reducing conditions and high concentrations of arsenic, iron, and manganese in groundwater samples from at monitoring wells SHL-11, SHL-20, SHM-96-05B, and SHM-96-22B suggests that the arsenic in groundwater was released when iron and manganese oxides and oxyhydrides in the upgradient aquifer were reduced by landfill influenced groundwater. Second, groundwater model simulations without the landfill cap indicate that the cap effectively diverts migration of groundwater away from Plow Shop Pond and monitoring wells SHL-3, SHL-4, SHL-10, and SHL-19. This diversion is evident in the improvements in groundwater quality at these wells. Finally, groundwater flow modeling suggests that most of the groundwater associated with Shepley's Hill Landfill flows north, discharging mainly to a section of Nonacoicus Brook in the wetland north of West Main Street; monitoring wells SHM-96-05B and SHM-96-22B are located such that they intercept this redirected groundwater flow as it moves north. Figures 3-3 and 3-4 show modeled groundwater flow with and without the landfill cap, respectively.

Question B: Are the Assumptions Used at the Time of Remedy Selection Still Valid?

Changes in Standards and To Be Considered: This five-year review did not identify ARARs that have been promulgated since the ROD was signed. However on June 22, 2000, USEPA proposed reducing the MCL for arsenic from 50 to 5 μg/L. Promulgation of a new standard is required by January 1, 2001; however, it likely would not take effect for 3 to 5 years. Attainment of the proposed standard would increase the stringency of the groundwater cleanup, and would reduce the potential residual risk from exposure to groundwater.

Changes in Exposure Pathways: No changes in the site conditions that affect exposure pathways were identified as part of this five-year review. First, there are no current or planned changes in land use at Shepley's Hill Landfill. Second, no new contaminants, sources, or routes of exposure were identified as part of this five-year review. Further, there is no indication that hydrologic/hydrogeologic conditions are not adequately characterized. Finally, there are no identified users or exposure to downgradient groundwater.

Changes in Toxicity and Other Contaminant Characteristics. The ROD based the cleanup level for manganese on background concentrations because background concentrations at Devens RFTA exceeded the risk-based concentration derived from the then available RfD value ($5x10^{-3}$ milligrams/kilogram/day). A revised/updated RfD ($4.7x10^{-2}$) (USEPA Region 1 Risk Updates, Nov. 1996), available when the Long-term Monitoring and Maintenance Plan was prepared, was used in the Long-term Monitoring and Maintenance Plan to calculate a revised cleanup level for manganese of 1,715 μg/L.

Changes in Risk Assessment Methodologies: Identified changes in risk assessment methodologies since the time of the ROD are discussed in the previous bulleted item "Changes in Toxicity and Other Contaminant Characteristics". These changes do not call into question the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the effectiveness of the remedy?

As discussed in "Early Indicators of Potential Remedy Failure", little or no reduction in arsenic concentration is occurring at monitoring wells SHL-11, SHL-20, SHM-96-05B, and SHM-96-22B. In fact, concentrations at SHL-11, SHM-96-05B, and SHM-96-22B have increased since the October 1997 sampling. At monitoring well SHL-20 arsenic concentrations have dropped only a few percent since 1998, and only 35 percent from baseline. The data in Table 3-2 suggest that 2003 incremental goals may not be met at monitoring wells SHL-11, SHL-20, SHM-96-05B, and SHM-96-22B. Additional time is needed, however, to confirm whether arsenic concentrations will meet established cleanup goals.

Review of topographic maps for Shepley's Hill Landfill and vicinity show the presence of a number of topographic features (i.e., linears) potentially indicative of bedrock fracturing. Extensive bedrock fracturing, if present, could play a role in the migration of contaminated groundwater and arsenic; however, the significance of the observed topographic features and presence of significant fractures is unproven. While some fractures undoubtedly exist in bedrock at Shepley's Hill Landfill, the majority of data indicate a competent low water yielding matrix.

In light of the fact that the background concentration of arsenic at Devens RFTA ranges from 1.3 to 15.2 μg/L, and following review of Table 3-2, it is uncertain whether groundwater at Shepley's Hill Landfill could meet a cleanup goal corresponding to the proposed MCL of 5 μg/L.

3.8 RECOMMENDATIONS

The Army should continue with its programs of annual landfill inspections and landfill gas sampling, and semi-annual groundwater sampling with annual reporting to USEPA and MADEP. Landfill maintenance should continue as recommended in the Long Term Monitoring and Maintenance Plan and in the annual reports.

The list of parameters monitored as part of the long-term sampling program should be reviewed with the intent of eliminating parameters that have no significant site history and that do not contribute to site risks or to the understanding of groundwater chemistry. These include cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, BOD_5, and cyanide. Analysis of TOC in lieu of BOD_5, would provide insight on the concentration of organic material in groundwater which is not currently available.

Samples from groundwater monitoring wells (i.e., SHM-99-31A, SHM-99-31B, SHM-99-31C, and SHM-99-32X) installed along Molumco Road north of Shepley's Hill Landfill should continue to be analyzed for arsenic, iron, manganese, and the general chemistry and field parameters monitored as part of the long-term sampling for the landfill. Samples from these monitoring wells will be used in the continuing assessment of arsenic migration north of the landfill.

Although landfill-gas readings are within the parameters of a mature landfill and landfill-gas vents appear to be working properly, because of high landfill-gas measurements during routine sampling, the Army should assess whether subsurface migration of landfill gas is occurring.

The contingency remedy of groundwater extraction with subsequent discharge to the Town of Ayer POTW should be re-evaluated by the Army. Although groundwater extraction has the potential to contain groundwater contaminants, it will not prevent the release of arsenic from aquifer materials and would need to be performed for a indeterminate length of time. Also, it appears that the POTW would no longer be suitable for receipt of extracted groundwater. These studies should be completed prior to the 2003 assessment of risk at Shepley's Hill Landfill.

3.9 PROTECTIVENESS STATEMENT

The remedy at Shepley's Hill Landfill Operable Unit is currently protective of human health and the environment. There are no known users of groundwater along the modeled downgradient path of groundwater leaving landfill area, although the presence of undocumented wells is possible. Further, the remedy directs groundwater flow away from Plow Shop Pond.

A HASP and investigation derived waste (IDW) handling procedures are in place, are sufficient to control risk to on-site workers and the public, and are being properly implemented during groundwater sampling. Human health is currently not at risk at Shepley's Hill Landfill Operable Unit because groundwater is not being used for potable use nor proposed for potable use.

3.10 NEXT REVIEW

The Shepley's Hill Landfill Operable Unit is a statutory site that requires ongoing five-year reviews. This is the second five-year review that has been performed at this operable unit; the first was performed in 1998, according to the schedule in the ROD. The next review will be performed within five years of the completion of this five-year review report; however, risk reduction will be evaluated in conformance with the ROD in 2003. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for nonconcurrence.

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4.0 AOC 63AX FIVE-YEAR SITE REVIEW

4.1 SITE DESCRIPTION AND HISTORY

AOC 63AX is located north of and near the western end of Patton Road on the southern portion of what was formerly the Main Post at Fort Devens (Figure 1-1). AOC 63AX formerly consisted of a large paved and fenced area, Building 2517, which at the time of the RI investigation was used as a warehouse by the U.S. Bureau of Prisons, and Building 2514 which was unoccupied. The area has recently been regraded and new office/laboratory buildings erected. Contamination at AOC 63AX is attributed to a previously removed 1,000-gallon waste oil UST adjacent to Building 2517 and a previously removed 5,000-gallon gasoline UST adjacent to Building 2514 (Figure 4-1).

The following items summarize the history for AOC 63AX. Refer to Section 1.0 for general enforcement activities at Devens RFTA (i.e., initiation of a MEP, placement on the NPL, and signing of the FFA).

- **1940s.** Building 2514 is thought to have served as a pumphouse for an historic gas station which supported a vehicle motor pool during World War II.
- **Late 1940s or early 1950s.** Motor pool operations were discontinued at Building 2514. No records are available on the decommissioning of this motor pool.
- **1966.** Building 2517 was built to serve as a tactical equipment repair shop. Subsequently, Building 2517 served as a motor repair shop, dispatch office for the Office of Logistics, and recreational vehicle storage facility.
- **1980.** A 1,000-gallon waste oil UST was installed along the southwestern side of Building 2517.
- **1989.** The Building 2517 waste oil UST and 100 cy of contaminated soil were removed as part of a Fort Devens initiative to replace waste oil USTs with aboveground storage tanks. Because residual TPHCs were observed in soils at the bottom of the excavation, the site was recommended for additional investigation.
- **1992.** The historic gas station associated with Building 2514, designated SA 43K, was investigated as part of the Groups 2 and 7 SI. During the SI, the 5,000-gallon gasoline UST was located and subsequently removed along with approximately 140 tons of contaminated soil. Soil sampling and field analysis performed following the UST removal, indicated no detectable concentrations of benzene, ethylbenzene, toluene, xylene (BTEX), or TPHCs in subsurface soil around the excavation. Based upon these findings, SA 43K was recommended for No Further Action. The No Further Action Decision Document was signed by USEPA and MADEP in January 1995.
- **1993.** Buildings 2517 and 2514 were investigated as part of Area Requiring Environmental Evaluation (AREE) 61O. A suspected drywell associated with Building 2514 and the former waste oil UST associated with Building 2517 were identified as potential sources of contamination.
- **1994.** The former waste oil UST associated with Building 2517 was designated AREE 63AX, and a field investigation was performed. To evaluate soil exposure risks under

current and potential future land-use conditions, the Army compared soil sample analytical data to MCP Method 1 S-2/GW-2 standards and identified no exceedances. Because several VOCs (i.e., benzene, trichloroethene (TCE), and 1,1-dichloroethene) in groundwater samples exceeded federal drinking water MCLs and MCP groundwater standards, an RI was recommended.

- **1995.** The former waste oil UST associated with Building 2517 was designated AOC 63AX, and an RI was performed. During the RI, the former gasoline UST associated with Building 2514 was identified as a potential contaminant source and subsequently became part of AOC 63AX. The RI did not identify VOCs in groundwater at concentrations exceeding federal or Massachusetts standards. No evidence of the drywell was found during the RI.
- **1996.** Fort Devens officially closed. AOC 63AX transferred to the Massachusetts Government Land Bank for commercial/industrial development. The Devens Reuse Plan designated the future use of the area as an Innovation and Business Technology Zone.
- **1997.** No Further Action ROD signed.

Significant findings of the RI are summarized in the following subsections.

4.1.1 Soil Contamination

Building 2517 Waste Oil Underground Storage Tank. During the RI, subsurface soils in the vicinity of the waste oil UST excavation were characterized by collecting 46 field-analytical samples from 15 TerraProbe[SM] points and 5 soil samples from 3 soil borings. The results of field analysis were used to assess whether residual contaminants from the former waste oil UST were present in subsurface soil and to provide a basis for locating subsequent soil borings and monitoring wells from which to collect confirmatory samples for off-site analysis for BTEX, selected halogenated compounds, and TPHC.

A total of nine soil samples were collected from three soil borings for off-site analysis for Project Analyte List (PAL) VOCs, PAL semivolatile organic compounds (SVOCs), PAL inorganics, and TPHC. The SVOCs fluoranthene (0.13 micrograms per gram [μg/g]), phenanthrene (0.067 μg/g), and pyrene (0.051 μg/g) were detected in the 6 feet bgs sample from boring AXB-95-05X, and TPHC (123 μg/g) was detected in the 4 feet bgs sample from boring AXB-95-04X. Bis(2-ethylhexyl)phthalate (up to 2.9 μg/g) and toluene (up to 0.0016 μg/g) were reported in samples from borings AXB-95-01X and AXB-95-04X, but were attributed to laboratory contamination. The waste oil UST identified as the most likely source of this contamination was removed along with approximately 100 cy of soil in 1989.

Building 2514 Gasoline Underground Storage Tank. Subsurface soil near and downgradient of Building 2514 and the former location of the 5,000-gallon gasoline UST was characterized by collection of 29 field-analytical samples from 11 TerraProbe[SM] points. Field analysis consisted of BTEX, selected halogenated compounds, and TPHC. The results of field analysis were used to delineate contaminant distribution, assess potential sources, and provide a basis for locating subsequent soil borings from which to collect confirmatory samples for off-site analysis.

Seven soil samples (including one duplicate) were collected from two soil borings (AXB-95-02X and AXB-95-03X) for off-site analysis for PAL VOCs, PAL SVOCs, PAL inorganics, and TPHC. The SVOC naphthalene was detected at 0.18 µg/g in the 4 feet bgs sample from boring AXB-95-03X, and TPHC was detected in five samples. The two highest TPHC concentrations, 8,840 and 885 µg/g, were observed in the 4- and 6-feet bgs samples, respectively, from boring AXB-95-02X. The maximum TPHC concentration in samples from boring AXB-95-03X was 136 µg/g in the 4-feet bgs sample. Toluene, acetone, trichlorofluoromethane, and bis(2-ethylhexyl)phthalate were also reported in samples from borings AXB-95-02X and AXB-95-03X, but were attributed to laboratory contamination.

One confirmatory soil sample was collected at 3-feet bgs from one of four test pits dug in an effort to locate the suspected drywell at Building 2514. Twelve SVOCs at individual concentrations up to 0.91 µg/g were reported in the sample. The reported TPHC concentration was 413 µg/g. No evidence of the drywell was found in either geophysical or intrusive investigations; it was concluded that the reported drywell did not exist.

4.1.2 Groundwater Contamination

Preliminary characterization of groundwater downgradient of Buildings 2514 and 2517 was accomplished by field analysis of groundwater samples from 17 TerraProbe^{SM} points. Field analysis consisted of BTEX, selected halogenated compounds, and gasoline range organics. The results of field analysis were used to delineate horizontal contaminant distribution and aid in placement of monitoring well locations.

Seven new monitoring wells were installed to supplement the three existing monitoring wells. Two rounds of groundwater samples were collected from all ten monitoring wells and analyzed for PAL VOCs, PAL SVOCs, total and dissolved PAL inorganics, pesticides, polychlorinated biphenyls (PCBs), TPHC, and several water quality parameters.

The VOCs ethylbenzene, chloroform, and dichloromethane were reported at low concentrations (maximum value of 2.9 µg/L) in three Round 1 samples. The presence of chloroform was attributed to laboratory contamination. Based on laboratory quality assurance/quality control samples, other Round 1 VOC results were considered estimated and possibly biased high. Toluene was reported in five Round 2 samples at concentrations of up to 1.5 µg/L.

One SVOC, 2-methylnaphthalene at 3.8 µg/L, was detected in one Round 1 sample, and two SVOCs, diethylphthalate and bis(2-ethylhexyl)phthalate, were detected in a total of four Round 1 and Round 2 samples. The presence of both phthalate compounds was attributed to laboratory contamination.

Several inorganic analytes were detected at concentrations above background in unfiltered groundwater samples. These analytes were aluminum, arsenic, barium, calcium, copper, iron, lead, magnesium, manganese, nickel, potassium, sodium, and zinc. Concentrations of aluminum, barium, lead, and zinc dropped to below background in filtered samples. Arsenic exceeded its federal drinking water MCL in the Round 1 sample from monitoring well 63AX-94-01, and iron and manganese exceeded federal SMCLs in the majority of samples. Aluminum exceeded the federal SMCL in the majority of unfiltered samples and appeared associated with the presence of suspended soil particles in the samples.

The highest concentrations of arsenic were detected in monitoring wells 63AX-94-01 and 63AX-94-02 which were located approximately 50 and 75 feet, respectively, downgradient of the waste oil UST excavation. An arsenic concentration of 130 µg/L was reported for the unfiltered Round 1 sample from monitoring well 63AX-94-01, while the filtered sample had a concentration of 79.4 µg/L. Both values exceeded the MCL of 50 µg/L. Arsenic concentrations in unfiltered and filtered Round 2 samples from monitoring well 63AX-94-01 were 47.5 and 46.8 µg/L, respectively. The maximum arsenic concentration in samples from monitoring well 63AX-94-02 was 30.1 µg/L in the unfiltered Round 2 sample. The maximum detected arsenic concentration in the remaining monitoring wells, including wells downgradient of 63AX-94-01 and 63AX-94-02, was 17.1 µg/L. Arsenic is not known to have been a constituent of the materials stored in the waste oil UST, and the high arsenic concentrations of monitoring wells 63AX-94-01 and 63AX-94-02 may be attributable to secondary mobilization caused by reducing conditions in the aquifer as a result of aerobic degradation of fuel-related compounds.

Concentrations of iron varied widely among AOC 63AX monitoring well samples; however, the highest unfiltered and filtered concentrations were observed in monitoring wells 63AX-94-01 and 63AX-94-02 (21,600 and 10,800 µg/L, respectively). Similar to arsenic, the high iron concentrations of monitoring wells 63AX-94-01 and 63AX-94-02 may be attributable to secondary mobilization caused by reducing conditions in the aquifer as a result of aerobic degradation of fuel-related compounds.

Concentrations of manganese also varied widely, but were greatest at monitoring wells further down- and cross-gradient than monitoring wells 63AX-94-01 and 63AX-94-02. Although less well defined than for arsenic and iron, high manganese concentrations at AOC 63AX may also be attributable to secondary mobilization caused by reducing conditions in the aquifer as a result of aerobic degradation of fuel-related compounds.

No TPHC, pesticides, or PCBs were reported in the RI off-site laboratory groundwater samples.

The overburden at AOC 63AX consists of three to five feet of gravelly-sand and silty-sand overlying increasingly dense basal till. This till extends to at least 27.7 bgs; the exact depth is not known because bedrock was not encountered during explorations at AOC 63AX. The water table occurs in the overburden at AOC 63AX at a depth of approximately six to eight feet below ground surface. Groundwater flow in the overburden is primarily northwest to southeast across the site. Although flow from northeast to southwest has also been observed, it is interpreted to be a transitory condition resulting from the paved yard which inhibits groundwater recharge. Groundwater velocity is moderately slow with a calculated maximum of 0.35 feet per day and a mean of 0.08 feet per day, consistent with the glacial till observed at the site. Upward vertical gradients were observed during each groundwater elevation measurement round at AOC 63AX. Bedrock aquifer characteristics were not monitored during the RI. Decreasing hydraulic conductivity with depth appears to serve as an aquitard between the watertable aquifer and deeper overburden and bedrock aquifer. Because of these upward gradients and low groundwater velocities, groundwater transport is not considered a major contaminant migration pathway.

Groundwater at Devens RFTA is designated Class 1 under Massachusetts regulations. Class 1 groundwaters consist of groundwaters "found in the saturated zone of unconsolidated deposits or consolidated rock and bedrock and are designated as a source of potable water supply". However, because of the low permeability at AOC 63AX, the aquifer is not considered capable of producing a sufficient quantity of water for use as a water supply.

4.1.3 Summary of Site Risks

An ecological risk assessment was not performed. The area surrounding AOC 63AX is paved and provides neither shelter nor foraging opportunities for wildlife. Ecological receptor exposure to site contaminants is considered unlikely.

The human-health risk assessment did not identify any potential risks associated with exposure to soil at AOC 63AX exceeding USEPA target values.

There is no current exposure to groundwater or an associated risk. Potential risk was associated with future commercial worker exposure to groundwater. The risk assessment in the 63AX RI report concluded that carcinogenic risks associated with exposure to both average and maximum concentrations of arsenic in unfiltered and filtered site groundwater samples are at or slightly greater than USEPA's acceptable risk target range. Also documented in the RI report are uncertainties associated with calculations for risk caused by arsenic exposure, and the USEPA's resulting acknowledgement that arsenic risk estimates could be modified downwards as much as an order of magnitude relative to risk estimates associated with most other carcinogens. When the downward modification is applied, cancer risks associated with exposure to arsenic in groundwater at 63AX fall within the USEPA's acceptable risk target range. Further, the property at AOC 63AX is served by the Devens RFTA public water supply system, and future worker exposure to site-derived groundwater is unlikely. Therefore, the Army concludes that AOC 63AX does not pose an imminent or substantial endangerment to public health, welfare, or the environment.

4.2 REMEDIAL OBJECTIVES

The results of the RI indicated that AOC 63AX poses no unacceptable risks to human health or the environment. Further, previous removal actions have eliminated USTs and contaminated soils that would otherwise be a continuing source of contamination. A ROD was signed in September 1997 documenting No Further Action as the selected remedy at AOC 63AX. Because No Further Action was selected and approved an FS was not performed and RAOs were not developed.

4.3 DESCRIPTION OF REMEDY

As is stated in Section 4.2, No Further Action was selected as the site remedy for AOC 63AX. This No Further Action decision addresses soil and groundwater contamination attributed to historical releases from the former waste oil UST at Building 2517 and the former gasoline UST at Building 2514. The waste oil UST and approximately 100 cy of contaminated soil were removed in 1989. The gasoline UST and approximately 140 tons of contaminated soil were removed in 1992. No other sources of contamination have been identified at AOC 63AX. No evidence of a suspected drywell associated with Building 2514 was found during the RI.

4.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS REVIEW

Because No Further Action was selected as the site remedy, ARARs were not identified in the ROD.

4.5 SUMMARY OF SITE VISIT

An HLA representative performed a site inspection at AOC 63AX on June 8, 2000. Conditions during the inspection were favorable with no precipitation and temperatures in the 60s.

All pre-existing buildings at the site have been removed. Monitoring wells have been removed or abandoned. Pharm Eco Laboratories were completing construction of a large office building over the northwestern portion of the site. Fencing which formerly surrounded the site has been removed.

The following individuals were interviewed as part of the five-year review:

- Jim Chambers, BRAC Environmental Coordinator, Devens RFTA
- John Regan, MADEP
- David Margolis, USACE, New England District

All personnel were interviewed on June 8, 2000 at the Devens RFTA BRAC office. No one was aware of any concerns regarding the reuse of the site. Likewise, no one was aware of any new exposure pathways (not assessed in the RI) attributed to the construction of the new building. There were no general comments or suggestions.

4.6 AREAS OF NON-COMPLIANCE

There are no areas of non-compliance or deficiencies noted during this review that would make the remedial action at AOCs 63AX non-compliant with the ROD, or sufficient to warrant a finding of not protective. This finding is based upon a review of site reports and the findings from the site inspection and interviews.

4.7 ASSESSMENT

Question A: Is the Remedy Functioning as Intended by the Decision Documents?

Implementation of Institutional Controls and Other Measures: There are no current or future plans for installation of potable water wells at AOC 63AX. No institutional controls are required or are in place.

Remedial Action Performance: The selected remedy of No Further Action was chosen because AOC 63AX poses no unacceptable risks to human health or the environment. Further, previous removal actions have eliminated USTs and contaminated soils that would otherwise be a continuing source of groundwater contamination. These conditions have not changed and therefore the selected remedy remains viable.

System Operations/Operation and Maintenance: There are no operations or maintenance required for the selected remedy.

Early Indicators of Potential Remedy Failure: No early indicators of potential remedy failure were noted during the review.

Question B: Are the Assumptions Used at the Time of Remedy Selection Still Valid?

Changes in Standards and To Be Considered: This five-year review did not identify any pertinent standards or guidelines which were promulgate since the ROD was signed.

Changes in Exposure Pathways: No changes have occurred at the site which would act to add exposure pathways which were not evaluated during the RI.

Changes in Toxicity and Other Contaminant Characteristics. There have been no changes in toxicity or other contaminant characteristics at the site.

Changes in Risk Assessment Methodologies: There have been no changes which call into question the protectiveness of the remedy.

4.8 RECOMMENDATIONS

There are no recommended changes to the site or selected remedy as a result of this five-year review.

4.9 PROTECTIVENESS STATEMENT

The selected remedy (No Further Action) at AOC 63AX is protective, and is expected to remain protective, of human health and the environment.

4.10 NEXT REVIEW

AOC 63AX is a statutory site that requires ongoing five-year reviews. This is the first five-year review that has been performed at AOC 63AX. The next review will be performed within five years of the completion of this five-year review report. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for nonconcurrence.

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5.0 AOCS 43G&J FIVE-YEAR SITE REVIEW

5.1 SITE DESCRIPTION AND HISTORY

Both AOCs 43G and 43J are historic gas stations located within the Devens RFTA. AOC 43G is located on Queenstown Road in the central portion of the former Main Post. AOC 43J is located on Patton Road at the southern edge of the former Main Post (see Figure 1-1).

These sites were combined administratively under one ROD but are described separately in the following subsections for clarity. Subsections 5.1.1 and 5.1.2 provide the site description and history for AOCs 43G and 43J, respectively. Each of these subsections begins with a bulleted list that summarizes the chronology of events that is specific for its respective site. Refer to the Introduction for general enforcement activities at Devens RFTA (i.e., initiation of a MEP, placement on the NPL, and signing of the FFA).

5.1.1 AOC 43G Site Description and History

A chronology of events specific to AOC 43G is as follows.

- **October 1990** Five gasoline USTs removed at Area 2.
- **May 1992** One waste oil UST removed at Area 3.
- **August 1992** SI initiated at SA 43G (Area 1)
- **May 1993** SI Report issued and recommends SSI
- **August 1993** SSI initiated at SA 43G (Area 1) and the Army Air Force Exchange Service (AAFES) gas station (Areas 2 and 3)
- **January 1994** SSI completed. No further action is recommended for Area 1 and an RI/FS recommended for Areas 2 and 3. SA 43G designated as an AOC.
- **September 1994** RI initiated for Areas 2 and 3 at AOC 43G.
- **June 1996** RI/FS completed to address contaminated groundwater associated with Areas 2 and 3.
- **August 1996** Three replacement USTs (Area 2), and sand and gas trap (Area 3) removed.
- **October 1996** ROD signature
- **April 1997** Intrinsic Remediation Assessment commences (remedial design)
- **November 1999** Intrinsic Remediation Assessment completed demonstrating intrinsic remediation is a viable alternative
- **December 1999** Completion of first long term groundwater monitoring round.

AOC 43G consists of an inactive Army Air Force Exchange Service (AAFES) gas station and historic gas station G. For purposes of field investigations, AOC 43G was divided into three areas (Figure 5-1). Area 1 is the former location of historic gas station G. Areas 2 and 3 are associated with the AAFES gas station and are at the locations of former gasoline USTs and the former waste oil UST/sand and gas trap, respectively.

The original study area [SA 43G (Area 1)] was the historic gas station G which was used as a motor vehicle pool to support military operations during World War II. Operations concerning the motor pool were halted during the late 1940s or early 1950s. The reported location of the historic gas station was to the southwest of the AAFES gasoline station (Building 2008) and to the southwest of Building 2009 (Figure 5-1). Based on the results of the 1992 SI and 1993 SSI, no further action was recommended for Area 1. Therefore, all further discussions in this five-year site review pertain only to Areas 2 and 3.

The location of the former AAFES gasoline station is approximately 120 feet northeast of the site of historic gas station G. At the time of the 1992 SI and 1993 SSI, it consisted of a service station (Building 2008) which housed three vehicle service bays and the AAFES store. It also included three 10,000-gallon USTs (installed as replacement UST in 1990 within Area 2), associated pump islands, and a sand and gas trap (Area 3).

SA 43G was expanded to include the former AAFES gas station (Areas 2 and 3) as part of the 1993 SSI. The AAFES gas station was added to further define the distribution of contamination detected during the removal of three former 9,000- and two 10,000-gallon gasoline USTs (removed in 1990 within Area 2). Contaminants had also been detected during the removal of a 500-gallon waste oil UST (completed in 1992 within Area 3). The excavation for the UST removals was extended only 20 feet downward, because of the limited reach of the excavator. Although soil samples were collected from the walls of the excavation, no samples were collected from the base of the excavation. The waste oil UST removal was stopped prior to the removal of all contaminated soil because of concerns that Building 2008 would be undermined.

The 1993 SSI detected fuel related compounds, principally BTEX in site soil and groundwater as a result of leaking USTs and sand and gas trap within Area 2 and 3. Because of the presence of soil and groundwater contamination, a RI and subsequent FS were recommended for Areas 2 and 3. The human-health risk assessment performed during the RI, revealed that the estimated human-health risk from exposure to soils did not exceed the USEPA carcinogenic target risk range or non-carcinogenic target level. However, the RI Report concluded that an FS should be prepared to analyze potential remedial alternatives to reduce human-health risks associated with potential future commercial/industrial exposure to groundwater. In 1996, the Army completed a FS to analyzed potential remedial alternatives that addressed the groundwater contamination at AOC 43G.

All identified USTs at Areas 2 and 3 have been removed. The replacement 10,000-gallon gasoline USTs, and associated piping, were removed by USACE - New England District in July/August 1996. In addition, the sand and gas trap and residual soil contamination in Area 3 were removed during this removal action. AAFES management of the station has been discontinued but the property has continued to be used for Army Reserve operations. Figure 5-2 shows the RFTA boundary in relation to AOC 43G.

5.1.2 AOC 43J Site Description and History

A chronology of events specific to AOC 43J is as follows:

- **May 1992** SI initiated at SA 43J. Abandoned gasoline UST discovered.

- **May 1992** Waste oil UST removed.
- **August 1992** Gasoline UST removed.
- **May 1993** SI Report recommends supplemental investigation (SSI)
- **August 1993** SSI initiated at SA 43J to collect soil and groundwater samples
- **January 1994** SSI completed. RI/FS recommended. SA 43J designated as an AOC.
- **August 1994** RI initiated for Areas at AOC 43J.
- **June 1996** RI/FS completed to address contaminated groundwater at AOC 43J.
- **October 1996** ROD signature
- **April 1997** Intrinsic remediation assessment commences (remedial design)
- **November 1999** Intrinsic remediation assessment complete demonstrating intrinsic remediation is a viable alternative
- **December 1999** Completion of first long term groundwater monitoring round.

At the time of base closure in 1996, the area around the location of AOC 43J, was being used as a vehicle storage yard and maintenance facility (former Building T-2446) for a Special Forces unit of the U.S. Army. The former maintenance facility used a 1,000-gallon UST for storage of maintenance wastes. This UST was located just south of former Building T-2446. The yard and maintenance facility is paved with asphalt and surrounded by a chain-link fence with a locked gate located at the northern side of the yard (Figure 5-3).

Prior to the building of the Special Forces unit vehicle maintenance facility, this area was historically used as a gas station/motor pool (historic gas station J) during the 1940's and 1950's. The structures of this historic gas station at AOC 43J consisted of a pump island and a small gasoline pumphouse. This gas station was reported to be a Type A station which had one 5,000-gallon (or possibly 5,140-gallon) UST located between the gasoline pumphouse and pump island. The station was used during World War II as a vehicle motor pool to support military operations. The motor pool operations were discontinued during the late 1940s or early 1950s. No records were available on the decommissioning of this motor pool or the removal of the associated UST.

During the 1992 SI, an abandoned 5,000-gallon UST was detected at historic gas station J. This UST was added to the Fort Devens UST removal program and removed in 1992. The former waste oil UST was also removed during the same year. During both UST removals, contaminated soil was removed and disposed of by the Army. Based on the collected soil data and the findings of the 1992 SI within the vicinity of the former USTs, additional investigations were recommended for the historic gas station 43J.

In 1993, a SSI was performed, to further define the soil contamination detected during the SI and to install groundwater monitoring wells. 1993 SSI investigations detected fuel related compounds, principally BTEX in site soil and groundwater as a result of leaking USTs. Because of the presence of soil and groundwater contamination, a RI and subsequent FS were recommended. The site designation for SA 43J was administratively changed to AOC 43J, at this junction. The human-health risk assessment performed during the RI, revealed that the estimated human-health risk from exposure to soils did not exceed the USEPA carcinogenic target risk range or non-carcinogenic target level. However, the RI Report concluded that an FS should be prepared to analyze potential remedial alternatives to reduce human-health risks associated with potential future commercial/industrial exposure to groundwater. In 1996, the Army completed a FS to analyze potential remedial alternatives that addressed the groundwater contamination at AOC 43J.

The property has continued to be used for Army Reserve operations. Figure 5-4 shows the RFTA boundary in relation to AOC 43J.

5.2 REMEDIAL OBJECTIVES

A ROD was signed in October 1996 documenting intrinsic remediation as the final selected cleanup remedy at both AOCs 43G and 43J. (USAEC, 1996). Remedial action objectives for the selected cleanup remedy at AOCs 43G and 43J are discussed in Subsections 2.2.1 and 2.2.2, respectively. Although remediation goals (RGs) are provided for both organic and inorganic COCs, groundwater remediation at both sites focuses on organic contamination. This is based on the premise that the naturally occurring inorganic chemicals within the groundwater have become more soluble as a result of microbial induced oxidation-reduction processes. Removal of the organics will return the groundwater quality (oxygen content, oxidation-reduction potential [ORP], pH) to upgradient conditions resulting in less soluble inorganic fractions.

It should also be noted that the available RfD used for manganese in the risk assessment for both sites ($5x10^{-3}$) has been made less stringent ($2.4x10^{-2}$) since the RI and FS because of updated USEPA risk assessment guidelines (USEPA Region 1 Risk Updates, Nov. 1996). The Army will consider establishing a new manganese remediation goal based on the current RfD if, after organic COCs are reduced to RGs at the site, manganese concentrations continue to exceed the Devens RFTA background concentration of 291 µg/L.

5.2.1 Remedial Action Objectives at AOC 43G

The remedial action objectives pertaining to groundwater at AOC 43G are to:

- Protect potential commercial/industrial receptors located on Army Reserve Enclave property from exposure to groundwater having chemicals in excess of the following RGs: iron (9,100 µg/L), manganese (291 µg/L), nickel (100 µg/L), benzene (5 µg/L), ethylbenzene (700 µg/L), and xylenes (10,000 µg/L).
- Protect potential commercial/industrial receptors located off Army Reserve Enclave property from exposure to groundwater having chemicals in excess of the above RGs.

The RGs for benzene, ethylbenzene, xylenes, and nickel are the MCLs and MMCLs. The RGs for iron and manganese are Devens RFTA inorganic background concentrations because background concentrations exceed the risk-based concentrations derived from available RfD values at the time of the RI/FS.

5.2.2 Remedial Action Objectives at AOC 43J

The remedial action objectives pertaining to groundwater at AOC 43J are to:

- Protect potential commercial/industrial receptors located on Army Reserve Enclave property from exposure to groundwater having chemicals in excess of the following RGs: arsenic (50 μg/L), iron (9,100 μg/L), manganese (291 μg/L), benzene (5 μg/L), ethylbenzene (700 μg/L), toluene (1,000 μg/L), and carbon tetrachloride (5 μg/L).
- Protect potential commercial/industrial receptors located off Army Reserve Enclave property from exposure to groundwater having chemicals in excess of the above RGs.

The RGs for benzene, carbon tetrachloride, ethylbenzene, toluene, and arsenic are the MCLs and MMCLs. The RGs for iron and manganese are Devens RFTA inorganic background concentrations because background concentrations exceed the risk-based concentrations derived from available RfD values.

5.3 DESCRIPTION OF REMEDY

The selected remedy at each site addresses long-term commercial/industrial exposure to contaminated groundwater, the principal known threat at both AOC 43G and 43J. The selected remedial alternative for both AOC 43G and 43J relies on intrinsic remediation, groundwater and contaminant modeling, and long-term groundwater monitoring to evaluate the effectiveness of the alternative at controlling groundwater contamination and site risk. The remedy will mitigate existing groundwater contamination through natural attenuation and remediation and reduce the potential risk of future commercial/industrial exposure to contaminated groundwater. The major components of the selected remedy for both AOC 43G and 43J include:

1) intrinsic remediation
2) intrinsic remediation assessment data collection and groundwater modeling
3) installing additional groundwater monitoring wells
4) long-term groundwater monitoring
5) annual data reports to USEPA and MADEP
6) five-year site reviews

The ROD states that if the intrinsic remediation assessment results at AOC 43G and 43J indicate that: 1) the groundwater contaminant plume may increase in size on Army property and/or, 2) the groundwater contaminant plume remains the same size, but cannot be remediated within 30 years; a soil vapor extraction (SVE) system will be installed at the existing AOC 43G source area, and an additional cleanup action will be implemented at AOC 43J. Furthermore, if at any time during this remedy there is an indication that contaminants are migrating off Army property at either AOC above drinking water standards (MCLs/MMCL or risk-based concentration [i.e., groundwater cleanup levels]) and/or if the five year site review indicates that intrinsic remediation alternative is not protective of human health, the Army will implement an additional cleanup action to protect human health and the environment as required under CERCLA.

Should the Army change the use of either AOC, additional assessment and/or possible remedial action, may be needed. In addition, if the Army transfers either AOC by lease or deed, an Environmental Baseline Survey (EBS) will be performed, and a determination will be made by the Army and USEPA that the selected remedy remains protective of human health and the environment.

The general description of the alternative, Intrinsic Remediation, that is presented below applies to both AOCs 43G and 43J.

5.3.1 Remedy Components Specified by the ROD

The following text in Subsection 5.3.1 describes the remedial components as presented in the ROD for comparison with the activities completed at the site which are described in Subsection 5.3.2.

Intrinsic Remediation. Intrinsic remediation was listed as the principal component in the selected remedy to meet the cleanup criteria specified in the ROD (Component No. 1). Based upon organic and inorganic speciation in the aquifer, it appears that biological degradation of the petroleum hydrocarbons is naturally occurring at both AOCs. Alternatives 2A (AOC 43G) and 2 (AOC 43J) allows the natural biological degradation (intrinsic remediation) of the COCs to continue at the site without interruption. To assess the effectiveness of biological degradation at the site, groundwater monitoring would be performed on a scheduled basis. Additional monitoring wells would be installed.

The biological degradation of hydrocarbons is essentially an oxidation-reduction reaction in which the hydrocarbon compound is oxidized (donates electrons) and an electron acceptor, such as oxygen, is reduced (accepts electrons). Under aerobic conditions, oxygen is the electron acceptor for biological degradation activity. When oxygen is absent or depleted from a system, anaerobic conditions exist and other compounds are used as electron acceptors. Other compounds that are used as electron acceptors during anaerobic degradation of petroleum hydrocarbons include nitrate, manganese oxides, sulfate, iron, and hydrogen.

Intrinsic remediation will continue at both AOCs until the remedial action objectives are achieved. FS solute transport calculations based upon degradation rates from literature indicated that contaminants would not migrate off Army property. Additional data collection is required as part of the intrinsic remediation assessment to confirm degradation rates, performance standards, and refine long-term groundwater monitoring needs.

Intrinsic Remediation Assessment Data Collection and Groundwater Modeling. Prior to installation of additional groundwater monitoring wells and refinement of a long-term groundwater monitoring plan, additional data collection and modeling is required. A work plan will be prepared detailing the proposed activities of the intrinsic remediation assessment and will be submitted to the USEPA and MADEP for review prior to implementation. The additional data collection will consist of supplemental soil sampling and free product assessment in bedrock below the former gasoline USTs (at AOCs 43G), and installation of additional bedrock groundwater monitoring wells (at AOC 43J). Additional rounds of groundwater sampling and analysis to refine estimates of intrinsic remediation effectiveness in protecting downgradient receptors will be performed at both AOCs. Collected data would include groundwater elevation, intrinsic remediation indicators, and COC concentrations. Groundwater elevation data would supplement the existing Devens RFTA water level data base for both sites and would be used to refine groundwater flow direction. Intrinsic remediation indicator data (e.g., electron acceptor concentrations, nutrient concentrations, and ORP) will be used to verify occurring intrinsic remediation and determine future intrinsic remediation potential. COC concentration data will assist directly in estimating site-specific degradation rates and the effectiveness of intrinsic remediation in achieving groundwater cleanup levels. Criteria for contaminant evaluations will use risk-based concentrations, MCLs and/or MMCLs.

Data collected from the intrinsic remediation assessment groundwater sampling will be incorporated into fate and transport modeling. This modeling will assess the degradation and migration of the organic COCs and refine current estimates of intrinsic remediation effectiveness. Initial intrinsic remediation modeling will be performed as part of the alternative long-term monitoring. The existing and the new groundwater information will be examined to determine the best location for additional groundwater monitoring wells and to finalize site-specific indicator data as required for the long-term monitoring program. As additional monitoring data are collected during long-term monitoring (see Long-Term Groundwater Monitoring in this subsection), the fate and transport modeling will be updated to allow the most accurate depiction of current and future groundwater conditions. The fate and transport model used for monitoring intrinsic remediation (such as Bioplume II or III) will be selected based upon the type of groundwater monitoring information gathered and market availability. Details of the model will be proposed as part of the intrinsic remediation assessment work plan.

Installing Additional Groundwater Monitoring Wells. Additional groundwater monitoring wells will be required to improve data collection coverage in the overburden and bedrock within and downgradient of the AOCs. The ultimate number and location of additional groundwater monitoring wells for monitoring intrinsic remediation at the site will depend upon the fate and transport modeling results. These monitoring wells would be used to monitor contaminant plume location and concentration on Army property in the overburden and bedrock and to collect intrinsic biodegradation indicators. Final monitoring well locations and details will be submitted for regulatory review and concurrence.

Long-term Groundwater Monitoring. Long-term groundwater monitoring is proposed to enable assessment of the intrinsic remediation progress and permit detection of any potential migration of contaminants that exceed groundwater cleanup levels beyond Army property. Dependent upon the results of the fate and transport modeling, groundwater monitoring would be performed on an annual basis until three consecutive sampling rounds indicate that cleanup objectives have been met. The last two years of monitoring (confirmation) would be for only the COCs.

Annual Data Reports. Annual reports would be submitted to USEPA and MADEP which would include a description of site activities, a summary of the long-term groundwater monitoring program results, and any modeling updates. The final detailed Long-term Groundwater Monitoring Plan shall include performance standard that will determine the effectiveness of the remedial action. The final detailed Long-Term Groundwater Monitoring Plan would be developed in conjunction with regulatory agency review and comment.

Five-year Site Reviews. Under CERCLA, any remedial action that results in contaminants remaining on site in excess of levels that allow for unrestricted reuse must be reviewed at least every five years. During five-year reviews, an assessment is made of whether the implemented remedy continues to be protective of human health and the environment or whether the implementation of additional remedial action is appropriate.

The five-year site review will evaluate the alternative's effectiveness at reducing potential human-health risk from exposure to groundwater on-site and downgradient considering current and potential future receptors. This evaluation will be based on how successful the alternative is at attaining groundwater cleanup levels at the long-term monitoring wells.

Specific criteria for evaluating the alternative's progress and effectiveness will be established upon completion of the intrinsic remediation assessment data collection and groundwater modeling to permit refinement of contaminant transport and biodegradation estimates.

If the data generated from the modeling or the long-term groundwater monitoring efforts indicate that groundwater cleanup cannot be met within 30 years, a more aggressive remedial action will take place to enhance the intrinsic remediation alternative.

5.3.2 Remedy Implementation

Remedial Components 2 (the intrinsic remediation assessment and groundwater modeling) and 3 (installation of additional groundwater monitoring wells) described in Subsection 2.3.1, were completed by Stone & Webster Environmental Technology & Services (SWETS) and HLA between 1998 and 1999 under contract with the USACE. The results of the intrinsic remediation assessment and associated field efforts are detailed in a Final Intrinsic Remediation Assessment Report for each site (SWETS, 1999a, 1999b). These reports were the culmination of field efforts and numerous interim deliverables documenting that intrinsic remediation will effectively remediate the groundwater at AOCs 43G and 43J.

The purpose of the intrinsic remediation assessment was to assess the effectiveness of intrinsic remediation as the selected remedial alternative at AOCs 43G and 43J. Effectiveness of the remedy at each site was evaluated in the intrinsic remediation assessment and will continue to be assessed in long term groundwater monitoring based upon criteria set forth in the ROD. Specifically, the Army will evaluate, and if necessary, initiate additional cleanup actions (including a SVE system at AOC 43G) to protect human health and the environment if:

1) based on intrinsic remediation assessment fate and transport modeling and assessment, the time frame for degradation of the existing groundwater contaminant plume to groundwater cleanup levels is determined to be longer than 30 years;

2) performance standards (outlined in the intrinsic remediation assessment report) are not achieved;

3) intrinsic remediation assessment groundwater sampling results or fate and transport

modeling show the contaminant plume with concentrations above groundwater cleanup levels, federal MCLs, or MMCLs will increase in size and migrate off Army property or to an area located inside the boundary in which compliance will be determined; or

4) The five-year site review indicates that the intrinsic remediation alternative is not protective of human health.

The intrinsic remediation assessment performed at both sites demonstrated that intrinsic remediation is working and the Army will not need to initiate additional cleanup actions. Based on modeling and statistical predictions, COCs will be less than the groundwater cleanup levels in less than 30 years (the first effectiveness criteria) and COCs will not migrate off the Army property (the third effectiveness criteria). Performance standards were developed as part of the intrinsic remediation assessment to be used for long-term groundwater monitoring. The second and fourth criteria (in addition to the first and third criteria) pertain to the Long Term Monitoring assessment that commenced December 1999. Long Term Monitoring will continue to be performed until RGs are obtained to observe that these effectiveness criteria are achieved.

The following paragraphs summarize the intrinsic remediation assessment approach and results at each AOC.

5.3.2.1 Intrinsic Remediation Lines of Evidence. The intrinsic remediation assessment focused on demonstrating the effectiveness of intrinsic remediation using two lines of evidence as recommended by protocol published by the U.S. Air Force Center for Environmental Excellence (AFCEE), (AFCEE, 1995). The results of these demonstrations were compared with the criteria set forth in the ROD. The two lines of evidence include the use of:

- statistically significant historical trends in contaminant concentrations to show that a reduction in the total mass of contaminants is occurring at the site.
- chemical analytical data in mass balance calculations to show that electron acceptor concentrations in groundwater (oxygen, nitrate, sulfate, or iron) are sufficient to facilitate degradation of dissolved contaminants; and a solute fate and transport model to predict future migration of contaminants and estimate concentrations at potential receptor locations.

For the types of contaminants at this site, there is no need at this time to perform a microcosm study, AFCEE's third line of evidence.

5.3.2.2 Intrinsic Remediation Assessment Field Activities. The Army performed field assessments as part of the intrinsic remediation assessment to complete the statistical analysis, assimilative capacity calculations and modeling. Numerous reports and data packages were also issued concurrently with the intrinsic remediation assessment process to provide opportunity for review and comment on the Army's approach as work proceeded.

The field activities performed at AOC 43G for the intrinsic remediation assessment were:

- Soil and Free Product Assessment (AOC 43G);

- Bedrock Monitoring Well Installations (AOC 43J); and
- Groundwater Sampling Program.

The Army used the results of these field assessments as part of the intrinsic remediation assessment to demonstrate the two lines of evidence (statistical analysis and assimilative capacity calculations along with modeling) confirming the effectiveness of intrinsic remediation.

AOC 43G. Field work for source area Soil and Free Product Assessment at AOC 43G commenced in March 1997 and entailed performing soil sampling and assessing free product on groundwater below the former gasoline USTs that were removed in 1990. Field activities included advancement of three soil borings during which soil sampling was performed and one groundwater monitoring well was installed.

Soil samples collected from directly below the former USTs at AOC 43G reveal the presence of residual petroleum contamination. The highest concentrations of residual contamination were detected within 20 to 24 feet bgs. (Previous UST removal excavation was stopped at 20 feet bgs). Concentrations of fuel-related contaminants generally decreased with depth. The highest concentration appeared to be in the center of the former UST excavation. Samples results reveal that concentrations of toluene, naphthalene, 2-methylnaphthalene, C5-C-8 aliphatics, C9-C12 aliphatics, C9-C10 aromatics, and C10-C22 aromatics exceed current MCP soil category S-3/GW-1 standards. Despite these exceedances, historic and recent data from nearby groundwater monitoring wells suggest that the former source of groundwater contamination in this area has been substantially reduced by the UST and soil removal activities. This becomes evident from the statistical and modeling assessments performed as part of the intrinsic remediation assessment.

The Army also installed a groundwater monitoring well within the area of the former gasoline USTs to provide a means of monitoring for free-phase product, and to collect groundwater samples from this area during intrinsic remediation assessment groundwater sampling rounds. An oil/water interface probe was used to check for free product in this well and in adjacent/downgradient source area wells. These measurements revealed only intermittent evidence of free-phase like product in four of the wells at the site during the quarterly groundwater sampling rounds (only once in the new source area well). Maximum measured thickness was 0.04 feet. However, other parameters, namely well headspace readings and BTEX concentrations detected in these wells are not supportive of the presence of free-phase product. It is suspected that the detected "free-phase product" at the groundwater interface is heavily weathered gasoline product devoid of, or lower in, BTEX and likely composed of heavier recalcitrant hydrocarbons.

Groundwater sampling activities were performed quarterly at AOC 43G in March 1997, June 1997, September 1997, December 1997, March 1998, June 1998, September 1998, and December 1998. The objectives of the groundwater sampling task were to collect groundwater data over time to evaluate for intrinsic remediation indicators and statistical trends in contamination concentration, and for performing fate and transport modeling. During the eight rounds of groundwater sampling, BTEX concentrations were found to have decreased significantly since early SI/RI rounds. In the last quarterly round, benzene is the only organic COC that exceeds its respective remediation goal and this exceedance occurs in only three of 16 groundwater monitoring wells.

AOC 43J. The bedrock monitoring well installation task commenced in March 1997 and entailed installing one bedrock well at the source area and two bedrock wells at downgradient locations at AOC 43J. The objectives of this task were to measure the hydraulic gradient between the soil and bedrock and to determine the presence or absence of VOCs and chlorinated solvents in bedrock groundwater at these three locations. Well locations were selected based on the proximity of existing overburden wells (for assessment of vertical hydraulic gradients) and position with regard to the orientation of the overburden groundwater plume.

A comparison of the groundwater level elevation measurements between the new bedrock wells and respective proximate overburden monitoring wells suggests that seasonal downward/upward gradients may occur at the site. An upward gradient (from bedrock into the overburden) is most prevalent. However, sporadic downward gradients appear and, but with a few exceptions, are more likely during periods of lower groundwater elevations (June, September, December).

Groundwater sampling activities were performed quarterly at AOC 43J in March 1997, June 1997, September 1997, December 1997, March 1998, June 1998, September 1998, and December 1998. The objectives of the groundwater sampling task were to collect groundwater data over time to evaluate for intrinsic remediation indicators and statistical trends in contamination concentration, and for performing fate and transport modeling. During the eight rounds of groundwater sampling BTEX concentrations were found to have generally decreased since SI/RI sampling rounds.

Groundwater analytical results from the source area bedrock monitoring well revealed the presence of benzene and ethylbenzene above their respective MCL concentrations. Analytical results from the downgradient bedrock wells revealed that benzene was detected marginally (maximum of 10 µg/L) above its MCL (5 µg/L) in only two of eight sampling rounds and in only one of the two downgradient bedrock groundwater monitoring wells.

5.3.2.3 Statistical Analysis. The Mann-Kendall test for trend was used as the first line of evidence to assess statistically, at the 95 percent confidence level, whether contaminant concentrations at AOC 43G and AOC 43J have been decreasing throughout the Groundwater Sampling Program. Data used in the statistical analyses were collected from the seven quarterly intrinsic remediation assessment groundwater sampling rounds (June 1997 through December 1998), the initial intrinsic remediation assessment groundwater sampling round (March 1997) and from up to four rounds of historical data (Supplemental Site Investigation /RI September 1993, January 1994, December 1994, and March 1995 rounds).

AOC 43G. The statistical results for BTEX show that all but four well/parameter pairs evaluated (or 28 of 32 combinations) exhibit a statistically significant downward trend at the 95 percent confidence level. The four well/parameter pairs that do not meet this confidence level exhibit a decreasing trend in concentration but at the 80 to 90 percent confidence level. Only two of these four pairs have had MCL exceedances within the last two years (AAFES 6/benzene and XGM-97-12X/benzene). Using the most conservative data set, the regression models predict that benzene concentrations in all selected wells will be at or below the MCL by October 2011, which is only 15 years following the signing of the ROD. This duration is within the 30-year remedial duration (year 2026) specified in the ROD. It is noted that uncertainties involved in predicting the course of contaminant reduction exist and the estimates are dependent upon the assumption that concentrations will continue to decline at rates consistent with the historical data. As a result, long term monitoring is proposed to evaluate the predicted decline in contaminant concentrations.

Statistical trends within VPH data were not as evident as with the BTEX data. Three of eight wells evaluated exhibit a statistically significant downward trend at the 95 percent confidence level for only one of the three VPH carbon chains groups. However, VPH performance standards are being met at this time. The Army will develop risk-based VPH values if MCP GW-1 concentrations for VPH are exceeded at the boundary or other compliance point. Groundwater sampling during the intrinsic remediation assessment revealed that there is not an imminent possibility of VPH concentrations that exceed MCP criteria reaching the RFTA boundary. Long term groundwater monitoring for VPH is recommended to continue assessment of VPH trends. These trends will not be used to assess progress towards meeting on-site remediation goals. Rather, the data will be used in five-year site reviews as a component in assessing the potential for off-site migration of VPH concentrations that exceed boundary performance standards.

AOC 43J. The Mann-Kendall test results for BTEX trends reveal that the source area overburden groundwater monitoring wells at AOC 43J exhibit a statistically significant downward trend at the 95 percent confidence level for almost all the well/contaminant pairs that currently or historically have exceeded MCLs. The only exception in the source area occurs in XJM-97-05X for ethylbenzene and toluene. Although a statistically significant downward trend at the 95 percent confidence level is achieved for benzene in XJM-97-05X, a downward trend is distinguishable at a slightly lower (92 to 94 percent) confidence level for ethylbenzene and toluene. However, consideration of seasonal effects (i.e., changes in groundwater elevation) resulted in the finding that the ethylbenzene concentrations in XJM-94-05X have been significantly decreasing since 1994, a result not identified in the less powerful non-parametric Mann-Kendall trend analysis.

With the exception of monitoring well 2446-02, the regression models predict that MCLs will be achieved by the end of the year 2004. This is only 8 years following the signing of the ROD and within the ROD's 30-year criteria period. The regression analysis for well 2446-02 predicts that all MCLs will be achieved by the year 2001. However, because of the relatively weak correlation coefficients for the three regression models for well 2446-02 (and the large unexplained variance terms; i.e., mean square errors), no meaningful conservative upper bound estimate of cleanup duration can be derived at the time of the intrinsic remediation assessment for well 2446-02. The COC concentrations detected in well 2446-02 during the December 1998 sampling event deviated greatly from the generally decreasing trend observed in during the last six years, contributing to the weak correlation in the regression analysis. It is premature to determine whether these recent analytical results are artifactual or not. Additional sampling of this well is required as part of the long term monitoring program to refine cleanup duration estimates and to enable continued assessment and reporting of the remedial progress.

The bedrock well XJM-97-12X, within the source area, does not show a decreasing statistical trend for benzene or ethylbenzene using the Mann-Kendall test for trend, primarily because of elevated concentrations detected in the last three groundwater sampling rounds. Concentrations appear to be rising in the last three months, which would be expected based upon the observed seasonal vertical downward gradients observed during these few months. These concentrations are expected to eventually decrease with the degradation of the overburden plume, but will likely require longer term sampling to show statistical significance using the Mann-Kendall test because of variability in vertical gradients and flow direction. Consideration of seasonal effects (i.e., changes in groundwater elevation) resulted in the finding that the ethylbenzene concentrations in XJM-97-12X have been significantly decreasing since 1997, a result not identified in the less powerful non-parametric Mann-Kendall trend analysis.

Statistical trends within the volatile petroleum hydrocarbon (VPH) data are not as evident as with the BTEX data but VPH performance standards are being met at this time. As detailed in the Intrinsic Remediation Assessment Work Plan (SWETS, 1997a), the Army will develop risk-based VPH values if MCP GW-1 concentrations for VPH are exceeded at the boundary or other compliance point. Groundwater sampling during the intrinsic remediation assessment has revealed that there does not appear to be an imminent possibility of VPH concentrations that exceed MCP criteria of reaching the RFTA boundary. Long term groundwater monitoring for VPH is recommended to continue assessment of VPH trends. Trends in VPH will not be used to assess progress towards meeting on-site remediation goals. Rather, the data will be used in five-year site reviews as a component in assessing the potential for off-site migration of VPH concentrations that exceed boundary performance standards.

Overall, the trend and regression analysis for BTEX in the source area wells strongly support that degradation is occurring and that the plume with concentrations above groundwater cleanup levels, MCLs, or MMCLs is not likely to increase in size and migrate off Army property or past established compliance points. Furthermore, subject to refinement of the cleanup period for well 2446-02, MCLs are expected to be achieved within the 30-year period specified in the ROD. It should be noted, however, that uncertainties involved in predicting the course of contaminant reduction exist and the estimates are dependent upon the assumption that concentrations will continue to decline at rates consistent with the historical data. Long term groundwater monitoring will be performed to verify these statistical predictions.

5.3.2.4 Assimilative Capacity Calculations. The second line of evidence to document the occurrence of intrinsic remediation is assimilative capacity (mass balance) calculations using collected chemical analytical field data. The calculations verified that electron acceptor concentrations in groundwater (i.e., primarily sulfate, manganese, iron, and oxygen at AOC 43G and sulfate and oxygen at AOC 43J) are sufficient to facilitate degradation of dissolved contaminants. BIOSCREEN modeling further supports the conclusions of the adequacy of intrinsic remediation. It suggests that, even with possibly continuing residual sources (both sites have undergone substantial removal actions), the extent of the plume as defined by the remediation goal would be limited to about 125 feet from one of the source area wells at AOC 43G and to about 90 feet from the assumed source centroid at AOC 43J. These distance put the furthest extent of the plumes (above RGs) well within the existing Devens RFTA boundary. This modeling is supportive of the third evaluation criteria as set forth in the ROD, that is that plumes with concentrations exceeding MCLs will not increase in size and migrate off Army property.

5.3.2.5 Fate and Transport Modeling. Solute fate and transport modeling was also used as part of the second line of evidence in conjunction with assimilative capacity calculations to support the viability of intrinsic remediation as an acceptable remedial alternative. Results from the BIOPLUME II modeling were used to estimate remedial duration and plume migration potential. Modeling demonstrates an unlikely potential for benzene plume migration off Army property and general agreement with regression analysis results. The modeling also considered added demands from other competitors (non-BTEX petroleum compounds). It revealed that this additional demand added only about 2 years to the time to reach remedial goals at each site. Benzene criterion at AOC 43G is estimated to be achieved approximately in the years 2007 to 2009, or between 11 to 13 years total following signing of the ROD which is compliant with the 30-year criterion in the ROD. Benzene criterion at AOC 43J is predicted to be achieved between 7 and 9 years total (from the baseline event in 1997), or about in the years 2004 to 2006 which is compliant with the 30-year criterion in the ROD.

5.3.3 Current Status

This is the first five-year site review for AOCs 43G and 43J. The Intrinsic Remediation Assessment Report (SWETS, 1999a, 1999b), the final deliverable of the intrinsic remediation assessment, supports the conclusion that the selected remedy will effectively remediate groundwater at AOCs 43G and 43J. Through submission and approval of the Intrinsic Remediation Assessment Report, Components 2 and 3 of the selected remedy have been achieved. No contingency action is required at this time at either AOC.

Current action consists of implementing the remaining components specified in the ROD: a long term groundwater monitoring program, annual reporting, and five-year site reviews (Component Nos. 4, 5, and 6, respectively). These components enable continued assessment for compliance with established performance standards and reporting of the remedial progress. Performance standards were established in the intrinsic remediation assessment and consist of contaminant migration and remedial duration assessments. The performance standards are being used during long term groundwater monitoring to ensure that the effectiveness criteria set forth in the ROD continue to be met and remedial objectives are ultimately achieved.

Long-term monitoring is being performed by the USACE, NAE, Concord, Massachusetts. The first long-term groundwater monitoring round since completion of the intrinsic remediation assessment was performed in December 1999. The Annual Report summarizing the data from the December 1999 round was not yet issued at the time that the Draft Five-Year Site Review was prepared. Work is being performed in accordance with the approved Long Term Monitoring Plans (SWETS, 1999 a, b). Estimated O&M costs for groundwater monitoring at AOCs 43G and 43J based on FS cost estimates were $32,000 and $24,600, respectively. Actual O&M costs are not yet available.

Subsection 5.3.3.1 and 5.3.3.2 describe the performance standards and VPH boundary standards that have been established for the long term groundwater monitoring program. Subsection 5.3.3.3 and 5.3.3.4 summarize the long term groundwater monitoring program and results of the

December 1999 long term groundwater monitoring round based upon preliminary review.

5.3.3.1 Groundwater Performance Standards. Groundwater performance standards are used to ensure that the effectiveness criteria set forth in the ROD continue to be met and remedial objectives are ultimately achieved. Both the statistical analysis and modeling suggest that organic COCs will likely be reduced to cleanup levels within the duration criteria specified in the ROD. The modeling further supports the position that the groundwater plume with concentrations exceeding MCLs will not increase in size and migrate off Army property.

Two sets of performance standards are presented below for use in the long term monitoring program:

Contaminant Migration Assessment. Intrinsic remediation at AOCs 43G and 43J will continue to be considered effective if the groundwater plume with concentrations exceeding MCLs will not increase in size and migrate off Army property.

Performance Standard: Additional field actions will be implemented if: MCL exceedances are detected in the sentry wells. Sentry wells are identified in the Long term Monitoring Plan (SWETS, 1999a,b) (Refer to Subsection 5.3.3.3 for a summary of this plan).

The additional field actions will depend upon the degree of exceedance (i.e., how elevated the exceedance is, how many wells have exceedances, characteristic of the exceedance in comparison with historical data, proximity of the exceedance to the Army boundary). The time-frame for implementing the field action will be commensurate with the severity of the degree of exceedance. If the exceedance is out of characteristic with historical data (i.e., no previous exceedances), likely field actions (in order of increasing severity of the exceedance) are:

1) resample the affected well for the COC prior to the next sampling round.
2) immediately sample adjacent downgradient/cross gradient wells for the COC if not already included in the long term groundwater-sampling event.
3) sample all wells prior to the next scheduled sampling round for intrinsic remediation assessment parameters and COCs for comparison with BIRA and intrinsic remediation assessment sampling results.
4) immediately install additional groundwater monitoring wells downgradient/crossgradient of the affected well(s) and sample.

Recommendations for the field action will be made within the Annual Report for review and approval. Following approval, the Annual Report will be followed up with an Interim Field Action Memorandum detailing the results of the approved field actions and, if needed, recommendations for revised remedial action (i.e., increased sampling frequency, modeling refinement, initiate additional cleanup actions).

Remedial Duration Assessment. Intrinsic remediation at AOCs 43G and 43J will continue to be considered effective if COCs will be reduced to cleanup levels within the duration criteria specified in the ROD.

Performance Standard: The need for additional assessment/remedial action will be evaluated if evaluation of source area well data indicate that COCs will not be reduced within 30 years. Source area wells to be sampled are included in the Long Term Monitoring Plan (SWETS, 1999a,b) (Refer to Subsection 5.3.3.2 for a summary of this plan).

Data evaluation will be performed for source area well/COC pairs that currently exceed cleanup concentrations and results will be included in the Annual Report. The need for updating the fate and transport model will also be evaluated based on the sampling results. Recommendation for further assessment/remedial action will be provided in the Report should analyses indicate that cleanup criteria will require greater than 30 years.

5.3.3.2 VPH Boundary Standards. The Army also uses the MCP GW-1 concentrations for VPH boundary performance standards. RGs within the plume are not established for VPH. However, if GW-1 concentrations are exceeded at the boundary or compliance point, the Army will develop risk-based VPH concentrations. As concluded in the intrinsic remediation assessment, migration of VPH concentrations in exceedance of GW-1 standards is not probable and no risk-based concentrations are required at this time.

5.3.3.3 Long Term Groundwater Monitoring Plan Summary. The Long Term Groundwater Monitoring Plans for each AOC are detailed in Appendix P of the Final Intrinsic Remediation Assessment Reports (SWETS, 1999a, b). Sampling will be performed using low-flow collection procedures in accordance with USEPA Region I Low-Flow Sampling Procedures (USEPA, 1996) on an annual basis in November or December. The number of monitoring wells sampled and parameters to be analyzed will be assessed for each round and any changes will be recommended in the Annual Report or at the five-year site reviews. Salient points of these plans for each AOC are summarized for convenience in the following paragraphs.

AOC 43G. As part of the long-term monitoring plan (LTMP) nine existing monitoring wells (four source wells and five sentry wells located on the site perimeter) will be sampled for BTEX, VPH, iron, nickel and manganese.

Source wells include AAFES-2, AAFES-6, XGM-93-02X, and XGM-97-12X.

Sentry wells include AAFES-5, XGM-94-04X, XGM-94-07X, XGM-94-08X and XGM-94-10X

AOC 43J. Twelve existing monitoring wells (four source wells and eight sentry wells located on the site perimeter) will be sampled for BTEX, VPH, arsenic, iron, and manganese.

Source wells include 2446-02, 2446-03, XJM-94-05X, and XJM-97-12X.

Sentry wells include 2446-04, XJM-93-02X, XJM-93-03X, XJM-94-06X, XJM-94-08X, XJM-94-10X, XJM-97-11X, XJM-97-13X.

5.3.3.4 December 1999 Long Term Groundwater Monitoring Results. The Annual Report summarizing the data from the December 1999 long term groundwater monitoring round was not yet issued at the time that the Draft Five-Year Site Review Report was prepared. However, preliminary results for AOCs 43G and 43J are presented in Appendix C-1 as Tables 1 and 2, respectively.

Contaminant Migration Assessment. The December 1999 analytical data was reviewed with respect to the Contaminant Migration Assessment Performance Standard described in the intrinsic remediation assessment and summarized in Subsection 5.3.3.1. This standard states that additional field actions will be implemented if MCL exceedances are detected in the sentry wells and if concentrations are out of characteristic with historical data). There were no MCL exceedances detected in December 1999 within AOC 43G sentry wells. The only MCL exceedances were for benzene in three source area wells (AAFES 2, XGM-93-02X and XGM-97-12X).

At AOC 43J, the MCL for benzene was exceeded in sentry well XJM-93-02X. However, a review of historical data for this well reveals that the MCL has been exceeded in nine of 12 groundwater sampling rounds (Appendix C-1, Table 5). Quarterly sampling in 1997 through 1998 shows that concentrations have historically fluctuated between 33 μg/L (September 1997) to less than 5 μg/L (March and June of 1998). No MCL exceedances or significant changes in BTEX concentrations were noted in the other seven sentry monitoring wells suggesting that the plume is not expanding or migrating off RFTA property. No further field action is warranted before the next scheduled sampling round in November or December 2000.

Remedial Duration Assessment. Data evaluation will be performed for source area well/COC pairs that exceed cleanup concentrations and results are to be included in the Annual Report. The need for updating the fate and transport model will also be evaluated based on the sampling results. Recommendation for further assessment/remedial action are also to be provided in the Annual Report should analyses indicate that cleanup criteria will require greater than 30 years. Results of this Annual Report and subsequent reports will be reviewed in the next five-year review.

VPH Boundary Standards. The December 1999 analytical data was reviewed with respect to the VPH Boundary Standard described in the intrinsic remediation assessment and summarized in Subsection 5.3.3.2. RGs within the plume are not established for VPH. However, if GW-1 concentrations are exceeded at the boundary or compliance point, the Army will develop risk-based VPH concentrations.

At AOC 43G, there were no exceedances of VPH GW-1 concentrations within sentry wells. In XGM-94-04X, the C9-C10 aromatic detection equaled the GW-1 standard of 200 μg/L. This detection is slightly elevated with respect to the 1999 historical data (ranged from less than 10 to 120 μg/L) but fairly consistent with the 1998 data (ranged from 57 to 360 μg/L). VPH concentrations were below detection limits in XGM-94-10X, located approximately 150 feet farther downgradient/crossgradient toward the RFTA property boundary.

At AOC 43J, the only exceedance of VPH GW-1 concentrations within sentry wells occurred for C9-C10 aromatic hydrocarbons in 2446-04. The detected concentration of 430 μg/L exceeded the GW-1 standard of 200 μg/L. This detection is consistent with historical observations. As shown in Figure 5-3, 2446-04 is only approximately 50 feet downgradient of the former waste oil UST.

A review of historical data for this well reveals that the GW-1 standards have been exceeded in seven of eight groundwater sampling rounds for C5-C8 aliphatics, and five of eight groundwater sampling rounds for C9-C10 aromatics. VPH concentrations were below detection limits in XJM-94-06X, located approximately 100 feet farther downgradient, as well as in sentry wells XJM-93-03X, XJM-94-08X, XJM-94-10X, and XJM-97-13X (in bedrock). VPH detections (110 µg/L C5-C-8 and 33 µg/L C9-C10) within the bedrock well XJM-97-11X are below their respective GW-1 standards (400 µg/L C5-C-8 and 200 µg/L C9-C10).

Overall, the December 1999 analytical results are supportive of the intrinsic remediation assessment conclusion that migration of VPH concentrations in exceedance of GW-1 standards off RFTA property is not probable and no risk-based concentrations are required at this time.

5.4 Applicable or Relevant and Appropriate Requirements Review

The ARARs presented in Tables 10, 11and 12 of the ROD are reprinted and appended in Appendix C-2. These standards and regulations were current at the signing of the ROD and for the five-year site review, have been reviewed for changes that could affect protectiveness.

There was one change in chemical-specific ARARs, specific to portions of the National Primary Drinking Water Standards 40 CFR Parts 141.11 - 141.16 and 141.50 - 141.52 and the Massachusetts Drinking Water Standards and Guidelines 310 CMR 22.0, that affects one of the COCs (nickel) at AOC 43G. In February 1995, USEPA and the Nickel Development Institute (a nickel trade association) filed a joint motion for a voluntary remand of the nickel MCL. In the same month, the court granted the motion and vacated and remanded the MCL for nickel (0.1 mg/L). The updated USEPA Office of Water Drinking Water Regulations and Health Advisories dated October 1996 now lists the MCL for nickel as "being remanded". This means that while many water suppliers continue to monitor nickel concentrations in their drinking water, there is currently no USEPA legal limit on the amount of nickel in drinking water. USEPA is reconsidering the limit on nickel. The Commonwealth of Massachusetts followed similar action. Drinking Water Standards and Guidelines for Chemicals in Massachusetts Drinking Water issued by the MADEP Office of Research and Standards (ORS) and dated Spring 2000, lists 0.1 mg/L as a guideline with a footnote that "the MCL for Nickel has been remanded and is no longer in effect".

On June 22, 2000, USEPA proposed reducing the MCL for arsenic from 50 to 5 µg/L effecting AOC 43J (FR 38887-38983). Promulgation of a new standard is required by January 1, 2001; however, the new standard will not take effect for 3 to 5 years.

None of the other ARARs listed in Appendix C-2 have had changes since signing of the ROD that affect the protectiveness of the implemented remedial action. Several other regulations were updated since the ROD, but do not affect the protectiveness of the remedy. These updated regulations include:

- 40 CFR 268 RCRA, Land Disposal Restrictions was altered on July 6, 1999 specifically with regard to 268.1 Purpose, Scope and Applicability and on June 8, 1998, specifically with regard to Appendix VII Effective Dates of Surface Disposed Prohibited Hazardous Wastes. These alterations do not affect the protectiveness of the remedy. This ARAR only pertains to the testing and disposal of activated granular carbon should an SVE system be required as a contingency measure at AOC 43G.

- Appendix A of 310 CMR 7.00 Massachusetts Air Pollution Regulations was updated in 1999. Revisions pertained to emission offsets and non-attainment review. These revisions do not affect the protectiveness of the remedy and only pertain should an SVE system be required as a contingency measure at AOC 43G.
- 310 CMR 7.18 "Volatile and Halogenated Organic Compounds" was in effect May 1, 1998 and applicable to facilities that emit VOCs. These revisions do not affect the protectiveness of the remedy and only pertain should an SVE system be required as a contingency measure at AOC 43G.
- 314 CMR 6.00 Massachusetts Groundwater Quality Standards was updated December 27, 1996. Compliance at AOCs 43G and 43J is continued through achievement of the MCLs and MMCLs.

In addition, a search was performed for any newly promulgated standards which could affect protectiveness at the site. No new ARARs were identified that would affect the protectiveness of the remedy.

Risk assessment methodology has been updated since the signing of the ROD. Discussion pertaining to these risk assessment updates and their affects on the protectiveness of the remedy are included in Section 5.7, Assessment.

5.5 Summary of Site Visit

An HLA representative performed site inspections at AOCs 43G and 43J on June 8, 2000. Conditions during the inspection were favorable with no precipitation and temperatures in the 60s.

No major changes to the site were noted during the site inspection at 43G. The gas station remains inoperative. All well protective casings and flush mounts were intact and secured. No evidence of excavation was noted at the site. A stormwater drainage swale and collection basin had been installed on the hillside between the former gas station and the car wash.

The building within the fenced-in motor pool at 43J has been removed. The paved motor pool is still used for vehicle storage. There were no signs of excavation within or near the pavement. The fence surrounding the yard was intact and locked at both gates. All monitoring well casings and flush mounts were intact and secured.

The following individuals were interviewed as part of the five-year review:

- Jim Chambers, BRAC Environmental Coordinator, Devens RFTA
- John Regan, MADEP

- David Margolis, USACE, New England District

All personnel were interviewed on June 8, 2000 at the Devens RFTA BRAC office. Mr. Chambers said that there are no immediate plans to transfer ownership of the properties or to change the defined RFTA boundaries. In addition, there have been no potable drinking water wells installed nor are there plans to install any in the future.

None of the personnel interviewed were aware of any reported problems with the monitored natural attenuation remedy. Mr. Chambers stated that the quarterly groundwater sampling rounds have indicated that monitored natural attenuation is working as the remedy.

There were no general comments or suggestions.

5.6 Areas of Non-Compliance

There are no areas of non-compliance or deficiencies that have been noted during this review that would make the remedial actions at AOCs 43G and 43J non-compliant with the ROD, or sufficient to warrant a finding of not protective. This finding is based upon a review of site reports that have been prepared since the signing of the ROD, a review of ARARs triggered by the remedial action, and the findings from the site inspection and interviews.

5.7 Assessment

Question A: Is the Remedy Functioning as Intended by the Decision Documents?

HASP: The health and safety procedures for long term monitoring at AOCs 43G and 43J are provided in the Site Safety and Health Plan which was prepared as part of the intrinsic remediation assessment Final Work Plan (SWETS, 1997a). This document and the Long-term Monitoring Plan also include IDW handling requirements. The HASP is being properly implemented for protection of on-site workers (groundwater samplers), the public, and the environment.

Implementation of Institutional Controls and Other Measures: There are no current or future plans for installation of potable water wells at either AOC. The Army proposes to maintain possession of these two AOCs for Army use. No institutional controls are required or are in place.

Remedial Action Performance: An intrinsic remediation assessment has been implemented at both sites in accordance with the ROD. The intrinsic remediation assessments demonstrated that intrinsic remediation is effective and based on data to date, the Army will not need to initiate additional cleanup actions. Based on modeling and statistical predictions, COCs will be less than the groundwater cleanup levels in less than 30 years and COCs will not migrate off the Army property. Performance standards developed as part of the intrinsic remediation assessment being used to assess long-term groundwater monitoring data. Long Term Monitoring commenced December 1999. Long Term Monitoring will continue to be performed until RGs are obtained to observe that remedial effectiveness criteria and objectives are achieved.

System Operations/Operation and Maintenance (Long-term Groundwater Monitoring): Groundwater monitoring is being performed in accordance with the approved Long Term Monitoring Plan (SWETS, 1999 a, b) for each AOC.

Cost of System Operations/Operation and Maintenance: Yearly O&M costs for implementation of the remedy at each AOC are not yet available for review.

Opportunities for Optimization: A reduction in the number of analytes to be sampled has been implemented since the signing of the ROD. As proposed and approved in the Final Intrinsic Remediation Assessment Report (SWETS, 1999b), carbon tetrachloride has been deleted from the analyte sampling list for AOC 43J. Carbon tetrachloride was originally included as a COC in the FS and ROD for AOC 43J because of its detection above MCLs in three wells in Round 6 of the RI (March 1995). It was suspected that it was undetected in previous rounds as a result of elevated detection limits in previous analytical rounds. However, further sampling and analysis was performed for up to 8 sampling rounds during the intrinsic remediation assessment for chlorinated solvents. Detection limits were less than 5 µg/L (and less than 0.5 µg/L in suspect wells) to assess the extent of carbon tetrachloride contamination, if at all present. No carbon tetrachloride has been detected in any of the wells at AOC 43J since the one sampling round in 1995.

Because there is no longer an MCL for nickel (Subsection 5.4), nickel is no longer considered a COC and does not require sampling and analysis at AOC 43G in accordance with the Long-Term Monitoring Plan.

Similarly, because of changes in risk assessment methodologies since the signing of the ROD, iron is no longer considered a COC and does not require sampling and analysis at AOCs 43G and 43J. (Refer to the paragraph entitled "Changes in Risk Assessment Methodologies" in this subsection)

Early Indicators of Potential Remedy Failure: No early indicators of potential remedy failure were noted during the review. Groundwater monitoring results have been generally consistent with expectations. However, a Remedial Duration Assessment needs to be performed using the December 1999 data. Recommendation for further assessment/remedial action will be provided in the Annual Report should analyses indicate that cleanup criteria will require greater than 30 years. Results of this Annual Report and subsequent reports will be reviewed in the next five-year review.

Question B: Are the Assumptions Used at the Time of Remedy Selection Still Valid?

Changes in Standards and To Be Considered: Refer to Subsection 5.4, ARARs review for changes in standards that have been promulgated since the ROD was signed.

Changes in Exposure Pathways: No changes in the site conditions that affect exposure pathways were identified as part of the five-year review. First, there are no current or planned changes in land use. Second, no new contaminants, sources, or routes of exposure were identified as part of this five-year review. Finally, there is no indication that hydrologic/hydrogeologic conditions are not adequately characterized. Both the statistical analysis and modeling performed for the intrinsic remediation assessments at each AOC suggest that organic COCs will likely be reduced to cleanup levels within the duration criteria specified in the ROD. Modeling further supports the position that the groundwater plume with concentrations exceeding MCLs will not increase in size and migrate off Army property. The results and preliminary assessment of the first long term groundwater monitoring round appear to be supportive of these conclusions.

Changes in Toxicity and Other Contaminant Characteristics. There have been no changes in toxicity or other factors for COCs at the site.

Changes in Risk Assessment Methodologies: Identified changes in risk assessment methodologies since the time of the ROD are discussed below. These changes call into question the possible over-protectiveness of the remedy, specifically with regard to consideration of iron and manganese as COCs.

Iron was identified as a COC in the ROD because non-cancer risks calculated for potential exposures to iron in groundwater exceeded a HI of 1. The non-cancer risks were calculated using a provisional oral RfD developed by the National Center for Environmental Assessment. USEPA Region I has since indicated that the agency does not endorse use of the iron RfD, because the RfD was developed based on concentrations needed to protect against a nutritional deficiency, rather than on quantitative estimates related to the hazard posed by overexposure to the element (USEPA Region I Risk Updates; Number 5; August, 1999). Based on this guidance, non-cancer health risks would not be calculated for iron. Consequently, a HI for iron would not be derived, and iron would not be identified as a COC based on health risk concerns.

It should also be noted that the available RfD used for manganese in the risk assessment for both sites ($5x10^{-3}$) has been made less stringent ($2.4x10^{-2}$) since the RI and FS as a result of updated USEPA risk assessment guidelines (USEPA Region 1 Risk Updates, Nov. 1996). The Army will consider establishing a new manganese remediation goal based on the current RfD value if, after organic COCs are reduced to RGs at the site, manganese concentrations continue to exceed the Devens RFTA background concentration of 291 µg/L.

5.8 RECOMMENDATIONS

Recommendation: Continue current remedial action activity which consists of implementing the remaining three components specified in the ROD: a long term groundwater monitoring program, annual reporting, and five-year site reviews (Component Nos. 4, 5, and 6, respectively). These components enable continued assessment for compliance with performance standards and reporting of the remedial progress. Follow performance standards established in the intrinsic remediation assessment and continue to assess for contaminant migration and remedial duration.

Long-term monitoring should continue as specified in the AOCs 43G and 43J Long-Term Monitoring Plans (SWETS, 1999a, 1999b) with the exception of the need to analyze for iron (AOCs 43G and 43J) and nickel (AOC 43J) as COCs. (Refer to Subsection 5.7). No reductions in sampled locations or in frequency are recommended at this time. The Long-term Monitoring is currently performed on an annual basis (November/December time period each year). The Army is responsible for implementation.

5.9 PROTECTIVENESS STATEMENT

The remedies at AOCs 43G and 43J are expected to be protective of human health and the environment upon completion, and immediate threats are addressed.

A HASP and IDW handling procedures are in place, are sufficient to control risk to on-site workers and the public, and are being properly implemented during groundwater sampling. Human health is currently not at risk at AOCs 43G and 43J because groundwater at the AOCs are not being used for potable use nor proposed for potable use, and COCs exceeding MCL/MMCLs or boundary standards are not migrating off RFTA property.

The remedial actions at AOCs 43G and 43J are expected to be protective of human health and the environment upon final achievement of RGs in groundwater. The Intrinsic Remediation Assessment Reports (SWETS, 1999a,b) document that intrinsic remediation (Component 1 of the selected remedy) will effectively remediate groundwater at AOCs 43G and 43J based on available data. Components 2 (intrinsic remediation assessment data collection with groundwater modeling) and 3 (additional groundwater monitoring well installations) of the selected remedy have been successfully completed during intrinsic remediation assessment implementation as stipulated in the ROD. No contingency action is required at this time at either AOC.

Current remedial action activity consists of implementing the remaining three components specified in the ROD: a long term groundwater monitoring program, annual reporting, and five-year site reviews (Component Nos. 4, 5, and 6, respectively). These components enable continued assessment for compliance with performance standards and reporting of the remedial progress. Performance standards were established in the intrinsic remediation assessment and require an assessment for contaminant migration and an assessment for remedial duration.

The Annual Report summarizing the data from the first (December 1999) long term groundwater monitoring round was not yet issued at the time that the Draft Five-Year Review Report was prepared. However, preliminary review of the December 1999 data with respect to contaminant migration at AOCs 43G and 43J suggest that the plumes are not expanding or migrating off RFTA property. No further field action is warranted at either site before the next scheduled sampling round in November or December 2000. A remedial duration assessment to refine predicted cleanup durations based on the December 1999 data is yet to be performed and will be included in the Annual Report.

5.10 NEXT REVIEW

These AOCs are statutory sites that require ongoing five-year reviews. This is the first five-year review that has been performed at either AOC. The next review will be performed within five years of the completion of this five-year review report. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for nonconcurrence.

REFERENCES

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U.S. Army Environmental Center (USAEC), 1996. "Record of Decision, Areas of Contamination, Devens, Massachusetts"; October 1996.

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6.0 SOUTH POST IMPACT AREA (AOCs 25, 26, 27, AND 41) (GROUNDWATER) FIVE-YEAR SITE REVIEW

6.1 SITE DESCRIPTION AND HISTORY

The South Post Impact Area (SPIA) covers approximately 1,500 acres and is located within the 4,800-acre South Post section of the former Fort Devens (see Figure 1-1). The SPIA is an active weapons and ordnance discharge area used by the Army, the Massachusetts National Guard, and law enforcement agencies for training purposes. The area is roughly bounded by Old Turnpike Road, Firebreak Road, the southern portion of Harvard Road, Trainfire Road, and Dixie Road. The SPIA covers AOCs 25, 26, 27, and 41 as well as several SAs, and a number of other firing ranges along Dixie Road and Trainfire Road that are not designated as AOCs. The portion of the SPIA covered by the ROD encompasses the 964 acres north and west of New Cranberry Pond. This area is referred to as the SPIA monitored area.

The physical setting and a brief history of each AOC is provided below. Refer to Section 1.0 for general enforcement activities at Fort Devens (i.e., initiation of a MEP, placement on the NPL, and signing of the FFA).

AOC 25 (EOD Range). EOD Range is located east of Firebreak Road, approximately two miles south of the main entrance to the South Post. The site is rectangular in shape and measures approximately 600 feet by 1,500 feet. From 1979 to 1992, approximately 1,200 pounds per year of explosives and munitions were disposed of in the disposal area by open burning/open detonation (OB/OD). The range was closed as part of the 1996 ROD

AOC 26 (Zulu Ranges). These ranges are located 2,000 feet north of the EOD Range, approximately 1.6 miles southwest of the main entrance to the South Post. The Zulu Ranges cover approximately 16 acres and consist of two adjacent land tracts, Zulu 1 and Zulu 2. Prior to 1979, the range was used for OB/OD of waste explosives and associated waste items. From 1979 to the present Zulu 1 has been primarily used for demolition training. The demolition training area is located in the center of Zulu 1. Zulu 2 has been historically used as a practice range for hand grenade training. The grenade training area is located on eastern end of Zulu 2 and consists of two concrete bunkers, which are used for cover and protection, and two sand pits which are used for receiving grenades.

AOC 27 (Hotel Range). Hotel Range is located adjacent to Cranberry Pond and is located approximately one mile south of the main entrance to the South Post. The Hotel Range covers approximately 23 acres and is currently used exclusively for firing small caliber weapons. The area of concern is located exclusively south of Old Turnpike Road. Before 1979, the Hotel Range was used for OB/OD of small arms, smoke grenades, and pyrotechnics. After 1979, the Hotel Range was modified and extended to the north side of the Old Turnpike Road and used for M-16s and small caliber weapons. Prior to 1989, the range was used as an M-70 range but after 1989 the range was modified to an M60-SAW range.

AOC 41 (Unauthorized Landfill). AOC 41 is located immediately north of New Cranberry Pond (separate from Cranberry Pond), east of Delta Range, and west of Harvard Road, approximately two miles southeast of the main entrance to South Post. AOC 41 is approximately 6 acres in size. The landfill material occupies an area approximately 75 feet square in the central portion of the site. It appears to have been associated with an historic brick making kiln that was operated in this area in the 1800s. The AOC is overgrown with trees and swampy vegetation and no records are available detailing when the site was used or what type of material was disposed of in this area. It is believed that this AOC was used until the 1950s for disposal of non-explosive military and household debris. Miscellaneous debris is scattered over a small hill located approximately 75 feet north of New Cranberry Pond.

RIs were performed for the EOD, Zulu, Hotel Ranges, and AOC 41 to characterized the nature and extent of site-related contamination. Samples from groundwater, surface water, sediments, and soil were collected as part of these efforts. Results of the RIs are summarized in the following subsections.

6.1.1 Groundwater

Groundwater at Devens RFTA occurs largely in the permeable glacial-deltaic outwash deposits of sand and gravel. Groundwater is found under the South Post at depths of 0 to 60 feet. A number of springs can be found around the boundary of the SPIA.

Groundwater in the vicinity of the ranges discharges to surface water before it leaves the South Post. More than 50 percent of the SPIA overlies a medium yield aquifer that is a potential source of drinking water. Measurements of hydraulic head in the groundwater and in streams and ponds within the South Post show that the streams around SPIA are gaining streams (i.e., groundwater discharges into the streams). Groundwater flow direction can be locally complex. At the EOD Range, overall groundwater flow discharge is to the east from the north end of the disposal area. At the Zulu Ranges, groundwater moves north toward a wetland and Slate Rock Brook. At the Hotel Range groundwater is east to Cranberry Pond. AOC 41 groundwater generally flows east towards the Nashua River; however, there is some local flow south to New Cranberry Pond. Groundwater models developed in conjunction with the RIs indicate that there are several groundwater divides in the area and that most groundwater discharges to surface water before leaving the SPIA.

Site specific sampling results are provided in the following subsections.

SPIA. Sampling events from the SPIA monitoring wells indicated the presence of explosives in three wells. Although their concentrations were low, no obvious source of the contamination was found. Additionally, four wells were found to have low concentrations of TPHC and one unfiltered sample was found to contain lead.

AOC 25 (EOD Range). Unfiltered samples from the EOD Range showed concentrations of iron, aluminum, and other metals above established background concentrations. Filtered samples showed concentrations several orders of magnitude lower than in the unfiltered samples. Four explosives or explosive-related organic compounds were also detected in the samples. Only the explosive RDX exceeded the screening value.

AOC 26 (Zulu Ranges). Similar to EOD, metals concentrations at the Zulu ranges wells exceeded established background concentrations. Filtered samples showed much lower concentrations. The explosive and explosive related compounds RDX, HMX, and TNT were detected in Zulu Range samples. Only RDX was detected above its health-based screening value. The monitoring wells showing the most significant concentrations of explosive-related substances are located where grenade-throwing and demolition were practiced.

AOC 27 (Hotel Range). Metals concentrations were similar to AOCs 25 and 26. All wells in this area indicated some level of explosives contamination. RDX and 1,3-dinitrobenzene exceeded their screening values.

AOC 41 (Unauthorized Landfill). AOC 41 groundwater was shown to contain several VOCs, primarily tetrachloroethene (PCE), TCE, and 1,1,2,2-tetrachloroethane. The groundwater results also indicated that several metals were present above established background concentrations in the unfiltered samples. Significantly lower metals concentrations in the filtered samples coupled with elevated total suspended solids measurements suggest that elevated concentrations in unfiltered samples are likely the result of suspended solids and not dissolved site-related contaminants.

6.1.2 Surface Water

The SPIA is drained primarily by two streams, Slate Rock Brook north and west of the SPIA and an unnamed stream in the southeast portion of the site.

AOC 25 (EOD Range). No surface water is known to exist within or adjacent to the EOD

AOC 26 (Zulu Ranges). Thirteen surface water samples were collected during the RI. Analytes detected above Ambient Water Quality Criteria (AWQC) included the metals arsenic and lead and the pesticide 2,2-bis(para-chlorophenyl)-1,1-dichloroethane (DDD). In addition, the explosives RDX and HMX, as well as several organic compounds were detected in Zulu Range surface water samples.

AOC 27 (Hotel Range). Nine surface water samples were collected for the RI within Cranberry Pond, adjacent to Hotel Range. Several metals were detected in the samples, but only lead exceeded the AWQC. Trace concentrations of explosives were detected in these samples.

6.1.3 Sediments

SPIA. Three sediment samples collected from the unnamed wetland southwest of New Cranberry Pond showed metals in excess of established background concentrations. However, the metal concentrations in sediments appeared to be influenced by sorbed solids on organic carbon.

AOC 25 (EOD Range). Several metals in the EOD Range sample exceeded established background concentrations.

AOC 26 (Zulu Ranges). Most metals in the Zulu Range samples were detected above background concentrations in at least one sample. Explosives, pesticides, VOCs, and TPHC were also detected.

AOC 27 (Hotel Range). Most samples collected in Cranberry Pond contained some metal concentrations in excess of those naturally occurring in the sediment. However, the data indicate that only one sample is unequivocally contaminated with metals. The explosive 4-amino2,6-dinitro toluene was detected in one third of the samples. VOCs, pesticides, TPHC and two PAHs were also detected.

6.1.4 Soil

The predominant soil in the South Post, including areas covered by the ROD, is the Hinkley-Merrimac-Windsor Association. This soil consists of loams or sandy loams, loamy fine sands, and other sands over sand or sand and gravel. Natural soils are disturbed within the ranges. A soil mapping of the SPIA found that, almost without exception, the soils are sandy and well drained. The exceptions are within wetland areas located outside of the ranges.

AOC 25 (EOD Range). Surface and subsurface soil samples collected during the RI at the EOD Range in November 1993 were analyzed for Target Analyte List (TAL) metals, explosives, and TPHC. Several metals were detected at concentrations above background in at least one sample. Copper and zinc exceeded the background concentration in three surface samples. Two explosives were also detected in EOD Range surface soil samples: nitrocellulose (detected in two samples) and nitroglycerine (detected in one sample). Low concentrations of TPHC were detected (maximum concentration of 45.2 µg/g). None of the substances detected exceeded the health-based soil screening criteria established for the RI.

AOC 26 (Zulu Ranges). Surface and subsurface soil samples were taken at the Zulu Ranges as part of the SI and RI. These samples were analyzed for Target Compound list (TCL) organics, TAL metals, explosives, and TPHC. Although several metals exceeded background concentrations in at least one surface and subsurface sample, none of the metals detected exceeded the health-based screening values. PAHs were detected in up to three surface and subsurface samples. One of the PAHs, benzo(b)fluoranthene (0.81 µg/g), exceeded the screening concentration (0.7 µg/g). RDX and TPHC was also detected. The maximum concentration of RDX in subsurface soil (38 µg/g) exceeded the health-based screening level (26 µg/g).

AOC 27 (Hotel Range). Subsurface soil samples were collected from boreholes at the Hotel Range and analyzed for TPHC, TAL metals, explosives, and TCL organics. None of the metals exceeded the screening values. Low concentrations of TPHC (maximum concentration of 75.6

μg/g), below the screening level of 5,000 μg/g, were detected in some samples. VOCs and pesticides were also detected at concentrations just above the detection limit. These concentrations were well below screening values.

AOC 41 (Unauthorized Landfill). In March 1995, a soil gas survey was performed in the shallow soils around monitoring wells 41M-93-03X and 41M-94-03B in an attempt to find the source area for the chlorinated solvent contamination detected in the groundwater. The soil gas survey indicated two detectable concentrations of TCE around the two wells. Soil samples collected from the same TerraProbe points used in the soil gas survey indicated TCE to be present in soils adjacent to the two wells at the 30 to 37 foot level.

Soil samples collected from five test pits in the area did not indicate the presence of any target analytes. Soil samples collected from the monitoring well borings during their emplacement in October 1994 indicated the presence of TCE below the 30' BGS level. The distribution of the TCE contamination coincides with the depth of the water in the boring. Therefore, it appears that the TCE contamination results from adsorption of TCE from groundwater to soil particles within the zone of the water table fluctuation. The area around 41M-93-03X and 41M-94-03B does not appear to be the source of the groundwater contamination.

6.1.5 Investigative Conclusions and Recommendations

SPIA. The human-health risk assessment found that there are no risks to human health from the SPIA activities, above the range considered acceptable by the USEPA under CERCLA and the MADEP under the MCP.

No significant risks to plants or wildlife were identified in SPIA soils, but potential risks were noted for aquatic life from surface water and sediments. A moderate affect on macroinvertebrates at one station in Slate Rock Brook was observed, but toxicity testing, using water from the contaminated wetlands north and south of Zulu Ranges, did not identify any site related effects. Continued observation of wildlife within the SPIA is recommended to evaluate the influence of continuing Army activities.

No further investigation or remedial actions are recommended. For this reason no site specific remedial action objectives were selected.

AOC 25 (EOD Range). Soils at the EOD Range ordnance detonation area significantly exceeded background in beryllium, cobalt, copper, iron, manganese, mercury, nickel, selenium, and zinc, although only zinc and copper exceeded background three times, and only beryllium, manganese, and selenium exceeded background twice. The remaining four metals exceeded background in only one sample which was significantly higher in silt and clay than other samples from the site. Nitrocellulose, nitroglycerine, and TPHC were also found in surface soils and TPHC and a trace of PCE were noted in subsurface soils. The two RCRA Toxicity Characteristic Leaching procedure (TCLP) soil samples showed no concentrations exceeding soil toxicity characteristics. Metals in filtered groundwater samples showed increased concentrations and increased frequency of detection in downgradient wells when compared to a local background well, but only manganese exceeded its MCL. Manganese concentrations are probably natural because they cannot be correlated to site activities, and manganese is above the MCL in many Devens RFTA wells. Several explosives were noted in groundwater within the AOC, but only Cyclonite exceeded its screening value, and then only in one well.

Because the EOD will continue to be part of the SPIA under Army control, the groundwater will not be available to the public for human consumption and will not be a completed pathway of exposure. As such, the risk of groundwater consumption was not estimated. Other pathways of exposure examined gave reasonable maximum exposures resulting in the assessed risks being below those deemed acceptable by the USEPA under current Superfund policy. This human-health risk assessment addresses the toxicological risks from explosives but does not address the far more substantial physical risks of unexploded ordnance located at EOD and throughout the SPIA.

The ecological risk assessment concluded that there were potential risks to small mammals and to plants in the ordnance detonation area, under reasonable maximum exposures, but not under average exposures. Based on the marginal exceedences of toxicity reference values, the potential for adverse ecological toxicological effects are minimal. The ecosystems in the general vicinity of the site have not been adversely affected by the EOD range, and the analytes detected are not ecologically significant. The ecological risk assessment concluded that no further action is necessary at the EOD range to further investigate or mitigate ecological risks from soil or other media in which analytes were detected. The ecological risk assessment addressed toxicological risks but did not evaluate the much more substantial physical risks from unexploded ordnance which will continue at EOD and throughout the SPIA.

From the extensive environmental investigations and ecological and human-health risk assessments performed on the EOD range, it is concluded that no further investigation or remediation is warranted at AOC 25, and no remedial action objectives will be developed.

AOC 26 (Zulu Range). Soils at AOC 26 were found to be contaminated with a number of chemicals, the most important of which were explosives, primarily Cyclonite; pesticides, primarily 2,2-bis(para-chlorophenyl)-1,1,1-trichloroethane (DDT); some PAHs; and traces of PCBs and volatiles. TCLP testing for surface soils showed only barium and chloroform present, both below RCRA toxicity characteristic concentrations. Lead, zinc, antimony, arsenic, beryllium, and cadmium exceed background but only lead and zinc could be related to possible site activities. Groundwater is contaminated with explosives, mainly Cyclonite (exceeding a Drinking Water Health Advisory level used as a screening value) and HMX, and by bis(2-ethylhexyl)phthalate, also at concentrations exceeding a screening value. Groundwater discharges to surface water and sediment in the wetland north of the ranges and probably to Slate Rock Brook north of the ranges. Unfiltered groundwater shows several elevated metals, but filtered groundwater shows exceedances of drinking water standards only for manganese. Surface water showed explosives, mainly Cyclonite, and methylphenol and traces of VOCs. Contaminants of Potential Concern (COPCs) were found in the wetlands both south and north of the ranges. Sediments in the wetlands showed explosives, pesticides, and traces of volatiles. Many metals exceeded background and were selected as COPCs. Because the ranges will remain active as a training facility and under Department of Defense jurisdiction for the foreseeable future, the groundwater pathway is considered incomplete and was not assessed. Estimated human-health risks of exposure under any probable scenario do not exceed the upper boundary of acceptable risks use by the USEPA under current Superfund guidance. These are one in 1,000,000 excess lifetime risk of cancer and a HI of one.

The ecological risk assessment found that some soils data exceed reference values for plants, small mammals, and songbirds, but that those exceedances are of such limited extent and the habitat so disturbed at those locations from ongoing military training activities as to be ecologically insignificant. Concentrations of lead in surface water exceed water quality criteria, but toxicity testing indicated no toxicity attributed to lead for an aquatic invertebrate and a fish that were tested. Substantial uncertainty exists in extrapolating from avian toxicity to reptilian toxicity, but, using avian data, no risks were identified for turtles. The ecosystems at AOC 26 do not appear to be adversely affected, as indicated by the thriving communities of benthic invertebrates and wildlife observed during the field surveys.

There are no unacceptable risks to human health or demonstrated effects on wildlife at AOC 26, and no further investigation or remedial action is recommended for this site.

AOC 27 (Hotel Range). The soil and groundwater at AOC 27 are affected by military training activities, shown primarily by the presence of explosives, pesticides, and TPHC in soil, groundwater, surface water, and sediment. Lead concentrations were also elevated in subsurface soil and in surface water. The pesticides, mostly DDT and its derivatives DDD and 2,2-bis(para-chlorophenyl)-1,1-dichloroethene (DDE), are below background in soils, and were not present in groundwater which only showed low concentrations of delta-BHC (0.045 µg/L in the one confirmed result). Pesticide residues are likely a result of pest control rather than training activities at the site. Explosives in the groundwater are by far the most conclusive evidence of effects from site operations. All wells showed at least some concentrations of explosives related compounds, with Cyclonite, HMX, and 1,3-dinitrobenzene the most frequently observed compounds. The groundwater affected by the site is flowing north across Old Turnpike Road, to discharge to a wetland within the northern part of Hotel Range, or possibly continuing on towards Slate Rock Pond.

The risk to human health at AOC 27 has been calculated for users, site workers, and trespassers. All estimated potential risks for carcinogens and non-carcinogens are below current EPA Superfund policy lower limits for lifetime risks. The occurrence of carcinogenic effects is below one in 1,000,000 excess risk per lifetime, and non-carcinogenic health effects are highly unlikely.

No evidence of site related chemical stress to plants or wildlife was observed during the field surveys. The toxicity testing done at Zulu Ranges (AOC 26) imply that the level of lead in Cranberry Pond water does not pose a hazard to aquatic biota. The mean concentrations of contaminants of potential concern are unlikely to pose a risk to the selected receptors, mallards and raccoons, with the possible exception of the affect of copper on mallards. Potential risks to benthic invertebrates from several metals in sediments (antimony, copper, lead, mercury, and nickel), and also from 4-amino-2,6-dinitrotoluene, were noted. These risks have high levels of uncertainty and do not apply to average concentrations but only to reasonable maximum exposure concentrations. In general, this risk assessment is more likely to overestimate risks than to underestimate them. The risk assessments have been performed for the toxicological risks of analytes detected at AOC 27, but does not address the more significant physical risks from unexploded ordnance.

As the Army continues to use the site, efforts should be made to ensure that no activities further contribute to contamination of Cranberry Pond. Periodic review of the risk assessment in light of increased toxicological information of the effects of the existing levels of contamination, should be used to more accurately assess the risk to the environment. Based on the results of the environmental investigations and the human-health and ecological risk assessments, no contamination is present in concentrations which pose unacceptable risks to human health or the environment. AOC 27 will continue to be used as a firing range by the Army, and no further investigation or remedial action is recommended at the Hotel Range.

AOC 41 (Unauthorized Landfill). The following conclusions are based on interpretation of data collected from each of the previous investigations (SI, SSI, and RI) completed at AOC 41.

The geologic setting at AOC 41 includes an upper sand layer underlain by a discontinuous clayey silt layer, a lower silty sand layer, and lower sand layer. Bedrock was not encountered in any of the borings completed at AOC 41.

The aquifer below AOC 41 can be classified as an unconfined overburden groundwater aquifer. The aquifer is recharged by surface water infiltration and percolation, and recharge from surface water from New Cranberry Pond. This hydraulic condition is caused by a road culvert located at the eastern end of the pond which artificially raises the surface water elevation in the pond, thus causing the surface water to recharge groundwater below AOC 41. The predominant local groundwater flow at AOC 41 is to the north-northeast, eventually discharging into the Nashua River.

The results of RI groundwater sampling and field analysis completed during the RI, indicate that the existing groundwater contaminant plume appears to be confined to the upper portion (water table) of the aquifer and it is oriented in a northeast-southwest direction. Based on the chemical properties of the contaminants, the slow rate of groundwater flow in the clayey silt, and the existing downgradient groundwater results (41M-94-09A and B), it appears that the distribution of the groundwater contamination has been determined, and that the likelihood of contaminant migration to any exposure point (i.e., Well D-1) is minimal.

Surface water and sediment from New Cranberry Pond were sampled during previous investigations. However, data collected during the SSI and the RI, demonstrate that New Cranberry Pond surface water recharges groundwater below AOC 41. An assessment of the potential surface soil migration pathways showed that no migration pathway (i.e., overland transport of surface soil via surface water) exists between the contaminants detected in the surface soil on the waste material and New Cranberry Pond surface water and sediment. Because of these reasons, the previous surface water and sediment data was not evaluated in the RI.

The baseline human-health risk assessment was limited to an evaluation of the exposure potential to groundwater at AOC 41, and a summary of quantitative risk evaluation for groundwater from Well D-1. The risk assessment concluded that there are no unacceptable risks to human health from the groundwater at Well D-1 for troops that consume the water for approximately 14 days per year, and that no further action would be required under CERCLA.

Based on the results and interpretation of the physical and chemical data and taking into account that the future land and groundwater use of this AOC will be similar to the present use, it was recommended that the Army complete a Proposed Plan and monitoring ROD for the groundwater at AOC 41 and to include the AOC 41-related contaminants in the analysis of the groundwater samples from Well D-1.

6.2 Remedial Objectives

A ROD was signed in July 1996 documenting No Action as the final selected remedy for the SPIA monitored-area groundwater, surface water, soil, and sediment and AOC 41 groundwater. Because No Action was selected and approved, no FS was performed and RAOs were not developed.

6.3 Description of Remedy

As part of the selected remedy of No Action for the SPIA monitored-area groundwater, surface water, soil, and sediment and AOC 41, Devens RFTA will ensure the following, excerpted from the 1996 Final Record of Decision for the SPIA and AOC 41 groundwater. Remedial components that have been undertaken are presented in Subsection 6.3.1. The current status of the remedy is discussed in Subsection 6.3.2.

- Groundwater monitoring for potential contaminant migration out of the SPIA monitored area.
- Wells will be used to monitor the groundwater from the EOD Range, Zulu Ranges, Hotel Range and AOC 41.
- Wells will be used to monitor the north, northeast, southeast, and east sides of the SPIA monitored-area.
- Monitoring wells will be sampled for explosives, TCL, and TAL metals.
- A Groundwater Monitoring Plan for the South Post will be developed that will include detailed groundwater monitoring at discharge points. The plan may include installation of additional monitoring wells to monitor for off-site groundwater flow.
- Well D-1 will be sampled and analyzed for explosives and MMCLs/MCLs.
- The Army will not develop new drinking water sources within the SPIA monitored-area
- An Integrated Natural Resources Management Plan will be developed and implemented to monitor adverse affects on the ecosystem in the SPIA monitored-area.
- Monitoring Reports will include a description of site activities and a summary of

analytical results. The Army will submit these reports annually. If there is an indication of contamination emanating from the SPIA monitored-area, the Army will evaluate the need for additional assessment.

- As required by CERCLA, the site will be subject to five-year reviews to assess if the No Action remedy remains protective of human health and the environment.
- Should the Army close or transfer or change the use of this property, an Environmental Baseline Survey (EBS) will be performed, and the "no action" decision of this ROD will be re-examined in light of the changed use and risk factors resulting from this closure/transfer.

6.3.1 Remedy Implementation

The following remedial components have been undertaken as outlined in the ROD.

Long-Term Groundwater Monitoring Plan. The Final Long-Term Monitoring Plan for the SPIA was issued in May 1997. The plan details the individual wells to be sampled on an annual basis. The plan also provides sampling methodology and analytical requirements. Additional monitoring wells were installed at AOC 26 and within SPIA to act as sentinel wells.

Integrated Natural Resources Management Plan. An Ecological Sampling Workplan was developed and implemented in 1998 to characterize surface water and sediment quality within the SPIA.

Groundwater Sampling. Annual groundwater monitoring has been performed in 1997, 1998, and 1999 as outlined in the Long Term Monitoring Plan. Annual reports have been provided for the 1997 (SWETS, 1998), 1998 (SWETS, 1999) and 1999 (SWETS, 2000) sampling events. The 1998 Annual Report also includes results of the ecological surface water and sediment sampling. Water Well D-1 was sampled during each sampling event.

6.3.2 Current Status

This is the first five-year site review for the SPIA. All components of the ROD have been implemented . No contingency action is required at this time at the SPIA or the individual AOCs.

Current action consists of continued implementation of the components specified in the ROD: a long term groundwater monitoring program, annual reporting, and five-year site reviews. These components enable continued assessment for compliance with established performance standards and reporting of performance standards.

Long-term monitoring is being performed by the USACE-NAE, Concord, Massachusetts. The first long-term groundwater monitoring round was performed in the fall of 1997 with subsequent rounds in the fall of 1998 and 1999. Work is being performed in accordance with the approved Long Term Monitoring Plans (SWETS, 1997).

6.3.2.1 Long Term Groundwater Monitoring Results. In general 1997 and 1998 groundwater sampling results were consistent to slightly lower in 1998. Metal concentrations from both rounds were generally lower than concentrations reported in the RIs. This decrease may largely reflect decreased sample turbidity resulting from implementation of low-flow sampling methodology. No metals were detected above MMCL/MCLs.

Concentrations of explosives were consistent between the 1997 and 1998 sampling rounds. Explosives concentrations measured during 1998 were generally less than those measured during the RIs. This trend, like the metals concentrations, is attributed to decreased sample turbidity resulting from implementation of the low-flow sampling methodology.

Available analytical data shows no indication that contaminants are emanating from the SPIA. Additional sampling rounds will be performed to continue to monitor for potential off-site migration.

Results of 1997, 1998 and 1999 groundwater sampling are provided in Appendix D.

6.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS REVIEW

ARARS were not specifically identified in the ROD. However, the ROD does state that Well D-1 will be sampled and analyzed for explosives and MMCLs/MCLs. There was a change to portions of the National Primary Drinking Water Standards 40 CFR Parts 141.11 - 141.16 and 141.50 - 141.52 and the Massachusetts Drinking Water Standards and Guidelines 310 CMR 22.0, that affects nickel. In February 1995, USEPA and the Nickel Development Institute (a nickel trade association) filed a joint motion for a voluntary remand of the nickel MCL. In the same month, the court granted the motion and vacated and remanded the MCL for nickel (0.1 mg/L). The updated USEPA Office of Water Drinking Water Regulations and Health Advisories dated October 1996 now lists the MCL for nickel as "being remanded". This means that while many water suppliers continue to monitor nickel concentrations in their drinking water, there is currently no USEPA legal limit on the amount of nickel in drinking water. USEPA is reconsidering the limit on nickel. The Commonwealth of Massachusetts followed similar action. Drinking Water Standards and Guidelines for Chemicals in Massachusetts Drinking Water issued by the MADEP Office of Research and Standards (ORS) and dated Spring 2000, lists 0.1 mg/L as a guideline with a footnote that "the MCL for Nickel has been remanded and is no longer in effect".

On June 22, 2000, USEPA proposed reducing the MCL for arsenic from 50 to 5 μg/L. Promulgation of a new standard is required by January 1, 2001; however the new standard may not be implemented for 3 to 5 years.

In addition, a search was performed for any newly promulgated standards which could affect protectiveness at the site. No new pertinent ARARs were identified.

6.5 SUMMARY OF SITE VISIT

An HLA representative performed site inspections at the South Post Impact Area (AOCs 25, 26, 27, and 41) on June 8, 2000. Conditions during the inspection were favorable with no precipitation and temperatures in the 60s.

No major changes were noted at any of the sites. AOC 25, EOD Range appeared to be unused. Other than normal range use there was no evidence of excavation at any of the sites. Monitoring well protective casings were locked and secured.

The following individuals were interviewed as part of the five-year review:

- Jim Chambers, BRAC Environmental Coordinator, Devens RFTA
- John Regan, MADEP
- David Margolis, USACE, New England District

All personnel were interviewed on June 8, 2000 at the Devens RFTA BRAC office. All personnel agreed that there were no plans to transfer ownership of the SPIA, nor were there any proposed changes to the site boundaries. Mr. Chambers also stated that there were no plans to install any drinking water sources within the SPIA.

None of the personnel interviewed were aware of any complaints, violations or other incidents related to the site which required a response by their respective offices.

John Regan questioned whether the Natural Resources Management Plan (NRMP) required issuance of an Annual Report. Mr. Chambers stated that this was not part of the ROD but may have been stated within the NRMP. Mr. Regan replied that the chain of events started by the ROD requires the natural resources Annual Report if not required by the ROD specifically.

Mr. Regan also questioned if the ROD influences lead bullet use. Have bullet traps been installed? Mr. Chambers stated that use of small arms occurs in ranges outside of the SPIA. In addition, use of the site for training is outside of the scope of the ROD.

6.6 AREAS OF NON-COMPLIANCE

There are no areas of non-compliance or deficiencies that have been noted during this review that would make the selected remedy at the SPIA and the associated AOCs non-compliant with the ROD, or sufficient to warrant a finding of not protective. This finding is based upon a review of site reports that have been prepared since the signing of the ROD, a review of ARARs triggered by the remedial action, and the findings from the site inspection and interviews.

6.7 ASSESSMENT

Question A: Is the Remedy Functioning as Intended by the Decision Documents?

Implementation of Institutional Controls and Other Measures: There are no current or future plans for installation of potable water wells within the SPIA. The Army proposes to maintain possession of the SPIA for Army use. No institutional controls are required or are in place.

Remedial Action Performance: Long-term groundwater monitoring is being performed on an annual basis to determine if contaminants are migrating off of the SPIA monitored-area and to ensure that the no-action alternative remains protective of human health and the environment. In addition, surface water and sediment sampling were performed in 1998 to assess affects on ecosystems within the SPIA monitored area as required by the ROD.

System Operations/Operation and Maintenance (Long-term Groundwater Monitoring): Groundwater monitoring is being performed in accordance with the approved Long Term Monitoring Plan (SWETS, 1997) for the SPIA.

Cost of System Operations/Operation and Maintenance: Yearly O&M costs for implementation of the remedy at each AOC are not yet available for review.

Opportunities for Optimization: No reduction in sampled locations or in frequency is recommended at this time.

Early Indicators of Potential Remedy Failure: No early indicators of potential remedy failure were noted during the review. Groundwater monitoring results have been generally consistent with expectations. Recommendation for further assessment/remedial action will be provided in the Annual Reports should analyses indicate that contaminants are migrating off-site. Results of these Annual Reports will be reviewed in the next five-year review.

Question B: Are the Assumptions Used at the Time of Remedy Selection Still Valid?

Changes in Standards and To Be Considered: As previously discussed, with the exceptions of arsenic and nickel standards and guidelines discussed in the ROD remain valid. Please refer to Section 6.4.

Changes in Exposure Pathways: No changes in the site conditions that affect exposure pathways were identified as part of the five-year review. First, there are no current or planned changes in land use. Second, no new contaminants, sources, or routes of exposure were identified as part of this five-year review. Finally, there is no indication that hydrologic/hydrogeologic conditions are not adequately characterized.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in toxicity or other contaminant characteristics which affect the selected remedy.

Changes in Risk Assessment Methodologies: There have been no changes which call into question the protectiveness of the remedy.

6.8 RECOMMENDATIONS

Recommendation: It is the recommendation of this review that long-term monitoring be continued as outlined in the ROD and LTMP. No changes are recommended at this time.

6.9 PROTECTIVENESS STATEMENT

The remedy at the SPIA and associated AOCs is expected to be protective of human health and the environment.

Human health is currently not at risk at the SPIA because groundwater is not being used for potable use nor proposed for potable use and identified contaminants are not migrating off of SPIA boundaries.

Current action consists of continued performance of the long-term groundwater monitoring program, annual reporting, and five-year site reviews. These components enable continued assessment for compliance with performance standards and reporting of the remedial progress.

Review of the annual reports suggest that contaminants are not migrating off of SPIA property.

6.10 NEXT REVIEW

These AOC are statutory sites that require ongoing five-year reviews. This is the first five-year review that has been performed for the SPIA. The next review will be performed within five years of the completion of this five-year review report. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for nonconcurrence.

REFERENCES

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7.0 AOCS 32 AND 43A FIVE YEAR SITE REVIEW

This section presents the five-year reviews for AOCs 32 and 43A.

7.1 SITE DESCRIPTIONS AND HISTORY

Both AOCs 32 and 43A are historically contaminated locations within the Devens RFTA. AOC 32, the DRMO, is located on the west side of Cook Street (West Yard) in the northeast portion of the former Main Post. AOC 43A is located to the south of AOC 32, across Market Street. (see Figures 7-1 and 7-2).

The two sites were combined administratively under one ROD, but are described separately in the following subsections for clarity. Subsections 7.1.1 and 7.1.2 provide the site description and history for AOCs 32 and 43A, respectively. Each of these subsections begins with a chronology of events specific to the site.

7.1.1 AOC 32 Site Description and History

A chronology of events specific to AOC 32 is listed below.

- 1991 SI initiated at AOC 32. Detected contamination exceeding screening concentrations for soil and ground water.
- 1994 RI concludes that soil and groundwater contamination requires remediation at AOC 32.
- 1997 FS completed to address contaminated soil and groundwater at AOC 32.
- 1998 ROD signature.

AOC 32 (DRMO Yard) was used as a materials storage facility. Operational records indicate that the facility was active from at least 1964 to 1995. The nature of the materials that were processed and the activities performed in this yard varied significantly. AOC 32 consists of three fenced areas. The DRMO Yard on the west side of Cook Street (West Yard) contained used equipment, including lead-acid batteries, telecommunications equipment, and administrative equipment. The yard on the east side of Cook Street (East Yard) was used for disassembling vehicles for reusable parts and previously contained scrap metal, tires, stored items ready for sale, and used photographic solutions. The only unpaved, fenced area is located just north of the East Yard and was used to store and recycle tires. A former UST site (UST #13) has been incorporated into AOC 32. This UST was used to store waste oil and was located just northeast of the DRMO Office. UST #13 and the remainder of AOC 32 appear to be in separate groundwater regimes.

In 1991, the Army performed a SI at AOC 32 and reported contamination exceeding screening concentrations for soil and ground water. A RI was initiated to determine the nature and distribution of contamination at AOC 32, assess the risk to human health, and provide a basis for performing FSs. The final RI report issued in 1994 concluded that soil contamination and groundwater contamination required a remedial action evaluation.

A FS designed to develop and analyze potential remedial alternatives for cleanup at AOC 32 was issued in January 1997. Following submission of the Army's Proposed Plan and receipt of public comments on the preferred remedial alternatives the Army issued a ROD, documenting the final choice of a remedy for cleanup of soils by excavation and offsite disposal, and for cleanup of groundwater by monitored natural attenuation. The ROD was signed in February 1998.

An evaluation of remedial actions to date has been performed. The Operating Properly and Successfully (OPS) Report (SWETS, 2000a) demonstrates that the selected remedial actions for AOC 32 and AOC 43A are operating properly and successfully in accordance with applicable USEPA guidance.

A separate evaluation of monitored natural attenuation as the selected remedy at AOC 32 has been performed. The Monitored Natural Attenuation Assessment Report (SWETS, 2000b) summarizes the data collected from MNAA field activities beginning in January 1999, and presents the final assessment and recommendations concerning natural attenuation effectiveness based on ROD criteria. The report concludes that natural attenuation, supplemented with long-term groundwater monitoring and establishment of institutional controls, will be an effective remedial action at AOC 32.

7.1.2 AOC 43A Site Description and History

A chronology of events specific to AOC 43A is listed below.

- 1991 SI initiated at AOC 43A. Low concentrations of xylene and elevated concentrations of petroleum hydrocarbons detected.
- 1994 RI concludes that groundwater contamination requires remediation at AOC 43A.
- 1997 FS completed to address contaminated groundwater at AOC 43A.
- 1998 ROD signature.

At the time of base closure in 1996, the area around the location of AOC 43A was being used as a petroleum, oils and lubricants storage area (POL). Located across Market Street from AOC 32, this area served as the central distribution point for all gasoline and fuel at Fort Devens from the 1940s to present. AOC 43A consists of a fenced lot within a developed industrial area.

The distribution facility formerly consisted of a main gasoline station building (T401), a pump house, four 12,000 gallon USTs, one 10,000 gallon UST, two 12,000 gallon aboveground storage tanks, and two 8,000 gallon aboveground storage tanks. Gasoline was delivered to the facility via railroad, and was transferred to the tanks. AOC 43A consists of a fenced lot located within a developed industrial area of buildings, roads, and grass lots, with the exception of the east side of the site, which was bounded by a wooded area on a rock outcrop. A set of railroad tracks, formerly used to transport fuels to the site, formed the site's northern boundary. The UST area was fenced. An asphalt driveway led into the POL Storage Area from Antietam Street. The driveway was bermed to contain potential spills. A pump station was located in the center of the fenced area, and the new USTs were located on the eastern side.

During the 1992 SI on the POL, field screening and confirmation sampling indicated that a low level of xylene and an elevated level of petroleum hydrocarbons existed within the subsurface soils. An RI was performed, and the final report concluded that groundwater contamination required a remedial action evaluation.

A FS, performed to develop and assess potential remedial alternatives for cleanup at AOC 43A, was issued in January 1997. Following submission of the Army's Proposed Plan and receipt of public comments on the preferred remedial alternatives, the Army issued a ROD to document the final choice of a remedy for cleanup of groundwater by monitored natural attenuation. The ROD was signed in February 1998.

An evaluation of the remedial actions to date has been performed. The Operating Properly and Successfully (OPS) Report (SWETS, 2000a) demonstrates that the selected remedial actions for AOC 32 and AOC 43A are operating properly and successfully in accordance with applicable USEPA guidance.

A separate evaluation of monitored natural attenuation as the selected remedy at AOC 43A has been performed. The Monitored Natural Attenuation Assessment Report (SWETS, 2000c) summarizes the data collected from MNAA field activities beginning in January 1999, and presents the final assessment and recommendations concerning natural attenuation effectiveness based on ROD criteria. The report concludes that natural attenuation, supplemented with long-term groundwater monitoring and establishment of institutional controls, will be an effective remedial action at AOC 43A.

AOC 43A underwent significant redevelopment in 2000. As a result, major demolition, re-grading, and building/paving construction has altered the site's physical setting and hydrology. All of the groundwater monitoring wells sampled as part of the MNAA have been destroyed. The Army intends to install source area monitoring wells and re-initiate long-term monitoring. In addition, piezometers will be installed and monitored to characterize the newly-altered flow field. Sentinel wells will then be installed in appropriate locations to complete the monitoring locations, and long-term monitoring will continue.

7.2 REMEDIAL OBJECTIVES

Remedial response objectives were defined to aid in developing and screening alternatives. The objectives aim to mitigate existing and future potential threats to human health and the environment. The response objectives for AOCs 32 and 43A are discussed in the following subsections.

7.2.1 Surface and Subsurface Soil Remedial Objectives

The RAOs for site-related surface and subsurface soils are as follows:

- Prevent direct and indirect contact, ingestion, and inhalation of the soil contaminated with COPCs by human and ecological receptors at levels that could pose risks.
- Prevent erosion and migration of soil contaminated with COPCs to storm sewers and surface water bodies.
- Prevent COPC migration to the groundwater at levels that could adversely affect human health and the environment.

Cleanup goals for soils are included in Table 2-2 in Appendix E. Table 2-2 is re-printed from (SWETS, 2000a). These values were calculated from the risk assessment as candidate goals for all contaminants except PCBs. The PCB cleanup goal is an ARAR that existed from Toxic Substance Control Act (TSCA). Other contaminants not addressed by these two sources used the lower value of the USEPA Region III risk-based concentration or the RCRA corrective action level was selected. If these values were below the background concentration, the background value was used as the cleanup goal. Because cleanup goals were not established in the ROD for EPH/VPH, the MCP S-2 standard was used as the cleanup goal.

7.2.2 Groundwater Remedial Objectives

The RAOs for site-related groundwater include the following:

- Prevent off-site migration of COPCs at levels that could adversely affect flora and fauna.
- Prevent lateral and vertical migration of COPCs at levels that could adversely affect potential and existing drinking water supply aquifers.
- Prevent seepage of groundwater from the site that could result in surface water concentrations in excess of ambient water quality standards.

The main post groundwater cleanup goals were developed from numerous sources and were presented in the ROD. These cleanup levels were used to screen groundwater data from both AOC 32 (UST #13) and DRMO/POL (AOC 32/43A). Groundwater cleanup goals for contaminants of concern are shown in Table 1-1 in Appendix E. Table 1-1 is reprinted from (SWETS, 2000c). When available, the most stringent of the ARARs was selected as a potential candidate cleanup goal. If no risk values were established, then the most stringent of the USEPA Office of Drinking Water Health Advisories, USEPA Region III tap water criteria, or the MADEP Office of Research and Standards Guidance for chemicals for which MMCLs have not been promulgated was selected. If measurable concentrations were below background values, the background concentration was established as the candidate inorganic contaminants, data from filtered samples were used to develop cleanup goals. Because cleanup goals were not established in the ROD for EPH/VPH, the MCP GW-1 standard was used as the cleanup goal. The cleanup goal for lead is related to the groundwater associated with AOC 43A, not AOC 32.

7.3 DESCRIPTION OF REMEDY

Surface and Subsurface Soil. The ROD states that key components of the selected remedy for surface and subsurface soil at AOC 32 include:

- Excavating contaminated soil (approximately 1,300 cy, confirmatory sampling will be performed prior to backfilling).
- Immediately transporting soils to an off-site, non-hazardous landfill for disposal.
- Backfilling the excavated area with clean material, and revegetating the area.
- Monitoring groundwater on an annual basis and reviewing the site at five-year intervals for 30 years or until contamination is reduced to acceptable concentrations

The excavation and disposal activities completed between October and December 1998 are summarized below:

- Removal and disposal of approximately 50 cy of metal debris
- Removal and disposal of approximately 1,200 cy of petroleum-contaminated soil
- Removal and disposal of approximately 800 cy of non-hazardous soil with shredded tire scrap
- Removal and disposal of approximately 400 cy of soil contaminated with lead and containing shredded tire scrap
- Removal and disposal of approximately 600 cy of soil and asphalt contaminated with low levels of PCBs and pesticides

The Removal Action for AOC 32, performed by the Army in October and November 1998, has permanently achieved the RAOs specified in the ROD. The final confirmation data results indicate that not only were cleanup levels met, sample concentrations were actually lower then the more conservative MCP S-1 criteria.

Groundwater. The ROD states that key components of the selected remedy for groundwater at AOCs 32 and 43A include:

- Establishing institutional controls
- Installing additional groundwater monitoring wells
- Providing for monitored natural attenuation
- Collecting data on monitored natural attenuation, assessing the data, and performing
- groundwater modeling
- Performing long term groundwater monitoring on an annual basis
- Reviewing the site at 5-year intervals for 30 years or until contamination is reduced to acceptable concentrations
- Providing annual data reports to USEPA, and MADEP

The MNAA field activities performed at AOC 32 and 43A are summarized below:

- Four rounds of quarterly groundwater sampling were performed. Four rounds of groundwater level measurements, taken before each round of groundwater sampling. These measurements were taken to determine the depth to the water table and confirm groundwater flow direction.
- Four microwells (43MA-99-12X, 43MA-99-13X, 43MA-99-14X, 43MA-99-15X) were

installed in AOC 43A between March 29 and March 31, 1999 to investigate the presence or absence of chlorinated VOCs.

- Two piezometers (32Z-99-01X and 32Z-99-02X) were installed between March 31 and April 1, 1999 to provide additional information regarding water table elevation and the direction of groundwater flow.
- Five monitoring wells (32M-99-08X, 32M-99-09X, 32-99-10X, 32M-99-11X, and 43MA-99-11X) were installed between April 2 and April 8, 1999 to provide additional points of groundwater quality and confirm water table elevation and groundwater flow direction. Permeability test were performed on two of the newly installed overburden monitoring wells (32M-99-10X and 32M-99-11X) on May 6, 1999 to provide information regarding the ability of groundwater to flow through the soil matrix.

Four rounds of quarterly groundwater sampling were performed in January, April, July, and October 1999. During the first round, fourteen existing monitoring wells (six at AOC 32 and eight at AOC 43A) were sampled. During the second and third rounds, twenty-three wells (thirteen at AOC 32 and ten at AOC 43A), and four microwells at AOC 43A were sampled. During the fourth round, the twenty-three wells sampled in round three were sampled again.

During each of the four sampling rounds, organic and inorganic compounds were detected in monitoring wells associated with AOC 32 and AOC 43A at concentrations exceeding cleanup goals. At AOC 32, there are two monitoring wells which have exhibited concentrations of organic compounds in excess of cleanup goals, and six wells which have exhibited concentrations of inorganics in excess of cleanup goals.

At AOC 43A, there are two monitoring wells which have exhibited concentrations of organic compounds in excess of cleanup goals, and two wells which have exhibited concentrations of inorganics in excess of cleanup goals.

Biodegradation of organic compounds is believed to be occurring at AOCs 32 and 43A. This is evidenced by observed concentration decreases of organic compounds in groundwater over time, and by geochemical indicator parameters.

A limited number of chlorinated organic compounds have been detected over the years in a few wells at AOCs 32 and 43A. The data show that concentrations of dichlorobenzene (DCB) have decreased over time in well 32M-92-04X. Likewise, concentrations of trichloroethene (TCE) have decreased over time in wells 32M-92-06X and POL-3. These decreases in concentration suggest that biodegradation may be occurring in these areas. While concentrations of DCB have remained fairly constant in well 32M-92-06X, it is believed that biodegradation is also occurring to some extent within this area. This is evidenced by the observed concentration decreases of TCE within this well.

Evidence of biodegradation is further supported by measurements of geochemical parameters used as indicators of biodegradation. These indicators include DO, redox potential (Eh), sulfate, ferrous iron, and methane concentrations. Geochemical parameters suggest an anaerobic condition within monitoring well 32M-92-06X. This is noted by a depletion of DO (1.07 mg/l), and a noticeable concentration of methane and ferrous iron. However, the concentrations of DCB have been fairly constant throughout 1999. It is believed that with time DCB concentrations will begin to attenuate as anaerobic bacteria use available methane as an electron acceptor to reduce the concentration (SWETS, 2000a).

Arsenic in groundwater was detected in several monitoring wells. Elevated arsenic concentrations coincide with areas where groundwater possesses a relatively low Eh, indicating that redox conditions are controlling arsenic solubility. The data suggest that as groundwater moves from areas of low Eh to areas of high Eh, the concentration of arsenic in solution should decrease, probably as a result of precipitation and formation of solid phases. Thus, mobility and transport of arsenic in groundwater should be limited at AOCs 32 and 43A.

Elevated lead concentrations observed in a limited number of monitoring wells are believed to be the result of small amounts of solid phase material (e.g., micro-particles and colloids) present in groundwater samples, which probably contained trace amounts of sorbed lead. The data indicate that the occurrence and mobility of lead at AOCs 32 and 43A is not a concern.

A Mann-Kendall test, used to assess statistical loss in contaminant concentrations, was performed. The test evaluated groundwater chemical data from the four sampling rounds and from sampling performed during the RI. With the exception of C9-C10 aromatics, organic compounds showed a downward trend as noted by the Mann-Kendall statistic.

Although remediation through natural attenuation is not applicable to inorganics, statistics were calculated to determine if downward inorganic concentration trends were occurring. No clear trends were observed at the 95percent confidence level. Downward trends at less than the 95percent confidence level were noted at some monitoring wells for concentrations of lead, arsenic, and manganese. Conversely, upward trends at confidence levels below 95percent were noted for concentrations of manganese and arsenic at some monitoring wells.

A detailed description of the Mann-Kendall test results is presented in the Monitoring Natural Attenuation Reports (SWETS, 2000b,c).

7.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS REVIEW

ARARs presented in Tables 24 and 25, reprinted from the ROD, are appended in Appendix E. These standards and regulations were current at the signing of the ROD and for the five-year site review, have been reviewed for changes that could affect protectiveness.

None of the ARARs listed in Appendix E have had changes since signing of the ROD that affect the protectiveness of the implemented remedial action. Several other regulations were updated since the ROD, but do not affect the protectiveness of the remedy. These updated regulations include:

- 40 CFR 268 RCRA, Land Disposal Restrictions was altered on July 6, 1999 specifically

with regard to 268.1 Purpose, Scope and Applicability and on June 8, 1998, specifically with regard to Appendix VII Effective Dates of Surface Disposed Prohibited Hazardous Wastes.
- Appendix A of 310 CMR 7.00 Massachusetts Air Pollution Regulations, updated in 1999 and revisions pertained to emission offsets and non-attainment review.
- 310 CMR 7.18 "Volatile and Halogenated Organic Compounds" was in effect May 1, 1998; applicable to facilities that emit VOCs.
- 314 CMR 6.00 Massachusetts Groundwater Quality Standards was updated December 27, 1996. Compliance at AOCs 32 and 43A is continued through achievement of the MCLs and MMCLs.

In addition, a search was performed for any newly promulgated standards which could affect protectiveness at the site. On June 22, 2000, USEPA proposed reducing the MCL for arsenic from 50 to 5 µg/L (FR 38887-38983). Promulgation of a new standard is required by January 1, 2001; however, the new standard will not take effect for 3 to 5 years.

7.5 SUMMARY OF SITE VISIT

An HLA representative performed site inspections at AOCs 32 and 43A on June 8, 2000. Conditions during the inspection were favorable with no precipitation and temperatures in the 60s.

All of the buildings associated with or near AOCs 32 and 43A have been removed. The topography of the area has been flattened, and the majority of the area's monitoring wells have been destroyed. At the time of the writing of this report, work had commenced on erecting a large warehouse on the property.

The following individuals were interviewed as part of the five-year review:

- Jim Chambers, BRAC Environmental Coordinator, Devens RFTA
- John Regan, MADEP
- David Margolis, USACE, New England District

All personnel were interviewed on June 8, 2000 at the Devens RFTA BRAC office. None of the interviewed personnel were aware of any site changes resulting from construction that would affect the selected remedy. It was a requirement of the redevelopment of the site that the destroyed monitoring wells be replaced following construction of the building. Mr. Chambers noted that the warehouse and paving would locally decrease recharge to groundwater, thereby improving the natural attenuation remedy.

Mr. Chambers believes that transfer of the property from the Army to the Devens Commerce Commission is imminent and the institutional controls specified in the ROD have been incorporated into the deed.

No one was aware of any violations of the institutional controls to-date. There have been no complaints, violations, or other incidents that have required a response by any of the interviewed personnel's offices. There were no general comments or recommendations.

7.6 AREAS OF NON-COMPLIANCE

There are no areas of non-compliance or deficiencies that have been noted during this review that would make the remedial actions at AOCs 32 and 43A non-compliant with the ROD, or sufficient to warrant a finding of not protective. This finding is based upon a review of site reports that have been prepared since the signing of the ROD, a review of ARARs triggered by the remedial action, and the findings from the site inspection and interviews.

7.7 ASSESSMENT

AOC 32 Surface and Subsurface Soil. Based on indications from analytical results of confirmatory soil samples collected from excavated areas, and the offsite disposal of excavated material and metal debris from AOC 32, site cleanup goals and remedial action objectives established in the ROD have been satisfied.

AOCs 32 and 43A Groundwater. Biodegradation of organic compounds is believed to be occurring. This is evidenced by observed concentration decreases of organic compounds in groundwater over time and by geochemical indicator parameters. The ultimate goal of the MNAA is to degrade contaminants in groundwater to below cleanup levels in 30 years. Based on groundwater monitoring results, MNAA will achieve this goal (SWETS, 2000b).

7.8 RECOMMENDATIONS

Surface and Subsurface Soil. Remedial actions have been successfully completed at AOC 32. No further remedial actions are necessary.

AOCs 32 and 43A Groundwater. Institutional controls, established in the ROD and described in further detail in (SWETS, 2000a), should be imposed on the properties to limit potential exposure to groundwater under both existing and future site conditions. Institutional controls will ensure that exposure to and extraction of groundwater from the site for industrial and/or potable water supply would not be permitted. The institutional controls for AOCs 32 and 43A will be incorporated either in full or by reference into deeds, easements, mortgages, leases, or other instruments of property transfer.

AOC 43A underwent significant redevelopment in 2000. As a result, major demolition, re-grading, and building/paving construction has altered the site's physical setting and hydrology. All of the groundwater monitoring wells sampled as part of the MNAA have been destroyed. The Army intends to install source area monitoring wells and re-initiate long-term monitoring sampling is planned for late Fall 2000. In addition, piezometers will be installed and monitored to characterize the newly-altered flow field. Sentinel wells will then be installed in appropriate locations to complete the monitoring locations, and long-term monitoring will continue.

7.9 PROTECTIVENESS STATEMENT

The remedies at AOCs 32 and 43A are expected to be protective of human health and the environment upon completion; immediate threats have been addressed.

A HASP and IDW handling procedures are in place, are sufficient to control risk to on-site workers and the public, and are being properly implemented during groundwater sampling. Human health is currently not at risk at AOCs 32 and 43A because groundwater at the AOCs are not being used for potable use nor proposed for potable use.

The remedial actions at AOCs 32 and 43A are expected to be protective of human health and the environment upon final achievement of RGs in groundwater. The demonstration of successful remedial action report (SWETS, 2000a) document that natural attenuation is effectively remediating groundwater at AOCs 32 and 43A based on available data. The Army intends to install source area groundwater monitoring wells and re-initiate long-term monitoring. No contingency action is required at this time at either AOC.

Current remedial action activity consists of implementing the remaining components specified in the ROD: a long term groundwater monitoring program, annual reporting, and five-year site reviews. These components enable continued assessment for compliance with performance standards and reporting of the remedial progress.

7.10 NEXT REVIEW

These AOCs are statutory sites that require ongoing five-year reviews. This is the first five-year review that has been performed at either AOC. The next review will be performed within five years of the completion of this five-year review report. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for nonconcurrence.

REFERENCES

Stone and Webster Environmental Technology & Services (SWETS), 2000a. "Final Demonstration of Remedial Actions Operating Properly and Successfully", AOCs 32 and 43A, DRMO and POL, Devens, Massachusetts. Prepared for the U.S. Army Corps of Engineers, New England District, Concord, Massachusetts. February.

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8.0 AOC 69W FIVE-YEAR SITE REVIEW

8.1 SITE DESCRIPTION AND HISTORY

AOC 69W is located at the northeast corner of the intersection of MacArthur Avenue and Antietam Street on the northern portion of what was formerly the Main Post at Fort Devens (Figure 1-1). AOC 69W is comprised of the former Fort Devens Elementary School (Building 215) and the associated parking lot and adjacent lawn extending approximately 300 feet northwest to Willow Brook. Contamination at AOC 69W is attributed to No. 2 heating oil which leaked from underground piping in two separate incidences; once in 1972 and again in 1978. It is estimated that approximately 7,000 to 8,000 gallons of fuel oil were released to soil from each release (Figure 8-1).

The following items summarize the history for AOC 69W. Refer to Section 1.0 for general enforcement activities at Fort Devens (i.e., initiation of a MEP, placement on the NPL, and signing of the FFA).

- **1951.** The Fort Devens Elementary School was built and was comprised of the east/southeast half of the present school. The school was heated by an oil-fired boiler, and the heating oil was stored in a 10,000-gallon UST located in what is currently the school courtyard. The school was operated and maintained by the Ayer School Department.

- **1972.** An addition to the school was built which formed the current school structure. Although a new boiler room was constructed, the old boiler room remained operational. The original 10,000-gallon UST was removed and a new 10,000-gallon UST was installed north of the school in the middle of the current parking lot. During the UST installation, the underground fuel line leading to the new boiler room was accidentally crimped, causing the pipe to split and leak approximately 7,000 to 8,000-gallons of No. 2 fuel oil to the ground.

- **1972-1973.** As a result of the fuel release, an oil recovery system was installed in the vicinity of the 10,000-gallon UST. The system consisted of underground piping connected to a buried 250-gallon concrete vault that acted as an oil/water separator. The vault collected oily water and was pumped out approximately every three months.

- **1978.** Underground fuel piping near the old boiler room failed at a pipe joint. Approximately 7,000 to 8,000-gallons of oil were released into the soil during the incident. Soil was excavated to locate the source of the release. The excavation was used to collect the residual oil for one month before the damaged piping was found and replaced. A minimum of 2,600-gallons of residual oil was pumped from the oil recovery system.

- **1993.** The Ayer School Department closed the school because the facility was excess to its needs. As part of the Base Closure process the Army performed a basewide evaluation of past spill sites and designated the elementary school spill site as AREE 69W. Based on document reviews and site visits, the evaluation concluded that residual fuel contamination may have been present in the soil and groundwater at the site.

- **1994.** The Army performed a SI which revealed the presence of fuel-related contaminants in both soil and groundwater between the school and the existing fuel UST, and in an area extending northwest from the existing fuel UST to near Willow Brook. The Army redesignated the site as AOC 69W and proposed that a RI be performed.

- **1995-1998.** An RI was performed to define the distribution of contaminants previously detected in the soil and groundwater during the AREE SI, and to determine whether remediation is warranted. Investigation activities included an historical record search and personnel interviews; a geophysical survey and test pitting; sediment and toxicity sampling in Willow Brook; surface and subsurface soil sampling; groundwater monitoring well installation; groundwater sampling and groundwater level measurements; aquifer testing; ecological survey and wetland delineation; air quality sampling within the elementary school; and human-health and ecological risk assessments (Figure 8-1). The RI data showed that fuel-related compounds, primarily TPHC and SVOCs, were present in soils extending from the new (1972) boiler room to approximately 300 feet northwest. Fuel-related VOCs, SVOCs, TPHC, and inorganics comprised the observed groundwater contaminants. Soil and groundwater contamination appeared to be largely a result of the 1972 fuel oil release. The underground oil recovery system apparently acted as a conduit for contaminant migration in soil and groundwater. Observed contamination from the 1978 release did not appear to be migrating downgradient and further migration is unlikely considering the age of the release and the paved parking lot that inhibits precipitation infiltration.

- **1996.** Fort Devens officially closed. AOC 69W slated for future transfer to the Massachusetts Government Land Band. The existing school building is expected to be re-opened in the near future.

- **1997-1998.** Based on a review of the soil and groundwater contaminant data, the Army performed a removal action and excavated approximately 3,500 cy of petroleum-contaminated soil associated with the 1972 fuel oil leak (see Figure 8-1). The 10,000-gallon fuel oil UST and the oil recovery system's 250-gallon vault and associated piping were also removed. The 10,000-gallon fuel oil UST was confirmed to be intact (i.e., no holes or leaks were observed). Confirmatory soil sampling in excavated areas indicated that EPH and VPH concentrations immediately adjacent to the school still exceeded the MCP Method 1 S-1/GW-1 soil standards after the removal action. Because of the proximity of the school, this soil could not be excavated without potential structural damage to the building. Because the area is paved, there is minimal potential for further migration of contaminants and future exposure.

- **1999.** Limited Action ROD signed. The Limited Action consists of long-term groundwater monitoring and institutional controls to limit the potential exposure to contaminated soils and groundwater under both existing and future site conditions.

Significant findings of the RI are summarized in the following subsections.

8.1.1 Summary of Site Geology and Hydrogeology

The predominant soil type at AOC 69W consists of dark yellowish-brown fine to coarse sands, gravely sands, and silty sands. Explorations in the vicinity of Willow Brook and its associated wetlands revealed a four- to five-foot layer of dark grayish-brown, sandy silt overlying the sands. Organic material was found in the area north of the school at a maximum depth of 4 feet bgs. Near surface soils beneath the school and parking lot consist of reworked native soils. Bedrock was not encountered at AOC 69W. The water table aquifer at AOC 69W occurs in the overburden at depths ranging from 4 to 6 feet bgs on the north side of the school building to approximately 1-foot bgs adjacent to Willow Brook. Groundwater flow directions are predominately south-southeast to north-northwest. Groundwater discharges to Willow Brook at times of high groundwater levels. Vertical gradients were not calculated as there are no deep overburden wells; however, the intermittent discharge to Willow Brook indicates locally upward gradients. Calculated groundwater flow velocities are consistent with the observed sandy soils with a maximum calculated flow velocity of 2 feet/day and a mean flow velocity of 0.7 feet/day. AOC 69W is located within the delineated Zone 2 for the MacPherson production well located approximately 3,000 feet to the north.

8.1.2 Soil Contamination

A review of the field and off-site analytical data from the 1995 and 1996 RI field investigations indicated that there were two areas of fuel-related soil contamination at AOC 69W. The larger area extended from the new boiler room to the 250-gallon UST in the wooded area approximately 300 feet northwest of the school. The contamination was attributed to the 1972 release of fuel oil from piping between the 10,000-gallon UST and the new boiler room. Analytical data and visual evidence suggested that the release may have been inside or near the new boiler room. As a result of the release, an oil recovery system was installed in 1972 to remove oil from the source area and presumably from near surface soils in the grassy area north of the school. Contaminant distributions established by the RI indicated that the trench for the underground piping associated with this system may have acted as a conduit for contaminant migration. Detected contaminants were primarily TPHC, polynuclear aromatic hydrocarbons (PAHs), and EPH/VPH at approximately 6 to 10 feet bgs adjacent to the school and 0 to 4 feet bgs downgradient in the grassy area and in the vicinity of the 250-gallon UST. Detected subsurface contaminants were located primarily at or near the water table. Surficial contamination downgradient of the school (near Willow Brook) is attributed to sorption during times of high groundwater levels.

Based on the nature and distribution of contaminants, a Removal Action was undertaken in the winter of 1997 and 1998 to remove contaminated soil associated with the 1972 release. Soil was excavated to a maximum depth of 13 feet bgs near the school, and 8 feet bgs near the 250-gallon UST. Confirmatory subsurface soil sample results from the Removal Action showed that concentrations of fuel-related contaminants still exceed MCP S-1/GW-1 standards for EPH in subsurface soils immediately adjacent to the school building, but are generally low in downgradient areas (only a few concentrations in soil slightly exceeded MCP S-1/GW-1 standards).

The other identified area of soil contamination is located adjacent to the school building outside of the old boiler room. This contamination is attributed to the 1978 release of fuel oil from ruptured piping. An excavation at the time of the release showed visible fuel oil contamination emanating from underneath the school. Analytical data indicate that the contaminants are primarily TPHC at depths of 4 to 7 feet bgs beneath the paved parking lot. Contaminants appear to be localized in the area immediately adjacent to the school. Site related contaminants were absent from downgradient soils (e.g., ZWR-95-27X, ZWR-95-54X, and ZWR-95-55X). Future migration is not likely as the area is paved, thereby inhibiting leaching of soils via precipitation infiltration.

8.1.3 Groundwater Contamination

Fuel-related VOCs, SVOCs, TPHC, and inorganics comprise the observed groundwater contaminants at AOC 69W. Varying degrees of groundwater contamination, as identified by field and off-site analysis, were observed to extend from the new boiler room towards the 250-gallon UST located approximately 300 feet to the northwest. The area of groundwater contamination was coincident with the underground pipe associated with the oil recovery system installed in response to the 1972 fuel oil release. Contaminant concentrations were highest between the new boiler room and monitoring well 69W—94-13, which was also the area of highest observed soil concentrations. The soil around monitoring wells 69W—94-10 and 69W—94-13 exhibited the highest contaminant and inorganic concentrations and were removed during the soil Removal Action.

Arsenic, calcium, iron, manganese, potassium, and sodium were detected in filtered samples at concentrations in excess of calculated Devens RFTA background concentrations. The greatest number of background exceedances and the only recorded MCL exceedances in Rounds 1 through 4 were observed in monitoring wells 69W—94-10 and 69W—94-13. Analytes that exceeded MCLs in these wells included arsenic, naphthalene, and the EPH and VPH aromatic fractions. Contaminated soils surrounding these wells were removed during the soil Removal Action.

The RI did not reveal any significant groundwater contamination associated with the 1978 fuel oil release in the vicinity of the old boiler room. Low concentrations of chlorinated VOCs were detected during the 1995 field analysis and Round 1 groundwater sampling; however, there were no chlorinated VOCs detected during the Rounds 2, 3, or 4 groundwater sampling efforts.

8.1.4 Summary of Site Risks

The risk assessment contained in the RI report evaluates the probability and magnitude of potential human-health effects associated with exposure to contaminated media at AOC 69W. The human-health risk assessment followed a four step process: (1) contaminant identification, which identified those hazardous substances that, given the specifics of the site, were of significant concern; (2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations, and determined the extent of possible exposure; (3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances; and (4) risk characterization, which integrated the three earlier steps to summarize the potential and actual risks posed by hazardous substances at the site, including carcinogenic and non-carcinogenic risks. A detailed discussion of the human-health risk assessment approach and results is presented in Section 9.0 of the RI report.

Ten soil analytes, 14 groundwater analytes, three sediment analytes, and four air analytes, listed in Table 1 in Appendix B of the ROD, were selected as chemicals of potential concern for evaluation in the human-health risk assessment of the RI report. These chemicals of potential concern were selected to represent potential site-related hazards based on toxicity, concentration, frequency of detection, mobility, and persistence in the environment. A summary of the health effects of each of the chemicals of potential concern can be found in the risk assessment detailed in Section 9.0 of the RI report.

Potential human-health effects associated with exposure to the chemicals of potential concern were estimated quantitatively or qualitatively through the development of several hypothetical exposure pathways associated with current and anticipated future land use. These pathways, listed below, were developed to reflect the potential for exposure to hazardous substances based on the present uses, potential future uses, and location of the site. A more detailed description can be found in Subsection 9.3.1 of the risk assessment.

Potential Exposure Pathways for Current and Future Land Use

- site maintenance worker exposure through dermal contact or incidental ingestion of surface soil and inhalation of soil particulates while maintaining the grassy area
- child trespasser exposure through incidental ingestion or dermal contact to surface water and sediment (as groundwater discharge) while wading in the brook or wetland area, incidental ingestion or dermal contact to surface soil while playing, and inhalation of particulates from soil

Potential Exposure Pathways for Future Land Use

- utility/construction worker exposure through incidental ingestion or dermal contact to surface and subsurface soil, inhalation of VOCs from soil, and inhalation of particulates from surface and subsurface soils
- school occupants (pupils) exposure through inhalation of VOCs in indoor air, incidental ingestion or dermal contact to surface water and sediment (as groundwater discharge) while wading in the brook or wetland area, incidental ingestion or dermal contact to surface soil while playing, and inhalation of particulates from soil
- general public exposure to site groundwater as a potable water source

Excess lifetime cancer risks were determined for each exposure pathway by multiplying the exposure level with the chemical-specific cancer slope factor. Cancer slope factors have been developed by USEPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic chemicals. That is, the true risk is unlikely to be greater than the risk predicted. The resulting risk estimates are expressed in scientific notation as a probability (e.g., $1x10^{-6}$ for 1/1,000,000) and indicate (using this example), that an average individual is not likely to have greater than a one in a million chance of developing cancer over 70 years as a result of site-related exposure to the chemical at the stated concentration. Current USEPA practice considers carcinogenic risks to be additive when assessing exposure to a mixture of hazardous substances.

The HI was also calculated for each exposure pathway as a measure of the potential for non-carcinogenic health effects. The HI is the sum of the hazard quotients (HQs) for individual chemicals with similar exposure pathways and toxic endpoints. A HQ is calculated by dividing the exposure level by the RfD or other suitable benchmark for non-carcinogenic health effects for each individual chemical. RfDs have been developed by USEPA to protect sensitive individuals over the course of a lifetime, and they reflect a daily exposure level that is likely to be without an appreciable risk of an adverse health effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. The HQ is often expressed as a single value (e.g., 0.3) indicating the ratio of the stated exposure to the RfD value (in this example, the exposure as characterized is approximately one third of an acceptable exposure level for the given chemical). The HQ is only considered additive for chemicals that have the same or similar toxic endpoint. For example, the HQ for a chemical known to produce liver damage should not be added to a second whose toxic endpoint is kidney damage. HQs do not need to be segregated unless the HI for all COPCs for the receptor is greater than one.

Under current land use conditions the estimated excess carcinogenic risks for exposure of a child trespasser and site maintenance worker to soil, sediment, and groundwater were within the USEPA acceptable risk range of $1x10^{-4}$ to $1x10^{-6}$. Similarly, potential non-cancer risks did not exceed the USEPA HI threshold value of 1. Estimated excess carcinogenic risks under future land use conditions were evaluated for a pupil (exposure to surface soil, sediment, groundwater, and indoor air) and utility worker (exposure to surface soil and subsurface soil). The excess carcinogenic risk for a pupil is within the USEPA acceptable risk range while the utility worker risk was less than the USEPA threshold level of $1x10^{-6}$. Again, potential non-cancer risks did not exceed the USEPA HI threshold value of 1.

There is no current use of groundwater at AOC 69W; therefore, the risk assessment evaluated potential risks associated with a future residential potable use. Estimated cancer and non-cancer risks associated with this hypothetical future exposure exceeded levels generally considered acceptable by the USEPA. These risks result primarily from the presence of arsenic in groundwater. The arsenic concentrations have been shown to be decreasing and are anticipated to further decrease because of contaminated soil removal. Furthermore, the arsenic concentrations that resulted in the excess risk were from monitoring wells 69W—94-10 and 69W—94-13. These wells, along with the surrounding contaminated soils were excavated during the 1997-1998 soil removal action. The historic arsenic concentrations are therefore believed to be a worst case scenario.

Potential risks for ecological receptors were evaluated for chemicals detected in surface soil, sediment, and groundwater at AOC 69W. Chemicals of potential concern that were identified in these media included metals, pesticides, PCBs, SVOCs, VOCs, and petroleum-related compounds including TPHC, EPH/VPH, and PAHs.

The following exposure pathways were evaluated in the ecological risk assessment:

- small mammal and bird, predatory mammal, terrestrial plant, and soil invertebrate exposures to surface soil
- small mammal and bird, predatory mammal, and aquatic receptor exposures to sediment in Willow Brook
- aquatic receptors exposures to groundwater that seasonally discharges to Willow Brook

The ecological risk assessment for aquatic receptors is highly conservative as Willow Brook is only seasonally inundated and is generally characterized as a degraded ditch habitat.

In general, there are no risks to ecological receptors except in few cases where negligible risks were estimated. Risks to terrestrial plants may occur at one surface soil sample location (ZWS-95-42X) because of the presence of lead. However, the presence of lead at this location may be associated more with road run-off or lawn mower maintenance than from the fuel oil release. Risks to the plants would be localized, and are not likely to result in population-level effects.

Risks to aquatic organisms were also identified for certain metals; however, the soil removal action has likely mitigated the reducing conditions in the subsurface soils that may have mobilized the metals in groundwater. Adverse effects were observed for aquatic organisms exposed to sediment in toxicity tests; however, these adverse effects are likely related to the poor habitat and substrate quality, rather than the presence of site-related chemicals. This is supported by the fact that exposure point concentrations for chemicals detected in sediment only slightly exceeded sediment benchmarks.

Based on the conclusions of the ecological risk assessment, there are no unacceptable risks associated with site-related fuel oil contamination at AOC 69W.

8.2 REMEDIAL OBJECTIVES

The RAOs for the site are:

- Restore the aquifer to drinking water standards within a reasonable time frame.
- Monitor potential future migration of ground water contamination
- Eliminate risk from potential consumption of groundwater
- Reduce or eliminate the direct contact threat of contaminated soils

The basis of the RAOs is the potential health risks to individuals based on current and future use scenarios (i.e., maintenance worker, and elementary school children scenario) at the site. The risk assessment results estimated cancer and non-cancer risks associated with the possible current and future exposures to surface soil, subsurface soil, sediment, groundwater discharge to surface water and indoor air were all within acceptable levels. Groundwater used as potable water source does exceed risk levels generally considered acceptable by the USEPA. The risk is attributable to arsenic in groundwater as a potable water source. The rationale for implementing the limited action alternative is two-fold:

1) The groundwater will not be used as a drinking water source. The town of Devens has a municipal water supply. Therefore, the groundwater poses no unacceptable risk to human health or the environment.
2) The Army will monitor arsenic and EPH/VPH levels in ground water and place Institutional Controls on the property to ensure current and future protectiveness.

8.3 Description of Remedy

A ROD was signed in June 1999 documenting Limited Action as the final selected cleanup remedy at AOC 69W. Because of previous source removal, the remedy only requires institutional controls and long-term monitoring of groundwater. A FS was not performed.

The Limited Action alternative for AOC 69W includes the following key components:

- Institutional Controls, including deed and/or use restrictions, are established and enforced that restrict or prevent potential human exposure to site soil and ground water contaminants left in place.
- A LTMP is developed to monitor for any potential off-site migration of contaminants and to verify that elevated concentrations decrease over time. The LTMP details the installation of additional water table groundwater monitoring wells to replace source area wells and downgradient sentry wells to monitor for off-site migration. Eight wells will be monitored twice annually for EPH, VPH, iron, manganese, arsenic, and bis(2-ethylhexyl)phthalate.
- Five-year reviews are performed to review the data collected and assess the effectiveness of the remedy.

The LTMP states that if there is indication that contaminants are migrating downgradient from the former source area, the Army in conjunction with MADEP and USEPA representatives will evaluate the need for additional action. Contaminants will be deemed to be migrating downgradient if any COCs are detected above their respective action levels in any of the designated sentry wells (ZWM-95-15X, ZWM-95-18X, ZWM-99-23X, and ZWM-99-24X).

Annual reports will be submitted to USEPA and MADEP. The annual reports will include a description of site activities, a result of site inspections, and a summary of the long-term groundwater monitoring results.

The expected outcome of this alternative is to restore the aquifer to drinking water standards within a reasonable time frame and to prevent exposure to contaminants remaining at the site through the establishment of institutional controls

8.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS REVIEW

The standards presented in Table 8-1 in Appendix E were identified as ARARs in the ROD. They were reviewed for changes that could affect protectiveness. None of the listed ARARs have been changed since signing of the ROD. It should be noted that notice has been given for Public Hearings (July 2000) on proposed amendments to the 310 CMR 22.00 Drinking Water Regulations. Proposed revisions do not affect AOC 69W because these revisions entail 1) a change to the public water system definition to clarify how systems with multiple sources on one parcel of land are classified as multiple systems, 2) the MCL for nickel is under review by the EPA but is still listed in Massachusetts as a guideline, and 3) sampling requirements for VOCs have become more stringent for public water systems.

On June 22, 2000 USEPA proposed reducing the MCL for arsenic from 50 to 5µg/L. Promulgation of a new standard is required by January 1, 2001; however, the new standard may not be implemented for 3 to 5 years.

In addition, a search was performed for any newly promulgated standards which could affect protectiveness at the site. Due primarily to the recent ROD signature date for AOC 69W, no new ARARs were identified.

8.5 SUMMARY OF SITE VISIT

An HLA representative performed site inspections at AOC 69W on June 8, 2000. Conditions during the inspection were favorable with no precipitation and temperatures in the 60s.

There was no observed excavations or other violations of proposed institutional controls anywhere at the site. All wells were intact and secured. The flush mount casing on ZWM-99-22X, located in the source area parking lot, had been struck by a plow and may require replacement in the future. Work was commencing on the inside of the school building in anticipation of reuse.

The following individuals were interviewed as part of the five-year review:

- Jim Chambers, BRAC Environmental Coordinator, Devens RFTA
- John Regan, MADEP
- David Margolis, USACE, New England District

All personnel were interviewed on June 8, 2000 at the Devens RFTA BRAC office. Jim Chambers stated that land use restrictions as outlined in the ROD will be covered by the Installation Master Plan. Implementation of institutional controls into the deed would occur upon transfer of the property. Transfer of the property was pending implementation of the Land Use Plan. None of the personnel were aware of any violations of the institutional controls as outlined in the ROD and LTMP.

None of the interviewed personnel were aware of any complaints, violations, or other incidents which required a response by their respective offices.

8.6 AREAS OF NON-COMPLIANCE

There are no areas of non-compliance or deficiencies that have been noted during this review that would make the remedial action at AOCs 69W non-compliant with the ROD, or sufficient to warrant a finding of not protective. This finding is based upon a review of site reports, a review of ARARs and the findings from the site inspection and interviews.

8.7 ASSESSMENT

Question A: Is the Remedy Functioning as Intended by the Decision Documents?

HASP: The health and safety procedures for long-term groundwater monitoring at AOC 69W are provided in Appendix A of the Fort Devens Project Operations Plan (ABB-ES, 1995). This document and the Long-term Monitoring Plan also include IDW handling requirements. The HASP is being properly implemented for protection of on-site workers (monitoring well installation personnel and groundwater samplers), the public, and the environment.

Implementation of Institutional Controls and Other Measures: There are no current or future plans for installation of potable water wells at AOC 69W. Institutional control restrictions as outlined in the ROD (prohibiting installation of drinking water wells at the site and restricting execution within the soils management area) will be covered by the Installation Master Plan until the time of property transfer. Upon transfer of the property to Mass Development, institutional controls will be incorporated into the deed and a Land Use Control Memorandum of Agreement.

Remedial Action Performance: Transfer of the property is pending the Land Use Plan Memorandum of Agreement; therefore, institutional controls have not been officially implemented into the deed. However, there have been no known violations of the stated institutional controls. Long-term groundwater monitoring commenced in May of 2000. Data from the long-term monitoring is not yet available for review.

System Operations/Operation and Maintenance: Groundwater monitoring is being performed in accordance with the approved Long-Term Monitoring Plan for AOC 69W (HLA, 2000).

Cost of System Operations/Operation and Maintenance: Yearly O&M costs for implementation of the remedy at AOC 69W are not yet available for review.

Opportunities for Optimization: Recommendations for optimization of the long-term monitoring plan are pending review of the first round of sampling data. Conditions for removal of specific analytes are outlined in the Long-Term Monitoring Plan. At this time, iron is no longer considered a COC and this Five-Year Review Report recommends removal of iron as a monitored contaminant. Refer to changes in Risk Assessment Methodologies in this subsection and Subsection 5.8, Recommendations. In addition, it is recommended that groundwater monitoring be discontinued if four consecutive representative samples are below action criteria.

Early Indicators of Potential Remedy Failure: No early indicators of potential remedy failure were noted during the review.

Question B: Are the Assumptions Used at the Time of Remedy Selection Still Valid?

Changes in Standards and To Be Considered: With the exception of arsenic, this five-year review did not identify any changes to existing ARARs. Furthermore, the review did not identify any newly promulgated standards or regulations which would affect the selected remedy at AOC 69W.

Changes in Exposure Pathways: No changes have occurred at the site which would act to add exposure pathways which were not evaluated during the RI. There are no current or planned land uses which were not evaluated during the RI. No new contaminants or sources were identified as part of the long-term monitoring or this review. There is no indication that hydrogeologic conditions are not adequately characterized.

Changes in Toxicity and Other Contaminant Characteristics. There have been no changes in toxicity or other factors for COCs at the site.

Changes in Risk Assessment Methodologies: Identified changes in risk assessment methodologies since the time of the ROD are discussed below.

Iron was identified as a COC in the ROD because non-cancer risks calculated for potential exposures to iron in groundwater exceeded a HI of 1. The non-cancer risks were calculated using a provisional oral RfD developed by the National Center for Environmental Assessment. USEPA Region I has since indicated that the agency does not endorse use of the iron RfD, because the RfD was developed based on concentrations needed to protect against a nutritional deficiency, rather than on quantitative estimates related to the hazard posed by overexposure to the element (USEPA Region I Risk Updates; Number 5; August, 1999). Based on this guidance, non-cancer health risks would not be calculated for iron. Consequently, a HI for iron would not be derived, and iron would not be identified as a COC based on health risk concerns.

8.8 RECOMMENDATIONS

Recommendation No. 1. Remove iron as a COC and as a sampled analyte in the Long-Term Monitoring Plan for ACO 69W. Refer to Subsection 8.7, Assessment.

Recommendation No. 2. Terminate groundwater monitoring if four consecutive groundwater samples are below action criteria.

8.9 PROTECTIVENESS STATEMENT

The selected remedy (No Further Action) at AOC 69W is protective, and is expected to remain protective, of human health and the environment.

A HASP and IDW handling procedures are in place, are sufficient to control risk to on-site workers and the public, and are being properly implemented during groundwater sampling. Human health is currently not at risk at AOC 69W because groundwater is not being used for potable use nor proposed for potable use, and COCs exceeding MCL/MMCLs is not migrating off-site.

Current remedial action activity consists of long-term groundwater monitoring, annual reporting, implementation of institutional controls, and five-year site reviews. The first round of groundwater sampling was performed in May 2000. Data is not yet available for review. Institutional controls will be placed in the deed at the time of property transfer. These components enable continued assessment of remedial progress.

8.10 NEXT REVIEW

AOC 69W is a statutory site that requires ongoing five-year reviews. This is the first five-year review that has been performed at AOC 69W. The next review will be performed within five years of the completion of this five-year review report. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for nonconcurrence.

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9.0 AOCs 9, 11, 40, SA 6, 12, 13, 41 (SOLID WASTE) FIVE-YEAR SITE REVIEW

9.1 SITE DESCRIPTION AND HISTORY

This subsection describes the debris disposal sites, including a summary of contaminant characterization. A summary of post-investigation, CERCLA-related site history is also presented.

SAs 6 and 12, and AOC 41 are located on the South Post (see Figure 1-1). AOC 9 is located on the former North Post of Fort Devens. AOCs 11 and 40, and SA 13 are located on the former Main Post of Fort Devens.

SIs were performed at SAs 12 and 13, and AOCs 9, 40, and 41 to verify the presence or absence of environmental contamination and to determine whether further investigation or remediation was warranted. Supplemental SI activities were performed at SAs 12 and 13, and AOC 41 to address data gaps identified in the SI reports. RIs were completed at AOCs 11, 40, and 41 to further assess contaminant distribution; the RIs included baseline human-health and ecological risk assessments for the three sites.

Predesign investigations were performed at SAs 6, 12, and 13, and AOC 9 (ABB-ES, 1994b) to define depth, areal extent, type of waste, composition of waste, and site conditions to help identify appropriate remedial alternatives.

Descriptions of the landfill sites, including contamination assessments and risk evaluations, where applicable, are available in the data packages, SI reports, and RI reports listed in Table 9-1 in Appendix G. These relevant documents were reviewed as part of the five-year review.

9.1.1 Description and History of SA 6

SA 6 is located on the eastern side of Shirley Road on the South Post (see Figure 1-1). The South Post is to be retained by the Army for continued military training. SA 6 was used between 1850 and 1920, prior to Army ownership, for disposal of household debris. Debris was deposited in a low area, less than one-quarter acre in size, south of the access road (Figure 9-1). SA 6 is moderately forested with hardwood trees. The disposal area has not been covered, and debris is visible on the ground surface.

Army investigations at SA 6 determined that the landfill contains household debris, primarily metal and glass. The volume of debris in the landfill is approximately 500 cy. Archaeologists have determined that SA 6 may be valuable in researching the socioeconomic status and trash disposal behavior of 19th Century northern Lancaster residents.

9.1.2 Description and History of AOC 9

AOC 9 is located on the former North Post, north of Walker Road and west of the wastewater treatment plant (Figure 1-1). The landfill was operated from the late 1950s until 1978 and was used by the Army, National Guard, contractors, and off-post personnel. Landfill material at AOC 9 is generally demolition debris, including wood, concrete, asphalt, metal, brick, glass, and tree stumps. Debris volume is estimated to be approximately 112,000 cy. Because of the extent of the partially vegetated cover, the area is generally not recognizable as a former landfill.

A geophysical survey was performed during the SI to supplement information derived from evaluation of aerial photographs and to help delineate the actual limits of the landfill. The results of the survey assisted in the placement of test pits and groundwater monitoring wells, and provided insight into the distribution of landfill debris. Results of the geophysical survey indicated that the landfill consists of five areas: a larger northern pod containing the majority of landfilled materials, and four smaller southern pods adjacent to the wetlands containing mostly near-surface debris (Figure 9-2).

AOC 9 Surface Water Contamination. During the SI at AOC 9, surface water samples were collected from the Nashua River and the swampy area south of the debris landfill. Concentrations of some inorganics were measured above background concentrations. The SI report suggested that inorganic concentrations in the river likely represent typical Nashua River water quality in the general area. The SI report concluded that contaminant effects on surface water from AOC 9 debris are probably not significant.

AOC 9 Sediment Contamination. Relatively low concentrations of TPHC and some inorganics are present in sediment samples collected from the swampy area south of the debris landfill. Relatively low concentrations of VOCs and SVOCs were measured in sediment samples collected from the Nashua River. Concentrations of inorganics in Nashua River sediment samples were relatively consistent upstream and downstream of AOC 9, and likely represent typical Nashua River sediment quality in the area. The SI report concluded that contaminant effects on sediment from AOC 9 debris are probably not significant.

AOC 9 Surface Soil Contamination. Organic contaminants were not detected in surface soil samples collected at AOC 9. The inorganics copper, lead, and nickel were detected at concentrations above the concentrations established as background at Devens RFTA, but below residential standards set by USEPA. Arsenic was detected at a concentration above USEPA residential standards, but below Devens RFTA background.

AOC 9 Subsurface Soil Contamination. Organic compounds detected in AOC 9 subsurface soil consist mostly of PAHs and TPHC. Because of their consistent co-location in samples collected from AOC 9, PAHs and TPHC are believed to be present as a result of charred lumber and ashes mixed with the demolition debris. Except for arsenic and beryllium, maximum concentrations of inorganics detected in subsurface soil were below screening standards established by USEPA for protection of a commercial/industrial worker. The maximum concentration of arsenic was equal to the Devens RFTA background concentration, and the maximum concentration of beryllium (1.0 μg/g) was higher than the commercial/industrial standard (0.67 μg/g).

AOC 9 Groundwater Contamination. Two rounds of groundwater samples were collected from monitoring wells at the site during the investigation. Two organic compounds were detected in AOC 9 groundwater. Chloroform was detected in one of ten samples collected during Round 1. The chloroform concentration was below the Massachusetts drinking water standard. TPHC was detected in three of ten samples, once in Round 1 and twice in Round 2. No drinking water standard or guideline exists for TPHC.

Inorganics were detected above background concentrations in nearly all groundwater samples collected from AOC 9 monitoring wells. Several organics were detected in up-, down-, and cross-gradient wells. Maximum concentrations of eight of the eighteen inorganics detected in unfiltered Round 1 samples exceeded their respective drinking water standard or guideline. The eight inorganics are aluminum, arsenic, chromium, cobalt, iron, lead, manganese, and nickel. Filtered samples collected during Round 2 showed reductions in concentrations of these inorganics, suggesting that elevated concentrations are result from suspended solids in the samples. During Round 2, reported concentrations of chromium, lead, and nickel were below their respective drinking water standards or guidelines.

9.1.3 Description and History of AOC 11

AOC 11 is located east of Lovell Road on the Main Post, adjacent to the Nashua River (Figure 1-1). The two-acre landfill received wood-frame hospital demolition debris from 1975 to 1980. Debris volume is estimated to be approximately 35,000 cy. The landfill is within a wetlands complex that runs along the western side of the Nashua River (Figure 9-3). East of the landfill, a 40-foot wide soil berm separates the landfill from the Nashua River. Refuse, including large pieces of metal, wood, bricks, and other construction debris is exposed at the ground surface throughout the site, except where an access road has been constructed over the fill. The landfill area is vegetated and is bordered on the north and south by wetlands.

The RI report for AOC 11 concluded the primary mode of contaminant transport from the debris landfill is by surface water runoff into the wetland areas adjacent to the landfill, where a significant proportion of contaminants sorb to sediments. Surface water in the wetlands contains metals and PAHs. However, the Nashua River contains metals and PAHs in surface water both adjacent to and upstream of AOC 11. Contamination in wetland surface water could be attributed to Nashua River contamination, and may not be related to AOC 11 debris.

AOC 11 Sediment Contamination. Sediments in the Nashua River and in wetland areas adjacent to the debris landfill contain pesticides, PCBs, PAHs, and metals. Pesticides concentrations were below Devens RFTA background concentrations; it is not clear whether PCBs, detected at relatively low concentrations in sediment, are from the debris area or from the Nashua River during periodic flooding; PAHs could be attributable to the Nashua River, and may not be related to AOC 11 debris; some metals were detected in sediment at concentrations exceeding Devens RFTA background concentrations.

AOC 11 Surface Soil Contamination. Pesticide concentrations measured in surface soil samples were, with the exception of one sample, below Devens RFTA background concentrations. Higher concentrations of PAHs were measured in surface soil samples collected within the debris area, compared to those collected outside the area. Metals were detected at concentrations exceeding background values at sample locations throughout the site.

AOC 11 Groundwater Contamination. Two rounds of groundwater sampling were collected for analysis during the RI. Relatively low concentrations of the pesticides DDD and DDT were detected in one monitoring well during the first round. Several metals were detected in groundwater during both sampling rounds. The highest metals concentrations were found in the northernmost groundwater monitoring well 11M-94-05X. Higher concentrations, and more metals types were detected in the shallower wells screened near the water table, while lower metals concentrations were detected in the deep well screened just above bedrock. Sampling results indicated that assorted metals at concentrations above and below respective drinking water standards and guidelines are being transported from the debris landfill to the Nashua River via groundwater flow.

9.1.4 Description and history of SA 12

SA 12, about one-half acre in size, is located on a steep, wooded slope adjacent to the Nashua River floodplain and partially encroaching on wetlands on the South Post. The landfill is located across Dixie Road from B and P Ranges (Figures 1-1 and 9-4). SA 12 was used by the Army beginning in 1960, was still in use in 1982, and appeared in 1988 to have been inactive for several years. The debris came from construction and range operations.

Debris at SA 12 consist mostly of lumber, sheet metal, concrete, and leaves mixed with soil. Debris volume is estimated to be approximately 8,700 cy .

SA 12 Surface Water Contamination. Inorganics were detected in surface water samples collected between the SA 12 debris area and the Nashua River. These detections could be attributable to Nashua River contamination, and may not be related to SA 12 debris.

SA 12 Sediment Contamination. Sediments between the SA 12 debris area and the Nashua River contain PAHs, TPHC, pesticides, and inorganics. Concentrations of similar contaminants in Nashua River sediment were higher than those in sediment at the foot of the debris area. This suggests that the river itself contributes to sediment contamination at the foot of the debris area.

SA 12 Surface Soil Contamination. The highest concentrations of PAHs, TPHC, pesticides, and inorganics measured in surface soil at SA 12 were associated with samples collected from the soil directly above the debris landfill. Evaluation of samples collected at SA 12 indicate that the majority of potential human-health and ecological risk from surface soil results from stained soil directly above the debris area.

SA 12 Groundwater Contamination. Organic compounds were not detected in groundwater samples collected at SA 12. Inorganic compounds were detected in unfiltered groundwater samples collected from shallow sumps downgradient from the debris landfill. It is believed that concentrations of inorganics detected in groundwater at SA 12 are largely the result of suspended solids in the samples.

9.1.5 Description and History of SA 13

SA 13 was used between 1965 and 1990 for disposal of construction debris, stumps, and brush. Debris volume is estimated to be approximately 10,000 cy. The landfill is less than one acre in size and is located on the west side of Lake George Street near Hattonsville Road on the former Main Post (Figures 1-1 and 9-5). SA 13 is surrounded by large trees, but no trees are growing on the landfill itself. Tree stumps, limbs, and trunks have been deposited on the surface of the landfill and down the steep lower slope. A wetland is located at the base of this slope.

In 1989 disposed stumps, branches, steel fencing, plumbing fixtures and pipes were removed from the site. The landfill is currently closed to debris disposal.

SA 13 Surface Water Contamination. Organic and inorganic compounds were detected in surface water samples collected from the wet area at the toe of the debris area. Nitroglycerine was detected in one of four surface water samples, at a concentration above its drinking water standard. Inorganic compounds in surface water, particularly mercury, present potential risk to sensitive aquatic ecological receptors.

SA 13 Sediment Contamination. Sediments at SA 13 contain PAHs, TPHC, pesticides, and inorganics. Pesticides in sediment present potential risk to sensitive aquatic ecological receptors.

SA 13 Surface Soil Contamination. Soil samples collected from stained areas directly over the debris area contained PAHs, TPHC, pesticides, and inorganics. Surface soil samples collected directly from the debris area contained higher concentrations of contaminants than those collected downgradient from the landfill.

SA 13 Groundwater Contamination. Contaminants detected in groundwater at SA 13 are primarily inorganics. It is believed that concentrations of inorganics detected in groundwater at SA 13 are attributable to suspended solids present in the unfiltered samples.

9.1.6 Description and History of AOC 40

AOC 40 occupies approximately four acres along the edge of Patton Road in the southeastern part of the former Main Post of Fort Devens. It extends for approximately 800 feet along Patton Road and out into the former wetland along Cold Spring Brook, now mostly submerged beneath Cold Spring Brook Pond (Figures 1-1 and 9-6). The upper surface of the landfill slopes gently toward the north and east. The surface is densely covered with small trees and scrub, the trees being predominantly pines. The edge of the landfill falls off abruptly to the wetland or to the pond with an elevation drop that ranges between 10 and 20 feet.

Debris in the landfill is mostly wood, concrete, asphalt, metal, brick, wire, ash, stumps, and logs. Debris volume is estimated at approximately 110,000 cy. The AOC 40 landfill is located approximately 600 feet from the Patton water supply well, within the well's recharge zone.

AOC 40 Surface Water Contamination. Inorganic compounds were detected in surface water samples collected from Cold Spring Brook Pond. Surface water contamination does not pose a risk to ecological receptors at the debris disposal area.

AOC 40 Sediment Contamination. Sediments in Cold Spring Brook Pond contain PAHs, pesticides, and inorganics. Risk to ecological receptors at two isolated areas in the pond are attributed to arsenic and the pesticide DDD.

AOC 40 Surface Soil Contamination. Samples collected from the debris landfill soil cover contain PAHs, pesticides, and inorganics. The relatively low concentrations of surface soil contaminants pose neither human-health nor ecological risks.

AOC 40 Groundwater Contamination. Groundwater quality at AOC 40 was characterized during two rounds of sampling during the RI, and during two rounds of sampling during the supplemental RI. Contaminants detected in groundwater are primarily inorganics. At this point in time, under existing conditions, the Army has concluded that AOC 40 is not a source of inorganic groundwater contamination.

9.1.7 Description and History of AOC 41

AOC 41 is located on the former South Post of Fort Devens, approximately one-half mile west of the Still River Gate, on the north shore of New Cranberry Pond (Figure 1-1 and 9-7). The landfill, less than one-quarter acre in size, was used up to the 1950s for disposal of non-explosive military and household debris. The site is overgrown with trees and brush.

Debris at AOC 41 includes beverage cans, bottles, and motor vehicle parts. Debris volume is estimated to be approximately 1,500 cy.

AOC 41 Surface Water Contamination. Organic and inorganic contaminants were detected in surface water samples collected from New Cranberry Pond, near AOC 41. The concentrations are not considered significant.

AOC 41 Sediment Contamination. Pesticides and inorganics were detected in sediment samples collected from New Cranberry Pond near AOC 41. It is unlikely that the contaminants pose a risk to ecological receptors.

AOC 41 Surface Soil Contamination. TPHC, PAHs, pesticides, and inorganics were detected in surface soil samples collected at the landfill. Some contaminant concentrations exceeded screening standards established by USEPA for protection of potential residents living at the site. There are no residents occupying the site. Surface soil contaminants were found to pose no risk to ecological receptors.

AOC 41 Groundwater Contamination. During the RI performed at AOC 41, it was determined that the source of groundwater contamination was not the landfill debris. In the 1996 SPIA ROD, the Army selected No Action with long-term groundwater monitoring as the remedy for groundwater.

9.1.8 Post-Site Investigation History

A history of post-site investigation activities related to Fort Devens landfill remediation is presented in this subsection. Referenced relevant documents, summarized in Table 9-2 in Appendix G, were reviewed as part of the five-year review.

The Landfill Consolidation FS Report (ABB-ES, 1995a) contained an evaluation of options to consolidate debris from the seven landfills into a single waste disposal site. After reviewing the FS report, the U.S. Army Forces Command (FORSCOM) requested evaluation of non-consolidation, containment options such as capping landfills in-place. In response to FORSCOM comments, the Debris Disposal Area Technical Memorandum (ABB-ES, 1996b) was issued in February 1996. The memorandum evaluated a cap-in-place and a consolidation option for each of the seven landfills.

To further respond to FORSCOM comments, the Landfill Remediation FS Report was prepared (ABB-ES, 1997). This FS report evaluated nine debris management alternatives, including various combinations of no further action, capping in-place, and debris removal and consolidation.

In the December 1997 Proposed Plan, the Army proposed an alternative that consisted of debris removal at three of the debris disposal areas (AOCs 9 and 40, and SA 13), with consolidation at a new landfill to be constructed in the area near the existing Shepley's Hill Landfill. Public comment on the Plan indicated a community preference for debris disposal either in an offsite landfill, or in a new onsite landfill in an alternate location. Because of the site's proximity to the Nashua River floodplain, the community also indicated a preference for full excavation and removal of debris from AOC 11.

In response to public comment, the Army issued a second Proposed Plan in November 1998. The proposed alternative included full debris removal at AOCs 9, 11, and 40, and SA 13, with disposal either at an offsite landfill, or at a new onsite landfill to be constructed at the former Golf Course Driving Range. The proposed alternative was evaluated in detail in the Landfill Remediation Feasibility Study Addendum Report (HLA, 1998).

A ROD was issued in July 1999 (HLA, 1999). The ROD presented the selected remedial actions for the seven debris disposal areas.

9.2 Remedial Objectives

Remedial response objectives were defined during the FS to aid in developing and screening alternatives. The objectives aim to mitigate existing and future potential threats to human health and the environment. The response objectives are:

- Prevent human exposure to groundwater contaminants released from Fort Devens landfills that exceed acceptable risk thresholds.

- Protect human and ecological receptors from exposure to landfill soils having concentrations of contaminants exceeding acceptable risk thresholds.
- Prevent landfill contaminant releases to surface water that result in exceedance of AWQC or acceptable ecological risk-based thresholds.
- Prevent exposure by ecological receptors to landfill-contaminated sediments exceeding acceptable risk-based thresholds.
- Reduce adverse effects from contaminated landfill media to the environment which would reduce the amount of land area available for natural resources use.
- Support the civilian redevelopment effort at Devens.

9.3 Description of Remedy

Key components of the selected remedy presented in the ROD include:

SA 6

No further action

SA 12, AOC 41

- Mobilization/demobilization
- Site preparation
- Surface debris removal
- Known hot-spot removal
- Backfilling/regrading/revegetation
- Site monitoring

AOC 9, AOC 11, SA 13, AOC 40

- Mobilization/demobilization
- Site preparation
- AOC 40 sediment removal with disposal either in the Consolidation Landfill or offsite
- AOC 40 drum removal with disposal either in the Consolidation Landfill or offsite
- Debris excavation, backfill, and regrading
- Wetlands restoration at AOC 9, AOC 11, and AOC 40
- Consolidation of excavated debris at onsite Consolidation Landfill, or transport to an offsite landfill
- If required, cover system monitoring and maintenance at Consolidation Landfill
- Institutional controls and five-year site reviews at those sites where unrestricted future use is not achievable or economical

The decision to proceed with on-site consolidation was issued June 30, 2000, and a temporary (120 day) access agreement to begin construction was signed on September 15, 2000.

9.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS REVIEW

Standards identified as ARARs appeared in the ROD (see Tables B.1, B.2, and B.3 in Appendix G) These were reviewed for changes that could affect protectiveness.

Standards relative to landfill remediation determined to be applicable, relevant and appropriate, or to be considered, have not become more stringent since the signing of the ROD in 1999. In addition, no new standards promulgated since the ROD signing were identified. However, revisions to existing setback requirements for the construction of new solid waste disposal facilities are currently being considered by the MADEP. Draft revisions to 310 CMR 16.00 were issued in 1999, have undergone a public hearing phase, and may be promulgated by the Fall of 2000. The proposed setback requirements are more stringent than the current standards used to select the former Golf Course Driving Range as the most desirable site among those evaluated. The effect of the proposed regulation revisions may be to reduce the area considered suitable for constructing a new debris consolidation landfill, should that disposal option be selected.

9.5 SUMMARY OF SITE VISIT

An HLA representative performed site inspections at AOCs 9, 11, 40, 41, and SAs 6,12, and 13 on June 8, 2000. Conditions during the inspection were favorable with no precipitation and temperatures in the 60s.

There was no evidence of excavation or disturbance at any of the landfill sites. The majority of the sites had become overgrown with trees and shrubs and were difficult to recognize. Inspected monitoring well casings were intact and secured.

The following individuals were interviewed as part of the five-year review:

- Jim Chambers, BRAC Environmental Coordinator, Devens RFTA
- John Regan, MADEP
- David Margolis, USACE, New England District

All personnel were interviewed on June 8, 2000 at the Devens RFTA BRAC office. There is no selected remedy as of the time of the interview so discussion was limited. None of the personnel were aware of any reported problems with any of the sites.

John Regan stated that MADEP was concerned with the delay over the announcement of the remedy.

9.6 AREAS OF NON-COMPLIANCE

Because planned remediation for the debris disposal areas has not yet been implemented, observations regarding deficiency cannot be made. At present, there are no deficiencies that would prevent planned response actions from being protective of human health and the environment, nor are any expected in the future.

9.7 ASSESSMENT

The planned remediation for the debris disposal areas has not yet been implemented. The planned remedy is expected to be protective of human health and the environment upon completion. There have been no changes to ARARs, exposure pathways, contaminant characteristics, or risk assessment methodologies since the time of the ROD. No additional information has been identified that would call into question the expected protectiveness of the planned remedy.

9.8 RECOMMENDATIONS

There are no site operations ongoing at the debris disposal areas. Because planned remediation has not yet been implemented, there are no recommendations for improvements.

As discussed in Subsection 9.4, more stringent requirements for siting new solid waste disposal facilities are being considered by the MADEP. If promulgated prior to receipt of a permit and site assignment for consolidation landfill construction at the former Golf Course Driving Range, revised requirements may reduce the area currently considered suitable for landfill construction. It is recommended that: (1) the Army submit the permit application for new landfill construction to the MADEP, if onsite disposal is selected as the most desirable option, and (2) proposed revisions to the setback requirements be evaluated for potential reduction of the area currently considered suitable for landfill construction.

9.9 PROTECTIVENESS STATEMENT

The planned remediation for the debris disposal areas has not yet been implemented. When completed, the remedy is expected to meet remedial action objectives, and be protective of human health and the environment.

9.10 NEXT REVIEW

The debris disposal areas are statutory sites that require ongoing five-year reviews. The next review will be performed within five years of the completion of this five-year review report. The completion date is the date on which USEPA issues its letter to the Army either concurring with report's findings or documenting reasons for nonconcurrence.

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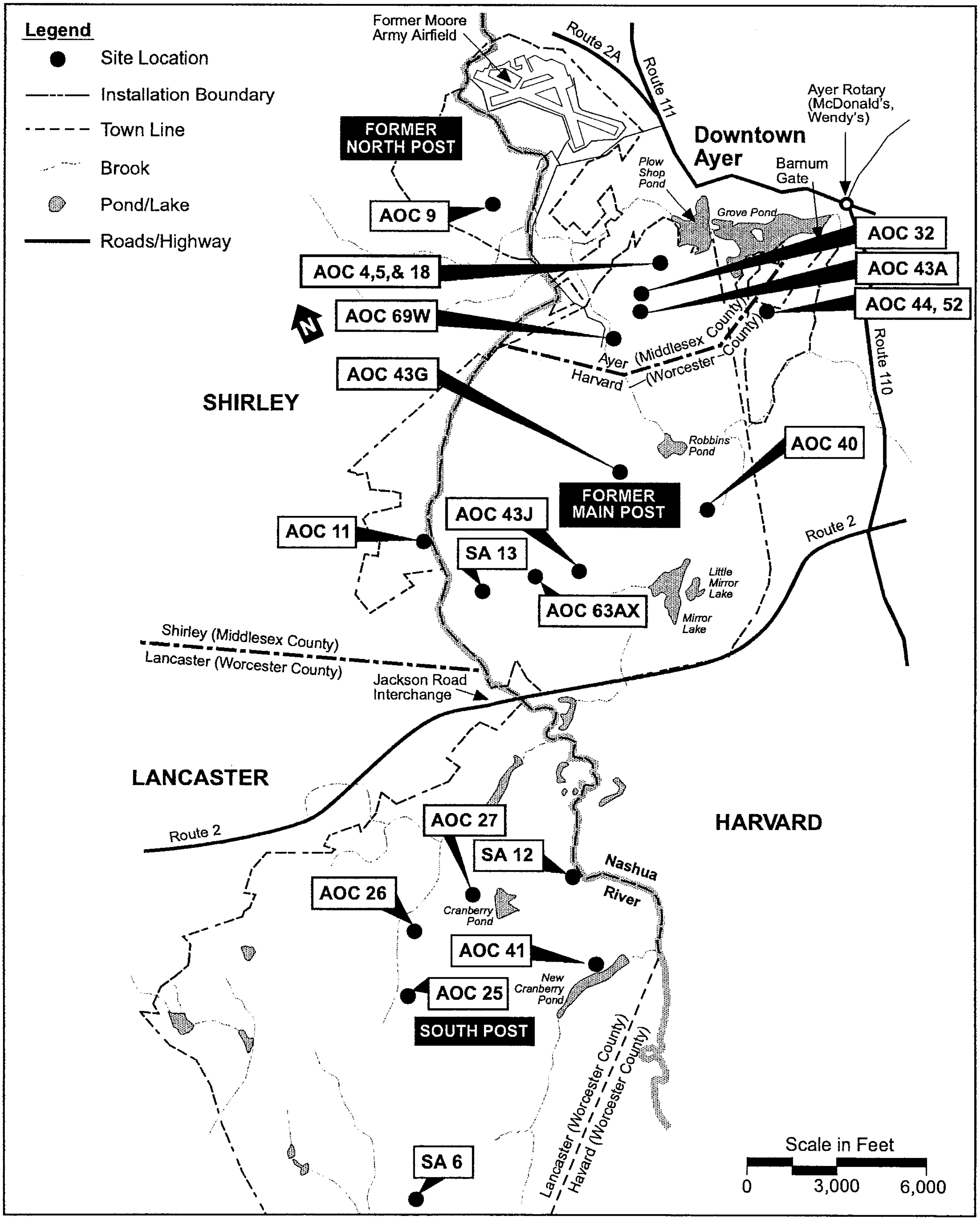
ABB-ES	ABB Environmental Services, Inc.
AOC	Area of Contamination
ADL	Arthur D. Little, Inc.
AAFES	Army Air Force Exchange Service
AOC	Area of Contamination
AREE	area requiring environmental evaluation
ARAR	applicable or relevant and appropriate requirements
AWQC	Ambient Water Quality Criteria
bgs	below ground surface
BEHP	bis(2-ethylhexl)phthalate
BRAC	Base Realignment and Closure
BTEX	benzene, toluene, ethylbenzene, and xylene
CBD	Commerce Business Daily
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
cm/sec	centimeters per second
COC	contaminant of concern
COPC	chemical of potential concern
cPAH	carcinogenic polynuclear aromatic hydrocarbon
cy	cubic yards
DCA	dichloroethane
DDD	2,2-bis(para-chlorophenyl)-1,1-dichloroethane
DDE	2,2-bis(para-chlorophenyl)-1,1-dichloroethene
DDT	2,2-bis(para-chlorophenyl)-1,1,1-trichloroethane
DRMO	Defense Reutilization and Marketing Office
EPH	Extractable Petroleum Hydrocarbons
ER-L	effects range-low
FFA	Federal Facility Agreement
FORSCOM	U S Army Forces Command
FS	Feasibility Study
HASP	Health and Safety Plan
HI	hazard index
HLA	Harding Lawson Associates
HQ	hazard quotient
IAG	Interagency Agreement
IDW	investigation-derived waste
IRP	Installation Restoration Program

kg	kilograms
LTMP	Long-term Monitoring Plan
MADEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level
MCP	Massachusetts Contingency Plan
MEP	Master Environmental Plan
mg/L	milligrams per liter
MMCL	Massachusetts Maximum Contaminant Level
MOGAS	motor vehicle gasoline
NCP	National Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
O&M	operation and maintenance
PA	Preliminary Assessment
PACE	People of Ayer Concerned about the Environment
PAH	polynuclear aromatic hydrocarbon
PAL	Project Analyte List
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PCL	protective contaminant levels
PID	photoionization detector
POTW	Publicly-Owned Treatment Works
PRE	preliminary risk evaluation
PRG	preliminary remediation goals
RAB	Restoration Advisory Board
RAO	remedial action objectives
RfD	reference dose
RFTA	Reserve Forces Training Area
RG	remediation goal
RI	Remedial Investigation
RME	reasonable maximum exposure
ROD	Record of Decision
SA	Study Area
SARA	Superfund Amendments and Reauthorization Act
SI	Site Investigation
SMCL	Secondary Maximum Contaminant Level
SPIA	South Post Impact Area
SQC	sediment quality criteria

SVOC	semivolatile organic compound
TAL	Target Analyte List
TCE	trichloroethene
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TDA	Table of Distributions and Allowances
TOC	total organic carbon
TPHC	total petroleum hydrocarbons
TRC	Technical Review Committee
TSCA	Toxic Substance Control Act
μg/g	micrograms per gram
μg/L	micrograms per liter
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
UST	underground storage tank
VPH	volatile petroleum hydrocarbons
VOC	volatile organic compound
WRS	Wetland Restoration Specifications



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LOCATION OF STUDY AREAS AND
AREAS OF CONTAMINATION
DEVENS, MA

FIGURE
1-1

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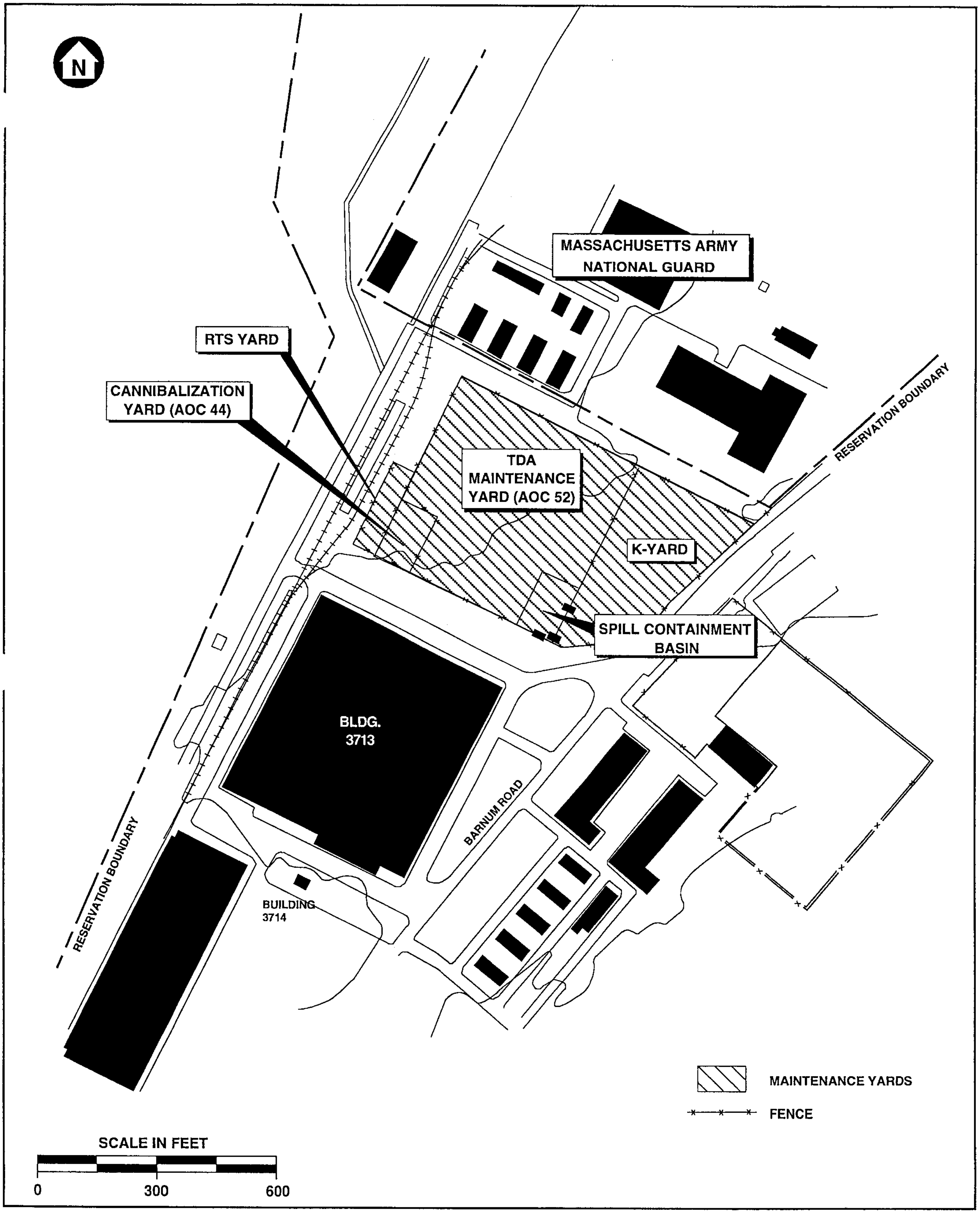

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MAINTENANCE YARDS
DEVENS, MA

FIGURE 2-1

DRAWN:	JOB NUMBER:	FILE NUMBER:	APPROVED:	DATE:	REVISED DATE:
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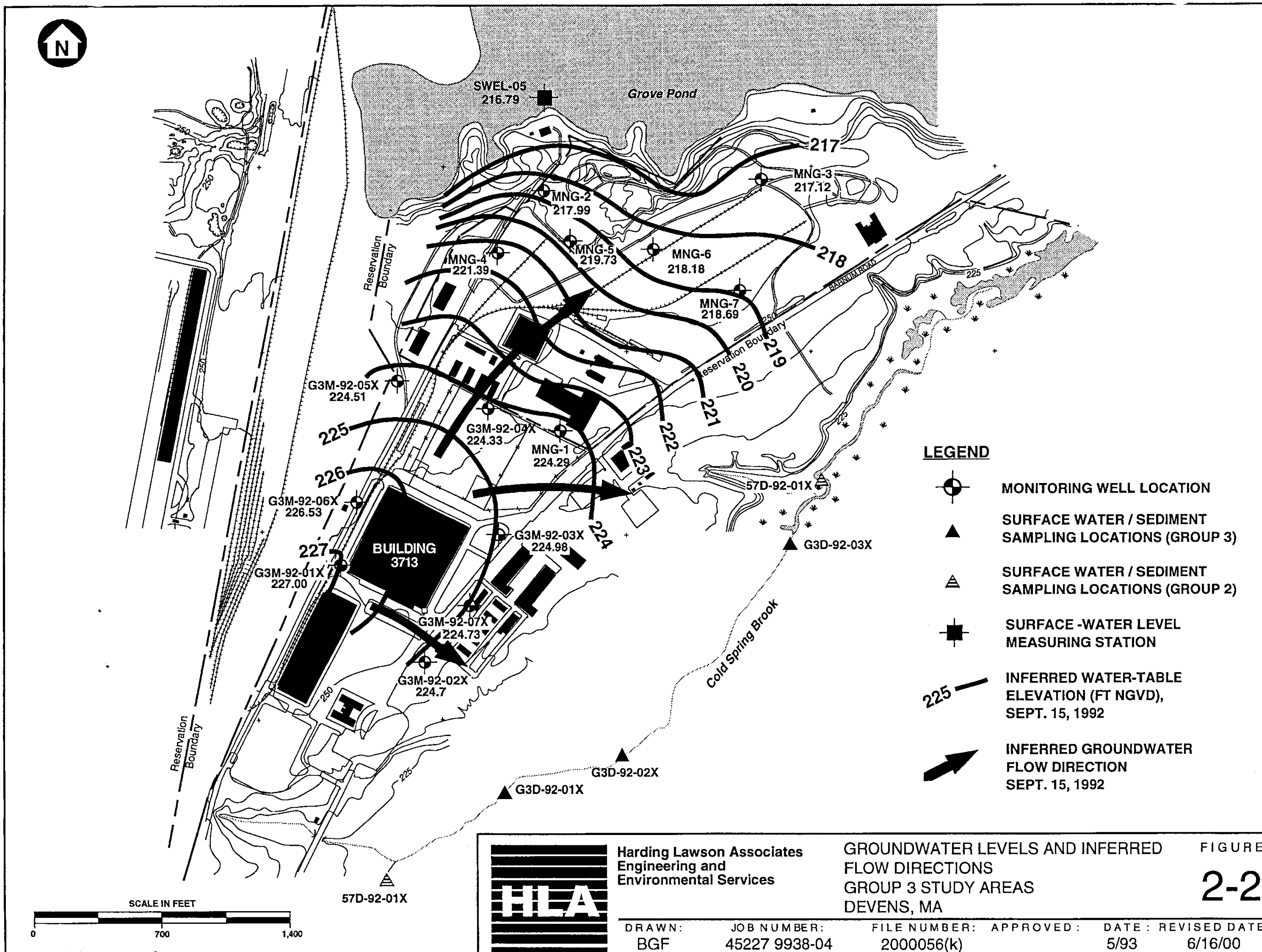

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GROUNDWATER LEVELS AND INFERRED FLOW DIRECTIONS
GROUP 3 STUDY AREAS
DEVENS, MA

FIGURE 2-2

DRAWN:	JOB NUMBER:	FILE NUMBER:	APPROVED:	DATE:	REVISED DATE:
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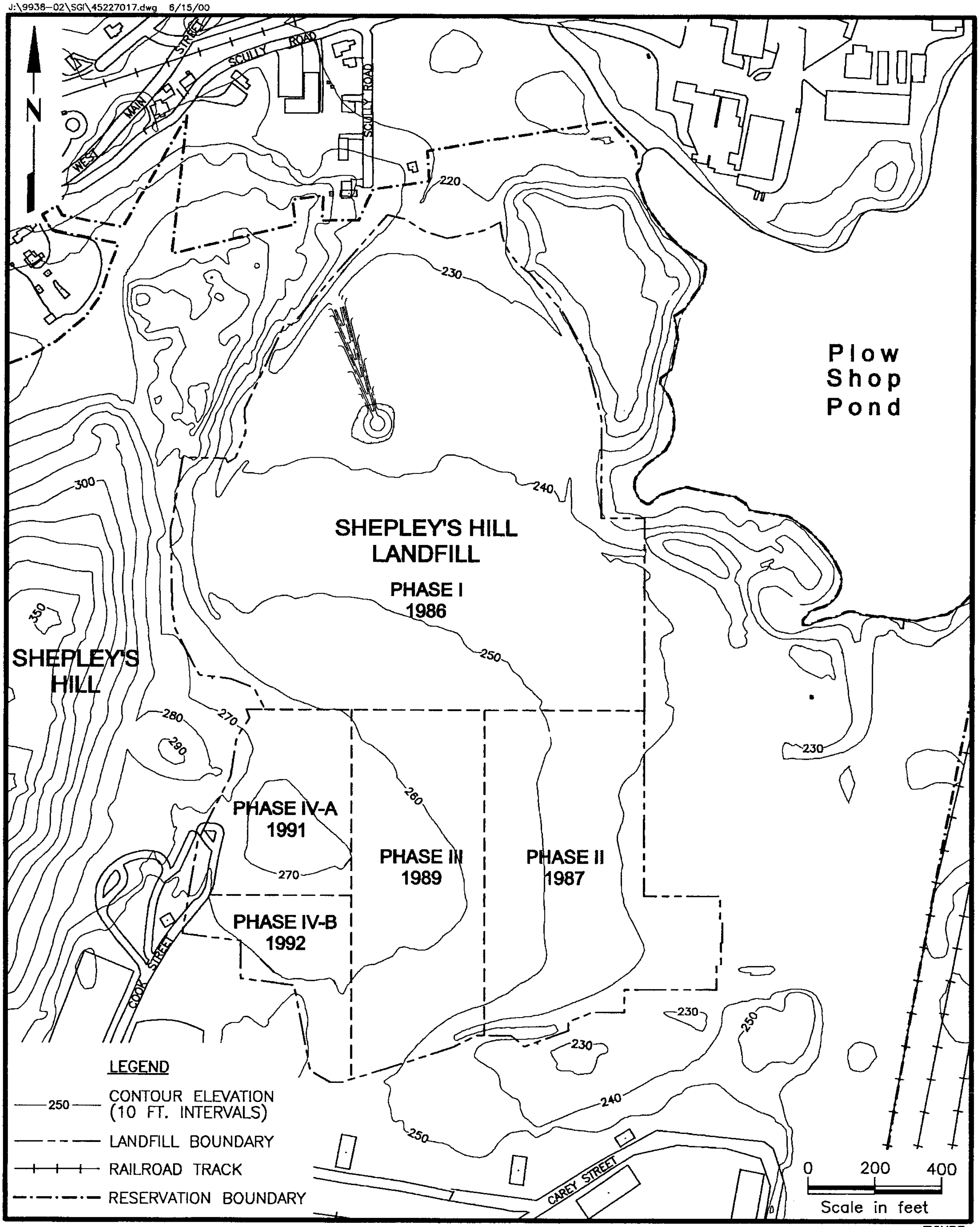

HLA

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SHEPLEY'S HILL LANDFILL
LANDFILL CAP SEQUENCE PLAN
DEVENS, MA

FIGURE **3-1**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
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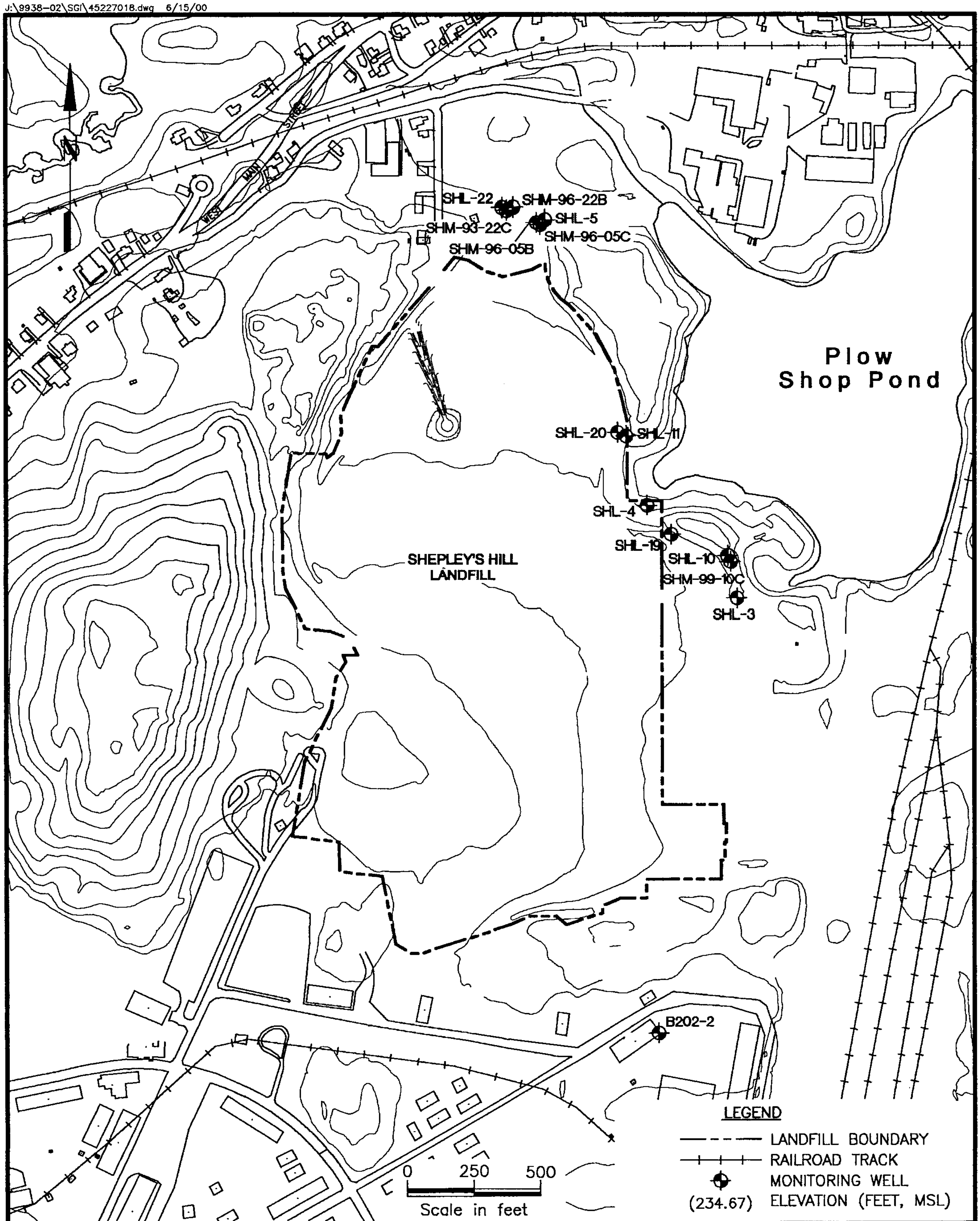

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SHEPLEY'S HILL LANDFILL SITE MAP
DEVENS, MA

FIGURE
3-2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
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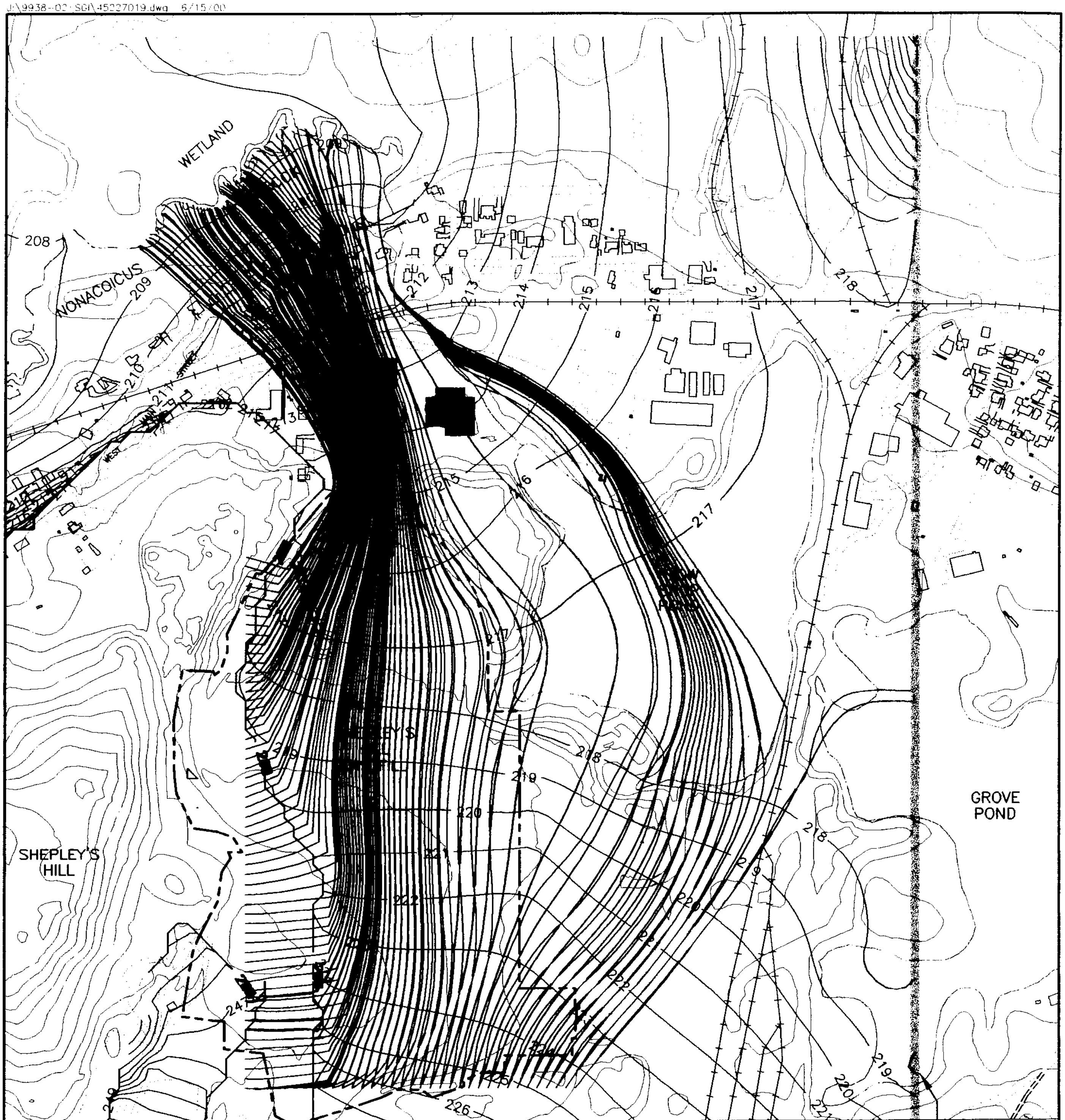

LEGEND

- PARTICLE IN LAYER 1
- PARTICLE IN LAYER 2
- —221— HEAD CONTOURS IN LAYER 1

0 300 600
Scale in feet

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MODELED PARTICLE TRACKS, PRESENT-DAY CONDITIONS SHEPLEY'S HILL LANDFILL DEVENS, MA

3-3

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
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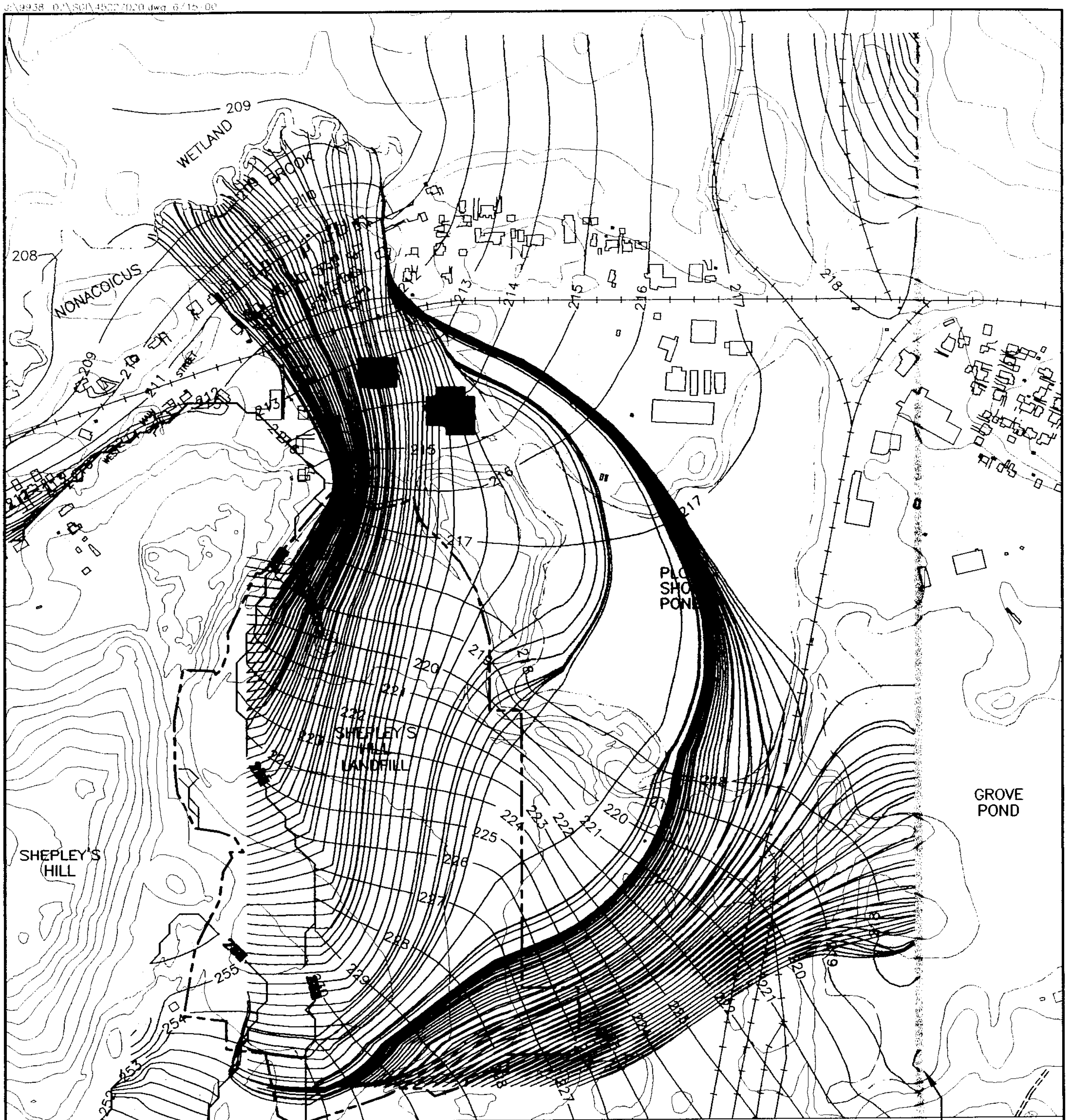

LEGEND

PARTICLE IN LAYER 1
PARTICLE IN LAYER 2
—221— HEAD CONTOURS IN LAYER 1

0 300 600
Scale in feet

APPROXIMATE MODEL BOUNDARY

HLA
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MODELED PARTICLE TRACKS, CAP REMOVED
SHEPLEY'S HILL LANDFILL
DEVENS, MA

3-4

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
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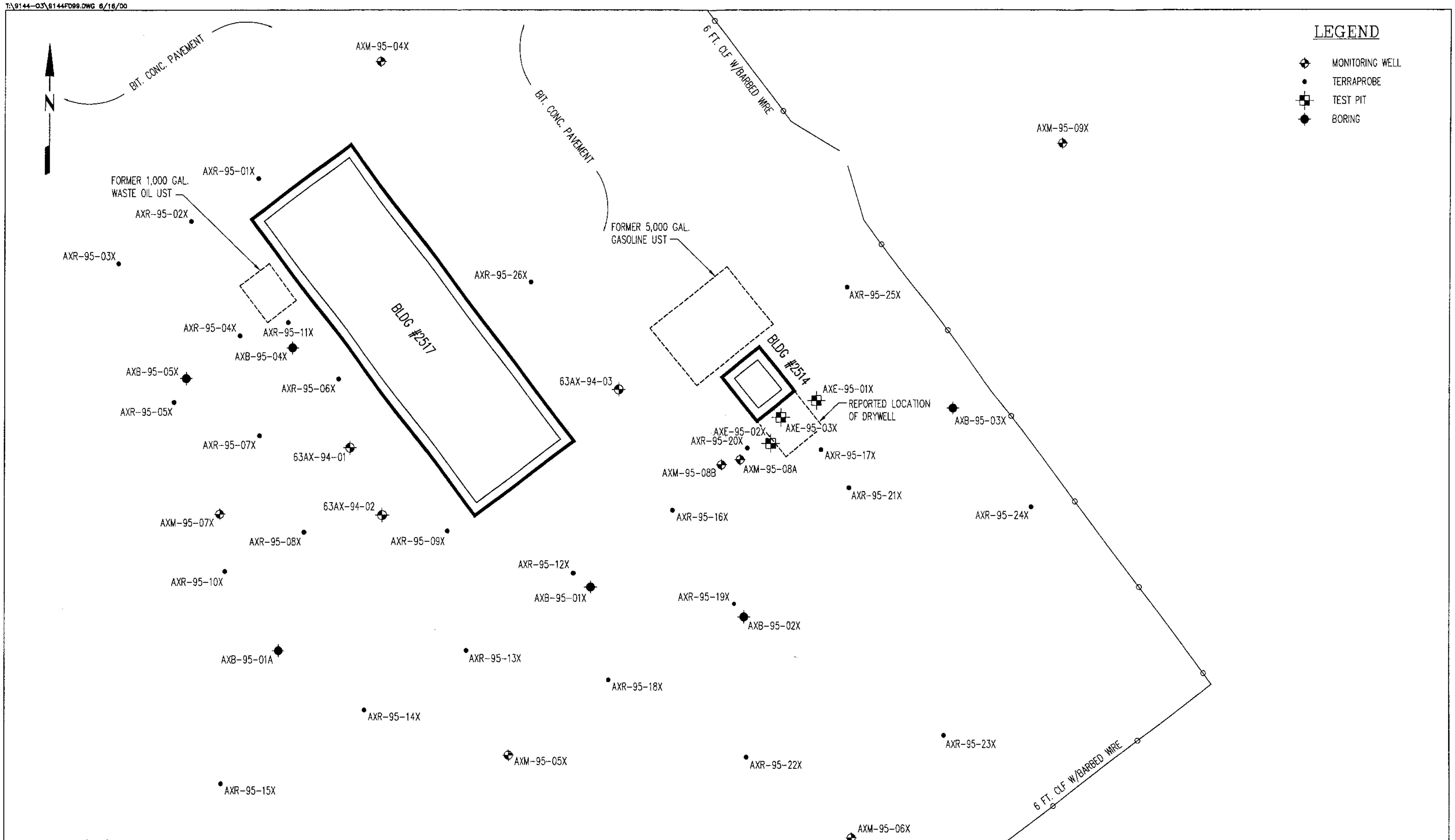

HLA	Harding Lawson Associates Engineering and Environmental Services		AOC 63AX SITE MAP DEVENS, MA		FIGURE 4-1
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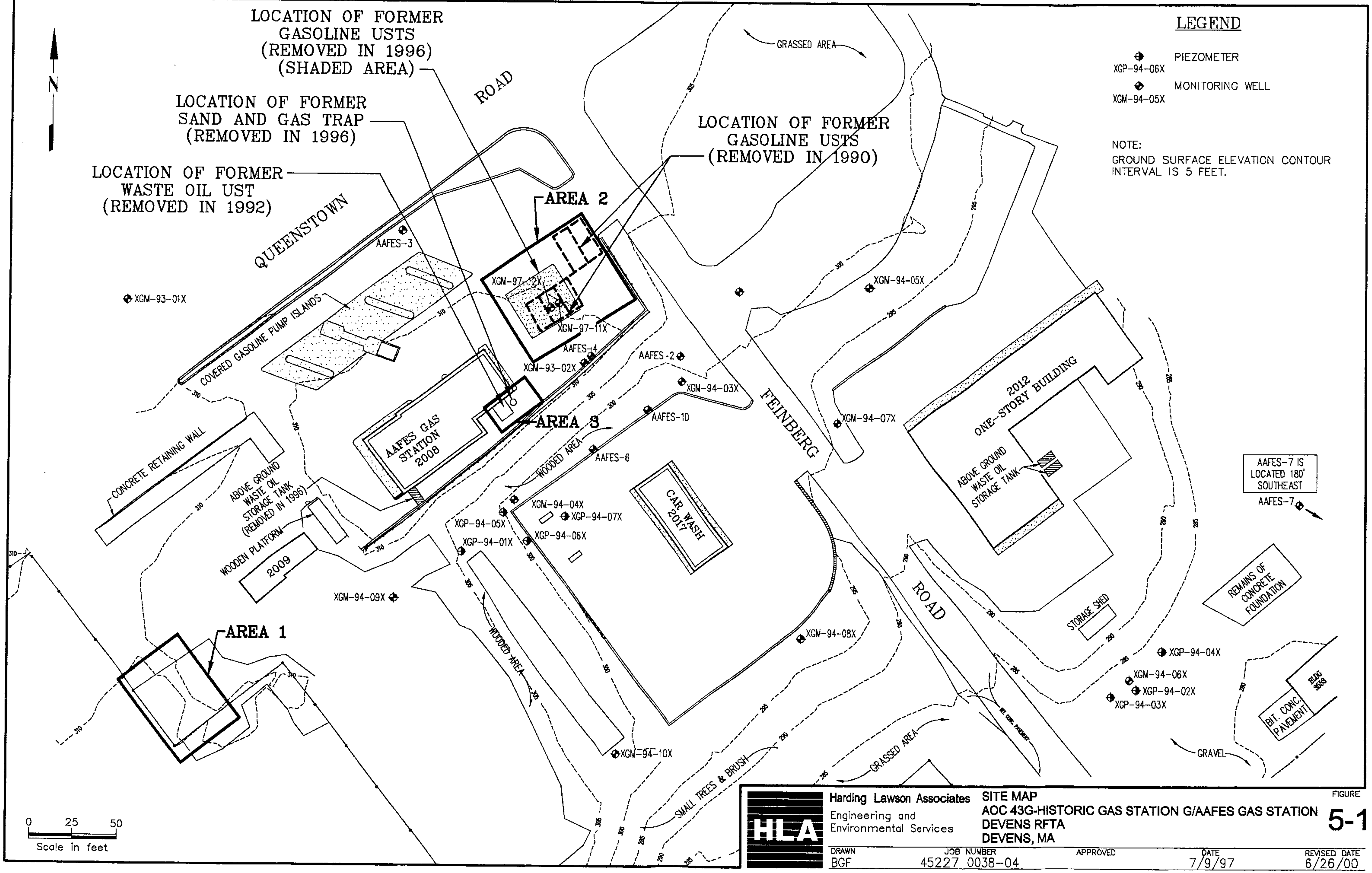

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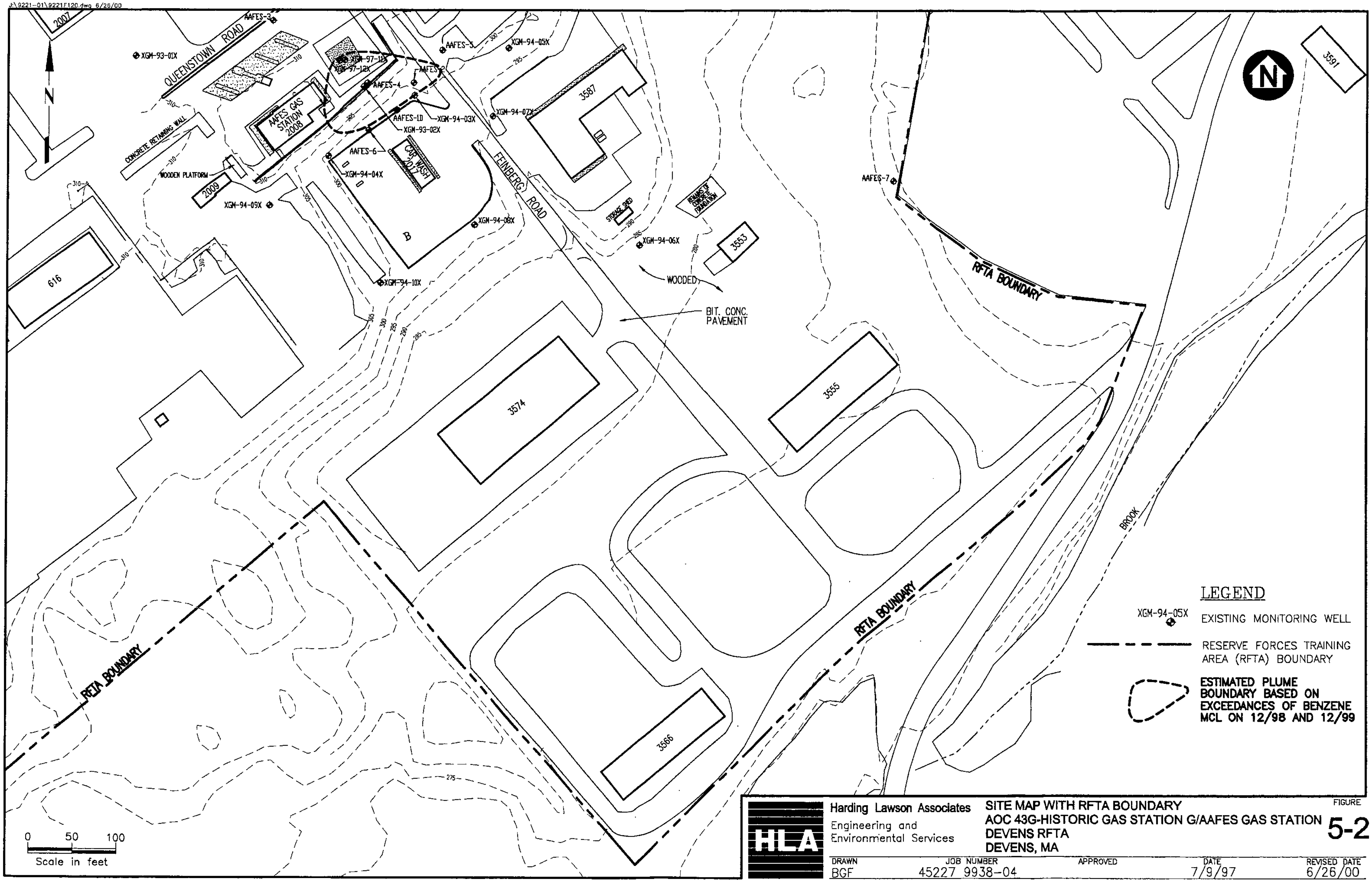
SITE MAP
AOC 43G-HISTORIC GAS STATION G/AAFES GAS STATION
DEVENS RFTA
DEVENS, MA

FIGURE 5-1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
BGF	45227 0038-04		7/9/97	6/26/00

J:\9221-01\9221F120.dwg 6/26/00



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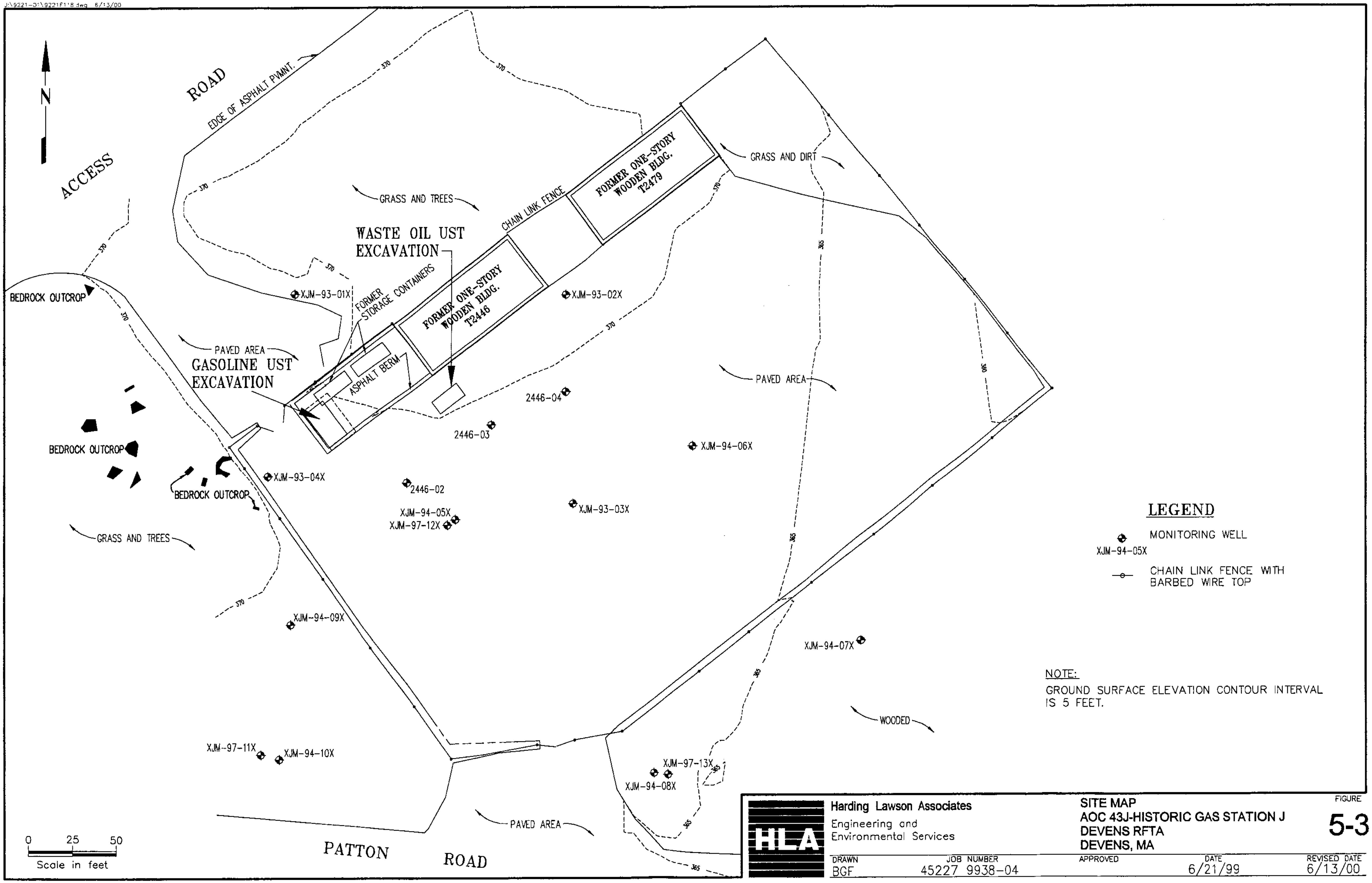
SITE MAP WITH RFTA BOUNDARY
AOC 43G-HISTORIC GAS STATION G/AAFES GAS STATION
DEVENS RFTA
DEVENS, MA

FIGURE 5-2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
BGF	45227 9938-04		7/9/97	6/26/00

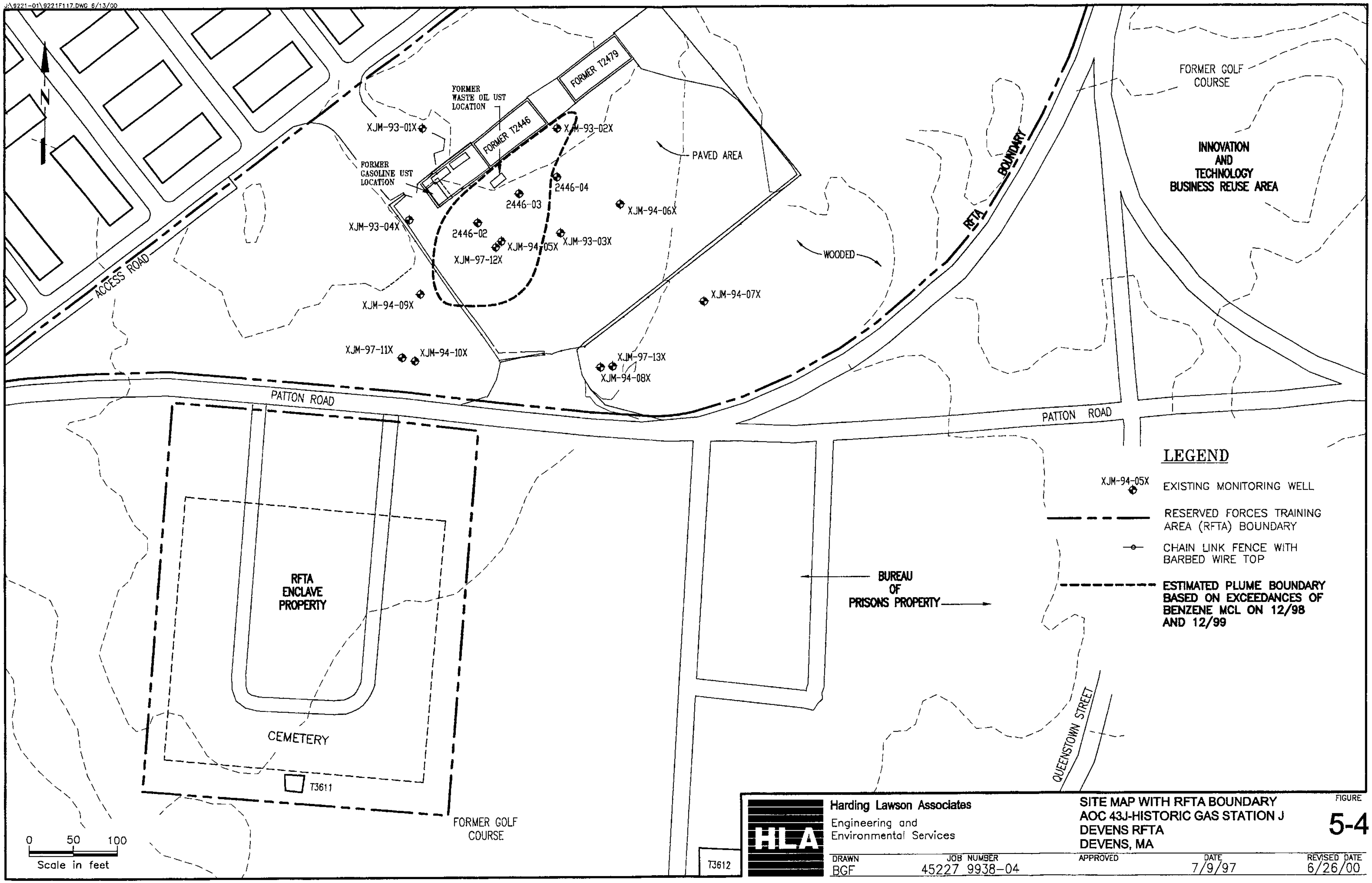


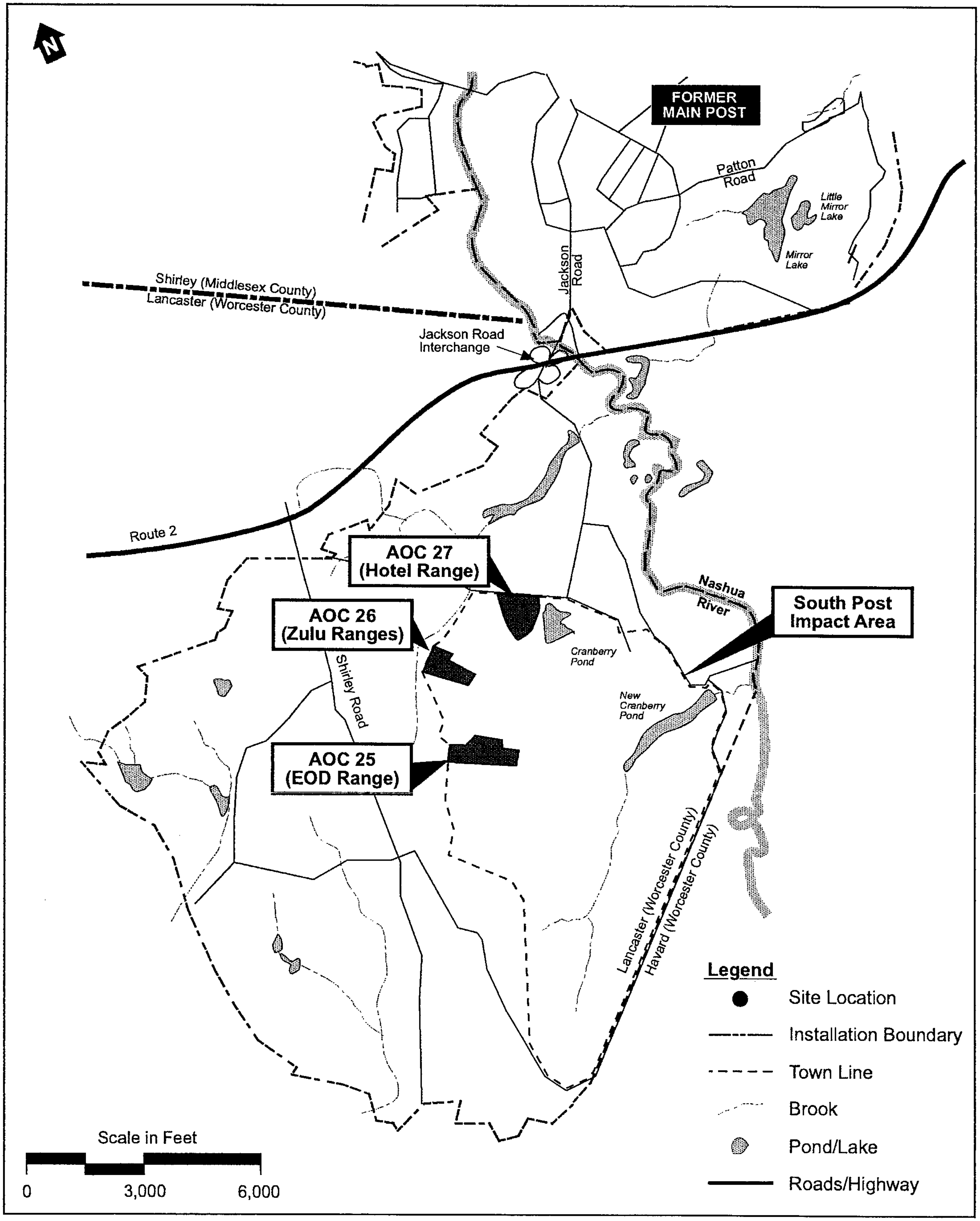
LEGEND

- MONITORING WELL (XJM-94-05X)
- CHAIN LINK FENCE WITH BARBED WIRE TOP

NOTE:
GROUND SURFACE ELEVATION CONTOUR INTERVAL IS 5 FEET.

HLA Harding Lawson Associates Engineering and Environmental Services		SITE MAP AOC 43J-HISTORIC GAS STATION J DEVENS RFTA DEVENS, MA		FIGURE 5-3
DRAWN BGF	JOB NUMBER 45227 9938-04	APPROVED	DATE 6/21/99	REVISED DATE 6/13/00


J:\9221-01\9221F117.DWG 6/13/00
N
FORMER WASTE OIL UST LOCATION
FORMER GASOLINE UST LOCATION
FORMER T2446
FORMER T2479
XJM-93-01X
XJM-93-02X
XJM-93-03X
XJM-93-04X
XJM-94-05X
XJM-94-06X
XJM-94-07X
XJM-94-08X
XJM-94-09X
XJM-94-10X
XJM-97-11X
XJM-97-12X
XJM-97-13X
2446-02
2446-03
2446-04
PAVED AREA
WOODED
ACCESS ROAD
PATTON ROAD
RFTA BOUNDARY
FORMER GOLF COURSE
INNOVATION AND TECHNOLOGY BUSINESS REUSE AREA
RFTA ENCLAVE PROPERTY
CEMETERY
T3611
T3612
BUREAU OF PRISONS PROPERTY
QUEENSTOWN STREET
LEGEND
XJM-94-05X EXISTING MONITORING WELL
RESERVED FORCES TRAINING AREA (RFTA) BOUNDARY
CHAIN LINK FENCE WITH BARBED WIRE TOP
ESTIMATED PLUME BOUNDARY BASED ON EXCEEDANCES OF BENZENE MCL ON 12/98 AND 12/99
0 50 100
Scale in feet
HLA
Harding Lawson Associates
Engineering and Environmental Services
SITE MAP WITH RFTA BOUNDARY
AOC 43J-HISTORIC GAS STATION J
DEVENS RFTA
DEVENS, MA
FIGURE
5-4
DRAWN BGF
JOB NUMBER 45227 9938-04
APPROVED
DATE 7/9/97
REVISED DATE 6/26/00



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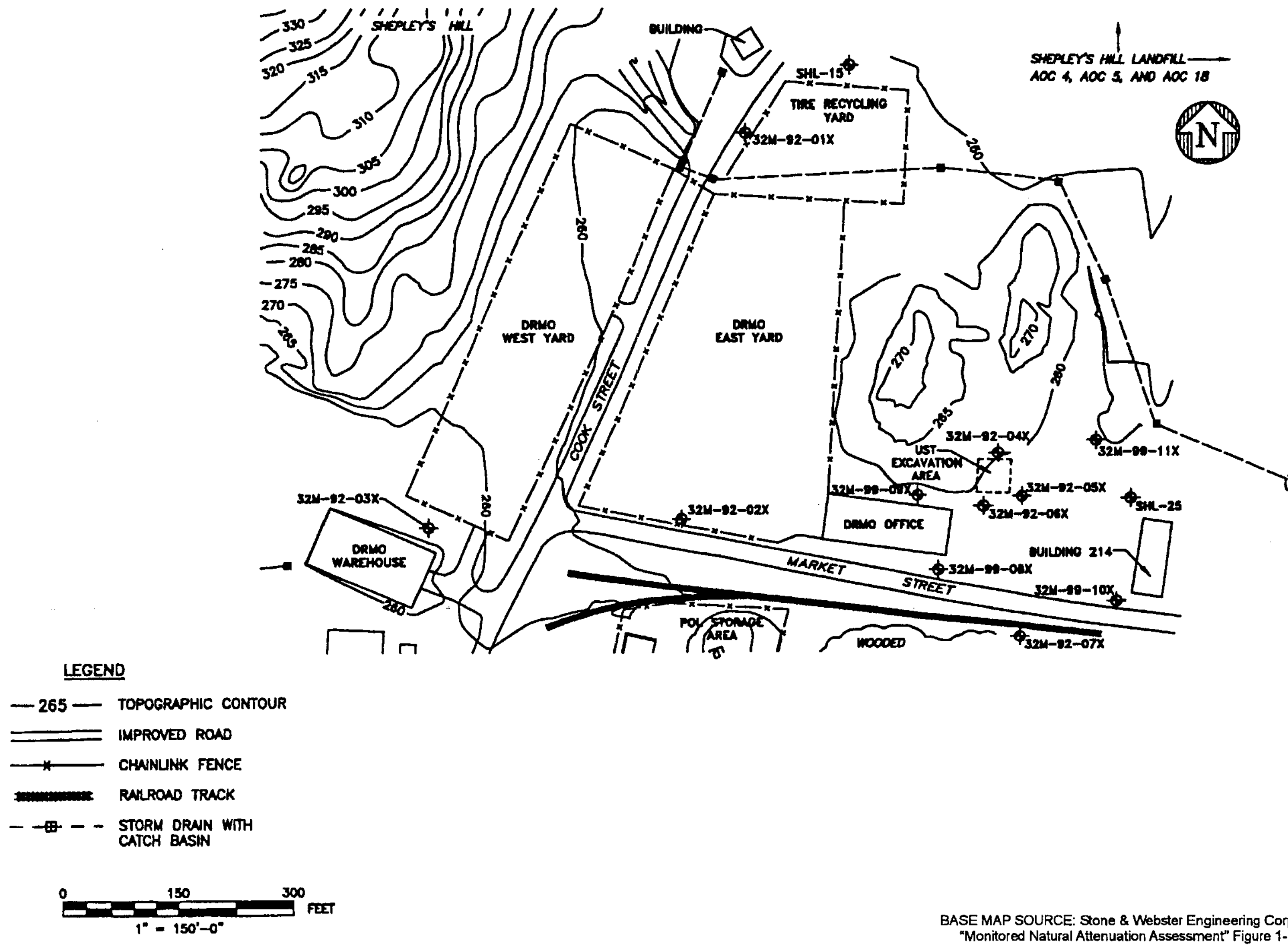
LOCATION OF SOUTH POST IMPACT AREA
AOCs 25, 26, 27, AND 41
DEVENS, MA

FIGURE **6-1**

DRAWN:	JOB NUMBER:	FILE NUMBER:	APPROVED:	DATE:	REVISED DATE:
BGF	45227 9938-04	W2000056(h)		3/99	6/15/99



BASE MAP SOURCE: Stone & Webster Engineering Corporation figure entitled: "Monitored Natural Attenuation Assessment" Figure 1-1. Dated May 2000.

HLA

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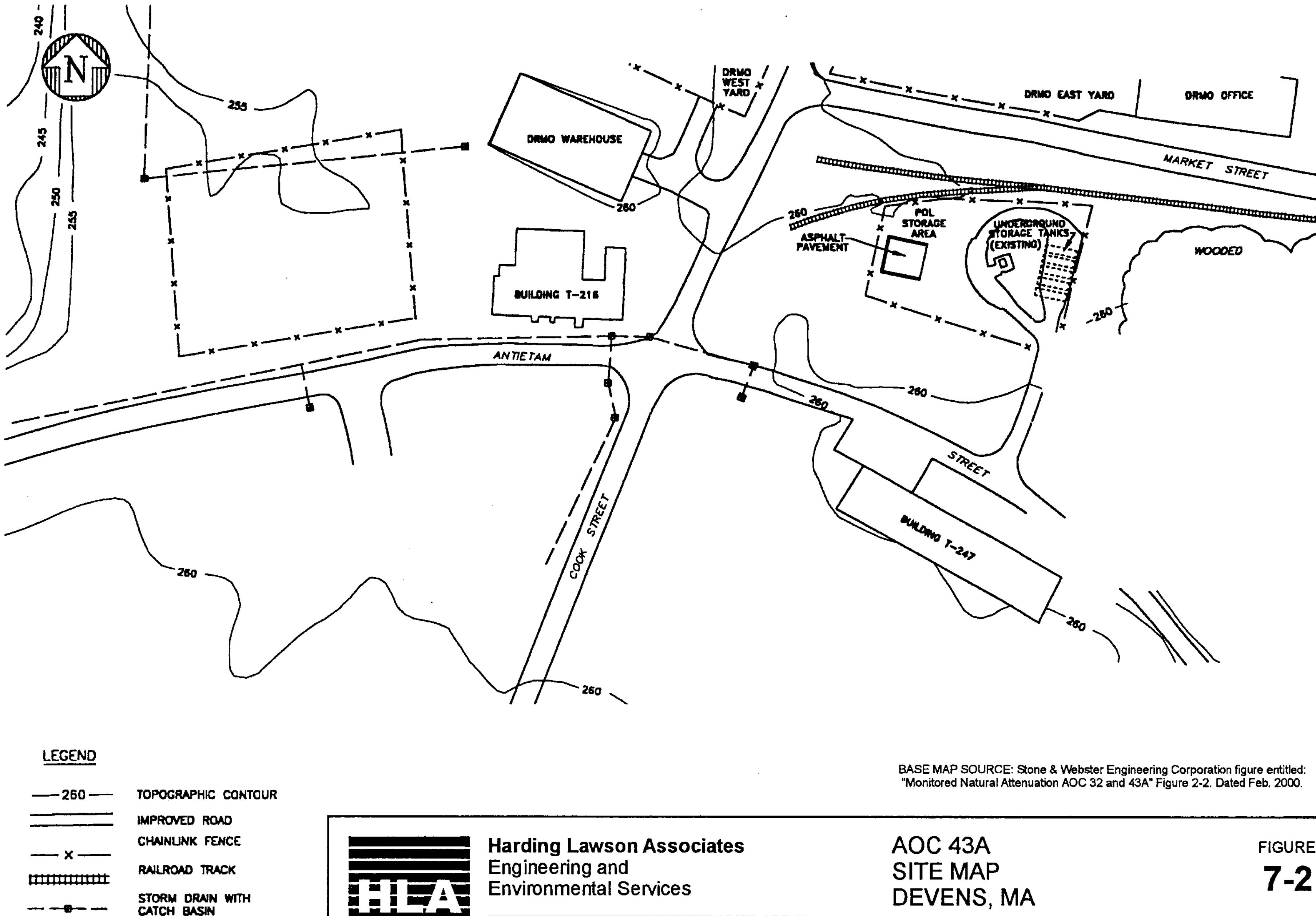
AOC 32
SITE MAP
DEVENS, MA

FIGURE
7-1

DRAWN	JOB NUMBER	FILE NUMBER	DATE	REVISED DATE
BGF	45227 9938-04	W2000056(i)	8/94	6/16/00



BASE MAP SOURCE: Stone & Webster Engineering Corporation figure entitled: "Monitored Natural Attenuation AOC 32 and 43A" Figure 2-2. Dated Feb. 2000.

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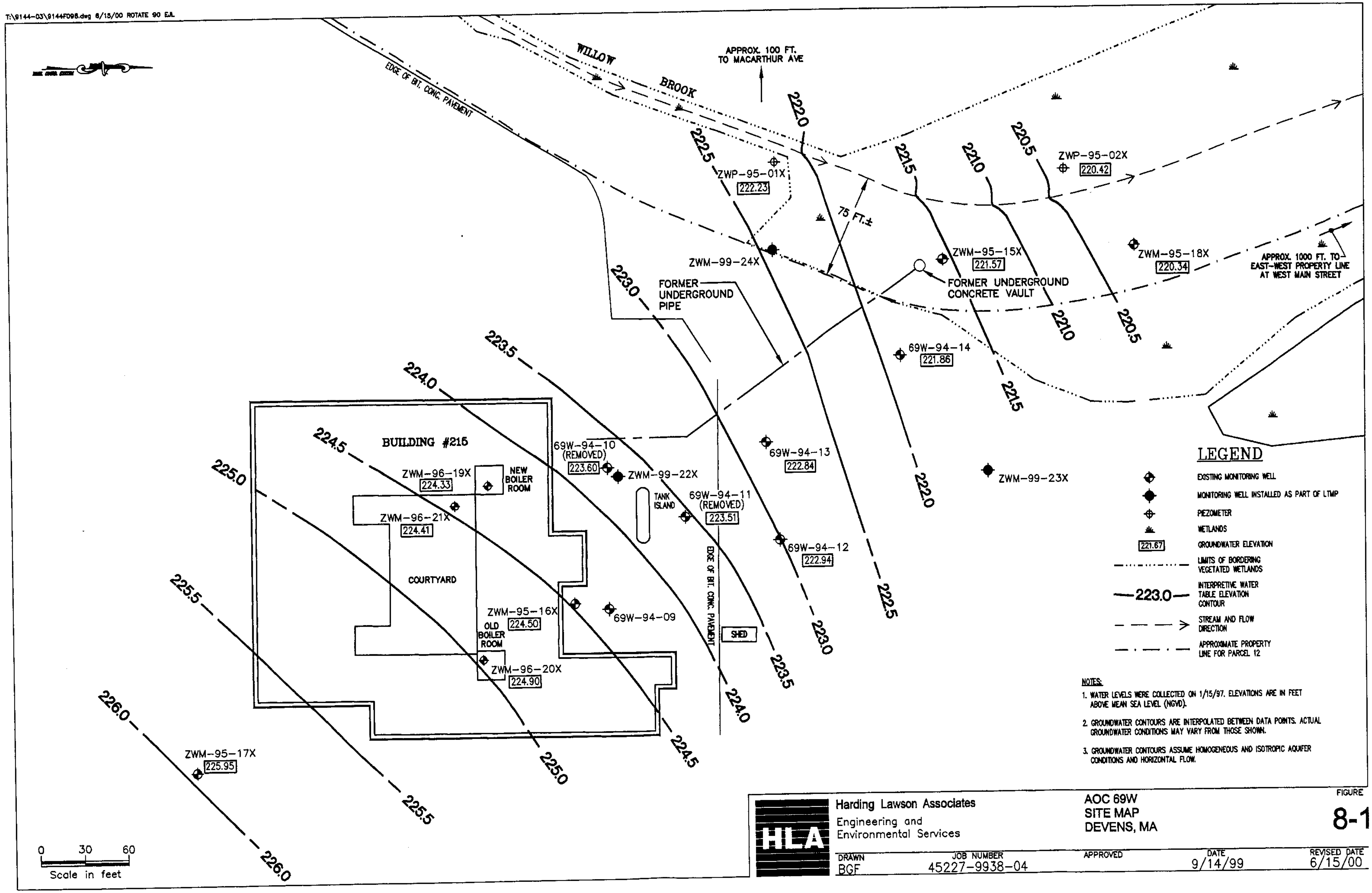
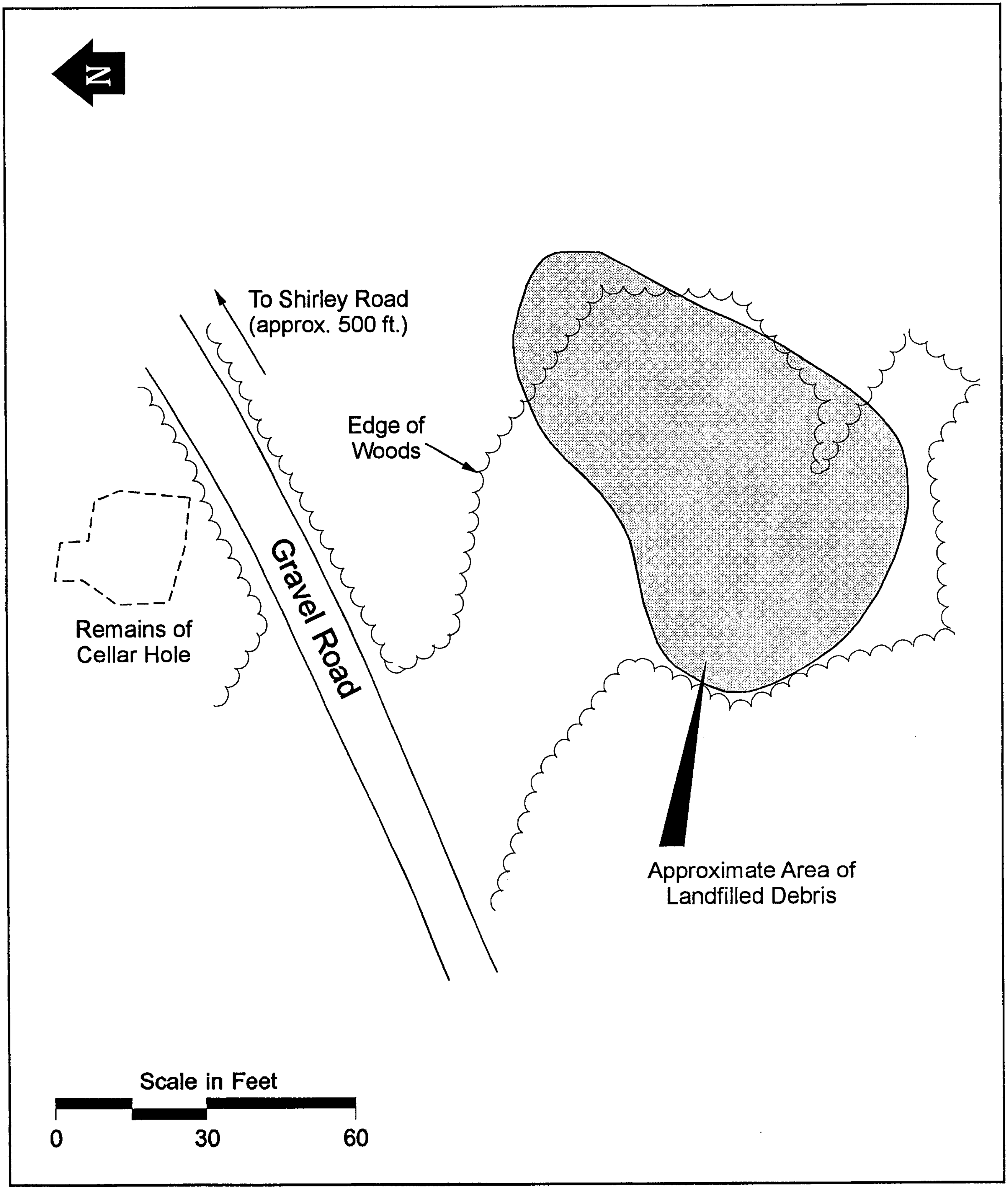
AOC 43A
SITE MAP
DEVENS, MA

FIGURE
7-2

DRAWN	JOB NUMBER	FILE NUMBER	DATE	REVISED DATE
BGF	45227 9938-04	W2000056(j)	8/94	6/16/00


T:\9144-03\9144F098.dwg 6/15/00 ROTATE 90 E.N.
WILLOW BROOK
APPROX. 100 FT. TO MACARTHUR AVE
EDGE OF BIT. CONC. PAVEMENT
APPROX. 1000 FT. TO EAST-WEST PROPERTY LINE AT WEST MAIN STREET
ZWP-95-02X 220.42
ZWP-95-01X 222.23
ZWM-95-18X 220.34
ZWM-95-15X 221.57
ZWM-99-24X
75 FT.±
FORMER UNDERGROUND CONCRETE VAULT
FORMER UNDERGROUND PIPE
69W-94-14 221.86
69W-94-13 222.84
69W-94-12 222.94
ZWM-99-23X
69W-94-10 (REMOVED) 223.60
ZWM-99-22X
69W-94-11 (REMOVED) 223.51
TANK ISLAND
EDGE OF BIT. CONC. PAVEMENT
SHED
BUILDING #215
NEW BOILER ROOM
ZWM-96-19X 224.33
ZWM-96-21X 224.41
COURTYARD
ZWM-95-16X 224.50
OLD BOILER ROOM
ZWM-96-20X 224.90
69W-94-09
ZWM-95-17X 225.95
220.5
221.0
221.5
222.0
222.5
223.0
223.5
224.0
224.5
225.0
225.5
226.0
0 30 60
Scale in feet
LEGEND
EXISTING MONITORING WELL
MONITORING WELL INSTALLED AS PART OF LTMP
PIEZOMETER
WETLANDS
221.67 GROUNDWATER ELEVATION
LIMITS OF BORDERING VEGETATED WETLANDS
223.0 INTERPRETIVE WATER TABLE ELEVATION CONTOUR
STREAM AND FLOW DIRECTION
APPROXIMATE PROPERTY LINE FOR PARCEL 12
NOTES:
1. WATER LEVELS WERE COLLECTED ON 1/15/97. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL (NGVD).
2. GROUNDWATER CONTOURS ARE INTERPOLATED BETWEEN DATA POINTS. ACTUAL GROUNDWATER CONDITIONS MAY VARY FROM THOSE SHOWN.
3. GROUNDWATER CONTOURS ASSUME HOMOGENEOUS AND ISOTROPIC AQUIFER CONDITIONS AND HORIZONTAL FLOW.
HLA
Harding Lawson Associates
Engineering and Environmental Services
AOC 69W
SITE MAP
DEVENS, MA
FIGURE
8-1
DRAWN BGF
JOB NUMBER 45227-9938-04
APPROVED
DATE 9/14/99
REVISED DATE 6/15/00



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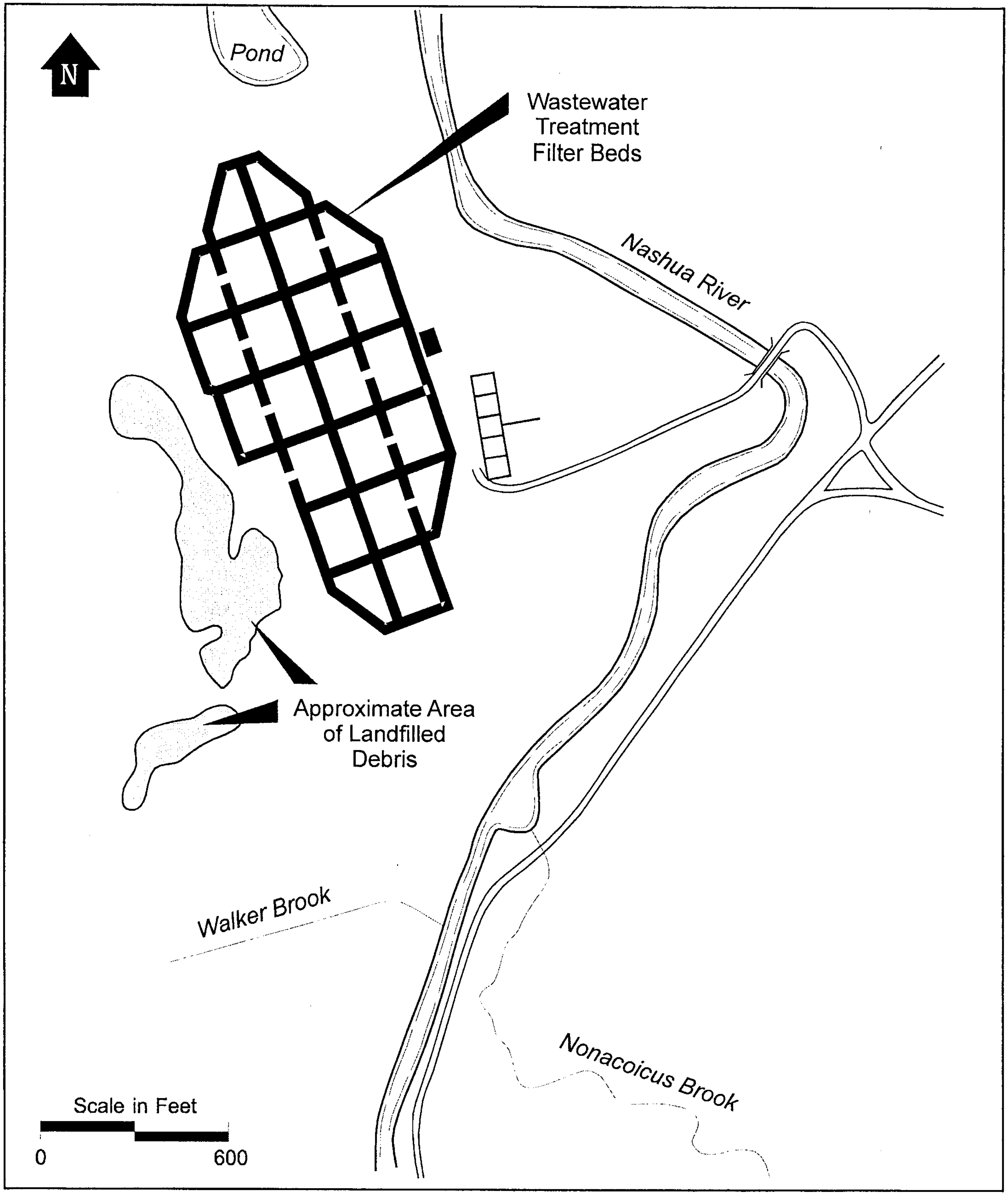
SA 6 SITE MAP
DEVENS, MA

FIGURE
9-1

DRAWN	JOB NUMBER	FILE NUMBER	DATE	REVISED DATE
BGF	45227 9938-04	W2000056(a)	3/99	6/15/00

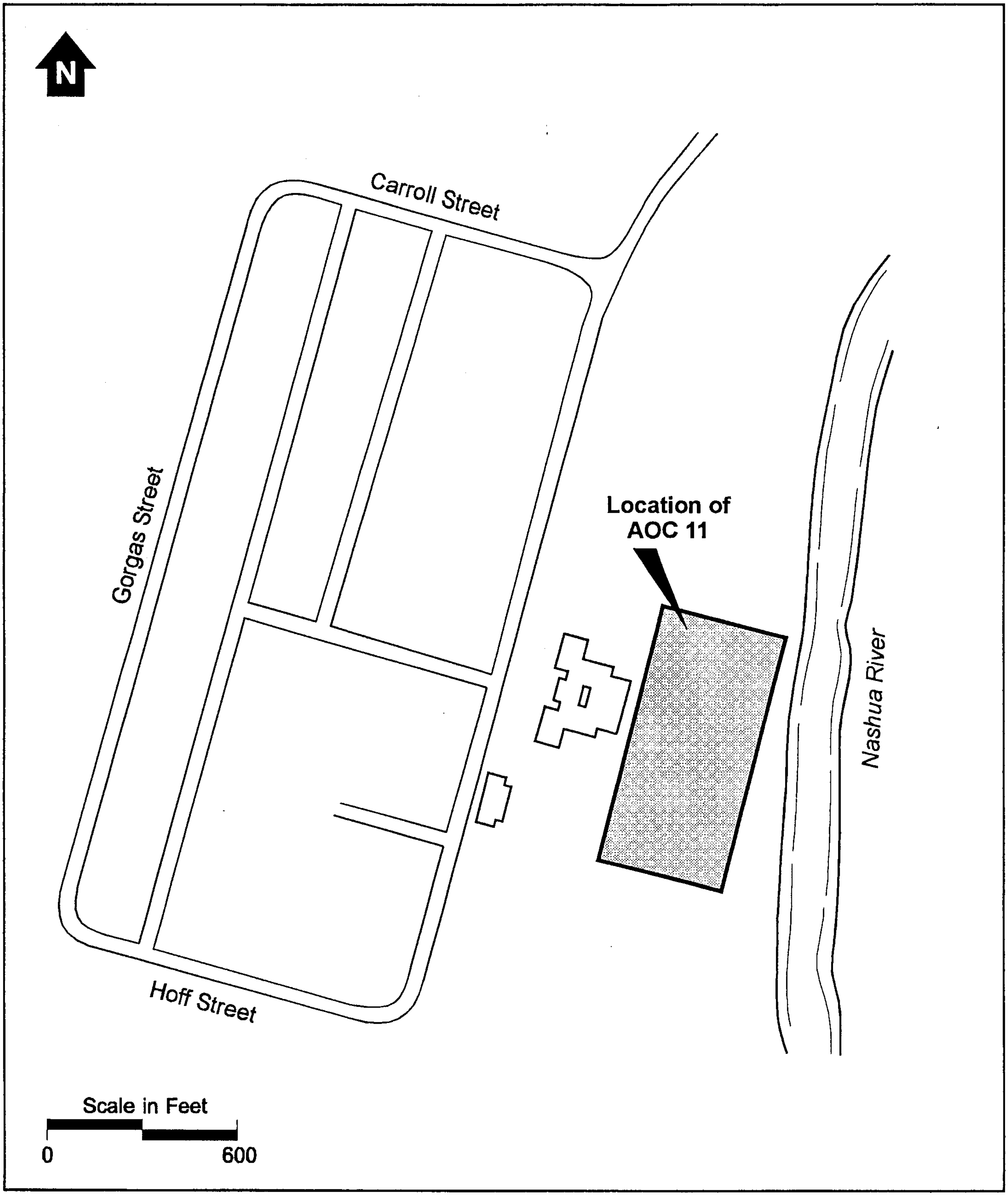


Harding Lawson Associates
Engineering and
Environmental Services

AOC 9 SITE MAP
DEVENS, MA

FIGURE
9-2

DRAWN	JOB NUMBER	FILE NUMBER	DATE	REVISED DATE
BGF	45227 9938-04	W2000056(b)	3/99	6/15/00

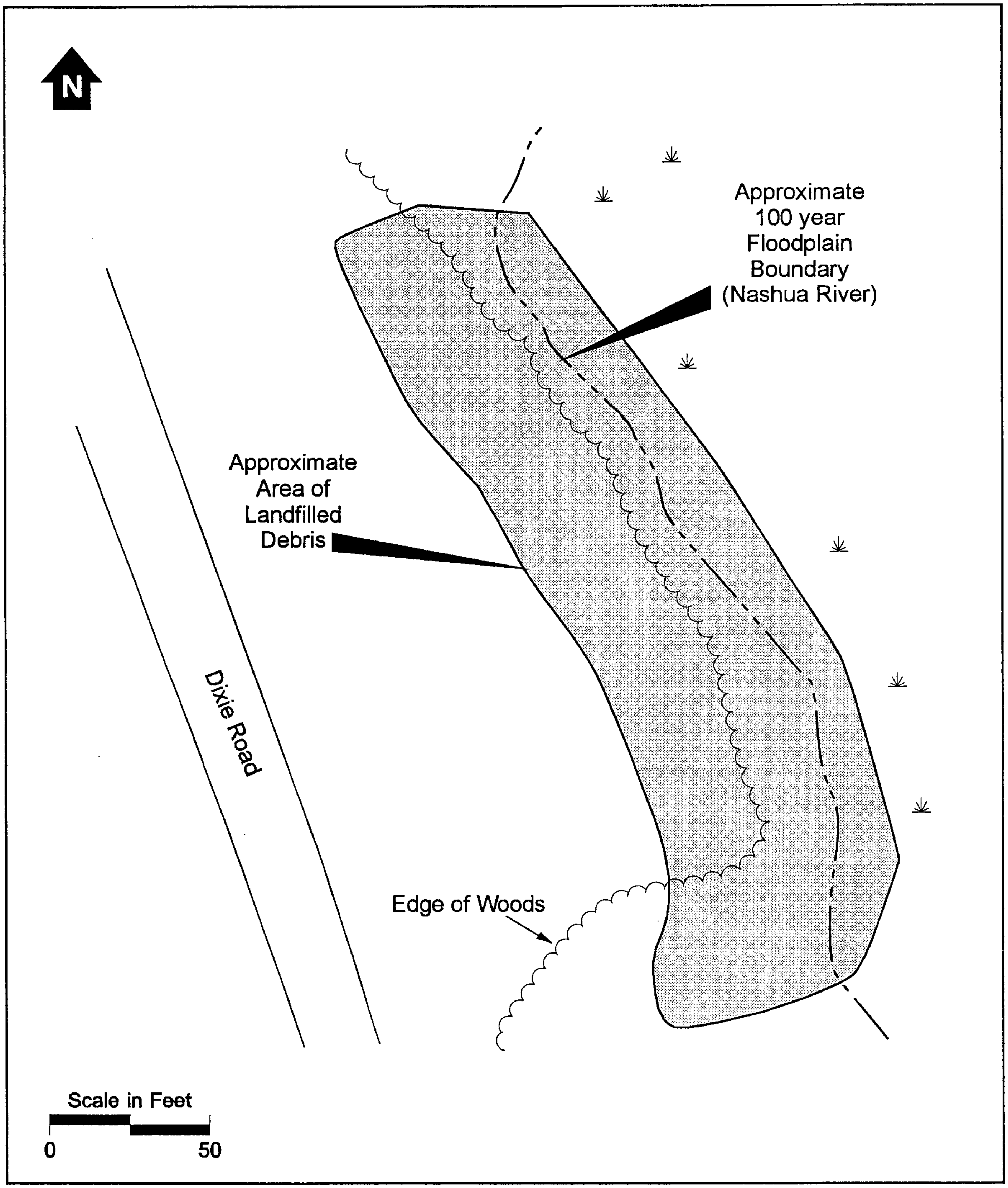


Harding Lawson Associates
Engineering and Environmental Services

AOC 11 SITE MAP
DEVENS, MA

FIGURE
9-3

DRAWN	JOB NUMBER	FILE NUMBER	DATE	REVISED DATE
BGF	45227 9938-04	W2000056(c)	3/99	6/15/00



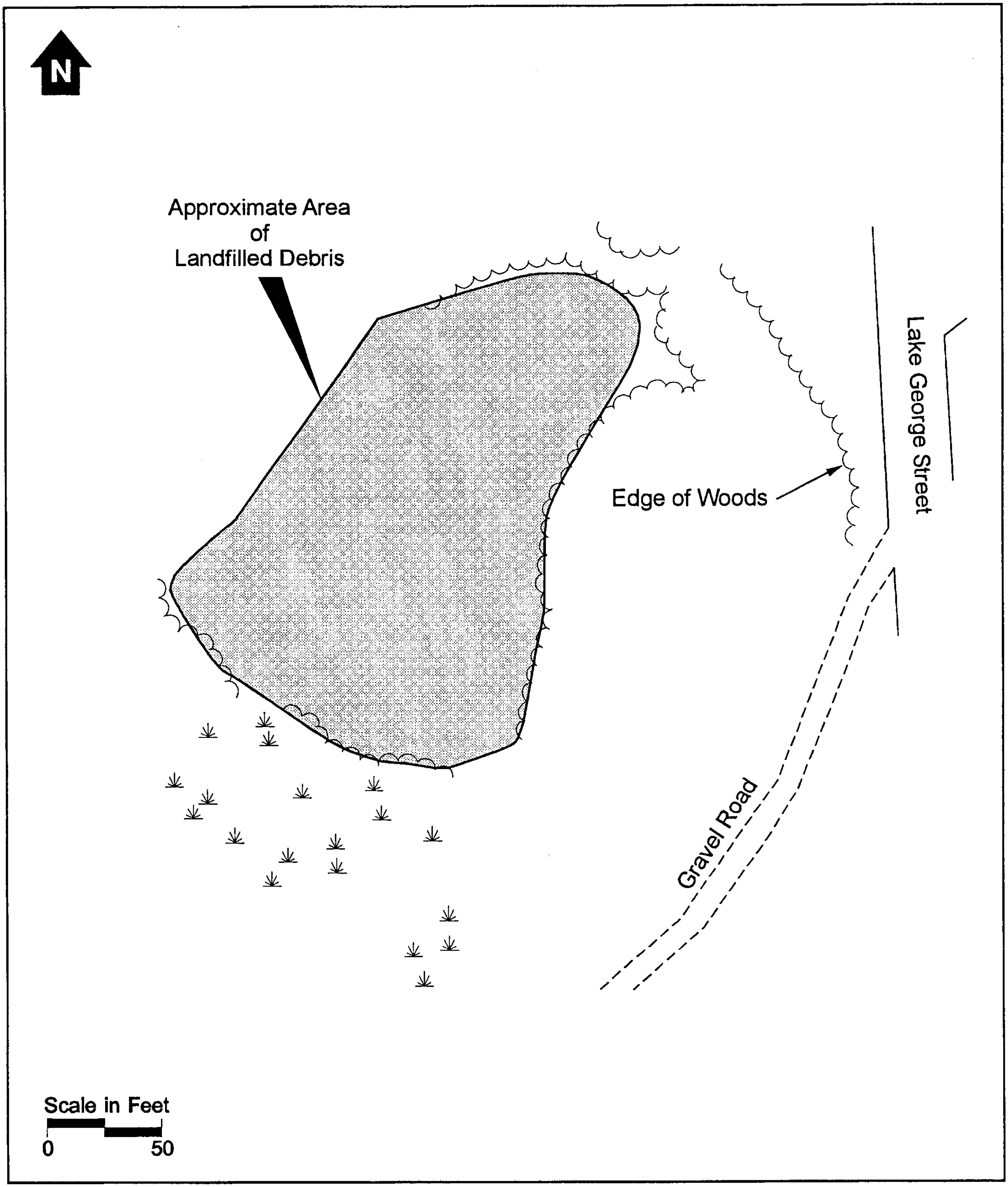
HLA

Harding Lawson Associates
Engineering and
Environmental Services

SA 12 SITE MAP
DEVENS, MA

FIGURE
9-4

DRAWN	JOB NUMBER	FILE NUMBER	DATE	REVISED DATE
BGF	45227 9938-04	W2000056(d)	3/99	6/15/00



Harding Lawson Associates
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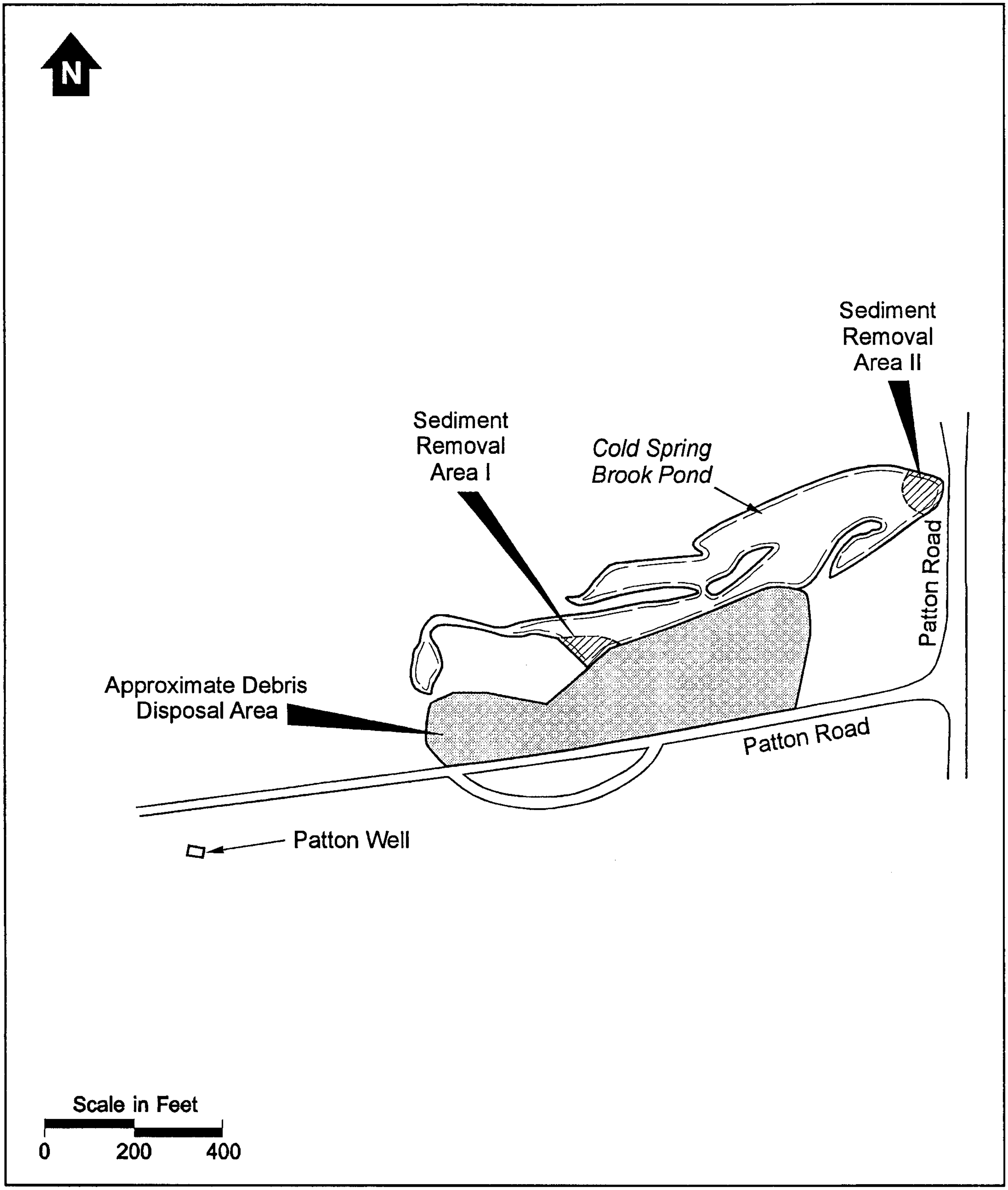
Environmental Services

SA 13 SITE MAP
DEVENS, MA

FIGURE
9-5

DRAWN	JOB NUMBER	FILE NUMBER	DATE	REVISED DATE
BGF	45227 9938-04	W2000056(e)	3/99	6/15/00



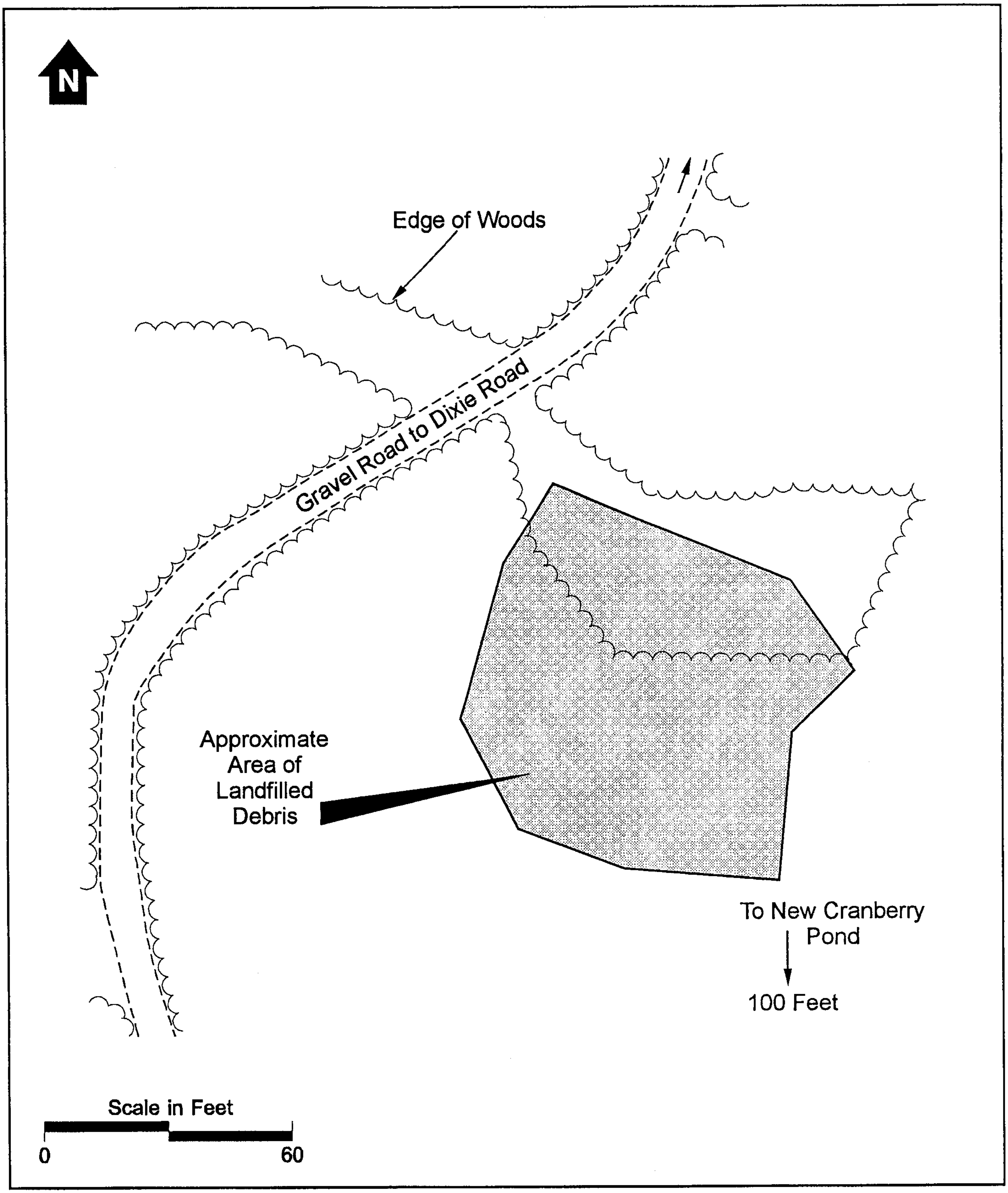
HLA

Harding Lawson Associates
Engineering and
Environmental Services

AOC 40 SITE MAP
DEVENS, MA

FIGURE
9-6

DRAWN	JOB NUMBER	FILE NUMBER	DATE	REVISED DATE
BGF	45227 9938-04	W2000056(f)	3/99	6/15/00



Harding Lawson Associates
Engineering and Environmental Services

AOC 41 SITE MAP
DEVENS, MA

FIGURE
9-7

DRAWN	JOB NUMBER	FILE NUMBER	DATE	REVISED DATE
BGF	45227 9938-04	W2000056(g)	3/99	6/15/00

TABLE 3-1
GROUNDWATER SAMPLE ANALYSES AND PROCEDURES

FIVE YEAR REVIEW
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS

Parameters	Method
Volatile Organic Compounds	USEPA 8260
xylenes	USEPA 8260
Acetone	
2-butanone	
2-methyl pentanone	
1,2-dichlorobenzene	
1,3-dichlorobenzene	
1,4-dichlorobenzene	
Inorganics	EPA-SW 6010
Arsenic	
Barium	
Cadmium	
Chromium	
Cyanide (wet chemistry)	
Iron	
Lead	
Manganese	
Mercury	
Selenium	
Silver	
Copper	
Zinc	
General Parameters (measured in Laboratory)	
Total Dissolved Solids	USEPA 160.2
Total Suspended Solids	USEPA 300
Chloride	
Hardness	USEPA 354.1
Nitrite-Nitrate as N	SW9056
Sulfate	USEPA 310.1
Alkalinity	
Biochemical Oxygen Demand	
Chemical Oxygen	
General Parameters (measured in the field)	
pH	
Temperature	
Specific Conductance	
Dissolved Oxygen	
Oxygen Reduction Potential	
VOCs (Headspace)	

TABLE 3-2
COMPARISON OF BASELINE ARSENIC CONCENTRATION TO LONG-TERM MONITORING RESULTS

FIVE YEAR REVIEW
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS

Well ID	Arsenic (*u*g/L)							
	Baseline	Nov-96	May-97	Oct-97	May-98	Nov-98	May-99	Nov-99
SHL-3	120	NS	<10 U	< 10 U	< 5 U	< 5.4 U	2.7 B	<1.9 U
SHL-4	260	48.8	**73.6 J**	**180**	37.4	**89.1**	**78.2**	**61.3**
SHL-5	38	12	< 10 U	< 10 U	< 5 U	11.5	5.0 B	6.5 J
SHM-96-5B	NS	**1440**	**3300 J**	**2040**	**4300**	**3080**	**3490**	**2700**
SHM-96-5C	NS	**71**	43.2	43.1	49.5	46.8	**57.0**	44.8
SHL-9	67	46.9	16.1 J	25.2	15	27.2	**71.3**	28.5
SHL-10	169	3.4 B	< 10	**209**	< 5 U	< 5.4 U	2.7 B	<1.9 U
SHM-93-10C	21.3	12.4	< 10 U	10.5	7.5	10.2	10.8 B	8.7 J
SHL-11	340	**332**	**252 J**	**366**	**346**	**376**	**431**	**492**
SHL-19	710	**138**	< 10 U	**298**	**77.5**	**145**	**156**	**176**
SHL-20	330	**244**	< 10 U	**227**	**238**	**218**	**216**	**215**
SHL-22	32.9	24.8	< 10 U	34.8	10.6	< 5.4 U	12.2 B	7.3 J
SHM-96-22B	NS	**324**	**318 J**	**352**	**365**	**406**	**707**	**1440**
SHM-93-22C	68.9	44.6	40.4	< 10 U	31.6	**51.1**	42.8	33.2

Notes:
Baseline concentrations from Appendix B of Long Term Monitoring and Maintenance Plan (SWET, 1996)
J = Estimated value below the quantitation limit
U = Not detected above the quantitation limit
B = Detected in associated blank
NS = Not sampled
Bold numbers indicate cleanup level exceedances (MCL cleanup level is 50 *u*g/L)

APPENDIX A

BARNUM ROAD MAINTENANCE YARDS AOCS 44 AND 52

TABLE 3-1
ANALYTICAL & GRAIN SIZE DISTRIBUTION RESULTS
AOCs 44 & 52
FORT DEVENS, MASSACHUSETTS

TESTPIT ID	SAMPLE ID	DEPTH (inches)	FIELD SCREENING RESULTS (mg/kg) TOTAL PAHs[1]	TOTAL cPAHs[2]	TPHC	SOIL PARAMETERS USCS SOIL CLASSIFICATION	SOIL DESCRIPTION
52E-94-01X	EX5201 +A	0-6	57.33	29.9	277	NA	0.0'-0.4': Light grey-blue, very dry, fine-med sand & gravel.
	EX5201 +B	6-12	207.8	100.49	1761	NA	0.4'-0.8': Dark brown, like above w/ cobbles 2"-6".
	EX5201 +C	12-18	1.62 J	0.83 J	79	NA	0.8'-1.6': Reddish br sand w/cobbles (2"-6"), mixed w/ dk br sand.
	EX5201 +D	18-24	1.38 J	0.73 J	56	NA	1.6'-2.0': Reddish brown sand.
	EX5201 +D	18-24 dup.	1.12 J	0.54 J	< 50	NA	
52E-94-02X	EX5202 +A	0-6	4.24 J	1.54 J	229	NA	0.0'-0.9': Tan, med sand w/ reddish brown pockets of med sand.
	EX5202 +B	6-12	1.01 J	0.38 J	81	NA	0.9'-1.1': Dark brown med sand w/ cobbles to 3".
	EX5202 +C	12-18	0.11 J	0 J	< 55	NA	1.1'-2.0': Reddish brown med sand. <5% fines.
	EX5202 +D	18-24	0 J	0 J	< 54	NA	
	EX5202 +D	18-24 dup.	NA	NA	< 54	NA	
52E-94-03X	EX5203 +A	0-6	269.07	179.87	6615	GW	0.0'-0.8': Dark brown sand w/ gravel; cobbles 3"-4" (some to 6"-8").
	EX5203 +B	6-12	2.97 J	1.62 J	82	(INC. IN ABOVE)	0.8'-2.0': Reddish tan med sand w/ 5% coarse sand.
	EX5203 +B	6-12 dup.	3.19 J	1.81 J	63		
	EX5203 +C	12-18	6.11 J	3.39 J	< 54	SP-SM	
	EX5203 +D	18-24	0.64 J	0.39 J	< 53	SP	
52E-94-04X	EX5204 +A	0-6	193.95	98.87	447	NA	0.0'-0.8': Dark brown sand & gravel w/ cobbles.
	EX5204 +B	6-12	60.61	31.96	100	NA	0.8'-1.6': Reddish br sand w/some dk br sand & gravel w/ cobbles.
	EX5204 +C	12-18	12.04 J	5.73 J	< 52	NA	1.6'-2.0': Reddish brown med sand. <5% coarse sand.
	EX5204 +D	18-24	2.5 J	1.27 J	< 55	NA	
52E-94-05X	EX5205 +A	0-6	396.45	237.82	1454	GP-GM	0.0'-0.5': Dk brown to gray sand & gravel. Some chunks of crumbly
	EX5205 +B	6-12	14.6	7.35 J	78	(INC. IN ABOVE)	dark brown soil (asphalt-treated?).
	EX5205 +C	12-18	0.31 J	0 J	< 51	SP	0.5'-1.2': Med sand & coarse gravel.
	EX5205 +D	18-24	0 J	0 J	< 50	SP	1.2'-2.0': Tan med sand w/ 10% coarse sand.
52E-94-06X	EX5206 +A	0-6	103.13	46.64	1097	NA	0.0'-0.5': Dark brown sand; some roots.
	EX5206 +B	6-12	3.89 J	1.74 J	< 51	NA	0.5'-1.0': Dark-light brown sand w/some gravel.
	EX5206 +C	12-18	1.28 J	0.46 J	< 52	NA	1.0'-2.0': Light reddish brown med sand w/ 5%-10% gravel.
	EX5206 +D	18-24	0.15 J	0 J	< 52	NA	
52E-94-07X	EX5207 +A	0-6	44.15	21.77	84	SM	0.0'-0.4': Light gray hard packed soil w/ roots.
	EX5207 +B	6-12	1.77 J	0.76 J	< 57	SW-SM	0.4'-1.2': Dark brown med sand w/ 10%-20% fines.
	EX5207 +C	12-18	1.1 J	0.52 J	< 51	SP-SM	1.2'-2.0': Light reddish br med sand; 5% coarse sand; 10% fine sand
	EX5207 +D	18-24	2.96 J	1.48 J	< 53	SW-SM	
52E-94-08X	EX5208 +A	0-6	512.57	272.89	1192	NA	0.0'-0.3': Roots and light fine dust.
	EX5208 +A	0-6 dup.	517.88	282.02	NA	NA	0.4'-0.8': Dark brown fine to med sand, 10%-20% gravel.
	EX5208 +B	6-12	13.16 J	6.95 J	204	NA	0.8'-1.2': Dk br and red-br f to med sand, 10%-20% gravel. Damp.
	EX5208 +C	12-18	3.31 J	1.71 J	86	NA	1.2'-2.0': Reddish-brown med sand; 10% fine sand,
	EX5208 +D	18-24	1.2 J	0.46 J	< 49	NA	0%-5% coarse sand. Damp.
44E-94-01X	EX4401 +A	0-6	6.99 J	3.77 J	99	SP-SM	0.0'-0.3': Dark brown sand and gravel w/ roots.
	EX4401 +B	6-12	0.34 J	0 J	< 53	(INC. IN ABOVE)	0.3'-0.9': Dark brown sand and gravel w/ cobbles.
	EX4401 +C	12-18	0 J	0 J	< 52	SP-SM	
	EX4401 +C	12-18 dup.	NA	NA	< 52		0.9'-1.4': Reddish br med sand; 5%-10% coarse sand w/ gravel.
	EX4401 +D	18-24	0 J	0 J	< 52	SP	1.4'-2.0': Tan med sand, 0%-5% coarse sand.

Notes:

[1] = Total of 18 PAHs. May include estimated values for compound(s) which were detected at less than the compound's detection limit.

[2] = Includes the following PAHs: benzo(a)anthracene; chrysene; benzo(b)fluoranthene; benzo(k)fluoranthene; benzo(a)pyrene; indeno(1,2,3-cd)pyrene; and dibenzo(a,h)anthracene. May include estimated values for compound(s) which were detected at less than the compound's respective detection limit.

J = All compounds which comprise the total were present (if detected) at concentration less than the compound's detection limit.

< = Analyte present at concentration less than the detection limit indicated.

NA = Analysis not performed.

PAHs = Polycyclic Aromatic Hydrocarbons; analysis by modified EPA Method 3550/8100.

cPAHs = Carcinogenic Polycyclic Aromatic Hydrocarbons; analysis by modified EPA Method 3550/8100.

TRPH = Total Recoverable Petroleum Hydrocarbons; analysis by modified EPA Method 418.1

USCS = Unified Soil Classification System. Sieve analysis performed in accordance with ASTM D422.

g:\home\hcolby\ftdev\4452\table

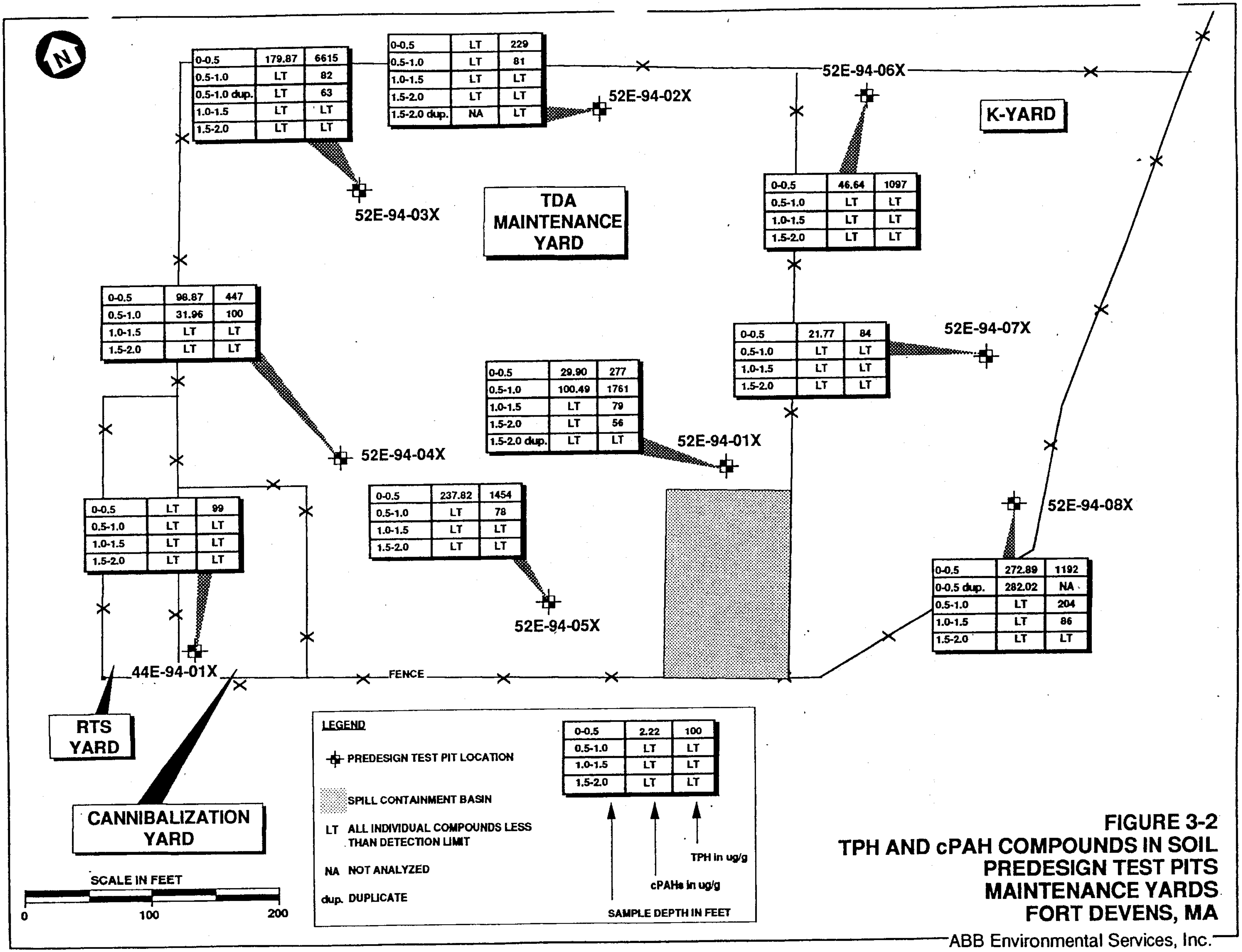


FIGURE 3-2
TPH AND cPAH COMPOUNDS IN SOIL
PREDESIGN TEST PITS
MAINTENANCE YARDS
FORT DEVENS, MA

ABB Environmental Services, Inc.

7467-00A

Roy F. Weston, Inc.
Ft. Devens-Maintenance Yard Remediation
No. DACW33-95-D-0004

12/26/95

Analytical Summary Table

Grid Location	Excavation No. (6 in.)	Date Excavation	Date Sampled	Sample Pile Location	Analytical Results Date	Time	Results (ppm) cPAH 7	TPH 500
A6	1	9/1/95	9/1/95	A-6,A-7	9/5/95	10:15	52.18	410
	2	9/6/95	9/6/95	A-7	9/7/95	8:21	17.57	364
	3	9/11/95	9/11/95	A-7	9/12/95	7:51	ND	142
	4	9/14/95	9/14/95	A-7	9/15/95	8:00	ND	8
A7	1	9/1/95	9/1/95	A-6,A-7	9/5/95	10:15	52.18	410
	2	9/6/95	9/6/95	A-7	9/6/95	8:21	17.57	364
	3	9/11/95	9/11/95	A-7	9/12/95	7:51	ND	142
	4	9/14/95	9/14/95	A-7	9/15/95	8:00	ND	8
A8	1	9/1/95	9/1/95	A-8	9/5/95	10:15	87.16	179
	2	9/6/95	9/6/95	A-8	9/6/95	8:21	5.12	39
	3	9/14/95	9/14/95	A-8	9/15/95	8:00	0.98	ND
	4	9/15/95	9/15/95	A-8	9/18/95	8:21	ND	ND
A9	1	9/1/95	9/1/95	A-10	9/5/95	10:15	45.00	319
	2	9/5/95	9/5/95	A-10	9/6/95	8:39	2.18	110
	3	9/6/95	9/6/95	A-10	9/7/95	8:21	1.75	174
	4	9/7/95	9/7/95	A-10	9/8/95	10:45	0.13	29
A10	1	9/1/95	9/1/95	A-10	9/5/95	10:15	45.00	319
	2	9/5/95	9/5/95	A-10	9/6/95	8:39	2.18	110
	3	9/6/95	9/6/95	A-10	9/7/95	8:21	1.75	174
	4	9/7/95	9/7/95	A-10	9/8/95	7:45	0.13	29
B1	1	8/18/95	8/18/95	B-1	8/21/95	10:54	30.70	1371
	2	8/25/95	8/25/95	B-1	8/28/95	7:45	17.14	108
	3	8/31/95	8/31/95	B-1	9/1/95	8:19	1.50	40
	4	9/6/95	9/6/95	B-1	9/7/95	8:21	ND	8
B2	1	8/18/95	8/18/95	B-2	8/21/95	10:54	78.18	841
	2	8/29/95	8/29/95	B-2	8/30/95	11:14	8.12	150
	3	9/5/95	9/5/95	B-2	9/6/95	8:39	0.68	11
	4	9/11/95	9/11/95	B-2	9/12/95	7:51	ND	28
B3	1	8/21/95	8/21/95	B-3	8/22/95	19:23	20.28	771
	2	8/29/95	8/29/95	B-3	8/30/95	11:14	3.35	193
	3	9/7/95	9/7/95	B-3	9/8/95	10:45	2.98	60
	4	9/12/95	9/12/95	B-3	9/13/95	10:31	ND	7
B4	1	8/29/95	8/29/95	B-4	8/30/95	11:14	68.45	449
	2	9/5/95	9/5/95	B-4	9/6/95	8:39	5.34	195
	3	9/7/95	9/7/95	B-4	9/8/95	10:45	ND	35
	4	9/13/95	9/13/95	B-4	9/14/95	10:35	ND	13
B5	1	8/29/95	8/29/95	B-5	8/30/95	11:14	22.21	354
	2	9/5/95	9/5/95	B-5	9/6/95	8:39	2.94	127
	3	9/14/95	9/14/95	B-5	9/15/95	8:00	1.04	20
	4	9/15/95	9/15/95	B-5	9/18/95	8:21	ND	ND
B6	1	8/29/95	8/29/95	B-6	8/30/95	11:14	33.99	441
	2	9/5/95	9/5/95	B-6	9/6/95	8:39	8.69	222
	3	9/13/95	9/13/95	B-6	9/14/95	10:35	1.15	86
	4	9/14/95	9/14/95	B-6	9/15/95	8:00	ND	ND
B7	1	9/6/95	9/6/95	B-7	9/7/95	8:21	87.19	442
	2	9/7/95	9/7/95	B-7	9/8/95	10:45	31.17	221
	3	9/11/95	9/11/95	B-7	9/12/95	7:51	1.45	16
	4	9/14/95	9/14/95	B-7	9/15/95	8:00	ND	17
B8	1	9/6/95	9/6/95	B-8	9/7/95	8:21	29.60	681
	2	9/7/95	9/7/95	B-8	9/8/95	10:45	9.78	149
	3	9/11/95	9/11/95	B-8	9/12/95	7:51	0.14	720
	4	9/15/95	9/15/95	B-8	9/18/95	8:21	ND	54
B9	1	9/1/95	9/1/95	B-9	9/5/95	10:15	30.02	384
	2	9/6/95	9/6/95	B-9	9/7/95	8:21	3.19	475

Cells: C-5, C-6, D-5, D-6 (Contaminated stockpile)
Cells: G-5, G-6 (Clean stockpile)

Roy F. Weston, Inc.
Ft. Devens-Maintenance Yard Remediation
No. DACW33-95-D-0004

12/26/95

Analytical Summary Table

Grid Location	Excavation No. (6 in.)	Date Excavation	Date Sampled	Sample Pile Location	Analytical Results Date	Time	Results (ppm) cPAH 7	TPH 500
	3	9/21/95	9/21/95	B-9	9/22/95	7:37	0.53	79
	4	9/22/95	9/22/95	B-9	9/25/95	6:51	ND	9
B10	1	9/1/95	9/1/95	B-10	9/5/95	10:15	20.68	377
	2	9/5/95	9/5/95	B-10	9/6/95	8:39	ND	484
	3	9/6/95	9/6/95	B-10	9/7/95	8:21	ND	151
	4	9/7/95	9/7/95	B-10	9/8/95	10:45	0.13	179
C1	1	8/18/95	8/18/95	C-1	8/21/95	10:54	19.78	696
	2	8/25/95	8/25/95	C-1	8/28/95	7:45	12.81	138
	3	8/31/95	8/31/95	C-1	9/1/95	8:19	2.96	41
	4	9/5/95	9/5/95	C-1	9/6/95	8:39	ND	81
C2	1	8/18/95	8/18/95	C-2	8/21/95	10:54	33.97	1706
	2	8/29/95	8/29/95	C-2	8/30/95	11:14	0.67	60
	3	9/7/95	9/7/95	C-2	9/8/95	10:45	ND	13
	4	9/11/95	9/11/95	C-2	9/12/95	7:51	ND	8
C3	1	8/21/95	8/21/95	C-3	8/22/95	19:23	40.07	735
	2	8/29/95	8/29/95	C-3	8/30/95	11:14	14.52	302
	3	9/7/95	9/7/95	C-3	9/8/95	10:45	ND	63
	4	9/11/95	9/11/95	C-3	9/12/95	7:51	ND	10
C4	1	8/24/95	8/24/95	C-4	8/25/95	8:45	78.45	1383
	2	9/7/95	9/7/95	C-4	9/8/95	10:45	4.29	85
	3	9/12/95	9/12/95	C-4	9/13/95	10:31	ND	10
	4	9/13/95	9/13/95	C-4	9/14/95	10:35	ND	16
C5	1	10/23/95	10/23/95	D-5	10/24/95	8:10	7.89	512
	2	10/23/95	10/23/95	B-5	10/24/95	8:10	7.91	1432
	3	10/23/95	10/23/95	B-5	10/24/95	8:10	ND	101
	4	10/23/95	10/23/95	C-5	10/24/95	8:10	ND	40
C6	1	10/23/95	10/23/95	D-6	10/24/95	8:10	59.04	1033
	2	10/23/95	10/23/95	B-6	10/24/95	8:10	3.21	299
	3	10/23/95	10/23/95	B-6	10/24/95	8:10	2.63	636
	4	10/23/95	10/23/95	C-6	10/24/95	8:10	ND	30
C7	1	8/28/95	8/28/95	C-7	8/29/95	10:58	47.96	242
	2	9/6/95	9/6/95	C-7	9/7/95	8:21	8.88	45
	3	9/8/95	9/8/95	C-7	9/11/95	7:45	ND	35
	4	9/14/95	9/14/95	C-7	9/15/95	8:00	ND	30
C8	1	8/24/95	8/24/95	C-8	8/25/95	8:45	56.52	358
	2	9/6/95	9/6/95	C-8	9/7/95	8:21	7.53	50
	3	9/8/95	9/8/95	C-8	9/11/95	7:45	ND	10
	4	9/13/95	9/13/95	C-8	9/14/95	10:35	0.12	ND
C9	1	8/25/95	8/25/95	C-9	8/28/95	7:45	86.74	261
	2	9/5/95	9/5/95	C-9	9/6/95	8:39	5.85	40
	3	9/8/95	9/8/95	C-9	9/11/95	7:45	0.83	9
	4	9/11/95	9/11/95	C-9	9/12/95	7:51	ND	ND
C10	1	8/25/95	8/25/95	C-10	8/28/95	7:45	49.64	360
	2	8/31/95	8/31/95	C-10	9/1/95	8:19	6.73	92
	3	9/5/95	9/5/95	C-10	9/6/95	8:39	ND	14
	4	9/6/95	9/6/95	C-10	9/7/95	8:21	ND	10
D1	1	8/18/95	8/18/95	D-1	8/21/95	10:54	63.69	680
	2	8/23/95	8/23/95	D-1	8/24/95	9:20	3.20	132
	3	8/28/95	8/28/95	D-1	8/29/95	10:58	ND	18
	4	8/31/95	8/31/95	D-1	9/1/95	8:19	0.23	ND
D2	1	8/18/95	8/18/95	D-2	8/21/95	10:54	37.60	890
	2	8/29/95	8/29/95	D-2	8/30/95	11:14	0.69	29
	3	8/31/95	8/31/95	D-2	9/1/95	8:19	ND	ND
	4	9/1/95	9/1/95	D-2	9/5/95	10:15	ND	ND

Cells: C-5, C-6, D-5, D-6 (Contaminated stockpile)
Cells: G-5, G-6 (Clean stockpile)

Roy F. Weston, Inc. 12/26/95
Ft. Devens-Maintenance Yard Remediation
No. DACW33-95-D-0004

Analytical Summary Table

Grid Location	Excavation No. (6 In.)	Date Excavation	Date Sampled	Sample Pile Location	Analytical Results Date	Analytical Results Time	Results (ppm) cPAH 7	Results (ppm) TPH 500
D3	1	8/21/95	8/21/95	D-3	8/22/95	19:23	62.50	607
	2	8/29/95	8/29/95	D-3	8/30/95	11:14	12.72	208
	3	9/7/95	9/7/95	D-3	9/8/95	10:45	1.89	82
	4	9/11/95	9/11/95	D-3	9/12/95	7:51	ND	128
D4	1	8/24/95	8/24/95	D-4	8/25/95	8:45	88.80	661
	2	9/7/95	9/7/95	D-4	9/8/95	10:45	6.89	120
	3	9/12/95	9/12/95	D-4	9/13/95	10:31	1.39	89
	4	9/13/95	9/13/95	D-4	9/14/95	10:35	ND	ND
D5	1	10/24/95	10/24/95	D-2	10/25/95	8:11	25.20	182
	2	10/24/95	10/24/95	D-5	10/25/95	8:11	6.98	97
	3	10/24/95	10/24/95	D-5	10/25/95	8:11	ND	ND
	4	10/24/95	10/24/95	D-5	10/25/95	8:11	0.47	ND
D6	1	10/24/95	10/24/95	D-2	10/25/95	8:11	25.59	286
	2	10/24/95	10/24/95	D-6	10/25/95	8:11	1.13	139
	3	10/24/95	10/24/95	D-6	10/25/95	8:11	3.95	9
	4	10/24/95	10/24/95	D-6	10/25/95	8:11	1.26	ND
D7	1	8/28/95	8/28/95	D-7	8/29/95	10:58	71.26	359
	2	9/6/95	9/6/95	D-7	9/7/95	8:21	8.54	148
	3	9/8/95	9/8/95	D-7	9/11/95	7:45	0.75	35
	4	9/13/95	9/13/95	D-7	9/14/95	10:35	ND	ND
D8	1	8/24/95	8/24/95	D-8	8/25/95	8:45	50.46	616
	2	9/6/95	9/6/95	D-8	9/7/95	8:21	24.00	330
	3	9/8/95	9/8/95	D-8	9/11/95	7:45	ND	7
	4	9/13/95	9/13/95	D-8	9/14/95	10:35	ND	50
D9	1	8/25/95	8/25/95	D-9	8/28/95	7:45	67.37	313
	2	9/5/95	9/5/95	D-9	9/6/95	8:39	4.62	26
	3	9/8/95	9/8/95	D-9	9/11/95	7:45	0.36	278
	4	9/11/95	9/11/95	D-9	9/12/95	7:51	ND	9
D10	1	8/25/95	8/25/95	D-10	8/28/95	7:45	50.93	397
	2	9/1/95	9/1/95	D-10	9/5/95	10:15	18.75	196
	3	9/5/95	9/5/95	D-10	9/6/95	8:39	0.78	26
	4	9/6/95	9/6/95	D-10	9/7/95	8:21	ND	ND
E1	1	8/18/95	8/18/95	E-1	8/21/95	10:54	34.31	1303
	2	8/23/95	8/23/95	E-1	8/24/95	9:20	3.19	124
	3	8/31/95	8/31/95	E-1	9/1/95	8:19	1.02	17
	4	9/1/95	9/1/95	E-1	9/5/95	10:15	ND	ND
E2	1	8/18/95	8/18/95	E-2	8/21/95	10:54	4.25	844
	2	8/29/95	8/29/95	E-2	8/30/95	11:14	0.69	19
	3	8/31/95	8/31/95	E-2	9/1/95	8:19	ND	ND
	4	9/1/95	9/1/95	E-2	9/5/95	10:15	ND	ND
E3	1	8/21/95	8/21/95	E-3	8/22/95	19:23	16.56	532
	2	8/29/95	8/29/95	E-3	8/30/95	11:14	ND	8
	3	9/11/95	9/11/95	E-3	9/12/95	7:51	ND	ND
	4	9/12/95	9/12/95	E-3	9/13/95	10:31	ND	11
E4	1	8/24/95	8/24/95	E-4	8/25/95	8:45	30.32	436
	2	8/30/95	8/30/95	E-4	8/31/95	7:54	7.15	122
	3	9/12/95	9/12/95	E-4	9/13/95	10:31	0.83	26
	4	9/13/95	9/13/95	E-4	9/14/95	10:35	ND	ND
E5	1	10/19/95	10/19/95	D-5	10/20/95	8:13	15.95	2169
	2	10/19/95	10/19/95	E-4	10/20/95	8:13	1.44	92
	3	10/19/95	10/19/95	E-4	10/20/95	8:13	ND	7
	4	10/19/95	10/19/95	E-5	10/20/95	8:13	ND	19
E6	1	10/19/95	10/19/95	D-6	10/20/95	8:13	24.60	414
	2	10/19/95	10/19/95	E-7	10/20/95	8:13	5.31	82

Cells: C-5, C-6, D-5, D-6 (Contaminated stockpile)
Cells: G-5, G-6 (Clean stockpile)

Analytical Summary Table

Grid Location	Excavation No. (6 in.)	Date Excavation	Date Sampled	Sample Pile Location	Analytical Results Date	Time	Results (ppm) cPAH 7	TPH 500
	3	10/19/95	10/19/95	E-7	10/20/95	8:13	0.13	10
	4	10/19/95	10/19/95	E-6	10/20/95	8:13	ND	7
E7	1	9/14/95	9/14/95	E-7	9/15/95	8:00	57.04	577
	2	9/15/95	9/15/95	E-7	9/18/95	8:21	2.95	491
	3	9/18/95	9/18/95	E-7	9/19/95	7:33	0.97	9
	4	9/19/95	9/19/95	E-7	9/20/95	7:33	0.97	14
E8	1	8/25/95	8/25/95	E-8	8/28/95	7:45	22.09	410
	2	9/5/95	9/5/95	E-8	9/6/95	8:39	9.86	165
	3	9/8/95	9/8/95	E-8	9/11/95	7:45	0.25	72
	4	9/12/95	9/12/95	E-8	9/13/95	10:31	ND	13
E9	1	8/25/95	8/25/95	E-9	8/28/95	7:45	40.86	544
	2	9/5/95	9/5/95	E-9	9/6/95	8:39	2.37	64
	3	9/8/95	9/8/95	E-9	9/11/95	7:45	ND	12
	4	9/11/95	9/11/95	E-9	9/12/95	7:51	ND	16
E10	1	8/25/95	8/25/95	E-10	8/28/95	7:45	34.41	304
	2	9/1/95	9/1/95	E-10	9/5/95	10:15	4.70	107
	3	9/5/95	9/5/95	E-10	9/6/95	8:39	ND	45
	4	9/6/95	9/6/95	E-10	9/7/95	8:21	ND	8
F1	1	8/18/95	8/18/95	F-1	8/21/95	10:54	44.84	1203
	2	8/23/95	8/23/95	F-1	8/24/95	9:20	1.38	59
	3	8/31/95	8/31/95	F-1	9/1/95	8:19	1.89	16
	4	9/1/95	9/1/95	F-1	9/5/95	10:15	ND	ND
F2	1	8/18/95	8/18/95	F-2	8/21/95	10:54	17.07	924
	2	8/29/95	8/29/95	F-2	8/30/95	11:14	2.16	53
	3	8/31/95	8/31/95	F-2	9/1/95	8:19	ND	29
	4	9/7/95	9/7/95	F-2	9/8/95	10:45	ND	9
F3	1	8/21/95	8/21/95	F-3	8/22/95	19:23	35.94	655
	2	8/29/95	8/29/95	F-3	8/30/95	11:14	1.44	36
	3	9/11/95	9/11/95	F-3	9/12/95	7:51	1.23	59
	4	9/12/95	9/12/95	F-3	9/13/95	10:31	0.25	26
F4	1	8/24/95	8/24/95	F-4	8/25/95	8:45	38.95	419
	2	8/30/95	8/30/95	F-4	8/31/95	7:54	4.65	132
	3	9/13/95	9/13/95	F-4	9/14/95	10:35	1.73	56
	4	9/14/95	9/14/95	F-4	9/15/95	8:00	0.11	ND
F5	1	10/12/95	10/23/95	F-4	10/24/95	8:10	42.73	447
	2	10/12/95	10/19/95	F-4	10/20/95	8:13	9.22	96
	3	10/19/95	10/19/95	F-5	10/20/95	8:13	1.42	43
	4	10/19/95	10/19/95	F-5	10/20/95	8:13	ND	10
F6	1	10/12/95	10/12/95	E-6	10/13/95	6:48	44.69	573
	2	10/12/95	10/12/95	F-7	10/13/95	6:48	9.61	212
	3	10/12/95	10/12/95	F-7	10/13/95	6:48	13.56	124
	4	10/12/95	10/12/95	F-6	10/13/95	6:48	2.64	46
F7	1	9/14/95	9/14/95	F-7	9/15/95	8:00	50.63	351
	2	9/15/95	9/15/95	F-7	9/18/95	8:21	34.97	512
	3	9/18/95	9/18/95	F-7	9/19/95	7:33	37.37	218
	4	9/19/95	9/19/95	F-7	9/20/95	7:33	11.53	44
	5	9/21/95	9/21/95	F-7	9/22/95	7:37	1.72	ND
F8	1	8/17/95	8/17/95	F-8	8/18/95	9:06	63.81	496
	2	8/23/95	8/23/95	F-8	8/24/95	9:20	8.70	169
	3	8/28/95	8/28/95	F-8	8/29/95	10:58	3.79	55
	4	8/31/95	8/31/95	F-8	9/1/95	8:19	0.70	ND
F9	1	8/17/95	8/17/95	F-10	8/17/95	9:06	45.55	481
	2	8/22/95	8/22/95	F-9,F-10	8/23/95	6:55	1.82	96
	3	8/28/95	8/28/95	F-10	8/29/95	10:58	1.44	31

Cells: C-5, C-6, D-5, D-6 (Contaminated stockpile)
Cells: G-5, G-6 (Clean stockpile)

Roy F. Weston, Inc.
Ft. Devens-Maintenance Yard Remediation
No. DACW33-95-D-0004

12/26/95

Analytical Summary Table

Grid Location	Excavation No. (6 in.)	Date Excavation	Date Sampled	Sample Pile Location	Analytical Results Date	Time	Results (ppm) cPAH 7	TPH 500
	4	8/31/95	8/31/95	F-10	9/1/95	8:19	0.57	15
F10	1	8/17/95	8/17/95	F-10	8/17/95	9:06	45.55	481
	2	8/22/95	8/22/95	F-9,F-10	8/23/95	6:55	1.82	96
	3	8/28/95	8/28/95	F-10	8/29/95	10:58	1.44	31
	4	8/31/95	8/31/95	F-10	9/1/95	8:19	0.57	15
G1	1	8/17/95	8/17/95	G-1	8/18/95	9:06	152.64	456
	2	8/23/95	8/23/95	G-1	8/24/95	9:20	5.22	42
	3	8/28/95	8/28/95	G-1	8/29/95	10:58	0.18	ND
	4	8/31/95	8/31/95	G-1	9/1/95	8:19	ND	7
G2	1	8/18/95	8/18/95	G-2	8/21/95	10:54	21.19	2107
	2	8/29/95	8/29/95	G-2	8/30/95	11:14	11.14	49
	3	9/6/95	9/6/95	G-2	9/7/95	8:21	ND	8
	4	9/7/95	9/7/95	G-2	9/8/95	10:45	ND	ND
G3	1	8/18/95	8/18/95	G-3	8/21/95	10:54	68.62	232
	2	8/30/95	8/30/95	G-3	8/31/95	7:54	3.65	26
	3	9/8/95	9/8/95	G-3	9/11/95	7:45	1.40	49
	4	9/11/95	9/11/95	G-3	9/12/95	7:51	ND	ND
G4	1	8/21/95	8/21/95	G-4	8/22/95	19:23	102.84	653
	2	8/30/95	8/30/95	G-4	8/31/95	7:54	5.76	74
	3	9/11/95	9/11/95	G-4	9/12/95	7:51	3.14	31
	4	9/12/95	9/12/95	G-4	9/13/95	10:31	0.34	8
G5	1	9/26/95	9/27/95	G-5	9/28/95	7:16	64.16	343
	2	9/27/95	9/27/95	G-5	9/28/95	7:16	8.64	52
	3	9/27/95	9/27/95	G-5	9/28/95	7:16	1.70	36
	4	9/27/95	9/27/95	G-5	9/28/95	7:16	1.56	7
G6	1	9/19/95	9/19/95	G-6	9/20/95	7:33	64.70	92
	2	9/21/95	9/21/95	G-6	9/22/95	7:37	15.51	54
	3	9/22/95	9/22/95	G-6	9/25/95	6:51	10.41	164
	4	9/25/95	9/27/95	G-6	9/28/95	7:16	1.27	14
G7	1	9/18/95	9/18/95	G-7	9/19/95	7:33	68.46	411
	2	9/19/95	9/19/95	G-7	9/20/95	7:33	4.28	17
	3	9/21/95	9/21/95	G-7	9/22/95	7:37	1.06	ND
	4	9/22/95	9/22/95	G-7	9/25/95	6:51	ND	23
G8	1	8/17/95	8/17/95	G-8	8/17/95	9:06	104.61	572
	2	8/23/95	8/23/95	G-8	8/24/95	9:20	9.88	114
	3	8/28/95	8/28/95	G-8	8/29/95	10:58	0.72	37
	4	8/31/95	8/31/95	G-8	9/1/95	8:19	1.57	11
G9	1	8/17/95	8/17/95	G-9	8/17/95	9:06	60.62	408
	2	8/23/95	8/23/95	G-9	8/24/95	9:20	4.22	11
	3	8/28/95	8/28/95	G-9	8/29/95	10:58	2.04	44
	4	8/31/95	8/31/95	G-9	9/1/95	8:19	1.05	15
G10	1	8/17/95	8/17/95	F-10	8/17/95	9:06	45.55	481
	2	8/22/95	8/22/95	F-9,F-10	8/23/95	6:55	1.82	96
	3	8/28/95	8/28/95	F-10	8/29/95	10:58	1.44	31
	4	8/31/95	8/31/95	F-10	9/1/95	8:19	0.57	15
H1	1	8/17/95	8/17/95	H-1	8/18/95	9:06	163.19	614
	2	8/21/95	8/21/95	H-1	8/22/95	19:23	11.35	20
	3	8/28/95	8/28/95	H-1	8/29/95	10:58	4.08	19
	4	8/30/95	8/30/95	H-1	8/31/95	7:54	1.94	ND
H2	1	8/16/95	8/16/95	H-3	8/17/95	8:50	40.05	357
	2	8/22/95	8/22/95	H-1	8/23/95	6:55	2.31	578
	3	8/28/95	8/28/95	H-2	8/29/95	10:58	1.88	173
	4	8/30/95	8/30/95	H-2	8/31/95	7:54	0.39	33
H3	1	8/16/95	8/16/95	H-3	8/17/95	8:50	38.61	61

Cells: C-5, C-6, D-5, D-6 (Contaminated stockpile)
Cells: G-5, G-6 (Clean stockpile)

Analytical Summary Table

Grid Location	Excavation No. (6 in.)	Date Excavation	Date Sampled	Sample Pile Location	Analytical Results Date	Analytical Results Time	Results (ppm) cPAH 7	Results (ppm) TPH 500
	2	8/22/95	8/22/95	H-3	8/23/95	6:55	ND	7
	3	8/28/95	8/28/95	H-3	8/29/95	10:58	ND	18
	4	8/30/95	8/30/95	H-3	8/31/95	7:54	ND	ND
H4	1	8/16/95	8/16/95	H-4	8/17/95	8:50	13.56	332
	2	8/22/95	8/22/95	H-4	8/23/95	6:55	11.56	42
	3	8/28/95	8/28/95	H-4	8/29/95	10:58	3.39	28
	4	8/30/95	8/30/95	H-4	8/31/95	7:54	0.99	ND
H5	1	8/16/95	8/16/95	H-5	8/17/95	8:50	10.22	72
	2	8/22/95	8/22/95	H-5	8/23/95	6:55	3.44	ND
	3	8/28/95	8/28/95	H-5	8/29/95	10:58	0.64	ND
	4	8/30/95	8/30/95	H-5	8/31/95	7:54	0.66	ND
H6	1	8/16/95	8/16/95	H-7	8/17/95	8:50	28.25	175
	2	8/22/95	8/22/95	H-6,H-7	8/23/95	6:55	12.91	34
	3	8/28/95	8/28/95	H-6	8/29/95	10:58	2.62	49
	4	8/30/95	8/30/95	H-6,H-7	8/31/95	7:54	0.26	ND
H7	1	8/16/95	8/16/95	H-7	8/17/95	8:50	28.25	175
	2	8/22/95	8/22/95	H-6,H-7	8/23/95	6:55	12.91	34
	3	8/28/95	8/28/95	H-6	8/29/95	10:58	2.62	49
	4	8/30/95	8/30/95	H-6,H-7	8/31/95	7:54	0.26	ND
H8	1	8/15/95	8/16/95	H-7	8/17/95	8:50	28.25	175
	2	8/22/95	8/22/95	H-6,H-7	8/23/95	6:55	12.91	34
	3	8/28/95	8/28/95	H-6	8/29/95	10:58	2.62	49
	4	8/30/95	8/30/95	H-6,H-7	8/31/95	7:54	0.26	ND
H9	1	8/15/95	8/16/95	H-7	8/17/95	8:50	28.25	175
	2	8/22/95	8/22/95	H-6,H-7	8/23/95	6:55	12.91	34
	3	8/28/95	8/28/95	H-6	8/29/95	10:58	2.62	49
	4	8/30/95	8/30/95	H-6,H-7	8/31/95	7:54	0.26	ND
I1	1	8/17/95	8/17/95	I-1	8/18/95	9:06	163.19	614
	2	8/21/95	8/21/95	H-1	8/23/95	19:23	11.35	20
	3	8/28/95	8/28/95	H-1	8/29/95	10:58	4.08	19
	4	8/30/95	8/30/95	H-1	8/31/95	7:54	1.94	ND
I2	1	8/17/95	8/17/95	I-2	8/17/95	8:50	40.05	357
	2	8/22/95	8/22/95	H-1	8/23/95	6:55	2.31	578
	3	8/28/95	8/28/95	H-2	8/29/95	10:58	1.88	173
	4	8/30/95	8/30/95	H-2	8/31/95	7:54	0.39	33
B9	10XCB	10/4/95	10/4/95	B-9	10/5/95	7:35	N/A	116
	10XCEW	10/4/95	10/4/95	B-9	10/5/95	7:35	N/A	8
	10XCWW	10/4/95	10/4/95	B-9	10/5/95	7:35	N/A	20
	10XEB	10/4/95	10/4/95	B-9	10/5/95	7:35	N/A	10
	10XEW	10/4/95	10/4/95	B-9	10/5/95	7:35	N/A	ND
	10XNEW	10/4/95	10/4/95	B-9	10/5/95	7:35	N/A	ND
	10XNW	10/4/95	10/4/95	B-9	10/5/95	7:35	N/A	ND
	10XNWW	10/4/95	10/4/95	B-9	10/5/95	7:35	N/A	ND
	10XSEW	10/4/95	10/4/95	B-9	10/5/95	7:35	N/A	ND
	10XSW	10/4/95	10/4/95	B-9	10/5/95	7:35	N/A	ND
	10XSWW	10/4/95	10/4/95	B-9	10/5/95	7:35	N/A	ND
	10XWB	10/4/95	10/4/95	B-9	10/5/95	7:35	N/A	ND
	10XWW	10/4/95	10/4/95	B-9	10/5/95	7:35	N/A	ND
B8	6XN1	10/4/95	10/4/95	B-8	10/5/95	7:35	N/A	10
	6XN1DUP	10/4/95	10/4/95	B-8	10/5/95	7:35	N/A	ND
	6XB1	10/4/95	10/4/95	B-8	10/5/95	7:35	N/A	14
	6XE1	10/4/95	10/4/95	B-8	10/5/95	7:35	N/A	ND
	6XS1	10/4/95	10/4/95	B-8	10/5/95	7:35	N/A	409
	6XW1	10/4/95	10/4/95	B-8	10/5/95	7:35	N/A	ND

Cells: C-5, C-6, D-5, D-6 (Contaminated stockpile)
Cells: G-5, G-6 (Clean stockpile)

Roy F. Weston, Inc.
Ft. Devens-Maintenance Yard Remediation
No. DACW33-95-D-0004

12/26/95

Analytical Summary Table

Grid Location	Excavation No. (6 In.)	Date Excavation	Date Sampled	Sample Pile Location	Analytical Results Date	Time	Results (ppm) cPAH 7	TPH 500

cc: Project File- C. Kane
QC File- R. Willey
c:\ftdv\tkwe1229.xls

Cells: C-5, C-6, D-5, D-6 (Contaminated stockpile)
Cells: G-5, G-6 (Clean stockpile)

TABLE 1-1
Summary of Analytical Data for Groundwater Samples
AOC 44 and 52

Sample ID	G3M-92-04X	G3M-92-05X	G3M-92-05XD	*MCP GW-1 Standards*
Date Sampled	5/21/98	5/21/98	5/21/98	
Units	ppb	ppb	ppb	*ppb*
EPH PARAMETERS				
Aliphatics/Aromatics				
C9-C18 Aliphatics	<61	<62	<61	***4,000***
C19-C36 Aliphatics	<61	<62	150	***5,000***
C10-C22 Aromatics	<160	<160	<160	***200***
Targeted PAH's Analytes				
Acenaphthene	<0.2	<0.2	<0.2	***20***
Acenaphthylene	<0.2	<0.2	<0.2	***300***
Anthracene	<0.2	<0.2	<0.2	***2,000***
Benzo (a) anthracene	<0.2	<0.2	<0.2	***1***
Benzo (b) fluoranthene	<0.2	<0.2	<0.2	***1***
Benzo (k) fluoranthene	<0.2	<0.2	<0.2	***1***
Benzo (a) pyrene	<0.2	<0.2	<0.2	***0.2***
Benzo (g,h.i) perylene	<0.2	<0.2	<0.2	***0.5***
Chrysene	<0.2	<0.2	<0.2	***2***
Dibenzo (a,h) anthracene	<0.2	<0.2	<0.2	***0.5***
Fluoranthene	<0.2	<0.2	<0.2	***300***
Flourene	<0.2	<0.2	<0.2	***300***
Indeno (1,2,3-cd) pyrene	<0.2	<0.2	<0.2	***0.5***
2-Methylnaphthalene	<0.2	<0.2	<0.2	***10***
Naphthalene	<0.2	<0.2	<0.2	***20***
Phenanthrene	<0.2	<0.2	<0.2	***300***
Pyrene	<0.2	<0.2	<0.2	***200***
VPH PARAMETERS				
Aliphatics/Aromatics				
C5-C8 Aliphatics	<40	<40	<40	***400***
C-9-C12 Aliphatics	<10	<10	<10	***4,000***
C9-C10 Aromatics	<10	<10	<10	***200***
Targeted VPH Analytes				
Benzene	<5	<5	<5	***60***
Toluene	<15	<15	<15	***500***
Ethylbenzene	<5	<5	<5	***700***
m,p-Xylenes	<20	<20	<20	***500***
o-Xylene	<10	<10	<10	***500***
Naphthalene	<10	<10	<10	***20***
Methyl-tert-butylether	<15	<15	<15	***70***
Lead	<5	<5	<5	***15***

TABLE 1-1
Summary of Analytical Data for Groundwater Samples
AOC 44 and 52

Sample ID	G3M-92-04X	G3M-92-05X	G3M-92-05XD	*MCP GW-1 Standards*
Date Sampled	06/08/1999	06/08/1999	06/08/1999	
Units	ppb	ppb	ppb	*ppb*
EPH PARAMETERS				
Aliphatics/Aromatics				
C9-C18 Aliphatics	<100	<110	<100	*4,000*
C19-C36 Aliphatics	<100	<110	<100	*5,000*
C10-C22 Aromatics	<100	<110	<100	*200*
Targeted PAH's Analytes				
Acenaphthene	<0.1	<0.11	<0.1	*20*
Acenaphthylene	<0.1	<0.11	<0.1	*300*
Anthracene	<0.1	<0.11	<0.1	*2,000*
Benzo (a) anthracene	<0.1	<0.11	<0.1	*1*
Benzo (b) fluoranthene	<0.1	<0.11	<0.1	*1*
Benzo (k) fluoranthene	<0.1	<0.11	<0.1	*1*
Benzo (a) pyrene	<0.1	<0.11	<0.1	*0.2*
Benzo (g,h.i) perylene	<0.1	<0.11	<0.1	*0.5*
Chrysene	<0.1	<0.11	<0.1	*2*
Dibenzo (a,h) anthracene	<0.1	<0.11	<0.1	*0.5*
Fluoranthene	<0.1	<0.11	<0.1	*300*
Flourene	<0.1	<0.11	<0.1	*300*
Indeno (1,2,3-cd) pyrene	<0.1	<0.11	<0.1	*0.5*
2-Methylnaphthalene	<0.1	<0.11	<0.1	*10*
Naphthalene	<0.1	<0.11	<0.1	*20*
Phenanthrene	<0.1	<0.11	<0.1	*300*
Pyrene	<0.1	<0.11	<0.1	*200*
VPH PARAMETERS				
Aliphatics/Aromatics				
C5-C8 Aliphatics	<100	<100	<100	*400*
C-9-C12 Aliphatics	<25	<25	<25	*4,000*
C9-C10 Aromatics	<25	<25	<25	*200*
Targeted VPH Analytes				
Benzene	<0.2	<0.2	<0.2	*60*
Toluene	<0.2	<0.2	<0.2	*500*
Ethylbenzene	<0.2	<0.2	<0.2	*700*
m,p-Xylenes	<0.2	<0.2	<0.2	*500*
o-Xylene	<0.2	<0.2	<0.2	*500*
Naphthalene	<0.2	<0.2	<0.2	*20*
Methyl-tert-butylether	<0.2	<0.2	<0.2	*70*
Lead	<5	<5	<5	*15*

TABLE 19
SYNOPSIS OF FEDERAL AND STATE ARARS
ALTERNATIVE 5: ASPHALT BATCHING SITE/ASPHALT BATCHING HOT SPOT AREAS

AOCS 44 AND 52 SOILS
FORT DEVENS, MASSACHUSETTS

AUTHORITY	LOCATION CHARACTERISTIC AND ARAR TYPE	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
Federal Regulatory Authority	Wetland Location-Specific	National Environmental Policy Act; [40 CFR Part 6]	Applicable	Requires that Federal agencies minimize the degradation, loss, or destruction of wetlands, and preserve and enhance natural and beneficial values of wetlands under Executive Orders 11990 and 11988.	Wetlands adjacent to AOCs 44 and 52 may currently be impacted by surface water runoff via the storm water system. This alternative covers the site with pavement, thus reducing potential off-site runoff of contaminants in surface water from AOCs 44 and 52 soils to the wetlands. The remedy will also be designed and constructed to manage the increased flow from the paved surface in a manner that will minimize impact to adjacent wetlands.
State Regulatory Requirements	Air Action-Specific	Massachusetts Air Pollution Control Regulations; [310 CMR 6.00 - 7.00]	Applicable	Establishes the standards and requirements for air pollution control in the Commonwealth. Specifically, Section 6.04 provides ambient air quality criteria such as particulate matter standards which is pertinent to AOCs 44 and 52 activity. As a minimum, respirable particulate matter (PM_{10}) for treatment and excavation activities must be maintained at an annual mean arithmetic concentration of 50 $\mu g/m^3$ and a maximum 24-hour concentration of 150 $\mu g/m^3$. Section 7.02 provides emissions limitations from facilities and operations and requires BACT. Additionally, the Massachusetts toxic air pollutant (TAP) control program requirements will be considered in limiting fugitive emissions (VOCs) and total suspended particulates during treatment and excavation activities.	The emissions limits for particulate matter and fugitive emissions will be managed through engineering controls during excavation and treatment activities.
	Soil Action-Specific	Massachusetts Hazardous Waste Management Rules (MHWMR) Identification and Listing of Hazardous Wastes [310 CMR 30.100]	Applicable	Waste oil is a listed as a hazardous waste under this rule and is therefore subject to 310 CMR 30.000 (i.e., the Massachusetts Hazardous Waste Management Rules).	The wastes found at this site were determined not to be characteristic hazardous wastes; however, waste oil is a listed hazardous waste under this rule.

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TABLE 6-8 (continued)
SYNOPSIS OF LOCATION-SPECIFIC FEDERAL AND STATE ARARS
ALTERNATIVE 5: ASPHALT BATCHING SITE/ASPHALT BATCHING HOT SPOT AREAS

AOCS 44 AND 52 SOILS
FORT DEVENS, MASSACHUSETTS

AUTHORITY	LOCATION CHARACTERISTIC AND ARAR TYPE	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
State Regulatory Requirements	Soil Action-Specific	MHWMR Provisions for Recyclable Materials and for Waste Oil [310 CMR 30.200]	Applicable	This regulation contains procedural and substantive requirements for handling regulated recyclable materials. The substantive requirements include preventing and reporting releases to the environment, proper maintenance of treatment and control systems, and handling of regulated recyclable materials.	Asphalt batching of soil on site will comply with the substantive requirements of this regulation.
	Soil Action-Specific	MHWMR - Waste Piles; [310 CMR 30.640 - 30.649]	Applicable	A waste pile facility must install a liner, provide a leachate collection system, provide a run-on/run-off control system, comply with the groundwater monitoring requirements, perform inspections, and close the facility properly.	These requirements will be addressed in the design of an area for stockpiling of wastes for on-site treatment.
	Ground-water Action-Specific	MHWMR Groundwater Protection; [310 CMR 30.660 - 30.679]	Relevant and Appropriate	Groundwater monitoring should be conducted during and following remedial actions. Concentration limits for the hazardous constituents are specified in 310 CMR 30.667.	Although cleanup of groundwater, if required, will be handled as a separate operable unit, groundwater monitoring will be conducted as a component of the remedy.
	All Chemical-Specific	Standards for Analytical Data for Remedial Response Action [WSC-300-89]	To Be Considered	This policy describes the minimum standards for analytical data submitted to the Department.	All sampling plans will be designed with consideration of the analytical methods provided in this policy.

APPENDIX B

SHEPLEY'S HILL LANDFILL OPERABLE UNIT (AOCS 4, 5, AND 18)

GROUNDWATER ANALYTICAL RESULTS
NOVEMBER 14-20, 1996 SAMPLING EVENT
SHEPLEY'S HILL LANDFILL
DEVENS, MASSACHUSETTS

Well No.	SHL-10	SHL-11GW	SHL-19/GW	SHL-20/GW	SHL-22/GW	SHL-4	SHM-4(DUP)	SHM-5/GW	SHL-9/GW	SHM-5B	SHM-5C	SHM-93-10C	SHM-93-22/GW	SHM-96-22B
PARAMETERS	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
VOLATILES (8260)														
1,1-Dichloroethane										2 J				
1,2-Dichloroethene (total)										3 J	2 J			5 J
Benzene										2J	1 J			3 J
Chlorobenzene											2 J			
Dichlorobenzenes (total)				6 J		1 J	1 J			2J	1 J			2 J
TICs (total)		8 NJ		20 NJ	7 NJ		9 NJ		54 NJ	10 NJ				16 NJ
TICs (total)								6 J						
SEMIVOLATILES (8270)														
Dichlorbenzenes (total)		2J		5 J	1J					1 J				2J
TICs (total)	14 J		5J					2 J						
METALS (TOTAL)														
Arsenic	3.4 B													
Barium		132 B		93.8 B	20.7	45 B	47.2 B		13.8 B	39 B	84.4 B		72 B	61.9 B
Chromium													5.2 B	
Copper	5.9 B						6.9 B	10.1 B	9.3 B			9.5 B		
Cyanide (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead										2.6 B	2.7 B			
Manganese	3.9 B													
Zinc	4.5 B	8.5 B	3.3 B	5.3 B		2.9 B	9.7 B	15.5 B	9.6 B					
GENERAL CHEMISTRY														
Alkalinity														
BOD-5 day	ND		ND	ND		ND	ND	ND		ND	ND	ND	ND	
Chemical Oxygen Demand			ND			ND							ND	
Nitrate-Nitrite (total)		ND		ND	ND			ND		ND	ND		ND	ND
Total Dissolved Solids														
Total Suspended Solids	ND					ND	ND	ND				ND		
Sulfate, IC		ND	ND		ND			ND						

Notes:
NJ - Estimated non-target concentration (TIC's)
ND - Not Detected
J - Estimated value below the quantitation limit
B - Detected in Associated Method Blank

GROUNDWATER ANALYTICAL RESULTS - MAY 27-30, 1997 SAMPLING EVENT
SHEPLEY'S HILL LANDFILL
DEVENS, MASSACHUSETTS

Well No.		SHL-3	SHL-4	SHL-5	SHM-96-5B	SHM-96-5C	SHL-9	SHL-10	SHM-93-10C	SHL-11	SHL-19	SHL-20	SHL-20 (D)	SHL-22	SHM-96-22B	SHM-93-22C	BLANK
PARAMETERS	CLEANUP	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
	LEVEL																
	µg/l																
VOLATILES (8260)																	
Benzene	5	<5	2 J	<5	1 J	1 J	2 J	<5	<5	2 J	2 J	2 J	2 J	<5	2 J	<5	<5
2-Butanone	NL	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	10	11	<10	<10	<10	<10
1,1-Dichloroethane	NL	<5	<5	<5	2 J	<5	<5	<5	1 J	4 J	<5	1 J	1 J	2 J	2 J	<5	<5
1,2-Dichloroethene (total)	NL	<5	<5	<5	3 J	2 J	<5	<5	2 J	4J	<5	3 J	3 J	3 J	3 J	<5	<5
1,2-Dichloroethane	5	<5	<5	<5	<5	<5	<5	<5	2 J	<5	<5	<5	<5	<5	<5	<5	<5
Tetrachloroethene	5	<5	0.8 J	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	0.8 J	<5	<5	<5
1,1,2-Trichloroethane	5	<5	<5	<5	<5	2 J	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	1000	<5	<5	<5	<5	<5	<5	<5	5	<5	<5	<5	<5	<5	<5	<5	<5
SEMIVOLATILES (8270)																	
1,4-Dichlorobenzene	5	<u><10</u>	<u><10</u>	<u><10</u>	1 J	<u><10</u>	<u><10</u>	<u><10</u>	<u><10</u>	2 J	<u><10</u>	3 J	3 J	1 J	<u><10</u>	<u><10</u>	<u><10</u>
METALS (TOTAL)																	
Arsenic	50	<10 J	**73.6 J**	<10 J	**3300 J**	43.2 J	16.1 J	<10 J	<10 J	**252 NJ**	<10 J	<10 J	<10 J	<10 J	**318 J**	40.4 J	<10 J
Chromium	100	68.2	52.3	<10	<10	<10	20.4	<13.8	<10	<10	<10	<10	<10	<10	<10	<10	<10
Iron	9100	2480	8630	3020	**29000**	**70200**	5430	223	118	**85000**	**22800**	**16100**	**15900**	574	**60100**	1180	193
Lead	15	<3	3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	4.7
Manganese	1715	65.1	448	598	**9940**	**4800**	401	15.2	24.3	**2230**	**1960**	**7060**	**6980**	702	**5400**	698	15.1
Zinc	2000	34.6	21.2	25.5	24.8	27.8	<20	22.5	<20	<20	<20	38.3	<20	<38	26	<20	67.6
GENERAL CHEMISTRY																	
Alkalinity	NL	8.4	49.2	48.8	381	321	68.4	18	198	290	43.2	423	420	475	403	276	NC
Biochemical Oxygen Dema	NL	<2	3	3	7	5	4	4	<2	14	<2	7	6	4	9	2	NC
Chloride	NL	<3	3.8	<3	72.3	42.1	49.7	<3	30.7	68.3	4.4	63.9	64.3	71	78.4	44.3	NC
Chemical Oxygen Demand	NL	33.3	<10	33.3	33.3	38.2	23.5	228	112	38.2	<10	30.8	28.4	18.6	38.2	<10	NC
Hardness	NL	10.5	37.6	39.3	319	241	53.1	19.1	215	136	40	336	334	422	319	289	NC
Nitrate-Nitrite (Total)	10000	0.13 J	0.2 J	<0.1	<0.1	<0.1	<0.1	0.29	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NC
Sulfate	NL	<10	<10	10.9	10.6	15.4	<10	<10	20.3	12.8	13.6	11.1	12.4	<10	12.6	30.4	NC
Total Dissolved Solids	NL	14	79	83	521	409	94	31	330	448	70	577	579	608	612	426	NC
Total Suspended Solids	NL	8	122	<5	74	85	7	7	<5	30	51	25	26	<5	85	63	NC

Notes:
Boldface text indicates compounds detected above the established cleanup level.
<u>Underlined</u> text indicates compounds quatitation limit is above the established cleanup level.
J - Estimated value below the quantitation limit
NL - Not Listed
NA - not analyzed
NJ - Estimated non-target concentration (TIC's)
NC - Not Collected
(D) = Duplicate

GROUNDWATER ANALYTICAL RESULTS - OCTOBER 20-24, 1997 SAMPLING EVENT
SHEPLEY'S HILL LANDFILL
DEVENS, MASSACHUSETTS

Well No.		SHL-3	SHL-4	SHL-5	SHM-96-5B	SHM-96-5C	SHM-96-5C (D)	SHL-9	SHL-10	SHM-93-10C	SHL-11	SHL-19	SHL-20	SHL-22	SHM-96-22B	SHM-93-22C	BLANK
PARAMETERS	CLEANUP LEVEL µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
VOLATILES (8260)																	
Benzene	5	<5	2 J	<5	<5	1 J	1 J	<5	<5	<5	2 J	<5	0.6 J	<5	2 J	<5	<5
Chlorobenzene	100	<5	0.9 J	<5	<5	3 J	3 J	<5	<5	<5	<5	<5	<5	<5	< 5	<5	<5
1,4-Dichlorobenzene	5	<5	<5	<5	<5	<5	0.8 J	<5	<5	<5	<5	<5	4 J	<5	1 J	<5	<5
1,1-Dichloroethane	NL	<5	1 J	<5	2J	<5	<5	<5	<5	<5	2 J	<5	<5	2 J	<5	<5	<5
1,2-Dichloroethene (total)	NL	<5	1 J	<5	2 J	3 J	2 J	<5	<5	2 J	3 J	2 J	2 J	2 J	3 J	2 J	<5
1,2-Dichloroethane	5	<5	<5	<5	<5	<5	<5	<5	<5	2 J	<5	0.7 J	<5	<5	<5	<5	<5
Toluene	1000	<5	2 J	0.4 J	<5	<5	0.3 J	0.3 J	<5	<5	<5	<5	<5	0.4 J	<5	0.4 J	<5
Vinyl Chloride	2	<10	<10	<10	<10	1 J	0.9 J	0.9 J	<10	<10	<10	0.6 J	<10	<10	<10	<10	<10
SEMIVOLATILES (8270)																	
1,3-Dichlorbenzene	600	<10	<10	<10	<10	<10	0.03 J	<10	<10	<10	0.2 J	<10	<10	<10	<10	<10	<10
1,4-Dichlorobenzene	5	<10	2 J	<10	1 J	0.9 J	0.9 J	<10	<10	<10	2 J	<10	3 J	<10	1 J	1 J	<10
1,2-Dichlorobenzene	600	<10	0.1 J	<10	0.1 J	0.4 J	0.5 J	<10	<10	<10	0.3 J	<10	<10	<10	<10	<10	<10
METALS (TOTAL)																	
Arsenic	50	<10	180	<10	**2040**	43.1	37.1	25.2	**209**	10.5	**366**	**298**	**227**	34.8	**352**	<10	<10
Barium	2000	<200	210	<200	200	<200	<200	<200	<15	<200	<200	<200	200	<200	<200	<200	<200
Chromium	100	16.3	**119**	<10	<10	<10	<10	<10	24.8	<10	<10	<10	<10	<10	<10	<10	<10
Iron	9100	407	**19000**	<4920	**18200**	**53600**	**55400**	7330	209	418	**95800**	**44000**	**17100**	1520	**58200**	1310	<100
Lead	15	<3	6	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
Manganese	1715	<15	874	344	**9770**	**6360**	**5970**	417	<15	62.9	**3040**	**4560**	**8100**	832	**5780**	1120	<15
Zinc	2000	20.7 J	29 J	<20	<20	<42.9	<20	1790	<20	24.5 J	<20	30.5 J	30.2 J	42.2 J	31.6 J	41.4 J	<20
DISSOLVED ARSENIC																	
	50	NA	NA	NA	**1960**	37.3	NA	NA	NA	NA	NA	NA	NA	NA	**324**	NA	NA
GENERAL CHEMISTRY																	
Alkalinity	NL	33.5	229	60	389	374	373	68.5	30.5	196	325	144	445	298	376	477	<2
Biochemical Oxygen Dema	NL	10	8	6	4	3	4	12	5	7	14	<2	6	<2	3	12	<2
Chloride	NL	<3	37.6	<3	65.6	51	49.7	<3	<3	28.4	58.5	6.5	71.2	47.1	68.7	73	<3
Chemical Oxygen Demand	NL	<10	19.1	28.4	30.7	28.4	23.7	23.7	<10	<10	42.2	14.5	30.7	<10	26	12.2	<10
Cyanide (total)	NL	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hardness	NL	38.4	193	56.7	287	289	276	64.1	35.3	242	185	99.1	388	346	314	451	1.49
Nitrate-Nitrite (total)	10	0.24	0.32	<0.1	<0.1	<0.1	<0.1	<0.1	0.33	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Sulfate	NL	<10	<10	10.2	<10	<10	<10	11.5	<10	17.1	<10	16.3	<10	29.2	<10	<10	<10
Total Dissolved Solids	NL	62	324	96	516	446	458	119	63	313	454	184	630	648	478	614	<10
Total Suspended Solids	NL	17	43	<10	54	61	84	<10	10	32	68	24	23	<10	107	<10	<10

Notes:
Boldface text indicates compounds detected above the established cleanup level.
Underlined text indicates compounds quatitation limit is above the established cleanup l

J - Estimated value below the quantitation limit
NL - Not Listed
NA - not analyzed

NJ - Estimated non-target concentration (TIC's)
NC - Not Collected
(D) = Duplicate

Groundwater Analytical Results - May 11 - 13, 1998 Sampling Event
Shepley's Hill Landfill
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No. CLEANUP LEVEL (1) ug/L	SHL-3	SHL-4	SHL-5	SHM-96-5B	SHM-96-5B DUP	SHM-96-5C	SHL-9	SHL-10	SHM-93-10C	SHL-11	SHL-19	SHL-20	SHL-22	SHM-96-22B	SHM-96-22C
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES (8260)																
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	9.8 J	<10.0	15	<10.0	<10.0	<10.0	<10.0	<10.0	11
2-Butanone	-	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
4-Methyl-2-Pentanone	-	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Benzene	5 (2)	<5.0	<5.0	<5.0	1.5 J	1.4 J	1.3 J	<5.0	<5.0	<5.0	2.0 J	<5.0	<5.0	<5.0	1.2 J	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	1.8 J	1.9 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.0 J	1.7 J	<5.0
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	2.7 J	2.6 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.6 J	<5.0
1,2-Dichloroethene (total)	70 (2)	<5.0	<5.0	<5.0	3 J	3.1 J	2.2 J	<5.0	<5.0	1.6 J	3.1 J	<5.0	2.3 J	2.4 J	2.2 J	<5.0
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.1 J	<5.0	4.7 J	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
TAL METALS (6010)																
Arsenic	50	<5.0	37.4	<5.0	**4,300**	**4,330**	49.5	15	<5.0	7.5	**346**	**77.5**	**1,238**	10.6	**305**	31.6
Barium	2,000 (2)	<7.6	23	7.6	63.5	64.2	57	12.5	<7.6	<7.6	123	9	105	14.5	86.1	86.8
Cadmium	5 (2)	1	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	<0.7
Chromium	100	4.8	<2.0	<2.0	3.3	3.7	2.9	<2.0	<2.0	<2.0	2.2	<2.0	3.8	3.7	<2.0	2.8
Copper	1,300 (3)	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	4.2	<3.4
Iron	9,100	177	3,230	1,390	**39,700**	**40,000**	**73,700**	4,110	<70.8	<70.8	**90,800**	**9,940**	**19,600**	1,190	**66,300**	728
Lead	15	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6
Manganese	1,715	5.2	418	377	**10,100**	**10,100**	**4,500**	393	1.9	39.2	**3,250**	1,350	**8,190**	1,240	**13,070**	667
Mercury (7470A)	2 (2)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	100	3.6	<3.5	<3.5	18.3	19	5.4	<3.5	<3.5	<3.5	4.8	<3.5	16.1	5.6	6.5	<3.5
Selenium	50 (2)	<3.1	<3.1	<3.1	5.1	4.6	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	5.3	<3.1	<3.1	<3.1
Silver	40 (4)	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6
Zinc	2,000 (4)	14	27.8	20.1	39.9	34.4	134	26.6	9.4	36.7	30.3	12.5	23.8	79.2	35.5	22.7
Aluminum	6,870	193	43.7	285	49.2	45.1	51.5	161	38.3	34.9	66.1	53.5	32.5	<27.7	51.8	35.3
Sodium	20,000	1,620	8,040	2,480	**45,700**	**46,300**	**31,300**	2,200	1,600	9,030	**44,100**	2,380	**54,100**	**51,900**	**74,700**	**23,700**
GENERAL CHEMISTRY																
Alkalinity	-	7,000	56,000	34,000	358,000	358,000	334,000	49,000	16,000	198,000	306,000	32,000	398,000	436,000	396,000	248,000
Biochemical Oxygen Demand	-	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<4,000	3,900	<2,000	<2,000	5,200	<2,000	<2,000	<2,000	<2,000
Chloride	-	600	1,600	800	64,300	61,800	39,300	1,200	900	28,300	48,600	800	62,700	67,200	55,000	38,600
Chemical Oxygen Demand	-	<5,000	6,000	27,000	29,000	30,000	31,000	19,000	6,000	<5,000	38,000	<5,000	34,000	16,000	30,000	13,000
Cyanide (Total)	200 (2)	<5.0	<5.0	<5.2	<5.0	<5.1	<5.0	<5.0	<5.0	<5.1	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Hardness	-	10,000	50,000	33,000	365,000	355,000	235,000	50,000	18,000	242,000	195,000	35,000	400,000	455,000	255,000	305,000
Nitrate-Nitrite (Total)	10,000 (2)	300	800	<100	<100	<100	<100	<100	300	<100	200	200	<100	<100	<100	<100
Sulfate	500,000 (2)	3,500	4,100	1,300	3,000	3,100	7,500	2,400	3,700	21,500	900	6,100	5,400	3,000	1,000	24,800
Total Dissolved Solids	-	34,000 JB	72,000 JB	151,000	516,000	515,000	429,000	106,000 JB	44,000 JB	304,000	418,000	60,000 JB	565,000	639,000	556,000	420,000
Total Suspended Solids	-	4,300	3,900	2,700	76,600	74,800	111,000	26,700	1,700	900 JB	56,600	16,000	28,100	3,500	120,000	3,400

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance. - **25**

J = Estimated value

B = Analyte is also present in equipment blank sample

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup values were developed so the Maximum Contamination Level (MCLs) were used

(3) No cleanup values were developed so the MMCLs were used

(4) No cleanup values were developed so the MCP GW-1 standard was used

Groundwater Analytical Results - November 2 - 4, 1998 Sampling Event
Shepley's Hill Landfill
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No. CLEANUP LEVEL (1)	SHL-3	SHL-4	SHL-5	SHM-96-5B	SHM-96-5B DUP	SHM-96-5C	SHL-9	SHL-10	SHM-93-10C	SHL-11	SHL-19	SHL-20	SHL-22	SHM-96-22B	SHM-93-22C
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES (8260)																
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	4.4 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Butanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	5 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	<5.0	1.9 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	2.6 J	2.6 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloroethene (total)	70 (2)	<5.0	<5.0	<5.0	3.2 J	3.0 J	2.7 J	<5.0	<5.0	<5.0	3.8 J	<5.0	2.8 J	<5.0	3.0 J	<5.0
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
METALS (6010)																
Arsenic	50	<5.4	**89.1**	11.5	**3,080**	**3,100**	46.8	27.2	<5.4	10.2	**376**	**145**	**218**	<5.4	**406**	**51.1**
Barium	2,000 (2)	<6.6	176	9.3	53.5	53.8	56.6	11.9	<6.6	8.9	111	26.3	100	11.2	97.3	68.7
Cadmium	5 (2)	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium	100	9.7	<0.9	1.0 B	3.7 B	3.9 B	2.0 B	1.0 B	1.0 B	3.5 B	<0.9	1.1 B	1.0 B	<0.9	<0.9	1.8 B
Copper	1,300 (3)	1.6 B	<1.4	<1.4	2.4 B	2.2 B	3.9 B	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	4.7 B	<1.4
Iron	9,100	206	**10,400**	3,690	**27,600**	**27,900**	**57,500**	6,470	<46.1	621	**83,400**	**30,200**	**13,600**	478	**72,800**	1,140
Lead	15	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Manganese	1,715	5.8 B	552	598	**13,300**	**13,400**	**6,590**	368	<0.6	43.7 B	**2,760**	**4,070**	**9,080**	722	**4,530**	648
Mercury (7470A)	2 (2)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	100	7.5	8.3	<2.1	12.4	11.3	<2.1	<2.1	<2.1	3.9	<2.1	9.5	14.2	5.7	3.2	<2.1
Selenium	50 (2)	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6	<4.6
Silver	40 (4)	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
Zinc	2,000 (4)	26	23.9	27.5	41.3	40.4	63.2	17.6 B	31.9	20.5 B	39.5	28.9	41.0	45.3	11.1 B	77.6
Aluminum	6,870	127	21.7	261	108	126	<21.1	65	37.2	520	<21.1	<21.1	<21.1	<21.1	33.5	<21.1
Sodium	20,000	1,560	**22,500**	4,100	**45,400**	**45,700**	**36,600**	1,170	913	7,760	**41,400**	3,090	**47,100**	**47,400**	**46,000**	**22,100**
GENERAL CHEMISTRY																
Alkalinity	-	32,000	176,000	56,000	384,000	384,000	340,000	70,000	25,000	196,000	610,000	102,000	418,000	450,000	350,000	280,000
Biochemical Oxygen Demand	-	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000
Chloride	-	500	33,900	1,400	65,000	64,300	50,000	1,400	1,000	29,300	47,100	3,300	58,800	70,400	66,600	43,800
Chemical Oxygen Demand	-	<5,000	9,000	24,000	26,000	28,000	31,000	27,000	<5,000	<5,000	29,000	<5,000	21,000	14,000	35,000	7,000
Cyanide (Total)	200 (2)	<5.1	<5.0	<5.3	<5.0	<5.0	<5.0	<5.3	<5.0	<5.0	<5.0	<5.1	<5.0	<5.1	<5.3	<5.0
Hardness	-	33,000	150,000	60,000	370,000	360,000	290,000	65,000	27,000	236,000	192,000	72,000	410,000	452,000	290,000	315,000
Nitrate as Nitrogen	10,000 (2)	400	700	<300	<300	<300	<300	<300	400	<300	<300	<300	<300	<300	<300	<300
Sulfate	500,000 (2)	5,100	8,500	5,700	3,600	3,700	2,500	900	3,900	21,100	<300	14,000	6,300	3,300	900	25,000
Total Dissolved Solids	-	50,000 JB	258,000	86,000 JB	521,000	519,000	455,000	87,000 JB	35,000 JB	299,000	416,000	150,000	585,000	561,000	491,000	380,000
Total Suspended Solids	-	9,600	8,600	4,400	50,800	50,600	33,300	700 JB	600 JB	8,200	76,400	16,900	19,100	1,500 JB	99,000	4,700

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance. - **25**

J = Estimated value

B = Analyte is also present in equipment blank sample

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup values were developed so the Maximum Contamination Level (MCLs) were used

(3) No cleanup values were developed so the MMCLs were used

(4) No cleanup values were developed so the MCP GW-1 standard was used

Groundwater Analytical Results - May 10 - 11, 1999 Sampling Event
Shepley's Hill Landfill
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No. CLEANUP LEVEL (1) ug/L	SHL-3	SHL-4	SHL-5	SHM-96-5B	SHM-96-5B DUP	SHM-96-5C	SHL-9	SHL-10	SHM-93-10C	SHL-11	SHL-19	SHL-20	SHL-22	SHM-96-22B	SHM-93-22C
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES (8260)																
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	<5.0	<5.0	<5.0	4.0 J	4.0 J	3.0 J	15	<5.0	3.2 J	<5.0	<5.0	3.0 J	<5.0	3.5 J	3.3 J
2-Butanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.7 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	5 (2)	<5.0	<5.0	<5.0	0.97 J	0.94 J	1.2 J	<5.0	<5.0	<5.0	2.1 J	<5.0	<5.0	<5.0	1.7 J	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	1.6 J	1.7 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.0 J	1.6 J	1.2 J
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	2.6 J	2.6 J	<5.0	<5.0	<5.0	0.97 J	<5.0	<5.0	<5.0	2.2 J	3.2 J	1.7 J
1,2-Dichloroethene (total)	70 (2)	<5.0	<5.0	<5.0	2.7 J	2.7 J	3.2 J	14	<5.0	1.3 J	2.6 J	1.5 J	2.0 J	2.5 J	3.3 J	1.3 J
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.1 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.4 J	<5.0	4.4 J	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
METALS (6010)																
Arsenic	50	2.7 B	**78.2**	5.0 B	**3,490**	**3,460**	**57.0**	**71.3**	2.7 B	10.8 B	**431**	**156**	**216**	12.2 B	**707**	42.8
Barium	2,000 (2)	<6.5	88.3	6.6	56.3	55.7	63.9	14.5	<6.5	7.4	116	33	111	12.8	108	76.6
Cadmium	5 (2)	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium	100	3.0 B	1.0 B	1.7 B	3.6 B	3.0 B	1.8 B	1.7 B	1.1 B	0.96 B	1.5 B	0.76 B	2.2 B	1.2 B	<0.7	2.0 B
Copper	1,300 (3)	2.8 B	2.2 B	1.7 B	3.9 B	2.1 B	2.0 B	3.6 B	1.4 B	<1.0	2.7 B	1.2 B	1.7 B	1.2 B	5.8 B	1.5 B
Iron	9,100	15.7	**16,600**	2,590	**30,900**	**30,600**	**60,900**	**13,900**	<14.9	30.7	**84,800**	**31,100**	**12,500**	558	**86,200**	606
Lead	15	0.99 B	<0.9	1.1 B	<0.9	<0.9	<0.9	2.3 B	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
Manganese	1,715	<1.4	1,100	415	**13,400**	**13,000**	**6,760**	547	<1.4	33.4	**2,770**	**3,690**	**8,470**	862	1,030	610
Mercury (7470A)	2 (2)	0.19 B	0.16 B	0.2 B	0.17 B	<0.14	0.2 B	0.15 B	0.13 B	0.12 B	0.17 B	0.16 B	0.15 B	0.24 B	0.13 B	0.21 B
Nickel	100	2.2	8.2	2.3	16.2	15.4	10.9	1.8	<1.4	1.9	2.6	10.7	14.7	7.5	5.7	<1.4
Selenium	50 (2)	4.3 BJ	<2.7 J	3.3 BJ	<2.7 J	3.1 BJ	<2.7 J	<2.7 J	<2.7 J	<2.7 J	<2.7 J	<2.7 J	3.9 BJ	4.1 BJ	3.3 BJ	<2.7 J
Silver	40 (4)	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
Zinc	2,000 (4)	11.3 B	18 B	25.8 B	5.5 B	9.8 B	55.9 B	32.3 B	13.6 B	35.7 B	29.4 B	27.7 B	32.6 B	47.4 B	10.3 B	48.1 B
Aluminum	6,870	<10.4	29.4	272	<10.4	<10.4	<10.4	142	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4	<10.4
Sodium	20,000	647 B	12,100	3,070	**43,500**	**42,800**	**37,100**	1,380	1,080 B	7,840	**39,300**	3,190	**47,300**	**48,200**	**44,000**	**22,500**
GENERAL CHEMISTRY																
Alkalinity	-	14,000	154,000	34,000	380,000	376,000	396,000	65,000	14,000	192,000	332,000	132,000	418,000	450,000	316,000	266,000
Biochemical Oxygen Demand	-	<2,000	<2,000	2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000
Chloride	-	900	18,900	2,300	62,400	61,000	61,000	4,200	1,000	34,900	52,000	4,800	64,100	66,900	58,900	34,000
Chemical Oxygen Demand	-	<5,000	10,000	32,000	31,000	31,000	42,000	95,000	<5,000	<5,000	35,000	7,000	21,000	17,000	44,000	9,000
Cyanide (Total)	200 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Hardness	-	18,000	132,000	31,000	365,000	364,000	320,000	66,000	18,000	238,000	202,000	97,000	405,000	446,000	245,000	289,000
Nitrate as Nitrogen	10,000 (2)	400	600	300	<200	<200	200	<200	600	<200	<200	<200	<200	<200	<200	<200
Sulfate	500,000 (2)	3,100	6,700	2,600	4,300	4,300	2,000	4,100	3,600	23,400	800 B	18,300	7,700	3,900	4,100	20,700
Total Dissolved Solids	-	33,000 B	205,000	68,000 B	511,000	528,000	518,000	90,000 B	32,000 B	299,000	404,000	173,000	562,000	569,000	463,000	381,000
Total Suspended Solids	-	8,100	10,200	168,000	46,800	54,900	43,200	32,700	500	800	55,300	15,700	10,200	2,200	59,300	2,700

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance. - **25**

J = Estimated value

B = Analyte is within 5 times of the amount detected in the equipment blank sample

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup values were developed so the Maximum Contamination Level (MCLs) were used

(3) No cleanup values were developed so the MMCLs were used

(4) No cleanup values were developed so the MCP GW-1 standard was used

Hardne: s for wells SHM-96-5B, SHM-96-5B DUP, and SHL-20 have been revised from what was previously repor e Spring 1999 Analytical Report due to Quality Assurance Report

Groundwater Analytical Results - November 1 - 2, 1999 Sampling Event
Shepley's Hill Landfill
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No. / CLEANUP LEVEL (1)	SHL-3	SHL-4	SHL-5	SHM-96-5B	SHM-96-5B DUP	SHM-96-5C	SHL-9	SHL-10	SHM-93-10C	SHL-11	SHL-19	SHL-20	SHL-22	SHM-96-22B	SHM-93-22C
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES (8260)																
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Butanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	5 (2)	<5.0	<5.0	<5.0	0.94 J	0.98 J	0.96 J	<5.0	<5.0	<5.0	2.1 J	<5.0	0.9 J	<5.0	1.7 J	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	1.5 J	1.5 J	2.1 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.9 J	1.4 J	1.2 J
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	2.6 J	2.6 J	1.7 J	<5.0	<5.0	0.93 J	<5.0	<5.0	<5.0	2.5 J	2.6 J	1.8 J
1,2-Dichloroethene (total)	70 (2)	<5.0	<5.0	<5.0	3.0 J	3.0 J	2.5 J	<5.0	<5.0	1.0 J	1.8 J	<5.0	1.9 J	2.7 J	3.0 J	1.3 J
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.1 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.9 J	<5.0	3.7 J	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
METALS (6010)																
Arsenic	50	<1.9	**61.3**	6.5	**2,700**	**2,700**	44.8	28.5	<1.9	8.7	**492**	**176**	**215**	7.3	**1,440**	33.2
Barium	2,000 (2)	<5.6	94.5	11.0	51.6	51.9	51.8	16.2	<5.6	6.8	121	22.2	116	10.8	123	75.1
Cadmium	5 (2)	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium	100	<0.9	<0.9	<0.9	4.7	4.5	<0.9	<0.9	1.6	<0.9	<0.9	<0.9	3.2	<0.9	1.0	<0.9
Copper	1,300 (3)	<1.7	<1.7	<1.7	1.8 B	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	<1.7	2.8 B	<1.7
Iron	9,100	37.3	5,630	2,200	**26,900**	**27,000**	**42,100**	**87,600**	229	25.5	**75,700**	**25,600**	**14,000**	400	**99,500**	479
Lead	15	<1.0	<1.0	1.6 B	<1.0	<1.0	<1.0	<1.0	1.5 B	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Manganese	1,715	1.6 B	651	627	**13,900**	**13,300**	**4,800**	578	1.8 B	34.2	**2,420**	**2,960**	**8,790**	684	**3,090**	528
Mercury (7470A)	2 (2)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	100	<1.7	4.0	2.0	13.5	13.9	2.0	<1.7	<1.7	<1.7	<1.7	5.4	13.7	7.4	7.2	<1.7
Selenium	50 (2)	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
Silver	40 (4)	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9	<1.9
Zinc	2,000 (4)	2.7 B	5.5 B	6.5 B	7.8 JB	5.8 JB	4.9 B	3.2 B	2.8 B	2.2 B	3.2 B	5.9 B	5.6 B	20.1	9.1 B	7.7 B
Aluminum	6,870	<14.3	<14.3	267	<14.3	<14.3	<14.3	54.1	25.7	<14.3	<14.3	<14.3	<14.3	<14.3	<14.3	<14.3
Sodium	20,000	648	**22,100**	3,240	**44,800**	**45,000**	**38,100**	1,380	623	8,020	**34,000**	3,340	**48,200**	**50,900**	**50,100**	**24,700**
GENERAL CHEMISTRY																
Alkalinity	-	8,000	166,000	39,000	336,000	344,000	272,000	64,000	12,000	188,000	300,000	84,000	406,000	420,000	348,000	240,000
Biochemical Oxygen Demand	-	<2,000	<2,000	2,000 B	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	2,000 B
Chloride	-	1,100	14,800	1,900	55,500	56,600	52,600	7,200	1,500	30,000	39,300	2,900	56,000	64,800	61,300	42,000
Chemical Oxygen Demand	-	14,000	29,000	12,000	20,000 J	28,000 J	42,000	24,000	12,000	26,000	33,000	8,000	36,000	14,000	34,000	18,000
Cyanide (Total)	200 (2)	<5.0	<5.0	<10.0	<10.0	<10.0	<10.0	<10.0	<5.0	<5.0	<5.0	<5.0	<5.0	<10.0	<10.0	<10.0
Hardness	-	12,000	132,000	50,000	355,000	355,000	245,000	72,000	14,000	222,000	185,000	60,000	380,000	430,000	310,000	270,000
Nitrate as Nitrogen	10,000 (2)	500	200	<200	<200	<200	<200	<200	900	<200	<200	<200	200	<200	<200	<200
Sulfate	500,000 (2)	3,900	7,700	10,000	4,600	4,600	700	7,300	3,200	19,600	1,400	12,500	5,900	4,100	2,600	14,600
Total Dissolved Solids	-	35,000 B	214,000	878,000	542,000	513,000	416,000	119,000	35,000 B	300,000	363,000	118,000	544,000	587,000	604,000	380,000
Total Suspended Solids	-	2,100 B	6,800	7,000	44,600	48,100	52,800	900 B	3,400	1,200 B	62,000	22,000	15,300	1,600 B	117,000	3,100

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance. - 25

J = Estimated value

B = Analyte is within 5 times of the amount detected in the equipment blank sample

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup values were developed so the Maximum Contamination Level (MCLs) were used

(3) No cleanup values were developed so the MMCLs were used

(4) No cleanup values were developed so the MCP GW-1 standard was used

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority	Floodplains	Floodplain Management Executive Order No. 11988, [40 CFR Part 6, App. A]	Applicable	Requires federal agencies to evaluate the potential adverse effects associated with direct and indirect development of a floodplain. Alternatives that involve modification/construction within a floodplain may not be selected unless a determination is made that no practicable alternative exists. If no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the floodplain.	To the extent that any activity associated with this alternative takes place in the floodplain, the activity will be altered to comply with the law.
	Wetlands	Protection of Wetlands Executive Order No. 11990	Applicable	Under this Order, federal agencies are required to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands. If remediation is required within wetland areas, and no practical alternative exists, potential harm must be minimized and action taken to restore natural and beneficial values.	To the extent that any activity associated with this alternative takes place in wetlands, the activity will be altered to comply with the law.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Surface Waters Endangered Species	Fish and Wildlife Coordination Act [16 USC 661 et seq.; 40 CFR Part 302]	Applicable	Actions which affect species/habitat require consultation with U.S. Department of the Interior, U.S. Fish and Wildlife Service, and National Marine Fisheries Service, and/or state agencies, as appropriate, to ensure that proposed actions do not jeopardize the continued existence of the species or adversely modify or destroy critical habitat. The effects of water-related projects on fish and wildlife resources must be considered. Action must be taken to prevent, mitigate, or compensate for project-related damages or losses to fish and wildlife resources. Consultation with the responsible agency is also strongly recommended for on-site actions. Under 40 CFR Part 300.38, these requirements apply to all response activities under the NCP.	No off-site remedial actions performed for this alternative. On-site actions would be minimal and would include agency consultation prior to implementation.
	Endangered Species	Endangered Species Act [16 USC 1531 et seq.; 50 CFR Part 402]	Applicable	This act requires action to avoid jeopardizing the continued existence of listed endangered or threatened species or modification of their habitat.	To minimize impact, landfill cover maintenance would be performed after nesting areas of the Grasshopper Sparrow have been identified.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARs FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State Regulatory Authority	Floodplains Wetlands	Massachusetts Wetland Protection Act and Regulations [MGL c. 131 s. 40; 310 CMR 10.00]	Applicable	Wetlands and land subject to flooding are protected under this Act and these regulations. Activities that will remove, dredge, fill, or alter protected areas (defined as areas within the 100-year floodplain) are subject to regulation and must file a Notice of Intent with the municipal conservation commission and obtain a Final Order of Conditions before proceeding with the activity. A Determination of Applicability or Notice of Intent must be filed for activities such as excavation within a 100 foot buffer zone. The regulations specifically prohibit loss of over 5,000 square feet of bordering vegetated wetland. Loss may be permitted with replication of any lost area within two growing seasons.	If remedial activities alter more than 5,000 square feet of protected area, the affected area will be restored within two growing seasons.
	Endangered Species	Massachusetts Endangered Species Act and implementing regulations [MGL c. 131A, s. 1 et seq.; 321 CMR 8.00]	Applicable	Actions must be conducted in a manner which minimizes the impact to Massachusetts listed endangered species and species listed by the Massachusetts Natural Heritage Program.	To minimize impacts, landfill cover maintenance would be performed after nesting areas of the Grasshopper Sparrow have been identified.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Area of Critical Environmental Concern	Areas of Critical Environmental Concern [301 CMR 12.00]	Relevant and Appropriate	An Area of Critical Environmental Concern is of regional, state, or national importance or contains significant ecological systems with critical inter-relationships among a number-of-components. An eligible area must contain features from four or more of the following groups: (1) fishery habitats; (2) coastal feature; (3) estuarine wetland; (4) inland wetland; (5) inland surface water; (6) water supply area (i.e., aquifer recharge area); (7) natural hazard area (i.e., floodplain); (8) agricultural area; (9) historical/archeological resources; (10) habitat resource (i.e., for endangered wildlife; or (11) special use areas.	Activities must be controlled to minimize impacts to nesting areas of the Grasshopper Sparrow.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	CHEMICAL MEDIUM	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority	Groundwater	Safe Drinking Water Act, National Primary Drinking Water Standards, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50-191.51]	Relevant and Appropriate	The National Primary Drinking Water Regulation establishes MCLs and non-zero Maximum Contaminant Level Goals for several common organic and inorganic contaminants. These MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques.	MCLs will be used to evaluate the performance of this alternative. If MCLs are exceeded, the remedy will be re-evaluated.
State Regulatory Authority	Surface water	Massachusetts Surface Water Quality Standards [314 CMR 4.00]	Applicable	Massachusetts Surface Water Quality Standards designate the most sensitive uses for which surface waters of the Commonwealth are to be enhanced, maintained and protected and designate minimum water quality criteria for sustaining the designated uses. Surface waters at Fort Devens are classified as Class B. Surface waters assigned to this class are designated as habitat for fish, other aquatic life and wildlife, and for primary and secondary contact recreation.	Discharges associated with remedial actions will be controlled/monitored to ensure that surface waters meet standards.

(continued)

Table 9
Synopsis of Federal and State ARARs for Alternative SHL-2: Limited Action

Record of Decision
Shepley's Hill Landfill Operable Unit
Fort Devens, MA

Authority	Chemical Medium	Requirement	Status	Requirement Synopsis	Action to be Taken to Attain Requirement
	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Applicable	Massachusetts Groundwater Quality Standards designate and assign uses for which groundwaters of the Commonwealth shall be maintained and protected and set forth water quality criteria necessary to maintain the designated uses. Groundwater at Fort Devens is classified as Class I. Groundwaters assigned to this class are fresh groundwaters designated as a source of potable water supply.	MCLs will be used to evaluate the performance of this alternative. If MCLs are exceeded, the remedy will be re-evaluated.
	Groundwater	Massachusetts Drinking Water Standards and Guidelines [310 CMR 22.00]	Relevant and Appropriate	The Massachusetts Drinking Water Standards and Guidelines list MMCLs which apply to water delivered to any user of a public water supply system as defined in 310 CMR 22.00. Private residential wells are not subject to the requirements of 310 CMR 22.00; however, the standards are often used to evaluate private residential contamination especially in CERCLA activities.	MMCLs will be used to evaluate the performance of this alternative. If MMCLs are exceeded, the remedy will be re-evaluated.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	CHEMICAL MEDIUM	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Air	Massachusetts Ambient Air Quality Standards [310 CMR 6.00]	Relevant and Appropriate	Regulations specify primary and secondary ambient air quality standards to protect public health and welfare for certain pollutants	Ambient Air Quality Standards will be used to evaluate the performance of this alternative. If standards are exceeded, the remedy will be re-evaluated.
	Air	Massachusetts Air Pollution Control Regulations [310 CMR 7.00]	Relevant and Appropriate	Regulations pertain to the prevention of emissions in excess of Massachusetts or national ambient air quality standards or in excess of emission limitations in those regulations.	Ambient Air Quality Standards will be used to evaluate the performance of this alternative. If standards are exceeded, the remedy will be re-evaluated.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority	Solid waste landfill construction, operation, closure, and post-closure	Resource Conservation and Recovery Act (RCRA) [Subtitle D, 40 CFR 258]	Relevant and Appropriate	RCRA Subtitle D regulates the generation, transport, storage, treatment, and disposal of solid wastes. Regulations at 40 CFR 258 govern preparedness and prevention, closure, and post-closure at municipal solid waste landfills.	Performance of this alternative will be evaluated to determine compliance with the substantive requirements of federal solid waste regulations. If the substantive requirements are not met at the appropriate time, the remedy will be re-evaluated.
	Hazardous waste landfill construction, operation, closure, and post-closure	Resource Conservation and Recovery Act (RCRA) [Subtitle C, 40 CFR 260,264]	Relevant and Appropriate	RCRA Subtitle C regulates the generation, transport, storage, treatment, and disposal of hazardous wastes. Regulations at 40 CFR 264 govern preparedness and prevention, closure, and post-closure at landfills.	Performance of this alternative will be evaluated to determine compliance with the substantive requirements of federal hazardous waste regulations. If the substantive requirements are not met at the appropriate time, the remedy will be re-evaluated.
State Regulatory Authority	Solid waste landfill construction, operation, closure, and post-closure.	Massachusetts Solid Waste Management Regulations [310 CMR 19.000]	Applicable	These regulations outline the requirements for construction, operation, closure, and post-closure at solid waste management facilities in the Commonwealth of Massachusetts.	This alternative includes components to meet closure and post-closure requirements at Shepley's Hill Landfill.

(continued)

TABLE 9
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE SHL-2: LIMITED ACTION

RECORD OF DECISION
SHEPLEY'S HILL LANDFILL OPERABLE UNIT
FORT DEVENS, MA

AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Hazardous waste landfill construction, operation, closure, and post-closure	Massachusetts Hazardous Waste Regulations [310 CMR 30.00]	Relevant and Appropriate	Regulates handling, storage, treatment, disposal, and record keeping at hazardous waste facilities.	Performance of this alternative will be evaluated to determine compliance with the substantive requirements of Massachusetts hazardous waste regulations. If the substantive requirements are not met at the appropriate time, the remedy will be re-evaluated.

Landfill Gas Monitoring

To be completed in indelible ink. *Monitoring is to be performed annually*

DATE: November 15, 1996

INSPECTOR: R. Skryness TITLE:________ ORGANIZATION: Stone & Webster

WEATHER: (Temp, rain, sun, etc.) Low 30s F, sunny BAROMETRIC PRESSURE: 1033 mb

Vent Number	VOCs (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	REMARKS (Visual observations, odor, etc.)
	PID	GA-90	CGI	CGI	CGI	GA-90	GA-90	
Vent - 1	0	21.4	0	0	0	0	0	animal burrow nearby
Vent - 2	0	21.5	0	0	0	0	0	animal burrow nearby
Vent - 3	0	21.3	0	0	0	0	0	
Vent - 4	0	21.3	0	2	0	0	0	animal burrow nearby
Vent - 5	0	21.4	0	0	0	0	0	
Vent - 6	0	21.4	0	0	0	0	0	
Vent - 7	0	21.4	0	0	0	0	0	animal burrows nearby
Vent - 8	0	21.2	0	2	0	0.1	0.1	
Vent - 9	0	21.2	0	1	0	0	0.1	
Vent - 10	0	21.2	0	0	0	0	0	
Vent - 11	0	21.3	0	0	0	0	0	
Vent - 12	0	21.2	0	0	0	0	0	
Vent - 13	0	21.2	0	0	0	0	0	
Vent - 14	0	21.2	0	0	0	0	0	
Vent - 15	0	20.1	0	11	0	0.6	0.4	animal burrow nearby
Vent - 16	0	21.1	0	1	0	0	0	
Vent - 17	0	21.0	0	2	0	0.2	0.1	
Vent - 18	0	21.2	0	2	0	0.1	0.2	only vent not iced over by frost

Note: See grid for well identifiers and locations.
Mark all vents with appropriate number during initial sampling. ✓

CALIBRATION INFORMATION

PID

Results: Calibrated to 100 ppm with 70 ppm isobutylene Calibrated by: J. Coyne, Stone & Webster

CGI

Results: shop calibrated Calibrated by: Heinrich Environmental

Landtec GA-90 Landfill Gas Monitor

Results: Calibrated to 3.9% O2, with 4.0% O2 (N2 balance) Calibrated by: Heinrich Environmental
Calibrated to 14.8% CH4, with 14.9% CH4
Calibrated to 15.0% CO2, with 15.0% CO2

Landfill Gas Monitoring

To be completed in indelible ink. *Monitoring is to be performed annually*

DATE: October 29, 1997

INSPECTOR: R. Skryness TITLE:_____________ ORGANIZATION: Stone & Webster

WEATHER: (Temp, rain, sun, etc.) 40s F, overcast until 1300 hours, then clearing

BAROMETRIC PRESSURE: 760 mm Hg (in Boston)

Vent Number	VOCs (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	REMARKS (Visual observations, odor, etc.)
	PID	GA-90	CGI	CGI	CGI	GA-90	GA-90	
Vent - 1	1	17.8	0	4	5	1.7	0.2	* pressure in bags at all 18 vents
Vent - 2	0	20.1	0	0	2	0.2	0	
Vent - 3	1	14.3	0	20	1	3.8	0.9	
Vent - 4	0	12.3	0	50	3	5.3	2.4	
Vent - 5	0.2	19.2	0	0	1	0.7	0	
Vent - 6	0	17.2	0	8	1	1.7	0.4	
Vent - 7	0	20.3	0	0	1	0.1	0	
Vent - 8	0	18.7	0	4	1	1.0	0.2	
Vent - 9	0	19.7	0	6	1	0.4	0.3	
Vent - 10	0.2	19.5	0	0	1	0.2	0	
Vent - 11	0	20.1	0	0	1	0.1	0	
Vent - 12	0	20.5	0	0	1	0	0	
Vent - 13	0	17.9	0	66	1	2.0	1.6	fan not used (inaccessible by vehicle - power source)
Vent - 14	0	20.4	0	0	1	0	0	
Vent - 15	0	13.4	0	46	1	4.2	2.2	
Vent - 16	0.2	18.0	0	2	1	1.0	0	
Vent - 17	0	16.1	0	8	1	2.5	0.5	
Vent - 18	0	18.6	0	50	0	2.4	2.7	

Note: See grid for well identifiers and locations.
Mark all vents with appropriate number during initial sampling. ✓

CALIBRATION INFORMATION

Multi -RAE

PID

Results: Calibrated to 100 ppm with 100 ppm isobutvlene Calibrated by: R. Skrvness, Stone & Webster

CGI

Results: Calibrated to 25 ppm H2S, with 25 ppm H2S Calibrated by: R. Skrvness, Stone & Webster

Calibrated to 50 ppm CO, with 50 ppm CO

Landtec GA-90 Landfill Gas Monitor

Results: Calibrated to 3.9% O2, with 4.0% O2 (N2 balance) Calibrated by: Heinrich Environmental

Calibrated to 14.9% CH4, with 15.0% CH4

Calibrated to 14.9% CO2, with 15.0% CO2

Landfill Gas Monitoring

To be completed in indelible ink.

Monitoring is to be performed annually

DATE: 26 October 1998

INSPECTOR: T.J. Marcotte, E. Iorio ORGANIZATION: U.S. Army Corps of Engineers, New England District

WEATHER: (Temp, rain, sun, etc.): 45 to 50 degrees F, Full Sun BAROMETRIC PRESSURE: 30.2 "/Hg

Vent Number	VOCs (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	REMARKS (Visual observations, odor, etc.)
	PID	CGI	CGI	CGI	CGI	GA-90	GA-90	
Vent - 1	0	21.0	0	0	0	0	0	animal burrow
Vent - 2	0	21.0	0	0	0	0	0	animal burrows
Vent - 3	0	21.0	0	0	0	0	0	animal burrow
Vent - 4	0	21.0	0	0	0	0	0	
Vent - 5	0	21.0	0	0	0	0	0	
Vent - 6	0	21.0	0	0	0	0	0	
Vent - 7	0	21.1	0	0	0	0	0	animal burrows
Vent - 8	0	21.0	0	0	0	0	0	animal burrows
Vent - 9	0	21.1	0	0	0	0	0	
Vent - 10	0	21.1	0	0	0	0	0	
Vent - 11	0	21.0	0	0	0	0	0	animal burrow
Vent - 12	0	21.0	0	0	0	0	0	
Vent - 13	0	21.0	0	0	0	0	0	
Vent - 14	0	21.2	0	0	0	0	0	
Vent - 15	0	21.6	0	0	0	0	0	animal burrows
Vent - 16	0	21.0	0	0	0	0	0	
Vent - 17	0	21.0	0	0	0	0	0	
Vent - 18	0	21.1	0	0	0	0	0	

Note: See grid for well identifiers and locations.
Mark all vents with appropriate number during initial sampling.

Landfill Gas Monitoring

Form to be completed in indelible ink *Monitoring is to be performed annually*

INSPECTOR: Iorio/Simmer TITLE: Geotechnical/Hydaulics Engineer DATE: 12/1/99

ORGANIZATION: CENAE-EP WEATHER: 20 – 30° F, sunny, windy

BARAMETER: 30.1 in Hg TIME: 0800 BARAMETER: 30.0 in Hg TIME: 1330

Vent No.	VOC ppm PID	O_2 % CGI/GA-90	H_2S ppm CGI	LEL % CGI	CO ppm CGI	CO_2 % GA-90	CH4 % GA-90	Remarks
V-1	0.0	10.8/2.0	3	>100	0	13.4	3.5	Burrows
V-2	0.0	13.3/2.8	0	>100	0	14	7.4	Burrows
V-3	0.0	2.3/0.9	0	>100	0	18.9	14.6	Burrows, Strong odor
V-4	0.0	4.4/1.4	0	>100	0	16.2	9.3	Strong odor
V-5	0.0	15.3/6.8	0	72	2.5	7.6	2.6	
V-6	0.0	2.5/1.4	0	>100	0	16.2	10.8	Slight Odor
V-7	0.0	5.6/3.8	0	54	0	9.1	0.8	Burrows
V-8	0.0	8.9/4.8	0	>100	1	9.6	2.2	Burrows
V-9	0.0	3.6/0.3	0	>100	1	23.2	26.6	
V-10	0.0	12.9/0.5	0	>100	2	17.7	7.0	
V-11	0.0	8.8/3.9	0	>100	0	9.7	7.3	
V-12	0.0	2.4/2.1	0	>100	0	14.5	10.5	
V-13	0.0	2.3/2.3	0	>100	0	14	18.5	
V-14	0.0	1.5/1.7	2	>100	0	22.2	34.1	
V-15	0.0	1.8/2.1	0	>100	0	22.5	23.7	Slight odor
V-16	0.0	2.0/1.8	0	>100	0	19.2	13.0	Slight odor
V-17	0.0	15.2/1.7	3	>100	0	25	26.2	Strong odor
V-18	0.0	1.7/1.7	0	>100	0	25.7	32.8	Slight odor

CALIBATION INFORMATION:

Instrument: PID, 10.6 eV lamp

Results: 0.0/248 ppm isobutylene Calibrated by: Iorio

Instrument: Industrial Scientific TMX 412 CGI

Results: 0.7% Pentane, 50% LEL, 14%/ 21% O_2 29ppm H_2S, 50 ppm CO Calibrated by: US Environmental Co

Instrument: Landtech Gem 500 GA-90

Results: 4% O2, 14% CO2, 14.5% CH4 Calibrated by: US Environmental Co

Landfill Gas Monitoring

Form to be completed in indelible ink *Monitoring is to be performed annually*

INSPECTOR: Iorio TITLE: Geotechnical Engineer DATE: 12/6/99 &12/7/99

ORGANIZATION: CENAE-EP WEATHER: 40-50° F, rain

BARAMETER: see below

Vent No.	VOC ppm PID	O_2 % CGI/GA-90	H_2S ppm CGI	LEL % CGI	CO ppm CGI	CO_2 % GA-90	CH4 % GA-90	Remarks	Date in. Hg
V-1	0.0	19.5/19.7	0	0	0	0.8	0	Burrows	12/7 29.64
V-2	0.0	8.2/7.2	0	>100	0.6	10.9	8.4	Burrows	12/7 29.63
V-3	0.0	20.9/21	0	0.1	0	0	0	Burrows	12/7 29.63
V-4	0.0	17.1/16.2	0	3	0	4.1	2.0	Burrows	12./7 29.63
V-5	0.0	21/21	0	0	0	0	0		12/7 29.63
V-6	0.0	20.8/21	0	0.5	0	0	0		12/7 29.63
V-7	0.0	21/21	0	0	0	0	0	Burrows	12/7 29.62
V-8	0.0	13.4/12.7	0	0	0	6.1	0	Burrows	12/7 29.60
V-9	0.0	20.6/20.2	0	0.5	0	0.6	0.5		12/7 29.60
V-10	0.0	20.9/20.9	0	0.1	0	0.2	0		12/7 29.60
V-11	0.0	21/21	0	0	0	0	0		12/7 29.60
V-12	0.0	20.9/20.6	0	0	0	0.6	0		12/7 29.60
V-13	0.0	14.4/14.7	0	>100	0	4.6	6.6		12/7 29.75
V-14	0.0	18.5/17.0	0	>100	0	5.2	8.0		12/6 29.75
V-15	0.0	20.8/20.2	0	0.4	0	0.7	0.6		12/6 29.65
V-16	0.0	21.0/20.9	0	0	0	0	0		12/6 29.70
V-17	0.0	21.0/20.2	0	0	0	0	0		12/6 29.65
V-18	0.0	0.2/0	0	>100	0	35.8	45.5	Slight odor	12/6 29.65

CALIBATION INFORMATION:

Instrument: PID, 10.6 eV lamp

Results: 0.0/248 ppm isobutylene Calibrated by: Iorio

Instrument: Industrial Scientific TMX 412 CGI

Results: 2.6% Methane, 50% LEL, 14%/ 21% O_2 29ppm H_2S, 50 ppm CO Calibrated by: US Environmental Co

Instrument: Landtech Gem 500 GA-90

Results: 4% O2, 14% CO2, 14.5% CH4 Calibrated by: US Environmental Co

APPENDIX C

AOCS 43G&J

Table 1
Groundwater Analytical Results - December 13 - 14, 1999 Sampling Event
AOC 43 G
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No.	AAFES-2	AAFES-2 DUP	AAFES-5	AAFES-6	XGM-93-02X	XGM-94-04X	XGM-94-07X	XGM-94-08X	XGM-94-10X	XGM-97-12X
	CLEANUP LEVEL (1)	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES (8260)	ug/L										
Methyl-t-Butyl Ether	70 (3)	<20	<20	0.81 J	<2.0	8.6 J	<2.0	<2.0	<2.0	<2.0	<20
Benzene	5 (2)	**62**	**62**	<2.0	2.5	**81**	0.61 J	<2.0	<2.0	<2.0	**270**
Toluene	1,000 (4)	8.2 J	7.1 J	<2.0	<2.0	6.6 J	1.1 J	<2.0	<2.0	<2.0	390
Ethylbenzene	700 (4)	320	310	<2.0	<2.0	260	30	<2.0	<2.0	<2.0	290
m,p-Xylene		800	770	<2.0	<2.0	220	<2.0	<2.0	<2.0	<2.0	640
o-Xylene		260	270	<2.0	<2.0	84	0.67 J	<2.0	<2.0	<2.0	410
Total Xylenes	10,000(2)	1,060	1,040	<2.0	<2.0	304	0.67 J	<2.0	<2.0	<2.0	1,050
Naphthalene	20 (4)	**170**	**260**	<2.0	<2.0	**110**	2.2 B	<2.0	<2.0	<2.0	**120**
VPH											
Aliphatic Hydrocarbons											
C5 - C8	400 (4)	<1,000	<1,000	<100	370	<1,000	<100	<100	120	<100	**970**
C9 - C12	4,000 (4)	<250	<250	<25	<25	<250	<25	<25	<25	<25	96
Aromatic Hydrocarbons											
C9 - C10	200 (4)	**9,400**	**9,000**	<25	170	**510**	**200**	<25	<25	<25	**4,500**
METALS (6010)											
Iron	9,100	**24,000**	**28,000**	25 JB	**11,000**	**30,000**	5,500	3,500	4,800	510 B	**32,000**
Manganese	291	**4,600**	**5,100**	**710**	**2,900**	**3,900**	**2,900**	**5,700**	**4,500**	**830**	**6,300**
Nickel	100 (4)	<40	9.2 J	11 J	<40	<40	12 J	26 J	<40	<40	19 J

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance. - 25

J = Estimated value detected below the PQL

B = Analyte is within 5 times of the amount detected in the equipment blank sample

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup values were developed so the Maximum Contamination Levels (MCLs) were used

(3) No cleanup values were developed so the MMCLs were used

(4) No cleanup values were developed so the MCP GW-1 standard was used

Table 2
Groundwater Analytical Results - December 15 - 16, 1999 Sampling Event
AOC 43 J
Devens, Massachusetts
(SHEET 1 of 1)

PARAMETERS	Well No. CLEANUP LEVEL (1) ug/L	2446-02	2446-02 Dup	2446-03	2446-04	XJM-93-02X	XJM-93-03X	XJM-94-05X	XJM-94-06X	XJM-94-08X	XJM-94-10X	XJM-97-11X	XJM-97-12X	XJM-97-13X
		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
VOLATILES (8260B)														
Methyl-t-Butyl Ether	70 (3)	<20	<20	<20	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Benzene	5 (2)	**34**	**35**	<20	4.2	**22**	<2.0	**16**	<2.0	<2.0	<2.0	<2.0	**27**	<2.0
Toluene	1,000 (4)	**2,400**	**2,700**	91	16	0.75 J	<2.0	66	<2.0	<2.0	<2.0	1.0 J	180	<2.0
Ethylbenzene	700 (4)	**2,600**	**2,800**	**780**	7.7	1.2 J	<2.0	150	<2.0	<2.0	<2.0	2.4	620	<2.0
m,p-Xylene		4,600	4,900	320	29	1.5 JB	<2.0	470	<2.0	<2.0	<2.0	3.2 B	940	<2.0
o-Xylene		2,900	2,900	180	13	0.77 J	<2.0	110	<2.0	<2.0	<2.0	1.2 J	31	<2.0
Total Xylenes	10,000(2)	7,500	7,800	500	42	2.27 J	<2.0	580	<2.0	<2.0	<2.0	4.4 J	971	<2.0
Naphthalene	20 (4)	**490**	**370**	**140**	15	3.1	<2.0	**56**	<2.0	<2.0	<2.0	1.8 J	**110**	<2.0
VPH														
Aliphatic Hydrocarbons														
C5 - C8	400(4)	**2,800**	**2,700**	<1,000	<100	120	<100	240	<100	<100	<100	110	**2,100**	<100
C9 - C12	4,000(4)	<250	<250	<250	<25	<25	<25	27	<25	<25	<25	<25	<250	<25
Aromatic Hydrocarbons														
C9 - C10	200(4)	**7100**	**7,800**	**3,600**	**430**	110	<25	**1,200**	<25	<25	<25	33	**4,400**	<25
METALS (6010)														
Arsenic	50 (4)	**80**	**76**	**69.0**	17 J	<25	<25	32	<25	<25	6.7 J	<25	**54**	<25
Iron	9,100	**33,000**	**33,000**	**33,000**	7,600	490 B	670 B	**13,000**	1,300	68 JB	680 B	80 JB	**18,000**	47 JB
Manganese	291	**17,000**	**17,000**	**11,000**	**6,400**	**3,100**	110	**5,400**	64	**540**	**330**	**390**	**6,400**	44

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance. - 25

J = Estimated value detected below the PQL

B = Analyte is within 5 times of the amount detected in the equipment blank sample

(1) Cleanup values as identified in the ROD (unless otherwised noted)

(2) No cleanup values were developed so the Maximum Contamination Level (MCLs) were used

(3) No cleanup values were developed so the MMCLs were used

(4) No cleanup values were developed so the MCP GW-1 standard was used

Table 10
Synopsis of Federal and State ARARs for Alternative 2A: Intrinsic Bioremediation
AOC 43G - Historic Gas Station G/AAFES Gas Station

Record of Decision
Fort Devens, MA

Authority	Location Specific	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal Regulatory Authority		No location-specific ARARs will be triggered.			
State Regulatory Authority		No location-specific ARARs will be triggered.			

(continued)

TABLE 10
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2A: INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	CHEMICAL SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority	Groundwater (Also applicable as an Action Specific ARAR)	SDWA, National Primary Drinking Water Standards, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50 - 141.52]	Relevant and Appropriate	The NPDWR establishes MCLs for several common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques.	Biodegradation of organic contaminants exceeding MCLs is believed to be occurring under existing conditions. MCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program will achieve MCLs at completion of remedy.
Federal Regulatory Authority	Groundwater	USEPA Reference Dose	TBC		
Federal Regulatory Authority	Groundwater	USEPA HAs	TBC		

TABLE 10
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2A:
INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	CHEMICAL SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Groundwater (Also applicable as an Action Specific ARAR)	Massachusetts Drinking Water Standards and Guidelines [310 CMR 22.0].	Relevant and Appropriate	The Massachusetts Drinking Water Standards and Guidelines list MMCLs which apply to water delivered to any user of a public water supply system as defined in 310 CMR 22.00. Private residential wells are not subject to the requirements of 310 CMR 22.00; however, the standards are often used to evaluate private residential contamination especially in CERCLA activities.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.

Table 10
Synopsis of Federal and State ARARs For Alternative 2A: Intrinsic Bioremediation
AOC 43G - Historic Gas Station G/AAFES Gas Station

Record of Decision
Fort Devens, MA

Authority	Action Specific	Requirements	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal Regulatory Authority		RCRA Subtitle C Subpart F	Relevant and Appropriate	Groundwater protection standard.	
State Regulatory Authority	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Applicable	Massachusetts Groundwater Quality Standards designate and assign uses for which groundwater of the Commonwealth shall be maintained and protected and set forth water quality criteria necessary to maintain the designated uses. Groundwater at Fort Devens is classified as Class 1. Groundwater assigned to this class are fresh groundwater designated as a source of potable water supply.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.

(continued)

TABLE 10
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2A: INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	ACTION SPECIFIC	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State Regulatory Authority	Groundwater Monitoring	Massachusetts Hazardous Waste Management Rules (MHWMR) Groundwater Protection; [310 CMR 30.660-30.679]	Relevant and Appropriate	Groundwater monitoring is required during and following remedial actions.	A long-term groundwater monitoring program is to be implemented to monitor the progress of remediation.

Notes:

CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
MCLs = Maximum Contaminant Levels
MHWMR = Massachusetts Hazardous Waste Management Rules
MMCLs = Massachusetts Maximum Contaminant Levels
NPDWR = National Primary Drinking Water Standards
SDWA = Safe Drinking Water Act

Table 11
Synopsis of Federal and State ARARs for Alternative 2B: Intrinsic Bioremediation
AOC 43G - Historic Gas Station G/AAFES Gas Station

Record of Decision
Fort Devens, MA

Authority	Location Specific	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal Regulatory Authority		No location-specific ARARs will be triggered.			
State Regulatory Authority		No location-specific ARARs will be triggered.			

Table 11
Synopsis of Federal and State ARARs for Alternative 2B: Intrinsic Bioremediation
AOC 43G - Historic Gas Station G/AAFES Gas Station

Record of Decision
Fort Devens, MA

Authority	Chemical Specific	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal Regulatory Authority	Groundwater (Also applicable as an Action Sp ecific ARAR)	SDWA, National Primary Drinking Water Standards, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50 - 141.52]	Relevant and Appropriate	The NPDWR establishes MCLs for several common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques.	Biodegradation of organic contaminants exceeding MCLs is believed to be occurring under existing conditions. MCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program will achieve MCLs at completion of remedy.
Federal Regulatory Authority	Groundwater	USEPA Reference Dose	TBC		
Federal Regulatory Authority	Groundwater	USEPA HAs	TBC		

TABLE 11
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2B:
INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	CHEMICAL SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Continued	Groundwater (Also applicable as an Action Specific ARAR)	Massachusetts Drinking Water Standards and Guidelines [310 CMR 22.0].	Relevant and Appropriate	The Massachusetts Drinking Water Standards and Guidelines list MMCLs which apply to water delivered to any user of a public water supply system as defined in 310 CMR 22.00. Private residential wells are not subject to the requirements of 310 CMR 22.00; however, the standards are often used to evaluate private residential contamination especially in CERCLA activities.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.

TABLE 11
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2B:
INTRINSIC BIOREMEDIATION
AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	ACTION SPECIFIC	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Disposal of treatment residues	RCRA, Land Disposal Restrictions [40 CFR 268]	Applicable	Land disposal of RCRA hazardous wastes without specified treatment is restricted. LDRs require that wastes must be treated either by a treatment technology or to a specific concentration prior to disposal in a RCRA Subtitle C permitted facility.	SVE carbon would be tested to evaluate characteristics for proper disposal/reactivation.

Table 11
Synopsis of Federal and State ARARs for Alternative 2B: Intrinsic Bioremediation
AOC 43G - Historic Gas Station G/AAFES Gas Station

Record of Decision
Fort Devens, MA

Authority	Action Specific	Requirements	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Applicable	Massachusetts Groundwater Quality Standards designate and assign uses for which groundwater of the Commonwealth shall be maintained and protected and set forth water quality criteria necessary to maintain the designated uses. Groundwater at Fort Devens is classified as Class 1. Groundwater assigned to this class are fresh groundwater designated as a source of potable water supply.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.
State Regulatory Authority	Groundwater Monitoring	Massachusetts Hazardous Waste Management Rules (MHWMR) Groundwater Protection; [310 CMR 30.660-30.679]	Relevant and Appropriate	Groundwater monitoring is required during and following remedial actions.	A long-term groundwater monitoring program is to be implemented to monitor the progress of remediation.

TABLE 11
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2B: INTRINSIC BIOREMEDIATION AOC 43G - HISTORIC GAS STATION G/AAFES GAS STATION

RECORD OF DECISION FORT DEVENS, MA

AUTHORITY	ACTION SPECIFIC	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Continued	SVE Treatment	Massachusetts Air Pollution Control Regulations [310 CMR 6.00 - 7.00]	Applicable	SVE system must reduce VOCs in air effluent stream by at least 95% by weight.	Emissions will be managed through engineering controls.

Notes:

CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
MCLs = Maximum Contaminant Levels
MHWMR = Massachusetts Hazardous Waste Management Rules
MMCLs = Massachusetts Maximum Contaminant Levels
NPDWR = National Primary Drinking Water Standards
SDWA = Safe Drinking Water Act

TABLE 12
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2:
INTRINSIC BIOREMEDIATION
AOC 43J - HISTORIC GAS STATION J

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	LOCATION SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority		No location-specific ARARs will be triggered.			
State Regulatory Authority		No location-specific ARARs will be triggered.			

TABLE 12
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2:
INTRINSIC BIOREMEDIATION
AOC 43J - HISTORIC GAS STATION J

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	CHEMICAL SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority	Groundwater (Also applicable as an Action Specific ARAR)	SDWA, National Primary Drinking Water Standards, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50 - 141.52]	Relevant and Appropriate	The NPDWR establishes MCLs for several common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques.	Biodegradation of organic contaminants exceeding MCLs is believed to be occurring under existing conditions. MCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program will achieve MCLs at completion of remedy.
Federal Regulatory Authority	Groundwater	USEPA Reference Dose	TBC		
Federal Regulatory Authority	Groundwater	USEPA HAs/TBC	TBC		

(continued)

TABLE 12
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2: INTRINSIC BIOREMEDIATION
AOC 43J - HISTORIC GAS STATION J

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	CHEMICAL SPECIFIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State Regulatory Authority	Groundwater (Also applicable as an Action Specific ARAR)	Massachusetts Drinking Water Standards and Guidelines [310 CMR 22.0].	Relevant and Appropriate	The Massachusetts Drinking Water Standards and Guidelines list MMCLs which apply to water delivered to any user of a public water supply system as defined in 310 CMR 22.00. Private residential wells are not subject to the requirements of 310 CMR 22.00; however, the standards are often used to evaluate private residential contamination especially in CERCLA activities.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.

(continued)

TABLE 12
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2:
INTRINSIC BIOREMEDIATION
AOC 43J - HISTORIC GAS STATION J

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	ACTION SPECIFIC	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal Regulatory Authority		RCRA Subtitle C Subpart F	Relevant and Appropriate	Groundwater protection standards.	
	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Applicable	Massachusetts Groundwater Quality Standards designate and assign uses for which groundwater of the Commonwealth shall be maintained and protected and set forth water quality criteria necessary to maintain the designated uses. Groundwater at Fort Devens is classified as Class 1. Groundwater assigned to this class are fresh groundwater designated as a source of potable water supply.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.

(continued)

TABLE 12
SYNOPSIS OF FEDERAL AND STATE ARARS FOR ALTERNATIVE 2:
INTRINSIC BIOREMEDIATION
AOC 43J - HISTORIC GAS STATION J

RECORD OF DECISION
FORT DEVENS, MA

AUTHORITY	ACTION SPECIFIC	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State Regulatory Authority	Groundwater Monitoring	Massachusetts Hazardous Waste Management Rules (MHWMR) Groundwater Protection; [310 CMR 30.660-30.679]	Relevant and Appropriate	Groundwater monitoring is required during and following remedial actions.	A long-term groundwater monitoring program is to be implemented to monitor the progress of remediation.

Notes:

CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
MCLs = Maximum Contaminant Levels
MHWMR = Massachusetts Hazardous Waste Management Rules
MMCLs = Massachusetts Maximum Contaminant Levels
NPDWR = National Primary Drinking Water Standards
SDWA = Safe Drinking Water Act

APPENDIX D

SOUTH POST IMPACT AREA (AOCS 25, 26, 27, AND 41) (GROUNDWATER)

TABLE 4-1
Groundwater Sample Analysis and Procedures

WELL DESIGNATION	PARAMETERS	METHOD
25M-92-06X 25M-97-11X 26M-92-02X 26M-92-03X 26M-97-08X 27M-92-01X 27M-93-05X 27M-93-06X 27M-93-08X SPM-93-06X SPM-93-08X SPM-93-10X SPM-93-12X SPM-93-16X SPM-97-23X SPM-97-24X	TAL Metals Explosives	USEPA 6010A and 7470A for Mercury USEPA 8330
41M-93-04X 41M-94-09A 41M-94-09B 41M-94-11X 41M-94-12X 41M-94-14X	Explosives Volatile Organics Trichloroethylene (TCE) Tetrachloroethylene (PCE) 1,1,2 trichloroethane (TCA) 1,2, dichloroethylene (DCE) Toluene Carbon tetrachloride Carbon disulfide	USEPA 8330 EPA-SW 8260A
D-1	Explosives	USEPA 8330
All wells	General Parameters (measured in the field) pH Temperature Specific Conductance Dissolved Oxygen Turbidity Oxygen Reduction Potential VOCs (Headspace)	

USEPA - U.S. Environmental Protection Agency
VOCs - Volatile Organic Compounds

TABLE 4-2
Groundwater Analytical Results - October 27 - November 3, 1997 Sampling Event (Sheet 1 of 2)
South Post Impact Area
Fort Devens - Ayer, Massachusetts
(UNITS IN ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	Well No. D-1	25M-92-06X	25M-92-06XD	25M-97-11X	26M-92-02X	26M-92-03X	26M-97-08X	26M-97-08XD	27M-92-01X	27M-93-05X	27M-93-06X	27M-93-08X
METALS															
Silver, Total Ag	4.6	na	na	pa	<15	--	<15	<15	<15	<15	<15	<15	<15	<15	<15
Aluminum, Total Al	6870	na	na	pa	<100	--	<100	170	<100	110J	140J	1680	2360	<100	<100
Arsenic, Total As	10.5	50	50	pa	<8	--	<8	<8	<8	<8	<8	<8	<8	<8	<8
Barium, Total Ba	39.6	2000	2000	pa	<5	--	<5	<5	13.5	9.1J	14J	13.4	27.4	<5	<5
Beryllium, Total Be	5	4	4	pa	<5	--	<5	<5	<5	<5	<5	<5	<5	<5	<5
Calcium, Total Ca	14700	na	na	pa	2440	--	2610	2700	4400	4330	4100	5660	16700	4920	7040
Cadmium, Total Cd	4.01	5	5	pa	<10	--	<10	<10	<10	<10	<10	<10	<10	<10	<10
Cobalt, Total Co	25	na	na	pa	<30	--	<30	<30	<30	<30	<30	<30	<30	<30	<30
Chromium, Total Cr	14.7	100	100	pa	<15	--	<15	25	28	<15	<15	78.8	30.4	<15	<15
Copper, Total Cu	8.09	1300	1300	pa	<25	--	<25	<25	<25	<25	<25	<25	<25	<25	<25
Iron, Total Fe	9100	na	na	pa	141	--	31	300	210	260	280	2530	2690	189	42
Mercury, Total Hg	0.243	2	2	pa	<0.200	--	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Potassium, Total K	2370	na	na	pa	<1000	--	<1000	<1000	<1000	<1000	<1000	1500	4500	1000	1800
Magnesium, Total Mg	3480	na	na	pa	690	--	980	1090	610	534	500	1120	2280	1310	1690
Manganese, Total Mn	291	na	na	pa	<5	--	<5	5.5	11.1	17.1	17	63.7	107	6.1	<5
Sodium, Total Na	10800	na	na	pa	1880	--	2660	3470	1740	2040	1940	3880	9260	2460	6680
Nickel, Total Ni	34.3	na	100	pa	<40	--	<40	<40	<40	<40	<40	68.5	<40	<40	<40
Lead, Total Pb	4.25	15	15	pa	<5	--	<5	<5	<5	<5	<5	<5	8	<5	<5
Antimony, Total Sb	3.03	6	6	pa	<8	--	<8	<8	<8	<8	<8	<8	<8	<8	<8
Selenium, Total Se	3.02	50	50	pa	<10	--	<10	<10	<10	<10	<10	<10	<10	<10	<10
Thallium, Total Tl	6.99	2	2	pa	<15	--	<15	<15	<15	<15	<15	<15	<15	<15	<15
Vanadium, Total V	11	na	na	pa	<25	--	<25	<25	<25	<25	<25	<25	<25	<25	<25
Zinc, Total Zn	21.1	na	na	pa	<25	--	<25	27.6	33.2	32.2J	<25J	25.8	76.1	<25	<25
EXPLOSIVES															
1,3,5-Trinitrobenzene	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125J	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125
1,3-Dinitrobenzene	1	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125J	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125
2,4,6-Trinitrotoluene	2	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125J	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125
2,4-Dinitrotoluene	30	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125J	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125
2,6-Dinitrotoluene	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125J	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125
2-Amino-4,6-Dinitrotoluen	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125J	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125
2-Nitrotoluene	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125J	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125
3-Nitrotoluene	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125J	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125
4-Amino-2,6-Dinitrotoluen	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125J	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125
4-Nitrotoluene	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125J	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125
HMX	400	na	na	<1.0J	<1.0	<1.0	<1.0J	<1.0	3.8J	4.9J	8.5J	1.1	<1.0	<1.0	<1.0
Tetryl	na	na	na	<0.5J	<0.5	<0.5	<0.5J	<0.5	<0.5J	<0.5J	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrobenzene	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125J	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125
RDX	2	na	na	<0.5J	<0.5	<0.5	<0.5J	<0.5	23J	29J	48	4.6	<0.5	2.2	<0.5
VOLATILES															
1,1,2-Trichloroethane	na	5	5	pa	--	--	--	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	na	70	70	pa	--	--	--	--	--	--	--	--	--	--	--
Carbon tetrachloride	na	5	5	pa	--	--	--	--	--	--	--	--	--	--	--
Carbon disulfide	na	na	na	pa	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	na	5	5	pa	--	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	na	100	100	pa	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene	na	5	5	pa	--	--	--	--	--	--	--	--	--	--	--
Toluene	na	1000	1000	pa	--	--	--	--	--	--	--	--	--	--	--
Vinyl chloride	na	2	2	pa	--	--	--	--	--	--	--	--	--	--	--

LEGEND

Shaded area indicates concentration above background levels. - 25	Cross-hatched area with bold number indicates MCL or MMCL exceedance. - 25	
J = Estimated value (based on data evaluation of laboratory results)	-- = Parameter not required to be analyzed in accordance with SPIA- LTMP	
pa = Analyzed under Army contract.	na = Not available.	NS = Not sampled.

TABLE 4-2 (cont.)
Groundwater Analytical Results - October 27 - November 3, 1997 Sampling Event (Sheet 2 of 2)
South Post Impact Area
Fort Devens - Ayer, Massachusetts
(UNITS IN ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	SPM-93-06X	SPM-93-08X	SPM-93-10X	SPM-93-12X	SPM-93-16X	SPM-97-23X	SPM-97-24X	41M-93-04X	41M-93-04XD	41M-94-09A	41M-94-09B	41M-94-11X	41M-94-12X	41M-94-14X
METALS																	
Silver, Total Ag	4.6	na	na	<15	<15	<15	<15	<15	<15	<15	--	--	--	--	--	--	--
Aluminum, Total Al	6870	na	na	2810	<100	140	<100	<100	<100	<100	--	--	--	--	--	--	--
Arsenic, Total As	10.5	50	50	<8	<8	<8	<8	<8	<8	<8	--	--	--	--	--	--	--
Barium, Total Ba	39.6	2000	2000	158	<5	<5	<5	<5	<5	9.4	--	--	--	--	--	--	--
Beryllium, Total Be	5	4	4	<5	<5	<5	<5	<5	<5	<5	--	--	--	--	--	--	--
Calcium, Total Ca	14700	na	na	74600	2740	2980	6480	2800	5720	9460	--	--	--	--	--	--	--
Cadmium, Total Cd	4.01	5	5	<10	<10	<10	<10	<10	<10	<10	--	--	--	--	--	--	--
Cobalt, Total Co	25	na	na	<30	<30	<30	41.3	<30	<30	<30	--	--	--	--	--	--	--
Chromium, Total Cr	14.7	100	100	<15	23.9	<15	63.3	21	<15	<15	--	--	--	--	--	--	--
Copper, Total Cu	8.09	1300	1300	<25	<25	<25	<25	<25	<25	<25	--	--	--	--	--	--	--
Iron, Total Fe	9100	na	na	82	155	235	621	190	90J	180	--	--	--	--	--	--	--
Mercury, Total Hg	0.243	2	2	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	--	--	--	--	--	--	--
Potassium, Total K	2370	na	na	44700	<1000	<1000	1200	<1000	<1000	2200	--	--	--	--	--	--	--
Magnesium, Total Mg	3480	na	na	50	350	750	2150	714	1270	3840	--	--	--	--	--	--	--
Manganese, Total Mn	291	na	na	<5	<5	5.5	32	5.6	6.3	17.4	--	--	--	--	--	--	--
Sodium, Total Na	10800	na	na	21200	2290	2840	5230	2560	3370	3750	--	--	--	--	--	--	--
Nickel, Total Ni	34.3	na	100	<40	<40	<40	81	<40	<40	<40	--	--	--	--	--	--	--
Lead, Total Pb	4.25	15	15	<5	<5	<5	<5	<5	<5	<5	--	--	--	--	--	--	--
Antimony, Total Sb	3.03	6	6	<8	<8	<8	<8	<8	<8	<8	--	--	--	--	--	--	--
Selenium, Total Se	3.02	50	50	<10	<10	<10	<10	<10	<10	<10	--	--	--	--	--	--	--
Thallium, Total Tl	6.99	2	2	<15	<15	<15	<15	<15	<15	<15	--	--	--	--	--	--	--
Vanadium, Total V	11	na	na	<25	<25	<25	<25	<25	<25	<25	--	--	--	--	--	--	--
Zinc, Total Zn	21.1	na	na	<25	35.7	<25	38.1	<25	<25	<25	--	--	--	--	--	--	--
EXPLOSIVES																	
1,3,5-Trinitrobenzene	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125	NS	<0.125	<0.125	<0.125	<0.125
1,3-Dinitrobenzene	1	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125	NS	<0.125	<0.125	<0.125	<0.125
2,4,6-Trinitrotoluene	2	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125	NS	<0.125	<0.125	<0.125	<0.125
2,4-Dinitrotoluene	30	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125	NS	<0.125	<0.125	<0.125	<0.125
2,6-Dinitrotoluene	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125	NS	<0.125	<0.125	<0.125	<0.125
2-Amino-4,6-Dinitrotol.	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125	NS	<0.125	<0.125	<0.125	<0.125
2-Nitrotoluene	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125	NS	<0.125	<0.125	<0.125	<0.125
3-Nitrotoluene	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125	NS	<0.125	<0.125	<0.125	<0.125
4-Amino-2,6-Dinitrotol.	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125	NS	<0.125	<0.125	<0.125	<0.125
4-Nitrotoluene	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125	NS	<0.125	<0.125	<0.125	<0.125
HMX	400	na	na	<1.0J	<1.0	<1.0	<1.0J	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	<1.0
Tetryl	na	na	na	<0.5J	<0.5	<0.5	<0.5J	<0.5	<0.5	<0.5	<0.5	<0.5	NS	<0.5	<0.5	<0.5	<0.5
Nitrobenzene	na	na	na	<0.125J	<0.125	<0.125	<0.125J	<0.125	<0.125	<0.125	<0.125	<0.125	NS	<0.125	<0.125	<0.125	<0.125
RDX	2	na	na	<0.5J	<0.5	<0.5	<0.5J	<0.5	<0.5	<0.5	<0.5	<0.5	NS	<0.5	<0.5	<0.5	<0.5
VOLATILES																	
1,1,2-Trichloroethane	na	5	5	--	--	--	--	--	--	--	<5	<5	NS	<5	<5	<5	<5
cis-1,2-Dichloroethene	na	70	70	--	--	--	--	--	--	--	<5	<5	NS	<5	<5	<5	<5
Carbon tetrachloride	na	5	5	--	--	--	--	--	--	--	<5	<5	NS	<5	<5	<5	<5
Carbon disulfide	na	na	na	--	--	--	--	--	--	--	<5	<5	NS	<5	<5	<5	<5
Tetrachloroethene	na	5	5	--	--	--	--	--	--	--	<5	3J	NS	<5	<5	<5	<5
trans-1,2-Dichloroethe	na	100	100	--	--	--	--	--	--	--	<5	<5	NS	<5	<5	<5	<5
Trichloroethene	na	5	5	--	--	--	--	--	--	--	<5	<5	NS	<5	<5	<5	<5
Toluene	na	1000	1000	--	--	--	--	--	--	--	<5	<5	NS	<5	<5	<5	<5
Vinyl chloride	na	2	2	--	--	--	--	--	--	--	<5	<5	NS	<5	<5	<5	<5

LEGEND

Shaded area indicates concentration above background levels. - 25	Cross-hatched area with bold numbers indicates MCL or MMCL exceedance. - 25
J = Estimated value (based on data evaluation of laboratory results)	-- = Parameter not required to be analyzed in accordance with SPIA- LTMP
	na = Not available. NS = Not sampled.

Table 4-3
AOC 25 - GROUNDWATER SAMPLING PROGRAM
SOUTH POST IMPACT AREA
CHEMICAL SUMMARY REPORT
(CONCENTRATIONS IN ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	06/23/93	11/17/92	03/02/93	06/23/93	10/30/97	10/30/97
			Well No.	25M-92-06X	25M-92-06X	25M-92-06X	25M-92-06X	25M-92-06X	25M-97-11X
			FILTERED?	YES	NO	NO	NO	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)							
Silver, Total Ag	4.6	nl	nl	<2	<2	<4.6	<4.6	<15	<15
Aluminum, Total Al	6870	nl	nl	<25	8710	1640	16000	<100	<100
Arsenic, Total As	10.5	50	50	<2	<2.54	<2.54	4.94	<8	<8
Barium, Total Ba	39.6	2000	2000	<10	38.4	9.35	86.6	<5	<5
Beryllium, Total Be	5	4	4	<5	<5	<5	<5	<5	<5
Calcium, Total Ca	14700	na	na	2990	3390	3290	3990	2440	2610
Cadmium, Total Cd	4.01	5	5	<5	<4.01	<4.01	<5	<10	<10
Cobalt, Total Co	25	na	na	<10	<25	<25	33.5	<30	<30
Chromium, Total Cr	14.7	100	100	<10	24.1	<6.02	41.9	<15	<15
Copper, Total Cu	8.09	1300	1300	<10	<25	<25	33.5	<25	<25
Iron, Total Fe	9100	na	na	<25	33600	5230	56000	141	31
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.200
Potassium, Total K	2370	na	na	1190	2490	2020	2480	<1000	<1000
Magnesium, Total Mg	3480	na	na	711	1370	933	2800	690	980
Manganese, Total Mn	291	na	na	12.6	383	68.7	690	<5	<5
Sodium, Total Na	10800	na	na	<2000	1950	2400	<2000	1880	2660
Nickel, Total Ni	34.3	na	100	<10	<34.3	<34.3	41.3	<40	<40
Lead, Total Pb	4.25	15	15	<5	4.77	<1.26	11.6	<5	<5
Antimony, Total Sb	3.03	6	6	<5	<3.03	<3.03	<5	<8	<8
Selenium, Total Se	3.02	50	50	<2	<3.02	<3.02	<2	<10	<10
Thallium, Total Tl	6.99	2	2	--	--	--	--	<15	<15
Vanadium, Total V	11	na	na	<10	16.2	<11	38.0	<25	<25
Zinc, Total Zn	21.1	na	na	<20	54.2	<21.1	121	<25	<25
EXPLOSIVES									
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	<0.125J
1,3-Dinitrobenzene	1	na	na	--	--	--	--	<0.125	<0.125J
2,4,6-Trinitrotoluene	2	na	na	--	<0.635	<0.635	<1	<0.125	<0.125J
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125	<0.125J
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<0.125J
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<0.125J
2-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<0.125J
3-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<0.125J
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<0.125J
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<0.125J
HMX	400	na	na	--	<1.21	<1.21	<1	<1.0	<1.0J
Tetryl	na	na	na	--	--	--	--	<0.5	<0.5J
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<0.125J
RDX	2	na	na	--	<1.17	<1.17	<1J	<0.5	<0.5J
PETN	na	na	na	--	<20	<20	<10	--	--

LEGEND	
Shaded areas are above background levels. -	25
J = Estimated value	
na = Not available.	
-- = Parameter not measured	

Notes: Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

TABLE 4-4
AOC 26 - GROUNDWATER SAMPLING PROGRAM
SOUTH POST IMPACT AREA
CHEMICAL SUMMARY REPORT
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	06/24/93	11/18/92	03/02/93	06/24/93	10/28/97	06/24/93	11/18/92	03/02/93	06/24/93	10/28/97	10/28/97
Well No.				26M-92-02X	26M-92-02X	26M-92-02X	26M-92-02X	26M-92-02X	26M-92-03X	26M-92-03X	26M-92-03X	26M-92-03X	26M-92-03X	26M-97-08X
FILTERED?				YES	NO	NO	NO	LOW FLOW	YES	NO	NO	NO	LOW FLOW	LOW FLOW
METALS														
Silver, Total Ag	4.6	na	na	--	--	--	--	<15	--	--	--	--	<15	<15
Aluminum, Total Al	6870	na	na	<25	4190J	1030J	748J	170	<25	1050	323J	6700J	<100	110J
Arsenic, Total As	10.5	50	50	5.07	<2.54	<2.54	4.94	<8	<2	2.88	<2.54	5.60	<8	<8
Barium, Total Ba	39.6	2000	2000	<10	38.4	9.35	86.6	<5	16.4	23.3	19.8	24.0	13.5	9.1J
Beryllium, Total Be	5	4	4	--	--	--	--	<5	--	--	--	--	<5	<5
Calcium, Total Ca	14700	na	na	2540	3190	2820	2520	2700	5650	6030	5920	5870	4400	4330
Cadmium, Total Cd	4.01	5	5	--	--	--	--	<10	--	--	--	--	<10	<10
Cobalt, Total Co	25	na	na	<10	<25	<25	<10	<30	<10	<25	<25	<10	<30	<30
Chromium, Total Cr	14.7	100	100	<10	6.78	<6.02	<10	25	<10	<6.02	<6.02	<10	28	<15
Copper, Total Cu	8.09	1300	1300	<10	11.4	<8.09	<10	<25	<10	<8.09	<8.09	<10	<25	<25
Iron, Total Fe	9100	na	na	<25	6290J	1130J	1200J	300	<25	1310	419J	2300J	210	260
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	--	--	--	--	<0.200	<0.200
Potassium, Total K	2370	na	na	<1000	1610	1820	<1000	<1000	1010	2200	2610	1510	<1000	<1000
Magnesium, Total Mg	3480	na	na	929	1910	1090	1080	1090	589	697	651	936	610	534
Manganese, Total Mn	291	na	na	<5	89.2J	20.9	17.8	5.5	15.8	62.7	34.8	76.2	11.1	17.1
Sodium, Total Na	10800	na	na	3370	3280	3410	2920	3470	2070	1900	2210	<2000	1740	2040
Nickel, Total Ni	34.3	na	100	<10	<34.3	<34.3	<10	<40	<10	<34.3	<34.3	<10	<40	<40
Lead, Total Pb	4.25	15	15	<5	4.99	3.15	<5	<5	<5	1.41	<1.26	<5	<5	<5
Antimony, Total Sb	3.03	6	6	--	--	--	--	<8	--	--	--	--	<8	<8
Selenium, Total Se	3.02	50	50	<2	<3.02	<3.02	<2	<10	<2	<3.02	<3.02	<2	<10	<10
Thallium, Total Tl	6.99	2	2	--	--	--	--	<15	--	--	--	--	<15	<15
Vanadium, Total V	11	na	na	<10	<10	<11	<11	<25	<10	<11	<11	<11	<25	<25
Zinc, Total Zn	21.1	na	na	76.7	59.2	95.3	99.3	27.6	<20	<21.1	<21.1	24.4	33.2	32.2J
EXPLOSIVES														
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125J	<0.125J
1,3-Dinitrobenzene	1	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125J	<0.125J
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125J	<0.125J
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125J	<0.125J
2,6-Dinitrotoluene	na	na	na	--	<0.074	<0.074	<1	<0.125	--	<0.074	<0.074	<1	<0.125J	<0.125J
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125J	<0.125J
2-Nitrotoluene	na	na	na	--	--	--	<1	<0.125	--	--	--	<1	<0.125J	<0.125J
3-Nitrotoluene	na	na	na	--	--	--	1.86	<0.125	--	--	--	<1	<0.125J	<0.125J
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	--	<1	<0.125	--	--	--	<1	<0.125J	<0.125J
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125J	<0.125J
HMX	400	na	na	--	<1.21	<1.21	<1.21	<1.0	--	11.2	9.42	8.93	3.8J	4.9J
Tetryl	na	na	na	--	--	--	--	<0.5	--	--	--	--	<0.5J	<0.5J
Nitrobenzene	na	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125J	<0.125J
RDX	2	na	na	--	<1.17	<1.17	<1	<0.5	--	75	83.4	58	23J	29J
PETN	na	na	na	--	24.8	<20	<20	--	--	<20	<20	<10	--	--
Nitroglycerine				--	68.3	<10	<10	--	--	<10	<10	<10		--

Notes: Background levels for Explosives are from Functional Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Shaded areas are above background levels. -	25
J = Estimated value	
na = Not available.	
-- = Parameter not measured	

TABLE 4-5
AOC 27 - GROUNDWATER SAMPLING PROGRAM
SOUTH POST IMPACT AREA
CHEMICAL SUMMARY REPORT (Sheet 1 of 2)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	09/21/92	01/13/93	10/29/97	08/17/93	11/10/93	08/17/93	11/10/93	10/29/97
			Well No.	27M-92-01X	27M-92-01X	27M-92-01X	27M-93-05X	27M-93-05X	27M-93-05X	27M-93-05X	27M-93-05X
			FILTERED?	NO	NO	LOW FLOW	YES	YES	NO	NO	LOW FLOW
		MCLs (ug/l)									
METALS											
Silver, Total Ag	4.6	na	na	<4.6	<4.6	<15	<2	<2	<2	<2	<15
Aluminum, Total Al	6870	na	na	<3.03	<3.03	1680	72.3	115J	2000	254J	2360
Arsenic, Total As	10.5	50	50	25.3	25.9	<8	4.96	5.22	10.8	6.64	<8
Barium, Total Ba	39.6	2000	2000	121	101	13.4	<10	<10	15	<10	27.4
Beryllium, Total Be	5	4	4	<5	<5	<5	0.113J	<5	0.123J	<5	<5
Calcium, Total Ca	14700	na	na	11400	9740	5660	11400	6730	11500	4640J	16700
Cadmium, Total Cd	4.01	5	5	<4.01	<4.01	<10	<5	<5	<5	<5	<10
Cobalt, Total Co	25	na	na	<25	<25	<30	<10	<10	<10	<10	<30
Chromium, Total Cr	14.7	100	100	46.4	35.5	78.8	<10	3.69J	7.38J	<10	30.4
Copper, Total Cu	8.09	1300	1300	29.4	25.9	<25	<10	<10	5.92J	<10	<25
Iron, Total Fe	9100	na	na	41500	32700	2530	22.6J	14.5	3000J	395J	2690
Mercury, Total Hg	0.243	2	2	<0.243	<0.240	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Potassium, Total K	2370	na	na	8680	7950	1500	1120	<1000	1580	549J	4500
Magnesium, Total Mg	3480	na	na	9610	7740	1120	1800	1790	2400	1200	2280
Manganese, Total Mn	291	na	na	820	585	63.7	1.46J	4.45J	102	32.1	107
Sodium, Total Na	10800	na	na	4560	4690	3880	5300	3320	5370	2120	9260
Nickel, Total Ni	34.3	na	100	52.1	<34.3	68.5	<10	<10	8.94J	<10	<40
Lead, Total Pb	4.25	15	15	17.4	15.3	<5	<5	<5	<5	3.19J	8
Antimony, Total Sb	3.03	6	6	<3.03	<3.03	<8	<5	<5	<5	<5	<8
Selenium, Total Se	3.02	50	50	--	--	<10	--	--	--	--	<10
Thallium, Total Tl	6.99	2	2	--	--	<15	--	--	--	--	<15
Vanadium, Total V	11	na	na	44.9	44.9	<25	<10	<10	<10	<10	<25
Zinc, Total Zn	21.1	na	na	125	119	25.8	9.65J	5.05J	34.6	57.8J	76.1
EXPLOSIVES											
1,3,5-Trinitrobenzene	nl	na	na	--	--	<0.125	--	--	--	--	<0.125
1,3-Dinitrobenzene	1	na	na	<0.611	<0.611	<0.125	--	--	0.288J	1.03	<0.125
2,4,6-Trinitrotoluene	2	na	na	--	--	<0.125	--	--	--	--	<0.125
2,4-Dinitrotoluene	30	na	na	<0.064	<0.064	<0.125	--	--	<1.0	0.281J	<0.125
2,6-Dinitrotoluene	na	na	na	--	--	<0.125	--	--	--	--	<0.125
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	<0.125	--	--	--	--	<0.125
2-Nitrotoluene	na	na	na	--	--	<0.125	--	--	<1.0	<1.0	<0.125
3-Nitrotoluene	na	na	na	--	--	<0.125	--	--	0.602	<1.0	<0.125
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<0.125	--	--	<1.0	<1.0	<0.125
4-Nitrotoluene	na	na	na	--	--	<0.125	--	--	--	--	<0.125
HMX	400	na	na	2.77	3.73	1.1	--	--	<1.0	<1.0	<1.0
Tetryl	na	na	na	--	--	<0.5	--	--	--	--	<0.5
Nitrobenzene	na	na	na	--	--	<0.125	--	--	--	--	<0.125
RDX	2	na	na	12.1	12.3	4.6	--	--	1.02	0.788J	<0.5

LEGEND	
Shaded areas are above background levels. -	25
J = Estimated value	
na = Not available.	
-- = Parameter not measured	

Notes: Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

TABLE 4-5 (cont.)
AOC 27 - GROUNDWATER SAMPLING PROGRAM
SOUTH POST IMPACT AREA
CHEMICAL SUMMARY REPORT (Sheet 2 of 2)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	08/18/93	11/10/93	08/18/93	11/10/93	10/29/97	08/17/93	11/10/93	08/17/93	11/10/93	11/03/97
Well No.				27M-93-06X	27M-93-06X	27M-93-06X	27M-93-06X	27M-93-06X	27M-93-08X	27M-93-08X	27M-93-08X	27M-93-08X	27M-93-08X
FILTERED?				YES	YES	NO	NO	LOW FLOW	YES	YES	NO	NO	LOW FLOW
		MCLs (ug/l)											
METALS													
Silver, Total Ag	4.6	na	na	<2	<2	1.49J	<2	<15	<2	<2	<2	<2	<15
Aluminum, Total Al	6870	na	na	26.1	75.8J	356	366J	<100	<25	66.3J	279	168J	<100
Arsenic, Total As	10.5	50	50	<2	<2	<2	1.03J	<8	<2	1.36J	<2	<2	<8
Barium, Total Ba	39.6	2000	2000	<10	<10	3.88J	3.99J	<5	6.19J	4.30J	8.02J	5.94J	<5
Beryllium, Total Be	5	4	4	0.315J	<5	0.204J	<5	<5	0.087J	<5	0.164J	<5	<5
Calcium, Total Ca	14700	na	na	5190	4370	5370	4360J	4920	10200	4910	10800	5360J	7040
Cadmium, Total Cd	4.01	5	5	<5	2.79	<5	<5	<10	<5	<5	<5	<5	<10
Cobalt, Total Co	25	na	na	<10	<10	<10	<10	<30	<10	<10	<10	<10	<30
Chromium, Total Cr	14.7	100	100	<10	<10	<10	<10	<15	<10	<10	<10	<10	<15
Copper, Total Cu	8.09	1300	1300	<10	<10	1.62J	<10	<25	<10	<10	2.58J	4.94J	<25
Iron, Total Fe	9100	na	na	21.6J	24.4J	609J	514J	189	<25	<25	384J	218J	42
Mercury, Total Hg	0.243	2	2	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Potassium, Total K	2370	na	na	<1000	432J	1500	787J	1000	2330	1470	2570	2640	1800
Magnesium, Total Mg	3480	na	na	1170	1130	1260	1270	1310	2580	812	2680	899	1690
Manganese, Total Mn	291	na	na	40.5	13.2J	54.6	35.4	6.1	74.1	35.9J	85.8	41.9	<5
Sodium, Total Na	10800	na	na	3290	818J	3110	3340	2460	10900	9560	11100	11800	6680
Nickel, Total Ni	34.3	na	100	<10	<10	<10	<10	<40	<10	<10	<10	<10	<40
Lead, Total Pb	4.25	15	15	<5	0.9J	<5	0.93J	<5	<5	<5	2.95J	<5	<5
Antimony, Total Sb	3.03	6	6	<5	<5	<5	1.78J	<8	<5	<5	<5	<5	<8
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	--	--	--	--	<10
Thallium, Total Tl	6.99	2	2	--	--	--	--	<15	--	--	--	--	<15
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<10	<10	<10	<10	<25
Zinc, Total Zn	21.1	na	na	15.1J	232J	15.1J	232J	<25	112	124	122	118J	<25
EXPLOSIVES													
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125
1,3-Dinitrobenzene	1	na	na	--	--	<1	1.09J	<0.125	--	--	1.82	1.03	<0.125
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125
2,4-Dinitrotoluene	30	na	na	--	--	<1	<1	<0.125	--	--	<1	<1	<0.125
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125
2-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125	--	--	<1	<1	<0.125
3-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125	--	--	2.76	<1	<0.125
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125	--	--	<1	<1	<0.125
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	--	--			<0.125
HMX	400	na	na	--	--	0.699J	0.894J	<1.0	--	--	0.11J	<1	<1.0
Tetryl	na	na	na	--	--	--	--	<0.5	--	--	--	--	<0.5
Nitrobenzene	na	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125
RDX	2	na	na	--	--	1.56	1.77	2.2	--	--	<1	<1	<0.5

LEGEND	
Shaded areas are above background levels. -	25
J = Estimated value	
na = Not available.	
-- = Parameter not measured	

Notes : Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

TABLE 4-6
AOC 41 - GROUNDWATER SAMPLING PROGRAM
SOUTH POST IMPACT AREA
CHEMICAL SUMMARY REPORT (Sheet 1of 2)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	12/07/94 41M-93-04X	03/13/95 41M-93-04X	10/31/97 41M-93-04X	10/31/97 41M-93-04XD	12/06/94 41M-94-09A	03/15/95 41M-94-09A	10/31/97 41M-94-09A	12/05/94 41M-94-09B	03/15/95 41M-94-09B	10/31/97 41M-94-09B
EXPLOSIVES													
1,3,5-Trinitrobenzene	na	na	na	--	--	<0.125	<0.125	--	--	NS	--	--	<0.125
1,3-Dinitrobenzene	1	na	na	--	--	<0.125	<0.125	--	--	NS	--	--	<0.125
2,4,6-Trinitrotoluene	2	na	na	<0.63	<0.63	<0.125	<0.125	<0.63	<0.63	NS	<0.63	<0.63	<0.125
2,4-Dinitrotoluene	30	na	na	--	--	<0.125	<0.125	--	--	NS	--	--	<0.125
2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<0.125	--	--	NS	--	--	<0.125
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	<0.125	<0.125	--	--	NS	--	--	<0.125
2-Nitrotoluene	na	na	na	--	--	<0.125	<0.125	--	--	NS	--	--	<0.125
3-Nitrotoluene	na	na	na	--	--	<0.125	<0.125	--	--	NS	--	--	<0.125
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<0.125	--	--	NS	--	--	<0.125
4-Nitrotoluene	na	na	na	--	--	<0.125	<0.125	--	--	NS	--	--	<0.125
HMX	400	na	na	--	--	<1.0	<1.0	--	--	NS	--	--	<1.0
Tetryl	na	na	na	--	--	<0.5	<0.5	--	--	NS	--	--	<0.5
Nitrobenzene	na	na	na	--	--	<0.125	<0.125	--	--	NS	--	--	<0.125
RDX	2	na	na	--	--	<0.5	<0.5	--	--	NS	--	--	<0.5
VOLATILES													
1,1,2-Trichloroethane	na	5	5	--	--	<5	<5	--	--	NS	--	--	<5
cis-1,2-Dichloroethene	na	70	70	<0.5	<0.5	<5	<5	<0.5	<0.5	NS	<0.5	<0.5	<5
Carbon tetrachloride	na	5	5	<0.5	<0.5	<5	<5	<0.5	<0.5	NS	<0.5	<0.5	<5
Carbon disulfide	na	na	na	<0.5	<0.5	<5	<5	<0.5	<0.5	NS	<0.5	<0.5	<5
Tetrachloroethene	na	5	5	<1.6	<1.6	<5	3J	<1.6	<1.6	NS	<1.6	<1.6	<5
trans-1,2-Dichloroethene	na	100	100	<0.5	<0.5	<5	<5	<0.5	<0.5	NS	<0.5	<0.5	<5
Trichloroethene	na	5	5	1.3	<0.5	<5	<5	<0.5	<0.5	NS	<0.5	<0.5	<5
Toluene	na	1000	1000	0.63	<0.5	<5	<5	<0.5	<0.5	NS	<0.65	<0.65	<5
Vinyl chloride	na	2	2	--	--	<5	<5	--	--	NS	--	--	<5

Note: Background levels for Explosives taken from Functional Area I RI.

LEGEND	
Shaded areas are above background levels. -	25
J = Estimated value	
na = Not available.	
-- = Parameter not measured	
NS = Not sampled	

TABLE 4-6 (cont.)
AOC 41 - GROUNDWATER SAMPLING PROGRAM
SOUTH POST IMPACT AREA
CHEMICAL SUMMARY REPORT (Sheet 2 of 2)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	12/06/94 41M-94-11X	03/14/95 41M-94-11X	10/31/97 41M-94-11X	12/05/94 41M-94-12X	03/15/95 41M-94-12X	10/31/97 41M-94-12X	12/07/94 41M-94-14X	03/13/95 41M-94-14X	10/31/97 41M-94-14X
EXPLOSIVES												
1,3,5-Trinitrobenzene	na	na	na	--	--	<0.125	--	--	<0.125	--	--	<0.125
1,3-Dinitrobenzene	1	na	na	--	--	<0.125	--	--	<0.125	--	--	<0.125
2,4,6-Trinitrotoluene	2	na	na	<0.63	<0.63	<0.125	<0.63	<0.63	<0.125	<0.63	<0.63	<0.125
2,4-Dinitrotoluene	30	na	na	--	--	<0.125	--	--	<0.125	--	--	<0.125
2,6-Dinitrotoluene	na	na	na	--	--	<0.125	--	--	<0.125	--	--	<0.125
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	<0.125	--	--	<0.125	--	--	<0.125
2-Nitrotoluene	na	na	na	--	--	<0.125	--	--	<0.125	--	--	<0.125
3-Nitrotoluene	na	na	na	--	--	<0.125	--	--	<0.125	--	--	<0.125
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<0.125	--	--	<0.125	--	--	<0.125
4-Nitrotoluene	na	na	na	--	--	<0.125	--	--	<0.125	--	--	<0.125
HMX	400	na	na	--	--	<1.0	--	--	<1.0	--	--	<1.0
Tetryl	na	na	na	--	--	<0.5	--	--	<0.5	--	--	<0.5
Nitrobenzene	na	na	na	--	--	<0.125	--	--	<0.125	--	--	<0.125
RDX	2	na	na	--	--	<0.5	--	--	<0.5	--	--	<0.5
VOLATILES												
1,1,2-Trichloroethane	na	5	5	--	--	<5	--	--	<5	--	--	<5
cis-1,2-Dichloroethene	na	70	70	<0.5	<0.5	<5	<0.5	<0.5	<5	<0.5	<0.5	<5
Carbon tetrachloride	na	5	5	<0.5	<0.5	<5	<0.5	<0.5	<5	<0.5	<0.5	<5
Carbon disulfide	na	na	na	<0.5	<0.5	<5	<0.5	<0.5	<5	<0.5	<0.5	<5
Tetrachloroethene	na	5	5	<1.6	<1.6	<5	<1.6	<1.6	<5	<1.6	<1.6	<5
trans-1,2-Dichloroethene	na	100	100	<0.5	<0.5	<5	<0.5	<0.5	<5	<0.5	<0.5	<5
Trichloroethene	na	5	5	<0.5	<0.5	<5	<0.5	<0.5	<5	1.2	<0.5	<5
Toluene	na	1000	1000	0.86	<0.5	<5	<0.5	<0.5	<5	<0.5	<0.5	<5
Vinyl chloride	na	2	2	--	--	<5	--	--	<5	--	--	<5

Note: Background levels for explosives taken from Functional Area I RI.

LEGEND	
Shaded areas are above background levels. -	25
J = Estimated value	
na = Not available.	
-- = Parameter not measured	

TABLE 4-7
GROUNDWATER SAMPLING PROGRAM
SOUTH POST IMPACT AREA - SPM WELLS
CHEMICAL SUMMARY REPORT (Sheet 1 of 3)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	08/16/93	11/10/93	08/16/93	11/10/93	10/28/97	08/18/93	11/10/93	08/18/93	11/10/93	10/29/97
			Well No.	SPM-93-06X	SPM-93-06X	SPM-93-06X	SPM-93-06X	SPM-93-06X	SPM-93-08X	SPM-93-08X	SPM-93-08X	SPM-93-08X	SPM-93-08X
			FILTERED?	YES	YES	NO	NO	LOW FLOW	YES	YES	NO	NO	LOW FLOW
METALS													
Silver, Total Ag	4.6	na	na	<2	<2	<2	<2	<15	<2	<2	<2	<2	<15
Aluminum, Total Al	6870	na	na	213	1970	1500	2000	2810	<25	42.3	109	190	<100
Arsenic, Total As	10.5	50	50	33.6	21.7	33.3	19.8	<8	1.82J	1.26J	1.64J	<2	<8
Barium, Total Ba	39.6	2000	2000	41.7	198	58	197	158	4.19J	<10	4.07J	3.14J	<5
Beryllium, Total Be	5	4	4	<5	<5	0.146J	<5	<5	0.246J	<5	0.175	<5	<5
Calcium, Total Ca	14700	na	na	14400	90800	14200	92900	74600	3860	2640	3960	2830	2740
Cadmium, Total Cd	4.01	5	5	<5	<5	<5	<5	<10	<5	1.56	<5	<5	<10
Cobalt, Total Co	25	na	na	<10	<10	<10	<10	<30	<10	<10	<10	<10	<30
Chromium, Total Cr	14.7	100	100	<10	2.88J	8.84J	3.89J	<15	<10	3.78J	<10	3.18J	23.9
Copper, Total Cu	8.09	1300	1300	<10	<10	3.48J	<10	<25	1.47J	<10	1.99J	<10	<25
Iron, Total Fe	9100	na	na	<25	21.8	2500	139	82	<25	<25	220	155	155
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	--	--	--	--	<0.200
Potassium, Total K	2370	na	na	18600	13600	17700	12500	44700	1440	<1000	2390	513	<1000
Magnesium, Total Mg	3480	na	na	989	<500	1620	47.3J	50	320J	283J	380J	358J	350
Manganese, Total Mn	291	na	na	17.8	1.08J	324	19.1	<5	23.1	8.56	31.4	13.1	<5
Sodium, Total Na	10800	na	na	12300	10400	11900	11500	21200	3200	539	4600	2480	2290
Nickel, Total Ni	34.3	na	100	<10	<10	8.89J	<10	<40	<10	<10	<10	<10	<40
Lead, Total Pb	4.25	15	15	<5	<5	<5	<5	<5	<5	<5	7.18	<5	<5
Antimony, Total Sb	3.03	6	6	<5	<5	<5	<5	<8	<5	2.44	<5	<5	<8
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	--	--	--	--	<10
Thallium, Total Tl	6.99	2	2	<2	<2	<2	<2	<15	<2	<2	<2	<2	<15
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<10	<10	<10	<10	<25
Zinc, Total Zn	21.1	na	na	<20	3.05	21.9	16.6	<25	37.7	110	43.1	456	35.7
EXPLOSIVES													
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125J	--	--			<0.125
1,3-Dinitrobenzene	1	na	na	--	--	<1	<1	<0.125J	--	--	<1	3.84	<0.125
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125J	--	--	--	--	<0.125
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125J	--	--	--	--	<0.125
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125J	--	--	--	--	<0.125
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125J	--	--	--	--	<0.125
2-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125J	--	--	<1	0.835J	<0.125
3-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125J	--	--	<1	1.45	<0.125
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125J	--	--	<1	<1	<0.125
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125J	--	--	--	--	<0.125
HMX	400	na	na	--	--	--	--	<1.0J	--	--	0.295	<1	<1.0
Tetryl	na	na	na	--	--	--	--	<0.5J	--	--	--	--	<0.5
Nitrobenzene	na	na	na	--	--	--	--	<0.125J	--	--	--	--	<0.125
RDX	2	na	na	--	--	<1	<1	<0.5J	--	--	--	--	<0.5

Notes: Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

LEGEND	
Shaded areas are above background levels. -	25 (shaded)
J = Estimated value	
na = Not available.	
-- = Parameter not measured	

TABLE 4-7 (cont.)
GROUNDWATER SAMPLING PROGRAM
SOUTH POST IMPACT AREA - SPM WELLS
CHEMICAL SUMMARY REPORT (Sheet 2 of 3)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	08/17/93 SPM-93-10X YES	11/09/93 SPM-93-10X YES	08/17/93 SPM-93-10X NO	11/09/93 SPM-93-10X NO	11/03/97 SPM-93-10X LOW FLOW	08/18/93 SPM-93-12X YES	11/09/93 SPM-93-12X YES	08/18/93 SPM-93-12X NO	11/09/93 SPM-93-12X NO	10/27/97 SPM-93-12X LOW FLOW
METALS													
Silver, Total Ag	4.6	na	na	<2	1.61J	<2	2.34	<15	<2	<2	<2	<2	<15
Aluminum, Total Al	6870	na	na	34.8	56.1	349	528	140	<25	49.8	395	352	<100
Arsenic, Total As	10.5	50	50	<5	<5	<5	<5	<8	<2	1.47J	<2	1.40J	<8
Barium, Total Ba	39.6	2000	2000	2.68J	<10	7.93J	4.43J	<5	2.37J	4.33J	5.67J	5.51J	<5
Beryllium, Total Be	5	4	4	0.104J	<5	<5	<5	<5	0.307	<5	0.234J	<5	<5
Calcium, Total Ca	14700	na	na	4360	3390	4740	3220	2980	8980	7870	9080	7360	6480
Cadmium, Total Cd	4.01	5	5	<5	<5	<5	<5	<10	<5	2.26J	<5	<5	<10
Cobalt, Total Co	25	na	na	<10	2.46J	<10	<10	<30	<10	2.33J	<10	3.74J	41.3
Chromium, Total Cr	14.7	100	100	<10	<10	7.58J	6.03J	<15	<10	<10	<10	3.14J	63.3
Copper, Total Cu	8.09	1300	1300	<10	<10	3.09J	<10	<25	<10	<10	2.43J	<10	<25
Iron, Total Fe	9100	na	na	51.5	124	579	811	235	30.9	44.9	639	521	621
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	--	--	--	--	<0.200
Potassium, Total K	2370	na	na	1530	2190	1600	1930	<1000	2300	2030	2410	1890	1200
Magnesium, Total Mg	3480	na	na	842	706	906	839	750	2400	2320	2610	2250	2150
Manganese, Total Mn	291	na	na	11.7	13.3	21.6	28.1	5.5	320	267	333	263	32
Sodium, Total Na	10800	na	na	3640	4210	3760	4240	2840	7530	5910	8490	5850	5230
Nickel, Total Ni	34.3	na	100	<10	<10	<10	<10	<40	<10	<10	<10	<10	81
Lead, Total Pb	4.25	15	15	<5	1.91J	<5	1.82J	<5	<5	1.23J	<5	0.720J	<5
Antimony, Total Sb	3.03	6	6	<5	<5	<5	<5	<8	<5	1.70J	<5	<5	<8
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	--	--	--	--	<10
Thallium, Total Tl	6.99	2	2	<2	0.91	<2	<2	<15	<2	1.32	<2	1.05	<15
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<10	<10	<10	<10	<25
Zinc, Total Zn	21.1	na	na	37.1	23.7	49	36.1	<25	1.28J	20.6	19.8J	35.2	38.1
EXPLOSIVES													
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125J
1,3-Dinitrobenzene	1	na	na	--	--	3.25	<1	<0.125	--	--	<1	<1	<0.125J
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125J
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125J
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125J
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125J
2-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125	--	--	<1	<1	<0.125J
3-Nitrotoluene	na	na	na	--	--	1.58	<1	<0.125	--	--	<1	<1	<0.125J
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125	--	--	<1	0.251J	<0.125J
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125J
HMX	400	na	na	--	--	--	--	<1.0	--	--	--	--	<1.0J
Tetryl	na	na	na	--	--	--	--	<0.5	--	--	--	--	<0.5J
Nitrobenzene	na	na	na	--	--	--	--	<0.125	--	--	--	--	<0.125J
RDX	2	na	na	--	--	0.334	0.782	<0.5	--	--	<1	0.251	<0.5J

Notes: Background levels for Explosives are from Functional Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND	
Shaded areas are above background levels. -	25
J = Estimated value	
na = Not available.	
-- = Parameter not measured	

TABLE 4-7 (cont.)
GROUNDWATER SAMPLING PROGRAM
SOUTH POST IMPACT AREA - SPM WELLS
CHEMICAL SUMMARY REPORT (Sheet 3 of 3)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	08/16/93	11/09/93	08/16/93	11/09/93	10/27/97	10/29/97	10/30/97
			Well No.	SPM-93-16X	SPM-93-16X	SPM-93-16X	SPM-93-16X	SPM-93-16X	SPM-97-23X	SPM-97-24X
			FILTERED?	YES	YES	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW
		MCLs (ug/l)								
METALS										
Silver, Total Ag	4.6	na	na	<2	<2	<2	<2	<15	<15	<15
Aluminum, Total Al	6870	na	na	34	<25	349	121	<100	<100	<100
Arsenic, Total As	10.5	50	50	<2	<2	<2	0.720J	<8	<8	<8
Barium, Total Ba	39.6	2000	2000	9.24J	<10	13	<10	<5	<5	9.4
Beryllium, Total Be	5	4	4	<5	<5	<5	<5	<5	<5	<5
Calcium, Total Ca	14700	na	na	6970	2700	7080	2950	2800	5720	9460
Cadmium, Total Cd	4.01	5	5	<5	<5	<5	<5	<10	<10	<10
Cobalt, Total Co	25	na	na	<10	2.72J	<10	<10	<30	<30	<30
Chromium, Total Cr	14.7	100	100	<10	<10	<10	<10	21	<15	<15
Copper, Total Cu	8.09	1300	1300	<10	<10	1.66J	<10	<25	<25	<25
Iron, Total Fe	9100	na	na	<25	<25	521	159	190	90J	180
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.200	<0.200
Potassium, Total K	2370	na	na	1140	991J	1160	647	<1000	<1000	2200
Magnesium, Total Mg	3480	na	na	784	654	890	707	714	1270	3840
Manganese, Total Mn	291	na	na	5.92	3.51J	16.4	6.16	5.6	6.3	17.4
Sodium, Total Na	10800	na	na	2930	3430	2690	3140	2560	3370	3750
Nickel, Total Ni	34.3	na	100	<10	<10	<10	<10	<40	<40	<40
Lead, Total Pb	4.25	15	15	<5	<5	<5	1.05J	<5	<5	<5
Antimony, Total Sb	3.03	6	6	<5	<5	2.46J	<5	<8	<8	<8
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<10	<10
Thallium, Total Tl	6.99	2	2	<2	0.85	<2	0.77	<15	<15	<15
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<25	<25
Zinc, Total Zn	21.1	na	na	22.3	38.3	79.3	44.7	<25	<25	<25
EXPLOSIVES										
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	<0.125	<0.125
1,3-Dinitrobenzene	1	na	na	--	--	4.37	2.06	<0.125	<0.125	<0.125
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<0.125	<0.125
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125	<0.125	<0.125
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<0.125	<0.125
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<0.125	<0.125
2-Nitrotoluene	na	na	na	--	--	0.995J	<1	<0.125	<0.125	<0.125
3-Nitrotoluene	na	na	na	--	--	2.77J	2.66	<0.125	<0.125	<0.125
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125	<0.125	<0.125
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<0.125	<0.125
HMX	400	na	na	--	--	--	--	<1.0	<1.0	<1.0
Tetryl	na	na	na	--	--	--	--	<0.5	<0.5	<0.5
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<0.125	<0.125
RDX	2	na	na	--	--	<1	<1	<0.5	<0.5	<0.5

Notes: Background levels for Explosives are from Function Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND	
Shaded areas are above background levels. -	25
J = Estimated value	
na = Not available.	

TABLE 4-2
GROUNDWATER ANALYTICAL RESULTS - October 19-23, 1998
SOUTH POST IMPACT AREA WELLS (Sheet 1 of 3)
Fort Devens - Ayer, Massachusetts
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	25M-92-06X	25M-97-11X	25M-97-11XD	26M-92-02X	26M-92-03X	26M-92-03XD	26M-92-04X	26M-97-08X	27M-92-01X	27M-93-05X
DATE				10/21/98	10/21/98	10/21/98	10/21/98	10/21/98	10/21/98	10/21/98	10/21/98	10/19/98	10/19/98
FILTERED?				LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
		MCLs (ug/l)											
METALS													
Silver, Total Ag	4.6	na	na	<3.0	<3.0	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3	<3
Aluminum, Total Al	6870	na	na	350	<200	--	219	<200	<200	<200	<200	747	<200
Arsenic, Total As	10.5	50	50	<5.0	<5.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<10	<10
Barium, Total Ba	39.6	2000	2000	<10.0	<10.0	--	<10.0	12.5	11.8	10.0	10.0	<10	<10
Beryllium, Total Be	5	4	4	<3.0	<3.0	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3	<3
Calcium, Total Ca	14700	na	na	2760	2670	--	2690	4020	3810	10300	3760	8800	4600
Cadmium, Total Cd	4.01	5	5	<3.0	<3.0	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3	<3
Cobalt, Total Co	25	na	na	<5.0	<5.0	--	<5.0	<5.0	<5.0	<5.0	8.5	<5	<5
Chromium, Total Cr	14.7	100	100	9.4	<5.0	--	<5.0	<5.0	<5.0	<5.0	5.2	<5	<5
Copper, Total Cu	8.09	1300	1300	<5.0	<5.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5	<5
Iron, Total Fe	9100	na	na	844	<100	--	239	<100	<100	<100	<100	615	<100
Mercury, Total Hg	0.243	2	2	<0.2	<0.2	--	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Potassium, Total K	2370	na	na	677	749	--	<500	1060	1030	790	793	1850	706
Magnesium, Total Mg	3480	na	na	776	971	--	1050	<500	<500	1250	<500	820	1190
Manganese, Total Mn	291	na	na	13.6	<5.0	--	<5.0	<5.0	<5.0	19.8	6.1	11.1	<5
Sodium, Total Na	10800	na	na	2100	2760	--	3490	1780	1750	4100	1950	4970	2250
Nickel, Total Ni	34.3	na	100	5.6	<5.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5	<5
Lead, Total Pb	4.25	15	15	<3.0	<3.0	--	<3.0	<3.0	<3.0	<3.0	<3.0	<3	<3
Antimony, Total Sb	3.03	6	6	<5.0	<5.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5	<5
Selenium, Total Se	3.02	50	50	<5.0	<5.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5	<5
Thallium, Total Tl	6.99	2	2	<2.0	<2.0	--	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2
Vanadium, Total V	11	na	na	<5.0	<5.0	--	<5.0	<5.0	<5.0	<5.0	<5.0	<5	<5
Zinc, Total Zn	21.1	na	na	50.4	12.4	--	14.3	12.4J	87.3J	12.9	21.5	97.6J	<10
EXPLOSIVES													
1,3,5-Trinitrobenzene	na	na	na	<1.20	<1.20	<1.20	<1.20	<1.20	<1.20J	<1.20	<1.20	<1.2	<1.2
1,3-Dinitrobenzene	1	na	na	<1.20	<1.20	<1.20	<1.20	<1.20	<1.20J	<1.20	<1.20	<1.2	<1.2
2,4,6-Trinitrotoluene	2	na	na	<1.20	<1.20	<1.20	<1.20	<1.20	<1.20J	<1.20	<1.20	<1.2	<1.2
2,4-Dinitrotoluene	30	na	na	<1.20	<1.20	<1.20	<1.20	<1.20	<1.20J	2.3	<1.20	<1.2	<1.2
2,6-Dinitrotoluene	na	na	na	<1.20	<1.20	<1.20	<1.20	<1.20	<1.20J	<1.20	<1.20	<1.2	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	<1.20	<1.20	<1.20	<1.20	<1.20	<1.20J	<1.20	<1.20	<1.2	<1.2
2-Nitrotoluene	na	na	na	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60J	<2.60	<2.60	<2.6	<2.6
3-Nitrotoluene	na	na	na	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60J	<2.60	<2.60	<2.6	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	<1.20	<1.20	<1.20	<1.20	<1.20	<1.20J	<1.20	<1.20	<1.2	<1.2
4-Nitrotoluene	na	na	na	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60J	<2.60	<2.60	<2.6	<2.6
HMX	400	na	na	<2.60	<2.60	<2.60	<2.60	2.60J	<2.60J	32.9	6.3	<2.6	<2.6
Tetryl	na	na	na	<2.60	<2.60	<2.60	<2.60	<2.60	<2.60J	<2.60	<2.60	<2.6	<2.6
Nitrobenzene	na	na	na	<1.20	<1.20	<1.20	<1.20	<1.20	<1.20J	<1.20	<1.20	<1.2	<1.2
RDX	2	na	na	<2.60	<2.60	<2.60	<2.60	8.90J	<2.60J	227.4	28.5	2.8	<2.6

Notes: Background levels for Explosives are from Function Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Shaded areas are above background levels. - 25
J = Estimated value
na = Not available.
-- = Parameter not measured

TABLE 4-2 (cont.)
GROUNDWATER ANALYTICAL RESULTS - October 19-23, 1998
SOUTH POST IMPACT AREA WELLS (Sheet 2 of 3)
Fort Devens - Ayer, Massachusetts
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	27M-93-06X	27M-93-08X	SPM-93-06X	SPM-93-08X	SPM-93-10X	SPM-93-12X	SPM-93-16X	SPM-97-23X	SPM-97-24X
DATE				10/19/98	10/19/98	10/19/98	10/22/98	10/22/98	10/22/98	10/22/98	10/19/98	10/22/98
FILTERED?				LOW FLOW	LOW FLOW	LOW FLOW	LOW-FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)										
Silver, Total Ag	4.6	na	na	<3	<3	<3	<3	<3	<3	<3	<3	<3
Aluminum, Total Al	6870	na	na	<200	<200	2070	<200	<200	<200	<200	<200	<200
Arsenic, Total As	10.5	50	50	<10	<10	<10	<10	<10	<10	<10	<10	<10
Barium, Total Ba	39.6	2000	2000	<10	<10	111	<10	<10	<10	<10	<10	<10
Beryllium, Total Be	5	4	4	<3	<3	<3	<3	<3	<3	<3	<3	<3
Calcium, Total Ca	14700	na	na	4600	8370	60600	2760	3560	6420	2850	6170	8790
Cadmium, Total Cd	4.01	5	5	<3	<3	<3	<3	<3	<3	<3	<3	<3
Cobalt, Total Co	25	na	na	<5	<5	<5	5.6	11.4	<5	<5	<5	<5
Chromium, Total Cr	14.7	100	100	<5	<5	<5	<5	13.5	9.3	<5	<5	<5
Copper, Total Cu	8.09	1300	1300	<5	<5	5.9	<5	<5	<5	<5	<5	<5
Iron, Total Fe	9100	na	na	<100	141	<100	<100	203	<100	<100	<100	260J
Mercury, Total Hg	0.243	2	2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Potassium, Total K	2370	na	na	706	1710	25200	690	1080	1210	527	735	1730
Magnesium, Total Mg	3480	na	na	1190	1970	<500	<500	899	2080	743	1290	3300
Manganese, Total Mn	291	na	na	<5	10.8	<5	<5	6.6	10.6	<5	<5	<5
Sodium, Total Na	10800	na	na	2250	6460	14600	2260	3270	5230	2580	3530	3310
Nickel, Total Ni	34.3	na	100	<5	<5	<5	<5	8.1	5.6	<5	<5	<5
Lead, Total Pb	4.25	15	15	<3	<3	<3	<3	<3	<3	<3	<3	<3
Antimony, Total Sb	3.03	6	6	<5	<5	<5	<5	<5	<5	<5	<5	<5
Selenium, Total Se	3.02	50	50	<5	<5	<5	<5	<5	<5	<5	<5	<5
Thallium, Total Tl	6.99	2	2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Vanadium, Total V	11	na	na	<5	<5	<5	<5	<5	<5	<5	<5	<5
Zinc, Total Zn	21.1	na	na	<10	<10	10.1	<10	21.7	33.0	<10	24.6	17.5
EXPLOSIVES												
1,3,5-Trinitrobenzene	na	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
1,3-Dinitrobenzene	1	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
2,4,6-Trinitrotoluene	2	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
2,4-Dinitrotoluene	30	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
2,6-Dinitrotoluene	na	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
2-Nitrotoluene	na	na	na	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6
3-Nitrotoluene	na	na	na	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
4-Nitrotoluene	na	na	na	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<1.2
HMX	400	na	na	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6
Tetryl	na	na	na	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6
Nitrobenzene	na	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
RDX	2	na	na	2.2J	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6

Notes: Background levels for Explosives are from Function Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Shaded areas are above background levels. - 25
J = Estimated value
na = Not available.
-- = Parameter not measured

TABLE 4-2 (cont.)
GROUNDWATER ANALYTICAL RESULTS - October 19-23, 1998
SOUTH POST IMPACT AREA WELLS (Sheet 3 of 3)
Devens - Ayer, Massachusetts
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	10/19/98	10/20/98	10/20/98	10/20/98	10/20/98	10/20/98	10/20/98	10/20/98	10/20/98	10/20/98
		MCLs (ug/l)		D - 1	41M-93-03X	41M-94-03B	41M-93-04X	41M-93-04XD	41M-94-09A	41M-94-09B	41M-94-11X	41M-94-12X	41M-94-14X
EXPLOSIVES													
1,3,5-Trinitrobenzene	na	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	NS	NS	<1.2	<1.2	<1.2
1,3-Dinitrobenzene	1	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	NS	NS	<1.2	<1.2	<1.2
2,4,6-Trinitrotoluene	2	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	NS	NS	<1.2	<1.2	<1.2
2,4-Dinitrotoluene	30	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	NS	NS	<1.2	<1.2	<1.2
2,6-Dinitrotoluene	na	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	NS	NS	<1.2	<1.2	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	NS	NS	<1.2	<1.2	<1.2
2-Nitrotoluene	na	na	na	<2.6	<2.6	<2.6	<2.6	<2.6	NS	NS	<2.6	<2.6	<2.6
3-Nitrotoluene	na	na	na	<2.6	<2.6	<2.6	<2.6	<2.6	NS	NS	<2.6	<2.6	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	NS	NS	<1.2	<1.2	<1.2
4-Nitrotoluene	na	na	na	<2.6	<2.6	<2.6	<2.6	<2.6	NS	NS	<2.6	<2.6	<2.6
HMX	400	na	na	<2.6	<2.6	<2.6	<2.6	<2.6	NS	NS	<2.6	<2.6	<2.6
Tetryl	na	na	na	<2.6	<2.6	<2.6	<2.6	<2.6	NS	NS	<2.6	<2.6	<2.6
Nitrobenzene	na	na	na	<1.2	<1.2	<1.2	<1.2	<1.2	NS	NS	<1.2	<1.2	<1.2
RDX	2	na	na	<2.6	<2.6	<2.6	<2.6	<2.6	NS	NS	<2.6	<2.6	<2.6
VOLATILES													
1,1,2-Trichloroethane	na	5	5	pa	1	<1	<1	<1	NS	NS	<1	<1	<1
cis-1,2-Dichloroethene	na	70	70	pa	<1	<1	<1	<1	NS	NS	<1	<1	<1
Carbon tetrachloride	na	5	5	pa	<1	<1	<1	<1	NS	NS	<1	<1	<1
Carbon disulfide	na	na	na	pa	<1	<1	<1	<1	NS	NS	<1	<1	<1
Tetrachloroethene	na	5	5	pa	1J	<1	<1	<1	NS	NS	<1	<1	<1
trans-1,2-Dichloroethene	na	100	100	pa	<1	<1	<1	<1	NS	NS	<1	<1	<1
Trichloroethene	na	5	5	pa	218	<1	1J	1J	NS	NS	<1	<1	1J
Toluene	na	1000	1000	pa	<1	<1	<1	<1	NS	NS	<1	<1	<1
Vinyl chloride	na	2	2	pa	<1	<1	<1	<1	NS	NS	<1	<1	<1

Note: Background levels for explosives taken from Functional Area I RI.

LEGEND	
Shaded areas are above background levels. -	25
J = Estimated value	pa = Analyzed under Army contract
na = Not available.	-- = Parameter not measured

TABLE 4-3
AOC 25 - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA WELLS 25M-92-06X, 25M-97-11X
CHEMICAL SUMMARY REPORT
(CONCENTRATIONS IN ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	06/23/93	11/17/92	03/02/93	06/23/93	10/30/97	10/21/98	10/30/97	10/21/98	10/21/98
Well No.				25M-92-06X	25M-92-06X	25M-92-06X	25M-92-06X	25M-92-06X	25M-92-06X	25M-97-11X	25M-97-11X	25M-97-11XD
FILTERED?				YES	NO	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)										
Silver, Total Ag	4.6	nl	nl	<2	<2	<4.6	<4.6	<15	<3.0	<15	<3.0	--
Aluminum, Total Al	6870	nl	nl	<25	8710	1640	16000	<100	350	<100	<200	--
Arsenic, Total As	10.5	50	50	<2	<2.54	<2.54	4.94	<8	<5.0	<8	<5.0	--
Barium, Total Ba	39.6	2000	2000	<10	38.4	9.35	86.6	<5	<10.0	<5	<10.0	--
Beryllium, Total Be	5	4	4	<5	<5	<5	<5	<5	<3.0	<5	<3.0	--
Calcium, Total Ca	14700	na	na	2990	3390	3290	3990	2440	2760	2610	2670	--
Cadmium, Total Cd	4.01	5	5	<5	<4.01	<4.01	<5	<10	<3.0	<10	<3.0	--
Cobalt, Total Co	25	na	na	<10	<25	<25	33.5	<30	<5.0	<30	<5.0	--
Chromium, Total Cr	14.7	100	100	<10	24.1	<6.02	41.9	<15	9.4	<15	<5.0	--
Copper, Total Cu	8.09	1300	1300	<10	<25	<25	33.5	<25	<5.0	<25	<5.0	--
Iron, Total Fe	9100	na	na	<25	33600	5230	56000	141	844	31	<100	--
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2	<0.200	<0.2	--
Potassium, Total K	2370	na	na	1190	2490	2020	2480	<1000	677	<1000	749	--
Magnesium, Total Mg	3480	na	na	711	1370	933	2800	690	776	980	971	--
Manganese, Total Mn	291	na	na	12.6	383	68.7	690	<5	13.6	<5	<5.0	--
Sodium, Total Na	10800	na	na	<2000	1950	2400	<2000	1880	2100	2660	2760	--
Nickel, Total Ni	34.3	na	100	<10	<34.3	<34.3	41.3	<40	5.6	<40	<5.0	--
Lead, Total Pb	4.25	15	15	<5	4.77	<1.26	11.6	<5	<3.0	<5	<3.0	--
Antimony, Total Sb	3.03	6	6	<5	<3.03	<3.03	<5	<8	<5.0	<8	<5.0	--
Selenium, Total Se	3.02	50	50	<2	<3.02	<3.02	<2	<10	<5.0	<10	<5.0	--
Thallium, Total Tl	6.99	2	2	--	--	--	--	<15	<2.0	<15	<2.0	--
Vanadium, Total V	11	na	na	<10	16.2	<11	38.0	<25	<5.0	<25	<5.0	--
Zinc, Total Zn	21.1	na	na	<20	54.2	<21.1	121	<25	50.4	<25	12.4	--
EXPLOSIVES												
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	<1.20	<0.125J	<1.20	<1.20
1,3-Dinitrobenzene	1	na	na	--	--	--	--	<0.125	<1.20	<0.125J	<1.20	<1.20
2,4,6-Trinitrotoluene	2	na	na	--	<0.635	<0.635	<1	<0.125	<1.20	<0.125J	<1.20	<1.20
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125	<1.20	<0.125J	<1.20	<1.20
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.20	<0.125J	<1.20	<1.20
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.20	<0.125J	<1.20	<1.20
2-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.60	<0.125J	<2.60	<2.60
3-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.60	<0.125J	<2.60	<2.60
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.20	<0.125J	<1.20	<1.20
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.60	<0.125J	<2.60	<2.60
HMX	400	na	na	--	<1.21	<1.21	<1	<1.0	<2.60	<1.0J	<2.60	<2.60
Tetryl	na	na	na	--	--	--	--	<0.5	<2.60	<0.5J	<2.60	<2.60
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.20	<0.125J	<1.20	<1.20
RDX	2	na	na	--	<1.17	<1.17	<1J	<0.5	<2.60	<0.5J	<2.60	<2.60
PETN	na	na	na	--	<20	<20	<10	--	--	--	--	--

Notes: Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

LEGEND	
Shaded areas are above background levels. -	25
J = Estimated value	
na = Not available.	-- = Parameter not measured

TABLE 4-4
AOC 26 - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA WELL 26M-92-02X
CHEMICAL SUMMARY REPORT (Sheet 1 of 3)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	06/24/93	11/18/92	03/02/93	06/24/93	10/28/97	10/21/98
			Well No.	26M-92-02X	26M-92-02X	26M-92-02X	26M-92-02X	26M-92-02X	26M-92-02X
			FILTERED?	YES	NO	NO	NO	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)							
Silver, Total Ag	4.6	na	na	--	--	--	--	<15	<3.0
Aluminum, Total Al	6870	na	na	<25	4190J	1030J	748J	170	219
Arsenic, Total As	10.5	50	50	5.07	<2.54	<2.54	4.94	<8	<5.0
Barium, Total Ba	39.6	2000	2000	<10	38.4	9.35	86.6	<5	<10.0
Beryllium, Total Be	5	4	4	--	--	--	--	<5	<3.0
Calcium, Total Ca	14700	na	na	2540	3190	2820	2520	2700	2690
Cadmium, Total Cd	4.01	5	5	--	--	--	--	<10	<3.0
Cobalt, Total Co	25	na	na	<10	<25	<25	<10	<30	<5.0
Chromium, Total Cr	14.7	100	100	<10	6.78	<6.02	<10	25 J	<5.0
Copper, Total Cu	8.09	1300	1300	<10	11.4	<8.09	<10	<25	<5.0
Iron, Total Fe	9100	na	na	<25	6290J	1130J	1200J	300	239
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2
Potassium, Total K	2370	na	na	<1000	1610	1820	<1000	<1000	<500
Magnesium, Total Mg	3480	na	na	929	1910	1090	1080	1090	1050
Manganese, Total Mn	291	na	na	<5	89.2J	20.9	17.8	5.5	<5.0
Sodium, Total Na	10800	na	na	3370	3280	3410	2920	3470	3490
Nickel, Total Ni	34.3	na	100	<10	<34.3	<34.3	<10	<40	<5.0
Lead, Total Pb	4.25	15	15	<5	4.99	3.15	<5	<5	<3.0
Antimony, Total Sb	3.03	6	6	--	--	--	--	<8	<5.0
Selenium, Total Se	3.02	50	50	<2	<3.02	<3.02	<2	<10	<5.0
Thallium, Total Tl	6.99	2	2	--	--	--	--	<15	<2.0
Vanadium, Total V	11	na	na	<10	<10	<11	<11	<25	<5.0
Zinc, Total Zn	21.1	na	na	76.7	59.2	95.3	99.3	27.6	14.3
EXPLOSIVES									
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	<1.20
1,3-Dinitrobenzene	1	na	na	--	--	--	--	<0.125	<1.20
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<1.20
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125	<1.20
2,6-Dinitrotoluene	na	na	na	--	<0.074	<0.074	<1	<0.125	<1.20
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.20
2-Nitrotoluene	na	na	na	--	--	--	<1	<0.125	<2.60
3-Nitrotoluene	na	na	na	--	--	--	1.86	<0.125	<2.60
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	--	<1	<0.125	<1.20
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.60
HMX	400	na	na	--	<1.21	<1.21	<1.21	<1.0	<2.60
Tetryl	na	na	na	--	--	--	--	<0.5	<2.60
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.20
RDX	2	na	na	--	<1.17	<1.17	<1	<0.5	<2.60
PETN	na	na	na	--	24.8	<20	<20	--	--
Nitroglycerine	na	na	na	--	68.3	<10	<10	--	--

Notes: Background levels for Explosives are from Functional Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Shaded areas are above background levels. - 25
J = Estimated value
na = Not available. -- = Parameter not measured

TABLE 4-4 (cont.)
AOC 26 - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA WELL 26M-92-03X
CHEMICAL SUMMARY REPORT (Sheet 2 of 3)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	06/24/93	11/18/92	03/02/93	06/24/93	10/28/97	10/21/98	10/21/98
			Well No.	26M-92-03X	26M-92-03X	26M-92-03X	26M-92-03X	26M-92-03X	26M-92-03X	26M-92-03XD
			FILTERED?	YES	NO	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)								
Silver, Total Ag	4.6	na	na	--	--	--	--	<15	<3.0	<3.0
Aluminum, Total Al	6870	na	na	<25	1050	323J	6700J	<100	<200	<200
Arsenic, Total As	10.5	50	50	<2	2.88	<2.54	5.60	<8	<5.0	<5.0
Barium, Total Ba	39.6	2000	2000	16.4	23.3	19.8	24.0	13.5	12.5	11.8
Beryllium, Total Be	5	4	4	--	--	--	--	<5	<3.0	<3.0
Calcium, Total Ca	14700	na	na	5650	6030	5920	5870	4400	4020	3810
Cadmium, Total Cd	4.01	5	5	--	--	--	--	<10	<3.0	<3.0
Cobalt, Total Co	25	na	na	<10	<25	<25	<10	<30	<5.0	<5.0
Chromium, Total Cr	14.7	100	100	<10	<6.02	<6.02	<10	28	<5.0	<5.0
Copper, Total Cu	8.09	1300	1300	<10	<8.09	<8.09	<10	<25	<5.0	<5.0
Iron, Total Fe	9100	na	na	<25	1310	419J	2300J	210	<100	<100
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2	<0.2
Potassium, Total K	2370	na	na	1010	2200	2610	1510	<1000	1060	1030
Magnesium, Total Mg	3480	na	na	589	697	651	936	610	<500	<500
Manganese, Total Mn	291	na	na	15.8	62.7	34.8	76.2	11.1	<5.0	<5.0
Sodium, Total Na	10800	na	na	2070	1900	2210	<2000	1740	1780	1750
Nickel, Total Ni	34.3	na	100	<10	<34.3	<34.3	<10	<40	<5.0	<5.0
Lead, Total Pb	4.25	15	15	<5	1.41	<1.26	<5	<5	<3.0	<3.0
Antimony, Total Sb	3.03	6	6	--	--	--	--	<8	<5.0	<5.0
Selenium, Total Se	3.02	50	50	<2	<3.02	<3.02	<2	<10	<5.0	<5.0
Thallium, Total Tl	6.99	2	2	--	--	--	--	<15	<2.0	<2.0
Vanadium, Total V	11	na	na	<10	<11	<11	<11	<25	<5.0	<5.0
Zinc, Total Zn	21.1	na	na	<20	<21.1	<21.1	24.4	33.2	12.4	87.3
EXPLOSIVES										
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125J	<1.20	<1.20
1,3-Dinitrobenzene	1	na	na	--	--	--	--	<0.125J	<1.20	<1.20
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125J	<1.20	<1.20
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125J	<1.20	<1.20
2,6-Dinitrotoluene	na	na	na	--	<0.074	<0.074	<1	<0.125J	<1.20	<1.20
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125J	<1.20	<1.20
2-Nitrotoluene	na	na	na	--	--	--	<1	<0.125J	<2.60	<2.60
3-Nitrotoluene	na	na	na	--	--	--	<1	<0.125J	<2.60	<2.60
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	--	<1	<0.125J	<1.20	<1.20
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125J	<2.60	<2.60
HMX	400	na	na	--	11.2	9.42	8.93	3.8J	2.60	<2.60
Tetryl	na	na	na	--	--	--	--	<0.5J	<2.60	<2.60
Nitrobenzene	na	na	na	--	--	--	--	<0.125J	<1.20	<1.20
RDX	2	na	na	--	75	83.4	58	23J	8.9	<2.60
PETN	na	na	na	--	<20	<20	<10	--	--	--
Nitroglycerine	na	na	na	--	<10	<10	<10	--	--	--

Notes: Background levels for Explosives are from Functional Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Shaded areas are above background levels. - 25
J = Estimated value
na = Not available. -- = Parameter not measured

TABLE 4-4 (cont.)
AOC 26 - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA WELLS 26M-92-04X, 26M-92-08X
CHEMICAL SUMMARY REPORT (Sheet 3 of 3)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	6/24/93	11/18/92	3/03/92	6/24/93	10/21/98	10/28/97	10/21/98
Well No.				26M-92-04X	26M-92-04X	26M-92-04X	26M-92-04X	26M-92-04X	26M-97-08X	26M-97-08X
FILTERED?				YES	NO	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)								
Silver, Total Ag	4.6	na	na	--	--	--	--	<3.0	<15	<3.0
Aluminum, Total Al	6870	na	na	<25	24200	2560	6400	<200	110J	<200
Arsenic, Total As	10.5	50	50	<2	100	7.46	6.61	<5.0	<8	<5.0
Barium, Total Ba	39.6	2000	2000	<10	86.5	21.9	11	10.0	9.1J	10.0
Beryllium, Total Be	5	4	4	--	--	--	--	<3.0	<5	<3.0
Calcium, Total Ca	14700	na	na	7920	15200	18100	8780	10300	4330	3760
Cadmium, Total Cd	4.01	5	5	--	--	--	--	<3.0	<10	<3.0
Cobalt, Total Co	25	na	na	<10	44.8	<25	<10	<5.0	<30	8.5
Chromium, Total Cr	14.7	100	100	<10	26.6	8.14	<10	<5.0	<15	5.2
Copper, Total Cu	8.09	1300	1300	<10	32	<8.09	<10	<5.0	<25	<5.0
Iron, Total Fe	9100	na	na	<25	31300	3060	2000	<100	260	<100
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.2	<0.2	<0.2
Potassium, Total K	2370	na	na	<1000	5470	2250	<1000	790	<1000	793
Magnesium, Total Mg	3480	na	na	1080	4830	2410	1390	1250	534	<500
Manganese, Total Mn	291	na	na	19.7	57.6	<34.3	<10	19.8	17.1	6.1
Sodium, Total Na	10800	na	na	3690	5810	6010	3390	4100	2040	1950
Nickel, Total Ni	34.3	na	100	<10	57.6	<34.3	<10	<5.0	<40	<5.0
Lead, Total Pb	4.25	15	15	<5	27	6.4	<5	<3.0	<5	<3.0
Antimony, Total Sb	3.03	6	6	--	--	--	--	<5.0	<8	<5.0
Selenium, Total Se	3.02	50	50	3.56	<3.02	<3.02	<2.0	<5.0	<10	<5.0
Thallium, Total Tl	6.99	2	2	--	--	--	--	<2.0	<15	<2.0
Vanadium, Total V	11	na	na	<10	24.9	<11	<10	<5.0	<25	<5.0
Zinc, Total Zn	21.1	na	na	<20	59.5	<21.1	27.6	12.9	32.2J	21.5
EXPLOSIVES										
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<1.20	<0.125J	<1.20
1,3-Dinitrobenzene	1	na	na	--	--	--	--	<1.20	<0.125J	<1.20
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<1.20	<0.125J	<1.20
2,4-Dinitrotoluene	30	na	na	--	--	--	--	2.3	<0.125J	<1.20
2,6-Dinitrotoluene	na	na	na	--	5.42	2.06	4.78	<1.20	<0.125J	<1.20
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<1.20	<0.125J	<1.20
2-Nitrotoluene	na	na	na	--	--	--	--	<2.60	<0.125J	<2.60
3-Nitrotoluene	na	na	na	--	--	--	--	<2.60	<0.125J	<2.60
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	--	--	<1.20	<0.125J	<1.20
4-Nitrotoluene	na	na	na	--	--	--	--	<2.60	<0.125J	<2.60
HMX	400	na	na	--	22.4	23	15.7	32.9	4.9J	6.3
Tetryl	na	na	na	--	--	--	--	<2.60	<0.5J	<2.60
Nitrobenzene	na	na	na	--	--	--	--	<1.20	<0.125J	<1.20
RDX	2	na	na	--	270	390	188	227.4	29J	28.5
PETN	na	na	na	--	<20	<20	<10	--	--	--
Nitroglycerine	na	na	na	--	<10	<10	<10	--	--	--

Notes: Background levels for Explosives are from Functional Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Shaded areas are above background levels. -	25
J = Estimated value	
na = Not available.	-- = Parameter not measured

TABLE 4-5
AOC 27 - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA - WELL 27M-92-01X
CHEMICAL SUMMARY REPORT (Sheet 1 of 4)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	09/21/92	01/13/93	10/29/97	10/19/98
			Well No.	27M-92-01X	27M-92-01X	27M-92-01X	27M-92-01X
			FILTERED?	NO	NO	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)					
Silver, Total Ag	4.6	na	na	<4.6	<4.6	<15	<3
Aluminum, Total Al	6870	na	na	<3.03	<3.03	1680	747
Arsenic, Total As	10.5	50	50	25.3	25.9	<8	<10
Barium, Total Ba	39.6	2000	2000	121	101	13.4	<10
Beryllium, Total Be	5	4	4	<5	<5	<5	<3
Calcium, Total Ca	14700	na	na	11400	9740	5660	8800
Cadmium, Total Cd	4.01	5	5	<4.01	<4.01	<10	<3
Cobalt, Total Co	25	na	na	<25	<25	<30	<5
Chromium, Total Cr	14.7	100	100	46.4	35.5	78.8	<5
Copper, Total Cu	8.09	1300	1300	29.4	25.9	<25	<5
Iron, Total Fe	9100	na	na	41500	32700	2530	615
Mercury, Total Hg	0.243	2	2	<0.243	<0.240	<0.200	<0.2
Potassium, Total K	2370	na	na	8680	7950	1500	1850
Magnesium, Total Mg	3480	na	na	9610	7740	1120	820
Manganese, Total Mn	291	na	na	820	585	63.7	11.1
Sodium, Total Na	10800	na	na	4560	4690	3880	4970
Nickel, Total Ni	34.3	na	100	52.1	<34.3	68.5	<5
Lead, Total Pb	4.25	15	15	17.4	15.3	<5	<3
Antimony, Total Sb	3.03	6	6	<3.03	<3.03	<8	<5
Selenium, Total Se	3.02	50	50	--	--	<10	<5
Thallium, Total Tl	6.99	2	2	--	--	<15	<2
Vanadium, Total V	11	na	na	44.9	44.9	<25	<5
Zinc, Total Zn	21.1	na	na	125	119	25.8	97.6
EXPLOSIVES							
1,3,5-Trinitrobenzene	nl	na	na	--	--	<0.125	<1.2
1,3-Dinitrobenzene	1	na	na	<0.611	<0.611	<0.125	<1.2
2,4,6-Trinitrotoluene	2	na	na	--	--	<0.125	<1.2
2,4-Dinitrotoluene	30	na	na	<0.064	<0.064	<0.125	<1.2
2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2
2-Nitrotoluene	na	na	na	--	--	<0.125	<2.6
3-Nitrotoluene	na	na	na	--	--	<0.125	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2
4-Nitrotoluene	na	na	na	--	--	<0.125	<2.6
HMX	400	na	na	2.77	3.73	1.1	<2.6
Tetryl	na	na	na	--	--	<0.5	<2.6
Nitrobenzene	na	na	na	--	--	<0.125	<1.2
RDX	2	na	na	12.1	12.3	4.6	2.8

Notes: Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

LEGEND

Shaded areas are above background levels. - 25

J = Estimated value

na = Not available. -- = Parameter not measured

TABLE 4-5 (cont.)
AOC 27 - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA - WELL 27M-92-05X
CHEMICAL SUMMARY REPORT (Sheet 2 of 4)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	08/17/93 27M-93-05X YES	11/10/93 27M-93-05X YES	08/17/93 27M-93-05X NO	11/10/93 27M-93-05X NO	10/29/97 27M-93-05X LOW FLOW	10/19/98 27M-92-05X LOW FLOW
METALS									
Silver, Total Ag	4.6	na	na	<2	<2	<2	<2	<15	<3
Aluminum, Total Al	6870	na	na	72.3	115J	2000	254J	2360	<200
Arsenic, Total As	10.5	50	50	4.96	5.22	10.8	6.64	<8	<10
Barium, Total Ba	39.6	2000	2000	<10	<10	15	<10	27.4	<10
Beryllium, Total Be	5	4	4	0.113J	<5	0.123J	<5	<5	<3
Calcium, Total Ca	14700	na	na	11400	6730	11500	4640J	16700	4600
Cadmium, Total Cd	4.01	5	5	<5	<5	<5	<5	<10	<3
Cobalt, Total Co	25	na	na	<10	<10	<10	<10	<30	<5
Chromium, Total Cr	14.7	100	100	<10	3.69J	7.38J	<10	30.4	<5
Copper, Total Cu	8.09	1300	1300	<10	<10	5.92J	<10	<25	<5
Iron, Total Fe	9100	na	na	22.6J	14.5	3000J	395J	2690	<100
Mercury, Total Hg	0.243	2	2	<0.200	<0.200	<0.200	<0.200	<0.200	<0.2
Potassium, Total K	2370	na	na	1120	<1000	1580	549J	4500	706
Magnesium, Total Mg	3480	na	na	1800	1790	2400	1200	2280	1190
Manganese, Total Mn	291	na	na	1.46J	4.45J	102	32.1	107	<5
Sodium, Total Na	10800	na	na	5300	3320	5370	2120	9260	2250
Nickel, Total Ni	34.3	na	100	<10	<10	8.94J	<10	<40	<5
Lead, Total Pb	4.25	15	15	<5	<5	<5	3.19J	8	<3
Antimony, Total Sb	3.03	6	6	<5	<5	<5	<5	<8	<5
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5
Thallium, Total Tl	6.99	2	2	--	--	--	--	<15	<2
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5
Zinc, Total Zn	21.1	na	na	9.65J	5.05J	34.6	57.8J	76.1	<10
EXPLOSIVES									
1,3,5-Trinitrobenzene	nl	na	na	--	--	--	--	<0.125	<1.2
1,3-Dinitrobenzene	1	na	na	--	--	0.288J	1.03	<0.125	<1.2
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<1.2
2,4-Dinitrotoluene	30	na	na	--	--	<1.0	0.281J	<0.125	<1.2
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2
2-Nitrotoluene	na	na	na	--	--	<1.0	<1.0	<0.125	<2.6
3-Nitrotoluene	na	na	na	--	--	0.602	<1.0	<0.125	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1.0	<1.0	<0.125	<1.2
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.6
HMX	400	na	na	--	--	<1.0	<1.0	<1.0	<2.6
Tetryl	na	na	na	--	--	--	--	<0.5	<2.6
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2
RDX	2	na	na	--	--	1.02	0.788J	<0.5	<2.6

Notes: Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals aretaken from AOC 57 RI.

LEGEND

Shaded areas are above background levels. - 25
J = Estimated value
na = No' 'lable. -- = Parameter not measured

TABLE 4-5 (cont.)
AOC 27 - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA WELL 27M-93-06X
CHEMICAL SUMMARY REPORT (Sheet 3 of 4)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	08/18/93	11/10/93	08/18/93	11/10/93	10/29/97	10/19/98
			Well No.	27M-93-06X	27M-93-06X	27M-93-06X	27M-93-06X	27M-93-06X	27M-93-06X
			FILTERED?	YES	YES	NO	NO	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)							
Silver, Total Ag	4.6	na	na	<2	<2	1.49J	<2	<15	<3
Aluminum, Total Al	6870	na	na	26.1	75.8J	356	366J	<100	<200
Arsenic, Total As	10.5	50	50	<2	<2	<2	1.03J	<8	<10
Barium, Total Ba	39.6	2000	2000	<10	<10	3.88J	3.99J	<5	<10
Beryllium, Total Be	5	4	4	0.315J	<5	0.204J	<5	<5	<3
Calcium, Total Ca	14700	na	na	5190	4370	5370	4360J	4920	4600
Cadmium, Total Cd	4.01	5	5	<5	2.79	<5	<5	<10	<3
Cobalt, Total Co	25	na	na	<10	<10	<10	<10	<30	<5
Chromium, Total Cr	14.7	100	100	<10	<10	<10	<10	<15	<5
Copper, Total Cu	8.09	1300	1300	<10	<10	1.62J	<10	<25	<5
Iron, Total Fe	9100	na	na	21.6J	24.4J	609J	514J	189	<100
Mercury, Total Hg	0.243	2	2	<0.200	<0.200	<0.200	<0.200	<0.200	<0.2
Potassium, Total K	2370	na	na	<1000	432J	1500	787J	1000	706
Magnesium, Total Mg	3480	na	na	1170	1130	1260	1270	1310	1190
Manganese, Total Mn	291	na	na	40.5	13.2J	54.6	35.4	6.1	<5
Sodium, Total Na	10800	na	na	3290	818J	3110	3340	2460	2250
Nickel, Total Ni	34.3	na	100	<10	<10	<10	<10	<40	<5
Lead, Total Pb	4.25	15	15	<5	0.9J	<5	0.93J	<5	<3
Antimony, Total Sb	3.03	6	6	<5	<5	<5	1.78J	<8	<5
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5
Thallium, Total Tl	6.99	2	2	--	--	--	--	<15	<2
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5
Zinc, Total Zn	21.1	na	na	15.1J	232J	15.1J	232J	<25	<10
EXPLOSIVES									
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2
1,3-Dinitrobenzene	1	na	na	--	--	<1	1.09J	<0.125	<1.2
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<1.2
2,4-Dinitrotoluene	30	na	na	--	--	<1	<1	<0.125	<1.2
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2
2-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125	<2.6
3-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125	<1.2
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.6
HMX	400	na	na	--	--	0.699J	0.894J	<1.0	<2.6
Tetryl	na	na	na	--	--	--	--	<0.5	<2.6
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2
RDX	2	na	na	--	--	1.56	1.77	2.2	2.2J

Notes: Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

LEGEND

Shaded areas are above background levels. - 25
J = Estimated value
na = Not available. -- = Parameter not measured

TABLE 4-5 (cont.)
AOC 27 - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA WELL 27M-93-08X
CHEMICAL SUMMARY REPORT (Sheet 4 of 4)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	08/17/93	11/10/93	08/17/93	11/10/93	11/03/97	10/19/98
			Well No.	27M-93-08X	27M-93-08X	27M-93-08X	27M-93-08X	27M-93-08X	27M-93-08X
			FILTERED?	YES	YES	NO	NO	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)							
Silver, Total Ag	4.6	na	na	<2	<2	<2	<2	<15	<3
Aluminum, Total Al	6870	na	na	<25	66.3J	279	168J	<100	<200
Arsenic, Total As	10.5	50	50	<2	1.36J	<2	<2	<8	<10
Barium, Total Ba	39.6	2000	2000	6.19J	4.30J	8.02J	5.94J	<5	<10
Beryllium, Total Be	5	4	4	0.087J	<5	0.164J	<5	<5	<3
Calcium, Total Ca	14700	na	na	10200	4910	10800	5360J	7040	8370
Cadmium, Total Cd	4.01	5	5	<5	<5	<5	<5	<10	<3
Cobalt, Total Co	25	na	na	<10	<10	<10	<10	<30	<5
Chromium, Total Cr	14.7	100	100	<10	<10	<10	<10	<15	<5
Copper, Total Cu	8.09	1300	1300	<10	<10	2.58J	4.94J	<25	<5
Iron, Total Fe	9100	na	na	<25	<25	384J	218J	42	141
Mercury, Total Hg	0.243	2	2	<0.200	<0.200	<0.200	<0.200	<0.200	<0.2
Potassium, Total K	2370	na	na	2330	1470	2570	2640	1800	1710
Magnesium, Total Mg	3480	na	na	2580	812	2680	899	1690	1970
Manganese, Total Mn	291	na	na	74.1	35.9J	85.8	41.9	<5	10.8
Sodium, Total Na	10800	na	na	10900	9560	11100	11800	6680	6460
Nickel, Total Ni	34.3	na	100	<10	<10	<10	<10	<40	<5
Lead, Total Pb	4.25	15	15	<5	<5	2.95J	<5	<5	<3
Antimony, Total Sb	3.03	6	6	<5	<5	<5	<5	<8	<5
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5
Thallium, Total Tl	6.99	2	2	--	--	--	--	<15	<2
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5
Zinc, Total Zn	21.1	na	na	112	124	122	118J	<25	<10
EXPLOSIVES									
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2
1,3-Dinitrobenzene	1	na	na	--	--	1.82	1.03	<0.125	<1.2
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<1.2
2,4-Dinitrotoluene	30	na	na	--	--	<1	<1	<0.125	<1.2
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2
2-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125	<2.6
3-Nitrotoluene	na	na	na	--	--	2.76	<1	<0.125	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125	<1.2
4-Nitrotoluene	na	na	na	--	--			<0.125	<2.6
HMX	400	na	na	--	--	0.11J	<1	<1.0	<2.6
Tetryl	na	na	na	--	--	--	--	<0.5	<2.6
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2
RDX	2	na	na	--	--	<1	<1	<0.5	<2.6

Notes : Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

LEGEND

Shaded areas are above background levels. - 25
J = Estimated value
na = Not available. -- = Parameter not measured

TABLE 4-6

AOC 41 - GROUNDWATER TRENDS

SOUTH POST IMPACT AREA WELLS 41M-93-03X, 41M-94-03B

CHEMICAL SUMMARY REPORT (Sheet 1 of 5)

(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MCLs (ug/l) MA	MCLs (ug/l) Federal	10/14/93 41M-93-03X	01/20/94 41M-93-03X	12/06/94 41M-93-03X	03/20/95 41M-93-03X	10/20/98 41M-93-03X	12/08/94 41M-94-03B	03/20/95 41M-94-03B	10/20/98 41M-94-03B
EXPLOSIVES											
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<1.2	--	--	<1.2
1,3-Dinitrobenzene	1	na	na	--	--	--	--	<1.2	--	--	<1.2
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<1.2	--	--	<1.2
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<1.2	--	--	<1.2
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<1.2	--	--	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<1.2	--	--	<1.2
2-Nitrotoluene	na	na	na	--	--	--	--	<2.6	--	--	<2.6
3-Nitrotoluene	na	na	na	--	--	--	--	<2.6	--	--	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	--	--	<1.2	--	--	<1.2
4-Nitrotoluene	na	na	na	--	--	--	--	<2.6	--	--	<2.6
HMX	400	na	na	--	--	--	--	<2.6	--	--	<2.6
Tetryl	na	na	na	--	--	--	--	<2.6	--	--	<2.6
Nitrobenzene	na	na	na	--	--	--	--	<1.2	--	--	<1.2
RDX	2	na	na	--	--	--	--	<2.6	--	--	<2.6
VOLATILES											
1,1,2-Trichloroethane	na	5	5	--	--	--	--	1	--		<1
cis-1,2-Dichloroethene	na	70	70	<1	<0.5	<0.5	<1	<1	<0.5	<0.5	<1
Carbon tetrachloride	na	5	5	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1
Carbon disulfide	na	na	na	<1	<0.5	<0.5	<0.5	<1	<0.5	<0.5	<1
Tetrachloroethene	na	5	5	<1	<1.6	<1.6	<3	1J	<1.6	<1.6	<1
trans-1,2-Dichloroethene	na	100	100	<1	<0.5	<0.5	<1	<1	<0.5	<0.5	<1
Trichloroethene	na	5	5	200	150	200	180	218	<0.5	<0.5	<1
Toluene	na	1000	1000	<1	0.7	1	<1	<1	0.6	<0.5	<1
Vinyl chloride	na	2	2	--	--	--	--	<1	--	--	<1

Note: Background levels for Explosives taken from Functional Area I RI.

LEGEND

Shaded areas are above background levels. - 25

J = Estimated value — NS = Not sampled

na = Not available. — -- = Parameter not measured

TABLE 4-6
AOC 41 - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA WELL 41M-93-04X
CHEMICAL SUMMARY REPORT (Sheet 2 of 5)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	12/07/94	03/13/95	10/31/97	10/31/97	10/20/98	10/20/98
		MCLs (ug/l)		41M-93-04X	41M-93-04X	41M-93-04X	41M-93-04XD	41M-93-04X	41M-93-04XD
EXPLOSIVES									
1,3,5-Trinitrobenzene	na	na	na	--	--	<0.125	<0.125	<1.2	<1.2
1,3-Dinitrobenzene	1	na	na	--	--	<0.125	<0.125	<1.2	<1.2
2,4,6-Trinitrotoluene	2	na	na	<0.63	<0.63	<0.125	<0.125	<1.2	<1.2
2,4-Dinitrotoluene	30	na	na	--	--	<0.125	<0.125	<1.2	<1.2
2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<0.125	<1.2	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	<0.125	<0.125	<1.2	<1.2
2-Nitrotoluene	na	na	na	--	--	<0.125	<0.125	<2.6	<2.6
3-Nitrotoluene	na	na	na	--	--	<0.125	<0.125	<2.6	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<0.125	<1.2	<1.2
4-Nitrotoluene	na	na	na	--	--	<0.125	<0.125	<2.6	<2.6
HMX	400	na	na	--	--	<1.0	<1.0	<2.6	<2.6
Tetryl	na	na	na	--	--	<0.5	<0.5	<2.6	<2.6
Nitrobenzene	na	na	na	--	--	<0.125	<0.125	<1.2	<1.2
RDX	2	na	na	--	--	<0.5	<0.5	<2.6	<2.6
VOLATILES									
1,1,2-Trichloroethane	na	5	5	--	--	<5	<5	<1	<1
cis-1,2-Dichloroethene	na	70	70	<0.5	<0.5	<5	<5	<1	<1
Carbon tetrachloride	na	5	5	<0.5	<0.5	<5	<5	<1	<1
Carbon disulfide	na	na	na	<0.5	<0.5	<5	<5	<1	<1
Tetrachloroethene	na	5	5	<1.6	<1.6	<5	3J	<1	<1
trans-1,2-Dichloroethene	na	100	100	<0.5	<0.5	<5	<5	<1	<1
Trichloroethene	na	5	5	1.3	<0.5	<5	<5	1J	1J
Toluene	na	1000	1000	0.63	<0.5	<5	<5	<1	<1
Vinyl chloride	na	2	2	--	--	<5	<5	<1	<1

Note: Background levels for Explosives taken from Functional Area I RI.

LEGEND	
Shaded areas are above background levels. -	25
J = Estimated value	NS = Not sampled
na = Not available.	-- = Parameter not measured

TABLE 4-6
AOC 41 - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA WELLS 41M-94-09A, 41M-04-09B
CHEMICAL SUMMARY REPORT (Sheet 3 of 5)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	12/06/94	03/15/95	10/31/97	10/20/98	12/05/94	03/15/95	10/31/97	10/20/98
Well No.		MCLs (ug/l)		41M-94-09A	41M-94-09A	41M-94-09A	41M-94-09A	41M-94-09B	41M-94-09B	41M-94-09B	41M-94-09B
EXPLOSIVES											
1,3,5-Trinitrobenzene	na	na	na	--	--	NS	NS	--	--	<0.125	NS
1,3-Dinitrobenzene	1	na	na	--	--	NS	NS	--	--	<0.125	NS
2,4,6-Trinitrotoluene	2	na	na	<0.63	<0.63	NS	NS	<0.63	<0.63	<0.125	NS
2,4-Dinitrotoluene	30	na	na	--	--	NS	NS	--	--	<0.125	NS
2,6-Dinitrotoluene	na	na	na	--	--	NS	NS	--	--	<0.125	NS
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	NS	NS	--	--	<0.125	NS
2-Nitrotoluene	na	na	na	--	--	NS	NS	--	--	<0.125	NS
3-Nitrotoluene	na	na	na	--	--	NS	NS	--	--	<0.125	NS
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	NS	NS	--	--	<0.125	NS
4-Nitrotoluene	na	na	na	--	--	NS	NS	--	--	<0.125	NS
HMX	400	na	na	--	--	NS	NS	--	--	<1.0	NS
Tetryl	na	na	na	--	--	NS	NS	--	--	<0.5	NS
Nitrobenzene	na	na	na	--	--	NS	NS	--	--	<0.125	NS
RDX	2	na	na	--	--	NS	NS	--	--	<0.5	NS
VOLATILES											
1,1,2-Trichloroethane	na	5	5	--	--	NS	NS	--	--	<5	NS
cis-1,2-Dichloroethene	na	70	70	<0.5	<0.5	NS	NS	<0.5	<0.5	<5	NS
Carbon tetrachloride	na	5	5	<0.5	<0.5	NS	NS	<0.5	<0.5	<5	NS
Carbon disulfide	na	na	na	<0.5	<0.5	NS	NS	<0.5	<0.5	<5	NS
Tetrachloroethene	na	5	5	<1.6	<1.6	NS	NS	<1.6	<1.6	<5	NS
trans-1,2-Dichloroethene	na	100	100	<0.5	<0.5	NS	NS	<0.5	<0.5	<5	NS
Trichloroethene	na	5	5	<0.5	<0.5	NS	NS	<0.5	<0.5	<5	NS
Toluene	na	1000	1000	<0.5	<0.5	NS	NS	<0.65	<0.65	<5	NS
Vinyl chloride	na	2	2	--	--	NS	NS	--	--	<5	NS

Note: Background levels for Explosives taken from Functional Area I RI.

LEGEND	
Shaded areas are above background levels. -	25
J = Estimated value	NS = Not sampled
na = Not available.	-- = Parameter not measured

TABLE 4-6 (cont.)
AOC 41 - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA WELLS 41M-94-11X, 41M-94-12X
CHEMICAL SUMMARY REPORT (Sheet 4 of 5)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	12/06/94	03/14/95	10/31/97	10/20/98	12/05/94	03/15/95	10/31/97	10/20/98
		MCLs (ug/l)									
Well No.				41M-94-11X	41M-94-11X	41M-94-11X	41M-94-11X	41M-94-11X	41M-94-12X	41M-94-12X	41M-94-12X
EXPLOSIVES											
1,3,5-Trinitrobenzene	na	na	na	--	--	<0.125	<1.2	--	--	<0.125	<1.2
1,3-Dinitrobenzene	1	na	na	--	--	<0.125	<1.2	--	--	<0.125	<1.2
2,4,6-Trinitrotoluene	2	na	na	<0.63	<0.63	<0.125	<1.2	<0.63	<0.63	<0.125	<1.2
2,4-Dinitrotoluene	30	na	na	--	--	<0.125	<1.2	--	--	<0.125	<1.2
2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2	--	--	<0.125	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2	--	--	<0.125	<1.2
2-Nitrotoluene	na	na	na	--	--	<0.125	<2.6	--	--	<0.125	<2.6
3-Nitrotoluene	na	na	na	--	--	<0.125	<2.6	--	--	<0.125	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2	--	--	<0.125	<1.2
4-Nitrotoluene	na	na	na	--	--	<0.125	<2.6	--	--	<0.125	<2.6
HMX	400	na	na	--	--	<1.0	<2.6	--	--	<1.0	<2.6
Tetryl	na	na	na	--	--	<0.5	<2.6	--	--	<0.5	<2.6
Nitrobenzene	na	na	na	--	--	<0.125	<1.2	--	--	<0.125	<1.2
RDX	2	na	na	--	--	<0.5	<2.6	--	--	<0.5	<2.6
VOLATILES											
1,1,2-Trichloroethane	na	5	5	--	--	<5	<1	--	--	<5	<1
cis-1,2-Dichloroethene	na	70	70	<0.5	<0.5	<5	<1	<0.5	<0.5	<5	<1
Carbon tetrachloride	na	5	5	<0.5	<0.5	<5	<1	<0.5	<0.5	<5	<1
Carbon disulfide	na	na	na	<0.5	<0.5	<5	<1	<0.5	<0.5	<5	<1
Tetrachloroethene	na	5	5	<1.6	<1.6	<5	<1	<1.6	<1.6	<5	<1
trans-1,2-Dichloroethene	na	100	100	<0.5	<0.5	<5	<1	<0.5	<0.5	<5	<1
Trichloroethene	na	5	5	<0.5	<0.5	<5	<1	<0.5	<0.5	<5	<1
Toluene	na	1000	1000	0.86	<0.5	<5	<1	<0.5	<0.5	<5	<1
Vinyl chloride	na	2	2	--	--	<5	<1	--	--	<5	<1

Note: Background levels for explosives taken from Functional Area I RI.

LEGEND	
Shaded areas are above background levels. -	25
J = Estimated value	
na = Not available.	-- = Parameter not measured

TABLE 4-6 (cont.)
AOC 41 - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA WELL 41M-94-14X
CHEMICAL SUMMARY REPORT (Sheet 5 of 5)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	12/07/94	03/13/95	10/31/97	10/20/98
		MCLs (ug/l)		41M-94-14X	41M-94-14X	41M-94-14X	41M-94-14X
EXPLOSIVES							
1,3,5-Trinitrobenzene	na	na	na	--	--	<0.125	<1.2
1,3-Dinitrobenzene	1	na	na	--	--	<0.125	<1.2
2,4,6-Trinitrotoluene	2	na	na	<0.63	<0.63	<0.125	<1.2
2,4-Dinitrotoluene	30	na	na	--	--	<0.125	<1.2
2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2
2-Nitrotoluene	na	na	na	--	--	<0.125	<2.6
3-Nitrotoluene	na	na	na	--	--	<0.125	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<0.125	<1.2
4-Nitrotoluene	na	na	na	--	--	<0.125	<2.6
HMX	400	na	na	--	--	<1.0	<2.6
Tetryl	na	na	na	--	--	<0.5	<2.6
Nitrobenzene	na	na	na	--	--	<0.125	<1.2
RDX	2	na	na	--	--	<0.5	<2.6
VOLATILES							
1,1,2-Trichloroethane	na	5	5	--	--	<5	<1
cis-1,2-Dichloroethene	na	70	70	<0.5	<0.5	<5	<1
Carbon tetrachloride	na	5	5	<0.5	<0.5	<5	<1
Carbon disulfide	na	na	na	<0.5	<0.5	<5	<1
Tetrachloroethene	na	5	5	<1.6	<1.6	<5	<1
trans-1,2-Dichloroethene	na	100	100	<0.5	<0.5	<5	<1
Trichloroethene	na	5	5	1.2	<0.5	<5	1J
Toluene	na	1000	1000	<0.5	<0.5	<5	<1
Vinyl chloride	na	2	2	--	--	<5	<1

Note: Background levels for explosives taken from Functional Area I RI.

LEGEND	
Shaded areas are above background levels.	25
J = Estimated value	
na = Not available.	-- = Parameter not measured

TABLE 4-7
SPM WELLS - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA - WELL SPM-93-06X
CHEMICAL SUMMARY REPORT (Sheet 1 of 5)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	08/16/93	11/10/93	08/16/93	11/10/93	10/28/97	10/19/98
Well No.				SPM-93-06X	SPM-93-06X	SPM-93-06X	SPM-93-06X	SPM-93-06X	SPM-93-06X
FILTERED?				YES	YES	NO	NO	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)							
Silver, Total Ag	4.6	na	na	<2	<2	<2	<2	<15	<3
Aluminum, Total Al	6870	na	na	213	1970	1500	2000	2810	2070
Arsenic, Total As	10.5	50	50	33.6	21.7	33.3	19.8	<8	<10
Barium, Total Ba	39.6	2000	2000	41.7	198	58	197	158	111
Beryllium, Total Be	5	4	4	<5	<5	0.146J	<5	<5	<3
Calcium, Total Ca	14700	na	na	14400	90800	14200	92900	74600	60600
Cadmium, Total Cd	4.01	5	5	<5	<5	<5	<5	<10	<3
Cobalt, Total Co	25	na	na	<10	<10	<10	<10	<30	<5
Chromium, Total Cr	14.7	100	100	<10	2.88J	8.84J	3.89J	<15	<5
Copper, Total Cu	8.09	1300	1300	<10	<10	3.48J	<10	<25	5.9
Iron, Total Fe	9100	na	na	<25	21.8	2500	139	82	<100
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2
Potassium, Total K	2370	na	na	18600	13600	17700	12500	44700	25200
Magnesium, Total Mg	3480	na	na	989	<500	1620	47.3J	50	<500
Manganese, Total Mn	291	na	na	17.8	1.08J	324	19.1	<5	<5
Sodium, Total Na	10800	na	na	12300	10400	11900	11500	21200	14600
Nickel, Total Ni	34.3	na	100	<10	<10	8.89J	<10	<40	<5
Lead, Total Pb	4.25	15	15	<5	<5	<5	<5	<5	<3
Antimony, Total Sb	3.03	6	6	<5	<5	<5	<5	<8	<5
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5
Thallium, Total Tl	6.99	2	2	<2	<2	<2	<2	<15	<2
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5
Zinc, Total Zn	21.1	na	na	<20	3.05	21.9	16.6	<25	10.1
EXPLOSIVES									
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125J	<1.2
1,3-Dinitrobenzene	1	na	na	--	--	<1	<1	<0.125J	<1.2
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125J	<1.2
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125J	<1.2
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125J	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125J	<1.2
2-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125J	<2.6
3-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125J	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125J	<1.2
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125J	<2.6
HMX	400	na	na	--	--	--	--	<1.0J	<2.6
Tetryl	na	na	na	--	--	--	--	<0.5J	<2.6
Nitrobenzene	na	na	na	--	--	--	--	<0.125J	<1.2
RDX	2	na	na	--	--	<1	<1	<0.5J	<2.6

Notes: Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

LEGEND

Shaded areas are above background levels. - 25

J = Estimated value

na = Not available. -- = Parameter not measured

TABLE 4-7 (cont.)
SPM WELLS - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA - WELL SPM-93-08X
CHEMICAL SUMMARY REPORT (Sheet 2 of 5)
(Concentrations in ug/l)

			DATE	08/18/93	11/10/93	08/18/93	11/10/93	10/29/97	10/22/98
			Well No.	SPM-93-08X	SPM-93-08X	SPM-93-08X	SPM-93-08X	SPM-93-08X	SPM-93-08X
PARAMETERS	BACKGROUND		FILTERED?	YES	YES	NO	NO	LOW FLOW	LOW-FLOW
	LEVELS	MA	Federal						
METALS		MCLs (ug/l)							
Silver, Total Ag	4.6	na	na	<2	<2	<2	<2	<15	<3
Aluminum, Total Al	6870	na	na	<25	42.3	109	190	<100	<200
Arsenic, Total As	10.5	50	50	1.82J	1.26J	1.64J	<2	<8	<10
Barium, Total Ba	39.6	2000	2000	4.19J	<10	4.07J	3.14J	<5	<10
Beryllium, Total Be	5	4	4	0.246J	<5	0.175	<5	<5	<3
Calcium, Total Ca	14700	na	na	3860	2640	3960	2830	2740	2760
Cadmium, Total Cd	4.01	5	5	<5	1.56	<5	<5	<10	<3
Cobalt, Total Co	25	na	na	<10	<10	<10	<10	<30	5.6
Chromium, Total Cr	14.7	100	100	<10	3.78J	<10	3.18J	23.9	<5
Copper, Total Cu	8.09	1300	1300	1.47J	<10	1.99J	<10	<25	<5
Iron, Total Fe	9100	na	na	<25	<25	220	155	155	<100
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2
Potassium, Total K	2370	na	na	1440	<1000	2390	513	<1000	690
Magnesium, Total Mg	3480	na	na	320J	283J	380J	358J	350	<500
Manganese, Total Mn	291	na	na	23.1	8.56	31.4	13.1	<5	<5
Sodium, Total Na	10800	na	na	3200	539	4600	2480	2290	2260
Nickel, Total Ni	34.3	na	100	<10	<10	<10	<10	<40	<5
Lead, Total Pb	4.25	15	15	<5	<5	7.18	<5	<5	<3
Antimony, Total Sb	3.03	6	6	<5	2.44	<5	<5	<8	<5
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5
Thallium, Total Tl	6.99	2	2	<2	<2	<2	<2	<15	<2
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5
Zinc, Total Zn	21.1	na	na	37.7	110	43.1	456	35.7	<10
EXPLOSIVES									
1,3,5-Trinitrobenzene	na	na	na	--	--			<0.125	<1.2
1,3-Dinitrobenzene	1	na	na	--	--	<1	3.84	<0.125	<1.2
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<1.2
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125	<1.2
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2
2-Nitrotoluene	na	na	na	--	--	<1	0.835J	<0.125	<2.6
3-Nitrotoluene	na	na	na	--	--	<1	1.45	<0.125	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125	<1.2
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.6
HMX	400	na	na	--	--	0.295	<1	<1.0	<2.6
Tetryl	na	na	na	--	--	--	--	<0.5	<2.6
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2
RDX	2	na	na	--	--	--	--	<0.5	<2.6

Notes: Background levels for Explosives are taken from Functional Area I RI.
Background levels for metals are taken from AOC 57 RI.

LEGEND

Shaded areas are above background levels. -	25
J = Estimated value	
na = Not available.	-- = Parameter not measured

TABLE 4-7 (cont.)
SPM WELLS - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA - WELL SPM-93-10X
CHEMICAL SUMMARY REPORT (Sheet 3 of 5)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	08/17/93	11/09/93	08/17/93	11/09/93	11/03/97	10/22/98
			Well No.	SPM-93-10X	SPM-93-10X	SPM-93-10X	SPM-93-10X	SPM-93-10X	SPM-93-10X
			FILTERED?	YES	YES	NO	NO	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)							
Silver, Total Ag	4.6	na	na	<2	1.61J	<2	2.34	<15	<3
Aluminum, Total Al	6870	na	na	34.8	56.1	349	528	140	<200
Arsenic, Total As	10.5	50	50	<5	<5	<5	<5	<8	<10
Barium, Total Ba	39.6	2000	2000	2.68J	<10	7.93J	4.43J	<5	<10
Beryllium, Total Be	5	4	4	0.104J	<5	<5	<5	<5	<3
Calcium, Total Ca	14700	na	na	4360	3390	4740	3220	2980	3560
Cadmium, Total Cd	4.01	5	5	<5	<5	<5	<5	<10	<3
Cobalt, Total Co	25	na	na	<10	2.46J	<10	<10	<30	11.4
Chromium, Total Cr	14.7	100	100	<10	<10	7.58J	6.03J	<15	13.5
Copper, Total Cu	8.09	1300	1300	<10	<10	3.09J	<10	<25	<5
Iron, Total Fe	9100	na	na	51.5	124	579	811	235	203
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.2	<0.2
Potassium, Total K	2370	na	na	1530	2190	1600	1930	<1000	1080
Magnesium, Total Mg	3480	na	na	842	706	906	839	750	899
Manganese, Total Mn	291	na	na	11.7	13.3	21.6	28.1	5.5	6.6
Sodium, Total Na	10800	na	na	3640	4210	3760	4240	2840	3270
Nickel, Total Ni	34.3	na	100	<10	<10	<10	<10	<40	8.1
Lead, Total Pb	4.25	15	15	<5	1.91J	<5	1.82J	<5	<3
Antimony, Total Sb	3.03	6	6	<5	<5	<5	<5	<8	<5
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5
Thallium, Total Tl	6.99	2	2	<2	0.91	<2	<2	<15	<2
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5
Zinc, Total Zn	21.1	na	na	37.1	23.7	49	36.1	<25	21.7
EXPLOSIVES									
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2
1,3-Dinitrobenzene	1	na	na	--	--	3.25	<1	<0.125	<1.2
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<1.2
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125	<1.2
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2
2-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125	<2.6
3-Nitrotoluene	na	na	na	--	--	1.58	<1	<0.125	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125	<1.2
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.6
HMX	400	na	na	--	--	--	--	<1.0	<2.6
Tetryl	na	na	na	--	--	--	--	<0.5	<2.6
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2
RDX	2	na	na	--	--	0.334	0.782	<0.5	<2.6

Notes: Background levels for Explosives are from Functional Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Shaded areas are above background levels. - 25
J = Estimated value
na = Not available. -- = Parameter not measured

TABLE 4-7 (cont.)
SPM WELLS - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA - WELL SPM-93-12X
CHEMICAL SUMMARY REPORT (Sheet 4 of 5)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	08/18/93	11/09/93	08/18/93	11/09/93	10/27/97	10/22/98
			Well No.	SPM-93-12X	SPM-93-12X	SPM-93-12X	SPM-93-12X	SPM-93-12X	SPM-93-12X
			FILTERED?	YES	YES	NO	NO	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)							
Silver, Total Ag	4.6	na	na	<2	<2	<2	<2	<15	<3
Aluminum, Total Al	6870	na	na	<25	49.8	395	352	<100	<200
Arsenic, Total As	10.5	50	50	<2	1.47J	<2	1.40J	<8	<10
Barium, Total Ba	39.6	2000	2000	2.37J	4.33J	5.67J	5.51J	<5	<10
Beryllium, Total Be	5	4	4	0.307	<5	0.234J	<5	<5	<3
Calcium, Total Ca	14700	na	na	8980	7870	9080	7360	6480	6420
Cadmium, Total Cd	4.01	5	5	<5	2.26J	<5	<5	<10	<3
Cobalt, Total Co	25	na	na	<10	2.33J	<10	3.74J	41.3	<5
Chromium, Total Cr	14.7	100	100	<10	<10	<10	3.14J	63.3	9.3
Copper, Total Cu	8.09	1300	1300	<10	<10	2.43J	<10	<25	<5
Iron, Total Fe	9100	na	na	30.9	44.9	639	521	621	<100
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2
Potassium, Total K	2370	na	na	2300	2030	2410	1890	1200	1210
Magnesium, Total Mg	3480	na	na	2400	2320	2610	2250	2150	2080
Manganese, Total Mn	291	na	na	320	267	333	263	32	10.6
Sodium, Total Na	10800	na	na	7530	5910	8490	5850	5230	5230
Nickel, Total Ni	34.3	na	100	<10	<10	<10	<10	81	5.6
Lead, Total Pb	4.25	15	15	<5	1.23J	<5	0.720J	<5	<3
Antimony, Total Sb	3.03	6	6	<5	1.70J	<5	<5	<8	<5
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5
Thallium, Total Tl	6.99	2	2	<2	1.32	<2	1.05	<15	<2
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5
Zinc, Total Zn	21.1	na	na	1.28J	20.6	19.8J	35.2	38.1	33.0
EXPLOSIVES									
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125J	<1.2
1,3-Dinitrobenzene	1	na	na	--	--	<1	<1	<0.125J	<1.2
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125J	<1.2
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125J	<1.2
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125J	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125J	<1.2
2-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125J	<2.6
3-Nitrotoluene	na	na	na	--	--	<1	<1	<0.125J	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	0.251J	<0.125J	<1.2
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125J	<2.6
HMX	400	na	na	--	--	--	--	<1.0J	<2.6
Tetryl	na	na	na	--	--	--	--	<0.5J	<2.6
Nitrobenzene	na	na	na	--	--	--	--	<0.125J	<1.2
RDX	2	na	na	--	--	<1	0.251	<0.5J	<2.6

Notes: Background levels for Explosives are from Functional Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Shaded areas are above background levels. - 25

J = Estimated value

na = Not available. -- = Parameter not measured

TABLE 4-7 (cont.)
SPM WELLS - GROUNDWATER TRENDS
SOUTH POST IMPACT AREA - WELLS SPM-93-16X, SPM-97-23X, SPM-97-24X
CHEMICAL SUMMARY REPORT (Sheet 5 of 5)
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	8/16/1993	11/09/93	8/16/1993	11/09/93	10/27/97	10/22/98	10/29/97	10/19/98	10/30/97	10/22/98
Well No.				SPM-93-16X	SPM-93-16X	SPM-93-16X	SPM-93-16X	SPM-93-16X	SPM-93-16X	SPM-97-23X	SPM-97-23X	SPM-97-24X	SPM-97-24X
FILTERED?				YES	YES	NO	NO	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
METALS		MCLs (ug/l)											
Silver, Total Ag	4.6	na	na	<2	<2	<2	<2	<15	<3	<15	<3	<15	<3
Aluminum, Total Al	6870	na	na	34	<25	349	121	<100	<200	<100	<200	<100	<200
Arsenic, Total As	10.5	50	50	<2	<2	<2	0.720J	<8	<10	<8	<10	<8	<10
Barium, Total Ba	39.6	2000	2000	9.24J	<10	13	<10	<5	<10	<5	<10	9.4	<10
Beryllium, Total Be	5	4	4	<5	<5	<5	<5	<5	<3	<5	<3	<5	<3
Calcium, Total Ca	14700	na	na	6970	2700	7080	2950	2800	2850	5720	6170	9460	8790
Cadmium, Total Cd	4.01	5	5	<5	<5	<5	<5	<10	<3	<10	<3	<10	<3
Cobalt, Total Co	25	na	na	<10	2.72J	<10	<10	<30	<5	<30	<5	<30	<5
Chromium, Total Cr	14.7	100	100	<10	<10	<10	<10	21	<5	<15	<5	<15	<5
Copper, Total Cu	8.09	1300	1300	<10	<10	1.66J	<10	<25	<5	<25	<5	<25	<5
Iron, Total Fe	9100	na	na	<25	<25	521	159	190	<100	90J	<100	180	260
Mercury, Total Hg	0.243	2	2	--	--	--	--	<0.200	<0.2	<0.200	<0.2	<0.200	<0.2
Potassium, Total K	2370	na	na	1140	991J	1160	647	<1000	527	<1000	735	2200	1730
Magnesium, Total Mg	3480	na	na	784	654	890	707	714	743	1270	1290	3840	3300
Manganese, Total Mn	291	na	na	5.92	3.51J	16.4	6.16	5.6	<5	6.3	<5	17.4	<5
Sodium, Total Na	10800	na	na	2930	3430	2690	3140	2560	2580	3370	3530	3750	3310
Nickel, Total Ni	34.3	na	100	<10	<10	<10	<10	<40	<5	<40	<5	<40	<5
Lead, Total Pb	4.25	15	15	<5	<5	<5	1.05J	<5	<3	<5	<3	<5	<3
Antimony, Total Sb	3.03	6	6	<5	<5	2.46J	<5	<8	<5	<8	<5	<8	<5
Selenium, Total Se	3.02	50	50	--	--	--	--	<10	<5	<10	<5	<10	<5
Thallium, Total Tl	6.99	2	2	<2	0.85	<2	0.77	<15	<2	<15	<2	<15	<2
Vanadium, Total V	11	na	na	<10	<10	<10	<10	<25	<5	<25	<5	<25	<5
Zinc, Total Zn	21.1	na	na	22.3	38.3	79.3	44.7	<25	<10	<25	24.6	<25	17.5
EXPLOSIVES													
1,3,5-Trinitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2	<0.125	<1.2	<0.125	<1.2
1,3-Dinitrobenzene	1	na	na	--	--	4.37	2.06	<0.125	<1.2	<0.125	<1.2	<0.125	<1.2
2,4,6-Trinitrotoluene	2	na	na	--	--	--	--	<0.125	<1.2	<0.125	<1.2	<0.125	<1.2
2,4-Dinitrotoluene	30	na	na	--	--	--	--	<0.125	<1.2	<0.125	<1.2	<0.125	<1.2
2,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2	<0.125	<1.2	<0.125	<1.2
2-Amino-4,6-Dinitrotoluene	na	na	na	--	--	--	--	<0.125	<1.2	<0.125	<1.2	<0.125	<1.2
2-Nitrotoluene	na	na	na	--	--	0.995J	<1	<0.125	<2.6	<0.125	<2.6	<0.125	<2.6
3-Nitrotoluene	na	na	na	--	--	2.77J	2.66	<0.125	<2.6	<0.125	<2.6	<0.125	<2.6
4-Amino-2,6-Dinitrotoluene	na	na	na	--	--	<1	<1	<0.125	<1.2	<0.125	<1.2	<0.125	<1.2
4-Nitrotoluene	na	na	na	--	--	--	--	<0.125	<2.6	<0.125	<2.6	<0.125	<2.6
HMX	400	na	na	--	--	--	--	<1.0	<2.6	<1.0	<2.6	<1.0	<2.6
Tetryl	na	na	na	--	--	--	--	<0.5	<2.6	<0.5	<2.6	<0.5	<2.6
Nitrobenzene	na	na	na	--	--	--	--	<0.125	<1.2	<0.125	<1.2	<0.125	<1.2
RDX	2	na	na	--	--	<1	<1	<0.5	<2.6	<0.5	<2.6	<0.5	<2.6

Notes: Background levels for Explosives are from Function Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Shaded areas are above background levels. -	25
J = Estimated value	
na = Not available.	-- = Parameter not measured

TABLE 4-2
GROUNDWATER ANALYTICAL RESULTS - October 18-21, 1999
SOUTH POST IMPACT AREA WELLS (Sheet 3 of 3)
Devens - Ayer, Massachusetts
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA MCLs (ug/l)	Federal MCLs (ug/l)	10/21/99 D-1	10/19/99 41M-93-04X	10/19/99 41M-94-09A	10/19/99 41M-94-09B	10/19/99 41M-94-11X	10/19/99 41M-94-12X	10/19/99 41M-94-14X	10/19/99 41M-94-14XD
EXPLOSIVES											
1,3,5-Trinitrobenzene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.26	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.27	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.28	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.29	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	<0.25	<0.25	<0.25	<0.30	<0.25	<0.25	<0.25	<0.25
Tetryl	na	na	na	<0.25	<0.25	<0.25	<0.31	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	<0.25	<0.25	<0.25	<0.32	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	<0.25	<0.25	<0.25	<0.33	<0.25	<0.25	<0.25	<0.25
VOLATILES											
1,1,2-Trichloroethane	na	5	5	pa	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	na	70	70	pa	<1	<1	<1	<1	<1	<1	<1
Carbon tetrachloride	na	5	5	pa	<1	<1	<1	<1	<1	<1	<1
Carbon disulfide	na	na	na	pa	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	na	5	5	pa	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	na	100	100	pa	<1	<1	<1	<1	0.81	1.2	1.4
Trichloroethene	na	5	5	pa	<1	<1	<1	<1	<1	<1	<1
Toluene	na	1000	1000	pa	<1	<1	<1	<1	<1	<1	<1
Vinyl chloride	na	2	2	pa	3.6J	<1J	<1J	<1J	<1J	<1J	<1J

Note: Background levels for explosives taken from Functional Area I RI.

LEGEND

Shaded areas are above background levels. -	25
J = Estimated value	pa = Analyzed under Army contract
na = Not available.	-- = Parameter not measured

TABLE 4-2
GROUNDWATER ANALYTICAL RESULTS - October 18-21, 1999
SOUTH POST IMPACT AREA WELLS (Sheet 1 of 3)
Fort Devens - Ayer, Massachusetts
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	10/21/99	10/21/99	10/20/99	10/20/99	10/20/99	10/20/99	10/20/99	10/20/99	10/20/99	10/18/99	10/18/99
Well No.				25M-92-06X	25M-97-11X	26M-92-02X	26M-92-03X	26M-92-03XD	26M-92-04X	26M-92-04XD	26M-97-08X	26M-97-08XD	27M-92-01X	27M-93-05X
FILTERED?				LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
		MCLs (ug/l)												
METALS														
Silver, Total Ag	4.6	na	na	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	<1.0	--	<0.8	<0.8
Aluminum, Total Al	6870	na	na	321	27.5	266	13.6	16.6	21.8	--	23.9	--	1300	1950
Arsenic, Total As	10.5	50	50	<1.0	<1.0	5.7	<1.0	<1.0	1.5	--	<1.0	--	<1.0	3.3
Barium, Total Ba	39.6	2000	2000	3.2	<2.8	<2.8	13.4	13.4	9.7	--	8.7	--	10.1	19.5
Beryllium, Total Be	5	4	4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	--	<0.1	--	0.1	0.13
Calcium, Total Ca	14700	na	na	2450	2440	2460	4660	4580	12100	--	3710	--	8700	9260
Cadmium, Total Cd	4.01	5	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	--	<0.2	--	<0.2	0.21
Cobalt, Total Co	25	na	na	<1.0	4.5	<1.0	<1.0	<1.0	1.7	--	2.6	--	<1.3	5.2
Chromium, Total Cr	14.7	100	100	2.1	<0.5	<0.5	<0.5	<0.5	<0.5	--	0.74	--	4.1	17.1
Copper, Total Cu	8.09	1300	1300	0.98	<0.9	<0.9	1.2	1.1	<0.9	--	<0.9	--	3	24.9
Iron, Total Fe	9100	na	na	654	30.4	317	<12.7	<12.7	<12.7	--	22.9	--	1140	2270
Mercury, Total Hg	0.243	2	2	<0.1	<0.1	0.12	1.1J	0.13J	0.11	--	<0.1	--	<0.1	<0.1
Potassium, Total K	2370	na	na	624	804	469	1180	1100	985	--	774	--	2310	3520
Magnesium, Total Mg	3480	na	na	726	909	1030	427	421	1380	--	455	--	1110	2110
Manganese, Total Mn	291	na	na	10.3	1.3	3.8	3.4	3.5	15.4	--	3.5	--	23.3	88.2
Sodium, Total Na	10800	na	na	1980	2580	3220	1390	1560	3880	--	1780	--	4860	3520
Nickel, Total Ni	34.3	na	100	2.6	1.1	<0.9	<0.9	<0.9	10.7	--	1.5	--	2.2	10.7
Lead, Total Pb	4.25	15	15	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	--	<0.5	--	1.6	6.5
Antimony, Total Sb	3.03	6	6	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	--	<1.4	--	<2.5	<2.5
Selenium, Total Se	3.02	50	50	2.5	1.3	1.4	2	<1.2	<1.2	--	1.7	--	1.5	<1.4
Thallium, Total Tl	6.99	2	2	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	--	<1.4	--	<1.4	<1.4
Vanadium, Total V	11	na	na	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	--	<0.8	--	1.9	2.9
Zinc, Total Zn	21.1	na	na	4.1	2.1	4.3	0.83	1	4.6	--	1.8	--	5.3	67.2
EXPLOSIVES														
1,3,5-Trinitrobenzene	na	na	na	<0.25	<0.25	<0.25	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	<0.25	<0.25	<0.25	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	<0.25	<0.25	<0.25	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	<0.25	<0.25	<0.25	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	<0.25	<0.25	<0.25	17	--	38	39	8.2	7.7	1	<0.25
Tetryl	na	na	na	<0.25	<0.25	<0.25	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	<0.25	<0.25	<0.25	<0.25	--	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	<0.25	<0.25	<0.25	97	--	240	250	46	44	3	<0.25

Notes: Background levels for Explosives are from Function Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Shaded areas are above background levels. - 25
J = Estimated value
na = Not available.
-- = Parameter not measured

TABLE 4-2
GROUNDWATER ANALYTICAL RESULTS - October 18-21, 1999
SOUTH POST IMPACT AREA WELLS (Sheet 2 of 3)
Fort Devens - Ayer, Massachusetts
(Concentrations in ug/l)

PARAMETERS	BACKGROUND LEVELS	MA	Federal	10/18/99	10/18/99	10/18/99	10/19/99	10/21/99	10/18/99	10/21/99	10/18/99	10/19/99
Well No.				27M-93-06X	27M-93-08X	SPM-93-06X	SPM-93-08X	SPM-93-10X	SPM-93-12X	SPM-93-16X	SPM-97-23X	SPM-97-24X
FILTERED?				LOW FLOW	LOW FLOW	LOW FLOW	LOW-FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW	LOW FLOW
		MCLs (ug/l)										
METALS												
Silver, Total Ag	4.6	na	na	1.1	<0.8	<0.8	<0.8	<1.0	<0.8	<1.0	<0.8	<0.8
Aluminum, Total Al	6870	na	na	237	18	2490	<7.2	190	55.8	13.6	21.9	107
Arsenic, Total As	10.5	50	50	<1.0	<1.0	8.1	<1.0	6.4	1	<1.0	<1.0	3.7
Barium, Total Ba	39.6	2000	2000	2.9	4.3	175	<2.8	<2.8	<2.8	<2.8	<2.8	2.9
Beryllium, Total Be	5	4	4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Calcium, Total Ca	14700	na	na	4900	8310	89600	2560	2980	6120	2550	5180	9270
Cadmium, Total Cd	4.01	5	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cobalt, Total Co	25	na	na	<1.3	<1.3	<1.3	<1.3	<1.0	<1.3	<1.0	<1.3	<1.3
Chromium, Total Cr	14.7	100	100	3.4	1.2	3.6	1	1.2	4.5	<0.5	0.92	3
Copper, Total Cu	8.09	1300	1300	2.9	0.96	3	0.89	<0.9	2.3	<0.9	1.4	1.4
Iron, Total Fe	9100	na	na	302	12.1	30.9	8.9	243	105	<12.7	35.7	101
Mercury, Total Hg	0.243	2	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Potassium, Total K	2370	na	na	1820	1870	45400	410	1070	1150	558	819	1640
Magnesium, Total Mg	3480	na	na	1010	2050	<99.5	346	817	2100	652	1110	3760
Manganese, Total Mn	291	na	na	9.9	5.9	<0.2	0.27	4.4	13.1	0.47	4.2	8.5
Sodium, Total Na	10800	na	na	1860	5900	25300	2070	2960	4740	2360	2900	2900
Nickel, Total Ni	34.3	na	100	1.3	<0.9	<0.9	<0.9	<0.9	1.2	<0.9	<0.9	<0.9
Lead, Total Pb	4.25	15	15	6.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Antimony, Total Sb	3.03	6	6	<2.5	<2.5	<2.5	<2.5	<1.4	<2.5	<1.4	<2.5	<2.5
Selenium, Total Se	3.02	50	50	<1.4	<1.4	<1.4	<1.4	2.5	1.8	<1.2	<1.4	<1.4
Thallium, Total Tl	6.99	2	2	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Vanadium, Total V	11	na	na	<0.8	<0.8	3.3	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
Zinc, Total Zn	21.1	na	na	3.1	1.3	3.1	3.2	2.6	2.1	1.5	14.3	3.9
EXPLOSIVES												
1,3,5-Trinitrobenzene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
1,3-Dinitrobenzene	1	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,4,6-Trinitrotoluene	2	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,4-Dinitrotoluene	30	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2-Amino-4,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
2-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
3-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
4-Amino-2,6-Dinitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
4-Nitrotoluene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
HMX	400	na	na	0.63	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Tetryl	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Nitrobenzene	na	na	na	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
RDX	2	na	na	1.3	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25

Notes: Background levels for Explosives are from Function Area I RI.
Background levels for metals are from AOC 57 RI.

LEGEND

Shaded areas are above background levels. - 25
J = Estimated value
na = Not available. -- = Parameter not measured

TABLE 4-8

Surface Water and Sediment Sample Analysis and Procedures

Sample Designation	Parameters Measured for All Samples	Preparation/Analysis Method
SPD-98-01X		
SPD-98-02X	**TAL METALS**	
SPD-98-03X	**Sediment**	**USEPA 3050B/6010B**
SPD-98-04X	**Surface Water**	**USEPA 3010B/6010B**
SPD-98-05X		
SPD-98-06X	**EXPLOSIVES**	
SPD-98-07X	**Sediment**	**USEPA 3541/8330**
SPD-98-08X	**Surface Water**	**USEPA 3541/8330**
SPD-98-09X		
SPD-98-10X	**PESTICIDES**	
SPD-98-11X	**Surface Water**	**USEPA 3510C,**
SPD-98-12X		**3520C/8081A**
SPD-98-13X		
SPD-98-14X	**TOTAL ORGANIC**	
SPD-98-15X	**CARBON**	
SPD-98-16X	**Sediment**	**Not Applicable/USEPA**
SPD-98-17X		**9060**
SPD-98-18X		
SPD-98-19X		
SPD-98-20X	**GRAIN SIZE ANALYSIS**	
SPD-98-21X	**Sediment**	**Not Applicable/ASTM**
SPD-98-22X		**D421,D422**
SPD-98-23X		
SPD-98-24X		
SPD-98-25X		
SPD-98-26X		
SPD-98-27X		
SPD-98-28X		
SPD-98-29X		
SPD-98-30X		
SPD-98-31X		

TABLE 4-9

SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS

Sample Location	Sample ID Number (SPD-9x-xx)	
	1993	1998
SPIA Monitored Area		
Cranberry Pond		30, 31
Heron Pond	04, 08	04, 08
New Cranberry Pond	01, 02, 03	01, 02, 03
Sierra Wetland	05, 06, 07	05, 06, 07
Slate Rock Brook	09 - 14	09 – 16*
SPIA Background Area		
Clear Pond		20, 21
Ponakin Brook		24, 25, 26
Ponakin Brook Pond		23
Ponakin Brook Wetlands		27, 28, 29
Spectacle Brook		18, 19
Spectacle Pond		17
Spectacle Brook Wetland		22

- Sample SPD-98-12X was not collected due to flooding by beaver dam.

TABLE 4-10: FIELD WATER QUALITY DATA

Sample ID Number	Date	Location	Depth (in.)	Water Temp (° C)	Dissolved Oxygen (mg/l)	pH	Specific Conduc. (umhos/cm^{-1})	Turbidity (JTU)
SPD-98-01	20-Nov-98	New Cranberry Pond	8	4.35	6.18	5.83	31.0	1.60
SPD-98-02	19-Nov-98	New Cranberry Pond	6	1.45	7.60	5.84	34.7	5.00
SPD-98-03	19-Nov-98	New Cranberry Pond	6	1.22	3.00	5.75	32.4	1.60
SPD-98-04	18-Nov-98	Heron Pond	8	5.89	7.50	5.73	22.4	0.70
SPD-98-05	19-Nov-98	Sierra Wetland	4	3.06	2.39	4.74	21.9	20.00
SPD-98-06	19-Nov-98	Sierra Wetland	6	5.75	4.72	5.45	19.0	0.80
SPD-98-07	19-Nov-98	Sierra Wetland	8	2.20	5.10	4.76	23.3	2.00
SPD-98-08	18-Nov-98	Heron Pond	8	6.56	6.94	5.72	25.3	0.60
SPD-98-09	17-Nov-98	Slate Rock Brook	4	5.25	9.45	6.06	33.3	0.60
SPD-98-10	16-Nov-98	Slate Rock Brook	6	6.30	11.60	6.31	32.5	0.75
SPD-98-11	16-Nov-98	Slate Rock Brook	6	6.36	11.56	6.46	32.4	0.60
SPD-98-12	No Sample	Slate Rock Brook						
SPD-98-13	17-Nov-98	Slate Rock Brook	12	5.59	6.68	5.73	35.7	1.10
SPD-98-14	17-Nov-98	Slate Rock Brook	14	6.07	7.94	5.92	35.4	0.90
SPD-98-15	16-Nov-98	Slate Rock Brook	6	6.21	11.75	6.1	32.5	0.65
SPD-98-16	16-Nov-98	Slate Rock Brook	4	6.45	11.68	6.28	32.8	0.75
SPD-98-17	18-Nov-98	Spectacle Pond	11	8.41	9.38	6.44	18.4	1.00
SPD-98-18	19-Nov-98	Spectacle Brook	18	3.6	4.31	5.71	79.7	0.70
SPD-98-19	19-Nov-98	Spectacle Brook	4	6.61	4.7	5.58	77.2	1.00
SPD-98-20	18-Nov-98	Clear Pond	8	5.55	10.46	6.51	36.6	1.60
SPD-98-21	18-Nov-98	Clear Pond	6	5.02	9.29	6.85	36.9	1.40
SPD-98-22	18-Nov-98	Spectacle Brk Wetland	8	4.85	9.14	6.51	45.7	15.00
SPD-98-23	18-Nov-98	Ponakin Brook Pond	18	4.64	9.56	6.34	33.9	1.90
SPD-98-24	18-Nov-98	Ponakin Brook	6	5.35	10.65	6.36	34.8	1.70
SPD-98-25	17-Nov-98	Ponakin Brook	6	5.94	11.25	5.88	27	1.30
SPD-98-26	17-Nov-98	Ponakin Brook	4	5.79	12	6.19	27.9	0.90
SPD-98-27	17-Nov-98	Ponakin Brk Wetland	4	5.67	11.68	6.04	30.5	3.40
SPD-98-28	20-Nov-98	Ponakin Brk Wetland	5	7.19	10.95	6.15	36.7	8.00
SPD-98-29	20-Nov-98	Ponakin Brk Wetland	2	5.25	9.12	5.98	32.9	6.00
SPD-98-30	16-Nov-98	Cranberry Pond	12	7.42	12.06	7.61	11.1	4.70
SPD-98-31	16-Nov-98	Cranberry Pond	8	7.85	12.07	6.62	10.7	4.85

* No sample collected in 1998. Site impounded by beaver dam.

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1998 Surface ..ater Results

Ponds/Brooks/Wetlands		New Cranberry Pond				Heron Pond	Sierra Wetland				Heron Pond	Slate Rock Brook						
SAMPLE ID	Screening Values	SPD-98-01X	'-01XDuplicate	SPD-98-02X	SPD-98-03X	SPD-98-04X	SPD-98-05X	SPD-98-06X	'-06XDuplicate	SPD-98-07X	SPD-98-08X	SPD-98-09X	SPD-98-10X	SPD-98-11X	SPD-98-12X	SPD-98-13X	SPD-98-14X	SPD-98-15X
Units	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	*	µg/l	µg/l	µg/l
TAL METALS Aluminum	25-773	<200	226	190	65.0	<37.0	**1010**	54.0	44.5	284	70.0	143	111	124	*	96.5	37.0	120
Antimony	3.0	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	*	<2.0	<2.0	<2.0
Arsenic	< 2.0-6.7	<5.0	<5.0	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	2.4	1.8	<1.6	*	<1.6	<1.6	1.9
Barium	< 2.8-40.1	<10.0	<10.0	5.2	3.8	2.4	18.8	8.0	8.2	7.2	2.9	4.3	3.7	3.7	*	3.5	3.6	4.0
Beryllium	5.0	<3.0	<3.0	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	*	<0.11	<0.11	0.11
Cadmium	4.0	<3.0	<3.0	0.33	0.38	0.31	0.39	0.26	0.28	0.38	0.4	0.34	0.29	0.36	*	0.29	0.25	0.38
Calcium	858-20,600	3120	2880	2300	2640	1460	1800	1550	1560	1010	1620	2520	2650	2710	*	2760	2440	2820
Chromium (total)	6.0	<5.0	<5.0	1.1	2.1	<0.60	1.9	<0.60	<0.60	0.95	<0.65	<0.60	<0.60	0.80	*	<0.60	0.62	0.78
Cobalt	25.0	<5.0	<5.0	<0.65	<0.65	<0.65	<0.65	<0.65	<0.65	<0.65	<0.60	<0.65	<0.65	<0.65	*	<0.65	<0.65	<0.65
Copper	8.1	<5.0	5.0	5.3	6.8	2.8	**17.0**	4.7	4.4	6.0	2.8	3.3	3.3	3.2	*	2.7	2.3	3.5
Iron	< 78-1630	472	481	805	475	353	**4240**	98.0	130	487	525	940	665	680	*	290	570	710
Lead	< 1.3-8.68	3.5	5.2	2.3	<1.3	<1.3	**19.0**	<1.3	<1.3	<1.3	1.4	1.6	<1.3	1.5	*	<1.3	3.0	1.6
Magnesium	< 500-3340	758	751	720	660	388	498	432	430	320	435.0	690	715	720	*	800	690	720
Manganese	12.8-357	32.7	35.5	58.0	29.6	54	**1630**	23.4	23.2	21.0	61.5	78.5	26.6	27.7	N	27.2	22.8	33.8
Mercury		<0.20	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	O	<0.10	<0.10	<0.10
Nickel	34.4	<5.0	<5.0	<1.2	<1.2	1.4	3.5	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	T	<1.2	<1.2	<1.2
Potassium	< 375-3150	954	1030	815	730	510	765	369	400	248	488.0	1350	1130	1130		444	373	1140
Selenium	3.02	<5.0	<5.0	<1.5	<1.5	<1.5	1.5	<1.5	<1.5	<1.5	<1.5	<1.5	1.5	<1.5	S	<1.5	<1.5	1.5
Silver	4.6	<3.0	<3.0	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	0.8	<0.60	<0.60	0.62	A	<0.60	<0.60	<0.60
Sodium	799-36300	2770	2760	2780	2600	2610	1630	2060	2060	1820	2530	2640	2600	2660	M	3020	2820	2660
Thallium		<10.0	<10.0	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	P	<2.8	<2.8	<2.8
Vanadium	11.0	<5.0	<5.0	<0.70	<0.70	<0.70	2.6	<0.70	<0.70	0.86	<0.70	<0.70	<0.70	<0.70	L	<0.70	<0.70	<0.70
Zinc	< 18-33.4	19.7	14.9	31.0	16.2	15.8	32.9	20.0	0.55	17.4	13.0	15.2	0.55	**35.4**	E	17.8	17.2	0.55
Explosives															D			
2-Amino-4,6-dinitrotoluene		<1.6	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	*	<2.5	<1.2	<1.2
4-Amino-2,6,dinitrotoluene		<1.6	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	*	<2.5	<1.2	<1.2
1,3-Dinitrobenzene		<1.6	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	*	<2.5	<1.2	<1.2
2,4-Dinitrotoluene	0.11	<1.6	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	*	<2.5	<1.2	<1.2
2,6-Dinitrotoluene		<1.6	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	*	<2.5	<1.2	<1.2
HMX		<3.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	*	<5.5	<2.6	<2.6
Nitrobenzene	27,000	<1.6	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	*	<2.5	<1.2	<1.2
2-Nitrotoluene		<3.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	*	<5.5	<2.6	<2.6
3-Nitrotoluene		<3.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	*	<5.5	<2.6	<2.6
4-Nitrotoluene		<3.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	*	<5.5	<2.6	<2.6
RDX		<3.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	*	<5.5	<2.6	<2.6
Tetryl		<3.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	*	<5.5	<2.6	<2.6
1,3,5-Trinitrobenzene		<1.6	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	*	<2.5	<1.2	<1.2
2,4,6-Trinitrotoluene		<1.6	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	*	<2.5	<1.2	<1.2
Pesticides 4,4'-DDD		<0.10	<0.10	<0.11	<0.11	<0.10	<0.14	<0.11	<0.11	<0.11	<0.10	<0.10	<0.10	<0.11	*	<0.10	<0.10	<0.11
4,4'-DDE		<0.10	<0.10	<0.11	<0.11	<0.10	<0.14	<0.11	<0.11	<0.11	<0.10	<0.10	<0.10	<0.11	*	<0.10	<0.10	<0.11
4,4'-DDT		<0.10	<0.10	<0.11	<0.11	<0.10	<0.14	<0.11	<0.11	<0.11	<0.10	<0.10	<0.10	<0.11	*	<0.10	<0.10	<0.11
Aldrin		<0.052	<0.052	<0.056	<0.053	<0.052	<0.069	<0.055	<0.055	<0.053	<0.052	<0.052	<0.052	<0.053	*	<0.051	<0.052	<0.055
alpha-Benzenehexachloride	9.2	<0.052	<0.052	<0.056	<0.053	<0.052	<0.069	<0.055	<0.055	<0.053	<0.052	<0.052	<0.052	<0.053	*	<0.051	<0.052	<0.055
alpha-Endosulfan/Endosulfan I	0.22	<0.052	<0.052	<0.056	<0.053	<0.052	<0.069	<0.055	<0.055	<0.053	<0.052	<0.052	<0.052	<0.053	*	<0.051	<0.052	<0.055
Endosulfan II	0.22	<0.10	<0.10	<0.11	<0.11	<0.10	<0.14	<0.11	<0.11	<0.11	<0.10	<0.10	<0.10	<0.11	*	<0.10	<0.10	<0.11
beta-Benzenehexachloride	16.3	<0.052	<0.052	<0.056	<0.053	<0.052	<0.069	<0.055	<0.055	<0.053	<0.052	<0.052	<0.052	<0.053	*	<0.051	<0.052	<0.055
delta-Benzenehexachloride		<0.052	<0.052	<0.056	<0.053	<0.052	<0.069	<0.055	<0.055	<0.053	<0.052	<0.052	<0.052	<0.053	*	<0.051	<0.052	<0.055
gamma-BHC (Lindane)	2.0	<0.052	<0.052	<0.056	<0.053	<0.052	<0.069	<0.055	<0.055	<0.053	<0.052	<0.052	<0.052	<0.053	*	<0.051	<0.052	<0.055
Chlordane-alpha	2.4	<0.052	<0.052	<0.056	<0.053	<0.052	<0.069	<0.055	<0.055	<0.053	<0.052	<0.052	<0.052	<0.053	*	<0.051	<0.052	<0.055
Chlordane-gamma	2.4	<0.052	<0.052	<0.056	<0.053	<0.052	<0.069	<0.055	<0.055	<0.053	<0.052	<0.052	<0.052	<0.053	*	<0.051	<0.052	<0.055
Dieldrin	2.5	<0.10	<0.10	<0.11	<0.11	<0.10	<0.14	<0.11	<0.11	<0.11	<0.10	<0.10	<0.10	<0.11	*	<0.10	<0.10	<0.11
Endosulfan sulfate		<0.10	<0.10	<0.11	<0.11	<0.10	<0.14	<0.11	<0.11	<0.11	<0.10	<0.10	<0.10	<0.11	*	<0.10	<0.10	<0.11
Endrin	0.18	<0.10	<0.10	<0.11	<0.11	<0.10	<0.14	<0.11	<0.11	<0.11	<0.10	<0.10	<0.10	<0.11	*	<0.10	<0.10	<0.11
Endrin aldehyde		<0.10	<0.10	<0.11	<0.11	<0.10	<0.14	<0.11	<0.11	<0.11	<0.10	<0.10	<0.10	<0.11	*	<0.10	<0.10	<0.11
Endrin ketone		<0.10	<0.10	<0.11	<0.11	<0.10	<0.14	<0.11	<0.11	<0.11	<0.10	<0.10	<0.10	<0.11	*	<0.10	<0.10	<0.11
Heptachlor	0.52	<0.052	<0.052	<0.056	<0.053	<0.052	<0.069	<0.055	<0.055	<0.053	<0.052	<0.052	<0.052	<0.053	*	<0.051	<0.052	<0.055
Heptachlor epoxide		<0.052	<0.052	<0.056	<0.053	<0.052	<0.069	<0.055	<0.055	<0.053	<0.052	<0.052	<0.052	<0.053	*	<0.051	<0.052	<0.055
Methoxychlor		<0.52	<0.52	<0.056	<0.53	<0.52	<0.69	<0.55	<0.55	<0.53	<0.052	<0.52	<0.52	<0.53	*	<0.51	<0.52	<0.55
Toxaphene		<5.2	<5.2	<5.6	<5.3	<5.2	<6.9	<5.5	<5.5	<5.3	<5.2	<5.2	<5.2	<5.3	*	<5.1	<5.2	<5.5

> Screening Values Bolded values exceed screening values in Appendix A of the Ecological Sampling Work Plan (Stone & Webster, 1998)

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1998 Surfac ter Results

Brooks/Ponds/ Wetlands	Slate Rock Brook		Spectacle Pond	Spectacle Brook			Clear Pond		Spectacle Brk. Wetland	Ponakin Brook Pond	Ponakin Brook			Ponakin Brook Wetlands			Cranberry Pond	
SAMPLE ID	Screening Values	SPD-98-16X	SPD-98-17X	SPD-98-18X	SPD-98-19X	' -19X Duplicate	SPD-98-20X	SPD-98-21X	SPD-98-22X	SPD-98-23X	SPD-98-24X	SPD-98-25X	SPD-98-26X	SPD-98-27X	SPD-98-28X	SPD-98-29X	SPD-98-30X	SPD-98-31X
Units	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
TAL Metals Aluminum	25-773	118	<37.0	64.0	54.0	51.0	<37.0	64.0	237	64.0	<37.0	131	86.0	**830**	688	**2810**	<37.0	<37.0
Antimony	3.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<5.0	<3.9	<2.0	<2.0
Arsenic	<2.0-6.7	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	5.5	<1.6	<1.6	2.4	2.2	5.9	<5.0	**21.6**	<1.6	<1.6
Barium	<2.8-40.1	3.5	12.2	10.4	16.0	15.5	4.7	5.4	9.8	4.6	4.0	2.9	2.4	9.2	10.0	24.7	5.1	5.4
Beryllium	5.0	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<3.0	0.54	<0.11	<0.11
Cadmium	4.0	0.24	0.23	0.28	0.16	0.31	0.28	0.32	0.32	0.34	0.30	0.31	0.22	0.29	<3.0	0.37	0.25	0.30
Calcium	858-20,600	2490	5350	6150	4680	4620	2800	3020	3280	3400	3200	2040	2020	2880	2710	4000	910	965
Chromium (total)	6.0	<0.60	<0.60	0.72	<0.60	<0.60	<0.60	<0.60	0.64	<0.60	<0.60	<0.60	<0.60	0.91	<5.0	2.6	<0.60	<0.60
Cobalt	25.0	<0.65	<0.65	<0.65	0.90	<0.65	<0.65	<0.65	0.94	<0.65	<0.65	<0.65	<0.65	3.0	<5.0	11.1	<0.65	<0.65
Copper	8.1	2.9	2.6	4.1	4.1	5.8	2.5	2.9	3.3	2.9	3.0	2.5	2.3	3.7	<5.0	4.8	4.6	5.0
Iron	<78-1630	710	202	298	250	268	188	284	3620	442	510	432	354	**2920**	786	**11800**	313	344
Lead	<1.3-8.68	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	3.2	<1.3	<1.3	1.6	<1.3	4.6	3.1	9.9	8.2	9.0
Magnesium	<500-3340	670	980	1350	1260	1200	615	655	690	865	795	462	462	660	1140	1700	252	267
Manganese	12.8-357	41.6	61.5	266	318	310	53.5	86.5	248	23.6	27.5	33.5	22.0	**550**	76.5	**2020**	22.2	21.4
Mercury		<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10
Nickel	34.4	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<5.0	3.6	<1.2	<1.2
Potassium	<375-3150	1100	910	1240	1290	1100	645	675	830	730	705	386	352	600	567	1040	457	425
Selenium	3.02	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<5.0	<3.0	<1.5	<1.5
Silver	4.6	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	0.62	<0.60	<0.60	<0.60	0.80	<0.60	<0.60	<3.0	<1.2	<0.60	<0.60
Sodium	799-36300	2490	22800	6000	8200	7750	2720	2860	2970	2030	1940	2420	2350	2520	3260	5310	1090	1180
Thallium		<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<10.0	<5.7	<2.8	<2.8
Vanadium	11.0	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	1.4	<0.70	<0.70	0.96	<0.70	2.0	<5.0	6.1	<0.70	<0.70
Zinc	<18-33.4	14.2	11.1	14.9	15.2	20.4	21.2	10.7	52.5	13.0	11.6	14.8	12.0	**33.6**	10	**56.5**	17.9	12.8
Explosives																		
2-Amino-4,6-dinitrotoluene		<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.5	<1.2	<1.4	<1.2	<1.9	<1.2	<1.2
4-Amino-2,6,dinitrotoluene		<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.5	<1.2	<1.4	<1.2	<1.9	<1.2	<1.2
1,3-Dinitrobenzene		<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.5	<1.2	<1.4	<1.2	<1.9	<1.2	<1.2
2,4-Dinitrotoluene	0.11	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.5	<1.2	<1.4	<1.2	<1.9	<1.2	<1.2
2,6-Dinitrotoluene		<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.5	<1.2	<1.4	<1.2	<1.9	<1.2	<1.2
HMX		<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<3.4	<2.6	<3.1	<2.6	<4.1	<2.6	<2.6
Nitrobenzene	27,000	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.5	<1.2	<1.4	<1.2	<1.9	<1.2	<1.2
2-Nitrotoluene		<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<3.4	<2.6	<3.1	<2.6	<4.1	<2.6	<2.6
3-Nitrotoluene		<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<3.4	<2.6	<3.1	<2.6	<4.1	<2.6	<2.6
4-Nitrotoluene		<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<3.4	<2.6	<3.1	<2.6	<4.1	<2.6	<2.6
RDX		<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<3.4	<2.6	<3.1	<2.6	<4.1	<2.6	<2.6
Tetryl		<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<2.6	<3.4	<2.6	<3.1	<2.6	<4.1	<2.6	<2.6
1,3,5-Trinitrobenzene		<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.5	<1.2	<1.4	<1.2	<1.9	<1.2	<1.2
2,4,6-Trinitrotoluene		<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.5	<1.2	<1.4	<1.2	<1.9	<1.2	<1.2
Pesticides 4,4'-DDD		<0.11	<0.10	<0.11	<0.11	<0.11	<0.10	<0.10	<0.11	<0.11	<0.13	<0.10	<0.11	<0.12	<0.11	<0.13	<0.10	<0.11
4,4'-DDE		<0.11	<0.10	<0.11	<0.11	<0.11	<0.10	<0.10	<0.11	<0.11	<0.13	<0.10	<0.11	<0.12	<0.11	<0.13	<0.10	<0.11
4,4'-DDT		<0.11	<0.10	<0.11	<0.11	<0.11	<0.10	<0.10	<0.11	<0.11	<0.13	<0.10	<0.11	<0.12	<0.11	<0.13	<0.10	<0.11
Aldrin	3.0	<0.053	<0.051	<0.053	<0.055	<0.054	<0.052	<0.051	<0.053	<0.054	<0.063	<0.052	<0.054	<0.062	<0.055	<0.067	<0.051	<0.053
alpha-Benzenehexachloride	9.2	<0.053	<0.051	<0.053	<0.055	<0.054	<0.052	<0.051	<0.053	<0.054	<0.063	<0.052	<0.054	<0.062	<0.055	<0.067	<0.051	<0.053
alpha-Endosulfan/Endosulfan I	0.22	<0.053	<0.051	<0.053	<0.055	<0.054	<0.052	<0.051	<0.053	<0.054	<0.063	<0.052	<0.054	<0.062	<0.055	<0.067	<0.051	<0.053
Endosulfan II	0.22	<0.11	<0.10	<0.11	<0.11	<0.11	<0.10	<0.10	<0.11	<0.11	<0.13	<0.10	<0.11	<0.12	<0.11	<0.13	<0.10	<0.11
beta-Benzenehexachloride	16.3	<0.053	<0.051	<0.053	<0.055	<0.054	<0.052	<0.051	<0.053	<0.054	<0.063	<0.052	<0.054	<0.062	<0.055	<0.067	<0.051	<0.053
delta-Benzenehexachloride		<0.053	<0.051	<0.053	<0.055	<0.054	<0.052	<0.051	<0.053	<0.054	<0.063	<0.052	<0.054	<0.062	<0.055	<0.067	<0.051	<0.053
gamma-BHC (Lindane)	2.0	<0.053	<0.051	<0.053	<0.055	<0.054	<0.052	<0.051	<0.053	<0.054	<0.063	<0.052	<0.054	<0.062	<0.055	<0.067	<0.051	<0.053
Chlordane-alpha	2.4	<0.053	<0.051	<0.053	<0.055	<0.054	<0.052	<0.051	<0.053	<0.054	<0.063	<0.052	<0.054	<0.062	<0.055	<0.067	<0.051	<0.053
Chlordane-gamma	2.4	<0.053	<0.051	<0.053	<0.055	<0.054	<0.052	<0.051	<0.053	<0.054	<0.063	<0.052	<0.054	<0.062	<0.055	<0.067	<0.051	<0.053
Dieldrin	2.5	<0.11	<0.10	<0.11	<0.11	<0.11	<0.10	<0.10	<0.11	<0.11	<0.13	<0.10	<0.11	<0.12	<0.11	<0.13	<0.10	<0.11
Endosulfan sulfate		<0.11	<0.10	<0.11	<0.11	<0.11	<0.10	<0.10	<0.11	<0.11	<0.13	<0.10	<0.11	<0.12	<0.11	<0.13	<0.10	<0.11
Endrin	0.18	<0.11	<0.10	<0.11	<0.11	<0.11	<0.10	<0.10	<0.11	<0.11	<0.13	<0.10	<0.11	<0.12	<0.11	<0.13	<0.10	<0.11
Endrin aldehyde		<0.11	<0.10	<0.11	<0.11	<0.11	<0.10	<0.10	<0.11	<0.11	<0.13	<0.10	<0.11	<0.12	<0.11	<0.13	<0.10	<0.11
Endrin ketone		<0.11	<0.10	<0.11	<0.11	<0.11	<0.10	<0.10	<0.11	<0.11	<0.13	<0.10	<0.11	<0.12	<0.11	<0.13	<0.10	<0.11
Heptachlor	0.52	<0.053	<0.051	<0.053	<0.055	<0.054	<0.052	<0.051	<0.051	<0.054	<0.063	<0.052	<0.054	<0.062	<0.055	<0.067	<0.051	<0.051
Heptachlor epoxide		<0.053	<0.051	<0.053	<0.055	<0.054	<0.052	<0.051	<0.053	<0.054	<0.063	<0.052	<0.054	<0.062	<0.055	<0.067	<0.051	<0.053
Methoxychlor		<0.53	<0.51	<0.53	<0.55	<0.54	<0.052	<0.51	<0.53	<0.54	<0.63	<0.52	<0.54	<0.62	<0.55	<0.067	<0.51	<0.53
Tox		<5.3	<5.1	<5.3	<5.5	<5.4	<5.2	[illegible]	<5.3	<5.4	<6.3	<5.2	<5.4	<6.2	<5.5	<6.3	<5.1	<5.3

> Screening Values Bolded values exceed screening values in Appendix A of the Ecological   ng Work Plan (Stone & Webster, 1998)

TABLE 4-12

REVISED SCREENING VALUES FOR SURFACE WATER

Metal	Screening Value	
	SPIA RI	**Modified**
Aluminum	25 – 733	25 – 733
Antimony	3.0[b]	**2.0**[b]
Arsenic	<2 – 6.7	<2 – 6.7
Barium	<2.8 - 40.1	<2.8 – 40.1
Beryllium	5.0[b]	**0.11**[b]
Cadmium	4.0[b]	**0.16 – 0.34**
Calcium	858 – 20,600	858 – 20,600
Chromium	6.0[b]	**<0.60 – 0.91**
Cobalt	25.0[b]	**<0.65 – 3.0**
Copper	8.1[b]	**2.3 – 5.8**
Iron	<78 – 1,630	<78 –1,630
Lead	<1.3 – 8.68	<1.3 – 8.68
Magnesium	<500 – 3,340	<500 – 3,340
Manganese	12.8 - 357	12.8 - 357
Mercury	0.24[b]	**0.10**[b]
Nickel	34.4[b]	**1.2**[b]
Potassium	<375 – 3,150	<375 – 3,150
Selinium	3.02[b]	**1.5**[b]
Silver	4.6[b]	**<0.6 – 0.8**
Sodium	799 – 36,300	799 – 36,300
Thallium	7.0[b]	**<2.8**[b]
Vanadium	11.0[b]	**<0.70 – 2.0**[b]
Zinc	<18 – 33.4	<18 – 33.4

Notes: a. Screening values modified only if SPIA RI values were based exclusively on detection limits. Modified values based on samples taken outside SPIA in 1998, excluding those with high turbidity (SPD-98-22X, SPD-98-28X, and SPD-98-29X). n=12.

b. Detection Limit.

SAMPLE ID	SPD-93-01X	SPD-98-01X	-01XDuplicate 1998	SPD-93-02X	SPD-98-02X	SPD-93-03X	SPD-98-03X	SPD-93-04X	SPD-98-04X	SPD-93-05X	SPD-98-05X	SPD-93-06X	SPD-98-06X	-06XDuplicate 1998	SPD-93-07X	SPD-98-07X
Units	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l
TAL Metals Aluminum	351	<200	226	1500	190	303	65.0	390	<37.0	176	1010	2940	54.0	44.5	294	284
Antimony	<5.00	<5.0	<5.0	<5.00	<2.0	9.83	<2.0	<5.00	<2.0	<5.00	<2.0	<5.00	<2.0	<2.0	<5.00	<2.0
Arsenic	2.47	<5.0	<5.0	7.99	<1.6	2.33	<1.6	2.87	<1.6	2.2	<1.6	15.6	<1.6	<1.6	4.41	<1.6
Barium	2.79 J	<10.0	<10.0	21.3	5.2	4.42 J	3.8	6.18 J	2.4	3.01 J	18.8	35.9	8.0	8.2	13.6	7.2
Beryllium	<5.00	<3.0	<3.0	0.229 BJ	<0.11	0.122 BJ	<0.11	0.136 BJ	<0.11	0.165 BJ	<0.11	0.298 BJ	<0.11	<0.11	0.199 BJ	<0.11
Cadmium		<3.0	<3.0		0.33		0.38		0.31		0.39		0.26	0.28		0.38
Calcium	2300	3120	2880	3890	2800	4020	2640	4870	1460	2200	1800	6400	1550	1560	2500	1010
Chromium (total)	<10.0	<5.0	<5.0	<10.0	1.1	10.0 J	2.1	5.69 J	<0.60	4.71 J	1.9	13	<0.60	<0.60	<10.00	0.95
Cobalt	<10.0	<5.0	<5.0	<10.0	<0.65	<10.0	<0.65	<10.0	<0.65	<10.0	<0.65	7.83 J	<0.65	<0.65	<10.00	<0.65
Copper	<10.0	<5.0	5.0	7.00 J	5.3	1.12 J	6.8	<10.0	2.8	1.25 J	17.0	6.76 J	4.7	4.4	2.82 J	6.0
Iron	438	472	481	1400	805	513	475	1300	353	801	4240	12000	98.0	130	4800	487
Lead	<5.00	3.5	5.2	27.7	2.3	<5.00	<1.3	20.5	<1.3	<5.00	19.0	17.3	<1.3	<1.3	<5.00	<1.3
Magnesium	745	758	751	60.9 J	720	886	660	976	388	667	498	1910	432	430	657	320
Manganese	21.5	32.7	35.5	84.2	58.0	37.2	29.6	105	54	77.9	1630	338	23.4	23.2	433	21.0
Mercury		<0.20	<0.20		<0.10		<0.10		<0.10		<0.10		<0.10	<0.10		<0.10
Nickel	<10.0	<5.0	<5.0	<10.0	<1.2	<10.0	<1.2	<10.0	1.4	<10.0	3.5	10.7	<1.2	<1.2	<10.0	<1.2
Potassium	<1000	954	1030	<1000	815	<1000	730	<1000	510	<1000	765	1110	369	400	1410	248
Selenium	<2.00	<5.0	<5.0	<2.00	<1.5	<2.00	<1.5	<2.00	<1.5	<2.00	1.5	<2.00	<1.5	<1.5	<2.00	<1.5
Silver	<2.00	<3.0	<3.0	<2.00	<0.60	<2.00	<0.60	<2.00	<0.60	<2.00	<0.60	1.44 BJ	<0.60	<0.60	1.73 BJ	<0.60
Sodium	934 J	2770	2760	1990 J	2780	1830 J	2600	3920	2610	776 J	1630	6190	2060	2060	<2000	1820
Thallium		<10.0	<10.0		<2.8		<2.8		<2.8		<2.8		<2.8	<2.8		<2.8
Vanadium	<10.0	<5.0	<5.0	5.09	<0.70	<10.0	<0.70	<10.0	<0.70	<10.0	2.6	6.99 J	<0.70	<0.70	<10.0	0.86
Zinc	<20.0	19.7	14.9	89.3	31.0	3.76 B	16.2	15.8 BJ	15.8	34.7	32.9	75.1 B	20.0	0.55	56.2 B	17.4
Explosives																
2-Amino-4,6-dinitrotoluene		<1.6	<1.2		<1.2		<1.2		<1.2		<1.2		<1.2	<1.2		<1.2
4-Amino-2,6,dinitrotoluene		<1.6	<1.2		<1.2		<1.2		<1.2		<1.2		<1.2	<1.2		<1.2
1,3-Dinitrobenzene	<1.00	<1.6	<1.2	<1.00	<1.2	<1.00	<1.2	<1.00	<1.2	<1.00	<1.2	<1.00	<1.2	<1.2	0.370 JC	<1.2
2,4-Dinitrotoluene	<1.00	<1.6	<1.2	<1.00	<1.2	<1.00	<1.2	<1.00	<1.2	<1.00	<1.2	<1.00	<1.2	<1.2	<1.00	<1.2
2,6-Dinitrotoluene		<1.6	<1.2		<1.2		<1.2		<1.2		<1.2		<1.2	<1.2		<1.2
HMX		<3.6	<2.6		<2.6		<2.6		<2.6		<2.6		<2.6	<2.6		<2.6
Nitrobenzene	<1.00 L	<1.6	<1.2	<1.00 L	<1.2	<1.00 L	<1.2	<1.00 L	<1.2	<1.00 L	<1.2	<1.00 L	<1.2	<1.2	4.04 LC	<1.2
2-Nitrotoluene	<1.00 R	<3.6	<2.6	<1.00 L	<2.6	<1.00 R	<2.6	<1.00 R	<2.6	<1.00 R	<2.6	<1.00 R	<2.6	<2.6	3.14 LC	<2.6
3-Nitrotoluene	<1.00	<3.6	<2.6	<1.00	<2.6	<1.00	<2.6	<1.00	<2.6	<1.00	<2.6	<1.00	<2.6	<2.6	1.24 C	<2.6
4-Nitrotoluene		<3.6	<2.6		<2.6		<2.6		<2.6		<2.6		<2.6	<2.6		<2.6
RDX		<3.6	<2.6		<2.6		<2.6		<2.6		<2.6		<2.6	<2.6		<2.6
Tetryl		<3.6	<2.6		<2.6		<2.6		<2.6		<2.6		<2.6	<2.6		<2.6
1,3,5-Trinitrobenzene		<1.6	<1.2		<1.2		<1.2		<1.2		<1.2		<1.2	<1.2		<1.2
2,4,6-Trinitrotoluene		<1.6	<1.2		<1.2		<1.2		<1.2		<1.2		<1.2	<1.2		<1.2
Pesticides 4,4'-DDD	<0.040	<0.10	<0.10	<0.160	<0.11	<0.040	<0.11	<0.045	<0.10	<0.046 J	<0.14	<0.200	<0.11	<0.11	<0.160	<0.11
4,4'-DDE	<0.040	<0.10	<0.10	<0.160	<0.11	<0.040	<0.11	<0.045	<0.10	<0.046 J	<0.14	<0.200	<0.11	<0.11	<0.160	<0.11
4,4'-DDT	<0.040	<0.10	<0.10	<0.160	<0.11	<0.040	<0.11	<0.045	<0.10	<0.046 J	<0.14	<0.200	<0.11	<0.11	<0.160	<0.11
Aldrin		<0.052	<0.052		<0.056		<0.053		<0.052		<0.069		<0.055	<0.055		<0.053
alpha-Benzenehexachloride	<0.02	<0.052	<0.052	<0.080	<0.056	<0.020	<0.053	<0.023	<0.052	<0.014 JC	<0.069	<0.100 L	<0.055	<0.055	<0.080	<0.053
alpha-Endosulfan/Endosulfan I	<0.02	<0.052	<0.052	<0.240 JU	<0.056	<0.020	<0.053	<0.023	<0.052	<0.023 J	<0.069	<0.100	<0.055	<0.055	<0.080	<0.053
Endosulfan II		<0.10	<0.10		<0.11		<0.11		<0.10		<0.14		<0.11	<0.11		<0.11
beta-Benzenehexachloride	0.052 U	<0.052	<0.052	0.140 JU	<0.056	<0.020	<0.053	<0.023	<0.052	0.081 JU	<0.069	0.130 C	<0.055	<0.055	<0.048 JU	<0.053
delta-Benzenehexachloride		<0.052	<0.052		<0.056		<0.053		<0.052		<0.069		<0.055	<0.055		<0.053
gamma-BHC (Lindane)	<0.020	<0.052	<0.052	<0.080	<0.056	<0.020	<0.053	<0.063 U	<0.052	<0.023 J	<0.069	<0.100 J	<0.055	<0.055	<0.080	<0.053
Chlordane-alpha		<0.052	<0.052		<0.056		<0.053		<0.052		<0.069		<0.055	<0.055		<0.053
Chlordane-gamma		<0.052	<0.052		<0.056		<0.053		<0.052		<0.069		<0.055	<0.055		<0.053
Dieldrin		<0.10	<0.10		<0.11		<0.11		<0.10		<0.14		<0.11	<0.11		<0.11
Endosulfan sulfate		<0.10	<0.10		<0.11		<0.11		<0.10		<0.14		<0.11	<0.11		<0.11
Endrin		<0.10	<0.10		<0.11		<0.11		<0.10		<0.14		<0.11	<0.11		<0.11
Endrin aldehyde		<0.10	<0.10		<0.11		<0.11		<0.10		<0.14		<0.11	<0.11		<0.11
Endrin ketone		<0.10	<0.10		<0.11		<0.11		<0.10		<0.14		<0.11	<0.11		<0.11
Heptachlor		<0.052	<0.052		<0.056		<0.053		<0.052		<0.069		<0.055	<0.055		<0.053
Heptachlor epoxide		<0.052	<0.052		<0.056		<0.053		<0.052		<0.069		<0.055	<0.055		<0.053
Methoxychlor		<0.52	<0.52		<0.056		<0.53		<0.52		<0.69		<0.55	<0.55		<0.53
Toxaphene		<5.2	<5.2		<5.6		<5.3		<5.2		<6.9		<5.5	<5.5		<5.3

> 1993 values

Tab' ' 13

Comparison of 1993 ·face Water Results

SAMPLE ID	SPD-93-08X	SPD-98-08X	SPD-93-09X	SPD-98-09X	SPD-93-10X	SPD-98-10X	SPD-93-11X	-11XDuplicate 1993	SPD-98-11X	SPD-93-12X	SPD-98-12X	SPD-93-13X	SPD-98-13X	SPD-93-14X	SPD-98-14X
Units	μg/l	μg/l	μg/l	μg/l	μg/l	μg/l	μg/l	μg/l	μg/l	μg/l	*	μg/l	μg/l	μg/l	μg/l
TAL Metals Aluminum	60.1	70.0	191	143	112	111	208	191	124	191	*	305	96.5	48.3	37.0
Antimony	< 5.00	<2.0	< 5.00	<2.0	< 5.00	<2.0	< 5.00	< 5.00	<2.0	< 5.00	*	< 5.00	<2.0	< 5.00	<2.0
Arsenic	< 2.00	<1.6	< 2.00	2.4	3.44	1.8	2.28	< 2.00	<1.6	< 2.00	*	2.84	<1.6	< 2.00	<1.6
Barium	6.15J	2.9	< 10.0	4.3	< 10.0	3.7	< 10.0	< 10.0	3.7	< 10.0	*	< 10.0	3.5	< 10.0	3.6
Beryllium	0.983 BJ	<0.11	< 5.00	<0.11	< 5.00	<0.11	< 5.00	< 5.00	<0.11	< 5.00	*	< 5.00	<0.11	< 5.00	<0.11
Cadmium		0.4		0.34		0.29			0.36		*		0.29		0.25
Calcium	2030	1620	3330	2520	3420	2650	3340	3440	2710	3440	*	3390	2760	3300	2440
Chromium (total)	< 10.00	<0.65	< 10.00	<0.60	28.1	<0.60	29.5	21.6	0.80	21.6	*	16.5	<0.60	18.7	0.62
Cobalt	4.72 J	<0.60	< 10.00	<0.65	< 10.00	<0.65	< 10.0	< 10.0	<0.65	< 10.0	*	< 10.0	<0.65	< 10.0	<0.65
Copper	< 10.00	2.8	< 10.00	3.3	< 10.00	3.3	< 10.0	< 10.0	3.2	< 10.0	*	< 10.0	2.7	< 10.0	2.3
Iron	1300	525	215	940	806	665	626	385	680	385	*	516	290	157	570
Lead	< 5.00	1.4	< 5.00	1.6	< 5.00	<1.3	6.48	< 5.00	1.5	< 5.00	*	< 5.00	<1.3	< 5.00	3.0
Magnesium	545	435.0	846	690	864	715	850	983	720	983	*	1000	800	9920	690
Manganese	133	61.5	15.1	78.5	134	26.6	76.2	69.2	27.7	69.2	N	39.5	27.2	10.4	22.8
Mercury		<0.10		<0.10		<0.10			<0.10		O		<0.10		<0.10
Nickel	< 10.0	<1.2	11	<1.2	19.8	<1.2	21.5	14.9	<1.2	14.9	T	13.4	<1.2	13.5	<1.2
Potassium	1540	488.0	1630	1350	1880	1130	1680	1360	1130	1360		1210	444	1190	373
Selenium	< 2.00	<1.5	2.72	<1.5	< 2.00	1.5	< 2.00	< 2.00	<1.5	< 2.00	S	< 2.00	<1.5	< 2.00	<1.5
Silver	1.62 BJ	0.8	< 2.00	<0.60	< 2.00	<0.60	< 2.00	< 2.00	0.62	< 2.00	A	< 2.00	<0.60	< 2.00	<0.60
Sodium	1940 J	2530	3620	2640	3580	2600	3540	4000	2660	4000	M	3940	3020	3960	2820
Thallium		<2.8		<2.8		<2.8			<2.8		P		<2.8		<2.8
Vanadium	< 10.0	<0.70	< 10.0	<0.70	< 10.0	<0.70	< 10.0	< 10.0	<0.70	< 10.0	L	< 10.0	<0.70	< 10.0	<0.70
Zinc	< 20.0	13.0	< 20.0	15.2	32.5	0.55	31	34.2	35.4	34.2	E	25.6	17.8	27.8	17.2
Explosives						<1.2			<1.2		D				
2-Amino-4,6-dinitrotoluene		<1.2		<1.2		<1.2			<1.2		*		<2.5		<1.2
4-Amino-2,6,dinitrotoluene		<1.2		<1.2		<1.2			<1.2		*		<2.5		<1.2
1,3-Dinitrobenzene	< 1.00	**<1.2**	< 1.00	**<1.2**	< 1.00	**<1.2**	< 1.00	< 1.00	**<1.2**	< 1.00	*	0.431 JC	<2.5	< 1.00	**<1.2**
2,4-Dinitrotoluene	< 1.00	**<1.2**	< 1.00	**<1.2**	< 1.00	**<1.2**	< 1.00	< 1.00	**<1.2**	< 1.00	*	0.326 JC	<2.5	< 1.00	**<1.2**
2,6-Dinitrotoluene		<1.2		<1.2		<2.6			<2.6		*		<2.5		<1.2
HMX		<2.6		<2.6		<1.2			<1.2		*		<5.5		<2.6
Nitrobenzene	< 1.00 L	**<1.2**	< 1.00	**<1.2**	< 1.00	**<2.6**	< 1.00	< 1.00	**<2.6**	< 1.00	*	< 1.00	**<2.5**	< 1.00	**<1.2**
2-Nitrotoluene	< 1.00 R	**<2.6**	< 1.00	**<2.6**	4.99 U	<2.6	5.61 U	3.66	<2.6	3.66	*	0.652 JC	<5.5	< 1.00	**<2.6**
3-Nitrotoluene	< 1.00	**<2.6**	< 1.00	**<2.6**	< 1.00	**<2.6**	< 1.00	< 1.00	**<2.6**	< 1.00	*	< 1.00	**<5.5**	< 1.00	**<2.6**
4-Nitrotoluene		<2.6		<2.6		<2.6			<2.6		*		<5.5		<2.6
RDX		<2.6		<2.6		<2.6			<2.6		*		<5.5		<2.6
Tetryl		<2.6		<2.6		<1.2			<1.2		*		<5.5		<2.6
1,3,5-Trinitrobenzene		<1.2		<1.2		<1.2			<1.2		*		<2.5		<1.2
2,4,6-Trinitrotoluene		<1.2		<1.2							*		<2.5		<1.2
Pesticides 4,4'-DDD	< 0.160	**<0.10**	0.04	**<0.10**	0.04	**<0.10**	0.026 JC	< 0.040	**<0.11**	< 0.040	*	< 0.040	**<0.10**	< 0.040	**<0.10**
4,4'-DDE	< 0.160	**<0.10**	0.04	**<0.10**	0.04	**<0.10**	0.019 JC	< 0.040	**<0.11**	< 0.040	*	< 0.040	**<0.10**	< 0.040	**<0.10**
4,4'-DDT	< 0.160	**<0.10**	0.04	**<0.10**	0.04	**<0.10**	< 0.040	< 0.040	**<0.11**	< 0.040	*	< 0.040	**<0.10**	< 0.040	**<0.10**
Aldrin		<0.052		<0.052		<0.052			<0.053		*		<0.051		<0.052
alpha-Benzenehexachloride	< 0.080 J	<0.052	< 0.020	**<0.052**	< 0.020	<0.052	< 0.020	< 0.020	**<0.053**	< 0.020	*	< 0.020	**<0.051**	< 0.020	**<0.052**
alpha-Endosulfan/Endosulfan I	< 0.080	<0.052	0.181 RU	<0.052	0.682 RU	<0.052	< 0.020 K	0.233 RC	**<0.053**	0.233 RC	*	< 0.020	**<0.051**	< 0.020	**<0.052**
Endosulfan II		<0.10		<0.10		<0.10			<0.11		*		<0.10		<0.10
beta-Benzenehexachloride	0.130 U	<0.052	< 0.020	**<0.052**	< 0.020	<0.052	< 0.020	< 0.020	**<0.053**	< 0.020	*	< 0.020	**<0.051**	< 0.020	**<0.052**
delta-Benzenehexachloride		<0.052		<0.052		<0.052			<0.053		*		<0.051		<0.052
gamma-BHC (Lindane)	< 0.080 J	<0.052	< 0.020	**<0.052**	< 0.020	**<0.052**	< 0.020	< 0.020	**<0.053**	< 0.020	*	< 0.020	**<0.051**	< 0.020	**<0.052**
Chlordane-alpha		<0.052		<0.052		<0.052			<0.053		*		<0.051		<0.052
Chlordane-gamma		<0.052		<0.052		**<0.052**			<0.053		*		<0.051		<0.052
Dieldrin		<0.10		<0.10		<0.10			<0.11		*		<0.10		<0.10
Endosulfan sulfate		<0.10		<0.10		<0.10			<0.11		*		<0.10		<0.10
Endrin		<0.10		<0.10		<0.10			<0.11		*		<0.10		<0.10
Endrin aldehyde		<0.10		<0.10		<0.10			<0.11		*		<0.10		<0.10
Endrin ketone		<0.10		<0.10		<0.10			<0.11		*		<0.10		<0.10
Heptachlor		<0.052		<0.052		<0.052			<0.053		*		<0.051		<0.052
Heptachlor epoxide		<0.052		<0.052		<0.052			<0.053		*		<0.051		<0.052
Methoxychlor		<0.052		<0.52		<0.52			<0.53		*		<0.51		<0.52
Toxaphene		<5.2		<5.2		<5.2			<5.3		*		<5.1		
ɔ3 values															

Table 4-14

Comparison of 1993 and 1998 Surface Water Quality for Selected Metals

Metal	Comparisons between 1998 and 1993 Levels			
	Lower in 98	Higher In 98	Equal	Not Possible
Arsenic	9	1		3
Calcium	12	1		
Chromium	8			5
Copper	2	3		8
Iron	8	5		
Lead	4	1		8
Manganese	9	4		
Nickel	6			7
Zinc	7	2	1	3

TABLE 4-15: COMPARISON OF 1998 SURFACE WATER METAL LEVELS WITH ECOLOGICAL SCREENING CRITERIA

SHEET 1 OF 2

Brooks/Ponds/Wetlands			New Cranberry Pond				Heron Pond	Sierra Wetland				Heron Pond	Slate Rock Brook					
Metal	Screening Values		SPD-98-01X	'-01XDuplicate	SPD-98-02X	SPD-98-03X	SPD-98-04X	SPD-98-05X	SPD-98-06X	'-06XDuplicate	SPD-98-07X	SPD-98-08X	SPD-98-09X	SPD-98-10X	SPD-98-11X	SPD-98-13X	SPD-98-14X	SPD-98-15X
	ug/l	Source	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Antimony	30.0	US EPA	<5.0	<5.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Arsenic	50.0	Quebec	<5.0	<5.0	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	2.4	1.8	<1.6	<1.6	<1.6	1.9
Barium	50,000	Quebec	<10.0	<10.0	5.2	3.8	2.4	18.8	8.0	8.2	7.2	2.9	4.3	3.7	3.7	3.5	3.6	4.0
Beryllium	5.3	US EPA	<3.0	<3.0	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	0.11
Cadmium	0.47	US EPA	<3.0	<3.0	0.33	0.38	0.31	0.39	0.26	0.28	0.38	0.4	0.34	0.29	0.36	0.29	0.25	0.38
Chromium (total)	11.0	US EPA	<5.0	<5.0	1.1	2.1	<0.60	1.9	<0.60	<0.60	0.95	<0.65	<0.60	<0.60	0.80	<0.60	0.62	0.78
Cobalt	5.0	US EPA	<5.0	<5.0	<0.65	<0.65	<0.65	<0.65	<0.65	<0.65	<0.65	<0.60	<0.65	<0.65	<0.65	<0.65	<0.65	<0.65
Copper	2.03	US EPA	<5.0	5.0	5.3	6.8	2.8	17.0	4.7	4.4	6.0	2.8	3.3	3.3	3.2	2.7	2.3	3.5
Iron	1,000	US EPA	472	481	805	475	353	4240	98.0	130	487	525	940	665	680	290	570	710
Lead	0.23	US EPA	3.5	5.2	2.3	<1.3	<1.3	19.0	<1.3	<1.3	<1.3	1.4	1.6	<1.3	1.5	<1.3	3.0	1.6
Manganese	100	US EPA	32.7	35.5	58.0	29.6	54	498	23.4	23.2	21.0	61.5	78.5	26.6	27.7	27.2	22.8	33.8
Mercury	0.012	US EPA	<0.20	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	15.4	US EPA	<5.0	<5.0	<1.2	<1.2	1.4	3.5	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
Selenium	20.0	US EPA	<5.0	<5.0	<1.5	<1.5	<1.5	1.5	<1.5	<1.5	<1.5	<1.5	<1.5	1.5	<1.5	<1.5	<1.5	1.5
Silver	0.12	US EPA	<3.0	<3.0	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	0.8	<0.60	<0.60	0.62	<0.60	<0.60	<0.60
Thallium	0.30	Ontario	<10.0	<10.0	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8
Vanadium	7.0	Ontario	<5.0	<5.0	<0.70	<0.70	<0.70	2.6	<0.70	<0.70	0.86	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70
Zinc	18.50	US EPA	19.7	14.9	31.0	16.2	15.8	32.9	20.0	0.55	17.4	13.0	15.2	0.55	35.4	17.8	17.2	0.55

Notes:

US EPA and Quebec values are chronic criteria. Ontario values are proposed Provincial Water Quality Guidelines.

Values for cadmium, copper, lead, nickel, and zinc are hardness dependent. 12.7 mg/l hardness used (E&E, 1994).

Aluminum excluded since US EPA criteria is based on clay free water sample.

Calcium, magnesium, potassium, and sodium excluded since no criteria are available for these metals.

No sample taken at station SPD-98-12X.

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TABLE 4-15: COMPARISON OF 1998 SURFACE WATER METAL LEVELS WITH ECOLOGICAL SCREENING CRITERIA
SHEET 2 OF 2

Brooks/Ponds/Wetlands			Slate R. B.	Spec. Pond	Spectacle Brook			Clear Pond		Spec. Wet	Ponk. Pond	Ponakin Brook			Ponakin Brook Wetland			Cranberry Pond	
Metal	Screening Values		SPD-98-16X	SPD-98-17X	SPD-98-18X	SPD-98-19X	-19X Duplicate	SPD-98-20X	SPD-98-21X	SPD-98-22X	SPD-98-23X	SPD-98-24X	SPD-98-25X	SPD-98-26X	SPD-98-27X	SPD-98-28X	SPD-98-29X	SPD-98-30X	SPD-98-31X
	ug/l	Source	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
Antimony	30.0	US EPA	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<5.0	<3.9	<2.0	<2.0
Arsenic	50.0	Quebec	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	5.5	<1.6	<1.6	2.4	2.2	5.9	<5.0	21.6	<1.6	<1.6
Barium	50,000	Quebec	3.5	12.2	10.4	16.0	15.5	4.7	5.4	9.8	4.6	4.0	2.9	2.4	9.2	10.0	24.7	5.1	5.4
Beryllium	5.3	US EPA	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<0.11	<3.0	0.54	<0.11	<0.11
Cadmium	0.47	US EPA	0.24	0.23	0.28	0.16	0.31	0.28	0.32	0.32	0.34	0.30	0.31	0.22	0.29	<3.0	0.37	0.25	0.30
Chromium (total)	11.0	US EPA	<0.60	< 0.60	0.72	<0.60	<0.60	<0.60	<0.60	0.64	<0.60	<0.60	<0.60	<0.60	0.91	<5.0	2.6	<0.60	<0.60
Cobalt	5.0	US EPA	<0.65	<0.65	<0.65	0.90	<0.65	<0.65	<0.65	0.94	<0.65	<0.65	<0.65	<0.65	3.0	<5.0	11.1	<0.65	<0.65
Copper	2.03	US EPA	2.9	2.6	4.1	4.1	5.8	2.5	2.9	3.3	2.9	3.0	2.5	2.3	3.7	<5.0	4.8	4.6	5.0
Iron	1,000	US EPA	710	202	298	250	268	188	284	3620	442	510	432	354	2920	786	11800	313	344
Lead	0.23	US EPA	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	3.2	<1.3	<1.3	1.6	<1.3	4.6	3.1	9.9	8.2	9.0
Manganese	100	US EPA	41.6	61.5	266	318	310	53.5	86.5	248	23.6	27.5	33.5	22.0	550	76.5	2020	22.2	21.4
Mercury	0.012	US EPA	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.20	<0.20	<0.10	<0.10
Nickel	15.4	US EPA	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	< 5.0	3.6	<1.2	<1.2
Selenium	20.0	US EPA	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	<5.0	<3.0	<1.5	<1.5
Silver	0.12	US EPA	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	0.62	<0.60	<0.60	<0.60	0.80	<0.60	<0.60	<3.0	<1.2	<0.60	<0.60
Thallium	0.30	Ontario	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<2.8	<10.0	<5.7	<2.8	<2.8
Vanadium	7.0	Ontario	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	1.4	<0.70	<0.70	0.96	<0.70	2.0	<5.0	6.1	<0.70	<0.70
Zinc	18.50	US EPA	14.2	11.1	14.9	15.2	20.4	21.2	10.7	52.5	13.0	11.6	14.8	12.0	33.6	10	56.5	17.9	12.8

Notes:
US EPA and Quebec values are chronic criteria. Ontario values are proposed Provincial Water Quality Guidelines.
Values for cadmium, copper, lead, nickel, and zinc are hardness dependent. 12.7 mg/l hardness used (E&E, 1994).
Aluminum excluded since US EPA criteria is based on clay free water sample.
Calcium, magnesium, potassium, and sodium excluded since no criteria are available for these metals.

Brooks/Ponds/Wetlands		New Cranberry Pond				Heron Pond	Sierra Wetland				Heron Pond
SAMPLE ID	Screening Values	SPD-98-01X	-01XDuplicate	SPD-98-02X	SPD-98-03X	SPD-98-04X	SPD-98-05X	SPD-98-06X	-06X Duplicate	SPD-98-07X	SPD-98-08X
units	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
TAL Metals Aluminum	1620-10500	9480	7430	3610	6590	9060	7690	3920	4160	4800	**16700**
Antimony	0.5	<2.4	**2.2**	**5.7**	<5.2	<4.5	<2.8	<0.64	<0.67	<0.65	<1.9
Arsenic	0.80-26.0	14.5	10.4	11.5	21.5	**50.4**	4.9	1.6	2.1	1.8	9.6
Barium	8.0-26.2	**41.3**	**35.5**	**65.4**	**63.9**	34.0	**71.4**	**38.1**	**44.5**	19.3	**32.3**
Beryllium	0.5	0.39	0.32	0.46	<0.45	0.33	0.86	**1.1**	**1.6**	0.39	**0.64**
Cadmium	0.5	<1.3	<0.98	<2.5	<2.9	0.95	<1.6	0.36	<0.38	<0.37	**0.65**
Calcium	<500-1100	**1980**	**1530**	**5480**	**6190**	**2130**	**2520**	**1510**	**1670**	267	**1130**
Chromium (total)	<4.1-15.9	10.6	8.3	5.0	14.6	10.0	4.6	6.4	6.8	2.6	14.4
Cobalt	<1.4-7.2	4.3	3.9	2.0	5.5	<1.5	<0.84	1.6	1.7	0.26	3.2
Copper	2.2-14.3	**47.6**	**50.6**	**21.4**	**29.1**	**16.1**	**31.1**	5.9	6.5	3.7	13.0
Iron	2380-7900	7050	5550	4340	8410	**10700**	2040	2740	2600	1640	**11100**
Lead	3.5-12.5	**54.8**	**45.7**	**101**	**109**	**55.7**	**357**	**22.7**	**29.7**	**18.9**	**27.9**
Magnesium	<500-3100	1220	1050	708	975	16.3	407	686	660	95.1	1400
Manganese	83.9-600	132	96.7	171	455	0.56	39.8	47.9	47.1	8.6	88.5
Mercury		<0.24	0.21	0.24	0.27	0.13	0.34	0.06	0.06	0.07	0.07
Nickel	<1.7-18.6	7.8	5.7	2.1	6.7	4.7	2.6	3.6	3.5	1.3	8.8
Potassium	<200-292	**669**	**553**	**346**	**872**	**539**	**381**	**456**	**436**	281	**451**
Selenium	0.2	<2.6	<1.9	**6.3**	<5.6	**4.1**	**3.1**	**1.1**	**1.8**	**0.74**	<1.5
Silver	0.2	<0.72	<0.53	<1.4	<1.6	<1.4	<0.84	<0.20	<0.20	<0.20	<0.59
Sodium	<200-289	<258	209	<483	630	381	<300	83.2	96.8	77.1	<160
Thallium		<2.6	<1.9	<4.8	<5.6	<6.6	<3.0	<0.70	<0.73	<0.71	<2.8
Vanadium	<3.4-13.3	**20.3**	**16.1**	**15.9**	**23.3**	**19.1**	13.1	4.6	4.4	4.3	**20.8**
Zinc	14.4-55.6	**65.7**	54.6	**56.0**	**147**	32.6	33.0	9.9	12.1	6.1	40.9
Units		µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Explosives											
2-Amino-4,6-dinitrotoluene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
4-Amino-2,6,dinitrotoluene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
1,3-Dinitrobenzene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
2,4-Dinitrotoluene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
2,6-Dinitrotoluene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
HMX		<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
Nitrobenzene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
2-Nitrotoluene		<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
3-Nitrotoluene		<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
4-Nitrotoluene		<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
RDX		<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
Tetryl		<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
1,3,5-Trinitrobenzene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
2,4,6-Trinitrotoluene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
%Total Organic Carbon		22.1	8.27	55.9	68.7	19.3	35.3	10.6	11.8	12.9	8.98
Grainsize % silt or clay		37		28	42	26	19	20		56	24

Note: % silt or clay defined by sieve mesh size #200

> Screening Value Bolded values exceed screening values in Appendix A of Ecological Sampling Work Plan (Stone & Webster, 1998)

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1998 Sediment Results

Brooks/Ponds/Wetlands		Slate Rock Brook								Spectacle Pond	Spectacle Brook		
SAMPLE ID	Screening Values	SPD-98-09X	SPD-98-10X	SPD-98-11X	SPD-98-12X	SPD-98-13X	SPD-98-14X	SPD-98-15X	SPD-98-16X	SPD-98-17X	SPD-98-18X	SPD-98-19X	-19XDuplicate
Units	µg/g	µg/g	µg/g	µg/g	*	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
TAL Metals Aluminum	1620-10500	7790	5630	7190	*	8930	**10700**	6850	7140	5450	**14200**	2860	2480
Antimony	0.5	<0.53	<1.3	<0.99	*	<5.9	<1.2	<0.91	<0.75	<0.55	<1.4	<0.31	<0.40
Arsenic	0.80-26.0	11.4	6.2	9.1	*	7.7	6.5	9.0	9.4	4.0	4.0	2.1	3.0
Barium	8.0-26.2	20.8	21.4	23.8	*	**70.3**	24.6	17.1	12.4	12.6	23.9	7.2	8.3
Beryllium	0.5	0.29	0.31	0.35	*	**0.82**	0.30	0.27	0.21	0.18	1.4	0.11	0.11
Cadmium	0.5	0.25	0.47	0.42	*	**2.1**	0.49	0.33	0.28	0.22	<0.78	<0.18	<0.23
Calcium	<500-1100	1030	**1100**	**1100**	*	**7000**	**3810**	772	583	478	**1700**	205	225
Chromium (total)	<4.1-15.9	14.1	10.7	12.4	*	14.9	**16.8**	**37.1**	10.9	9.3	7.1	4.4	4.5
Cobalt	<1.4-7.2	4.3	4.9	5.8	*	4.8	5.0	4.3	3.8	2.3	0.96	1.3	1.5
Copper	2.2-14.3	12.0	9.7	10.4	*	**27.4**	**14.3**	8.8	11.0	5.9	12.0	1.3	1.6
Iron	2380-7900	**13100**	7420	**9670**	*	6320	**15200**	**10700**	**13400**	**8420**	2500	4190	4110
Lead	3.5-12.5	9.4	**25.3**	**26.9**	*	**96.1**	11.9	**18.7**	10.4	10.1	**27.2**	4.6	5.1
Magnesium	<500-3100	2780	1400	1710	*	1540	2760	1860	2120	1750	691	880	812
Manganese	83.9-600	156	257	269	N	163	202	197	210	94.3	136	124	201
Mercury		<0.02	0.04	<0.04	O	0.22	<0.04	0.03	<0.02	<0.02	0.08	<0.02	<0.02
Nickel	<1.7-18.6	12.7	6.5	8.2	T	12.9	17.2	17.4	9.9	8.5	4.1	3.8	3.3
Potassium	<200-292	**833**	**447**	**548**		**475**	**724**	**490**	**369**	**451**	**456**	170	118
Selenium	0.2	<0.40	**1.4**	**0.85**	S	**4.8**	**1.0**	**0.77**	<0.58	<0.43	**2.1**	<0.34	<0.44
Silver	0.2	<0.16	<0.40	<0.30	A	<1.8	<0.37	<0.28	<0.23	<0.17	<0.42	<0.09	<0.12
Sodium	<200-289	92.8	142	106	M	<491	209	97.4	98.1	88.2	**345**	54.9	<43.7
Thallium		<0.77	<1.9	<1.4	P	<8.6	<1.8	<1.3	<1.1	<0.81	<1.5	<0.34	<0.44
Vanadium	<3.4-13.3	11.8	9.8	11.9	L	**16.3**	11.9	10.4	9.2	7.5	6.3	3.4	3.3
Zinc	14.4-55.6	31.0	39.1	41.6	E	**97.1**	39.0	31.9	33.5	28.2	17.1	8.9	8.6
Units		µg/kg	µg/kg	µg/kg	D	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Explosives					*								
2-Amino-4,6-dinitrotoluene		<250.0	<250.0	<250.0	*	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
4-Amino-2,6,dinitrotoluene		<250.0	<250.0	<250.0	*	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
1,3-Dinitrobenzene		<250.0	<250.0	<250.0	*	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
2,4-Dinitrotoluene		<250.0	<250.0	<250.0	*	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
2,6-Dinitrotoluene		<250.0	<250.0	<250.0	*	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
HMX		<500.0	<500.0	<500.0	*	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
Nitrobenzene		<250.0	<250.0	<250.0	*	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
2-Nitrotoluene		<500.0	<500.0	<500.0	*	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
3-Nitrotoluene		<500.0	<500.0	<500.0	*	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
4-Nitrotoluene		<500.0	<500.0	<500.0	*	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
RDX		<500.0	<500.0	<500.0	*	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
Tetryl		<500.0	<500.0	<500.0	*	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
1,3,5-Trinitrobenzene		<250.0	<250.0	<250.0	*	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
2,4,6-Trinitrotoluene		<250.0	<250.0	<250.0	*	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
%Total Organic Carbon		<.132	7.17	13.6	*	42.2	4.52	7.25	5.74	.906	22.6	2.96	.395
Grainsize % silt or clay		2	27	16	*	50	6	14	57400	2	23	2	

Note: %silt or clay defined by sieve mesh size #200

> Screening Value Bolded values exceed screening values in Appendix A of Ecological Sampling Work Plan (Stone & Webster, 1998)

Brooks/Ponds/Wetlands		Clear Pond		Spectacle Brk. Wetland	Ponakin Brook Pond	Ponakin Brook			Ponakin Brook Wetland			Cranberry Pond	
SAMPLE ID	Screening Values	SPD-98-20X	SPD-98-21X	SPD-98-22X	SPD-98-23X	SPD-98-24X	SPD-98-25X	SPD-98-26X	SPD-98-27X	SPD-98-28X	SPD-98-29X	SPD-98-30X	SPD-98-31X
Units	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
TAL Metals Aluminum	1620-10500	8780	7270	**14800**	7180	4030	6570	**13100**	**20900**	**19900**	**21000**	**11200**	2730
Antimony	0.5	<1.6	<1.0	<4.5	<2.6	<1.1	<0.52	<0.50	<2.7	<1.3	<2.7	<0.91	<0.93
Arsenic	0.80-26.0	7.5	5.0	**56.5**	14.1	13.3	10.5	20.9	**49.6**	**33.2**	**52.7**	9.6	1.3
Barium	8.0-26.2	23.7	19.1	**105**	33.0	22.1	10.4	14.6	**59.5**	**86.4**	**121**	25.5	10.0
Beryllium	0.5	0.31	0.30	1.6	0.35	0.21	0.22	0.44	**0.91**	**1.7**	**2.2**	0.40	0.12
Cadmium	0.5	**0.52**	0.34	**2.5**	**0.66**	0.31	0.22	0.54	**0.90**	**1.0**	**1.8**	0.46	0.23
Calcium	<500-1100	**1960**	974	**4910**	**2460**	729	332	526	**2500**	**2600**	**4420**	**1210**	440
Chromium (total)	<4.1-15.9	8.0	7.6	**26.5**	10.5	6.4	9.2	**18.2**	**21.1**	**18.4**	**19.6**	**43.9**	2.6
Cobalt	<1.4-7.2	2.0	2.0	**14.8**	4.2	4.0	3.3	6.8	**15.6**	**22.2**	**33.4**	4.1	<0.31
Copper	2.2-14.3	**135**	7.2	**30.9**	**22.7**	7.2	5.7	9.6	**35.7**	**15.9**	**26.9**	**33.6**	8.5
Iron	2380-7900	7850	5690	**23400**	**9870**	**8360**	**10200**	**27800**	**28200**	**19400**	**22300**	**17200**	881
Lead	3.5-12.5	**21.9**	**21.5**	**87.3**	**20.3**	6.1	5.7	12.4	**29.9**	**48.2**	**67.8**	**85.7**	**42.8**
Magnesium	<500-3100	914	862	2250	1790	1090	1700	3970	2640	2440	2760	**3810**	139
Manganese	83.9-600	112	101	**777**	346	425	185	432	**1590**	**1260**	**1700**	190	15.2
Mercury		0.04	0.03	0.21	<0.07	<0.03	<0.02	<0.02	0.09	0.14	0.27	<0.02	0.03
Nickel	<1.7-18.6	5.3	5.1	**19.3**	9.2	4.5	7.8	17.4	15.0	16.6	**23.0**	**19.4**	1.3
Potassium	<200-292	225	206	**804**	**591**	**540**	**316**	**415**	**1000**	**1270**	**1550**	**881**	165
Selenium	0.2	<1.2	<0.78	**5.5**	<2.0	<0.82	<0.40	**1.2**	<2.1	**1.5**	**3.1**	<0.70	<0.72
Silver	0.2	**0.50**	<0.31	**1.5**	**0.81**	<0.33	<0.16	<0.16	<0.82	<0.39	<0.82	**0.87**	<0.29
Sodium	<200-289	133	112	**507**	246	115	64.1	63.5	**312**	221	<291	113	108
Thallium		<2.3	<1.5	<6.6	<3.8	<1.6	<0.75	<0.74	<3.9	<1.4	<2.9	<1.3	<1.4
Vanadium	<3.4-13.3	12.3	10.2	**38.3**	12.9	7.0	8.8	**18.4**	**26.9**	0.39	33.3	**16.9**	2.8
Zinc	14.4-55.6	**59.5**	30.1	**182**	**61.0**	28.8	23.8	45.7	**78.3**	1.4	**145**	0.26	8.3
Units		µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Explosives													
-Amino-4,6-dinitrotoluene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
4-Amino-2,6,dinitrotoluene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
1,3-Dinitrobenzene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
2,4-Dinitrotoluene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
2,6-Dinitrotoluene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
HMX		<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
Nitrobenzene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
2-Nitrotoluene		<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
3-Nitrotoluene		<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
4-Nitrotoluene		<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
RDX		<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
Tetryl		<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0	<500.0
1,3,5-Trinitrobenzene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
2,4,6-Trinitrotoluene		<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0	<250.0
%Total Organic Carbon		6.84	2.69	28.3	9.23	3.34	0.904	0.621	12.9	11.1	22.6	0.841	5.26
Grainsize % silt or clay		11	17	55	6	6	4	0	48	55	44	3	13

Note: %silt or clay defined by sieve mesh size #200

> **Screening Value** Bolded values exceed screening values in Appendix A of Ecological Sampling Work Plan (Stone & Webster, 1998)

TABLE 4-17: RELATIVE CONCENTRATIONS OF SELECTED METALS IN 1998 SEDIMENT SAMPLES

Location	Sample ID Number	As	Cd	Cr	Cu	Pb	Mn	Hg	Ni	Zn	TOC
SPIA MONITORING AREA											
New Cranberry Pond	SPD-98-01	Upper	Low	Middle	Upper	Upper	Middle	Low	Low	Upper	Upper
New Cranberry Pond	SPD-98-02	Middle	Low	Low	Middle	Upper	Middle	Upper	Low	Upper	Upper
New Cranberry Pond	SPD-98-03	Upper	Low	Upper	Upper	Upper	Upper	Upper	Low	Upper	Upper
Heron Pond	SPD-98-04	Upper	Upper	Middle	Middle	Upper	Low	Low	Low	Low	Upper
Heron Pond	SPD-98-08	Low	Middle	Middle	Middle	Low	Low	Low	Low	Low	Low
Sierra Wetland	SPD-98-05	Low	Low	Low	Upper	Upper	Low	Upper	Low	Low	Upper
Sierra Wetland	SPD-98-06	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Sierra Wetland	SPD-98-07	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Slate Rock Brook	SPD-98-09	Low	Low	Middle	Middle	Low	Middle	Low	Upper	Middle	Low
Slate Rock Brook	SPD-98-10	Low	Middle	Middle	Middle	Middle	Upper	Low	Low	Middle	Low
Slate Rock Brook	SPD-98-11	Middle	Middle	Middle	Middle	Middle	Upper	Low	Low	Middle	Upper
Slate Rock Brook	SPD-98-13	Middle	Upper	Upper	Upper	Upper	Middle	Upper	Upper	Upper	Upper
Slate Rock Brook	SPD-98-14	Low	Middle	Upper	Middle	Low	Middle	Low	Upper	Middle	Low
Slate Rock Brook	SPD-98-15	Low	Low	Upper	Low	Low	Middle	Low	Upper	Middle	Low
Slate Rock Brook	SPD-98-16	Middle	Low	Middle	Low	Low	Middle	Low	Low	Middle	Low
Cranberry Pond	SPD-98-30	Low	Low	Upper	Upper	Upper	Middle	Low	Upper	Low	Low
Cranberry Pond	SPD-98-31	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
SPIA BACKGROUND AREAS											
Spectacle Pond	SPD-98-17	Low	Low	Middle	Low	Low	Low	Low	Low	Low	Low
Spectacle Brook	SPD-98-18	Low	Low	Low	Low	Low	Low	Low	Low	Low	Upper
Spectacle Brook	SPD-98-19	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Clear Pond	SPD-98-20	Low	Low	Low	Upper	Low	Low	Low	Low	Upper	Low
Clear Pond	SPD-98-21	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
Spectacle Brk Wetland	SPD-98-22	Upper	Upper	Upper	Upper	Upper	Upper	Upper	Upper	Upper	Upper
Ponakin Brook Pond	SPD-98-23	Upper	Middle	Low	Upper	Middle	Upper	Low	Low	Upper	Low
Ponakin Brook	SPD-98-24	Upper	Low	Low	Low	Low	Upper	Low	Low	Low	Low
Ponakin Brook	SPD-98-25	Middle	Low	Middle	Low	Low	Middle	Low	Low	Low	Low
Ponakin Brook	SPD-98-26	Upper	Middle	Upper	Low	Low	Upper	Low	Upper	Upper	Low
Ponakin Brk Wetland	SPD-98-27	Upper	Upper	Upper	Upper	Middle	Upper	Low	Upper	Upper	Low
Ponakin Brk Wetland	SPD-98-28	Upper	Upper	Upper	Middle	Upper	Upper	Upper	Upper	Low	Low
Ponakin Brk Wetland	SPD-98-29	Upper	Upper	Upper	Upper	Upper	Upper	Upper	Upper	Upper	Upper

Non detect or lowest one-third: [ ] Middle one-third: [ ] Upper one-third [■]

TABLE 4-18
CORRELATIONS BETWEEN METAL LEVELS AND TOC AND PERCENT FINES

Metal	Correlation Coefficient (r)	
	TOC	Percent Fines (silt + clay)
Arsenic	0.217	0.522
Barium	0.612	0.730
Beryllium	0.247	0.608
Cadmium	0.679	0.686
Calcium	0.826	0.574
Chromium	-0.089	0.067
Copper	0.596	0.547
Iron	-0.171	0.150
Lead	0.578	0.244
Magnesium	-0.309	-0.158
Manganese	0.096	0.498
Mercury	0.697	0.438
Nickel	-0.140	0.141
Selenium	0.785	0.529
Vanadium	0.412	0.411
Zinc	0.590	0.510

Notes: If metal was not detected, value set at one-half detection limit.
$P < 0.05 = 0.361$; $p < 0.01 = 0.463$; df = 28
Correlations significant at $p < 0.01$ are shaded.
For copper, samples SPD-98-20X and SPD-30X are deleted as outliers.

TABLE 4-19
METAL LEVELS IN SPIA VS BACKGROUND LOCATIONS

Metal	Monitored Area (n=17)		Background Area (n=13)	
	Mean (mg/kg)	Range (mg/kg)	Mean (mg/kg)	Range (mg/kg)
Arsenic	10.9	1.3 - 50.4	21.0	2.1 – 56.5
Cadmium	0.67	< 0.37 – 2.1	0.73	< 0.18 – 2.5
Chromium	13.6	2.6 – 43.9	12.8	4.4 – 26.5
Copper	17.9	3.7 – 47.6	24.3	1.3 – 135
Lead	63.2	9.4 – 357	27.9	4.6 – 67.8
Manganese	153	0.5 – 210	560	94.3 – 1700
Mercury	0.10	< 0.02 – 0.34	0.07	< 0.02 – 0.27
Nickel	8.4	2.1 – 19.4	10.7	3.8 – 23.0
Zinc	41.9	0.26 – 147	54.6	1.4 – 182
TOC (%)	18.8	0.06 – 68.7	9.6	0.6 – 22.6
(% Fines)	22.9	3 – 50	21	0 – 55

TABLE 4-20

RESULTS OF STATISTICAL ANALYSIS

Factor	DF	SS	MS	F
TOC	1	42,400	42,400	18.4*
% Fines	1	1281	1281	0.56
Location	1	1271	1271	0.55
Habitat	2	31,038	15,519	6.73*
Location X Habitat	2	55.9	55.9	0.02
Residual	22	50,727	2306	
Total	29	1267445		

*: $p < 0.01$; $r^2 = 0.60$

Ta[illegible] 1

Comparison of 19[illegible] Sediment Results

SAMPLE ID		SPD-93-01X	SPD-98-01X	-01XDuplicate 1998	SPD-93-02X	SPD-98-02X	SPD-93-03X	SPD-98-03X	SPD-93-04X	SPD-98-04X	SPD-93-05X	SPD-98-05X	SPD-93-06X	SPD-98-06X	-06XDuplicate 1998	SPD-93-07X	SPD-98-07X
Units		µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
TAL Metals	Aluminum	5900	**9480**	**7430**	7740	3610	2200	**6590**	5000	**9060**	5800	**7690**	17000	3920	4160	6600	4800
	Antimony		<2.4	2.2		5.7		<5.2		<4.5		<2.8		<0.64	<0.67		<0.65
	Arsenic	3.37	**14.5**	**10.4**	15.5	11.5	1.91	**21.5**	3.24	**50.4**	4.75	**4.9**	23	1.6	2.1	9.78	1.8
	Barium	12	**41.3**	**35.5**	73.8	65.4	10.1J	**63.9**	20.3	**34.0**	18.8	**71.4**	78.2	38.1	44.5	30	19.3
	Beryllium	0.321J	**0.39**	**0.32**	0.508J	0.46	0.120J	<0.45	0.282J	**0.33**	0.246J	**0.86**	0.805J	**1.1**	**1.6**	0.335J	**0.39**
	Cadmium		<1.3	<0.98		<2.5		<2.9		0.95		<1.6		0.36	<0.38		<0.37
	Calcium	<500	**1980**	**1530**	5380J	**5480**	2190	**6190**	729J	**2130**	926	**2520**	3570	1510	1670	625J	267
	Chromium (total)	6.33B	**10.6**	**8.3**	<2.00	**5.0**	11.0B	**14.6**	8.90B	**10.0**	9.47B	4.6	23	6.4	6.8	10.6B	2.6
	Cobalt	2.76	**4.3**	**3.9**	7.10J	2.0	2.13	**5.5**	2.45	<1.5	3.72	<0.84	13	1.6	1.7	4.36	0.26
	Copper	4.5	**47.6**	**50.6**	30.2	21.4	2.53	**29.1**	4.67	**16.1**	31.8	31.1	19.7	5.9	6.5	3.73	3.7
	Iron	4300	**7050**	**5550**	5730	4340	2800	**8410**	4600	**10700**	5700	2040	18000	2740	2600	4800	1640
	Lead	8.09	**54.8**	**45.7**	92.7	**101**	6.84	**109**	12.1	**55.7**	8.74	**357**	35.7	22.7	29.7	18.3	**18.9**
	Magnesium	853	**1220**	**1050**	<500	**708**	787J	**975**	1350	16.3	1290	407	3360	686	660	1080	95.1
	Manganese	48.3	**132**	**96.7**	224	171	51.9	**455**	57	0.56	118	39.8	170	47.9	47.1	83.5	8.6
	Mercury		<0.24	0.21		0.24		0.27		0.13		0.34		0.06	0.06		0.07
	Nickel	5.96B	**7.8**	5.7	14.2	2.1	4.01B	**6.7**	6.50B	4.7	7.81B	2.6	22.1	3.6	3.5	6.40B	1.3
	Potassium	306	**669**	**553**	858J	346	173J	872	604	539	542	381	1580	456	436	412	281
	Selenium	<0.200R	**<2.6**	**<1.9**	<0.200R	**6.3**	0.968J	<5.6	0.443J	**4.1**	0.465J	**3.1**	<0.200R	**1.1**	**1.8**	<0.200R	0.74
	Silver	<0.200	**<0.72**	**<0.53**	1.90J	<1.4	<0.200	**<1.6**	<0.200	**<1.4**	<0.200	**<0.84**	<0.200	<0.20	<0.20	<0.200	<0.20
	Sodium	156J	<258	**209**	<200	**<483**	<200	**630**	189J	**381**	216J	<300	<200	**83.2**	**96.8**	<0.200	**77.1**
	Thallium		<2.6	<1.9		<4.8		<5.6		<6.6		<3.0		<0.70	<0.73		<0.71
	Vanadium	6.83	**20.3**	**16.1**	26.5	15.9	4.64	**23.3**	9.49	**19.1**	9.91	**13.1**	28.4	4.6	4.4	11.9	4.3
	Zinc	19.1	**65.7**	**54.6**	213	56.0	18.1	**147**	26	**32.6**	45.6	33.0	94.3	9.9	12.1	26.8	6.1
Units		µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Explosives																	
2-Amino-4,6-dinitrotoluene			<250.0	<250.0		<250.0		<250.0		<250.0		<250.0		<250.0	<250.0		<250.0
4-Amino-2,6,dinitrotoluene			<250.0	<250.0		<250.0		<250.0		<250.0		<250.0		<250.0	<250.0		<250.0
	1,3-Dinitrobenzene		<250.0	<250.0		<250.0		<250.0		<250.0		<250.0		<250.0	<250.0		<250.0
	2,4-Dinitrotoluene		<250.0	<250.0		<250.0		<250.0		<250.0		<250.0		<250.0	<250.0		<250.0
	2,6-Dinitrotoluene		<250.0	<250.0		<250.0		<250.0		<250.0		<250.0		<250.0	<250.0		<250.0
	HMX		<500.0	<500.0		<500.0		<500.0		<500.0		<500.0		<500.0	<500.0		<500.0
	Nitrobenzene		<250.0	<250.0		<250.0		<250.0		<250.0		<250.0		<250.0	<250.0		<250.0
	2-Nitrotoluene		<500.0	<500.0		<500.0		<500.0		<500.0		<500.0		<500.0	<500.0		<500.0
	3-Nitrotoluene		<500.0	<500.0		<500.0		<500.0		<500.0		<500.0		<500.0	<500.0		<500.0
	4-Nitrotoluene		<500.0	<500.0		<500.0		<500.0		<500.0		<500.0		<500.0	<500.0		<500.0
	RDX		<500.0	<500.0		<500.0		<500.0		<500.0		<500.0		<500.0	<500.0		<500.0
	Tetryl		<500.0	<500.0		<500.0		<500.0		<500.0		<500.0		<500.0	<500.0		<500.0
	1,3,5-Trinitrobenzene		<250.0	<250.0		<250.0		<250.0		<250.0		<250.0		<250.0	<250.0		<250.0
	2,4,6-Trinitrotoluene		<250.0	<250.0		<250.0		<250.0		<250.0		<250.0		<250.0	<250.0		<250.0
Units		µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g
Total Organic Carbon		41100	**221000**	**82700**	499000	**559000**	49700	**687000**	42100	**193000**	68900	**353000**	192000	106000	118000	36800	**129000**
Grainsize % silt or clay			37			28		42		26		19		20			56

Note: % silt or clay definedby sieve mesh size #200

> 1993 values

For 1993 data:

B - Attributable to field or laboratory contamination

C - Confirmed by reanalysis

J - Estimated Value

K - Result biased high

L - Result biased low

R - Result rejected

U - Unconfirmed (reanalysis performed, compound not found)

SAMPLE ID	SPD-93-08X	SPD-98-08X	SPD-93-09X	SPD-98-09X	SPD-93-10X	SPD-98-10X	SPD-93-11X	-11XDuplicate 1993	SPD-98-11X	SPD-93-12X	SPD-98-12X	SPD-93-13X	SPD-98-13X	SPD-93-14X	SPD-98-14X
Units	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	*	µg/g	µg/g	µg/g	µg/g
TAL Metals Aluminum	8900	16700	2300	7790	12000	5630	2400	2200	7190	869	*	4450	8930	2220	10700
Antimony		<1.9		<0.53		<1.3			<0.99		*		<5.9		<1.2
Arsenic	7.79	9.6	3.28	11.4	11.7	6.2	4.07	2.81	9.1	0.515	*	10.7	7.7	3.9	6.5
Barium	26.7	32.3	7.72	20.8	44.6	21.4	8.16	7.79	23.8	<5.00	*	38.7	70.3	16.3	24.6
Beryllium	0.332J	0.64	<0.500	0.29	<0.500	0.31	<0.500	<0.500	0.35	<0.500	*	<0.500	0.82	<0.500	0.30
Cadmium		0.65		0.25		0.47			0.42		*		2.1		0.49
Calcium	<500	1130	<500	1030	<500	1100	929	<500	1100	<500	*	5080	7000	2260	3810
Chromium (total)	18.4	14.4	6.04B	14.1	18.1	10.7	5.80B	6.20B	12.4	<2.00	*	16.7	14.9	5.87BJ	16.8
Cobalt	6.35	3.2	3.05	4.3	13.6	4.9	3.48	3.74	5.8	<1.00	*	7.72	4.8	29.3	5.0
Copper	6.78	13.0	4.14	12.0	15.1	9.7	4.02	3.68	10.4	14	*	8.75	27.4	5.25	14.3
Iron	13000	11100	6900	13100	13000	7420	5900	5100	9670	966	*	4730	6320	2780	15200
Lead	19.8	27.9	6.8	9.4	70	25.3	8.62	6.61	26.9	3.69	*	25.1	96.1	21.1	11.9
Magnesium	1830	1400	676	2780	1700	1400	1120	<500	1710	<500	*	<500	1540	<500	2760
Manganese	138	88.5	94.8	156	730	257	94.8	170	269	19.8	N	357	163	174	202
Mercury		0.07		<0.02		0.04			<0.04		O		0.22		<0.04
Nickel	10.2	8.8	5.49B	12.7	14.4	6.5	5.54B	5.92B	8.2	2.21B	T	13.4	12.9	6.80B	17.2
Potassium	327J	451	<200	833	<200	447	<200	<200	548	<200		<200	475	<200	724
Selenium	<0.200R	<1.5	<0.200R	<0.40	<0.200R	1.4	<0.200R	<0.200R	0.85	<0.200R	S	1.66J	4.8	0.654J	1.0
Silver	<0.200	<0.59	<0.200	<0.16	<0.200	<0.40	<0.200	<0.200	<0.30	<0.200	A	<0.200	<1.8	<0.200	<0.37
Sodium	<0.200	<160	<0.200	92.8	<0.200	142	<0.200	<0.200	106	<200	M	<200	<491	<200	209
Thallium		<2.8		<0.77		<1.9			<1.4		P		<8.6		<1.8
Vanadium	21.6	20.8	5.41	11.8	25	9.8	6.79	5.74	11.9	<2.00	L	<2.00	16.3	<2.00	11.9
Zinc	27.4	40.9	21.8	31.0	69.2	39.1	17.8	22.5	41.6	14	E	52.4	97.1	27.7	39.0
Units	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	D	µg/kg	µg/kg	µg/kg	µg/kg
Explosives											*				
2-Amino-4,6-dinitrotoluene		<250.0		<250.0		<250.0			<250.0		*		<250.0		<250.0
4-Amino-2,6-dinitrotoluene		<250.0		<250.0		<250.0			<250.0		*		<250.0		<250.0
1,3-Dinitrobenzene		<250.0		<250.0		<250.0			<250.0		*		<250.0		<250.0
2,4-Dinitrotoluene		<250.0		<250.0		<250.0			<250.0		*		<250.0		<250.0
2,6-Dinitrotoluene		<250.0		<250.0		<250.0			<250.0		*		<250.0		<250.0
HMX		<500.0		<500.0		<500.0			<500.0		*		<500.0		<500.0
Nitrobenzene		<250.0		<250.0		<250.0			<250.0		*		<250.0		<250.0
2-Nitrotoluene		<500.0		<500.0		<500.0			<500.0		*		<500.0		<500.0
3-Nitrotoluene		<500.0		<500.0		<500.0			<500.0		*		<500.0		<500.0
4-Nitrotoluene		<500.0		<500.0		<500.0			<500.0		*		<500.0		<500.0
RDX		<500.0		<500.0		<500.0			<500.0		*		<500.0		<500.0
Tetryl		<500.0		<500.0		<500.0			<500.0		*		<500.0		<500.0
1,3,5-Trinitrobenzene		<250.0		<250.0		<250.0			<250.0		*		<250.0		<250.0
2,4,6-Trinitrotoluene		<250.0		<250.0		<250.0			<250.0		*		<250.0		<250.0
Units	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	µg/g	*	µg/g	µg/g	µg/g	µg/g
Total Organic Carbon	62900	89800	6940	<1320	62400	71700	6980	10100	136000	13400	*	252000	422000	71700	45200
Grainsize % silt or clay		24		2		27			16		*		50		6
Note: %silt or clay definedby sieve mesh size #200											*				

> 1993 values

For 1993 data:
B - Attributable to field or laboratory contamination
C - Confirmed by reanalysis
J - Estimated Value
K - Result biased high
L - Result biased low
R - Resul' 'ed
U - Unco l (reanalysis performed, compound not found)

Tab' '2
Sedime. ening
Values

Brooks/Ponds/Wetlands				New Cranberry Pond				Heron Pond	Sierra Wetland				Heron Pond
SAMPLE ID	Rojko 1990	Lowest Effect	Severe Effect	SPD-98-01X	-01XDuplicate	SPD-98-02X	SPD-98-03X	SPD-98-04X	SPD-98-05X	SPD-98-06X	-06X Duplicate	SPD-98-07X	SPD-98-08X
	"Normal" Levels	Level	Level										
units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Arsenic	< 25	6	33	14.5	10.4	11.5	21.5	50.4	4.9	1.6	2.1	1.8	9.6
Cadmium	< 5	0.6	10	<1.3	<0.98	<2.5	<2.9	0.95	<1.6	0.36	<0.38	<0.37	0.65
Chromium (total)	< 30	26	110	10.6	8.3	5.0	14.6	10.0	4.6	6.4	6.8	2.6	14.4
Copper	< 70	16	110	47.6	50.6	21.4	29.1	16.1	31.1	5.9	6.5	3.7	13.0
Iron	< 30000	20000	40000	7050	5550	4340	8410	10700	2040	2740	2600	1640	11100
Lead	< 200	31	250	54.8	45.7	101	109	55.7	357	22.7	29.7	18.9	27.9
Manganese	< 350	460	1100	132	96.7	171	455	0.56	39.8	47.9	47.1	8.6	88.5
Mercury	< 0.35	0.2	2	<0.24	0.21	0.24	0.27	0.13	0.34	0.06	0.06	0.07	0.07
Nickel	< 35	16	75	7.8	5.7	2.1	6.7	4.7	2.6	3.6	3.5	1.3	8.8
Zinc	< 250	120	820	65.7	54.6	56.0	147	32.6	33.0	9.9	12.1	6.1	40.9
%Total Organic Carbon		1.00	10.0	22.1	8.27	55.9	68.7	19.3	35.3	10.6	11.8	12.9	8.98
Grainsize % silt or clay				37		28	42	26	19	20		56	24
Note: %silt or clay defined by sieve mesh size #200													
>LEL	Shaded values exceed the Lowest Effect Level for Sediment Quality (Ministry of Environment and Energy, 1993)												
> SEL	Values in black cells exceed the Severe Effect Level for Sediment Quality (Ministry of Environment and Energy, 1993)												

Ta‘ ’2
Sedim ening
V...s

Brooks/Ponds/Wetlands				Slate Rock Brook								Spectacle Pond	Spectacle Brook		
SAMPLE ID	Rojko 1990	Lowest Effect	Severe Effect	SPD-98-09X	SPD-98-10X	SPD-98-11X	SPD-98-12X	SPD-98-13X	SPD-98-14X	SPD-98-15X	SPD-98-16X	SPD-98-17X	SPD-98-18X	SPD-98-19X	-19XDuplicate
	"Normal" Levels	Level	Level												
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	*	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Arsenic	< 25	6	33	11.4	6.2	9.1	N	7.7	6.5	9.0	9.4	4.0	4.0	2.1	3.0
Cadmium	< 5	0.6	10	0.25	0.47	0.42	O	2.1	0.49	0.33	0.28	0.22	<0.78	<0.18	<0.23
Chromium (total)	< 30	26	110	14.1	10.7	12.4	T	14.9	16.8	37.1	10.9	9.3	7.1	4.4	4.5
Copper	< 70	16	110	12.0	9.7	10.4	*	27.4	14.3	8.8	11.0	5.9	12.0	1.3	1.6
Iron	< 30000	20000	40000	13100	7420	9670	S	6320	15200	10700	13400	8420	2500	4190	4110
Lead	< 200	31	250	9.4	25.3	26.9	A	96.1	11.9	18.7	10.4	10.1	27.2	4.6	5.1
Manganese	< 350	460	1100	156	257	269	M	163	202	197	210	94.3	136	124	201
Mercury	< 0.35	0.2	2	<0.02	0.04	<0.04	P	0.22	<0.04	0.03	<0.02	<0.02	0.08	<0.02	<0.02
Nickel	< 35	16	75	12.7	6.5	8.2	L	12.9	17.2	17.4	9.9	8.5	4.1	3.8	3.3
Zinc	< 250	120	820	31.0	39.1	41.6	E	97.1	39.0	31.9	33.5	28.2	17.1	8.9	8.6
%Total Organic Carbon		1.00	10.0	<.132	7.17	13.6	D	42.2	4.52	7.25	57.4	.906	22.6	2.96	0.395
Grainsize % silt or clay				2	27	16	*	50	6	14	7	2	23	2	
Note: %silt or clay defined by sieve mesh size #200															

>LEL — Shaded values exceed the Lowest Effect Level for Sediment Quality (Ministry of Environment and Energy, 1993)
> SEL — Values in black cells exceed the Severe Effect Level for Sediment Quality (Ministry of Environment and Energy, 1993)

Brooks/Ponds/Wetlands				Clear Pond		Spectacle Brk. Wetland	Ponakin Brook Pond	Ponakin Brook			Ponakin Brook Wetland			Cranberry Pond	
SAMPLE ID	Rojko 1990 "Normal" Levels	Lowest Effect Level	Severe Effect Level	SPD-98-20X	SPD-98-21X	SPD-98-22X	SPD-98-23X	SPD-98-24X	SPD-98-25X	SPD-98-26X	SPD-98-27X	SPD-98-28X	SPD-98-29X	SPD-98-30X	SPD-98-31X
Units	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Arsenic	< 25	6	33	7.5	5.0	56.5	14.1	13.3	10.5	20.9	49.6	33.2	52.7	9.6	1.3
Cadmium	< 5	0.6	10	0.52	0.34	2.5	0.66	0.31	0.22	0.54	0.90	1.0	1.8	0.46	0.23
Chromium (total)	< 30	26	110	8.0	7.6	26.5	10.5	6.4	9.2	18.2	21.1	18.4	19.6	43.9	2.6
Copper	< 70	16	110	135	7.2	30.9	22.7	7.2	5.7	9.6	35.7	15.9	26.9	33.6	8.5
Iron	< 30000	20000	40000	7850	5690	23400	9870	8360	10200	27800	28200	19400	22300	17200	881
Lead	< 200	31	250	21.9	21.5	87.3	20.3	6.1	5.7	12.4	29.9	48.2	67.8	85.7	42.8
Manganese	< 350	460	1100	112	101	777	346	425	185	432	1590	1260	1700	190	15.2
Mercury	< 0.35	0.2	2	0.04	0.03	0.21	<0.07	<0.03	<0.02	<0.02	0.09	0.14	0.27	<0.02	0.03
Nickel	< 35	16	75	5.3	5.1	19.3	9.2	4.5	7.8	17.4	15.0	16.6	23.0	19.4	1.3
Zinc	< 250	120	820	59.5	30.1	182	61.0	28.8	23.8	45.7	78.3	1.4	145	0.26	8.3
%Total Organic Carbon		1.00	10.0	6.84	2.69	28.3	9.23	3.34	.904	.621	12.9	11.1	22.6	.841	5.26
Grainsize % silt or clay				11	17	55	6	6	4	0	48	55	44	3	13
Note: %silt or clay defined by sieve mesh size #200															
>LEL	Shaded values exceed the Lowest Effect Level for Sediment Quality (Ministry of Environment and Energy, 1993)														
> SEL	Values in black cells exceed the Severe Effect Level for Sediment Quality (Ministry of Environment and Energy, 1993)														

APPENDIX E

AOCS 32 AND 43

TABLE 1-1
Cleanup Goals for Chemicals of Concern in Groundwater

Analytes	Cleanup Goal µg/l
Volatile Organic Compounds	
1,2-Dichloroethene (total)	55
1,1,1 Trichloroethane	5
Trichlorothene (TCE)	5
1,2-Dichlorobenzene	600
1,3-Dichlorobenzene	600
1,4-Dichlorobenzene	75
Volatile Petroleum Hydrocarbons	
Benzene	5
C5-C8 Aliphatics*	400
C9-C12 Aliphatics*	4,000
C9-C10 Aromatics*	200
Extractable Petroleum Hydrocarbons	
C9-C18 Aliphatics*	4,000
C19-C36 Aliphatics*	5,000
C11-C22 Aromatics*	200
Polychlorinated Biphenyls	
PCB-1260	0.5
Inorganics	
Arsenic	50
Lead	15
Manganese	3,500

Note: * No cleanup goal was established for this analyte in the Record of Decision.
The Massachusetts Contingency Plan GW-1, standard is being used in lieu of a cleanup goal.

TABLE 2-2
Surface/Subsurface Soil Cleanup Goals for Chemicals of Concern

Analytes	Cleanup Goal (ppm)
Extractable Petroleum Hydrocarbons	
C_9 - C_{18} Aliphatics*	2,500 ppm
C_{19} - C_{36} Aliphatics*	5,000 ppm
C_{11} - C_{22} Aromatics*	200 ppm
Volatile Petroleum Hydrocarbons	
C_5 - C_8 Aliphatics*	500 ppm
C_9 - C_{12} Aliphatics*	2,500 ppm
C_9 - C_{10} Aromatics*	300 ppm
Pesticides	
DDD	3 ppm
DDE	2 ppm
DDT	2 ppm
Polychlorinated Biphenyls	
Aroclor 1254	2 ppm
Aroclor 1260	2 ppm
Inorganics	
Arsenic	24 ppm
Lead	426 ppm

Notes:
ppm = parts per million
* No cleanup goal was established for this analyte in the Record of Decision.
The Massachusetts Contingency Plan S-2, standard is being used in lieu of a cleanup goal

Table 24
Synopsis of Federal and State ARARs for Monitored Natural Attenuation
Area of Contamination 32 and 43A
Devens, Massachusetts

Location Specific

Authority	Location Specific	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal Regulatory Authority		No location-specific ARARs will be triggered.			
State Regulatory Authority		No location-specific ARARs will be triggered.			

Table 24
Synopsis of Federal and State ARARs for Monitored Natural Attenuation
Area of Contamination 32 and 43A
Devens, Massachusetts

Chemical Specific

Authority	Chmical Specific	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal Regulatory Authority	Groundwater (Also applicable as an Action Specific ARAR)	SDWA, National Primary Drinking Water Standards, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50 - 141.52]	Relevant and Appropriate	The NPDWR establishes MCLs for several common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques.	Biodegradation of organic contaminants exceeding MCLs is believed to be occurring under existing conditions. MCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program will achieve MCLs at completion of remedy.
Federal Regulatory Authority	Groundwater	USEPA Reference Dose	TBC		
Federal Regulatory Authority	Groundwater	USEPA HAs	TBC		
State Regulatory Authority	Groundwater(Also applicable as an Action Specific ARAR)	Massachusetts Drinking Water Standards and Guidelines [310 CMR 22.0].	Relevant and Appropriate	The Massachusetts Drinking Water Standards and Guidelines list MMCLs which apply to water delivered to any user of a public water supply system as defined in 310 CMR 22.00. Private residential wells are not subject to the requirements of 310 CMR 22.00; however, the standards are often used to evaluate private residential contamination especially in CERCLA activities.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.

Table 24
Synopsis of Federal and State ARARs for Monitored Natural Attenuation
Area of Contamination 32 and 43A
Devens, Massachusetts

Action Specific

Authority	Action Specific	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal Regulatory Authority		RCRA Subtitle C Subpart F	Relevant and Appropriate	Groundwater protection standard.	
State Regulatory Authority	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Applicable	Massachusetts Groundwater Quality Standards designate and assign uses for which groundwater of the Commonwealth shall be maintained and protected and set forth water quality criteria necessary to maintain the designated uses. Groundwater at Fort Devens is classified as Class 1. Groundwater assigned to this class are fresh groundwater designated as a source of potable water supply.	Biodegradation of organic contaminants exceeding MMCLs is believed to be occurring under existing conditions. MMCLs will be used to evaluate the performance of this alternative through implementation of a long-term groundwater monitoring program.
State Regulatory Authority	Groundwater Monitoring	Massachusetts Hazardous Waste Management Rules (MHWMR) Groundwater Protection; [310 CMR 30.660-30.679]	Relevant and Appropriate	Groundwater monitoring is required during and following remedial actions.	A long-term groundwater monitoring program is to be implemented to monitor the progress of remediation.

Notes:

CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
MCLs = Maximum Contaminant Levels
MHWMR = Massachusetts Hazardous Waste Management Rules

MMCLs = Massachusetts Maximum Contaminant Levels
NPDWR = National Primary Drinking Water Standards
SDWA = Safe Drinking Water Act

Table 25
Synopsis of Federal and State ARARs for Excavation and Off-site Disposal
Area of Contamination 32 and 43A
Devens, Massachusetts

Location Specific

Authority	Location Specific	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal Regulatory Authority		There are no location specific ARARs for the DRMO Yard.			
State Regulatory Authority		There are no location specific ARARs for the DRMO Yard.			

Table 25
Synopsis of Federal and State ARARs for Excavation and Off-site Disposal
Area of Contamination 32 and 43A
Devens, Massachusetts

Chemical Specific

Authority	Chemical Specific	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal Regulatory Authority	For surface soil (0 to 10 inches) For subsurface soil (below 10 inches)	Toxic Substance Control Act (TSCA) 40 CFR 761.125(c)(4)	TBC	Unrestricted access with less than 1 mg/kg PCBs. Unrestricted access with less than 10 mg/kg PCBs.	
Federal Regulatory Authority	Soil	EPA Region III Risk Based Concentration Table	TBC	Exposure levels to numerous chemicals under specific scenarios.	
Federal Regulatory Authority	Soil	Resource Conservation and Recovery Act (RCRA) Corrective Action Levels 55 FR 30798, July 1990.	TBC	To establish the need for a corrective measure study. Numerous chemicals.	
Federal Regulatory Authority	Soil	Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. EPA OSWER Directive 9355.4-12, July 1994	TBC		
State Regulatory Authority	Soil	Background levels for soil.	TBC		
State Regulatory Authority	Soil	Massachusetts Contingency Plan (MCP) 310 CMR 40.09705(6)(a)	TBC	Total petroleum hydrocarbons not to exceed 500 mg/kg.	

APPENDIX F

AOC 69W

TABLE G-1
CHEMICAL-, LOCATION-, AND ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE
AOC 69W

5-YEAR SITE REVIEW
DEVENS, MASSACHUSETTS

MEDIA	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
GROUNDWATER Federal	Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs; 40 CFR 141.11-141.16 and 141.50-141.52	Relevant and Appropriate	MCLs are enforceable standards (based in part on the availability and cost of treatment) that specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLGs are non-enforceable health based goals that specify the maximum concentration at which no known or anticipated adverse effects on humans will occur.	Long-term groundwater monitoring will ensure that site contaminants do not migrate off-site. Implementation of Institiutional Controls prohibiting installation of drinking water wells at the site will prevent exposure. In addition, arsenic concentrations are expected to decrease following the soil removal which eliminated the majority of the source of the aquifers reducing conditions.
State	Massachusetts Groundwater Quality Standards; 310 CMR 6.00	Relevant and Appropriate	These standards designate and assign uses for which groundwaters of the Commonwealth shall be maintained and protected, and set forth water quality criteria necessary to maintain the designated uses. Groundwater at AOC 69W is classified as Class I, fresh groundwaters designated as a source of potable water supply.	Long-term groundwater monitoring will ensure that site contaminants do not migrate off-site. Implementation of Institiutional Controls prohibiting installation of drinking water wells at the site will prevent exposure. In addition, arsenic concentrations are expected to decrease following the soil removal which eliminated the majority of the source of the aquifers reducing conditions.

TABLE G-1
CHEMICAL-, LOCATION-, AND ACTION-SPECIFIC ARARS, CRITERIA, ADVISORIES, AND GUIDANCE
AOC 69W

5-YEAR SITE REVIEW
DEVENS, MASSACHUSETTS

MEDIA	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
	Massachusetts Drinking Water Regulations; 310 CMR 22.00	Relevant and Appropriate	These regulations list Massachusetts MCLs which apply to drinking water distributed through a public water system.	Long-term groundwater monitoring will ensure that site contaminants do not migrate off-site. Implementation of Institiutional Controls prohibiting installation of drinking water wells at the site will prevent exposure. In addition, arsenic concentrations are expected to decrease following the soil removal which eliminated the majority of the source of the aquifers reducing conditions.
	Massachusetts Hazardous Waste Management Regulations; 310 CMR 30.300	Applicable	These regulations contain requirements for generators including testing of wastes to determine if they are hazardous wastes and accumulation of hazardous waste prior to disposal.	Any hazardous waste (soils or groundwater) generated from long-term monitoring or excavation at AOC 69W will be managed in accordance with these regulations. Institutional Controls will limit contact to in-situ and excavated site soils.

APPENDIX G

AOC s 9, 11, 40, SA 6, 12, 13, 41 (Solid Waste)

TABLE B.1
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE 4C

RECORD OF DECISION
SAs 6, 12, AND 13 AND AOCS 9, 11, 40 AND 41
DEVENS, MA

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal	Surface Waters, Endangered Species, Migratory Species	Fish and Wildlife Coordination Act [16 USC 661 et. seq.]	Relevant and Appropriate AOC 9 AOC 11 AOC 40 SA 13	Actions that affect species/habitat require consultation with U.S. Department of Interior, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and/or state agencies, as appropriate, to ensure that proposed actions do not jeopardize the continued existence of the species or adversely modify or destroy critical habitat. The effects of water-related projects on fish and wildlife resources must be considered. Action must be taken to prevent, mitigate, or compensate for project-related damages or losses to fish and wildlife resources. Consultation with the responsible agency is also strongly recommended for on-site actions. Under 40 CFR Part 300.38, these requirements apply to all response activities under the National Contingency Plan.	To the extent necessary, actions will be taken to develop measures to prevent, mitigate, or compensate for project related impacts to habitat and wildlife. The U.S. Fish and Wildlife Service, acting as a review agency for the USEPA, will be kept informed of proposed remedial actions.
	Endangered Species	Endangered Species Act [50 CFR Parts 17.11-17.12]	Applicable AOC 9 AOC 11 AOC 40 SA 13 Consolidation Facility	This act requires action to avoid jeopardizing the continued existence of listed endangered or threatened species or modification of their habitat.	The protection of endangered species and their habitat will be considered during excavation activities and cover installation.
	Atlantic Flyway, Wetlands, Surface Waters	Migratory Bird Treaty Act [16 USC 703 et seq.]	Relevant and Appropriate AOC 11	The Migratory Bird Treaty Act protects migratory birds, their nests, and eggs. A depredation permit is required to take, possess, or transport migratory birds or disturb their nests, eggs, or young.	Remedial actions will be performed to protect migratory birds, their nests, and eggs.

TABLE B.1
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE 4C

RECORD OF DECISION
SAs 6, 12, AND 13 AND AOCS 9, 11, 40 AND 41
DEVENS, MA

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal	Floodplains	Floodplain Management Executive Order 11988 [40 CFR Part 6, Appendix A]	Applicable AOC 9 AOC 11 AOC 40	Requires federal agencies to evaluate the potential adverse effects associated with direct and indirect development of a floodplain. Alternatives that involve modification/construction within a floodplain may not be selected unless a determination is made that no practicable alternative exists. If no practicable alternative exists, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the floodplain.	Drum removal and hot-spot sediment removal will be designed to minimize alteration/destruction of floodplain area. If this alternative is chosen, wetlands adversely affected by remedial action will be restored to the extent necessary.
	Wetlands	Protection of Wetlands Executive Order 11990 [40 CFR Part 6, Appendix A]	Applicable AOC 9 AOC 11 AOC 40	Under this Order, federal agencies are required to minimize the destruction, loss, or degradation of wetlands, and preserve and enhance natural and beneficial values of wetlands. If remediation is required within wetland areas, and no practical alternative exists, potential harm must be minimized and action taken to restore natural and beneficial values.	Drum removal and hot-spot sediment removal will be designed to minimize alteration/destruction of floodplain area. If this alternative is chosen, wetlands adversely affected by remedial action will be restored to the extent necessary.
	Wetlands, Aquatic Ecosystem	Clean Water Act, Dredge or Fill Requirements Section 404 [40 CFR Part 230]	Relevant and Appropriate AOC 9 AOC 11 AOC 40	Section 404 of the Clean Water Act regulates the discharge of dredged or fill materials to U.S. waters, including wetlands. Filling wetlands would be considered a discharge of fill materials. Guidelines for Specification of Disposal Sites for Dredged or Fill material at 40 CFR Part 230, promulgated under Clean Water Act Section 404(b)(1), maintain that no discharge of dredged or fill material will be permitted if there is a practical alternative that would have less effect on the aquatic ecosystem. If adverse impacts are unavoidable, action must be taken to restore, or create alternative wetlands.	The removal of drums/sediments will be designed to minimize placement of fill in wetland areas. If this alternative is chosen, the affected areas will be restored to the extent necessary.

TABLE B.1
SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE 4C

RECORD OF DECISION
SAs 6, 12, AND 13 AND AOCS 9, 11, 40 AND 41
DEVENS, MA

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
State	Floodplains, Wetlands, Surface Waters	Massachusetts Wetland Protection Act and regulations [MGL c. 131 s. 40; 310 CMR 10.00]	Applicable AOC 9 AOC 11 AOC 40 SA 13	These regulations include standards on dredging, filling, altering, or polluting inland wetlands and protected areas (defined as areas within the 100-year floodplain). A Notice of Intent (NOI) must be filed with the municipal conservation commission and a Final Order of Conditions obtained before proceeding with the activity. A Determination of Applicability or NOI must be filed for activities such as excavation within a 100 foot buffer zone. The regulations specifically prohibit loss of over 5,000 square feet of bordering vegetated wetland. Loss may be permitted with replication of any lost area within two growing seasons.	All work to be performed within wetlands and the 100 foot buffer zone will be in accordance with the substantive requirements of these regulations.
	Endangered Species	Massachusetts Endangered Species Regulations [321 CMR 8.00]	Applicable AOC 9 AOC 11 AOC 40 SA 13 Consolidation Facility	Actions must be conducted in a manner that minimizes the impact to Massachusetts-listed rare, threatened, or endangered species, and species listed by the Massachusetts Natural Heritage Program.	The protection of state listed endangered species (in particular the Grasshopper Sparrow at the Consolidation Facility) will be considered during the design and implementation of this alternative.

Notes:

AWQC = Ambient Water Quality Criteria
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Rules
CWA = Clean Water Act
DOI = Department of the Interior
FWS = Fish and Wildlife Service
MEPA = Massachusetts Environmental Policy Act
MGL = Massachusetts General Laws
NMFS = National Maine Fisheries Service
USC = United States Code

Note: A Record Notice of Landfill Operation for AOC 11 is not necessary with Alternative 4c.

TABLE B.2
SYNOPSIS OF FEDERAL AND STATE CHEMICAL-SPECIFIC ARARS FOR ALTERNATIVE 4C

RECORD OF DECISION
SAs 6, 12, AND 13 AND AOCS 9, 11, 40 AND 41
DEVENS, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Surface water	Clean Water Act, Ambient Water Quality Criteria [40 CFR 131; Quality Criteria for Water 1986]	Relevant and Appropriate AOC 11 AOC 40	Federal Ambient Water Quality Criteria (AWQC) include (1) health-based criteria developed for 95 carcinogenic and noncarcinogenic compounds and (2) acute and chronic toxicity values for the protection of aquatic life. AWQC for the protection of human health provide protective concentrations for exposure from ingesting contaminated water and contaminated aquatic organisms, and from ingesting contaminated aquatic organisms alone. Remedial actions involving contaminated surface water or discharge of contaminants to surface water must consider the uses of the water and the circumstances of the release or threatened release.	Remedial actions will be performed in a manner to prevent AWQC exceedances in surface water. Activities at AOC 11 will be performed to prevent AWQC exceedances in the Nashua River. Removal of sediment at AOC 40 will be performed in a manner to prevent AWQC exceedances in Cold Spring Brook Pond. Supernatant from dredged spoil will be monitored to prevent AWQC exceedances in Cold Spring Brook Pond.
	Groundwater	Safe Drinking Water Act, National Primary Drinking Water Regulations, MCLs and MCLGs [40 CFR Parts 141.60 - 141.63 and 141.50 - 141.52]	Relevant and Appropriate AOC 40	The National Primary Drinking Water Regulations establish Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) for several common organic and inorganic contaminants. MCLs specify the maximum permissible concentrations of contaminants in public drinking water supplies. MCLs are federally enforceable standards based in part on the availability and cost of treatment techniques. MCLGs specify the maximum concentration at which no known or anticipated adverse effect on humans will occur. MCLGs are non-enforceable health based goals set equal to or lower than MCLs.	At AOC 40 the MCL for bis(2-ethylhexyl)phthalate will be met under average scenario, and the MCL for arsenic will be met under average and maximum scenario. MCLs are not exceeded at Patton Well.

TABLE B.2
SYNOPSIS OF FEDERAL AND STATE CHEMICAL-SPECIFIC ARARS FOR ALTERNATIVE 4C

RECORD OF DECISION
SAs 6, 12, AND 13 AND AOCS 9, 11, 40 AND 41
DEVENS, MA

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
State	Surface water	Massachusetts Surface Water Quality Standards [314 CMR 4.00]	Relevant and Appropriate AOC 11 AOC 40	Massachusetts Surface Water Quality Standards designate the most sensitive uses for which surface waters of the Commonwealth are to be enhanced, maintained, and protected, and designate minimum water quality criteria for sustaining the designated uses. Surface waters at Fort Devens are classified as Class B. Surface waters assigned to this class are designated as habitat for fish, other aquatic life and wildlife, and for primary and secondary contact recreation. These criteria supersede federal AWQC only when they are more stringent (more protective) than the AWQC.	At AOC 11 activities will be performed in a manner to prevent exceedances of surface water quality in the Nashua River. At AOC 40 sediment removal will be performed in a manner to prevent exceedances of Surface Water Quality Standards in Cold Spring Brook Pond. Supernatant from dredged spoil dewatering will be monitored to prevent exceedances in the pond. To the extent necessary, Surface Water Quality Standards will be used to develop discharge limitations.
	Groundwater	Massachusetts Groundwater Quality Standards [314 CMR 6.00]	Relevant and Appropriate AOC 40	These standards designate and assign uses for which groundwaters of the Commonwealth shall be maintained and protected, and set forth water quality criteria necessary to maintain the designated uses. Groundwater at Fort Devens is classified as Class I, fresh groundwaters designated as a source of potable water supply.	At AOC 40 the MCL for bis(2-ethylhexyl)phthalate will be met under average scenario, and the MCL for arsenic will be met under average and maximum scenario. MCLs are not exceeded at Patton Well.
	Groundwater	Massachusetts Drinking Water Regulations [310 CMR 22.00]	Relevant and Appropriate AOC 40	These regulations list Massachusetts MCLs which apply to drinking water distributed through a public water system.	At AOC 40 the MCL for bis(2-ethylhexyl)phthalate will be met under average scenario, and the MCL for arsenic will be met under average and maximum scenario. MCLs are not exceeded at Patton Well.

Notes:

AWQC = Ambient Water Quality Criteria
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
CMR = Code of Massachusetts Rules
CWA = Clean Water Act
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
MMCL = Massachusetts Maximum Contaminant Level
NPDWR = National Primary Drinking Water Regulations
SDWA = Safe Drinking Water Act
SMCL = Secondary Maximum Contaminant Level

Note: A Record Notice of Landfill Operation for AOC 11 is not necessary with Alternative 4c.

TABLE B.3
SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 4C

RECORD OF DECISION
SAs 6, 12, AND 13 AND AOCS 9, 11, 40 AND 41
DEVENS, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State	Solid Waste Landfill Construction, Operation, Closure, and Post-Closure Care	Massachusetts Solid Waste Management Regulations [310 CMR 19.000]	Relevant and Appropriate AOC 9,AOC 11, SA 12,,SA 13 Consolidation Facility	These regulations outline the requirements for construction, operation, closure, and post closure at solid waste management facilities in the Commonwealth of Massachusetts.	Final closure and post-closure plans will be prepared and submitted to satisfy the requirements of 310 CMR 19.021 for AOCs 9, 11, and 40, and SAs 12 and 13. The consolidation landfill will be constructed, operated, and closed in conformance with the regulations at 310 CMR 19.000. A Record Notice of Landfill Operation will be filed for AOC 11 in accordance with 310 CMR 19.141.
	Activities that potentially affect surface water quality	Massachusetts Water Quality Certification and Certification for Dredging [314 CMR 9.00]	Relevant and Appropriate AOC 40	For activities that require a MADEP Wetlands Order of Conditions to dredge or fill navigable waters or wetlands, a Chapter 91 Waterways License, a USACE permit or any major permit issued by USEPA (e.g., Clean Water Act NPDES permit), a Massachusetts Division of Water Pollution Control Water Quality Certification is required pursuant to 314 CMR 9.00.	Excavation, filling, and disposal activities will meet the substantive criteria and standards of these regulations. Remedial activities will be designed to attain and maintain Massachusetts Water Quality Standards in affected waters.
	Activities that affect ambient air quality	Massachusetts Air Pollution Control Regulations [310 CMR 7.00]	Applicable AOC 9 AOC 11 AOC 40 SA 13 Consolidation Facility	These regulations pertain to the prevention of emissions in excess of Massachusetts ambient air quality standards.	Remedial activities will be conducted to meet the standards for Visible Emissions (310 CMR 7.06); Dust, Odor, Construction and Demolition (310 CMR 7.09); Noise (310 CMR 7.10); and Volatile Organic Compounds (310 CMR 7.18).

Notes:

CFR = Code of Federal Regulations
CMR = Code of Massachusetts Rules
CWA = Clean Water Act
MADEP = Massachusetts Department of Environmental Protection
MGL = Massachusetts General Laws
NPDES = National Pollutant Discharge Elimination System
RCLA = Comprehensive Environmental Response, Compensation, and Liability Act
USACE = U.S. Army Corps of Engineers
USC = United States Code

Note: A Record Notice of Landfill Operation for AOC 11 is not necessary with Alternative 4c.

TABLE B.3
SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 4C

RECORD OF DECISION
SAs 6, 12, AND 13 AND AOCS 9, 11, 40 AND 41
DEVENS, MA

Regulatory Authority	Location Characteristic	Requirement	Status	Requirement Synopsis	Action To Be Taken To Attain Requirement
Federal	Construction over/in navigable waters	Rivers and Harbors Act of 1899 [33 USC 401 et seq.]	Relevant and Appropriate AOC 40 AOC 11	Section 10 of the Rivers and Harbors Act of 1899 requires an authorization from the Secretary of the Army, acting through the U.S. Army Corps of Engineers (USACE), for the construction of any structure in or over any "navigable water of the U.S."; the excavation from or deposition of material in such waters, or any obstruction of alteration in such waters.	Excavating, filling, and disposal activities will be conducted to meet the substantive criteria and standards of these regulations.
	Control of surface water runoff, Direct discharge to surface water	Clean Water Act NPDES Permit Program [40 CFR 122,125]	Relevant and Appropriate AOC 9 AOC 11 AOC 40 SA 13 Consolidation Facility	The National Pollutant Discharge Elimination System (NPDES) permit program specifies the permissible concentration or level of contaminants in the discharge from any point source, including surface runoff, to waters of the United States.	Construction activities will be controlled to meet USEPA discharge requirements. On-site discharges will meet the substantive requirements of these regulations.
	Land Disposal of Hazardous Wastes	Resource Conservation and Recovery Act (RCRA), Land Disposal Restrictions (LDRs); (40 CFR Part 268)	Applicable AOC 9 AOC 11 AOC 40 SA 13	Land disposal of RCRA hazardous wastes without specified treatment is restricted. Remedial actions must be evaluated to determine if they constitute "placement" and if LDRs are applicable. The LDRs require that wastes must be treated either by a treatment technology or to a specific concentration prior to disposal in a RCRA Subtitle C permitted facility.	If it is determined that materials excavated from AOCs 9, 11, 40, or SA 13 are hazardous materials subject to LDRs, the materials will be handled and disposed of in compliance with these regulations.
	Disposal of PCB-contaminated wastes	Toxic Substance Control act Regulations [40 CFR Part 761]	Applicable AOC 9 AOC 11 AOC 40 SA 13	Established prohibitions of and requirements for the manufacturing, processing, distribution in commerce, use, disposal, storage, and marking of PCB items. Sets forth the "PCB Spill Cleanup Policy."	If it is determined that materials excavated from AOCs 9, 11, 40 or SA 13 are contaminated with PCBs at concentrations of 50 ppm or greater, the materials will be handled and disposed of in compliance with these regulations
State	Solid Waste Landfill Siting	Massachusetts Solid Waste Facilities Site Regulations [310 CMR 16.00]	Applicable Consolidation Facility	These regulations outline the requirements for selecting the site of a new solid waste landfill for the Commonwealth of Massachusetts.	The consolidation facility will be sited in accordance with these regulations.

APPENDIX H

POLICY REVIEWS AND CURRENT SITE STATUS

TABLE H-1
SUMMARY OF SITES WITH CERCLA DECISION DOCUMENTS

FIVE YEAR REVIEW
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS

SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
AOCs 4, 5, 18 **SHEPLEY'S HILL LANDFILL (SHL) GROUP 1A** **STATUS: LTM ROD LEASE PARCEL**	SA 4, Incinerator, household debris incinerated (quantity unknown) SA 5, Municipal Sanitary Landfill, Disposal of household refuse, construction debris, and military refuse (6500 ton/year) SA 18, Asbestos Cell, disposal of asbestos and asbestos containing debris (about 6.6 ton). The landfill has contaminated groundwater with arsenic, iron, barium, and some organic solvents. Groundwater discharge into Plow Shop Pond may have contaminated sediments in the pond with arsenic, iron, and barium.	HISTORY: ***Water:*** Final SHL Operable Unit Feasibility Study issued February 1995. Final Proposed Plan issued May 1995. Final Delivery Order Work Plan issued June 1995. Final ROD issued in September 1995. The Final Work Plan for the Monitoring Well Installation was issued in December 1995, and revised in May 1996. Final Contract Drawings and Specifications for the Landfill Cap Improvements were issued in January 1996. The groundwater model update was completed in March 1996. The Final Long Term Monitoring and Maintenance Plan was released in May 1996. Groundwater Pumping Test (Final Work Plan & Final Site Safety and Health Plan) December 1996. Semi-Annual Groundwater Analytical Report for Fall 1996, January 1997. Draft Groundwater Pumping Test Report March 1997. In April 1997, Stone & Webster Environmental Technology and Services submitted to the Corps of Engineers three documents on Shepley's Hill Landfill: the Comment Response Package to the Annual Report, the Addendum to the 1996 Annual Report, and the Addendum to the Long Term Monitoring and Maintenance Plan. In July 1997, the 30% Concept Design Extraction/Discharge System was issued, as well as the Semi-Annual Groundwater Analytical Report for Spring 1997. The Landfill Cap Improvement Report was issued in October 1997. The 60% Design Extraction/Discharge System was issued in November 1997. The Semi-Annual Groundwater Analytical Report for Fall 1997 was issued in December 1997. The Groundwater Pumping Test Report was issued January 1998. The Draft Five Year Review Long Term Monitoring Report was issued February 1998. The Semi-Annual Groundwater Analytical Report for Spring 1998 was issued in July 1998. The Final Five Year Review Long Term Monitoring Report was issued 1 August 1998. The Draft Work Plan Supplemental Groundwater Investigation was issued 1 October 1998. The Final Work Plan Supplemental Groundwater Investigation was issued February 1999. The 1998 Annual Report SHLF Long Term Monitoring and Maintenance was issued in March 1999. The Review of Pump and Treat Groundwater Remediation Systems at SHLF & MAAF was issued 31 August 1999.

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AOCs 4, 5, 18 continued		The Review of Pump and Treat Groundwater Remediation Systems at SHLF & MAAF was issued 31 August 1999. The 1999 Annual Report, Long Term Monitoring and Maintenance was issued in March 2000. The Draft Supplemental Groundwater Investigation was issued July 2000. ***Soil***: Draft Close Out Report issued in July 1995. Final Close Out Report issued in March 1996. Semi-Annual GW Analytical Report Spring 1999 **ISSUES:** Protection of potential residential receptors from exposure to contaminated groundwater migrating from the landfill having chemicals in excess of MCLs. Prevent contaminated groundwater from contributing to the contamination of Plow Shop Pond sediments in excess of human-health and ecological risk-based concentrations. **CURRENT STATUS:** Long-term monitoring of landfill gas and groundwater is currently being implemented. The remedy (including landfill cap and closure) is protective of human health and the environment because it directs groundwater flow away from Plow Shop Pond and because there are no users of groundwater downgradient of the landfill.

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SA 6 **LANDFILL No. 2 SOUTH POST GROUP 10** **STATUS: Remedial Design/ Remdial Action**	Disposal of household refuses and glass (quantity unknown). No contamination found.	**HISTORY:** No Further Action in MEP update (April 1993). Under consideration as part of the Landfill Consolidation Feasibility Study. BCT Management Plan for Debris Disposal issued in March 1995. Landfill Consolidation Draft Task Order Work Plan issued in May 1995. Draft Landfill Consolidation Feasibility Study issued in September 1995.Landfill remediation reconsidered as seven separate sites, with consolidation as only one possible alternative. Landfill Consolidation Feasibility Study released January 1997. Draft Proposed Plan for SAs6, 12, and 13 and AOCs 9, 11, 40, and 41 released April 17, 1997. Army recommends alternative two: 6, 12, and 40- NFA; 13 and 11-Remove surface wastes; 9 and 40-to be capped. July 23, 1997, the USEPA requests, by August 6, the reason the Army has not complied with theFederal Facilities Agreement to respond to USEPA's comments (on the Proposed Plan for Landfill Remediation) within 45-day response period. The Army issued its response to comments on the Landfill Remediation Proposed Plan in early August 1997.The Draft Final Proposed Plan was issued in September 1997.The Landfill Remediation Update (a bulletin) was drafted in October 1997.On November 3, 1997, the Preliminary Final Proposed Plan (for Landfills) was issued. On December 8, 1997 the Proposed Plan was issued. Public Comment Period for Proposed Plan ended March 8, 1998. The Army has focused all activities on addressing community comments and is currently reevaluating the Proposed Plan. The Landfill Remediation Test Pit Summary was issued Apr 1998. Preliminary Draft Proposed Plan issued in July 1998. The Preliminary Draft Proposed Plan for SAs 6, 12, and 13, and AOCs 9, 11, 40 and 41 was issued July 1, 1998. Request for 30-day extension for Response to Comments re: Draft Final Proposed Plan submitted to USEPA 28 Sep 98. Draft Feasibility Addendum Report for SAs 6, 11, 12, 13 and AOCs 9, 11, 40 & 41,issued Oct 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, issued Nov 1998. Landfill Remediation Feasibility. Study Addendum Report issued November 1998.

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SA 6 continued		The Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, issued Nov 1998. Public Comment Period for Proposed Plan Version 2 began Dec 7, 1998. The Public Comment Period for the Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41 ended on Jan 20, 1999. The Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, issued Mar 1999, 65% Draft Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation. Final Record of Decision for Landfill Remediation, July 1999. 95% Design for Landfill Consolidation, August 1999. The Design Analysis Report for Landfill Consolidation, was published in October 1999.The Final Design Technical Specifications for Landfill Consolidation was published in, October 1999. The Final Design Technical Specifications for Offsite Disposal Alternative was published in October 1999. The Draft Sampling and Analysis Plan Landfill Remediation was issued in January 2000. The Draft Site Safety and Health Plan, Landfill Remediation Project, was published in January 2000. The Draft Contractor Quality Control Plan, Landfill Remediation Project,was published in January 2000.The Draft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, were published in Feb 2000. The Remedy Selection Report, On-Site Vs. Off-Site Disposal Options, Landfill Remediation Project was published in March 2000.The Memorandum of Agreement between the Army and the Massachusetts Development Finance Agency for the utilization of the former golf course driving range for the purpose of landfill consolidation was signed in June 2000. **ISSUES:** Prevent human exposure to groundwater contaminants released from Fort Devens landfills that exceed acceptable risk thresholds. Protect human and ecological receptors from exposure to landfill soils having concentrations of contaminants exceeding acceptable risk thresholds. Prevent landfill contaminant releases to surface water that result in exceedance of AWQC or acceptable ecological risk-based thresholds.

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SA 6 continued		ISSUES continued: Prevent exposure by ecological receptors to landfill-contaminated sediments exceeding acceptable risk-based thresholds. Reduce adverse effects from contaminated landfill media to the environment, which would reduce the amount of land area available for natural resources use. Support the civilian redevelopment effort at Devens. CURRENT STATUS: No further action is required concerning the household debris landfill at SA 6.
AOC 9 **NORTH POST LANDFILL GROUP 5** **STATUS: Remedial Design/ Remedial Action** **ROD LEASE PARCEL**	Disposal of construction debris, tree stumps, and limbs (quantity unknown). No contamination found.	HISTORY: No Further Action Decision Document signed by Commander, Devens in January 1994; MADEP and USEPA did not concur. Solid waste closure will be required. Under consideration as part of the Landfill Consolidation Feasibility Study. BCT Management Plan for Debris Disposal issued in March 1995. Landfill Consolidation Draft Task Order Work Plan issued in May 1995. Draft Landfill Consolidation Feasibility Study issued in September 1995. Landfill Remediation reconsidered as seven separate sites, with consolidation as only one possible alternative. Landfill Remediation Feasibility Study released January 1997. Draft Proposed Plan for SAs 6, 12, and 13, and AOCs 9, 11, 40, and 41 released April 18, 1997. The Army recommends alternative two: 6, 12, and 41 - NFA; 13 and 11 - Remove surface wastes; 9 and 40 - to be capped. In May 1997, Haley & Aldrich prepared for the DCC the Supplemental Groundwater Modeling, Groundwater Mounding Evaluation, Devens Wastewater Treatment Plant Rapid Infiltration Basins. July 23, 1997, the USEPA requests, by August 6, the reason the Army has not complied with the Federal Facilities Agreement to respond to the USEPA's comments (on the Proposed Plan for Landfill remediation) within the 45-day response period. The Army issued its response to comments on the Landfill Remediation Proposed Plan in early August 1997. September 1997 the Draft Final Proposed Plan was issued. . In October 1997 the Landfill Remediation Update (a bulletin) was drafted. November 3, 1997, the Preliminary Final Proposed Plan (for Landfills) was issued, and December 8, the Proposed Plan was issued. Public Comment Period for Proposed Plan ended March 8, 1998. The Army has focused all activities on addressing community comments and is currently reevaluating the Proposed Plan. The Landfill Remediation Test Pit Summary was issued Apr 1998. Preliminary Draft Proposed Plan issued in July 1998. The Draft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, were published in Feb 2000.

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AOC 9 continued		The Preliminary Draft Proposed Plan for SAs 6, 12, and 13, and AOCs 9, 11, 40 and 41 was issued July 1, 1998. Request for 30-day extension for Response to Comments re: Draft Final Proposed Plan submitted to USEPA 28 Sep 98. Draft Feasibility Addendum Report for SAs 6, 11, 12, 13 and AOCs 9, 11, 40 & 41,issued Oct 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, issued Nov 1998. Landfill Remediation Feasibility. The Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41. issued Nov 1998Study Addendum Report, issued Nov 1998. Public Comment Period for Proposed Plan Version 2 began Dec 7, 1998. The Public Comment Period for the Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41 ended on Jan 20, 1999. The Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, issued Mar 1999, 65% Draft Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation. Final Record of Decision for Landfill Remediation, July 1999. 95% Design for Landfill Consolidation, August 1999. The Design Analysis Report for Landfill Consolidation, was published in October 1999.The Final Design Technical Specifications for Landfill Consolidation was published in, October 1999. The Final Design Technical Specifications for Offsite Disposal Alternative, October 1999. The Hydrogeologic Study in Support of Proposed Consolidation Landfill Former Golf Course Driving Range, was published in Dec 1999. The Draft Sampling and Analysis Plan Landfill Remediation was issued in January 2000. The Draft Site Safety and Health Plan, Landfill Remediation Project, was published in January 2000. . The Draft Contractor Quality Control Plan, Landfill Remediation Project,was published in January 2000. TheDraft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, were published in Feb 2000.

SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
AOC 9 continued		The Remedy Selection Report, On-Site Vs. Off-Site Disposal Options, Landfill Remediation Project was published in March 2000.The Memorandum of Agreement between the Army and the Massachusetts Development Finance Agency for the utilization of the former golf course driving range for the purpose of landfill consolidation was signed June 2000. **ISSUES:** Prevent human exposure to groundwater contaminants released from Fort Devens landfills that exceed acceptable risk thresholds. Protect human and ecological receptors from exposure to landfill soils having concentrations of contaminants exceeding acceptable risk thresholds. Prevent landfill contaminant releases to surface water that result in exceedance of AWQC or acceptable ecological risk-based thresholds. Prevent exposure by ecological receptors to landfill-contaminated sediments exceeding acceptable risk-based thresholds. Reduce adverse effects from contaminated landfill media to the environment, which would reduce the amount of land area available for natural resources use. Support the civilian redevelopment effort at Devens. **CURRENT STATUS:** Plan to remove debris, backfill and restore wetland has yet to be implemented. When completed, the remedy is expected to meet remedial action objectives, and be protective of human health and the environment.

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AOC 11 **LOVELL STREET LANDFILL GROUP 7** **STATUS: Remedial Design/ Remedial Action** **RETAINED PARCEL**	Disposal of debris from demolition of hospital (quantity unknown). Contamination of surface water, sediment, and soils by hazardous materials.	HISTORY: RI work plan included in SI Report. Under consideration as part of the Landfill Consolidation Feasibility Study. BCT Management Plan for Debris Disposal issued in March 1995. Landfill Consolidation Draft Task Order Work Plan issued in May 1995. Final RI Report AOC 11 issued in August 1995. Draft Landfill Consolidation Feasibility Study issued in September 1995. Landfill Remediation reconsidered as seven separate sites, with consolidation as only one possible alternative. Landfill Remediation Feasibility Study released January 1997. Draft Proposed Plan for SAs 6, 12, and 13, and AOCs 9, 11, 40, and 41 released April 18, 1997. The Army recommends alternative two: 6, 12, and 41 - NFA; 13 and 11 - Remove surface wastes; 9 and 40 - to be capped. July 23, 1997, the USEPA requests, by August 6, the reason the Army has not complied with the Federal Facilities Agreement to respond to the USEPA's comments (on the Proposed Plan for Landfill remediation) within the 45-day response period. The Army issued its response to comments on the Landfill Remediation Proposed Plan in early August 1997. September 1997 the Draft Final Proposed Plan was issued. . In October 1997 the Landfill Remediation Update (a bulletin) was drafted. November 3, 1997, the Preliminary Final Proposed Plan (for Landfills) was issued, and December 8, the Proposed Plan was issued. Public Comment Period for Proposed Plan ended March 8, 1998. The Army has focused all activities on addressing community comments and is currently reevaluating the Proposed Plan. The Preliminary Draft Proposed Plan for SAs 6, 12, and 13, and AOCs 9, 11, 40 and 41 was issued July 1, 1998.

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AOC 11 continued		The Remedy Selection Report, On-Site Vs. Off-Site Disposal Options, Landfill Remediation Project was published in March 2000.The Memorandum of Agreement between the Army and the Massachusetts Development Finance Agency for the utilization of the former golf course driving range for the purpose of landfill consolidation was signed June 2000. **ISSUES:** Prevent human exposure to groundwater contaminants released from Fort Devens landfills that exceed acceptable risk thresholds. Protect human and ecological receptors from exposure to landfill soils having concentrations of contaminants exceeding acceptable risk thresholds. Prevent landfill contaminant releases to surface water that result in exceedance of AWQC or acceptable ecological risk-based thresholds. Prevent exposure by ecological receptors to landfill-contaminated sediments exceeding acceptable risk-based thresholds. Reduce adverse effects from contaminated landfill media to the environment, which would reduce the amount of land area available for natural resources use. Support the civilian redevelopment effort at Devens. **CURRENT STATUS:** The planned removal of debris, backfilling and wetland restoration has not yet been implemented. When completed, the remedy is expected to meet remedial action objectives, and be protective of human health and the environment

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SA 12 **RANGE CONTROL LANDFILL GROUP 7** **STATUS: Remedial Design/ Remedial Action**	Disposal of construction and range operation debris (quantity unknown). Soil and sediments contaminated with metals, pesticides and PCB's (sediment contamination not attributable to the landfill). Surface water contaminated with metals.	HISTORY: Draft No Further Action DD issued May 1994. Solid waste closure required (will address soil contamination) Under consideration as part of the Landfill Consolidation Feasibility Study. BCT Management Plan for Debris Disposal issued in March 1995. Landfill Consolidation Draft Task Order Work Plan issued in May 1995. Draft Landfill Consolidation Feasibility Study issued in September 1995. Landfill Remediation reconsidered as seven separate sites, with consolidation as only one possible alternative. Landfill Remediation Feasibility Study released January 1997. Draft Proposed Plan for SAs 6, 12, and 13, and AOCs 9, 11, 40, and 41 released April 18, 1997. The Army recommends alternative two: 6, 12, and 41 - NFA; 13 and 11 - Remove surface wastes; 9 and 40 - to be capped. July 23, 1997, the USEPA requests, by August 6, the reason the Army has not complied with the Federal Facilities Agreement to respond to the USEPA's comments (on the Proposed Plan for Landfill remediation) within the 45-day response period. The Army issued its response to comments on the Landfill Remediation Proposed Plan in early August 1997. September 1997 the Draft Final Proposed Plan was issued. . In October 1997 the Landfill Remediation Update (a bulletin) was drafted. November 3, 1997, the Preliminary Final Proposed Plan (for Landfills) was issued, and December 8, the Proposed Plan was issued. Proposed Plan Public Comment Period ended March 8, 1998. The Army has focused all activities on addressing community comments and is currently reevaluating the Proposed Plan. The Preliminary Draft Proposed Plan for SAs 6, 12, and 13, and AOCs 9, 11, 40 and 41 was issued July 1, 1998.

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SA 12 continued		The Remedy Selection Report, On-Site Vs. Off-Site Disposal Options, Landfill Remediation Project was published in March 2000.The Memorandum of Agreement between the Army and the Massachusetts Development Finance Agency for the utilization of the former golf course driving range for the purpose of landfill consolidation was signed June 2000. **ISSUES:** Prevent human exposure to groundwater contaminants released from Fort Devens landfills that exceed acceptable risk thresholds. Protect human and ecological receptors from exposure to landfill soils having concentrations of contaminants exceeding acceptable risk thresholds. Prevent landfill contaminant releases to surface water that result in exceedance of AWQC or acceptable ecological risk-based thresholds. Prevent exposure by ecological receptors to landfill-contaminated sediments exceeding acceptable risk-based thresholds. Reduce adverse effects from contaminated landfill media to the environment, which would reduce the amount of land area available for natural resources use. Support the civilian redevelopment effort at Devens. **CURRENT STATUS:** The planned removal of known hot-spots and surface debris, backfilling, and re-vegetation has not yet been implemented. When completed, the remedy is expected to meet remedial action objectives, and be protective of human health and the environment

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SA 13 **LAKE GEORGE STREET LANDFILL GROUP 2** **STATUS: Remedial Design/ Remedial Action** **ROD LEASE PARCEL**	Disposal of construction debris, tree stumps, and possibly oil (quantity unknown). Soil contaminated with petroleum products and organic chemicals.	HISTORY: Under consideration as part of the Landfill Consolidation Feasibility Study. BCT Management Plan for Debris Disposal issued in March 1995. Landfill Consolidation Draft Task Order Work Plan issued in May 1995. Draft Landfill Consolidation Feasibility Study issued in September 1995. Landfill Remediation reconsidered as seven separate sites, with consolidation as only one possible alternative. Landfill Remediation Feasibility Study released January 1997. Draft Proposed Plan for SAs 6, 12, and 13, and AOCs 9, 11, 40, and 41 released April 18, 1997. The Army recommends alternative two: 6, 12, and 41 - NFA; 13 and 11 - Remove surface wastes; 9 and 40 - to be capped. July 23, 1997, the USEPA requests, by August 6, the reason the Army has not complied with the Federal Facilities Agreement to respond to the USEPA's comments (on the Proposed Plan for Landfill remediation) within the 45-day response period. The Army issued its response to comments on the Landfill Remediation Proposed Plan in early August 1997. September 1997 the Draft Final Proposed Plan was issued. . In October 1997 the Landfill Remediation Update (a bulletin) was drafted. November 3, 1997, the Preliminary Final Proposed Plan (for Landfills) was issued, and December 8, the Proposed Plan was issued. Proposed Plan Public Comment Period ended March 8, 1998. The Army has focused all activities on addressing community comments and is currently reevaluating the Proposed Plan. The Landfill Remediation Test Pit Summary was issued in April 1998 The Preliminary Draft Proposed Plan for SAs 6, 12, and 13, and AOCs 9, 11, 40 and 41 was issued July 1, 1998.

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SA 13 continued		The Remedy Selection Report, On-Site Vs. Off-Site Disposal Options, Landfill Remediation Project was published in March 2000.The Memorandum of Agreement between the Army and the Massachusetts Development Finance Agency for the utilization of the former golf course driving range for the purpose of landfill consolidation was signed June 2000. **ISSUES:** Prevent human exposure to groundwater contaminants released from Fort Devens landfills that exceed acceptable risk thresholds. Protect human and ecological receptors from exposure to landfill soils having concentrations of contaminants exceeding acceptable risk thresholds. Prevent landfill contaminant releases to surface water that result in exceedance of AWQC or acceptable ecological risk-based thresholds. Prevent exposure by ecological receptors to landfill-contaminated sediments exceeding acceptable risk-based thresholds. Reduce adverse effects from contaminated landfill media to the environment, which would reduce the amount of land area available for natural resources use. Support the civilian redevelopment effort at Devens. **CURRENT STATUS:** The planned removal of debris, backfilling and regrading has not yet been implemented. When completed, the remedy is expected to meet remedial action objectives, and be protective of human health and the environment

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AOCs 25, 26, 27, 41 **GROUNDWATER OPERABLE UNIT SOUTH POST IMPACT AREA GROUP 1B** **STATUS: LTM (AOC:25, 26, 27)** **STATUS: Remedial Design/ Remedial Action (AOC:41)** **RETAINED PARCELS**	AOC 25 EOD Range, Destruction of various explosives stored in bunker 187 (1200 LB/year). Groundwater and surface soil are contaminated with explosives. AOC 26 ZULU I & II, Training area/hand grenade range, open explosives (suspected explosive disposal area). Soil, groundwater and sediments are contaminated with heavy metals and explosives. AOC 27 Hotel Range, Training area, machine gun and 20-mm cannon firing (suspected explosive disposal area). Metals found in groundwater and sediments. Pesticides found in sediments. Explosives found in groundwater and soil.	<u>HISTORY:</u> SA 24 (Bunker 187) A RCRA Closure Report was issued for this EOD Area in September 1994 as part of EOD Study of Sites 25, 26, and 27. USEPA Letter of Approval of Closure Report for Bunker 187 and the EOD Range, June 1996. AOCs 25, 26, and 27 (SPIA Groundwater): Redesignated as AOCs based upon site investigation results. Remedial Investigation Report was issued in August 1994. Proposed Plan issued in January 1996. Record of Decision: draft issued February 1996, final in July 1996. Final Long Term Monitoring Plan and Final Well Installation Work Plan issued in May 1997. The 1997 Groundwater Analytical Report (SPIA) issued in February 1998. The Annual Report 1997 for SPIA Long Term Monitoring was issued in August 1998. The Ecological Sampling Work Plan was issued in October 1998. The Final Ecological Sampling Work Plan SPIA was issued in March 1999. The Final Integrated Natural Resources Management Plan 1998-1002 was issued in April 1999. The Annual Report 1998 Long Term Groundwater Monitoring and Ecological Surface Water/Sediment Sampling South Port Impact Area, was issued September 1999

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SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
AOCs 25, 26, 27, 41 continued	AOC 41 UNAUTHORIZED DUMPING AREA, Disposal of unknown materials. Soil, groundwater, and sediments contaminated with metals. Groundwater contaminated with organic chemicals. Surface water and sediments contaminated with pesticides	AOC 41 UNAUTHORIZED DUMPING AREA, SOILS: Supplemental Site Investigation Data Package issued in February 1994. Environmental Health and Safety Plan issued in February 1995. Groundwater, separate issue, RI Report issued February 1996. Draft Proposed Plan issued March 1996. Landfill Remediation Feasibility Study January 1997. Draft Proposed Plan April 1997. July 23, 1997, the USEPA requests, by August 6, the reason the Army has not complied with the Federal Facilities Agreement to respond to the USEPA's comments (on the Proposed Plan for Landfill remediation) within the 45-day response period. The Army issued its response to comments on the Landfill Remediation Proposed Plan in early August 1997. The Preliminary Draft Proposed Plan for SAs 6, 12, and 13, and AOCs 9, 11, 40 and 41 was issued July 1, 1998. Request for 30-day extension for Response to Comments re: Draft Final Proposed Plan submitted to USEPA 28 Sep 98. The Draft Final Proposed Plan for SAs 6, 12, and 13, and AOCs 9, 11, 40, and 41 was issued in November 1998. The Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, issued Mar 1999, The 65% Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation was published in June 1999.The Final Record of Decision, Landfill Remediation for SAs 6, 12, and 13 and AOCs 9, 11,40, and 41 was issued in July 1999. The Annual Report-1999 for South Post Impact Area Long Term Monitoring was published in July 2000. AOCs 25, 26, 27, and 41 GROUNDWATER OPERABLE UNIT: The Draft Final and Final ROD, as well as remedial design documentation, will include AOC 41. The Draft Long Term Monitoring Plan, which includes AOC 41 in the SPIA, was issued in April 1996. Draft Final ROD issued 29 April 1996. Record of Decision signed July 1, 1996. Draft Long Term Monitoring Plan, and Draft Monitoring Well Installation Work Plan, both December 1996. The Integrated Natural Resource Management Plan will be incorporated into the final Long-Term Monitoring Plan

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AOCs 25, 26, 27, 41 continued		**ISSUES:** No Action was chosen as the final remedy for the SPIA monitored-area groundwater, surface water, soil, and sediment and AOC 41 groundwater. Because No Action was selected and approved, no FS was performed and Remedial Action Objectives were not developed. There are recognized potential risks for aquatic life from surface water and sediments. Continued observation of wildlife on the SPIA is recommended. **CURRENT STATUS:** All components of the ROD have been implemented. No contingency action is required at this time at the SPIA or the individual AOCs. Current action consists of long-term monitoring, annual reporting and five-year reviews.

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AOC 32 **DRMO YARD GROUP 1B** **STATUS: Remedial Design/ Remedial Action** **ROD LEASE PARCEL**	Storage of scrap metal, drained batteries, tires and used office equipment. Soil contaminated with petroleum products (fuels, oils), organic chemicals (solvents), and metals (leads, arsenic, and mercury). Groundwater contaminated with organic chemicals (solvents)	HISTORY: Removal of PCB contaminated scrap completed in April 1993. Draft Remedial Investigation Report (Functional Area II) was issued in April 1994. Draft Feasibility Study (FA II) issued in March 1995. Radiological Survey 8/95 - 3/96. Draft Radiological Survey and Remediation Report issued in August 1996. The Final Feasibility Study and Draft Proposed Plan were issued in September 1996. The Final Radiological Survey and Remediation Report DRMO Yard was submitted November 1996; the Final Feasibility Study Report (Rev. 2), in January 1997. Both the Proposed Plan and the Preliminary Draft Record of Decision were issued in January 1997, the Draft Record of Decision, in February 1997. The Feasibility Study Proposed Plan Comment Period is expected in early May 1997 with the ROD to follow. The Corps of Engineers is to send Weston a modification to their contract for work on this site, according to notes from the 15 July 1997 contractor meeting. September 9, 1997, the Corps of Engineers requested a proposal from Stone & Webster Environmental on a Statement of Work for this site. September 1997 the Preliminary Final Record of Decision for this site was issued, and a second preliminary final version was issued in December 1997. The unbound, unsigned final ROD, dated December 1997, was received in the BRAC Environmental Office January 20, 1998.Final signed ROD, dated February 1998, received 25 March 1998.The Draft Remedial Action Workplan-Soil Asphalt, and Debris Removal was issued 1 April 1998. The Draft Workplan Monitoring Natural Attenuation Assessment, AOCs 32 and 43A, was issued Jul 1, 1998.The Final Remedial Action Work Plan Soil, Asphalt and Debris Removal was issues 1 July 1998. The Final Work Plan Monitoring Natural Attenuation Assessment, AOCs 32 and 43A was issued Nov 1998.Weston completed excavation in Nov 1998 and is awaiting confirmation results. The GW Sampling Data Report Round 1, Jan 1999 was issued 1 Mar 99, GW Sampling Data Report Round 2, June 1999, Draft Demonstration of Remedial Actions Operating Properly and Successfully, July 1999. The GW Sampling Data Report Round 3-July 1999 was issued September 1999.

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AOC 32 continued.		The Draft Soils Remedial Action Completion Report, Soil Asphalt, and Debris Removal at AOC 32 was issued 1 Oct 99. The GW Sampling Data Report Round 4- October 1999 was issued in December 1999. The Final Soils Remedial Action Completion Report, Soil Asphalt, and Debris Removal at AOC 32 was issued 1 Jan 2000. The Final Demonstration of Remedial Actions Operating Properly and Successfully AOCs 32 and 43A DRMO and POL, was issue Feb 2000. The Draft Monitoring Natural Attenuation Assessment Report AOC 32,Vol I & II was published in May 2000. **ISSUES:** Soil- Prevent direct and indirect contact, ingestion, and inhalation of the soil contaminated with COPCs by human and ecological receptors at levels that could pose risks. Prevent erosion and migration of soil contaminated with COPCs to storm sewers and surface water bodies. Prevent COPC migration to the groundwater at levels that could adversely affect human health and the environment. Water- Prevent off-site migration of COPCs at levels that could adversely affect flora and fauna. Prevent lateral and vertical migration of COPCs at levels that could adversely affect potential and existing drinking water supply aquifers. Prevent seepage of groundwater from the site that could result in surface water concentrations in excess of ambient water quality standards. **CURRENT STATUS:** Soil remediation has been completed at AOC 32. Institutional controls have been implemented to prevent exposure to and extraction of groundwater from the site. These remedies are expected to be protective of human health and the environment; immediate threats have been addressed.

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SA 34 **Former DEH Entomology Shop at Building 245** **STATUS: NFA** **TRANSFERRED PARCEL**		**HISTORY:** NFA DD signed by BCT 5 September 1996. DCC: RAM Plan for Entomology Complex 27 December 1996 **CURRENT STATUS:** No Further Action necessary
SA 35 **Former DEH Entomology Shop at Building 254** **STATUS: NFA** **TRANSFERRED PARCEL**		**HISTORY:** NFA DD signed 1 November 1995. DCC: RAM Plan for Entomology Complex 27 December 1996 **CURRENT STATUS:** No Further Action necessary

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AOC 40 **COLD SPRING BROOK LANDFILL GROUP 1A** **STATUS: Remedial Design/ Remedial Action** **ROD LEASE PARCEL**	Disposal of construction debris and unmarked drums. Sediments are contaminated with arsenic, mercury and chromium. Low levels of PAH in soil.	HISTORY: Cold Spring Brook OU draft FS issued in March 1994. Final Feasibility Study issued in December 1994. Under consideration as part of the Landfill Consolidation Feasibility Study. BCT Management Plan for Debris Disposal issued in March 1995. Landfill Consolidation Draft Task Order Work Plan issued in May 1995. Draft Landfill Consolidation Feasibility Study issued in September 1995. Landfill Remediation reconsidered as seven separate sites, with consolidation as only one possible alternative. Landfill Remediation Feasibility Study released January 1997. Draft Proposed Plan for SAs 6, 12, and 13, and AOCs 9, 11, 40, and 41 released April 18, 1997. The Army recommends alternative two: 6, 12, and 41 - NFA; 13 and 11 - Remove surface wastes; 9 and 40 - to be capped. July 23, 1997, the USEPA requests, by August 6, the reason the Army has not complied with the Federal Facilities Agreement to respond to the USEPA's comments (on the Proposed Plan for Landfill remediation) within the 45-day response period. The Army issued its response to comments on the Landfill Remediation Proposed Plan in early August 1997. September 1997 the Draft Final Proposed Plan was issued. In October 1997 the Landfill Remediation Update (a bulletin) was drafted. November 3, 1997, the Preliminary Final Proposed Plan (for Landfills) was issued, and December 8, the Proposed Plan was issued. Proposed Plan Public Comment Period ended March 8, 1998. The Army has focused all activities on addressing community comments and is currently reevaluating the Proposed Plan. The Landfill Remediation Test Pit Summary was issued in April 1998 The Preliminary Draft Proposed Plan for SAs 6, 12, and 13, and AOCs 9, 11, 40 and 41 was issued July 1, 1998. Request for 30-day extension for Response to Comments re: Draft Final Proposed Plan submitted to USEPA 28 Sep 98. Draft Feasibility Addendum Report for SAs 6, 11, 12, 13 and AOCs 9, 11, 40 & 41,issued Oct 1998. The Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, issued Nov 1998. Landfill Remediation Feasibility Study Addendum Report, issued Nov 1998.

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AOC 40 Continued		The Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, issued Nov 1998. Public Comment Period for Proposed Plan Version 2 began Dec 7, 1998. The Public Comment Period for the Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41 ended on Jan 20, 1999. The Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, issued Mar 1999. The 65% Draft Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation was published in June 1999. Final Record of Decision for Landfill Remediation, was issued in July 1999. The Remedy Selection Report, On-Site Vs. Off-Site Disposal Options, Landfill Remediation Project was published in March 2000.The Memorandum of Agreement between the Army and the Massachusetts Development Finance Agency for the utilization of the former golf course driving range for the purpose of landfill consolidation was signed June 2000. **ISSUES:** Prevent human exposure to groundwater contaminants released from Fort Devens landfills that exceed acceptable risk thresholds. Protect human and ecological receptors from exposure to landfill soils having concentrations of contaminants exceeding acceptable risk thresholds. Prevent landfill contaminant releases to surface water that result in exceedance of AWQC or acceptable ecological risk-based thresholds. Prevent exposure by ecological receptors to landfill-contaminated sediments exceeding acceptable risk-based thresholds. Reduce adverse effects from contaminated landfill media to the environment, which would reduce the amount of land area available for natural resources use. Support the civilian redevelopment effort at Devens. **CURRENT STATUS:** The planned removal of debris, backfilling and wetland restoration has not yet been implemented. When completed, the remedy is expected to meet remedial action objectives, and be protective of human health and the environment

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SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
AOC 41 **UNAUTHORIZED DUMPING AREA SURFACE SOILS** **NON-PRIORITY LANDFILL - SOUTH POST GROUP 7** **RETAINED PARCEL**	Disposal of unknown materials. Soil, groundwater, and sediments contaminated with metals. Groundwater contaminated with organic chemicals. Surface water and sediments contaminated with pesticides.	**HISTORY:** Supplemental Site Investigation Data Package issued in February 1994. Environmental Health and Safety Plan issued in February 1995. Solid Waste/ Debris Disposal. Under consideration as part of the Landfill Consolidation Feasibility Study. Draft Landfill Consolidation Feasibility Study issued in September 1995. Groundwater issued being addressed in conjunction with SPIA, see AOCs 25, 26, 27, and 41 for more information. Landfill Remediation reconsidered as seven separate sites, with consolidation as only one possible alternative. Landfill Remediation Feasibility Study released January 1997. Draft Proposed Plan for Sas 6, 12, and 13, and AOCs 9, 11, 40, and 41 released April 18, 1997. The Army recommends alternative two: 6, 12, and 41 - NFA; 13 and 11 - Remove surface wastes; 9 and 40 - to be capped. July 23, 1997, the USEPA requests, by August 6, the reason the Army has not complied with the Federal Facilities Agreement to respond to the USEPA's comments (on the Proposed Plan for Landfill remediation) within the 45-day response period. September 1997 the Draft Final Proposed Plan was issued. . In October 1997 the Landfill Remediation Update (a bulletin) was drafted. November 3, 1997, the Preliminary Final Proposed Plan (for Landfills) was issued, and December 8, the Proposed Plan was issued.1997 Groundwater Analytical Report issued February 1, 1998.Proposed Plan Public Comment Period ended March 8, 1998. The Army has focused all activities on addressing community comments and is currently reevaluating the Proposed Plan. The Preliminary Draft Proposed Plan for SAs 6, 12, and 13, and AOCs 9, 11, 40 and 41 was issued July 1, 1998. Request for 30-day extension for Response to Comments re: Draft Final Proposed Plan submitted to USEPA 28 Sep 98. Draft Feasibility Addendum Report for SAs 6, 11, 12, 13 and AOCs 9, 11, 40 & 41,isued Oct 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, issued Nov 1998. Landfill Remediation Feasibility Study Addendum Report, issued Nov 1998. The Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, issued Nov 1998. Public Comment Period for Proposed Plan Version 2 began Dec 7, 1998.

SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
AOC 41 continued		The Public Comment Period for the Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41 ended on Jan 20, The Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, issued Mar 1999. Final Record of Decision for Landfill Remediation, was issued in July 1999.The Remedy Selection Report, On-Site Vs. Off-Site Disposal Options, Landfill Remediation Project was published in March 2000.The Memorandum of Agreement between the Army and the Massachusetts Development Finance Agency for the utilization of the former golf course driving range for the purpose of landfill consolidation was signed June 2000. **ISSUES:** Prevent human exposure to groundwater contaminants released from Fort Devens landfills that exceed acceptable risk thresholds. Protect human and ecological receptors from exposure to landfill soils having concentrations of contaminants exceeding acceptable risk thresholds. Prevent landfill contaminant releases to surface water that result in exceedance of AWQC or acceptable ecological risk-based thresholds. Prevent exposure by ecological receptors to landfill-contaminated sediments exceeding acceptable risk-based thresholds. Reduce adverse effects from contaminated landfill media to the environment, which would reduce the amount of land area available for natural resources use. Support the civilian redevelopment effort at Devens. **CURRENT STATUS:** The planned removal of known hot-spots and surface debris, backfilling and revegetation has not yet been implemented. When completed, the remedy is expected to meet remedial action objectives, and be protective of human health and the environment

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AOC 43A **POL STORAGE AREA GROUP 1B** **STATUS: Remedial Design/ Remedial Action** **ROD LEASE PARCEL**	Gasoline, diesel fuel, and heating oil storage and distribution. Soil and groundwater contaminated with petroleum products and organic chemicals.	HISTORY: Site has been redesignated as an AOC and moved to Group 1B from Group 2. Remedial Investigations Report Functional Area II was issued in August 1994. Draft Feasibility Study (FA II) issued in March 1995. The Final Feasibility Study and Draft Proposed Plan were issued in September 1996. Revision 2 of Final Feasibility Study Report, Proposed Plan, and Preliminary Draft Record of Decision, all three in January 1997. Draft Record of Decision February 1997. The Feasibility Study Proposed Plan is expected in Early May with the ROD to follow. September 9, 1997, the Corps of Engineers requested a proposal from Stone & Webster Environmental on a Statement of Work for this site. September 1997 the Preliminary Final Record of Decision for this site was issued, and a second preliminary final version was issued in December 1997. The unbound, unsigned final ROD, dated December 1997, was received in the BRAC Environmental Office January 20, 1998. The Final signed ROD, dated February 1998, was received 25 March 1998. The Draft Workplan Monitoring Natural Attenuation Assessment, AOCs 32 and 43A, was issued Jul 1, 1998. The Final Work Plan Monitoring Natural Attenuation Assessment, AOCs 32 and 43A was issued Nov 1998. The GW Sampling Data Report Round 1, Jan 1999 was issued 1 Mar 99, GW Sampling Data Report Round 2 June 1999, Draft Demonstration of Remedial Actions Operating Properly and Successfully, July 1999. The GW Sampling Data Report Round 3-July 1999 was issued September 1999. The GW Sampling Data Report Round 4- October 1999 was issued in December 1999. The Final Demonstration of Remedial Actions Operating Properly and Successfully AOCs 32 and 43A DRMO and POL, was issue Feb 2000. The Draft Monitoring Natural Attenuation Assessment Report, AOC 43A Vol I & II, was published in May 2000.

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SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
AOC 43A cont.		ISSUES: ***Soil-*** Prevent direct and indirect contact, ingestion, and inhalation of the soil contaminated with COPCs by human and ecological receptors at levels that could pose risks. Prevent erosion and migration of soil contaminated with COPCs to storm sewers and surface water bodies. Prevent COPC migration to the groundwater at levels that could adversely affect human health and the environment. ***Water-*** Prevent off-site migration of COPCs at levels that could adversely affect flora and fauna. Prevent lateral and vertical migration of COPCs at levels that could adversely affect potential and existing drinking water supply aquifers. Prevent seepage of groundwater from the site that could result in surface water concentrations in excess of ambient water quality standards. CURRENT STATUS: Institutional controls will be implemented to prevent exposure to and extraction of groundwater from the site. These remedies are expected to be protective of human health and the environment; immediate threats have been addressed.

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SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
AOC 43G **HISTORIC GAS STATION SITE** **AAFES GAS STATION GROUP 2** **STATUS: Remedial Design/ Remedial Action** **RETAINED PARCEL**	Gasoline and waste oil storage and distribution. Soil and groundwater contaminated with petroleum products and organic chemicals. Area 1: Historic Gas Station site Area 2: AAFES Gas Station (2) 10,000-gallon USTs and (1) 15,000-gallon UST, removed Area 3: AAFES Gas Station Sand and gas trap Former Waste Oil UST 1,000-gallon fuel oil UST	<u>HISTORY:</u> Redesignated as AOC based upon SSI results. SSI Data Package issued in February 1994. RI/FS will include releases from the UST's at the AAFES gas station. Initial Screening of Alternatives issued in August 1995. Final RI Report and Draft FS Report issued in February 1996. Final FS and Draft PP completed in June 1996. Time Critical Removal being conducted as part of Contaminated Soil Removal Various Sites Phase II. Final Proposed Plan released for public review 26 August 1996. Final Record of Decision October 17, 1996. Removal Action by Roy F. Weston complete and Closeout Report submitted to Corps of Engineers March 1997. Final Work Plan for Intrinsic Remediation Assessment was issued in April 1997. April 10, 1997, a data report was received for the soil analytical results: AOC 43G Area 2 Soil and Free Product Assessment Data Report-Intrinsic Remediation Assessment. On May 15, 1997, the Memorandum Modeling Work Plan (for) Intrinsic Remediation Assessment was issued. On May 20, 1997, contractors submitted a report of preliminary "hits only" groundwater data from the initial round of sampling in March. In June 1997, the Initial Groundwater Sampling Data Report was issued, as well as the Removal Action Report for 43G Gasoline USTs (Area 2), Sand and Gas Trap, and Fuel Oil UST (Area 3) issued on June 17, 1997. The Draft Baseline Intrinsic Remediation Assessment Report was received July 29, 1997. Issued in August 1997 was the Groundwater Sampling Data Report - Round 1, and in November was the Groundwater Sampling Data Report – Round 2 ;Groundwater Sampling Data Report-Round 3 issued in February 1998; 1997 Annual Report issued 1 Feb 98.The Groundwater Sampling Data Report-Round 4 was issued 1 May 1998. The Groundwater Sampling Data Report-Round was issued 1 Aug 1998. The Groundwater Sampling Data Report-Round 6 was issued Oct 1998. The Groundwater Sampling Data Report-Round 7 was issued 1 Feb 1999. Draft Intrinsic Remediation Assessment Report, June 1999. Final Intrinsic Remediation Assessment Report was issued Nov 1999.

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AOC 43G continued		**ISSUES**: Although remediation goals (RGs) are provided for both organic and inorganic COCs, groundwater remediation at both sites focuses on organic contamination. This is based on the premise that the naturally occurring inorganic chemicals within the groundwater have become more soluble as a result of microbial induced oxidation-reduction processes. Removal of the organics will return the groundwater quality (oxygen content, oxidation-reduction potential [ORP], pH) to upgradient conditions resulting in less soluble inorganic fractions. The remedial action objectives pertaining to groundwater at AOC 43G are to: • Protect potential commercial/industrial receptors located on Army Reserve Enclave property from exposure to groundwater having chemicals in excess of the following RGs: iron (9,100 µg/L), manganese (291 µg/L), nickel (100 µg/L), benzene (5 µg/L), ethylbenzene (700 µg/L), and xylenes (10,000 µg/L). • Protect potential commercial/industrial receptors located off Army Reserve Enclave property from exposure to groundwater having chemicals in excess of the above RGs. **CURRENT STATUS:** The most current document for AOC 43G is a five-year review issued September 2000. Although, an Intrinsic Remediation Assessment Report (SWETS, 1999a, 1999b), the final deliverable of the intrinsic remediation assessment, documents that Component 1 of the selected remedy which will effectively remediate groundwater at AOCs 43G and 43J. Through submission and approval of the Intrinsic Remediation Assessment Report, Components 2 and 3 of the selected remedy have been achieved. No contingency action is required at this time at either AOC.

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AOC 43G continued		Current action consists of implementing the remaining components specified in the ROD: a long term groundwater monitoring program, annual reporting, and five-year site reviews (Component Nos. 4, 5, and 6, respectively). These components enable continued assessment for compliance with established performance standards and reporting of the remedial progress.
AOC 43J **HISTORIC GAS STATION SITE GROUP 2** **STATUS: Remedial Design/ Remedial Action** **RETAINED PARCEL**	Gasoline and waste oil storage and distribution. Soil and groundwater contaminated with petroleum products and organic chemicals.	HISTORY: Redesignated as AOC based upon Supplemental Site Investigation results. SSI Data Package was issued in February 1994. RI/FS will include gasoline UST and nearby waste oil UST removed in 1992. Initial Screening of Alternatives issued in August 1995. Final RI Report and Draft FS Report issued in February 1996. Final FS and Draft PP completed in June 1996. Final Proposed Plan released for public review 26 August 1996. Final Record of Decision October 17, 1996. Removal Action by Roy F. Weston complete and Closeout Report underway, January 1997. Final Work Plan for Intrinsic Remediation Assessment was issued in April 1997. On May 15, 1997, the Memorandum Modeling Work Plan (for) Intrinsic Remediation Assessment was issued. On May 20, 1997, contractors submitted a report of preliminary "hits only" groundwater data from the initial round of sampling in March. In June 1997, the Initial Groundwater Sampling Data Report was issued. The Draft Baseline Intrinsic Remediation Assessment Report was received July 29, 1997. Issued in August 1997 was the Groundwater Sampling Data Report - Round 1, and in November was the Groundwater Sampling Data Report – Round 2.; Groundwater Sampling Data Report-Round 3 issued in February 1998; Annual Report 1997 Annual Report issued 1 Feb 98. The Groundwater Sampling Data Report-Round 4 was issued 1 May 1998. The Groundwater Sampling Data Report-Round was issued 1 Aug 1998. The Groundwater Sampling Data Report-Round 6 was issued Oct 1998. The Groundwater Sampling Data Report-Round 7 was issued 1 Feb 1999. Draft Intrinsic Remediation Report June 1999. .The Final Intrinsic Remediation Assessment Report Vol III of III App P, was issued in Nov 1999.

SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
AOC 43J continued		<u>ISSUES:</u> Although remediation goals (RGs) are provided for both organic and inorganic COCs, groundwater remediation at both sites focuses on organic contamination. This is based on the premise that the naturally occurring inorganic chemicals within the groundwater have become more soluble as a result of microbial induced oxidation-reduction processes. Removal of the organics will return the groundwater quality (oxygen content, oxidation-reduction potential [ORP], pH) to upgradient conditions resulting in less soluble inorganic fractions.The remedial action objectives pertaining to groundwater at AOC 43J are: • Protect potential commercial/industrial receptors located on Army Reserve Enclave property from exposure to groundwater having chemicals in excess of the following RGs: iron (9,100 µg/L), manganese (291 µg/L), nickel (100 µg/L), benzene (5 µg/L), ethylbenzene (700 µg/L), and xylenes (10,000 µg/L). • Protect potential commercial/industrial receptors located off Army Reserve Enclave property from exposure to groundwater having chemicals in excess of the above RGs. <u>CURRENT STATUS:</u> The most current document for AOC 43J is a five-year review issued September 2000. Although, an Intrinsic Remediation Assessment Report (SWETS, 1999a, 1999b), the final deliverable of the intrinsic remediation assessment, documents that Component 1 of the selected remedy which will effectively remediate groundwater at AOCs 43G and 43J. Through submission and approval of the Intrinsic Remediation Assessment Report, Components 2 and 3 of the selected remedy have been achieved. No contingency action is required at this time at either AOC.
AOC 43J continued		Current action consists of implementing the remaining components specified in the ROD: a long term groundwater monitoring program, annual reporting, and five-year site reviews (Component Nos. 4, 5, and 6, respectively). These components enable continued assessment for compliance with established performance standards and reporting of the remedial

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SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
AOC 44 **CANNIBALIZATION YARD, BARNUM ROAD GROUP 3** **STATUS: Remedial Action Complete. GW Monitoring in Progress** **RETAINED PARCEL**	Vehicle storage prior to disassembly for parts. Soil contaminated with petroleum products and organic chemicals.	HISTORY: Draft Remedial Design submittal 20 December 1994. Radiological Survey March 1995. ROD issued in March 1995. RD/RA Work Plan issued in June 1995, with the revised final issued in August 1995. Combined with AOC 52. Removal Complete December 1995. The EPA Delisting Inspection was conducted on 2 May 1996. The Remedial Action Completion Report was issued in June 1996. Contract Modification for Groundwater Monitoring, January 1997. Work Plan and Field Sampling and Analysis Plan for Groundwater Monitoring was issued March 1997. The PAH detection requirements were causing some problems for contractor Roy F. Weston in November, so they will use method 8310 in Spring, 1998. In December 1997, the contractor was revising the sampling plan for review by Corps of Engineers. The Revised Work Plan and Field Sampling and Analysis Plan Groundwater Monitoring for AOC 44 and 52 was issued in April 1998. Revised Sampling began in May 1998. The Annual Groundwater Sampling Report 1998 was issued in October 1998. The Annual Groundwater Sampling Report 1999, was issued in October 1999.

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AOC 44 continued		<u>ISSUES:</u> Remedial action objectives (RAOs) for the selected cleanup remedy at AOC 44 is discussed below. • Minimize direct contact/ingestion and inhalation with surface soils at the Maintenance Yards, which are estimated to exceed the USEPA Superfund target range of one in 10,000 to one in 1,000,000 excess cancer risk for carcinogens. • Reduce off-site run-off of contaminants that might result in concentrations in excess of ambient surface water quality standards and background concentrations in sediments. • Reduce or contain the source of contamination to minimize potential migration of contaminants of concern which might result in groundwater concentrations in excess of the federal drinking water Maximum Contaminant Levels (MCLs). <u>CURRENT STATUS:</u> The first five-year site review for AOC 44 was issued September 2000. Remediation and groundwater monitoring are complete. Groundwater sampling is complete. Other than standard operation and maintenance (O&M) requirements of the drainage system and oil/water separator there are no long term O&M needs to maintain the integrity of the remedial action. Restrictions pertaining to soils management and other deed restrictions are currently covered by the Installation Management Plan.

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SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
AOC 50 WW II FUEL POINTS GROUP 6 **STATUS: RI/FS (GW/Soil) COE to operate soil vapor extraction system COE removal of UIS by Weston** **ROD LEASE PARCEL**	Fuel storage. Soil and groundwater contaminated with petroleum products and tetrachloroethene (PCE).	<u>HISTORY:</u> Phase I Removal (3 USTs) completed in January 1993. Phase II Removal: Soil Vapor extraction system for tetrachloroethene installed in January 1994, removal ongoing. Phase III Site Investigation Data Package issued in July 1995. Final RI Work Plan issued in June 1996. Contaminated Soil Removal Phase II Drywell and Cesspool Removal - Action Memorandum and Field Sampling and Analysis Plan Addendum November 1996. Summary Report SVE Monitoring, November 1996. Removal Action complete and Closeout Report pending by Roy F. Weston, January 1997. Memorandum on Additional RI/FS Data Needs at AOC 50 distributed by ABB 7 February 1997. Risk Assessment Approach Plan issued 10 Feb 1997. In March 1997, work was underway to identify the extent of the PCE plume. Before the Draft RI report due in September 1997, a Summary of Remedial Investigation Findings was issued 16 Jul 1997. According to notes from the soil-removal contractor meeting on 15 July 1997, a closure report is done, and the Corps of Engineers is to assume operations of the soil vapor extraction system. July 18, 1997, the Revised Risk Assessment Approach Plan was issued. Roy F. Weston issued their Removal action Report on the Drywell, Cesspool, and Fuel Oil UST Removals, September 1997. The Draft Remedial Investigation Report was issued October 1997. The Draft Work Plan Supplemental Remedial Investigation Activities at AOC 50 was issued 1 September 1998. The Final Work Plan Supplemental Remedial Investigation Activities at AOC 50 was issued March 1999. The Review of Pump and Treat Groundwater Remediation Systems at SHLF & MAAF was issued 31 August 1999. The Draft Work Plan Pilot-Scale Evaluation of Hydrogen Release Compound (HRC) for Enhanced Natural Attenuation was issued in December 1999. The Final Remedial Investigation Report AOC 50 was issued in January 2000. The Draft Findings Report Benzene & Ethylene Dibromide Assessments at AOC 50, was issued in March 2000. The Preliminary Final Work Plan Pilot-Scale Evaluation of HRC for Enhanced In-Situ Bioremediation, was issued in April 2000.

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AOC 50 continued		The Final Work Plan Pilot-Scale Evaluation of HRC for Enhanced In-Situ Bioremediation at AOC 50 was issued in April 2000. ISSUES: Potable use of groundwater by commercial/industrial workers associated with future use. Unrestricted potable use of groundwater by area residents. Construction and use of residential dwellings over source area plume. CURRENT STATUS: Feasibility Study to be conducted for evaluation of alternatives to reduce potential human-health risks associated with groundwater.
AOC 52 **TDA MAINTENANCE YARD BARNUM ROAD GROUP 3** **STATUS: Remedial Action Complete GW Monitoring in progress** **RETAINED PARCEL**	Vehicles with significant leaks stored for repairs. Soil contaminated with petroleum products and organic chemicals.	HISTORY: Draft RD submittal 20 DEC 1994. RAD Survey March 1995. ROD issued in March 1995. RD/RA Work Plan issued in June 1995, with the revised final issued in August 1995. Combined with AOC 52. Removal Complete December 1995. The EPA Delisting Inspection was conducted on 2 May 1996. The Remedial Action Completion Report was issued in June 1996. Contract Modification for Groundwater Monitoring, January 1997. The Work Plan and Field Sampling and Analysis Plan for Groundwater Monitoring was issued March 1997. The PAH detection requirements were causing some problems for contractor Roy F. Weston in November, so they will use method 8310 in Spring, 1998. . In December 1997, the contractor was revising the sampling plan for review by Corps of Engineers. The Revised Work Plan and Field Sampling and Analysis Plan Groundwater Monitoring for AOC 44 and 52 was issued in April 1998. The Annual Groundwater Sampling Report 1999 was issued in October 1999.

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AOC 52 continued		<u>ISSUES:</u> Remedial action objectives (RAOs) for the selected cleanup remedy at AOC 52 are discussed below. • Minimize direct contact/ingestion and inhalation with surface soils at the Maintenance Yards, which are estimated to exceed the USEPA Superfund target range of one in 10,000 to one in 1,000,000 excess cancer risk for carcinogens. • Reduce off-site run-off of contaminants that might result in concentrations in excess of ambient surface water quality standards and background concentrations in sediments. • Reduce or contain the source of contamination to minimize potential migration of contaminants of concern which might result in groundwater concentrations in excess of the federal drinking water Maximum Contaminant Levels (MCLs). <u>CURRENT STATUS:</u> The first five-year site review for AOC 52 was issued September 2000. Remediation and groundwater monitoring are complete. Groundwater sampling is complete. Other than standard operation and maintenance (O&M) requirements of the drainage system and oil/water separator there are no long term O&M needs to maintain the integrity of the remedial action. Restrictions pertaining to soils management and other deed restrictions are currently covered by the Installation Management Plan.

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AOC 57 **BLDG 3713 FUEL OIL SPILL SITE GROUP 2** **STATUS: RI/FS** **ROD LEASE PARCEL**	Fuel storage. Soil contaminated with petroleum products and organic chemicals. Area 1 Fuel Oil Spill Site Area 2 Suspected Crankcase Oil Spill Site Area 3: Historic Garage Waste Disposal Site	**HISTORY:** Interim Removal Action completed in October 1994. RI field work in progress. AOC status. Final Task Order Work Plan issued in February 1996. Final RI Work Plan Addendum issued in August 1996. Storm Drain System No. 6 Outfall - Action Memorandum, and Field Sampling and Analysis Plan Addendum, October 1996. Draft Remedial Investigation Report released March 1997. Note: Per BCT March 16, 1997 meeting notes, this schedule and action may change. Per soil-removal contractor meeting notes of 15 July 1997, they are preparing a cost proposal for Area 3, off Barnum Road. Draft RI/FS Supplemental Workplan for Areas 2 and 3 issued March 12, 1998. The Contaminated Soil Removal-Phase II-Removal Action Report Storm Drain No. 6 Outfall was, issued July 1, 1998. Action Memorandum (Contaminated Soil Removal) issued February 1999. The Draft Final Remedial Investigation Report was issued 1 October 1999. Draft RI/FS Letter Work Plan, Area 3, was issued 3 May 2000. The Final RI/FS Letter Work Plan, AOC 57 Area 3, was issued 1 June 2000. The Final Remedial Investigation Report was issued 1 June 2000. The Draft Focused Feasibility Study, was issued in June 2000.Ground Water Sampling results published by MADEP 20 July 2000. **ISSUES:** Area 1- No Further Action. Area 2- Protect human-health against contaminated soil exposure with regards to possible future use or unrestricted land use scenarios. Area 3- Protect human-health against contaminated groundwater exposure with regards to possible future use of unrestricted land use scenarios. **CURRENT STATUS:** Final Feasibilty Study pending. Evaluation of alternatives to minimize human-health risks associated with exposure to residual contamination in soil and groundwater complete (Areas 2 and 3).

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SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
SA 61Z **HISTORICAL MOTOR POOL BLDG 202 GROUP 3, 5, 6** **STATUS: NFADD** **FUTURE TRANSFERRED LEASE PARCELS**	Motor repair facility. 5,000G No. 2 fuel oil UST. **Soil:** Petroleum products in soil. Unpaved parking lot (UPPL), TPHC contamination. **Groundwater:** TPHC in Groundwater.	**HISTORY:** ***General***: Drywell removed by OHM 1995. Final AREE 61 Report issued in September 1995 Recommendation: site evaluation. Final RI Work Plan issued in June 1996. Risk Assessment Approach Plan 10 Feb 1997. Draft Site Investigation Report issued March 1997. The February 1997 Risk Assessment Approach Plan for AOCs 61Z and 50 was revised and issued July 18, 1997, but appears to only affect AOC 50. At the BCT Meeting January 9, 1998, the BRAC Cleanup Team came to a consensus, changing AOC to SA and an NFA will be pending. Draft No Further Action July 1999. The Draft Final No Further Action Decision Document was published in October 1999. The Draft Final No Further Action Decision Document was published in December 1999. The Final No Further Action Decision Document was signed on January 26, 2000. ***Soil***: Contaminated Soil Removal Phase II, Various Sites issued in February 1996. Time-critical removal Action Memorandum (Soil) issued in March 1996. The Soil Storage Inventory Report was issued in June 1996. The Draft Work Plan Soil Sampling Program Parcel 9-West Rail Area was issued in May 2000. ***Ground Water***: Draft RI/FS Groundwater (GW) Work Plan issued in March 1996. Notes from the March 1997 BCT meeting indicates that for the groundwater issue, the Army proposes a No Action Record of Decision by changing the Remedial Investigation into a Site Investigation, then recommending No Further Action with a Consensus Statement. Consensus Statement signed at 6 Jan 98 BCT Meeting changing GW from AOC to SA. The Final Site Investigation Report was issued Jan 1998. UST: 5000 gallon UST + 30 cubic yards of soil removed June 1996. Draft UST Closure Report October 29, 1996 Final UST Closure Report, Building 202 issued April 1997. UPPL: November 1996: Draft Unpaved Parking Lot (UPPL) Removal Site Evaluation Work Plan. January 1997: Roy F. Weston submitted UPPL evaluation. December 1997: Final UPPL evaluation to be done upon removal of soil stockpile.
SA 61Z continued		**ISSUES:** Soil and groundwater contamination **CURRENT STATUS:** No Further Action necessary

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AOC 63 AM **Previously Removed UST Building 618** **STATUS: NFA** **RETAINED PARCEL**		**HISTORY:** NFA DD signed by BCT 1 November 1995 **ISSUES:** Subsurface soil contamination **CURRENT STATUS:** No Further Action necessary.
AOC 63 AX **Previously Removed UST Building 2517** **STATUS: NFA/ROD** **TRANSFERRED PARCEL**		**HISTORY:** NFA Record of Decision signed October 1997 **ISSUES:** Previous removal action removed USTs and contaminated soils. **CURRENT STATUS:** No Further Action chosen for site based on no unacceptable risks to human health or the environment.
AOC 63BD **FORMER UST SITES BUILDING 1666** **STATUS: NFA** **TRANSFERRED PARCELS**		**HISTORY:** Consensus Statement NFA signed 28 January 1997. NFA DD signed by BCT 28 January 1997. DCC: Work Plan Groundwater Monitoring March 1997 **ISSUES:** Subsurface soil and groundwater contamination **CURRENT STATUS:** Soil removal action complete. Planned commercial reuse of property. No Further Action determined.

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SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
AOC 63 BE **Former UST Sites Building 2290** **STATUS: NFA** **FUTURE TRANSFERRED LEASE PARCELS**		**HISTORY:** Draft Phase III Site Investigation Report May 1996. Draft No Further Action May 1997. Draft No Further Action Mar 1998. NFA DD signed by BCT 6 May 1998. Final Signed NFADD received May 15, 1998 **CURRENT STATUS:** No Further Action necessary
SA 63BH **FORMER UST SITES BUILDING 2458** **STATUS: NFA** **FUTURE TRANSFERRED LEASE PARCEL**		**HISTORY:** NFA DD signed by BCT 4 January 1996 **CURRENT STATUS:** No Further Action necessary

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SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
AREE 63BQ **REMOVED UST, LUST BUILDING 2527** **STATUS: NFA** **FUTURE TRANSFERRED LEASE PARCEL**		HISTORY: NFA DD signed by BCT 7 August 1997 ISSUES: Contaminated subsurface soil. CURRENT STATUS: Subsurface soils removed. No Further Action necessary.

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SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
AOC 69W **BLDG 2151 ELEMENTARY SCHOOL GROUP 2** **STATUS: LTM** **ROD LEASE PARCEL**	**Soil** contaminated with TPHC and cPAHs. **Groundwater** contaminated with TPHC and TAL metals.	**HISTORY:** SSE Data package issued October 1994. Final AREE 69 Report issued June 1995. Revised September 1995. Draft Task Order Work Plan AOC 69W issued July 1995. Final Task Order Work Plan issued in January 1996. Final Work Plan Addendum issued in August 1996. Draft Air Sampling Results, AOC 69W Fort Devens Elementary School November 1996. Risk Assessment Approach Plan, (for) Remedial Investigation Report, issued in January 1997. The Draft Remedial Investigation Report was issued May 1997. In July 1997, the Draft RI/FS Task Workplan Addendum for Supplemental Air Sampling was issued. As of July 17, 1997 the air sampling is to continue and Weston is preparing a cost proposal. In September 1997, Roy F. Weston issued their Draft Action Memorandum for Contaminated Soil Removal and time-critical removal action at this site. In October 1997, the Final Remedial Investigation/Feasibility Study Workplan Addendum for Supplemental Air Sampling was issued. The Analytical Approach for Groundwater Sampling was issued in November 1997.The Final Action Memorandum Contaminated Soil Removal-Phase II was issued in December 1997. Weston removed the UST, concrete box and clay piping in December 1997; work continues. The Draft Supplemental Air Sampling Report was issued in December 1997. The Draft Remedial Investigation Report was issued 1 April 1998. The Contaminated Soil Removal-Phase II Removal Action Report was issued in May 1998. The Final Remedial Investigation Report was issued in August 1998. The Draft Proposed Plan was issued in September 1998. The Draft Proposed Plan was issued in November 1998. The Final Proposed Plan was issued in April 1999. Record of Decision (unsigned); June 8, 1999. The Final Record of Decision was signed on June 24, 1999. The Draft Long Term Monitoring Plan was issued in October 1999. The Final Long Term Monitoring Plan, was issued March 1, 2000.The Semi-Annual Groundwater Analytical Data Report May 2000 was issued August 2000.
AOC 69W continued		**ISSUES:** Restore the aquifer to drinking water standards within reasonable time frame. Monitor potential future migration of groundwater contamination. Eliminate risk from potential consumption of groundwater. Reduce or eliminate the direct contact threat of post-removal-action contaminated soils. **CURRENT STATUS:** The selected remedy (Limited Action) at AOC 69W is protective, and is expected to remain protective, of human health and the environment. The Soil Removal Action has been performed and long-term groundwater monitoring has commenced.

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SITE I.D.	ENVIRONMENTAL CONCERNS	HISTORY\ ISSUES\CURRENT STATUS
SA 71 **RAILROAD ROUNDHOUSE GROUP 1A** **STATUS: RI/FS, RA IN PROGRESS** **FUTURE TRANSFERRED LEASE PARCEL**	Metals, petroleum in soils	**HISTORY:** Established as site 72 Spring 1995. SI Data Package Plow Shop Pond issued September 1994. SI Data Package Grove Pond issued February 1995. Draft Sediment Evaluation Report issued in October 1995. Action on this site is awaiting a decision on the PRP Study. EPA and MADEP Independent Study. Army notes the EPA as the lead agency in the PRP Study. Screening-Level Ecological Risk Assessment was published in April 1998. TRC Sediment Sampling Results Grove Pond issued May 1998. Health Consultation Evaluation of Health Concerns Associated with Drinking Water from Grove Pond Wells-ATSDR, July 1998. The Draft Health Consultation e Evaluation on Health Concerns Associated with Grove Pond and Plow Shop Pond was issued September 1998. The Surface Water and Sediment Sampling Report was issued November 25, 1998.The Final Health Consultation Evaluation on Health Concerns Associated with Grove Pond and Plow Shop Pond was issued December 1998. The Final Phase I Work Plan Grove Pond Arsenic Investigation was issued May 1999. The Draft Phase I Interim Data Report Grove Pond Arsenic Investigation was issued in April 1999 (received Oct 1999). The Final Phase II Work Plan Grove Pond Arsenic Investigation was issued in Sep 1999. **ISSUES:** Time critical removal of soils **CURRENT STATUS:** RA report in progress

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1	SA	Cutler Army Hospital Incinerator	3654	NFA	Master Environmental Plan Update April 1993
2	SA	Veterinary Clinic Incinerator	1450	NFA	Master Environmental Plan Update April 1993
3	SA	Intelligence School Incinerator	1484	NFA	Master Environmental Plan Update April 1993
4	AOC	Sanitary Landfill Incinerator	38	LTM	Final ROD September 1995 Groundwater Model Update March 1996 Final Close-Out Report March 1996 Long Term Monitoring & Maintenance Plan May 1996 Final Monitoring Well Installation Work Plan May 1996 Groundwater Pumping Test (Final Work Plan & Final Site Safety and Health Plan) December 1996 Semi-Annual Groundwater Analytical Report, Fall 1996 Jan 97 Draft Groundwater Pumping Test Report March 1997 Addendum to Long Term Monitoring/Maintenance Plan Apr 97 Addendum to Shepley's Hill Landfill '96 Annual Report Apr 97 30% Concept Design Extraction/Discharge System July 1997 Semi-Annual Groundwater Analytical Rpt. Spring (July) 97 60% Design Extraction /Discharge System November 1997 Semi-Annual Groundwater Analytical Rpt Fall (Dec) 1997 Groundwater Pumping Test Report January 1998 Draft Five Year Review LTM ,Feb 98 Semi-Annual Groundwater Analytical Rpt Spring (Jul) 1998 Final Five Year Review LTM, August 1998 Draft Work Plan Supplemental Groundwater Investigation Oct 1998. Final Work Plan Supplemental Groundwater Investigation Feb 99. Review of Pump and Treat GW Remediation Systems at SHLF & MAAF, 31 Aug 99. 1999 Annual Report, Long Term Monitoring & Maintenance, March 2000. Draft Suppl Groundwater Investigation, Jul 2000.

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Site	Type	Site Description	Building	Status	Source Document(s)
5	AOC	Landfill No. 1, Shepley's Hill		LTM	Final ROD September 1995 Groundwater Model Update March 1996 Final Close-Out Report March 1996 Long Term Monitoring & Maintenance Plan May 1996 Final Monitoring Well Installation Work Plan May 1996 Groundwater Pumping Test (Final Work Plan & Final Site Safety and Health Plan) December 1996 Semi-Annual Groundwater Analytical Report, Fall 1996 Jan 97 Draft Groundwater Pumping Test Report March 1997 Addendum to Long Term Monitoring/Maintenance Plan Apr 97 Addendum to Shepley's Hill Landfill '96 Annual Report Apr 97 30% Concept Design Extraction/Discharge System July 1997 Semi-Annual Groundwater Analytical Rpt Spring (July) 97 60% Design Extraction /Discharge System November 1997 Semi-Annual Groundwater Analytical Rpt Fall (Dec) 1997 Groundwater Pumping Test Report January 1998 Draft Five Year Review LTM, Feb 98 Semi-Annual Groundwater Analytical Rpt Spring (Jul) 1998 Final Five Year Review LTM, August 1998 Draft Work Plan Supplemental Groundwater Investigation Oct 1998. Final Work Plan Supplemental Groundwater Investigation Feb 99. 1998 Annual Report Long Term Monitoring & Maintenance, March 1999, Semi-Annual GW Analytical Report Spring 1999. Review of Pump and Treat GW Remediation Systems at SHLF & MAAF, 31 Aug 99. 1999 Annual Report, Long Term Monitoring & Maintenance, March 2000. Draft Suppl Groundwater Investigation, Jul 2000

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6	SA	Landfill No. 2, South Post Area 7b / Household Dump		Remedial Design/Remedial Action	Landfill Remediation Feasibility Study January 1997 Draft Proposed Plan for 6, 12, 13, 9, 11, 40, and 41 April 97 USEPA requests Landfill PP response compliance July 1997 Response to Comments-Landfill Remed. Proposed Plan 8/97 Draft Final Proposed Plan September 1997 Preliminary Final Proposed Plan October 1997 Proposed Plan December 1997 Proposed Plan for LFC Public Comments period ended 9 Mar 98 Preliminary Draft Proposed Plan Jul 1998 Draft Feasibility Study Addendum Report for SAs 6, 12, 13 and AOCs 9, 11, 40 & 41, Oct 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Landfill Remediation Feasibility Study Addendum Report, Nov 1998. Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41., Nov 1998 Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, Mar 1999, 65% Draft Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation Final Record of Decision Landfill Remediation, July 1999 95% Design for Landfill Consolidation, August 1999 Design Analysis Report for Consolidation Landfill, Oct 1999 Final Design Technical Specifications for Consolidation Landfill, Oct 1999. Final Design Technical Specifications for Offsite Disposal Alternative, Oct 1999. Draft Sampling and Analysis Plan, Landfill Remediation, January 2000. Draft Site Safety and Health Plan, Landfill Remediation Project, January 2000. Draft Contractor Quality Control Plan, Landfill Remediation Project, January 2000. Remedy Selection Report, On-Site versus Off-Site Disposal Options, Landfill Remediation Project, March 2000.
7	SA	Landfill No. 3, South Post Area (West of EOD) / Household Dump		NFA	Master Environmental Plan Update April 1993. BCT meeting 21 August 1995 site GB
8	SA	Landfill No. 4, South Post Area 8a / Household Dump		NFA	Master Environmental Plan Update April 1993. BCT meeting 21 August 1995 site ED

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Site	Type	Site Description	Building	Status	Source Document(s)
9	AOC	Landfill No. 5, North Post Landfill (WWTP) CNST Debris Landfill		Remedial Design/Remedial Action	Landfill Remediation Feasibility Study January 1997 Draft Proposed Plan for 6, 12, 13, 9, 11, 40, and 41 April 97 USEPA requests Landfill PP response compliance July 1997 Response to Comments-Landfill Remed. Proposed Plan 8/97 Supplemental Groundwater Modeling, Groundwater Mounding Evaluation, Devens Wastewater Treatment Plant Rapid Infiltration Basins May 1997 Draft Final Proposed Plan September 1997 Preliminary Final Proposed Plan October 1997 Proposed Plan December 1997 Proposed Plan for LFC Public Comments period ended 9 Mar 98 Landfill Remediation Test Pit Summary, Summary (AOCs 9 & 40 & SA 13) Apr 98 Preliminary Draft Proposed Plan Jul 1998. Draft Feasibility Study Addendum Report for SAs 6, 12, 13 and AOCs 9, 11, 40 & 41, Oct 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41. Nov 1998. Landfill Remediation Feasibility Study Addendum Report, Nov 1998. Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41. Nov 1998. Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, Mar 1999, 65% Draft Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation Final Record of Decision Landfill Remediation, July 1999 95% Design for Landfill Consolidation, August 1999. Design Analysis Report for Consolidation Landfill, Oct 1999 Final Design Technical Specifications for Consolidation Landfill, Oct 1999. Final Design Technical Specifications for Offsite Disposal Alternative, Oct 1999. Hydrogeologic Study in Support of Proposed Consolidation Landfill Former Golf Course Driving Range, Dec 1999. Draft Sampling and Analysis Plan, Landfill Remediation, January 2000. Draft Site Safety and Health Plan, Landfill Remediation Project, January 2000

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9 cont	AOC	Landfill No. 5, North Post Landfill (WWTP) CNST Debris Landfill		Remedial Design/Remedial Action	Draft Contractor Quality Control Plan, Landfill Remediation Project, January 2000. Draft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Feb 2000. Remedy Selection Report, On-Site versus Off-Site Disposal Options, Landfill Remediation Project, March 2000.
10	SA	Landfill No. 6 (Shirley Gate) / CNST Debris Landfill		NFA	NFA DD signed by BCT January 1995

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11	AOC	Landfill No. 7 / CNST Debris Landfill		Remedial Design/Remedial Action	Landfill Remediation Feasibility Study January 1997 Draft Proposed Plan for 6, 12, 13, 9, 11, 40, and 41 April 97 USEPA requests Landfill PP response compliance July 1997 Response to Comments-Landfill Remed. Proposed Plan 8/97 Draft Final Proposed Plan September 1997 Preliminary Final Proposed Plan October 1997 Proposed Plan December 1997 Proposed Plan for LFC Public Comments period ended 9 Mar 98 Preliminary Draft Proposed Plan Jul 1998 . Draft Feasibility Study Addendum Report for SAs 6, 12, 13 and AOCs 9, 11, 40 & 41, Oct 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Landfill Remediation Feasibility Study Addendum Report, Nov 1998. Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, Mar 1999, 65% Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation Final Record of Decision Landfill Remediation, July 1999 95% Design for Landfill Consolidation, August 1999. Design Analysis Report for Consolidation Landfill, Oct 1999 Final Design Technical Specifications for Consolidation Landfill, Oct 1999. Final Design Technical Specifications for Offsite Disposal Alternative, Oct 1999. Hydrogeologic Study in Support of Proposed Consolidation Landfill Former Golf Course Driving Range, Dec 1999. Draft Site Safety and Health Plan, Landfill Remediation Project, January 2000. Draft Contractor Quality Control Plan, Landfill Remediation Project, January 2000. Draft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Feb 2000. Remedy Selection Report, On-Site versus Off-Site Disposal Options, Landfill Remediation Project, March 2000.

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12	SA	Landfill No. 8, Combat Pistol Range / CNST Debris Landfill		Remedial Design/Remedial Action	Landfill Remediation Feasibility Study January 1997 Draft Proposed Plan for 6, 12, 13, 9, 11, 40, and 41 April 97 USEPA requests Landfill PP response compliance July 1997 Response to Comments-Landfill Remed. Proposed Plan 8/97 Draft Final Proposed Plan September 1997 Preliminary Final Proposed Plan October 1997 Proposed Plan December 1997 Proposed Plan for LFC Public Comments period ended 9 Mar 98 Preliminary Draft Proposed Plan Jul 1998 . Draft Feasibility Study Addendum Report for SAs 6, 12, 13 and AOCs 9, 11, 40 & 41, Oct 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Landfill Remediation Feasibility Study Addendum Report, Nov 1998. Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, Mar 1999, 65% Draft Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation Final Record of Decision Landfill Remediation, July 1999 95% Design for Landfill Consolidation, August 1999. Design Analysis Report for Consolidation Landfill, Oct 1999 Final Design Technical Specifications for Consolidation Landfill, Oct 1999. Final Design Technical Specifications for Offsite Disposal Alternative, Oct 1999. Hydrogeologic Study in Support of Proposed Consolidation Landfill Former Golf Course Driving Range, Dec 1999. Draft Sampling and Analysis Plan, Landfill Remediation, January 2000. Draft Site Safety and Health Plan, Landfill Remediation Project, January 2000. Draft Contractor Quality Control Plan, Landfill Remediation Project, January 2000. Draft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Feb 2000.
12 cont	SA	Landfill No. 8, Combat Pistol Range / CNST Debris Landfill		Remedial Design/Remedial Action	Remedy Selection Report, On-Site versus Off-Site Disposal Options, Landfill Remediation Project, March 2000

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Site	Type	Site Description	Building	Status	Source Document(s)
13	SA	Landfill No. 9, Lake George St. Landfill / Open CNST Debris Landfill		Remedial Design/Remedial Action	Landfill Remediation Feasibility Study January 1997 Draft Proposed Plan for 6, 12, 13, 9, 11, 40, and 41 April 97 USEPA requests Landfill PP response compliance July 1997 Response to Comments-Landfill Remed. Proposed Plan 8/97 Draft Final Proposed Plan September 1997 Preliminary Final Proposed Plan October 1997 Proposed Plan December 1997 Proposed Plan for LFC Public Comments period ended 9 Mar 98 Landfill Remediation Test Pit Summary, Summary (AOCs 9 & 40 & SA 13)Apr 98 Preliminary Draft Proposed Plan Jul 1998 . Draft Feasibility Study Addendum Report for SAs 6, 12, 13 and AOCs 9, 11, 40 & 41, Oct 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Landfill Remediation Feasibility Study Addendum Report, Nov 1998. Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, Mar 1999, 65% Draft Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation Final Record of Decision Landfill Remediation, July 1999 95% Design for Landfill Consolidation, August 1999. Design Analysis Report for Consolidation Landfill, Oct 1999 Final Design Technical Specifications for Consolidation Landfill, Oct 1999. Final Design Technical Specifications for Offsite Disposal Alternative, Oct 1999. Hydrogeologic Study in Support of Proposed Consolidation Landfill Former Golf Course Driving Range, Dec 1999. Draft Sampling and Analysis Plan, Landfill Remediation, January 2000. Draft Site Safety and Health Plan, Landfill Remediation Project, January 2000. Draft Contractor Quality Control Plan, Landfill Remediation Project, January 2000. Draft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Feb 2000.

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Site	Type	Site Description	Building	Status	Source Document(s)
13 cont	SA	Landfill No. 9, Lake George St. Landfill / Open CNST Debris Landfill		Remedial Design/Remedial Action	Remedy Selection Report, On-Site versus Off-Site Disposal Options, Landfill Remediation Project, March 2000.
14	SA	Landfill No. 10 / Abandoned Quarry		NFA	NFA DD signed by BCT January 1995
15	SA	Landfill No. 11, Helipad / Old Disposal Pit		NFA	NFA DD signed by BCT September 1995
16	SA	Landfill No. 12, Shoppette Landfill		NFA	NFA DD signed by BCT January 1995
17	SA	Landfill No. 13, Little Mirror Lake		NFA	NFA DD signed by BCT 12 March 1997
18	AOC	Asbestos Cell, Shepley's Hill Landfill, Landfill No 1		LTM	Final ROD September 1995 Groundwater Model Update March 1996 Final Close-Out Report March 1996 Long Term Monitoring & Maintenance Plan May 1996 Final Monitoring Well Installation Work Plan May 1996 Groundwater Pumping Test (Final Work Plan & Final Site Safety and Health Plan) December 1996 Semi-Annual Groundwater Analytical Report, Fall 1996 Jan 97 Draft Groundwater Pumping Test Report March 1997 Addendum to Long Term Monitoring/Maintenance Plan Apr 97 Addendum to Shepley's Hill Landfill '96 Annual Report Apr 97 30% Concept Design Extraction/Discharge System July 1997 Semi-Annual Groundwater Analytical Rpt Spring (July) 97 60% Design Extraction /Discharge System November 1997 Semi-Annual Groundwater Analytical Rpt Fall (Dec) 1997 Groundwater Pumping Test Report January 1998 Draft Five Year Review LTM February 1998 Semi-Annual Groundwater Analytical Rpt Spring (Jul) 1998. Final Five Year Review LTM, August 1998 Draft Work Plan Supplemental Groundwater Investigation Oct 1998. Final Work Plan Supplemental Groundwater Investigation Feb 99. Review of Pump and Treat GW Remediation Systems at SHLF & MAAF, 31 Aug 99. 1999 Annual Report, Long Term Monitoring & Maintenance, March 2000. Draft Suppl Groundwater Investigation, Jul 2000
19	SA	Wastewater Treatment Plant / Imhoff Tank		NFA	NFA DD signed by BCT 2 November 1995 Hydrogeologic Evaluation for GW Discharge Permit, 6 Nov 98
20	SA	Rapid Infiltration Beds, WWTP		NFA	NFA DD signed by BCT 2 November 1995
21	SA	Sludge Drying Beds, WWTP		NFA	NFA DD signed by BCT 2 November 1995
22	SA	Hazardous Waste Storage Facility	1650	NFA, RCRA closure	Master Environmental Plan April 1992

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23	SA	Paper Recycling Center	1650	NFA	Master Environmental Plan April 1992
24	SA	Waste Explosive Storage Bunker	3644 (Bunker 187)	NFA	RCRA Closure Report for EOD Area, September 1994 USEPA Letter of Approval of Closure Report for Bunker 187 and the EOD Range, June 1996 NFA DD signed by Army and EPA March 1993
25	AOC	EOD Range		LTM	RCRA Closure Report for EOD Area, September 1994 USEPA Letter of Approval of Closure Report for Bunker 187 and the EOD Range, June 1996 Final Record of Decision July 1996 Final LTMP May 1997 Final Well Installation Work Plan May 1997 1997 GW Analytical Rpt, SPIA, 2/98. Annual Report 1997, SPIA LTM, August 1998 Ecological Sampling Work Plan SPIA, October 1998 Final Ecological Sampling Work Plan SPIA ,March 1999 Final INRMP 1998-1002, Apr 1999. Annual Report 1998 Long Term Groundwater Monitoring and Ecological Surface Water/Sediment Sampling South Port Impact Area, September 1999 Annual Report 1999 SPIA Long Term Monitoring, July 2000
26	AOC	Zulu I and II Ranges		LTM	RCRA Closure Report for EOD Area, September 1994 USEPA Letter of Approval of Closure Report for Bunker 187 and the EOD Range, June 1996 Final Record of Decision July 1996 Final LTMP May 1997 Final Well Installation Work Plan May 1997 1997 GW Analytical Rpt, SPIA, 2/98. Annual Report 1997, SPIA LTM, August 1998 Ecological Sampling Work Plan SPIA, October 1998 Final Ecological Sampling Work Plan SPIA ,March 1999 Final INRMP 1998-1002, Apr 1999. Annual Report 1998 Long Term Groundwater Monitoring and Ecological Surface Water/Sediment Sampling South Port Impact Area, September 1999. Annual Report 1999 SPIA Long Term Monitoring, July 2000

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27	AOC	Hotel Range		LTM	RCRA Closure Report for EOD Area, September 1994 USEPA Letter of Approval of Closure Report for Bunker 187 and the EOD Range, June 1996 Final Record of Decision July 1996 Final LTMP May 1997 Final Well Installation Work Plan May 1997 1997 GW Analytical Rpt, SPIA, 2/98. Annual Report 1997, SPIA LTM, August 1998 Ecological Sampling Work Plan SPIA, October 1998 Final Ecological Sampling Work Plan SPIA ,March 1999 Final INRMP 1998-1002, Apr 1999. Annual Report 1998 Long Term Groundwater Monitoring and Ecological Surface Water/Sediment Sampling South Port Impact Area, September 1999. Annual Report 1999 SPIA Long Term Monitoring, July 2000
28	SA	Training Area 14		NFA	NFA DD signed by BCT August 1994
29	SA	Transformer Storage Area	1438	NFA	NFA DD signed by BCT 15 January 1995
30	SA	Drum Storage Areas		NFA	NFA DD signed by BCT 9/11/95. Mass DEP withdrew original document for further review
31	SA	Fire-Fighting Training Area		NFA	NFA DD signed by BCT 15 January 1995

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32	AOC	DRMO Yard	204	Remedial Design/Remedial Action	Proposed Plan January 1997 Preliminary Draft Record of Decision January 1997 Draft Record of Decision February 1997 Proposed Plan June 1997 Preliminary Final Record of Decision September 1997 Preliminary Final Record of Decision December 1997 Final Record of Decision December 1997 (unsigned) Draft Work Plan Submitted Feb 98 per Roy F. Weston Periodic Update Report 4 Mar 98. Final Record of Decision February 1998 (signed) Draft RA/WP, Soil, Asphalt & Debris Removal, Apr 98. Draft WP Monitoring Natural Attenuation Assessment, AOCs 32 and 43A DRMO and POL, 1 July 1998 Contaminated Soil Removal Phase II-Final Remedial Action WP-Soil, Asphalt & Debris Removal Jul 98. Final WP Monitoring Natural Attenuation Assessment, AOCs 32 and 43A DRMO and POL, 1 Nov 1998. GW Sampling Data Report Round 1, 1 Mar 99 GW Sampling Data Report Round 2, June 1999 Draft Demonstration of Remedial Actions Operating Properly and Successfully, July 1999. Groundwater Sampling Data Report-Round 3-Sep 99 Draft Soils Remedial Action Completion Report, Soil, Asphalt & Debris Removal, Oct 99. Groundwater Sampling Data Report Round 4, 1 Dec 99. Final Soils Remedial Action Completion Report, Soil, Asphalt & Debris Removal, Jan 2000. Final Demonstration of Remedial Actions Operating Properly and Successfully AOCs 32 and 43A DRMO and POL, Feb 2000. Draft Monitoring Natural Attenuation Assessment Report Vol I & II, AOC 32, DRMO, May 2000.
33	SA	DEH Entomology Shop	262	NFA	NFA DD signed by BCT 18 March 1996 DCC: RAM Plan for Entomology Complex 27 December 1996
34	SA	Former DEH Entomology Shop	245	NFA	NFA DD signed by BCT 5 September 1996 DCC: RAM Plan for Entomology Complex 27 December 1996
35	SA	Former DEH Entomology Shop	254	NFA	NFA DD signed 1 November 1995 DCC: RAM Plan for Entomology Complex 27 December 1996

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Site	Type	Site Description	Building	Status	Source Document(s)
36	SA	Former DEH Entomology Shop	2728	NFA	NFA DD signed by BCT 18 March 1996
37	SA	Golf Course Entomology Shop	37A - 3622 37B - 3627 37C - 3601 37D - 3606	NFA	NFA DD signed by BCT 18 March 1996
38	SA	Battery Repair Area	3713	NFA	NFA DD signed by BCT 11 September 1995
39	SA	Transformer	near F4250	NFA	NFA DD signed by BCT 2 October 1996
40	AOC	Cold Spring Brook Landfill		Remedial Design/Remedial Action	Landfill Remediation Feasibility Study January 1997 Draft Proposed Plan for 6, 12, 13, 9, 11, 40, and 41 April 97 USEPA requests Landfill PP response compliance July 1997 Response to Comments-Landfill Remed. Proposed Plan 8/97 Draft Final Proposed Plan September 1997 Preliminary Final Proposed Plan October 1997 Final Proposed Plan December 1997 Proposed Plan for LFC Public Comment Period ended 9 Mar 98, numerous comments received from citizens. Landfill Remediation Test Pit Summary (AOCs 9 & 40 & SA 13), Apr 98 Preliminary Draft Proposed Plan Jul 1998 . Draft Feasibility Study Addendum Report for SAs 6, 12, 13 and AOCs 9, 11, 40 & 41, Oct 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Landfill Remediation Feasibility Study Addendum Report, Nov 1998. Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, Mar 1999, 65% Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation Final Record of Decision Landfill Remediation, July 1999 95% Design for Landfill Consolidation, August 1999. Design Analysis Report for Consolidation Landfill, Oct 1999.

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Site	Type	Site Description	Building	Status	Source Document(s)
40 Cont	AOC	Cold Spring Brook Landfill		Remedial Design/Remedial Action	Final Design Technical Specifications for Consolidation Landfill, Oct 1999. Final Design Technical Specifications for Offsite Disposal Alternative, Oct 1999. Hydrogeologic Study in Support of Proposed Consolidation Landfill Former Golf Course Driving Range, Dec 1999. Draft Sampling and Analysis Plan, Landfill Remediation, January 2000. Draft Site Safety and Health Plan, Landfill Remediation Project, January 2000. Draft Contractor Quality Control Plan, Landfill Remediation Project, January 2000. Draft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Feb 2000. Remedy Selection Report, On-Site versus Off-Site Disposal Options, Landfill Remediation Project, March 2000

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Site	Type	Site Description	Building	Status	Source Document(s)
41	AOC	Unauthorized Dumping Area, Site A Groundwater is an Operable Unit Under ROD for Sites 25, 26, 27, and 41 (South Post Impact Area)(SPIA) Surface Debris Under Site 41 is a landfill and is covered under the Proposed Plan for Landfill Remediation.		Remedial Design/Remedial Action	RCRA Closure Report for EOD Area, September 1994 USEPA Letter of Approval of Closure Report for Bunker 187 and the EOD Range, June 1996 Final ROD (SPIA) GW July 1996 LTMP December 1996 (surface debris) Landfill Remediation Feasibility Study January 1997 Draft Proposed Plan for 6, 12, 13, 9, 11, 40, and 41 April 97 Final LTMP May 1997 Final Well Installation Work Plan May 1997 USEPA requests Landfill PP response compliance July 1997 Response to Comments-Landfill Remed. Proposed Plan 8/97 Draft Final Proposed Plan September 1997 Preliminary Final Proposed Plan October 1997 Final Proposed Plan December 1997 1997 GW Analytical Rpt, SPIA, 2/98 Proposed Plan for LFC Public Comment Period ended 9 Mar 98 Preliminary Draft Proposed Plan Jul 1998. Annual Report 1997, SPIA LTM, August 1998 Ecological Sampling Work Plan SPIA, October 1998 Draft Feasibility Study Addendum Report for SAs 6, 11, 12, 13 and AOCs 9, 11, 40 & 41, Oct 1998. Draft Final Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Landfill Remediation Feasibility Study Addendum Report, Nov 1998. Proposed Plan for SAs 6, 12, and 13 and AOCs 9, 11, 40, and 41, Nov 1998. Draft Record of Decision, Landfill Remediation Study SAs 6, 12, and 13 and AOCs 9, 11, 40 and 41, Mar 1999. Final Ecological Sampling Work Plan SPIA ,March 1999 Final INRMP 1998-1002, Apr 1999, 65% Landfill Remediation Construction Specifications, Design Analysis and Technical Specifications for Landfill Consolidation Final Record of Decision Landfill Remediation, July 1999 95% Design for Landfill Consolidation, August 1999 Annual Report 1998 Long Term Groundwater Monitoring and Ecological Surface Water/Sediment Sampling South Post Impact. Area, September 1999

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Site	Type	Site Description	Building	Status	Source Document(s)
41 Cont	AOC	Unauthorized Dumping Area, Site A Groundwater is an Operable Unit Under ROD for Sites 25, 26, 27, and 41 (South Post Impact Area)(SPIA) Surface Debris Under Site 41 is a landfill and is covered under the Proposed Plan for Landfill Remediation		Remedial Design/Remedial Action	Hydrogeologic Study in Support of Proposed Consolidation Landfill Former Golf Course Driving Range, Dec 1999. Draft Sampling and Analysis Plan, Landfill Remediation, January 2000. Draft Site Safety and Health Plan, Landfill Remediation Project, January 2000. Draft Contractor Quality Control Plan, Landfill Remediation Project, January 2000. Draft Work Plans-Sampling & Analysis Plan: Environmental Protection Plan & Excavation & Handling Plan, Landfill Remediation Project, Feb 2000. Remedy Selection Report, On-Site versus Off-Site Disposal Options, Landfill Remediation Project, March 2000
42	SA	Popping Furnace (O Range)		NFA	NFA signed by BCT 5 September 1996
43A	AOC	POL Storage Site	F186	Remedial Design/Remedial Action	Proposed Plan January 1997 Preliminary Draft Record of Decision January 1997 Draft Record of Decision February 1997 Proposed Plan June 1997 Preliminary Final Record of Decision September 1997 Preliminary Final Record of Decision December 1997 Final Record of Decision December 1997 (unsigned) Final Record of Decision February 1998 (signed) Draft WP Monitoring Natural Attenuation Assessment, AOCs 32 and 43A DRMO and POL, 1 July 1998 Final WP Monitoring Natural Attenuation Assessment, AOCs 32 and 43A DRMO and POL, 1 Nov 1998. GW Sampling Data Report Round 1, 1 Mar 99 GW Sampling Data Report Round 2, June 1999 Draft Demonstration of Remedial Actions Operating Properly and Successfully, July 1999. Groundwater Sampling Data Report-Round 3-Sep 99 Groundwater Sampling Data Report-Round 4, 1 Dec 99. Final Demonstration of Remedial Actions Operating Properly and Successfully AOCs 32 and 43A DRMO and POL, Final Demonstration of Remedial Actions Operating Properly and Successfully AOCs 32 and 43A DRMO and POL,Feb 2000. Draft Monitoring Natural Attenuation Assessment Report Vol I & II, AOC 43A POL, May 2000.
43B	SA	Historic Gas Station	F169	NFA	NFA DD signed by BCT 18 January 1995
43C	SA	Historic Gas Station	F170	NFA	NFA DD signed by BCT 18 January 1995

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Site	Type	Site Description	Building	Status	Source Document(s)
43D	SA	Historic Gas Station Patch Road	F171	NFA	NFA DD signed by BCT 23 July 1996
43E	SA	Historic Gas Station	F172	NFA	NFA DD signed by BCT 18 January 1995
43F	SA	Historic Gas Station	F173	NFA	NFA DD signed by BCT 18 January 1995
43G	AOC	Historic Gas Station Area 1: Historic Gas Station site Area 2: AAFES Gas Station 2008 (2) 10,000-gallon USTs and (1) 15,000-gallon UST, removed Area 3: AAFES Gas Station 2008 Sand and gas trap removed 1,000-gallon fuel oil UST removed 500-gal. waste oil UST, removed	F174, current 2008	Remedial Design/Remedial Action	Final Record of Decision October 17, 1996 Final Work Plan Intrinsic Remediation Assessment April 97 AOC 43G Area 2 Soil and Free Product Assessment Data Report, and Intrinsic Remediation Assessment April 10, 1997 Prelim. Groundwater Data-Sampling/Field Analysis May 97 Memorandum Modeling Work Plan, IRA May 1997 Initial Groundwater Sampling Data Report June 1997 Proposed Sampling and Laboratory Analysis Schedule for Groundwater Sampling Round 1, IRA, June 1997 Removal Action Report Area 2 and Area 3, June 1997 Draft Baseline Intrinsic Remed. Assessment Report July 97 Groundwater Sampling Data Report - Round 1 August 1997 Groundwater Sampling Data Report- Round 2 Nov 1997 Groundwater Sampling Data Report Round 3 Feb 1998 1997 Annual Report 1 Feb 98 Groundwater Sampling Data Report-Round 4 May 1998 Groundwater Sampling Data Report-Round 5 June 1998 Groundwater Sampling Data Report-Round 6 Oct 1998. Groundwater Sampling Data Report-Round 7 Feb 1999. Draft Intrinsic Remediation Assessment Report June 1999 Final Intrinsic Remediation Assessment Report Vols I thru III, Report, Nov 1999.
43H	SA	Historic Gas Station Queenstown St Spill	F175 (602)	NFA	NFA DD signed by BCT 5 September 1996
43I	SA	Historic Gas Station Queenstown St Spill	F176	NFA	NFA DD signed by BCT 5 September 1996

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Site	Type	Site Description	Building	Status	Source Document(s)
43J	AOC	Historic Gas Station	F177	Remedial Design/Remedial Action	Final Record of Decision October 17, 1996 Final Work Plan Intrinsic Remediation Assessment April 97 Prelim. Groundwater Data-Sampling/Field Analysis May 97 Memorandum Modeling Work Plan, IRA May 1997 Initial Groundwater Sampling Data Report June 1997 Proposed Sampling and Laboratory Analysis Schedule for Groundwater Sampling Round 1, IRA, June 1997 Draft Baseline Intrinsic Remed. Assessment Report July 97 Groundwater Sampling Data Report - Round 1 August 1997 Groundwater Sampling Data Report – Round 2 Nov 1997; Groundwater Sampling Data Report – Round 3 Feb 1998 1997 Annual Report 1 Feb 98 Groundwater Sampling Data Report- Round 4 May 1998 Groundwater Sampling Data Report-Round 5 June 1998 Groundwater Sampling Data Report-Round 6 Oct 1998. Groundwater Sampling Data Report-Round 7 Feb 1999 Draft intrinsic Remediation Assessment Report, June 1999 Final Intrinsic Remediation Assessment Report Vol I thru III, Nov 1999.
43K	SA	Historic Gas Station	F178	NFA	NFA DD signed by BCT 18 January 1995
43L	SA	Historic Gas Station	F179	NFA	NFA DD signed by BCT 18 January 1995
43M	SA	Historic Gas Station	F180	NFA	NFA DD signed by BCT 18 January 1995
43N	SA	Historic Gas Station	F181	NFA	NFA DD signed by BCT 18 January 1995
43O	SA	Historic Gas Station	F182	NFA	NFA DD signed by BCT 25 June 1996
43P	SA	Historic Gas Station	F183	NFA	NFA DD signed by BCT 18 January 1995
43Q	SA	Historic Gas Station	F184	NFA	NFA DD signed by BCT 18 January 1995
43R	SA	Historic Gas Station	F185	NFA	NFA DD signed by BCT 18 January 1995
43S	SA	Historic Gas Station	F203	NFA	NFA DD signed by BCT 18 January 1995

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Site	Type	Site Description	Building	Status	Source Document(s)
44	AOC	Cannibalization Yard Barnum Road	3713	Remedial Action Complete. GW Monitoring in Progress	Final Record of Decision AOCs 44 & 52 (signed) March 1995. Remedial Action Completion Report June 1996 Contract Modification for Groundwater Monitoring Jan 1997 Work Plan and Field Sampling Analysis Plan Groundwater Monitoring for AOCs 44 & 52 , March 1997 Roy F. Weston Periodic Update 10 December 1997 Roy F. Weston Periodic Update Report 4 Mar 98 Work Plan and Field Sampling and Analysis Plan Groundwater Monitoring for AOC 44 and 52, April 1998 (revised) Roy F. Weston Periodic Update Report 29 Apr 98 Annual Groundwater Sampling Report 1998, October 1998 Annual Groundwater Sampling Report 1999, October 1999.
45	SA	Wash Rack, Lake George Street		NFA	NFA in MEP Update 1993, requiring removal. Closure Report July 1994 GAS Environmental
46	SA	Training Area 6d		NFA	Master Environmental Plan Update April 1993
47	SA	LUST Site	3816	NFA	NFA DD signed by Army and EPA 20 June 1994
48	SA	LUST Site / Building 202 UST	202	NFA (Additional work regarding groundwater: see 61Z TPH 24 ppm gw)	NFA DD signed by BCT 18 January 1995
49	SA	LUST Site	3602	NFA	NFA DD signed by BCT 2 October 1996

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Site	Type	Site Description	Building	Status	Source Document(s)
50	AOC	WWII Fuel Points Solvent contamination associated with parachute tower UIS	PCE Site Near Airport	RI/FS (GW/Soil) COE to operate soil vapor extraction system COE removal of UIS by Weston	Final RI Work Plan June 1996 Summary Report SVE Monitoring November 1996 Risk Assessment Approach Plan 10 February 1997 Summary of Remedial Investigation Findings 7/97 Revised Risk Assessment Approach Plan July 1997 Roy F. Weston Periodic Update Report September 10, 1997 Removal Action Report September 1997 Draft Remedial Investigation Report October 1997 Roy F. Weston Periodic Update Report 4 Mar 98 Draft Work Plan Supplemental Remedial Investigation Activities at AOC 50, September 1998. Final Work Plan Supplemental Remedial Investigation Activities at AOC 50, March 1999. Review of Pump and Treat GW Remediation Systems at SHLF & MAAF, 31 Aug 99. Draft Work Plan Pilot-Scale Evaluation of Hydrogen Release Compound for Enhanced Natural Attenuation, December 1999. Final Remedial Investigation Report Vols I, II & III of III Jan 2000. Draft Findings Report Benzene & Ethylene Dibromide Assessments at AOC 50, March 2000. Preliminary Final Work Plan for Pilot-Scale Eval of Hydrogen Release Compound for Enhanced In-Situ Bioremediation, Apr 2000. Final Work Plan Pilot-Scale Evaluation of Hydrogen Release Compound for Enhanced In-Situ Bioremediation , Apr 2000 Draft Work Plan Supplemental Ground Water Sampling, July 2000.
51	SA	O'Neil Building Spill Site	3412	NFA	NFA DD signed by BCT 11 September 1995

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Site	Type	Site Description	Building	Status	Source Document(s)
52	AOC	TDA Maintenance Yard Barnum Road		Remedial Action Complete Groundwater Monitoring in progress	Final Record of Decision AOC 44 & 52 (signed) March 1995. Remedial Action Completion Report June 1996 Contract Modification for Groundwater Monitoring Jan 1997 Work Plan and Field Sampling Analysis Plan Groundwater Monitoring for AOCs 44 & 52, March 1997 Roy F. Weston Periodic Update 10 December 1997 Roy F. Weston Periodic Update Report 4 Mar 98 Work Plan and Field Sampling and Analysis Plan Groundwater Monitoring for AOC 44 and 52, April 1998 (revised) Roy F. Weston Periodic Update Report 29 Apr 98 Roy F. Weston Periodic Update Report 27 May 98 Annual Groundwater Sampling Report 1998, October 1998. Annual Groundwater Sampling Report 1999, October 1999.
53	SA	POL Spill Areas		NFA	Master Environmental Plan Update April 1993
54	SA	Historic Gas Station	f182	same as 43O which is NFA	NFA DD signed by BCT 6 June 1996 (SA 43O)
55	SA	Shirley Housing Area Trailer Park Fuel Tanks		NFA (EMO tank removal complete)	Master Environmental Plan Update April 1993, requiring removal; Closure Report August 1995 OHM.
56	SA	LUST Site	2417	NFA	NFA DD signed by BCT 2 October 1996
57	AOC	Area 1 - Fuel Oil Spill Site Area 2 –Crankcase oil Spill Site Area 3 - Off Barnum Road Also includes AREE 70.6 storm water outfall No. 6	3713	RI/FS	Final RI Work Plan Addendum August 1996 Storm Drain System No. 6 Outfall Action Memo. And Field Sampling and Analysis Plan Addendum October 96 Draft Remedial Investigation Report March 1997 Triweekly Update Roy F. Weston 15 July 1997 Draft RI/FS Suppl Workplan Areas 2 and 3 12 Mar 98 Roy F. Weston Periodic Update Report 4 Mar 98 Roy F. Weston Periodic Update Report 1 Apr 98 Contaminated Soil Removal Phase II-Removal Action Report Storm Drain System No. 6 Outfall, 1 July 1998. Action Memorandum, 1 Jan 99 Action Memorandum, 1 Feb 99 Draft Final Remedial Investigation Report, October 1999 Draft RI/FS Letter Work Plan, AOC 57, Area 3 3 May 2000. Final RI/FS Letter Work Plan, AOC 57, Area 3, 1 June 2000. Final Remedial Investigation Report, June 2000. Draft Focused Feasibility Study, June 2000. Ground Water Sampling Results, July 2000.

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58	SA	LUST Sites	2648 / 2650	NFA	NFA DD signed by BCT 2 November 1995
59	SA	Bridge 526		NFA	NFA DD signed by BCT 18 January 1995
60	AREE	Training Areas & Ranges	NA	NFA	NFA Remains in DRFTA Operation
61.A	AREE	MWAA, Former Motor Pool	242, UPPL	NFA	DCC: RAM Plan for Entomology Complex 27 December 1996 NFA DD signed by BCT 28 January 1997
61.B	AREE	MWAA, Motor Pool	3774, 3773	NFA	Final Report September 1995 Draft UPPL Removal Site Evaluation Work Plan Nov 96 AREE 61B Action Memorandum November 1997 Roy F. Weston Periodic Update 7 January 1998 Roy F. Weston Periodic Update 4 March 1998 Roy F. Weston Periodic Update Report 1 Apr 1998 Roy F. Weston Periodic Update Report 29 Apr 1998 Draft NFADD Various Removal Actions Phase II Apr 1998 NFADD signed by BCT 11 June 1998
61.C	AREE	MWAA, Former Motor Pool	2021	NFA	NFA DD signed by BCT 17 October 1995
61.D	AREE	MWAA, Motor Pool, Satellite Accumulation Area	1677	NFA	NFA DD signed by BCT 17 October 1995
61.E	AREE	MWAA, Motor Pool	1401	NFA (UIS Closure)	NFA DD signed by BCT 17 October 1995
61.F	AREE	MWAA, Motor Pool	3549	NFA (UIS Closure)	NFA DD signed by BCT 17 October 1995
61.G	AREE	MWAA, Motor Pool	2008	NFA (Area surrounding building referred to AOC 43G, which has gone to ROD)	Final AREE 61 Report September 1995
61.H	AREE	MWAA, Motor Pool	616 617 618 619	NFA (UIS Closure)	NFA DD signed 1 November 1995
61.I	AREE	MWAA, Motor Pool	601 602 603 604 605 606 607 608	NFA (Referred to 43 H&I)	Final AREE 61 Report September 1995 NFA DD for 43.H&I signed by BCT 5 September 1996
61.J	AREE	MWAA, Motor Pool	612 613 614 615	NFA	NFA DD signed by BCT 17 October 1995
61.K	AREE	MWAA, Motor Pool	3612	NFA	NFA DD signed by BCT 2 November 1995
61.L	AREE	MWAA, Motor Pool -Across from cemetery		NFA (Deleted because was never a motor pool)	Final AREE 61 Report September 1995
61.M	AREE	MWAA, Motor Pool	3606	NFA	NFA DD signed by BCT 5 September 1996
61.N	AREE	MWAA, Motor Pool	3605	NFA	NFA DD signed by BCT 17 October 1995

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TABLE H-2
SITE STATUS TABLE – SEPTEMBER 15, 2000

FIVE YEAR REVIEW
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS

Site	Type	Site Description	Building	Status	Source Document(s)
61.O	AREE	MWAA, Motor Pool	2517 / 2514	NFA Referred to 43K and 63AX	Referred to in MWAA AR61 (AR 61 94101ADLR) Suppl Site Eval Data Package, Oct 1994. Final AREE 61 Report September 1995 NFA DD (43K) signed by BCT 18 January 1995 Record of Decision (63AX) October 1997
61.P	AREE	MWAA, Motor Pool	2601 / 2681	NFA	NFA DD signed by BCT 2 October 1996
61.Q	AREE	MWAA, Motor Pool	2682 / 2613	NFA	NFA DD signed by BCT 17 October 1995
61.R	AREE	MWAA, Motor Pool	2656, 2711, 181	NFA	NFA DD signed by BCT 1 November 1995
61.S	AREE	MWAA, Motor Pool	2680	NFA	NFA DD signed by BCT 2 October 1996
61.T	AREE	MWAA, Motor Pool	622	NFA	NFA DD signed by BCT 17 October 1995
61.U	AREE	MWAA, Motor Pool	Across fr. 694	NFA	NFA DD signed by BCT 1 November 1995
61.V	AREE	MWAA, Motor Pool	3412	NFA	NFA DD signed by BCT 5 June 1997
61.W	AREE	MWAA, Motor Pool	3601	NFA	NFA DD signed by BCT 17 October 1995
61.X	AREE	MWAA, TDA Waste Accumulation Area	3713	Building and unpaved area referred to AOCs 44&52, SEA floor drain study; tanks to 63BJ and 63BK (now NFA); Needs completion confirmation	Final Report September 1995
61.Y	AREE	MWAA, Satellite Waste Accumulation Areas	3813 / 3816 / 3818	NFA	NFA DD signed by BCT 17 October 1995

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FIVE YEAR REVIEW
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS

Site	Type	Site Description	Building	Status	Source Document(s)
61.Z	SA	MWAA, Waste Accumulation Area Groundwater Operable Unit 61Z UPPL Soil Storage Facility All co-located	202	NFADD	Remed. Investigation/Feasibility Study Final Work Plan June 96 Draft UPPL Removal Site Evaluation Work Plan November 96 Risk Assessment Approach Plan 10 February 1997 Draft (Groundwater) Site Investigation Report March 1997 Final UST Closure Report Building 202 - 61Z April 1997 Revised Risk Assessment Approach Plan (for 50& 61Z) July 1997 Final SI Report Jan 98 Consensus Statement signed at BCT 6 Jan 98 changing GW from AOC to SA (removed from RI). Roy F. Weston Periodic Update Report 29 Apr 98 Roy F. Weston Periodic Update Report 27 May 98 Draft No Further Action July 1999 Draft Final No Further Action October 1999. Draft Final No Further Action December 1999 Final No Further Action Decision signed Jan 26, 2000. Draft Work Plan Soil Sampling Program Parcel 9-West Rail Area, May 2000.
61AA	AREE	MWAA, Commissary Parking Lot	3712	NFA	NFA DD signed by BCT 17 October 1995
61AB	AREE	MWAA, DEH Roads and Railroads Maintenance Shop; Triangular Area triangle shaped area will be evaluated when lot is empty	219	NFADD	Final Report September 1995 Draft UPPL Removal Site Evaluation Work Plan November 96 Roy F. Weston Periodic Update Report 4 Mar 1998 Roy F. Weston Periodic Update Report 1 Apr 1998. Various Removal Actions-Phase II Action Memorandum Nov 98 Draft NFADD 1 Feb 1999 Final NFADD signed by BCT 8 Apr 1999
61AC	AREE	MWAA, Waste Accumulation Area	207	NFA	NFA DD signed by BCT 17 October 1995
61AD	AREE	MWAA, Waste Accumulation Area	247	NFA	NFA DD signed by BCT 17 October 1995
61AE	AREE	MWAA, Waste Accumulation Area	1672	NFA	NFA DD signed by BCT 17 October 1995
61AF	AREE	MWAA, Waste Accumulation Area	2479 / 2446	NFA pending regulatory decision	Final Report September 1995 BCT Meeting Notes 1 November 1995 9:00 am Referred to AOC 43J
61AG	AREE	MWAA, Waste Accumulation Area	3809	NFA	NFA DD signed by BCT 17 October 1995
61AH	AREE	MWAA, Waste Accumulation Area	1453	NFA	NFA DD signed by BCT 17 October 1995
61AI	AREE	MWAA, Waste Accumulation Area	3587	NFA	NFA DD signed by BCT 17 October 1995
61AJ	AREE	MWAA, Waste Accumulation Area	3625	NFA	NFA DD signed by BCT 17 October 1995
61AK	AREE	MWAA, Waste Accumulation Area	12	NFA	NFA DD signed by BCT 17 October 1995

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DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS

Site	Type	Site Description	Building	Status	Source Document(s)
61AL	AREE	MWAA, Waste Accumulation Area	3	NFA	NFA DD signed by BCT 17 October 1995
61AM	AREE	MWAA, Waste Accumulation Area	3654	NFA	NFA DD signed by BCT 17 October 1995
61AN	AREE	MWAA, Waste Accumulation Area	2729	NFA	NFA DD signed by BCT 17 October 1995
61AO	AREE	MWAA, Waste Accumulation Area	1450	NFA	NFA DD signed by BCT 17 October 1995
61AP	AREE	MWAA, Waste Accumulation Area	1677	NFA (Deleted, 61D duplicate)	Final AREE 61 Report September 1995 NFA DD for 61.D signed by BCT 17 October 1995
61AQ	AREE	MWAA, Waste Accumulation Area	3545	NFA, UIS remains in place	NFA DD signed by BCT 17 October 1995
61AR	AREE	MWAA, Waste Accumulation Area	171	NFA, UIS remains in place	NFA DD signed by BCT 17 October 1995
61AS	AREE	MWAA, Waste Accumulation Area	2020	NFA	NFA DD signed by BCT 17 October 1995
61AT	AREE	MWAA, Historic Motor Pool		NFA	NFA DD signed by BCT 17 October 1995
61AU	AREE	MWAA, General Maintenance Facilities	3757 / 3758 / 3748 / 3759	NFA	Draft UPPL Removal Site Evaluation Work Plan November 96 Soil Sampling Work Plan January 1997 (Weston for COE) Final Work Plan - Barnum Rd. Parking Lot Soil Sampling Mar 97 (Haley & Aldrich for DCC) AREE 61AU Action Memorandum November 1997 Roy F. Weston Periodic Update 7 January 1998 Roy F. Weston Periodic Update Report 1 Apr 1998. Draft NFA DD, Various Removal Actions Phase II, April 1998 NFADD signed by BCT 11 June 1998
61AV	AREE	MWAA, Maintenance and POL	1420 / 1417 / 1419	NFA	NFA DD signed by BCT 17 October 1995
61AW	AREE	MWAA, General Administrative, Fire Dept	3591	NFA	NFA DD signed by BCT 17 October 1995
61AX	AREE	MWAA, Motor Park	1410	NFA	NFA DD signed by BCT 17 October 1995
61AY	AREE	MWAA, Maintenance and POL	1405	NFA	NFA DD signed by BCT 17 October 1995
61AZ	AREE	MWAA, Maintenance and POL	2017	NFA	NFA DD signed by BCT 17 October 1995
61BA	AREE	MWAA, Storage of Hospital Equipment	3574	NFA	NFA DD signed by BCT 17 October 1995
61BB	AREE	MWAA, O'Neil Building,	3412	NFA	NFA DD signed by BCT 17 October 1995
61BC	AREE	MWAA, Intel School	3413	NFA	NFA DD signed by BCT 17 October 1995
61BD	AREE	MWAA, General Storage / Disposal Area	216	NFA	NFA DD signed by BCT 17 October 1995
61BE	AREE	MWAA, Motor Park	1677	NFA	NFA DD signed by BCT 17 October 1995

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SITE STATUS TABLE – SEPTEMBER 15, 2000

FIVE YEAR REVIEW
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DEVENS, MASSACHUSETTS

Site	Type	Site Description	Building	Status	Source Document(s)
61BF	AREE	MWAA, Intel School, Electronic Equipment Training Site	1457 1458 1459 1460 1461 1462 1463 1464 1465 1466 / 1469 1470 1471 1472	NFA	NFA DD signed by BCT 17 October 1995
61BG	AREE	MWAA, General Storage / Disposal Area		NFA	NFA DD signed by BCT 17 October 1995
62	AREE	Existing Underground Storage Tanks UST		Ongoing Program	USAR Tank Management Plan, DCC Tank Removals
63.A	AREE	Previously Removed UST	219	NFA	NFA DD signed by BCT 4 January 1996
63.B	AREE	Previously Removed UST	242	NFA	NFA DD signed by BCT 4 January 1996 DCC: RAM Plan for Entomology Complex 27 December 1996
63.C	AREE	Previously Removed UST	631	NFA	NFA DD signed by BCT 17 October 1995
63.D	AREE	Previously Removed UST	1419	NFA	NFA DD signed by BCT 17 October 1995
63.E	AREE	Previously Removed UST	1404	NFA	NFA DD signed by BCT 20 August 1996 DCC: Work Plan Groundwater Monitoring March 1997
63.F	AREE	Previously Removed UST	1425	NFA	NFA DD signed by BCT 17 October 1995
63.G	AREE	Previously Removed UST	1429	NFA	NFA DD signed by BCT 17 October 1995
63.H	AREE	Previously Removed UST	2419	NFA	NFA DD signed by BCT 17 October 1995
63.I	AREE	Previously Removed UST	2434	NFA	NFA DD signed by BCT 17 October 1995
63.J	AREE	Previously Removed UST	2452	NFA	NFA DD signed by BCT 17 October 1995
63.K	AREE	Previously Removed UST	2461	NFA	NFA DD signed by BCT 17 October 1995
63.L	AREE	Previously Removed UST	2686	NFA	NFA DD signed by BCT 17 October 1995
63.M	AREE	Previously Removed UST	3774	NFA	NFA DD signed by BCT 17 October 1995
63.N	AREE	Previously Removed UST	3774	NFA	NFA DD signed by BCT 17 October 1995
63.O	AREE	Previously Removed UST	2623	NFA	NFA DD signed by BCT 17 October 1995
63.P	AREE	Previously Removed UST	2624	NFA	NFA DD signed by BCT 17 October 1995
63.Q	AREE	Previously Removed UST	2626	NFA	NFA DD signed by BCT 2 October 1996
63.R	AREE	Previously Removed UST	2637	NFA	NFA DD signed by BCT 17 October 1995
63.S	AREE	Previously Removed UST	2640	NFA	NFA DD signed by BCT 17 October 1995
63.T	AREE	Previously Removed UST	2643	NFA	NFA DD signed by BCT 17 October 1995
63.U	AREE	Previously Removed UST	2644	NFA	NFA DD signed by BCT 17 October 1995
63.V	AREE	Previously Removed UST	2647	NFA	NFA DD signed by BCT 17 October 1995
63.W	AREE	Previously Removed UST	2649	NFA	NFA DD signed by BCT 17 October 1995
63.X	AREE	Previously Removed UST	2649	NFA	NFA DD signed by BCT 17 October 1995

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SITE STATUS TABLE – SEPTEMBER 15, 2000

FIVE YEAR REVIEW
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS

Site	Type	Site Description	Building	Status	Source Document(s)
63.Y	AREE	Previously Removed UST	2659	NFA	NFA DD signed by BCT 17 October 1995
63.Z	AREE	Previously Removed UST	2660	NFA	NFA DD signed by BCT 17 October 1995
63AA	AREE	Previously Removed UST	2661	NFA	NFA DD signed by BCT 17 October 1995
63AB	AREE	Previously Removed UST	2662	NFA	NFA DD signed by BCT 17 October 1995
63AC	AREE	Previously Removed UST	2602	NFA	NFA DD signed by BCT 1 November 1995 DCC: Response Action Outcome for Bldg 2602 March 1997
63AD	AREE	Previously Removed UST	2603	NFA	NFA DD signed by BCT 17 October 1995
63AE	AREE	Previously Removed UST	2604	NFA	NFA DD signed by BCT 17 October 1995
63AF	AREE	Previously Removed UST	2605	NFA	NFA DD signed by BCT 17 October 1995
63AG	AREE	Previously Removed UST	2606	NFA	NFA DD signed by BCT 17 October 1995
63AH	AREE	Previously Removed UST	2608	NFA	NFA DD signed by BCT 17 October 1995
63AI	AREE	Previously Removed UST	2618	NFA	NFA DD signed by BCT 17 October 1995
63AJ	AREE	Previously Removed UST	2619	NFA	NFA DD signed by BCT 17 October 1995
63AK	AREE	Previously Removed UST	2621	NFA	NFA DD signed by BCT 17 October 1995
63AL	AREE	Previously Removed UST	2622	NFA	NFA DD signed by BCT 17 October 1995
63AM	AREE	Previously Removed UST	618	NFA	NFA DD signed by BCT 1 November 1995
63AN	AREE	Previously Removed UST	618 B	NFA	NFA DD signed by BCT 1 November 1995
63AO	AREE	Previously Removed UST	618 C	NFA	NFA DD signed by BCT 1 November 1995
63AP	AREE	Previously Removed UST	1429	NFA	NFA DD signed by BCT 17 October 1995
63AQ	AREE	Previously Removed UST	3809	NFA	NFA DD signed by BCT 17 October 1995
63AR	AREE	Previously Removed UST (63AR and 63AS are North and South sides of same site)	Shirley Housing, N	NFA	NFA DD signed by BCT 17 October 1995
63AS	AREE	Previously Removed UST (63AR and 63AS are North and South sides of same site)	Shirley Housing, S	NFA	NFA DD signed by BCT 17 October 1995
63AT	AREE	Previously Removed UST	3500	NFA	NFA DD signed by BCT 17 October 1995
63AU	AREE	Previously Removed UST	3607 A	NFA	NFA DD signed by BCT 17 October 1995
63AV	AREE	Previously Removed UST	3607 B	NFA	NFA DD signed by BCT 17 October 1995
63AW	AREE	Previously Removed UST	1404	NFA	NFA DD signed by BCT 17 October 1995
63AX	AOC	Previously Removed UST	2517	NFA/ROD	NFA Record of Decision signed October 1997
63AY	AREE	Previously Removed UST	2601	NFA	NFA DD signed by BCT 17 October 1995
63AZ	AREE	Previously Removed UST	2613	NFA	NFA DD signed by BCT 17 October 1995
63BA	AREE	Previously Removed UST	2613	NFA	NFA DD signed by BCT 17 October 1995
63BB	AREE	Former UST Sites	614	NFA	NFA DD signed by BCT 4 January 1996
63BC	AREE	Former UST Sites	1435	NFA	NFA DD signed by BCT 5 September 1996

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SITE STATUS TABLE – SEPTEMBER 15, 2000

FIVE YEAR REVIEW
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS

Site	Type	Site Description	Building	Status	Source Document(s)
63BD	AREE	Former UST Sites	1666	NFA	Consensus Statement NFA signed 28 January 1997 NFA DD signed by BCT 28 January 1997 DCC: Work Plan Groundwater Monitoring March 1997
63BE	AREE	Former UST Sites	2290	NFA	Draft Phase III Site Investigation Report May 1996 Draft No Further Action May 1997 Draft No Further Action Mar 1998 NFA DD signed by BCT 6 May 1998 Final Signed NFADD received May 15, 1998
63BF	AREE	Former UST Sites	2432	NFA	NFA DD signed by BCT 4 January 1996
63BG	AREE	Former UST Sites	2447	NFA	NFA DD signed by BCT 4 January 1996
63BH	AREE	Former UST Sites	2458	NFA	NFA DD signed by BCT 4 January 1996
63BI	AREE	Former UST Sites	2519	NFA	NFA DD signed by BCT 4 January 1996
63BJ	AREE	Former UST Sites	3713	NFA	NFA DD signed by BCT 4 January 1996
63BK	AREE	Former UST Sites	3713	NFA	NFA DD signed by BCT 4 January 1996
63BL	AREE	Former UST Sites	242	NFA	NFA DD signed by BCT 4 January 1996 DCC: RAM Plan for Entomology Complex 27 December 1996
63BM	AREE	Former UST Sites	619	NFA	NFA DD signed by BCT 4 January 1996
63BN	AREE	Former UST Sites	1401	NFA	NFA DD signed by BCT 4 January 1996
63BO	AREE	Former UST Sites	219	NFA	NFA DD signed by BCT 4 January 1996
63BP	AREE	Former UST Sites	3622	NFA	NFA DD signed by BCT 4 January 1996
63BQ	AREE	Removed UST, LUST	2527	NFA	NFA DD signed by BCT 7 August 1997
64	AREE	Above Ground Storage Tanks (ASTs)		Ongoing Program	USAR Tank Management Plan, DCC Tank Removals
65	AREE	Asbestos			Final Report May 1995
66A	AREE	Transformer #641425	3752	NFA	NFA DD signed by BCT 1 May 1997
66B	AREE	Transformer # Not Recorded	1634	NFA	Final NFA DD (April 96), NFA DD Addendum April 1997
66C	AREE	Transformer #7671845 P-3657 Golf Course	3657	NFA	NFA DD signed by BCT 7 December 1995
66D	AREE	Transformer #6573226, P-3575, Red Cross	3575	NFA	NFA DD signed by BCT 1 November 1995
66E	AREE	Transformer #70b11472 & 3344617		NFA	NFA DD signed by BCT 1 November 1995
66F	AREE	Transformer #6287290, P-2025	2025	NFA	NFA DD signed by BCT 6 June 1996
66G	AREE	Verbeck Substation		NFA	NFA DD signed by BCT 1 May 1997
67	AREE	Radon			Final Report May 1995
68	AREE	Lead Paint			Final Report October 1995
69.A	AREE	Past Spill Site	3606, ramp 3651	NFA	NFA DD signed by BCT 20 August 1996

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FIVE YEAR REVIEW
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS

Site	Type	Site Description	Building	Status	Source Document(s)
69.B	AREE	Past Spill Site	2602	NFA	NFA DD signed by BCT 2 October 1996 DCC: Response Action Outcome for Bldg 2602 March 1997
69.C	AREE	Past Spill Site	2417	NFA (Referred to SA 56)	Final Report September 1995 NFA DD for SA 56 signed by BCT 2 October 1996
69.D	AREE	Past Spill Site	DRMO Yard	Referred to AOC 32	Final Report September 1995
69.E	AREE	Past Spill Site	Bridge 526	NFA (Referred to SA 59)	Final Report September 1995 NFA DD for SA 59 signed by BCT 18 January 1995
69.F	AREE	Past Spill Site	Lots 10 & 11 behind 3412	NFA (Referred to SA 51)	Final Report September 1995 NFA DD for SA 51 signed by BCT 11 September 1995
69.G	AREE	Past Spill Site All contaminated soil removed and placed in drums.		NFA (Deleted because area was not included in study, spill occurred on South Post. See Table 3-1, Summary of Past Spill Sites, in Final Report)	Final Report September 1995
69.H	AREE	Past Spill Site	Intel School	NFA	NFA DD signed by BCT 17 October 1995
69.I	AREE	Past Spill Site	3809	NFA	NFA DD signed by BCT 17 October 1995
69.J	AREE	Past Spill Site	3818	NFA	NFA DD signed by BCT 17 October 1995
69.K	AREE	Past Spill Site		NFA	NFA DD signed by BCT 20 August 1996
69.L	AREE	Past Spill Site	Woods behind Lake George St	NFA	NFA DD signed by BCT 17 October 1995
69.M	AREE	Past Spill Site	202	Referred to Main Post SI	Final Report September 1995
69.N	AREE	Past Spill Site	3654	NFA	NFA DD signed by BCT 17 October 1995
69.O	AREE	Past Spill Site	1401	NFA (Referred to 61E)	Final Report September 1995 NFA DD for 61.E signed by BCT 17 October 1995
69.P	AREE	Past Spill Site	Foxhole near Goddard Memorial	NFA	NFA DD signed by BCT 17 October 1995
69.Q	AREE	Past Spill Site	1405	NFA	NFA DD signed by BCT 17 October 1995
69.R	AREE	Past Spill Site	Pole by 3575	NFA (Referred to 66D)	Final Report September 1995 NFA DD for 66.D signed by BCT 1 November 1995
69.S	AREE	Past Spill Site	DEH Transformer Storage Area	NFA (Referred to SA 29)	Final Report September 1995 NFA DD for SA 29 signed by BCT 15 January 1995
69.T	AREE	Past Spill Site		NFA	NFA DD signed by BCT 17 October 1995

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DEVENS, MASSACHUSETTS

Site	Type	Site Description	Building	Status	Source Document(s)
69.U	AREE	Past Spill Site		NFA	NFA DD signed by BCT 17 October 1995
69.V	AREE	Past Spill Site	2517	NFA	NFA DD signed by BCT 17 October 1995
69.W	AOC	Past Spill Site - Elementary School 10,000 gal UST Removed Fuel lines removed 3,500 yards of contaminated soil removed	215I	LTM	Final RI Work Plan Addendum August 1996 Risk Assess. Approach Plan for Remedial Invest. Report Jan 97 Draft Remedial Investigation Report May 1997 Draft RI/FS Task Workplan Addendum for Supplemental Air Sampling July 1997. Draft Action Memorandum Contaminated Soil Removal 9/97 Final RI/FS Workplan Adden. for Sup. Air Sampling Oct 97 Final Action Memorandum Contam. Soil Removal Dec 97 Roy F. Weston Periodic Report 7 January 1998 Analytical Approach for Groundwater Sampling Nov 1997 Draft Supplemental Air Sampling Report December 1997 Roy F. Weston Periodic Update Report 4 Mar 98; Roy F. Weston Periodic Update Report 1 Apr 1998 Draft Remedial Investigation Report 1 April 1998 Contaminated Soil Removal Phase II Removal Action Report 1 May 98. Final Remedial Investigation Report, Vol I & II, August 1998 Draft Proposed Plan, September 1998 Draft Proposed Plan, November 1998. Draft Proposed Plan, February 1999 Final Proposed Plan, April 1999 Record of Decision (unsigned); June 8, 1999 Final Record of Decision, June 24, 1999 Draft Long Term Monitoring Plan, October 1999. Final Long Term Monitoring Plan, March 2000. Semi-Annual GW Analytical Data May 2000 Long Term Monitoring, Aug 2000.t
69.X	AREE	Past Spill Site	1404	Referred to 70.10	Final Report September 1995
69.Y	AREE	Past Spill Site	1404	NFA	NFA DD signed by BCT 17 October 1995
69.Z	AREE	Past Spill Site	1404	NFA (Referred to 63AW)	Final Report September 1995 NFA DD for 63AW signed by BCT 17 October 1995
69AA	AREE	Past Spill Site	1404	NFA	NFA DD signed by BCT 17 October 1995
69AB	AREE	Past Spill Site	Warehouse 16	NFA	NFA DD signed by BCT 17 October 1995
69AC	AREE	Past Spill Site	1004	NFA	NFA DD signed by BCT 1 November 1995
69AD	AREE	Past Spill Site	203	NFA	NFA DD signed by BCT 5 June 1997

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DEVENS, MASSACHUSETTS

Site	Type	Site Description	Building	Status	Source Document(s)
69AE	AREE	Past Spill Site	MAAF, next to POL shed, 3809	RA; UPPL Evaluation submitted. Agreement on required action has not been reached.	Final Report September 1995 Draft UPPL Removal Site Evaluation Work Plan November 96 Biweekly Update Roy F. Weston 22 January 1997. Roy F. Weston Periodic Update Report 1 Apr 1998.
69AF	AREE	Past Spill Site	Near post office	NFA	NFA DD signed by BCT 5 June 1997
69AG	AREE	Past Spill Site	3713	NFA	NFA DD signed by BCT 17 October 1995
69AH	AREE	Past Spill Site		NFA	NFA DD signed by BCT 17 October 1995
69AI	AREE	Past Spill Site, 9-12 Apr 1988, 6-7 Feb 84	202	Referred to 61Z and SA 48	Final Report September 1995
69AJ	AREE	Past Spill Site	2734	NFA	NFA DD signed by BCT 17 October 1995
69AK	AREE	Past Spill Site	3413	NFA	NFA DD signed by BCT 1 November 1995
69AL	AREE	Past Spill Site	264	NFA	NFA DD signed by BCT 20 August 1996
69AM	AREE	Past Spill Site	2601	NFA (Referred to 61P)	Final Report September 1995 NFA DD signed by BCT 2 October 1996
69AN	AREE	Past Spill Site	3713	NFA	NFA DD signed by BCT 17 October 1995
69AO	AREE	Past Spill Site	6	NFA	NFA DD signed by BCT 17 October 1995
69AP	AREE	Past Spill Site - AAFES Gas Station	2008	Referred to 43G	Final Report September 1995
69AQ	AREE	Past Spill Site		NFA	NFA DD signed by BCT 17 October 1995
69AR	AREE	Past Spill Site		Referred to 72	Final Report September 1995
69AS	AREE	Past Spill Site	Behind TDA	Referred to 57, including AREE 70.6	Final Report September 1995
69AT	AREE	Past Spill Site	SW corner of 3712	Referred to 57, including AREE 70.6	Final Report September 1995
69AU	AREE	Past Spill Site	TDA Maintenance Yard	Referred to AOC 44 and AOC 52	Final Report September 1995
69AV	AREE	Past Spill Site	665	NFA	NFA DD signed by BCT 5 June 1997
70.01	AREE	Storm Sewer System 1	West of 3769	FA (see SA 73)	Lower Cold Spring Brook SI Report December 1995
70.02	AREE	Storm Sewer System 2	East 2258	FA (see SA 73)	Lower Cold Spring Brook SI Report December 1995
70.03	AREE	Storm Sewer System 3	Near 259	FA (see SA 73)	Lower Cold Spring Brook SI Report December 1995
70.04	AREE	Storm Sewer System 4		FA (see SA 73)	Lower Cold Spring Brook SI Report December 1995
70.05	AREE	Storm Sewer System 5		FA (see SA 73)	Lower Cold Spring Brook SI Report December 1995
70.06	AREE	Storm Sewer System 6		FA (see SA 73); Removal action; sampling comparison in progress. See SA 57	Lower Cold Spring Brook SI Report December 1995 Roy F. Weston Periodic Update 6 August 1997 Roy F. Weston Periodic Update 4 Mar 98

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DEVENS, MASSACHUSETTS

Site	Type	Site Description	Building	Status	Source Document(s)
70.07	AREE	Storm Sewer System 7		FA (see SA 73)	Lower Cold Spring Brook SI Report December 1995
70.08	AREE	Storm Sewer System 8		NFA Pending	Final Report June 1994
70.09	AREE	Storm Sewer System 9		NFA Pending	Addendum Report for the AREE 70, AREE 69B, and Cold Spring Brook Supplemental Sampling Event November 1995
70.10	AREE	Storm Sewer System 10		NFA Pending	Final Report June 1994
70.11	AREE	Storm Sewer System 11		NFA Pending	Final Report June 1994
70.12	AREE	Storm Sewer System 12		NFA Pending	Final Report June 1994
70.13	AREE	Storm Sewer System 13		NFA (Deleted, system 12)	Final Report June 1994
70.14	AREE	Storm Sewer System 14		NFA Pending	Addendum Report for the AREE 70, AREE 69B, and Cold Spring Brook Supplemental Sampling Event November 95
70.15	AREE	Storm Sewer System 15		NFA Pending	Final Report June 1994
70.16	AREE	Storm Sewer System 16		NFA Pending	Final Report June 1994
70.17	AREE	Storm Sewer System 17		NFA Pending	Final Report June 1994
70.18	AREE	Storm Sewer System 18		NFA Pending	Final Report June 1994
70.19	AREE	Storm Sewer System 19		NFA Pending	Final Report June 1994
70.20	AREE	Storm Sewer System 20		NFA Pending	Final Report June 1994
70.21	AREE	Storm Sewer System 21		NFA Pending	Addendum Report for the AREE 70, AREE 69B, and Cold Spring Brook Supplemental Sampling Event Nov 95
70.22	AREE	Storm Sewer System 22		NFA Pending	Final Report June 1994
70.23	AREE	Storm Sewer System 23		NFA Pending	Final Report June 1994
70.24	AREE	Storm Sewer System 24		NFA Pending	Final Report June 1994
70.25	AREE	Storm Sewer System 25		NFA Pending	Addendum Report for the AREE 70, AREE 69B, and Cold Spring Brook Supplemental Sampling Event Nov 95
70.26	AREE	Storm Sewer System 26		NFA Pending	Final Report June 1994
70.27	AREE	Storm Sewer System 27		NFA Pending	Final Report June 1994
70.28	AREE	Storm Sewer System 28		NFA Pending	Final Report June 1994
70.29	AREE	Storm Sewer System 29		NFA Pending	Final Report June 1994
70.30	AREE	Storm Sewer System 30		NFA Pending	Final Report June 1994
70.31	AREE	Storm Sewer System 31		NFA Pending	Final Report June 1994
70.32	AREE	Storm Sewer System 32		NFA Pending	Final Report June 1994
70.33	AREE	Storm Sewer System 33		NFA Pending	Final Report June 1994
70.34	AREE	Storm Sewer System 34		NFA Pending	Final Report June 1994
70.35	AREE	Storm Sewer System 35		NFA Pending	Final Report June 1994
70.36	AREE	Storm Sewer System 36		NFA Pending	Final Report June 1994

Sites Updated Since Last Issue (September 8, 2000) shown in shading

TABLE H-2
SITE STATUS TABLE – SEPTEMBER 15, 2000

FIVE YEAR REVIEW
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS

Site	Type	Site Description	Building	Status	Source Document(s)
70.37	AREE	Storm Sewer System 37		NFA Pending	Final Report June 1994
70.38	AREE	Storm Sewer System 38		NFA Pending	Final Report June 1994
70.39	AREE	Storm Sewer System 39		NFA Pending	Final Report June 1994
70.40	AREE	Storm Sewer System 40		NFA Pending	Final Report June 1994
70.41	AREE	Storm Sewer System 41		NFA Pending	Final Report June 1994
70.42	AREE	Storm Sewer System 42		NFA Pending	Final Report June 1994
70.43	AREE	Storm Sewer System 43		NFA Pending	Final Report June 1994
70.44	AREE	Storm Sewer System 44		NFA Pending	Final Report June 1994
70.45	AREE	Storm Sewer System 45		NFA Pending	Final Report June 1994
70.46	AREE	Storm Sewer System 46		NFA Pending	Final Report June 1994
70.47	AREE	Storm Sewer System 47		NFA Pending	Final Report June 1994
70.48	AREE	Storm Sewer System 48		NFA Pending	Final Report June 1994
70.49	AREE	Storm Sewer System 49		NFA Pending	Final Report June 1994
70.50	AREE	Storm Sewer System 50		NFA Pending	Final Report June 1994
70.51	AREE	Storm Sewer System 51		NFA Pending	Final Report June 1994
70.52	AREE	Storm Sewer System 52		NFA Pending	Final Report June 1994
70.53	AREE	Storm Sewer System 53		NFA Pending	Final Report June 1994
70.54	AREE	Storm Sewer System 54		NFA Pending	Final Report June 1994
70.55	AREE	Storm Sewer System 55		NFA Pending	Final Report June 1994
71	SA	Railroad Roundhouse		RI/FS Time Critical Removal action -3800 cy of soil removed-2400 cy contaminated. Clean soil used as backfill. RA Report in progress	Railroad Roundhouse SSI September 1995 Revisions to Scope of Work; Action Memorandum and Design December 1996 Biweekly Update Roy F. Weston 22 January 1997 Roy F. Weston Periodic Update Report 4 Mar 98 Roy F. Weston Periodic Update Report 23 Sep 98 Roy F. Weston Periodic Update Report 5 Nov 99 Action Memorandum, 1 November 1999. Draft Removal Action Report Various Removal Actions Phase II, August 2000

Sites Updated Since Last Issue (September 8, 2000) shown in shading

TABLE H-2
SITE STATUS TABLE – SEPTEMBER 15, 2000

FIVE YEAR REVIEW
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS

Site	Type	Site Description	Building	Status	Source Document(s)
72	AOC	Plow Shop Pond and Grove Pond		RI/FS EPA designated lead agency.	Draft Plow Shop Pond and Grove Pond Sediment Evaluation October 1995 FWS Study Outline-Trace Elements in Freshwater Mussels from Plow Shop Pond and Grove Pond-1 May 1998 TRC Sediment Sampling Results Grove Pond 18 May 1998 Health Consultation-Eval of Health Concerns Associated with Drinking Water from Grove Pond Wells, 30 July 1998 Draft Health Consultation on the Evaluation of Health Concerns Associated with Grove Pond and Plow Shop Pond, September 1998. Surface Water and Sediment Sampling, Grove Pond & Plow Shop Pond, November 1998:Final Health Consultation USGS Map Showing Morphometry, Bathymetry, and Soft-Sediment Thickness of Plow Shop Pond and Grove Pond, Ayer, Massachusetts, Jan 1999. Evaluation of Health Concerns Associated with Grove Pond and Plow Shop Pond, 10 Dec 1998. Screening-Level Ecological Risk Assessment, April 19, 1999 Final Phase I Work Plan Grove Pond Arsenic Investigation May 1999. Draft Phase I Interim Data Report Grove Pond Arsenic Investigation, April 1999. Final Phase II Work Plan, Grove Pond Arsenic Investigation, September 1999.
73	SA	Lower Cold Spring Brook		NFA Pending. EPA designated lead agency	Lower Cold Spring Brook SI Report December 1995. Supplemental Sampling at Well CSB-01, Jul 1998

Sites Updated Since Last Issue (September 8, 2000) shown in shading

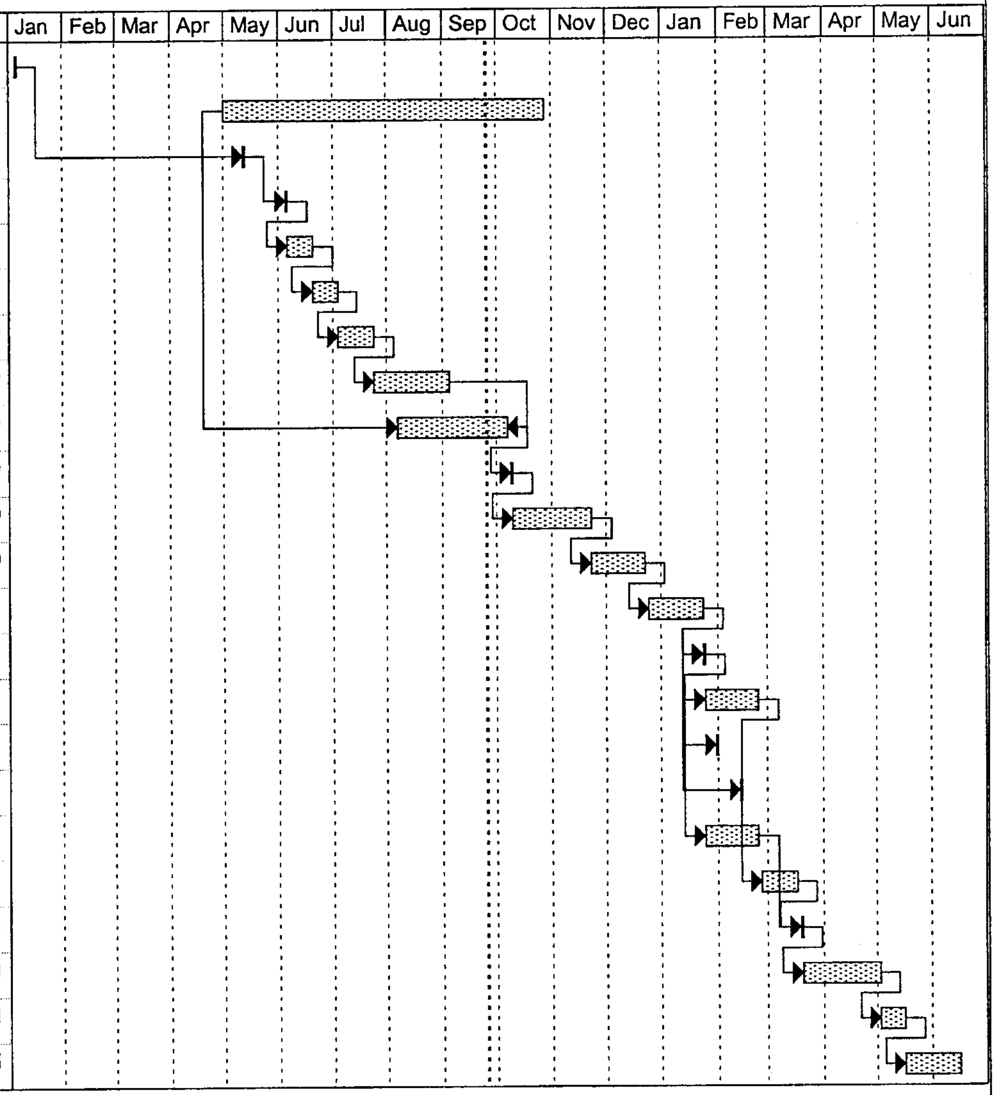
APPENDIX I

SCHEDULES FOR ONGOING ACTIVITIES

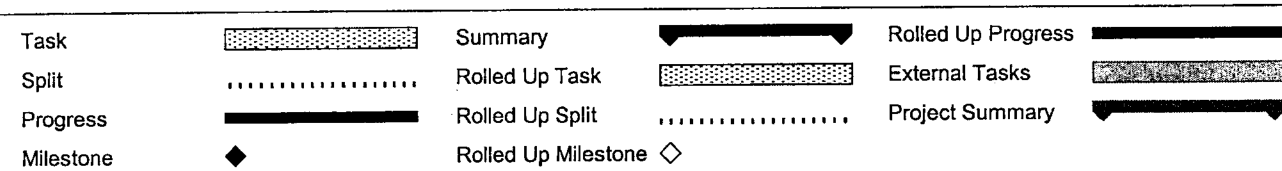
AOC 50

(note: duration in "work days")

ID		Task Name	Duration	Start	Finish
1	▦	Issue Final RI report	1 day	Wed 1/5/00	Wed 1/5/00
2	▦	HRC Pilot Test	130 days	Mon 5/1/00	Fri 10/27/00
3		Receive Final RI Comments	1 day	Fri 5/12/00	Fri 5/12/00
4	▦	Comment Review Meeting	1 day	Mon 6/5/00	Mon 6/5/00
5		Prep. Supp. W. Plan	10 days	Tue 6/6/00	Mon 6/19/00
6		Work Plan review	10 days	Tue 6/20/00	Mon 7/3/00
7		Perform Add'l Field Work	15 days	Tue 7/4/00	Mon 7/24/00
8		Data receipt/review	30 days	Tue 7/25/00	Mon 9/4/00
9		Prepare Draft FS Report	45 days	Mon 8/7/00	Fri 10/6/00
10		Issue Draft FS Report	1 day	Mon 10/9/00	Mon 10/9/00
11		Review Period	32 days	Tue 10/10/00	Wed 11/22/00
12		Prepare Final FS Report	22 days	Thu 11/23/00	Fri 12/22/00
13		Prepare Proposed Plan	22 days	Mon 12/25/00	Tue 1/23/01
14		Issue Proposed Plan	1 day	Wed 1/24/01	Wed 1/24/01
15		30-day P. Comment Period	22 days	Thu 1/25/01	Fri 2/23/01
16		Public Informational Meeting	1 day	Wed 1/31/01	Wed 1/31/01
17		Public Hearing	1 day	Wed 2/14/01	Wed 2/14/01
18		Prepare Draft ROD	22 days	Thu 1/25/01	Fri 2/23/01
19		Responsiveness Summary	15 days	Mon 2/26/01	Fri 3/16/01
20		Issue Draft ROD	1 day	Mon 3/19/01	Mon 3/19/01
21		Draft ROD Review	32 days	Tue 3/20/01	Wed 5/2/01
22		Prepare Final ROD	10 days	Thu 5/3/01	Wed 5/16/01
23		Final ROD Review/Signature	22 days	Thu 5/17/01	Fri 6/15/01



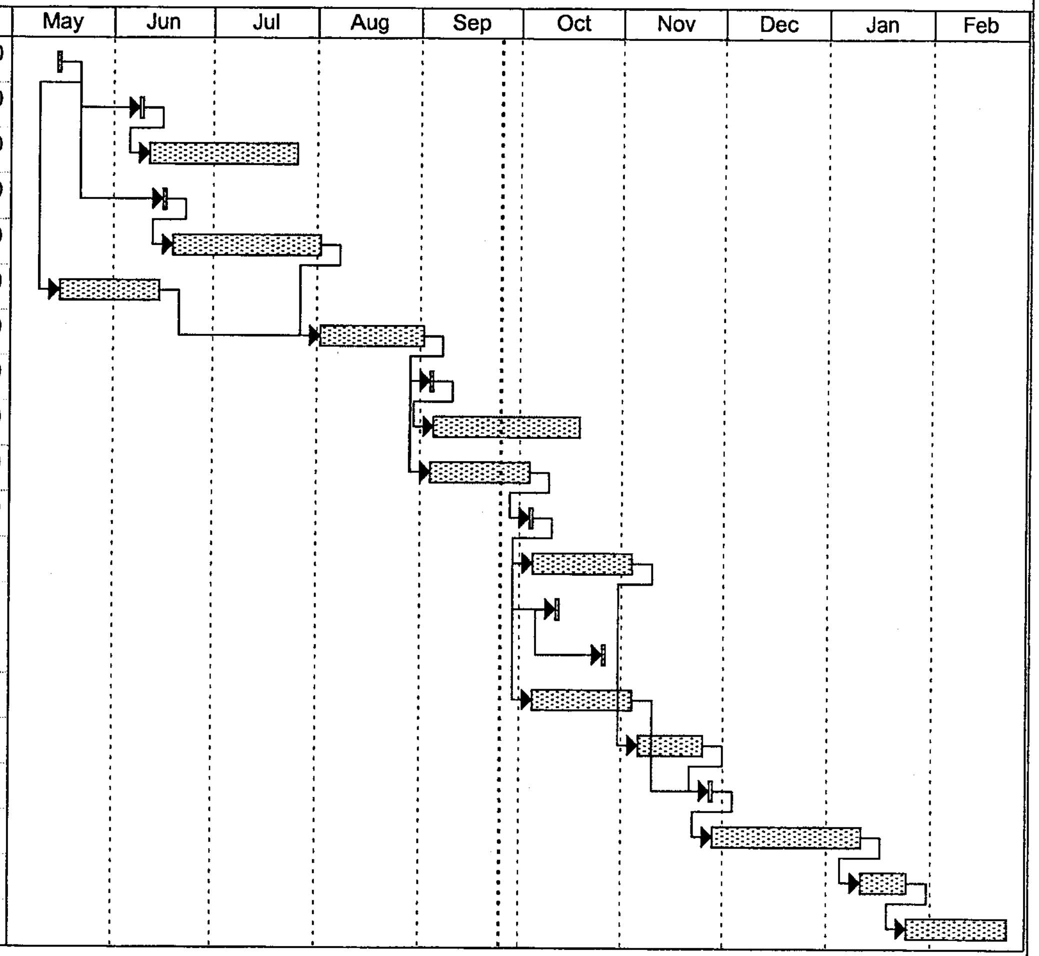
Project: AOC50schedule
Date: Mon 9/25/00



AOC 57 - 30-Day Comment Period

(note: duration in "work days")

ID	ⓘ	Task Name	Duration	Start	Finish
1		Start Schedule	1 day	Mon 5/15/00	Mon 5/15/00
2		Issue Final RI Report	1 day	Fri 6/9/00	Fri 6/9/00
3		Final RI Review	32 days	Mon 6/12/00	Tue 7/25/00
4		Issue Draft FS Report	1 day	Fri 6/16/00	Fri 6/16/00
5		Draft FS Review	32 days	Mon 6/19/00	Tue 8/1/00
6		Supplemental Sampling	22 days	Tue 5/16/00	Wed 6/14/00
7		Prepare Final FS Report	23 days	Wed 8/2/00	Fri 9/1/00
8		Issue Final FS Report	1 day	Mon 9/4/00	Mon 9/4/00
9		Final FS Review	32 days	Tue 9/5/00	Wed 10/18/00
10		Prepare Proposed Plan	22 days	Mon 9/4/00	Tue 10/3/00
11		Issue Proposed Plan	1 day	Wed 10/4/00	Wed 10/4/00
12		30-day P.Comment Period	22 days	Thu 10/5/00	Fri 11/3/00
13		Public Information Meeting	1 day	Thu 10/12/00	Thu 10/12/00
14		Pubic Hearing	1 day	Thu 10/26/00	Thu 10/26/00
15		Prepare Draft ROD	22 days	Thu 10/5/00	Fri 11/3/00
16		Responsiveness Summary	15 days	Mon 11/6/00	Fri 11/24/00
17		Issue Draft ROD	1 day	Mon 11/27/00	Mon 11/27/00
18		Draft ROD Review	32 days	Tue 11/28/00	Wed 1/10/01
19		Prepare Final ROD	10 days	Thu 1/11/01	Wed 1/24/01
20		Final ROD Review/Signiture	22 days	Thu 1/25/01	Fri 2/23/01

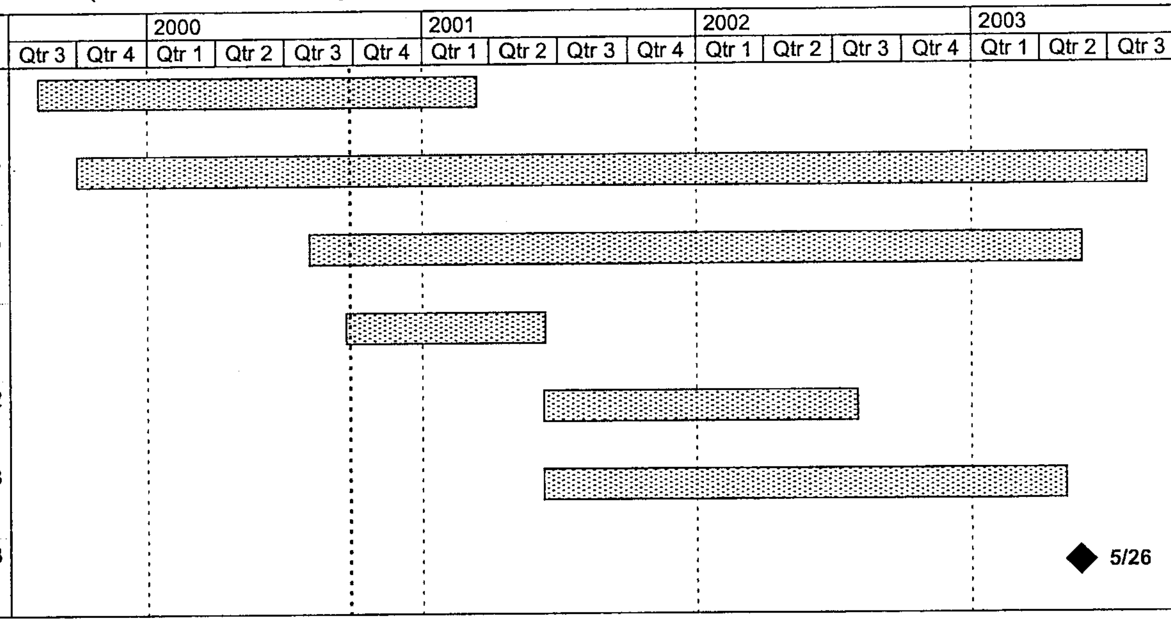


Project: 57sched
Date: Mon 9/25/00

Task		Summary		Rolled Up Progress	
Split		Rolled Up Task		External Tasks	
Progress		Rolled Up Split		Project Summary	
Milestone	◆	Rolled Up Milestone	◇		

DEVENS LANDFILL REMEDIATION PROJECT
(note: duration in "work days")

ID	Task Name	Duration	Start	Finish
1	Proposal, Quote, and ROE	419 days	Mon 8/9/99	Thu 3/15/01
2	Prepare Plans and Drawings	1014 days	Fri 10/1/99	Wed 8/20/03
3	Project Mobilization, Restoration, and Demobilization	733 days	Thu 8/3/00	Mon 5/26/03
4	Construct Landfill	189 days	Thu 9/21/00	Tue 6/12/01
5	Operate Landfill	300 days	Mon 6/11/01	Fri 8/2/02
6	Landfill Closure	496 days	Mon 6/11/01	Mon 5/5/03
7	Project Site Work Complete	1 day	Mon 5/26/03	Mon 5/26/03



Project: landfillssch
Date: Mon 9/25/00

Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary