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PHASE III EVALUATION OF REMEDIAL ALTERNATIVES AND REMEDIAL ACTION PLAN OUTLINE

RUSSELL FIELD
CAMBRIDGE, MASSACHUSETTS

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EH&E Report #10515
April 30, 2004

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LIST OF ABBREVIATIONS AND ACRONYMS

ACM	asbestos-containing material
ANI	Alewife Neighbors, Inc.
AUL	Activity and Use Limitation
CAO	Cambridge Asbestos Ordinance
COC	Contaminant of Concern
EH&E	Environmental Health & Engineering, Inc.
EPA	U.S. Environmental Protection Agency
MADEP	Massachusetts Department of Environmental Protection
MBTA	Massachusetts Bay Transportation Authority
MCP	Massachusetts Contingency Plan
PAH	polycyclic aromatic hydrocarbon
RAO	Response Action Outcome
RC	Reportable Concentration
RIP	Remedy Implementation Plan
RTN	Release Tracking Number
UCL	Upper Concentration Limit

1.0 INTRODUCTION

1.1 GENERAL

Environmental Health & Engineering, Inc. (EH&E) has prepared this Phase III Evaluation of Remedial Alternatives and Remedial Action Plan Outline for the City of Cambridge (the City) in accordance with the Massachusetts Contingency Plan (MCP). Contaminants were detected in subsurface soil at Russell Field, a City-owned facility; the Massachusetts Department of Environmental Protection (MADEP) Release Tracking Number for this release is 3-0017087. Figure 1, Site Location Map, illustrates the location of the Russell Field Site (the Site).

The Phase II Comprehensive Site Assessment Report which accompanies this document summarizes information obtained during Phase I Site Assessment activities, December 1997 through February 1998, and details Phase II Site Assessment activities conducted August 25, 1999; July 8 through 16, 2002; May 27, 2003 through June 5, 2003; and November 18, 2003 through December 2, 2003. A Phase I Site Assessment Report was submitted to the MADEP on July 23, 1999 under release tracking number 3-0017087.

A Notice of Delay was submitted to MADEP on July 23, 2001. The primary reason for delay in completion of Phase II and Phase III assessments was the lack of MADEP policy and guidance on assessment, risk characterization, and management of asbestos in soil. In addition, the schedule was impacted by the need to address neighborhood concerns, integrate park renovation design, and comply with the Cambridge Asbestos Ordinance (CAO).

Much of the assessment work completed subsequent to Phase I at the Russell Field Site also supported CAO compliance. This conservative and protective ordinance governs the management of soils containing asbestos fibers (not debris) at concentrations equal to or greater than 1%. Assessment in accordance with the CAO could not be completed until 100% design drawings for field renovation were issued in October/November 2003. Subsequent to receipt of these plans, the final sampling program was completed. The Site is fully compliant with the CAO and results of testing for CAO compliance are

included in the Phase II Report. However, CAO compliance, as described, significantly impacted the Phase II assessment schedule for the Site.

Alewife Neighbors, Inc. (ANI) is a local citizens group. Throughout the Phase I and Phase II assessment programs, the City has provided ANI with access to the Site to perform oversight during field activities and for the collection of split samples. Results of sample analysis by ANI (or their consultants) are included in this assessment.

1.2 PURPOSE AND OBJECTIVES

The purpose of a Phase III study is to identify, evaluate, and select a comprehensive remedial action alternative that addresses the risks identified during the Risk Characterization. The Risk Characterization for the Site is documented in the Phase II Comprehensive Site Assessment for Russell Field, MADEP Release Tracking Number (RTN) 3-0017087 (May 2004).

The Phase III evaluation is conducted in order to support the selection of a remedial alternative for the specific contaminants of concern at the Site. Possible remedial technologies undergo an initial feasibility screening. Based upon the results of the initial screening, some potential remedial technologies are found to be unsuitable for the specific characteristics of the Site using the criteria presented in the MCP (310 CMR 40.0856), while other potential remedial technologies are retained for further evaluation. Remedial technologies which pass the initial screening are then developed into comprehensive remedial alternatives, which are further evaluated using the criteria specified in the MCP (310 CMR 40.0858). From these evaluations, a proposed remedy for the contaminants of concern at the Site is selected and recommended.

As detailed in the MCP (Sections 310 CMR 40.0850 through 40.0869), the Phase III report is required to contain an identification and evaluation of alternatives reasonably likely to achieve a level of no significant risk. In addition, the Phase III study must also consider alternatives that reduce, to the extent feasible, the concentration of impacts in the environment to levels that achieve or approach background conditions. In summary, the Phase III report includes:

- Identification of remedial action alternatives.
- Initial screening of remedial action alternatives.
- Detailed evaluation of remedial action alternatives.

The criteria set by the MCP for evaluating remedial actions (310 CMR 40.0858) can be summarized as:

- Effectiveness of alternative.
- Short- and long-term reliability.
- Feasibility of implementation.
- Total cost.
- Risks associated with alternative.
- Benefits associated with alternative.
- Timeliness.
- Non-monetary considerations such as aesthetic values.

2.0 BACKGROUND

The following paragraphs summarize background information compiled during the Phase I and II assessments at Russell Field.

2.1 SITE DESCRIPTION

Russell Field is located off Rindge Avenue in Cambridge and is owned by the City. The MADEP Release Tracking Number for the Site is 3-0017087. The Site Location Map, Figure 1, is a topographic map showing the location of the Russell Field site with the 500 foot and ½ mile radii indicated.

Russell Field is a municipal recreational facility located in North Cambridge, Massachusetts. The Site is bounded by Rindge Avenue to the south, the W.R. Grace property to the north, the Massachusetts Bay Transportation Authority (MBTA) Alewife Station (Alewife Station) to the west, residential properties to the east, and several pedestrian pathways, including Linear Park. The park includes a football field, soccer field, and two baseball diamonds; a Massachusetts Department of Conservation and Recreation (formerly MDC) swimming pool is located on an abutting property to the east. The Site is heavily used by athletic teams and area residents and serves as a pedestrian route to Alewife Station. In the early to mid-1980s, Russell Field was used as a staging area by the MBTA during construction of the Red Line extension to Alewife. The Red Line tunnel runs under a portion of the Site (Figure 2).

Beginning in 2004, the Site will be closed off to the public while the City of Cambridge performs a large site renovation and upgrade. Any remediation required for CAO and MCP compliance will be completed in conjunction with the renovation project.

2.2 PHASE I ASSESSMENT FINDINGS

In response to neighborhood concerns, a surficial soil sampling program was developed to assess the potential presence of contaminants in surficial soils on Russell Field from reported historic land use activities at the field and on adjacent properties. This program was completed in Spring 1998. The first subsurface soil investigation at Russell Field was conducted through the completion of a soil boring program between June 17, 1998

and July 7, 1998. The soil boring program consisted of the advancement of borings at seventeen locations. Results indicated that MADEP notification was required due to the presence of asbestos, polycyclic aromatic hydrocarbons (PAHs), and metals in soil.

Therefore, in a second round of subsurface investigation (May 1999), borings were completed at 79 locations. All but fifteen of these borings were shallow (0 to 3'), and samples from this interval in all borings were screened for asbestos. Additional analytes were selected for the fifteen deep borings (designated 101 to 115) and selected shallow borings. Borings were completed on a 75-foot grid across the field. Results confirmed the presence of metals and PAHs above Reportable Concentrations (RCs), and the presence of asbestos in soil and debris.

Results of the sampling programs completed in 1998 and 1999 were submitted to the MADEP under RTN 3-0017087 in the form of a Phase I Site Assessment and Tier Classification report on July 23, 1999. The Site is currently listed with the MADEP Bureau of Waste Site Cleanup as a Tier 2 disposal site.

In total, Phase I investigations included the completion of 96 borings and seventeen ground water wells. Soil and ground water were sampled and analyzed for a wide range of compounds, including volatile organic compounds, semivolatile organic compounds, metals, sulfate, and cyanide. In addition, soil was analyzed for asbestos. Analytical results indicated that PAHs, metals, and asbestos are present in soil fill at concentrations exceeding MADEP RCs. Topsoil at the Site generally did not contain elevated concentrations of site contaminants. No contaminants were detected in ground water at concentrations exceeding RCs.

2.3 PHASE II COMPREHENSIVE SITE ASSESSMENT FINDINGS

Additional site assessment activities were conducted as comprehensive response actions subsequent to the July 23, 1999, Phase I report and are listed below. The results of these investigations are detailed in the Phase II Comprehensive Site Assessment Report which accompanies this document.

- August 1999—Asbestos Air Monitoring Program. Included sampling at 23 locations to assess the potential for airborne asbestos under current site conditions.

- July 8, 2002, through July 16, 2002—Supplemental Site Assessment for Cambridge Asbestos Ordinance Compliance (report dated April 24, 2003). Included the advancement of 281 soil borings and perimeter air monitoring. All soil samples were analyzed for asbestos. Selected soil samples were also analyzed for additional analytes.

- May 27, 2003, through June 5, 2003—Geotechnical Engineering Study conducted by EnviroSense, Inc. and Weber Engineering Associates, LLC to provide recommendations to architects for field renovations and field house construction. Included the advancement of approximately 12 soil borings to depths of 26 feet below ground surface or greater and perimeter air monitoring. A limited number of soil/debris samples were collected and analyzed for asbestos based upon field observations.

- November 18, 2003, through December 2, 2003—Supplemental Site Assessment for Cambridge Asbestos Ordinance Compliance. Advancement of 202 soil borings to depths ranging from 3 to sixteen feet below ground surface, and perimeter air monitoring. All soil samples were analyzed for asbestos. Selected soil samples were also analyzed for PAHs and metals.

The Phase II Investigations were conducted to further define the nature and extent of soil contamination at Russell Field, to satisfy the requirements of the CAO, and support Risk Characterization.

The conclusions of the Phase II Comprehensive Site Assessment are based upon data obtained during numerous field investigations conducted from 1998 to 2003. Contaminants of Concern (COCs) at Russell Field are found only in soil at concentrations exceeding MADEP RCs. Contaminants exceeding RCs include PAHs and metals; the presence of asbestos was confirmed in soil and debris. These contaminants are found in fill at various locations and depths across the Site. Therefore, the source of contamination is interpreted to be urban fill. Contaminant concentrations in

ground water do not exceed GW-2 nor GW-3 clean-up standards. Air monitoring at Russell Field did not detect asbestos at concentrations above published background levels.

Results of risk characterization indicate the following:

- Locations with asbestos concentrations >1% in soil will be remediated in accordance with the CAO and other applicable regulations and, therefore, are not further characterized. Remediation in accordance with the CAO requires the use of 'tenting and venting' technologies which will be at least as conservative as MCP-required remediation strategies.

- Locations with asbestos concentrations >1% in debris will be remediated in accordance with the MCP and other applicable regulations.

- A hotspot was identified at C-39; benzo(a)anthracene and benzo(a)pyrene are present at concentrations exceeding Upper Concentration Limits (UCLs) at this location. Risk calculations also indicate potential significant risk due to human receptors at this exposure point.

- No significant risk is indicated throughout the Site for human receptors in the absence of the C-39 exposure point and assuming the remediation of asbestos in soil and debris at concentrations >1%.

- Exceedance of UCLs at C-39 indicates a potential Risk to Public Welfare.

- No Risk to Public Safety as a result of Site contamination is indicated.

- With the exception of the potential risk due to the UCL exceedances at C39, no risk of harm to environmental receptors is indicated.

Based upon these results, it was recommended that the proposed asbestos and PAH remediation locations be evaluated as part of Phase III activities.

If exposure to contamination at C39 is mitigated to provide a condition of No Significant Risk, results of this assessment do not indicate the need for an Activity and Use Limitation (AUL) at this Site for non-asbestos COCs in soil deeper than three feet. These deeper soils have not been characterized via the U.S. Environmental Protection Agency (EPA) Elutriator Method for asbestos. Limited additional evaluation of archived soils from locations greater than three feet in depth is recommended to characterize potential risk from exposure to trace level concentrations of asbestos in this stratum. Upon completion of analysis via the EPA Elutriator Method, those results should be evaluated in conjunction with the results of this assessment to ensure full evaluation of potential risk to receptors. An addendum to the Phase II report (and Phase III report if necessary) will be provided subsequent to the completion of this evaluation. A step-wise application of the Elutriator Method was chosen to avoid potentially unnecessary costs associated with the use and interpretation of this analytical method.

2.4 CAMBRIDGE ASBESTOS ORDINANCE COMPLIANCE

Site remediation at Russell Field is required in accordance with the CAO and regulations administered by the MADEP. CAO remediation and site delisting must be accomplished prior to the initiation of any other earth moving or disturbing activities at Russell Field. In accordance with the CAO, the draft plan for CAO remediation was provided to the Cambridge Department of Public Health on March 30, 2004, and subsequently underwent a 21-day public comment period.

The CAO Remediation Plan describes activities required at Russell Field to complete excavation and transport for off-site disposal of soil known to contain asbestos fibers at concentrations greater than 1%, in accordance with the CAO, Cambridge Municipal Code, Title 8—Health and Safety, Chapter 8.61 Asbestos Protection. This work will be included in the Phase IV Remedy Implementation Plan (RIP) and, as such, will be conducted pursuant to the MCP 310 CMR 40. This work is being done to satisfy the requirements of both the CAO and MCP, but because the CAO is more specific as to remedial approach and affects all earthwork at the property until satisfied, CAO required remediation will be completed first.

This work must also be conducted in full compliance with Massachusetts Air Pollution Control Regulation 310 CMR 7.00, Massachusetts Department of Labor and Workforce Development (DLWD) regulations governing the Removal, Containment or Encapsulation of Asbestos 453 CMR 6.00, Occupational Safety and Health Administration (OSHA) regulations governing Construction Safety 29 CFR 1926 and Hazardous Waste Site Operations 29 CFR 1910.120, and all other relevant and applicable regulations.

3.0 INITIAL SCREENING OF REMEDIAL ALTERNATIVES

The purpose of this section is to provide an initial screening of remedial technologies to identify remedial action alternatives for further evaluation for Russell Field. A discussion of remedial objectives is also provided here. In accordance with MADEP guidance, this evaluation is an initial screening to identify those remedial action alternatives that are reasonably likely to be feasible and achieve a level of No Significant Risk. Table 3.1 lists the remedial alternatives identified for Russell Field and summarizes the results of screening.

3.1 OBJECTIVES OF RESPONSE ACTIONS

Specific remedial goals were developed to determine the extent of materials subject to remediation, in order to provide a consistent basis for comparing remedial alternatives, as discussed in the following sections. According to the information presented in earlier studies (see Section 2), PAHs and asbestos are the COCs requiring remediation at Russell Field and have been identified in fill at the Site. The focus of future remedial actions, and therefore the criteria by which potential remedial actions will be assessed, will be impacts to soil.

The objectives of response actions at the Site are to:

- Prevent significant risks to human health, public welfare, and the environment from contaminated fill.
- Comply with the requirements of the MCP and CAO.
- Utilize remedial actions that can be safely, practically, and cost-effectively implemented.
- Allow for the continued use of the Site as a recreational facility.

Previous site characterization activities have identified a current and future potential risk to human health, a potential current and future risk to public welfare, and a potential future risk to the environment, based upon the concentrations of PAHs and asbestos present in the soil. A review of the data presented in the Phase II identified current risks

to Public Welfare and the Environment, per 310 CMR 40.0996(3)(b), posed by UCL exceedances documented in the soil. Site COCs do not pose a significant risk to safety.

3.2 SCREENING OF REMEDIAL ALTERNATIVES

In accordance with 310 CMR 40.0856, identified remedial alternatives were those judged to be feasible, based upon the Site COC-related impacts, the nature of the impacted media, and Site characteristics. As is noted in 310 CMR 40.0856, remedial alternatives are reasonably feasible if:

- The technologies to be employed by the alternative are reasonably likely to result in a Permanent or Temporary Solution.

- Individuals with the expertise needed to effectively implement available solutions would be available, regardless of arrangements for securing their services.

Table 3.1 Initial Screening—Soil Remediation Technologies, Russell Field, Cambridge, Massachusetts

Technology Type	Process Option	Feasibility of Achieving Permanent Solution or Temporary Solution; Availability of Expertise; Screening Results	Screening Outcome
		No Action	
No Action	No Action • No Remediation or Monitoring Performed	• Permanent Solution Achieved? No for A-1, A-2, or A-3 due to upper 3 feet impacted. • Temporary Solution Achieved? No, upper 3 feet impacted. • Experts Available? None required. • Remediation Required at some locations in accordance with the CAO.	Eliminate
		Monitored Natural Attenuation	
Soil Monitoring	Soil Sampling and Analysis	• Permanent Solution Achieved? No for A-1, A-2, or A-3 due to upper 3 feet impacted and PAHs and Asbestos not amenable to attenuation. • Temporary Solution Achieved? No, PAHs and Asbestos present in the upper 3 feet and not amenable to attenuation. • Experts Available? Yes. • Remediation Required at some locations in accordance with the CAO.	Eliminate
		Institutional Controls	
Restrictions	Physical Barriers • Fencing around perimeter of AOC	• Permanent Solution Achieved? No for A-1, A-2, or A-3 due to upper 3 feet impacted. • Temporary Solution Achieved? No, upper 3 feet impacted. • Not compatible with recreational use of the Site. • Experts Available? Yes.	Eliminate
Restrictions	Activity and Use Limitations • Future use limitations will control future exposure pathways	• Permanent Solution Achieved? Yes, potential component of Class A-3 RAO with other remedial technologies. • Temporary Solution Achieved? Yes, if combined with other remedial technologies. • Experts Available? Yes.	Retain
		Containment	
Capping	Capping with Engineered Barrier • Required for soil with UCL exceedances to achieve a PS, if not remediated	• Permanent Solution Achieved? Yes, potential component of Class A-3 RAO with other remedial technologies and an AUL. • Temporary Solution Achieved? Yes. • Experts Available? Yes.	Retain
		Removal	
Removal	Excavation	• Permanent Solution Achieved? Yes for A-1, A-2, or A-3. • Temporary Solution Achieved? Not applicable if complete excavation. • Experts Available? Yes.	Retain

Table 3.1 Continued

Technology Type	Process Option	Feasibility of Achieving Permanent Solution or Temporary Solution; Availability of Expertise; Screening Results	Screening Outcome
		Treatment (in-Situ)	
Thermal Treatment	In-Situ Thermal Desorption • Apply vacuum and heat to volatilize/destroy/extract contaminants	• Permanent Solution Achieved? No—infeasible due to co-mingled asbestos and metals, and limited soil quantity. • Temporary Solution Achieved? Not applicable due to co-mingled asbestos and metals. • Experts Available? Yes.	Eliminate
Physical Treatment	Soil Vapor Extraction	• Permanent Solution Achieved? No—not effective for PAHs or asbestos. • Temporary Solution Achieved? No—not effective for PAHs or asbestos. • Experts Available? Yes.	Eliminate
Physical Treatment	Stabilization • Large diameter augers stir soil and stabilizing agent	• Permanent Solution Achieved? Not economical based on limited soil quantity. • Temporary Solution Achieved? Not economical based on limited soil quantity. • Experts Available? Yes.	Eliminate
Chemical Treatment	Soil Flushing • Inject water-based extractant into soil.	• Permanent Solution Achieved? Not economical based on limited soil quantity. Not effective for asbestos. • Temporary Solution Achieved? Not economical based on limited soil quantity. Not effective for asbestos. • Experts Available? Yes.	Eliminate
Biological Treatment	Bioremediation/Bioventing • Inject microbes (and for bioventing induce airflow through vadose soil) to stimulate aerobic degradation of contaminants	• Permanent Solution Achieved? No for A-1, A-2, or A-3 due to upper 3 feet impacted, co-mingled asbestos, and technology ineffective for asbestos and some PAHs. • Temporary Solution Achieved? No for A-1, A-2, or A-3 due to upper 3 feet impacted, co-mingled asbestos, technology ineffective for asbestos and some PAHs. • Experts Available? Yes.	Eliminate
		Treatment (ex-Situ)	
Thermal Treatment	Incineration • Excavation, transport off-site for incineration.	• Permanent Solution Achieved? Not cost effective based on limited soil quantity. Temporary Solution Achieved? Not cost effective based on limited soil quantity. • Experts Available? Yes. Incineration facility not available regionally.	Eliminate
Thermal Treatment	Thermal Desorption, On-Site or Off-Site • Excavation, on-/off-site treatment and soil disposal.	• Permanent Solution Achieved? Not cost effective based on limited soil quantity. Not technically effective for asbestos. • Temporary Solution Achieved? Not cost effective based on limited soil quantity. Not technically effective for asbestos. • Experts Available? Yes.	Eliminate

Table 3.1 Continued

Technology Type	Process Option	Feasibility of Achieving Permanent Solution or Temporary Solution; Availability of Expertise; Screening Results	Screening Outcome
		Treatment (ex-Situ) (Continued)	
Physical Treatment	Soil Washing • Excavation, separate silt and clay fraction from sand fraction, desorb contaminants into aqueous phase.	• Permanent Solution Achieved? Not cost effective based on limited soil quantity. Effectiveness of soil washing for asbestos is uncertain. Pilot studies required. • Temporary Solution Achieved? Not cost effective based on limited soil quantity. Effectiveness of soil washing for asbestos is uncertain. Pilot studies required. • Experts Available? Yes.	Eliminate
Physical Treatment	Stabilization • Excavation and stabilization of soil using cement/silica binder.	• Permanent Solution Achieved? May not effectively encapsulate PAH compounds, resulting in a partially treated soil product. • Temporary Solution Achieved? Not cost effective based on limited soil quantity and asbestos present. • Experts Available? Yes.	Eliminate
Physical Treatment	Asphalt Batching, On-Site or Off-Site • Excavation, on- or off-site asphalt batching, on-site or off-site re-use of soil.	• Permanent Solution Achieved? Not applicable due to co-mingled asbestos. • Temporary Solution Achieved? Not applicable due to co-mingled asbestos. • Experts Available? Yes.	Eliminate
		Disposal	
Disposal	Off-Site Landfill Disposal • Off-site disposal of soil.	• Permanent Solution Achieved? Component of A-1, A-2, or A-3. • Temporary Solution Achieved? Not applicable since Temporary Solution not achievable due to asbestos present. • Experts Available? Yes.	Retain

As indicated in Table 3.1, only soil remediation technologies were evaluated. Results of Phase I and II assessments do not indicate the need for ground water remediation at Russell Field. The general categories of soil remediation considered are: No Action, Monitored Natural Attenuation, Institutional Controls, Containment, Removal, In-situ Treatment, Ex-situ Treatment, and Disposal.

Most of the alternatives evaluated were eliminated from further consideration because they are not technically feasible, effective, or readily available. COCs that require remediation include asbestos and PAHs. The commingling of these COCs and the presence of metals in soil at elevated concentrations at some locations resulted in the elimination of all Monitored Natural Attenuation, In-situ Treatment, and Ex-situ Treatment technologies. In addition, one form of Institutional Control (Physical Barriers) was also eliminated. The No Action Alternative was eliminated based upon CAO Remediation Requirements and the inability to achieve No Significant Risk via this option.

The remaining alternatives: Activity and Use Limitations, Containment, Removal, and Off-site Disposal were retained for more detailed evaluation. These alternatives will be more fully discussed in Section 4.0.

4.0 DETAILED EVALUATION OF REMEDIAL ALTERNATIVES

In accordance with the MCP (310 CMR 40.0856), the initial screening of potential remedial technologies was conducted, and resulted in a total of four retained remedial technologies. However, only one comprehensive remedial action alternative was developed based upon the combination of two of these technologies (Excavation and Off-site Disposal), and was subject to the most detailed evaluation. Containment technology is considered briefly in this Section, and was eliminated due to limited applicability and feasibility based upon the planned future use of the Site. Potential implementation of an AUL in addition to Excavation and Off-site Disposal at Russell Field is also considered in this Section, but not currently indicated. No comprehensive remedial action alternative was found which can be expected to reduce contaminant concentrations to background due to the presence of urban fill underlying much of the Site. However, the selected alternative can achieve a condition of No Significant Risk to Public Health, Public Safety and Welfare, and the Environment, as demonstrated in the Risk Characterization.

4.1 CONTAINMENT

Containment technologies, such as capping with an engineered barrier, are technically feasible at Russell Field. However, only limited applications are compatible with the City's planned renovation and continued use of Russell Field as a municipal recreational facility. The limited areas where remediation is needed do not coincide with locations where capping would be appropriate (i.e., most of the proposed remediation locations are located beneath the soccer and baseball fields at the facility). See Figure 2. Permeable surface requirements for the proposed renovations and floodplain considerations place further restrictions on the applicability of this remedial alternative. Therefore, containment is eliminated from further consideration as a remedial alternative for Russell Field on the basis of poor implementability, low benefits, and negative non-pecuniary effects.

4.2 EXCAVATION AND OFF-SITE DISPOSAL

Excavation and off-site disposal provide the only alternative that will provide a feasible option for field renovation due to restrictions and requirements of the CAO. Further, this

is a proven technology that can be used (possibly in combination with an AUL) to provide a Condition of No Significant Risk. This alternative has been selected for Russell Field in accordance with 310 CMR 40.0858, because it has been proven effective in remediating the types of hazardous materials present at the Site. This technology can be implemented without posing significant risk of harm to public health, safety, welfare or the environment. Results of these efforts may approach urban background conditions for soil at Russell Field, but are unlikely to reduce all locations to concentrations below background levels, because of the presence of urban fill.

The detailed evaluation of this alternative relative to the MCP criteria is presented below.

- **Effectiveness—**Excavation and off-site landfill disposal effectively achieves a Permanent Solution by eliminating the Significant Risk posed by the impacted soil. The Significant Risk posed by the impacted soil results from the potential for human or environmental exposure to the soil in their present location, and from the potential for the impacted soil to be transported to another location where exposure is a potential. This alternative can provide a Permanent Solution.

- **Short-Term and Long-Term Reliability—**This alternative is moderately effective in managing residues, remaining wastes, and controlling emissions as the excavation and off-site disposal does not destroy or fixate the contaminants of concern, but rather encapsulates them in a landfill. The short-term and long-term reliability is good, because the alternative is effective, and can be completed during a finite period.

- **Implementability—**The implementability of this alternative is excellent. This alternative relies on excavation and landfilling technology which is well understood and of low complexity.

- **Cost—**The approximate total cost, in 2004 dollars, to implement this alternative is estimated at $700,000 to $850,000. This approximate cost, in addition to remedial costs, includes preparation of the Phase IV Remedy Implementation Plan, excavation and landfill disposal of the impacted soil, and preparation and submittal of an Response Action Outcome (RAO) Statement. It should be noted that the relatively

high estimated cost is significantly impacted by CAO compliance, which requires the use of 'tenting and venting' technologies during excavation and removal.

- **Risks—**The risks associated with this alternative are moderate. Following successful completion of excavation and backfilling activities, the risks associated with this alternative become minimal. It should be noted that the risks associated with the impacted soil are removed from the Site, but are then transferred to the disposal facility.

- **Benefits—**The benefits of this alternative are high. Barring temporary construction access restraints, this alternative would allow site operations to continue, and would provide the potential to restore the Site to a condition of 'No Significant Risk' posed by Site contamination.

- **Timeliness—**The timeliness of this alternative is good due to the finite nature of excavation-based remediation.

- **Non-pecuniary effects—**This alternative would have moderate negative non-pecuniary interests. Except for relatively short-duration soil removal and restoration operations, the Site will remain undisturbed by remedial activities during this alternative. The contaminants of concern would not be destroyed or fixated, but would be transferred to a more secure location, where the chance of uncontrolled human or environmental impact would be greatly diminished but not removed. This alternative is compatible with proposed field renovations and continued use of the Site as a municipal recreational facility.

4.3 ACTIVITY AND USE LIMITATIONS

Implementation of an AUL was only retained as an alternative that could be used in conjunction with other remedial technologies. More specifically, an AUL will not produce a Condition of No Significant Risk without the planned additional remediation given the proposed future use of Russell Field as a municipal recreational facility.

A limited amount of additional assessment was recommended based upon the findings of the Phase II assessment for Russell Field. In particular, asbestos in soil was only characterized using the EPA Elutriator Method for soils in non-remediation areas at depths of zero to three feet. (Remediation areas will be fully discussed in Section 5.0 of this document.) Although there is no formal policy, MADEP recommends the use of a three-foot S-1 soil thickness for the depth of acceptable quality soil at public parks. This does not represent a stratigraphic boundary. Analysis of deeper soils was deferred in order to first determine if an AUL would be necessary for these soils based upon the presence of other contaminants. Non-asbestos COCs at Russell Field do not represent a condition of Significant Risk in deeper soils outside of the selected remediation locations. Therefore additional assessment of asbestos in these soils via the Elutriator Method is planned. Results are anticipated in May or June 2004 and will be presented in an addendum to the Phase II and Phase III documentation for Russell Field.

4.4 CONCLUSIONS

The only technically feasible and effective alternatives that are compatible with planned future use at Russell Field are Removal and Off-site Disposal, possibly in combination with an AUL. Removal and Off-site Disposal are planned for the Site. An AUL may or may not be necessary. Follow-up documentation will be provided subsequent to a limited amount of additional testing. This documentation will provide an evaluation of the necessity to implement an AUL at Russell Field. These alternatives provide a Permanent Solution and can achieve a condition of No Significant Risk.

Because low concentrations of COCs were detected in ground water at Russell Field (below RCs) and ground water remediation is not indicated or necessary, it is unlikely that background conditions will be achieved at Russell Field.

Additionally, the selected remedial alternatives for soil: removal, off-site disposal, and possibly an AUL can achieve a condition of No Significant Risk, but are unlikely to reduce Site contaminants to background concentrations, due to the presence of urban fill at the Site.

5.0 REMEDIAL ACTION PLAN OUTLINE

The following paragraphs provide an outline of proposed remedial activities at the Russell Field Site. A brief discussion of each major component of the remediation program and preliminary schedule is included.

5.1 PRELIMINARY PROJECT SCHEDULE

Two phases of remedial activity are anticipated at the Site, and will be fully described in the Phase IV RIP. Completion of the RIP for Russell Field is anticipated in mid to late May 2004.

As discussed previously, CAO Remediation must be completed prior to the initiation of other earthmoving activities (including additional MCP remediation) at Russell Field. In accordance with the CAO, the draft plan for CAO remediation was provided to the Cambridge Department of Public Health on March 30, 2004, and subsequently underwent a 21-day public comment period. It is anticipated that CAO remediation will commence in late May or early June 2004.

The earliest date anticipated for initiation of additional MCP remediation is late June or early July 2004. Because this second phase of remediation will be integrated with site renovation activities, and sequencing has not yet been determined, the exact timing of initiation and completion of this work is not currently known. However, it is anticipated that all site renovations and remediation will be complete by the end of the summer of 2005. Therefore, it is currently anticipated that all remediation activities and submission of an RAO for Russell Field may be completed by year-end 2005.

The additional assessment needed to determine if an AUL affecting deeper soils is necessary at the Site will be complete prior to completion of CAO Remediation and initiation of additional earthmoving activities. Because stringent soil management strategies are required for this phase of remediation, it can be assumed that these restrictions are likely to exceed any placed upon potential AUL soils at the Site. These restrictions are discussed in Section 5.2.

5.2 CAO REMEDIATION

Four locations with asbestos concentrations in soil exceeding 1% were identified at Russell Field (Figure 2). These locations (PS-2, PS-6, PS-14, C-150) require remediation in accordance with the CAO and MCP prior to the initiation of other earthmoving activities unless those activities are conducted using 'tenting and venting' technologies.

In accordance with the CAO, remediation of soils at these locations will be completed within negatively pressurized containment structures. Exhaust air will be filtered using HEPA units. Air monitoring will be conducted within the containment to ensure worker health and safety and outside the containment to ensure proper function and public safety in surrounding areas. A Massachusetts Licensed Asbestos Monitor will oversee these activities. The containment will remain in place and negatively pressurized until confirmatory analysis of soils and clearance testing of the containment indicates remediation is complete at that location.

Soils will be excavated and containerized within the containment structure, and subsequently disposed of off-site, at a licensed disposal facility in compliance with all applicable laws and regulations. Confirmatory analysis of soils will ensure compliance with both CAO and MCP clean-up criteria.

5.3 MCP REMEDIATION

Additional MCP remediation will be conducted at four locations at Russell Field. As illustrated in Figure 2, asbestos-containing material (ACM) as debris was identified at three locations (A-25, ESB2, ESB11) and PAHs exceeding Upper Concentration Limits were identified at C-39.

Soils and debris will be excavated, containerized, and subsequently disposed of off-site, at a licensed disposal facility in compliance with all applicable laws and regulations. Confirmatory analysis of soils will ensure compliance with MCP clean-up criteria.

Air monitoring will be conducted to ensure worker health and safety and public safety in surrounding areas. A Massachusetts Licensed Asbestos Monitor will oversee remediation of the ACM debris locations.

6.0 CONCLUSIONS

EH&E completed a Phase III Evaluation of Remedial Alternatives and Remedial Action Plan Outline for Russell Field in accordance with the MCP. Contaminants were detected in subsurface soil at Russell Field, a City-owned facility; the MADEP Release Tracking Number for this release is 3-0017087.

Based upon the findings of the Phase III Evaluation, EH&E concludes the following:

- The only technically feasible and effective alternatives that are compatible with planned future use and CAO compliance at Russell Field are Removal and Off-site Disposal, possibly in combination with an AUL. Removal and Off-site Disposal are planned for the Site. An AUL may or may not be necessary. These alternatives provide a Permanent Solution and can achieve a condition of No Significant Risk.

- Follow-up documentation will be provided subsequent to a limited amount of additional asbestos testing. This documentation will provide an evaluation of the necessity to implement an AUL at Russell Field.

- Because low concentrations of COCs were detected in ground water at Russell Field (below RCs) and ground water remediation is not indicated or necessary, it is unlikely that background conditions will be achieved at Russell Field. However, ground water at the Site does not pose a condition of Significant Risk to Public Health, Safety, Welfare, and the Environment.

- Additionally, the selected remedial alternatives for soil, removal, off-site disposal, and possibly an AUL, can achieve a condition of No Significant Risk to Public Health, Safety, Welfare, and the Environment, but are unlikely to reduce Site contaminants in soil to background concentrations.

A Remedial Action Plan Outline for Russell Field is provided in Section 5.0 of this report. Remediation locations are illustrated in Figure 2. Major components of the remediation plan include:

- CAO Remediation must be conducted at four locations before any additional earthmoving activities (including additional MCP remediation) can take place. Excavation and off-site disposal will be conducted at these locations; excavation activities will occur within containment structures in accordance with the CAO. A Massachusetts Licensed Asbestos Monitor will oversee these activities.

- ACM debris was identified at three locations that will be remediated in accordance with the MCP and other applicable and relevant regulations. Excavation and off-site disposal will be conducted at these locations. A Massachusetts Licensed Asbestos Monitor will oversee these activities.

- Remediation of PAHs at an identified hotspot will be conducted through excavation and off-site disposal in accordance with the MCP.

- Health and Safety Plans will be developed for all of remediation activities at Russell Field, and will include air monitoring programs.

- It is currently anticipated that all remediation activities and submission of an RAO for Russell Field may be completed by year-end 2005.

APPENDIX A

LIMITATIONS

LIMITATIONS

1. Environmental Health & Engineering, Inc.'s (EH&E) assessment described in the attached report number 10515, *Phase III Evaluation of Remedial Alternatives and Remedial Action Plan Outline Russell Field Cambridge, Massachusetts* (hereafter "the Report"), was performed in accordance with generally accepted practices employed by other consultants undertaking similar studies at the same time and in the same geographical area; and EH&E observed that degree of care and skill generally exercised by such other consultants under similar circumstances and conditions. The observations described in the Report were made under the conditions stated therein. The recommendations presented in the Report were based solely upon the services described therein, and not on scientific tasks or procedures beyond the scope of described services, nor beyond the time and budgetary constraints imposed by the client.

2. Observations were made of the site as indicated within the Report. Where access to portions of the site was unavailable or limited, EH&E renders no opinion as to the condition of that portion of the site.

3. The observations and recommendations contained in the Report are based on limited environmental sampling and visual observation and were arrived at in accordance with generally accepted standards of consulting practice. The sampling and observations conducted at the site were limited in scope and, therefore, cannot be considered representative of areas not sampled or observed.

4. When an outside laboratory conducted sample analyses, EH&E relied upon the data provided and did not conduct an independent evaluation of the reliability of these data.

5. The purpose of the Report was to assess the characteristics of the subject site as stated within the Report. No specific attempt was made to verify compliance by any party with all federal, state, or local laws and regulations.

APPENDIX B

PHASE III COMPLETION STATEMENT