

LANDFILL REMEDIATION FEASIBILITY STUDY

DEVENS, MASSACHUSETTS

VOLUME I OF II

TEXT, FIGURES AND TABLES

CONTRACT DACA31-94-D-0061 TASK ORDER 0002

U.S. ARMY ENVIRONMENTAL CENTER ABERDEEN PROVING GROUND, MARYLAND

JANUARY 1997

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LANDFILL REMEDIATION FEASIBILITY STUDY

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CONTRACT DACA31-94-D-0061 TASK ORDER 0002



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Prepared for:

U.S. Army Environmental Center Aberdeen Proving Ground, Maryland

Prepared by:

ABB Environmental Services, Inc. Portland, Maine 8712-04

JANUARY 1997

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	DEGREE OF ADHERENCE TO EVALUATION CRITERIA ALTERNATIVE NO.								
EVALUATION CRITERIA	1	2	3	4	5	6	7	8	9
Overall protection of human health and the environment	Low	Medium	Medium	Medium	High	High	High	Medium	High
Compliance with ARARs	Low	Medium	Medium	Medium	Medium	High	High	Medium	High
Long-term effectiveness and permanence	Low	Medium	Medium	Medium	High	High	High	Medium	High
Reduction of toxicity, mobility, and volume through treatment	None	Low	Low	Low	Low	Low	Low	Low	Low
Effectiveness: Short-term	None	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Implementability	Low	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Cost	None	\$7.6M	\$9.5M	\$16.6M	\$19.6M	\$21.6M	\$12.5M	\$18.1M	\$20.2M

LANDFILL REMEDIATION FEASIBILITY STUDY

LIST OF TABLES (continued)

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22

2	EXECUTIVE SUMMARY
3	
4	
5	ABB Environmental Services, Inc. (ABB-ES) prepared this Feasibility Study (FS) Report
6	in accordance with the U.S. Army Environmental Center (USAEC) Contract
7	DACA31-94-D-0061, Task Order No. 0002. The objective of this task order is to
8	complete an engineering feasibility study that will enable preparation of a Record of
9	Decision (ROD) for managing seven debris disposal areas at the Devens Reserve Forces
10	I raining Area (RFIA, formerly Fort Devens), Devens, Massachusetts.
11	The FS is being conducted in accordance with the U.S. Environmental Protection Agency
12	(USEPA) Remedial Investigation/Feasibility Study Guidance Manual (USEPA, 1988) the
14	USEPA guidance on conducting Remedial Investigation/Feasibility Studies for CERCLA
15	Municipal Landfill Sites (USEPA, 1991a), the Federal Facility Agreement between the
16	USEPA and the U.S. Department of the Army, also referred to as the Interagency
17	Agreement (IAG) (USEPA, 1991b), and the National Contingency Plan (NCP) (USEPA,
18	1990a).
19	
20	During the collection of information for the MEP and subsequent studies, the Army
21	identified seven debris disposal areas throughout Fort Devens. These disposal areas are in
22	addition to the Shepley's Hill Landfill, which has served as the primary solid waste disposal
23	location at the installation. This 80-acre facility (Area of Contamination [AOC] 05) has
24	Subtitle D Closure Plan and is being remediated under the Comprehensive Environmental
25	Response Compensation and Liability Act (CERCLA)
27	Response, compensation, and Endomy ret (CERCERT).
28	The seven debris disposal areas have been the subject of previous investigations under
29	CERCLA, and have been found to pose varying risks to public health and the
30	environment. The Army has determined from discussions with federal and state regulatory
31	agencies that the disposal areas must be managed, with consideration given to the
32	Massachusetts solid waste management regulations.
33	

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EXECUTIVE SUMMARY

The Army has decided to address the disposal areas under the CERCLA Feasibility Study 1 process due to the benefits of: (1) a consistent administrative approach for all sites; 2 (2) similarity of waste material; and (3) the administrative difficulty in mixing CERCLA 3 and non-CERCLA waste. 4 5 Management of the debris disposal areas is being further influenced by property reuse 6 considerations. The Massachusetts Government Land Bank (MGLB) and its consultants 7 have indicated that water supply and wastewater resources will be affected by the 8 9 management options chosen for the disposal areas. 10 Three previous documents contained evaluations of options for managing the seven debris 11 areas. These are the Plan of Action (see Appendix A), the Draft Landfill Consolidation 12 Feasibility Study Report (ABB-ES, 1995), and the Debris Disposal Area Technical 13 Memorandum (ABB-ES, 1996). Pertinent information developed in the documents are 14 contained in this report. 15 16 Plan of Action. The Plan of Action constituted an agreement to proceed with plans for 17 consolidating debris from the seven disposal areas into a single disposal site. The Plan was 18 endorsed by the Fort Devens BRAC Environmental Coordinator, USEPA Region I, 19 Massachusetts Department of Environmental Protection (MADEP), and the MGLB. The 20 Plan of Action considered six debris management options. Each option was comprised of 21 one or more of the following actions: (1) debris consolidation to a single on-site disposal 22 area, (2) capping of debris disposal areas in-place, and (3) debris disposal at an offsite 23 commercial facility. Of these, Plan of Action proponents favored excavating debris from 24 all seven areas, and consolidating the debris at a vacant parcel of land east of Shepley's 25 Hill Landfill 26 27 Landfill Consolidation Feasibility Study Report. The consolidation FS report 28 evaluated in detail the excavation/consolidation option endorsed in the Plan of Action. Its 29

purpose was to enable preparation of a ROD for consolidating debris from the seven
disposal areas into a single waste disposal site. However, review comments on the FS

report from the U.S. Army Forces Command (FORSCOM) caused Plan of Action

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ES-2

1	proponents	to reconsider the evaluation process from which landfill consolidation was
2	disposal area	or sin place or no further estion
3	disposar area	as in-place of no further action.
4	Dahnia Dian	And Technical Memory dam. The technical memory land 1
5	Debris Disp	nt (i.e. compine) alternative and a concellidation alternative for each of the
6	a containme	In (i.e., capping) alternative, and a consolidation alternative for each of the
7	seven landin	ation ES report
8	the consolid	ation FS report.
9	To further r	ornend to EORSCOM's concerns. Plan of Action property character to record
10	this ES repo	espond to FORSCOM s concerns, Plan of Action proponents chose to prepare
11	management	t options containing non-consolidation actions including those originally
13	developed in	the Plan of Action
14	The purpose	e of this FS Report is to:
15	III	
16		establish response objectives describing the environmental and
17		administrative benefits of debris management;
18		0 ,
19		identify the types of response actions necessary to achieve response
20		objectives;
21		
22		identify and screen specific remedial technologies that may be capable of
23		attaining response objectives;
24		
25	•	develop and evaluate a range of remedial alternatives based on those
26		technologies; and
27		
28	•	compare the alternatives in accordance with criteria recommended by
29		USEPA.
30		
31	This FS Repo	ort is based on information and data presented in the various Site Investigation
32	(SI) and Ren	nedial Investigation (RI) reports prepared for the seven debris disposal areas. The
33	debris dispos	al areas are: Study Areas (SAs) 6, 12, and 13, and Areas of Contamination
34	(AOCs) 9, 11	1, 40, and 41.

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EXECUTIVE SUMMARY

Site Investigations (SIs) were conducted at Study Areas (SAs) 12 and 13 and AOCs 9, 40, and 2 41 to verify the presence or absence of environmental contamination and to determine whether 3 further investigation or remediation was warranted. Supplemental SI activities were also 4 conducted at SAs 12 and 13 and AOC 41 to address data gaps identified in the SI reports. RIs 5 were completed at AOCs 11, 40, and 41 to further assess the distribution of contaminants: the 6 RIs included human health and ecological risk assessments for the three sites. 7 8 In addition to the SI and Supplemental SI activities, predesign investigations were conducted at 9 SAs 6, 12, and 13 AOCs 9, and 40 to define the depth, areal extent, composition of waste, and 10

site conditions in order to identify appropriate remedial alternatives.

12

1

13 Development of alternatives to meet landfill management goals begins with the identification

and screening of potentially applicable remedial technologies. The number of identified

technologies was reduced during screening in which the advantages and disadvantages of the

16 effectiveness and implementability of each technology were evaluated. Technologies retained

17 have the potential for effectively achieving response objectives, either alone or in combination

with other technologies. The process used for technology screening is consistent with USEPA
RI/FS guidance.

20

21 Remedial technologies retained after screening for each site were assembled into remedial

22 alternatives. The remedial alternatives were then screened upon consideration of effectiveness,

implementability, and cost. A summary of alternatives considered for detailed evaluation is
presented in Table ES-1.

25

The alternatives retained after screening (i.e., Alternative Nos. 1 through 9 in Table ES-1) were evaluated in detail using criteria suggested in the RI/FS guidance. The alternatives evaluated

include consolidating debris at a proposed site near Shepley's Hill Landfill, and capping the

29 landfills in place. A summary of the detailed evaluation of the retained alternatives is presented

in Table ES-2.

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1	1.0 INTRODUCTION
2	
3	
4	ABB Environmental Services, Inc. (ABB-ES) prepared this Feasibility Study (FS) Report
5	in accordance with the U.S. Army Environmental Center (USAEC) Contract
6	DACA31-94-D-0061, Task Order No. 0002. The objective of this task order is to
7	complete an engineering FS that will enable preparation of a Record of Decision (ROD)
8	for managing seven debris disposal areas at the Devens Reserve Forces Training Area
9	(RFTA, formerly Fort Devens), Devens, Massachusetts. These disposal areas are:
10	Study Area (SA) 6
11	• Study Area (SA) 0
12	• Area of Contamination (AOC) 9
13	
14	• SA 12
15	• SA 13
16	• AUC 40
17	• AOC 41
18 19 20 21 22 23 24 25 26	The FS is being conducted in accordance with the U.S. Environmental Protection Agency (USEPA) Remedial Investigation (RI)/FS guidance manual (USEPA, 1988), the USEPA guidance on Conducting Remedial Investigation/Feasibility Studies for CERCLA Municipal Landfill Sites (USEPA, 1991a), the Federal Facility Agreement between the USEPA and the U.S. Department of the Army, also referred to as the Interagency Agreement (IAG) (USEPA, 1991b), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (USEPA, 1990a).
27	Fort Devens was identified for cessation of operations and closure under Public
28	Law 101-510, the Defense Base Closure and Realignment (BRAC) Act of 1990, and
29	officially closed in September 1996. Portions of the property formerly occupied by Fort
30	Devens were retained by the Army for reserve forces training and renamed the Devens
31	Reserve Forces Training Area. Areas not retained as part of the Devens RFTA were, or
32	are in the process of being, transferred to new owners for reuse and redevelopment. Fort
33	Devens was placed on the National Priority List (NPL) on December 21, 1989, under the

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Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as 1 amended by the Superfund Amendments and Reauthorization Act (SARA). 2 3 4 1.1 DEVENS RESERVE FORCES TRAINING AREA BACKGROUND 5 6 The Devens RFTA is located within the towns of Ayer and Shirley (Middlesex County) 7 and Harvard and Lancaster (Worcester County), approximately 35 miles northwest of 8 Boston, Massachusetts. It was established in 1996, coincident with the closure of Fort 9 Devens, to provide facilities for the training of reserve forces in central New England. 10 The Devens RFTA includes portions of the former North Post and Main Post, and the 11 entire South Post, and lies within the Ayer, Shirley, and Clinton map quadrangles 12 $(7\frac{1}{2}$ -minute series). 13 14 Fort Devens was established in 1917 as Camp Devens, a temporary training camp for 15 16 soldiers from the New England area. In 1931, the camp became a permanent installation and was redesignated as Fort Devens. Throughout its history, Fort Devens served as a 17 training and induction center for military personnel and a unit mobilization and 18 demobilization site. All or portions of this function occurred during World Wars I and II, 19 the Korean and Vietnam conflicts, and operations Desert Shield and Desert Storm. 20 21 Over 3,000 acres at Fort Devens were developed for housing, buildings, and other 22 facilities and the installation was reported as the largest undeveloped land holding under a 23 single owner in north-central Massachusetts (U.S. Fish and Wildlife Service [USFWS], 24 1992). The North Post consisted primarily of the Moore Army Airfield and the site of the 25 installation's wastewater treatment facility. The Main Post was the site of numerous 26 buildings, including vehicle maintenance facilities, training and administrative buildings, 27 barracks and other military housing, and recreational facilities. The South Post, largely 28 undeveloped, is located south of Massachusetts Route 2 and was used for field training 29 exercises. 30 31

32

1	1.2 STATUS OF LANDFILLS AT FORT DEVENS
2	
3	In conjunction with the U.S. Army Installation Restoration Program, the USAEC
4	developed a Master Environmental Plan (MEP) for Fort Devens in 1992. The MEP
5	included assessments of the environmental status of study areas (SAs), specified necessary
6	investigations, and provided recommendations for response actions with the objective of
7	identifying priorities for environmental restoration at Fort Devens. Areas Requiring
8	Environmental Evaluation (AREEs) and SAs were identified and investigations initiated to
9	determine where removal actions were necessary.
10	
11	During the collection of information for the MEP and subsequent studies, the Army
12	identified seven debris disposal areas throughout Fort Devens (Figure 1-1). These
13	disposal areas were in addition to the Shepley's Hill Landfill, which served as the primary
14	solid waste disposal location at the installation. This 80-acre facility (Area of
15	Contamination [AOC] 05) was closed under a state-approved Resource Conservation and
16	Recovery Act (RCRA) Subtitle D Closure Plan, and is being remediated under CERCLA.
17	The ROD for the Shepley's Hill Landfill Operable Unit (ABB-ES, 1995b) describes the
18	selected remedy for the site (i.e., landfill closure with a low-permeability cap and
19	associated actions).
20	
21	Included within AOC 05 are the smaller AOC 04 and AOC 18. AOC 04, the sanitary
22	landfill incinerator, was located in former Building 38 near the end of Cook Street within
23	the area included in Phase I of the sanitary landfill closure. The incinerator was
24	constructed in 1941, and burned household refuse until the late 1940s. Ash from the
25	incinerator was buried in the landfill. The incinerator was demolished and buried in the
26	landfill in September 1967. The building foundation was removed and buried on-site in
27	1976.
28	
29	AUC 18, the asbestos cell, is located in the section of the landfill that was closed during
30	Phase IV. An estimated 0.0 tons of asbestos construction debris were placed in the
31	section closed during Phase IV-A, between March 1982 and November 1985. A new
32	aspestos cell was opened in 1990 in the section closed during Phase IV-B, and used for
33	disposal of small volumes of asbestos-containing material until July 1992.
34	

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The seven debris disposal areas have been the subject of previous investigations under 1 CERCLA, and have been found to pose varying risks to human health and the 2 environment. The Army has determined from discussions with federal and state regulatory 3 agencies that the disposal areas must be managed, with consideration given to the 4 Massachusetts solid waste management regulations. 5 6 The Army has decided to address the disposal areas under the CERCLA Feasibility Study 7 process due to the benefits of: (1) a consistent administrative approach for all sites; 8 (2) similarity of waste material; and (3) the administrative difficulty in mixing CERCLA 9 and non-CERCLA waste. 10 11 Management of the debris disposal areas is being further influenced by property reuse 12 considerations. The Massachusetts Government Land Bank (MGLB) and its consultants 13 have indicated that water supply and wastewater resources will be affected by the 14 management options chosen for the disposal areas. 15 16 17 18 1.3 PREVIOUS DOCUMENTS ADDRESSING DEBRIS AREA MANAGEMENT 19 Three previous documents evaluated options for managing the seven debris areas: the 20 BRAC Cleanup Team (BCT) Plan of Action (Appendix A), the Draft Landfill 21 Consolidation Feasibility Study Report (ABB-ES, 1995), and the Debris Disposal Area 22 Technical Memorandum (ABB-ES, 1996a). Pertinent information developed in the latter 23 documents is contained in this report. 24 25 Plan of Action. The Plan of Action constituted an agreement to proceed with plans for 26 consolidating debris from the seven disposal areas into a single disposal site. The Plan 27 was endorsed by the Fort Devens BRAC Environmental Coordinator, USEPA Region I, 28 Massachusetts Department of Environmental Protection (MADEP), and the MGLB. The 29 Plan of Action considered six debris management options, each comprised of one or more 30 of the following actions: (1) debris consolidation to a single on-site disposal area, (2) 31 capping of debris disposal areas in-place, and (3) debris disposal at an offsite commercial 32 facility. Of these, Plan of Action proponents favored excavating debris from all seven 33 areas and consolidating the debris at a vacant parcel of land east of Shepley's Hill Landfill. 34

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1	
2	Landfill Consolidation Feasibility Study Report. The consolidation FS report
3	(ABB-ES, 1995c) evaluated in detail the excavation/consolidation option endorsed in the
4	Plan of Action. Its purpose was to enable preparation of a ROD for consolidating debris
5	from the seven disposal areas into a single waste disposal site. However, review comments
6	on the FS report from the U.S Army Forces Command (FORSCOM) caused the Plan of
7	Action proponents to reconsider the evaluation process from which landfill consolidation
8	was selected. FORSCOM requested evaluation of non-consolidation options such as
9	capping disposal areas in-place or no further action.
10	
11	Debris Disposal Area Technical Memorandum. The technical memorandum evaluated
12	a containment (i.e., capping) alternative and a consolidation alternative for each of the
13	seven landfills. The memorandum was prepared in response to FORSCOM comments on
14	the consolidation FS report.
15	
16	To further respond to FORSCOM's concerns, Plan of Action proponents chose to prepare
17	this FS report. In addition to the consolidation-only option, this report evaluates debris
18	developed in the Plan of Action
19	developed in the Plan of Action.
20	
21	1 4 DIDDORE AND ODCANIZATION OF DEDODT
22	1.4 TURFUSE AND ORGANIZATION OF REPORT
23	The purpose of this FS Report is to:
25	
26	• establish response objectives describing the environmental and administrative
27	benefits of debris management.
28	concerte of accent management,
29	• identify the types of response actions necessary to achieve response objectives
30	
31	• identify and screen specific remedial technologies that may be capable of
32	attaining response objectives;
33	

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1	•	develop and evaluate a range of remedial alternatives based on those
2		technologies; and
3		
4	•	compare the alternatives in accordance with criteria recommended by USEPA.
5		
6	This repor	t is based on information and data presented in the various Site Investigation
7	(SI) and R	I reports prepared for the seven debris disposal areas. These reports are
8	referenced	in the debris disposal site descriptions presented in this section.
9		
10	This report	t consists of nine sections. Section 2 provides descriptions of the seven debris
11	disposal sit	tes, including the nature and extent of contamination. Section 3 summarizes
12	results of t	he baseline risk assessment and preliminary risk evaluation (PRE) discussions
13	presented i	in the SI and RI reports.
14		
15	Section 4 d	liscusses chemical-specific, location-specific, and action-specific Applicable or
16	Relevant a	nd Appropriate Requirements (ARARs) and their role in site remediation.
17	Section 5 i	dentifies remedial action objectives. Section 6 identifies and screens potential
18	remedial te	chnologies.
19		
20	Section 7 c	levelops and screens potential remedial alternatives. Section 8 contains the
21	detailed an	alysis of alternatives, and Section 9 contains the comparative analysis of

22 alternatives.

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1	2.0 CHARACTERIZATION OF WASTE DISPOSAL SITES
2	
3	
4	The Enhanced Preliminary Assessment (Weston, 1992) identified and characterized areas
5	requiring environmental evaluation (AREESs) associated with historical and current uses
6	of the Devens property.
7	
8	The Enhanced PA recommended that site reconnaissance and a geophysical survey be
9	conducted at each of the seven landfills to determine their exact location and areal extent.
10	A field investigation comprised of surface water, sediment, soil, and/or groundwater
11 12	action would be taken at SA 12, SA 13 and AOC 41 For AOC 41 the report
13	recommended that a Remedial Investigation/Feasibility Study (RI/FS) be undertaken. The
14	RI/FS would include soil, groundwater, surface water and sediment sampling as well as
15	quarterly water level measurement.
16	
17	SIs were conducted at SAs 12 and 13, and AOCs 9, 40, and 41 to verify the presence or
18	absence of environmental contamination and to determine whether further investigation or
19	remediation was warranted. In addition, supplemental SI activities were conducted at SAs
20	12 and 13, and AOC 41 to address data gaps identified in the SI reports. RIs were
21	completed at AOCs 11, 40, and 41 to further assess contaminant distribution; the RIs
22	included baseline human health and ecological risk assessments for the three sites. Risk
23	assessment results are summarized in Section 3.
24	
25	In addition to the SI and Supplemental SI activities, predesign investigations were
26	conducted at SAS 6, 12, and 13, and AOCs 9 and 40 to define depth, areal extent, type of
27	alternatives
28	alternatives.
30	The following subsections describe the history of waste disposal and associated nature and
31	extent of contamination at the seven landfills. Previous documentation of the disposal
32	areas can be found in the Administrative Record according to study group. The study
33	group number pertinent to each area is designated in parentheses in the subsection titles
34	

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2.1 STUDY AREA 6 (GROUP 10)

4 The South Post Household Debris Landfill (Landfill No. 2), also referred to as SA 6, was used between 1850 and 1920 for disposal of household waste (Biang et al., 1992). It is 5 6 located on the South Post, within Tactical Training Area 6A. A variety of household wastes were deposited in a low area, less than 0.25 acres in size, south of the access road. 7 SA 6 is moderately forested with hardwood trees (e.g., red maple, ash, yellow birch, and 8 hickory), with trunk diameters up to 12 inches. An abandoned cellar hole is located across 9 the road. The disposal area has not been covered, and trash is visible on the ground 10 surface. Figure 2-1 is a plan of the site showing the extent of debris as interpreted from 11 test trenches. Scattered surficial debris may extend beyond the limits shown. Cross 12 sections depicting subsurface information learned from test trenching are shown in 13 Figures 2-2 and 2-3. 14

15

1 2

3

Nature and Extent of Contamination. Predesign activities at this site included excavation 16 of six test trenches to define the extent and depth of landfilled material and to determine 17 the composition of the waste. The trenches contained concentrated household debris, 18 primarily metal and glass. Military-type waste was not observed. Waste appeared to be 19 deposited on a layer of cobbles, presumably a natural formation. The water table, 20 encountered at a depth of approximately 5 feet below ground surface (bgs) at the lowest 21 area of the landfill, was observed to be below the bottom of waste at that location. The 22 maximum depth of waste was observed to be approximately 5 feet. The volume of waste 23 in the landfill, calculated based on observed depth and lateral extent, was approximately 24 500 cubic yards (cy). Waste volume calculations for SA 6 and the other six Devens 25 landfills can be found in Appendix B. Actual waste volumes may vary from those derived 26 in the calculations. The volumes are believed to be within the bounds of accuracy 27 acceptable for this preliminary engineering study. 28 29

Due to the apparent age of waste at the site, archaeologists were present during trench excavation to characterize and date the waste and to assess the cultural value of the site. Personnel from The Public Archaeology Laboratory, Inc. of Pawtucket, Rhode Island observed the excavations at SA 6 (Public Archaeology Laboratory, Inc., 1994). The archaeologists noted cultural materials at the site manufactured in the late 1700s to early

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1900s, with the majority of the material dating from the late 1800s to 1900. Waste was 1 identified as primarily household debris, potentially originating from more than one 2 household proximal to the site prior to the property's incorporation into Fort Devens. The 3 site was determined to be potentially valuable in researching the socioeconomic status and 4 refuse disposal behavior of 19th Century northern Lancaster residents. Additional studies 5 of the site prior to remedial or removal actions were recommended by the archaeologists. 6 Soil sampling was not conducted at SA 6 due to the age and type of waste observed, and 7 the lack of evidence of contamination. 8 9 ABB-ES personnel also characterized the site to determine whether the site would be 10 considered a wetland under state or federal jurisdiction. Vegetation, hydrology, and soil 11 type were examined within the basin-like depression in the western portion of SA 6. This 12 basin represents the lowest point of elevation at SA 6. While it is possible that during the 13 spring and early summer this basin may hold water, no federal or state jurisdictional 14 wetlands were identified at SA 6 15 16 17 2.2 AREA OF CONTAMINATION 9 (GROUP 5) 18 19 AOC 9, the North Post Landfill, is located on the North Post, west of the Fort Devens 20 wastewater treatment plant. It is known informally as the old "stump dump" or "wood 21 dump", or Landfill No. 5. The landfill is part of a larger area that is controlled by Fort 22 Devens Range Control and occasionally used for tactical training exercises. 23 24 The landfill was operated from the late 1950s until 1978, when access was uncontrolled. 25 It was used by the Army, National Guard, contractors, and off-post personnel (McMaster 26 et al., 1982; Biang et al., 1992). Materials reportedly disposed of at this location include 27 tree stumps, limbs, and the debris from about 100 demolished buildings. Automobiles, 28 automobile parts, and other debris (including asphalt, bedsprings, and 5-gallon cans) were 29 observed in a location above and adjacent to the north side of the landfill, on the lower 30 slope from the wastewater infiltration beds. 31 32 The landfill occupies a low area that originally contained a small pond (Jahns, 1953), and 33 the bluffs to the west have been used for gravel quarrying. The disposal of solid waste 34

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and placement of cover gravel have filled the depressions and raised the land surface 1 approximately 35 to 40 feet (ft) (McMaster et al., 1982). Because of the extent and 2 effectiveness of the partially vegetated cover, the area is generally not recognizable as a 3 former landfill. Soils are typical of kame, kame-plain, and ice-contact deposits consisting 4 of sand and pebble-to-cobble gravel. These soils are also visible in the bluff to the west of 5 the landfill. Immediately south of the landfill are post-glacial swamp and floodplain 6 deposits consisting of sand with variable gravel and silt content. 7 8 9 An SI was conducted by ABB-ES under contract with the USAEC (ABB-ES, 1996b). The purpose of the SI was to verify the presence or absence of environmental 10 contamination and to determine whether further investigation or remediation was 11 warranted. 12 13 A geophysical survey was conducted at the landfill to supplement information derived 14 from evaluation of aerial photographs and delineate the actual limits of the landfill. The 15 results of the survey assisted in the placement of test pits and groundwater monitoring 16 wells, and provided insight into the distribution of landfilled materials. Results of the 17 geophysical survey indicated that the landfill consists of five areas: a larger northern pod 18 containing the majority of landfilled materials, and four smaller southern pod adjacent to 19 the wetlands containing mostly near-surface debris (Figure 2-4). Cross sections depicting 20 subsurface information from test trenching are shown in Figures 2-5 and 2-6. 21 22 23 Nature and Extent of Contamination. Surface water and sediment samples were collected from the Nashua River and the swampy area south of the landfill. Results indicated that 24 coliform bacteria counts and concentrations of inorganics were elevated in surface water 25 samples. Polynuclear aromatic hydrocarbons (PAHs) were detected in sediment samples 26 from the Nashua River and the pond nearby. Concentrations of these analytes were 27 generally low, and no consistent distribution along the river was apparent. Total 28 petroleum hydrocarbon compounds (TPHC) were detected in sediment samples in a 29 similar sporadic distribution, but no significant correlation between PAHs and TPHC was 30 evident. TPHC and inorganics were elevated in sediment in the swampy area. 31 32 Soil borings for monitoring wells G5M-92-01X through G5M-92-03X were drilled just 33 outside the limits of the North Post Landfill (to avoid penetrating landfill materials), to 34

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approximately 10 ft below the water table. Two rounds of groundwater samples and 1 water table measurements, collected three months apart, were collected from the three 2 new monitoring wells and 16 existing monitoring wells. The 16 existing monitoring wells 3 were installed to evaluate the effectiveness of the wastewater treatment plant (SA 19). 4 Due to cross-contamination likely resulting from the pump used to purge the wells during 5 the second sampling round, a third round of groundwater samples was collected for 6 volatile organic compounds (VOCs) only. To evaluate the potential impact to 7 groundwater due to releases from the landfill, analytes detected in five selected wells 8 9 located radially around the landfill (WWTMW-07, WWTMW-08, G5M-92-01X, G5M-92-02X, and G5M-92-03B) were compared to the other 14 wells. The absence of 10 organic compounds in groundwater adjacent to and downgradient from the mapped 11 landfill suggests that the organic compounds detected in soil have not impacted 12 groundwater quality. Low counts of coliform bacteria were measured in landfill wells 13 G5M-92-01X and G5M-92-02X in Round 1 and WWTMW-08 in Round 2. In the five 14 selected landfill wells, concentrations of several inorganic analytes were elevated in up-, 15 down-, and cross-gradient wells. Elevated concentrations of these analytes correlated well 16 with elevated total suspended solids (TSS) concentrations. Filtered samples collected 17 during Round 2 exhibited significant reductions in the concentrations of inorganic analytes 18 such as arsenic, chromium, iron, lead, vanadium, and zinc. Other more soluble inorganic 19 analytes also showed concentration reductions, but not to the same magnitude. 20 21 To further characterize the nature of soils and landfilled materials, four test pits 22 (09E-92-01X through 09E-92-04X) were excavated in 1992 in areas where landfilled 23 material was identified during geophysical surveys. A cross section depicting subsurface 24 information from test pitting is shown in Figure 2-5. Test pitting within the suspected 25 landfill limits showed the landfilled contents consist of mixed refuse, including piping, 26 brick, charred wood, roof slate, bottles, carpet, and plastic, and silt and sand. Soil samples 27 were collected from apparent zones of contamination in each of the four test pits. In most 28 cases, the samples were collected from darkened or stained soil, presumably from burned 29 materials. A total of eight soil samples was collected. Significant semivolatile organic 30 compound (SVOC) concentrations (mostly PAHs) were detected in soil samples from test 31 pits 09E-92-01X and 09E-92-02X. SVOCs were, however, absent in soil collected from 32 test pits 09E-92-03X and 09E-92-04X. TPHC levels were detected in all test pits except 33 09E-92-04X, located just outside the southern limit of geophysical mapped landfill 34

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materials. The test pit log for 09E-92-04X indicated that the soil was relatively free of 1 landfill debris, suggesting that this pit is on the fringe of the landfill. Organic compounds 2 detected in soil samples collected from the landfill test pits are likely derived from the ash 3 and charred wood observed during sampling; absence of volatile petroleum compounds in 4 soil supports this contention. Absence of organic compounds in groundwater adjacent to 5 and downgradient from the landfill suggest that organic compounds detected in soil have 6 not impacted groundwater quality. Several inorganic analytes, including barium and zinc, 7 were detected in test pit soils above the calculated background concentrations for Fort 8 Devens soils. 9 10 Predesign activities at AOC 9 included excavation of four test trenches in 1994. Because 11 three test pits were excavated in the main portion of the landfill in 1992, this predesign 12 activity focused on verifying the extent of debris identified by a previous geophysical 13 survey and determining the composition of waste in the southernmost part of the landfill. 14 A cross section depicting subsurface information from test trenching is shown in 15 Figure 2-6. 16 17 Test trench 09E-94-05X was excavated across the gravel access road on the south end of 18 the landfill. A layer (1 to 4 ft in depth) of clean fill was exposed above a layer of 19 concentrated lumber, concrete, sheet metal, structural steel, pipes, asphalt pavement, and 20 insulation. The layer was observed to have been burned. The test trenches were 21 excavated no deeper than the water table, which was encountered approximately 6 ft bgs 22 in 09E-94-05X. The bottom of the debris layer is below the water table. 23 24 Test trench 09E-94-06X was excavated in the southernmost portion of the landfill. Sheet 25 metal, pipe, steel cable, bricks, a section of a brick chimney, and a 4 ft x 4 ft x 2 ft block of 26 formed concrete were primarily located in the top 1 foot of soil. This layer consists of 27 organic-rich sand and roots of alder, poplar, and birch trees. Natural soil, (gravelly sand 28 to silty fine sand) was observed below 1 foot. The water table is approximately 5 ft bgs at 29 this location. Material in test trench 09E-94-07X is similar to that observed in 30 09E-94-06X, but the fill layer is approximately 2.5-ft thick. The water table was 31 encountered at approximately 6 ft bgs at this location. 32 33

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Test trench 09E-94-08X intercepted a gravelly sand fill berm along the roadside. Beneath 1 and east of the berm, debris similar to that described in the other trenches was 2 encountered in a layer 2.5- to 5-ft thick. The water table was approximately 7 ft bgs at 3 this location. 4 5 SEA Consultants (SEA), under contract with MGLB, excavated 22 test pits at AOC 9 in 6 1996 (SEA, 1996). Waste depths observed in those explorations augmented information 7 from the 1992 and 1994 test excavations. The type of waste observed by SEA was 8 generally demolition debris (i.e., wood, concrete, asphalt, metal, brick, plastic, glass, and 9 10 stumps). The combined information was used to calculate debris volume at AOC 9, by multiplying the waste areas (from the geophysical survey) by the average depth of waste 11 (as interpreted from test trenches. The volume of waste is estimated at 112,000 cy (see 12 Appendix B). 13 14 A vegetated wetland area lies to the south of AOC 9. Although much of this wetland is 15 subject to both state and federal jurisdiction, a small region of wetlands in the eastern 16 portion of the site contains wetlands that are subject to state, but not federal, jurisdiction, 17 18 19 2.3 AREA OF CONTAMINATION 11 (GROUP 9) 20 21 The Lovell Road Debris Disposal Area (Landfill No. 7), also referred to as AOC 11, was 22 identified as a 2-acre landfill that received wood-frame hospital demolition debris from 23 1975 to 1980. The landfill is within a wetlands complex that runs along the western side 24 of the Nashua River. East of the landfill, a 40-ft-wide soil berm separates the landfill from 25 the Nashua River. Refuse, including large pieces of metal, wood, bricks, and other 26 construction debris is exposed at the ground surface throughout the site, except where an 27 access road has been constructed over the fill. The landfill area is vegetated and is 28 bordered on the north and south by wetlands. Site features are shown on Figure 2-7. 29 Cross sections depicting subsurface information from test trenches are shown in 30 Figures 2-8 and 2-9. 31 32 Nature and Extent of Contamination. Initial SI activities at AOC 11 were conducted in 33

³⁴ 1993 as part of the Main Post SI (Arthur D. Little, 1994). The SI consisted of geophysics

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to determine the extent of waste, sampling and analysis of soil in test pits excavated in the 1 landfill area, and sampling and analysis of surface water and sediment samples from the 2 Nashua River and wetlands areas adjacent to the landfill. Metal, wood, and plastic debris 3 was observed in the test pits. Test pit soils contained acrylonitrile, PAH compounds, 4 pesticides, and several inorganic analytes. Metals, SVOCs, pesticides, and TPHC were 5 detected in surface water and sediments in the wetlands. Contaminant concentrations in 6 wetland sediments were not significantly higher than concentrations in the Nashua River. 7 Most contaminant concentrations, with the exception of iron, in the river near AOC 11 8 were not significantly elevated in comparison with other sample locations upstream and 9 downstream of AOC 11. 10

11

12 Because contaminants were detected in soils, surface water, and sediment during the SI,

13 further investigation was recommended and an RI was conducted at AOC 11 from

14 September to December 1994 (Arthur D. Little, 1995). The RI field work included

excavation of additional test pits and sampling of subsurface soil, surface soil sampling,

ambient air sampling, surface water and sediment sampling, monitoring well installation,

and groundwater sampling. Piezometers and surface water gauges were also installed to
evaluate the hydraulic connection between wetlands, groundwater, and the Nashua River.

19

20 Test pits excavated during the RI indicated that debris was present over a 2.1-acre area, to

depths ranging from 2 to 13.5 ft. In test pits where the water table was encountered,

refuse extended an average of 2 ft below the water table (see Figures 2-8 and 2-9). The

volume of waste was estimated to be approximately 35,000 cy (see Appendix B). Refuse
observed in the test pits included wood, concrete, metal pipes, scrap metal, wire, tile, and

- 25 glass, intermixed with sand.
- 26

The RI analytical results indicated that surface and subsurface soils within the landfill area 27 contain pesticides, metals including cadmium, copper, and mercury, and PAHs. The 28 wetlands adjacent to AOC 11 contain pesticides, metals, PAHs, and polychlorinated 29 biphenyls (PCBs), where concentrations are similar to or lower than concentrations of 30 these contaminants in the reference wetland upstream of AOC 11. Surface water data did 31 not indicate that contaminants are migrating beyond the wetlands. Groundwater sample 32 results indicated that low levels of some metals are being transported from the landfill to 33 the Nashua River via groundwater flow. 34

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1 2 2.4 STUDY AREA 12 (GROUP 7) 3 4 The Range Control Landfill (Landfill No. 8), also referred to as SA 12, was used by the 5 Army beginning in 1960, was still in use in 1982, and appeared in 1988 to have been 6 inactive for several years (McMaster et al., 1982; Biang et al., 1992). The debris came 7 from construction and range operations. The landfill is about 0.5 acre in size, located on a 8 steep, wooded slope adjacent to the Nashua River floodplain and partially encroaching on 9 associated wetlands on the South Post of Fort Devens. The landfill is located across Dixie 10 Road from B and P Ranges. 11 12 The top of the slope is covered with dense brush. The north and south sides of the landfill 13 are bounded (and defined) by dense growth of large (60-ft high, 20-inch diameter) oak 14 trees. A wetland is located at the base of the slope on the east side. Site features are 15 shown on Figure 2-10. A representative cross section based on test trench data is shown 16 on Figure 2-11. 17 18 19 Nature and Extent of Contamination. Initial SI activities at SA 12 were conducted in August 1992 as part of the Group 7 field activities (ABB-ES, 1995d). The SI consisted of 20 sampling and analysis of groundwater from a monitoring well installed upgradient of the 21 landfill, sampling and analysis of four surface soil samples from the landfill cover material, 22 sampling and analysis of four groundwater and sediment sample pairs from shallow sumps 23 dug in the floodplain near the base of the landfill, and sampling and analysis of four surface 24 water and sediment sample pairs (two from the backwater lagoon and two from the 25 Nashua River). Samples collected from the cover soil contained low concentrations of 26 pesticide and PCB compounds, and several inorganic analytes were detected above Fort 27 Devens background values. Pesticides, PCBs, PAHs, TPHC, and several inorganics were 28 detected in sediments in the backwater area at the base of the slope. 29 30 Potential human health and ecological risks were identified during the SI based on the 31 concentrations of organic and inorganic analytes in surface water and sediment at SA 12 32 (ABB-ES, 1994a). In order to better identify the sources and the fate and transport 33 mechanisms for site contaminants, Supplemental SI field activities were implemented. The 34

Supplemental SI focused on sampling surface water and sediment in the backwater area 1 adjacent to SA 12 to further define contaminant distribution and to provide a partial basis 2 for distinguishing SA-derived contamination from Nashua River-derived contamination, 3 particularly in the SA 12 backwater. Reference backwater sampling locations were also 4 selected at upriver and downriver locations to determine if similar contaminant profiles 5 exist in the surface water and sediment of comparable floodplain environments remote 6 from SA 12 (i.e., to identify the contribution of Nashua River contamination in the SA 12 7 backwater). Results of this investigation concluded that similar contaminants were present 8 in the backwater areas upstream and downstream of SA 12, and a comparison of arsenic, 9 copper, and lead concentrations in sediment in the area immediately downgradient of the 10 landfill suggested that contamination in the backwater may have resulted from seasonal 11 flooding of the Nashua River rather than from the landfill. 12 13 Predesign activities at SA 12 included excavation of five test trenches to define the 14 western extent and depth of landfilled material and to determine the composition of the 15 waste. A representative cross section based on test trench data is shown in Figure 2-11. 16 Gravelly sand with debris such as lumber, sheet metal, concrete, and other construction 17 materials, was encountered in the top layer of each test trench. A 6- to 12-inch layer of 18 leaves, wood, and wood ash mixed with soil was observed beneath the top layer in test 19 trenches 12E-94-02X through 12E-94-04X. Beneath this layer, dense, silty sand was 20 observed. While some debris was observed in the silty sand layer in trench 12E-94-03X, 21 this layer is not believed to contain significant landfilled material. Samples were not 22 collected for chemical analysis. The volume of waste was estimated to be approximately 23 8,700 cy, based on the area and estimated average depth of 12 ft (see Appendix B). 24 25 Due to the past use of the site as the Range Control Landfill, unexploded ordnance (UXO) 26 clearance specialists were subcontracted to excavate and monitor the trenches. No live 27 ordnance or explosive materials were encountered. ABB-ES personnel also characterized 28 the site to determine the wetland limits under state or federal jurisdiction. 29 30 The topography at SA 12 is distinct and the wetland boundary abrupt. The borders of the 31 wetlands under federal and state regulations are not differentiated; therefore, a joint 32

- 33 state/federal wetland boundary line is delineated at this study area.
- 34

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1 2.5 STUDY AREA 13 (GROUP 2) 2 3 The Lake George Street Landfill (Landfill No. 9), also referred to as SA 13, was used 4 between 1965 and 1970 for disposal of construction debris, stumps, and brush (McMaster 5 et al., 1982; Biang et al., 1992). Landfill No. 9 was "reported to contain some oil 6 (unknown quantity)" (McMaster et al., 1982, Table 2.2-3). Debris appears to have been 7 dumped and pushed over the slope. The landfill is less than 1 acre in size and is located on 8 9 the west side of Lake George Street near Hattonsville Road on the Main Post. 10 Unauthorized dumping appears to have continued after the dump was closed. In 1989, the 11 Fort Devens Environmental Management Office observed and recommended the removal 12 of recently disposed stumps, branches, steel fencing, plumbing fixtures and pipes. The 13 landfill is currently closed to waste disposal. 14 15 SA 13 is surrounded by large trees (e.g., oak, red maple, ash, hickory), but no trees are 16 growing on the landfill itself. Tree stumps, limbs, and trunks have been deposited on the 17 18 surface of the landfill and down the steep lower slope. A wetland is located at the base of this slope. Site features are shown on Figure 2-12. Cross sections depicting subsurface 19 information learned from test trenches are shown on Figures 2-13 and 2-14. 20 21 Nature and Extent of Contamination. The initial SI activities were conducted in July 1992 22 as part of the Group 2 field activities (ABB-ES, 1995). The investigation at SA 13 was 23 designed to determine whether the waste material in the landfill, and past waste disposal 24 practices, were adversely impacting environmental media at this SA. The program 25 consisted of the collection of surface water and sediment samples, surface soil samples. 26 subsurface soil samples, and installation and sampling of an upgradient groundwater 27 monitoring well. Nitroglycerin, lead, and mercury were detected at elevated 28 concentrations in surface water samples, while TPHC, PAHs, pesticides, and inorganics 29 were detected at elevated concentrations in sediment. Pesticides, PCBs, PAHs, TPHC, 30 and several inorganics were detected in cover soils. Pesticides and inorganic analytes 31 were detected in subsurface soils. Elevated inorganic concentrations were detected in the 32 upgradient well and in groundwater collected from the downgradient sumps. 33 34

The SI concluded that a supplemental investigation was warranted at SA 13. A 1 Supplemental SI (ABB-ES, 1994a) was conducted to determine whether downgradient 2 groundwater and soil quality was being impacted by potential contaminants emanating 3 from the waste material. The results of the water samples collected from the sump during 4 the SI were deemed unrepresentative of shallow groundwater conditions. Therefore, two 5 shallow well points were installed in the wet area downgradient of the waste material and 6 samples of the shallow groundwater were collected and analyzed. In addition, one 7 subsurface soil sample from each of the well point borings was also collected and 8 submitted for laboratory analysis. Results of downgradient soil and groundwater sampling 9 did not indicate that the contaminants detected in the surface soil samples collected during 10 the SI have migrated to the soil at the base of the waste material or groundwater 11 downgradient of the site. 12 13 Predesign activities at this site included excavation of six test trenches to define the extent 14 and depth of landfilled material and to determine the composition of the waste. Cross 15 sections depicting subsurface information learned from test trenching are shown in 16 Figures 2-13 and 2-14. Trenches 13E-94-01X and 13E-94-02X were excavated on a 17 mound of soil originally thought to be part of the landfill. The soil encountered in these 18 trenches was loose, distinctly stratified sand and gravel typical of river or deltaic deposits. 19 There was no evidence of debris in either trench. Trenches 13E-94-03X through 20 13E-94-06X contained demolition debris, including lumber, asphalt, bricks, concrete, air 21 ducts, cable, angle iron, and sheet metal. The top 2 ft of test trench 13E-94-03X were 22 observed to consist of organic-rich gravelly sand fill containing limited debris. Below the 23 fill layer, a 2-ft layer of charred and burned lumber was observed, tapering off to the 24 northeast. Bouldery sand containing concentrated debris was observed beneath the 25 burned wood. Undisturbed soil was encountered approximately 8 ft bgs at the northeast 26 end of the trench, but the bottom of the landfill was not reached on the southwest side. 27 Test trenches 13E-94-04X and 13E-94-05X were excavated to define the west side of the 28 landfill. Trench 13E-94-04X exposed gravelly sand mixed and interlayered with lumber, 29 slabs of concrete, electric cable, sheet metal, and pipes. No evidence of burning was 30 apparent. The base of the debris unit contained concentrated roots, suggesting in-situ pre-31 landfill ground surface, now buried. On the west side of the landfill, outside the limit of 32 debris, yellow till, similar to the undisturbed soil encountered at the bottom of 33 13E-94-03X, was observed. The waste within trench 13E-94-05X was similar to 34

13E-94-04X, but included a layer of burned wood similar to that found in 13E-94-03X. 1 On the east side of trenches 13E-94-04X and 13E-94-05X, debris extended below the 2 bottom of the 10- to 12-ft deep trenches. Trench 13E-94-06X, on the east side of the 3 landfill, contained similar layers of fill and debris as 13E-94-03X and 13E-94-05X. The 4 bottom of the landfill was encountered from 4 to 10 ft bgs. A water tank was discovered 5 approximately 7 ft bgs in this trench, and was removed. Groundwater was not 6 encountered in the trenches 7 8 The water table was not encountered in test trenches at SA 13. Samples were not 9 collected for chemical analysis. The volume of waste was calculated electronically at 10 SA 13 by comparing pre-landfill and current topography. The volume was estimated at 11 10,000 cy (see Appendix B). 12 13 ABB-ES personnel also characterized the site to determine the wetland limits under state 14 or federal jurisdiction. A joint state/federal vegetated wetland lies north of an access road 15 adjacent to the SA 13 landfill. In most areas, a steep bank slopes down to the wetland 16 area. A small island of upland is located within the wetland. In addition, an intermittent 17 drainage ditch runs perpendicular to the wetland boundary; because no Bordering 18 Vegetated Wetland is associated with this intermittent stream, it is not considered a state 19 jurisdictional wetland. 20 21 22 2.6 AREA OF CONTAMINATION 40 (GROUP 1A) 23 24 Cold Spring Brook Landfill occupies approximately four acres along the edge of Patton 25 Road in the southeastern part of the Main Post. It extends for approximately 800 ft along 26 Patton Road and out into the former wetland along Cold Spring Brook, now mostly 27 submerged beneath Cold Spring Brook Pond (Figure 2-15). The upper surface of the 28 landfill slopes gently toward the north and east and varies in elevation from about 250 to 29 30 260 ft above sea level (ASL). 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 31 wetland or to the pond with an elevation drop that ranges between 10 and 20 ft. Based on 32

visual observations at the edge of the landfill, the bottom of debris is estimated by

ABB-ES to extend to approximately 237 ft ASL.

1 SEA excavated eight test pits at AOC 40 in 1996 (SEA, 1996). The types of wastes 2 observed by SEA were generally demolition debris and solid waste (i.e., wood, concrete, 3 asphalt, metal, brick, wire, ash, stumps, and logs). Debris volume is estimated at 4 110,000 cy (see Appendix B). Cross sections showing estimated debris disposal depths 5 are shown in Figures 2-16 and 2-17. 6 7 Aerial photographs showed that Patton Road formerly curved around the Cold Spring 8 Brook wetland before realignment during the mid-to-late 1960s (Detrick, 1991, 9 Figures 21, 22, and 23). Deposition of material at the landfill coincided with the 10 realignment of Patton Road and apparently began very close to the edge of Patton Road. 11 Based on terrain conductivity and magnetic survey data collected during the RI (E&E, 12 1993), Patton Road was interpreted to have been built on clean borrow material, and the 13 landfill interpreted to extend north from the road embankment. 14 15 The elevation of the landfill along its southern edge is essentially the same as that of 16 Patton Road. No roadside drainage ditch exists, and the existing surface of the landfill 17 slopes down to the north toward the pond and toward the east at a rate of approximately 18 2 percent. Remnants of the old roadbed are still visible between well CSB-3 and Patton 19 Road. South of the old roadbed is a flat area with little vegetation, that appears to have 20 been excavated for gravel and sand. Beyond the apparent excavation area, a low hill 21 covered with trees rises abruptly to about 350 ft ASL. Previous studies do not identify 22 landfilling in this area. 23 24 Cold Spring Brook Landfill, considered abandoned, was identified in November 1987 25 when 14 55-gallon drums were discovered along the edge of Cold Spring Brook Pond. 26 An identification number on the drums indicated that the original contents of several 27 drums had been antifreeze manufactured by Union Carbide and that the drums were 15 to 28 20 years old. Apparently, the drums had been painted yellow and reused. A response 29 team from a Union Carbide facility in New Hampshire examined the drums in March 1988, 30 identified seven Union Carbide drums, and sampled their contents. Analysis revealed the 31 presence of chlorinated solvents and some metals. Other wastes at the landfill included 32 concrete slabs, wire, storage tanks, rebar, timber, and debris. No landfill hot spots or 33

suspect hazardous waste disposal areas were identified during RI or Supplemental RI 1 activities. 2 3 The 3.5-acre Cold Spring Brook Pond was created between 1965 and 1972 by the raised 4 inlet of the Patton Road culvert, as shown in aerial photographs from that period. The 5 pond has a surface elevation of approximately 240 ft ASL, and depth that ranges from 6 1 foot or less at its western end to a maximum of approximately 6 ft near its eastern end. 7 8 Patton Well, a water supply well for Devens, is located south of Patton Road, about 9 600 feet west of the landfill. Patton Well is screened from 46 to 76 ft bgs and appears to 10 tap the same aquifer as that monitored by several landfill wells. Patton Well operates on 11 an on-demand basis at approximately 800 gallons per minute (gpm). An ammunition 12 storage facility lies west of the pond, and Cold Spring Brook originates as drainage from a 13 wetland in the center of this area. The brook drains north to Grove Pond, passing through 14 several palustrine forested or scrub/shrub wetlands before reaching the pond. 15 16 The U.S. Army Environmental Hygiene Agency (USAEHA) completed a hydrological 17 investigation of Cold Spring Brook Landfill in 1988. The investigation showed that the 18 landfill is located over glacial sand and gravel deposits in, or adjacent to, a former 19 wetland. U.S. Geological Survey (USGS) information indicates the area is underlain by 20 swampy deposits of muck and peat, with adjacent units of sand and gravel from kame 21 deposits. 22 23 Eight wetland vegetative cover types were identified in the vicinity of Cold Spring Brook 24 Landfill during the RI through the completion of New England Division Army Corps of 25 Engineers (USACE) Wetland Delineation Data Forms (E&E, 1993). Each wetland cover 26 type meets the three criteria (i.e., hydrophytic vegetation, hydric soils, and wetland 27 hydrology) necessary to be classified as jurisdictional wetland. Interpreted wetlands 28 delineation is shown on Figure 2-18. No 100-year flood plain is located in the vicinity of 29 Cold Spring Brook Landfill. 30 31 Nature and Extent of Contamination. Three samples were collected from landfill cover 32 materials during the RI in 1991 and analyzed for Target Compound List (TCL) organics 33

and Target Analyte List (TAL) metals. PAHs (up to 2.6 micrograms per gram [µg/g]),

and the pesticide residues 2,2-bis(para-chlorophenyl)-1,1-dichloroethane (DDD) (up to 1 0.10 µg/g) and 2,2-bis(para-chlorophenyl)-1,1,1-trichloroethane (DDT) (up to 0.23 µg/g), 2 were identified as cover soil contaminants. In addition, a number of inorganics were 3 reported above background concentrations and considered contaminants (E&E, 1993). 4 Cover soil was not sampled during the supplemental RI in 1992 (ABB-ES, 1993b). 5 6 Groundwater quality was characterized through two rounds of sampling at seven 7 monitoring wells during the RI, and two confirming rounds at 10 wells during the 8 supplemental RI. 9 10 The explosives 1,3,5-trinitrobenzene and 1,3-dinitrobenzene, detected in well CSB-1 at 11 7.94 micrograms per liter (μ g/L) and 2.86 μ g/L, respectively, were the only interpreted 12 organic contaminants in groundwater in the RI Report. Inorganics were interpreted as 13 contaminants in several wells, including upgradient/background wells (E&E, 1993). 14 15 Investigations during the Supplemental RI allowed refinement of the hydrogeologic model 16 for Cold Spring Brook Landfill and of the contamination assessment. The RI Addendum 17 Report concluded that monitoring wells CSB-3 and CSB-8 were upgradient of the landfill 18 and CSB-1, CSB-6, and CSB-7 were cross-gradient of the landfill. Wells CSM-92-02A 19 and CSM-92-02B, screened at and below the water table, respectively, were interpreted to 20 be slightly cross-gradient of groundwater flow at the western end of Cold Spring Brook 21 Landfill while monitoring wells CSB-2 and CSM-93-01A were interpreted as being 22 downgradient. Although located close to the upgradient edge of the landfill, the boring 23 log indicates that well CSB-8 is not constructed in landfill materials. Wells CSB-4 and 24 CSB-5 are located in a peat formation considered unrepresentative of a productive aquifer 25 and were not used during the contamination assessment. 26 27 Resurvey of Cold Spring Brook Landfill monitoring wells in March 1995 revealed several 28 errors in previous survey data that affected the previous interpretation of groundwater 29 flow. Specifically, the updated indicate that groundwater does not flow from Cold Spring 30 Brook Landfill toward Patton Well under non-pumping conditions, or during pumping 31 conditions of upto about 250,000 gallons per day. 32

33

The only Project Analyte List (PAL) organic detected in groundwater at Cold Spring 1 Brook Landfill during supplemental RI sampling was bis(2-ethylhexyl)phthalate (BEHP), 2 in the Round 1 sample from well CSM-93-02B at 14 µg/L. BEHP was undetected (i.e., 3 <4.5 μ g/L) in the three primary Round 2 samples, but was reported at 4.4 μ g/L in the 4 duplicate sample from well CSM-93-02B. The explosives 1,3,5-trinitrobenzene and 5 1,3-dinitrobenzene were not detected during Supplemental RI sampling. 6 7 Based on the distribution pattern for inorganics in unfiltered samples and comparison of 8 data from filtered and unfiltered samples, the RI Addendum Report concluded that Cold 9 Spring Brook Landfill is not a source of inorganic groundwater contamination. 10 11 12 The characterization of Cold Spring Brook Pond was accomplished during both the RI and Supplemental RI. The RI Report concluded that pond sediments were contaminated 13 with the inorganics arsenic, lead, manganese, mercury, and zinc. Organic contaminants 14 included PAHs (total concentration of 13 PAHs up to 79.6 $\mu g/g$), DDD (up to 1.29 $\mu g/g$), 15 and 2,2-bis(para-chlorophenyl)-1,1-dichloroethene (DDE) (up to 0.202 µg/g) (E&E, 16 17 1993). 18 The RI Addendum Report concluded that pond sediments were contaminated with several 19 PAHs, inorganics, and the pesticides DDD, DDE, and DDT. PAHs were detected most 20 frequently and at the highest concentrations near the pond outlet. A second area of PAH 21 contamination was also identified at the small cove near CSD-92-09X. Low 22 concentrations of the pesticides DDD, DDE, and DDT were detected throughout the 23 pond. The RI Addendum Report concluded that pond sediments are contaminated with 24 arsenic, manganese, barium, iron, chromium, nickel, zinc, lead, and copper. The Final 25 Feasibility Study Report (ABB-ES, 1994b) identified areas (Areas I and II on 26 Figure 2-15), where sediment would be removed during remedial action. 27 28 29 2.7 AREA OF CONTAMINATION 41 (GROUP 1B) 30 31 Unauthorized Dumping Area (Site A) (AOC 41) is located on the South Post, 32 approximately 0.5 mile west of the Still River Gate, on the north shore of New Cranberry 33 Pond. This 0.14-acre dump was discovered by Fort Devens personnel. No record of its 34

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origin or use is known to exist, but it was observed that "...it appears that the site was 1 used up to the 1950s for disposal of nonexplosive military and household debris" (Biang et 2 3 al., 1992). 4 Most of the visible debris at the time of the SI consisted of rusted "cone-top" beer cans 5 (e.g., Harvard Ale, Boston Post Beer). Cone-top beer cans were manufactured between 6 1935 and the mid-1950s. Rusted vehicle fenders appeared by their shape to date 7 approximately from the 1910s or 1920s. No military debris was observed during the SI 8 9 (ABB-ES, 1995d). 10 The site is overgrown with trees and brush. Wetlands delineation, documented in 11 Appendix C, was performed by ABB-ES in June 1995. Site features are shown on 12 Figure 2-19. Cross sections depicting subsurface information from test excavations are 13 shown on Figures 2-20 and 2-21. 14 15 Nature and Extent of Contamination. The initial SI field activities were conducted by 16 ABB-ES in September 1992 as part of the Group 7 field activities. The objective of the SI 17 was to investigate the presence or absence of environmental contaminants in the different 18 environmental media found at the site, and to assess the vertical and horizontal distribution 19 of the contaminants. Samples of soil and groundwater were collected to characterize local 20 impacts from the dump. Surface water and sediment samples were collected for 21 laboratory analysis to assess potential downgradient impacts from the dump. TPHC, 22 PAHs, pesticides, and inorganic analytes were detected in surface soil samples collected 23 from the landfill. VOCs and inorganics were detected in groundwater samples. 24 Significant contamination was not detected in surface water, however, pesticide 25 compounds and inorganic analytes were detected in sediment samples. 26 27 The Supplemental SI was conducted to assess other potential sources of the groundwater 28 contamination detected during the SI, further define the hydrogeologic conditions, and 29 further investigate the potential for contaminant migration from the landfill waste material 30 to New Cranberry Pond. A surficial geophysical survey was conducted in the area directly 31 north of the debris disposal area to locate a source area of the chlorinated solvent 32 contaminants, detected in groundwater during the SI. Based on the results of the surveys, 33

1 no magnetic or ferrous metal anomalies were detected. These results indicate that there did not appear to be a source area directly north of the waste material. 2 3 Three sediment samples were collected from the wet area at the base of the waste 4 material. No surface water samples were collected from these sampling points due to 5 insufficient surface water volumes at the time of sampling. Two surface water and 6 sediment pairs were collected from the northern side of New Cranberry Pond. The surface 7 water samples did not contain elevated levels of contaminants. Notable concentrations of 8 PAHs and lead were detected in sediment samples. 9 10 Groundwater samples were collected from the five newly installed monitoring wells and 11 the existing monitoring well in October 1993 and January 1994. VOCs and inorganics 12 were detected in these wells. Because the source of the VOCs in groundwater had not 13 been identified, an RI was conducted at AOC 41 (ABB-ES, 1996c). 14 15 The RI program for AOC 41 consisted of geophysical surveys, surficial and down-hole 16 UXO clearance, soil borings, test pits, subsurface soil sampling, monitoring well 17 installation and sampling, aquifer conductivity testing, and a survey of explorations to 18 attempt to locate the source and extent of groundwater contamination at the site. Because 19 groundwater contamination is being addressed as a separate operable unit at AOC 41, only 20 the test pit results from the RI program are discussed in the following paragraphs. 21 22 A total of nine test pits (41E-94-01X through 41E-94-09X) was excavated in and around 23 the landfill waste material, geophysical anomalies, and monitoring wells 41M-93-03X and 24 41M-94-03B. Up to three soil samples were collected from each test pit. Test pits 25 excavated within the landfill area (41E-94-01X through 41E-94-03X) indicated that debris 26 is primarily surficial. Cross sections depicting subsurface information from test pitting are 27 shown in Figures 2-20 and 2-21. Waste material observed in the test pits included 28 cone-top beer cans, glass bottles, and other scattered metal debris (e.g., car parts, water 29 cans). The glass appeared deformed, indicative of burning. Topsoil was observed in the 30 top 1 foot. A sand layer underlain by clay, was encountered from 1 to 7 ft bgs. 31 Groundwater was encountered in one test pit at a depth of approximately 10.5 ft bgs. 32 Groundwater has been observed at 13 ft bgs at the top of the slope and at 4 to 5 ft bgs at 33 the base of the landfill. 34

1

Analytical results from the soil samples collected from these test pits indicated that no 2 SVOCs or TPHC were present in these samples. Trichlorofluoromethane was detected 3 consistently at low concentrations, but is not believed to be a site-related contaminant. It 4 was determined that the source of groundwater contamination detected at AOC 41 was 5 not the landfill. A ROD for AOC 41 groundwater (Horne, 1996_) describes the selected 6 remedy (i.e., no formal remedial action). Long-term groundwater monitoring will be 7 conducted as part of the "no action" decision. To facilitate inclusion of AOC 41 into the 8 multi-site ROD, it was transferred to Group 1B from Group 7 prior to ROD preparation. 9 10 The inorganic results indicated that several inorganic analytes were detected above the 11

calculated Fort Devens background concentrations. Results of Toxicity Characteristic
 Leaching Procedure (TCLP) testing indicated that detected concentrations of arsenic and
 barium in the TCLP extract were below regulatory levels. These results suggest that the
 waste and underlying soil at AOC 41 are not likely to be classified as hazardous. The
 volume of waste is estimated to be 1,500 cy (see Appendix B).

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1	3.0 RISK ASSESSMENT SUMMARIES
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3	
4	This section presents the potential human health and ecological risks for each of the seven debris areas. The information for each debris area was summarized from previous SI
5	Supplemental SL RL and FS reports as referenced. Table 3-1 presents an interpretation of
7	information contained in this section. It includes the risk evaluation approach for each
8	area of contamination and the status of anticipated human health and ecological risks for
9	each medium.
10	
11	
12	3.1 SUMMARY OF HUMAN HEALTH RISK ASSESSMENTS
13	
14	The following subsections summarize the human health risk evaluation/assessment results
15	for the debris areas.
16	
17	3.1.1 Study Area 6
18	
19	Previous investigations at SA 6 consisted of only predesign activities. A PRE or risk
20	Assessment was not performed, because SI of KI activities indicate that SA 6 contains only
21	household debris primarily metal and glass dating from the late 1700s to the early 1900s
22	Military-type waste was not observed. Human health risk evaluations were not performed
24	for SA 6 ⁻ however due to the relatively small volume and nature of the observed waste at
25	this site, risks to potential human receptors at SA 6 are expected to be minimal.
26	
27	3.1.2 Area of Contamination 9
28	
29	The human health PRE presented in the SI Report for AOC 9 (ABB-ES, 1996b) evaluated
30	potential human health risks associated with exposure to site contaminants in surface soil,
31	subsurface soil, groundwater, surface water, and sediment.
32	

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Citing no evidence or reason to conclude that AOC 9 landfill contents are causing 1 significant environmental contamination or threat to human health and the environment, a 2 No Further Action Decision under CERCLA document (ABB-ES, 1993a) was submitted 3 by the Army to USEPA, Region I. USEPA did not concur with the decision to remove 4 AOC 9 from the CERCLA process, stating that levels of certain organic and inorganic 5 analytes in groundwater were detected above Maximum Contaminant Levels (MCLs), and 6 appear to be outside USEPA's acceptable target risk range for unrestricted future use. As 7 a result, AOC 9 was added by the Army to the group of landfills being considered for 8 9 remediation in this FS report. 10 Surface Soil. Three inorganic compounds (i.e., copper, lead, and nickel) were detected in 11 surface soil at concentrations above base-wide background levels; however, 12 concentrations were well below USEPA Region III residential soil concentrations. 13 Although arsenic was detected at a concentration above the USEPA Region III residential 14 soil concentration, it did not exceed the base-wide statistical background concentration. 15 16 Subsurface Soil. Organic compounds detected in AOC 9 subsurface soil consisted 17 mostly of PAHs. Of the sixteen detected PAHs, the maximum detected concentrations of 18 six exceeded the USEPA Region III commercial/industrial soil concentrations. 19 20 Although several inorganic compounds were detected in AOC 9 subsurface soil at 21 concentrations above base-wide statistical background concentrations, only two 22 compounds (i.e., arsenic and beryllium) were present at concentrations above the USEPA 23 Region III commercial/industrial soil concentrations. In the case of arsenic, the maximum 24 detected concentration was equal to the base-wide statistical background concentration. 25 Although the maximum beryllium concentration exceeded the USEPA Region III 26 commercial/industrial concentration, the exceedance was slight. 27 28 Groundwater. Two organic analytes, chloroform and TPHC, were detected in AOC 9 29 monitoring wells. Chloroform was detected once in Round 1 at a concentration below the 30 Massachusetts drinking water guideline for chloroform. TPHC was detected in three out 31 of ten samples, once in Round 1 and twice in Round 2. No federal drinking water 32

33 standard or guideline exists for TPHC, so concentrations were compared to proposed

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Massachusetts Contingency Plan (MCP) GW-1 guidance values. The detected 1 concentrations were only slightly greater than the proposed guidance value. All 2 concentrations of TPHC were detected in locations outside and upgradient of the landfill 3 boundary. 4 5 Inorganic analytes were detected above background in virtually all groundwater samples 6 collected from up-, down-, and cross-gradient AOC 9 monitoring wells. The maximum 7 detected concentrations of eight of the 18 inorganic analytes exceeded their respective 8 drinking water standard or guideline. The eight analytes were aluminum, arsenic, 9 chromium, cobalt, iron, lead, manganese, and nickel. 10 11 Filtered samples collected during Round 2 showed significant reductions in the 12 concentrations of these analytes. Therefore, elevated concentrations of inorganics were 13 believed to be the result of suspended materials in the unfiltered groundwater samples. 14 For chromium, lead, and nickel, the concentrations of four out of four filtered samples 15 were below the respective drinking water standard or guideline. For aluminum, arsenic, 16 and iron, the concentrations of three out of four filtered samples were below drinking 17 water standards or guidelines. Cobalt was not detected above the detection limit in four 18 out of four filtered samples. For manganese, the concentrations of two out of four filtered 19 samples were below the USEPA secondary MCL for manganese. 20 21 Surface Water. Of the eight analytes detected in the surface water in this area, only two 22 (i.e., BEHP and iron) were detected at concentrations above their respective drinking 23 water standards and guidelines. BEHP was detected in one of three samples at a 24 concentration only slightly above the USEPA Region III tap water concentration. Iron 25 was detected in three of three samples at concentrations above the USEPA secondary 26 MCL for iron. The magnitude and frequency of exposure to surface water in this area 27 would be expected to be much less than that upon which the drinking water guidelines are 28 based. The use of drinking water guidelines for comparison to surface water 29 concentrations is a conservative approach and was used due to a lack of available health-30 based guidelines for exposure to surface water. 31 32 Sediment. Of 13 analytes detected in sediments, arsenic is the only one that has 33 concentrations exceeding USEPA Region III residential soil concentrations. The USEPA 34

35 Region III residential soil concentration is designed to be protective for exposures that

could occur 350 days per year for a residential lifetime of 30 years. Arsenic, therefore, is 1 not expected to pose a significant human health risk in the sampled swampy area, because 2 exposure to sediment in this area would be much less than that expected in a residential 3 setting. 4 5 6 3.1.3 Area of Contamination 11 7 The baseline human health risk assessment (RA) presented in the Draft RI Report for 8 AOC 11 (Arthur D. Little, Inc. [ADL], 1995) evaluated potential human health risks 9 associated with exposure to site contaminants in surface soil, surface water and sediment. 10 Although uncertainties are associated with the risk assessment, conservative exposure 11 parameters and model inputs were selected for calculation of risk, resulting in conservative 12 estimates of potential site-related risks. 13 14 Surface Soils. Risks were calculated for recreational exposures to adults and children 15 including incidental ingestion and dermal contact. Cancer risks related to incidental 16 ingestion for the average and maximum exposure scenarios are all equal or below 1x10⁻⁶. 17 No individual contaminants of concern (COCs) contribute greater than 1x10⁻⁶ to the 18 incremental cancer risk from incidental ingestion. For potential dermal exposures, no 19 cancer risks were calculated due to a lack of recommended absorption values or published 20 toxicity values for the COCs. 21 22 The noncancer hazard index (HI) for all scenarios is less than 1. The results show that no 23 adverse, noncancer, health effects are likely to occur from exposure to these surface soils. 24 25 Surface Water. Risks associated with Nashua River surface water were calculated based 26 on adult and child swimming scenarios (i.e., incidental ingestion and dermal contact). 27 Risks associated with surface water in the Northern and Southern Wetlands were based on 28 adult and child wading scenarios (i.e., dermal contact). Carcinogenic risks for incidental 29 ingestion of Nashua River surface water were below the USEPA's guidance range of 30 1x10⁻⁶ to 1x10⁻⁴. Noncancer risks for incidental ingestion of Nashua River surface water 31

- ³² were also below guidance values.
- 33

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Total cancer risks associated with dermal contact with Nashua River surface water are 1 2 below the USEPA guidance for average concentrations, and within the guidance range for maximum concentrations. Only BEHP has an individual cancer risk that exceeds the 3 lower value of the range. Cancer risks are also within the USEPA risk range for dermal 4 contact with surface waters from the Northern and Southern Wetland. In the Northern 5 Wetland, the risk is primarily due to concentrations of DDD, DDT, and arsenic. In the 6 Southern Wetland, DDD and DDT are the primary contributors to risk. 7 8 Noncancer risks associated with dermal contact of surface water in all three locations are 9 less than the USEPA guidance value of 1. This indicates that noncancer health effects are 10 unlikely to occur as a result of this exposure level. 11 12 Sediment. Risks associated with sediment from the three locations were calculated based 13 on adult and child dermal contact scenarios. Estimated cancer risks for dermal contact 14 with sediment in the Nashua River were equal to the low limit of the guidance range, and 15 no individual COC exceeded this range. The cancer risk was associated with potential 16 exposure to Aroclor 1016, Aroclor 1254, and Aroclor 1260. Because inorganic COCs do 17 not have recommended dermal absorption values or published toxicity values, estimated 18 cancer risks for Northern and Southern Wetland sediments were not calculated. 19 20 Noncancer HIs do not exceed 1 for dermal contact with sediment in the Nashua River, 21 Northern Wetland, or Southern Wetland, indicating that noncancer health effects are 22 unlikely to occur when individuals contact these sediments. 23 24 3.1.4 Study Area 12 25 26 The human health PRE presented in the Revised Final SI Report for SA 12 (ABB-ES, 27 1995d) evaluated potential human health risks associated with exposure to site 28 contaminants in surface soil, groundwater, and sediment. The Final SI Report for SA 12 29 (ABB-ES, 1993a) evaluated potential human health risks associated with surface water. 30 The future use of SA 12 was assumed to be residential for purposes of the PRE. 31 32 Surface Soil. Surface soils at SA 12 were collected from stained surficial soils and 33 shallow soil depths. The levels of detected organic analytes in the surface soil were below 34

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the USEPA Region III residential soil concentrations, with the exception of Aroclor 1254. 1 However, Aroclor 1254 was detected in only one of the nine samples collected. 2 3 Of the eight inorganic analytes detected above the base-wide statistical background 4 concentrations, two analytes (i.e., beryllium and lead) were detected at concentrations 5 above their respective health-based soil guideline. Lead was detected at concentrations 6 exceeding the USEPA Superfund lead cleanup level; however, this exceedance occurred in 7 only one sampling location. Beryllium concentrations exceeded USEPA Region III 8 residential soil concentrations in three of nine samples. One additional inorganic analyte 9 (i.e., arsenic) was detected at concentrations above the USEPA Region III residential soil 10 concentrations. However, the maximum arsenic concentration did not exceed the base-11 wide statistical background concentration. Based on this screening-level analysis, it 12 appeared that beryllium and lead may pose a potential risk to human health at the reported 13 sampling locations, the area of stained surficial soils. 14 15 Groundwater. Unfiltered groundwater samples from four downgradient sump locations 16 were used to assess the impact of the landfill on groundwater. Of the two organic 17 compounds (i.e., BEHP and chloroform) detected in groundwater associated with SA 12, 18 only BEHP concentrations exceeded a drinking water standard. BEHP was detected in 19 one of six samples at a concentration only slightly above the USEPA Region III tap water 20 concentration, and therefore was not believed to pose a significant human health risk. 21 22 When comparing inorganic concentrations to the base-wide statistical background 23 concentrations, significant exceedances included: aluminum, arsenic, chromium, copper, 24 iron, lead, manganese, mercury, and zinc. Seven inorganic analytes were detected at 25 concentrations above their drinking water standard/guideline. Aluminum, iron, and 26 manganese were detected in six of six samples collected and each average concentration 27 exceeded its respective USEPA secondary MCL. Beryllium, antimony, and cadmium 28 were detected in one of six samples and the detected concentration of each contaminant 29 exceeded its respective drinking water standard/guideline. In addition, the maximum and 30 average concentrations of lead exceeded the USEPA lead action level. 31 32

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A filtered sample was collected during Round 2 sampling. A comparison of the filtered 1 and unfiltered samples indicated that high TSS levels may have been responsible for the 2 high levels of some inorganic analytes, such as aluminum, calcium, iron, potassium, 3 4 magnesium, and manganese. Based on the screening-level analysis, it appeared that lead and possibly beryllium, antimony, and cadmium, may have posed a potential risk to human 5 health at the reported sampling locations. 6 7 Surface Water. One organic compound, BEHP, was detected below its USEPA 8 9 Region III tap water concentration in surface waters associated with SA 12. Five inorganic analytes were detected in surface waters at concentrations that exceeded their 10 respective drinking water standard/guideline. The maximum concentration of lead was 11 three times the USEPA lead action level and the average concentration slightly exceeded 12 the action level. Aluminum, iron, and manganese were detected in all samples collected 13 and each exceeded its respective USEPA secondary MCL. The maximum concentration 14 of arsenic exceeded the Massachusetts drinking water guideline; however, the average 15 concentration in the four surface water samples did not. 16 17 The use of drinking water guidelines for comparison to surface water concentrations in a 18 wetland or river is a conservative approach used due to a lack of available health-based 19 guidelines for surface water exposure. Because exposure to surface waters in the future is 20 anticipated to be restricted to wading, it is not likely that an individual would encounter 21 inorganic concentrations that would pose a public health threat. 22 23 Sediment. Several organic analytes were detected in sediment samples, including: 24 pesticide residues, PAHs, PCBs, acetone, and BEHP. Acetone and BEHP are common 25 laboratory contaminants and were not considered to be SA-related contaminants. The 26 levels of all PAHs detected in the sediment were below the MCP S-2/GW-1 soil standards 27 and the USEPA Region III residential soil concentrations. Detected concentrations of 28 DDT and its breakdown products were also below Region III residential soil 29 concentrations. 30 31 Aroclor 1248 and Aroclor 1260 were the detected PCBs. The maximum detected 32 concentrations of Aroclor 1248 and Aroclor 1260 exceeded the Region III residential soil 33 concentration for PCBs. 34

35

Of the inorganic analytes detected in the sediment, antimony, arsenic, cadmium, and lead exceed their respective USEPA Region III residential soil concentration. However, these compounds are not expected to pose a significant health risk in the sampled areas because exposure to sediment in these areas would be much less than that expected in a residential setting.

7 3.1.5 Study Area 13

9 The human health PRE presented in the SI Report for SA 13 (ABB-ES, 1995d) evaluated 10 potential human health risks associated with exposure to site contaminants in surface soil, 11 groundwater, surface water, and sediment. The landfill is not currently in use, however, 12 the future use of SA 13 was assumed to be residential for purposes of the PRE.

13

8

¹⁴ Surface Soil. The levels of detected organic analytes in surface soil are below the

15 USEPA Region III residential soil concentrations, with the exception of four PAHs.

16 These four PAHs only slightly exceed their respective USEPA Region III residential soil

17 concentrations and each was detected in only one of four samples collected.

18 19

Of the 13 inorganic analytes detected above the base-wide statistical background

20 concentrations, two were detected at concentrations above their respective health-based

soil guideline; arsenic and beryllium. Only the maximum detected concentration of arsenic

exceeds the base-wide background concentration. The maximum and average

23 concentrations of beryllium are above the USEPA Region III residential soil

24 concentration. Elevated concentrations of inorganics were identified primarily in the

- visually contaminated soil directly on top of the landfill.
- 26

Groundwater. A comparison of unfiltered groundwater concentrations to the Devens
 background indicated that the maximum detected concentration of every analyte exceeded
 background concentrations. Four of these detections were at concentrations above their
 respective drinking water standard or guideline. Aluminum, manganese, and iron had

average concentrations that exceeded their respective USEPA secondary MCL. The

maximum detected concentration of lead exceeded the lead action level; however, the

³³ average concentration did not exceed the action level.

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The filtered samples, in general, showed significantly lower concentrations than the 2 unfiltered samples. In the four filtered samples, the concentrations of aluminum, lead, and 3 iron were below detection limits, and the concentration of manganese dropped below the 4 secondary MCL. Based on the filtered sample data, the high inorganic concentrations 5 detected in the unfiltered groundwater samples appear to have been associated with 6 suspended solids in the samples, not landfill contamination. Therefore, groundwater at 7 SA 13 was not believed to pose a risk to human health. 8 9 Surface Water. Two organic compounds were detected in the surface waters associated 10 with SA 13, BEHP and nitroglycerine. BEHP is a common laboratory contaminant and 11 was not considered to be a SA-related contaminant. Nitroglycerine was detected in one of 12 four samples at a concentration that exceeded the USEPA Lifetime Health Advisory. 13 14 The concentrations of four inorganic analytes that were detected in the surface water 15 exceed their respective drinking water standard/guideline. Aluminum, iron, and 16 manganese were detected in all samples collected and each exceeded their respective 17 USEPA secondary MCL. Only the maximum concentration of lead exceeded the USEPA 18 action level. 19 20 The use of drinking water guidelines for comparison to surface water concentrations is a 21 conservative approach and is used due to a lack of available health-based guidelines for 22 exposure to surface water. The magnitude and frequency of exposure to surface water 23 associated with SA 13 would be expected to be much less than that upon which drinking 24 water guidelines are based. Because exposure to surface waters in the wetlands is 25 anticipated to be restricted to wading in the future, it is not likely that an individual would 26 encounter concentrations that would pose a threat to the individual's health. 27 28 Sediment. Several organic contaminants were detected in sediment samples collected 29 from the wetland area southwest of SA 13; however, the levels of all detected organics are 30 below the USEPA Region III residential soil concentrations. Of the inorganic analytes 31 detected in sediment, only arsenic and beryllium exceed their respective USEPA 32 Region III residential soil concentration. The concentrations of arsenic and beryllium 33 detected in sediment are not expected to pose a significant health risk in the sampled area 34

³⁵ because exposure to sediment in this area would be much less than that expected in a

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residential setting. The use of residential soil concentrations for comparison to sediment
 concentrations is a conservative approach used due to a lack of available health-based
 guidelines.

4

6

3.1.6 Area of Contamination 40

A Supplemental Risk Assessment was performed for Cold Spring Brook Landfill and
 presented in the Final RI Addendum Report (ABB-ES, 1993b) to evaluate potential
 human health risk associated with exposure to site contaminants in surface soil and
 groundwater, and sediment.

11

Fish Sampling Program. Fish tissue analyses obtained through the October 1992 fish sampling program provided measured chemical of potential concern (CPC) concentrations in fish. The health risks faced by a recreational fisherman or family member who consumes fish from Cold Spring Brook Pond fell within the USEPA target risk range. The maximum detected concentrations of mercury, DDE, and DDD in the fish at Cold Spring Brook Pond were also below their respective U.S. Food and Drug Administration action levels.

19

Surface Soil. The health risks associated with contact with surface soil at Cold Spring Brook Landfill are below the USEPA cancer risk guidance value of 1×10^{-6} and target HI of 1. Under current land use conditions, an adult and child are assumed to be exposed to soil by dermal contact and incidental ingestion five days per year for 30 and 5 years, respectively. The health risks associated with surface soil exposure under future assumed residential conditions (350 days/year) are within the USEPA carcinogenic guidance range of 1×10^{-6} to 1×10^{-4} , and below the noncancer HI of 1.

27

Groundwater. Based on the groundwater sampling data from the March and June 1993
 sampling rounds, cancer risks associated with future residential use of the unfiltered
 groundwater exceeded the USEPA points of departure and USEPA target risk range.
 Arsenic accounted for approximately 99 percent of the total risk. The cancer slope factor
 for inorganic arsenic is thought by many to overestimate the true cancer risk by as much as
 an order of magnitude relative to risk estimates associated with most other carcinogens.

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departure. The hazard quotients (HQs) for manganese ranged from 16 to 37. BEHP 2 presented cancer risks slightly above the point of departure (at 6.5×10^{-6}). 3 4 Although these risks are above USEPA guidance values, they were estimated based on 5 residential exposure to groundwater under future land use conditions. Because there is no 6 residential groundwater exposure under current land use conditions there is no associated 7 carcinogenic risk. In addition, the noncancer risks associated with manganese in drinking 8 water may be overestimated due to the uncertainty and limitations of the one 9 epidemiological study upon which the reference dose (RfD) for manganese is based. 10 11 In comparing the March and June 1993 sampling results to drinking water standards, the 12 maximum detected concentrations from the March and June 1993 sampling rounds of 13 aluminum, iron, and manganese exceeded their Secondary MCLs. The federal and state 14 guidelines for sodium in drinking water were also exceeded. The primary MCL for BEHP 15 of 6 μ g/L was exceeded only by its maximum detected concentration of 14 μ g/L; the 16 average concentration of 4 μ g/L was below the MCL. 17 18 Surface Water. During the RI, risks were calculated based on the scenario of incidental 19 ingestion of surface water while fishing in Cold Spring Brook Pond. This exposure route 20 did not present health risks above the Superfund points of departure. Although not 21 evaluated as a potential exposure pathway in the risk assessment, the health risks from 22 contact with the pond surface water while swimming were expected to be low. A 23 comparison of the average and maximum concentrations of analytes in surface water to 24

Two additional analytes, BEHP and manganese, presented risks above the points of

drinking water standards and guidelines showed the detected concentrations of all

compounds except iron and manganese to be below standards. Because iron has a
 relatively low toxicity for humans, and the average concentration of manganese is below

its Maximum Contaminant Level Goal, health risks are expected to be low.

29

1

Sediment. In the Supplemental Risk Assessment, direct contact with sediment presented cancer risks within the USEPA target risk range of 1×10^{-6} to 1×10^{-4} for both current and future land use conditions.

33

The health risks from lead in Cold Spring Brook Pond sediment could not be estimated

quantitatively; however, the concentrations of lead in sediment were evaluated using the

USEPA interim soil cleanup level for lead in residential settings of $500 \mu g/g$. Although the maximum detected concentration of lead in Cold Spring Brook Pond sediment was above the soil lead cleanup level, the average concentration was below the soil lead cleanup level. Exposure to lead in sediment was also predicted to be much less than in a residential setting. Therefore, lead in sediment was not predicted to pose a significant health risk.

78

3.1.7 Area of Contamination 41

9

The human health PRE presented in the SI Report for AOC 41 (ABB-ES, 1995d) 10 evaluated potential human health risks associated with exposure to site contaminants in 11 surface soil, groundwater, surface water, and sediment. Subsequent to the SI and 12 Supplemental SI, investigation of groundwater contamination at AOC 41 was conducted 13 under a separate operable unit from that of the other media. The recently completed RI 14 for AOC 41 (ABB-ES, 1996c) focused on the groundwater operable unit only; however, 15 test pits were completed in the waste material to determine whether the waste is a source 16 of groundwater contamination at this AOC. Data from collected soil samples indicated 17 that the waste material is not the source of groundwater contamination. Because 18 groundwater contamination is being addressed as a separate operable unit and is not 19 related to debris at this AOC, only the potential human health risks associated with 20 exposure to site contaminants in surface soil, surface water, and sediment are summarized 21 in this subsection. For purposes of the PRE, it was assumed that future use of AOC 41 22 would be residential. It is highly unlikely that private residences would be built near 23 AOC 41. 24 25 Surface Soil. Surface soil samples at AOC 41 were collected from areas of stained soils 26

and from shallow soil depths. The levels of detected organic analytes in surface soil were
 below the USEPA Region III residential soil concentrations, with the exception of four
 PAHs. Only the maximum detected concentrations of the four PAHs exceeded the
 USEPA Region III residential soil concentrations, and the exceedances were generally
 slight.

31 32

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An assessment of the inorganic data for AOC 41 surface soils showed elevated inorganic 1 contamination in the visually stained soils directly on top of the waste material. Shallow 2 soil samples showed few exceedances. Of the 12 inorganic analytes detected above the 3 base-wide statistical background concentrations, two were detected at concentrations 4 above their respective health-based soil guideline. Beryllium was detected above the 5 USEPA Region III residential soil concentration, and lead exceeded the USEPA 6 Superfund lead cleanup level at two of 10 sampling locations. One additional inorganic 7 analyte, arsenic, was detected at concentrations above the USEPA Region III residential 8 soil concentration; however, the maximum arsenic concentration did not exceed the base-9 wide statistical background concentration. 10 11 During the Supplemental SI, three surface soil samples were collected from the low area 12 at the base of the waste material. Several PAHs, acetone, di-n-butylphthalate, and 13 Aroclor 1260 were detected in the samples. Five of the PAHs, each detected in only one 14 of four samples, exceeded either the USEPA Region III residential soil concentrations 15 and/or the MCP S-2/GW-1 soil standard. Aroclor 1260 was detected in all four samples 16 at concentrations above the residential soil concentration but below the MCP S-2/GS-1 17 soil standard. Arsenic was the only inorganic detected above health screening guidelines; 18 however, the concentration is below the basewide background level for arsenic. It 19 appears, based on these comparisons, that only the PAHs presented a potential risk under 20 a residential setting. 21 22 Surface Water. Two organic compounds, toluene and dichloroethane (DCA) were 23 detected in surface waters associated with AOC 41. The maximum concentrations of both 24 were below their respective primary drinking water MCLs. 25 26 The concentrations of four inorganic analytes that were detected in the surface water 27 exceed their respective drinking water standard/guideline. The average concentration of 28 lead detected in New Cranberry Pond exceeds the USEPA lead action level. Aluminum, 29 iron, and manganese were detected in all samples collected and each exceeded its 30 respective USEPA secondary MCL. The use of drinking water guidelines for comparison 31 to surface water concentrations is a conservative approach and was used due to a lack of 32

available health-based guidelines for exposure to surface water. Because exposure to

³⁴ surface water was expected to be restricted, it is unlikely that contaminants would pose a ³⁵ significant threat to public health

35 significant threat to public health.

1

Sediment. Several organic analytes were detected in sediment samples: pesticide 2 residues, acetone, chloroform, and Aroclor 1260. Acetone and chloroform are common 3 laboratory contaminants and were not considered to be SA-related. The levels of all 4 pesticide residues detected in sediment were below the USEPA Region III residential soil 5 concentrations and MCP S-2/GW-1 soil standards. The concentration of Aroclor 1260 6 exceeded the Region III residential soil concentration, but not the MCP S-2/GW-1 soil 7 standard. 8 9 Of the inorganic analytes detected in sediment, only arsenic exceeds its respective USEPA 10 Region III residential soil concentration but not the MCP S-2/GW-1 soil standard. 11 Concentrations of contaminants detected in sediment are not expected to pose a significant 12 health risk in the sampled area because exposure to sediment in this area would be much 13 14 less than expected in a residential setting. 15 16 3.2 SUMMARY OF ECOLOGICAL EVALUATIONS AND RISK ASSESSMENTS 17 18 The following subsections discuss the ecological risk evaluation/assessment results for the 19 debris areas. The ecological PREs contained in the SI reports for AOC 9, SA 12, SA 13, 20 and AOC 41 are summarized, as are the ecological risk assessment contained in the RI 21 reports for AOC 11 and AOC 40, to provide a broad overview of potential ecological 22 risks associated with the debris areas. 23 24 3.2.1 Study Area 6 25 26 As discussed in Subsection 3.1.1, the risk to potential human receptors at SA 6 are 27 expected to be minimal because of the relatively small volume and nature of the waste at 28 this site. The same conclusion can be applied to potential ecological receptors. 29 30

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3.2.2 Area of Contamination 9

1 2 3

The ecological PRE presented in the SI Report for AOC 9 (ABB-ES, 1996a) evaluated

- potential ecological risks associated with exposure to site contaminants in surface soil,
 surface water, and sediment.
- 6

Surface Soil. The inorganic analytes copper, lead, and nickel were detected above 7 background in two surface soil samples taken from test pits on the AOC 9 landfill. A 8 9 screening-level evaluation of the potential effects from surface soil exposure was conducted by comparing the maximum concentrations of these contaminants to their 10 respective protective contaminant levels (PCLs). The maximum concentrations of copper 11 and nickel were less than their respective PCLs, and the maximum concentration of lead 12 was greater than the PCL, which was established to be the background concentration. 13 14 Although lead exceeded the PCL, it was not considered to pose ecological risks to 15 terrestrial receptors at the site for several reasons: (1) the maximum lead concentration is 16 less than twice the background value; (2) areas of unvegetated terrestrial habitat, that are 17 unsuitable for foraging, exist at the AOC 9 landfill; and (3) PCLs derived for other 18 receptors are at least an order of magnitude above the detected lead concentrations at 19

20 AOC 9.

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Surface Water. Several inorganic compounds were detected and chosen as COCs from three surface water samples taken from wetlands located to the southeast of the AOC 9 landfill. Risks to aquatic receptors in wetlands surface water were evaluated through

direct comparison of maximum concentrations to aquatic benchmark values.

26 Concentrations of aluminum, lead, and iron detected above Federal Ambient Water

27 Quality Criteria (AWQC) were most likely reflective of background conditions rather than

28 landfill-related conditions. Concentrations of aluminum and lead, although above the 29 chronic AWOC were lower than the acute AWOC. In addition, a review of AWOC

chronic AWQC, were lower than the acute AWQC. In addition, a review of AWQC
 documents indicated that early life stages of trout are among the most sensitive ecological

receptors. Because the site's ecological receptors are likely to be more tolerant of

contamination, it is unlikely that the low levels of contamination in surface water will have

- 33 an adverse effect on receptors.
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Sediment. Maximum lead and arsenic concentrations in wetlands sediments exceeded the 1 screening level benchmark toxicity values. The average lead concentration is identical to 2 the New York State Department of Environmental Conservation (NYSDEC) sediment 3 quality guideline and less than the Natural Oceanic and Atmospheric Administration 4 (NOAA) effects range-low (ER-L) value (Long and Morgan, 1990). Therefore, lead is 5 not considered to be causing significant ecological risk at AOC 9. The average arsenic 6 concentration is only slightly greater than the NYSDEC sediment quality guideline and is 7 considerably less than the ER-L of NOAA (Long and Morgan, 1990). Therefore, arsenic 8 is not considered to be causing any significant ecological risk at AOC 9. 9 10 3.2.3 Area of Contamination 11 11 12 The Ecological Risk Assessment presented in the Draft RI Report for AOC 11 (ADL, 13 1995) evaluated potential ecological risks associated with exposure to site contaminants in 14 surface soil, surface water, and sediment. 15 16 Surface Soils. Exposure risks are expected to be moderate for cadmium and high for lead 17 from dietary exposures in the AOC-11 disposal area. These risks, however, are based on 18 conservative scenarios of restricted foraging entirely within the 2-acre habitat found on the 19 debris disposal area surface, and are therefore, likely overestimated. Maximum debris 20 disposal area soil exposure risks are expected to be low for other COCs, essentially 21 identical to those for the Devens' soil background. 22 23 Surface Water. Surface water risks associated with the Northern and Southern wetlands, 24 are elevated due to the presence of metals and pesticides, although the wetlands do not 25 appear to have been functionally impaired and do not exhibit obvious stress symptoms. 26 Surface water risks associated with the Nashua River are insignificant and do not increase 27 adjacent to or downstream of AOC 11. 28 29 The results of toxicity tests performed on the downstream wetlands indicated that 30 wetlands surface water samples are not toxic to test organisms. Similar tests revealed the 31 same results in samples collected from the upstream wetlands. These test results failed to 32

indicate any toxicity that is strictly associated with AOC 11 wetland surface waters.

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Sediment. Both AOC 11 wetlands exhibit high average and maximum, noncarcinogenic 2 sediment risks for metals and pesticides, with pesticides accounting for most of the risk. 3 However, with the exception of the maximum detected levels of a few COCs, most of the 4 wetland risks do not significantly exceed those observed in the upstream reference wetland 5 located within the same, western floodplain as the AOC 11 wetlands. This information 6 suggests that the contamination is likely reflecting historical and continuing inputs from 7 over-bank flooding by the Nashua River rather than current site conditions. The results of 8 toxicity tests indicate that, in general, the wetlands sediment samples are not toxic to most 9 of the test organisms. The tests fail to indicate any toxicity that was strictly associated 10 with the AOC 11 wetlands. 11

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Most of the aquatic ecological risks in the Nashua River are attributed to sediment 13 contamination with metals and pesticides. Significant incremental risk increases occur in 14 river sediments adjacent to AOC 11 for several metals and pesticides. Since these 15 increases do not appear to be related to current surface water influx of suspended 16 sediments from AOC 11 wetlands to the river, the increase may be due to historical 17 sediment releases from the wetlands during infrequent high-flow events and/or subsurface 18 migration of inorganics via groundwater flow from the AOC 11 refuse area. The 19 occurrences may also reflect local variation in these contaminant concentrations along the 20 entire length of the Nashua River. 21

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The elevated risk levels in the AOC 11 wetlands are not clearly attributed, at least solely,
 to contaminants derived from AOC 11. Rather, periodic over-bank flooding of the

25 Nashua River appears to have contributed a portion of the metal and pesticide

contamination found in both the AOC 11 and upstream wetlands, while the wetlands

appear to be retarding contamination influx to the Nashua River. Remedial action within

these wetlands could exacerbate existing river contamination by resuspending sediment-

29 sorbed contaminants into the water and releasing them into the river.

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3.2.4 Study Area 12

The ecological PRE presented in the Revised Final SI Report for SA 12 (ABB-ES, 1995d) 3 evaluated potential ecological risks associated with exposure to site contaminants in 4 surface soil, and sediment. The Final SI Report for SA 12 (ABB-ES, 1993a) evaluated 5 potential ecological risks associated with surface water. 6

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Surface Soil. The maximum concentrations of barium, lead, zinc, and Aroclor 1254 8 exceeded their respective surface soil benchmark values used for the screening-level 9 evaluation. The maximum detected concentration of lead was approximately 18 times its 10 benchmark value. Aroclor 1254, detected in only one sample, was approximately twice 11 the benchmark value established for this PCB. The maximum barium and zinc 12 concentrations were approximately 4 and 6 times their respective surface soil benchmark 13 values. This information suggests possible adverse effects to ecological receptors from 14 surface soil contamination in the landfill area. 15

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Surface Water. Risks to aquatic receptors in wetlands surface waters were evaluated 17 through comparison of maximum concentrations to aquatic benchmark values. The 18 maximum concentrations of aluminum, chromium, copper, iron, lead, and zinc in SA 12 19 floodplain surface water exceeded their respective aquatic benchmark values. Generally 20 the USEPA chronic AWQC was used as the benchmark value. The maximum detected 21 concentration of aluminum was approximately 13 times the chronic AWQC and the 22 maximum detected concentration of iron was approximately 74 times the chronic AWQC. 23 Maximum concentrations of chromium, copper, lead, and zinc were all several times 24 higher than their respective aquatic benchmark values. These values suggest possible 25 adverse effects to ecological receptors from surface water contamination; however, the 26 concentrations of inorganics detected in Nashua River surface waters are most likely 27 representative of background surface water conditions and are not site related. 28 29 Sediment. The pesticides DDD and DDE were both detected at concentrations 30 approximately an order of magnitude greater than their total organic carbon (TOC)-31

normalized benchmark values. Aroclor 1248 and BEHP were detected at maximum 32

concentrations that were approximately twice their respective sediment benchmark values. 33

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The maximum concentrations of 11 inorganic and four organic analytes in floodplain 2 sediments exceeded their respective sediment benchmark values. Antimony, arsenic, 3 cadmium, chromium, copper, iron, lead, mercury, nickel, silver, and zinc in wetlands 4 sediment were all detected at levels greater than their sediment benchmark values. The 5 maximum detected concentration of arsenic was approximately 15 times its benchmark 6 value, while cadmium was detected at approximately 270 times its benchmark value. The 7 maximum detected concentration of chromium was approximately 13 times its benchmark 8 value and the maximum concentration of copper was approximately 27 times its 9 benchmark value. Lead and mercury were both detected at maximum concentrations 10 approximately 30 times their sediment benchmark values. The maximum concentrations 11 of the inorganic analytes in the Nashua River floodplain sediment may be the most 12 significant contributors to ecological risk in the vicinity of SA 12; however, these 13 concentrations are most likely representative of Nashua River surface water conditions 14 and are not site related. 15 16

3.2.5 Study Area 13

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The ecological PRE presented in the SI Report for SA 13 (ABB-ES, 1995d) evaluated potential ecological risks associated with exposure to site contaminants in surface soil, surface water, and sediment.

Surface Soil. A screening-level evaluation of potential effects from surface soil exposure 23 was conducted by comparing the maximum concentrations of all CPCs to their respective 24 surface soil benchmark values. No organic analytes at SA 13 were found to exceed their 25 ecological benchmark values, however, the maximum concentrations of arsenic, barium, 26 beryllium, cadmium, lead, and selenium were greater than their respective surface soil 27 benchmarks. The maximum concentrations of arsenic, barium, beryllium, cadmium, and 28 selenium were only slightly higher than their respective benchmark values and therefore 29 were not considered a significant ecological risk. 30 31

The maximum lead concentration was approximately 6.5 times greater than the benchmark for lead in surface soils, and the average lead concentration was approximately twice the benchmark value. These concentration of lead may pose a risk to certain ecological receptors.

1 Surface Water. Risks to aquatic receptors in surface water were evaluated through 2 comparison of maximum concentrations to USEPA chronic AWQC. The maximum 3 concentration of aluminum exceeded the acute and chronic AWQC, while iron and lead 4 exceeded only the chronic AWQC. Because these compounds were present at high levels 5 in background soils and groundwater at Devens, their presence in SA 13 surface water 6 may be reflective of background conditions, and not of landfill impacts. Furthermore, a 7 review of AWOC documents indicated that the ecological receptors upon which the 8 guidance levels are based were among the most sensitive. It is unlikely that the levels of 9 aluminum, iron, and lead in surface water will have an adverse effect on the site's 10 ecological receptors, which are likely to be more tolerant than the risk targeted receptor. 11 12 Mercury was detected in one of the three surface water samples in addition to the 13 duplicate sample. The maximum concentration was less than the acute AWQC, but 14 approximately an order of magnitude greater than the chronic AWQC. The presence of 15 mercury in SA 13 surface water may pose a threat to ecological receptors. 16 17 Sediment. Risks to ecological receptors from sediments were evaluated through 18 comparison of maximum concentrations to sediment benchmark values. Maximum lead, 19 copper, arsenic, DDE, gamma-chlordane, and heptachlor concentrations exceeded the 20 screening level benchmark toxicity values. The average lead concentration was lower than 21 the NYSDEC sediment quality guideline and the ER-L of NOAA. The average 22 concentrations of arsenic and copper were only slightly greater than the NYSDEC 23 sediment quality guidelines, and were considerably less than their respective NOAA ER-L. 24 Therefore, lead, copper, and arsenic were not considered to be causing significant 25 ecological risk in SA 13 sediments. 26 27 The maximum DDE concentration is approximately twice the TOC-normalized USEPA 28 Sediment Quality Criteria (SQC) (USEPA, 1989) and approximately an order of 29

magnitude greater than the NOAA ER-L (Long and Morgan, 1990). Heptachlor and
 gamma-chlordane are also present at concentrations at least an order of magnitude greater

than their respective sediment benchmark values. These compounds may be causing

33 significant risks to ecological receptors.

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3.2.6 Area of Contamination 40

A supplemental ecological risk assessment was performed at the Cold Spring Brook 4 Landfill and presented in the Final RI Addendum Report (ABB-ES, 1993c) to integrate 5 information gathered from several phases of investigation at the Group 1A sites and 6 determine whether environmental contaminants may pose a risk to ecological receptors. 7 Specifically, the supplemental risk assessment evaluated sediment and fish tissue analytical 8 data that were unavailable when the RI Report was produced. The risk assessment of the 9 RI Report indicated that sediment contamination in Cold Spring Brook Pond may pose a 10 risk to ecological receptors (E&E, 1993). Arsenic was found to be the primary risk 11 contributor to aquatic and semi-aquatic biota. Risks to aquatic biota were also predicted 12 from DDD. 13

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Fish Sampling Program. Average and maximum fish tissue analyte concentrations of 15 fish collected from Cold Spring Brook Pond were compared to regional and national data 16 bases by trophic level. The average fish tissue concentration from Cold Spring Brook 17 Pond exceeded regional averages for the following analytes; DDE, iron, manganese, and 18 zinc. The maximum Cold Spring Brook Pond whole body chain pickerel concentrations of 19 mercury and zinc exceeded their respective National Contaminant Biomonitoring Program 20 85th percentile concentrations. Fish body weight (and concomitantly trophic status) 21 appears to be a good predictor of mercury contaminant burden in Cold Spring Brook 22 Pond, with higher trophic level fish species having accumulated higher concentrations of 23 this analyte. 24

25

A total of 95 fish representing five families and six species were collected in Cold Spring
 Brook Pond. A gross pathological examination of the fish suggested that the individuals
 from the population examined were healthy. No tumors, lesions, or other significant
 abnormalities were observed in any fish examined.

- 30 31 Macroinvertebrates
- Macroinvertebrates. The macroinvertebrate program at Cold Spring Brook Pond was designed to provide baseline information regarding the biota associated with aquatic
- habitats in the vicinity of the landfill. The macroinvertebrate community data suggested
- that Cold Spring Brook Pond may be unimpacted or slightly impacted. Within Cold
- 35 Spring Brook Pond, sampling stations located adjacent to the landfill appeared to have

lower diversity and abundance of aquatic macroinvertebrates than the station located 1 furthest from the landfill. However, water quality parameters did not appear to be 2 influencing factors in the differences observed. A statistical analysis, although generally 3 inconclusive, did suggest that a group of approximately 15 inorganic CPCs may 4 collectively impact the macroinvertebrate community adversely. 5 6 Surface Soils. Based on a review of field sampling data collected during the RI, risks to 7 upland terrestrial wildlife from surface soils were not calculated. The review indicated a 8 lack of significant soil contamination. 9 10 Surface Water. The average Cold Spring Brook Pond surface water concentrations of 11 iron and manganese slightly exceeded their respective chronic AWQC values. Under the 12 reasonable maximum exposure (RME) scenario, the maximum concentrations of copper 13 and zinc exceeded their respective acute AWQC values. For both the average exposure 14 and RME scenarios at Cold Spring Brook Pond, no HQs were greater than 1 for any of 15 the eight evaluated semi-aquatic receptor species. 16 17 In the absence of site-specific information regarding bioavailability and toxicity, literature 18 sources were used to establish a range of candidate arsenic and lead preliminary 19 remediation goals (PRGs) for this site. PRG determination for arsenic and lead in 20 sediment was documented in the AOC 40 Final Feasibility Study Report (ABB-ES, 21 1994b). The AOC 40 FS Report recommended sediment removal at two hot spots 22 (Areas I and II) at Cold Spring Brook Pond (see Figure 2-15). Sediment removal at 23 Areas I and II are included as a component of the remedial alternatives evaluated in 24 Section 8.0 of this report. 25 26 Sediment. Concentrations of DDD, DDE, DDT, anthracene, arsenic, barium, iron, lead, 27 manganese, mercury, nickel, silver, and zinc exceeded the available sediment quality 28 criteria and guidelines. Because the USEPA sediment quality criteria for DDD, DDE, and 29 DDT may be overly conservative for use at this site, this value was adjusted to reflect 30 more realistic site-specific values. Use of the adjusted pesticide sediment quality criteria 31 HQ eliminates the risk from DDE for the average exposure scenario and lowers risks from 32

33 DDD for RME scenarios.

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3.2.7 Area of Contamination 41

4 The ecological PRE presented in the Revised Final SI Report for AOC 41 (ABB-ES,

5 1995d) evaluated potential ecological risks associated with exposure to site contaminants

in surface soil, surface water, and sediment.

Surface Soil. The Final SI PRE reported that no organic compounds in surface soil
 exceeded established benchmark values; however, the maximum detected concentrations
 of the inorganics antimony, barium beryllium, cadmium, copper, lead, and zinc did exceed
 their respective benchmark values. These maximum concentrations were associated
 primarily with samples collected from the landfill surface.

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Subsequent to the Final SI, three surface soil samples were collected downgradient of the landfill. With the exception of cobalt, for which no background data are available, the maximum concentrations of all inorganics were less than background concentrations. In addition to inorganics, 16 organic compounds, including 13 PAHs and a PCB, were detected in additional soil samples. A screening-level evaluation of potential effects from surface soil exposure was conducted in which no surface soil benchmark values were exceeded by the maximum detected concentrations of contaminants.

Although several analytes associated with surface soil samples collected during the SI exceeded ecological benchmark values, ecological risks are likely to be minimal. Elevated analyte concentrations were generally associated with samples taken directly from the landfill, and contaminated surface soils do not appear to pose a risk to ecological receptors elsewhere at AOC 41.

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Surface Water. The results from two surface water samples collected during the Supplemental SI were combined with surface water sample data from the Final SI. Two organic compounds, DCA and toluene, were detected but are thought to be common laboratory contaminants and not site related. The maximum concentrations of aluminum, copper, iron, lead, and zinc exceeded their benchmark values. Concentrations ranged from two to 93 times the benchmark values.
Although the inorganic analytes exceeded surface water screening values, the maximum 1 concentrations of these compounds were all detected in one sample. Additionally, copper 2 and zinc were undetected in all other surface water samples. It is believed that aluminum 3 and iron were present at naturally high levels in background soils and groundwater at 4 Devens, and the presence of these analytes may be reflective of background conditions. 5 rather than landfill impacts. Furthermore, AWQC documents indicate that standards are 6 based on ecological receptors that are more sensitive than those likely to occur in AOC 41 7 wetlands. Lastly, it is likely that the use of unfiltered surface water samples lead to 8 unrepresentatively high levels of inorganics due to contamination entrained on suspended 9 solids. It is highly unlikely that the elevated levels of contaminants detected will have an 10 adverse effect on potential ecological receptors. 11 12 Sediment. During the Supplemental SI, two sediment samples were collected at AOC 41 13 and the data combined with sediment sample data from the Final SI. Seven organic 14 compounds and 11 inorganic analytes were detected in sediment samples. 15 16 The maximum concentrations of DDD, DDE, heptachlor, arsenic, lead, and zinc were the 17 only values identified above their respective benchmark values. Arsenic was detected in 18 all samples at a maximum concentration over twice its benchmark value. Lead was 19 detected in both samples at a maximum concentration approximately 1.5 times its 20 benchmark value. The maximum concentrations of zinc and heptachlor slightly exceeded 21 their benchmarks. 22 23 The maximum concentration of all the compounds were detected in one sediment sample. 24 The average concentrations of all three inorganic analytes were at or near the benchmark 25 values, indicating that it is highly unlikely that arsenic, lead, and zinc pose an ecological 26 risk to aquatic receptors. Additionally, the Interim SQC for DDT and its breakdown 27 products likely represents an extremely conservative guideline for use at Devens. 28 Therefore, it is unlikely that these pesticides in New Cranberry Pond sediments pose a risk 29

- 30 to ecological receptors.
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4.0 ASSESSMENT OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

⁵ Compliance with ARARs is one of the CERCLA criteria to be evaluated for each of the
⁶ alternatives screened for detailed analysis in Section 8. CERCLA was passed by Congress
⁷ and signed into law on December 11, 1980 (Public Law 96-510). This act was intended to
⁸ provide for "liability, compensation, cleanup, and emergency response for hazardous
⁹ substances released into the environment and cleanup of inactive waste disposal sites."
¹⁰ SARA, adopted on October 17, 1986 (Public Law 99-499), did not substantially alter the
¹¹ original structure of CERCLA, but provided extensive amendments to it.

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In particular, §121 of CERCLA specifies that remedial actions for cleanup of hazardous substances must comply with requirements or standards under federal or more stringent state environmental laws that are applicable or relevant and appropriate to the hazardous substances or circumstances at a site. Inherent in the interpretation of ARARs is the assumption that protection of human health and the environment is ensured.

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4.1 TERMS AND DEFINITIONS

The following is an explanation of the terms used throughout this ARARs discussion:

Applicable requirements are "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site" (52 FR 32496, August 27, 1987).

Relevant and appropriate requirements are "those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to

1	those encountered at the CERCLA site that their use is well suited to the particular site"
2	(52 FR 32496).
3	
4	Requirements under federal or state law may be either applicable or relevant and
5	appropriate to CERCLA cleanup actions, but not both. However, requirements must be
6	both relevant and appropriate for compliance to be necessary. In the case where both a
7	federal and a state ARAR are available, or where two potential ARARs address the same
8	issue, the more stringent regulation must be selected. The final NCP states that a standard
9	must be legally enforceable and more stringent than a corresponding federal standard to be
10	relevant and appropriate (55 FR 8756, March 8, 1990). However, CERCLA §121(d)(4)
11	provides several ARAR waiver options that may be invoked, providing that the basic
12	premise of protection of human health and the environment is not ignored. A waiver is
13	available for state standards that have not been uniformly applied in similar circumstances
14	across the state. In addition, CERCLA $\frac{121(d)(2)(C)}{1000}$ forbids state standards that
15	effectively prohibit land disposal of hazardous substances.
16	
17	CERCLA on-site remedial response actions must comply only with the substantive
18	requirements of a regulation and not the administrative requirements to obtain federal,
19	state, or local permits [CERCLA §121(e)]. As noted in the ARARs guidance (USEPA,
20	1988):
21	
22	The CERCLA program has its own set of administrative procedures which assure
23	proper implementation of CERCLA. The application of additional or conflicting
24	administrative requirements could result in delay or confusion.
25	
26	Substantive requirements pertain directly to the actions or conditions at a site, while
27	administrative requirements facilitate their implementation. In order to ensure that
28	CERCLA response actions proceed as rapidly as possible, the USEPA has reaffirmed this
29	position in the final NCP (55 FR 8756, March 8, 1990). The NCP defines on-site as "the
30	areal extent of contamination and all areas in very close proximity to the contamination
31	necessary for implementation of the response action." The Interagency Agreement (IAG)
32	provides additional guidance on the applicability of permitting requirements to response

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actions at the RFTA (USEPA, 1991b). The USEPA recognizes that certain of the 1 administrative requirements, such as consultation with state agencies and reporting, are 2 accomplished through the state involvement and public participation requirements of the 3 NCP. 4 5 The provisions of the MCP, (310 Code of Massachusetts Regulations [CMR] 40.0000) 6 (November 19, 1993) are mostly administrative in nature and, therefore, do not have to be 7 complied with in connection with the response action selected for the Consolidation 8 Landfill. Further, the MCP contains a specific provision (310 CMR 40.0111) for deferring 9 application of the MCP at CERCLA sites. 310 CMR 40.0111(1)(a) provides that 10 response actions at CERCLA sites shall be deemed adequately regulated for purposes of 11 compliance with the MCP, provided the MADEP concurs in the CERCLA ROD. 12 13 In the absence of federal- or state-promulgated regulations, many criteria, advisories, 14 guidance values, and proposed standards are not legally binding, but may serve as useful 15 guidance for remedial actions. These are not potential ARARs, but are "to-be-considered" 16 (TBC) guidance. These guidelines may be addressed as deemed appropriate. 17 18 ARARs are divided into the three categories listed below. 19 20 Location-specific ARARs "set restrictions upon the concentration of • 21 hazardous substances or the conduct of activities solely because they are in 22 special locations" (53 FR 51394). In determining the use of location-specific 23 ARARs for selected remedial actions at CERCLA sites, one must investigate 24 the jurisdictional prerequisites of each of the regulations. Basic definitions and 25 exemptions must be analyzed on a site-specific basis to confirm the correct 26 application of the requirements. 27 28 Chemical-specific ARARs are usually health- or risk-based standards that • 29 limit the concentration of a chemical found in or discharged to the 30 environment. They govern the extent of site remediation by providing either 31 actual cleanup levels, or the basis for calculating such levels. For example, 32 groundwater MCLs may provide the necessary cleanup goals for sites with 33 contaminated groundwater. There are no direct chemical-specific ARARs for 34 soils. Chemical-specific ARARs for the site may also be used to indicate 35

1	acceptable levels of discharge in determining treatment and disposal
2	requirements, and to assess the effectiveness of future remedial alternatives.
3	
4	• Action-specific ARARs set controls or restrictions on particular kinds of
5	activities related to the management of hazardous waste (53 FR 51437).
6	Selection of a particular remedial action at a site will invoke the appropriate
7	action-specific ARARs that may specify particular performance standards or
8	technologies, as well as specific environmental levels for discharged or residual
9	chemicals. Action-specific ARARs are established under RCRA, the Clean Air
10	Act, the Clean Water Act, the Safe Drinking Water Act, the Toxic Substances
11	Control Act, and other laws.
12	
13	Many regulations can fall into more than one category. For example, many location-
14	specific ARARs are also action-specific because they are triggered if remedial activities
15	affect site features. Likewise, many chemical-specific ARARs are also location-specific.
16	
17	The Occupational Safety and Health Administration (OSHA) has promulgated standards
18	for protection of workers at hazardous waste operations at RCRA or CERCLA sites (29
19	CFR Part 1910). These regulations are designed to protect workers who would not be
20	exposed to hazardous waste. Federal construction activities involving no potential for
21	hazardous substance exposure are covered by the OSHA standards found in 29 CFR
22	Part 1926. USEPA requires compliance with the OSHA standards in the NCP (40 CFR
23	300.150), not through the ARAR process. Therefore, the OSHA standards are not
24	considered as ARARs. They are discussed in the site-specific Health and Safety Plan.
25	
26	Section 8 contains alternative-specific discussions of ARARs.
27	
28	The following subsections present general discussions of location-, chemical-, and action-
29	specific ARARs as they pertain to the remedial alternatives being considered for the
30	landfills at Devens.
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4.2 LOCATION-SPECIFIC ARARS

3 Federal and Massachusetts location-specific ARARs identified for landfill remediation are

discussed in the following paragraphs. These location-specific ARARs are primarily

⁵ related to the location of the various debris areas in or near wetlands or floodplains,

critical habitats, or areas of potential historical or archeological significance. Table 4-1
 presents location-specific ARARs.

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Federal ARARs. The Floodplain Management Executive Order No. 11988 (40 CFR 9 Part 6, App. A) is applicable to activities involved in the debris excavation portion of the 10 Consolidation Landfill project. This executive order protects floodplains from adverse 11 effects of direct and indirect development, and provides that potential harm must be 12 minimized and action taken to restore and preserve the natural and beneficial values of the 13 floodplain. Three of the debris areas are located within floodplains: AOCs 9, 11, and 40. 14 AOC 11 is located within the 100-year floodplain of the Nashua River and is separated 15 from the river by a 40-ft-wide berm; and Cold Spring Brook Pond may be impacted by 16 remedial actions at the Cold Spring Brook Landfill, which could involve removal of debris 17 and contaminated sediment from within the pond. 18

19

The Protection of Wetlands Executive Order No. 11990 (40 CFR Part 6, Appendix. A) is applicable to activities related to remedial actions at the landfills. This executive order protects wetlands from destruction, loss, and degradation, and attempts to preserve and enhance the natural and beneficial values of wetlands. Most of the seven debris areas are located within or adjacent to wetlands.

The Clean Water Act, Dredge or Fill Requirements, Section 404 (33 CFR Part 230; 40

27 CFR Part 230) is applicable to activities related to remedial actions at the landfills.

28 Section 404 regulates the discharge of dredged or fill material to waters of the United

29 States, including wetlands. If adverse conditions resulting from dredging and filling

30 operations are unavoidable, action must be taken to restore or create alternative wetlands.

- The Rivers and Harbors Act of 1899 (33 U.S. Code 401 et seq.) is applicable to activities
 - involved in the excavation of debris for consolidation in the Consolidation Landfill. The
 - act regulates the construction of any structure in or over any "navigable water of the
 - 35 United States," the excavation from or deposition of material in such waters, or any

obstruction or alteration in such waters. Because waste material excavation from within 1 Cold Stream Brook Pond and sediment dredging from the Nashua River are being 2 evaluated, this ARAR would need to be attained. 3 4 The Archeological and Historic Preservation Act (16 U.S. Code 469; 40 CFR 5 Part 6301(c)) is applicable to activities related to remedial actions at the landfills. This act 6 establishes procedures to provide for preservation of historical and archeological 7 resources that might be destroyed through alteration of terrain as a result of a federal 8 construction project. SA 6 has been investigated by archaeologists and was determined to 9 be a potentially valuable archeological resource, and is recommended for further 10 investigation prior to any remedial or removal actions. The requirements of this act will 11 be met to ensure that the archeological data at SA 6 are properly protected. 12 13 The Fish and Wildlife Coordination Act (16 USC 661 et seq.; 40 CFR Part 302) is 14 applicable to activities related to remedial actions at the landfills. Actions that affect 15 species/habitats require consultation with Department of the Interior, U.S. Fish and 16 Wildlife Service, National Marine Fisheries Service, and other agencies as appropriate to 17 ensure that proposed actions do not jeopardize the continued existence of the species or 18 adversely modify or destroy critical habitat, and actions must be taken to prevent, 19 mitigate, or compensate for project-related damages or losses to fish and wildlife 20 resources. 21 22 The Endangered Species Act (16 USC 1531 et seq.; 50 CFR Part 402) is relevant and 23 appropriate to activities related to remedial actions at the landfills. This act requires action 24 to avoid jeopardizing the continued existence of the listed endangered or threatened 25 species or modification of their habitat. While no federally protected species are recorded 26 at any of the debris areas or at the proposed location of the Consolidation Landfill, the 27 substantive requirements of the act will be taken into account. 28 29 Massachusetts ARARs. The Massachusetts Wetlands Protection Act and regulations 30 (MGL c. 131, s. 40; 310 CMR 10.00) are applicable to activities related to remedial 31 32

actions at the landfills. These regulations set the performance standards for dredging,

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filling, or altering wetlands and lands under water, and work within 100 ft of a wetland is 1 also regulated under these requirements. Because several of the debris areas are in or 2 adjacent to wetlands, or within 100 ft of a wetland, these requirements will be met. 3 4 The Massachusetts Endangered Species Act (MGL c. 131A, s. 1 et seq.; 321 CMR 8.00) 5 is applicable to activities related to remedial actions at the landfills. This act and 6 implementing regulations, in conjunction with the Massachusetts Natural Heritage 7 Program (MNHP) species list, identifies critical species that may be found during the 8 course of site cleanup. Several Massachusetts-listed species have been recorded at the 9 debris areas or near the proposed location of the Consolidation Landfill, including: the 10 Grasshopper Sparrow, a Species of Special Concern, which breeds on Shepley's Hill 11 Landfill; The Upland Sandpiper, a Massachusetts Endangered Species that migrates 12 through the Devens area and has been recorded at Shepley's Hill Landfill; the Coopers 13 Hawk, a Species of Special Concern with flyby records at Shepley's Hill Landfill; and the 14 Blandings Turtle, a Massachusetts Threatened Species that has been recorded as breeding 15 at SA 12. Prior to construction activities at any of these locations, the MNHP will be 16 contacted. 17 18 The Massachusetts Waterways Act (MGL c. 91; 310 CMR 9.00) is relevant and 19 appropriate to the activities being evaluated for landfill remediation. The act and 20 regulations set forth licensing requirements for any work in or over any tidelands, river or 21 stream, great pond, or outlet thereof. While no licenses are required for on-site activities 22 at CERCLA sites, the substantive requirements of the act will be met. 23 24

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4.3 CHEMICAL-SPECIFIC ARARS

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Federal and Massachusetts chemical-specific ARARs are discussed in the following
 paragraphs. These chemical-specific ARARs are primarily related to the remedial actions
 proposed for the Cold Spring Brook Landfill, and are discussed in more detail in the Cold
 Spring Brook Landfill Operable Unit FS (ABB-ES, 1994b). Table 4-2 presents chemical specific ARARs.

- Federal ARARs. The Clean Water Act AWQC (40 CFR Part 131; Water Quality
- 35 Criteria) are applicable to activities which could cause contamination of surface water.

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Federal AWQC for protection of human health provide protective concentrations for 1 exposure from ingesting contaminated water and contaminated aquatic organisms, and 2 from ingesting contaminated aquatic organisms alone. Federal AWQC also include acute 3 and chronic toxicity values for the protection of aquatic life. Remedial actions involving 4 contaminated surface water or discharge of contaminants to surface water must consider 5 the uses of the water and the circumstances of the potential release. Sediment removal 6 and wetland excavation could potentially result in AWQC exceedances. 7 8 The Safe Drinking Water Act, National Primary Drinking Water Standards, MCLs (40 9 CFR Parts 141.11 - 141.16 and 141.50 - 141.53) are applicable to activities related to 10 remedial actions at the Devens landfills. MCLs specify the maximum permissible 11 concentrations of contaminants in public drinking water supplies. 12 13 Massachusetts ARARs. The Massachusetts Surface Water Quality Standards (314 CMR 14 4.00) are applicable to activities related to remedial actions at the landfills. These 15 standards designate the most sensitive uses for which surface waters of the 16 Commonwealth are to be enhanced, maintained, and protected, and to designate minimum 17 water quality criteria for sustaining the designated uses. Surface waters at the landfill 18 areas are classified as Class B, and are designated as habitat for fish, other aquatic life, and 19 wildlife, and for primary and secondary recreation. Sediment removal and wetland 20 excavation could potentially result in Surface Water Quality standard exceedances. 21 22 The Massachusetts Groundwater Quality Standards (314 CMR 6.00) are relevant and 23 appropriate to activities related to remedial actions at the Devens landfills. These 24 standards designate and assign uses for which groundwaters of the Commonwealth shall 25 be maintained and protected, and set forth water quality criteria necessary to maintain the 26 designated uses. Groundwater at Fort Devens is classified as Class I, fresh groundwaters 27 designated as a source of potable water supply. 28 29 The Massachusetts Drinking Water Standards and Guidelines (314 CMR 22.00) are 30

relevant and appropriate to activities related to remedial actions at the Devens landfills.

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4 4.4 ACTION-SPECIFIC ARARS 5 6 Federal and Massachusetts action-specific ARARs are discussed in the following 7 paragraphs. Table 4-3 presents action-specific ARARs. 8 9 Federal ARARs. The Clean Water Act National Pollutant Discharge Elimination System 10 (NPDES) Permit Program (40 CFR Parts 122 and 125) is applicable. The NPDES permit 11 program specifies the permissible concentration or level of contaminants in the discharge 12 from any point source to waters of the United States. 13 14 Massachusetts ARARs. The Massachusetts Solid Waste Facilities Site Regulations (310 15 CMR 16.00) are applicable to the siting of a landfill or solid waste facility. These 16 regulations list the criteria MADEP uses in approving or rejecting a site for a solid waste 17 landfill. These regulations are more stringent than 40 CFR Part 257, and thus take 18 precedence. 19

These standards and guidelines list Massachusetts MCLs which apply to water delivered

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The Massachusetts Solid Waste Management Regulations (310 CMR 19.000) are

applicable to the construction/operation of a landfill or solid waste facility. These

regulations outline the requirements for construction, operation, closure, and post-closure

at solid waste management facilities in the Commonwealth. These regulations are more

stringent than 40 CFR Part 257, and thus take precedence.

to any user of a public water supply system.

26

27 The Massachusetts Water Quality Certification and Certification of Dredging requirements

28 (314 CMR 9.00) are relevant and appropriate to the activities being evaluated for landfill

remediation. A Water Quality Certification is required for activities that require a

30 MADEP Wetlands Order of Conditions to dredge or fill navigable waters or wetlands, a

³¹ USACE permit, or any major permit issued by the USEPA. While no licenses are required

- ³² for on-site activities at CERCLA sites, the substantive requirements will be met.
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SECTION 5.0

1	5.0 BASIS FOR REMEDIATION
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4	Response objectives, identified in this section, form the basis for identifying remedial
5	technologies and developing remedial alternatives. Response objectives are site-specific,
6	qualitative objectives based on the nature and extent of waste, the resources currently or
7	potentially affected, and the potential for human and environmental exposure.
8	
9	For Devens landfill remediation, response objectives were formulated based on
10	environmental concerns defined in the pertinent environmental contamination assessments,
11	lisk assessments, and ARARS analyses presented in the SI and RI reports prepared for the
12	alternatives
14	arcinatives.
15	The following response objectives were identified for landfill remediation
16	The tene wing response cojectives were identified for iditation remediation.
17	• Prevent human exposure to groundwater contaminants released from Devens
18	landfills that exceed acceptable risk thresholds.
19	
20	• Protect human and ecological receptors from exposure to landfill soils having
21	concentrations of contaminants exceeding acceptable risk thresholds.
22	
23	• Prevent landfill contaminant releases to surface water that result in exceedance
24	of AWQC or acceptable ecological risk-based thresholds.
25	
26	 Prevent exposure by ecological receptors to landfill-contaminated sediments
27	exceeding acceptable risk-based thresholds.
28	
29	• Reduce adverse impacts from contaminated landfill media to the environment
30	that would reduce the amount of land area available for natural resources use.
31	

5.0 BASIS FOR REMEDIATION



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SECTION 6.0

6.0 TECHNOLOGY IDENTIFICATION AND SCREENING

Remedial technologies considered implementable, and which address the response objectives listed in Section 5, are identified in this section. Candidate remedial technologies are then screened based on their applicability to landfill remediation. The purpose of the screening is to produce an inventory of suitable technologies that can be assembled into remedial alternatives capable of meeting response objectives.

6.1 TECHNOLOGY IDENTIFICATION

Categories of remedial technologies and specific process options were identified based on a review of literature, vendor information, and experience in developing other FSs under CERCLA. Table 6-1 identifies remedial technologies and debris process options to be considered for inclusion in remedial alternatives. Table 6-2 provides descriptions for debris process options.

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6.2 TECHNOLOGY SCREENING

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The technology screening process reduces the number of potentially applicable

technologies and process options by evaluating factors that may influence process option

24 effectiveness and implementability. This overall screening is consistent with the guidance

²⁵ for conducting FSs under CERCLA (USEPA, 1988).

26

27 The screening process assesses each technology or process option for its probable

effectiveness and implementability with regard to site-specific conditions, and physical

debris characteristics. The effectiveness evaluation focuses on: (1) whether the

30 technology is capable of handling the estimated debris volume and of meeting the goals

identified in the response objectives; (2) the effectiveness of the technology in protecting

human health during the construction and implementation phase; and (3) the reliability of

the technology with respect to debris characteristics and conditions at the various sites

³⁴ where the work will take place. Implementability encompasses both the technical and

institutional feasibility of implementing a technology. Effectiveness and implementability 1 are incorporated into two screening criteria: waste- and site-limiting characteristics. 2 3 Waste-limiting characteristics largely establish the effectiveness and performance of a 4 technology; site-limiting characteristics affect implementability of a technology. 5 Waste-limiting characteristics consider the suitability of a technology based on debris 6 types. Site-limiting characteristics consider the effect of site-specific physical features, 7 including topography and available space. Technology screening based on waste- and 8 site-limiting characteristics serves the two-fold purpose of screening out technologies 9 whose applicability is limited by debris characteristics or site considerations, while 10 retaining as many potentially applicable technologies as possible. 11 12 Table 6-3 summarizes the technology screening phase. Technologies and process options 13 judged effective or implementable were retained for further consideration. 14 15 Table 6-4 summarizes the technologies retained for further consideration. The 16 technologies retained following screening represent an inventory of technologies 17 considered most suitable for landfill remediation. Technologies retained in this section 18 may be used to develop remedial alternatives. 19

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7.0 DEVELOPMENT AND SCREENING OF ALTERNATIVES

In this section, technically feasible technologies and process options retained following the
 screening described in Section 6 are combined to form remedial alternatives. Alternatives
 are developed to attain the remedial action objectives discussed in Section 5.

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Six candidate alternatives for landfill remediation were developed by the Devens BRAC 8 Cleanup Team (BCT) on March 31, 1995. These are documented in the BCT Plan of 9 Action (Appendix A). The six alternatives included various combinations of capping 10 landfills in-place, excavating landfill wastes, disposing of excavated debris in a new on-site 11 landfill (excavation/consolidation), and disposing landfill wastes offsite. The waste 12 consolidation alternatives were evaluated in the Draft Consolidation Landfill Feasibility 13 Study report (ABB-ES, 1995c). The FS report evaluated only alternatives involving 14 waste consolidation, and did not assess alternatives involving capping wastes in-place. 15 The FS report was reviewed by MADEP, USEPA, U.S. Department of the Interior (Fish 16 and Wildlife Service), and FORSCOM. Review comments by FORSCOM indicated a 17 preference to evaluate cap-in-place alternatives as well as consolidation alternatives. 18

- To respond to the FORSCOM comments, a Technical Memorandum (ABB-ES, 1996b) was prepared. The Technical Memorandum compared the costs of capping the seven landfills in-place with costs of consolidating landfilled waste. The memorandum documented that costs to cap landfills in-place are necessarily less, because additional site investigations, remedial alternative evaluations, and post-closure monitoring plans would also be required.
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On December 9, 1996, the BCT developed nine alternatives for remediation of the landfills. As with the six alternatives developed in the Plan of Action, these nine alternatives were comprised of various capping and waste consolidation combinations at the seven disposal areas. Although similar to the six earlier alternatives, only one of the nine alternatives was identical. Thus, a total of fourteen alternatives were developed by the BCT. These are listed in Table 7-1. Alternative PA-2 is identical to Alternative 9, and will be eliminated from further discussion in this report.

34

The remedial alternatives were then screened with respect to the criteria of effectiveness, 1 implementability, and cost to meet the requirements of CERCLA and the NCP. The 2 screening step was designed to eliminate impractical and higher cost alternatives (i.e., 3 order of magnitude cost differences) that provide little or no greater in effectiveness or 4 implementability over lower cost alternatives. Alternative 1 - No Further Action (NFA) 5 under CERCLA will not be evaluated according to these screening criteria; this alternative 6 will be screened as a baseline for the other retained alternatives (USEPA, 1988) during the 7 detailed analysis. The three criteria used for screening the alternatives follow: 8

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Effectiveness. Each alternative was judged for its ability to effectively protect public 10 health and the environment by reducing the toxicity, mobility, or volume of contaminants. 11 Both short- and long-term effectiveness were screened. Short-term effectiveness included 12 reducing existing risks to the community and workers during the construction and 13 implementation period, ability to meet remedial action objectives, and time frame required 14 to achieve remedial action objectives. Long-term effectiveness, which applies after 15 remedial action objectives have been attained, considered the magnitude of the remaining 16 residual risk due to untreated wastes and waste residuals, and the adequacy and reliability 17 of specific technical components and control measures. Effectiveness also considered 18 adverse environmental impacts during construction and implementation of the alternative, 19 and the availability of mitigating measures to minimize impacts. 20

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Each alternative was evaluated in terms of technical and Implementability. 22 administrative feasibility. In the assessment of short-term technical feasibility, availability 23 of a technology for construction or mobilization and operation, as well as compliance with 24 action-specific ARARs during the remedial action were considered. Long-term technical 25 feasibility considered the ease of operation and maintenance (O&M), replacement, 26 monitoring of technical controls of residuals and untreated wastes, technology reliability, 27 and ease of undertaking additional remedial actions. Administrative feasibility for 28 implementing a given technology addressed coordination with other agencies. 29 Implementability also considers the availability of required services and trained specialists 30 or operators. 31

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Cost. The final criterion for screening of alternatives was the associated cost including 1 relative capital and O&M costs, as well as factors influencing cost sensitivity. Absolute 2 accuracy of cost estimates during screening was not considered essential. The focus was 3 rather to make relatively accurate comparative estimates for alternatives so that cost 4 decisions would be sustained as the accuracy of cost estimates improves beyond screening 5 Detailed cost estimates for those alternatives not eliminated after (USEPA, 1988). 6 screening are presented in the detailed analysis of retained alternatives in Section 8. 7 8

9 Alternative Evaluation. For each alternative, a matrix was developed highlighting the alternative's advantages and disadvantages with respect to effectiveness, implementability, and cost. The alternative evaluation matrix presented a concise procedure for screening potential remedial action alternatives. Based on this matrix, a decision was made to either retain the alternative for detailed analysis or eliminate it from further consideration.

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7.1 DEVELOPMENT OF ALTERNATIVES FOR LANDFILL REMEDIATION

Fourteen remedial alternatives were developed by the BCT to address remedial response objectives presented in Section 5. In assembling the alternatives, general response actions and technology process options selected to represent the various technology types were combined to form alternatives (USEPA, 1988). Alternatives were developed to provide a range of options consistent with USEPA RI/FS guidance (USEPA, 1988).

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7.1.1 Alternative PA-1: Cap-in-Place AOCs 9, 11, 40, 41, and Excavate/Dispose Off-Site SAs 6, 12, 13

Alternative PA-1 consists of placing a low-permeability cap on landfills at AOCs 9, 11, 40,
 41, excavating wastes at SAs 6, 12, 13, and disposing them off site.

The cap designs would include a hydraulic barrier layer to prevent infiltration of precipitation. A 30-year groundwater monitoring program would be performed at the capped landfills. Landfills where waste excavation occurs would be backfilled with soil and vegetated.

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7.1.2 Alternative PA-2: Excavate/Consolidate AOCs 9, 11, 40, 41, and SAs 6, 12 and 13 near Shepley's Hill

Alternative PA-2 is identical to Alternative 9. See Subsection 7.1.15 for Alternative 9
 description.

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7.1.3 Alternative PA-3: Excavate/Consolidate AOCs 9, 40, 41, and SAs 6, 12, and 13 at the North Post Landfill, and Cap-in-Place AOC 11

Alternative PA-3 consists of excavating wastes at AOCs 9, 40, 41, and SAs 6, 12, 13, and disposing of them in a consolidation landfill to be constructed at AOC 9 (North Post Landfill). The consolidation landfill would contain a leachate collection system and be covered with a low-permeability cap.

The landfill at AOC 11 would be covered in-place with a low-permeability cap designed to prevent infiltration of precipitation. A 30-year groundwater monitoring program would be performed at the capped landfills.

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7.1.4 Alternative PA-4: Excavate/Consolidate AOCs 9, 11, 40, 41, and SAs 6, 12, 13 at the North Post Landfill

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Alternative PA-4 consists of excavating wastes at AOCs 9, 11, 40, and 41 and SAs 6, 12, (all seven landfills) and disposing of them in a consolidation landfill to be constructed at AOC 9 (North Post Landfill). The consolidation landfill would contain a leachate collection system and be covered with a low-permeability cap. A 30-year groundwater monitoring program would be performed at the capped landfill.

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near Shepley's Hill, and Cap-in-Place AOCs 9 and 11 2 3 Alternative PA-5 consists of excavating wastes at AOCs 40 and 41 and SAs 6, 12, 13, and 4 disposing of them in a consolidation landfill to be constructed in the expansion area near 5 Shepley's Hill landfill. The consolidation landfill would contain a leachate collection 6 system and be covered with a low-permeability cap. 7 8 Landfills at AOCs 9 and 11 would be covered in-place with a low-permeability cap 9 designed to prevent infiltration of precipitation. A 30-year groundwater monitoring 10 program would be performed at the capped landfills. 11 12 7.1.6 Alternative PA-6: Excavate/Consolidate AOCs 9, 11, 41 and SAs 6, 12, and 13 13 near Shepley's Hill, and Cap-in-Place AOC 40 14 15 Alternative PA-6 consists of excavating wastes at AOCs 9, 11, 41, and SAs 6, 12, and 13 16 and disposing of them in a consolidation landfill to be constructed in the expansion area 17 near Shepley's Hill landfill. The consolidation landfill would contain a leachate collection 18 system and be covered with a low-permeability cap. 19 20 The landfill at AOC 40 would be covered in-place with a low-permeability cap designed to 21 prevent infiltration of precipitation. A 30-year groundwater monitoring program would be 22 performed at the capped landfills. 23 24 25 7.1.7 **Alternative 1: No Further Action** 26 Alternative 1 consists of NFA at all seven landfills. No remedial activities would be 27 undertaken to meet the response objectives described in Section 5 of this report. 28 29 7.1.8 Alternative 2: No Further Action at AOC 41, and SAs 6, 12, and 13; Limited 30 Removal at AOC 11 (Disposal at AOC 9), and Cap-in-Place at AOCs 9 and 31 40 32 33 Alternative 2 consists of NFA at AOC 41 and SAs 6, 12, 13. At AOC 11, surface debris 34 only would be removed and disposed under an in-place cap at AOC 9. At AOCs 9 and 35

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7.1.5 Alternative PA-5: Excavate/Consolidate AOCS 40, 41, and SAs 6, 12, and 13

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40, a low-permeability cap designed to prevent infiltration of precipitation would be
 constructed. A 30-year groundwater monitoring program would be performed at the two
 capped landfills.

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7.1.9 Alternative 3: No Further Action at AOC 41 and SAs 6, 12, and 13; and Cap-in-Place at AOCs 9, 11, and 40

Alternative 3 consists of placing a low-permeability cap designed to prevent infiltration of
 precipitation over landfills at AOCs 9, 11, 40. A 30-year groundwater monitoring
 program would be performed at the three capped landfills. No action would be taken at
 AOC 41 and SAs 6, 12, 13.

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7.1.10 Alternative 4: No Further Action at AOC 41 and SAs 6, 12, and 13; Limited Removal at AOC 11 (Disposal in Consolidation Landfill); and Excavation and Consolidation AOCs 9 and 40

Alternative 4 consists of excavating wastes at AOCs 9 and 40, and disposing of them in a consolidation landfill to be constructed in the expansion area near Shepley's Hill landfill. The consolidation landfill would contain a leachate collection system and be covered with a low-permeability cap. At AOC 11, surface debris only would be removed and disposed in the consolidation landfill. NFA would be taken at AOC 41 and SAs 6, 12, 13.

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7.1.11 Alternative 5: Limited Removal at AOC 11 (Disposal in Consolidation Landfill); and Cap-in-Place at AOC 41 and SAs 6, 12, and 13; and Excavation and Consolidation of AOCs 9 and 40

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Alternative 5 consists of excavating wastes at AOCs 9 and 40, and disposing of them in a consolidation landfill to be constructed in the expansion area near Shepley's Hill landfill.

The consolidation landfill would contain a leachate collection system and be covered with a low-permeability cap. A low-permeability cap designed to prevent infiltration of

precipitation would be placed on landfills at AOC 41 and SAs 6, 12, 13. A 30-year

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groundwater monitoring program would be performed at the capped landfills. At AOC 11
 surface debris only would be removed and disposed in the consolidation landfill.

7.1.12 Alternative 6: Cap-in-Place at AOC 41 and SAs 6, 12, and 13; and Excavation and Consolidation of AOCs 9, 11, and 40

Alternative 6 consists of excavating wastes at AOCs 9, 11, and 40, and disposing them in a consolidation landfill to be constructed in the expansion area near Shepley's Hill landfill. The consolidation landfill would contain a leachate collection system and be covered with a low-permeability cap. A low-permeability cap designed to prevent infiltration of precipitation would be placed on landfills at AOC 41 and SAs 6, 12, 13. A 30-year groundwater monitoring program would be performed at the capped landfills.

7.1.13 Alternative 7: Cap-in-Place at All Seven Disposal Areas

Alternative 7 consists of placing a low-permeability cap designed to prevent infiltration of precipitation on all seven landfills. A 30-year groundwater monitoring program would be performed at the capped landfills.

7.1.14 Alternative 8: Limited Removal at AOC 11 (Disposal in Consolidation Landfill); and Excavation and Consolidation of AOCs 9, 40, and 41, and SAs 6, 12, and 13

Alternative 8 consists of excavating wastes at AOCs 9, 40, 41 and SAs 6, 12, 13, and disposing them in a consolidation landfill to be constructed in the expansion area near Shepley's Hill landfill. The consolidation landfill would contain a leachate collection system and be covered with a low-permeability cap. At AOC 11, surface debris only would be removed and disposed in this consolidation landfill.

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7.1.15 Alternative 9: Excavation and Consolidation of All Seven Disposal Areas 1 2 Alternative 9 consists of excavating wastes at all seven landfills and disposing them in a 3 consolidation landfill to be constructed in the expansion area near Shepley's Hill landfill. 4 The consolidation landfill would contain a leachate collection system and be covered with 5 a low-permeability cap. 6 7 8 7.2 9 SCREENING OF ALTERNATIVES FOR THE CONSOLIDATION LANDFILL 10 Based on the screening approach presented at the beginning of this section, screening 11 matrices for each alternative are presented in Table 7-2 and a screening summary is 12 presented in Table 7-3. 13 14 7.2.1 Alternative PA-1: Cap-in-Place AOCs 9, 11, 40, and 41, and 15 Excavate/Dispose Off-Site SAs 6, 12, 13 16 17

Effectiveness. The long-term effectiveness of a low-permeability landfill cover at controlling potential future releases from the unsaturated zone beneath would depend on maintenance of cap integrity. If adequately installed and maintained, low-permeability cover systems have a history of effectively reducing surface infiltration to landfill materials, promoting surface water drainage, minimizing erosion, and isolating landfill materials from the environment.

24

Excavation and offsite disposal of landfill debris would effectively prevent human and ecological exposure and prevent the landfill from being a potential source of future groundwater contamination.

28

Implementability. Cover system construction can be accomplished using standard construction procedures and conventional earthmoving equipment. Many engineering and construction companies are qualified to design and construct a landfill cover system. Postclosure monitoring and maintenance are easily implementable. Installation of the cover

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system could increase the scope of potential future remedial actions at the site, if these
 actions required access to the debris.

4 Debris excavation and offsite disposal can be accomplished using standard construction 5 procedures and conventional earthmoving equipment, and many engineering and 6 construction companies are qualified and available.

8 **Cost.** The capital costs associated with this alternative are moderate. The associated 9 operating costs are moderate.

Conclusion. This alternative will be eliminated from further evaluation. Offsite disposal costs are too high compared to other available disposal options.

7.2.2 Alternative PA-2: Excavate/Consolidate AOCs 9, 11, 40, and 41, and SAs 6, 12, 13 near Shepley's Hill

Alternative PA-2 is identical to Alternative 9. See Subsection 7.2.15 for Alternative 9 screening.

7.2.3 Alternative PA-3: Excavate/Consolidate AOCs 9, 40, and 41 and SAs 6, 12, and 13 at North Post Landfill; Cap-in-Place AOC 11

Effectiveness. The long-term effectiveness of a low-permeability landfill cover at controlling potential future releases from the unsaturated zone beneath AOC 11 would depend on the maintenance of cap integrity. If adequately installed and maintained, low permeability cover systems have a history of effectively reducing surface infiltration to landfill materials, promoting surface water drainage, minimizing erosion, and isolating landfill materials from the environment.

Excavation of landfill debris would effectively prevent human and ecological exposure and would prevent the landfill from being a potential source of future groundwater contamination. The effectiveness of the consolidation facility at isolating landfill debris would depend on the quality of construction and proper maintenance of cover and leachate collection systems. Landfills that include groundwater protection systems with

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leachate collection, cover systems, and long-term monitoring and maintenance have a
 history of effectively isolating wastes from the environment.

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Implementability. Cover system construction can be accomplished using standard construction procedures and conventional earthmoving equipment. Many engineering and construction companies are qualified to design and construct a landfill cover system. Postclosure monitoring and maintenance are easily implementable. Installation of the cover system could increase the scope of potential future remedial actions at the site, if these actions required access to the debris.

10

Landfill excavation and construction can be accomplished using standard construction 11 procedures and conventional earthmoving equipment, and many engineering and 12 construction companies are qualified and available. Successful implementation of this 13 alternative is contingent on the approval and construction of a consolidation facility to 14 accept the excavated debris. The consolidation facility would be constructed and 15 maintained to effectively isolate landfill debris. Implementation of this alternative would 16 not limit or interfere with the ability to perform future remedial actions at the excavated 17 landfill. 18

19

Cost. The capital costs associated with this alternative are high. The associated operating
 costs are moderate.

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Conclusion. This alternative will be eliminated from further evaluation. Costs associated with excavating and staging wastes at the North Post Landfill prior to constructing the consolidation landfill are too high compared to constructing the landfill near Shepley's Hill.

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7.2.4 Alternative PA-4: Excavate/Consolidate AOCs 9, 11, 40, and 41 and SAs 6, 12, and 13 at North Post Landfill

Effectiveness. Excavation of landfill debris would effectively prevent human and ecological exposure and would prevent the landfill from being a potential source of future

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groundwater contamination. The effectiveness of the consolidation facility at isolating 1 landfill debris would depend on the quality of construction and proper maintenance of 2 cover and leachate collection systems. Landfills that include groundwater protection 3 systems with leachate collection, cover systems, and long-term monitoring and 4 maintenance have a history of effectively isolating wastes from the environment. 5

6

Implementability. Landfill excavation and construction can be accomplished using 7 standard construction procedures and conventional earthmoving equipment, and many 8 engineering and construction companies are qualified and available. Successful 9 implementation of this alternative is contingent on the approval and construction of a 10 consolidation facility to accept the excavated debris. The consolidation facility would be 11 constructed and maintained to effectively isolate landfill debris. Implementation of this 12 alternative would not limit or interfere with the ability to perform future remedial actions 13 at the excavated landfill. 14

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Cost. The capital costs associated with this alternative are high. The associated operating 16 costs are moderate. 17

Conclusion. This alternative will be eliminated from further evaluation. Costs associated 19 with excavating and staging wastes at the North Post Landfill prior to constructing the consolidation landfill are too high compared to constructing the landfill near Shepley's Hill. 22

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7.2.5 Alternative PA-5: Excavate/Consolidate AOCs 40 and 41 and SAs 6, 12, and 13 near Shepleys Hill, Cap-in-Place AOCs 9 and 11

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Effectiveness. The long-term effectiveness of a low-permeability landfill cover at 27 controlling potential future releases from the unsaturated zone beneath the landfills would 28 depend on the maintenance of cap integrity. If adequately installed and maintained, low-29 permeability cover systems have a history of effectively reducing surface infiltration to 30 landfill materials, promoting surface water drainage, minimizing erosion, and isolating 31 landfill materials from the environment. 32

- 33
- Excavation of landfill debris would effectively prevent human and ecological exposure and 34 would prevent the landfill from being a potential source of future groundwater 35

contamination. The effectiveness of the consolidation facility at isolating landfill debris would depend on the quality of construction and proper maintenance of cover and leachate collection systems. Landfills that include groundwater protection systems with leachate collection, cover systems and long-term monitoring and maintenance have a history of effectively isolating wastes from the environment.

6

Implementability. Cover system construction can be accomplished using standard construction procedures and conventional earthmoving equipment. Many engineering and construction companies are qualified to design and construct a landfill cover system. Postclosure monitoring and maintenance are easily implementable. Installation of the cover system could increase the scope of potential future remedial actions at the site, if these actions required access to the debris.

13

Landfill excavation and construction can be accomplished using standard construction 14 procedures and conventional earthmoving equipment, and many engineering and 15 construction companies are qualified and available. Successful implementation of this 16 alternative is contingent on the approval and construction of a consolidation facility to 17 accept the excavated debris. The consolidation facility would be constructed and 18 maintained to effectively isolate landfill debris. Implementation of this alternative would 19 not limit or interfere with the ability to perform future remedial actions at the excavated 20 landfill. 21

22

Cost. This capital costs associated with this alternative are high. The associated
 operating costs are moderate.

25

Conclusion. Alternative PA-5 will be eliminated from further evaluation. This alternative
 contains different actions for AOCs 9 and 40, the landfills having the two largest waste
 volumes. Thus, economics of scale cannot be realized.

307.2.6Alternative PA-6: Excavate/Consolidate AOCs 9, 11, 41 and SAs 6, 12, 1331near Shepley's Hill, Cap-in-Place AOC 40

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Effectiveness. The long-term effectiveness of a low-permeability landfill cover at controlling potential future releases from the unsaturated zone beneath AOC 40 would depend on the maintenance of cap integrity. When adequately installed and maintained, low permeability cover systems have a history of effectively reducing surface infiltration to landfill materials, promoting surface water drainage, minimizing erosion, and isolating landfill materials from the environment.

7

8 Excavation of landfill debris would effectively prevent human and ecological exposure and 9 would prevent the landfill from being a potential source of future groundwater 10 contamination. The effectiveness of the consolidation facility at isolating landfill debris 11 would depend on the quality of construction and proper maintenance of cover and 12 leachate collection systems. Landfills that include groundwater protection systems with 13 leachate collection, cover systems, and long-term monitoring and maintenance have a 14 history of effectively isolating wastes from the environment.

15

Implementability. Cover system construction can be accomplished using standard construction procedures and conventional earthmoving equipment. Many engineering and construction companies are qualified to design and construct a landfill cover system. Postclosure monitoring and maintenance are easily implementable. Installation of the cover system could increase the scope of potential future remedial actions at the site, if these actions required access to the debris.

22

Landfill excavation and construction can be accomplished using standard construction 23 procedures and conventional earthmoving equipment, and many engineering and 24 construction companies are qualified and available. Successful implementation of this 25 alternative is contingent on the approval and construction of a consolidation facility to 26 accept the excavated debris. The consolidation facility would be constructed and 27 maintained to effectively isolate landfill debris. Implementation of this alternative would 28 not limit or interfere with the ability to perform future remedial actions at the excavated 29 landfill. 30

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Cost. The capital costs associated with this alternative are high. The associated operating
 costs are moderate.

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Conclusion. Alternative PA-6 will be eliminated from further evaluation. This alternative contains different actions for AOCs 9 and 40, the landfills having the two largest waste volumes. Thus, economics of scale cannot be realized.

7.2.7 Alternative 1: No Further Action

This alternative will pass through screening and be evaluated in detail in Section 8.

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7.2.8 Alternative 2: No Further Action at AOC 41, and SAs 6, 12, and 13; and Limited Removal at AOC 11 (Disposal at AOC 9); and Cap-in-Place at AOCs 9 and 40

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Effectiveness. At SA 6, potential human health and environmental risks have not been evaluated in a PRE or baseline risk assessment, but are considered minimal. Therefore, this alternative is considered to provide limited protection of human health and the environment at SA 6.

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This alternative does not provide protection of human health and the environment at SAs 12 and 13, and AOC 41.

20

At AOC 11, removal and disposal of surface debris would remove potential physical hazards to occasional site visitors and reduce human and terrestrial receptor exposure to surface soil, thereby reducing potential risk. Because potential human health risks were within or below the USEPA target values, the human health risk reduction benefit is considered low. No actions would be included to reduce or monitor potential ecological risk from exposure to wetland soil/sediment or surface water.

27

The long-term effectiveness of a low permeability landfill cover at controlling potential future releases from the unsaturated zone beneath the landfill would depend on the maintenance of cap integrity. When adequately installed and maintained, low permeability cover systems have a history of effectively reducing surface infiltration to landfill

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materials, promoting surface water drainage, minimizing erosion, and isolating landfill
 materials from the environment.

4 **Implementability.** The NFA portion of this alternative would be easy to implement and 5 would not limit or interfere with the ability to perform future remedial actions.

Surface debris removal can be accomplished using standard construction procedures and
 conventional earthmoving equipment. Many engineering and construction companies are
 qualified and available.

11 Cover system construction can be accomplished using standard construction procedures 12 and conventional earthmoving equipment. Many engineering and construction companies 13 are qualified to design and construct a landfill cover system. Post-closure monitoring and 14 maintenance are easily implementable. Installation of the cover system could increase the 15 scope of potential future remedial actions at the site, if these actions required access to the 16 debris.

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Cost. The capital costs associated with this alternative are low. The associated operating costs low.

Conclusion. This alternative will be retained for detailed evaluation in Section 8.

7.2.9 Alternative 3: No Further Action at AOC 41 and SAs 6, 12, and 13; and Cap-in-Place at AOCs 9, 11, and 40

Effectiveness. At SA 6, potential human health and environmental risks have not been evaluated in a PRE or baseline risk assessment, but are considered minimal. Therefore, this alternative is considered to provide limited protection of human health and the environment at SA 6.

This alternative does not provide protection of human health and the environment at SAs 12 and 13, and AOC 41.

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The long-term effectiveness of a low permeability landfill cover at controlling potential future releases from the unsaturated zone beneath the landfill would depend on the

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maintenance of cap integrity. When adequately installed and maintained, low permeability 1 cover systems have a history of effectively reducing surface infiltration to landfill 2 materials, promoting surface water drainage, minimizing erosion, and isolating landfill 3 materials from the environment. 4 5 Implementability. The NFA portion of this alternative would be easy to implement and 6 7 would not limit or interfere with the ability to perform future remedial actions. 8 9 Cover system construction can be accomplished using standard construction procedures and conventional earthmoving equipment. Many engineering and construction companies 10 are qualified to design and construct a landfill cover system. Post-closure monitoring and 11 maintenance are easily implementable. Installation of the cover system could increase the 12 scope of potential future remedial actions at the site, if these actions required access to the 13 debris. 14 15 Cost. The capital costs associated with this alternative are moderate. The associated 16 operating costs are moderate. 17 18 Conclusion. This alternative will be retained for detailed evaluation in Section 8. 19 20 7.2.10 Alternative 4: No Further Action at AOC 41 and SAs 6, 12, and 13; and 21 Limited Removal at AOC 11 (Disposal in Consolidation Landfill); and 22 **Excavation and Consolidation of AOCs 9 and 40** 23 24 Effectiveness. At SA 6, potential human health and environmental risks have not been 25 evaluated in a PRE or baseline risk assessment, but are considered minimal. Therefore, 26 this alternative is considered to provide limited protection of human health and the 27 environment at SA 6. 28 29 This alternative does not provide protection of human health and the environment at 30 SAs 12 and 13, and AOC 41. 31 32

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At AOC 11, removal and disposal of surface debris would remove potential physical hazards to occasional site visitors and reduce human and terrestrial receptor exposure to surface soil, thereby reducing potential risk. Because potential human health risks are within or below the USEPA target values, the human health risk reduction benefit is considered low. No actions would be included to reduce or monitor potential ecological risk from exposure to wetland soil/sediment or surface water.

7

8 Excavation of landfill debris would effectively prevent human and ecological exposure and 9 would prevent the landfill from being a potential source of future groundwater 10 contamination. The effectiveness of the consolidation facility at isolating landfill debris 11 would depend on the quality of construction and proper maintenance of cover and 12 leachate collection systems. Landfills that include groundwater protection systems with 13 leachate collection, cover systems, and long-term monitoring and maintenance have a 14 history of effectively isolating wastes from the environment.

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Implementability. The NFA portion of this alternative would be easy to implement and would not limit or interfere with the ability to perform future remedial actions.

Surface debris removal can be accomplished using standard construction procedures and
 conventional earthmoving equipment. Many engineering and construction companies are
 qualified and available.

23 Landfill excavation and construction can be accomplished using standard construction procedures and conventional earthmoving equipment, and many engineering and 24 construction companies are qualified and available. Successful implementation of this 25 alternative is contingent on the approval and construction of a consolidation facility to 26 accept the excavated debris. The consolidation facility would be constructed and 27 maintained to effectively isolate landfill debris. Implementation of this alternative would 28 not limit or interfere with the ability to perform future remedial actions at the excavated 29 landfill 30

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Cost. The capital costs associated with this alternative are moderate. The associated operating costs are low.

34

35 **Conclusion.** This alternative will be retained for detailed evaluation in Section 8.

7.2.11 Alternative 5: Limited Removal at AOC 11 (Disposal in Consolidation Landfill); and Cap-in-Place at AOC 41 and SAs 6, 12, and 13; and Excavation and Consolidation AOCs 9 and 40

6 Effectiveness. At AOC 11, removal and disposal of surface debris would remove 7 potential physical hazards to occasional site visitors and reduce human and terrestrial 8 receptor exposure to surface soil, thereby reducing potential risk. Because potential 9 human health risks are within or below the USEPA target values, the human health risk 10 reduction benefit is considered low. No actions would be included to reduce or monitor 11 potential ecological risk from exposure to wetland soil/sediment or surface water.

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The long-term effectiveness of a low permeability landfill cover at controlling potential future releases from the unsaturated zone beneath the landfill would depend on the maintenance of cap integrity. When adequately installed and maintained, low permeability cover systems have a history of effectively reducing surface infiltration to landfill materials, promoting surface water drainage, minimizing erosion, and isolating landfill materials from the environment.

19

Excavation of landfill debris would effectively prevent human and ecological exposure and would prevent the landfill from being a potential source of future groundwater contamination. The effectiveness of the consolidation facility at isolating landfill debris would depend on the quality of construction and proper maintenance of cover and leachate collection systems. Landfills that include groundwater protection systems with leachate collection, cover systems, and long-term monitoring and maintenance have a history of effectively isolating wastes from the environment.

27

Implementability. Surface debris removal can be accomplished using standard construction procedures and conventional earthmoving equipment. Many construction companies are qualified and available.

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1 Cover system construction can be accomplished using standard construction procedures 2 and conventional earthmoving equipment. Many engineering and construction companies 3 are qualified to design and construct a landfill cover system. Post-closure monitoring and 4 maintenance are easily implementable. Installation of the cover system could increase the 5 scope of potential future remedial actions at the site, if these actions required access to the 6 debris.

Landfill excavation and construction can be accomplished using standard construction 8 procedures and conventional earthmoving equipment, and many engineering and 9 construction companies are qualified and available. Successful implementation of this 10 alternative is contingent on the approval and construction of a consolidation facility to 11 accept the excavated debris. The consolidation facility would be constructed and 12 maintained to effectively isolate landfill debris. Implementation of this alternative would 13 not limit or interfere with the ability to perform future remedial actions at the excavated 14 landfill 15

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Cost. The capital costs associated with this alternative are moderate. The associated operating costs are moderate.

Conclusion. This alternative will be retained for detailed evaluation in Section 8.

7.2.12 Alternative 6: Cap-in-Place at AOC 41 and SAs 6, 12, and 13; and Excavation and Consolidation of AOCs 9, 11, and 40

Effectiveness. The long-term effectiveness of a low permeability landfill cover at controlling potential future releases from the unsaturated zone beneath the landfills would depend on the maintenance of cap integrity. When adequately installed and maintained, low permeability cover systems have a history of effectively reducing surface infiltration to landfill materials, promoting surface water drainage, minimizing erosion, and isolating landfill materials from the environment.

31

Excavation of landfill debris would effectively prevent human and ecological exposure and would prevent the landfill from being a potential source of future groundwater contamination. The effectiveness of the consolidation facility at isolating landfill debris would depend on the quality of construction and proper maintenance of cover and

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leachate collection systems. Landfills that include groundwater protection systems with
 leachate collection, cover systems, and long-term monitoring and maintenance have a
 history of effectively isolating wastes from the environment.

4

5 Implementability. Cover system construction can be accomplished using standard 6 construction procedures and conventional earthmoving equipment. Many engineering and 7 construction companies are qualified to design and construct a landfill cover system. Post-8 closure monitoring and maintenance are easily implementable. Installation of the cover 9 system could increase the scope of potential future remedial actions at the site, if these 10 actions required access to the debris.

11

Landfill excavation and construction can be accomplished using standard construction 12 procedures and conventional earthmoving equipment, and many engineering and 13 construction companies are qualified and available. Successful implementation of this 14 alternative is contingent on the approval and construction of a consolidation facility to 15 The consolidation facility would be constructed and accept the excavated debris. 16 maintained to effectively isolate landfill debris. Implementation of this alternative would 17 18 not limit or interfere with the ability to perform future remedial actions at the excavated landfill 19

20

Cost. The capital costs associated with this alternative are high. The associated operating
 costs are moderate.

23

24 **Conclusion.** This alternative will be retained for detailed evaluation in Section 8.

25

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7.2.13 Alternative 7: Cap-in-Place at All Seven Disposal Areas

Effectiveness. The long-term effectiveness of a low permeability landfill cover at controlling potential future releases from the unsaturated zone beneath the landfills would depend on the maintenance of cap integrity. If adequately installed and maintained, low permeability cover systems have a history of effectively reducing surface infiltration to landfill materials, promoting surface water drainage, minimizing erosion, and isolating landfill materials from the environment.

Implementability. Cover system construction can be accomplished using standard construction procedures and conventional earthmoving equipment. Many engineering and construction companies are qualified to design and construct a landfill cover system. Postclosure monitoring and maintenance are easily implementable. Installation of the cover system could increase the scope of potential future remedial actions at the site, if these actions required access to the debris.

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Cost. The capital costs associated wit this alternative are high. The associated operating costs are high.

20 Conclusion. This alternative will be retained for detailed evaluation in Section 8.

7.2.14 Alternative 8: Limited removal at AOC 11 (Disposal in Consolidation Landfill); and Excavation and Consolidation of AOCs 9, 40, and 41, and SAs 6, 12, and 13

Effectiveness. At AOC 11, removal and disposal of surface debris would remove potential physical hazards to occasional site visitors and reduce human and terrestrial receptor exposure to surface soil, thereby reducing potential risk. Because potential human health risks are within or below the USEPA target values, the human health risk reduction benefit is considered low. No actions would be included to reduce or monitor potential ecological risk from exposure to wetland soil/sediment or surface water.

32

Excavation of landfill debris would effectively prevent human and ecological exposure and would prevent the landfill from being a potential source of future groundwater contamination. The effectiveness of the consolidation facility at isolating landfill debris

would depend on the quality of construction and proper maintenance of cover and
 leachate collection systems. Landfills that include groundwater protection systems with
 leachate collection, cover systems, and long-term monitoring and maintenance have a
 history of effectively isolating wastes from the environment.

5

9

6 **Implementability.** Surface debris removal can be accomplished using standard 7 construction procedures and conventional earthmoving equipment. Many engineering and 8 construction companies are qualified and available.

Landfill excavation and construction can be accomplished using standard construction 10 procedures and conventional earthmoving equipment, and many engineering and 11 construction companies are qualified and available. Successful implementation of this 12 alternative is contingent on the approval and construction of a consolidation facility to 13 accept the excavated debris. The consolidation facility would be constructed and 14 maintained to effectively isolate landfill debris. Implementation of this alternative would 15 not limit or interfere with the ability to perform future remedial actions at the excavated 16 landfill 17

18

Cost. The capital costs associated with this alternative are high. The associated operating
 costs are moderate.

21

22 **Conclusion.** This alternative will be retained for detailed evaluation in Section 8.

23

24

7.2.15 Alternative 9: Excavation and Consolidation of All Seven Disposal Areas

25

Effectiveness. Excavation of landfill debris would effectively prevent human and ecological exposure and would prevent the landfill from being a potential source of future groundwater contamination. The effectiveness of the consolidation facility at isolating landfill debris would depend on the quality of construction and proper maintenance of cover and leachate collection systems. Landfills that include groundwater protection systems with leachate collection, cover systems, and long-term monitoring and maintenance have a history of effectively isolating wastes from the environment.

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Implementability. Landfill excavation and construction can be accomplished using 2 3 standard construction procedures and conventional earthmoving equipment, and many engineering and construction companies are qualified and available. 4 Successful implementation of this alternative is contingent on the approval and construction of a 5 consolidation facility to accept the excavated debris. The consolidation facility would be 6 constructed and maintained to effectively isolate landfill debris. Implementation of this 7 alternative would not limit or interfere with the ability to perform future remedial actions 8 at the excavated landfill 9

10

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11 **Cost.** The capital costs associated with this alternative are high. The associated operating 12 costs are moderate.

13

14 **Conclusion.** This alternative will be retained for detailed evaluation in Section 8.

15



8.0 DETAILED ANALYSIS

3 This detailed analysis of alternatives provides a description of each candidate landfill 4 remediation alternative and an evaluation using the first seven of the evaluation criteria 5 recommended in USEPA's RI/FS guidance (USEPA, 1988) and described in Table 8-1. 6 The remaining two criteria, state and community acceptance, will be addressed after the 7 public comment period on the proposed plan. The nine alternatives that are evaluated in 8 this section are those remaining after screening in Section 7 and listed in Table 7-3. 9 10 Alternative 1: No Further Action 11 Alternative 2: No Further Action at AOC 41, and SAs 6, 12, and 13; 12 Limited Removal at AOC 11 (Disposal at AOC 9); and 13 Cap-in-Place at AOCs 9 and 40 14 Alternative 3: No Further Action at AOC 41 and SAs 6, 12, and 13; and 15 Cap-in-Place at AOCs 9, 11, and 40 16 Alternative 4: No Further Action at AOC 41 and SAs 6, 12, and 13; 17 Limited Removal at AOC 11 (Disposal in Consolidation Landfill); and 18 Excavation and Consolidation of AOCs 9 and 40 19 Alternative 5: Limited Removal at AOC 11 (Disposal in Consolidation Landfill); and 20 Cap-in-Place at AOC 41 and SAs 6, 12, and 13; and 21 Excavation and Consolidation of AOCs 9 and 40 22 Alternative 6: Cap-in-Place at AOC 41 and SAs 6, 12, and 13; and 23 Excavation and Consolidation of AOCs 9, 11, and 40 24 Alternative 7: Cap-in-Place at All Seven Disposal Areas 25 Alternative 8: Limited Removal at AOC 11 (Disposal in Consolidation Landfill); and 26 Excavation and Consolidation of AOCs 9, 40, and 41, and SAs 6, 12, and 27 13 28 Alternative 9: Excavation and Consolidation of All Seven Disposal Areas 29 30 31

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8.1 ALTERNATIVE 1: NO FURTHER ACTION
This subsection describes the NTA Alter in the state of t
This subsection describes the NFA Alternative and evaluates the alternative using the
seven evaluation criteria.
911 Departmention of Alternation 1
o.1.1 Description of Alternative 1
The NEA Alternative serves as a baseline alternative with which to some setup
alternatives per CERCLA regulations. No action will be taken to most the response
objectives stated in Section 5
objectives stated in Section 5.
8.1.2 Detailed Evaluation of Alternative 1
The following subsections present an assessment of this alternative according to the seven
evaluation criteria.
8.1.2.1 Overall Protection of Human Health and the Environment. The following
paragraphs assess how the proposed actions of the NFA Alternative would provide
protection of human health and the environment.
SA 6. Potential human health and environmental risks have not been evaluated in a PRE
or baseline risk assessment, but are considered minimal. Therefore, this alternative is
considered to provide limited protection of human health and the environment at SA 6.
<u>AOC 9</u> . This alternative does not include actions to provide protection of human health
and the environment at AOC 9. However, the Army interprets both the contribution to
potential risks by AOC 9 and the risk reduction benefit of remedial action at AOC 9 to be
low. The human health PRE for surface water and sediment is based on comparison to
difficing water and soil benchmarks values, respectively, and likely overestimates potential
exceed benchmark values, entrained soil particles in the complex mentions of the second banchmark values.
the exceedances and groundwater with high ontrained solids concentrations and the
unlikely to be used as a drinking water source. Further, monitoring data indicate that
uninery to be used as a drinking water source. Further, monitoring data indicate that

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1	exceedances occurred in samples collected both upgradient and crossgradient of AOC 9,
2	suggesting that AOC 9 is not the source of the exceedances. The USEPA, however, does
3	not concur and recommends that remedial response action be taken to reduce potential
4	risks at AOC 9.
5	
6	AOC 11, SA 12, SA 13, AOC 40, and AOC 41. This alternative does not provide
7	protection of human health and the environment at these areas.
8	
9	8.1.2.2 Compliance with ARARs. The NFA Alternative does not include any remedial
10	actions and would not trigger any location-specific ARARs.
11	
12	The National Primary Drinking Water Regulations (40 CFR Parts 141.11-141.16 and
13	141.50-141.53) are chemical-specific ARARs at AOC 40. Under Alternative 1, the MCL
14	for BEHP would be met under average conditions, and the MCL for arsenic would be met
15	under average and maximum conditions. Available data indicate that MCLs are not
16	exceeded at the Fatton wen.
17	The following federal and Massachusetts landfill closure regulations are appropriate for
10	consideration as potential action-specific ARARs for the seven disposal areas discussed in
20	this FS
21	
22	USEPA Criteria for Municipal Solid Waste Landfills at 40 CFR Part 258
23	1
24	 Massachusetts Solid Waste Management Regulations at 310 CMR 19.000
25	
26	USEPA Regulations for Owners and Operators of Permitted Hazardous Waste
27	Facilities at 40 CFR Part 264
28	
29	 Massachusetts Hazardous Waste Management Rules at 310 CMR 30.000
30	
31	USEPA regulations at 40 CFR Part 258 establish minimum national criteria under RCRA
32	for municipal solid waste units. However, USEPA has delegated authority to MADEP to
33	regulate municipal solid waste units in Massachusetts; therefore, USEPA regulations at 40
34	CFR Part 258 are not considered ARARs.
35	

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The Massachusetts Solid Waste Management Regulations at 310 CMR 19.000 regulate 1 the storage, transfer, processing, treatment, disposal, use, and reuse of solid waste in 2 3 Massachusetts. These regulations were adopted effective July 1, 1990 and contain specific detailed provisions for facilities in use on or after that date. For facilities that 4 ceased operation prior to July 1, 1990 but after April 21, 1971, (i.e., inactive landfills), the 5 regulations at 310 CMR 19.021(4)(a) require proof of closure in accordance with a plan 6 approved by the MADEP or submittal of a final closure and post-closure plan in 7 accordance with 310 CMR 19.030(3)(c)5. For landfills that ceased operation prior to 8 April 21, 1971 (also classified as inactive landfills), the regulations at 310 CMR 9 19.021(4)(b) indicate that preparation and submittal of final closure and post-closure plans 10 may be required if so ordered by the MADEP. 11 12

As shown in the following table, disposal at AOC 9, AOC 11, and SA 12 ceased between 13 April 1971 and July 1990; 310 CMR 19.021(4)(a) is considered applicable for these 14 inactive disposal areas. The remaining four disposal areas ceased operation prior to April 15 1971. Further, MADEP has not issued an order for preparation of final closure and post-16 closure plans for these four disposal areas. Therefore, 310 CMR 19.021(4)(b) is 17 considered relevant and appropriate for SA 6, SA 13, AOC 40, and AOC 41. 18

19

DISPOSAL AREA	CESSATION OF OPERATIONS	REGULATORY STATUS
SA 6	1920	310 CMR 19.021(4)(b), relevant and appropriate
AOC 9	1978	310 CMR 19.021(4)(a), applicable
AOC 11	1980	310 CMR 19.021(4)(a), applicable
SA 12	1982	310 CMR 19.021(4)(a), applicable
SA 13	1970	310 CMR 19.021(4)(b), relevant and appropriate
AOC 40	late 1960s	310 CMR 19.021(4)(b), relevant and appropriate
AOC 41	1950s	310 CMR 19.021(4)(b), relevant and appropriate

20

Under Alternative 1, the requirements of 310 CMR 19.021(4)(a) would not be met for 21

disposal areas at AOC 9, AOC 11, or SA 12. The SI, RI, and FS reports and the ROD 22

would be submitted to satisfy 310 CMR 19.021(4)(b) at SA 6, SA 13, AOC 40, and 23

AOC 41. 24

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1	USEPA regu	lations at 40 CFR Part 264 establish criteria for the treatment, storage, and
2	disposal of ha	azardous wastes. To be applicable to a CERCLA remedial action, the
3	following crit	teria must be met:
4		
5	the w	aste is a RCRA hazardous waste, and either:
6		
7	1)	the waste was initially treated, stored, or disposed of after November 19,
8		the effective date of CERCLA regulation, or
9		
10	2)	the activity at the CERCLA site constitutes treatment, storage, or disposal.
11		
12	The wastes a	t the seven disposal areas have not been shown to be, or identified as,
13	hazardous wa	astes, and in six of seven instances wastes were disposed of prior to 1980.
14	USEPA haza	rdous waste regulations at 40 CFR Part 264 are not considered ARARs.
15		
16	Massachusett	s Hazardous Waste Management Rules at 310 CMR 30.000 regulate the
17	generation, st	torage, collection, transport, treatment, disposal, use, reuse, and recycling of
18	hazardous ma	aterials in Massachusetts. Because wastes at the seven disposal sites have not
19	been identifie	d as hazardous, 310 CMR 30.000 is not considered an ARAR.
20	0102 I	
21	8.1.2.5 Long	g-term Effectiveness and Permanence. The following paragraphs assess
22	Alternative	reflectiveness and permanence of the proposed actions of the NFA
23	Alternative.	
24	SA6 This a	Itemative mere not provide long term effectiveness at controlling retention
25	<u>SAO</u> . This a	and environmental risks at SA 6 because undefined site risks may exist
20	numan neatti	and environmental fisks at SA 0, because undermed site fisks may exist.
27	AOC 9 Ass	tated in Subsection 8.1.2.1, the Army interprets the risk reduction benefits of
20	remedial resp	onse action at AOC 9 to be low. Therefore, this alternative is interpreted to
30	provide long-	term effectiveness at controlling site risks
31	provide iong	term encourveness at controlling site risks.
32	AOC 11. SA	12. SA 13. AOC 40, and AOC 41. This alternative would not provide long-
33	term effective	eness at controlling potential human health or environmental risks at these
34	areas.	
35		

1	8.1.2.4 Reduction of Toxicity, Mobility, and Volume Through Treatment. The
2	following paragraphs assess the reduction of toxicity, mobility, and volume of
3	contaminants through treatment offered by the proposed actions of the NFA Alternative.
4	
5	SA 6, AOC 9, AOC 11, SA 12, SA 13, AOC 40, and AOC 41. This alternative would not
6	use removal, containment, or treatment processes to address contamination at this site.
7	No reduction of toxicity, mobility, or volume of contaminants through treatment would
8	occur. This alternative would not satisfy the statutory preference for treatment as a
9	component of remedial actions.
10	•
11	8.1.2.5 Short-term Effectiveness. The following paragraphs assess the short-term
12	effectiveness of NFA proposed at each of the landfills.
13	1 1
14	SA 6, AOC 9, AOC 11, SA 12, SA 13, AOC 40, and AOC 41. This alternative would not
15	provide any remedial actions. Therefore, no short-term risks to the community or
16	environment would result from implementation
17	
18	8.1.2.6 Implementability. The following paragraphs assess the implementability of NFA
19	proposed at each of the landfills
20	
21	SA 6, AOC 9, AOC 11, SA 12, SA 13, AOC 40, and AOC 41. This alternative would be
22	easy to implement and would not limit or interfere with the ability to perform future
23	remedial actions
24	
25	8.1.2.7 Cost. Because no action would be taken, there are no capital or operation and
26	maintenance costs associated with this alternative
27	mantenance costs associated with this attenuitye.
28	
29	8.2 ALTERNATIVE 2: NO FURTHER ACTION AT AOC 41 AND SAS 6 12 AND
30	13: LIMITED REMOVAL AT AOC 11 (DISPOSAL AT AOC 9). AND CAD-IN-
31	PLACE AT AOCS 9 AND 40
37	
54	

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This subsection describes and evaluates Alternative 2 using the seven evaluation criteria,
 and provides a cost estimate.

8.2.1 Description of Alternative 2

This alternative includes different types of management at the seven disposal sites. At 6 AOC 41, and SAs 6, 12, and 13 NFA would be taken. At AOC 11 only surface debris 7 would be removed for disposal at AOC 9. At AOCs 9 and 40 a cap would be placed over 8 the debris. AOC 9 will have some consolidation of debris, which will minimize both the 9 area to be capped, and associated costs. The debris collected from AOC 11 would be 10 placed under this cap. Alternative 2 also includes removing exposed drums at AOC 40 to 11 remove a potential source of contamination, and excavation of sediment from two hot 12 spots in Cold Spring Brook Pond to reduce ecological risk from exposure to contaminated 13 sediments. These actions at AOC 40 were described previously in the FS for AOC 40 14 (ABB-ES, 1994b). 15

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Key components of Alternative 2 include:

19 No Further Action at AOC 41, SAs 6, 12, 13

- No action.
- Limited Removal at AOC 11
- 24

Mobilization/demobilization;

- Excavation of debris and transportation to AOC 9;
- Backfilling site; and
- Site restoration.
- 30 Cap-in-Place AOCs 9 and 40
- 31

29

- Mobilization/demobilization;
- Site preparation;
- Sediment removal and disposal at AOC 40;
- Drum removal and disposal at AOC 40;

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Consolidate debris at AOC 9; • 1 Cap construction; 2 • Site restoration; • 3 Wetland restoration; • 4 Institutional controls; • 5 Cover system monitoring and maintenance; and • 6 Five-year site reviews. 7 • 8 Each of these actions is described below: 9 10 8.2.1.1 Description of No Further Action Components for Alternative 2. The NFA 11 components are similar to those discussed for Alternative 1. Subsection 8.1.1. 12 13 8.2.1.2 Description of Limited Removal Components for Alternative 2. 14 15 Mobilization/demobilization. Excavation and backfill equipment including backhoes, front 16 end loaders, and dump trucks would be mobilized to AOC 11 to remove surface debris 17 and transport it to AOC 9. There would be minimal disruption to AOC 11. Clearing is 18 not anticipated and no roads would be constructed. 19 20 Excavation of debris and transportation to AOC 9. Excavation at AOC 11 would be 21 limited to surface debris and refuse. The 2+ acres of level area and the 10-foot banking 22 along the south wetlands have exposed refuse including large pieces of metal, wood, 23 bricks, and other construction debris. Clearing the landfill surfaces of trees and brush 24 would be minimal. Individual protruding debris items would be removed by excavators of 25 appropriate size, and hauled by truck to AOC 9, where it would be placed prior to cap 26 installation. About 500 cy would be handled. Silt fences may be installed along the 27 wetlands, to be removed after construction. No change in the wetlands footprint would 28 result after the landfill banking was regraded and revegetated. Disturbed wetlands would 29 be cleared of construction materials and left for natural revegetation. 30 31

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Backfilling site. The excavated/disturbed areas of AOC 11 would be backfilled with 1 vegetative soil and graded. 2 3 Site restoration. The site would then be restored by seeding, mulching, and fertilizing the 4 disturbed areas. Wetlands would be left for natural revegetation. 5 6 8.2.1.3 Description of Cap-In-Place Components for Alternative 2. 7 8 Mobilization/demobilization. Excavation and backfill equipment including backhoes, 9 bulldozers, and rollers would be mobilized at AOC 9 and AOC 40. Specialized equipment 10 may be required for cap construction at AOC 40, due to steep banks and heavy debris at 11 the bottom of the slopes at this area. Additional sediment removal equipment requiring 12 mobilization at AOC 40 includes an excavator or a clamshell crane, watertight dump 13 trucks, and water storage tanks. A plan view of AOC 9 is shown on Figure 8-1, and a 14 cross-section view on Figure 8-2. A plan view of AOC 40 is shown on Figure 8-3; a 15 cross-section view of AOC 40 is shown on Figure 8-4. 16 17 Site Preparation. Initial activities at both AOC 9 and AOC 40 would be some clearing of 18 trees, constructing temporary access roads, and installing silt fences and erosion control 19 measures. Contractor trailers with utilities would be established, and parking and staging 20 areas prepared. 21 22 At AOC 40, Cold Spring Brook Landfill, drum removal would be attempted by hydraulic 23 excavator or backhoe from the landfill surface. Some tree removal and minor regrading of 24 the landfill surface may be needed to accomplish this task. Sediment removal from 25 sediment Area I would also be attempted from the landfill surface. The most direct access 26 to sediment Area I from Patton Road would be to cross the landfill east of well 27 CSM-93-01A. However, the landfill surface is relatively high in this area and it may not 28 be possible to reach the entire sediment removal area. As an alternative, approaching the 29 sediment removal area via a more easterly route may make sense. The pond bank is lower 30 and the debris/rubble would provide a relatively firm foundation for excavation equipment. 31 Even with this approach, construction of up to 200 ft of temporary road along the edge of 32 the pond/landfill may be necessary. A third alternative would be to construct 33 approximately 500 ft of temporary access road along the northwestern side of the landfill. 34 Construction of either access road would likely require placement of a geotextile mat and 35

significant quantities of gravel over the naturally occurring peat to support heavy 1 equipment. Construction of the longer road would also require removal of a number of 2 trees. As indicated in Figure 8-3, it may be possible to construct the road along the 3 northwest edge of the landfill without crossing wetland areas. However, this would need 4 to be confirmed. The cost estimates for sediment removal at Area I are based on 5 construction and subsequent removal of 200 ft of temporary access road. 6 7 Prior to excavation at sediment Area II near the outlet of Cold Spring Brook Pond, some 8 fill material may need to be placed along the bank of the pond to provide a level platform 9 for equipment. Access would be from Patton Road east of the pond. For cost estimating 10 purposes, it is assumed that gravel would be obtained on-site from the southern side of 11 Patton Road to construct the work platforms and access roads. If this gravel cannot be 12 used, material costs would increase. These access roads would be temporary, and would 13 be removed following completion of remedial activities at the landfill. The cost estimates 14 include the cost to remove any temporary roads or work platforms at Area II. 15 16 17 Construction of a lined basin for dewatering sediment, a lined drum storage area for staging drums, small decontamination pads, a stockpile area approximately 1 acre in size 18 for cover system materials, and a small parking area would be required. 19 20 Partial dewatering of Cold Spring Brook Pond may be required prior to cap construction. 21 22 Sediment removal and disposal at AOC 40 Sediment removal is proposed at AOC 40 for 23 two hot spot locations producing elevated ecological risks due to arsenic and lead 24 contamination in Cold Spring Brook Pond. The first location (Area I) is a small inlet east 25 of monitoring well CSB-2 (see Figure 8-3). The second location (Area II) is at the pond 26 outlet. For cost estimating purposes, the volume of sediment to be removed has been 27 estimated to be 1,200 cy. 28 29 A silt fence or a floating boom weighted at its bottom would be placed around the two 30 excavation areas to prevent sediment suspended during excavation from migrating to other 31 locations in the pond. Sediment removal would be attempted by a long-stick hydraulic 32 excavator or a crane with a watertight clamshell bucket to minimize the quantity of water 33

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and sediment spilling adjacent to the excavation. If access from the top of the landfill is 1 not successful, a temporary access road would be constructed along the northern side of 2 the landfill, and sediment would be removed with an excavator. Sediment would be 3 placed in watertight dump trucks and transported to a lined dewatering basin constructed 4 as close to the landfill area as practicable. For cost estimating purposes, the lined 5 dewatering basin is proposed to be 100 by 100 ft with a 4 ft. depth, constructed with an 6 impervious liner to temporarily store sediment and water. 7 8 As the sediment settles out, the supernatant water would be pumped into tanks and 9 sampled. If analysis shows that the water will not cause Cold Spring Brook Pond to 10 exceed AWQC, it would be discharged back to the pond. If water quality does not meet 11 acceptable criteria, it would be treated on-site in a mobile clarifier before discharge to the 12 pond. Sediments would be disposed at AOC 9. The addition of a sorbent or solidifying 13 agent may be necessary to eliminate free water prior to transport and disposal. For cost 14 estimating purposes, treatment of supernatant water is assumed. 15 16 Drum removal and disposal at AOC 40. At AOC 40, 14 55-gallon drums along the 17 northern edge of Cold Spring Brook Landfill would be removed. Drums are located on 18 the landfill bank, as well as partially submerged in the pond (see Figure 8-3). Drum 19 removal would be attempted with a backhoe or hydraulic excavator working from cleared 20 areas on top of the landfill. 21 22 Drums with contents would be lifted manually or by means of a sling, and overpacked into 23 85-gallon drums. These drums would then be removed and staged on a lined, bermed, 24 on-site staging area approximately 400 square ft in size. Drum contents would be sampled 25 and analyzed for TCLP constituents following drum staging. After TCLP results are 26 obtained, the drums would be disposed at AOC 9 or an off-site RCRA Treatment, 27 Storage, or Disposal (TSD) facility. Empty drums would be placed in polybags and taken 28 to AOC 9. 29 30 Consolidate debris areas at AOC 9. AOC 9, shown on Figure 8-1, consists of five 31 separate areas. In this alternative, the four smaller peripheral areas would be excavated 32 using standard excavation equipment (e.g., hydraulic excavators) and spread and 33 34 compacted over existing grades in the large area. Consolidation will minimize the size of the cap at AOC 9 and the corresponding costs. The debris from the peripheral AOC 9 35

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1	areas, as well as the debris from the limited removal at AOC 11, can be used to minimize the amount of subgrade fill required to create the proper grades for the cap at AOC 9.	2
3	the amount of subgrade in required to create the proper grades for the cap at AOC 9.	
4 5	Cap Construction. To conform with the intent of regulations 310 CMR 19.112: a landf cover must meet six general performance standards:	ill
6		
7	 minimize surface water infiltration to landfilled material 	
8	 promote surface water drainage 	`
9	minimize erosion	
10	 facilitate venting and control of landfill gas 	
11	 isolate landfilled material from the environment 	
12	 accommodate settling and subsidence 	
13		
14	The regulations also provide general design and component standards to achieve the	
15	performance standards. The conceptual cover system design for AOC 9 would conform	
16	o the general design standards in regard to final top slope, side slope and layer	
17	construction. Because of the age and nature of the landfill debris, landfill gas generation	is
18	not expected, and gas vents are not included. A cross section of the cap is shown on	
19	Figure 8-5.	
20		
21	The conceptual cover system design for AOC 40 is intended to achieve the performance	
22	tandards, but varies slightly from the general design standards. A cross section of the ca	ıp
23	s shown on Figure 8-4. Several factors combine to require a special approach to top slo	pe
24	nd side slope design:	
25		
26	 the proximity of Patton Road 	
27		
28	• the shallow slope of the existing landfill surface	
29	the intermented as other and flow of an one has the here of the	
30	 the interpreted northward flow of groundwater beneath the landfill and discharge to Cold Spring Proof. Pard 	
31	discharge to Cold Spring Brook Pond	
32		

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• the landfilled debris that extend into the pond along much of the landfill's northern boundary

These factors create two special design constraints. The first constraint is the need to 4 minimize the diversion of surface water from the landfill cover toward Patton Road, and 5 the second is to not interrupt the continued discharge of groundwater to the pond. The 6 closeness of the landfill to the road and the similarities in surface elevation make 7 construction of drainage ditches, especially open, lined ditches, problematic. To minimize 8 the southward diversion of surface water, this alternative proposes to hold cover system 9 buildup to a minimum. It may also be necessary to incorporate surface slopes of less than 10 5 percent. The narrowness of the landfill will help promote adequate lateral drainage at 11 shallow slopes. Minimizing the buildup of the landfill surface in the middle of the landfill 12 and reducing final top slope can be achieved by increasing side slope and thereby reducing 13 the volume of waste pullback. (It is assumed that material pulled back from the sides 14 would be placed on top of the landfill). Side slope design to prevent instability will be 15 considered as part of the design to address the second special design constraint, continued 16 groundwater passage. 17

Maintenance of normal groundwater flow is an important design consideration.
 Construction of low permeability cap on the north side of the landfill would block

21 groundwater discharge to the pond and could have several adverse effects.

- The water balance of the pond would change. A reduced groundwater discharge to the pond could result in lower water levels, reduced water quality, and adverse ecological effects.
- Buildup of groundwater behind low permeability side slope cover would result in unbalanced hydrostatic heads and could contribute to side slope cover failure.
- Buildup of groundwater behind low permeability side slope cover has the potential to increase contact between debris and groundwater and the possibility of leaching.

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The effect of raising the water table in the vicinity of the landfill on 1 groundwater quality at Patton Well is not known. 2 3 To maintain undisturbed groundwater discharge to Cold Spring Brook Pond, it is 4 proposed to construct a riprap side slope on the north side of the landfill. A trench would 5 be excavated through the layer of sediment at the bottom of the pond to the underlying 6 sand layer to provide a stable footing for the riprap. A representative cross section 7 through the proposed cover system showing a conceptual layout of the cover system north 8 side slope is shown in Figure 8-5. It is proposed that the riprap slope extend as high as 9 possible, at a slope of 1.5 or 2 to 1 and that areas with 3 to 1 slope be held to a minimum. 10 Use of riprap material should enable construction of a stable slope steeper than 3 to 1. 11 During the cover system design, a natural filter should be designed to prevent siltation or 12 erosion below the groundwater table. In addition, the weight of the cover system layers 13 and the groundwater uplift pressures should be compared to determine if the cover system 14 needs to be thicker or if the geomembrane requires anchoring. 15 16 The proposed design does not include a gas venting layer because the construction debris 17 in the Cold Spring Brook Landfill is not anticipated to generate landfill gas. Furthermore, 18 the proposed placement of riprap on the north side of the landfill would allow landfill gas 19 to escape and prevent gas accumulation, achieving the intent of 310 CMR 19.112. 20 21 To meet the desired performance standards, the proposed cover system would consist of 22 23 the following components from bottom to top: 24 subgrade fill 25 • geomembrane 26 drainage layer 27 • geotextile • 28 moisture retention layer . 29 vegetative cover layer 30

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Prior to placement of cover system layers, trees on the landfill surface would be cleared. 1 In addition, grading of the landfill material and surface soil and addition of clean subgrade 2 fill would be required to achieve cover design slopes. Subgrade fill would be free of 3 materials that may damage or abrade the geomembrane and be of sufficient thickness to 4 collect all solid waste. Regulations 310 CMR 19.112 specify a minimum top slope of 5 5 percent, and a maximum side slope of three horizontal to one vertical. However, as 6 discussed previously, a more shallow top slope and a steeper side slope are proposed for 7 at Cold Spring Brook Landfill. In addition to achieving required slopes, grading would 8 cover or move any pieces of concrete or metal protruding from the surface of the landfill, 9 and would sufficiently fill void spaces in the upper portion of the debris to create a stable 10 base on which to place the cover system. Because of the makeup and age of the landfill 11 debris, problems are not expected from future settling and subsidence. To grade the 12 landfill surface effectively, some of the larger pieces of concrete and asphalt pavement may 13 need to be broken up. 14 15

The majority of the cover system can be placed with equipment working from the graded landfill surface. However, to complete the cover system at the toe of the slope, a temporary access road may be required along the northeastern edge of the landfill, within the limits of Cold Spring Brook Pond. To construct this access road, the pond may require partial dewatering, or, alternately, installation of coffer dams and groundwater pumping to enable access by construction equipment.

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To promote stormwater runoff from the cover system, top slopes would be graded down 23 to the north, east and west as much as feasible. Little stormwater run-on to the cover 24 system is anticipated from Patton Road and areas south of the landfill because the soil in 25 the vicinity is sandy. A shallow, unlined drainage swale could be constructed along the 26 southern edge of the cover system to direct stormwater from Patton Road around the 27 cover system to Cold Spring Brook Pond (see Figure 8-3). However, runoff from the 28 cover would be expected to infiltrate rapidly, pre-empting the need for the drainage swale 29 in the first place. Stormwater calculations would be conducted during design to determine 30 the required extent of stormwater controls. 31

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A textured geomembrane is proposed for the hydraulic barrier of the landfill cover. The hydraulic barrier would have a maximum in-place saturated hydraulic conductivity of

 1×10^{-7} centimeter per second (cm/sec) and be placed above the subgrade fill.

1 A 12-inch minimum thickness drainage layer with a minimum hydraulic conductivity of 2 1×10^{-3} cm/sec would be placed above the geomembrane to promote lateral drainage and 3 minimize accumulation of water above the geomembrane. The drainage layer would direct 4 intercepted infiltration to the perimeter of the cover and ultimately to Cold Spring Brook 5 Pond 6 7 A layer of geotextile will be placed above the drainage layer to prevent the migration of 8 fines to the drainage layer. 9 10 An 18-inch layer of moisture retention soil will be placed above the geotextile. The 11 moisture retention layer will protect underlying layers from the adverse effects of 12 desiccation, extreme temperatures, frost, and erosion. 13 14 A 6-inch layer of soil capable of supporting grass growth would be placed above the filter 15 layer. This soil should contain some fines to improve its capacity to hold water, and it 16 would be seeded, fertilized and mulched to promote a stable vegetative cover. 17 18 This cover system results in a total soil thickness of 36 inches above the hydraulic barrier 19 layer. This is less than the estimated frost depth for central Massachusetts of 20 approximately 4 feet (U.S. Navy, 1982); however, the performance of geomembrane 21 layers is not as sensitive to frost as is clay or clay/soil barriers. 22 23 The Army believes this conceptual design meets the general performance standards of 310 24 CMR 19.112. The conceptual design would be reviewed and refined during the final 25 design phase to optimize the balance between top/side slopes and runoff/drainage 26 concerns. 27 28 For the cost estimating purposes of this FS, cover system material quantities have been 29 estimated to include an extension of the cover system layers beyond the limits of landfill 30 debris. 31 32

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1	Site restoration. The AOC 9 and AOC 40 sites will be restored by seeding, mulching, and
2	fertilizing the disturbed areas. Wetlands will be left for natural revegetation.
3	
4	Wetlands Restoration. Remedial activities at AOC 9 and AOC 40 will occupy bordering
5	wetland areas which would be restored in accordance with a Wetland Restoration
6	Specification (WRS) prepared prior to any wetland restoration.
7	
8	At AOC 40, the northern edge of the low-permeability cover system, and the additional
9	length of access road proposed for this alternative would extend beyond the limits of the
10	landfill into Cold Spring Brook Pond. Areas of sediment excavation, temporary access
11	road construction, and ditch excavation at the toe of the cover system would be backfilled
12	and graded, and some areas potentially revegetated. For cost estimating purposes, the
13	extent of wetland restoration associated with landfill capping and sediment removal is
14	assumed to be approximately 1.5 acres. This area would increase to an estimated
15	2.5 acres of the landfill was excavated for subsequent disposal/consolidation. The WRS
16	would incorporate guidelines from the Massachusetts Wetland Protection Act and
17	Regulations, specifically 310 CMR 10.55. The primary goal of wetland restoration
18	activities at Cold Spring Brook Pond and the surrounding wetland area would be to
19	restore self-sustaining freshwater wetlands in situ (i.e., in the same "footprint" as the
20	altered wetlands).
21	Postoration of watlands at Cold Spring Prook Dond would
22	Restoration of wetlands at Cold Spring Brook Fold would.
25	• reduce the long term impacts of activities in and adjacent to the wetlands:
24	• reduce the long-term impacts of activities in and adjacent to the wettands,
25	 compensate for losses of wetland habitats:
20	· compensate for fosses of wehand habitats,
28	 restore or replace degraded wetlands: and
20	· restore or replace degraded weblands, and
30	• meet state and federal permitting and regulatory guidelines and
31	requirements
32	
33	At Cold Spring Brook Pond and the surrounding wetland area, it is anticipated that
34	required wetland restoration would be relatively minor. The areas of sediment excavation
35	within the pond would require backfilling to pre-remediation grade. Restoration in the

wetland area on the northwest side of Cold Spring Brook Landfill, where an access road 1 may be placed, would require removal of road materials, backfilling and grading to match 2 the pre-remediation grade, and potentially revegetating the disturbed area. 3 4 5 Based on regulatory guidelines, including 310 CMR 10.55 and wetlands regulations regarding restoration, the WRS should include: careful consideration of Cold Spring 6 Brook Pond hydrology, topography, vegetation, and soil characteristics; evaluation of 7 wetlands functional assessment; examination of regional wetlands replacement literature; 8 consultation with regulatory and technical authorities; and experience with similar wetland 9 restoration projects. This WRS would be prepared in accordance with state and federal 10 technical requirements for wetland alteration. Development of the WRS may depend on 11 terms described in the IAG between the U.S. Army and the USEPA (USEPA, 1991b). 12 The WRS would include a detailed description of all proposed activities, a discussion of 13 goals based on wetland functional attributes, and a long-term monitoring plan (which 14 would be combined with the proposed biomonitoring). 15 16 The goal of wetlands restoration would be to restore the wetland within the same footprint 17 to achieve at a minimum, the same values and functions as determined by the evaluation 18 used to assess the functions and values of the Cold Spring Brook wetland. 19 20 It is difficult to estimate the costs of implementing the WRS until it has been developed 21 and approved, and state and federal regulatory requirements are better defined. For cost-22 estimating purposes of this FS, a cost of \$50,000 per acre is assumed for wetland 23 restoration activities, including soil replacement, revegetation, monitoring, and 24 maintenance. 25 26 Institutional Controls. Institutional controls for AOC 9 and AOC 40 are proposed in the 27 form of land use restrictions for any property released by the U.S. Army during Fort 28 Devens base closure activities. The Devens Reuse Plan, Main and North Posts (VHB, 29 1994) has proposed that U.S. Army land north of Patton Road, including Cold Spring 30 Brook Landfill and Cold Spring Brook Pond, would be zoned as open space. 31 32

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By preempting residential use, these controls will help limit human exposure. In addition, 1 the U.S. Army will place land use restrictions at AOCs 9, 11, and 40 in conformance with 2 310 CMR 19.141. This, in combination with long-term groundwater monitoring, would 3 protect potential human receptors from potential future releases to groundwater. These 4 controls would be drafted, implemented and enforced in cooperation with state and local 5 government. 6 7 Cover System Monitoring and Maintenance. Massachusetts Solid Waste Management 8 Regulations (310 CMR 19.142) require the post-closure monitoring period to extend a 9 minimum of 30 years. Proposed cover system monitoring and maintenance at AOC 9 and 10 AOC 40 would consist of conducting annual site inspections, performing needed cover 11 system repairs, and mowing. 12 13 Inspections would be conducted to ensure the integrity of the landfill cover system layers, 14 surface water diversion trenches, monitoring wells, access roads, and the general site 15 conditions. Required maintenance activities would be proposed and conducted based on 16 information from site inspections. 17 18 Groundwater monitoring is proposed to confirm that groundwater quality will remain 19 acceptable over time. For AOC 9, a minimum of one upgradient and three downgradient 20 monitoring wells is assumed for cost estimating. All monitoring wells would be sampled 21 and analyzed semi-annually consistent with the monitoring requirements of 310 CMR 22 19.132 for a minimum of 30 years. Assumptions made for this monitoring plan are for 23 cost estimating purposes only. A final detailed monitoring plan would be developed in 24 conjunction with regulatory agency review and comment. 25 26 At Cold Spring Brook Landfill, AOC 40, extra monitoring wells would be used to detect 27 potential contaminant migration toward Patton Well. Five existing monitoring wells, 28 CSB-1, CSB-2, CSB-3, CSM-93-2A, and CSM-93-02B, plus the two newly installed 29 downgradient wells, would be sampled and analyzed semi-annually. 30 31 Landfill gas monitoring is not proposed at Cold Spring Brook Landfill. The construction 32 debris at the landfill is not expected to generate landfill gas, and ambient air monitoring 33 during the RI did not identify VOCs above background at the landfill. 34 35

Five-year Site Reviews. Under CERCLA 121c, any remedial action (or lack thereof) that 1 results in contaminants remaining on-site must be reviewed at least every five years. Data 2 collected during the groundwater monitoring program would provide information for 3 these reviews. The reviews would evaluate whether Alternative 2 is protective of human 4 health and the environment and whether additional remedial actions should be initiated. 5 6 7 8.2.2 Detailed Evaluation of Alternative 2 8 The following subsections present an assessment of Alternative 2 according to the seven 9 evaluation criteria. 10 11 8.2.2.1 Overall Protection of Human Health and the Environment. The following 12 paragraphs assess how the proposed actions of Alternative 2 would provide protection of 13 human health and the environment 14 15 SA 6. Overall protection of human health and the environment is similar to that discussed 16 for the NFA Alternative in Subsection 8.1.2.1. 17 18 AOC 9. Installation of a low permeability cover at AOC 9 would remove potential 19 physical hazards to occasional site visitors, limit human and ecological exposure to surface 20 soils, and reduce infiltration of precipitation which could potentially leach contaminants 21 from landfill debris and contaminate groundwater. Implementation of a long-term 22 groundwater monitoring program and five-year site review would provide a means to 23 assess the affect of potential future releases of contaminants on groundwater. Because the 24 PRE did not identify significant potential for human or ecological exposure risk at AOC 9, 25 the risk-reduction benefit from capping AOC 9 is considered low. 26 27 AOC 11. Removal and disposal of surface debris would remove potential physical hazards 28 to occasional site visitors and reduce human and terrestrial receptor exposure to surface 29 soil, thereby reducing potential risk. Because potential human health risks were within or 30 below the USEPA target values, the human health risk-reduction benefit is considered 31 low. No actions would be included to reduce or monitor potential ecological risk from 32 exposure to wetland soil/sediment or surface water. 33

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- SA 12. Similar to the NFA Alternative, this alternative would not provide protection of human health and the environment.
 SA 13. Similar to the NFA Alternative, this alternative would not provide protection of human health and the environment.
- <u>AOC 40</u>. Alternative 2 has significant potential for protecting human health and the
 environment under both current and future land use conditions. As stated previously, no
 current residential groundwater exposure or risk exists at Cold Spring Brook Landfill.
- This alternative relies on institutional controls in the form of land use restrictions to
 control potential future residential exposure to groundwater at Cold Spring Brook
 Landfill. Removal and disposal of discarded 55-gallon drums would remove associated
- physical hazards and prevent them from acting as a potential source of soil or water contamination.
- 17

1

- Installation of a low permeability cover at AOC 40 would remove potential physical 18 hazards to occasional site visitors, limit human and ecological exposure to surface soils, 19 and reduce infiltration of precipitation which could potentially leach contaminants from 20 landfill debris and contaminate groundwater, surface water, and sediments. The baseline 21 risk assessment did not identify significant potential risk from exposure to surface soil; 22 however, potential groundwater, surface water, and sediment contamination is a concern. 23 Alternative 2 would provide protection of the Patton Well by installing two additional 24 monitoring wells between Patton Well and the landfill and providing long-term monitoring 25 of these and other Cold Spring Brook Landfill monitoring wells. Implementation of a 26 long-term groundwater monitoring program and five-year site reviews would provide a 27 means to assess the affect of potential future releases of contaminants on groundwater as 28 well as monitor potential migration of contaminants toward Patton Well. 29 30 Removing sediment from Cold Spring Brook Pond would reduce potential ecological risk 31 from exposure to those sediments. 32
- 33
- AOC 41. Similar to the NFA Alternative, this alternative would not provide protection of
 human health and the environment.

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8.2.2.2 Compliance with ARARs. Tables 8-2, 8-3, and 8-4 summarize how Alternative 2 2 will attain ARARs. 3 4 8.2.2.3 Long-term Effectiveness and Permanence. The following paragraphs assess 5 the long-term effectiveness and permanence of the proposed actions of Alternative 2. 6 7 SA 6. The long-term effectiveness of this alternative is similar to that discussed for the 8 NFA Alternative in Subsection 8.1.2.1. 9 10 AOC 9. The long-term effectiveness of a low permeability landfill cover at controlling 11 potential future releases from the unsaturated zone beneath the landfill would depend on 12 maintenance of cap integrity. If adequately installed and maintained, low permeability 13 cover systems have a history of effectively reducing surface infiltration to landfill 14 materials, promoting surface water drainage, minimizing erosion, and isolating landfill 15 materials from the environment. 16 17 A landfill cover system would not reduce potential future releases to groundwater from 18 wastes located in the saturated zone. 19 20 AOC 11. Removal of surface debris would provide long-term and effective protection 21 from existing physical hazards. The proposed action would not limit infiltration of 22 precipitation with the potential benefit of reducing contaminant leaching. Portions of the 23 landfill are subject to periodic flooding by the Nashua River which could expose expose 24 currently buried debris, possibly transport it to new locations, and present new exposure 25 hazards or pathways. 26 27 SA 12. Similar to the NFA Alternative, this alternative would not provide long-term 28 effectiveness at protecting human health or the environment. 29 30 SA 13. Similar to the NFA Alternative, this alternative would not provide long-term 31 effectiveness at protecting human health or the environment. 32 33

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AOC 40. The long-term effectiveness of the low permeability cover system at controlling 1 potential future releases from the unsaturated zone of the landfill would depend on 2 maintenance of cap integrity. When adequately installed and maintained, low-permeability 3 cover systems have a history of effectively reducing surface infiltration to landfilled waste. 4 promoting surface water drainage, minimizing erosion, and isolating landfilled materials 5 from the environment 6 7 Along the northeastern toe of the Cold Spring Brook Landfill, debris can be seen in 8 contact with water, and it is not known how much debris is in contact with groundwater 9 within the landfill. A landfill cover system would not reduce potential future releases from 10 the saturated zone. Consideration must be given during the design of the toe of the 11 landfill cover system to ensure that groundwater flow to the pond is not interrupted by 12 cover system layers. The long-term effectiveness of this alternative at preventing potential 13 human exposure also depends on enforcement of institutional controls and the long-term 14 groundwater monitoring program. 15 16 Excavation, removal, and disposal of hot spot sediments and drums from Cold Spring 17 Brook Pond and the landfill area would eliminate current risk to aquatic and semi-aquatic 18 receptors. Long-term sediment and biomonitoring programs would monitor potential 19 future releases to the pond. 20 21 AOC 41. Similar to the NFA Alternative, this alternative would not provide long-term 22 effectiveness at protecting human health or the environment. 23 24 8.2.2.4 Reduction of Toxicity, Mobility, and Volume Through Treatment. The 25 following paragraphs assess the reduction of toxicity, mobility, and volume of 26 contaminants through treatment offered by the proposed actions of Alternative 2. 27 28 SA 6. Similar to the NFA Alternative, there would be no reduction of toxicity, mobility, 29 or volume of contaminants through treatment. This alternative would not satisfy the 30 statutory preference for treatment as a component of remedial actions. 31 32 AOC 9. Reduction of toxicity, mobility, or volume of contaminants through treatment 33 would not be achieved. By reducing the potential for contaminant leaching in the 34

1 2	unsaturated zone, the potential for contaminant migration to groundwater would be reduced.
3	
4	AOC 11. Reduction of toxicity, mobility, or volume of contaminants through treatment
5	would not be achieved. Removal of surface debris would reduce waste volume at
6	AOC 11; this volume would be transferred to another disposal site, however,
7	,
8	SA 12. Similar to the NFA Alternative, there would be no reduction of toxicity, mobility,
9	or volume of contaminants through treatment. This alternative would not satisfy the
10	statutory preference for treatment as a component of remedial actions.
11	
12	SA 13. Similar to the NFA Alternative, there would be no reduction of toxicity, mobility,
13	or volume of contaminants through treatment. This alternative would not satisfy the
14	statutory preference for treatment as a component of remedial actions.
15	
16	AOC 40. Reduction of toxicity, mobility, or volume of landfill contaminants through
17	treatment would not be achieved. By reducing the potential for leaching of landfill
18	materials in the unsaturated zone, the potential for contaminant migration to groundwater
19	would be reduced. No reduction of toxicity, mobility, or volume of groundwater
20	contaminants would be achieved. Sediment and drum removal would not reduce the
21	toxicity or volume of associated contaminants. Disposal of drums and dewatered
22	sediments under the low permeability cover at AOC 9 or at another approved disposal
23	facility would reduce contaminant mobility.
24	
25	AOC 41. Similar to the NFA Alternative, there would be no reduction of toxicity,
26	mobility, or volume of contaminants through treatment. This alternative would not satisfy
27	the statutory preference for treatment as a component of remedial actions.
28	
29	8.2.2.5 Short-term Effectiveness. The following paragraphs assess the short-term
30	effectiveness of the actions proposed at each of the landfills.
31	SA 6 Similar to the NEA Alternative no action would be taken which the
32	<u>SA 0.</u> Similar to the NFA Alternative, no action would be taken which would present
33	short-term risks to workers, the community, or the environment.

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AOC 9. This alternative would present minimal short-term risks to workers, the 2 community, and the environment. Risk to the community would be minimal because 3 residences are not close enough to the site to be impacted by noise or dust potentially 4 generated from cover system placement activities. It is anticipated that deliveries can be 5 planned to avoid creating traffic congestion and hazards. 6 7 RCRA and Department of Transportation (DOT) regulations affecting handling and 8 transportation of any potentially hazardous soils/sediments would reduce the risk of 9 community exposure to an uncontrolled release of hazardous materials. 10 11 Grading the landfill prior to capping could present potential risk to workers if hazardous 12 materials are uncovered. Exposure to potentially contaminated soil and debris could be 13 reduced to a safe level by worker adherence to general health and safety practices, and use 14 of personnel monitoring during any intrusive activities at the landfill. 15 16 AOC 11. This alternative would be expected to present minimal short-term risks to 17 workers, the community, and the environment. Risk to the community would be minimal 18 because residences are not close enough to the site to be impacted by noise or dust 19 potentially generated from debris removal activities. It is anticipated that debris removal 20 activities can be planned to avoid creating traffic congestion and hazards. 21 22 Grading the landfill prior to capping could present potential risk to workers if hazardous 23 materials are uncovered. Exposure to potentially contaminated soil and debris could be 24 reduced to a safe level by worker adherence to general health and safety practices, and use 25 of personnel monitoring during any intrusive activities at the landfill. 26 27 SA 12. Similar to the NFA Alternative, no action would be taken which would present 28 short-term risks to workers, the community, or the environment. 29 30 SA 13. Similar to the NFA Alternative, no action would be taken which would present 31 short-term risks to workers, the community, or the environment. 32 33 AOC 40. This alternative would present minimal short-term risks to workers and the 34 community, but would present some short-term risks to the environment. Risk to the 35

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community would be minimal because residences are not close enough to the site to be 1 impacted by noise or dust potentially generated from cover system placement activities. 2 Several routes and entry points to Devens exist, and it is anticipated that delivery of 3 construction materials can be planned to avoid creating traffic congestion and hazards. In 4 addition, rerouting of traffic on the section of Patton Road south of the Cold Spring 5 Brook Landfill would be evaluated. Inclusion of this section of the road and an area to the 6 south of Patton Road included in the exclusion zone used during cover system placement 7 and sediment and drum removal would facilitate remedial activities. 8 9 RCRA and DOT regulations affecting handling and transportation of any potentially 10 hazardous soils/sediments would reduce the risk of community exposure to an 11 uncontrolled release of hazardous materials 12 13 Grading the landfill prior to capping could present potential risk to workers if hazardous 14 materials are uncovered. Exposure to potentially contaminated soil and debris could be 15 reduced to a safe level by worker adherence to general health and safety practices, and use 16 of personnel monitoring during any intrusive activities at the landfill. 17 18 Implementation of Alternative 2 will result in several short-term adverse effects to the 19 environment. The installation of the proposed cover system would require cutting and 20 clearing the established tree and grassed areas. This would temporarily displace current 21 biota and destroy their habitat. Reconstruction of the landfill slope leading down to Cold 22 Spring Brook Pond would require some excavation in the pond and possibly the 23 construction of a temporary access road along the edge of the pond. This and proposed 24 sediment removal activity would destroy existing wetland habitat. The vegetation of the 25 landfill cover and wetland restoration program would restore/replace these affected areas. 26 27 No endangered species or species of special concern are known to occur at Cold Spring 28 Brook Pond. However, silt fence or a floating boom weighted at the bottom and placed 29 around the areas of sediment excavation would minimize sediment contaminant migration 30 beyond the excavation boundaries. Wetland restoration in disturbed areas would mitigate 31 short-term impact and minimize long-term impact to the environment. Because the 32

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disturbed areas would be relatively small compared to Cold Spring Brook Pond and 1 bordering wetland, adverse community effects, although possible, are unlikely. 2 3 AOC 41. Similar to the NFA Alternative, no action would be taken which would present 4 short-term risks to workers, the community, or the environment. 5 6 7 **8.2.2.6 Implementability.** The following paragraphs assess the implementability of the actions proposed at each of the landfills. 8 9 <u>SA 6</u>. Similar to the NFA Alternative, this alternative is readily implementable at SA 6. 10 11 AOC 9. Placement of land use restrictions on property currently owned by the U.S. Army 12 would be easily implemented upon property transfer. The filing of a Record Notice of 13 Landfill Operation, in conformance with 310 CMR 19.141, is an easily implementable land 14 use restriction. 15 16 17 Cover system construction can be accomplished using standard construction procedures and conventional earthmoving equipment. Many engineering and construction companies 18 are qualified to design and construct a landfill cover system. Materials required to 19 construct a low-permeability cover system are readily available. Post-closure monitoring 20 and maintenance are easily implementable. Installation of the cover system could increase 21 the scope of potential future remedial actions at the site, if these actions required access to 22 the debris. 23 24 According to the NCP, no federal, state, or local permits are required for on-site response 25 actions conducted pursuant to CERCLA, although coordination with review agencies is 26 recommended. Placement of the cover system would not require any permits, because it is 27 an on-site activity. During construction of the cover system, stormwater runoff would be 28 controlled to minimize erosion and potential surface water contamination. 29 30 Compliance with the post-closure long-term monitoring and maintenance requirements of 31 310 CMR 19.000 increases the administrative burden and complexity of this alternative 32 and makes implementation more difficult. 33 34

1 AOC 11. Placement of zoning and deed restrictions on property currently owned by the U.S. Army would be easily implemented in the event of property transfer. The filing of a 2 Record Notice of Landfill Operation, in conformance with 310 CMR 19.141, is an easily 3 implementable land use restriction. 4 5 Debris removal would not increase the scope of potential future remedial actions at the 6 site. 7 8 According to the NCP, no federal, state, or local permits are required for on-site response 9 actions conducted pursuant to CERCLA, although coordination with review agencies is 10 recommended. Debris removal would not require any permits, because it is an on-site 11 activity. During debris removal, stormwater runoff would be controlled to minimize 12 erosion and potential surface water contamination. 13 14 SA 12. Similar to the NFA Alternative, this alternative is readily implementable at SA 12. 15 16 SA 13 Similar to the NFA Alternative, this alternative is readily implementable at SA 13. 17 18 AOC 40. Placement of land use restrictions on property currently owned by the U.S. 19 Army would be easily implemented upon property transfer. The filing of a Record Notice 20 of Landfill Operation, in conformance with 310 CMR 19.141, is an easily implementable 21 land use restriction. Equipment required to excavate and handle sediment, remove and 22 handle 55-gallon drums and potentially construct a temporary access road at the Cold 23 Spring Brook Landfill is conventional in nature, and contractors are readily available. 24 Implementation of this alternative would not limit or interfere with the ability to perform 25 future remedial actions. 26 27 Discarded 55-gallon drums would be disposed of at AOC 9 or at an off-site TSD facility if 28 drum contents displayed hazardous characteristics. Sediment would require dewatering to 29 eliminate free water prior to disposal at AOC 9. Some sediments may exhibit hazardous 30 characteristics, and would require disposal at a licensed landfill or incinerator. Off-site 31 services should have sufficient capacity for the relatively small volume of sediments 32

33 requiring disposal.

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According to the NCP, no federal, state, or local permits are required for on-site response 2 actions conducted pursuant to CERCLA, although coordination with review agencies is 3 recommended. Because remedial actions for this alternative will be conducted on-site, 4 permits would not be required for sediment dredging or discharge of water from 5 dewatered sediment to Cold Spring Brook Pond. However, consultation with the local 6 conservation commission in accordance with Massachusetts Wetlands Protection 7 Regulations (310 CMR 10.000) may be required prior to constructing an access road at 8 the northwestern toe of the landfill. In addition, dredging of sediment in Cold Spring 9 Brook Pond will have to be done in accordance with the technical requirements of the 10 Massachusetts Waterways Act (MGL, c. 91; 310 CMR 9.00), and the Massachusetts 11 Water Quality Certification for Dredging (314 CMR 9.00). 12 13 Cover system construction can be accomplished using standard construction procedures 14 and conventional earthmoving equipment. Many engineering and construction companies 15 are qualified to design and construct a landfill cover system. Materials required to 16 construct a low-permeability cover system include approximately 14,200 cy of sand, 17 9,600 cy of common borrow, 7,100 cy of vegetative soil, 2,250 cy of riprap, and 192,000 18 sf of geomembrane, all of which are readily available. Post-closure monitoring and 19 maintenance are easily implementable. 20 21 Partial dewatering of the Cold Spring Brook Pond, and construction of a temporary access 22 road are implementable, but would require extra engineering precautions and time to 23 create a stable work platform and cover footing while minimizing impacts to the pond and 24 associated wetland. To stabilize the toe of the slope of the cover system, it would most 25 likely be necessary to excavate to stable sands beneath the sediment. 26 27 Installation of the cover system could increase the scope of potential future remedial 28 actions at the site, if these actions required access to the debris. 29 30 Placement of the cover system would not require any permits, because it is an on-site 31 activity. During construction of the cover system, stormwater runoff would be controlled 32 to minimize the quantity of sediments and contaminants entering the pond. 33 34

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Compliance with the post-closure long-term monitoring and maintenance requirements of 1 310 CMR 19.000 increases the administrative burden and complexity of this alternative 2 and makes implementation more difficult. 3 4 AOC 41. Similar to the NFA Alternative, this alternative is readily implementable at 5 AOC 41. 6 7 8.2.2.7 Cost. The cost estimate for Alternative 2 includes estimates of direct and indirect 8 capital costs and O&M costs. Direct capital costs for this alternative include site 9 preparation, debris and sediment excavation, drum removal, cap construction, site 10 restoration and monitoring wells installation. A 25 percent contingency is included in 11 direct cost items to account for unforeseen project complexities (e.g., adverse weather 12 conditions and inadequate site characterization). 13 14 O&M costs include landfill cover maintenance, and environmental monitoring for 15 groundwater, wetlands and sediment. 16 17 Table 8-5 summarizes the cost estimate for Alternative 2. The total capital cost (direct 18 plus indirect costs) is estimated to be \$6,633,000. O&M costs are estimated to be 19 \$89,000 per year. 20 21 To enable evaluation of costs that would occur over different time periods, the table also 22 includes a present worth analysis. Present worth represents the amount of money that, if 23 invested now and disbursed as needed, would be sufficient to cover all costs associated 24 with the remedial action over its planned life. A discount rate of 7 percent before taxes 25 and after inflation is used as recommended in USEPA's Office of Solid Waste and 26 Emergency Response (OSWER) Directive 9355.3-20. Unless noted otherwise, costs are 27 based on a 30-year time frame. Cost calculations are included in Appendix D. 28 29 30

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ALTERNATIVE 3: NO FURTHER ACTION AT AOC 41, AND SAS 6, 12, AND 13; 8.3 1 AND CAP-IN-PLACE AT AOCS 9, 11, AND 40 2 3 This subsection describes Alternative 3, evaluates the alternative using the seven 4 evaluation criteria, and provides a cost estimate. 5 6 8.3.1 Description of Alternative 3 7 8 This alternative includes different types of management at the seven disposal sites. At 9 AOC 41, and SAs 6, 12, and 13 NFA is taken. At AOCs 9, 11, and 40 a cap is placed 10 over the debris. AOC 9 will have some consolidation of debris to minimize the size of the 11 cap. Alternative 3 also includes removing exposed drums at AOC 40 to remove a 12 potential source of contamination, and excavation of sediment from two hot spots in Cold 13 Spring Brook Pond, to reduce ecological risk from exposure to contaminated sediments. 14 These actions at AOC 40 were described previously in the FS for AOC 40 (ABB-ES, 15 1994b). 16 17 Key components of Alternative 3 include: 18 19 No Further Action at AOC 41, SAs 6, 12, 13 20 21 No action 22 23 Cap-in-Place AOCs 9, 11, 40 24 25 Mobilization/demobilization; 26 • Site preparation; • 27 Sediment removal and disposal at AOC 40; • 28 Drum removal and disposal; at AOC 40; • 29 Consolidate debris areas at AOC 9; • 30 Cap construction; • 31 Site restoration: . 32 Wetland restoration: 33 . Institutional controls: • 34 Cover system monitoring and maintenance; and 35

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• Five-year site reviews.

8.3.1.1 Description of No Further Action Components for Alternative 3. The NFA is similar to that discussed for Alternative 1, Subsection 8.1.1.

8.3.1.2 Description of Cap-In-Place Components for Alternative 3.

Mobilization/demobilization. This component is similar to that discussed in Alternative 2,
 Subsection 8.2.1.3.

10

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3

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6 7

<u>Site Preparation</u>. This component is similar to that discussed in Alternative 2,
 Subsection 8.2.1.3.

13

16

19

<u>Sediment removal and disposal at AOC 40</u>. This component is similar to that discussed in
 Alternative 2, Subsection 8.2.1.3.

Drum removal and disposal at AOC 40. This component is similar to that discussed in
 Alternative 2, Subsection 8.2.1.3.

<u>Consolidate debris areas at AOC 9</u>. This component is similar to that discussed in
 Alternative 2, Subsection 8.2.1.3.

22

23 <u>Cap construction</u>. This component is similar to that discussed in Alternative 2,

Subsection 8.2.1.3. The cap for AOC 11 is similar to that described for AOC 9 and will

²⁵ include riprap for erosion control over the portion of the cap along the Nashua River.

a plan view of AOC 11 is shown on Figure 8-6.

27 28

Site restoration. This component is similar to that discussed in Alternative 2,

29 Subsection 8.2.1.3.

30

31 <u>Wetland restoration</u>. This component is similar to that discussed in Alternative 2,

32 Subsection 8.2.1.3.

33

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1	Institutional controls. This component is similar to that discussed in Alternative 2,
2	Subsection 8.2.1.3.
3	
4	Cover system monitoring and maintenance. This component is similar to that discussed in
5	Alternative 2, Subsection 8.2.1.3.
6	
7	Five-year site reviews. This component is similar to that discussed in Alternative 2,
8	Subsection 8.2.1.3.
9	
10	8.3.2 Detailed Evaluation of Alternative 3
11	
12	The following subsections present an assessment of Alternative 3 according to the seven
13	evaluation criteria.
14	
15	8.3.2.1 Overall Protection of Human Health and the Environment. The following
16	paragraphs assess how the proposed actions of this alternative would provide protection
17	of numan health and the environment.
18	SA 6 Quarall protoction of human health and the environment is similar to that discussed
19	$\underline{SA0}$. Over an protection of number health and the environment is similar to that discussed for the NEA Alternative in Subsection 8.1.2.1
20	for the NFA Alternative in Subsection 8.1.2.1.
21	AOC 9 Overall protection of human health and the environment is similar to that
22	discussed in Subsection 8.2.2.1
23	
25	AOC 11 Installation of a low permeability cover at AOC 11 would remove potential
26	physical hazards to occasional site visitors, limit human and ecological exposure to surface
27	soils, and reduce infiltration of precipitation which could potentially leach contaminants
28	from landfill debris and contaminate groundwater. Implementation of a long-term
29	groundwater monitoring program and five-year site review would provide a means to
30	assess the affect of potential future releases of contaminants on groundwater.
31	
32	SA 12. Similar to the NFA Alternative, this alternative would not provide protection of
33	human health and the environment.
34	

1 2	$\underline{SA 13}$. Similar to the NFA Alternative, this alternative would not provide protection of human health and the environment.
3	
4	AOC 40. Overall protection of human health and the environment is similar to that
5	discussed in Subsection 8.2.2.1.
6	
7	AOC 41. Similar to the NFA Alternative, this alternative would not provide protection of
8	human health and the environment.
9	
10	8.3.2.2 Compliance with ARARs. Tables 8-6, 8-7, and 8-8 summarize how
11	Alternative 3 will attain ARARs.
12	
13	8.3.2.3 Long-term Effectiveness and Permanence. The following paragraphs assess
14	the long-term effectiveness and permanence of the proposed actions of this alternative.
15	
16	$\underline{SA6}$. The long-term effectiveness and permanence of this alternative is similar to that
17	discussed in Subsection 8.1.1.3.
18	
19	$\underline{AOC 9}$. The long-term effectiveness and permanence of this alternative is similar to that
20	discussed in Subsection 8.2.2.3.
21	AOC 11 The long form official and a long 1 'l' 1 10'l
22	AOC 11. The long-term effectiveness of a low permeability landfill cover at controlling
23	the maintenance of can integrity. When adequately installed and maintained law
24	nermeability cover systems have a history of effectively reducing surface infiltration to
25	landfill materials, promoting surface water drainage, minimizing erosion, and isolating
27	landfill materials from the environment. Portions of the low permeability cover would
28	likely be subject to periodic flooding by the Nashua River and could be washed away
29	and the subject to periodic noouning by the reasing a rever and could be washed away.
30	SA 12. Similar to the NFA Alternative, this alternative would not provide long-term
31	effectiveness at protecting human health or the environment
32	

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1	<u>SA 13</u> . Similar to the NFA Alternative, this alternative would not provide long-term
2	effectiveness at protecting human health or the environment.
3	
4	AOC 40. The long-term effectiveness and permanence of this alternative is similar to that
5	discussed in Subsection 8.2.2.3.
6	
7	AOC 41. Similar to the NFA Alternative, this alternative would not provide long-term
8	effectiveness at protecting human health or the environment.
9	
10	8.3.2.4 Reduction of Toxicity, Mobility, and Volume Through Treatment. The
11	following paragraphs assess the reduction of toxicity, mobility, and volume of
12	contaminants through treatment offered by the proposed actions of this alternative.
13	
14	<u>SA 6</u> . Similar to the NFA Alternative, there would be no reduction of toxicity, mobility,
15	or volume of contaminants through treatment. This alternative would not satisfy the
16	statutory preference for treatment as a component of remedial actions.
17	AOC 0. The reduction in terricity multility and allow the later to the initial states in the
18	$\underline{AOC 9}$. The reduction in toxicity, mobility, and volume through treatment is similar to that discussed in Subsection 8.2.2.4
19	that discussed in Subsection 8.2.2.4.
20	AOC 11 Reduction of toxicity mobility or volume of contaminants through treatment
22	would not be achieved. By reducing the notential for contaminant leaching in the
23	unsaturated zone, the potential for contaminant migration to groundwater would be
24	reduced
25	
26	SA 12. Similar to the NFA Alternative, there would be no reduction of toxicity, mobility
27	or volume of contaminants through treatment. This alternative would not satisfy the
28	statutory preference for treatment as a component of remedial actions.
29	
30	SA 13. Similar to the NFA Alternative, no reduction of toxicity, mobility, or volume of
31	contaminants would be achieved through treatment. This alternative would not satisfy the
32	statutory preference for treatment as a component of remedial actions.
33	
34	AOC 40. The reduction in toxicity, mobility, and volume through treatment is similar to
35	that discussed in Subsection 8.2.2.4.

1 AOC 41. Similar to the NFA Alternative, there would be no reduction of toxicity, 2 mobility, or volume of contaminants through treatment. This alternative would not satisfy 3 the statutory preference for treatment as a component of remedial actions. 4 5 8.3.2.5 Short-term Effectiveness. The following paragraphs assess the short-term 6 effectiveness of the actions proposed at each of the landfills. 7 8 SA 6. Similar to the NFA Alternative, no action would be taken which would present 9 short-term risks to workers, the community, or the environment. 10 11 AOC 9. The short-term effectiveness of this alternative is similar to that discussed in 12 Subsection 8.2.2.5. 13 14 AOC 11. This alternative would be expected to present minimal short-term risks to 15 workers, the community, and the environment. Risk to the community would be minimal 16 because residences are not close enough to the site to be impacted by noise or dust 17 potentially generated from cover system placement activities. It is anticipated that 18 deliveries can be planned to avoid creating traffic congestion and hazards. 19 20 Grading the landfill prior to capping could present potential risk to workers if hazardous 21 materials are uncovered. Exposure to potentially contaminated soil and debris could be 22 reduced to a safe level by worker adherence to general health and safety practices, and use 23 24 of personnel monitoring during any intrusive activities at the landfill. 25 SA 12. Similar to the NFA Alternative, no action would be taken which would present 26 short-term risks to workers, the community, or the environment. 27 28 SA 13. Similar to the NFA Alternative, no action would be taken which would present 29 short-term risks to workers, the community, or the environment. 30 31 AOC 40. The short-term effectiveness of this alternative is similar to that discussed in 32 Subsection 8.2.2.5. 33

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- <u>AOC 41</u>. Similar to the NFA Alternative, no action would be taken which would present
 short-term risks to workers, the community, or the environment.
 - **8.3.2.6 Implementability.** The following paragraphs assess the implementability of the actions proposed at each of the landfills.
- 8 <u>SA 6</u>. Similar to the NFA Alternative, this alternative is readily implementable at SA 6.
- 10 AOC 9. The implementability of this alternative is similar to that discussed in
- 11 Subsection 8.2.2.6.
- 12

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- ¹³ <u>AOC 11</u>. Placement of land use restrictions on property currently owned by the U.S.
- 14 Army would be easily implemented upon property transfer. The filing of a Record Notice
- of Landfill Operation, in conformance with 310 CMR 19.141, is an easily implementable
- 16 land use restriction.
- 17
- Cover system construction can be accomplished using standard construction procedures 18 and conventional earthmoving equipment. Many engineering and construction companies 19 are qualified to design and construct a landfill cover system. Materials required to 20 construct a low-permeability cover system are readily available. Post-closure monitoring 21 and maintenance are easily implementable. Installation of the cover system could increase 22 the scope of potential future remedial actions at the site, if these actions required access to 23 the debris. 24 25 According to the NCP, no federal, state, or local permits are required for on-site response 26
- actions conducted pursuant to CERCLA, although coordination with review agencies is
 recommended. Placement of the cover system would not require any permits, because it is
 an on-site activity. During construction of the cover system, stormwater runoff would be
 controlled to minimize erosion and potential surface water contamination.
- Compliance with the post-closure long-term monitoring and maintenance requirements of
 310 CMR 19.000 increases the administrative burden and complexity of this alternative
 and makes implementation more difficult.
- 35

1	SA 12. Similar to the NFA Alternative, this alternative is readily implementable at SA 12.
2	SA 12 Similar to the NEA Alternative dia to the state of the state of the
3	$\underline{SA 13}$. Similar to the NFA Alternative, this alternative is readily implementable at SA 13.
4	
5	AUC 40. The implementability of this alternative is similar to that discussed in
6	Subsection 8.2.2.6.
7	
8	$\frac{AOC \ 41}{1}$. Similar to the NFA Alternative, this alternative is readily implementable at AOC
9	41.
10	
11	8.3.2. Cost. The cost estimate for Alternative 3 includes estimates of direct and indirect
12	capital costs and O&M costs. Direct capital costs included for this alternative include site
13	preparation, sediment and debris excavation, drum removal, cap construction, site
14	restoration and monitoring well installation. A 25 percent contingency is included in
15	direct cost items to account for unforeseen project complexities (e.g., adverse weather
16	conditions and inadequate site characterization).
17	
18	O&M costs include landfill cover maintenance, and environmental monitoring of
19	groundwater, wetlands and sediment.
20	
21	Table 8-9 summarizes the cost estimate for Alternative 3. The total capital cost (direct
22	sills numeric costs) is estimated to be \$8,226,000. O&M costs are estimated to be
23	\$112,000 per year.
24	To enable evaluation of costs that would occur over different time name do the table of
25	includes a present worth analysis. Present worth represents the amount of means that if
20	invested now and disbursed as needed, would be sufficient to cover all costs associated
29	with the remedial action over its planned life. A discount rate of 7 percent before taxes
20	and after inflation is used as recommended in USEPA's OSWEP Directive 0355.2.20
30	Unless noted otherwise costs are based on a 30-year time frame. The estimated total
31	present worth is \$9 507 000. Cost calculations are included in Appendix D
32	present in ordina \$2,207,000. Cost calculations are included in Appendix D.
33	

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1	8.4	ALTERNATIVE 4: NO FURTHER ACTION AT AOC 41, AND SAS 6, 12, AND 13;
2		LIMITED REMOVAL AT AOC 11 (DISPOSAL IN CONSOLIDATION LANDFILL);
3		AND EXCAVATION AND CONSOLIDATION OF AOCS 9 AND 40
4		
5	8.4.1	Description of Alternative 4
6		
7	Alter	native 4 proposes removal of surface debris from AOC 11, excavating
8	const	ruction/demolition debris from AOC 9 and AOC 40, and consolidating the debris in a
9	prop	osed secure landfill near Shepley's Hill Landfill. Based on available information, these
10	landf	contain non-nazardous debris only. The AOCs will be treated as construction debris
11	lanui	IIIS.
12	Alter	native 4 also includes removing exposed drums at Cold Spring Brook I andfill
14	(AO	(240) to remove a potential source of contamination and excavating sediment from
15	two	not spots in Cold Spring Brook Pond, to reduce ecological risk from exposure to
16	conta	minated sediments. These actions were described previously in the FS for AOC 40
17	(ABE	B-ES, 1994b).
18		
19	The l	tey components of Alternative 4 include:
20		
21	No F	urther Action at AOC 41, SAs 6, 12, 13
22		
23	• N	o action
24		
25	Limit	ed Removal at AOC 11
26		
27	• N	lobilization/demobilization;
28	• E	xcavation of debris and transportation to the Consolidation Landfill;
29	• B	ackfilling site; and
30	• \$	ite restoration.
31	Б	ention and Consolidation of AOCo 0 and 40
32	Exca	vation and Consolidation of AUCS 9 and 40
33		Achilization/domobilization:
34	• •	ACC 40 sodiment removal and disposal:
35	• /	NOC 40 seument removal and disposal,

1	 AOC 40 drum removal and disposal;
2	• Debris excavation and backfill at AOCs 9 and 40;
3	Wetlands restoration;
4	 Consolidation of excavated debris at consolidation landfill;
5	Institutional controls;
6	• Cover system monitoring and maintenance at consolidation landfill; and
7	• Five-year site reviews;
8	
9 10	8.4.1.1 Description of No Further Action Components for Alternative 4 . NFA is similar to that discussed for Alternative 1. Subsection 8.1.1
11	
12	8.4.1.2 Description of Limited Removal Components for Alternative 4
13	•
14	Mobilization/demobilization. This component is similar to that discussed in Alternative 2,
15	Subsection 8.2.1.3.
16	
17	Excavation of debris and transportation to the Consolidated Landfill. This component is
18	similar to that discussed in Alternative 2, Subsection 8.2.1.3.
19	
20	Backfilling site. This component is similar to that discussed in Alternative 2,
21	Subsection 8.2.1.3.
22	Site restoration This component is similar to that discussed in Ale
23	Subsection 8.2.1.3
25	Subsection 0.2.1.5.
26	8.4.1.3 Description of Excavate and Consolidate AOC 9 and AOC 40 Components
27	for Alternative 4.
28	
29	Mobilization/demobilization. This component is similar to that discussed in Alternative 2
30	Subsection 8.2.1.3.
31	

1 2	Site Preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3.
3	
4	Sediment Removal and Disposal at AOC 40. This component is similar to that discussed
5	in Alternative 2, Subsection 8.2.1.3.
6	
7	Drum Removal and Disposal at AOC 40. This component is similar to that discussed in
8	Alternative 2, Subsection 8.2.1.3.
9	
10	Debris Excavation and Backfill at AOCs 9 and 40. A total debris volume of
11	approximately 222,000 cy will be generated by excavation from AOC 9 (112,000 cy) and
12	AOC 40 (110,000 cy). The basis of the debris volumes is presented in Appendix B.
13	
14	As presented in Section 1, the estimated volumes are based primarily on observations
15	during test pit/trench excavations. Debris will be removed with excavators with the
16	possible necessity of specialized equipment for AOC 40, due to the steep slopes at these
17	areas. Erosion control measures will be used at all excavations, especially those adjacent
18	to wetlands, to prevent impacts to surrounding areas. These measures may include silt
19	fences, hay bales, and polystyrene covers for soil piles left on-site during excavation.
20	
21	Subsequent to debris removal, the excavation at AOC 9 will be backfilled to correspond to
22	existing topography which existed prior to removal. AUC 40 will be backfilled to match a
23	2.1 slope from an off site borrow source
24	be nom an on-site borrow source.
25	Wetlands Restoration. This component is similar to that discussed in Alternative 2
27	Subsection 8 2 1 3
28	
29	Consolidation of Excavated Debris at Consolidation Landfill The preferred site for the
30	Consolidation Landfill is an open, sandy borrow area east of Shepley's Hill Landfill (see
31	Figure 8-8). The site covers approximately 12 acres, bounded on the north by Plow Shop
32	Pond, on the west and south by Shepley's Hill Landfill, and on the east by the Army
33	reservation boundary.
34	

This area was selected because of its large size and favorable location in an area that 1 would have minimal impact on human health. The area is not visible from main roads or 2 public areas, so it would not adversely impact the aesthetic value of the surrounding 3 property. The Shepley's Hill Landfill site is accessible off Carey Street on the Main Post. 4 However, access to the site would need to be significantly improved for truck traffic, 5 because the current access road is narrow and unpaved. Utilities are not available on site. 6 A drainage swale from the existing landfill crosses the site and would require rerouting 7 and culvert installations to permit facility construction. 8 9 Hydrogeology at the Shepley's Hill area has been studied extensively, and much 10 information has been documented in previous reports. A compilation of this data is 11 provided in Appendix E consistent with the requirements for a Hydrogeological Study 12 derived in the Massachusetts Solid Waste Regulation (310 CMR 19.104.(3)). 13 14 The Consolidation Landfill would be constructed near Shepley's Hill Landfill to 15 accommodate debris from the disposal areas at Devens. Design for construction, 16 operation, and closure of the landfill would be carried out in accordance with the 17 Massachusetts Solid Waste Management Facility Regulations 310 CMR 19,000 Parts I 18 and II. This alternative assumes that the Consolidation Landfill would be constructed 19 prior to excavation at the debris areas. 20 21 The conceptual design for the Consolidation Landfill complies with the requirements of 22 310 CMR 19.110 and 19.112. If this alternative is selected, alternative design components 23 and methodologies to improve performance and/or reduce costs should be evaluated 24 during the design phase. 25 26 The cost estimate for this alternative, presented in Appendix D, is based on construction 27 of an approximately 7-acre landfill with enough capacity for the estimated 222,000 cy of 28 debris from AOCs 9 and 40. For estimating purposes, the daily cover was estimated to be 29

³⁰ 10 percent of the total volume to be landfilled and the final cover would be 5 ft thick. The

estimated volume would be approximately 304,000 cy.

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The conceptual Consolidation Landfill used for cost estimating is, approximately 550 ft by 1 550 ft, and has three-horizontal to one-vertical side slopes maximum, 5 percent top slope 2 minimum, and 2 percent bottom slope. The landfill height would be approximately 50 ft 3 above existing grade. Figures 8-9 and 8-10 show the plan and cross-sectional views of the 4 Consolidation Landfill, respectively. The basis for the Consolidation Landfill footprint and 5 elevations is presented in Appendix B. A geotechnical evaluation was made for 6 settlement, slope stability under static and seismic conditions, and for geosynthetic-soil 7 interface stability. The geotechnical evaluation is presented in Appendix F. 8 9 The conceptual Consolidation Landfill includes a groundwater protection system to: 10 (1) provide an effective hydraulic barrier preventing leachate from reaching groundwater, 11 and (2) to collect landfill leachate for disposal. The groundwater protection system would 12 consist of a composite hydraulic barrier layer (low permeable soil layer and 13 geomembrane), a drainage layer with leachate collection pipes, a buffer soil layer, and a 14 geotextile fabric. The purpose of the fabric is to prevent clogging of the leachate 15 collection soil layers caused by potential migration of fine particles contained within the 16 landfilled debris. The composite hydraulic barrier would consist of 24 inches of 17 compacted soil with a maximum in-place saturated hydraulic conductivity of 18 1×10^{-7} cm/sec, overlain by a 60-mil geomembrane (Figure 8-11). A 12-inch sand drainage 19 layer is proposed above the geomembrane. The drainage layer would have a minimum 20 hydraulic conductivity of 1×10^{-2} cm/sec with leachate collection pipes spaced 50 ft on 21 center. The sand drainage layer and the leachate collection pipes would provide a high 22 permeability pathway for leachate collection. The 12-inch buffer soil layer above the sand 23 layer would have a minimum hydraulic conductivity of 1×10^{-3} cm/sec. Leachate collected 24 in the landfill could be removed by pumping the leachate directly from the leachate 25 collection system into tanker trucks for transport to an approved wastewater treatment 26 facility for disposal. 27 28

When debris disposal is complete, the landfill will be closed and a low-permeability cover system constructed. Figure 8-11 shows the groundwater protection and cover system build-up used for cost estimating. A 12-inch minimum subgrade buffer soil will be placed over the debris to prevent penetration of the overlying geomembrane. A 12-inch sand drainage layer with a minimum hydraulic conductivity of 1×10^{-3} cm/sec would overlay the geomembrane. An 18-inch common borrow soil with 15-35 percent fines would overlay the drainage soil for moisture retention and protection of the geomembrane against

1	heaving from frost. A geotextile fabric would separate the moisture retention soil layer
2	from the drainage soil layer. The vegetative topsoil layer would be approximately 6 inches
• 3	cover thick and the moisture retention soil.
4	
5	Institutional Controls. This component is similar to that discussed in Alternative 2,
6	Subsection 8.2.1.3.
7	
8	Cover System Monitoring and Maintenance at Consolidation Landfill. This component is
9	similar to that discussed in Alternative 2, Subsection 8.2.1.3.
10	
11	Five-year Site Reviews. This component is similar to that discussed in Alternative 2,
12	Subsection 8.2.1.3.
13	
14	8.4.2 Detailed Evaluation of Alternative 4
15	
16	The following subsections present an assessment of Alternative 4 according to the seven
17	evaluation criteria.
18	
19	8.4.2.1 Overall Protection of Human Health and the Environment. The following
20	of human health and the environment
21	of human health and the environment.
22	SA 6 Overall protection of human health and the environment is similar to that discussed
23	for the NFA Alternative in Subsection 8.1.2.1
25	
26	AOC 9 This alternative would provide protection of human health and the environment
27	by excavating landfill materials and then disposing of them at the consolidation facility
28	This would prevent potential future exposure to surface soil and sediment and would
29	prevent potential future releases from landfill debris to groundwater. However, moving
30	the landfill debris to a separate consolidation facility would transfer the risk of potential
31	releases to another location. Because the PRE did not identify significant potential for
32	human or ecological exposure risk at AOC 9, the risk reduction benefit from excavating
33	and consolidating AOC 9 is considered low.

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1 AOC 11. Similar to Alternative 2, removal and disposal of surface debris would remove 2 potential physical hazards to occasional site visitors and reduce human and terrestrial 3 receptor exposure to surface soil, thereby reducing potential risk. This alternative differs 4 from Alternative 2 in that removed surface debris would be disposed of at the 5 consolidation facility rather than under a low permeability cover at AOC 9. Because the 6 consolidation facility would be lined, disposal at the consolidation facility is theoretically 7 more protective. However, because potential human health risks at AOC 11 were within 8 or below the USEPA target values, the human health risk reduction benefit is considered 9 low. No actions would be included to reduce or monitor potential ecological risk from 10 exposure to wetland soil/sediment or surface water. 11 12 SA 12. Similar to the NFA Alternative, this alternative would not provide protection of 13 human health and the environment. 14 15 SA 13. Similar to the NFA Alternative, this alternative would not provide protection of 16 human health and the environment. 17 18 AOC 40. This alternative has significant potential for achieving an acceptable level of risk 19 for human and ecological receptors. The drum and sediment removal components of this 20 alternative would provide the same protectiveness as in Alternative 2; however, this 21 alternative would prevent potential future releases from landfill debris to groundwater and 22 Cold Spring Brook Pond sediment by excavating the soil and debris from the Cold Spring 23 Brook Landfill, and disposing it in the Consolidation Landfill. However, moving the 24 landfill debris to a separate consolidation facility would transfer the risk of potential 25 releases to another location. 26 27 AOC 41. Similar to the NFA Alternative, this alternative would not provide protection of 28 human health and the environment. 29 30 8.4.2.2 Compliance with ARARs. Tables 8-10, 8-11, and 8-12 summarize how 31 Alternative 4 will attain ARARs. 32 33 **8.4.2.3 Long-term Effectiveness and Permanence.** The following paragraphs assess 34 the long-term effectiveness and permanence of the proposed actions of this alternative. 35

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SA 6. The long-term effectiveness of this alternative is similar to that discussed for the 2 NFA Alternative in Subsection 8.1.2.3. 3 4 AOC 9. Excavation of landfill debris would effectively prevent human and ecological 5 exposure and would prevent the landfill from being a potential source of future 6 groundwater contamination. The effectiveness of the consolidation facility at isolating 7 landfill debris would depend on the quality of construction and proper maintenance of 8 cover and leachate collection systems. Landfills that include groundwater protection 9 systems with leachate collection, cover systems, and long-term monitoring and 10 maintenance have a history of effectively isolating wastes from the environment. 11 12 AOC 11. The long-term effectiveness of this alternative is similar to that discussed in 13 Subsection 8.2.2.3. 14 15 SA 12. Similar to the NFA Alternative, this alternative would not provide long-term 16 effectiveness at protecting human health or the environment. 17 18 SA 13. Similar to the NFA Alternative, this alternative would not provide long-term 19 effectiveness at protecting human health or the environment. 20 21 AOC 40. Removal of the landfill as a potential source of future groundwater 22 contamination, and removal of hot spot sediments and drums would effectively prevent 23 human and ecological exposure. The effectiveness of the consolidation facility at isolating 24 Cold Spring Brook Landfill debris would depend on the quality of construction and proper 25 maintenance of cover and leachate collection systems. Landfills that include groundwater 26 protection systems with leachate collection, cover systems, and long-term monitoring and 27 maintenance have a history of effectively isolating wastes from the environment. 28 29 30 AOC 41. Similar to the NFA Alternative, this alternative would not provide long-term effectiveness at protecting human health or the environment. 31 32

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8.4.2.4 Reduction of Toxicity, Mobility, and Volume Through Treatment. The 1 following paragraphs assess the reduction of toxicity, mobility, and volume of 2 contaminants through treatment offered by the proposed actions of this alternative. 3 4 SA 6. Similar to the NFA Alternative, there would be no reduction of toxicity, mobility, 5 or volume of contaminants through treatment. This alternative would not satisfy the 6 statutory preference for treatment as a component of remedial actions. 7 8 AOC 9. Reduction of toxicity, mobility, or volume of landfill contaminants through 9 treatment would not be achieved. By removing landfill debris, the potential for leaching of 10 landfill materials and contamination of groundwater would be reduced. No reduction of 11 toxicity, mobility, or volume of groundwater contaminants would be achieved. Disposal 12 of excavated landfill debris at a consolidation facility with low permeability liner, leachate 13 collection, and low permeability cover would reduce contaminant mobility. 14 15 AOC 11. The reduction in toxicity, mobility, and volume would be similar to that 16 discussed in Subsection 8.2.2.4. 17 18 SA 12. Similar to the NFA Alternative, there would be no reduction of toxicity, mobility, 19 or volume of contaminants through treatment. This alternative would not satisfy the 20 statutory preference for treatment as a component of remedial actions. 21 22 SA 13. Similar to the NFA Alternative, there would be no reduction of toxicity, mobility, 23 or volume of contaminants through treatment. This alternative would not satisfy the 24 statutory preference for treatment as a component of remedial actions. 25 26 AOC 40. Reduction of toxicity, mobility, or volume of landfill contaminants through 27 treatment would not be achieved. By removing landfill debris, the potential for leaching of 28 landfill materials and contamination of groundwater would be reduced. No reduction of 29 toxicity, mobility, or volume of groundwater contaminants would be achieved. Sediment 30 and drum removal would not reduce the toxicity or volume of associated contaminants. 31 Disposal of excavated landfill debris, drums, and dewatered sediments at a consolidation 32 facility with low permeability liner, leachate collection, and low permeability cover would 33 reduce contaminant mobility. 34 35

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AOC 41. Similar to the NFA Alternative, there would be no reduction of toxicity, 1 mobility, or volume of contaminants through treatment. This alternative would not satisfy 2 the statutory preference for treatment as a component of remedial actions. 3 4 8.4.2.5 Short-term Effectiveness. The following paragraphs assess the short-term 5 effectiveness of the actions proposed at each of the landfills. 6 7 SA 6. Similar to the NFA Alternative, no action would be taken which would present 8 short-term risks to workers, the community, or the environment. 9 10 AOC 9. This alternative is expected to present minimal risks to workers, the community, 11 and the environment. Transportation of excavated materials would be planned to avoid 12 creating traffic congestion and hazards to the community. Handling and transportation of 13 any hazardous materials would be conducted according to RCRA and DOT regulations to 14 protect workers and the community. 15 16 Available information does not suggest the presence of hazardous substances which would 17 present a risk to workers during excavation. Worker adherence to general health and 18 safety practices, and use of personnel monitoring would reduce potential exposure to 19 potentially hazardous substances to a safe level. Excavation of landfilled debris and 20 construction of the consolidation facility could generate dust. Dust suppression 21 techniques would reduce potential risk to workers and the community. 22 23 AOC 11. The short-term risks associated are the same as discussed for Alternative 2 in 24 Subsection 8.2.2.5. This alternative differs from Alternative 2 in that removed surface 25 debris would be disposed of at the consolidation facility. This would be expected to 26 present minimal short-term risks, and the overall short-term risk associated with this 27 alternative at AOC 11 would be expected to be minimal. 28 29 SA 12. Similar to the NFA Alternative, no action would be taken which would present 30 short-term risks to workers, the community, or the environment. 31 32

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short-term risks to workers, the community, or the environment. 2 3 4 AOC 40. This alternative is expected to present minimal risks to workers, the community, and the environment. Transportation of excavated materials would be planned to avoid 5 creating traffic congestion and hazards to the community. To further protect the 6 community, traffic on Patton Road could be rerouted during removal of soil and debris 7 from the Cold Spring Brook Landfill. Handling and transportation of any hazardous 8 materials would be conducted according to RCRA and DOT regulations to protect 9 workers and the community. 10 11 12 Available information does not suggest the presence of hazardous substances that would present a risk to workers during excavation. Worker adherence to general health and 13 safety practices, and use of personnel monitoring would reduce potential exposure to 14 potentially hazardous substances to a safe level. Excavation of landfilled debris and 15 construction of the consolidation facility could generate dust. Dust suppression 16 techniques would reduce potential risk to workers and the community. 17 18 Excavation activities at the Cold Spring Brook Landfill would be conducted to minimize 19 adverse affects on the environment. Excavation would be conducted to minimize pond 20 water entering the excavation. In addition, stormwater runoff and groundwater flow into 21 the excavation would be controlled to minimize the quantity of sediment and contaminants 22 entering the pond. Construction of the temporary access road along the northwest toe of 23 the landfill may adversely affect the environment, but wetland restoration activities would 24 minimize any permanent effect. The consolidation facility would be located and 25 constructed according to regulations to minimize adverse affects on the environment. 26 27 AOC 41. Similar to the NFA Alternative, no action would be taken which would present 28 short-term risks to workers, the community, or the environment. 29 30 **8.4.2.6 Implementability.** The following paragraphs assess the implementability of the 31 actions proposed at each of the landfills. 32 33 SA 6. Similar to the NFA Alternative, this alternative is readily implementable at SA 6. 34 35

SA 13. Similar to the NFA Alternative, no action would be taken which would present

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AOC 9. Landfill excavation and construction can be accomplished using standard 1 construction procedures and conventional earthmoving equipment, and many engineering 2 and construction companies are qualified and available. Successful implementation of this 3 alternative is contingent on the approval and construction of a consolidation facility to 4 accept the excavated debris. The consolidation facility would be constructed and 5 maintained to effectively isolate debris excavated from AOC 9. Implementation of this 6 alternative would not limit or interfere with the ability to perform future remedial actions 7 at AOC 9. 8 9 10 All activities to excavate AOC 9 would be conducted on-site, and permits would not be required. Design, construction, operation, closure, and post-closure monitoring and 11 maintenance of the consolidation facility would be conducted according to the technical 12 requirements of Massachusetts 310 CMR 19.000. 13 14 Consolidation of this disposal area with others reduce the administrative burden and 15 complexity of implementing the long-term monitoring and maintenance requirements of 16 310 CMR 19.000 at separate disposal areas. 17 18 AOC 11. Similar to Alternative 2 discussed in Subsection 8.2.2.6, this alternative is 19 readily implementable. 20 21 SA 12. Similar to the NFA Alternative, this alternative is readily implementable at SA 6. 22 23 SA 13. Similar to the NFA Alternative, this alternative is readily implementable at SA 6. 24 25 AOC 40. The implementability of sediment and drum removal, and installation and 26 monitoring of groundwater monitoring wells, is similar to that discussed for Alternative 2 27 in Subsection 8.2.2.6. 28 29 Landfill excavation and construction can be accomplished using standard construction 30 procedures and conventional earthmoving equipment, and many engineering and 31 construction companies are qualified and available. Successful implementation of this 32 alternative is contingent on the approval and construction of a consolidation facility to 33

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accept the excavated debris. The consolidation facility would be constructed and 1 maintained to effectively isolate Cold Spring Brook Landfill debris. Implementation of 2 this alternative would not limit or interfere with the ability to perform future remedial 3 actions at Cold Spring Brook Landfill. 4 5 All activities to excavate Cold Spring Brook Landfill for this alternative would be 6 conducted on-site, and permits would not be required. At the Cold Spring Brook Landfill, 7 stormwater runoff would be controlled to minimize the quantity of sediments and 8 contaminants entering the pond. Design, construction, operation, closure, and post-9 closure monitoring and maintenance of the consolidation facility would be conducted 10 according to the technical requirements of Massachusetts 310 CMR 19,000. 11 12 Consolidation of this disposal area with others reduce the administrative burden and 13 complexity of implementing the long-term monitoring and maintenance requirements of 14 310 CMR 19.000 at separate disposal areas. 15 16 AOC 41. Similar to the NFA Alternative, this alternative is readily implementable at SA 6. 17 18 **8.4.2.7** Cost. The cost estimate for Alternative 4 includes estimates of direct and indirect 19 capital costs and O&M costs. Direct capital costs included for this alternative include site 20 preparation, sediment and debris excavation, drum removal, cap construction, site 21 restoration and monitoring well installation. A 25 percent contingency is included in 22 direct cost items to account for unforeseen project complexities (e.g., adverse weather 23 conditions and inadequate site characterization). 24 25 O&M costs include landfill cover maintenance, and environmental monitoring of 26 groundwater, wetlands, and sediment. 27 28 Table 8-13 summarizes the cost estimate for Alternative 5. The total capital cost (direct 29 plus indirect costs) is estimated to be \$16,235,000. O&M costs are estimated to be 30 \$56,000 per year. 31 32 To enable evaluation costs that would occur over different time periods, the table also 33 includes a present worth analysis. Present worth represents the amount of money that, if 34 invested now and disbursed as needed, would be sufficient to cover all costs associated 35

with the remedial action over its planned life. A discount rate of 7 percent before taxes 1 and after inflation is used as recommended in OSWER Directive 9355.3-20. Unless noted 2 otherwise, costs are based on a 30-year time frame. The estimated total present worth is 3 \$16,646,000. Cost calculations are included in Appendix D. 4 5 6 8.5 ALTERNATIVE 5: LIMITED REMOVAL AT AOC 11 (DISPOSAL IN 7 CONSOLIDATION LANDFILL); CAP-IN-PLACE AT AOC 41 AND SAS 6, 12, AND 8 13; AND EXCAVATION AND CONSOLIDATION OF AOCS 9 AND 40 9 10 This subsection describes Alternative 5, evaluates the alternative using the seven 11 evaluation criteria, and provides a cost estimate. 12 13 8.5.1 Description Of Alternative 5 14 15 Alternative 5 proposes limited removal of debris from AOC 11; capping AOC 41, SAs 6, 16 12, 13; excavating construction/demolition debris from AOCs 9 and 40; and consolidating 17 the excavated debris in a proposed secure landfill near Shepley's Hill Landfill. Based on 18 available information, these areas contain non-hazardous debris only. The SA/AOCs will 19 be treated as construction debris landfills. 20 21 Alternative 5 also includes removing exposed drums at Cold Spring Brook Landfill 22 (AOC 40) to remove a potential source of contamination, and excavating sediment from 23 two hot spots in Cold Spring Brook Pond, to reduce ecological risk from exposure to 24 contaminated sediments. These actions were described previously in the FS for AOC 40 25 (ABB-ES, 1994b). 26 27 The key components of Alternative 5 include: 28 29 Limited Removal at AOC 11 30 31 Mobilization/demobilization; 32 Excavation of debris and transportation to the Consolidation Landfill; . 33

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Backfilling site; and 1 Site restoration. 2 3 Cap-in-Place AOC 41, SAs 6, 12, 13 4 5 Mobilization/demobilization; ٠ 6 Site preparation; 7 ٠ UXO Monitoring at SAs 6, 12, and AOC 41; 8 • • Cap construction; 9 Site restoration; 10 Wetland restoration; 11 • Institutional controls: • 12 Cover system monitoring and maintenance; and 13 • Five-year site reviews. ٠ 14 15 Excavation and Consolidation at AOC 9 and AOC 40 16 17 Mobilization/demobilization; 18 • AOC 40 sediment removal and disposal; 19 . AOC 40 drum removal and disposal; 20 . Debris excavation and backfill at AOCs 9 and 40; . 21 Wetlands restoration; • 22 Consolidation of excavated debris at Consolidation Landfill; 23 • Institutional controls; • 24 Cover system monitoring and maintenance at Consolidation Landfill; and • 25 Five-year site reviews; • 26 27 28 8.5.1.1 Description of Limited Removal Components for Alternative 5. 29 Mobilization/demobilization. This component is similar to that discussed in Alternative 2, 30 Subsection 8.2.1.3. 31 32 Excavation of debris and transportation to the Consolidated Landfill. This component is 33 similar to that discussed in Alternative 2, Subsection 8.2.1.3. 34

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1	
2	Backfilling site. This component is similar to that discussed in Alternative 2,
3	Subsection 8.2.1.3.
4	
5	Site restoration. This component is similar to that discussed in Alternative 2,
6	Subsection 8.2.1.3.
7	
8	8.5.1.2 Description of Cap-In-Place Components for Alternative 5.
9	
10	Mobilization/demobilization. This component is similar to that discussed in Alternative 2,
11	Subsection 8.2.1.3.
12	
13	Site Preparation. This component is similar to that discussed in Alternative 2,
.14	Subsection 8.2.1.3.
15	
16	UXO Monitoring at SAs 6, 12 and AOC 41. UXO monitoring by professionals trained
17	and experienced in this work is included during excavation at the SAs 6, 12 and AOC 41
18	debris areas. Indications of spent ordnance (e.g45 ACP Ammunition Can and Crate,
19	40mm Grenade Bandoleer Cups, MK 2 Grenade Fuses, M 14 Stripper Clips) were found
20	during the 1994 test trench investigation at SA 12. SA 12 was used as a Range Control
21	Landfill, and it is uncertain whether other debris areas may contain ordnance. UXO
22	clearance and monitoring would be the responsibility of the remediation contractor.
23	
24	<u>Cap construction</u> . This component is similar to that discussed in Alternative 2,
25	Subsection 8.2.1.3. Plan views of AOC 41, SAs 6, 12 and 13 are snown on Figures 8-12
26	through 8-18.
27	at the state of th
28	Site restoration. This component is similar to that discussed in Alternative 2,
29	Subsection 8.2.1.3.
30	The second is similar to that discussed in Alternative 2
31	Wetland restoration. This component is similar to that discussed in Alternative 2,
32	Subsection 8.2.1.3.
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1	Institutional controls. This component is similar to that discussed in Alternative 2,
2	Subsection 8.2.1.3.
3	
4	Cover system monitoring and maintenance. This component is similar to that discussed in
5	Alternative 2, Subsection 8.2.1.3.
6	
7	Five-year site reviews. This component is similar to that discussed in Alternative 2,
8	Subsection 8.2.1.3.
9	
10	8.5.1.3 Description of Excavate and Consolidate AOC 9 and AOC 40 Components for Alternative 5
12	
13	Mobilization/demobilization. This component is similar to that discussed in Alternative 2
14	Subsection 8.2.1.3.
15	
16	Site preparation. This component is similar to that discussed in Alternative 2.
17	Subsection 8.2.1.3.
18	
19	Sediment removal and disposal at AOC 40. This component is similar to that discussed in
20	Alternative 2, Subsection 8.2.1.3.
21	
22	Drum removal and disposal at AOC 40. This component is similar to that discussed in
23	Alternative 2, Subsection 8.2.1.3.
24	
25	Debris excavation and backfill at AOCs 9 and 40. This component is similar to that
26	discussed in Alternative 4, Subsection 8.4.1.3.
27	
28	Wetlands restoration. This component is similar to that discussed in Alternative 2,
29	Subsection 8.2.1.3.
30	
31	<u>Consolidation of excavated debris at Consolidation Landfill</u> . This component is similar to
32	that discussed in Alternative 4, Subsection 8.4.1.3.
33	Institutional controls. This component is similar to that discussed in Alternative 2
34	Institutional controls. This component is similar to that discussed in Alternative 2,
35	Subsection 6.2.1.3.

<u>Cover system monitoring and maintenance at Consolidation Landfill</u>. This component is
 similar to that discussed in Alternative 4, Subsection 8.4.1.3.

<u>Five-year site reviews</u>. This component is similar to that discussed in Alternative 2,
 Subsection 8.2.1.3.

8.5.2 Detailed Evaluation of Alternative 5

The following subsections present an assessment of Alternative 5 according to the seven evaluation criteria.

8.5.2.1 Overall Protection of Human Health and the Environment. The following
 paragraphs assess how the proposed actions of this alternative would provide protection
 of human health and the environment.

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SA 6. Installation of a low permeability cover at SA 6 would remove potential physical 17 hazards to occasional site visitors, limit human and ecological exposure to surface soils, 18 and reduce infiltration of precipitation which could potentially leach contaminants from 19 landfill debris and contaminate groundwater. Implementation of a long-term groundwater 20 monitoring program and five-year site review would provide a means to assess the affect 21 of potential future releases of contaminants on groundwater. These actions would provide 22 protection of human health and the environment. However, although potential human 23 health and environmental risks at SA 6 have not been evaluated in a PRE or baseline risk 24 assessment, they are considered minimal. Therefore, this alternative is considered to 25 provide little increased protection from the NFA Alternative, and the risk reduction benefit 26 from capping SA 6 is considered low. 27 28

<u>AOC 9</u>. Overall protection of human health and the environment is similar to that
 discussed in Subsection 8.4.2.1.

31

AOC 11. Overall protection of human health and the environment is similar to that discussed in Subsection 8.4.2.1.

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1 SA 12. Installation of a low permeability cover at SA 12 would remove potential physical 2 hazards to occasional site visitors, limit human and ecological exposure to surface soils, 3 and reduce infiltration of precipitation which could potentially leach contaminants from 4 landfill debris and contaminate groundwater. Implementation of a long-term groundwater 5 monitoring program and five-year site review would provide a means to assess the affect 6 of potential future releases of contaminants on groundwater. These actions would provide 7 8 protection of human health and the environment. 9 SA 13. Installation of a low permeability cover at SA 13 would remove potential physical 10 hazards to occasional site visitors, limit human and ecological exposure to surface soils, 11

and reduce infiltration of precipitation, which could potentially leach contaminants from
 landfill debris and contaminate groundwater. Implementation of a long-term groundwater
 monitoring program and five-year site review would provide a means to assess the affect
 of potential future releases of contaminants on groundwater. These actions would provide
 protection of human health and the environment.

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31

<u>AOC 40</u>. Overall protection of human health and the environment is similar to that
 discussed in Subsection 8.4.2.1.

AOC 41. Installation of a low permeability cover at AOC 41 would remove potential physical hazards to occasional site visitors, limit human and ecological exposure to surface soils, and reduce infiltration of precipitation which could potentially leach contaminants from landfill debris and contaminate groundwater. Implementation of a long-term groundwater monitoring program and five-year site review would provide a means to assess the affect of potential future releases of contaminants on groundwater. These actions would provide protection of human health and the environment.

8.5.2.2 Compliance with ARARs. Tables 8-14, 8-15, and 8-16 summarize how
 Alternative 5 will attain ARARs.

8.5.2.3 Long-term Effectiveness and Permanence. The following paragraphs assess
 the long-term effectiveness and permanence of the proposed actions of this alternative.

1	SA 6. The long-term effectiveness of a low permeability landfill cover at controlling
2	potential future releases from the unsaturated zone beneath the landfill would depend on
3	maintenance of cap integrity. When adequately installed and maintained, low permeability
4	cover systems have a history of effectively reducing surface infiltration to landfill
5	materials, promoting surface water drainage, minimizing erosion, and isolating landfill
6	materials from the environment.
7	
8 9	A landfill cover system would not reduce potential future releases from the saturated zone.
10	AOC 9. The long-term effectiveness and permanence of this alternative is similar to that
11	discussed in Subsection 8.4.2.3.
12	
13	AOC 11. The long-term effectiveness and permanence of this alternative is similar to that
14	discussed in Subsection 8.4.2.3.
15	
16	SA 12. The long-term effectiveness of a low permeability landfill cover at controlling
17	exposure to surface soil and potential future releases from the unsaturated zone beneath
18	the landfill would depend on maintenance of cap integrity. When adequately installed and
19	maintained, low permeability cover systems have a history of effectively reducing surface
20	infiltration to landfill materials, promoting surface water drainage, minimizing erosion, and
21	isolating landfill materials from the environment.
22	
23	A landfill cover system would not reduce potential future releases from the saturated zone.
24	
25	<u>SA 13</u> . The long-term effectiveness of a low permeability landfill cover at controlling
26	exposure to surface soil and potential future releases from the unsaturated zone beneath
27	the landfill would depend on the maintenance of cap integrity. When adequately installed
28	and maintained, low permeability cover systems have a history of effectively reducing
29	surface infiltration to landfill materials, promoting surface water drainage, minimizing
30	erosion, and isolating landfill materials from the environment.
31	
32	A landfill cover system would not reduce potential future releases from the saturated zone.
33	

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1	AOC 40. The long-term effectiveness and permanence of this alternative is similar to that
2	discussed in Subsection 8.4.2.3.
3	
4	AOC 41. The long-term effectiveness of a low permeability landfill cover at controlling
5	exposure to surface soil and potential future releases from the unsaturated zone beneath
6	the landfill would depend on the maintenance of cap integrity. When adequately installed
7	and maintained, low permeability cover systems have a history of effectively reducing
8	surface infiltration to landfill materials, promoting surface water drainage, minimizing
9	erosion, and isolating landfill materials from the environment.
10	
11	A landfill cover system would not reduce potential future releases from the saturated zone.
12	
13	8.5.2.4 Reduction of Toxicity, Mobility, and Volume Through Treatment. The
14	following paragraphs assess the reduction of toxicity, mobility, and volume of
15	contaminants through treatment offered by the proposed actions of this alternative.
16	
17	SA 6. Reduction of toxicity, mobility, or volume of contaminants through treatment
18	would not be achieved. By reducing the potential for contaminant leaching in the
19	unsaturated zone, the potential for contaminant migration to groundwater would be
20	reduced.
21	
22	AOC 9. The reduction of toxicity, mobility, and volume through treatment is similar to
23	that discussed in Subsection 8.4.2.4.
24	
25	AOC 11. The reduction of toxicity, mobility, and volume through treatment is similar to
26	that discussed in Subsection 8.4.2.4.
27	
28	SA 12. Reduction of toxicity, mobility, or volume of contaminants through treatment
29	would not be achieved. By reducing the potential for contaminant leaching in the
30	unsaturated zone, the potential for contaminant migration to groundwater would be
31	reduced.
32	
33	SA 13. Reduction of toxicity, mobility, or volume of contaminants through treatment
34	would not be achieved. By reducing the potential for contaminant leaching in the

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1 2	unsaturated zone, the potential for contaminant migration to groundwater would be reduced.
3	
4	AOC 40. The reduction of toxicity, mobility, and volume through treatment is similar to
5	that discussed in Subsection 8.4.2.4.
6	
7	AOC 41. Reduction of toxicity, mobility, or volume of contaminants through treatment
8	would not be achieved. By reducing the potential for contaminant leaching in the
9	unsaturated zone, the potential for contaminant migration to groundwater would be
10	reduced.
11	
12	8.5.2.5 Short-term Effectiveness. The following paragraphs assess the short-term
13	effectiveness of the actions proposed at each of the landfills.
14	
15	<u>SA 6</u> . This alternative would be expected to present minimal short-term risks to workers,
16	the community, and the environment. Risk to the community would be minimal because
17	residences are not close enough to the site to be impacted by noise or dust potentially
18	generated from cover system placement activities. It is anticipated that delivery of
19	construction of materials can be planned to avoid creating traffic congestion and hazards.
20	
21	Grading the landfill prior to capping could present potential risk to workers if hazardous
22	materials are uncovered. Exposure to potentially contaminated soil and debris could be
23	reduced to a safe level by worker adherence to general health and safety practices, and use
24	of personnel monitoring during any intrusive activities at the landfill.
25	AOC 0. The short term effectiveness of this alternative is similar to that discussed in
26	<u>AOC 9</u> . The short-term enectiveness of this alternative is similar to that discussed in Subsection 8.4.2.5
27	Subsection 8.4.2.5.
20	AOC 11 The short-term effectiveness of this alternative is similar to that discussed in
30	Subsection 8.4.2.5
31	
32	SA 12. This alternative would be expected to present minimal short-term risks to
33	workers, the community, and the environment. Risk to the community would be minimal

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because residences are not close enough to the site to be impacted by noise or dust 1 potentially generated from cover system placement activities. It is anticipated that delivery 2 of construction materials can be planned to avoid creating traffic congestion and hazards. 3 4 Grading the landfill prior to capping could present potential risk to workers if hazardous 5 materials are uncovered. Exposure to potentially contaminated soil and debris could be 6 reduced to a safe level by worker adherence to general health and safety practices, and use 7 of personnel monitoring during any intrusive activities at the landfill. 8 9 SA 13. This alternative would be expected to present minimal short-term risks to 10 11 workers, the community, and the environment. Risk to the community would be minimal because residences are not close enough to the site to be impacted by noise or dust 12 potentially generated from cover system placement activities. It is anticipated that delivery 13 of construction can be planned to avoid creating traffic congestion and hazards. 14 15 Grading the landfill prior to capping could present potential risk to workers if hazardous 16 materials are uncovered. Exposure to potentially contaminated soil and debris could be 17 reduced to a safe level by worker adherence to general health and safety practices, and use 18 of personnel monitoring during any intrusive activities at the landfill. 19 20 AOC 40. The short-term effectiveness of this alternative is similar to that discussed in 21 Subsection 8.4.2.5. 22 23 AOC 41. This alternative would be expected to present minimal short-term risks to 24 workers, the community, and the environment. Risk to the community would be minimal 25 because residences are not close enough to the site to be impacted by noise or dust 26 potentially generated from cover system placement activities. It is anticipated that delivery 27 of construction materials can be planned to avoid creating traffic congestion and hazards. 28 29 Grading the landfill prior to capping could present potential risk to workers if hazardous 30 materials are uncovered. Exposure to potentially contaminated soil and debris could be 31 reduced to a safe level by worker adherence to general health and safety practices, and use 32 of personnel monitoring during any intrusive activities at the landfill. 33 34

8.5.2.6 Implementability. The following paragraphs assess the implementability of the actions proposed at each of the landfills.

3

SA 6. Placement of land use restrictions on property currently owned by the U.S. Army

s would be easily implemented upon property transfer. The filing of a Record Notice of

Landfill Operation, in conformance with 310 CMR 19.141, is an easily implementable land
 use restriction.

8

9 Cover system construction can be accomplished using standard construction procedures and conventional earthmoving equipment. Many engineering and construction companies are qualified to design and construct a landfill cover system. Materials required to construct a low-permeability cover system are readily available. Post-closure monitoring and maintenance are easily implementable. Installation of the cover system could increase the scope of potential future remedial actions at the site, if these actions required access to the debris.

16

According to the NCP, no federal, state, or local permits are required for on-site response actions conducted pursuant to CERCLA, although coordination with review agencies is recommended. Placement of the cover system would not require any permits, because it is an on-site activity. Post-closure technical requirements of the Massachusetts Solid Waste Management Regulations (310 CMR 19.000) would be met by this alternative. During construction of the cover system, stormwater runoff would be controlled to minimize erosion and potential surface water contamination.

AOC 9. The implementability of this alternative is similar to that discussed in
 Subsection 8.4.2.6.

27

AOC 11. The implementability of this alternative is similar to that discussed in

- 29 Subsection 8.4.2.6.
- 30

31 <u>SA 12</u>. Placement of land use restrictions on property currently owned by the U.S. Army

32 would be easily implemented upon property transfer. The filing of a Record Notice of

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Landfill Operation, in conformance with 310 CMR 19.141, is an easily implementable land
 use restriction.

- Cover system construction can be accomplished using standard construction procedures and conventional earthmoving equipment. Many engineering and construction companies are qualified to design and construct a landfill cover system. Materials required to construct a low-permeability cover system are readily available. Post-closure monitoring and maintenance are easily implementable. Installation of the cover system could increase the scope of potential future remedial actions at the site, if these actions required access to the debris.
- 11

3

According to the NCP, no federal, state, or local permits are required for on-site response actions conducted pursuant to CERCLA, although coordination with review agencies is recommended. Placement of the cover system would not require any permits, because it is an on-site activity. Post-closure technical requirements of the Massachusetts Solid Waste Management Regulations (310 CMR 19.000) would be met by this alternative. During construction of the cover system, stormwater runoff would be controlled to minimize erosion and potential surface water contamination.

19

<u>SA 13</u>. Placement of land use restrictions on property currently owned by the U.S. Army
 would be easily implemented upon property transfer. The filing of a Record Notice of
 Landfill Operation, in conformance with 310 CMR 19.141, is an easily implementable land
 use restriction.

24

Cover system construction can be accomplished using standard construction procedures and conventional earthmoving equipment. Many engineering and construction companies are qualified to design and construct a landfill cover system. Materials required to construct a low-permeability cover system are readily available. Post-closure monitoring and maintenance are easily implementable. Installation of the cover system could increase the scope of potential future remedial actions at the site, if these actions required access to the debris.

- According to the NCP, no federal, state, or local permits are required for on-site response actions conducted pursuant to CERCLA, although coordination with review agencies is
- recommended. Placement of the cover system would not require any permits, because it is

an on-site activity. Post-closure technical requirements of the Massachusetts Solid Waste 1 Management Regulations (310 CMR 19.000) would be met by this alternative. During 2 construction of the cover system, stormwater runoff would be controlled to minimize 3 erosion and potential surface water contamination. 4 5 AOC 40. The implementability of this alternative is similar to that discussed in 6 Subsection 8.4.2.6. 7 8 AOC 41. Placement of land use restrictions on property currently owned by the U.S. 9 Army would be easily implemented upon property transfer. 10 11 Cover system construction can be accomplished using standard construction procedures 12 and conventional earthmoving equipment. Many engineering and construction companies 13 are qualified to design and construct a landfill cover system. Materials required to 14 construct a low-permeability cover system are readily available. Post-closure monitoring 15 and maintenance are easily implementable. Installation of the cover system could increase 16 the scope of potential future remedial actions at the site, if these actions required access to 17 the debris. 18 19 According to the NCP, no federal, state, or local permits are required for on-site response 20 actions conducted pursuant to CERCLA, although coordination with review agencies is 21 recommended. Placement of the cover system would not require any permits, because it is 22 an on-site activity. Post-closure technical requirements of the Massachusetts Solid Waste 23 Management Regulations (310 CMR 19.000) would be met by this alternative. During 24 construction of the cover system, stormwater runoff would be controlled to minimize 25 erosion and potential surface water contamination. 26 27 **8.5.2.7** Cost. The cost estimate for Alternative 5 includes estimates of direct and indirect 28 capital costs and O&M costs. Direct capital costs included for this alternative include site 29 preparation, excavation of sediment and debris, drum removal, cap construction, site 30 restoration and monitoring well installation. A 25 percent contingency is included in 31 direct cost items to account for unforeseen project complexities (e.g., adverse weather

direct cost items to account for unforeseen project complexities
 conditions and inadequate site characterization).

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O&M costs include landfill cover maintenance, and environmental monitoring for
 groundwater, wetlands, and sediment.

Table 8-17 summarizes the cost estimate for Alternative 5. The total capital cost (direct plus indirect costs) is estimated to be \$17,843,000. O&M costs are estimated to be \$165,000 per year.

To enable evaluation costs that would occur over different time periods, the table also includes a present worth analysis. Present worth represents the amount of money that, if invested now and disbursed as needed, would be sufficient to cover all costs associated with the remedial action over its planned life. A discount rate of 7 percent before taxes and after inflation is used as recommended in OSWER Directive 9355.3-20. Unless noted otherwise, costs are based on a 30-year time frame. The estimated total present worth is \$19,607,000. Cost calculations are included in Appendix D.

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8.6 ALTERNATIVE 6: CAP-IN-PLACE AT AOC 41 AND SAS 6, 12, AND 13; AND EXCAVATION AND CONSOLIDATION OF AOCS 9, 11, AND 40

This subsection describes Alternative 6, evaluates the alternative using the seven evaluation criteria, and provides a cost estimate.

24 8.6.1 Description of Alternative 6

Alternative 6 proposes capping at AOC 41 and SAs 6, 12, 13; excavating debris from AOCs 9, 11, and 40; and consolidating the excavated debris in a proposed secure landfill near Shepley's Hill Landfill. Based on available information, these areas contain nonhazardous debris only. The SA/AOCs will be treated as construction debris landfills.

Alternative 6 also includes removing exposed drums at Cold Spring Brook Landfill (AOC 40) to remove a potential source of contamination, and excavating sediment from two hot spots in Cold Spring Brook Pond, to reduce ecological risk from exposure to contaminated sediments. These actions were described previously in the FS for AOC 40

35 (ABB-ES, 1994b).

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1	
2	Key components of Alternative 6 include:
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4	Cap-in-Place AOC 41, SAs 6, 12, 13
5	
6	Mobilization/demobilization;
7	• Site preparation;
8	• UXO monitoring at SAs 6, 12 and AOC 41;
9	Cap construction;
10	• Site restoration;
11	 Wetland restoration;
12	 Institutional controls;
13	 Cover system monitoring and maintenance; and
14	• Five-year site reviews.
15	
16	Excavation and Consolidation at AOCs 9, 11 and 40
17	
18	 Mobilization/demobilization;
19	 AOC 40 sediment removal and disposal;
20	 AOC 40 drum removal and disposal;
21	 Debris excavation and backfill at AOCs 9, 11 and 40;
22	Wetlands restoration;
23	 Consolidation of excavated debris at Consolidation Landfill;
24	Institutional controls;
25	 Cover system monitoring and maintenance at Consolidation Landfill; and
26	• Five-year Site Reviews;
27	
28	8.6.1.2 Description of Cap-In-Place Components for Alternative 6.
29	
30	Mobilization/demobilization. This component is similar to that discussed in Alternative 2,
31	Subsection 8.2.1.3.
32	

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 Subsection 8.2.1.3. UXO monitoring at SAs 6, 12 and AOC 41. This component is similar to that discussed in Alternative 5, Subsection 8.5.1.2. <u>Cap construction</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Site restoration</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Wetland restoration</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Wetland restoration</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Institutional controls</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Cover system monitoring and maintenance</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Five-year site reviews</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Bite reviews</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Soussection 8.2.1.3</u>. <u>Soussection 8.2.1.3</u>. <u>Subsection 8.2.1.3</u>. <u>Soussection 8.2.1.3</u>. <li< th=""><th>1</th><th>Site preparation. This component is similar to that discussed in Alternative 2,</th></li<>	1	Site preparation. This component is similar to that discussed in Alternative 2,
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4 UXO monitoring at SAs 6, 12 and AOC 41. This component is similar to that discussed in Alternative 5, Subsection 8.5.1.2. 6 Cap construction. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 9 Site restoration. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 9 Site restoration. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 9 Wetland restoration. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 16 Institutional controls. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 17 Subsection 8.2.1.3. 18 Cover system monitoring and maintenance. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 19 Five-year site reviews. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 21 Five-year site reviews. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 22 Setternative 6. 23 Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 24 Source of the component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 25 Subsection 8.2.1.3. 26 Souponent for Alternative 6. <t< td=""><td>3</td><td></td></t<>	3	
 in Alternative 5, Subsection 8.5.1.2. <u>Cap construction</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Site restoration</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Wetland restoration</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Institutional controls</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Cover system monitoring and maintenance</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Five-year site reviews</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Subsection 8.2.1.3</u>. <u>Five-year site reviews</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Subsection 8.2.1.3</u>. <u>Site preparation</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Site preparation</u>. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. <u>Sediment removal and disposal at AOC 40</u>. This component is similar to that discussed in Alternative 2. Subsection 8.2.1.3. 	4	UXO monitoring at SAs 6, 12 and AOC 41. This component is similar to that discussed
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17 Subsection 8.2.1.3. 18 Cover system monitoring and maintenance. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 19 Five-year site reviews. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 12 Five-year site reviews. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 14 8.6.1.3 Description of Excavate and Consolidate AOCs 9, 11 and AOC 40 16 Components for Alternative 6. 17 Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 18 Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 18 Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3.	16	Institutional controls. This component is similar to that discussed in Alternative 2
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 Cover system monitoring and maintenance. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Five-year site reviews. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 8.6.1.3 Description of Excavate and Consolidate AOCs 9, 11 and AOC 40 Components for Alternative 6. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Subsection 8.2.1.3. 	18	
 Alternative 2, Subsection 8.2.1.3. Five-year site reviews. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 8.6.1.3 Description of Excavate and Consolidate AOCs 9, 11 and AOC 40 Components for Alternative 6. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Alternative 2, Subsection 8.2.1.3. 	19	Cover system monitoring and maintenance. This component is similar to that discussed in
 Five-year site reviews. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 8.6.1.3 Description of Excavate and Consolidate AOCs 9, 11 and AOC 40 Components for Alternative 6. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 	20	Alternative 2, Subsection 8.2.1.3.
 Five-year site reviews. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 8.6.1.3 Description of Excavate and Consolidate AOCs 9, 11 and AOC 40 Components for Alternative 6. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 	21	
 Subsection 8.2.1.3. 8.6.1.3 Description of Excavate and Consolidate AOCs 9, 11 and AOC 40 Components for Alternative 6. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Alternative 2, Subsection 8.2.1.3. 	22	Five-year site reviews. This component is similar to that discussed in Alternative 2,
 8.6.1.3 Description of Excavate and Consolidate AOCs 9, 11 and AOC 40 Components for Alternative 6. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Alternative 2, Subsection 8.2.1.3. 	23	Subsection 8.2.1.3.
 8.6.1.3 Description of Excavate and Consolidate AOCs 9, 11 and AOC 40 Components for Alternative 6. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Alternative 2, Subsection 8.2.1.3. 	24	
 Components for Alternative 6. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 	25	8.6.1.3 Description of Excavate and Consolidate AOCs 9, 11 and AOC 40
 Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 	26	Components for Alternative 6.
 Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 	27	
 Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 	28	Mobilization/demobilization. This component is similar to that discussed in Alternative 2,
 Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. 	29	Subsection 8.2.1.3.
 Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Alternative 2, Subsection 8.2.1.3. 	30	Site memory time this second section is the state of the state of the
 32 Subsection 6.2.1.5. 33 34 <u>Sediment removal and disposal at AOC 40</u>. This component is similar to that discussed in 35 Alternative 2. Subsection 8.2.1.3. 	31	Subsection 8.2.1.2
 Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2. Subsection 8.2.1.3 	32	Subsection 6.2.1.5.
Alternative 2 Subsection 8 2 1 3	33	Sediment removal and disposal at AOC 40. This component is similar to that disposal in
	35	Alternative 2 Subsection 8 2 1 3
1		
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2	Drum removal and disposal at AOC 40. This component is similar to that discussed in	
3	Alternative 2, Subsection 8.2.1.3.	
4		
5	Debris excavation and backfill at AOCs 9, 11 and 40. This component for AOC 9 and	
6	AOC 40 is similar to that discussed in Alternative 4, Subsection 8.4.1.3.	
7		
8	At AOC 11, excavation of debris would be accomplished in phases because some debris is	
9	buried below the groundwater table. The site is between wetlands to the north and south,	
10	and adjacent to the Nashua River to the east. A natural 40 ft wide berm along the Nashua	
11	River separates the debris from the river water. This berm is 8 to 10 feet above normal	
12	river elevations, but still below flood stage. Excavation would be planned for the low-	
13	flow summer months. The first phase would be to excavate all of the debris above the	
14	watertable utilizing a backhoe, bulldozer and trucks. The estimated volume of debris	
15	above groundwater is about 90 percent of the total amount of AOC 11. The second phase,	
16	removing the debris (about 10 percent) from below groundwater, would require	
17	dewatering of one limited area at a time, then excavating and immediately backfilling.	
18	Dewatering would consist of a two rows of individual sumps either side of the debris to	
19	intercept groundwater from the river and from the upland hill. The length of the	
20	dewatered excavation would vary from 50 to 100 ft. After one 100-ft long section is	
21	excavated and backfilled, the operation would move along until all of the 500-ft long	
22	excavation of debris is removed. Additional soils investigation would be necessary during	
23	design to determine soil properties and limits of debris.	
24		
25	Wetlands restoration. This component is similar to that discussed in Alternative 2,	
26	Subsection 8.2.1.3.	
27		
28	Consolidation of excavated debris at Consolidation Landfill. This component is similar to	
29	that discussed in Alternative 4, Subsection 8.4.1.3. In Alternative 6, the Consolidation	
30	Landfill volume would be 343,000 cy.	
31		
32	Institutional controls. This component is similar to that discussed in Alternative 2,	
33	Subsection 8.2.1.3.	

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2	Cover system monitoring and maintenance at Consolidation Landfill. This component is
3	similar to that discussed in Alternative 4, Subsection 8.4.1.3.
4	Five-year site reviews. This component is similar to that discussed in Alternative 2
6	Subsection 8.2.1.3.
7	
8	8.6.2 Detailed Evaluation of Alternative 6
9	
10	The following subsections present an assessment of Alternative 6 according to the seven
11	evaluation criteria.
12	
13	8.6.2.1 Overall Protection of Human Health and the Environment. The following
14	paragraphs assess how the proposed actions of this alternative would provide protection
15	of numan health and the environment.
16	SA 6 Oursell protoction of the sector to 1/1 - 1/1 - 1/1 - 1/1 - 1/1 - 1/1 - 1/1 - 1/1 - 1/1 - 1/1 - 1/1 - 1/1
17	$\underline{SA0}$. Overall protection of numan health and the environment is similar to that discussed in Subsection 8.5.2.1
18	In Subsection 8.5.2.1.
19	$\Delta OC Q$ Overall protection of human health and the environment is similar to that
20	discussed in Subsection 8.5.2.1
21	discussed in Subsection 8.5.2.1.
22	AOC 11 This alternative would provide protection of human health and the any incomment
23	by excavating landfill materials and then disposing of them at the consolidation facility
25	This would prevent potential future exposure to surface soil and sediment and would
26	prevent potential future releases from landfill debris to groundwater. However, moving
27	the landfill debris to a separate consolidation facility would transfer the risk of potential
28	releases to another location. Because the PRE did not identify significant potential for
29	human or ecological exposure risk at AOC 11, the risk reduction benefit from excavating
30	and consolidating AOC 11 is considered low.
31	-
32	SA 12. Overall protection of human health and the environment is similar to that
33	discussed in Subsection 8.5.2.1.
34	

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1	<u>SA 13</u> . Overall protection of human health and the environment is similar to that discussed in Subsection $8.5.2.1$
2	discussed in Subsection 8.5.2.1.
4	AOC 40 Overall protection of human health and the environment is similar to that
5	discussed in Subsection 8.5.2.1.
6	
7	AOC 41. Overall protection of human health and the environment is similar to that
8	discussed in Subsection 8.5.2.1.
9	
10	8.6.2.2 Compliance with ARARs. Tables 8-18, 8-19, and 8-20 summarize how
11	Alternative 6 will attain ARARs.
12	
13	8.6.2.3 Long-term Effectiveness and Permanence. The following paragraphs assess
14	the long-term effectiveness and permanence of the proposed actions of this alternative.
15	
16	SA 6. The long-term effectiveness and permanence of this alternative is similar to that $\frac{1}{10000000000000000000000000000000000$
17	discussed in Subsection 8.5.2.3.
18	AOC 9. The long term effectiveness and permanence of this alternative is similar to that
20	discussed in Subsection 8.5.2.3
21	discussed in Subsection 6.5.2.5.
22	AOC 11. Excavation of landfill debris would effectively prevent human and ecological
23	exposure and would prevent the landfill from being a potential source of future
24	groundwater contamination. The effectiveness of the consolidation facility at isolating
25	landfill debris, would depend on the quality of construction and proper maintenance of
26	cover and leachate collection systems. Landfills that include groundwater protection
27	systems with leachate collection, cover systems, and long-term monitoring and
28	maintenance have a history of effectively isolating wastes from the environment.
29	
30	<u>SA 12</u> . The long-term effectiveness and permanence of this alternative is similar to that
31	discussed in Subsection 8.5.2.3.
32	

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1 2	<u>SA 13</u> . The long-term effectiveness and permanence of this alternative is similar to that discussed in Subsection 8.5.2.3
3	
4	<u>AOC 40</u> . The long-term effectiveness and permanence of this alternative is similar to that discussed in Subsection 8.5.2.3
6	
7	AOC 41 The long-term effectiveness and permanence of this alternative is similar to that
8	discussed in Subsection 8.5.2.3
9	
10	8.6.2.4 Reduction of Toxicity, Mobility, and Volume Through Treatment The
11	following paragraphs assess the reduction of toxicity, mobility, and volume of
12	contaminants through treatment offered by the proposed actions of this alternative.
13	
14	SA 6. The reduction of toxicity, mobility, and volume through treatment is similar to that
15	discussed in Subsection 8.5.2.4.
16	
17	AOC 9. The reduction of toxicity, mobility, and volume through treatment is similar to
18	that discussed in Subsection 8.5.2.4.
19	
20	AOC 11. Reduction of toxicity, mobility, or volume of landfill contaminants through
21	treatment would not be achieved. By removing landfill debris, the potential for leaching of
22	landfill materials and contamination of groundwater would be reduced. No reduction of
23	toxicity, mobility, or volume of groundwater contaminants would be achieved. Disposal
24	of excavated landfill debris at a consolidation facility with low permeability liner, leachate
25	collection, and low permeability cover would reduce contaminant mobility.
26	
27	<u>SA 12</u> . The reduction of toxicity, mobility, and volume through treatment is similar to $\frac{1}{10000000000000000000000000000000000$
28	that discussed in Subsection 8.5.2.4.
29	
30	SA 13. The reduction of toxicity, mobility, and volume through treatment is similar to
31	that discussed in Subsection 8.3.2.4.
32	AOC 40. The reduction of terrisity multility and endows there is the second state in the
33	AUC 40. The reduction of toxicity, mobility, and volume through treatment is similar to
34	that discussed in Subsection 8.5.2.4.
35	

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1	AOC 41. The reduction of toxicity, mobility, and volume through treatment is similar to
2	that discussed in Subsection 8.5.2.4.
3	
4	8.6.2.5 Short-term Effectiveness. The following paragraphs assess the short-term
5	effectiveness of the actions proposed at each of the landfills.
6	
7	SA 6. The short-term effectiveness of this alternative is similar to that discussed in
8	Subsection 8.5.2.5.
9	
10	AOC 9. The short-term effectiveness of this alternative is similar to that discussed in
11	Subsection 8.5.2.5.
12	
13	AOC 11. This alternative is expected to present minimal risks to workers, the community,
14	and the environment. Transportation of excavated materials would be planned to avoid
15	creating traffic congestion and hazards to the community. Handling and transportation of
16	any hazardous materials would be conducted according to RCRA and DOT regulations to
17	protect workers and the community.
18	
19	Available information does not suggest the presence of hazardous substances that would
20	present a risk to workers during excavation. Worker adherence to general health and
21	safety practices, and use of personnel monitoring would reduce potential exposure to
22	potentially hazardous substances to a safe level. Excavation of landfilled debris and
23	construction of the consolidation facility could generate dust. Dust suppression
24	techniques would reduce potential risk to workers and the community.
25	
26	SA 12. The short-term effectiveness of this alternative is similar to that discussed in
27	Subsection 8.5.2.5.
28	
29	SA 13. The short-term effectiveness of this alternative is similar to that discussed in
30	Subsection 8.5.2.5.
31	
32	AOC 40. The short-term effectiveness of this alternative is similar to that discussed in
33	Subsection 8.5.2.5.

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2 3	AOC 41. The short-term effectiveness of this alternative is similar to that discussed in Subsection $8.5.2.5$.
4	,
5	8.6.2.6 Implementability. The following paragraphs assess the implementability of the actions proposed at each of the landfills
7	
8	<u>SA 6</u> . The implementability of this alternative is similar to that discussed in Subsection 8.5.2.6.
10	Subsection 0.5.2.0.
11	AOC 9. The implementability of this alternative is similar to that discussed in Subsection $8.5.2.6$
12	Subsection 8.5.2.6.
13	AOC 11 Londfill execution and construction can be accountly by the table to the table
14	ACC 11. Landin excavation and construction can be accomplished using standard
16	and construction companies are qualified and available. Successful implementation of this
17	alternative is contingent on the approval and construction of a consolidation facility to
18	accept the excavated debris. The consolidation facility would be constructed and
19	maintained to effectively isolate debris excavated from AOC 11 Implementation of this
20	alternative would not limit or interfere with the ability to perform future remedial actions
21	at AOC 11.
22	
23	All activities to excavate AOC 11 would be conducted on-site, and permits would not be
24	required. Design, construction, operation, closure, and post-closure monitoring and
25	maintenance of the consolidation facility would be conducted according to the technical
26	requirements of Massachusetts 310 CMR 19.000.
27	
28	Consolidation of this disposal area with others reduce the administrative burden and
29	complexity of implementing the long-term monitoring and maintenance requirements of
30	310 CMR 19.000 at separate disposal areas.
31	
32 33	<u>SA 12</u> . The implementability of this alternative is similar to that discussed in Subsection $8.5.2.6$.

34

1	SA 13. The implementability of this alternative is similar to that discussed in
2	Subsection 8.5.2.6.
3	
4	AOC 40. The implementability of this alternative is similar to that discussed in
5	Subsection 8.5.2.6.
6	
7	AOC 41. The implementability of this alternative is similar to that discussed in
8	Subsection 8.5.2.6.
9	
10	8.6.2.7 Cost. The cost estimate for Alternative 6 includes estimates of direct and indirect
11	capital costs and O&M costs. Direct capital costs included for this alternative include site
12	preparation, sediment and debris excavation, drum removal, cap construction site
13	restoration and monitoring well installation. A 25 percent contingency is included in
14	direct cost items to account for unforeseen project complexities (e.g., adverse weather
15	conditions and inadequate site characterization).
16	
17	O&M costs include landfill cover maintenance, and environmental monitoring for
18	groundwater, wetlands, and sediment.
19	
20	Table 8-21 summarizes the cost estimate for Alternative 6. The total capital cost (direct
21	plus indirect costs) is estimated to be \$19,828,000. O&M costs are estimated to be
22	\$161,000 per year.
23	
24	To enable evaluation costs that would occur over different time periods, the table also
25	includes a present worth analysis. Present worth represents the amount of money that, if
26	invested now and disbursed as needed, would be sufficient to cover all costs associated
27	with the remedial action over its planned life. A discount rate of 7 percent before taxes
28	and after inflation is used as recommended in OSWER Directive 9355.3-20. Unless noted
29	otherwise, costs are based on a 30-year time frame. The estimated total present worth is
30	\$21,585,00. Cost calculations are included in Appendix D.
31	
32	

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1	8.7 ALTERNATIVE 7: CAP-IN-PLACE AT ALL SEVEN DISPOSAL AREAS
2	
3	This subsection describes Alternative 7, evaluates the alternative using the seven
4	evaluation criteria, and provides a cost estimate.
5	
6	This alternative includes construction of a cap over each of the seven disposal sites.
7 8	Alternative 7 also includes removing exposed drums at AOC 40 to remove a potential source of contamination, and excavation of sediment from two hot spots in Cold Spring
9	Brook Pond, to reduce ecological risk from exposure to contaminated sediments. These
10	actions at AOC 40 were described previously in the FS for AOC 40 (ABB-ES, 1994b).
11	
12	8.7.1 Description Of Alternative 7
13	
14	Key components of Alternative / include:
15	Cap in Place AOCs 0, 11, 40, 41 and $SA_2 \in \{12, 12, 12\}$
17	Cap-III-1 lace AOCS 9, 11, 40, 41 and SAS 0, 12, 15
18	 Mobilization/demobilization:
19	Site preparation:
20	 AOC 40 sediment removal and disposal:
21	 AOC 40 drum removal and disposal;
22	 UXO monitoring:
23	Cap construction:
24	• Site restoration:
25	Wetland restoration:
26	Institutional controls:
27	• Cover system monitoring and maintenance; and
28	• Five-year site reviews.
29	
30	8.7.1.1 Description of Cap-In-Place Components for Alternative 7.
31	
32	Mobilization/demobilization. This component is similar to that discussed in Alternative 2
33	Subsection 8.2.1.3.
34	

1	Site preparation. This component is similar to that discussed in Alternative 2,
2	Subsection 8.2.1.3.
3	
4	Sediment removal and disposal at AOC 40. This component is similar to that discussed in
5	Alternative 2, Subsection 8.2.1.3.
6	
7	Drum removal and disposal at AOC 40. This component is similar to that discussed in
8	Alternative 2, Subsection 8.2.1.3.
9	
10	UXO monitoring. This component is similar to that discussed in Alternative 5,
11	Subsection 8.5.1.2.
12	
13	Cap construction. This component is similar to that discussed in Alternative 2,
14	Subsection 8.2.1.3.
15	
16	Site restoration. This component is similar to that discussed in Alternative 2,
17	Subsection 8.2.1.3.
18	
19	Wetland restoration. This component is similar to that discussed in Alternative 2,
20	Subsection 8.2.1.3.
21	
22	Institutional controls. This component is similar to that discussed in Alternative 2,
23	Subsection 8.2.1.3.
24	
25	Cover system monitoring and maintenance. This component is similar to that discussed in
26	Alternative 2, Subsection 8.2.1.3, and
27	
28	Five-year site reviews. This component is similar to that discussed in Alternative 2,
29	Subsection 8.2.1.3.
30	

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1	8.7.2 Detailed Evaluation of Alternative 7
2	
3	The following subsections present an assessment of Alternative 7 according to the seven
4	evaluation criteria.
5	
6	8.7.2.1 Overall Protection of Human Health and the Environment. The following
7 8	paragraphs assess how the proposed actions of this alternative would provide protection of human health and the environment
9	
10	SA 6. Overall protection of human health and the environment is similar to that discussed
11	in Subsection 8.5.2.1.
12	
13 14	<u>AOC 9</u> . Overall protection of human health and the environment is similar to that discussed in Subsection 8.2.2.1
15	
16	AOC 11 Overall protection of human health and the environment is similar to that
17	discussed in Subsection 8.3.2.1
18	
19	SA 12. Overall protection of human health and the environment is similar to that
20	discussed in Subsection 8.5.2.1.
21	
22	SA 13. Overall protection of human health and the environment is similar to that
23	discussed in Subsection 8.5.2.1.
24	
25	AOC 40. Overall protection of human health and the environment is similar to that
26	discussed in Subsection 8.2.2.1.
27	
28	AOC 41. Overall protection of human health and the environment is similar to that
29	discussed in Subsection 8.5.2.1.
30	
31	8.7.2.2 Compliance with ARARs. Tables 8-22, 8-23, and 8-24 summarize how
32	Alternative 7 will attain ARARs.
33	
34	8.7.2.3 Long-term Effectiveness and Permanence. The following paragraphs assess
35	the long-term effectiveness and permanence of the proposed actions of this alternative.

1 SA 6. The long-term effectiveness and permanence of this alternative is similar to that 2 discussed in Subsection 8.5.2.3. 3 4 AOC 9. The long-term effectiveness and permanence of this alternative is similar to that 5 discussed in Subsection 8.2.2.3. 6 7 AOC 11. The long-term effectiveness and permanence of this alternative is similar to that 8 discussed in Subsection 8.3.2.3. 9 10 SA 12. The long-term effectiveness and permanence of this alternative is similar to that 11 discussed in Subsection 8.5.2.3. 12 13 SA 13. The long-term effectiveness and permanence of this alternative is similar to that 14 discussed in Subsection 8.5.2.3. 15 16 AOC 40. The long-term effectiveness and permanence of this alternative is similar to that 17 discussed in Subsection 8.2.2.3. 18 19 AOC 41. The long-term effectiveness and permanence of this alternative is similar to that 20 discussed in Subsection 8.5.2.3. 21 22 8.7.2.4 Reduction of Toxicity, Mobility, and Volume Through Treatment. The 23 following paragraphs assess the reduction of toxicity, mobility, and volume of 24 contaminants through treatment offered by the proposed actions of this alternative. 25 26 SA 6. The reduction of toxicity, mobility, and volume through treatment is similar to that 27 discussed in Subsection 8.5.2.4. 28 29 AOC 9. The reduction of toxicity, mobility, and volume through treatment is similar to 30 that discussed in Subsection 8.2.2.4. 31 32

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AOC 11. The reduction of toxicity, mobility, and volume through treatment is similar to 1 that discussed in Subsection 8.3.2.4. 2 3 4 SA 12. The reduction of toxicity, mobility, and volume through treatment is similar to that discussed in Subsection 8.5.2.4. 5 6 SA 13. The reduction of toxicity, mobility, and volume through treatment is similar to 7 that discussed in Subsection 8.5.2.4. 8 9 AOC 40. The reduction of toxicity, mobility, and volume through treatment is similar to 10 that discussed in Subsection 8.2.2.4. 11 12 AOC 41. The reduction of toxicity, mobility, and volume through treatment is similar to 13 that discussed in Subsection 8.5.2.4. 14 15 8.7.2.5 Short-term Effectiveness. The following paragraphs assess the short-term 16 effectiveness of the actions proposed at each of the landfills. 17 18 SA 6. The short-term effectiveness of this alternative is similar to that discussed in 19 Subsection 8.5.2.5. 20 21 AOC 9. The short-term effectiveness of this alternative is similar to that discussed in 22 Subsection 8.2.2.5. 23 24 AOC 11. The short-term effectiveness of this alternative is similar to that discussed in 25 Subsection 8.3.2.5. 26 27 SA 12. The short-term effectiveness of this alternative is similar to that discussed in 28 Subsection 8.5.2.5. 29 30 SA 13. The short-term effectiveness of this alternative is similar to that discussed in 31 Subsection 8.5.2.5. 32 33 AOC 40. The short-term effectiveness of this alternative is similar to that discussed in 34 Subsection 8.2.2.5. 35

1	
2	AOC 41. The short-term effectiveness of this alternative is similar to that discussed in
3	Subsection 8.5.2.5.
4	
5	8.7.2.6 Implementability. The following paragraphs assess the implementability of the
6	actions proposed at each of the landfills.
7	
8 9	SA 6. The implementability of this alternative is similar to that discussed in Subsection 8.5.2.6.
10	
11	AOC 9. The implementability of this alternative is similar to that discussed in
12	Subsection 8.2.2.6.
13	
14	AOC 11. The implementability of this alternative is similar to that discussed in
15	Subsection 8.3.2.6.
16	
17	SA 12. The implementability of this alternative is similar to that discussed in
18	Subsection 8.5.2.6.
19	
20	SA 13. The implementability of this alternative is similar to that discussed in
21	Subsection 8.5.2.6.
22	
23	AOC 40. The implementability of this alternative is similar to that discussed in
24	Subsection 8.2.2.6.
25	
26	AOC 41. The implementability of this alternative is similar to that discussed in
27	Subsection 8.5.2.6.
28	
29	8.7.2.7 Cost. The cost estimate for Alternative 7 includes estimates of direct and indirect
30	capital costs and O&M costs. Direct capital costs included for this alternative include site
31	preparation, sediment and debris excavation, drum removal, cap construction, site
32	restoration and monitoring well installation. A 25 percent contingency is included in

direct cost items to account for unforeseen project complexities (e.g., adverse weather 1 conditions and inadequate site characterization). 2 3 O&M costs include landfill cover maintenance and environmental monitoring for 4 groundwater, wetlands and sediment. 5 6 Table 8-25 summarizes the cost estimate for Alternative 7. The total capital cost (direct 7 plus indirect costs) is estimated to be \$9,832,000. O&M costs are estimated to be 8 \$221,000 per year. 9 10

To enable evaluation costs which would occur over different time periods, the table also includes a present worth analysis. Present worth represents the amount of money that, if invested now and disbursed as needed, would be sufficient to cover all costs associated with the remedial action over its planned life. A discount rate of 7 percent before taxes and after inflation is used as recommended in OSWER Directive 9355.3-20. Unless noted otherwise, costs are based on a 30-year time frame. The estimated total present worth is \$12,466,000. Cost calculations are included in Appendix D.

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8.8 ALTERNATIVE 8: LIMITED REMOVAL AT AOC 11 (DISPOSAL IN CONSOLIDATION LANDFILL); AND EXCAVATION AND CONSOLIDATION OF AOCS 9, 40, AND 41, AND SAS 6, 12, AND 13

This subsection describes and evaluates Alternative 8 using the seven evaluation criteria, and provides a cost estimate.

27 8.8.1 Description Of Alternative 8

Alternative 8 proposes limited removal of debris from AOC 11; excavating debris from AOCs 9, 40, 41 and SAs 6, 12, 13; and consolidating the excavated debris in a proposed secure landfill near Shepley's Hill Landfill. Based on available information, these areas contain non-hazardous debris only. The SA/AOCs will be treated as construction debris landfills.

1	Based on archeological monitoring conducted during the predesign investigations at SA 6,
2	further study is assumed to be warranted prior to disturbance of waste at this site. Work
3	at this site would need to comply with the requirements of the Archeological and
4	Historical Preservation Act Regulations (40 CFR Part 6), which establishes procedures to
5	provide for preservation of historical and archeological data which might be destroyed
6	through alteration of terrain as a result of a Federal construction project. Archeological
7	monitoring at the remaining six SA/AOCs is not anticipated.
8	
9	Alternative 8 also includes removing exposed drums at Cold Spring Brook Landfill
10	(AOC 40) to remove a potential source of contamination, and excavating sediment from
11	two hot spots in Cold Spring Brook Pond, to reduce ecological risk from exposure to
12	contaminated sediments. These actions were described previously in the FS for AOC 40
13	(ABB-ES, 1994b).
14	
15	The key components of Alternative 8 include:
16	Limited Removal at AOC 11
17	Linited Removal at AOC 11
10	Mobilization/demobilization
20	 Excavation of debris and transportation to the Consolidation L andfills
20	Excavation of debris and transportation to the Consolidation Landing Backfilling site: and
21	• Backhing Site, and
22	• Site restoration.
23	Exception and Consolidation at AOCs 9, 40, 41 and SAs 6, 12, 13
25	Excavation and Consolidation at AOCS 7, 40, 41 and SAS 0, 12, 15
26	Mobilization/demobilization
27	AOC 40 sediment removal and disposal
28	 AOC 40 drum removal and disposal:
29	• UXO monitoring at SAs 6 12 and AOC 41
30	• Debris excavation and backfill
31	• Wetlands restoration:
32	 Consolidation of excavated debris at Consolidation Landfill:
	,

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1	Institutional controls;
2	• Cover system monitoring and maintenance at Consolidation Landfill; and
3	• Five-year site reviews;
4	
5	8.8.1.1 Description of Limited Removal Components for Alternative 8.
6	
7 8	Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3.
9	
10 11	Excavation of debris and transportation to the Consolidation Landfill. This component is similar to that discussed in Alternative 2. Subsection 8 2 1 3
12	
13	Backfilling site. This component is similar to that discussed in Alternative 2,
14	Subsection 8.2.1.3.
15	
16	Site restoration. This component is similar to that discussed in Alternative 2,
17	Subsection 8.2.1.3.
18	
19	8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8.
19 20	8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8.
19 20 21 22	8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8 . <u>Mobilization/demobilization</u> . This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3.
19 20 21 22 23	8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8 . <u>Mobilization/demobilization</u> . This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3.
19 20 21 22 23 24	 8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2,
19 20 21 22 23 24 25	 8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3.
19 20 21 22 23 24 25 26	 8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3.
19 20 21 22 23 24 25 26 27	 8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in
19 20 21 22 23 24 25 26 27 28	 8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Alternative 2, Subsection 8.2.1.3.
19 20 21 22 23 24 25 26 27 28 29	 8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3.
19 20 21 22 23 24 25 26 27 28 29 30	 8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Drum removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3.
19 20 21 22 23 24 25 26 27 28 29 30 31	 8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Drum removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3.
19 20 21 22 23 24 25 26 27 28 29 30 31 32	 8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Drum removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3.
19 20 21 22 23 24 25 26 27 28 29 30 31 32 33	 8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Drum removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. UXO monitoring. This component is similar to that discussed in Alternative 2,
19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34	 8.8.1.2 Description of Excavation and Consolidation Components for Alternative 8. Mobilization/demobilization. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Site preparation. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Sediment removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. Drum removal and disposal at AOC 40. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3. UXO monitoring. This component is similar to that discussed in Alternative 2, Subsection 8.2.1.3.

1 2	<u>Debris excavation and backfill at AOCs 9 and 40</u> . This component is similar to that discussed in Alternative 4, Subsection 8.4.1.3.
3	
4	Wetlands restoration. This component is similar to that discussed in Alternative 2.
5	Subsection 8.2.1.3.
6	
7	Consolidation of excavated debris at Consolidation Landfill. This component is similar to
8	that discussed in Alternative 4, Subsection 8.4.1.3. The Consolidation Landfill volume for
9	Alternative 8 is 327,000 cy.
10	
11	Institutional controls. This component is similar to that discussed in Alternative 2,
12	Subsection 8.2.1.3.
13	
14	Cover system monitoring and maintenance at Consolidation Landfill. This component is
15	similar to that discussed in Alternative 4, Subsection 8.4.1.3.
16	
17	Five-year site reviews. This component is similar to that discussed in Alternative 2,
18	Subsection 8.2.1.3.
19	
20	8.8.2 Detailed Evaluation of Alternative 8
21	
22	The following subsections present an assessment of Alternative 8 according to the seven
23	evaluation criteria.
24	
25	8.8.2.1 Overall Protection of Human Health and the Environment. The following
26	paragraphs assess how the proposed actions of this alternative would provide protection
27	of human health and the environment.
28	
29	<u>SA 6</u> . This alternative would provide protection of human health and the environment by
30	excavating landfill materials and then disposing of them at the consolidation facility. This
31	would prevent potential future exposure to surface soil and sediment and would prevent
32	potential future releases from landfill debris to groundwater. However, moving the landfill
33	debris to a separate consolidation facility would transfer the risk of potential releases to

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ecological exposure risk at SA 6, the risk reduction benefit from excavating and 2 consolidating SA 6 is considered low. 3 4 AOC 9. Overall protection of human health and the environment is similar to that 5 discussed Subsection 8.4.2.1. 6 7 AOC 11. Overall protection of human health and the environment is similar to that 8 discussed Subsection 8.4.2.1. 9 10 SA 12. This alternative would provide protection of human health and the environment by 11 excavating landfill materials and then disposing of them at the consolidation facility. This 12 would prevent potential future exposure to surface soil and sediment and would prevent 13 potential future releases from landfill debris to groundwater. However, moving the landfill 14 debris to a separate consolidation facility would transfer the risk of potential releases to 15 another location. 16 17 SA 13. This alternative would provide protection of human health and the environment by 18 excavating landfill materials and then disposing of them at the consolidation facility. This 19 would prevent potential future exposure to surface soil and sediment and would prevent 20 potential future releases from landfill debris to groundwater. However, moving the landfill 21 debris to a separate consolidation facility would transfer the risk of potential releases to 22 another location. 23 24 AOC 40. Overall protection of human health and the environment is similar to that 25 discussed Subsection 8.4.2.1. 26 27 AOC 41. This alternative would provide protection of human health and the environment 28 by excavating landfill materials and then disposing of them at the consolidation facility. 29 This would prevent potential future exposure to surface soil and sediment and would 30 prevent potential future releases from landfill debris to groundwater. However, moving 31 the landfill debris to a separate consolidation facility would transfer the risk of potential 32 releases to another location. 33 34

another location. Because the PRE did not identify significant potential for human or

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1 2	8.8.2.2 Compliance with ARARs . Tables 8-26, 8-27, and 8-28 summarize how Alternative 8 will attain ARARs.
3	
4	8.8.2.3 Long-term Effectiveness and Permanence. The following paragraphs assess
5	the long-term effectiveness and permanence of the proposed actions of this alternative.
6	
7	<u>SA 6</u> . Excavation of landfill debris would effectively prevent human and ecological
8	exposure and would prevent the landfill from being a potential source of future
9	groundwater contamination. The effectiveness of the consolidation facility at isolating
10	landfill debris would depend on the quality of construction and proper maintenance of
11	cover and leachate collection systems. Landfills that include groundwater protection
12	systems with leachate collection, cover systems, and long-term monitoring and
13	maintenance have a history of effectively isolating wastes from the environment.
14	AOC 9 The long-term effectiveness and nermanence of this alternative is similar to that
16	discussed in Subsection 8.4.2.3
17	
18	AOC 11. The long-term effectiveness and permanence of this alternative is similar to that
19	discussed in Subsection 8.4.2.3.
20	
21	SA 12. Excavation of landfill debris would effectively prevent human and ecological
22	exposure and would prevent the landfill from being a potential source of future
23	groundwater contamination. The effectiveness of the consolidation facility at isolating
24	landfill debris would depend on the quality of construction and proper maintenance of
25	cover and leachate collection systems. Landfills that include groundwater protection
26	systems with leachate collection, cover systems, and long-term monitoring and
27	maintenance have a history of effectively isolating wastes from the environment.
28	
29	SA 13. Excavation of landfill debris would effectively prevent human and ecological
30	exposure and would prevent the landfill from being a potential source of future
31	groundwater contamination. The effectiveness of the consolidation facility at isolating
32 33	cover and leachate collection systems. Landfills that include groundwater protection

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systems, with leachate collection, cover systems and long-term monitoring and 1 maintenance have a history of effectively isolating wastes from the environment. 2 3 AOC 40. The long-term effectiveness and permanence of this alternative is similar to that 4 discussed in Subsection 8.4.2.3. 5 6 AOC 41. Excavation of landfill debris would effectively prevent human and ecological 7 exposure and would prevent the landfill from being a potential source of future 8 groundwater contamination. The effectiveness of the consolidation facility at isolating 9 landfill debris would depend on the quality of construction and proper maintenance of 10 cover and leachate collection systems. Landfills that include groundwater protection 11 systems with leachate collection, cover systems, and long-term monitoring and 12 maintenance have a history of effectively isolating wastes from the environment. 13 14 8.8.2.4 Reduction of Toxicity, Mobility, and Volume Through Treatment. The 15 following paragraphs assess the reduction of toxicity, mobility, and volume of 16 contaminants through treatment offered by the proposed actions of this alternative. 17 18 SA 6. Reduction of toxicity, mobility, or volume of landfill contaminants through 19 treatment would not be achieved. By removing landfill debris, the potential for leaching of 20 landfill materials and contamination of groundwater would be reduced. No reduction of 21 toxicity, mobility, or volume of groundwater contaminants would be achieved. Disposal 22 of excavated landfill debris at a consolidation facility with low permeability liner, leachate 23 collection, and low permeability cover would reduce contaminant mobility. 24 25 AOC 9. The reduction in toxicity, mobility, and volume is similar to that discussed in 26 Subsection 8.4.2.4. 27 28 AOC 11. The reduction in toxicity, mobility, and volume is similar to that discussed in 29 Subsection 8.4.2.4. 30 31 SA 12. Reduction of toxicity, mobility, or volume of landfill contaminants through 32 treatment would not be achieved. By removing landfill debris, the potential for leaching of 33 landfill materials and contamination of groundwater would be reduced. No reduction of 34 toxicity, mobility, or volume of groundwater contaminants would be achieved. Disposal 35

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of excavated landfill debris at a consolidation facility with low permeability liner, leachate 1 collection, and low permeability cover would reduce contaminant mobility. 2 3 SA 13. Reduction of toxicity, mobility, or volume of landfill contaminants through 4 treatment would not be achieved. By removing landfill debris, the potential for leaching of 5 landfill materials and contamination of groundwater would be reduced. No reduction of 6 toxicity, mobility, or volume of groundwater contaminants would be achieved. Disposal 7 of excavated landfill debris at a consolidation facility with low permeability liner, leachate 8 collection, and low permeability cover would reduce contaminant mobility. 9 10 AOC 40. The reduction in toxicity, mobility, and volume is similar to that discussed in 11 Subsection 8.4.2.4. 12 13 AOC 41. Reduction of toxicity, mobility, or volume of landfill contaminants through 14 treatment would not be achieved. By removing landfill debris, the potential for leaching of 15 landfill materials and contamination of groundwater would be reduced. No reduction of 16 toxicity, mobility, or volume of groundwater contaminants would be achieved. Disposal 17 of excavated landfill debris at a consolidation facility with low permeability liner, leachate 18 collection, and low permeability cover would reduce contaminant mobility. 19 20 8.8.2.5 Short-term Effectiveness. The following paragraphs assess the short-term 21 effectiveness of the actions proposed at each of the landfills. 22 23 SA 6. This alternative is expected to present minimal risks to workers, the community, 24 and the environment. Transportation of excavated materials would be planned to avoid 25 creating traffic congestion and hazards to the community. Handling and transportation of 26 any hazardous materials would be conducted according to RCRA and DOT regulations to 27 protect workers and the community. 28 29 Available information does not suggest the presence of hazardous substances which would 30 present a risk to workers during excavation. Worker adherence to general health and 31 safety practices, and use of personnel monitoring would reduce potential exposure to 32 potentially hazardous substances to a safe level. Excavation of landfilled debris and 33

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construction of the consolidation facility could generate dust. Dust suppression 1 techniques would reduce potential risk to workers and the community. 2 3 AOC 9. The short-term effectiveness of this alternative is similar to that discussed in 4 Subsection 8.4.2.5. 5 6 AOC 11. The short-term effectiveness of this alternative is similar to that discussed in 7 Subsection 8.4.2.5. 8 9 SA 12. This alternative is expected to present minimal risks to workers, the community, 10 and the environment. Transportation of excavated materials would be planned to avoid 11 creating traffic congestion and hazards to the community. Handling and transportation of 12 any hazardous materials would be conducted according to RCRA and DOT regulations to 13 protect workers and the community. 14 15 Available information does not suggest the presence of hazardous substances which would 16 present a risk to workers during excavation. Worker adherence to general health and 17 safety practices, and use of personnel monitoring would reduce potential exposure to 18 potentially hazardous substances to a safe level. Excavation of landfilled debris and 19 construction of the consolidation facility could generate dust. Dust suppression 20 techniques would reduce potential risk to workers and the community. 21 22 SA 13. This alternative is expected to present minimal risks to workers, the community, 23 and the environment. Transportation of excavated materials would be planned to avoid 24 creating traffic congestion and hazards to the community. Handling and transportation of 25 any hazardous materials would be conducted according to RCRA and DOT regulations to 26 protect workers and the community. 27 28 Available information does not suggest the presence of hazardous substances which would 29 present a risk to workers during excavation. Worker adherence to general health and 30 safety practices, and use of personnel monitoring would reduce potential exposure to 31 potentially hazardous substances to a safe level. Excavation of landfilled debris and 32 construction of the consolidation facility could generate dust. Dust suppression 33 techniques would reduce potential risk to workers and the community. 34 35

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1 2	AOC 40. The short-term effectiveness of this alternative is similar to that discussed in Subsection 8.4.2.5.
3	
4	AOC 41. This alternative is expected to present minimal risks to workers, the community,
5	and the environment. Transportation of excavated materials would be planned to avoid
6	creating traffic congestion and hazards to the community. Handling and transportation of
7	any hazardous materials would be conducted according to RCRA and DOT regulations to
8	protect workers and the community.
9	
10	Available information does not suggest the presence of hazardous substances which would
11	present a risk to workers during excavation. Worker adherence to general health and
12	safety practices, and use of personnel monitoring would reduce potential exposure to
13	potentially hazardous substances to a safe level. Excavation of landfilled debris and
14	construction of the consolidation facility could generate dust. Dust suppression
15	techniques would reduce potential risk to workers and the community.
16	
17	8.8.2.0 Implementability . The following paragraphs assess the implementability of the
18	actions proposed at each of the landnils.
19	SA 6. Landfill everytion and construction can be accomplished using standard
20	<u>SA 0</u> . Landmi excavation and construction can be accomplished using standard
21	and construction companies are qualified and available. Successful implementation of this
22	alternative is contingent on the approval and construction of a consolidation facility to
24	accept the excavated debris. The consolidation facility would be constructed and
25	maintained to effectively isolate debris excavated from SA 6 Implementation of this
26	alternative would not limit or interfere with the ability to perform future remedial actions
27	at SA 6.
28	
29	All activities to excavate SA 6 would be conducted on site, and permits would not be
30	required. Design, construction, operation, closure, and post-closure monitoring and
31	maintenance of the consolidation facility would be conducted according to the technical
32	requirements of Massachusetts 310 CMR 19.000.
33	

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Consolidation of this disposal area with others reduce the administrative burden and 1 complexity of implementing the long-term monitoring and maintenance requirements of 2 310 CMR 19.000 at separate disposal areas. 3 4 AOC 9. The implementability of this alternative is similar to that discussed in 5 Subsection 8.4.2.6 6 7 AOC 11. The implementability of this alternative is similar to that discussed in 8 Subsection 8.4.2.6. 9 10 11 SA 12. Landfill excavation and construction can be accomplished using standard construction procedures and conventional earthmoving equipment, and many engineering 12 and construction companies are qualified and available. Successful implementation of this 13 alternative is contingent on the approval and construction of a consolidation facility to 14 accept the excavated debris. The consolidation facility would be constructed and 15 maintained to effectively isolate debris excavated from SA 12. Implementation of this 16 alternative would not limit or interfere with the ability to perform future remedial actions 17 at SA 12. 18 19 All activities to excavate SA 12 would be conducted on site, and permits would not be 20 required. Design, construction, operation, closure, and post-closure monitoring and 21 maintenance of the consolidation facility would be conducted according to the technical 22 requirements of Massachusetts 310 CMR 19.000. 23 24 Consolidation of this disposal area with others reduce the administrative burden and 25 complexity of implementing the long-term monitoring and maintenance requirements of 26 310 CMR 19.000 at separate disposal areas. 27 28 SA 13. Landfill excavation and construction can be accomplished using standard 29 construction procedures and conventional earthmoving equipment, and many engineering 30 and construction companies are qualified and available. Successful implementation of this 31 alternative is contingent on the approval and construction of a consolidation facility to 32 accept the excavated debris. The consolidation facility would be constructed and 33 maintained to effectively isolate debris excavated from SA 13. Implementation of this 34

alternative would not limit or interfere with the ability to perform future remedial actions 1 2 at SA 13. 3 All activities to excavate SA 13 would be conducted on-site, and permits would not be 4 required. Design, construction, operation, closure, and post-closure monitoring and 5 maintenance of the consolidation facility would be conducted according to the technical 6 7 requirements of Massachusetts 310 CMR 19.000. Consolidation of this disposal area with others reduce the administrative burden and 8 complexity of implementing the long-term monitoring and maintenance requirements of 9 310 CMR 19.000 at separate disposal areas. 10 11 AOC 40. The implementability of this alternative is similar to that discussed in 12 Subsection 8.4.2.6. 13 14 AOC 41. Landfill excavation and construction can be accomplished using standard 15 construction procedures and conventional earthmoving equipment, and many engineering 16 and construction companies are qualified and available. Successful implementation of this 17 alternative is contingent on the approval and construction of a consolidation facility to 18 accept the excavated debris. The consolidation facility would be constructed and 19 maintained to effectively isolate debris excavated from AOC 41. Implementation of this 20 alternative would not limit or interfere with the ability to perform future remedial actions 21 at AOC 41. 22 23 All activities to excavate AOC 41 would be conducted on site, and permits would not be 24 required. Design, construction, operation, closure, and post-closure monitoring and 25 maintenance of the consolidation facility would be conducted according to the technical 26 requirements of Massachusetts 310 CMR 19.000. 27 28 Consolidation of this disposal area with others reduce the administrative burden and 29 complexity of implementing the long-term monitoring and maintenance requirements of 30 310 CMR 19.000 at separate disposal areas. 31 32

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1	8.8.2.7 Cost. The cost estimate for Alternative 8 includes estimates of direct and indirect
2	capital costs and O&M costs. Direct capital costs included for this alternative include site
3	preparation, sediment and debris excavation, drum removal, cap construction, site
4	restoration and monitoring well installation. A 25 percent contingency is included in
5	direct cost items to account for unforeseen project complexities (e.g., adverse weather
6	conditions and inadequate site characterization).
7	
8	O&M costs include landfill maintenance and environmental monitoring for groundwater,
10	wenands and sedment.
11	Table 8-29 summarizes the cost estimate for Alternative 8. The total capital cost (direct
12	nus indirect costs) is estimated to be $\$17.730.000$. Or M costs are estimated to be
13	\$56 000 per year
14	
15	To enable evaluation costs which would occur over different time periods, the table also
16	includes a present worth analysis. Present worth represents the amount of money that if
17	invested now and disbursed as needed, would be sufficient to cover all costs associated
18	with the remedial action over its planned life. A discount rate of 7 percent before taxes
19	and after inflation is used as recommended in OSWER Directive 9355.3-20. Unless noted
20	otherwise, costs are based on a 30-year time frame. The estimated total present worth is
21	\$18,141,000. Cost calculations are included in Appendix D.
22	
23	
24	8.9 ALTERNATIVE 9: EXCAVATION AND CONSOLIDATION OF ALL SEVEN DISPOSAL
25	AREAS
26	
27	This subsection describes Alternative 9, evaluates the alternative using the seven
28	evaluation criteria, and provides a cost estimate.
29	

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8.9.1 Description Of Alternative 9

2 Alternative 9 proposes excavating construction/demolition debris from SAs 6, 12, 13, 3 AOCs 9, 11, 40 and 41, and consolidating the excavated debris in a proposed secure 4 landfill near Shepley's Hill Landfill. Based on available information, these areas contain 5 non-hazardous debris only. The SA/AOCs will be treated as construction debris landfills. 6 7 Based on archeological monitoring conducted during the predesign investigations at SA 6, 8 further study is assumed to be warranted prior to disturbance of waste at this site. Work 9 at this site would need to comply with the requirements of the Archeological and 10 Historical Preservation Act Regulations (40 CFR Part 6), which establishes procedures to 11 provide for preservation of historical and archeological data which might be destroyed 12 through alteration of terrain as a result of a federal construction project. Archeological 13 monitoring at the remaining six SA/AOCs is not anticipated. 14 15 Alternative 9 also includes removing exposed drums at Cold Spring Brook Landfill 16 (AOC 40) to remove a potential source of contamination, and excavating sediment from 17 two hot spots in Cold Spring Brook Pond, to reduce ecological risk from exposure to 18 contaminated sediments. These actions were described previously in the FS for AOC 40 19 (ABB-ES, 1994b). 20 21 The key components of Alternative 9 include: 22 23 Excavation and Consolidation at AOCs 9,11, 40, 41 and SAs 6, 12, 13 24 25 Mobilization/demobilization; 26 • AOC 40 sediment removal and disposal; . 27 AOC 40 drum removal and disposal; • 28 UXO monitoring at SAs 6, 12 and AOC 41; . 29 Debris excavation and backfill; • 30 Wetlands restoration; . 31

• Consolidation of excavated debris at Consolidation Landfill;

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1	Institutional controls;
2	• Cover system monitoring and maintenance at Consolidation Landfill; and
3	• Five-year site reviews;
4	
5	8.9.1.1 Description of Excavate and Consolidate Components for Alternative 9
6	
7	Mobilization/demobilization. This component is similar to that discussed in Alternative 2,
8	Subsection 8.2.1.3.
9	
10	Site preparation. This component is similar to that discussed in Alternative 2,
11	Subsection 8.2.1.3.
12	
13	Sediment removal and disposal at AOC 40. This component is similar to that discussed in
14	Alternative 2, Subsection 8.2.1.3.
15	
16	Drum removal and disposal at AOC 40. This component is similar to that discussed in
17	Alternative 2, Subsection 8.2.1.3.
18	
19	\underline{OXO} monitoring. This component is similar to that discussed in Alternative 5,
20	Subsection 8.5.1.2.
21	Debris execution and healffly. This execution is in the start of the
22	<u>Debris excavation and backfill</u> . This component is similar to that discussed in
23	Alternative 4, Subsection 8.4.1.3.
24	Watlands restaration. This component is similar to that discussed in Alternative 2
25	Subsection 8.2.1.2
20	Subsection 8.2.1.5.
27	Consolidation of excavated debris at Consolidation Landfill. This component is similar to
20	that discussed in Alternative 4. Subsection 8.4.1.3. The Consolidation I and fill volume for
29	Alternative 9 is 366 000 cv
30	Alternative 9 is 500,000 cy.
32	Institutional controls. This component is similar to that discussed in Alternative 2
33	Subsection 8 2.1.3
34	

Cover system monitoring and maintenance at Consolidation Landfill. This component is 1 similar to that discussed in Alternative 4, Subsection 8.4.1.3. 2 3 Five-year site reviews. This component is similar to that discussed in Alternative 2, 4 Subsection 8.2.1.3. 5 6 8.9.2 Detailed Evaluation of Alternative 9 7 8 The following subsections present an assessment of Alternative 9 according to the seven 9 evaluation criteria. 10 11 8.9.2.1 Overall Protection of Human Health and the Environment. The following 12 paragraphs assess how the proposed actions of this alternative would provide protection 13 of human health and the environment. 14 15 SA 6. Overall protection of human health and the environment is similar to that discussed 16 Subsection 8.8.2.1. 17 18 AOC 9. Overall protection of human health and the environment is similar to that 19 discussed Subsection 8.4.2.1. 20 21 AOC 11. Overall protection of human health and the environment is similar to that 22 discussed Subsection 8.6.2.1. 23 24 SA 12. Overall protection of human health and the environment is similar to that 25 discussed Subsection 8.8.2.1. 26 27 SA 13. Overall protection of human health and the environment is similar to that 28 discussed Subsection 8.8.2.1. 29 30 AOC 40. Overall protection of human health and the environment is similar to that 31 discussed Subsection 8.4.2.1. 32 33

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AOC 41. Overall protection of human health and the environment is similar to that 1 discussed Subsection 8.8.2.1. 2 3 8.9.2.2 Compliance with ARARs. Tables 8-30, 8-31, and 8-32 summarize how 4 Alternative 9 will attain ARARs. 5 6 8.9.2.3 Long-term Effectiveness and Permanence. The following paragraphs assess 7 the long-term effectiveness and permanence of the proposed actions of this alternative. 8 9 SA 6. The long-term effectiveness and permanence of this alternative is similar to that 10 discussed in Subsection 8.8.2.3. 11 12 AOC 9. The long-term effectiveness and permanence of this alternative is similar to that 13 discussed in Subsection 8.4.2.3. 14 15 AOC 11. The long-term effectiveness and permanence of this alternative is similar to that 16 discussed in Subsection 8.6.2.3. 17 18 19 <u>SA 12</u>. The long-term effectiveness and permanence of this alternative is similar to that discussed in Subsection 8.8.2.3. 20 21 SA 13. The long-term effectiveness and permanence of this alternative is similar to that 22 discussed in Subsection 8.8.2.3. 23 24 AOC 40. The long-term effectiveness and permanence of this alternative is similar to that 25 discussed in Subsection 8.4.2.3. 26 27 AOC 41. The long-term effectiveness and permanence of this alternative is similar to that 28 discussed in Subsection 8.8.2.3. 29 30 8.9.2.4 Reduction of Toxicity, Mobility, and Volume Through Treatment. The 31 following paragraphs assess the reduction of toxicity, mobility, and volume of 32 contaminants through treatment offered by the proposed actions of this alternative. 33 34

1 2	<u>SA 6</u> . The reduction in toxicity, mobility, and volume is similar to that discussed in Subsection 8.8.2.4.
3	
4	AOC 9. The reduction in toxicity, mobility, and volume is similar to that discussed in
5	Subsection 8.4.2.4.
6	
7	AOC 11. The reduction in toxicity, mobility, and volume is similar to that discussed in
8	Subsection 8.6.2.4.
9	
10	SA 12. The reduction in toxicity, mobility, and volume is similar to that discussed in
11	Subsection 8.8.2.4.
12	
13	SA 13. The reduction in toxicity, mobility, and volume is similar to that discussed in
14	Subsection 8.8.2.4.
15	
16	AOC 40. The reduction in toxicity, mobility, and volume is similar to that discussed in
17	Subsection 8.4.2.4.
18	
19	AOC 41. The reduction in toxicity, mobility, and volume is similar to that discussed in
20	Subsection 8.8.2.4.
	8025 Showt town Effectiveness. The fallowing many land to the
21	a.5.2.5 Short-term Enectiveness. The following paragraphs assess the short-term
22	enectiveness of the actions proposed at each of the landfills.
23	
24	<u>SA 6.</u> The short-term effectiveness of this alternative is similar to that discussed in
25	Subsection 8.8.2.5.
26	
27	$\frac{AOC 9}{2}$. The short-term effectiveness of this alternative is similar to that discussed in
28	Subsection 8.4.2.5.
29	AOC 11. The short term offention of the state of the stat
30	AUC 11. The short-term effectiveness of this alternative is similar to that discussed in
31	Subsection 6.0.2.5.
32	

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1 2	$\underline{SA 12}$ The short-term effectiveness of this alternative is similar to that discussed in Subsection 8.8.2.5.
3	
4	SA 13. The short-term effectiveness of this alternative is similar to that discussed in Subsection $8.8.2.5$
5	Subsection 8.6.2.5.
0	AOC 40. The short term effectiveness of this alternative is similar to that discussed in
0	<u>AUC 40</u> . The short-term enectiveness of this alternative is similar to that discussed in Subsection 8.4.2.5
0	Subsection 8.4.2.5.
10	AOC 41. The short-term effectiveness of this alternative is similar to that discussed in
11	Subsection 8 8 2 5
12	
13	8.9.2.6 Implementability. The following paragraphs assess the implementability of the
14	actions proposed at each of the landfills.
15	
16	<u>SA 6</u> . The implementability of this alternative is similar to that discussed in
17	Subsection 8.8.2.6.
18	
19	AOC 9. The implementability of this alternative is similar to that discussed in
20	Subsection 8.4.2.6.
21	
22	AOC 11. The implementability of this alternative is similar to that discussed in
23	Subsection 8.6.2.6.
24	
25	SA 12. The implementability of this alternative is similar to that discussed in
26	Subsection 8.8.2.6.
27	
28	$\underline{SA 13}$. The implementability of this alternative is similar to that discussed in
29	Subsection 8.8.2.6.
30	
31	<u>AOC 40</u> . The implementability of this alternative is similar to that discussed in
32	Subsection 8.4.2.6.
33	
34	<u>AUC 41</u> . The implementability of this alternative is similar to that discussed in

35 Subsection 8.8.2.6.

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8.9.2.7 Cost. The cost estimate for Alternative 9 includes estimates of direct and indirect 2 capital costs and O&M costs. Direct capital costs included for this alternative include site 3 preparation, sediment and debris excavation, drum removal, cap construction, site 4 restoration and monitoring well installation. A 25 percent contingency is included in 5 direct cost items to account for unforeseen project complexities (e.g., adverse weather 6 conditions and inadequate site characterization). 7 8 O&M costs include landfill cover maintenance and environmental monitoring for 9 groundwater, wetlands and sediment. 10 11 Table 8-33 summarizes the cost estimate for Alternative 9. The total capital cost (direct 12 plus indirect costs) is estimated to be \$19,715,000. O&M costs are estimated to be 13 \$52,000 per year. 14 15 To enable evaluation costs which would occur over different time periods, the table also 16 includes a present worth analysis. Present worth represents the amount of money that, if 17 invested now and disbursed as needed, would be sufficient to cover all costs associated 18 19 with the remedial action over its planned life. A discount rate of 7 percent before taxes and after inflation is used as recommended in OSWER Directive 9355.3-20. Unless noted 20 otherwise, costs are based on a 30-year time frame. The estimated total present worth is 21 \$20,195,000. Cost calculations are included in Appendix D. 22 23

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SECTION 9.0

9.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

4 This section compares relative advantages and disadvantages of the landfill management alternatives. The alternatives are complex, because each involves seven sites with various 5 remedial actions. Table 9-1 presents a comparison of the alternatives with regard to the 6 relative degree (i.e., low, medium, high) of conformance to the evaluation criteria. In 7 general, the alternatives offer a higher degree of criteria conformance as they progress in 8 numerical order. For example, Alternative 1 offers a low degree of overall protection of 9 human health and the environment, while Alternative 9 offers a high degree. To further 10 assist in alternatives comparison, distinguishing features of each alternative are discussed 11 in Subsection 9.1. 12

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9.1 ALTERNATIVES COMPARISON

Alternative 1. MADEP landfill closure requirements would not be met for disposal areas at AOC 9, AOC 11, or SA 12. The site investigation, remedial investigation, and feasibility study reports, and records of decision would be submitted to satisfy 310 CMR 19.021 (4)(b) at SA 6, SA 13, AOC 40, and AOC 41.

Alternative 2. This alternative offers a significant amount of protection of human health and the environment at relatively low cost.

Alternative 3. An approximately 20% increase in cost over Alternative 2 offers relatively little increase in overall protection of human health and the environment at AOC 11.

27

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Alternative 4. The effectiveness of Alternative 4 is roughly similar to that of

Alternative 2, with the difference being that AOCs 9 and 40 are excavated and

30 consolidated in Alternative 4 rather than being capped. Both alternatives have significant

31 potential to achieve acceptable risk levels for human and ecological receptors. The cost of

Alternative 4 is \$16.6 million compared to \$7.6 million for Alternative 2.

33

Alternative 5. The effectiveness of Alternative 5 can be directly compared to

Alternative 4, with the difference being that AOC 41 and SAs 6, 12, and 13 are capped in

place in Alternative 5 rather than being subjected to no further action. This results in a 1 relatively significant increase in protection of human health and the environment for 2 Alternative 5. 3 4 Alternative 6. Alternative 6, the most costly of the alternatives, can be directly compared 5 to Alternative 5, with the difference being that AOC 11 is excavated and consolidated in 6 Alternative 6 rather than being subjected to limited removal. The cost of Alternative 6 is 7 \$21.6 million, compared to \$19.6 million for Alternative 5. Alternative 6 offers relatively 8 little increase in protection of human health and the environment, because the PRE did not 9 identify significant potential for human or ecological risk at AOC 11. 10 11 Alternative 7. At \$12.5 million, Alternative 7 offers as much protection of human health 12 and the environment as Alternative 6, which costs \$21.6 million. The capped landfills of 13 Alternative 7 would preclude the seven disposal sites from future re-use, and may impact 14 choices for re-development at Devens with regard to water supply and wastewater 15 resources. 16 17 Alternative 8. Because wastes at AOC 11 would undergo only surface removal, 18 Alternative 8 is considered to be less compliant with ARARs than Alternatives 7 or 9, but 19 would offer essentially the same degree of protection of human health and the 20 environment 21 22 Alternative 9. Of the alternatives, Alternative 9 offers the greatest amount of former 23 landfill area to be reused, because wastes at all sites are relocated to the consolidation 24 landfill. No further environmental monitoring would be required at the seven landfills after 25 waste removal. Thus, Alternative 9 offers the least impact on water supply and 26 wastewater resources at Devens. 27 28

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

1	ABB-ES	ABB Environmental Services, Inc.
2	ACEC	area of critical environmental concern
3	AOC	Area of Contamination
4	ARARs	Applicable or Relevant and Appropriate Requirements
5	AREE	Area Requiring Environmental Evaluation
6	ASL	above sea level
7	AWQC	Ambient Water Quality Criteria
8		•
9	BCT	BRAC Cleanup Team
10	BEHP	bis(2-ethylhexyl)phthalate
11	bgs	below ground surface
12	BRAC	Base Realignment and Closure
13		
14	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
15	CFR	Code of Federal Regulations
16	CMR	Code of Massachusetts Regulations
17	cm/sec	centimeter per second
18	COC	contaminant of concern
19	CPC	chemical of potential concern
20	cy	cubic yards
21		
22	DCA	dichloroethane
23	DDD	2,2-bis(para-chlorophenyl)-1,1-dichloroethane
24	DDE	2,2-bis(para-chlorophenyl)-1,1-dichloroethene
25	DDT	2,2-bis(para-chlorophenyl)-1,1,1-trichloroethane
26	DOT	Department of Transportation
27		
28	E&E	Ecology of Environment, Inc.
29		
30	ft	feet
31	FORSCOM	U.S. Army Forces Command
32	FS	Feasibility Study
33		
34	gpm	gallons per minute
35		
36	HI	hazard index
37		

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

1	IAG	Interagency Agreement
2		
3	MADEP	Massachusetts Department of Environmental Protection
4	MCL	Maximum Contaminant Level
5	MCP	Massachusetts Contingency Plan
6	mg/L	milligrams per liter
7	MEP	Master Environmental Plan
8	MEPA	Massachusetts Environmental Protection Act
9	MGLB	Massachusetts Government Land Bank
10	MNHP	Massachusetts Natural Heritage Program
11		5 5
12	NCP	National Oil and Hazardous Substances Pollution Contingency Plan
13	NFA	No Further Action
14	NPDES	National Pollutant Discharge Elimination System
15	NPL	National Priority List
16		
17	O&M	operations and maintenance
18	OSHA	Occupational Safety and Health Administration
19		
20	PAH	polynuclear aromatic hydrocarbon
21	PAL	Project Analyte List
22	PCB	polychlorinated biphenyl
23	POTW	publicly owned treatment works
24	PP	proposed plan
25	PRE	Preliminary Risk Evaluation
26	PRG	Preliminary Remediation Goal
27	PVC	polyvinyl chloride
28		
29	RCRA	Resource Conservation and Recovery Act
30	RfD	reference dose
31	RFTA	Reserve Forces Training Area
32	RI	Remedial Investigation
33	ROD	Record of Decision
34		
35	SA	Study Area
36	SARA	Superfund Amendments and Reauthorization Act
37	SEA	SEA Consultants

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

1	sf	square feet
2	SHL	Shepley's Hill Landfill
3	SI	Site Investigation
4	SMCL	Secondary Maximum Contaminant Level
5	SSI	Supplemental Site Investigation
6	SVOC	semivolatile organic compound
7		See
8	TAL	Target Analyte List
9	TBC	to-be-considered
10	TCL	Target Compound List
11	TCLP	Toxicity Characteristic Leachate Procedure
12	TPHC	total petroleum hydrocarbon compounds
13	TSS	total suspended solids
14		
15	μg/g	micrograms per gram
16	μg/L	micrograms per liter
17	USACE	U.S. Army Corps of Engineers
18	USAEC	U.S. Army Environmental Center
19	USAEHA	U.S. Army Environmental Hygiene Agency
20	USEPA	U.S. Environmental Protection Agency
21	USFWS	U.S. Fish and Wildlife Service
22	USGS	U.S. Geological Survey
23	UXO	unexploded ordinance
24		
25	VOC	volatile organic compound
26		
27	WRS	Wetland Restoration Specification

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1:/8112-04/8112E014.DWG 1"=10' 1/07/97



1:/8112-04/8712F015.DWG 1"=10' 1/07/97



^{1:/8712-04/8712}F016.DWG 1"=100' 1/28/97



1:/8712-04/8712F017.DWG 1=100 1/07/97





^{1:/8112-04/8112}E019.DWG 1"=50' 1/28/97



SEE FIGURE 2-7 FOR CROSS SECTION ORIENTATION. 1. GEOLOGIC DESCRIPTIONS BASED ON TEST PIT LOGS. 2. CROSS SECTION TAKEN FROM FIGURE RI REPORT, ARTHUR D. LITTLE, APRIL NOTES: З. 1:/8112-04/8112F020.DWG 1"=80' 1/07/97











^{1:/8112-04/8112}F025.DWG 1'=10' 1/07/97



1:/8712-04/8712F026.DWG 1"=10' 1/07/97





^{1:/8112-04/8112}E027.DWG 1"=40' 1/07/97



		NOTES: 1. BOTTOM OF WASTE IS ESTIMATED	2. SEE FIGURE 2-15 FOR CROSS SE	
	<i>L6/L</i> 0	5E058'DMC 1,=80, 1/	128/40-2128	3/:L











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1:/8112-04/8112E001.DWG 1"=50' 1/28/97








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NOTES:

- 1. LINER TO BE SLOPED @ 2% MIN.
- 2. LEACHATE COLLECTION PIPES (6-INCH DIA.) TO BE SLOPED @ 1% MIN ..
- 3. ALTERNATELY, A GEOSYNTHETIC CLAY LINER MAY BE CONSIDERED FOR THE SOIL OR ADMIXTURE LAYER.

FIGURE 8-11 CONSOLIDATION LANDFILL CAP AND LINER SECTIONS LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

NOT TO SCALE

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TABLE ES-1 SUMMARY OF CONSIDERED LANDFILL REMEDIATION ALTERNATIVES

			ALTERNATIVE CO	MPONENT	
ALTERNATIVE	EXCAVATE/ CONSOLIDATE	CAP-IN-PLACE	EXCAVATE/ DISPOSE OFF-SITE	LIMITED REMOVAL (SURFACE DEBRIS)	NO FURTHER ACTION
1 ³					All seven landfills
2		AOCs 9, 40		AOC 11 - dispose under AOC 9 Cap	AOC 41 SAs 6, 12, 13
3		AOCs 9, 11, 40			AOC 41 SAs 6, 12, 13
4	AOCs 9, 40			AOC 11 - dispose in consolidation landfill	AOC 41 SAs 6, 12, 13
5	AOCs 9, 40	AOC 41 SAs 6, 12, 13		AOC 11 - dispose in consolidation landfill	
6	AOCs, 9, 11, 40	AOC 41 SAs 6, 12, 13			
7		All seven disposed areas			
8	AOCs 9, 40, 41 SAs 6, 12, 13			AOC 11 - dispose in consolidation landfill	
9	All seven landfills				

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

Notes:

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PA-1 = BCT Plan of Action (3/31/95), Option 1. Alternative PA-2 is identical to Alternative 9. Alternatives 1 through 9 were developed by the BCT on December 9, 1996.

TABLE ES-1 SUMMARY OF CONSIDERED LANDFILL REMEDIATION ALTERNATIVES

		r	ALTERNATIVE CO	MPONENT	
ALTERNATIVE	EXCAVATE/ CONSOLIDATE	CAP-IN-PLACE	EXCAVATE/ DISPOSE OFF-SITE	LIMITED REMOVAL (SURFACE DEBRIS)	NO FURTHER ACTION
PA-1 ¹	×	AOCs 9, 11, 40, 41	SAs 6, 12, 13		
PA-2 ²	All seven landfills (near Shepley's Hill)				
PA-3	AOCs 9, 40, 41 SAs 6, 12, 13 (at North Post Landfill)	AOC 11			
PA-4	All seven landfills (at North Post Landfill)				
PA-5	AOCs 40, 41 SAs 6, 12, 13 (near Shepley's Hill	AOCs 9, 11			
PA-6	AOCs 9, 11, 41 SAs 6, 12, 13 (near Shepley's Hill)	AOC 40			- -

TABLE ES-2 COMPARATIVE ANALYSIS OF ALTERNATIVES

			DEGRI	ee of Adhe	RENCE TO	EVALUATIO	N CRITERIA	۱. · · ·	
					ALTERNATIV	E NO.			
EVALUATION CRITERIA	1	2	3	4	5	6	7	8	9
Overall protection of human health and the environment	Low	Medium	Medium	Medium	High	High	High	Medium	High
Compliance with ARARs	Low	Medium	Medium	Medium	Medium	High	High	Medium	High
Long-term effectiveness and permanence	Low	Medium	Medium	Medium	High	High	High	Medium	High
Reduction of toxicity, mobility, and volume through treatment	None	Low	Low	Low	Low	Low	Low	Low	Low
Effectiveness: Short-term	None	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
Implementability	Low	Medium	Medium	Medium	Medium	Medium	Medium	Mediu::h	Medium
Cost	None	\$7.6M	\$9.5M	\$16.6M	\$19.6M	\$21.6M	\$12.5M	\$18.1M	\$20.2M

TABLE 3-1 INTERPRETED RISK ASSESSMENT SUMMARY

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

AREA OF CONTAMINATION AND MEDIUM	RISK EVALUATION APPROACH	INTERPRETED HUMAN HEALTH RISK	INTERPRETED ECOLOGICAL RISK
SA 6	Not applicable	None anticipated	None anticipated
AOC 9 Surface Soil Subsurface Soil Groundwater Surface Water Sediment	PRE PRE PRE PRE PRE	No No No No ^{1, 2} No ³ No ⁴	No Not evaluated Not evaluated No ⁶ No
AOC 11 Surface Soil Surface Water Sediment	Baseline RA Baseline RA Baseline RA	No No No	No No ⁷ No ⁷
SA 12 Surface Soil Groundwater Surface Water Sediment	PRE PRE PRE PRE	Yes (Landfill area) Yes No ³ No ⁴	Yes (Landfill area) Not evaluated No ⁷ No ⁷
SA 13 Surface Soil Groundwater Surface Water Sediment	PRE PRE PRE PRE	Yes No ² No ³ No ⁴	Yes Not evaluated Yes Yes
AOC 40 Surface Soil Groundwater Surface Water Sediment	Baseline RA Baseline RA Baseline RA Baseline RA	No ₅ No No	No Not Evaluated No Yes
AUC 41 Surface Soil Surface Water Sediment	PRE PRE PRE	Yes No ³ No ⁴	No 6 No 6 No 8

Notes:

¹ Data review shows groundwater contamination at upgradient and crossgradient wells, therefore potential risk is interpreted as non site related.

² Comparison of unfiltered groundwater-sample data for inorganics to drinking water screening values suggests risk; however, based on filtered-sample data, high inorganic concentrations appear associated with entrained suspended solids.

³ Comparison of surface water data to drinking water screening values suggests potential risk; however, probability of significant overstatement exists because exposure to surface water is expected to be less than for drinking water scenario.

Comparison of sediment data to residential soil screening values suggests potential risk; however, probability of significant overstatement exists because exposure to sediment is expected to be less than for residential scenario.

- ⁵ Comparison of groundwater data to a future residential use scenario suggests potential risk; however, probability of significant overstatement exists because there is no residential groundwater exposure under current land use conditions.
- Comparison of unfiltered surface water sample data to AWQC suggests potential risks; however, suspended contaminants may not be bioavailable. Further, regulatory test species are considered not representative of AOC species.
- ⁷ Complete data review shows contamination in surface water and sediments is most likely attributed to Nashua River contamination and is not site related.
- Interim Sediment Quality Criteria used for screening of DDT are overly conservative for Devens.

ATION-SPECIFIC ARARS	ΙΒΙLITY STUDY	REQUIREMENT SYNOPSIS	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.	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.	Section 404 of the CWA regulates the discharge of dredged or fill materials to U.S. waters, including wetlands. Filling wetlands would be considered a discharge of fill materials. Procedures for complying with regulatory conditions are contained in 33 CFR Part 323. Guidelines for Specification of Disposal Sites for Dredged or Fill material at 40 CFR Part 230, promulgated under CWA 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.	This law prohibits the excavation, damage, alteration, and trade of archeological resources obtained illegally from public or Native American.
TABLE 4-1 ND STATE LOC/	ediation Feasi Devens, MA	Status	Applicable	Applicable	Applicable	Relevant and Appropriate
Synopsis of Federal a	LANDFILL REM	REQUIREMENT	Floodplain Management Executive Order No. 11988 [40 CFR Part 6, App. A]	Protection of Wetlands Executive Order No. 11990 [40 CFR Part 6, App. A]	CWA, Dredge or Fill Requirements Section 404 [33 CFR Part 230; 40 CFR Part 230]	Archeological Resources Protection Act of 1979 [16 USC 47099-11]
		LOCATION CHARACTERISTIC	Floodplains	Wetlands	Wetlands Aquatic Ecosystem	Archeological Sites
)		AUTHORITY	Federal Regulatory Authority			

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continued				
		Synopsis of Federal a	TABLE 4-1 ND STATE LOC	VTION-SPECIFIC ARARS
		Landfill Rem	IEDIATION FEAS DEVENS, MA	ΒΙLITY STUDY
AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS
Federal Regulatory Authority (continued)	Archeological and Historic Sites	Archeological and Historic Data Preservation Act [16 USC 469-469c; 40 CFR 469; 40 CFR 6.301(c)] and National Historic Preservation Act [16 USC 470-470w6]	Applicable	These laws establish the procedures for the inventory, registration, and preservation of historical and archeological resources. Such resources must be retrieved, preserved, and properly managed when terrain is altered as a result of a federal or federally licensed construction activity.
	Surface Waters Endangered Species Migratory Species	Fish and Wildlife Coordination Act [16 USC 661 et seq.; 40 CFR Part 302]	Applicable	Actions that affect species/habitat require consultation with DOI, FWS, NMFS, 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.
	Endangered Species Atlantic Flyway Wetlands Surface Waters	Endangered Species Act [16 USC 1531 et seq.; 50 CFR Part 402] Migratory Bird Treaty Act (16 USC 703-711)	Relevant and Appropriate Relevant and Appropriate	This act requires action to avoid jeopardizing the continued existence of listed endangered or threatened species or modification of their habitat. 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, edgs. or vound.
State Regulatory Authority	Floodplains Wetlands Surface Waters	Massachusetts Wetland Protection Act and regulations [MGL c. 131 s. 40; 310 CMR 10.00]	Applicable	These regulations include permitting requirements and performance standards on dredging, filling, altering, or polluting surface waters, floodplains, and wetlands. Work within 100 feet of a bank of a surface water or of a vegetated wetland is also regulated under these requirements. This state law is locally administered, often in conjunction with local wetland laws, by the Conservation Commission.

ION-SPECIFIC ARARS	LITY STUDY	REQUIREMENT SYNOPSIS	ctions must be conducted in a manner that minimizes the npact to Massachusetts-listed rare, threatened, or endangered pecies, and species listed by the Massachusetts Natural leritage Program.	s part of the Massachusetts Department of Environmental lanagement's Scenic Rivers Program, the Nashua River and ontiguous land up to 100 yards on each side of its natural anks are afforded special protection under this law	
TABLE 4-1 VD STATE LOCATI	ediation Feasibi Devens, MA	STATUS	Applicable A in H	Applicable A M co	
SVNOPSIS OF FEDERAL AN	LANDFILL REME	REQUIREMENT	Massachusetts Endangered Species Act and implementing regulations [MGL c. 131A, s. 1 et seq.; 321 CMR 8.00]	Scenic Rivers Act [MGL c. 21 s. 27B]	
		LOCATION CHARACTERISTIC	Endangered Species	Nashua River	
		AUTHORITY	State Regulatory Authority (continued)		Notes:

- Code of Federal Regulations Code of Massachusetts Regulations . -
 - Clean Water Act н н н
- Department of the Interior Fish and Wildlife Service Massachusetts Environmental Policy Act Massachusetts General Laws National Maine Fisheries Service 11 11 CFR CMR CMR CMR DOI FWS MGL NMFS USC
- - United States Code

TABLE 4-2 Svnopsis of Federal and State Chemical-Specific ARARs

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Landfill Remediation Feasibility Study Devens, MA

AUTHORITY	CHEMICAL MEDIUM	REQUIREMENT	STATUS	Requirement Synopsis
Federal Regulatory Authority	Surface water	CWA, Ambient Water Quality Criteria [40 CFR 131; Quality Criteria for Water 1986]	Applicable	Federal 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.
	Groundwater	Safe Drinking Water Act (SDWA), National Primary Drinking Water Regulations (NPDWR), MCLs [40 CFR Parts 141.11 - 141.16 and 141.50 - 141.53]	Applicable	The NPDWR establishes MCLs and 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 goals.

TABLE 4-2 Synopsis of Federal and State Chemical-Specific ARARs

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Landfill Remediation Feasibility Study Devens, MA

REQUIREMENT SYNOPSIS	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.
STATUS	Applicable
Requirement	Massachusetts Surface Water Quality Standards [314 CMR 4.00]
CHEMICAL MEDIUM	Surface water
AUTHORITY	State Regulatory Authority

Notes:

AWQC	н	Ambient Water Quality Criteria
CERCLA	11	Comprehensive Environmental Response. Compensation. and Liability Act
CFR	11	Code of Federal Regulations
CMR	11	Code of Massachusetts Rules
CWA	11	Clean Water Act
MCL	н	Maximum Contaminant Level
MCLG	н	Maximum Contaminant Level Goal
MMCL	Ш	Massachusetts Maximum Contaminant Level
NPDWR	11	National Primary Drinking Water Regulations
SDWA	11	Safe Drinking Water Act
SMCL	11	Secondary Maximum Contaminant Level

TABLE 4-3 Synopsis of Federal and State Action-Specific ARARS

Landfill Remediation Feasibility Study Devens, MA

AUTHORITY	ACTION	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS
Federal	Construction over/in	Rivers and Harbors Act of	Applicable	Section 10 of the Rivers and Harbors Act of
Regulatory	navigable waters.	1899		1899 requires an authorization from the
Authority		[33 USC 401 et seq.]		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.
	Control of surface	CWA, NPDES Permit	Applicable	The NPDES permit program specifies the
	water runoff.	Program [40 CFR 122,125]		permissible concentration or level of
	Direct discharge to			contaminants in the discharge from any
	surface water.			point source to waters of the United States.
	Land Disposal of	Resource Conservation and	Applicable	Testing may determine that a small portion
	Hazardous Wastes.	Recovery Act (RCRA), Land		of wastes at the Devens RFTA landfills meets
		Disposal Restrictions (LDRs);		the RCRA definition of restricted wastes.
		(40 CFR Part 268)		LDRs specify that such hazardous waste be
				disposed in a RCRA Subtitle C permitted
				facility.
State	Solid Waste Landfill	Massachusetts Solid Waste	Applicable	These regulations list the criteria used to
Hegulatory	Siting.	Facilities Site Regulations		approve or reject a site from a solid waste
Authority		[310 CMR 16.00]		landfill.
	Solid Waste Landfill	Massachusetts Solid Waste	Applicable	These regulations outline the requirements
	Construction,	Management Regulations		for construction, operation, closure, and post
	Operation, Closure,	[310 CMR 19.100]		closure at solid waste management facilities
	and Post-Closure			in the Commonwealth of Massachusetts.
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SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS TABLE 4-3

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

AUTHORITY	ACTION	REQUIREMENTS	STATUS	REQUIREMENT SYNOPSIS
State Regulatory	Construction over/in a waterway.	Massachusetts Waterways Act [MGL c. 91; 310 CMR	Relevant and Appropriate	The Massachusetts Waterways Act and regulations require that a license from
Authority		9.00]		MADEP be obtained for any work in or over
(naniminon)				any tidelands, river or stream (with respect to which public funds have been expended).
				or great pond, or outlet thereof.
	Activities that	Massachusetts Water Quality	Relevant and	For activities that require a MADEP Wetlands
	potentially affect	Certification and Certification	Appropriate	Order of Conditions to dredge or fill
	surface water quality.	for Dredging [314 CMR 9.00]		navigable waters or wetlands, a Chapter 91
				Waterways License, a USACE permit or any
				major permit issued by USEPA (e.g., CWA
				NPDES permit), a Massachusetts Division of
				Water Pollution Control Water Quality
				Certification is required pursuant to 314 CMR
				9.00.
	Actions that affect	Massachusetts Air Pollution	Applicable	A permit and appropriate treatment are
	ambient air quality.	Control Regulations		required for actions that may result in
		[310CMR 7.00]		emissions in excess of Massachusetts or
				national air quality standards.

Notes:

- CFR
 =
 Code of Federal Regulations

 CMR
 =
 Code of Massachusetts Rules

 CWA
 =
 Code of Massachusetts Rules

 CWA
 =
 Clean Water Act

 MADEP
 =
 Massachusetts Department of Environmental Protection

 MGL
 =
 Massachusetts Department of Environmental Protection

 MGL
 =
 Massachusetts General Laws

 NPDES
 =
 National Pollutant Discharge Elimination System

 USACE
 =
 U.S. Army Corps of Engineers

 USC
 =
 United States Code

TABLE 6-1 POTENTIAL REMEDIAL TECHNOLOGIES AND DEBRIS PROCESS OPTIONS

GENERAL RESPONSE ACTION	REMEDIAL TECHNOLOGY	DEBRIS PROCESS OPTION
No Action	None	Not Applicable
Removal	Surface Debris Removal Excavation	Surface Debris Removal Excavation
Disposal	On Site	Landfilling
Containment	Capping	Landfill Closure



TABLE 6-2 DESCRIPTION OF DEBRIS PROCESS OPTIONS

GENERAL RESPONSE ACTION/TECHNOLOGY	DESCRIPTION OF DEBRIS PROCESS OPTIONS
No Action	· · · · · · · · · · · · · · · · · · ·
None	No action taken to remediate landfills.
Removal	
Surface Debris Removal	Surface Debris Removal. Remove only those wastes protruding through the land surface.
Excavation	Excavation. Remove waste source by excavating debris sites.
Disposal	
On Site	Landfilling. Disposal of debris at on-site Consolidation Landfill.
Containment	
Capping	Landfill Closure. Close landfill with low-permeability cover system.



TABLE 6-3	SCREENING OF TECHNOLOGIES AND DEBRIS PROCESS OPTIONS
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Landfill Remediation Feasibility Study Devens, MA

	APPLICABILIT	2		
GENERAL RESPONSE ACTION/ PROCESS OPTION	SITE-LIMITING CHARACTERISTICS	WASTE-LIMITING CHARACTERISTICS	SCREENING	COMMENTS
No Action				
None	None	Does not remove threats	Retained.	Required for
	Easily implementable.	posed by waste at the landfills.		consideration by NCP.
Removal				
Surface Debris Removal	Compliance with wetlands regulations for some activities may be required.	None.	Retained.	Would be used selectively.
Excavation	Access to some portions of debris sites may be difficult due to steep terrain.	Effectively removes debris. Excavation of some debris	Retained.	Would be used extensively.
	Compliance with wetlands regulations would be required for some	may be difficult due to steep terrain or remote location.		
	construction activities within debris disposal areas.			

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TABLE 6-3 Screening of Technologies and Debris Process Options

Landfill Remediation Feasibility Study Devens, MA

	APPLICABILIT	Y T0		
GENERAL RESPONSE ACTION/ PROCESS OPTION	SITE-LIMITING CHARACTERISTICS	WASTE-LIMITING CHARACTERISTICS	Screening Status	COMMENTS
Disposal				
Landfilling	On-site space restrictions must be considered.	To the extent possible, debris must be recompacted to pre-	Retained.	Only practical technology for debris
	Must comply with Massachusetts solid waste regulations.	excavated volume.		disposal.
Containment				
Capping	Capping of some landfills would be difficult because of their locations on steep terrain or in low-lying areas near water bodies.	None.	Retained.	As defined by USEPA, capping is the Presumptive Remedy for solid waste landfills

TABLE 7-1 SUMMARY OF DEVELOPED LANDFILL REMEDIATION ALTERNATIVES

			ALTERNATIVE CO	MPONENT	
ALTERNATIVE	EXCAVATE/ CONSOLIDATE	CAP-IN-PLACE	EXCAVATE/ DISPOSE OFF-SITE	LIMITED REMOVAL (SURFACE DEBRIS)	NO FURTHER ACTION
PA-1 ¹		AOCs 9, 11, 40, 41	SAs 6, 12, 13		
PA-2 ²	All seven landfills (near Shepley's Hill)				
PA-3	AOCs 9, 40, 41 SAs 6, 12, 13 (at North Post Landfill)	AOC 11			
PA-4	All seven landfills (at North Post Landfill)				
PA-5	AOCs 40, 41 SAs 6, 12, 13 (near Shepley's Hill	AOCs 9, 11			
PA-6	AOCs 9, 11, 41 SAs 6, 12, 13 (near Shepley's Hill)	AOC 40		~	

TABLE 7-1 SUMMARY OF DEVELOPED LANDFILL REMEDIATION ALTERNATIVES

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

			ALTERNATIVE CO	MPONENT	
ALTERNATIVE	EXCAVATE/ CONSOLIDATE	CAP-IN-PLACE	EXCAVATE/ DISPOSE OFF-SITE	LIMITED REMOVAL (SURFACE DEBRIS)	No Further Action
1 ³					All seven disposal areas
2		AOCs 9, 40		AOC 11 - dispose under AOC 9 Cap	AOC 41 SAs 6, 12, 13
3		AOCs 9, 11, 40		a l	AOC 41 SAs 6, 12, 13
4	AOCs 9, 40			AOC 11 - dispose in consolidation landfill	AOC 41 SAs 6, 12, 13
5	AOCs 9, 40	AOC 41 SAs 6, 12, 13		AOC 11 - dispose in consolidation landfill	
6	AOCs, 9, 11, 40	AOC 41 SAs 6, 12, 13	·•		
7		All seven disposal areas			
8	AOCs 9, 40, 41 SAs 6, 12, 13			AOC 11 - dispose in consolidation landfill	
9	All seven disposal areas				

Notes:

PA-1 = BCT Plan of Action (3/31/95), Option 1.

² Alternative PA-2 is identical to Alternative 9, and is eliminated from further discussion in this report.

Alternatives 1 through 9 were developed by the BCT on December 9, 1996.



Implementability Cost Status	Excavation, consolidation, Capital: Moderate Eliminated. Off-site and cap-in-place actions can be accomplished using standard construction procedures and conventional equipment.	Eliminated from Further Discussion.
Effectiveness	Hurman health and ecological risks would be eliminated at SAs 6, 12, and 13 Effectiveness of landfill caps would be measured by post-closure groundwater monitoring. Damage to proposed cap at AOC 11 caused by Nashua River flooding is a concern.	Identical to Alternative 9
Alternative	PA-1 Excavate/Dispose Offsite: Sas 6, 12, 13 Cap-in-Place AOCs 9, 11, 40, 41	PA-2

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TABLE 7-2 Preliminary Screening of Alternatives

Landfill Remediation Feasibility Study Devens, MA

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TABLE 7-2 Preliminary Screening of Alternatives

Landfill Remediation Feasibility Study Devens, MA

Alternative	Effectiveness	Implementability	Cost	Status
PA-3 Consolidate at North Post Landfill: AOCs 9, 40, 41 Sas 6, 12, 13 Cap-in-Place: AOC 11	Human health and ecological risks would be eliminated at AOCs 9, 40, 41, and SAs 6, 12, 13. Effectiveness of cap at AOC 11 would be measured by post-closure groundwater monitoring.	Excavation, consolidation, and cap-in-place actions can be accomplished using standard construction procedures and conventional equipment.	Capital: High Operating: Moderate	Eliminated. Shepley's Hill Landfill is preferable to North Post Landfill as site for consolidation landfill.
	Damage to proposed cap at AOC 11 caused by Nashua River flooding is a concern.			
PA-4 Consolidate at North Post Landfill: AOCs 9, 11, 40, 41 SAs 6, 12, 13	Human health and ecological risks would be eliminated at the seven landfills	Excavation and consolidation actions can be accomplished using standard construction procedures and conventional equipment.	Capital: High Operating: Moderate	Eliminated. Shepley's Hill Landfill area is preferable to North Post Landfill as site for consolidation landfill.
		30-year monitoring and maintenance program needed at only one landfill.		

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TABLE 7-2 Preliminary Screening of Alternatives

Landfill Remediation Feasibility Study Devens, MA

Status	Eliminated. This alternative contains different actions for AOCs 9 and 40, the landfills having the 2 largest waste volumes. Thus, economies of scale cannot be realized.		Eliminated. This alternative contains different actions for AOCs 9 and 40, the landfills having the 2 largest waste volumes. Thus, economies of scale cannot be realized.
Cost	Capital: High Operating: Moderate		Capital: High Operating: Moderate
Implementability	Excavation, consolidation, and cap-in-place actions can be accomplished using standard construction procedures and conventional equipment.		Excavation, consolidation, and cap-in-place actions can be accomplished using standard construction procedures and conventional equipment.
Effectiveness	Human health and ecological risks would be eliminated at AOCs 40, 41, and SAs 6, 12, 13. Effectiveness of caps at AOCs 9 and 11 would be measured by post-closure groundwater monitoring.	Damage to cap at AOC 11 caused by Nashua River flooding is a concern.	Human health and ecological risks would be eliminated at AOCs 9, 11, 41 and SAs 6, 12, 13. Effectiveness of cap at AOC 40 would be measured by groundwater monitoring.
Alternative	PA-5 Consolidate near Shepley's Hill: AOCs 40, 41, and SAs 6, 12, 13 Cap-in-Place: AOCs 9, 11		PA-6 Consolidate near Shepley's Hill: AOCs 9, 11, 41, and SAs 6, 12, 13 Cap-in-Place AOC 40

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Table 7-2 Preliminary Screening of Alternatives

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Landfill Remediation Feasibility Study Devens, MA

Alternative	Effectiveness	Implementability	Cost	Status
1. No Further Action: All seven landfills.	Not to be evaluated using Screening Criteria.			Retained.
 No Further Action: AOC 41 and SAs 6, 12, 13 Limited Removal: AOC 11 	Because the PRE did not identify significant human health or ecological risk, a low-permeability cap would provide only low risk - reduction benefit at AOC 9.	Capping at AOCs 9 and 40, and limited removal at AOC 11 can be accomplished using standard construction procedures and conventional equipment.	Capital: Low Operating: Low	Retained
Cap-in-place: AOCs 9,40	Cap and monitoring at AOC 40 would mitigate and allow assessment of potential future release of contaminants to groundwater.	No implementability concerns for No Further Action at AOC 41 and SAs 6, 12, and 13.		
	Physical hazards would be removed at AOC 11.			

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TABLE 7-2 Preliminary Screening of Alternatives

Landfill Remediation Feasibility Study Devens, MA

	Effectiveness	Implementability	Cost	Status.	
3. No Further Action: AOC 41 and SAs 6, 12, 13 Cap-in-place: AOCs 9, 11, 40	Because significant human health or ecological risks were not identified at AOCs 9 and 11, a low- permeability cap would provide low risk-reduction benefit.	Capping at AOCs 9, 11, and 40 can be accomplished using standard construction procedures and conventional equipment.	Capital: Moderate Operating: Moderate	Retained.	
	Damage to cap at AOC 11 caused by Nashua River flooding is a concern.	No implementability concerns for No Further Action at AOC 41 and SAs 6, 12, and 13.			

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Table 7-2 Preliminary Screening of Alternatives

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Landfill Remediation Feasibility Study Devens, MA

Alternative	Effectiveness	Implementability	Cost	Status
 No Further Action: AOC 41 and SAs 6, 12, 13 	Human health and ecological risk would be removed at AOCs 9 and 40.	Excavation and consolidation of wastes at AOCs 9 and 40, and limited	Capital: Moderate Operating: Low	Retained.
Limited Removal: AOC 11	Physical hazards would be removed at AOC 11.	waste removal at AOC 11 can be accomplished using standard construction		
Consolidate: AOCs 9, 40		procedures and conventional equipment.		
		UXO clearance activities would be implemented during waste excavations at AOCs 9 and 40.		
		No implementability concerns for No Further Action at AOC 41 and SAs 6, 12, and 13.		

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TABLE 7-2 Preliminary Screening of Alternatives

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Landfill Remediation Feasibility Study Devens, MA

Alternative	Effectiveness	Implementability	Cost	Status
5. Limited Removal: AOC 11	Human health and ecological risk would be removed at AOCs 9 and 40.	Excavation, consolidation, cap-in-place, and limited removal actions can be	Capital: Moderate Operating: Moderate	Retained.
Cap-in-Place: AOC 41 and SAs 6, 12, 13	Because significant human	accomplished using standard construction		
Consolidate: AOCs 9, 40	neatrn and ecological risks were not identified at AOC 41 and SAs 6, 12, and 13, a	procedures and conventional equipment.		
	low-permeability cap would provide only low risk- reduction benefit.		÷	
	Physical hazards would be removed at AOC 11.			



Landfill Remediation Feasibility Study Devens, MA

Alternative	Effectiveness	Implementability	Cost	Status
6. Cap-in-Place: AOC 41 and SAs 6, 12, 13 Consolidate: AOCs 9, 11, 40	Human health and environmental risks would be removed at AOCs 9, 11, and 40. Because significant human health and ecological risks were not identified at AOC 41 and SAs 6, 12, and 13, a low-permeability cap would provide only low risk- reduction benefit.	Excavation, consolidation, and cap-in-place actions can be accomplished using standard construction procedures and conventional equipment.	Capital: High Operating: Moderate	Retained.
	Erosion of a cap at SA 12 is a concern because of the site's steep terrain.			

TABLE 7-3 SCREENING SUMMARY OF REMEDIAL ACTION ALTERNATIVES

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

Reme	edial Action Alternative	Retained	Eliminated
PA-1:	Cap-in-Place AOCs 9, 11, 40, 41 Excavate/Dispose Offsite SAs 6, 12, 13		x
PA-2:	Excavate/Consolidate AOCs 9, 11, 40, 41, and SAs 6, 12, 13 near Shepley's Hill	See Alternative 9	
PA-3:	Excavate/Consolidate AOCs 9, 40, 41, and SAs 6, 12, 13 at North Post Landfill Cap-in-Place AOC 11		X
PA-4:	Excavate/Consolidate AOCs 9, 11, 40, 41, and SAs 6, 12, 13 at North Post Landfill		x
PA-5:	Excavate/Consolidate AOCs 40, 41, and SAs 6, 12, 13 near Shepley's Hill Cap-in-Place AOCs 9, 11		x
PA-6:	Excavate/Consolidate AOCs 9, 11, 41 and SAs 6, 12, 13 near Shepley's Hill Cap-in-Place AOC 40		x
1:	No Further Action at AOCs 9, 11, 40, 41, and SAs 6, 12, 13	x	
2:	No Further Action at AOC 41 and SAs 6, 12, 13 Limited Removal at AOC 11 Cap-in-Place AOCs 9, 40	x	
3.	No Further Action at AOC 41 and SAs 6, 12, 13 Cap-in-Place AOCs 9, 11, 40	×	
4.	No Further Action at AOC 41 and SAs 6, 12, 13 Limited Removal at AOC 11 Excavate/Consolidate AOCs 9, 40	x	
5.	Limited Removal at AOC 11 Cap-in-Place AOC 41 and SAs 6, 12, 13 Excavate/Consolidate AOCs 9, 40	x	
6.	Cap-in-Place AOC 41 and SAs 6, 12, 13 Excavate/Consolidate AOCs 9, 11, 40	x	
7.	Cap-in-Place AOCs 9, 11, 40, 41 and SAs 6, 12, 13	x	
8.	Limited Removed at AOC 11 Excavate/Consolidate AOCs 9, 40, 41, and SAs 6, 12, 13	×	
9.	Excavate Consolidate AOCs 9, 11, 40, 41 and SAs 6, 12, 13	x	



TABLE 8-1 ALTERNATIVE EVALUATION CRITERIA

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

THRESHOLD CRITERIA (must be met by each alternative)

- <u>OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT</u> Assesses how well an alternative, as a whole, achieves and maintains protection of human health and the environment.
- <u>COMPLIANCE WITH ARARs</u> Assesses how the alternative complies with location-, chemical-, and action-specific ARARs, and whether a waiver is required or justified.

PRIMARY CRITERIA (basis of alternative evaluation)

- <u>LONG-TERM EFFECTIVENESS AND PERMANENCE</u> Evaluates the effectiveness of the alternative in protecting human health and the environment after response objectives have been met. Includes consideration of the magnitude of residual risks and the adequacy and reliability of controls.
- <u>REDUCTION OF TOXICITY, MOBILITY, AND VOLUME THROUGH TREATMENT</u> Evaluates the effectiveness of treatment processes used to reduce toxicity, mobility, and volume of hazardous substances. This criterion considers the degree to which treatment is irreversible, and the type and quantity of residuals remaining after treatment.
- <u>SHORT-TERM EFFECTIVENESS</u> Examines the effectiveness of the alternative in protecting human health and the environment during the construction and implementation of a remedy until response objectives have been met. Considers the protection of the community, workers, and the environment during implementation of remedial actions.
- <u>IMPLEMENTABILITY</u> Assesses the technical and administrative feasibility of an alternative and availability of required goods and services. Technical feasibility considers the ability to construct and operate a technology and its reliability, the ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of a remedy. Administrative feasibility considers the ability to obtain approvals from other parties or agencies and extent of required coordination with other parties or agencies.
 - COST Evaluates the capital and operation and maintenance cost of each alternative.

BALANCING CRITERIA

- <u>STATE ACCEPTANCE</u> This criterion considers the state's preferences among or concerns about alternatives.
- <u>COMMUNITY ACCEPTANCE</u> This criterion considers the communities preferences among or concerns about alternatives.

TABLE 8-2 SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE 2

Landfill Remediation Feasibility Study Devens, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	Status	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Floodplains	Floodplain Management Executive Order No. 11988 [40 CFR Part 6, App. 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, hot-spot sediment removal, and landfill capping 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.
Federal	Wetlands	Protection of Wetlands Executive Order No. 11990 [40 CFR Part 6, App. 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, hot-spot sediment removal, and landfill capping 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.

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Wetlands Aquatic Ecosystem	Clean Water Act, Dredge or Fill Requirements Section 404 [33 CFR Part 230; 40 CFR Part 230]	Applicable 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. Procedures for complying with regulatory conditions are contained in 33 CFR Part 323. 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 and cover installation 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.
Federal	Construction over/in navigable waters.	Rivers and Harbors Act of 1899 [33 USC 401 et seq.]	Applicable AOC 40	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.

TABLE 8-2 Synopsis of Federal and State Location-Specific ARARs For Alternative 2

continued

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA



TABLE 8-2 Synopsis of Federal and State Location-Specific ARARs For Alternative 2

Landfill Remediation Feasibility Study 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.; 40 CFR Part 302]	Applicable AOC 9 AOC 11 AOC 40	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.
Federal	Endangered Species	Endangered Species Act [16 USC 1531 et seq.; 50 CFR Part 402]	Relevant and Appropriate AOC 11 AOC 40	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.
Federal	Atlantic Flyway Wetlands Surface Waters	Migratory Bird Treaty Act (16 USC 703-711)	Applicable 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.	The protection of endangered species and their habitat will be considered during excavation activities and cover installation.

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	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	All work to be performed within wetla and the 100 foot buffer zone will be i accordance with the substantive requirements of these regulations.	Excavation, filling, and disposal activi will meet the substantive criteria and standards of these regulations	The protection of state listed endange species will be considered during the design and implementation of this alternative.
	REQUIREMENT SYNOPSIS	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.	The Massachusetts Waterways Act and regulations require that a license from Massachusetts Department of Environmental Protection (MADEP) be obtained for any work in or over any tidelands, river or stream (with respect to which public funds have been expended), or great pond, or outlet thereof.	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.
DEVENS	STATUS	Applicable AOC 9 AOC 11 AOC 40	Relevant and Appropriate AOC 40	Applicable AOC 9 AOC 11 AOC 40
	REQUIREMENT	Massachusetts Wetland Protection Act and regulations [MGL c. 131 s. 40; 310 CMR 10.00]	Massachusetts Waterways Act [MGL c. 91; 310 CMR 9.00]	Massachusetts Endangered Species Act and implementing regulations [MGL c. 131A, s. 1 et seq.; 321 CMR 8.00]
	LOCATION CHARACTERISTIC	Floodplains Wetlands Surface Waters	Construction over/in a waterway.	Endangered Species
	REGULATORY AUTHORITY	State	State	State

TABLE 8-2 Synopsis of Federal and State Location-Specific ARARs For Alternative 2

continued

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA



LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

REGULATORY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State	Nashua River	Scenic Rivers Act [MGL c. 21 s. 27B]	Applicable AOC 11	As part of the Massachusetts Department of Environmental Management's Scenic Rivers Program, the Nashua River and contiguous land up to 100 yards on each side of its natural banks are afforded special protection under this law.	Remedial activities will be performed to comply with the substantive requirements of this act.

Notes:

Code of Federal Regulations	Code of Massachusetts Regulations	Clean Water Act	Department of the Interior	Fish and Wildlife Service	Massachusetts Environmental Policy Act	Massachusetts General Laws	National Maine Fisheries Service	United States Code
11	IJ	11	11	H	11	II	П	11
CFR	CMR	CWA	Ō	FWS	MEPA	MGL	NMFS	USC

TABLE 8-3 Synopsis of Federal and State Chemical-Specific ARARs For Alternative 2

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LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

REGULATORY AUTHORITY	CHEMICAL MEDIUM	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]	Applicable 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 human health provide protection of human health provide protective concentrations for exposure from ingesting contaminated water and contami- nated 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 vater and the circumstances of the release or threatened release.	Remedial actions will be performed in a manner to prevent AWQC exceedances in surface water. Actives 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.
Federal	Groundwater	Safe Drinking Water Act, National Primary Drinking Water Regulations, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50 - 141.53]	ADD ficable AOC 40	The National Primary Drinking Water Act establishes 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 conditions, and the MCL for arsenic will be met under average and maximum conditions. MCLs are not exceeded at Patton Well.

TABLE 8-3 Synopsis of Federal and State Chemical-Specific ARARs For Alternative 2

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

REGULATORY	CHEMICAL				ACTION TO BE TAKEN
AUTHORITY	MEDIUM	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	To ATTAIN REQUIREMENT
State	Surface water	Massachusetts Surface Water	Applicable	Massachusetts Surface Water Quality	At AOC 11 activities will be performed in a
		Quality Standards [314 CMR	AOC 11	Standards designate the most sensitive	manner to prevent exceedances of surface
		4.00]	AOC 40	uses for which surface waters of the	water quality in the Nashua River.
				Commonwealth are to be enhanced,	
				maintained, and protected, and designate	At AOC 40 sediment removal will be
				minimum water quality criteria for	performed in a manner to prevent
				sustaining the designated uses. Surface	exceedances of Surface Water Quality
				waters at Fort Devens are classified as	Standards in Cold Spring Brook Pond.
				Class B. Surface waters assigned to this	Supernatant from dredged spoil dewatering
				class are designated as habitat for fish,	will be monitored to prevent exceedances in
				other aquatic life and wildlife, and for	the pond. To the extent necessary, Surface
				primary and secondary contact recreation.	Water Quality Standards will be used to
				These criteria supersede federal AWQC	develop discharge limitations.
				only when they are more stringent (more	
				protective) than the AWQC.	

Notes:

Ambient Water Quality Criteria

11

AWQC

CERCLA	11	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	11	Code of Federal Regulations
CMR	H	Code of Massachusetts Rules
CWA	Ш	Clean Water Act
MCL		Maximum Contaminant Level
MCLG	н	Maximum Contaminant Level Goal
MMCL	н	Massachusetts Maximum Contaminant Level
NPDWR	Ш	National Primary Drinking Water Regulations
SDWA	Ш	Safe Drinking Water Act
SMCL	II	Secondary Maximum Contaminant Level

TABLE 8-4 SVNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 2

Landfill Remediation Feasibility Study Devens, MA

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN DEMINEMENT
Federal	Control of surface water runoff. Direct discharge to surface water.	Clean Water Act Program [40 CFR 122,125]	Applicable AOC 9 AOC 11 AOC 40	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.
Federal	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	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, or 40 are hazardous materials subject to LDRs, the materials will be handled and disposed of in compliance with these regulations.
State	Solid Waste Landfill Construction, Operation, Closure, and Post-Closure Care.	Massachusetts Solid Waste Management Regulations [310 CMR 19.100] CMR 19.100]	Applicable AOC 9 AOC 11 SA 12 Relevant and Appropriate SA 6 SA 13 AOC 40 AOC 40	These regulations outline the requirements for construction, operation, closure, and post-closure at solid waste management facilities in the Commonwealth of Massachusetts.	The pertinent site investigation, and feasibility study reports and record of decision will be submitted to satisfy the requirements of 310 CMR 19.021 for submittal for final closure and post-closure plans at inactive landfills SA 6, SA 13, and AOC 41.

	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	The requirements of 310 CMR 19.021 will not be satisfied for SA 12.	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.	The proposed landfill cover at AOC 9 will meet the requirements of 310 CMR 19.112.	The proposed cover at AOC 40 will conform with the intent of 310 CMR 19.112, although it may be considered an Alternative Cover System Design by MADEP (310 CMR 19.113).	Long-term monitoring and maintenance plans which meet the requirements of 310 CMR 19.118, 19.132, and 19.142 will be developed for AOCs 9 and 40.	A Record Notice of Landfill Operation will be filed for AOCs 9, 11, and 40 in accordance with 310 CMR 19.141.	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.
N FEASIBILITY STUDY , MA	REQUIREMENT SYNOPSIS							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.
ll Remediation Devens	Status							Relevant and Appropriate AOC 40
LANDFI	REQUIREMENT							Massachusetts Water Quality Certification for Dredging [314 CMR 9.00]
	Action							Activities that potentially affect surface water quality.
	REGULATORY AUTHORITY	State (continued)						State

TABLE 8-4 SVNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 2

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SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 2

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State		Massachusetts Air Pollution Control Regulations [310 CMR 7.00]	Applicable AOC 9 AOC 11 AOC 40	These 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. Specifically, Section 6.04 governs ambient air quality such as particulate matter standards. Emissions from site treatment activities must be maintained at an annual geometric mean of 75 g/m ³ and a maximum 24-hour concentration of 40 mg/m ³ (primary standard). Carbon monoxide, nitrogen dioxide, and lead are also regulated. Section 7.02 governs plan approval and emissions limitations. A permit and BACT are required prior to operation. Under Section 7.02, visible emissions are limited. Additionally, the Massachusetts toxic air pollutant (TAP) control program	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:

- Code of Federal Regulations
 Code of Massachusetts Rules CFR
 - CMR
 - = Clean Water Act CWA
- MADEP MGL USACE USACE
- Massachusetts Department of Environmental Protection
 Massachusetts General Laws
 National Pollutant Discharge Elimination System
 U.S. Army Corps of Engineers
 United States Code

	TABLE 8 - 5 COST SUMMARY TABLE ALTERNATIVE 2: NO FURTHER ACTION AT SA\$ 6, 12, 13, AOC 41; LIMITED REMOVAL AT AOC 11; CAP IN PLACE AOC\$ 9 & 40 LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS. MA		
	ITEM	TOTA	LCOST
DIRECT COSTS			
NO FURTHE	ACTION		
	SA 6	\$	
	SA 12		
	SA 13		
LIMITED REN	NOVAL AT AOC 11		44.00
CAP IN PLAC	SE		44,00
	AOC 9		3,301,00
	AOC 40		1,758,00
	TOTAL DIRECT COSTS	\$	5,103,00
INDIRECT COSTS			
	LEGAL, ADMIN, PERMITTING	ş	255,000
	ENGINEERING		510,000
	SERVICES DURING CONSTRUCTION		510,000
	TOTAL INDIRECT COSTS	9	1,530,000
	TOTAL CAPITAL (DIRECT + INDIRECT) COSTS	\$	6,633,000
	AINTENANCE COSTS		
OPERATION AND N	IAINTENANCE COSTS TOTAL ANNUAL O&M COSTS FOR AOC 11 - 2 YRS	\$	4,000
OPERATION AND N	IAINTENANCE COSTS TOTAL ANNUAL O&M COSTS FOR AOC 11 - 2 YRS TOTAL ANNUAL O&M COSTS FOR CAP-IN-PLACE AREAS - 30 YRS	\$	4,000 72,000
OPERATION AND N	IAINTENANCE COSTS TOTAL ANNUAL O&M COSTS FOR AOC 11 - 2 YRS TOTAL ANNUAL O&M COSTS FOR CAP-IN-PLACE AREAS - 30 YRS TOTAL ADDITIONAL ANNUAL O&M COSTS FOR AOC 40 - 5 YRS	\$	4,000 72,000 13,000
OPERATION AND N	TOTAL ANNUAL O&M COSTS FOR AOC 11 - 2 YRS TOTAL ANNUAL O&M COSTS FOR CAP-IN-PLACE AREAS - 30 YRS TOTAL ANNUAL O&M COSTS FOR AOC 40 - 5 YRS TOTAL ADDITIONAL ANNUAL O&M COSTS FOR AOC 40 - 5 YRS	\$	4,000 72,000 13,000
OPERATION AND N	MAINTENANCE COSTS TOTAL ANNUAL O&M COSTS FOR AOC 11 - 2 YRS TOTAL ANNUAL O&M COSTS FOR CAP-IN-PLACE AREAS - 30 YRS TOTAL ADDITIONAL ANNUAL O&M COSTS FOR AOC 40 - 5 YRS TOTAL ADDITIONAL ANNUAL O&M COSTS	\$	4,000 72,000 13,000 953,000
	MAINTENANCE COSTS TOTAL ANNUAL O&M COSTS FOR AOC 11 - 2 YRS TOTAL ANNUAL O&M COSTS FOR CAP-IN-PLACE AREAS - 30 YRS TOTAL ADDITIONAL ANNUAL O&M COSTS FOR AOC 40 - 5 YRS TOTAL PRESENT WORTH OF O&M COSTS	\$	4,000 72,000 13,000 953,000
DPERATION AND N	MAINTENANCE COSTS TOTAL ANNUAL O&M COSTS FOR AOC 11 - 2 YRS TOTAL ANNUAL O&M COSTS FOR CAP-IN-PLACE AREAS - 30 YRS TOTAL ADDITIONAL ANNUAL O&M COSTS FOR AOC 40 - 5 YRS TOTAL PRESENT WORTH OF O&M COSTS TOTAL PRESENT WORTH OF O&M COSTS	\$	4,000 72,000 13,000 953,000 7,586,000

TABLE 8-6 Synopsis of Federal and State Location-Specific ARARs For Alternative 3

Landfill Remediation Feasibility Study Devens, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Floodplains	Floodplain Management Executive Order No. 11988 [40 CFR Part 6, App. 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, hot-spot sediment removal, and landfill capping 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.
Federal	Wetlands	Protection of Wetlands Executive Order No. 11990 [40 CFR Part 6, App. 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, hot-spot sediment removal, and landfill capping 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.



Landfill Remediation Feasibility Study Devens, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Wetlands Aquatic Ecosystem	Clean Water Act, Dredge or Fill Requirements Section 404 [33 CFR Part 230; 40 CFR Part 230]	Applicable 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. Procedures for complying with regulatory conditions are contained in 33 CFR Part 323. Guidelines for Specification of Disposal Sites for Dredged or Fill material at 40 CFR Part S30, 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 and cover installation 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.
Federal	Construction over/in navigable waters.	Rivers and Harbors Act of 1899 [33 USC 401 et seq.]	Applicable AOC 40	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 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.



Landfill Remediation Feasibility Study 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.: 40 CFR Part 302]	Applicable AOC 9 AOC 11 AOC 40	Actions that affect species/habitat require consultation with U.S. Department of Interior, U.S. Fish and Wildlife Service, and/or 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.
Federal	Endangered Species	Endangered Species Act [16 USC 1531 et seq.; 50 CFR Part 402]	Relevant and Appropriate AOC 9 AOC 11 AOC 40	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.
Federal	Atlantic Flyway Wetlands Surface Waters	Migratory Bird Treaty Act (16 USC 703-711)	Applicable 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.

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Landfill Remediation Feasibility Study 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	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.
State	Construction over/in a waterway.	Massachusetts Waterways Act [MGL c. 91; 310 CMR 9.00]	Relevant and Appropriate AOC 40	The Massachusetts Waterways Act and regulations require that a license from Massachusetts Department of Environmental Protection (MADEP) be obtained for any work in or over any tidelands, river or stream (with respect to which public funds have been expended), or great pond, or outlet thereof.	Excavation, filling, and disposal activities will meet the substantive criteria and standards of these regulations
State	Endangered Species	Massachusetts Endangered Species Act and implementing regulations [MGL c. 131A, s. 1 et seq.; 321 CMR 8.00]	Applicable AOC 9 AOC 11 AOC 40	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 will be considered during the design and implementation of this alternative.

TABLE 8-6 Synopsis of Federal and State Location-Specific ARARs For Alternative 3

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Landfill Remediation Feasibility Study Devens, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State	Nashua River	Scenic Rivers Act [MGL c. 21 s. 27B]	Applicable AOC 11	As part of the Massachusetts Department of Environmental Management's Scenic Rivers Program, the Nashua River and contiguous land up to 100 yards on each side of its natural banks are afforded special protection under this law.	Remedial activities will be performed to comply with the substantive requirements of this act.

Notes:

Code of Federal Regulations	Code of Massachusetts Regulations	Clean Water Act	Department of the Interior	Fish and Wildlife Service	Massachusetts Environmental Policy Act	Massachusetts General Laws	National Maine Fisheries Service	United States Code
H	11	11	11	11	H	11	II	11
CFR	CMR	CWA	IOQ	FWS	MEPA	MGL	NMFS	NSC



TABLE 8-7





TABLE 8-7 Synopsis of Federal and State Chemical-Specific ARARs For Alternative 3

Landfill Remediation Feasibility Study Devens, MA

ACTION TO BE TAVEN	TO ATTAIN REQUIREMENT	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.
	REQUIREMENT SYNOPSIS	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.
	STATUS	Applicable AOC 11 AOC 40
	REQUIREMENT	Massachusetts Surface Water Quality Standards [314 CMR 4.00]
CHEMICAL	MEDIUM	Surface water
REGULATORY	AUTHORITY	State

Notes:

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act CFR = Code of Federal Regulations CMR = Code of Massachusetts Rules CWA = Code of Massachusetts Rules CWA = Clean Water Act MCL = Maximum Contaminant Level MCL = Maximum Contaminant Level MMCL = Massachusetts Maximum Contaminant Level NPDWR = National Primary Drinking Water Regulations SDWA = Safe Drinking Water Act SMCL = Secondary Maximum Contaminant Level

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA	ACTION REQUIREMENT STATUS REQUIREMENT SYNOPSIS ATTAIN REQUIREMENT	Control of surface water runoff.Clean Water Act Program [40Applicable AOC 9The National Pollutant Discharge Elimination System (NPDES) permit program specifies 	Land Disposal of Hazardous Wastes.Resource Conservation and Recovery Act (RCRA), Land AOC 9Applicable without specified treatment is restricted.If it is determined that materials excavated from AOC 9, 11, or 40 are hazardous materials subject to LDRs, the materials materials subject to LDRs, the materials and disposed of in 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 RCRALand Disposal Restrictions (LDRs); 400 CFR Part 268)AOC 9 AOC 40without specified treatment is restricted. Remedial actions must be evaluated to 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	Solid Waste LandfillMassachusetts Solid WasteApplicableThese regulations outline the requirementsThe pertinent site investigation, remedial construction, operation, closure, and AOC 11These regulationes (310ADC 9Construction, Operation, Closure, and Post-ClosureCMR 19.100]AOC 11post-closure at solid waste management and record of decision will be submitted to satisfy the requirements of 310 CMR 19.021 for submitted to satisfy the requirements of 310 CMR 19.021 for submitted to satisfy the requirements of 310 CMR 19.021 for AOC 41
	ACTIO	Control of su water runoff. Direct dischal surface water	Land Disposa Hazardous W	Solid Waste L Construction, Operation, Clo and Post-Clos Care.
	REGULATORY	Federal	Federal	State

TABLE 8-8 SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 3

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TABLE 8-8	AND STATE ACTION Spe
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SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 3

Landfill Remediation Feasibility Study Devens, MA

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State (continued)					
					The requirements of 310 CMR 19.021 will not be satisfied for SA 12.
					The proposed landfill cover at AOC 9 will meet the requirements of 310 CMR 19.112.
					The proposed landfill cover at AOC 11 will meet the requirements of 310 CMR 19.112.
					The proposed landfill cover at AOC 40 will conform with the intent of 310 CMR 19.112 although it may be considered an Alternative Cover System Design by MADEP (310 CMR 19.113).
					Long-term monitoring and maintenance plans which meet the requirements of 310 CMR 19.118, 19.132, 19.133, and 19.142 will be developed for AOCs 9, 11, and 40.
					A Record Notice of Landfill Operation will be filed for AOCs 9, 11, and 40 in accordance with 310 CMR 19.141.
State	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.

	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	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).
	REQUIREMENT SYNOPSIS	These 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. Specifically, Section 6.04 governs ambient air quality such as particulate matter standards. Emissions from site treatment activities must be maintained at an annual geometric mean of 75 g/m ³ and a maximum 24-hour concentration of 40 mg/m ³ (primary standard). Carbon monoxide, nitrogen dioxide, and lead are also regulated. Section 7.02 governs plan approval and emissions limitations. A permit and BACT are required prior to operation. Under Section 7.02, visible emissions are limited. Additionally, the Massachusetts toxic air pollutant (TAP) control program requirements will be considered.
	Status	Applicable AOC 9 AOC 11 AOC 40
	REQUIREMENT	Massachusetts Air Pollution Control Regulations [310 CMR 7.00]
	ACTION	* *
	REGULATORY AUTHORITY	State

Notes:

 Code of Federal Regulations
 Code of Massachusetts Rules
 Clean Water Act
 Massachusetts Department of Environmental Protection
 Massachusetts General Laws CFR CMR MADEP MGL USACE USACE

National Pollutant Discharge Elimination System
 U.S. Army Corps of Engineers
 United States Code

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SVNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 3

TABLE 8-8

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS. MA

	TABLE 8 - 9 COST SUMMARY TABLE ALTERNATIVE 3: NO FURTHER ACTION AT SA\$ 6, 12, 13, AOC 41; CAP IN PLACE AOC\$ 9, 11, & 40		
	LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA		
	ITEM	1(0)	ALCOST
	DIRECT COSTS		а.
	NO FURTHER ACTION		
	SA 6	\$	0
	SA 12		0
	SA 13		0
			0 001 000
	AOC 9		3,301,000
	AOC 11		1 758 000
	AOC 40		1,756,000
	1		
	TOTAL DIRECT COSTS	\$	6,328,000
	INDIRECT COSTS		
	HEALTH AND SAFETY	Ś	316 000
	LEGAL, ADMIN, PERMITTING		316.000
	ENGINEERING		633,000
1	SERVICES DURING CONSTRUCTION		633,000
	TOTAL INDIRECT COSTS	ş	1,898,000
	TOTAL CAPITAL (DIRECT + INDIRECT) COSTS	4	9 336 000
		•	8,220,000
	OPERATION AND MAINTENANCE COSTS		
	TOTAL ANNUAL O&M COSTS FOR AOC 9, 11, 40 - 30 YRS	\$	99,000
	TOTAL ADDITIONAL ANNUAL O&M COSTS FOR AOC 40 - 5 YRS		13,000
	TOTAL PRESENT WORTH OF O&M COSTS		1 281,000
	TOTAL COSTS ALTERNATIVE 3	٠	9,507,000
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ENS, MA	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	Drum removal, hot-spot sediment removal, and landfill capping 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.	Drum removal, hot-spot sediment removal, and landfill capping 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.	The removal of drums/sediments and cover installation 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.
	REQUIREMENT SYNOPSIS	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, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the floodplain.	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 within wetland action taken to restore minimized and action taken to restore natural and beneficial values.	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. Procedures for complying with regulatory conditions are contained in 33 CFR Part 323. Guidelines for Specification of Disposal Sites for Dredged or Fill material at 40 CFR Part 230, pronulgated under Caan 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 wetlands.
DEVENS,	STATUS	Applicable AOC 9 AOC 11 AOC 40	Applicable AOC 9 AOC 11 AOC 40	Applicable AOC 9 AOC 11 AOC 40
	REQUIREMENT	Floodplain Management Executive Order No. 11988 [40 CFR Part 6, App. A]	Protection of Wetlands Executive Order No. 11990 [40 CFR Part 6, App. A]	Clean Water Act, Dredge or Fill Requirements Section 404 [33 CFR Part 230; 40 CFR Part 230]
	LOCATION CHARACTERISTIC	Floodplains	Wetlands	Wetlands Aquatic Ecosystem
	REGULATORY AUTHORITY	Federal	Federal	Federal

TABLE 8-10 Synopsis of Federal and State Location-Specific ARARs For Alternative 4

LANDFILL REMEDIATION FEASIBILITY STUDY



TABLE 8-10 Synopsis of Federal and State Location-Specific ARARs For Alternative 4

Landfill Remediation Feasibility Study Devens, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REGUIREMENT	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.]	Applicable AOC 40	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.
Federal	Surface Waters Endangered Species Migratory Species	Fish and Wildlife Coordination Act [16 USC 661 et seq.: 40 CFR Part 302]	Applicable AOC 9 AOC 40	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 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.
Federal	Endangered Species	Endangered Species Act [16 USC 1531 et seq.; 50 CFR Part 402]	Relevant and Appropriate AOC 9 AOC 11 AOC 40 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.

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TABLE 8-10 Synopsis of Federal and State Location-Specific ARARs For Alternative 4

Landfill Remediation Feasibility Study Devens, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Atlantic Flyway Wetlands Surface Waters	Migratory Bird Treaty Act (16 USC 703-711)	Applicable 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 vound.	Remedial actions will be performed to protect migratory birds, their nests, and eggs.
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	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 more drown of any lost area within two drowing 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.
State	Construction over/in a waterway.	Massachusetts Waterways Act [MGL c. 91; 310 CMR 9.00]	Relevant and Appropriate AOC 40	The Massachusetts Waterways Act and regulations require that a license from Massachusetts Department of Environmental Protection (MADEP) be obtained for any work in or over any tidelands, river or stream (with respect to which public funds have been expended), or great pond, or outlet thereof.	Excavation, filling, and disposal activities will meet the substantive criteria and standards of these regulations
State	Endangered Species	Massachusetts Endangered Species Act and implementing regulations [MGL c. 131A, s. 1 et seq.; 321 CMR 8.00]	Applicable AOC 9 AOC 11 AOC 10 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.

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TABLE 8-10 Synopsis of Federal and State Location-Specific ARARs For Alternative 4

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State	Nashua River	Scenic Rivers Act [MGL c. 21 s. 27B]	Applicable AOC 11	As part of the Massachusetts Department of Environmental Management's Scenic Rivers Program, the Nashua River and contiguous land up to 100 yards on each side of its natural banks are afforded	Remedial activities will be performed to comply with the substantive requirements of this act.
				SDECIAL DIOTECTION UNDER This law	

Notes:

Code of Federal Regulations	Code of Massachusetts Regulations	Clean Water Act	Department of the Interior	Fish and Wildlife Service	Massachusetts Environmental Policy Act	Massachusetts General Laws	National Maine Fisheries Service	United States Code
H			11	11	11	H	H	H
CFR	CMR	CWA	IOG	FWS	MEPA	MGL	NMFS	nsc

TABLE 8-11 Synopsis of Federal and State Chemical-Specific ARARs For Alternative 4

Landfill Remediation Feasibility Study Devens, MA

REGULATORY AUTHORITY	CHEMICAL MEDIUM	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]	Applicable 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 protection of human health provide protection of human health provide ingesting contaminated water and contami- nated aquatic organisms, and from ingesting contaminated aquatic organisms alone. Remedial actions involving contaminated surface water or discharge of contaminates of the 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. Actives 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.
Federal	Groundwater	Safe Drinking Water Act, National Primary Drinking Water Regulations, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50 - 141.53]	Applicable AOC 40	The National Primary Drinking Water Act establishes Maximum Contaminant Levels (MCLs) and Maximum Contaminant Levels (MCLs) and Maximum Contaminant Levels 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 conditions, and the MCL for arsenic will be met under average and maximum conditions. MCLs are not exceeded at Patton Well.



TABLE 8-11 Synopsis of Federal and State Chemical-Specific ARARS For Alternative 4

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LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

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AUTHORITY	MEDIUM	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State	Surface water	Massachusetts Surface Water Quality Standards [314 CMR 4.00]	Applicable 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 AWOC only when they are more stringent (more protective) than the MOC	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.

Notes:

Ambient Water Quality Criteria	Comprehensive Environmental Response. Compensation, and Liability Act	Code of Federal Regulations	Code of Massachusetts Rules	Clean Water Act	Maximum Contaminant Level	Maximum Contaminant Level Goal	Massachusetts Maximum Contaminant Level	National Primary Drinking Water Regulations	Safe Drinking Water Act	Secondary Maximum Contaminant Level
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AWQC	CERCLA	CFR	CMR	CWA	MCL	MCLG	MMCL	NPDWR	SDWA	SMCL

TABLE 8-12	STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 4
TABLE	SYNOPSIS OF FEDERAL AND STATE ACTIO

Landfill Remediation Feasibility Study

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REGULATORY AUTHORITY	ACTION	REQUIREMENT	Status	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Control of surface water runoff. Direct discharge to surface water.	Clean Water Act Program [40 CFR 122,125]	Applicable AOC 9 AOC 11 AOC 40 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.
Federal	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	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, or 40 are hazardous materials subject to LDRs, 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 in the Commonwealth of Massachusetts.	The consolidation facility will be sited in accordance with these regulations.

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SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 4

TABLE 8-12

	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	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).
N FEASIBILITY STUDY , MA	REQUIREMENT SYNOPSIS	These 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. Specifically, Section 6.04 governs ambient air quality such as particulate matter standards. Emissions from site treatment activities must be maintained at an annual geometric mean of 75 g/m ³ and a maximum 24-hour concentration of 40 mg/m ³ (primary standard). Carbon monoxide, nitrogen dioxide, and lead are also regulated. Section 7.02 governs plan approval and emissions limitations. A permit and BACT are required prior to operation. Under Section 7.02, visible emissions are limited. Additionally, the Massachusetts toxic air pollutant (TAP) control program requirements will be considered.
dfill Remediation Devens	Status	Applicable AOC 9 AOC 11 AOC 40 Consolidation Facility
LANDFI	REQUIREMENT	Massachusetts Air Pollution Control Regulations [310 CMR 7.00]
	ACTION	
	REGULATORY AUTHORITY	State

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SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 4

FABLE 8-12

Notes:

CFR=Code of Federal RegulationsCMR=Code of Massachusetts RulesCMA=Clean Water ActCWA=Clean Water ActMADEP=Massachusetts Department of Environmental ProtectionMGL=Massachusetts General LawsMGL=National Pollutant Discharge Elimination SystemUSACE=U.S. Army Corps of EngineersUSC=United States Code
TABLE 8 - 13 COST SUMMARY TABLE ALTERNATIVE 4: NO FURTHER ACTION AT SAs 6, 12, 13, AOC 41; LIMITED REMOVAL AT AOC 11; EXCAVATE AND CONSOLIDATE AOCs 9 & 40 LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA ITEM TOTAL COST DIRECT COSTS NO FURTHER ACTION SA 6 0 SA 12 0 SA 13 0 AOC 41 0 LIMITED REMOVAL AT AOC 11 44,000 EXCAVATE AND CONSOLIDATE AOC 9 3,835,000 AOC 40 3,370,000 CONSOLIDATION LANDFILL CONSTRUCTION 5,240,000 TOTAL DIRECT COSTS 12,489,000 \$ INDIRECT COSTS HEALTH AND SAFETY 624,000 LEGAL, ADMIN, PERMITTING 624,000 ENGINEERING 1,249,000 SERVICES DURING CONSTRUCTION 1,249,000 TOTAL INDIRECT COSTS 3,746,000 \$ TOTAL CAPITAL (DIRECT + INDIRECT) COSTS 16,235,000 OPERATION AND MAINTENANCE COSTS TOTAL ANNUAL O&M COSTS FOR AOC 11 - 2 YRS 4,000 TOTAL ANNUAL O&M COSTS CONSOLIDATION LANDFILL - 30 YRS 23,000 TOTAL ADDITIONAL ANNUAL O&M COSTS FOR AOC 40 - 5 YRS 29,000 TOTAL PRESENT WORTH OF O&M COSTS 8 411,000 **TOTAL COSTS ALTERNATIVE 4** 16.846.000

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SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE 5

Landfill Remediation Feasibility Study Devens, MA

OUIREMENT SYNOPSIS TO ATTAIN REQUIREMENT	deral agencies to evaluate the Drum removal, hot-spot sediment remov Verse effects associated with indirect associated with indirect development of a and landfill capping will be designed to indirect development of a and landfill capping will be designed to Atternatives that involve in inimize alteration/destruction of Atternatives that involve is chosen, wetlands adversely affected by may not be selected unless a remedial action will be restored to the exists. If no practicable is extent necessary. Instruction taken to restore and and action taken to restore and e natural and beneficial values	Order, federal agencies are Drum removal, hot-spot sediment remov minimize the destruction, loss, and landfill capping will be designed to tion of wetlands, and preserve and landfill capping will be designed to minimize alteration/destruction of minimize alteration/destruction of floodplain area. If this alternative is thermediation is required to reson, wetlands adversely affected by remedial action will be restored to the and action taken to restore beneficial values.	I of the Clean Water Act le discharge of dredged or fill D.S. waters, including Filling wetlands would be a discharge of fill materials. Filling wetlands would be a discharge of fill materials. a discharge of fill materials. for complying with regulatory are contained in 33 CFR part fines for Specification of thes for Dredged or Fill material areas will be restored to the extent nees for Dredged or Fill material areas will be restored to the extent nees for Dredged or will be permitted if there is a ernative that would have less a equatic ecosystem. If adverse unavoidable, action must be	of the Rivers and Harbors Act of Excavating, filling, and disposal activities
 Requires federal agencies to e potential adverse effects asso direct and indirect developme floodplain. Atternatives that in modification/construction with floodplain may not be selected determination is made that no alternative exists. If no practic alternative exists, potential ha minimized and action taken to preserve the natural and bene of the floodplain. Under this Order, federal ager required to minimize the destion of wetlands. If remediation is within wetland action taken to matural and bene of the exists, potential ha and enhance natural and bene of the floodplain. 	 Under this Order, federal ager required to minimize the desting or degradation of wetlands, ar and enhance natural and ben of wetlands. If remediation is within wetlands. Ar and no I alternative exists, potential ha minimized and action taken to natural and beneficial values. Section 404 of the Clean Wate regulates the discharge of dre materials to U.S. weters, inclu materials to U.S. weters, inclu 	Ile Section 404 of the Clean Wate regulates the discharge of dre materials to U.S. waters, inclu	revealures. Timing weutarus we considered a discharge of fill Procedures for complying with conditions are contained in 33 323. Guidelines for Specificati Disposal Sites for Dredged or at 40 CFR Part 230, promulga Clean Water Act Section 404ft maintain that no discharge of fill material will be permitted it practical alternative that would effect on the aquatic ecosystel impacts are unavoidable, actic taken to restore, or create atte wetlands.	Ie Section 10 of the Rivers and F 1899 requires an authorization Secretary of the Army, acting U.S. Army Corps of Engineers U.S. Army Corps of Engineers U.S. Army Corps of Engineers the construction of any structu any "navigable water of the U." excavation from or deposition such waters, or any obstruction
Toodplain Management Applicab Securive Order No. 11988 [40 AOC 9 Securive Order No. 11988 [40 AOC 11 SA 12 SA 13 AOC 40 AOC 41 SA 12 SA 13 AOC 41 AOC 41	Protection of Wetlands Executive Applicab Drder No. 11990 [40 CFR Part 6, AOC 9 AOC 11 SA 12 SA 12 SA 12 SA 12 SA 13 AOC 40 AOC 40 AOC 41 AOC	Nean Water Act, Dredge or Fill Applicab	5FÅ Part 230; 40 CFR Part 230] AOC 11 SA 12 AOC 40 AOC 41	ivers and Harbors Act of 1899 Applicabl 33 USC 401 et seq.] AOC 40
Ploodplains Wetlands	Wetlands		Wetlands Aquatic Ecosystem	Construction over/in F navigable waters.
Federal	Federal		Federal	Federal

continued



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LANDFILL REMEDIATION FEASIBILITY STUDY 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.; 40 CFR Part 302]	Applicable AOC 9 AOC 11 SA 12 AOC 40 AOC 41	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.	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.
Federal	Endangered Species	Endangered Species Act [16 USC 1531 et seq.; 50 CFR Part 402]	Relevant and Appropriate SA 6 AOC 9 AOC 11 SA 12 SA 12 SA 13 AOC 40 AOC 41 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.
Federal	Atlantic Flyway Wetlands Surface Waters	Migratory Bird Treaty Act (16 USC 703-711)	Applicable 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.
Federal	Archeological Sites	Archeological Resources Protection Act of 1979 [16 USC 47099-11]	Relevant and Appropriate SA 6	This law prohibits the excavation, damage, alteration, and trade of archeological resources obtained illegally from public or Native American.	Remedial actions will be performed to prevent the illegal excavation, damage, alteration, or trade of archeological resources.

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TABLE 8-14 SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE 5

Landfill Remediation Feasibility Study Devens, MA

ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	s for the Remedial actions will be conducted to ttion of inventory, register, and preserve historical es. and archeological resources. when et al or ity.	s on All work to be performed within wetlands and the 100 foot buffer zone will be in accordance with the substantive ar ing f a 100 20 wetland. a 100 20 20 20 20 20 20 20 20 20	and Excavation, filling, and disposal activities om will meet the substantive criteria and will meet the substantive criteria and standards of these regulations of to act to	nner The protection of state listed endangered species (in particular the Grasshopper d, or Sparrow at the Consolidation Facility) will sted by be considered during the design and implementation of this alternative.
REQUIREMENT SYNOPSIS	These laws establish the procedures inventory, registration, and preserva historical and archeological resource Such resources must be retrieved, preserved, and properly managed w terrain is altered as a result of a fed federally licensed construction activi	These regulations include standards dredging, filling, altering, or pollutin inland wetlands and protected areas (defined as areas within the 100-yea floodplain). A Notice of Intent (NOI be filed with the municipal conservi- commission and a Final Order of Conditions obtained before proceed with the activity. A Determination of Applicability or NOI must be filed fo activities such as excavation within foot buffer zone. The regulations specifically prohibit loss of over 5,00 square of bordering vegetated v Loss may be permitted with replicat any lost area within two growing see	The Massachusetts Waterways Act a regulations require that a license fro Massachusetts Department of Environmental Protection (MADEP) t obtained for any work in or over any tidelands, river or stream (with respe which public funds have been exper or great pond, or outlet thereof.	Actions must be conducted in a mai that minimizes the impact to Massachusetts-listed rare, threatene endangered species, and species lis the Massachusetts Natural Heritage Program.
STATUS	Applicable SA 6	Applicable AOC 9 AOC 11 SA 12 SA 12 SA 12 AOC 40 AOC 41	Relevant and Appropriate AOC 40	Applicable SA 6 AOC 9 AOC 11 SA 12 SA 12 SA 13 AOC 40 AOC 41 Consolidation
REQUIREMENT	Archeological and Historic Data Preservation Act [16 USC 469- 469c; 40 CFR 469; 40 CFR 6.301(c)] and National Historic Preservation Act [16 USC 470- 470w6]	Massachusetts Wetland Protection Act and regulations [MGL c. 131 s. 40; 310 CMR 10.00]	Massachusetts Waterways Act [MGL c. 91; 310 CMR 9.00]	Massachusetts Endangered Species Act and implementing regulations [MGL c. 131A, s. 1 et seq.; 321 CMR 8.00]
LOCATION CHARACTERISTIC	Archeological and Historic Sites	Floodplains Wetlands Surface Waters	Construction over/in a waterway.	Endangered Species
REGULATORY AUTHORITY	Federal	State	State	State

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LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State	Nashua River	Scenic Rivers Act [MGL c. 21 s. 27B]	Applicable AOC 11	As part of the Massachusetts Department of Environmental Management's Scenic Rivers Program, the Nashua River and contiguous land up to 100 yards on each side of its natural banks are afforded	Remedial activities will be performed to comply with the substantive requirements of this act.

Notes:

Code of Federal Regulations	Code of Massachusetts Regulations	Clean Water Act	Department of the Interior	Fish and Wildlife Service	Massachusetts Environmental Policy Act	Massachusetts General Laws	National Maine Fisheries Service	United States Code
11	H	H	11	11		H	11	H
CFR	CMR	CWA	ĪŌ	FWS	MEPA	MGL	NMFS	NSC

TABLE 8-15 Svnopsis of Federal and State Chemical-Specific ARARs For Alternative 5

Landfill Remediation Feasibility Study Devens, MA

REGULATORY AUTHORITY	CHEMICAL MEDIUM	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]	Applicable 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 human health provide protective concentrations for exposure from ingesting contaminated water and contami- nated aquatic organisms, and from ingesting contaminated aquatic organisms alone. Remedial actions involving contaminated surface water or discharge of contaminate to surface water and the contaminates of the release or threatened release.	Remedial actions will be performed in a manner to prevent AWQC exceedances in surface water. Actives 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.
Federal	Groundwater	Safe Drinking Water Act, National Primary Drinking Water Regulations, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50 - 141.53]	Applicable AOC 40	The National Primary Drinking Water Act establishes Maximum Contaminant Levels (MCLs) and Maximum Contaminant Levels (MCLs) and Maximum Contaminant Levels (MCLs) and Maximum Contaminants. MCLs specify 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 fect 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 conditions, and the MCL for arsenic will be met under average and maximum conditions. MCLs are not exceeded at Patton Well.

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LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

AUTHORITY	MEDIUM	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State	Surface water	Massachusetts Surface Water Quality Standards [314 CMR 4 001	Applicable AOC 11	Massachusetts Surface Water Quality Standards designate the most sensitive	At AOC 11 activities will be performed in a manner to prevent exceedances of surface
				Commonwealth are to be enhanced,	water quality in the Nashua River.
				maintained, and protected, and designate minimum water quality criteria for	At AOC 40 sediment removal will be performed in a manner to prevent
				sustaining the designated uses. Surface waters at Fort Devens are classified as	exceedances of Surface Water Quality Standards in Cold Spring Prook Pond
				Class B. Surface waters assigned to this class are designated as habitat for fish.	Supernatant from dredged spoil dewatering will be monitored to prevent exceedances in
				other aquatic life and wildlife, and for primary and secondary contact recreation	the pond. To the extent necessary, Surface
				These criteria supersede federal AWOC	develop discharge limitations.
				only when they are more stringent (more protective) than the AWOC	

Notes:

Ambient Water Quality Criteria Comprehensive Environmental Response, Compensation, and Liability, Ard	Code of Federal Regulations	Code of Massachusetts Rules	Clean Water Act	Maximum Contaminant Level	Maximum Contaminant Level Goal	Massachusetts Maximum Contaminant Level	National Primary Drinking Water Regulations	Safe Drinking Water Act	Secondary Maximum Contaminant Level
	11	11	11	11	11	11	Ш	Ш	П
AWOC	CFR	CMR	CWA	MCL	MCLG	MMCL	NPDWR	SDWA	SMCL

TABLE 8-16	SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 5
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Landfill Remediation Feasibility Study Devens, MA

REGULATORY AUTHORITY	ACTION	REQUIREMENT	Status	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Control of surface water runoff. Direct discharge to surface water.	Clean Water Act Program [40 CFR 122,125]	Applicable AOC 9 AOC 11 SA 12 SA 12 SA 13 AOC 40 AOC 41 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.
Federal	Land Disposal of Hazardous Wastes.	Resource Conservation and Recovery Act (RCRA), Land Disposal Restrictions (LDRs); (40 CFR Part 268)	Applicable SA 6 AOC 9 AOC 11 SA 12 SA 13 AOC 40 AOC 41	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 excavated materials are hazardous materials subject to LDRs, the materials will be handled and disposed of in compliance with these regulations.
State	Activities carried out with Commonwealth financial assistance or requiring Commonwealth permits.	Massachusetts Environmental Policy Act and regulations [MGL c.30; 301 CMR 11.00]	Relevant and Appropriate Consolidation Facility	A project is subject to the Massachusetts Environmental Policy Act if it requires state agency action, financial assistance, or permit. For such projects, an Environmental Notification form must be filed if a project exceeds the following: (1) a categorical inclusion threshold set forth in 301 CMR 11.25; (2) a review threshold set forth in 301 CMR 11.26 for agency permits; (3) a review threshold for agency action or financial assistance set forth in 301 CMR 11.25; (4) the area is designated an area of critical environmental concerned 2010 CMB 12.00)	The documents developed during the remedial investigation, feasibility study, Record of Decision, conceptual design, and final design will meet the requirements of the EIR.

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Landfill Remediation Feasibility Study Devens, MA

AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
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 in the Commonwealth of Massachusetts.	The consolidation facility will be sited in accordance with these regulations.
State	Solid Waste Landfill Construction, Operation, Closure, and Post-Closure Care.	Massachusetts Solid Waste Management Regulations [310 CMR 19.100]	Applicable AOC 9 AOC 11 Relevant and Appropriate	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 all disposal areas; however, only debris removal is proposed for AOC 11.
			SA 12 SA 13 AOC 40 AOC 41	5	The proposed landfill cover systems at SA 6, SA 12, SA 13, and AOC 41 will meet the requirements of 310 CMR 19.112.
					The consolidation landfill will be constructed, operated, and closed in conformance with the regulations at 319 CMR 19.000.
					A Record Notice of Landfill Operation will be filed for SA 6, AOC 11, SA 12, SA 13, and AOC 41 in accordance with 310 CMR 19.141.
State	Activities that potentially affect surface water quality.	Massachusetts Water Quality 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.

	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	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).	
, МА	REQUIREMENT SYNOPSIS	These 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. Specifically, Section 6.04 governs ambient air quality such as particulate matter standards. Emissions from site treatment activities must be maintained at an annual geometric mean of 75 g/m ³ and a maximum 24-hour concentration of 40 mg/m ³ (primary standard). Carbon monoxide, nitrogen dioxide, and lead are also regulated. Section 7.02 governs plan approval and emissions limitations. A permit and BACT are required prior to operation. Under Section 7.02, visible emissions are limited. Additionally, the Massachusetts toxic air pollutant (TAP) control program requirements will be considered.	
DEVENS	Status	Applicable AOC 9 AOC 11 AOC 40 Consolidation Facility	
	REQUIREMENT	Massachusetts Air Pollution Control Regulations [310 CMR 7.00]	
	ACTION		
	REGULATORY AUTHORITY	State	

Notes:

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 Code of Federal Regulations CFR CMR CWA

Code of Massachusetts Rules
 Clean Water Act
 Clean Water Act
 Assachusetts Department of Environmental Protection
 Massachusetts General Laws
 National Pollutant Discharge Elimination System
 U.S. Army Corps of Engineers
 United States Code

MADEP MGL NPDES USACE

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SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 5 **TABLE 8-16**

LANDFILL REMEDIATION FEASIBILITY STUDY 1

	COST SUMMARY TABLE ALTERNATIVE 5: LIMITED REMOVAL AT AOC 11; CAP-IN-PLACE SAs 6, 12, 13, AOC 41; EXCAVATE AND CONSOLIDATE AOCs 9 & 40		
	LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA		
	ITEM	то	IALCOST
DIRECT COSTS			
LIMITED R	EMOVAL AT AOC 11	\$	44.0
CAP IN PL	ACE		
	SA 6		159,0
	SA 12		507,0
	SA 13		395,0
EXCAVAT			175,0
LACAVAI			
			3,835,0
CONSOLID			3,370,0
			5,240,0
	TOTAL DIRECT COSTS		
INDIRECT COST	S HEALTH AND SAFETY	\$	686,0
INDIRECT COST	S HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION	\$	686,0 686,0 1,373,0 1,373,0
INDIRECT COST	S HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS	ş	686,0 686,0 1,373,0 1,373,0 4,118,0
INDIRECT COST	S HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS	\$	686,0 686,0 1,373,0 1,373,0 4,118,0
INDIRECT COST	S HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS	\$ \$	686,0 686,0 1,373,0 1,373,0 4,118,0 17,843,0
INDIRECT COST	S HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS	\$ \$	686,0 686,0 1,373,0 1,373,0 4,118,0 17,843,0
INDIRECT COST	S HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS	\$	686,0 686,0 1,373,0 1,373,0 4,118,0 17,843,0
INDIRECT COST	S HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS	\$	686,0 686,0 1,373,0 1,373,0 4,118,0 17,843,0
INDIRECT COST	S HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL INDIRECT COSTS O MAINTENANCE COSTS TOTAL ANNUAL O&M COSTS FOR AOC 11 - 2 YRS TOTAL ANNUAL O&M COSTS FOR CAP IN PLACE AREAS - 30 YRS	\$ \$ \$	686,0 686,0 1,373,0 1,373,0 4,118,0 17,843,0 4,00 109,00
INDIRECT COST	S HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL ANDIRECT COSTS O MAINTENANCE COSTS TOTAL ANNUAL O&M COSTS FOR AOC 11 - 2 YRS TOTAL ANNUAL O&M COSTS FOR AOC 11 - 2 YRS TOTAL ANNUAL O&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL O&M COSTS FOR CAP IN PLACE AREAS - 30 YRS	\$ \$ _\$	686,0 686,0 1,373,0 1,373,0 4,118,0 17,843,0 17,843,0 109,0 23,00
INDIRECT COST	S HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL INDIRECT COSTS O MAINTENANCE COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS O MAINTENANCE COSTS TOTAL ANNUAL 0&M COSTS FOR AOC 11 - 2 YRS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS CONSOLIDATION LANDFILL - 30 YRS TOTAL ADDITIONAL ANNUAL 0&M COSTS FOR AOC 40 - 5 YRS	\$	686,0 686,0 1,373,0 1,373,0 4,118,0 17,843,0 17,843,0 (109,00 23,00 29,00
INDIRECT COST	S HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS O MAINTENANCE COSTS TOTAL ANNUAL O&M COSTS FOR AOC 11 - 2 YRS TOTAL ANNUAL O&M COSTS FOR AOC 11 - 2 YRS TOTAL ANNUAL O&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL O&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL O&M COSTS CONSOLIDATION LANDFILL - 30 YRS TOTAL ADDITIONAL ANNUAL O&M COSTS FOR AOC 40 - 5 YRS	\$	686,0 686,0 1,373,0 1,373,0 4,118,0 17,843,0 17,843,0 4,00 109,00 23,00 29,00
OPERATION AND	S HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS O MAINTENANCE COSTS TOTAL ANNUAL 0&M COSTS FOR AOC 11 - 2 YRS TOTAL ANNUAL 0&M COSTS FOR AOC 11 - 2 YRS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS FOR AOC 40 - 5 YRS	\$ \$ 	686,0 686,0 1,373,0 1,373,0 4,118,0 17,843,0 4,0 109,0 23,0 23,0 29,0

	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	Drum removal, hot-spot sediment removal, and landfill capping 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.	Drum removal, hot-spot sediment removal, and landfill capping 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.	The removal of drums/sediments and cover installation 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.	Excavating, filling, and disposal activities will be conducted to meet the substantive criteria and standards of these regulations.
i Feasibility Study , MA	REQUIREMENT SYNOPSIS	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, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the floodplain.	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.	Section 404 of the Clean Water Act regulates the discharge of dredged or fill materials to U.S. waters, including wettands. Filling wettands would be considered a discharge of fill materials. Procedures for complying with regulatory conditions are contained in 33 CFR Part 323. 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 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.	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 such waters, or any obstruction of alteration in such waters.
ILL REMEDIATION DEVENS,	STATUS	Applicable AOC 9 AOC 11 SA 12 SA 12 AOC 40 AOC 41	Applicable AOC 9 AOC 11 SA 12 SA 13 AOC 40 AOC 40	Applicable AOC 9 AOC 11 SA 12 SA 13 AOC 41 AOC 41	Applicable AOC 40
LANDF	REQUIREMENT	Floodplain Management Executive Order No. 11988 [40 CFR Part 6, App. A]	Protection of Wetlands Executive Order No. 11990 [40 CFR Part 6, App. A]	Clean Water Act, Dredge or Fill Requirements Section 404 [33 CFR Part 230; 40 CFR Part 230]	Rivers and Harbors Act of 1899 [33 USC 401 et seq.]
	LOCATION CHARACTERISTIC	Floodplains	Wetlands	Wetlands Aquatic Ecosystem	Construction over/in navigable waters.
	REGULATORY AUTHORITY	Federal	Federal	Federal	Federal

TABLE 8-18 Synopsis of Federal and State Location-Specific ARARS For Alternative 6

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Landfill Remediation Feasibility Study 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.; 40 CFR Part 302]	Applicable AOC 9 AOC 11 SA 12 SA 13 AOC 40 AOC 41	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.	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.
Federal	Endangered Species	Endangered Species Act [16 USC 1531 et seq.; 50 CFR Part 402]	Pelevant and Appropriate SA 6 AOC 9 AOC 11 SA 12 SA 12 SA 12 SA 13 AOC 41 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.
Federal	Atlantic Flyway Wetlands Surface Waters	Migratory Bird Treaty Act (16 USC 703-711)	Applicable 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.
Federal	Archeological Sites	Archeological Resources Protection Act of 1979 [16 USC 47099-11]	Relevant and Appropriate SA 6	This law prohibits the excavation, damage, alteration, and trade of archeological resources obtained illegally from public or Native American	Remedial actions will be performed to prevent the illegal excavation, damage, attention, or trade of archeological

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TABLE 8-18 SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE 6

Landfill Remediation Feasibility Study Devens, MA

ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	Remedial actions will be conducted to inventory, register, and preserve historical and archeological resources.	All work to be performed within wetlands and the 100 foot buffer zone will be in accordance with the substantive requirements of these regulations.	Excavation, filling, and disposal activities will meet the substantive criteria and standards of these regulations	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.
REQUIREMENT SYNOPSIS	These laws establish the procedures for the inventory, registration, and preservation of historical and archeological resources. Such resources must be retrieved, preserved, and properly managed when terrain is altered as a result of a federal or federally licensed construction activity.	These regulations include standards on dredging, filling, attering, 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.	The Massachusetts Wateways Act and regulations require that a license from Massachusetts Department of Environmental Protection (MADEP) be obtained for any work in or over any tidelands, river or stream (with respect to which public funds have been expended), or great pond, or outlet thereof.	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.
STATUS	Applicable SA 6	Applicable AOC 9 AOC 11 SA 12 SA 12 SA 12 AOC 40 AOC 41	Relevant and Appropriate AOC 40	Applicable SA 6 AOC 9 AOC 11 SA 12 SA 13 AOC 40 AOC 41 AOC 41 Facility
REQUIREMENT	Archeological and Historic Data Preservation Act [16 USC 469- 469c; 40 CFR 469; 40 CFR 6.301(c)] and National Historic Preservation Act [16 USC 470- 470w6]	Massachusetts Wetland Protection Act and regulations [MGL c. 131 s. 40; 310 CMR 10.00]	Massachusetts Waterways Act [MGL c. 91; 310 CMR 9.00]	Massachusetts Endangered Species Act and implementing regulations [MGL c. 131A, s. 1 et seq.; 321 CMR 8.00]
LOCATION CHARACTERISTIC	Archeological and Historic Sites	Floodplains Wetlands Surface Waters	Construction over/in a waterway.	Endangered Species
REGULATORY AUTHORITY	Federal	State	State	State

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LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	Remedial activities will be performed to comply with the substantive requirements of this act.
REQUIREMENT SYNOPSIS	As part of the Massachusetts Department of Environmental Management's Scenic Rivers Program, the Nashua River and contiguous land up to 100 yards on each side of its natural banks are afforded special protection under this law
STATUS	Applicable AOC 11
REQUIREMENT	Scenic Rivers Act [MGL c. 21 s. 27B]
LOCATION CHARACTERISTIC	Nashua River
REGULATORY AUTHORITY	State

Notes:

Code of Federal Regulations Code of Massachusetts Regulations Clean Water Act

H CFR CMR CMR DOI DOI MGL NMFS USC

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Department of the Interior Fish and Wildlife Service Massachusetts Environmental Policy Act Massachusetts General Laws National Maine Fisheries Service United States Code H

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TABLE 8-19 Synopsis of Federal and State Chemical-Specific ARARs For Alternative 6

Landfill Remediation Feasibility Study Devens, MA

REGULATORY	CHEMICAL	Deciliberatin			ACTION TO BE TAKEN
		LEGUIREMENT	SIAIUS	HEQUIREMENT SYNOPSIS	TO ATTAIN REQUIREMENT
1909 1907 1907	Surface water	Clean Water Act, Ambient Water Quality Criteria [40 CFR 131; Quality Criteria for Water 1986]	Applicable AOC 11 AOC 40	Federal Ambient Water Quality Criteria (AWQC) include (1) health-based criteria developed for 95 carcinogenic and adveloped for 95 carcinogenic and and chronic toxicity values for the protection of aquatic life. AWQC for the protection of human health provide protection of human health provide protective concentrations for exposure from ingesting contaminated water and contami- nated aquatic organisms, and from ingesting contaminated aquatic organisms alone. Remedial actions involving contaminated surface water or discharge of contaminated surface water and the contaminated surface water and the contaminated surface water and the contaminated surface water and the contaminated surface water or discharge of contaminated surface water and the contaminated surface water and the 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. Actives 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.
Federal	Groundwater	Safe Drinking Water Act, National Primary Drinking Water Regulations, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50 - 141.53]	Applicable AOC 40	The National Primary Drinking Water Act establishes Maximum Contaminant Levels (MCLs) and Maximum Contaminant Levels (MCLs) and Maximum Contaminant Levels 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 conditions, and the MCL for arsenic will be met under average and maximum conditions. MCLs are not exceeded at Patton Well.

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LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

×۲	CHEMICAL MEDIUM Surface water	REGUIREMENT Massachusetts Surface Water Quality Standards [314 CMR 4.00]	STATUS Applicable AOC 11 AOC 40	REQUIREMENT SYNOPSIS 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	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT 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
				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.	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.

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Ambient Water Quality Criteria Comprehensive Environmental Response. Compensation, and Liability Ard	Code of Federal Regulations	Code of Massachusetts Rules	Clean Water Act	Maximum Contaminant Level	Maximum Contaminant Level Goal	Massachusetts Maximum Contaminant Level	National Primary Drinking Water Regulations	Safe Drinking Water Act	Secondary Maximum Contaminant Level
11 11	Ш	11	Ш	11	11	11	II	II	Ш
AWOC	CFR	CMR	CWA	MCL	MCLG	MMCL	NPDWR	SDWA	SMCL

TABLE 8-20 SVNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 6

Landfill Remediation Feasibility Study Devens, MA

AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Control of surface water runoff. Direct discharge to surface water.	Clean Water Act Program [40 CFR 122,125]	Applicable AOC 9 AOC 11 SA 12 SA 13 AOC 40 AOC 41 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.
Federal	Land Disposal of Hazardous Wastes.	Resource Conservation and Recovery Act (RCRA), Land Disposal Restrictions (LDRs); (40 CFR Part 268)	Applicable SA 6 AOC 9 AOC 11 SA 12 SA 13 AOC 40 AOC 40	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 excavated materials are hazardous materials subject to LDRs, 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 in the Commonwealth of Massachusetts.	The consolidation facility will be sited in accordance with these regulations.
State	Solid Waste Landfill Construction, Operation, Closure, and Post-Closure Care.	Massachusetts Solid Waste Management Regulations [310 CMR 19.100] CMR 19.100]	Applicable AOC 9 AOC 1 Relevant and Appropriate SA 12 SA 12 AOC 40 AOC 41	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 all disposal areas. The proposed landfill cover systems at SA 6, SA 12, SA 13, and AOC 41 will meet the requirements of 310 CMR 19.112. The consolidation landfill wilt be constructed, operated, and closed in constructed, operated, and closed in constructed, operated, and closed in constructed of the regulations at 319 CMR 19.000. A Record Notice of Landfill Operation will be filed for SA 6, SA 12, SA 13, and AOC th in accordance with 310 CMR 19.141.





SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 6 TABLE 8-20

Landfill Remediation Feasibility Study Devens, MA

ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	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.	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).
REQUIREMENT SYNOPSIS	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.	These 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. Specifically, Section 6.04 governs ambient air quality such as particulate matter standards. Emissions from site treatment activities must be maintained at an annual geometric mean of 75 g/m ³ and a maximum 24-hour concentration of 40 mg/m ³ (primary standard). Carbon monoxide, nitrogen dioxide, and lead are also regulated. Section 7.02 governs plan approval and emissions limitations. A permit and BACT are required prior to operation. Under Section 7.02, visible emissions are limited. Additionally, the Massachusetts toxic air pollutant (TAP) control program
STATUS	Relevant and Appropriate AOC 40	Applicable AOC 9 AOC 11 AOC 40 Consolidation Facility
REQUIREMENT	Massachusetts Water Quality Certification and Certification for Dredging [314 CMR 9.00]	Massachusetts Air Pollution Control Regulations [310 CMR 7.00]
ACTION	Activities that potentially affect surface water quality.	
REGULATORY AUTHORITY	State	State

Code of Federal Regulations Code of Massachusetts Rules

Clean Water Act

Massachusetts Department of Environmental Protection

Massachusetts General Laws

National Pollutant Discharge Elimination System U.S. Army Corps of Engineers United States Code GFR CMR CMR Madep Mgle USACE USACE USC

	COST SUMMARY TABLE ALTERNATIVE 6: CAP-IN-PLACE SAs 6, 12, 13, AOC 41; EXCAVATE AND CONSOLIDATE AOCs 9, 11, & 40		
	LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA		
	ITEM	TOT	AL COST
DIRECT COSTS			
CAP IN PLA	CE		
	SA 6	\$	159,
	SA 12		507,
	SA 13		395,
	AOC 41		175,
EXCAVATE	AND CONSOLIDATE		
	AOC 9		3,835,
	AOC 11		1,571,
	AOC 40		3,370,
CONSOLIDA	TION LANDFILL CONSTRUCTION		5,240,
	TOTAL DIRECT COSTS	4	15,252,
INDIRECT COSTS			
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION	\$	763, 763, 1,525,(1,525,(
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION	\$	763, 763, 1,525, 1,525,
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS	\$	763, 763, 1,525, 1,525, 4,576 ,
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS	\$	763, 763, 1,525, 1,525, 4,576 ,
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS	\$	763, 763, 1,525, 1,525, 4,576, 19,828 ,
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS	\$	763, 763, 1,525, 1,525, 4,576, 19,828 ,
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS	\$	763, 763, 1,525, 1,525, 4,576, 19,828 ,
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS MAINTENANCE COSTS TOTAL ANNUAL Q&M COSTS FOR CAP IN PLACE ABEAS - 20 YPS	\$	763, 763, 1,525, 1,525, 4,576, 19,828 ,
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS MAINTENANCE COSTS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS	\$ \$ \$	763, 763, 1,525, 1,525, 4,576, 19,828, 109,0
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL APITAL (DIRECT + INDIRECT) COSTS MAINTENANCE COSTS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS CONSOLIDATION LANDFILL - 30 YRS TOTAL ADDITIONAL ANNUAL 0&M COSTS FOR AOC 40 - 5 YPS	\$	763, 763, 1,525, 1,525, 4,576, 19,828, 109,(23,(
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS MAINTENANCE COSTS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS CONSOLIDATION LANDFILL - 30 YRS TOTAL ADDITIONAL ANNUAL 0&M COSTS FOR AOC 40 - 5 YRS	\$	763, 763, 1,525, 1,525, 4,576, 19,828, 109,(23,(29,(
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL ADDITAL (DIRECT + INDIRECT) COSTS MAINTENANCE COSTS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS CONSOLIDATION LANDFILL - 30 YRS TOTAL ADDITIONAL ANNUAL 0&M COSTS FOR AOC 40 - 5 YRS	\$	763, 763, 1,525, 1,525, 4,576, 19,828, 109, 23,(29,(
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS MAINTENANCE COSTS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS CONSOLIDATION LANDFILL - 30 YRS TOTAL ANNUAL 0&M COSTS FOR AOC 40 - 5 YRS	\$	763, 763, 1,525, 1,525, 4,576, 19,828, 109, 23, 29, 1,767,
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION TOTAL INDIRECT COSTS TOTAL CAPITAL (DIRECT + INDIRECT) COSTS MAINTENANCE COSTS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS FOR CAP IN PLACE AREAS - 30 YRS TOTAL ANNUAL 0&M COSTS FOR AOC 40 - 5 YRS TOTAL ADDITIONAL ANNUAL 0&M COSTS FOR AOC 40 - 5 YRS	\$	763, 763, 1,525, 1,525, 4,576, 19,828, 109, 23, 29,0 1,767, 0

TABLE 8-22 Synopsis of Federal and State Location-Specific ARARS For Alternative 7

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Landfill Remediation Feasibility Study Devens, MA

ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	Drum removal, hot-spot sediment removal, and landfill capping will be designed to minimize alteration/destruction of filoodplain area. If this alternative is chosen, wettands adversely affected by emedial action will be restored to the extent necessary.	Drum removal, hot-spot sediment removal, and landfill capping will be designed to minimize alteration/destruction of floodplain area. If this alternative is shosen, wetlands adversely affected by emedial action will be restored to the extent necessary.	The removal of drums/sediments and cover installation 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.	ccavating, filling, and disposal activities vill be conducted to meet the substantive riteria and standards of these regulations.
REQUIREMENT SYNOPSIS	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.	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.	Section 404 of the Clean Water Act regulates the discharge of dredged or fill materials to U.S. waters, including wettands. Filling wettands would be considered a discharge of fill materials. Procedures for complying with regulatory conditions are contained in 32 CFR Part 323. 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 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.	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 atteration in such waters.
STATUS	Applicable AOC 9 AOC 11 SA 12 SA 13 AOC 40 AOC 41	Applicable AOC 9 AOC 11 SA 12 SA 12 SA 13 AOC 40 AOC 41	Applicable AOC 9 AOC 11 SA 12 SA 13 AOC 41 AOC 41	Applicable AOC 40
REQUIREMENT	Floodplain Management Executive Order No. 11988 [40 CFR Part 6, App. A]	Protection of Wetlands Executive Order No. 11990 [40 CFR Part 6, App. A]	Clean Water Act, Dredge or Fill Requirements Section 404 [33 CFR Part 230; 40 CFR Part 230]	Rivers and Harbors Act of 1899 [33 USC 401 et seq.]
LOCATION CHARACTERISTIC	Floodplains	Wetlands	Wetlands Aquatic Ecosystem	Construction over/in navigable waters.
REGULATORY AUTHORITY	Federal	Federal	Federal	Federal

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Landfill Remediation Feasibility Study Devens, MA

ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	To the extent necessary, actions will be taken to develop measures to project related 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.	The protection of endangered species and their habitat will be considered during excavation activities and cover installation.	Remedial actions will be performed to protect migratory birds, their nests, and eggs.	Remedial actions will be performed to prevent the illegal excavation, damage, alteration, or trade of archeological resources.
REQUIREMENT SYNOPSIS	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 Platn.	This act requires action to avoid jeopardizing the continued existence of listed endangered or threatened species or modification of their habitat.	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.	This law prohibits the excavation, damage, alteration, and trade of archeological resources obtained illegally from public or Native American.
STATUS	Applicable AOC 9 AOC 11 SA 12 SA 12 AOC 40 AOC 41	Relevant and Appropriate SA 6 AOC 9 AOC 11 SA 12 SA 12 SA 13 AOC 40 AOC 41	Applicable AOC 11	Relevant and Appropriate SA 6
REQUIREMENT	Fish and Wildlife Coordination Act [16 USC 661 et seq.; 40 CFR Part 302]	Endangered Species Act [16 USC 1531 et seq.; 50 CFR Part 402]	Migratory Bird Treaty Act (16 USC 703-711)	Archeological Resources Protection Act of 1979 [16 USC 47099-11]
LOCATION CHARACTERISTIC	Surface Waters Endangered Species Migratory Species	Endangered Species	Atlantic Flyway Wetlands Surface Waters	Archeological Sites
REGULATORY AUTHORITY	Federal	Federal	Federal	Federal

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Landfill Remediation Feasibility Study Devens, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	Action To Be Taken To Attain Requirement
Federal	Archeological and Historic Sites	Archeological and Historic Data Preservation Act [16 USC 469- 469c; 40 CFR 499; 40 CFR 6.301(c)] and National Historic Preservation Act [16 USC 470- 470w6]	Applicable SA 6	These laws establish the procedures for the inventory, registration, and preservation of historical and archeological resources. Such resources must be retrieved, preserved, and properly managed when terrain is attered as a result of a federal or federally licensed construction activity.	Remedial actions will be conducted to inventory, register, and preserve historical and archeological resources.
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 SA 12 SA 12 AOC 40 AOC 41	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 drowing asasons.	All work to be performed within wetlands and the 100 foot buffer zone will be in accordance with the substantive requirements of these regulations.
State	Construction over/in a waterway.	Massachusetts Waterways Act [MGL c. 91; 310 CMR 9.00]	Relevant and Appropriate AOC 40	The Massachusetts Waterways Act and regulations require that a license from Massachusetts Department of Environmental Protection (MADEP) be obtained for any work in or over any tidelands, river or stream (with respect to which public funds have been expended), or great pond, or outlet thereof.	Excavation, filling, and disposal activities will meet the substantive criteria and standards of these regulations
State	Endangered Species	Massachusetts Endangered Species Act and implementing regulations [MGL c. 131A, s. 1 et seq.; 321 CMR 8.00]	Applicable SA 6 AOC 9 AOC 11 SA 12 SA 12 SA 13 AOC 41	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 will be considered during the design and implementation of this alternative.

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TABLE 8-22 Synopsis of Federal and State Location-Specific ARARS For Alternative 7

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
State	Nashua River	Scenic Rivers Act [MGL c. 21 s. 27B]	Applicable AOC 11	As part of the Massachusetts Department of Environmental Management's Scenic Rivers Program, the Nashua River and contiguous land up to 100 yards on each side of its natural banks are afforded	Remedial activities will be performed to comply with the substantive requirements of this act.

Notes:

Code of Federal Regulations	Code of Massachusetts Regulations	Clean Water Act	Department of the Interior	Fish and Wildlife Service	Massachusetts Environmental Policy Act	Massachusetts General Laws	National Maine Fisheries Service	United States Code	
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CFR	CMR	CWA	ĪO	FWS	MEPA	MGL	NMFS	NSC	

TABLE 8-23 Synopsis of Federal and State Chemical-Specific ARARs For Alternative 7

Landfill Remediation Feasibility Study Devens, MA

REGULATORY AUTHORITY	CHEMICAL MEDIUM	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]	Applicable 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 protection of human health provide protection of human health provide ingesting contaminated water and contami- nated aquatic organisms, and from ingesting contaminated aquatic organisms alone. Remedial actions involving contaminated surface water or discharge of contaminates of the 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. Actives 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.
Federal	Groundwater	Safe Drinking Water Act, National Primary Drinking Water Regulations, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50 - 141.53]	Applicable AOC 40	The National Primary Drinking Water Act establishes Maximum Contaminant Levels (MCLs) and Maximum Contaminant Levels (MCLs) and Maximum Contaminant Levels 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 conditions, and the MCL for arsenic will be met under average and maximum conditions. MCLs are not exceeded at Patton Well.

continued

TABLE 8-23 SYNOPSIS OF FEDERAL AND STATE CHEMICAL-SPECIFIC ARARS FOR ALTERNATIVE 7

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

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ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	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 will be used to develop discharge limitations.
REQUIREMENT SYNOPSIS	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.
STATUS	Applicable AOC 11 AOC 40
REQUIREMENT	Massachusetts Surface Water Quality Standards [314 CMR 4.00]
CHEMICAL MEDIUM	Surface water
REGULATORY AUTHORITY	State

	H
Notes:	AWQC

Ambient Water Quality Criteria	Comprehensive Environmental Response. Compensation, and Liability Act	Code of Federal Regulations	Code of Massachusetts Rules	Clean Water Act	Maximum Contaminant Level	Maximum Contaminant Level Goal	Massachusetts Maximum Contaminant Level	National Primary Drinking Water Regulations	Safe Drinking Water Act	Secondary Maximum Contaminant Level
н	11	II	н	H	Ш	II	H	11	II	
AWQC	CERCLA	CFR	CMR	CWA	MCL	MCLG	MMCL	NPDWR	SDWA	SMCL

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LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

REGULATORY AUTHORITY	ACTION	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Control of surface water runoff. Direct discharge to surface water.	Clean Water Act Program [40 CFR 122,125]	Applicable AOC 9 AOC 11 AOC 40	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.
Federal	Land Disposal of Hazardous Wastes.	Resource Conservation and Recovery Act (RCRA), Land Disposal Restrictions (LDRs); (40 CFR Part 268)	Applicable SA 6 AOC 9 AOC 11 SA 12 SA 12 SA 12 AOC 40 AOC 41	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 excavated materials are hazardous materials subject to LDRs, the materials will be handled and disposed of in compliance with these regulations.
State	Solid Waste Landfill Construction, Operation, Closure, and Post-Closure Care.	Massachusetts Solid Waste Management Regulations [310 CMR 19.100]	Applicable AOC 9 AOC 11 SA 12 Relevant and	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 all disposal areas.
			Appropriate SA 6 SA 13 AOC 40 AOC 41		The proposed landfill cover systems at Sa 6, AOC 9, AOC 11, SA 12, SA 13, and AOC 41 will meet the requirements of 310 CMR 19.112.
					The proposed landfill cover at AOC 40 will conform with the intent of 310 CMR 19.112, although it may be considered an Alternative Cover System Design by MADEP (310 CMR 19.113).
					A Record Notice of Landfill Operation will be filed for all disposal areas in accordance with 310 CMR 19.141.
State	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 Duality Cartification is convised curversed	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.
				314 CMR 9.00.	

ACTION TO BE TAKE ATTAIN REQUIREME	dial activities will be conc the standards for Visible MR 7.06); Dust, Odor, C emolition (310 CMR 7.09) 7.10); and Volatile Organi ounds (310 CMR 7.18).	
	Remed 310 C 1 C CMR 7 C CMR 7	
REQUIREMENT SYNOPSIS	These 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. Specifically, Section 6.04 governs ambient air quality such as particulate matter standards. Emissions from site treatment activities must be maintained at an annual geometric mean of 75 g/m ³ and a maximum 24-hour concentration of 40 mg/m ³ (primary standard). Carbon monoxide, nitrogen dioxide, and lead are also regulated. Section 7.02 governs plan approval and emissions limitations. A permit and BACT are required prior to operation. Under Section 7.02, visible emissions are limited. Additionally, the Massachusetts toxic air pollutant (TAP) control program requirements will be considered.	
STATUS	Applicable SA 6 AOC 9 AOC 11 SA 12 SA 13 AOC 40 AOC 41	
REQUIREMENT	Massachusetts Air Pollution Control Regulations [310 CMR 7.00]	
ACTION		
REGULATORY AUTHORITY	State	Notae:

Notes:

CFR = Code of Fe Code of Mi CMR = Code of Mi CFR = Ciean Wate
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wassachusetts Department of Environmental Protection
 Massachusetts General Laws
 National Pollutant Discharge Elimination System
 U.S. Army Corps of Engineers
 United States Code

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TABLE 8-24 SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 7

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

continued

	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	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).
	REQUIREMENT SYNOPSIS	These regulations pertain to the prevention of emissions in excess of Massachusetts or national ambient air quality standards or in egulations. Specifically, Section 6.04 governs. Specifically, Section 6.04 governs ambient air quality such as particulate matter standards. Emissions from site treatment activities must be maintained at an annual geometric mean of 75 g/m ³ and a maximum 24-hour concentarion of 40 mg/m ³ (primary standard). Carbon monoxide, introgen dioxide, and lead are also regulated. Section 7.02 governs plan approval and emissions limitations. A permit and BACT are required prior to operation. Under Section 7.02, visible emissions are limited. Additionally, the Massachusetts toxic air pollutant (TAP) control program
	STATUS	Applicable SA 6 AOC 9 AOC 11 SA 12 SA 12 SA 12 AOC 40 AOC 41
	REQUIREMENT	Massachusetts Air Pollution Control Regulations [310 CMR 7.00]
	ACTION	
	REGULATORY AUTHORITY	State

Notes:

 Code of Federal Regulations
 Code of Massachusetts Rules
 Clean Water Act
 Massachusetts Department of Environmental Protection
 Massachusetts General Laws
 National Pollutant Discharge Elimination System
 U.S. Army Corps of Engineers
 United States Code

W001973T2.080/40

TABLE 8-24 SVNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 7

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

continuer

			
	TABLE 8 - 25COST SUMMARY TABLEALTERNATIVE 7: CAP IN PLACEALL SEVEN DISPOSAL AREAS		
	LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA		
	ITEM	TO	TAL COST
DIRECT COSTS	24.2		
	SA B	\$	159,000
	AUC 9		3,301,000
			1,269,000
	5A 12		507,000
	5A 15		395,000
	AOC 40		1,758,000
	A0C 41		175,000
	TOTAL DIRECT COSTS	\$	7,564.000
INDIRECT COSTS	HEALTH AND SAFETY LEGAL, ADMIN, PERMITTING ENGINEERING SERVICES DURING CONSTRUCTION	\$	378,000 378,000 756,000 756,000
	TOTAL INDIRECT COSTS	ş	2.268.000
	TOTAL CAPITAL (DIRECT + INDIRECT) COSTS	\$	9,832,000
OFERATION AND I			
	TOTAL ANNUAL 0&M COSTS - 30 YRS	\$	208,000
	TOTAL ADDITIONAL ANNUAL O&M COSTS FOR AOC 40 - 5 YRS		13,000
	TOTAL PRESENT WORTH OF O&M COSTS	3	2,634,000
	TOTAL COSTS ALTERNATIVE 7	\$	12,466,000

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LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

SULATORY	LOCATION				ACTION TO BE TAKEN
AIT/	CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	TO ATTAIN REQUIREMENT
	Floodplains	Floodplain Management Executive Order No. 11988 [40 CFR Part 6, App. A]	Applicable AOC 9 AOC 11 SA 12 SA 12 AOC 40 AOC 41	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, potential harm must be minimized and action taken to restore and preserve the natural and beneficial values of the floodplain.	Drum removal, hot-spot sediment removal, and landfill capping 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 No. 11990 [40 CFR Part 6, App. A]	Applicable AOC 11 SA 12 SA 13 AOC 40 AOC 41	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, hot-spot sediment removal, and landfill capping 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 [33 CFR Part 230; 40 CFR Part 230]	Relevant and Appropriate AOC 9 AOC 11 SA 12 SA 12 AOC 41 AOC 41	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. Procedures for complying with regulatory conditions are contained in 33 CFR Part 323. 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 alternative that would have less effect on the aquatic ecosystem. If adverse impacts are unavoidable, action must be wetlands.	The removal of drums/sediments and cover installation 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.

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	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	Excavating, filling, and disposal activities will be conducted to meet the substantive criteria and standards of these regulations.	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.	The protection of endangered species and their habitat will be considered during excavation activities and cover installation.
FEASIBILITY STUDY MA	REQUIREMENT SYNOPSIS	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 such waters, or any obstruction of alteration in such waters.	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.	This act requires action to avoid jeopardizing the continued existence of listed endangered or threatened species or modification of their habitat.
LL REMEDIATION DEVENS,	STATUS	Applicable AOC 40	Applicable AOC 9 AOC 11 SA 12 SA 12 SA 13 AOC 40 AOC 41	Relevant and Appropriate SA 6 AOC 9 AOC 11 SA 12 SA 13 AOC 40 AOC 41 AOC 40 AOC 41 AOC 40 AOC 41 AOC
LANDFI	REQUIREMENT	Rivers and Harbors Act of 1899 [33 USC 401 et seq.]	Fish and Wildlife Coordination Act [16 USC 661 et seq.; 40 CFR Part 302]	Endangered Species Act [16 USC 1531 et seq.; 50 CFR Part 402]
	LOCATION CHARACTERISTIC	Construction over/in navigable waters.	Surface Waters Endangered Species Migratory Species	Endangered Species
	REGULATORY AUTHORITY	Federal	Federal	Federal

TABLE 8-26 Synopsis of Federal and State Location-Specific ARARs For Alternative 8

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TABLE 8-26 SYNOPSIS OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE 8

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LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN REQUIREMENT
Federal	Atlantic Flyway Wetlands Surface Waters	Migratory Bird Treaty Act (16 USC 703-711)	Applicable 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.
Federal	Archeological Sites	Archeological Resources Protection Act of 1979 [16 USC 47099-11]	Relevant and Appropriate SA 6	This law prohibits the excavation, damage, alteration, and trade of archeological resources obtained illegally from public or Native American.	Remedial actions will be performed to prevent the illegal excavation, damage, alteration, or trade of archeological resources.
Federal	Archeological and Historic Sites	Archeological and Historic Data Preservation Act [16 USC 469- 469c; 40 CFR 469; 40 CFR 6.301(c)] and National Historic Preservation Act [16 USC 470- 470w6]	Applicable SA 6	These laws establish the procedures for the inventory, registration, and preservation of historical and archeological resources. Such resources must be retrieved, preserved, and properly managed when terrain is altered as a result of a federal or federally licensed construction activity.	Remedial actions will be conducted to inventory, register, and preserve historical and archeological resources.
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 SA 12 SA 13 AOC 40 AOC 41	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.
State	Construction over/in a waterway.	Massachusetts Waterways Act [MGL c. 91; 310 CMR 9.00]	Relevant and Appropriate AOC 40	The Massachusetts Waterways Act and regulations require that a license from Massachusetts Department of Environmental Protection (MADEP) be obtained for any work in or over any tidelands, river or stream (with respect to which public funds have been expended), or great pond. or outlet thereof.	Excavation, filling, and disposal activities will meet the substantive criteria and standards of these regulations

TABLE 8-26 Svnopsis of Federal and State Location-Specific ARARs For Alternative 8

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

ACTION TO BE TAKEN IVNOPSIS TO ATTAIN REQUIREMENT	d in a manner The protection of state listed endangered to species (in particular the Grasshopper threatened, or Sparrow at the Consolidation Facility) will species listed by be considered during the design and Heritage implementation of this alternative.	tts Department Remedial activities will be performed to ment's Scenic comply with the substantive requirements ta River and of this act. yards on each e afforded is law.
REQUIREMENT S	Actions must be conducted that minimizes the impact Massachusetts-listed rare, i endangered species, and s the Massachusetts Natural Program.	As part of the Massachuset of Environmental Managerr Rivers Program, the Nashu contiguous land up to 100 side of its natural banks ar special protection under thi
STATUS	Applicable SA 6 AOC 9 AOC 11 SA 12 SA 12 SA 13 AOC 41 Consolidation Facility	Applicable AOC 11
REQUIREMENT	Massachusetts Endangered Species Act and implementing regulations [MGL c. 131A, s. 1 et seq.; 321 CMR 8.00]	Scenic Rivers Act [MGL c. 21 s. 27B]
LOCATION CHARACTERISTIC	Endangered Species	Nashua River
REGULATORY AUTHORITY	State	State

Notes:

CFR = Code of Federal Regulations CMR = Code of Massachusetts Regulations CWA = Code of Massachusetts Regulations CWA = Clean Water Act Clean Water Act Fish and Wildlife Service MEPA = Massachusetts Environmental Policy Act MEPA = Massachusetts General Laws NMFS = United States Code

TABLE 8-27 Synopsis of Federal and State Chemical-Specific ARARs For Alternative 8

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

REGULATORY AUTHORITY	CHEMICAL	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]	Applicable AOC 11 AOC 40	Federal Ambient Water Quality Criteria (AWOC) include (1) health-based criteria developed for 95 carcinogenic and noncarcinogenic compounds and (2) acute and chronic toxicity values for the protection of human health provide protective concentrations for exposure from ingesting contarninated water and contarni- nated aquatic organisms, and from ingesting contarninated aquatic organisms alone. Remedial actions involving contaminants to surface water or discharge of contaminants to surface 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. Actives at AOC 11 will be performed to prevent AWQC exceedances in 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.
Federal	Groundwater	Safe Drinking Water Act, National Primary Drinking Water Regulations, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50 - 141.53]	Applicable AOC 40	The National Primary Drinking Water Act establishes Maximum Contaminant Levels (MCLs) and Maximum Contaminant Levels (MCLs) and Maximum Contaminant Levels 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 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 conditions, and the MCL for arsenic will be met under average and maximum conditions. MCLs are not exceeded at Patton Well.

continued

TABLE 8-27 Synopsis of Federal and State Chemical-Specific ARARs For Alternative 8

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	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.
REQUIREMENT SYNOPSIS	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 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 AWOC only when they are more stringent (more
STATUS	Applicable AOC 11 AOC 40
REQUIREMENT	Massachusetts Surface Water Quality Standards [314 CMR 4.00]
CHEMICAL MEDIUM	Surface water
REGULATORY AUTHORITY	State

Notes:

Ambient Water Quality Criteria Comprehensive Environmental Response. Compensation, and Liability Act	Code of Federal Regulations	Code of Massachusetts Rules	Clean Water Act	Maximum Contaminant Level	Maximum Contaminant Level Goal	Massachusetts Maximum Contaminant Level	National Primary Drinking Water Regulations	Safe Drinking Water Act	Secondary Maximum Contaminant Level
N N	11	11	Ш	11	11	11	11	H	н
AWOC	CFR	CMR	CWA	MCL	MCLG	MMCL	NPDWR	SDWA	SMCL
Action To Be Taken To Attain Requirement	ction activities will be controlled to SEPA discharge requirements. On- tharges will meet the substantive nents of these regulations.	etermined that excavated materials ardous materials subject to LDRs, erials will be handled and disposed mpliance with these regulations.	solidation facility will be sited in nce with these regulations.	sure and post-closure plans will be d and submitted to satisfy the nents of 310 CMR 19.021 for all l areas; however, only debris is proposed for AOC 11. solidation landfill for SA 6, AOC 9, A 13, AOC 40, and AOC 41 will be ted, operated, and closed in ance with the regulations at 319 000.	on, filling, and disposal activities t the substantive criteria and ds of these regulations. Remedial : will be designed to attain and i Massachusetts Water Quality ds in affected waters.				
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	Construit meet US site disc requirem	If it is de are haza the matr of in cor	The con accorda	Final clo prepared requirent disposal remova removal removal removal removal removal removal r	Excavati will mee standard activities maintain Standard				
REQUIREMENT SYNOPSIS	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.	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.	These regulations outline the requirements for selecting the site of a new solid waste landfill in the Commonwealth of Massachusetts.	These regulations outline the requirements for construction, operation, closure, and post closure at solid waste management facilities in the Commonwealth of Massachusetts.	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 Duality Certification is required pursuant to 314 CMR 9.00.				
STATUS	Applicable AOC 9 AOC 11 AOC 40 Consolidation Facility	Applicable SA 6 AOC 9 AOC 11 SA 12 SA 12 SA 12 AOC 40 AOC 41	Applicable Consolidation Facility	Applicable AOC 9 AOC 11 SA 12 Relevant and Appropriate SA6 SA 13 AOC 40 AOC 40 AOC 41 AOC 40 AOC 41 AOC 40 AOC 40	Relevant and Appropriate AOC 40				
REQUIREMENT	Clean Water Act Program [40 CFR 122,125]	Resource Conservation and Recovery Act (RCRA), Land Disposal Restrictions (LDRs); (40 CFR Part 268)	Massachusetts Solid Waste Facilities Site Regulations [310 CMR 16.00]	Massachusetts Solid Waste Management Regulations [310 CMR 19.100]	Massachusetts Water Quality Certification and Certification for Dredging [314 CMR 9.00]				
ACTION	Control of surface water runoff. Direct discharge to surface water.	Land Disposal of Hazardous Wastes.	Solid Waste Landfill Siting.	Solid Waste Landfill Construction, Operation, Closure, and Post-Closure Care.	Activities that potentially affect surface water quality.				
REGULATORY AUTHORITY	Federal	Federal	State	State	State				

TABLE 8-28 Synopsis of Federal and State Action-Specific ARARS For Alternative 8

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Landfill Remediation Feasibility Study Devens. MA

ACTION TO BE TAKEN TO ATTAIN BECUIDEMENT	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).	
REQUIREMENT SYNOPSIS	These 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. Specifically, Section 6.04 governs ambient air quality such as particulate matter standards. Emissions from site treatment activities must be maintained at an annual geometric mean of 5 g/m ³ and a maximum 24-hour concentration of 40 mg/m ³ (primary standard). Carbon monoxide, nitrogen dioxide, and lead are also regulated. Section 7.02 governs plan approval and emissions limitations. A permit and BACT are required prior to operation. Under Section 7.02, visible emissions are limited. Additionally, the Massachusetts toxic air pollutant (TAP) control program	
STATUS	Applicable SA6 AOC 9 AOC 1 SA 12 SA 13 AOC 40 AOC 40 Consolidation Facility	
REQUIREMENT	Massachusetts Air Pollution Control Regulations [310 CMR 7.00]	
ACTION		
REGULATORY AUTHORITY	State	

Notes:

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Code of Federal Regulations
 Code of Massachusetts Rules
 Clean Water Act
 Clean Water Act
 Massachusetts Department of Environmental Protection
 Massachusetts General Laws
 Mater Pollutant Discharge Elimination System
 U.S. Army Corps of Engineers
 United States Code

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TABLE 8-28 Synopsis of Federal and State Action-Specific ARARS For Alternative 8

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

continued

	TABLE C. CO.		
	TABLE 8 - 29 COST SUMMARY TABLE		
	ALTERNATIVE 8: LIMITED REMOVAL AT AOC 11;		
	EXCAVATE AND CONSOLIDATE AOCs 9, 40, & 41, SA 6, 12, & 13		
	LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA		
	ITEM	TO	TAL COST
DIRECT COSTS			
LIMITED REP	MOVAL AT AOC 11		
EXCAVATE	AND CONSOLIDATE	\$	44,000
	SA6		64,000
	AOC 9		3,835,000
1	SA 12		490,000
	SA 13		502,000
	AUC 40		3,370,000
			93,000
	CONSOLIDATION LANDFILL CONSTRUCTION		5,240,000
	TOTAL DIRECT COSTS		
			1010500000
INDIRECT COSTS			
	HEALTH AND SAFETY	\$	682,000
	LEGAL, ADMIN, PERMITTING		682,000
	ENGINEERING		1,364,000
	SERVICES DURING CONSTRUCTION		1,364,000
	TATAL NUMBERT COOTS		
	TOTAL INDIRECT COSTS	\$	4,092,000
	TOTAL CAPITAL (DIRECT + INDIRECT) COSTS	\$	17 730 000
		•	17,730,000
OPERATION AND	MAINTENANCE COSTS		
	TOTAL ANNUAL O&M COSTS FOR AOC 11 - 2 YRS	\$	4,000
	TOTAL ANNUAL O&M COSTS CONSOLIDATION LANDFILL - 30 YRS		23,000
	TOTAL ADDITIONAL ANNUAL O&M COSTS FOR AOC 40 - 5 YRS		29,000
	TOTAL PRESENT WORTH OF O&M COSTS		
			411,000
	TOTAL COSTS ALTERNATIVE 8	\$	18,141,000

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TABLE 8-30 Synopsis of Federal and State Location-Specific ARARs For Alternative 9

Landfill Remediation Feasibility Study Devens, MA

REGULATORY AUTHORITY	LOCATION CHARACTERISTIC	REQUIREMENT	STATUS	REOUREMENT SYNOPSIS	ACTION TO BE TAKEN
Federal	Floodplains	Floodplain Management Executive Order No. 11988 [40 CFR Part 6, App. A]	Applicable AOC 9 AOC 11 SA 12 SA 12 AOC 40 AOC 41	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, hot-spot sediment removal, and landfill capping 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.
Federal	Wetlands	Protection of Wetlands Executive Order No. 11990 [40 CFR Part 6, App. A]	Applicable AOC 9 AOC 11 SA 12 SA 12 SA 13 AOC 40 AOC 41	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, hot-spot sediment removal, and landfill capping 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.
Federal	Wetlands Aquatic Ecosystem	Clean Water Act, Dredge or Fill Requirements Section 404 [33 CFR Part 230; 40 CFR Part 230]	Applicable AOC 9 AOC 11 SA 12 SA 13 AOC 40 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. Procedures for complying with regulatory conditions are contained in 33 CFR Part 323. 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 wetlands.	The removal of drums/sediments and cover installation 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.
Federal	Construction over/in navigable waters.	Rivers and Harbors Act of 1899 [33 USC 401 et seq.]	Applicable AOC 40	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.

TABLE 8-30	Landfill Remediation Feasibility Study
OF FEDERAL AND STATE LOCATION-SPECIFIC ARARS FOR ALTERNATIVE 9	Devens, MA
Synopsis of Federal a	LAN

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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.; 40 CFR Part 302]	Applicable AOC 9 AOC 11 SA 12 SA 12 AOC 40 AOC 41	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.	To the extent necessary, actions will be taken to develop measures to prevent, mittigate, 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.
Federal	Endangered Species	Endangered Species Act [16 USC 1531 et seq.; 50 CFR Part 402]	Relevant and Appropriate SA 6 AOC 9 AOC 11 SA 12 SA 12 SA 13 AOC 41 AOC 41 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.
Federal	Atlantic Flyway Wetlands Surface Waters	Migratory Bird Treaty Act (16 USC 703-711)	Applicable 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.
Federal	Archeological Sites	Archeological Resources Protection Act of 1979 [16 USC 47099-11]	Relevant and Appropriate SA 6	This law prohibits the excavation, damage, alteration, and trade of archeological resources obtained illegally from public or Native American.	Remedial actions will be performed to prevent the illegal excavation, damage, alteration, or trade of archeological resources.

continued

TABLE 8-30 Synopsis of Federal and State Location-Specific ARARs For Alternative 9

Landfill Remediation Feasibility Study Devens, MA

AUTHORITY AUTHORITY Federal fate fate fate fate fate fate fate fate	Characteristic Archeological and Historic Sites and Historic Sites and Historic Sites and Historic Sites and Matands Surface Waters Surface Waters Construction over /in a waterway.	REQUIREMENT Archeological and Historic Data Preservation Act [16 USC 469- 469: 40 CFR 469; 40 CFR 6.301(c)] and National Historic Preservation Act [16 USC 470- 470w6] Massachusetts Wetland Protection Act and regulations (MGL c. 131 s. 40; 310 CMR 10.00] Massachusetts Waterways Act [MGL c. 91; 310 CMR 9.00] Massachusetts Endangered Massachusetts Endangered Species Act and implementing	STATUS Applicable Applicable AOC 9 AOC 40 AOC 40 AOC 40 AOC 40 AOC 40 AOC 40 AOC 40 APplicable	REGUIREMENT SYNOPSIS These laws establish the procedures for the inventory, registration, and preservad, and properly managed when terrain is altered as a result of a federal or federally licensed construction activity. 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 activity, A Determination of Conditions obtained before proceeding with the activity and a Final Order of Conditions obtained before proceeding with the activity or NOI must be filed for a proceeding with the activity or NOI must be filed with the activity a determination of Conditions obtained before proceeding with the activity a proving seasons. The Massachusetts Waterways Act and Loss may be permitted with replication of any lost area within two growing seasons. The Massachusetts Department of MADEP) be obtained for any work in or over any vitich public funds have been expended), or outlet thereof. Actions must be conducted in a manner that minimizes the inpoact to which public funds have been expended).	Action To Be Taken To Artain Recuirement Remedial actions will be conducted to inventory, register, and preserve historical and archeological resources. All work to be performed within wetlands and the 100 foot buffer zone will be in accordance with the substantive requirements of these regulations. Excavation, filling, and disposal activities will meet the substantive criteria and standards of these regulations will meet the substantive criteria and standards of these regulations trandards of these regulations
		seq.; 321 CMR 8.00]	ACC 1 SA 12 SA 12 SA 13 AOC 40 AOC 40 AOC 41 Consolidation Facility	massacrupents-insted rare, mneatened, or endangered species, and species listed by the Massachusetts Natural Heritage Program.	design and implementation of this alternative.

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TABLE 8-30 Synopsis of Federal and State Location-Specific ARARs For Alternative 9

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

ACTION TO BE TAKEN TO ATTAIN REQUIREMENT	t Remedial activities will be performed to comply with the substantive requirements of this act.
REQUIREMENT SYNOPSIS	As part of the Massachusetts Department of Environmental Management's Scenic Rivers Program, the Nashua River and contiguous land up to 100 yards on each side of its natural banks are afforded special protection under this law
STATUS	Applicable AOC 11
REQUIREMENT	Scenic Rivers Act [MGL c. 21 s. 27B]
LOCATION CHARACTERISTIC	Nashua River
REGULATORY AUTHORITY	State

Notes:

Code of Federal Regulations	Code of Massachusetts Regulations	Clean Water Act	Department of the Interior	Fish and Wildlife Service	Massachusetts Environmental Policy Act	Massachusetts General Laws	National Maine Fisheries Service	United States Code	
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CFR	CMR	CWA	ĪŌ	FWS	MEPA	MGL	NMFS	USC	

TABLE 8-31 Svnopsis of Federal and State Chemical-Specific ARARs For Alternative 9

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

GEN	med in a adances in adances in aediment at manner to cold Spring dredged nt AWQC ook Pond.	under L for arsenic maximum sded at
ACTION TO BE TAI TO ATTAIN REQUIREN	Remedial actions will be performanner to prevent AWQC exceeds surface water. Actives at AOC of performed to prevent AWQC extite Nashua River. Removal of the Nashua River. Removal of a AOC 40 will be performed in a prevent AWQC exceedances in Prevent Brook Pond. Supernatant from Brook Pond. Supernatant from spoil will be monitored to prevent exceedances in Cold Spring Brook Pond.	At AOC 40 the MCL for bis(2- ethylhexyl)phthalate will be met average conditions, and the MC will be met under average and i conditions. MCLs are not excet Patton Well.
REQUIREMENT SYNOPSIS	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 protection of human health provide protection of numan health provide nated aquatic organisms, and from ingesting contaminated aquatic organisms alone. Remedial actions involving contaminate surface water must consider the uses of the water and the contaminants to surface water and the consider the uses of the water and the circumstances of the release or threatened release.	The National Primary Drinking Water Act establishes 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.
STATUS	Applicable AOC 11 AOC 40	Applicable AOC 40
REQUIREMENT	Clean Water Act, Ambient Water Quality Criteria [40 CFR 131; Quality Criteria for Water 1986]	Safe Drinking Water Act, National Primary Drinking Water Regulations, MCLs [40 CFR Parts 141.11 - 141.16 and 141.50 - 141.53]
CHEMICAL MEDIUM	Surface water	Groundwater
REGULATORY AUTHORITY	Federal	Federal

continued

TABLE 8-31 Synopsis of Federal and State Chemical-Specific ARARs For Alternative 9

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LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

	in a face tering ces in rrface o
BE TAKEN EQUIREMENT	Ill be performed sedances of su sedances of su smoval will be r to prevent a Water Quality ing Brook Pond lged spoil dewa fevent exceedar nt necessary, S ds will be used itations.
ACTION TC TO ATTAIN F	t AOC 11 activities we attend to prevent exceedances of Surfax reprinting the name of the name of the name coedances of Surfax renderes of Surfax
REQUIREMENT SYNOPSIS	Massachusetts Surface Water Quality A Standards designate the most sensitive m uses for which surface waters of the commonwealth are to be enhanced, m maintained, and protected, and designate At minimum water quality criteria for minimum water quality criteria for sustaining the designated uses. Surface we waters at Fort Devens are classified as Class B. Surface waters assigned to this viter aquatic life and wildlife, and for the reation. W primary and secondary contact recreation. W primary when they are more stringent (more protective) than the AWQC.
STATUS	Applicable AOC 11 AOC 40
REQUIREMENT	Massachusetts Surface Water Quality Standards [314 CMR 4.00]
CHEMICAL MEDIUM	Surface water
REGULATORY AUTHORITY	State

Notes:

Ambient Water Quality Criteria	Compensations criminating response, compensation, and Lability Act Code of Federal Regulations	Code of Massachusetts Rules	Clean Water Act	Maximum Contaminant Level	Maximum Contaminant Level Goal	Massachusetts Maximum Contaminant Level	National Primary Drinking Water Regulations	Safe Drinking Water Act	Secondary Maximum Contaminant Level
		11	11	II	ш	II	11	11	II
AWOC CERCI A	CFR	CMR	CWA	MCL	MCLG	MMCL	NPDWR	SDWA	SMCL

	Action to be taken to Attain Requirement	construction activities will be controlled to neet USEPA discharge requirements. On- te discharges will meet the substantive quirements of these regulations.	it is determined that excavated materials re hazardous materials subject to LDRs, re materials will be handled and disposed in compliance with these regulations.	he consolidation facility will be sited in cordance with these regulations.	nal closure and post-closure plans will be repared and submitted to satisfy the quirements of 310 CMR 19.021 for all sposal areas. The consolidation landfill for all disposal re consolidation landfill for all disposal seed in conformance with the regulations 319 CMR 19.000.	ccavation, filling, and disposal activities ill meet the substantive criteria and andards of these regulations. Remedial tivities will be designed to attain and aintain Massachusetts Water Quality andards in affected waters.
. MA	REQUIREMENT SYNOPSIS	The National Pollutant Discharge Elimination C System (NPDES) permit program specifies n the permissible concentration or level of s contaminants in the discharge from any point source, including surface runoff, to waters of the United States.	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 reatment technology or to a specific concentration prior to disposal in a RCRA Subtite C permitted facility.	These regulations outline the requirements T for selecting the site of a new solid waste landfill in the Commonwealth of Massachusetts.	These regulations outline the requirements F for construction, operation, closure, and p post closure at solid waste management rafacilities in the Commonwealth of Massachusetts.	For activities that require a MADEP Wetlands E Order of Conditions to dredge or fill w navigable waters or wetlands, a Chapter 91 w Wateways License, a USACE permit or any a major permit issued by USEPA (e.g., Clean m Water Act NPDES permit), a Massachusetts Si Division of Water Pollution Control Water Quality Certification is required pursuant to 314 CMR 9.00.
DEVENS,	Status	Applicable AOC 9 AOC 11 AOC 10 Consolidation Facility	Applicable SA 6 AOC 9 AOC 11 SA 12 SA 12 SA 13 AOC 40 AOC 41	Applicable Consolidation Facility	Applicable AOC 9 AOC 11 SA 12 Relevant and Appropriate SA 6 SA 13 AOC 40 AOC 41 Consolidation Facility	Relevant and Appropriate AOC 40
	REQUIREMENT	Clean Water Act Program [40 CFR 122,125]	Resource Conservation and Recovery Act (RCRA), Land Disposal Restrictions (LDRs); (40 CFR Part 268)	Massachusetts Solid Waste Facilities Site Regulations [310 CMR 16.00]	Massachusetts Solid Waste Management Regulations [310 CMR 19.100]	Massachusetts Water Quality Certification for Dredging [314 CMR 9.00]
	ACTION	Control of surface water runoff. Direct discharge to surface water.	Land Disposal of Hazardous Wastes.	Solid Waste Landfill Siting.	Solid Waste Landfill Construction, Operation, Closure, and Post-Closure Care.	Activities that potentially affect surface water quality.
	REGULATORY AUTHORITY	Federal	Federal	State	State	State

TABLE 8-32 Synopsis of Federal and State Action-Specific ARARs for Alternative 9

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LANDFILL REMEDIATION FEASIBILITY STUDY

SYNOPSIS OF FEDERAL AND STATE ACTION-SPECIFIC ARARS FOR ALTERNATIVE 9 TABLE 8-32

LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA

REGULATORY AUTHORITY	ACTION	REOUIREMENT	STATIS	REGULEEMENT CONDECIE	ACTION TO BE TAKEN TO
				I FROM FILMENT OT NOT 913	AI TAIN REQUIREMENT
State		Massachusetts Air Pollution Control Regulations [310 CMR 7.00]	Applicable SA 6 AOC 9 AOC 11 SA 12 SA 12 SA 12 SA 12 SA 12 AOC 40 AOC 41 Consolidation Facility	These 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. Specifically, Section 6.04 governs ambient air quality such as particulate matter standards. Emissions from site treatment activities must be maintained at an annual geometric mean of 75 g/m ³ and a maximum 24-hour concentration of 40 mg/m ³ (primary standard). Carbon monoxide, nitrogen dioxide, and lead are also regulated. Section 7.02 governs plan approval and emissions limitations. A permit and BACT are required prior to operation. Under Section 7.02, visible emissions are limited. Additionally, the Massachusetts toxic air pollutant (TAP).	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:

- CER COMR MADEP MGL USACE

- Code of Federal Regulations
 Code of Massachusetts Rules
 Clean Water Act
 Massachusetts Department of Environmental Protection
 Massachusetts General Laws
 National Pollutant Discharge Elimination System
 U.S. Army Corps of Engineers
 United States Code

	TABLE 8 - 33 COST SUMMARY TABLE ALTERNATIVE 9: EXCAVATE AND CONSOLIDATE ALL DEBRIS AREAS							
LANDFILL REMEDIATION FEASIBILITY STUDY DEVENS, MA								
	ITEM	TC	TAL COST					
DIRECT COSTS								
	SA6	\$	64,000					
	AOC 9		3,835,000					
E.	AUC TT		1,571,000					
	SA 12		490,000					
			502,000					
	AOC 41		3,370,000					
			93,000					
	CONSCIDENTION LANDFILL CONSTRUCTION		5,240,000					
	TOTAL DIRECT COSTS	\$	15 165 000					
INDIRECT COSTS								
	HEALTH AND SAFETY	\$	758,000					
	LEGAL, ADMIN, PERMITTING		758,000					
			1,517,000					
	SERVICES DURING CONSTRUCTION		1,517,000					
	TOTAL BIDIPECT CORTE							
	TOTAL INDIRECT COSTS	\$	4,550,000					
	TOTAL CAPITAL (DIRECT + INDIRECT) COSTS		10 715 000					
		\$	19,715,000					
OPERATION AND	MAINTENANCE COSTS							
	TOTAL ANNUAL O&M COSTS CONSOLIDATION LANDFILL - 30 YRS	Ś	23 000					
	TOTAL ADDITIONAL ANNUAL O&M COSTS FOR AOC 40 - 5 YRS		29,000					
	TUTAL PRESENT WORTH OF O&M COSTS	\$	480,000					
		-						
	TOTAL ODETE ALTERNATION							
	IVIAL UVOID ALIENNATIVE 9	*	20,195,000					