Table 20
Data Comparison: Mill Pond Surface Water

COC (ug/L)	1997 Surface Water		1999 Surface Water	
	Average (1)	Max (2)	Average (1)	Max (2)
Trichloroethene	18.5	65	0.50	ND
bis(2-Ethylhexyl)phthalate	100	480	5.00	ND
Copper	2.02	3.70	0.47	0.8
Selenium	1.86	ND	3.06	10.00

Notes:

(1) Average is the arithmetic mean of all samples in the group, using 1/2 the listed detection limit for non-detects.

(2) Maximum is the maximum detected concentration within the sample group.

NA indicates that the chemical was not included in analysis for the sample.

ND - Not detected in the sample group. Average values in such cases are driven by 1/2 the detection limit.

Table 21
Data Comparison: Dennys River Surface Water

COC (ug/L)	1996-1997 Surface Water		1999 Surface Water	
	Average (1)	Max (2)	Average (1)	Max (2)
Trichloroethene	5.00	ND	0.50	ND
bis(2-Ethylhexyl)phthalate	5.00	ND	5.00	ND
Arsenic	2.55	3	1.50	ND
Copper	1.60	ND	0.40	ND
Selenium	1.84	ND	2.40	3.90

Notes:

(1) Average is the arithmetic mean of all samples in the group, using 1/2 the listed detection limit for non-detects.

(2) Maximum is the maximum detected concentration within the sample group.

NA indicates that the chemical was not included in analysis for the sample.

ND - Not detected in the sample group. Average values in such cases are driven by 1/2 the detection limit.

Table 22
Distribution and Selection of Chemicals of Concern (COC)
Meddybemps Lake Sediments

COC	Units	Background Samples		Meddybemps Lake Samples			Benchmark ug/kg	Benchmark Reference	Max > Bench-mark	UCL > Bench-mark
		Average	95% UCL	Maximum	Average	95% UCL				
Methoxychlor	ug/Kg	ND	ND	78	19	35	19	a	Y	Y
Arsenic	mg/Kg	7.11	75.7	25	15	19	6	b	Y	Y
Copper	mg/Kg	10.1	140	21	18	20	16	b	Y	Y
Manganese	mg/Kg	213	522	1,080	457	685	460	b	Y	Y
Nickel	mg/Kg	16.8	35.7	32	26	28	16	b	Y	Y

Notes:

a - benchmarks from Ingersoll et al. (1996) - endpoint = NEC

b - benchmarks from Jaagumagi (1995) - endpoint = Lowest Effect Level

Y - Yes N - No

ND - chemical was not detected in any background sample

Table 23
Data Comparison: Meddybemps Lake Sediments

COC	Units	1996-1997 Sediment Data		1999 Sediment Data	
		Average (1)	Max (2)	Average (1)	Maximum (2)
Methoxychlor	mg/Kg	26	78	8	ND
Arsenic	mg/Kg	11	16	19	25
Copper	mg/Kg	17	21	18	20
Manganese	mg/Kg	283	390	689	1,080
Nickel	mg/Kg	24	28	28	32

Notes:

(1) Average is the arithmetic mean of all samples in the group, using 1/2 the listed detection limit for non-detects.

(2) Maximum is the maximum detected concentration within the sample group.

ND - Not detected in the sample group. Average values in such cases are driven by 1/2 the detection limit.

Table 24
Distribution and Selection of Chemicals of Concern (COC)
Dennys River/Mill Pond Sediments

COC	Units	Background Samples		Dennys River/Mill Pond Samples			Benchmark ug/kg	Benchmark Reference	Max > Benchmark	UCL > Benchmark
		Average	95% UCL	Max	Average	95% UCL				
Benzo(a)anthracene	ug/Kg	250	379	620	279	346	320	a	Y	Y
Benzo(a)pyrene	ug/Kg	ND	ND	640	296	360	370	a	Y	N
Benzo(g,h,i)perylene	ug/Kg	ND	ND	420	285	333	170	a	Y	Y
Benzo(k)fluoranthene	ug/Kg	267	356	510	278	336	240	a	Y	Y
Fluoranthene	ug/Kg	273	364	1,100	427	558	750	a	Y	N
Indeno(1,2,3-cd)pyrene	ug/Kg	ND	ND	380	274	323	200	a	Y	Y
Phenanthrene	ug/Kg	249	399	750	304	389	560	a	Y	N
Pyrene	ug/Kg	271	361	1,600	469	662	490	a	Y	Y
Dieldrin	ug/Kg	3.86	7.7	5.30	2.62	3.12	2	a	Y	Y
Endrin	ug/Kg	ND	ND	9.00	3.26	3.98	3	a	Y	Y
Sum of PCB Homologs	ug/Kg	0.78	1.44	NC	202	315	190	b	NC	Y
Arsenic	mg/Kg	7.11	75.7	30	13	15	6	a	Y	Y
Chromium	mg/Kg	18.3	31.2	45	24	27	26	a	Y	Y
Copper	mg/Kg	10.1	140	22	12	14	16	a	Y	N
Lead	mg/Kg	22.7	1,020	65	19	24	31	a	Y	N
Manganese	mg/Kg	213	522	598	287	335	460	a	Y	N
Nickel	mg/Kg	16.8	35.7	67	28	33	16	a	Y	Y

Notes:

a- benchmarks from Jaagumagi (1995) - endpoint = Lowest Effect Level

b- benchmarks from Ingersoll et al. (1996) - endpoint = NEC

Y- Yes

N- No

NC - value was not calculated because the maximum values for individual PCB homologues were not all found within a single sample.

ND - chemical was not detected in any background sample.

Table 25
Data Comparison: Mill Pond Sediments

	Units	1996 Sediment Data		1999 Sediment Data	
		Average (1)	Max (2)	Average (1)	Max (2)
Benzo(a)anthracene	ug/Kg	319	ND	103	28
Benzo(a)pyrene	ug/Kg	319	ND	138	ND
Benzo(g,h,i)perylene	ug/Kg	319	ND	138	ND
Benzo(k)fluoranthene	ug/Kg	319	ND	138	ND
Fluoranthene	ug/Kg	319	ND	106	39
Indeno(1,2,3-cd)pyrene	ug/Kg	319	ND	138	ND
Phenanthrene	ug/Kg	319	ND	138	ND
Pyrene	ug/Kg	319	ND	113	59
Dieldrin	ug/Kg	3.53	5.3	1.38	ND
Endrin	ug/Kg	3.19	ND	2.33	4.3
Total PCB Homologs (max) (3)	ug/Kg	?	1.20	?	1,140.23
Arsenic	mg/Kg	10.6	29.5	16.1	22.3
Chromium	mg/Kg	23.30	38.2	27.48	44.8
Copper	mg/Kg	7.61	14.4	14.26	20.3
Lead	mg/Kg	21.67	64.9	12.38	16.1
Manganese	mg/Kg	219	298	438	598
Nickel	mg/Kg	21.55	31.5	33.08	67.0

Notes:

(1) Average is the arithmetic mean of all samples in the group, using 1/2 the listed detection limit for non-detects.

(2) Maximum is the maximum detected concentration within the sample group.

(3) Value is the sum of maximum homolog values within the sample group, not the sum of homologs for any individual sample.

ND - Not detected in the sample group. Average values in such cases are driven by 1/2 the detection limit.

Table 26
Distribution and Selection of Chemicals of Concern (COC)
Site Soils

COC	Units	Background Samples		Site Soils			Benchmark mg/kg	Benchmark Reference	Max > Benchmark	UCL > Benchmark
		Average	95% UCL	Maximum	Mean	95% UCL				
Aluminum	mg/kg	13600	15000	17600	NC	NC	1700	a	Y	NE
Arsenic	mg/kg	14.8	17	43	17	35.8	9.9	b	Y	Y
Barium	mg/kg	50.9	77.1	563	61.3	130.8	283	b	Y	N
Cadmium	mg/kg	ND	ND	13.2	1.22	4.1	4	b	Y	Y
Chromium	mg/kg	21.6	21.9	145	30.7	64.5	0.4	b	Y	Y
Copper	mg/kg	12	20.9	144	NC	NC	60	b	Y	NE
Lead	mg/kg	14.7	18.4	146	NC	NC	40.5	b	Y	NE
Mercury	mg/kg	ND	ND	0.33	NC	NC	0.00051	b	Y	NE
Nickel	mg/kg	16	18.4	31	NC	NC	30	b	Y	NE
Selenium	mg/kg	0.613	21.3	1.1 J??	NC	NC	0.21	b	Y	NE
Thallium	mg/kg	ND	ND	1.1 J??	0.472	1.009	1	b	Y	Y
Vanadium	mg/kg	32.8	41.3	37.3	NC	NC	2	b	Y	NE
Zinc	mg/kg	82.9	174	430	NC	NC	8.5	b	Y	NE

Notes:

a- ABB Environmental Services, Inc. 1992

b - Preliminary Remediation Goals for Ecological Endpoints, Efroymson et al. 1997

NA - Not Available

NC - Not calculable - insufficient detected data to calculate value.

NE - Not Evaluated

Y- Yes

N- No

Table 27
COC Concentrations Expected to Provide Adequate Protection of Ecological Receptors for Surface Water and Sediment

Habitat Name/ Type	Exposure Medium	COC	Protective Level	Units	Basis	Assessment Endpoint
Lake, Pond, or River Meddybemps Lake Mill Pond Dennys River	Surface Water	Aluminum	87	ug/L	a	Maintenance of healthy freshwater pelagic community
		Arsenic				
		Barium	4	ug/L	b	
		Lead	0.5	ug/L	a	
		Silver	0.36	ug/L	b	
	Sediment	Benzo(a)anthracene	320	ug/kg	c	Maintenance of invertebrate community species diversity and abundance
		Benzo(a)pyrene	370	ug/kg	c	
		Benzo(g,h,i)perylene	170	ug/kg	c	
		Benzo(k)fluoranthene	240	ug/kg	c	
		Fluoranthene	750	ug/kg	c	
		Indeno(1,2,3-cd)pyrene	200	ug/kg	c	
		Phenanthrene	560	ug/kg	c	
		Pyrene	490	ug/kg	c	
		Dieldrin	2	ug/kg	c	
		Endrin	3	ug/kg	c	
		Methoxychlor	19	ug/kg	d	
		Sum of PCB Homologs	190	ug/kg	d	
		Arsenic	6	mg/kg	c	
		Chromium	26	mg/kg	c	
		Copper	16	mg/kg	c	
		Lead	31	mg/kg	c	
		Manganese	460	mg/kg	c	
		Nickel	16	mg/kg	c	
		Lead	31	mg/kg	c	
		Manganese	460	mg/kg	c	
		Nickel	16	mg/kg	c	

Notes:

a - benchmarks from Maine Statewide Water Quality (1998) - Endpoint = CCC; values of certain metals adjusted to hardness of 25 mg/L

b - benchmarks from Suter and Tsao (1996) - Endpoint = Second Chronic Values (Tier II)

c - benchmarks from Jaagumagi (1995) - endpoint = Lowest Effect Level

d - benchmarks from Ingersoll et al. (1996) - endpoint = NEC

Data from PCB congener and dioxin/furan analyses were used to determine 2,3,7,8 -TCDD toxic equivalency (TEQ) concentrations by using toxic equivalence factors (TEFs) for polychlorinated dibenzodioxins and dibenzofurans (dioxins/furans) and PCBs to relate the toxic potency of the various congeners to 2,3,7,8 -TCDD. TEQs were calculated only for mammals and birds, and the TEFs used to adjust dioxin and furan concentrations can be found in U.S. EPA, 1998.

Surface water samples taken from the Meddybemps Lake site revealed four chemicals with maximum concentrations and 95% UCLs greater than benchmark values (Table 17). These COCs are aluminum, barium, lead, and silver. Aluminum, barium and lead were detected at lower concentrations in 1999 than the previous sampling round in 1996/1997 (Table 18). It should be noted that silver has not been widely detected at the site, and this single detection may not be accurate because of the noted blank contamination. The average and 95% UCL for silver was greater than the benchmark in the background samples.

Trichloroethene, bis(2-ethylhexyl)phthalate, copper, and selenium maximum concentrations were greater than corresponding benchmark values (Table 19) and were identified as COCs within Mill Pond and the Dennys River surface waters. However, none of the 95% UCLs for those four COCs were higher than the benchmark values. In general, concentrations for those compounds was lower in 1999 with the exception of selenium (Tables 20 and 21).

Maximum and 95% UCLs for methoxychlor, arsenic, copper, manganese and nickel concentrations in sediments within Meddybemps Lake were higher than benchmark values (Table 22). Methoxychlor was detected at lower concentrations in sediments in 1999 (Table 23). Arsenic, copper, manganese and nickel were detected in sediments collected at the background locations.

Table 24 lists the 17 sediment COCs for the Dennys River and Mill Pond that include: benzo(a)anthracene, benzo(g,h,i)perylene, benzo(k)fluoranthene, fluoranthene, indeno(1,2,3-cd)pyrene, phenanthrene, pyrene, dieldrin, endrin, arsenic, chromium, copper, lead, manganese, nickel, zinc, and total PCBs. The majority of these COCs were detected at lower concentrations in 1999 (Table 25).

13 COCs were identified in surface soil at the Site, including: aluminum, arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, thallium, vanadium, and zinc. The 95% UCL only exceeded the benchmark values for arsenic, cadmium, chromium, and thallium (Table 26).

b. Exposure Assessment

Data which were incorporated into the ecological setting of the Site came from several sources, including: interviews with local residents, discussions with regional state and federal wildlife and fisheries biologists, observations from a September 1997 Site visit, and a review of flora and fauna from this region of Maine with special emphasis on the information of natural resources from the Moosehorn National Wildlife Refuge, which borders the southeastern portion of Meddybemps Lake. The discussion of the ecological setting associated with the Site is separated into two sections: Terrestrial Habitat and Wildlife; and Meddybemps Lake and Dennys River Aquatic Life.

The terrestrial portion of the Site covers approximately 5 acres and is bordered generally by Meddybemps Lake to the north, the Dennys River to the east, Route 191 to the south, and Stone Road to the west. The Site vegetation consists of an interspersed mix of secondary growth deciduous and coniferous forest patches and early successional herbaceous fields. The surplus disposal yard and terrestrial habitats bordering the Dennys River downstream from the Site provide suitable foraging areas for a variety of wildlife species. The bald eagle, a state and federally listed threatened species, has been occasionally observed foraging in Meddybemps Lake and along the Dennys River. In addition, osprey also forage in these areas and maintain a nest on the southern portion of Meddybemps Lake.

Meddybemps Lake and the Dennys River both support active recreational fisheries, provide excellent habitat for numerous aquatic species, and serve as water and food sources for wildlife. The Dennys River, originating from Meddybemps Lake directly adjacent to the Site, is currently monitored and managed to protect and restore the Atlantic salmon (*Salmo salar*) fisheries. Other migratory fish species that utilize the Dennys River include: American eel (*Anguilla rostrata*), alewife (*Alosa pseudoharengus*), and American shad (*Alosa sapidissma*).

During the RI, fish and mussels were collected in September 1997 by the U.S. Fish and Wildlife Service from the Meddybemps Lake and the Dennys River for tissue analysis. Fish species collected were: brook trout (*Salvelinus fontinalis*), pumpkinseed (*Lepomus gibbosus*), smallmouth bass (*Micropterus dolomieui*), and white sucker (*Catostomus commersoni*). Mussel species collected include the Eastern Elliptio (*Elliptio complanata*) and Alewife Floater (*Anadonta imiplicata*). The East Machais River was selected as the reference area for fish and mussel tissue. In September 1997, the State of Maine conducted a benthic community assessment in the Dennys River. The brook floater (*Alasmidonta varicosa*), a freshwater mussel listed as a special concern species in Maine, has been found in the Dennys River.

Within the exposure assessment, the potential exposure pathways for various species

groups, such as fish, shellfish, mammals, and birds, were directly or indirectly evaluated to determine those considered to be at risk of significant exposure from Site contaminants. Table 28 lists the exposure media, habitat types, receptors, exposure routes, and assessment and measurement endpoints for selected species groups for which a potential exposure pathway has been identified and for which quantitative data exist. For this assessment, avian and mammalian species (e.g., great blue heron, osprey and river otter) had the greatest potential for exposure and were selected for a quantitative evaluation of exposure. The potential for biomagnification was evaluated by including receptors that typically ingest species for which tissue concentrations were assessed (e.g., fish and shellfish).

The river otter was assumed to be exposed to COCs through the ingestion of chemicals in mussels (site-specific data) and fish (site-specific data), ingestion of surface water and incidental ingestion of sediments within Meddybemps Lake and the Dennys River. The osprey was assumed to be exposed to chemicals of concern through the ingestion of fish (site-specific data) and ingestion of surface water from Meddybemps Lake and the Dennys River. The great blue heron was assumed to be exposed to chemicals of concern through the ingestion of fish (site-specific data) and surface water from Meddybemps Lake, Mill Pond and the Dennys River. In addition, it was assumed that the great blue heron would incidentally ingest sediments during feeding.

Table 28 - Ecological Exposure Pathways of Concern

Exposure Medium	Sensitive Environment Flag (Y or N)	Receptor	Endangered/ Threatened Species Flag (Y or N)	Exposure Routes	Assessment Endpoints	Measurement Endpoints
Surface Water	N	Fish	N	Ingestion, respiration, and direct contact with chemicals in surface water	Maintenance of an abundant and productive game fish population	Comparison of chemical concentrations in surface waters to criteria values
		Mussels	N	Ingestion, respiration, and direct contact with chemicals in surface water	Maintenance of an abundant mussel population	Comparison of chemical concentrations in surface waters to criteria values
Surface Water	N	Mussels	N	Ingestion, respiration, and direct contact with chemicals in surface water	Maintenance of an abundant mussel population	Comparison of chemical concentrations in surface waters to criteria values
Sediment	N	Benthic organisms	N	Ingestion, respiration, and direct contact with chemicals in sediment	Benthic invertebrate community species diversity and abundance	Comparison of chemical concentrations in sediments to guidance values
Soil	N	Terrestrial inverte-brates	N	Ingestion and direct contact with chemicals in soils	Survival of terrestrial invertebrate community	Comparison of chemical concentrations in soils to guidance values
		Terrestrial plants	N	Direct contact with chemicals in soils	Survival of terrestrial plant community	Comparison of chemical concentrations in soils to guidance values
Fish and Mussels	N	Piscivorus birds and mammals	N	Ingestion of chemicals in fish and mussels and indirect ingestion of chemicals in surface water and sediment	Survival, reproduction and growth of piscivorous birds and mammals	Comparison of chemicals in fish tissue to published database values and avian and mammalian exposure modeling

c. Ecological Effects Assessment

Information on the toxicity of the chemicals of concern to the benthic organisms, fish, birds, and mammals was summarized in the toxicity assessment of the ecological risk assessment (Weston, 1999). Species-specific toxicity data for the indicator avian and mammalian species (great blue heron, osprey, and river otter) were not available for all of the chemicals of potential concern. Thus, toxicity values from the literature were selected

using the most closely related species. Toxicity values selected for the assessment were the lowest exposure doses reported to be toxic or the highest doses associated with no adverse effect. Data for chronic toxicity were preferentially used, when available. These toxicity values were compared with the estimated dietary dose of each COC received by the great blue heron, osprey and river otter to determine the potential adverse effects from predicted exposures.

In addition, the toxicity of chemicals of concern to aquatic life was assessed by comparing average and maximum surface water concentrations in Meddybemps Lake and the Dennys River to the federal freshwater acute and chronic AWQC and Maine Statewide Water Quality Criteria, where available. The toxicity of the chemicals of concern identified in Meddybemps Lake and the Dennys River sediments to benthic and epibenthic organisms was evaluated by comparing sediment contaminant concentrations to the Ontario Ministry of Environment and Energy Sediment Quality Guidelines (Persaud et al., 1996), the NOAA biological effect ranges (Long et al., 1995), and the sediments effect concentrations (Ingersoll et al., 1996), along with predicting the interstitial water contaminant concentrations through the use of the equilibrium partitioning approach and comparing those values to AWQC. Potential ecological effects associated with soil contamination were evaluated by comparing COC concentrations in soils to the lowest of the Oak Ridge National Laboratory soil toxicological benchmarks for plants, earthworms or wildlife (Sample, 1996 and Efroymson et al., 1997).

Chemical concentrations detected in fish collected from Meddybemps Lake and the Dennys River were compared to a database of aquatic species tissue residues (Jaravinen and Ankley, 1999).

d. Ecological Risk Characterization

The potential risks posed to ecological receptors (great blue heron, osprey, river otter, benthic invertebrates and fish) were evaluated by comparing estimated daily doses or medium-specific concentrations with critical toxicity values as discussed in Section 4.2 of the Ecological Risk Assessment (Weston, 1999). This comparison, described as a Hazard Quotient (HQ), was made for each chemical. If the HQ exceeds unity (e.g., > 1), this indicates that the species may be at risk to an adverse effect from the chemical through the identified exposure route.

For the great blue heron and osprey exposed to contaminants in Meddybemps Lake and Mill Pond, HQs were greater than one for total PCBs and mercury (see Table 4-18 and 4-19 in the ERA). HQs were greater than one for total PCBs (HQ=2.63) , mercury (HQ=6.35) and aluminum (HQ=2.39) for the great blue heron and osprey exposed to contaminants in the Dennys River (see Tables 4-21 and 4-22 in the ERA). The ingestion of fish contributes to almost 100% of the HQ.

For the river otter, HQs are presented in Tables 4-20 and 4-23 in the ERA (Weston 1999), and the three contaminants contributing to the majority of the HQ were total PCBs (HQ=2.33) and mercury (HQ=1.03) for Meddybemps Lake and Mill Pond, and total PCBs (HQ=5.73), aluminum (HQ=129), lead (HQ= 222) and mercury (HQ=1.02) for the Dennys River.

In the fish tissue analysis conducted by Mierzykowski et al. (1999), PCB concentrations were significantly higher in bass collected from Meddybemps Lake and the Dennys River near the Site. However, these concentrations were not considered elevated when compared with regional, state or national data (Miezykowski et al., 1999). No other contaminants were detected at elevated levels in either fish or mussels collected near the Site.

Given the magnitude in which the HQ exceeds unity and the detection of these contaminants in fish collected from reference locations, it is unlikely that contaminant residues in fish or mussels would be responsible for an adverse impact to piscivorus birds or mammals, such as the river otter, osprey and great blue heron.

Based on all the surface water sampling rounds that were conducted for Meddybemps Lake during the RI and following the NTCRA, the 95% UCLs for aluminum, barium, lead, and silver exceeded the benchmarks. However, the 95% UCLs for barium and silver at the background location were similar to concentrations detected in surface waters collected from Meddybemps Lake. In addition, the average and maximum surface water concentrations of these COCs were detected at lower concentrations from the 1999 sampling round than the 1996/1997 sampling round. Surface water results from the Dennys River and Mill Pond identified trichloroethene, bis (2-ethylhexyl)phthalate, copper and selenium as COCs. However, the 95% UCLs for copper and selenium at the background locations were similar to concentrations detected in surface water from the Dennys River and Mill Pond. Average and maximum COC surface water concentrations were detected at lower concentrations from the 1999 sampling round than the 1996/1997 sampling round with the exception of selenium. Given the magnitude by which the criteria were exceeded, the detection of barium, silver, copper, and selenium at background locations, and the confirmation of lower contaminant concentrations from the 1999 sampling round, it is unlikely that direct exposure of aquatic organisms to aluminum, lead, trichloroethene, and bis (2-ethylhexyl)phthalate in Meddybemps Lake, Mill Pond and the Dennys River will result in significant adverse aquatic ecological effects.

Based on the sediment sampling conducted in Meddybemps Lake during the RI and following the NTCRA, the 95% UCLs for arsenic, copper, manganese, methoxychlor, and nickel exceeded ecological effects benchmarks. However, the 95% UCLs for arsenic, copper, manganese, and nickel were greater than or similar to concentrations detected in

Meddybemps Lake sediments. Furthermore, the average and maximum concentrations of methoxychlor in sediments collected in 1999 were detected at a lower concentration than the 1996/1997 sampling round. Sediment concentrations of arsenic, copper and nickel were detected at similar concentrations during the 1996/1997 and 1999 sampling rounds with the exception of manganese that was detected at a greater concentration in the 1999 sampling round. Sediment sampling results from the Dennys River and Mill Pond identified the following 17 COCs: benzo(a) anthracene; benzo(a)pyrene; benzo(g,h,i)perylene; benzo(k)fluoranthene; fluoranthene; indeno(1,2,3-cd)pyrene; phenanthrene; pyrene; dieldrin; endrin; PCBs; arsenic; chromium; copper; lead; manganese; and nickel. The 95% UCLs for benzo(a) anthracene, benzo(k)fluoranthene, phenanthrene, dieldrin, arsenic, chromium, copper, lead, manganese, and nickel detected at the background location was greater than or similar to concentrations detected in the Dennys River and Mill Pond sediments. Furthermore, the average and maximum PAH concentrations were detected at lower concentrations from the 1999 sampling round in comparison to the 1996/1997 sampling round. Given the magnitude by which the benchmarks were exceeded, the detection of several of the COCs detected at the background location, and the confirmation of lower PAH concentrations in sediments from the 1999 sampling round, it is unlikely that direct exposure of benthic organisms to the COCs detected in sediments from Meddybemps Lake, Dennys River and Mill Pond will result in adverse ecological effects.

Based on the most recent soil sampling results following the NTCRA, the 95% UCLs for arsenic, cadmium, chromium, and thallium exceeded ecological soil benchmarks. However, based on the limited number of soil samples collected, a 95% UCL could not be calculated for the majority of inorganic COCs. Pesticides, PCBs and PAHs were not detected in Site soils following the NTCRA. In addition, the average or 95% UCL background concentrations of aluminum, arsenic, barium, and chromium were similar to concentrations detected at the Site. Given the fact that the majority of the contaminated Site soils were excavated, it is unlikely that direct exposure to terrestrial invertebrates and plants to inorganics will result in an adverse ecological effect.

The ecological risk assessment is subject to some uncertainties. For example, in the exposure assessment, conservative assumptions were made in order to estimate daily intakes for the indicator species: the great blue heron, osprey and river otter. These species were assumed to spend 100% of foraging time within the Site. Since limited site-specific information was available, assumptions were made regarding ingestion rates, frequency of exposure, and exposure point locations. These conservative exposure point concentration and life-history exposure assumptions were made in the absence of site-specific information and most likely overestimate the risks to both avian and mammalian receptors. The reader is referred to Section 4.2.6.6 of the ERA (Weston, 1999) for a discussion of the primary uncertainties associated with the risk evaluation for each of the indicator species.

In summary, contaminant levels in surface waters, surface soils, sediments and fish and mussel tissues are not sufficiently elevated to pose a substantial risk to invertebrates, fish and wildlife through direct contact and dietary exposure to the site-related COCs.

3. Overall Risk Assessment Conclusion--Basis for Response Action

While the ecological risk assessment revealed that there is no substantial risk to ecological receptors due to site-related COCs, the baseline human health risk assessment revealed that future residents potentially exposed to COCs in groundwater via ingestion of drinking water may present an unacceptable human health risk. As such, actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

H. REMEDIATION OBJECTIVES

Based on preliminary information relating to types of contaminants, environmental media of concern, and potential exposure pathways, response action objectives (RAOs) were developed to aid in the development and screening of alternatives. These RAOs were developed to mitigate, restore and/or prevent existing and future potential threats to human health and the environment. The RAOs for the selected remedy for the Eastern Surplus Company Superfund Site are:

- Prevent the ingestion of groundwater contaminants that exceed federal or state maximum contaminant levels (MCLs), non-zero maximum contaminant level goals (MCLGs), State of Maine maximum exposure guidelines (MEGs), or in their absence, an excess cancer risk of 1 x 10^{-6} or a hazard quotient of 1 per contaminant;

- Prevent, to the extent practicable, the off-site migration of groundwater with contamination above cleanup levels;

- Restore groundwater to meet federal or state maximum contaminant levels (MCLs), non-zero maximum contaminant level goals (MCLGs), State of Maine maximum exposure guidelines (MEGs), or in their absence, an excess cancer risk of 1 x 10^{-6} or a hazard quotient of 1 per contaminant; and

- Provide long-term monitoring of surface water, sediments, groundwater, and fish to verify that the cleanup actions at the Site are protective of human health and the environment.

I. DEVELOPMENT AND SCREENING OF ALTERNATIVES

1. Statutory Requirements/Response Objectives

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences, including: a requirement that EPA's remedial action, when complete, must comply with all federal and more stringent state environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked; a requirement that EPA select a remedial action that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and a preference for remedies in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances is a principal element over remedies not involving such treatment. Response alternatives were developed to be consistent with these Congressional mandates.

2. Technology and Alternative Development and Screening

CERCLA and the National Contingency Plan (NCP) set forth the process by which remedial actions are evaluated and selected. In accordance with these requirements, a range of alternatives were developed for the Site.

With respect to the groundwater response action, the RI/FS developed a limited number of remedial alternatives that attain site-specific remediation levels within different time frames using different technologies, as well as a no-action alternative.

As discussed in Section 2 of the FS, groundwater treatment technology options were identified, assessed and screened based on implementability, effectiveness, and cost. Section 3 of the FS presented the remedial alternatives developed by combining the technologies identified in the previous screening process in the categories identified in Section 300.430(e)(3) of the NCP. The purpose of the initial screening was to narrow the number of potential remedial actions for further detailed analysis while preserving a range of options. Each alternative was then evaluated in detail in Section 4 of the FS.

J. DESCRIPTION OF ALTERNATIVES

This Section provides a narrative summary of each management of migration alternative evaluated.

Management of migration (MM) alternatives address contaminants that have migrated into and with the groundwater from the original source of contamination. At the Site, contaminants

have migrated from the surficial containers, leaking drums, and cans, and highly contaminated soils that were present at the Site prior to EPA's initial time-critical removal action and the NTCRA. The MM alternatives analyzed for the Site include:

- No Further Action
- Limited Action/Institutional Controls
- Groundwater Extraction With On-Site Treatment
- Groundwater Extraction With On-Site Treatment Along With Enhanced Flushing and/or Chemical Oxidation

Each of the four MM alternatives is summarized below. A more complete, detailed presentation of each alternative are found in Section 3 of the FS.

Alternative 1: No Further Action

No monitoring or other activities would take place beyond the NTCRA. The NTCRA source control groundwater system would be demobilized. Site use restrictions would be left to the local officials and/or State of Maine.

No costs are associated with this alternative.

Alternative 2: Limited Action/Institutional Controls

Long-term monitoring would be performed twice per year for 5 years and then annually for at least 30 years. The contamination is not expected to reduce to acceptable concentration for a period of approximately 150 years. Deed restrictions (e.g., easements and covenants) on the lands containing contaminated groundwater would be relied upon to prevent ingestion of contaminated groundwater.

Present Value: $2,624,000

Alternative 3: Groundwater Extraction With On-Site Treatment

This alternative would use groundwater extraction and on-site treatment to restore the aquifer to drinking water standards. The time period for restoration of the aquifer was estimated to be between 30-60 years. At the end of the period, the groundwater beneath and adjacent to the Site is expected to meet federal and state drinking water standards. Two contaminant plumes exist at the Site and each would be aggressively remediated using a series of extraction wells. Approximately 3-5 bedrock wells would be used to extract the groundwater from each plume. Overburden wells may be included as part of the extraction system for the southern plume. The flow rate would be determined by the design. All of the groundwater withdrawn by the extraction wells would be sent to a common treatment plant for treatment. The system is

expected to handle 10-20 gallons per minute of contaminated water. A series of carbon drums and filters would be used to reduce contaminants to federal and state drinking water standards prior to discharge into the overburden through an on-site infiltration gallery. PCE is expected to be the controlling constituent for the VOC treatment components and manganese for the inorganics.

Sampling of the monitoring wells, surface water, and nearby residents is expected to be performed twice per year for 5 years and then annually until cleanup is achieve. Costs were only estimated for 30 years of treatment system operation and monitoring.

Institutional controls in the form of deed restrictions, such as easements and covenants, would prevent groundwater use during the time period required for restoration of the groundwater. The State of Maine has agreed to impose institutional controls, in the form of restrictions or covenants that run with the land, on the two Site properties that it has agreed to accept ownership of. The ability of EPA or the State of Maine to secure deed restrictions on the property across Route 191, which contains the majority of the southern plume, however, may be difficult.

Capital Cost: $830,610
Total Net Present Value: $5,770,320 (assume 30 years at 7% discount rate)

Alternative 4: Groundwater Extraction With On-Site Treatment Along With Enhanced Flushing and/or Chemical Oxidation

This alternative would use groundwater extraction and on-site treatment to restore the aquifer to drinking water standards. It differs from Alternative 3 in that enhanced flushing and/or chemical oxidation of the aquifer will be used to reduce the time period required for restoration. It is assumed that these technologies will reduce the time period required for restoration to 5-10 years. At the end of the period, the groundwater beneath and adjacent to the Site is expected to meet federal and state drinking water standards. Two contaminant plumes exist at the Site and each would be aggressively remediated using a series of extraction wells. Approximately 3-5 bedrock wells would be used to extract the groundwater from each plume. Overburden wells may be included as part of the extraction system for the southern plume. The flow rate would be determined by the design. All of the groundwater withdrawn by the extraction wells would be sent to a common treatment plant for treatment. The system is expected to handle 10-20 gallons per minute of contaminated water. A series of carbon drums and filters would be used to reduce contaminants to federal and state drinking water standards prior to discharge into the overburden through an on-site infiltration gallery. PCE is expected to be the controlling constituent for the VOC treatment components and manganese for the inorganics.

Sampling of the monitoring wells, surface water, and nearby residents is expected to be performed twice per year for 5 years and then annually until cleanup is achieve. Costs were only estimated for 5 years of treatment system operation and monitoring.

Institutional controls in the form of deed restrictions, such as easement and covenants, would prevent groundwater use during the time period required for restoration of the groundwater. The State of Maine has agreed to impose institutional controls, in the form of restrictions or covenants that run with the land, on the two Site properties that it has agreed to accept ownership of. The ability of EPA or the State of Maine to secure deed restrictions on the property across Route 191, which contains the majority of the southern plume, however, may be difficult.

Capital Cost: $1,425,499
Total Net Present Value: $4,108,679 (assume 30 years at 7% discount rate)

K. SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 121(b)(1) of CERCLA presents several factors that at a minimum EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives.

A detailed analysis was performed on the alternatives using the nine evaluation criteria in order to select a site remedy. The following is a summary of the comparison of each alternative's strengths and weaknesses with respect to the nine evaluation criteria. These criteria are summarized as follows:

Threshold Criteria

The two threshold criteria described below must be met in order for the alternatives to be eligible for selection in accordance with the NCP:

1. Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with applicable or relevant and appropriate requirements (ARARs) addresses whether or not a remedy will meet all Federal environmental and more stringent State environmental and facility siting standards, requirements, criteria or limitations, unless a waiver is invoked.

Primary Balancing Criteria

The following five criteria are utilized to compare and evaluate the elements of one alternative to another that meet the threshold criteria:

3. Long-term effectiveness and permanence addresses the criteria that are utilized to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

4. Reduction of toxicity, mobility, or volume through treatment addresses the degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the Site.

5. Short term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until cleanup goals are achieved.

6. Implementability addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

7. Cost includes estimated capital and Operation Maintenance (O&M) costs, as well as present-worth costs.

Modifying Criteria

The modifying criteria are used as the final evaluation of remedial alternatives, generally after EPA has received public comment on the RI/FS and Proposed Plan:

8. State acceptance addresses the State's position and key concerns related to the preferred alternative and other alternatives, and the State's comments on ARARs or the proposed use of waivers.

9. Community acceptance addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS report.

Following the detailed analysis of each individual alternative, a comparative analysis, focusing on the relative performance of each alternative against the nine criteria, was conducted. A comparative analysis can be found as Table 4-5 of the FS.

Table 29 below presents the nine criteria and a brief narrative summary of the alternatives and the strengths and weaknesses according to the detailed and comparative analysis. Only those alternatives which satisfied the first two threshold criteria were balanced and modified using the remaining seven criteria.

Table 29 - Summary for the Comparative Analysis of Alternatives

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

Of the alternatives evaluated, the No Further Action and Limited Action/Institutional Controls Alternatives would not be protective as they would allow for continued migration of contaminated groundwater. Alternatives 3 and 4 are protective of human health and the environment by eliminating, reducing, or controlling risks posed by the Site through extraction and treatment of contaminated groundwater as well as controlling the off-site migration of contaminated groundwater. Institutional controls would also be included to prevent exposure during the time period required for restoration of the groundwater. Alternatives 3 and 4 provide comparable protection with Alternative 4 being more protective as the time period for restoration is shorter.

Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA requires that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA section 121(d)(4).

Applicable requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law that specifically address hazardous substances, the remedial action to be implemented at the Site, the location of the Site, or other circumstances present at the Site. Relevant and appropriate requirements are those substantive environmental protection requirements, criteria, or limitations promulgated under Federal or State law which, while not applicable to the hazardous materials found at the Site, the remedial action itself, the Site location or other circumstances at the Site, nevertheless address problems or situations sufficiently similar to those encountered at the Site that their use is well-suited to the Site.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes or provides a basis for invoking a waiver.

All alternatives, except the No Further Action Alternative, had common ARARs associated with the drinking water standards for groundwater. All alternatives, except Alternatives 1 and 2, will attain their respective Federal and State ARARs. Drinking water standards may never be met through Alternatives 1 or 2, with at least 150 years estimated for natural attenuation. These standards may be meet by the pump and treat alternatives in 30-60 years and within 5-10 years for pump and treat with enhanced flushing and/or chemical oxidation.

Because Alternatives 1 and 2 do not satisfy the first two threshold criteria, they were not analyzed using the seven remaining criteria.

Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once clean-up levels have been met. This criterion includes the consideration of residual risk and the adequacy and reliability of controls.

Alternative 3 provides a high degree of effectiveness and permanence with the removal of contaminants from the groundwater though treatment. Alternative 4 is more effective than Alternative 3 with the addition of enhanced flushing and/or chemical oxidation to more aggressively remove the contamination in the overburden and bedrock. Alternatives 3 and 4 are both effective and permanent in restoring groundwater quality by attaining drinking water standards in a reasonable time frame. Alternative 4 will achieve permanent restoration in the shortest time period.

Until the groundwater cleanup levels are achieved and the remedial action is determined to be protective by EPA, five-year reviews will be necessary to evaluate the effectiveness of any of these alternatives because hazardous substances would remain on-site in concentrations above health-based levels.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Alternatives 3 and 4 would provide comparable reductions in the mobility, volume, and toxicity of groundwater contamination at the Site. Volatile organic concentrations in groundwater would be reduced to drinking water standards through treatment of groundwater by carbon filters. The organics would eventually be destroyed by the carbon regeneration.

Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers and the community during construction and operation of the remedy until cleanup goals are achieved.

Alternatives 3 and 4 should be implemented within 1 year. The NTCRA has established much of the infrastructure needed to implement Alternatives 3 and 4. There would be the potential for limited exposure during installation of groundwater extraction wells and conveyance pipes. Implementation of Alternative 4 may involved increased construction risks due to the handling of chemical reagents.

Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

In general, Alternatives 3 and 4 can be easily implemented. All materials and services needed for implementation are readily, commercially available. The components necessary for the groundwater remedy are readily available and would not require any special engineering modification prior to use at the Site. Operation and maintenance of the carbon filters would include cleaning and replacement of well components, regeneration of activated carbon, and maintenance of the pumps. The institutional controls on the property across Route 191 from the "surficial" Site, however, may be difficult to implement.

Cost

Alternative 3 is estimated to cost $5.8 million, while Alternative 4 is estimated to cost $4.1 million. In comparison with Alternative 3, Alternative 4 will require additional costs for the enhanced flushing and/or chemical oxidation. However, the predicted shorter timeframe to achieve the groundwater cleanup goals will result in reduced operation and maintenance costs. Accordingly, Alternative 4 is the more cost effective than Alternative 3.

State / Support Agency Acceptance

The State has expressed its support for Alternatives 3 and 4. The State does not believe that Alternatives 1 or 2 provide adequate protection of human health and the environment.

Community Acceptance

During the public comment period, the community expressed its support for either Alternatives 3 or 4. The community was highly supportive of the proposed action and wants EPA to take the most aggressive approach to Site restoration. The Passamaquoddy Tribe submitted comments in support of the Alternative 4. The Passamaquoddy Tribe also requested additional long-term monitoring.

L. THE SELECTED REMEDY

1. Summary of the Rationale for the Selected Remedy

The selected remedy is the final component of a comprehensive remedy for the Site which utilizes groundwater extraction with on-site treatment along with enhanced flushing and/or chemical oxidation. The selected remedy is the proposed preferred alternative that was identified in the Proposed Plan and that was presented in more detail in the FS.

2. Description of Remedial Components

The major components of the remedy are:

- Extraction and treatment of the contaminated groundwater in two distinct plumes (northern plume and southern plume) will be performed. Groundwater from each of the two contaminated plumes will be extracted and treated by a common treatment system. Each extraction system will be designed to prevent off-site migration of contaminated groundwater and restore the aquifer to drinking water standards;

- The groundwater extraction system will be enhanced by flushing of treated water and/or injection of a chemical reagent to facilitate the removal of contamination;

- Land-use restrictions in the form of deed restrictions, such as easements and covenants to prevent ingestion of groundwater and disturbance of archaeological resources, will be used to control the two parcels of property that represent the surficial extent of the Site, which the State of Maine has agreed to own. The State has agreed to impose institutional controls that run with the land for these parcels. Institutional controls shall also be implemented on those other Site properties upon which groundwater contamination is located until groundwater meets cleanup levels;

- Long-term monitoring of groundwater, surface water, and sediments will be performed to evaluate the success of the remedial action. Additional biota sampling (fish, mammals, and plants) may also be performed, as necessary;

- Portions of the mitigation of adverse effects upon the archaeological resources at the Site,

caused by the non-time-critical removal action's soil excavation in 1999, will be performed as part of the remedial action; and

- Five-year reviews to assess protectiveness until cleanup goals have been met.

More specifically, the remedial action includes:

a. Installation of groundwater extraction wells. The data generated by the NTCRA source control groundwater system will be evaluated to determine the need for additional data gathering prior to the design of the remedy. It is assumed that additional wells will be installed to provide a better assessment of the depth of contamination. The groundwater extraction wells will be installed in locations that will allow for the interception of the groundwater contamination before the contamination leaves the Site boundary. The extraction wells will also be located to maximize the withdrawal of contaminated water and restore the groundwater as soon as possible.

b. Installation of a groundwater treatment system. The groundwater treatment system installed as part of the NTCRA will be operated and maintained to treat water collected by the extraction wells. Future expansion of the treatment system may be necessary to accommodate any additional extraction wells or to comply with discharge standards. The treated groundwater will be injected into an on-site infiltration gallery. The standards for reinjection of treated groundwater are the same as the groundwater cleanup standards for the Site.

c. Operation, maintenance, and monitoring of the treatment system, along with long-term monitoring of the groundwater, surface water, and sediments. The system shall be operated and maintained to ensure the continuing effectiveness of the treatment system. Influent and effluent monitoring will be performed to evaluate the effectiveness of the treatment system. Water level monitoring will be used to evaluate the capture zone of the wells. Groundwater monitoring will indicate the effectiveness of the system in restoring the groundwater. Additional monitoring of surface water, sediments and fish may also be performed as determined necessary to evaluate the effectiveness of the selected remedy.

d. Enhanced flushing and/or chemical oxidation of the aquifer to facilitate the removal of contamination from the bedrock and/or overburden. The major emphasis of the selected remedy is to use the best available techniques for reducing the time period required for restoration of the aquifer. This will achieve protection of human health more quickly and will also dramatically reduce the total cost of the remedy as the operation, maintenance, and monitoring over 60 years is substantial. The rate of injection of clean water and/or chemical reagent would be determined after pilots

tests. The chemical reagent addition will need to be designed and implemented in a manner that does not allow for groundwater discharge to the Dennys River or Meddybemps Lake that would violate the State Water Quality Standards. In addition, any reagent addition would also need to be evaluated with respect to any potential impacts on the treatment plant.

e. Institutional controls to prevent ingestion of groundwater during the period required for restoration and to protect archaeological resources. The State of Maine has agreed to implement institutional controls, such as restrictions and covenants that run with the land, on the Site properties that it has agreed to accept ownership of. Under the Consent Decree for the Site, the current property owners will transfer ownership of the two parcels of property that represent the surficial extent of the Site to the State of Maine. Institutional controls to prevent use of the contaminated groundwater will be implemented until the groundwater is restored to cleanup standards. Institutional controls with respect to the southern plume may be difficult to implement as the property upon which portions of the southern plume exist is owned by individuals, whom are not parties to the Consent Decree that obligates the other property owners to cooperate with EPA. In addition, institutional controls will be implemented on the portions of the Site containing archaeological resources (located in the northern portion of the Site) to prevent excavation or any other unauthorized disturbance of the archaeological resources.

In addition to federal and state drinking water standards that will define the discharge criteria and cleanup levels, the National Historic Preservation Act (NHPA) will impact the implementation of the selected remedy. One of the first actions to be undertaken as part of the selected remedy will be the continuation of the mitigation efforts required to offset adverse effects upon the archaeological resources at the Site caused by the NTCRA. The NTCRA resulted in unavoidable adverse effects because the excavation and off-site disposal of contaminated soils meant that certain archaeological resources were irretrievably lost. A Memorandum of Agreement with respect to the mitigation of adverse effects has been signed by EPA, the Maine Historic Preservation Commission, the Passamaquoddy Tribe, and the national Advisory Council on Historic Preservation, which memorialized the exact nature of the mitigation effort, as required by the NHPA. This effort includes additional archaeological field investigation extending over 200 square meters, reports addressing the scientific and cultural value of the recovered materials, and generation of popular reporting materials to transmit the findings to the public. The excavation portion of the mitigation requirements will be completed as part of the NTCRA. The long-term evaluation, documentation, and public outreach will be addressed as part of the Selected remedy.

After the cleanup levels have been met for three years and the remedy is determined to be protective, the groundwater treatment system will be shut down. The groundwater monitoring system will be utilized to collect information quarterly for three years to ensure

that the cleanup levels have been met and the remedy is protective.

To the extent required by law, EPA will review the Site at least once every five years after the initiation of remedial action at the Site if any hazardous substances, pollutants or contaminants remain at the Site (until the groundwater cleanup goals are met) to assure that the remedial action continues to protect human health and the environment.

The selected remedy may change somewhat as a result of the remedial design and construction processes. Changes to the remedy described in this Record of Decision will be documented in a technical memorandum in the Administrative Record for the Site, an Explanation of Significant Differences or a Record of Decision Amendment, as appropriate.

3. Summary of the Estimated Remedy Costs

Item	Description	Quantity	Unit	Cost
1.	Pre-Design Investigation			
	Drilling and installation of bedrock and overburden wells	8 bedrock 6 overburden	Lump sum (LS)	$191,966
	Enhanced flushing and chemical oxidation pilot tests			$180,000
	Field staff	6 persons	LS	$72,615
2.	Design			
	Design Preparation			$23,520
	Procurement			$17,450
3.	Construction			
	Injection Wells	9	LS	$94,832
	Mobilization/Demobilization		LS	$39,770
	Trenching and Piping	1100 feet	LS	$44,040
	Extraction Equipment		LS	$113,511
	Electrical Equipment		LS	$18,745
	Construction Oversight		LS	$45,500
	Construction personnel and field equipment		LS	$86,350
4.	Start-Up Testing		LS	$43,400
	Sub-total			$971,699
	Contractor mark-ups			$308,000
	Contingency (15%)			$145,800
	Capital Cost Total			$1,425,499

Year	Capital Cost	Annual Cost	Total Cost	Discount Factor	Present Worth
0	1,425,499	$300,000	$1,725,499	1	$1,725,499
1		$584,860	$584,860	0.935	$546,600
2		$584,860	$584,860	0.873	$510,840
3		$486,730	$486,730	0.816	$397,320
4		$486,730	$486,730	0.763	$371,330
5		$510,730	$510,730	0.713	$389,460
6-9		0	0	0	0
10		$157,000	$157,000	0.508	$97,860
11-14		0	0	0	0
15		$157,000	$157,000	0.362	$69,770
	Total Present Worth				$4,108,679

Long-Term Monitoring	$133,000 per event for 2 sampling events (groundwater, surface water, and sediments) for years 0-5, with 1 sampling event during years 10 and 15 $24,000 additional in years 0, 5, 10, and 15 for sediment sampling
5-year reviews	$35,500 per review
Operation and Maintenance of Pump and Treat System (included in these O&M costs are the costs for the injection of a chemical reagent)	$318,000 for years 1 and 2 $220,000 for years 3-5
	All costs assume that the enhanced flushing and/or chemical oxidation will reduce the operating time of groundwater extraction and treatment system to 5 years. Costs for an additional five years of operation and maintenance are approximately $700,000.

The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the Administrative Record file, an ESD, or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

4. Expected Outcomes of the Selected Remedy

The primary expected outcome of the selected remedy is that the entire Site will no longer present an unacceptable risk to future users of the groundwater via ingestion and inhalation of groundwater and will be suitable for unrestricted use. Approximately 5-10 years are estimated as the amount of time necessary to achieve the goals consistent with future residential land use. The selected remedy will also reduce the flux of VOCs into the Dennys River. The previous removal actions, including the NTCRA, have eliminated any threat from exposure to Site soils. It is anticipated that the selected remedy will also provide socio-economic and community revitalization impacts such as the Site potentially being used as a park or as a resource for future archaeological studies.

a. Cleanup Levels--Interim Groundwater Cleanup Levels

Interim cleanup levels have been established in groundwater for all chemicals of concern identified in the Baseline Risk Assessment found to pose an unacceptable risk to either public health or the environment. Interim cleanup levels have been set based on the ARARs (e.g., MCLs and more stringent State groundwater remediation standards) as available, or other suitable criteria described below. Periodic assessments of the protection afforded by remedial actions will be made as the remedy is being implemented and at the completion of the remedial action. At the time that Interim Groundwater Cleanup Levels identified in the ROD, ARARs, and newly promulgated ARARs and modified ARARs which call into question the protectiveness of the remedy have been achieved and have not been exceeded for a period of three consecutive years, a risk assessment shall be performed on all residual groundwater contamination to determine whether the remedial action is protective. This risk assessment of the residual groundwater contamination shall follow EPA procedures and will assess the cumulative carcinogenic and non-carcinogenic risks posed by all chemicals of concern (including but not limited to the chemicals of concern) via ingestion and dermal contact of groundwater and inhalation of VOCs from domestic water usage. If, after review of the risk assessment, the remedial action is not determined to be protective by EPA, the remedial action shall continue until either protective levels are achieved, and are not exceeded for a period of three consecutive years, or until the remedy is otherwise deemed protective or is modified. These protective residual levels shall constitute the final cleanup levels for this

ROD and shall be considered performance standards for this remedial action.

Because the aquifer under the Site is a potential drinking water source, MCLs, non-zero MCLGs established under the Safe Drinking Water Act, and State of Maine maximum exposure guidelines (MEGs) are ARARs.

Interim cleanup levels for known, probable, and possible carcinogenic chemicals of concern (Classes A, B, and C) have been established to protect against potential carcinogenic effects and to conform with ARARs. Since MCLGs for Class A and B compounds are set at zero and are thus not suitable for use as interim cleanup levels, MCLs have been selected as the interim cleanup levels for these chemicals of concern. MCLGs for the Class C compounds are greater than zero, and can readily be confirmed; thus MCLGs have been selected as the interim cleanup levels for Class C chemicals of concern.

Interim cleanup levels for Class D and E chemicals of concern (not classified, and no evidence of carcinogenicity) have been established to protect against potential non-carcinogenic effects and to conform with ARARs. Because the MCLGs for these Classes are greater than zero and can readily be confirmed, MCLGs and proposed MCLGs have been selected as the interim cleanup levels for these classes of chemicals of concern.

Where a promulgated State standard is more stringent than values established under the Safe Drinking Water Act, the State standard was used as the interim cleanup level. In the absence of an MCLG, an MCL, a proposed MCLG, proposed MCL, a more stringent State standard, or other suitable criteria to be considered (e.g., health advisory, state guideline), an interim cleanup level was derived for each chemical of concern having carcinogenic potential (Classes A, B, and C compounds) based on a 10^{-6} excess cancer risk level per compound considering the current or future ingestion of groundwater from domestic water usage. In the absence of the above standards and criteria, interim cleanup levels for all other chemicals of concern (Classes D and E) were established based on a level that represent an acceptable exposure level to which the human population including sensitive subgroups may be exposed without adverse affect during a lifetime or part of a lifetime, incorporating an adequate margin of safety (hazard quotient = 1) considering the current or future ingestion of groundwater from domestic water usage.

Three constituents (arsenic, chromium, and cis 1,3 dichloropropene) were evaluated as contaminants of concern in the risk assessment were not retained as a final contaminants of concern and, therefore, cleanup levels were not established for these constituents. Arsenic and chromium were eliminated as site-specific contaminants of concern because the levels detected within the Site groundwater were below the federal MCLs. In addition arsenic and chromium were within the range found in local groundwater as background levels. Cis 1,3 dichloropropene was eliminated as a

contaminant of concern because it was detected in only 1 of 36 samples and at a concentration that did not exceed the federal MCL.

Table 30 below summarizes the Interim Cleanup Levels for carcinogenic and non-carcinogenic chemicals of concern identified in groundwater.

Table 30 - Interim Groundwater Cleanup Levels

Carcinogenic Chemicals of Concern	Cancer Classification	Interim Cleanup Level (ug/l)	Basis	RME Hazard Quotient	Target Engpoint	RME Risk
1,1,2 trichloroethane	C	3	MEG	0.02	Blood	2E-06
trichloroethene	B2	5	MCL	0.02	Cardiovascular/liver/CNS	6.4E-06
tetrachloroethene	B2	3	MEG	0.008	liver	1.8E-06
chloromethane	C	3	MEG	na	na	4.6E-07
methylene chloride	B2	5	MCL	0.002	liver	4.4E-07
polychlorinated biphenyls (PCBs)	B2	0.05	MEG	0.07	Skin/eye	1.1E-06
bis (2-ethyl hexyl)phthalate	C	6	MCL	0.008	liver	9.8E-07
Sum of Carcinogenic Risk						**1.1E-05**

Non-Carcinogenic Chemicals of Concern	Target Endpoint	Interim Cleanup Level (ug/l)	Basis			RME Hazard Quotient
cis-1,2 dichloroethene	liver	70	MCL/MCLG			0.19
manganese	central nervous system	200	MEG			0.17
antimony	blood	6	MCL/MCLG			0.4
cadmiun	kidney	5	MCL/MCLG			0.31
lead	central nervous system	15	Action Level			NA
xylene	central nervous system	600	MEG			0.008
1,1-dichloroethane	none observed	5	MEG			0.001
HI (liver): 0.23		**HI (central nervous system): 0.2**				
HI (blood): 0.42		**HI (Kidney): 0.3 HI (skin/eye): 0.07**				

Key

MCL: Federal Safe Drinking Water Act Maximum Contaminant Level
MCLG: Federal Safe Drinking Water Act Maximum Contaminant Level Goal
MEG: State of Maine Maximum Exposure Guidelines
HI: Hazard Index
RME: Reasonable Maximum Exposure

All Interim Groundwater Cleanup Levels identified in the ROD, ARARs, and newly promulgated ARARs and modified ARARs which call into question the protectiveness of the remedy and the protective levels determined as a consequence of the risk assessment of residual contamination, must be met at the completion of the remedial action at the points of compliance. At this Site, Interim Cleanup Levels must be met throughout the contaminated groundwater plume. The interim values represent concentration levels that cannot be exceeded in any given well location at the Site. EPA has estimated that the Interim Groundwater Cleanup levels will be obtained within 5-10 years after the initiation of the selected remedy.

M. STATUTORY DETERMINATIONS

The remedial action selected for implementation at the Eastern Surplus Company Superfund Site is consistent with CERCLA and, to the extent practicable, the NCP. The selected remedy is protective of human health and the environment, will comply with ARARs and is cost effective. In addition, the selected remedy utilizes permanent solutions and alternate treatment technologies or resource recovery technologies to the maximum extent practicable, and satisfies the statutory preference for treatment that permanently and significantly reduces the mobility, toxicity or volume of hazardous substances as a principal element.

1. The Selected Remedy is Protective of Human Health and the Environment

The remedy at this Site will adequately protect human health and the environment by eliminating, reducing or controlling exposures to human and environmental receptors through treatment, engineering controls and institutional controls. More specifically, the selected remedy's (Alternative GW4) groundwater extraction system will also prevent the discharge of contaminated water into the Dennys River and Meddybemps Lake. Institutional controls will limit future Site use to prevent ingestion of groundwater during the period required for restoration. Long-term monitoring will allow for the evaluation of the cleanup and the identification of any future threats. The groundwater extraction and treatment system will prevent off-site migration of contamination and promote the restoration of the aquifer. As local residents are dependent upon groundwater for their water supply the containment of the plume and restoration of the groundwater are keys to protecting public health.

The selected remedy will reduce potential human health risk levels such that they do not

exceed EPA's acceptable risk range of 10^{-4} to 10^{-6} for incremental carcinogenic risk and such that the non-carcinogenic hazard is below a level of concern. It will reduce potential human health risk levels to protective ARARs levels, i.e., the remedy will comply with ARARs and To Be Considered criteria. Implementation of the selected remedy will not pose any unacceptable short-term risks or cause any cross-media impacts.

At the time that the ARAR-based Interim Groundwater Cleanup Levels identified in the ROD and newly promulgated ARARs and modified ARARs that call into question the protectiveness of the remedy have been achieved and have not been exceeded for a period of three consecutive years, a risk assessment shall be performed on the residual groundwater contamination to determine whether the remedy is protective. This risk assessment of the residual groundwater contamination shall follow EPA procedures and will assess the cumulative carcinogenic and non-carcinogenic risks posed by ingestion of groundwater and inhalation of VOCs from domestic water usage If, after review of the risk assessment, the remedy is not determined to be protective by EPA, the remedial action shall continue until protective levels are achieved and have not been exceeded for a period of three consecutive years, or until the remedy is otherwise deemed protective. These protective residual levels shall constitute the final cleanup levels for this Record of Decision and shall be considered performance standards for any remedial action.

2. The Selected Remedy Complies With ARARs

The selected remedy will comply with all federal and any more stringent state ARARs that pertain to the Site. In particular, this remedy will comply with the following ARARs.

ARARs that define the cleanup levels that must be achieved by the selected action are:

Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs), 40 CFR 141.11 - 141.16. The SDWA MCLs and non-zero MCLGs are relevant and appropriate because they are the basis for some of the interim cleanup levels (i.e., the Interim Groundwater Cleanup Levels) for the Site groundwater, which is a potential future drinking water source. MCLs were identified as a chemical specific standard in the FS. The Maine Department of Human Services Rule (10-144 CMR 231-233) standards are also chemical specific ARARs. The Maine primary drinking water standards are equivalent to MCLs. The selected remedy is expected to result in groundwater meeting the concentration requirements of the SDWA as specified as MCLs.

Maine Standards for Hazardous Waste Facilities, Miscellaneous Units (06-096 CMR Chapter 854, Section 15) Maximum Exposure Guidelines (MEGs). The Maine MEGs are the basis for some of the interim cleanup levels (i.e., the Interim Groundwater Cleanup Levels) for the Site groundwater. MEGs were identified as an action specific standard in the FS. The Maine Standards for Hazardous Waste Facilities require that a miscellaneous

unit must be closed in a manner that will ensure that hazardous waste shall not appear in ground or surface waters above MEGs. MEGs are relevant and appropriate because the Site is considered analogous to a miscellaneous hazardous waste unit. The selected remedy is expected to result in groundwater meeting the concentration requirements of the Maine MEGs.

In addition, Cancer Slope Factors (CSFs) and Reference Doses (RFDs) were included as criteria "to be considered" in establishing cleanup levels in the absence of a SWDA MCL or Maine MEG. CSFs and RFDs are guidance values used to evaluate the potential respective carcinogenic and non-carcinogenic hazard caused by exposure to Site contaminants. The recently issued Maine Department of Human Services, Maximum Exposure Guidelines for Drinking Water (MEGs), dated January 20, 2000 will be used as guidance for establishing cleanup levels when MCLs, non-zero MCLGs, and promulgated MEGs (1992) are not available.

ARARs that apply to the extraction, treatment, and reinjection of the contaminated groundwater are:

Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCLs), 40 CFR 141.11 - 141.16. The SDWA MCLs and non-zero MCLGs are relevant and appropriate as reinjection criteria because they define levels that would be protective to a future user of the groundwater. MCLs were identified as a action specific standard in the FS with respect to the reinjection/recharge limits for the treatment plant. The Maine Department of Human Services Rule (10-144 CMR 231-233) standards are also action specific ARARs. The Maine primary drinking water standards are equivalent to MCLs. The selected remedy is expected to result in extracted groundwater being treated such that the effluent does not exceed MCLs prior to reinjection into the ground.

Underground Injection Control Regulations (40 CFR Parts 144, 145, 146, and 147). These regulations are relevant and appropriate because they provide regulatory compliance standards for treatment facilities that inject wastes underground. These regulations prohibit the use of wells to dispose of wastes. Treatment of the extracted groundwater to meet MCLs will result in the groundwater no longer being considered a hazardous waste; therefore, the selected remedy will comply with this requirement. In-Situ injection of reagents is not considered to be classified as disposal of a waste.

RCRA Air Emission Standards for Equipment Leaks (40 CFR 264 Subpart BB). This regulation contains air pollutant emission standards for equipment leaks at hazardous waste treatment, storage, and disposal facilities. The rule is applicable when the waste stream has an organic concentration of at least 10 percent by weight. As it is unlikely that the trigger concentration will be exceeded by the selected remedy as maximum concentrations, these regulations are considered relevant and appropriate for the selected

remedy. A leak detection and repair program will be implemented during groundwater treatment to comply with these standards.

RCRA Containment Building Requirements (40 CFR 264 Subpart DD). This regulation is relevant and appropriate because it contains design, operation, closure, and post-closure standards and requirements for the storage and treatment of hazardous waste in containment buildings. The design, operation, closure, and post-closure of the selected remedy's groundwater treatment building will comply with requirements.

Clean Air Act - National Emissions Standards for Vinyl Chloride (40 CFR 61 Subpart F). These regulations are relevant and appropriate because vinyl chloride was detected at the Site. Any air emissions from the groundwater treatment will be monitored to comply with the requirements of these regulations.

Maine Standards for Hazardous Waste Facilities, Miscellaneous Units (06-096 CMR Chapter 854, Section 15) Maximum Exposure Guidelines (MEGs). MEGs were identified as an action specific standard in the FS. The Maine Standards for Hazardous Waste Facilities require that a miscellaneous unit must be closed in a manner that will ensure that hazardous waste shall not appear in ground or surface waters above MEGs. MEGs are relevant and appropriate because the Site is considered analogous to a miscellaneous hazardous waste unit. The selected remedy's treatment of extracted groundwater will result in effluent that does not exceed MEGs prior to reinjection into the ground.

Maine Ambient Air Quality Standards (38 MRSA 584; 06-096 CMR Chapter 110). These regulations are relevant and appropriate because they establish ambient air quality standards for certain pollutants that have been detected at the Site. The emissions from the selected remedy will be monitored to ensure that the requirements in these regulations are met.

Maine Solid Waste Management Rules (06-096 CMR, Chapter 400.1). The regulations are applicable to the management of non-hazardous waste generated by the selected remedy. The spent carbon units may be managed under these requirements if they are determined to be non-hazardous.

Maine Air Pollution Control Laws - Maine Emissions License Regulations (38 MSRA 585, 590-591; 06-096 CMR Chapter 115). These regulations would be relevant and appropriate to the selected remedy if a technology employing air emissions is included in the treatment plant. At this time, no air emission technologies are planned for inclusion in the treatment plant.

Maine Rules to Control the Subsurface Discharge of Pollutants by Well Injection (06-096

CMR Chapter 543). These regulations are relevant and appropriate because they provide regulatory compliance standards for treatment facilities that inject wastes underground. The use of wells to dispose of wastes is prohibited. Treatment of the extracted groundwater to meet MCLs will result in the groundwater no longer being considered a hazardous waste; therefore, the selected action will comply with this requirement. In-Situ injection of reagents is not considered to be classified as the disposal of a waste.

Other criteria "to be considered" in the operation of the groundwater extraction and treatment system include:

Maine Department of Human Services, Interim Ambient Air Guidelines, Memorandum dated February 23, 1993. This memorandum provides a list of risk based criteria that apply to the ambient air as protective levels. The selected remedy is not expected to create an air emission release. Monitoring of the Site during the NTCRA has confirmed that there is not a concern regarding ambient air.

Maine Department of Human Services, Maximum Exposure Guidelines for Drinking Water (MEGs), Memorandum dated January 20, 2000. While not promulgated, these 2000 MEGs will be used to set treatment effluent levels when MCLs, non-zero MCLGs, and promulgated MEGs (1992) are not available.

ARARs that apply as a result of the location of the Site are:

Protection of Wetlands (Executive Order 11990, 40 CFR 6.302(a) and 40 CFR 6, App. A (Policy on Implementing E.O. 11990)). Federal agencies are required to avoid undertaking or providing assistance for new construction located in wetlands unless there is no practicable alternative and the proposed action includes all practicable measures to minimize harm to wetlands that may result from such use. There is a small wetland area in the northeast corner of the Site. There may be some unavoidable impacts to this wetland if monitoring wells or groundwater extraction wells must be located in this area to accomplish the remedial action. If any impacts occur, then all practical measures will be taken to minimize and mitigate any adverse effects.

Floodplain Management (Executive Order 11988, 40 CFR 6.302(b) and 40 CFR 6, App. A (Policy on Implementing E.O. 11988)). Federal agencies are required to avoid impacts associated with the occupancy and modification of a floodplain and avoid support of floodplain development wherever there is a practicable alternative. While there is no floodplain delineation for the area in which the Site is located, there may be limited activities associated with the installation of monitoring wells and sampling in the area that is seasonally flooded and is likely within the floodplain. The selected remedy will comply with these requirements by avoiding work in the potential floodplain to the extent practicable and minimizing the impacts to the function of the floodplain when impacts are

unavoidable.

National Historic Preservation Act (16 USC 470 et seq; 40 CFR 800). These requirements are applicable because they contain provisions for the identification of and consideration of impacts on any historic properties prior to any federal undertaking. Previous work at the Site has identified historic properties (archaeological resources) that result in portions of the Site being deemed eligible for listing on the National Register of Historic Places. EPA has followed the NHPA Section 106 procedures for consultation with the Maine Historic Preservation Commission (the State Historic Preservation Officer), the national Advisory Council on Historic Preservation, the Passamaquoddy Tribe, and other consulting parties. Because adverse effects resulting from the implementation of the NTCRA on the Site's archaeological resources were unavoidable, steps have been and will be taken to minimize and mitigate the adverse effects in accordance with the NHPA. An agreement regarding the scope of mitigation activities has been reached, and a Memorandum of Agreement has been executed to memorialize such agreement. The excavation portion of the mitigation requirements will be completed as part of the NTCRA. The long-term evaluation, documentation, and public outreach will be addressed as part of the selected remedy.

Endangered Species Act (16 USC 1531 et seq.; 40 CFR 6.302 (h)). This statute requires that federal agencies avoid activities that jeopardize threatened or endangered species or adversely modify habitats essential to their survival. One threatened species, the American Bald Eagle, inhabits the area in which the Site is located. No endangered or threatened species were identified on-site. In addition, the selected remedy is not anticipated to jeopardize or have an adverse effect on the American Bald Eagle or any other threatened or endangered species. Rather, the selected remedy combined with the NTCRA will reduce the levels of contamination in the habitat of the American Bald Eagle and the Atlantic Salmon (if listed).

Maine Wetlands Protection Rule (06-096 CMR Chapter 310, Section 1). This rule is applicable because activities adjacent to a freshwater wetland greater than 10 acres or with an associated stream, brook, or pond must not unreasonably interfere with certain natural features, such as natural flow, quality of waters, nor harm significant aquatic habitat, freshwater fisheries, or other aquatic life. The selected remedy will comply with this requirement through minimization of any impacts along the shoreline and river bank along with erosion and sediment control practices during any necessary activities within 100 feet of the surface water or wetland.

Maine Natural Resources Protection Act, Permit by Rule Standards (06-096 CMR Chapter 305). The rule is applicable because it prescribes standards for specific activities that may take place in or adjacent to wetlands or water bodies. The standards are designed to ensure that the disturbed soil material is stabilized to prevent erosion and siltation of the water. There will be minimal activities during the remedial action that

cause a substantial disturbance of the soil. Erosion control and sediment control measures will be put in place to meet the requirements of this rule.

Maine Endangered Species Act and Regulations (12 MSRA Section 7751-7756; 09-137 CMR 008). The State of Maine determines the appropriate uses of habitat for species on the Maine Watch List, Special Concern List, and Indeterminate Category. A freshwater mussel, the brook floater, occurs in the vicinity of the Site and is a Special Concern species in Maine. The selected remedy is not expected to have an impact on this species. The injection of the chemical reagents into the groundwater will be under a controlled situation that will minimize the potential for discharge of any chemicals into the surface water. This regulation would only be applicable if such species are encountered.

Maine Site Location Law and Regulations (38 MRSA Sections 481-490; 06-096 CMR Chapter 375. These regulations are relevant and appropriate because they prescribe standards for specific activities that are considered to be a development. The selected remedy will comply with these standards by preventing unreasonable adverse effects to: air quality; runoff/infiltration relationships and surface water quality; and alteration of climate or natural drainage-ways as well as implementing erosion, sediment, and noise controls.

A discussion of why these requirements are applicable or relevant and appropriate may be found in the FS Report in Section 2.

3. The Selected Remedy is Cost-Effective

In EPA's judgment, the selected remedy is cost-effective because the remedy's costs are proportional to its overall effectiveness (see 40 CFR 300.430(f)(1)(ii)(D)). This determination was made by evaluating the overall effectiveness of those alternatives that satisfied the threshold criteria (i.e., that are protective of human health and the environment and comply with all federal and any more stringent State ARARs, or as appropriate, waive ARARs). Overall effectiveness was evaluated by assessing three of the five balancing criteria -- long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness, in combination. The overall effectiveness of each alternative then was compared to the alternative's costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence represents a reasonable value for the money to be spent. As only two alternatives were considered to be protective and ARAR compliant, the evaluation of the most cost effective alternative was based upon a comparison of the costs between Alternative 3 (with a net present value of $5.8 million) and Alternative 4 (with a net present value of $4.1 million). The only substantive differences between the two are Alternative 4's cost for the chemical reagent addition and the reduced time period for operation, maintenance, and monitoring (and the resulting reduction in long-term operation

and maintenance costs). The selected remedy (Alternative 4) will attain cleanup goals in 5-10 years as opposed to the 30-60 years estimated for Alternative 3. Therefore, Alternative 4 is the most cost effective of the alternatives evaluated.

4. The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

Once EPA identified those alternatives that attain or, as appropriate, waive ARARs and that are protective of human health and the environment, EPA then identified which alternative utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. This determination was made by deciding which one of the identified alternatives provides the best balance of trade-offs among alternatives in terms of: 1) long-term effectiveness and permanence; 2) reduction of toxicity, mobility or volume through treatment; 3) short-term effectiveness; 4) implementability; and 5) cost. The balancing test emphasized long-term effectiveness and permanence and the reduction of toxicity, mobility and volume through treatment; and considered the preference for treatment as a principal element, the bias against off-site land disposal of untreated waste, and community and state acceptance. The selected remedy provides the best balance of trade-offs among the alternatives.

Only two alternatives were considered to be protective and able to fully comply with ARARs. Alternative 1 (No Further Action) was not considered to be protective or compliant with ARARs. Alternative 2 (Limited Action/Institutional Controls) would be more protective; however, compliance with groundwater cleanup ARARs is uncertain. Of the four alternatives evaluated, only two alternatives, Alternative 3 (Groundwater Extraction With On-Site Treatment) and Alternative 4 (Groundwater Extraction with On-Site Treatment Along With Enhanced Flushing and/or Chemical Oxidation), are protective and fully compliant with ARARs. Both Alternatives 3 and 4 achieve similar degrees of long-term effectiveness and permanence while using treatment to reduce the toxicity, mobility, or volume. Treatment is a principle element of both Alternative 3 and Alternative 4. The State of Maine and the community were very supportive of both Alternative 3 and Alternative 4. However, the potential to achieve cleanup goals in a shorter timeframe and at a lower cost supports the selection of Alternative 4 over Alternative 3.

5. The Selected Remedy Satisfies the Preference for Treatment Which Permanently and Significantly Reduces the Toxicity, Mobility or Volume of the Hazardous Substances as a Principal Element

The principal element of the selected remedy is the extraction and treatment of contaminated groundwater. This element addresses the primary threat at the Site, contamination of groundwater, as defined by the risk to local water supplies and the exceedance of MCLs. The selected remedy satisfies the statutory preference for treatment as

a principal element by reducing the contamination in the aquifer through extraction and treatment of the contaminated groundwater.

6. Five-Year Reviews of the Selected Remedy are Required

Because this remedy will result in hazardous substances remaining on-site above levels that will not allow for unlimited use and unrestricted exposure, a review will be conducted within five years after initiation of the remedial action, until the groundwater cleanup goals are met, to ensure that the remedy continues to provide adequate protection of human health and the environment.

N. DOCUMENTATION OF NO SIGNIFICANT CHANGES

EPA presented a proposed plan that described extraction and treatment of the groundwater along with the possibly use of enhanced flushing and/or chemical oxidation as the proposed long-term remediation of the Site on August 19, 1999. EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the proposed plan, were necessary.

One cleanup standard has been modified since the Proposed Plan. The cleanup standard for PCBs has been revised to 0.05 ug/l to reflect the State of Maine MEG as opposed to the federal MCL. This change results in the cleanup being more protective. As MCLs and MEGs were identified as the basis for cleanup levels in the FS and Proposed Plan, this change is not considered significant.

O. STATE ROLE

The State of Maine Department of Environmental Protection has reviewed the various alternatives and has indicated its support for the selected remedy. The State has also reviewed the Remedial Investigation, Risk Assessment and Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate State environmental and facility siting laws and regulations. The State of Maine concurs with the selected remedy for the Eastern Surplus Company Superfund Site. A copy of the declaration of concurrence is attached as Appendix B.