RECORD OF DECISION

REMEDIAL ALTERNATIVE SELECTION

Site: Ottati & Goss/Great Lakes Container Corporation

Kingston, New Hampshire

Documents Reviewed

I am basing my decision concerning the appropriate remedial alternative for the Ottati & Goss/Great Lakes Container Corporation Site (O&G/GLCC Site) primarily on the following documents. A substantial number of additional documents are included in the administrative record as well.

1. O&G/GLCC Remedial Investigation/Feasibility Study, Volumes I-VII, August 1986, prepared by Goldberg-Zoino and Associates, Inc.

2. Summary of Remedial Alternative Selection.

3. Community Relations Responsiveness Summary.

4. December 1985 Opinion in United States, et al. v. Ottati & Goss, Inc., et al

5. Testimony and Exhibits introduced in United States, et al. v. Ottati & Goss, Inc., et. al

6. Public Comments

7. The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. §§ 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986.

8. The National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300, November 20, 1985.

Description of Preferred Remedial Alternative

- Excavation of approximately 5,000 cubic yards of PCB contaminated soil and sediments followed by destruction of contaminants by incineration.

- Aeration (low temperature thermal stripping) of approximately 14,000 cubic yards of contaminated soils.

- Installation of groundwater extraction and treatment system with discharge of treated groundwater to upgradient groundwater, and possibly, to local surface waters.

- Site grading and disposal of contaminated GLCC building materials.

- Site Cover

- Installation of groundwater monitoring system, drinking water surveillance program, and Country Pond monitoring system.

° Operation and Maintenance

Maintenance will include lawn mowing of the grass cover system, clearing obstructions from the site stormwater drainage systems, and regrading of the site as necessary. Monitoring will include sampling and analysis of upgradient and downgradient monitoring wells; of surface waters including Country Pond; and of area private water supply wells.

Declaration

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA or the 1986 Act), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R Part 300. I have determined that at the O&G/GLCC Superfund Site, the selected remedial alternative is cost-effective, consistent with a permanent remedy and provides adequate protection of public health and welfare and the environment.

The State of New Hampshire has been consulted and concurs with the selected remedial alternative.

I have determined that the action being taken is consistent with Section 121 of SARA and is appropriate when balanced against the availability of Trust Fund monies for use at other sites.

The action will require operation and maintenance activities to ensure continued effectiveness of the remedial alternative as well as to insure that the performance objectives meet applicable state surface and groundwater quality criteria.

1/16/87
Date

Regional Administrator

The authority to sign this Record of Decision under the 1986 Superfund Amendments has not yet been delegated by President Reagan. This ROD will become effective upon my receipt of such delegation.

1/16/87
Date

Regional Administrator

SITE DESCRIPTION AND SUMMARY OF REMEDIAL ALTERNATIVE SELECTION FOR THE OTTATI & GOSS/GREAT LAKES CONTAINER CORPORATION SITE

January 16, 1987
US EPA
Boston, Massachusetts

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FIGURES

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SITE DESCRIPTION AND SUMMARY OF REMEDIAL ALTERNATIVE SELECTION FOR THE OTTATI & GOSS/GREAT LAKES CONTAINER CORPORATION SITE

SITE LOCATION AND DESCRIPTION

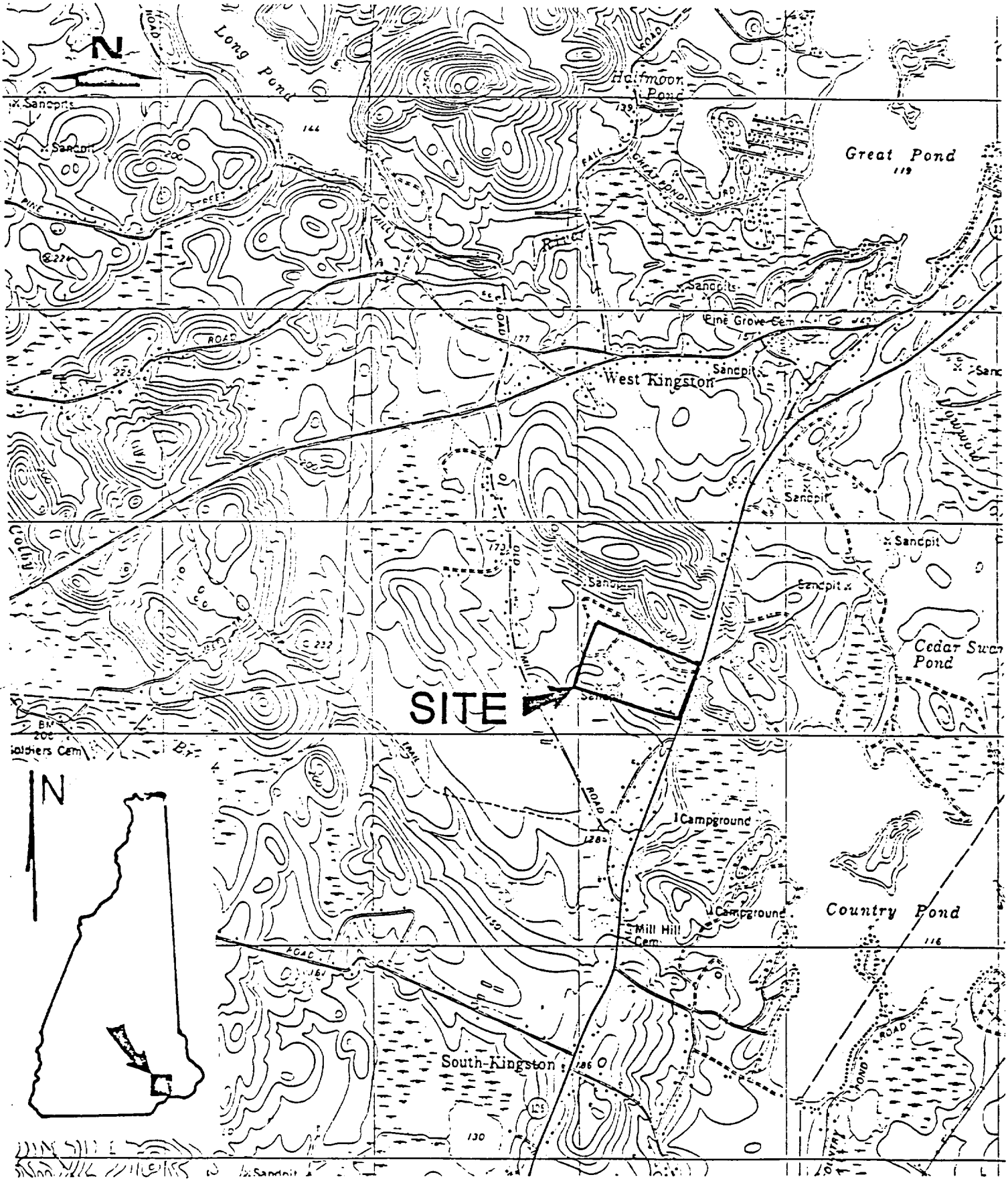
The Ottati & Goss/Great Lakes Container Corporation (O&G/GLCC) site was placed on the National Priorities List on September, 1981. The site is located immediately west of Route 125 in Kingston, New Hampshire, as shown on Figure 1. The entire site, depicted on Figure 2, consists of approximately 35 acres. The site is bounded on its easterly side by Route 125 and is traversed by an Exeter-Hampton Electric Company power line easement. Approximately 28 acres of the site are owned by the Senter Transportation Co. (Senter) with the remaining 5.88-acre portion currently owned by Great Lakes Container Corporation (GLCC). The GLCC property contains a one-story cinder block building. Senter Transportation leased an approximately one-acre parcel in the southwestern portion of the site to the Ottati & Goss, Inc. in 1978.

The site occupies an east-west trending topographic valley which drains to the east toward a marsh area east of Route 125. Site topographic relief is on the order of 10 feet, decreasing from a ground surface elevation of approximately 135 to 140 feet above mean sea level at its westerly edge to approximately 125-130 feet just west of the Route 125 embankment.

Two brooks traverse the site to the north and south. North Brook flows eastward near the northerly boundary of the site through a culvert beneath Route 125 and into the marsh adjacent to Country Pond. South Brook flows eastward near the southerly edge of the site, through a culvert beneath Route 125 and into the marsh. These brooks drain several marshy areas of seasonally ponded surface water on-site.

The study area for the RI/FS includes the O&G/GLCC site, a marsh area east of Route 125, and Country Pond adjacent to this marsh area. The marsh is somewhat triangular in shape and wooded, with an area of approximately 40 acres. Three small brooks were observed draining the marsh at its interface with Country Pond, the northern-most of which is North Brook.

The O&G/GLCC site is underlain by 20 to 50 feet of soil deposits consisting of fill, glacial outwash, glacial ice contact deposits, and glacial till. Fill materials appear to be granular and to locally contain buried drums and drum fragments. Outwash and ice contact deposits consisted of sands and gravels and are considered to comprise a relatively permeable overburden aquifer. Glacial till underlying the aquifer, while relatively less permeable than other unconsolidated deposits, was not observed in all borings and is not considered very restrictive of groundwater flow between the overburden aquifer and underlying bedrock. Bedrock, to the depth investigated (30 to 40 feet below the bedrock/overburden contact), was observed to consist of schist with pegmatite and

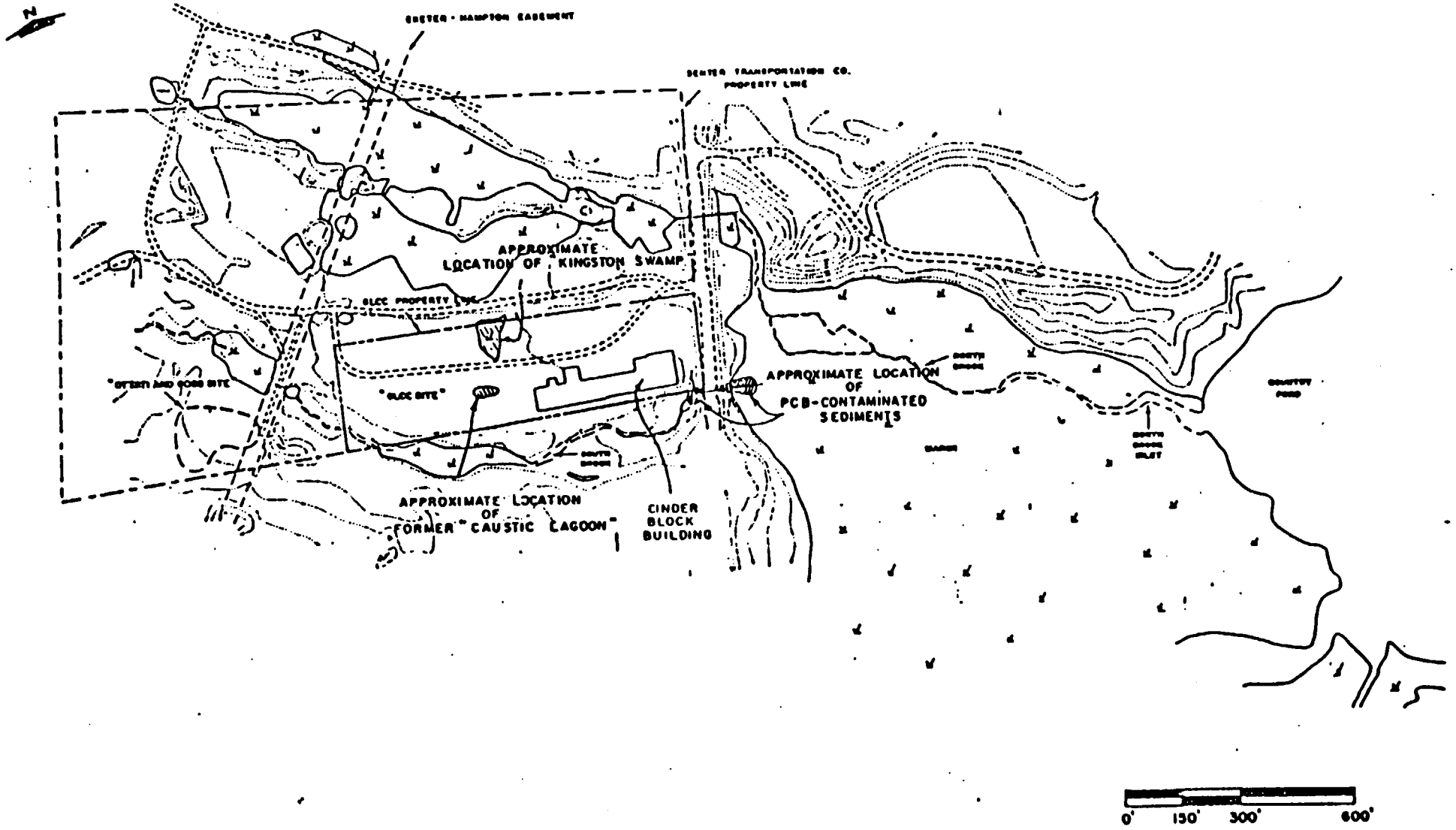


LOCUS PLAN

O &G/GLCC SITE

KINGSTON, N.H.

Figure 1



SITE PLAN

O &G/GLCC SITE
KINGSTON, N.H.

FIGURE 2

granite intrusions. The schist was observed to be slightly weathered and slightly to moderately fractured. The pegmatite and granite encountered in the rock cores were observed to be fresh to slightly weathered, and fractured to a similar degree as the schist. Permeability of the bedrock was generally observed to be low to very low.

Bedrock topographic data contained in the Remedial Investigation/ Feasibility Study indicate that a Y-shaped trough or depression trending to the east underlies the site west of Route 125 with the 2 "forks" portion of the GLCC site. Available data suggest this depression continues to the east of Route 125. A possible bedrock high was observed in the north central portion of the marsh.

Groundwater within the overburden aquifer beneath the O&G/GLCC site flows to the northeast across the site toward the topographic low associated with North Brook. Upon approaching North Brook, flow becomes southeasterly. Overburden groundwater flow converges and flows under Route 125 at the eastern edge of the site. Southeasterly groundwater flow continues within the marsh area east of Route 125 toward Country Pond.

On-site, where ice contact deposits predominate, the rate of groundwater flow was estimated at approximately 60-240 feet per year. In the marsh area, where more permeable outwash deposits predominate, the rate of groundwater flow was estimated at approximately 110 to 330 feet per year.

Both upward and downward hydraulic pressure gradients between the bedrock and the overburden, as well as within the bedrock, were observed at various locations around the site. The presence of significant downward gradients in some areas, together with the lack of a continuous impermeable soil layer between overburden and bedrock, indicates the potential for localized migration of overburden aquifer contaminants into bedrock.

Groundwater is the present drinking water source in the study area. Water is supplied by individual residential wells deriving water from unconsolidated bedrock aquifers. To date, no residential well contamination has been attributed to the site. There is presently no state or municipal restriction of groundwater use in the vicinity of the site.

Groundwater, surface water, and soil/sediment contamination is identified both on and off site. The major classes of compounds detected include volatile organic compounds (VOCs), acid and base/neutral (ABN) extractable organic compounds, polychlorinated biphenyls (PCBs), and metals.

SITE HISTORY

Portions of the site have been used for drum reconditioning operations and for disposal of hazardous materials since at least the late 1950's. The following summary of site history and plant operations is based on discussions with personnel from the U.S. EPA, New Hampshire Water Supply and Pollution Control Commission (WSPCC), and the U.S. Department of Justice; depositions and court testimony from ongoing litigation (United States, et al. vs. Ottati & Goss, Inc., et al.); and the Findings of Fact.

From the late 1950's through 1967, drum reconditioning operations were performed on the present GLCC site by the Conway Barrel and Drum Company (CBD), owned by Messrs. James and Daniel Conway. Available information concerning site operations of the CBD is limited. A State of New Hampshire Water Pollution Board (WPB) memorandum dated September 28, 1961, indicated that the CBD was established in 1959 for the purpose of reconditioning drums. WSPCC files indicate that reconditioning operations included caustic rinsing of drums and apparent disposal of the caustic rinse water in a dry well in the vicinity of South Brook. The location of the dry well was not documented.

As a result of State concerns regarding the proximity of the dry well to South Brook and complaints of resulting South Brook and Country Pond pollution, CBD established a "leaching pit" in an area removed from South Brook. This pit is commonly referred to as the "caustic lagoon" and was located on the property approximately 150 feet to the west of the existing cinder block building. The approximate location of the former caustic lagoon is shown on Figure 2.

A review of WSPCC files indicated numerous complaints against CBD by area residents. These complaints focused on on-site runoff and seepage from leaching pits draining into South Brook and eventually into Country Pond. Complaints included reports of fish kills in Country Pond, dying vegetation along South Brook, and skin irritation of swimmers in Country Pond.

In 1967, Messrs. Leroy Boudreaux and Daniel Conway formed the Kingston Steel Drum Company (KSD) which continued site operations until 1973. The KSD operations consisted of reconditioning both open head and closed head drums.

For open head drums, residues were emptied into 55 gallon drums which were reportedly hauled away from the site. Emptied drums were then passed through an incinerator to burn off remaining residues and subsequently brought into the plant for sand blasting, dedenting, and lining operations.

Reconditioning operations for the closed head drums differed from those for the open head drums. The closed head drums were pre-flushed and then rinsed with a caustic rinse solution. The drums were then washed in a dilute hydrochloric acid solution, sand blasted, and dedented. Caustic rinse water was disposed of in the previously described caustic lagoon located approximately 150 feet to the west of the cinder block building.

As described in a March 28, 1973 International Mineral and Chemical Corporation (IMC) memorandum, the caustic lagoon was a barbell shaped pond averaging approximately 25 feet in width, 100 feet in length and 3 feet in depth. An oil layer 1-1/2 feet thick was reported to cover the lagoon. According to the IMC memorandum, in 1973 the caustic lagoon received approximately 4,000 gallons/day of caustic rinse water.

Another small pond, commonly referred to as the "Kingston Swamp" was described in the same 1973 IMC memorandum as being generally circular in shape, approximately 100 feet in diameter and 1 foot deep. The approximate former location of the "Kingston Swamp" is shown on Figure 2.

In May 1973, KSD was purchased by IMC, who owned and operated the drum reconditioning plant from 1973 until 1976. With some modifications, IMC continued drum reconditioning in a manner similar to KSD, though apparently on a larger scale. Modifications apparently included measures intended to reduce the potential for pollution at the site. In the March 28, 1973 IMC memo, three potential pollution sources were identified by IMC prior to its purchase of the site. These included the caustic lagoon, the "Kingston Swamp", and spill water, including floor washings and building rinse water from the north side of the plant which eventually discharged into South Brook. Water samples collected in March 1973 by IMC indicated degraded water quality in the caustic lagoon, "Kingston Swamp", and on-site drainage into South Brook at Route 125.

The "Kingston Swamp" was reportedly backfilled in 1973 and the caustic lagoon was backfilled in 1974. Oil separation equipment was installed and IMC, and later GLCC, stored "deoiled" and "oily" wastes from the closed head drum process in separate on-site holding tanks.

Heavy sludges (approximately thirty 55-gallon drums per month) from the wash tanks and drums drainings, as well as residues from incinerator operations, were brought to the O&G site for "processing" beginning in 1978. After the O&G operations ceased, in June 1979, GLCC continued processing these sludges on-site in a manner similar to the O&G process. GLCC reconditioning

operations ceased in July 1980. A large number of drums were reportedly removed by GLCC in 1981.

Between July and December 1984, IMC performed drum excavation and removal operations at the GLCC site. These operations included excavating large portions of the GLCC site where drum burial was suspected based on previous test pit excavations, geophysical data, and court testimony. The O&G site was operated by Ottati and Goss, Inc., Mr. Louis Ottati, and Mr. Wellington Goss, from March 1978 through June 1979. During this time, site operations consisted of "processing" hazardous materials brought to the site in drums. This processing apparently involved emptying the contents of the drum in the box of a dump truck and mixing the wastes with sawdust and lime. The mixed waste and sawdust was then placed in dumpsters and reportedly removed from the site.

Material processed at the site allegedly included sludges from the GLCC site. On July 1, 1979 the New Hampshire Bureau of Solid Waste Management ordered the owners and operators of the O&G site to remove the drums and cease site operations. Between December 1980 and July 1982, EPA processed and removed approximately 4000 drums of waste from the O&G site. IMC, the owner and operator of the KSD drum reconditioning plant from 1973 to 1976, performed drum excavation and removal operations between July and December 1984. All stockpiled contaminated soils were removed from the site by June 1985. The total volume of contaminated soils, drums, and metal debris removed was approximately 12,800 tons. However, results of the Remedial Investigation (RI) indicate that additional drum fragments, crushed drums, and contaminated soil remain on the site.

CURRENT SITE STATUS

Goldberg-Zoino & Associates (GZA), under contract with the New Hampshire Water Supply and Pollution Control Commission, completed a Remedial Investigation/Feasibility Study (RI/FS) for the O&G/GLCC Site in August 1986. Data collected in the RI and in previous studies done by Ecology and Environment (E&E), under contract with EPA; P.E. LaMoreaux and Associates (PELA), consultants to GLCC; Roy F. Weston (RFW), consultants to GLCC; and Camp, Dresser & McKee (CDM), consultants to International Minerals and Chemical Corporation; were used to describe the nature and extent of contamination. Contamination sources, contaminant transport, environmental receptors impacted and suspected risks posed by contaminants are evaluated in the Remedial Investigation/Feasibility Study Report. The following is a brief summary of the types and concentrations of contaminants detected in soil, sediment, groundwater, surface water, and air.

° Soil

Elevated concentrations of VOCs, PCBs, ABNs, metals and cyanide have been observed in on-site soils at numerous locations on one or both of the O&G/GLCC portions of the site. At least four

major VOC contamination (high of 870,000 ppb) source areas have been identified; the GLCC caustic lagoon area, the "Kingston Swamp" area, an area immediately east of the cinder block building on the GLCC site, and the O&G site. Of the VOCs identified at the O&G/GLCC site, four of the contaminants are probable or known carcinogens. They are: trichloroethylene, tetrachloroethylene, 1,2-dichloroethane, and benzene. Sampling performed subsequent to the IMC removal identified maximum concentrations of trichloroethylene of 3,900 ppb and tetrachloroethylene of 160,000 ppb in the vicinity of the caustic lagoon. A further discussion of these carcinogens is included in the Management of Migration Remedy. Due to past waste disposal practices at the site, it is likely that additional localized contaminant source areas exist. The observation of buried drums in the upper 6 feet of soil at numerous locations indicates the potential for concentrated "point" sources for VOCs, and perhaps, other contaminants.

PCBs were observed in soils over a wide area of the site. The highest PCB concentrations (143,000 ppb) were observed in the "Kingston Swamp" and caustic lagoon areas.

ABN compounds (high of 19,000 ppb) were observed in on-site soils at numerous locations in concentrations on the same order as VOCs, although there is no apparent correlation in terms of spatial distribution between ABNs and VOCs. The mobility of ABNs in groundwater or surface water is limited due to their propensity to absorb onto finegrained soil particles. Many metals and cyanide were observed at elevated concentrations in on-site soils; highest concentrations were observed in areas of suspected past disposal activity. As with VOC contamination, past practices at the site suggest that additional, localized contaminant source areas are likely present. Although both arsenic and nickel have been observed at elevated concentrations in groundwater downgradient of the site, arsenic concentrations in on-site soils did not exceed those observed at presumed background sampling points.

° Surface Water and Sediments

The principal contaminants of concern transported in surface waters in North and South Brooks are dissolved VOCs (high total VOC concentration of 500 ppb) in surface waters and sediments (high total VOC concentration of 6,000 ppb) in the vicinity of the North Brook inlet to Country Pond. These VOC concentrations appear to be related to upward discharge of contaminated groundwater. Despite the presence of VOCs in pond water and sediments in the vicinity of the North Brook inlet, volatilization and pond dispersion characteristics likely account for the lack of detection of VOCs in other areas of the pond.

Also of concern is the apparent transport of PCB-contaminated South Brook sediments into the marsh area, where up to 14,000 ppb of PCBs has been reported by EPA, based on the results of sampling performed in May 1980.

° Groundwater

The groundwater contaminants of principal concern at the O&G/GLCC site are VOCs, arsenic, and nickel, iron and manganese. ABNs appear to be highly attenuated relative to VOCs. PCBs/pesticides were not observed in groundwater downgradient of the site.

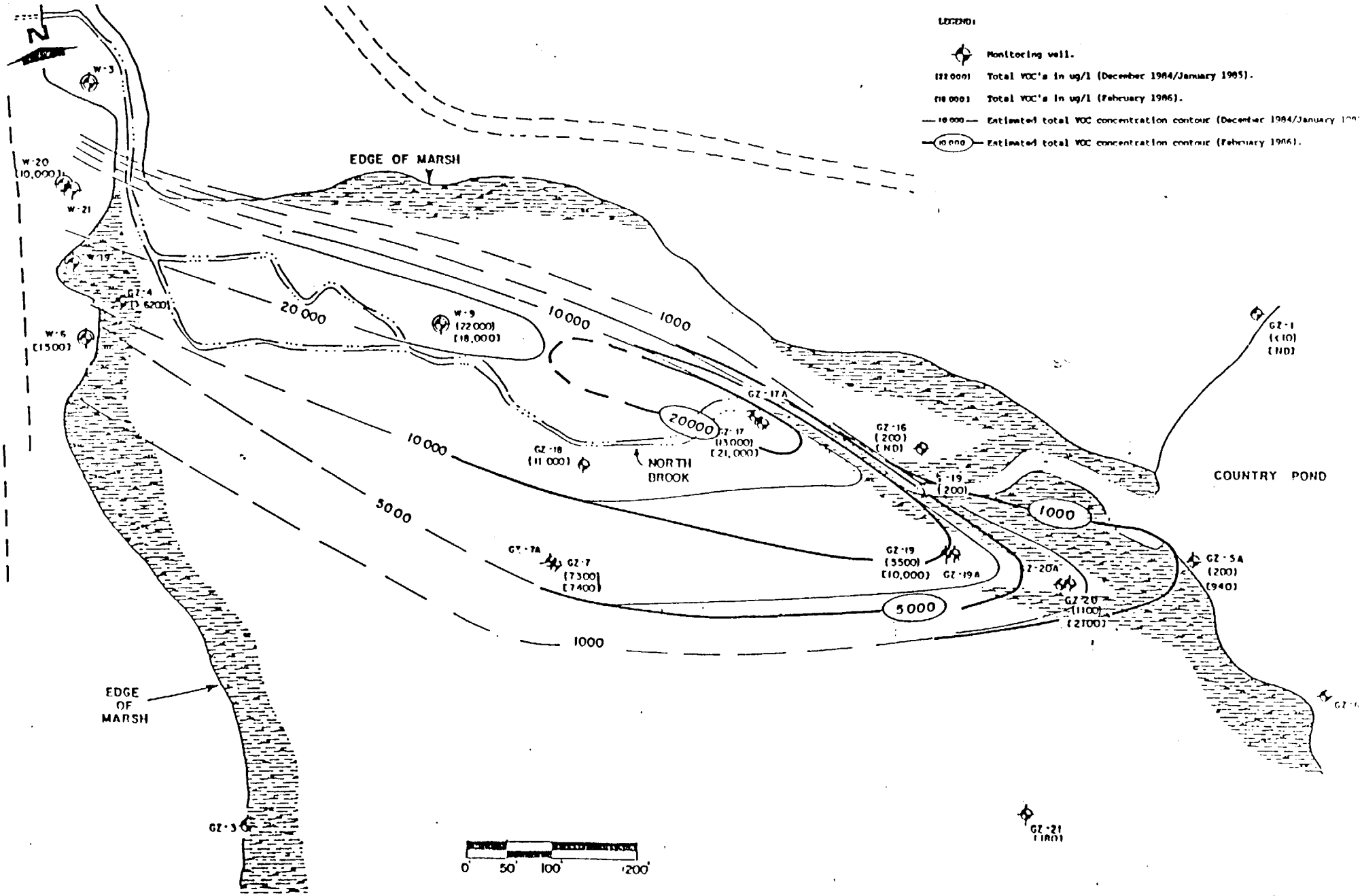
VOC groundwater contamination arises from numerous on-site source areas, most notably the O&G site, the caustic lagoon area, the "Kingston Swamp" area, and the area east of the GLCC cinder block building. Total VOC concentrations in groundwater in these areas generally have exceeded 10,000 ppb. The Court found the O&G plume moves generally from southwest to northeast and then parallel to North Brook and towards Route 125 and the marsh.

Individual contaminant plumes generated on-site would merge due to converging groundwater flow. East of Route 125, the plume appears to be limited to the northern third of the marsh area. Contaminants within the marsh are estimated to be migrating at a rate of 110 to 330 feet/year, have crossed the marsh area and impacted groundwater at the western edge of Country Pond. Total VOC concentrations in the western half of the marsh are on the same order but somewhat lower than those observed on-site. Figure 3 shows the distribution of VOCs off-site in the marsh.

Data concerning the spatial distribution and migration of arsenic and nickel in groundwater, though limited in quantity, suggest that these contaminants are migrating off-site in groundwater.

° Air

In February 1981, EPA collected eight 2- to 24-hour air samples in the vicinity of the O&G/GLCC site using either a tenax or a charcoal trap. Samples were analyzed for VOCs by GC/MS. The data provided in Appendix H of the RI/FS indicate no detectable levels of VOCs, with a detection limit of 50 ppb. GZA monitored air quality on- and off-site during site drilling operations using an organic vapor analyzer (OVA). VOC background concentrations both on-site and off-site were observed to be on the order of 0.2 to 0.4 ppm (200 to 400 ppb) during the September to December 1983 field exploration program. Since this concentration is near the detection limit of the OVA instrument, the above estimates may be considered to be a conservative estimate of background ambient air conditions prevalent both on- and off-site. The lack of discernible difference in on-site and off-site background OVA readings suggests that emissions of organic vapors during the site exploration program occured at concentrations below approximately 200 ppb. Though data are limited, it appears that the threat to human or environmental receptors posed by emissions of contaminants to the atmosphere is minimal. However, circumstances that alter existing site conditions, such as excavation of on-site materials or extensive remedial activity, should be accompanied by an air quality monitoring program to protect on-site and off-site receptors and to provide additional data concerning this potential contaminant migration pathway.



DISTRIBUTION OF TOTAL VOLATILE ORGANICS

(DECEMBER 1984-FEBRUARY 1986)

O &G/GLCC SITE

KINGSTON, N.H.

FIGURE 3

RISK ASSESSMENT

A baseline risk assessment was conducted to evaluate the risk to public health and the environment associated with the O&G/GLCC site in the absence of remedial action. The risk assessment was developed as follows: identify contaminants of concern; describe pathways of exposure associated with site contaminants; estimate levels of exposure and determine populations potentially exposed; characterize potential risks to humans and the environment.

Contaminants of Concern

A variety of different chemicals were found at the site, including volatile organic compounds (VOCs), acid and base/neutral (ABN) compounds, metals, cyanide, and PCB/pesticides. Many of these contaminants occur at substantial concentrations on-site, but considerably fewer have been observed to be migrating off-site. The VOCs appear to be the most mobile of site contaminants. VOCs have been observed in downgradient groundwater, surface water and sediments. PCB/pesticides, ABN compounds, metals, and cyanide appear to be less mobile. Possible exceptions include arsenic and nickel, where data suggest downgradient migration. ABN compounds have been detected at relatively high levels in the marsh area. PCB/pesticides have not been observed in downgradient groundwater or surface water. PCBs have been identified in the ppm range in South Brook sediments on-site and within the marsh area, as well as in on-site soils.

The various chemicals found on and off-site may cause a variety of different adverse health effects, depending upon the type of chemical and the concentration found. Some of the compounds present are known or suspected human carcinogens, such as benzene, arsenic, tetrachloroethylene, trichloroethylene and 1,2,dichloroethane, whereas other compounds may cause kidney and liver disorders and other adverse effects if chronic exposure to sufficient levels occurs.

Exposure Pathways/Exposure Populations

There are a variety of potential pathways of exposure to chemicals at the O&G/GLCC site. The following pathways were evaluated: ingestion of groundwater by contact with contamination in overburden, bedrock or Country Pond; ingestion of contaminated food, primarily focusing on fish consumption; inhalation of contaminated vapors or particulates from the site, dermal contact with contaminated soils, sediment or water on or off-site; ingestion of or dermal contact with contaminated media by birds and wildlife visiting the site.

EPA believes that based upon the risk assessment and the information available, the on-site soils present a direct contact risk. The soils also pose a risk as a source for the contaminated groundwater. The contaminated groundwater on-site and in the marsh pose a human health risk to anyone who drinks the water. The PCBs in the sediment also pose a human health risk through ingestion.

Risk Characterization

High levels of contamination are present on site, and have migrated in the groundwater east of Route 125 to where the marsh and Country Pond meet, as well as under the Pond itself. The Court has found that many of the chemicals are present on site in concentrations much higher than acceptable levels. Sampling data from the the RI/FS show that many hazardous substances in the soil and groundwater continue to be present in concentrations substantially above acceptable limits. Humans and biota may be exposed to these concentrations through ingestion, inhalation and dermal contact. Although on site risks were not quantified, they are potentially significant, as the site is accessible to humans and wildlife. This is particularly so since the site has the potential to be developed. Although most of the on site soil data indicates subsurface contamination, this does not preclude exposure, as areas of contaminated soils may be disturbed now or in the future, resulting in an opportunity for exposure. Moreover, surface contamination existed in the past, and such contamination may continue to be present.

For the groundwater ingestion pathways, results of sampling performed on groundwater on site and in the marsh revealed levels of various contaminants at concentrations to present a considerable risk if the site was ever developed and a person installed a well and consumed the water.

DEVELOPMENT OF ALTERNATIVES

The remedial alternatives for the O&G/GLCC site were developed and evaluated using the "Guidance on Feasibility Studies under CERCLA" and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 C.F.R. § 300.68 as guidance. To the extent that it was both possible and appropriate at least one alternative was developed in each of the folloiwng categories, as required by 40 C.F.R. § 300.68(f)(1) of the NCP:

1. Alternatives specifying off-site storage, destruction, treatment, or secure disposal of hazardous substances at a facility approved under the Resource Conservation and Recovery Act (RCRA). Such a facility must also be in compliance with all other applicable EPA standards (e.g., Clean Air Act, Toxic Substances Act).

2. Alternatives that meet all applicable or relevant federal public health or environmental standards, guidance, and advisories.

3. Alternatives that exceed all applicable or relevant federal public health or environmental standards, guidance, and advisories.

4. Alternatives that meet CERCLA goals but do not attain all applicable or relevant federal public health or environmental standards, guidance, and advisories.

5. No action alternatives.

Prior to the development of alternatives, the Feasibility Study performed an evaluation of general response actions and technology screening for inclusion in proposed remedies applicable to the O&G/GLCC site. General response actions are broad response categories based on the findings of field work conducted. Technology screening considers the waste-limiting (waste characteristics that limit the effectiveness or feasibility of a technology) and site-limiting (site characteristics such as soil permeability that preclude the use of a technology) factors unique to the O&G/GLCC site, and the level of technical development for each technology.

The screening of the various technologies was based on the following criteria:

1. The technology must be reliable, based either on successful implementation at other hazardous waste sites, or in comparable applications;

2. The technology must be technically feasible, reliable, and applicable to site conditions and waste characteristics at the O&G/GLCC site, based on engineering judgement; and

3. The technology must be capable, by itself, or in conjunction

with other alternatives, of addressing at least one of the FS objectives.

Technologies that did not meet all of the above criteria were excluded from further consideration.

Table 1 lists the various technologies that were considered appropriate for evaluation at this site. Technologies which emerged from this screening process were then combined into source control and management of migration alternatives. As a result, eighteen (18) remedial action alternatives, as specified on Table 2, were developed for evaluation.

INITIAL SCREENING

The eighteen (18) remedial alternatives have been subjected to an initial screening consistent with 40 C.F.R. § 300.68(g)(1), (2), and (3) of the NCP to narrow the list of potential remedial actions for further detailed analysis. The initial screening process eliminated the following twelve (12) alternatives:

1. Alternatives 1A and 1B

   - 300.68 (g)(3); Do not effectively contribute to protection of public health and welfare.

2. Alternatives 2 - Alternative 6

   - 300.68(g)(3); Do not address off-site migration of contaminated groundwater. As a result, do not effectively contribute to the protection of public health and welfare.

3. Alternative 8

   - 300.68(g)(3); Is not considered effective in addressing on-site source contamination.

4. Alternative 9

   - 300.68(g)(3); Is not considered effective in controlling on-site contaminant release.

5. Alternatives 10A & 10B

   - 300.68(g)(2); Is not considered acceptable engineering practice since subsurface conditions are not conducive to the successful use of a soil/bentonite wall.
   - 300.68(g)(3); Use of cap not considered sufficient in controlling release of contaminants and does not effectively contribute to protection of public health.

6. Alternative 11

   - 300.68(g)(3); Is not considered effective in removing continued release of on-site contamination and thus not protective of public health and welfare.

TABLE 1
SUMMARY OF TECHNOLOGY SCREENING
LISTING OF REMEDIAL TECHNOLOGIES

- SURFACE WATER CONTROLS
  - Grading
  - Revegetation
  - Diversion and Collection Systems
- LEACHATE & GROUNDWATER CONTROLS
  - Capping
  - Groundwater Pumping
  - Containment and Barriers
- GAS MIGRATION CONTROLS
  - Gas Collection
- EXCAVATION & REMOVAL OF WASTE & SOIL
  - Excavation and Removal
  - Grading
  - Capping
  - Revegetation
  - Cover
- REMOVAL & CONTAINMENT OF CONTAMINATED SEDIMENTS
  - Sediment Removal
- IN-SITU TREATMENT
  - Soil Aeration
- DIRECT WASTE TREATMENT
  - Incineration
  - Biological Treatment
  - Physical and Chemical Treatment
  - Solid Handling and Treatment
- LAND DISPOSAL
  - Landfills
- CONTAMINATED WATER SUPPLIES & SEWER LINES
  - Alternative Drinking Water Supplies

° LAND USE RESTRICTIONS

- Restrict Site Access/Security Fencing
- Deed Restrictions
- Land Use Restrictions

° ENVIRONMENTAL MONITORING

- Groundwater
- Surface Water
- Air
- Fish

TABLE 2

LISTING OF REMEDIAL ALTERNATIVES

ALTERNATIVE NUMBER	DESCRIPTION
1A	No action
1B	No action; with site monitoring
1C	No action; with site monitoring and land use restrictions
2	RCRA GLCC site cap; O&G source excavation and relocation
3	RCRA GLCC site cap; O&G source excavation and relocation; and disposal or aeration on-site of highly contaminated soils, wastes, and sediments
4	RCRA GLCC site cap; O&G source excavation and relocation; and complete perimeter soil/bentonite cutoff wall
5	RCRA GLCC site cap; O&G source excavation and relocation; and upgradient soil/ bentonite cutoff wall
6	RCRA GLCC site cap; O&G source excavation and relocation; and upgradient groundwater interceptor trench; disposal or aeration on-site of highly contaminated soil, wastes, and sediments
7	RCRA GLCC site cap; O&G source excavation and relocation; and upgradient groundwater interceptor trench; disposal or aeration on-site of highly contaminated soil, wastes, and sediments
8	Groundwater extraction and treatment; RCRA GLCC site cap; O&G source excavation and relocation
9	Groundwater extraction and treatment; RCRA GLCC site cap; O&G source excavation and relocation; disposal or aeration on-site of highly contaminated soil, waste, and sediments

10A	Groundwater extraction and treatment; RCRA GLCC site cap; O&G source excavation and relocation; perimeter soil/bentonite cutoff wall
10B	Groundwater extraction and treatment; RCRA GLCC site cap; O&G source excavation and relocation; upgradient soil/bentonite cutoff wall
11	Groundwater extraction and treatment; RCRA GLCC site cap; O&G source excavation and relocation; upgradient groundwater interceptor trench
12	Groundwater extraction and treatment; RCRA GLCC site cap; O&G source excavation and relocation; upgradient groundwater interceptor trench; disposal or aeration on-site of highly contaminated soil, waste, and sediments
13	Alternate water supply; groundwater extraction and treatment; RCRA GLCC site cap; O&G source excavation and relocation; upgradient groundwater interceptor trench; disposal or aeration on-site of highly contaminated soil, waste, and sediments
14	Complete removal of on-site and off-site hazardous soils, waste, sediments, groundwater, with off-site disposal
15	Excavation and on-site treatment of contaminated soils, wastes, and sediments; groundwater extraction and treatment; site cover

DETAILED EVALUATION OF ALTERNATIVES

A detailed evaluation of each of the six (6) alternatives remaining after the initial screening was conducted in the RI/FS consistent with 40 C.F.R. § 300.68(h) of the NCP. For each alternative, the following factors, as appropriate, were considered:

(1) Detailed cost estimation, including operation and maintenance costs, and distribution of costs over time;

(2) Evaluation in terms of engineering implementation, reliability, and constructibility;

(3) An assessment of the extent to which the alternative is expected to effectively prevent, mitigate, or minimize threats to, and provide adequate protection of public health and welfare and the environment. This included an evaluation of the extent to which the alternative attains or exceeds applicable or relevant and appropriate federal public health and environmental requirements. Where the analysis determined that federal public health and environmental requirements are not applicable or relevant and appropriate, the analysis, as appropriate, evaluated the risks of the various exposure levels projected or remaining after implementation of the alternative under consideration;

(4) An analysis of whether recycle/reuse, waste minimization, waste biodegration, or destruction, or other advanced, innovative, or alternative technologies is appropriate to reliably minimize present or future threats to public health or welfare or the environment;

(5) An analysis of any adverse environmental impacts, methods for mitigating these impacts, and costs of mitigation.

The remaining alternatives after preliminary screening are: 1C, 7, 12, 13, 14, and 15. A description of these final alternatives is included on Table 3. Table 4 lists the capital and present worth costs for these alternatives.

Alternative 1C - No Action, with Land Use Controls and Water Quality Monitoring. The no-action alternative at the O&G/GLCC site consists of allowing the site to remain in its existing condition. However, actions would be undertaken to limit the potential risks posed by the site to public health and the environment. These actions include instituting land use controls (security fencing around the site) and a water quality and fish (environmental) monitoring program. The environmental monitoring program would allow periodic reassessment of public health and environmental risks posed by the site, and would include annual sampling of all bedrock wells within an approximate 1.5 mile radius of the site. It is anticipated that the environmental monitoring program would extend for at least the first ten (10) years following site closure and would be extended if warranted.

Table 3

REMEDIAL ALTERNATIVES PASSING
PUBLIC HEALTH AND ENVIRONMENTAL SCREENING

Alternative	Description
1C	No Action; with site monitoring and land use restrictions.
7	Upgradient groundwater interceptor trench; disposal or aeration on-site of highly contaminated soils, wastes and sediments; RCRA GLCC site cap; O & G source excavation and relocation.
12	Upgradient groundwater interceptor trench; disposal or aeration on-site of highly contaminated soils, wastes, and sediments; groundwater extraction and treatment; RCRA GLCC site cap; O & G source excavation and relocation.
13	Alternative 12, plus an alternate water supply.
14	Complete removal of on-site and off-site hazardous soils, wastes, and sediments to an off-site RCRA facility.
15	Excavation and on-site treatment of contaminated soils, wastes, and sediments; groundwater extraction and treatment; site cover.

Notes:

1. Alternatives 1C through 15 include provisions for periodic environmental quality monitoring and land use controls as discussed in Sections 2.2.2 and 2.2.3 of the FS.

2. Alternatives 7, 12 and 13 include on-site disposal or aeration of highly contaminated soils as follows:

   a. VOC concentrations greater than 1 ppm and PCB concentrations greater than 50 ppm; aeration of soil to reduce VOC concentrations to less than 1 ppm followed by disposal in a RCRA landfill on-site.
   b. VOC concentrations greater than 1 ppm and PCB concentrations less than 50 ppm: aeration of soil to reduce VOC concentrations to less than 1 ppm followed by on-site disposal under a RCRA cap.
   c. VOC concentrations less than 1 ppm and PCB concentrations greater than 50 ppm: soil disposed in an on-site RCRA landfill.

d. VOC concentrations less than 1 ppm and PCB concentrations less than 50 ppm: soil left in place to be covered by a RCRA cap.
e. Marsh sediments in drainage swale to the east of Route 125 to be removed to residual PCB concentrations of 1 ppm or less. PCB material disposal on-site in a RCRA landfill.

3. Alternative 15 includes on-site treatment to an acceptable residual soil concentration via incineration.

TABLE 4

REMEDIAL ALTERNATIVES PASSING
PUBLIC HEALTH AND ENVIRONMENTAL SCREENING

ALTERNATIVE		CAPITAL COST (x $1000)	PRESENT WORTH (x $1000)
1C	No Action.	202	1,029
7	Upgradient groundwater interceptor trench; disposal or on-site aeration of highly contaminated soil, wastes and sediments; RCRA cap over GLCC site; O&G source excavation and relocation.	4,150	5,543
12	Upgradient groundwater interceptor trench; disposal or on-site aeration of highly contaminated soil, wastes and sediments; groundwater extraction and treatment; RCRA cap over GLCC site O&G source excavation and relocations	6,713	10,499
13	Similar to Alternative 12 plus an alternative water supply.	10,787	14,358
14	Complete excavation and removal of on-site and off-site contaminated soils, wastes, and sediments to an off-site RCRA facility.	33,878	34,705
15	Excavation and treatment of contaminated soils, wastes, and sediments; groundwater extraction and treatment; site cover.		
	Estimated 1×10^{-4} cancer risk:	12,073	14,825
	Estimated 1×10^{-5} cancer risk:	14,023	17,759
	Estimated 1×10^{-6} cancer risk:	16,298	20,847
	Estimated 1×10^{-7} cancer risk:	25,723	31,236

Notes:

1. Costs are estimated with an accuracy of -30 to +50 percent.
2. Present worth estimates are based on a 10% discount rate.
3. Capital costs include 25% indirect costs for design and engineering and construction contingencies.
4. Alternatives 12 and 13 assume 4 years of groundwater extraction and treatment at 100 gpm.
5. Refer to the text and Appendix D for assumptions made in estimating costs.

The no-action alternative is not appropriate because it would not do anything to permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances at the site. Precipitation at the site would continue to leach mobile contaminants such as VOCs from source areas. VOC levels in site soils and groundwater would decrease over time due to dilution from precipitation and natural attenuation mechanisms. The rate of attenuation would be difficult to predict. However, on-site soils and groundwater are not expected to approach background levels for mobile constituents (VOCs) within 30 years. In addition, non-mobile constituents such as heavy metals and PCB's would likely remain essentially at currently observed levels indefinitely.

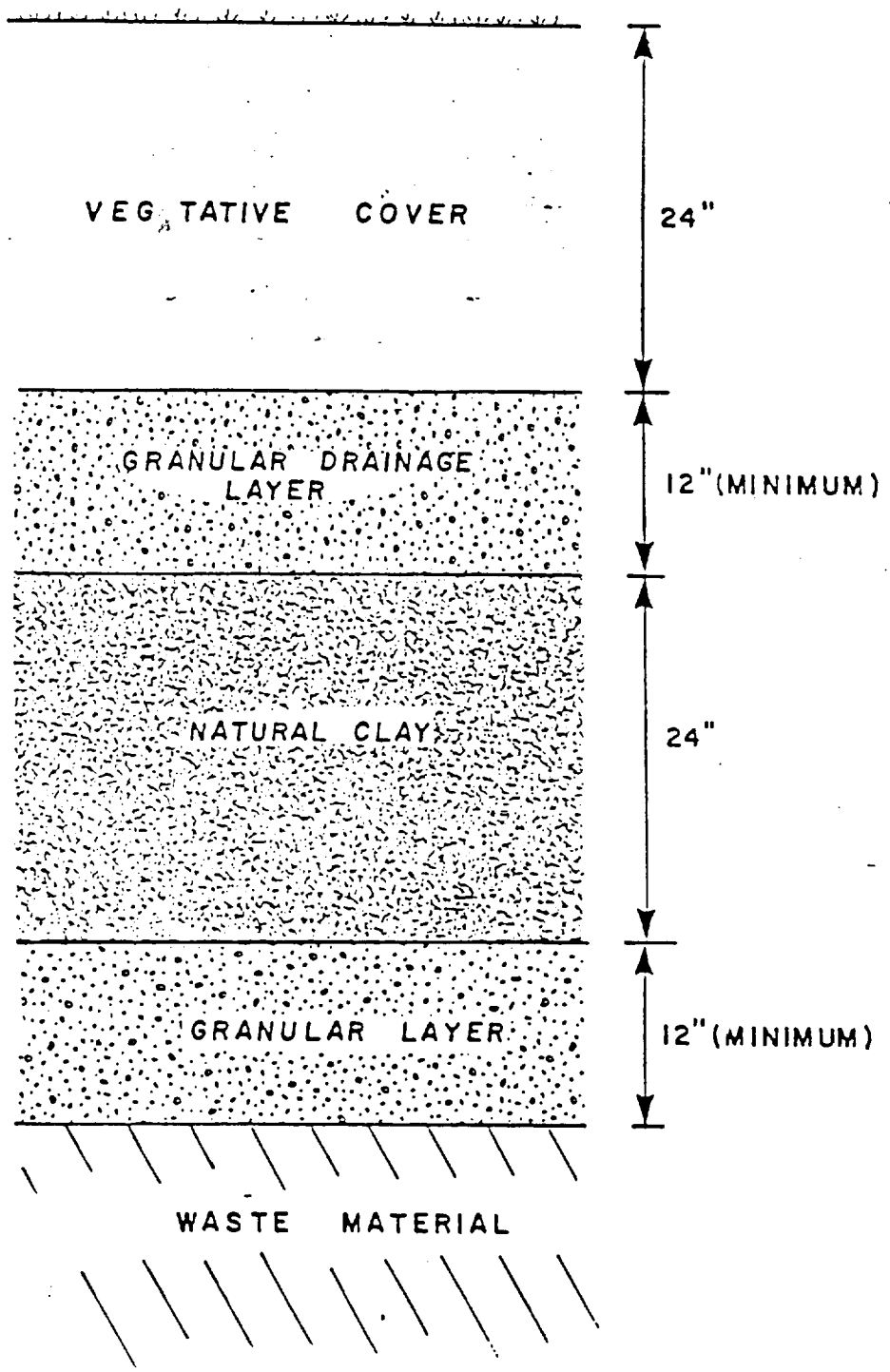
Alternative 1C would not be consistent with the technical requirements of the Resource Conservation and Recovery Act (RCRA). In particular, RCRA requires that waste and waste residues to be removed at closure or capped as a landfill. Also, this alternative does not meet the RCRA groundwater protection regulations in 40 CFR § 264, which require cleanup to background, MCLs, or ACLs.

Without effective source control, it is likely that on site and downgradient groundwater quality would remain at levels on the same order as currently observed for the next 20 to 30 years. The more concentrated portion of the marsh VOC plume east of Route 125 would continue to migrate and would be anticipated to reach Country Pond in approximately 3 years. The capital cost is estimated to be $202,000. The annual operation and maintenance cost (O&M) is estimated to be $133,000. The present worth is $1,029,000, assuming a 10 percent discount rate.

Alternative 7 - GLCC Site Cap; O&G Source Excavation and Relocation; Upgradient Groundwater Interceptor Trench; and On-Site Aeration or Disposal of Highly Contaminated Soil, Waste and Sediments.

Alternative 7 includes GLCC site capping, O&G source excavation and relocation, construction of an upgradient groundwater interceptor trench, and on-site aeration or treatment of highly contaminated soil, waste, and sediments as source control measures. GLCC site capping would be performed consistent with RCRA technical standards. The upgradient trench is intended to maintain groundwater levels within the GLCC site at or near seasonal low levels. In addition, this alternative includes the land use controls and environmental monitoring program as described in Alternative 1C.

Construction of a GLCC site cap and interceptor trench would significantly reduce the infiltration of precipitation into the site soils, and reduce the rate of groundwater migration across the GLCC site. Figure 4, which is a conceptual RCRA cap profile, shows that a cap would provide a minimum of 6 feet of clean



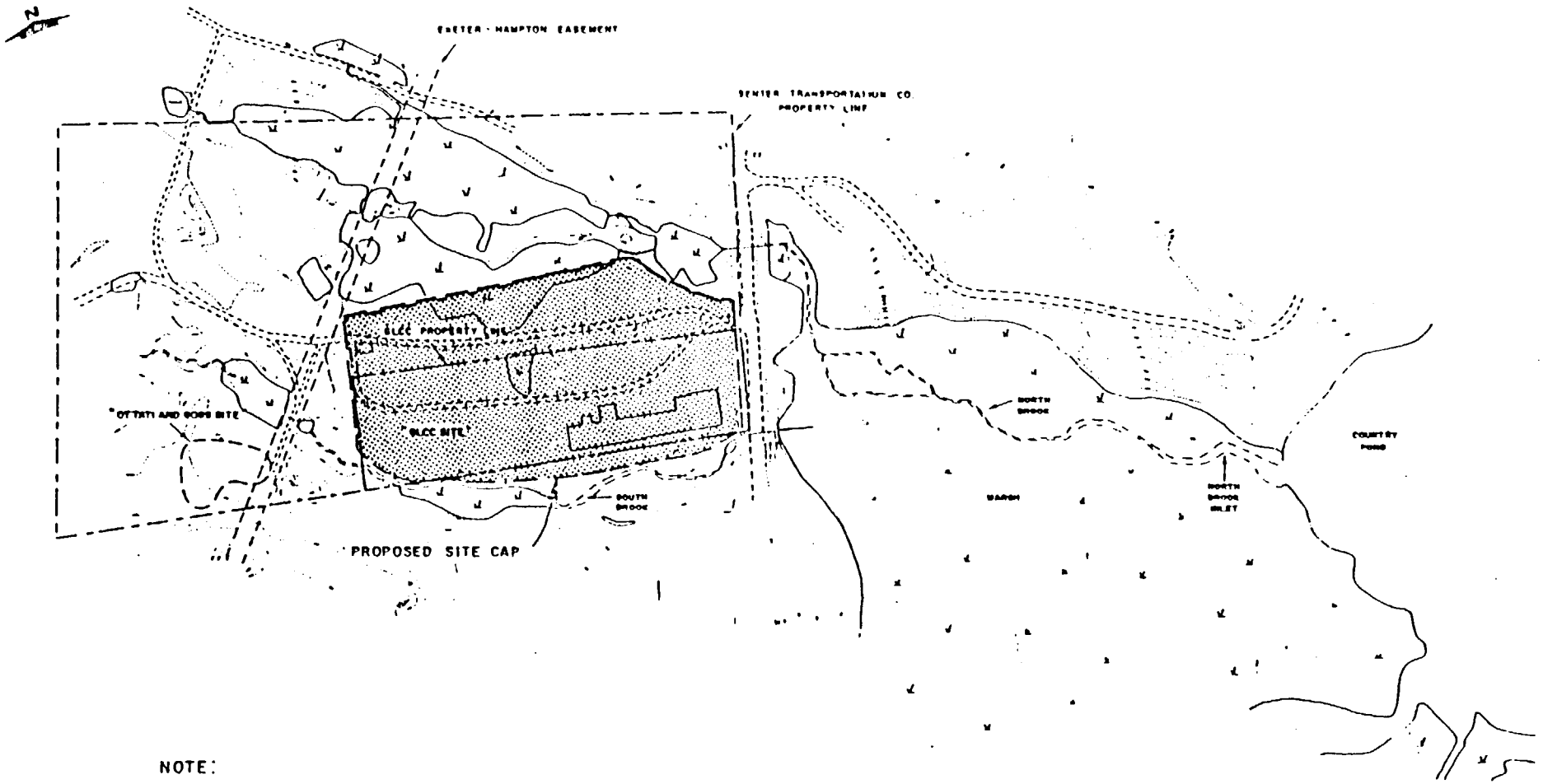
- NOT TO SCALE -

RCRA CAP PROFILE (CONCEPTUAL)

O &G/GLCC SITE

KINGSTON,N.H.

FIGURE 4



NOTE:

1) THE PROPOSED AREAL EXTENT OF THE SITE CAP IS CONCEPTUAL AND IS INTENDED FOR ALTERNATIVE EVALUATION ONLY.

PROPOSED AREAL EXTENT OF SITE CAP

O &G/GLCC SITE
KINGSTON, N.H.

FIGURE 5

material as a barrier between on-site contaminants and the ground surface. With proper maintenance, the useful life of a RCRA cap is considered to be at least 30 years. The proposed areal extent of the site cap is shown on Figure 5. The cap area would be the same under Alternatives 7, 12, and 13.

On-site disposal or aeration would involve excavation and removal of highly contaminated waste, soil and sediments from identified source areas. Materials with total VOC concentrations greater than 1 ppm, and less than 50 ppm of PCBs, would be aerated to reduce total VOC concentrations to less than 1 ppm before placement beneath the GLCC site cap. Materials with greater than 50 ppm of PCB's, would either be placed within a newly constructed on-site double-lined RCRA landfill or transported off-site to a licensed PCB treatment or storage facility. The decision to dispose the PCB material on-site or off-site would depend on the relative costs as well as environmental, public health, and institutional consideration. Figure 6 shows the identified areas for source removal which would apply for Alternatives 7, 12, 13, and 14.

Alternative 7 is expected to have significant long-term environmental benefits beyond the no action alternative. Exposure of biota to on-site contaminants would be effectively eliminated through on-site source control measures, particularly site capping, which would place a 6-foot thick barrier of soil between wastes and the ground surface. By capping contaminated soil on-site, off-site transport of contaminated sediments to North or South Brook would be effectively eliminated. This should eliminate further accumulation of PCB-contaminated sediments in South Brook, halt the further deposition of PCB-contaminated sediments in the marsh, and limit the off-site transport of VOC's and heavy metals by the surface water pathway. By limiting the transport of contaminants to these surface water resources, it is expected that the adverse impacts on both the surface water flora and fauna would be reduced.

There would be a direct impact to the South Brook wetland from channelling South Brook. Construction of the lined open channel would entail destruction of approximately one acre of wetland area along with flora and biota living within the South Brook wetland channel. Site reconnaissance of the South Brook wetland area indicates that oak, red maple, low bush small cranberry, princes pine, check berry, white pine, eastern hemlock, maple leaf viburnum, and partridge berry could all potentially be adversely affected or destroyed within the limited area. The site reconnaissance also indicates that the South Brook wetland does not support a large fish or wildlife population.

Adverse impact to portions of the South Brook wetland outside of the main channel can be limited by careful liner construction which would be confined primarily to the channelled area. It is likely that, over time, some vegetation would be naturally re-

established in the channel and along edges of the channel previously disturbed by liner construction operations. Therefore, considering the small area and observed limited functional value of the South Brook wetland as discussed in the wetlands assessment, the overall impact is limited.

PCB sediments in South Brook east of Route 125 would be removed and contained on-site in a RCRA landfill. The total quantity of PCB sediments east of Route 125 is estimated to be approximately 50 cubic yards, and is estimated to extend approximately 100 feet out into the marsh. Therefore, the impact to the marsh wetland is anticipated to be minimal.

Construction of the site cap would entail destruction in the southern portion of the North Brook wetland area on-site. Because very little vegetation beyond sparse grasses and light bush was observed within this limited area, the impact to the North Brook wetland is considered insignificant. No construction would be required elsewhere in the North Brook wetland.

North Brook and South Brook surface water quantities would increase as a result of runoff from the capped area. The increase in runoff is anticipated to have a beneficial impact to both wetland areas via provision of additional water. North Brook and South Brook surface water quality would also be improved by effectively eliminating offsite transport of contaminated surface runnoff and by channelling South Brook.

Groundwater intercepted by the interceptor trench will be discharged to South Brook, resulting in increase surface water flow to the Country Pond area at this point. It is anticipated that discharge from the interceptor pipe will be on the order of 5 gpm. Considering the large size of the marsh, it is anticipated that only beneficial impacts, if any, would result from this small additional discharge of clean water.

Impact of the wetland areas due to sedimentation from excavation and construction activities is anticipated to be insignificant if proper erosion and sedimentation controls, including siltation fences or temporary siltation ponds, are carefully constructed.

Limiting excavation and construction activities to drier times of the year would also serve to limit erosion and sedimentation. By reducing further contaminant contributions to site groundwater, natural attentuation processes would gradually improve on-site and downgradient water quality. It is estimated that maximum VOC concentrations in the wetlands would be reduced by approximately an order of magnitude within a period of 20 to 30 years after institution of effective on-site source control measures. In the meantime, conditions discussed in the baseline wetlands assessment would likely prevail.

During this period and beyond, overburden groundwater resources within and in the vicinity of the estimated limits of plume migration would remain unusable. Overburden groundwater contamination within this area would continue to provide a potential source of degradation of bedrock aquifers in the area.

Alternative 7 would allow the concentrated portion of the VOC contaminant plume within the wetlands to continue its easterly migration toward Country Pond. The projected impact of this portion of the plume on Country Pond would result in further degradation of Country Pond sediments, water quality, and biota. As discussed in the baseline risk assessment, this impact would likely result in detectable levels of VOC's in Country Pond surface water (10 to 100 ug/l) as well as increased exposure levels to Country Pond biota and fauna.

The RCRA cap and landfill would be designed consistent with RCRA technical standards. Since hazardous wastes would remain on-site, both closure and post-closure requirements for a hazardous waste disposal facility, 40 CFR § 264, Subpart G, and 40 C.F.R. § 264.310 would be relevant and appropriate. This alternative does not comply with RCRA groundwater protection regulations, 40 CFR § 264, Subpart F, since this alternative does not provide for a corrective action program to address existing groundwater contamination at the site. RCRA siting standards for a disposal facility (40 CFR § 264.18) include requirements that the site be located outside a 100-year floodplain and more than 200 feet from an active fault would be applicable to the on-site landfill. These requirements are likely achievable at the site. However, because PCB-contaminated soils (greater than 50 ppm) would be disposed on-site, disposal would also be subject to mroe stringent requirements set forth in the Toxic Substance Control Act (TSCA - 40 CFR § 761).

In addition to RCRA requirements, PCB waste landfill under TSCA is required to have a 50-foot separation distance between the landfill liner and the seasonal high groundwater table (40 CFR § 761.75(b)(3)). This requirement could not be met at the O&G/GLCC site, where the seasonal high groundwater table is generally within 5 feet of ground surface. Exceptions to this requirement can be granted provided that no consequent adverse impacts be demonstrated.

Because the removal of contaminated sediments from the wetland is provided for, Alternative 7 would be in compliance with Executive Order 11990 (wetlands). Further, no designed discharge of waste is anticipated to occur to the wetland.

The capital cost is estimated to be $4,150,000. The annual O&M costs are estimated to be $193,000. The present worth is $5,543,000 assuming a 10 percent discount rate.

Alternative 12 - GLCC Site Cap; O&G Source Excavation and Relocation; Groundwater Extraction and Treatment; Upgradient Groundwater Interceptor Trench; Limited On-Site Aeration or Disposal of Highly Contaminated Soils, Waste, and Sediments. The GLCC site cap, O&G source excavation and relocation, a groundwater interceptor trench, and on-site disposal and treatment of source materials discussed previously for Alternative 7 would be provided as source control measures. To mitigate the effects of contaminants which have already entered the groundwater, a groundwater extraction and treatment program would be undertaken.

Groundwater extraction and treatment is a common and successful remedial technology at hazardous waste sites. The areas that groundwater would be extracted from are the same as those previously described under Alternative 8. The proposed groundwater treatment train shown on Figure 7 was developed specifically for the O&G/GLCC site. The useful life of this alternative is expected to be at least 30 years. Assuming effective source control, groundwater reclamation goals, once achieved, should last indefinitely. The operation and maintenance requirements (O&M), however, for groundwater extraction and treatment are much greater than for Alternatives 1C and 7. Additional environmental benefits and concerns relevant to Alternative 12, beyond those of Alternative 7, are discussed below.

Soils: Environmental pathways associated with on-site soils would be significantly reduced through construction of a RCRA cap and O&G source excavation and relocation.

Air: Groundwater treatment would likely result in volatile organic air emissions due to the air stripper. However, these emissions could be controlled with a vapor recovery unit. Other treatment processes are not expected to have significant air emissions.

Wetlands: Construction of an access roadway for drilling of groundwater extraction wells could adversely affect the marsh wetland area via destruction of wetland vegetation beneath the roadway fill. Characteristic plant species observed in the marsh wetland including highbush bluberry, white oak, red maple, reeds, cattails, and meadow sweet could all be impacted. It is unlikely that construction of an access roadway would adversely impact flood storage of the marsh wetland due to the relatively limited areal extent of the roadway fill and the anticipated east-west roadway alignment which would not serve to dam water behind the fill. Further assessment of the roadway impact on the marsh during the pilot scale design phase may be warranted. If further studies indicate detrimental impact, the roadway could be excavated from the marsh, and marsh vegetation reestablished once groundwater extraction and treatment has been completed.

Groundwater: While the actual extent of groundwater reclamation would be established through institutional requirements discussed below, groundwater quality beneath and downgradient of the site would be substantially improved. Contaminated groundwater that is likely to be discharged to Country Pond and the North Brook inlet would be reduced as would further off-site plume migration during the life of the groundwater extraction program.

Reducing overburden groundwater contamination, as well as performing limited on-site groundwater extraction from bedrock, would reduce future exposure of bedrock groundwater to site contaminants. In addition, overburden extraction and on-site source control actions, would reduce the potential for downward hydraulic gradients that would otherwise cause contaminant migration into bedrock.

Surface Waste: By intercepting contaminated groundwater prior to its discharge into Country Pond, contaminant levels in Country Pond water and sediments would likely remain at levels similar to those presently observed.

In addition to the institutional requirements previously discussed for Alternative 7, additional requirements for groundwater extraction and treatment would be satisfied. This alternative would allow RCRA groundwater protection regulations, 40 CFR § 264, Subpart F, to be met, which would not be achievable under Alternative 7.

The Clean Water Act would be applicable to surface water discharge of treated groundwater. The technical requirements for obtaining a NDPES permit for discharge to surface water would likely prevail prior to such a discharge being implemented. The decision to select surface water discharge of treated effluent instead of groundwater discharge would be made from groundwater treatability studies.

The capital cost is estimated to be $6,713,000. The annual O&M cost is estimated to be $948,000. The present worth is estimated to range between $10,499,000 for a treatment duration of 4 years to $14,959,000 for a treatment duration of 25 years.

Alternative 13 - GLCC Site Cap; O&G Source Excavation and Relocation; Groundwater Extraction and Treatment; Upgradient Groundwater Interceptor Trench; limited Excavation and On-Site Treatment or Disposal of Highly Contaminated Soils, Waste, and Sediments.

Alternative 13 is identical to Alternative 12 with the addition of the immediate development of the alternate water supply system for the area 1 mile west of the site and 1.5 miles north, south, and east of the site.

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Anticipated environmental impacts of the response are similar to those discussed for Alternative 12. In addition, the construction of an alternate water supply system would effectively eliminate risks associated with ingestion of and washing in contaminated groundwater. Also, eliminating the withdrawal of bedrock groundwater within the study area would prevent diversion of contaminated groundwater to new or existing bedrock wells, reducing the risk of migration of contaminants with bedrock groundwater.

The implementability of the proposed water supply system cannot be fully assessed until the hydrogeologic studies are completed. There is no assurance that a suitable overburden groundwater resource would be found within the immediate area. If this were the case, a groundwater resource some distance away from the study area would have to be considered. Water may have to be purchased and transported from the nearest existing municipal water supply system in Exeter, NH or Haverhill, MA, which are approximately 10 miles away.

An additional environmental concern would be the short-term inconvenience to area residents during installation of water distribution pipes. The disruption would include noise and dust from construction operations.

In addition to the institutional requirements specified under Alternative 12, an alternate water supply would also be subject to drinking water standards promulgated under the Safe Drinking Water Act (SDWA).

The capital cost is estimated to be $10,787,000. The annual O&M cost is estimated to be $913,000. Variations in the durations of groundwater extraction and treatment result in a present worth ranging between $14,358,000 (4 year duration) and $19,130,000 (25 year duration).

Alternative 14 - Complete Removal of On-Site and Off-Site Hazardous Soils, Wastes and Sediments to an Off-Site RCRA Facility. This alternative would involve the complete removal of all contaminated on-site and off-site soils (marsh sediments). Based on available test pit data, approximately 54,000 cubic yards of contaminated soils, waste, and sediments would be excavated and transported off-site in accordance with RCRA standards to a licensed RCRA treatment, storage, or disposal facility. This alternative would also include the demolition of existing site structures and removal of underlying contaminated soils. The extent of the area to be excavated is shown in Figure 6.

The removed material would be replaced by an equal volume of clean soil. Following soil replacement, the site would be graded, loamed, and seeded.

With the complete removal option, less stringent land use controls may be appropriate. For instance, limited on-site development may be considered but there may be no need for a security fence.