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Office of
Emergency and
Remedial Response

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September 1985

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Superfund Record of Decision:

Beacon Heights, CT

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16. ABSTRACT

The Beacon Heights Landfill site is located two miles east of the intersection of Connecticut Routes 8 and 42 in Beacon Falls, Connecticut. From the 1920's until 1970 the site was known as "Betkoski's Dump" and consisted of approximately six acres on which active dumping occurred. According to records at the Connecticut Department of Environmental Protection (CT DEP), waste accepted at the dump included municipal refuse, rubber, plastics, and industrial chemicals and sludges. Landfill operations consisted primarily of open burning along with burial of noncombustibles. In 1970, the Betkoski property and adjacent properties totaling 83 acres were purchased by the Murtha Trucking Company, and the name was changed to Beacon Heights, Inc. Landfill. At this time, the landfill area was expanded to approximately 30 acres. Records of the CT DEP, including a 1973 report by the landfill engineer, listed rubber, plastics, oils, hydrocarbons, chemical liquids and sludges, and solvents as being disposed of at the landfill by the trucking company.

The selected remedial action for this site includes: excavation of Betkoski's Dump and other contaminated soils for consolidation with the main landfill prior to closure; RCRA capping of the consolidated wastes including gas venting and stormwater management controls; installation of a perimeter leachate collection system; collection of leachate and transportation to a licensed waste water treatment facility or onsite treat-

(see attached page)

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Record of Decision Beacon Heights, CT Contaminated Media: gw, sw, soil Key contaminants: VOCs, benzene, chlorobenzene, chloroethane, 2-butanone, bis(2-chloroethyl)-ether, xylenes		

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ment followed by discharge to a tributary of Hockanum Brook; extension of a public water supply; fencing; installation of a more extensive ground water monitoring system; and enforcement of State and local institutional controls on ground water use in the impacted area. Total capital cost for the selected remedial alternative is estimated to be $17,397,000 with O&M costs approximately $235,000 per year. In addition, a Supplementary Decision Document will be prepared during the design phase to justify the decisions reached on the manner and location of leachate treatment, the extent of excavation in the satellite areas, and the need for air pollution controls on the landfill gas vents.

RECORD OF DECISION
REMEDIAL ALTERNATIVE SELECTION

SITE : Beacon Heights Landfill, Beacon Falls, Connecticut

DOCUMENTS REVIEWED :

I am basing my decision primarily on the following documents describing the analysis of cost-effectiveness of remedial alternatives for the Beacon Heights Landfill site:

1. Remedial Investigation for the Beacon Heights Landfill site, Beacon Falls, Connecticut, April 1985, prepared for U.S. EPA, Region 1, by NUS Corporation, Pittsburgh, Pennsylvania.

2. Feasibility Study for the Beacon Heights Landfill site, Beacon Falls, Connecticut, August 1985, prepared for the U.S. EPA, Region 1, by NUS Corporation, Pittsburgh, Pennsylvania.

3. Summary of Remedial Alternative Selection (attached)

4. Community Relations Responsiveness Summary (attached)

5. Remedial Action Master Plan for the Beacon Heights Landfill site, Beacon Falls, Connecticut, June 1984, prepared for the U.S. EPA, Region 1, by Camp, Dresser and McKee, Inc., Boston, Massachusetts.

7. The National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300.

8. 40 C.F.R. Part 264, Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities.

DESCRIPTION OF SELECTED REMEDY

REMEDY:

- Excavation of Betkoski's Dump and other contaminated soils for consolidation with the main landfill prior to closure.

- RCRA capping of the consolidated wastes, including gas venting (with air pollution controls if determined necessary during design), and stormwater management controls.

- Installation of a perimeter leachate collection system.

- Collection of leachate and transportation to a licensed waste water treatment facility or on-site treatment followed by discharge to a tributary of Hockanum Brook.
- Extension of a public water supply along Skokorat Road to the next municipal supply and along Blackberry Hill Road to the demographic limits.
- Enclosure of the site with security fencing.
- Installation of a more extensive groundwater monitoring system.

OPERATION AND MAINTENANCE:

Maintenance will include lawnmowing of the grass cover overlying the cap, inspection and repair of the cap, repair of damage to the security fence, removal of obstructions from the stormwater management and gas venting systems, and regrading as necessary. Monitoring will include sampling and analysis of upgradient and downgradient monitoring wells and surface waters and collected leachate. Operations will include collection of leachate and transport to an offsite facility or operation of an onsite treatment facility. (To be decided during design phase).

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 C.F.R. Part 300), I have determined that at the Beacon Heights Site, a full RCRA-approved cap, leachate collection and treatment at an approved offsite facility or on-site treatment and discharge to an unnamed tributary of Hockanum Brook, extension of municipal water supply, long-term groundwater monitoring and institutional controls on groundwater usage, and other methods described above are the cost-effective remedies which provide adequate protection of public health, welfare, and the environment.

The State of Connecticut has been consulted and concurs with the selected remedy. In addition, the action will require future operation and maintenance activities to ensure the continued effectiveness of the remedy. Leachate treatment will be considered part of the approved action and eligible for Trust Fund monies for a period of up to two years from the completion of the cap and leachate collection system. All other operation and maintenance activities will be eligible for Trust Fund monies for one year after completion of the source control remedial action.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites.

EPA will utilize the post closure monitoring data to determine the need for an additional remedial investigation/feasibility study to evaluate offsite groundwater contaminant migration. If additional remedial actions are deemed necessary a Record of Decision will be prepared for approval of the future remedial action.

In addition, a Supplementary Decision Document will be prepared for the signature of the Regional Administrator during the design phase to justify the decisions reached on the manner and location of leachate treatment (onsite or offsite), the extent of excavation in the satellite areas, and the need for air pollution controls on the landfill gas vents.

9/23/85
Date

[signature]
Regional Administrator

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
FOR
BEACON HEIGHTS LANDFILL SITE, BEACON FALLS, CT.

September 20, 1985
U.S. Environmental Protection Agency
Boston, Massachusetts

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SITE NAME

Beacon Heights Landfill site

SITE LOCATION AND DESCRIPTION

The Beacon Heights Landfill site is located two miles east of the intersection of Connecticut Routes 8 and 42 in Beacon Falls, Connecticut. Access to the landfill is from Blackberry Hill road about 3500 feet from this road's intersection with Route 42. The landfill occupies approximately 30 acres of an 83 acre property within the lower Naugatuck River valley. The site sits atop a ridge southeast of the intersection of Skokorat and Blackberry Hill roads. Approximately 21 homes border the site to the west along Skokorat road and 23 homes lie to the north along Blackberry Hill road in an area of low residential density. The closest residence is about 800 feet away on Blackberry Hill Road. The site is located within the Hockanum Brook drainage area. Hockanum Brook, which is 0.5 miles northwest of the landfill, flows down toward the Naugatuck river, which is two miles west of the site. Gravel pit operations also exist in this area, one northwest of the site, the other to the northeast. Both are approximately 0.5 miles from the landfill. Residences on Skokorat road as well as those above a recently installed water main on Blackberry Hill road have private water supplies. The site layout and location is further delineated on the maps presented in appendix A and figure 1.

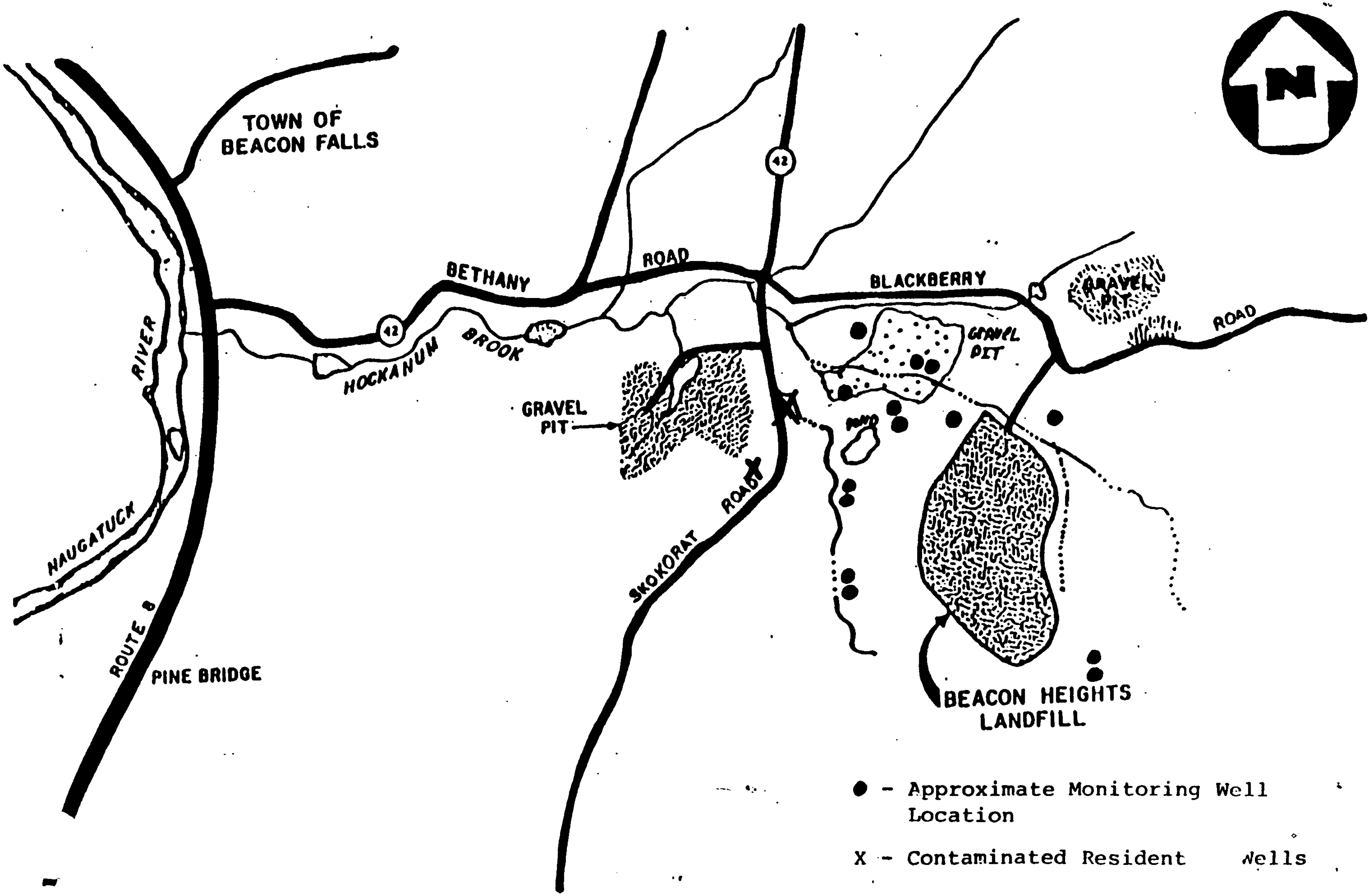
The entire site lies outside the 100 year floodplain of Hockanum Brook, and neither includes nor borders any wetland areas.

Groundwater in the region occurs in both the unconsolidated deposits, till and drift, and in the bedrock. Based on regional estimates of 47 inches of precipitation and 22 inches of evapotranspiration annually, approximately 25 inches of precipitate contact the landfill. Of this amount, 12 inches is discharged as surface runoff which allows 13 inches to percolate into the fill material. This percolate becomes contaminated from contacting the wastes prior to recharging the unconsolidated and bedrock aquifers and/or discharging as leachate at seeps at the base of the landfill, as illustrated in Figure 3.

Groundwater in the shallow unconsolidated aquifer contributes to the base flow of Hockanum Brook and to the flow of its two tributaries which flow north from the site and eventually join the Naugatuck River. The shallow unconsolidated aquifer also provides water for a number of residential wells in the area.

Site Location Map

Figure 1



SITE HISTORY

From the 1920's until 1970 the site was known as "Betkoski's Dump" and consisted of approximately 6 acres of active dumping in the northwest corner of the existing site. According to records at the Connecticut Department of Environmental Protection (CT DEP), the dump accepted a variety of waste including municipal refuse, rubber, plastics, and industrial chemicals and sludges. Operations consisted primarily of open burning along with burial of non-combustibles. Problems of wind blown litter and smoke from open burning were reported during this period. In 1970, the Betkoski property and adjacent properties totaling 83 acres were purchased by the Murtha Trucking Company, and the name was changed to Beacon Heights, Inc. Landfill. The landfill area was expanded to approximately 30 acres using excavated soils for daily cover material. Records of the CT DEP including a 1973 report by the landfill engineer listed rubber, plastics, oils, hydrocarbons, chemical liquids and sludges, and solvents as being disposed at the landfill. Site operations reportedly ceased in 1979 with two exceptions. Wastewater treatment plant sludge was spread over large areas of the site until 1983. Also a very small refuse transfer station for neighboring Bethany residents remains in operation immediately inside the access gate.

Several pools of liquid as well as evidence of open burning are visible on the site in aerial photographs taken in 1965. In addition, other aerial photographs taken in 1963, 1970, and 1975 visibly document the landfill expansion. An engineering geology study of the landfill completed in April, 1973 stated that leachate production was occuring. Another documented release of contaminants to the environment was a sampling of surface water near the site in 1979. The results from this sample were 30 parts per billion (ppb) chloroform, 110 ppb ethyl acetate, 400 ppb methyl acetate, and 30 ppb methyl ethyl ketone. Releases of contaminants to the air, groundwater, and surface water surrounding the Beacon Heights Landfill are further documented in the remedial investigation report prepared by NUS Corp., and are discussed further herein in the <u>Current Site Status</u> section.

During the period of operations from 1970 to 1979, both municipal wastes and industrial wastes and refuse were disposed of by landfilling. The Connecticut DEP monitored and permitted site operations during this period and issued a series of Administrative Orders to the owner/operator to perform engineering-geological studies to remedy alleged permit violations related to unauthorized acceptance of industrial wastes, disposal in unauthorized areas, surface water contamination from leachate migration, inadequate cover, and others.

These activities culminated in a Consent Order to close the facility by July 1, 1979. This Consent Order was signed by the president of Beacon Heights, Inc. on June 20, 1979 and entered as a final Order of the Connecticut Commissioner of Environmental Protection on July 24, 1979. The closure requirements of the Order, which included placement of final cover and implementation of a groundwater monitoring system, were never implemented. On December 4, 1979 the CT DEP inspected the Beacon Heights Landfill and reported that landfill operations had ceased.

No response actions have been taken at the site by EPA or the CT DEP. However, the DEP has been providing bottled water to 2 homes on Skokorat Road since November, 1984 after their wells were found to be contaminated above levels considered acceptable for drinking water by the Connecticut Department of Health Services.

CURRENT SITE STATUS

The site consists of two overlapping waste management areas. The main area, formerly operated by Beacon Heights, Incorporated occupies approximately 30 acres of an 83 acre property. Visually it is a large mound with elevations ranging from 550 to 718 ft. above mean sea level. The depth of waste ranges from 0 feet at the toe to 40-60 feet near the top. Based on comparisons of current and old topographic maps it is estimated that 650,000 cubic yards of waste comprise the body of the landfill. Due to the random codisposal of municipal refuse and industrial wastes it is not possible to identify specific locations of hazardous materials within the landfill mass.

The second area of disposal is known as the former "Betkoski Dump". This smaller 6 acre area is located immediately adjacent to the landfill to the northwest of the site access road (see figure 2), although portions of it extend beneath the access road and beneath the Beacon Heights landfill area.

The following summary hydrologic profile of the landfill explains the surface water and groundwater migration pathways for contaminant migration from the site. Precipitation percolates into the fill materials and becomes contaminated from contact with the wastes. This contaminated water (leachate) flows through the permeable refuse until it contacts the less permeable bedrock. Some leachate then flows downward into the shallow bedrock system under the influence of gravity, while the rest flows at the interface of the fill and bedrock until it exits the landfill at one of the leachate seeps. Some leachate entering the bedrock flows downgradient in the upper fractured zone until the gradients are such that allow this leachate to discharge as seeps at the base of the landfill in local groundwater discharge areas. At two of the three major seep areas, the leachate is collected by a crude channel that runs along one side of the site until its juncture with a stream. The stream transports the leachate offsite through a former gravel pit operation where a portion of the stream percolates into the ground to recharge the shallow aquifer. The remainder of the leachate entering the bedrock flows along the most transmissive fractures to the regional discharge area, the Naugatuck River, located to the northwest of the site.

During the remedial investigation (RI) samples of leachate were analyzed as the most direct indication of the contaminant source since no other specific waste materials could be sampled, i.e. liquid wastes, lagoon wastes, etc. Three major seep areas were identified, sampled, and analyzed. The sample results indicated significant contamination with volatile organics as well as some acid extractable compounds. The primary contaminants were benzene (35,100 ppb max.), chlorobenzene (5,310 ppb max.), chloroethane (1,450 ppb max.), 2-butanone (6,090 ppb max.), and bis(2-chloroethyl)ether (4,680 ppb max.). Specific sample locations and concentrations are further defined within the maps and tables of Appendix B and Figure 2 of this document.

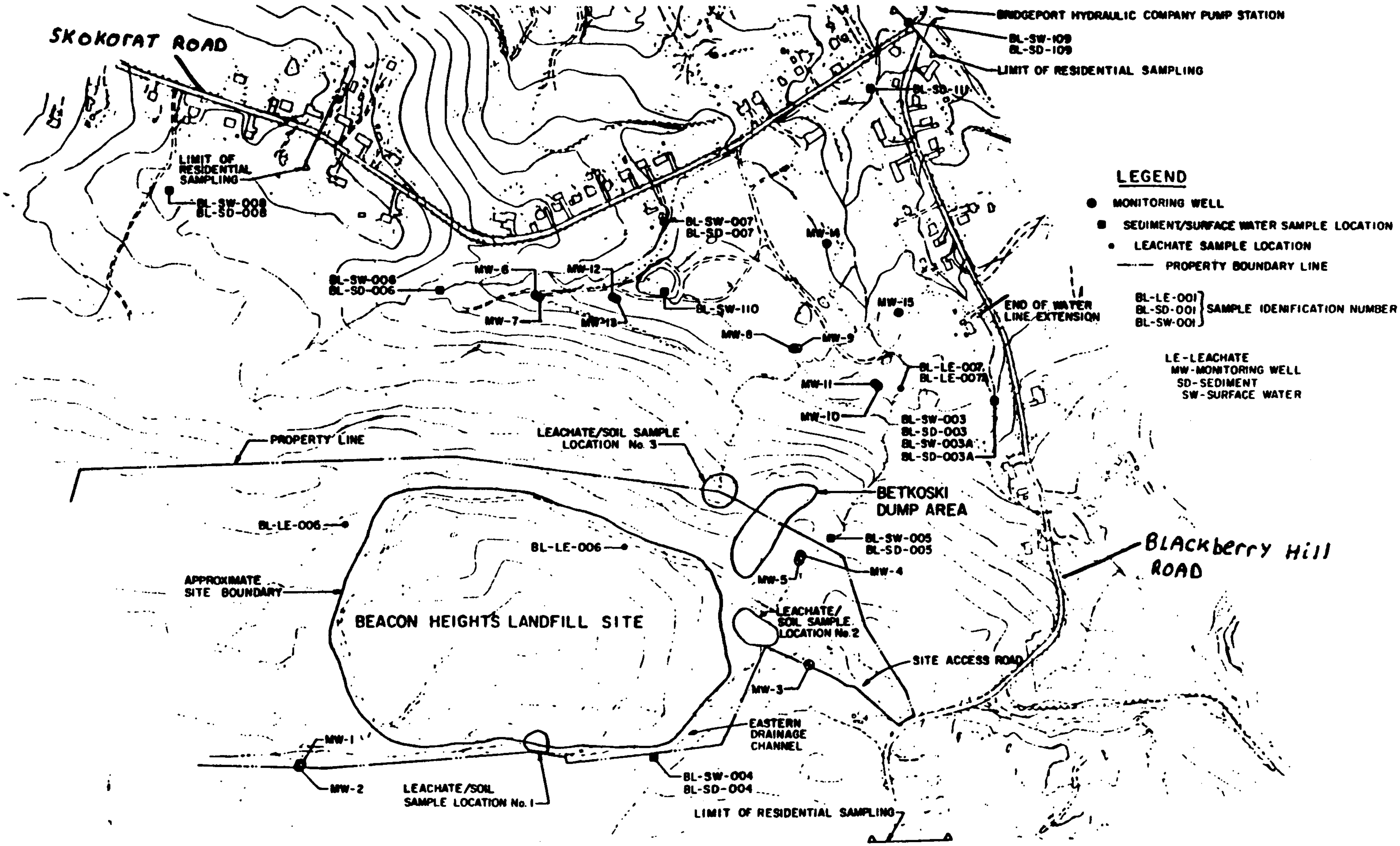
Fifteen groundwater monitoring wells were installed at various locations surrounding the site. Both unconsolidated and bedrock wells were installed. Sampling and analysis of these wells indicated significant contamination in four wells; two in the unconsolidated deposits, two in bedrock. The other wells contained trace levels of both base/neutral and volatile organic chemicals. One set of the significantly contaminated wells (one bedrock, one unconsolidated) is located approximately 400 feet downgradient and the other set approximately 1000 feet downgradient of the landfill. Benzene was detected in these four wells at concentrations up to 850 ppb. Chlorobenzene and chloroethane were also detected at levels up to 797 and 131 ppb respectively. Bis(2-chloroethyl)ether was also found at levels up to 4360 ppb.

Water samples were also collected from 44 private residential wells along Blackberry Hill and Skokorat Roads adjacent to the landfill. These wells were considered to provide another good indication of offsite groundwater contaminant migration from the landfill given the lack of any other apparent sources between the homes and the landfill. Analysis of these water samples indicated that two residential wells were contaminated with 48 and 131 ppb of benzene respectively. Followup sampling confirmed these results with levels of 22 and 98 ppb in the second round and 42 and 89 ppb in the third round. Other residences sampled had trace levels of contamination below current drinking water standards. A complete listing of all residential well results can be found in Appendix A to the feasibility study.

A tributary to Hockanum Brook (the largest surface water stream in the area) drains the northern part of the landfill. This stream was contaminated with benzene (49 ppb), chlorobenzene (95 ppb), bis(2-chloroethyl)ether (420 ppb) and iron (89,000 ppb). This tributary stream accepts discharge from a channel which drains both surface runoff and leachate from the landfill. The tributary is free of contamination upstream of the landfill (See figure A-2 in Appendix A of this document for details).

Results of limited air samples analyzed for volatile organics and soil samples analyzed for PCB's, dioxin, and heavy metals indicate no apparent health hazards at the current site as a result of inhalation of volatile organic compounds or airborne contaminated particulates. However, there are volatile organic emissions as noted in Table B-3 of Appendix B as reported in the RI. Therefore

Figure 2



SITE PLAN
BEACON HEIGHTS LANDFILL SITE, BEACON FALLS, CT
SCALE: 1" = 400'

A Hallit

should onsite actions require breaking into the fill, or excavation of satellite areas, additional monitoring would be required.

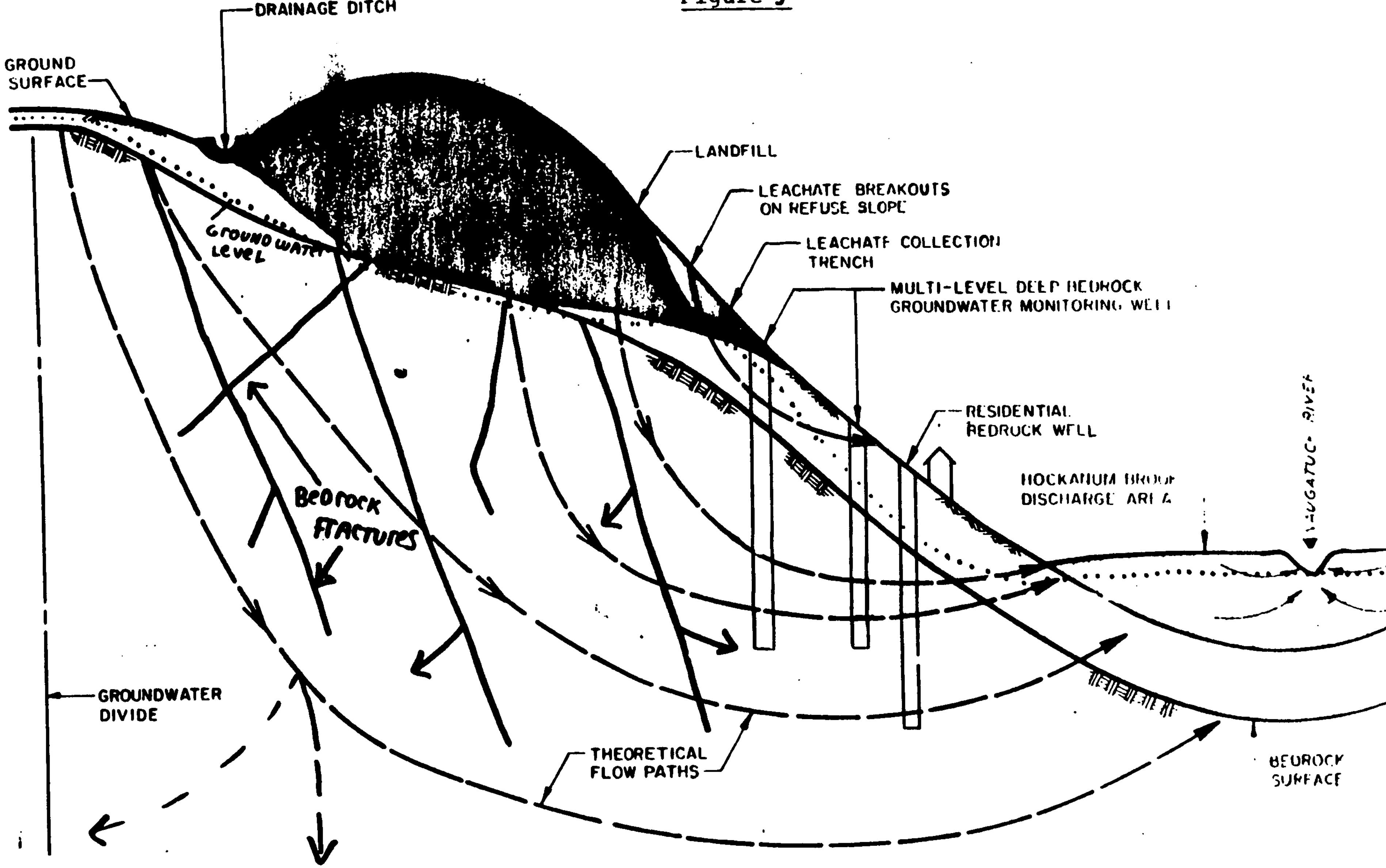
Thus, the major exposure pathway to human receptors from the release of hazardous substances from the site is the ingestion of contaminated groundwater withdrawn from either the unconsolidated aquifer or the bedrock aquifer, both of which are contaminated with benzene, chlorobenzene, chloroethanes, bis (2-chloroethyl) ether, xylenes, and other hazardous compounds. These two aquifers provide water for 44 homes along Skokorat and Blackberry Hill Roads. Assuming 3.8 occupants per residence, approximately 167 people utilize private wells drawing water from these aquifers for drinking water and other domestic uses.

The aforementioned hydrologic setting of the landfill provides a pathway for contaminant releases from the site to reach these wells. As shown in Figure 3, the landfill is situated in a local recharge area for the unconsolidated aquifer which discharges to Hockanum Brook. The estimated groundwater velocity in this aquifer is approximately 52 feet per year. The residences are within approximately 1/2 mile (2640 feet) from the landfill; the closest is within 800 feet. Since significant contamination has already been found in the unconsolidated monitoring wells at distances of 400 and 1000 feet from the landfill, it is evident that the area residential wells which draw from the unconsolidated aquifer are threatened by continued offsite migration of contaminants from the site.

Contaminant flow in the fractured bedrock also threatens the nearby residential wells which draw from the bedrock aquifer. Again referring to Figure 3, the landfill is sited in an area which provides recharge to the bedrock aquifer which discharges locally to Hockanum Brook and regionally to the Naugatuck River. CT DEP records indicate that the unconsolidated deposits in the filled areas were removed prior to landfilling for use as daily cover material. Thus, the wastes were placed directly on the bedrock surface, thereby providing a pathway for leachate to enter the bedrock fractures. Outside the waste management areas, the unconsolidated aquifer recharges the bedrock aquifer, i.e. there is downward flow of water and contaminants from the unconsolidated deposits into the bedrock. Once contaminants enter the bedrock, by either means, <u>local</u> flow paths and velocities cannot be defined since they are governed by fracture spacing and directions, interconnections of the fractures, and local disturbances such as pumping. However, the regional flow direction is north-northwest toward Hockanum Brook and the Naugatuck River. The residences on both Skokorat and Blackberry Hill Roads are within the flow paths of contaminated groundwater and could be impacted at any time.

Two bedrock residential wells on Skokorat Road were found to be significantly contaminated with benzene, a human carcinogen, during the remedial investigation performed by NUS. In three separate sampling rounds in the summer and fall of 1984 and the

Figure 3



THEORETICAL FLOW PATHS OF GROUNDWATER AND CONTAMINANTS FROM THE BEACON HEIGHTS LANDFILL winter of 1985, benzene levels in the two wells were 48 and 131 ppb, 22 and 98 ppb, and 42 and 89 ppb. No federal drinking water standard has been set for benzene; the EPA Office of Drinking Water has set a SNARL (Suggested No Adverse Response Level) of 70 ppb to protect against chronic systemic toxicity from long term ingestion. The SNARL does not consider carcinogenicity, however. The cancer risk associated with ingestion of benzene at 131 ppb is 1.98 x 10^{-4} lifetime excess cancers, i.e. 2 excess cancers above normal cancer rates for every 10,000 people ingesting this compound over a 70 year lifetime. Should the levels in the residential wells reach the 860 ppb measured in offsite monitoring wells, the cancer risk would increase proportionately. Benzene is ubiquitous at the site, having been found in groundwater, leachate, surface water, soils, and air, and the concentrations in offsite groundwater can be expected to increase over time as the plumes spread further out from the site.

The above findings prompted the Connecticut Department of Health Services to notify the occupants of the two residences that their well water was unfit for human consumption since the benzene levels were substantially in excess of that Department's guideline of 1 ppb. Subsequently, the CT DEP has provided bottled water to the two residences under the provisions of Connecticut Public Act 85 - 407.

Other contaminants detected in the residential wells by NUS include methylene chloride, 1,1 dichloroethane, bromodichloromethane, xylene, trichloroethene, chloroform, bis(2-ethylhexyl)phthalate, and di-n-octyl phthalate. Although current levels of these contaminants are below federal and state guidelines for drinking water, significant levels of many of these same contaminants have been found in both leachate and offsite groundwater and thus, the levels in the residential wells could increase over time as contaminant plumes migrate further from the landfill source. A complete listing of the critical contaminants and their associated threshold and nonthreshold effects is presented in Tables B-4 and B-5 of the Feasibility Study Report prepared by NUS. (See Appendix B of this document for additional information).

Leachate discharges and contaminated surface runoff from the site have also degraded the small tributary of Hochanum Brook which drains the site. Both the brook and its tributaries are classified by the CT DEP as B/A, meaning that the desired classification is A but that the current status approximates B due to the effects of waste discharges on stream quality. Samples taken from the tributary in the fall of 1984 at a location approximately 800 feet downstream of the leachate discharge point were contaminated with benzene (49 ppb), chlorobenzene (95 ppb), bis(2-chloroethyl)ether (420 ppb), and 1,2 dichlorobenzene (10 ppb), and the streambed is heavily discolored from the high iron content of the leachate.

The allowable level of chemical contaminants in Class A streams is determined by General Policy 11 of the Connecticut Water Quality Standards and Criteria, adopted on September 9, 1980. This policy states that " the waters shall be free from chemical constituents in concentrations or combinations which would be harmful to human, animal, or aquatic life for the most sensitive and governing water use class. Criteria for chemical constituents contained in guidelines published by the U.S. Environmental Protection Agency shall be considered ..."

EPA has issued water quality criteria for benzene and for bis(2-chloroethyl)ether pursuant to § 304(a)(1) of the Clean Water Act, 33 U.S.C. 1314(a)(1). (See Federal Register Volume 45 Number 231, November 28,1980). These criteria are discussed separately for each contaminant in the following excerpts from that Federal Register.

<u>Benzene</u> : "For the maximum protection of human health from the potential carcinogenic effects due to exposure to benzene through the ingestion of contaminated water and contaminated organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels that may result in incremental increase of cancer risk over the lifetime are estimated at 10^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are 6.6 ppb, .66 ppb, and .066 ppb, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 400 ppb, 40 ppb, and 4 ppb, respectively."

<u>Bis(2-chloroethyl)ether</u> :

"For the maximum protection of human health from the potential carcinogenic effects due to exposure to bis(2-chloroethyl)ether through ingestion of contaminated water and contaminated aquatic organisms, the ambient water concentration should be zero based on the non-threshold assumption for this chemical. However, zero level may not be attainable at the present time. Therefore, the levels which may result in incremental cancer risk over a lifetime are estimated at 10^{-5}, 10^{-6}, and 10^{-7}. The corresponding criteria are .3 ppb, .03 ppb, and .003 ppb, respectively. If the above estimates are made for consumption of aquatic organisms only, excluding consumption of water, the levels are 13.6 ppb, 1.36 ppb, and .136 ppb, respectively."

Thus, the attainment of Class A standards is threatened by the leachate disharge. It is noted that the aforementioned contaminant levels were measured at a point 800 feet downstream of the actual disharge point. Sampling could not be conducted closer to the discharge point, because the stream enters an underground culvert immediately after the discharge point. Were this location accessible to sampling, the contaminant levels would be expected to be higher than at the downstream sampling location.

Finally, the presence of exposed leachate and contaminated soils, primarily at leachate seeps, presents a potential direct contact hazard from ingestion or dermal contact. Specific data on the compounds present in these areas can be found in Chapter 2 of the Feasibility Study Report and in Appendix B of this document.

ENFORCEMENT ANALYSIS

Included as an EPA enforcement confidential document in Appendix E.

ALTERNATIVES EVALUATION

The feasibility study has addressed both source control remedial actions and offsite remedial actions. Source control actions are appropriate since substantial concentrations of hazardous substances remain at or near the area where they were originally located and inadequate barriers exist to retard the migration of hazardous substances into the environment. (See 40 C.F.R. § 300.68 (e)(2) of the NCP) Offsite remedial actions were also evaluated, since contaminants have migrated beyond the area where they were originally located. Furthermore, source control actions may not, in and of themselves, mitigate and minimize damage to public health, welfare, and the environment. (See 40 C.F.R. § 300.68 (e)(3) of the NCP)

Objectives

The objectives of the remedial action are to reduce the generation of contaminated leachate and thereby mitigate future groundwater and surface water contamination; to minimize offsite migration of contaminants via surface runoff; to minimize direct human contact with contaminated soils on site; and to assure a safe drinking water supply for area residents. These objectives may be achieved by source control actions supplemented by offsite actions. To meet these broad objectives, the landfill wastes must be isolated to minimize contact with groundwater and surface water, and to prevent human and animal exposure.

Development of Alternatives

The remedial alternatives for the Beacon Heights Landfill were developed and evaluated using 40 C.F.R § 300.68 (g), (h), (i), and (j) of the NCP as guidance.

The first step in developing the remedial action alternatives was to consider the wide range of possible methods for remedying releases at any site and then to select those methods which were applicable to the stated objectives of remediation at the Beacon Heights Landfill site. Table 4-1 lists the general response methods considered appropriate for evaluation at this site. Table 4-2 lists those that were rejected as inappropriate. The methods listed in Table 4-1 were then combined to form the 13 remedial action alternatives listed in Figure 4. Alternatives 1 - 8 are source control actions; alternatives 9 - 13 are offsite actions.

Initial Screening

The thirteen alternatives were screened based on the criteria in 40 C.F.R. § 300.68 (h) of the NCP, i.e. cost, effects of the alternative, and acceptable engineering practices.

The following is a brief discussion of those alternatives that were eliminated from detailed evaluation and the reasons for the elimination. Please note alternatives are numbered as presented in Figure 4.

Alternative Number 1, Offsite Disposal in an Approved Facility This alternative includes excavation of all contaminated materials, disposal in an offsite RCRA-approved landfill, backfilling and revegetation of the excavated areas, and installation of stormwater management controls. The total present worth cost of this alternative is $101,257,000 with an initial capital cost of $100,459,000. This alternative is roughly twice the cost of the next cheapest source control alternative. Although technically possible, this alternative is not a reliable means of addressing the site problems. Implementation could require 3 to 7 years or more, depending on the availability of an approved landfill. Currently there are no approved facilities located in Connecticut, or New England. Furthermore, the excavated wastes may require extensive rehandling to meet the landfill site's requirements on free liquid content, solvent content, or some wastes may be encountered which would not be accepted even after rehandling.

Significant short term adverse impacts could also result from the implementation of this alternative. Excavation of 700,000 cubic yards of waste would result in substantial amounts of contaminated surface runoff and leachate migration which would be extremely difficult if not impossible to control. Additionally, increased volatilization of both hazardous organic compounds and methane from garbage decomposition could cause local air emission problems.

Selection of this alternative would also not comply with the

Figure 4

CATEGORIZATION AND CLASSIFICATION OF REMEDIAL ACTION ALTERNATIVES BEACON HEIGHTS LANDFILL SITE

Remedial Action Alternative

Site Remediation Alternatives

1. Offsite Disposal in an Approved Landfill
2. Onsite Incineration
3. RCRA Closure with Cap, Leachate Collection, and Treatment to NPDES Standards
4. Onsite RCRA Landfill, Leachate Collection, and Treatment to NPDES Standards
5. Onsite RCRA Landfill, Leachate Collection, and Treatment to Drinking Water Quality Standards
6. Soil Cover, Leachate Collection, and Treatment to NPDES Standards
7. No-Action
8. Limited No-Action with Long-Term Monitoring

Water Supply Alternatives

9. Public water supply provided to extended area (Skokorat Road to next municipal supply, Blackberry Hill Road to demographic limits)
10. Public water supply provided to affected area (Partial coverage on Skokorat Road)

Groundwater Alternatives

11. Groundwater Extraction and Treatment to Drinking Water Quality Standards
12. Additional Groundwater Hydrogeologic Investigation
13. Limited No-Action with Monitoring

Table 4-1

GENERAL RESPONSE ACTIONS AND ASSOCIATED REMEDIAL TECHNOLOGIES BEACON HEIGHTS LANDFILL SITE

General Response Action	Applicable Remedial Technologies
No Action	Monitoring
Containment	Groundwater containment barrier Capping
Pumping	Onsite groundwater pumping - extraction Offsite groundwater pumping - extraction
Collection	Leachate collection Gas vents Gas collection systems Sedimentation basins French drains Pipe collection systems
Diversion	Regrading and revegetation Diversion channels
Complete Removal	Excavation of landfill waste material including soils, sediments, and liquid wastes
Onsite Treatment	Waste incineration - RCRA Leachate treatment - physical, chemical, biological Groundwater treatment - physical, chemical, biological
Offsite Treatment	Waste incineration - RCRA Leachate treatment - physical, chemical, biological Groundwater treatment - physical, chemical, biological
Offsite Disposal	RCRA Landfill
Onsite Disposal	RCRA Landfill
Alternative Water Supply	Municipal water system Individual treatment devices New wells

Table 4-2

ELIMINATED GENERAL RESPONSE ACTIONS AND ASSOCIATED REMEDIAL TECHNOLOGIES BEACON HEIGHTS LANDFILL SITE

General Response Action	Eliminated Remedial Technologies	Comments
Containment	Bulk heads Gas barriers	Not applicable to site characteristics and problems. Data does not support the need for this technology.
Diversion	Stream diversion ditches Terraces and benches Chutes and downpipes Levees Seepage basin	Site or remediation not affected by stream location. Surface water run-on not affecting site significantly. Surface water run-on can be controlled by other means. Flood plains not applicable to site. Site characteristics do not support this technology.
Complete Removal	Contaminated structures Sewers and water pipes	Not applicable to this site Not applicable to this site
Partial Removal	Excavation	The random codisposal of industrial wastes with the municipal refuse eliminates the feasibility of identifying specific locations of buried hazardous waste.
Onsite Treatment and Offsite Treatment	Solidification Land treatment	The codisposal of industrial wastes with municipal waste has created a complex waste that cannot be treated with any effectiveness by these technologies
In-situ Treatment	Permeable treatment beds Bioreclamation Soil flushing Neutralization Landfarming	The codisposal of industrial wastes with municipal wastes has created a complex waste that cannot be treated with any effectiveness by these technologies. The complex hydrogeology also adversely affects the ability to control implementation of these technologies.

Table 4-2

ELIMINATED GENERAL RESPONSE ACTIONS AND ASSOCIATED REMEDIAL TECHNOLOGIES BEACON HEIGHTS LANDFILL SITE PAGE TWO

General Response Action	Applicable Remedial Technologies	Comments
Storage	Impoundments Storage Structures	The massive volume of total waste and codisposal of the industrial wastes with municipal wastes eliminates these technologies.
Offsite Disposal	Surface impoundments Land applications	These technologies are not applicable to the nature or volume of wastes at the site.
Alternative Water Supply	Bottled water Cisterns Above-ground tanks Relocation of intake structures	The residential wells that have been contaminated need to be replaced with an equally permanent water supply The cisterns, above ground tanks, and bottled water systems are temporary solutions and are not the best technology available in the affected area. The intake structure relocation is not applicable to this site

statutory restrictions on offsite disposal under CERCLA § 101 (24). It is not the cost effective alternative, it is not necessary to protect public health, welfare, and the environment, and it would not create additional disposal capacity. Based on the uncertain feasibility of securing an approved disposal site, the potential adverse environmental impacts of unearthing, transporting, and redisposing of such a large amount of waste, the extended timeframe for implementation, and the excessive cost relative to the other alternatives without corresponding benefit, this alternative was eliminated from detailed evaluation.

Alternative Number 2, Onsite Incineration. This remedial action involves the excavation of all contaminated materials including the main landfill, the Betkoski Dump, and peripheral contaminated soils. Following excavation the waste would be burned in four portable incinerators. After incineration, all ash and non combustibles (estimated at 200,000 cubic yards) would be disposed in an onsite RCRA landfill. This is the most complex of all 13 alternatives to implement.

The reliability and thus engineering feasibility of this alternative is highly questionable due to the heterogenous nature of the waste material and its mixture with large quantities of soil and debris. This would hinder the ability of the incinerators to effectively destroy the hazardous constituents and would likely result in a high incidence of malfunctions and downtime. Short term adverse impacts to air quality from malfunctions and poor destruction efficiency could also be expected and could pose a potential threat to public health. In addition, a minimum of 3 to 4 years would be required for implementation.

The total capital cost of this alternative is $51,201,000 with a total present worth cost of $64,055,000. Based on the engineering infeasibility of burning the contents of the entire 30 acre, 650,000 cubic yard landfill in a safe, effective, and timely manner, and the possibility of short term adverse impacts to public health, this alternative was eliminated from detailed evaluation.

Alternative 3A, RCRA Closure with a Cap, No Leachate Collection or Treatment, Postclosure Monitoring. This alternative is identical to Alternative 3 except the perimeter leachate collection is omitted. Initial capital cost is $ 14,326,000 and total present worth cost is $ 15,193,000. (See Table C-3 for cost comparison with other options under Alternative 3). The CT DEP requested an evaluation of this alternative based on their opinion that a RCRA cap would so dramatically curb leachate production that a collection system would not be needed. Based on water balance calculations, it is expected that leachate would be produced, at least initially, at a rate of approximately 5000 gallons per day. This rate of leachate production will most likely decline after capping once the presently saturated wastes within the landfill have dewatered. However, the degree to which leachate production will drop and the time required to do so cannot be accurately predicted. Since no cap may be engineered to be complete impermeable and since waste will remain beneath the cap, leachate will continue to be produced in some amount. If not collected, this leachate will be a continuing source of contamination to groundwater and surface waters. Thus, this alternative does not provide adequate control of source material as required by 40 C.F.R. § 300.68 (h)(2) of the NCP and therefore has been dropped from consideration.

Alternative Number 6, Soil Cover, Leachate Collection, and Treatment to Drinking Water Quality Standards, Postclosure Monitoring. In this alternative the entire site will be covered with a soil cap, leachate collection and treatment will be provided, and gas venting and storm water management systems will be installed. The soil cover will consist of two feet of till material and a six inch loam layer to maintain vegetation. The purpose of the soil cover is to reduce contaminated surface water runoff and to reduce some of the infiltration that subsequently generates leachate. The amount of leachate reduction will depend on the impermeability of the cap. Even though leachate production would be reduced, this soil cap would permit a substantial amount (10,000 to 20,000 gallons per day) of leachate to be produced as a result of the infiltrated precipitation. This alternative would control the discharge of leachate and contaminated runoff into surrounding surface waters but would allow continued releases of contaminants to groundwater. The initial capital cost of this alternative is $6,175,000 with a total present worth cost of $8,277,000.

Continued leachate production under this alternative poses an ongoing threat to the environment and to the public health and therefore does not meet the site objectives. Due to inadequate control of leachate production, this action does not constitute adequate control of source material as required by 40 C.F.R. § 300.68 (h)(2) of the NCP and therefore has been dropped from further consideration.

Alternative Number 7, No Action. This alternative represents the baseline against which all other alternatives are to be compared. The objectives for site remediation, described earlier, are based on the conclusion that the current and future potential risks to public health, welfare, and the environment are unacceptable. These risks were identified in the Feasibility Study Report and in the Current Site Status section of this document. The No Action alternative provides no source control measures and no measures to minimize and mitigate the offsite migration of contaminants. As such it will not reduce leachate generation and subsequent migration of contaminants into groundwater and local surface water and therefore will not reduce the public health threat from ingestion of contaminated groundwater or the public health and environmental threats from continued surface water contamination. It also will not reduce the potential health threat associated with direct contact with contaminated soils and water at leachate breakouts (seeps).

In summary, the no action alternative would not achieve adequate control of source material and would not minimize nor mitigate the the threat of harm to human health, welfare, or the environment as required under 40 C.F.R. § 300.68 (h)(2) of the NCP. Therefore, this alternative was eliminated from detailed evaluation.

Alternative Number 8, Monitoring. This alternative is a form of the no action alternative. As such it does not include construction activities to remediate site contamination but instead provides for developing and maintaining a long-term monitoring program. The results of the monitoring program would be evaluated to track any adverse impacts to the public health and/or environment, and to identify a point at which remedial activities may be required. Monitoring includes the sampling and analysis of several newly installed wells, as well as sampling the residential, groundwater, and surface waters on a quarterly basis over a 30 year period. The initial capital cost for this alternative is $272,000 with a total present worth cost of $1,969,000. This monitoring alternative does not provide for more immediate actions to remedy contaminant migration or adverse impacts to public health and the environment. It does not minimize continued release of contaminants to the groundwater, nor does it provide a long term solution for adequate source control. Again, based on 40 C.F.R § 300.68 (h)(2) of the NCP this alternative does not constitute adequate control of source material. Based on this reason as well as those outlined in alternative 7 above, this alternative has been dropped from further consideration in the detailed analysis.

Alternative Number 11, Groundwater Extraction and Treatment to Drinking Water Quality Standards. A groundwater extraction system was developed to mitigate the threat to human health caused by the offsite migration of contaminants into drinking water aquifers. This alternative includes the installation of approximately 70 bedrock extraction wells. Each well would have its own pumping system. These pumps will discharge to a main line that leads to a treatment unit. The treatment unit would use a combination of air stripping and carbon adsorption to process the flow. This process would operate for at least a 30 year period, or until remedial cleanup goals are met (background, Maximum Concentration Limits - MCL's, or Alternate Concentration Limits - ACL's as required under RCRA).

Extraction of contaminated groundwater from deep fractured bedrock is not a proven practice. In addition, site specific geologic and hydrologic conditions complicate the design and implementation of an extraction system. The bedrock fractures in the area have predominant vertical dips. This is readily visible on the abundant bedrock outcrops surrounding the site. This fact severely complicates the siting of extraction wells. With a vertical fracture system, the probability of intersecting the fractures with vertical extraction wells is remote, and near misses will render the well useless since unfractured impermeable rock prevents water flow. Pumping wells that do intercept fractures would only draw water from those particular fractures and any interconnected fractures. To circumvent this problem, an enormous number of wells would be required. However, the probability of intercepting all fractures carrying contaminants from the site would still be remote, and any fractures that were missed would continue to provide a conduit for contaminant migration from the site, thereby rendering the entire system ineffective. (See Table C-2 for estimated costs).

Removal of contaminated groundwater from the thin glacial till material is technically feasible, although very difficult. Even if removal of groundwater contamination from the till material could be achieved, leachate would continue to enter the fractured bedrock beneath the landfill for subsequent migration offsite. Thus, the threat to the environment and public health would not be adequately mitigated.

Due to the technical infeasibility of groundwater extraction from deep, fractured bedrock and the inadequate mitigation of the public health threat provided by extraction and treatment of contaminants from the unconsolidated aquifer, this alternative was eliminated from further evaluation.

Alternative Number 12, Additional Groundwater Hydrogeologic Study. This additional hydrogeologic study alternative was developed to collect additional data to better design an effective groundwater extraction and treatment system. An additional hydrogeologic study would provide more information on bedrock conditions. However, the existing data are adequate to conclude that the hydrogeologic setting of the landfill precludes effective interception and extraction of contaminated groundwater. Therefore, this alternative cannot provide for minimization or mitigation of threats to public health and the environment from the offsite migration of contaminated groundwater, and it was eliminated from further consideration.

DETAILED EVALUATION OF ALTERNATIVES

The alternatives remaining for detailed evaluation are discussed below. A detailed analysis of these alternatives was performed in accordance with 40 C.F.R. § 300.68 (i) of the National Contingency Plan (NCP), which requires consideration of technical feasibility, detailed cost estimation including distribution of costs over time, constructibility, effectiveness in addressing environmental, welfare, and public health concerns, and adverse environmental impacts and measures for mitigating those impacts.

In response to comments received by the CT DEP, the PRP's, and others on the draft Feasibility Study Report, three modifications to Alternative 3 were developed. These options relate to whether or not leachate is collected, and, if collected, whether to treat onsite or offsite. As indicated in the attached Figure 10, the range in total project costs among the options is small enough that it does not affect the choice of a recommended source control alternative from among the remaining Alternatives 3, 4, and 5.

The remaining offsite remedial alternatives include Alternatives 9 and 10, which would extend the municipal water supply to a limited (10) or an extended (9) area. Alternative 13 would deal with offsite groundwater contamination via long term monitoring coupled with institutional controls. Costs for all alternatives including long term costs are included in Appendix C of this document.

<u>Alternative Number 3</u>, RCRA Cap, Leachate Collection and Onsite Treatment, Postclosure Monitoring. This alternative involves closure of the landfill with a RCRA capping system, along with the implementation of postclosure monitoring requirements. The Betkoski Dump wastes and contaminated soils and sludges around the site will be excavated, consolidated and placed on top of the landfill prior to closure. These "satellite" areas are shallow in depth (approximately 3 to 15 feet), and lie directly over bedrock. Wastes in these areas will be excavated to background or to alternate levels protective of human health, welfare, and the environment. Predesign/design sampling will be necessary to define the excavation criteria. A Decision Document will be prepared at that time to document the cost-effectiveness of the selected approach. The steep sideslopes on the north side of Betkoski's Dump preclude the ability to effectively cap this area and provide leachate collection, thus necessitating consolidation. Leachate will be treated onsite and discharged to a tributary of Hockanum Brook. The site will be enclosed with a fence, and new monitoring wells will be installed to monitor the effectiveness of the cap as required by 40 C.F.R. § 264 Subparts (F), (G), and (N).

A landfill gas venting system will also be installed to prevent the buildup of gasses under the cap. The need for air pollution controls on the vented gasses would be evaluated during design. The initial capital cost for this alternative is $15,439,000 with a 30 year total present worth cost of $17,155,000. The proposed area of capping and the extent of the leachate collection system are shown in Figure 5. The quantities of materials for construction of a multimedia cap are outlined in Figure 6. A cross section of the proposed cap is shown in Figure 7. A cost summary of all leachate collection and treatment options included under Alternatives 3, 3A, 3B, and 3C can be found in Figure 6a and in Appendix C Table C-3 of this document.

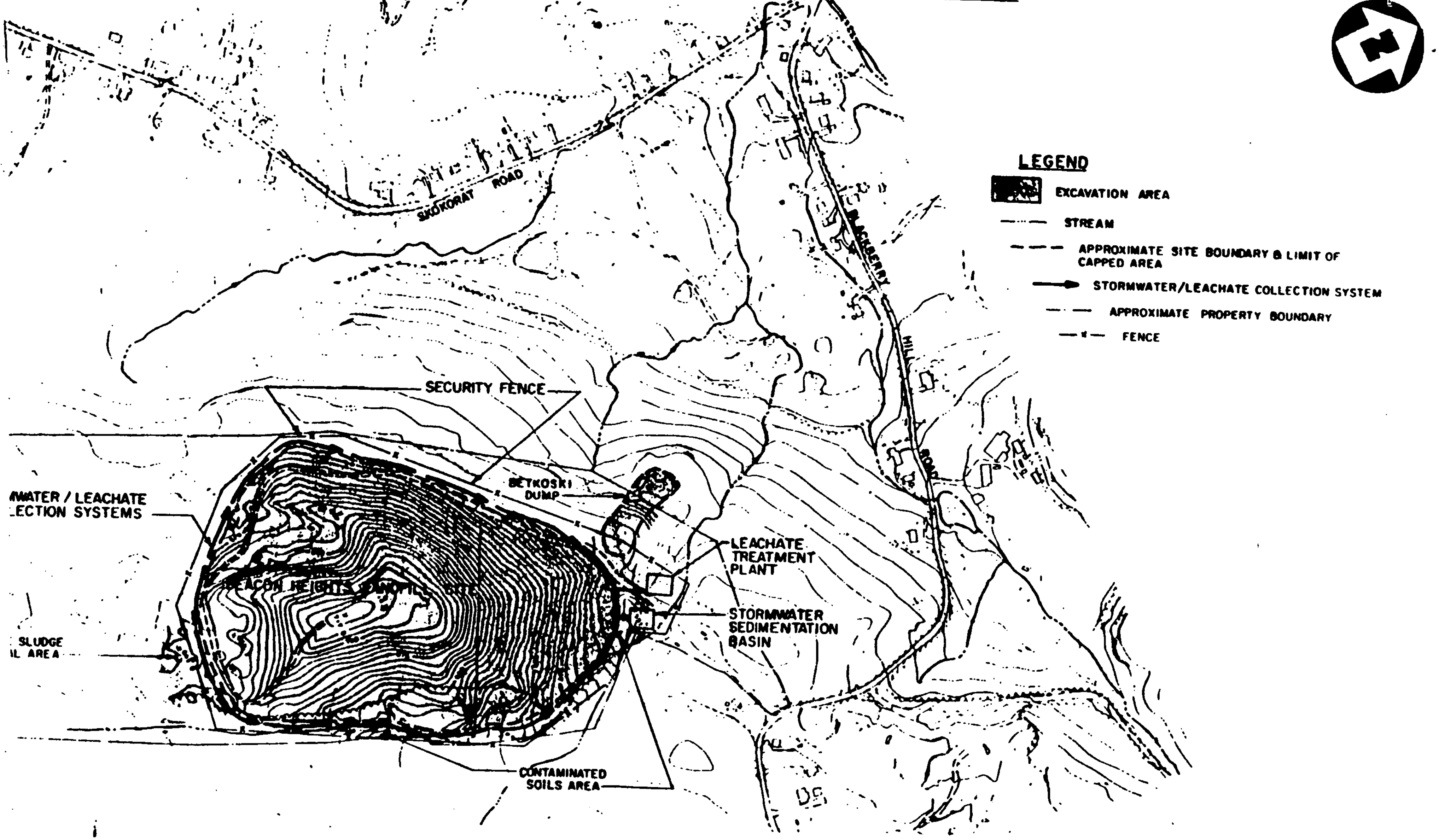
This alternative satisfies all of the objectives for source control. Consolidation of the outlying contaminated soils with the main landfill followed by capping that landfill will eliminate the direct contact threat and the offsite migration of contaminants via surface runoff. Installation of a cap which meets the requirements of RCRA will minimize the future production of leachate which, in turn, will minimize future groundwater contamination and surface water contamination. The provision of a perimeter leachate collection and treatment system will ensure adequate source control of the majority of the leachate which will be generated after capping, during the period of time required for the presently saturated wastes to dewater, and the small amount of leachate which will be generated by leakage through the cap.

<u>Alternative 3B</u>, RCRA Cap, Leachate Collection, Offsite Treatme
This alternative is identical to Alternative 3 with the exception that the leachate collected onsite would be transported to an offsite treatment facility. The PRP committee requested an evaluation of this alternative based on their opinion that onsite treatment and discharge to Hockanum Brook (Alternative 3) would not be allowed under Connecticut Water Quality Standards and that treatment at the Naugatuck or Beacon Falls POTW would be more cost effective.

Under this alternative, the perimeter leachate collection system would drain by gravity to a holding tank. An estimated 5000 gallons per day (GPD) would initially be removed off site by two tank trucks per day and transported to the nearest available wastewater treatment facility. Prior to removal, leachate would be pretreated onsite with an alkaline metal precipitation process. Preliminary scoping has shown that the Naugatuck wastewater treatment facility may be able to accept and process this leachate load. This facility is about four miles from the site. The initial capital cost of this alternative is $15,216,000 with a total 30 year present worth of $18,610,000.

The Beacon Falls POTW was eliminated from consideration for technical reasons; only domestic wastes are presently treated at the facility, and the system is presently experiencing problems due to infiltration/inflow.

Figure 5



SCHEMATIC OF RCRA TYPE CLOSURE - ALTERNATIVE 3
BEACON HEIGHTS LANDFILL SITE, BEACON FALLS, CT
SCALE: 1" = 400'

400 0 400
SCALE IN FEET

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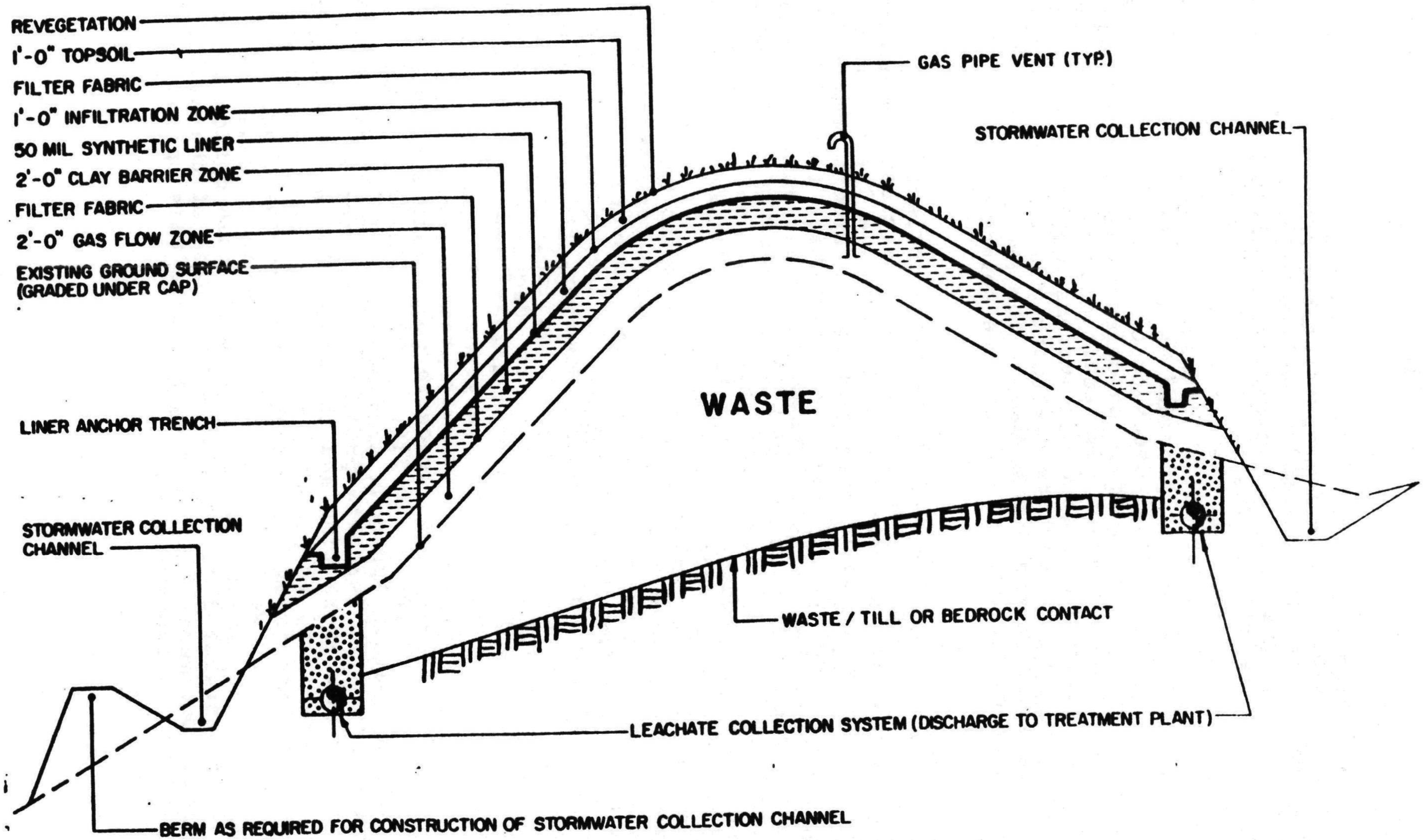
Figure 6

QUANTITY ESTIMATES
REMEDIAL ACTION ALTERNATIVE 3
BEACON HEIGHTS LANDFILL SITE

Remedial Action	Estimated Quantity
• Excavation	
Betkoski Dump	25,000 CY
Sewage Sludge and Soils	18,000 CY
• Leachate Collection System	
Perimeter Drain	
Trench Excavation	16,700 CY
Synthetic Liner (50 mil)	157,000 SF
Gravel Backfill ($K>10^{-3}$ cm/sec)	16,700 CY
8 in. perforated pipe	4,500 LF
Filter Fabric	7,500 SY
• Stormwater Management System	
Channel Excavation and Grading	11,000 CY
Berm Construction	10,000 CY
Site Revegetation	40 AC
• Leachate Treatment System	
Package Treatment Plant	5,000 GPD
• Multimedia Cap	
Gas Flow Zone	
2 ft. sand & gravel $K>10^{-3}$ cm/sec	106,500 CY
Impervious Zone	
2 ft. clay $K<10^{-7}$ cm/sec	106,500 CY
50 mil synthetic liner	1,437,500 SF
Filter fabric	159,700 SY
Infiltration Zone	
1 ft. sand & gravel $K>10^{-3}$ cm/sec	53,200 CY
Soil Zone	
Filter Fabric	159,700 SY
1 ft. topsoil	53,200 CY

CY: Cubic Yards
LF: Lineal Feet
AC: Acres
GPD: Gallons Per Day
SF: Square Feet
SY: Square Yard
K: Permeability
cm/sec: Centimeters Per Second

Figure 7



CONCEPTUAL CROSS SECTION OF RCRA-TYPE CAP CLOSURE - ALTERNATIVE 3
BEACON HEIGHTS LANDFILL SITE, BEACON FALLS, CT
NOT TO SCALE

CERCLA, Section 101 (24), defines "remedial action" as including the use of offsite transport of hazardous substances only if is necessary to protect public health, welfare, and the environmer creates additional disposal capacity, or is more cost effective than onsite remedies. The first two criteria are not satisfied by this alternative. However, the present worth cost is very close to that of Alternative 3 (onsite treatment). Since the degree of source control provided is identical to that provided by Alternative 3, a final decision on the leachate treatment aspect of Alternative 3 would be deferred to the design phase of the project, during which time additional data would be collected and analyzed and the cost effectiveness analysis refined to better compare the leachate treatment options within Alternative 3. A Decision Memorandum signed by the Regional Administrator would then be prepared to justify the selected option.

Alternative 3C, RCRA Cap, Leachate collection and treatment onsite with a temporary mobile system, Postclosure monitoring. This alternative is identical to Alternative 3 with the exception that a temporary, mobile treatment system from a commercial vendor would be used instead of building a permanent installation. This unit will most likely consist of an air stripper, to remove volatile organics, combined with carbon adsorption for removal of non-volatile organics. The unit would remain on-site until either leachate production drops to non-processable levels or leachate production does not drop as expected, at which point additional leachate handling techniques would be evaluated. The primary advantage of this option is that a permanent on-site facility need not be built if leachate production is only to continue for a few short years, and in the meantime a less costly treatment option can be pursued. However, this alternative has disadvantages in that commercially available mobile systems may not have all necessary unit processes to adequately process leachate to discharge standards. It has been assumed for costing purposes that this treatment will continue for five years after completion of the source control remedy. The total 30 year present worth cost of this alternative, assuming that leachate collection and treatment is needed for only 5 years, is $16,409,000. Again, costing data are included within Appendix C, Table C-3. If design or predesign work confirms that leachate production may drop to non processable levels within a short time and that a mobile unit can adequately treat the leachate, this option is the most cost effective of all the leachate treatment options that provide adequate protection of public health, welfare and the environment. Based on this possibility, if Alternative 3 is selected this option would be further investigated during the design phase of the project and a Decision Document would be prepared were this option to be selected over options 3 or 3B.

Alternative Number 4, Onsite RCRA Landfill, Leachate Collection and Treatment to NPDES Standards. This remedial alternative involves the phased construction of an onsite landfill meeting the technical requirements of RCRA, and the placement of all contaminated material within the new landfill. The leachate from the new landfill (double lined bottom) would be treated to NPDES standards and discharged to the tributary of Hockanum Brook. This alternative includes a gas venting system and fencing around the entire site. The phased construction process requires constructing sections of the new landfill while excavating portions of the old landfill. The project would require extremely high quality control during construction to maintain the integrity of the bottom, double lined layer, since large earth moving equipment will be moving on top of it. Free liquids found within the existing landfill would also require stabilization before disposal in the new landfill.

This alternative satisfies all source control objectives for site remediation and would provide a slightly increased degree of protection beyond that afforded by Alternative 3 since all leachate would be collected. Nonetheless, an offsite remedy would still be required to mitigate the groundwater contamination which already exists.

The implementability and therefore feasibility of this alternative is questionable. Construction of this landfill would require significant quantities of both fill and impermeable cover and liner materials to be delivered to the site and consequently may take 4 or more years to implement. In addition, the siting would have to take place partly on adjacent property since Beacon Heights, Inc., does not own enough suitable land on which to build a new landfill. This would require purchasing or taking land by eminent domain to construct the new landfill and could also add to the estimated time required for implementation. Excluding the costs to purchase this additional land, the initial capital cost of this alternative is $38,240,000 with a 30 year total present worth cost of $40,040,000.

Implementation of this alternative may also cause short term adverse impacts to human health and the environment which may not be totally controllable by the use of mitigative measures. The excavation and rehandling of such a huge mass of waste may result in releases to the air of both hazardous organic chemicals and methane from garbage decomposition in sufficient quantities to pose a threat to the health of area residents. The control of contaminated leachate and surface runoff during this operation, particularly during storm events, would be extremely difficult if not impossible with the result that both surface waters and groundwater would be adversely affected.

Thus, on the basis of high costs and adverse environmental impacts of the alternative, this alternative has been eliminated.

Alternative Number 5, Onsite RCRA Landfill, Leachate Collection and Treatment to Drinking Water Quality Standards. This alternative is the same as alternative number 4 except that the leachate will be treated to a more stringent discharge standard, the drinking water quality standards rather than the NPDES standards. This option was eliminated for the same reasons as number 4 above.

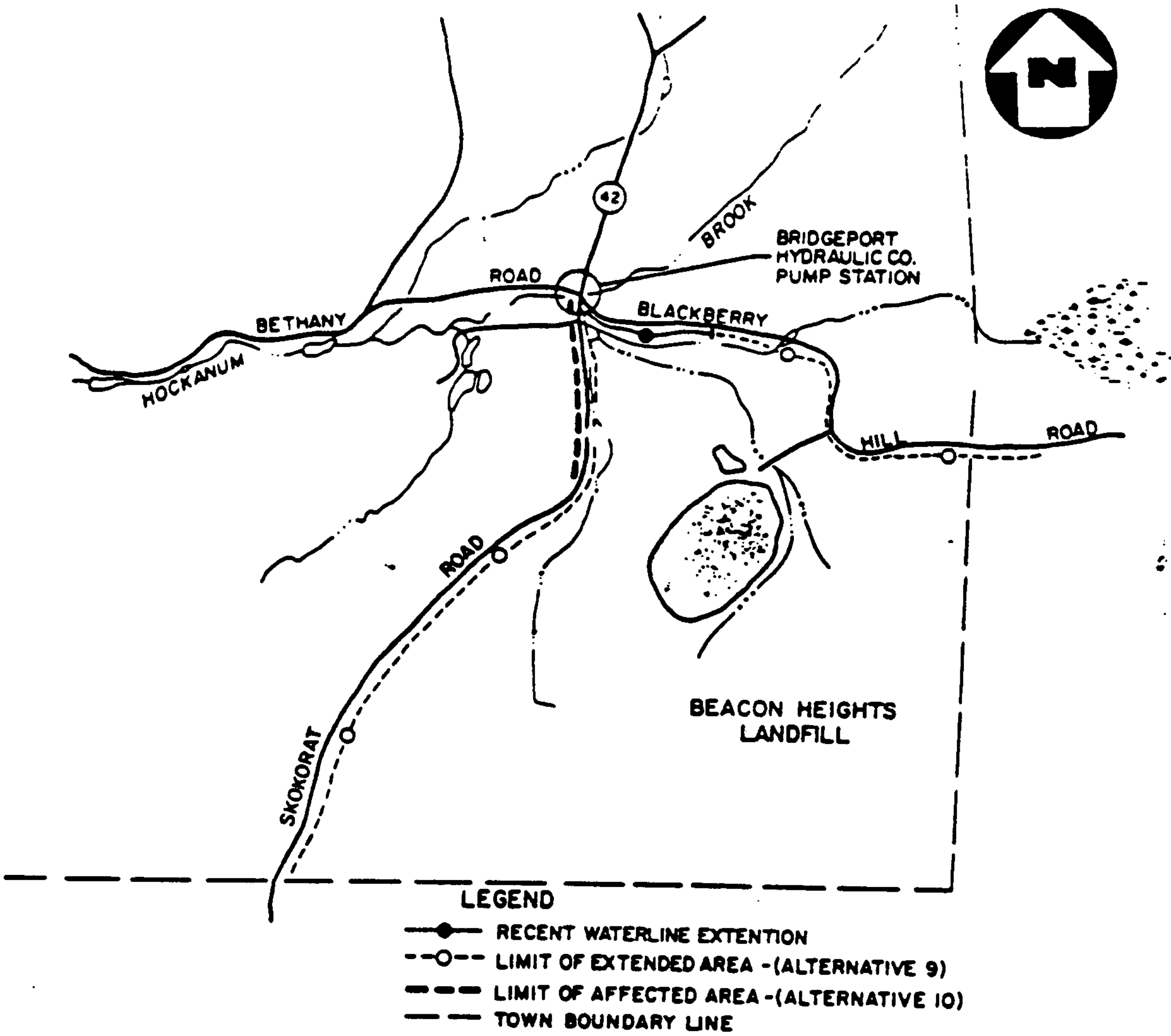
Alternative Number 9, Public Water Supply Provided to Extended Area. This alternative includes extending the municipal water supply approximately 7,000 feet along Skokorat Road to the next town's existing water main, and extending the public water supply along Blackberry Hill Road approximately 5,200 feet to the demographic limits. The limits of the waterline extension are shown in Figures 8 and 9. All present and potential human receptors along Skokorat Road and Blackberry Hill Road will be provided with an alternate water supply.

The area of coverage for the water line was initially based on the hydrogeologic setting of the landfill which was described earlier. The indeterminate nature of local contaminant flow in anisotropic, fractured bedrock mandates that coverage extend beyond both the presently impacted area and the area of impact inferred from consideration of surface topography to account for local disturbances in flow patterns due to pumping of private wells or quirks in stratigraphy. These influences may cause contaminants to flow toward deep bedrock receptor wells upgradient of the landfill. Under this alternative, the water line would be extended to the limits of residential development on Blackberry Hill Road to encompass these more distant potential receptors. The next possible receptor is 3000 feet from the proposed limit of the waterline. Homes in this area would require extremely deep wells to penetrate the bedrock formation that may carry groundwater from the landfill, and such homes are far enough away to avoid influences of pumping or other disturbances on local contaminant flow patterns. The Skokorat Road waterline would be extended to the next town's service limits for the same reasons.

This waterline extension will also require upgrading of a pumping station and installation of individual tap-ins to all residences (approximately 54). Construction and engineering requirements needed to complete this alternative are very common.

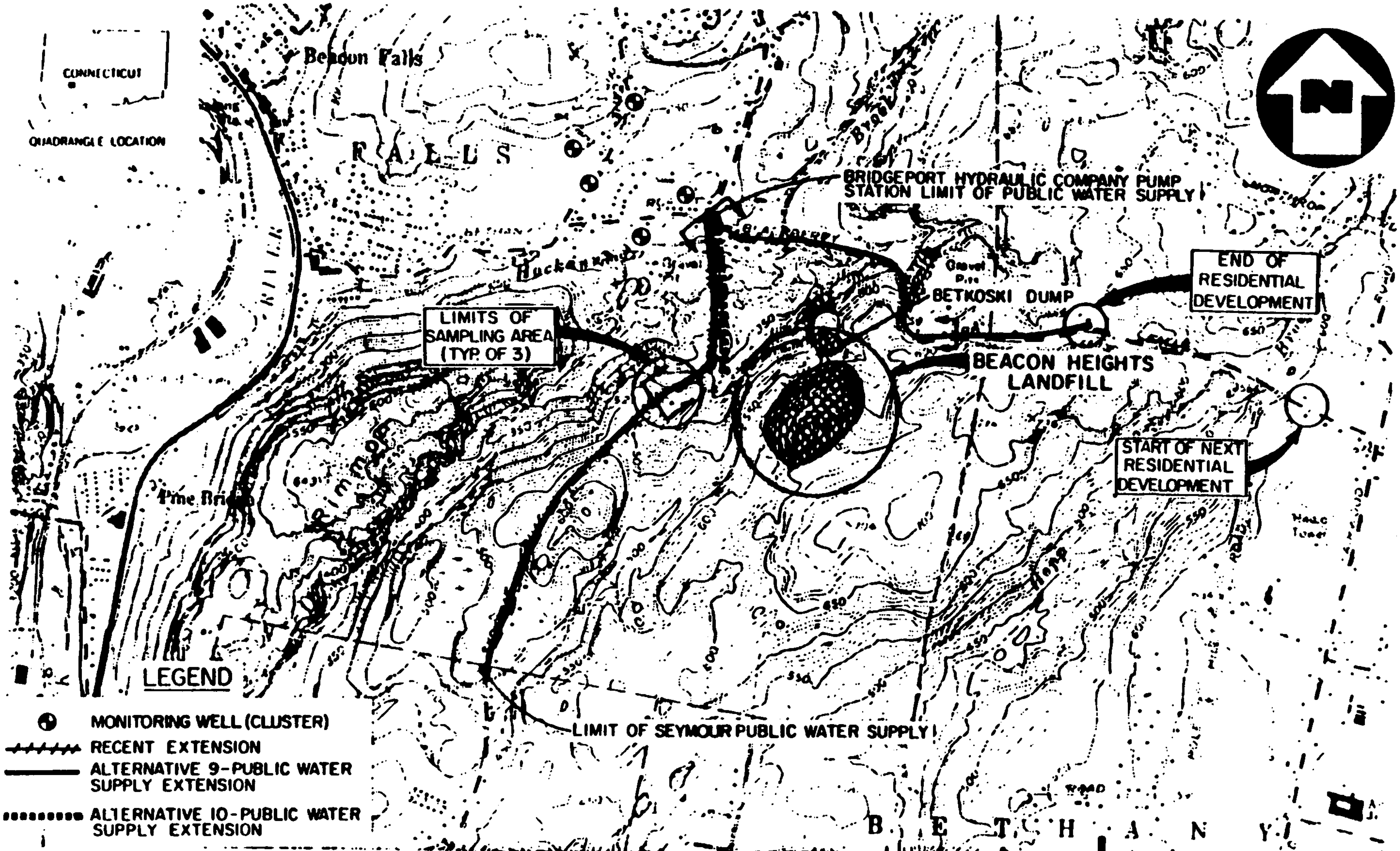
Since none of the source control remedies will mitigate the existing groundwater contamination and all will allow some leachate to enter the groundwater, this alternative would serve as a supplement to a source control remedy to mitigate and minimize the risk from groundwater contamination. The initial capital cost of this alternative is $1,958,000 with a long term present worth cost of $2,458,000. The quality of water from a municipal source is predictable and costs are reasonable for the extent, degree, and quality of remediation achieved.

Figure 8



Remedial Action Alternatives 9 and 10

Figure 9



BASE MAP IS A PORTION OF THE U.S.G.S. NAUGATUCK, CT QUADRANGLE (7.5 MINUTE SERIES, 1964. PHOTOREVISED 1972). CONTOUR INTERVAL 10'.

PUBLIC WATER SUPPLY-ALTERNATIVES 9 & 10
BEACON HEIGHTS LANDFILL SITE, BEACON FALLS, CT

SCALE: 1"=2000'

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Alternative Number 10, Public Water Supply to Affected Area. Remedial action alternative number 10 addresses the area that has been shown to be impacted by contamination above current acceptable standards. The impacted area includes a section of Skokorat Road approximately 2,000 feet long. The limit of this water line extension is shown on Figure 8, along with Alternative 9. This alternative would require the installation of tap-ins to affected residences (approximately 18) along the proposed extension. The connection of a new public water supply to the affected residences along Skokorat Road will eliminate exposure where site contaminants have already been identified in residential wells in excess of recommended federal and state guidelines. However, no mitigation or minimization of the public health threat to those current residents and/or future residents outside the proposed service area would be provided. Given the aforementioned hydrologic setting of the site, these residents may be exposed to higher levels of contaminants in groundwater at some future time. Already, residential wells outside this affected area have been shown to be contaminated with trace levels of organic chemicals below current health advisory levels. The total capital cost of this alternative is $370,000 with a long term present worth cost of $870,000. This alternative, in conjunction with a source control alternative, will eliminate exposure to residences along Skokorat Road only. Due to the lack of adequate protection provided to residents outside the proposed service limits (Blackberry Hill Road and the top of Skokorat road), this alternative has been eliminated since it does not adequately mitigate or minimize the threat to public health posed by offsite migration of contaminants from the site.

Alternative Number 13, Long Term Monitoring with Institutional Controls. This alternative assumes that, due to the specific technical constraints posed by the site hydrogeology, an effective groundwater extraction and treatment system cannot be implemented. Approximately 10 to 15 varying depth groundwater monitoring wells will be installed adjacent to and downgradient of the site to monitor the effectiveness of the cap and to track any further spread of groundwater contamination. Several of these wells will be located below the junction of Skokorat Road and Blackberry Hill Road to assess the potential for future groundwater contaminant migration to this area, which contains several streets which lack municipal water service and thus where private wells provide drinking water supply. Monitoring will be performed for a period of 30 years, or until determined unnecessary by the Agency after thorough review of the data. The long term monitoring data to be provided from these wells may form the basis for establishment of ACL's (Alternate Concentration Limits), if needed to protect other groundwater users beyond the current limits of groundwater contamination emanating from the site.

It is expected that after a source control remedy is implemented (cap) the groundwater contamination will attenuate and dilute to insignificant levels. In the unlikely event that contamination in these monitoring wells does not reduce after the cap is completed, the Agency reserves the right to perform further testing or studies on the extent of contamination in the bedrock aquifer.

In order to ensure the long term protection of public health in the area surrounding the site, strict institutional control over the extraction and use of groundwater within the area of influence of the landfill can be carried out under State institutional controls, which are authorized by sections 2532 and 2533 of the Connecticut General Statutes. For public supplies the Connecticut Department of Health Services (DOHS) must approve the well site prior to drilling. Prior to use of the well(s), extensive testing is required, and the data reviewed and approved by DOHS before use of the well is allowed. For private water supplies no site approval is needed, but a permit for use is required from the local health department. In addition, the Connecticut state building codes require new homes to connect to a municipal water supply if it is available within 200 feet from the residence.

This alternative, in and of itself, does not provide adequate mitigation of the public health threat posed by groundwater contamination emanating from the site, but may be a necessary adjunct to whatever source control and offsite remedies are selected.

The initial capital cost of this alternative is $272,000 with a 30 year total present worth cost of $998,000.

COMMUNITY RELATIONS

The public comment period for the Beacon Heights landfill site began on May 20, 1985 with a press release announcing the availability of the draft feasibility study for public comment. During the comment period, a public meeting was held (June 5, 1985), to present results of the RI/FS and answer questions from the public concerning the cleanup alternatives. On June 11, 1985 a formal public hearing was held to record comments on the cleanup alternatives for the Beacon Heights landfill. The public comment period closed on June 14, 1985.

The overriding concern of many residents was to be provided with a new water supply first, cleanup later. Getting clean water to affected and potentially affected residents was priority number one for the residents themselves and local officials. Alternative number 9, water supply to an extended area was the only water supply option that residents would accept. The State of Connecticut agreed with the residents on this point.

Another major concern expressed by several citizens was that alternatives 2, 4, and 5, onsite incineration, and RCRA approved landfill with leachate collection and treatment to NPDES or drinking water standards, could lead to other wastes from other areas being brought onsite for incineration or disposal. Since no other RCRA permitted landfills are available in Connecticut the fear of other wastes being brought to the Beacon Heights landfill was brought up. In addition, a group of potentially responsible parties, the Connecticut DEP, and others submitted comments during the public comment period. These comments along with those of the citizens are addressed in the responsiveness summary. Further information on community relations concerns can be found in the Beacon Heights responsiveness summary in appendix D of this document.

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

Environmental laws which may be applicable or relevant to the Beacon Heights remedial action are as follows;

- Resource Conservation and Recovery Act (RCRA)
- Clean Water Act
- Safe Drinking Water Act
- Clean Air Act

Based on written comments from EPA's Planning and Standards Section there are no wetlands on site and no potential wetland impacts as a result of remedial activities at the site. The Connecticut Historic Preservation office concludes that this project will have no effect on historical, architectural, or archaeological resources listed on or eligible for the National Register of Historic Places. Flood Plain maps provided by the U.S. Department of Housing and Urban Development do not list the site as lying within a 100 year flood plain. Gary King of the Connecticut office of Policy and Management, the Designated Single Point of Contact for intergovernmental review of federal financial assistance and direct federal development recommended federal agency funding of this project and further concluded that funding is not inconsistent with the Connecticut Conservation and Development Policies Plan.

The primary environmental law of concern at the Beacon Heights site is the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901, et seq. The proposed alternatives were reviewed for consistency with applicable RCRA technical standards, Closure and Post Closure Care, and 40 C.F.R. § 264 Subpart F entitled Ground Water Protection. The first area addressed is the capping, followed by the leachate collection and treatment, and lastly, the alternate water supply and the groundwater remediation strategy. The RCRA cap will be designed in accordance with 40 C.F.R. § 264.310 (a) to achieve the following:

1) Provide long term minimization of migration of liquids through the closed landfill.

2) Function with minimum maintenance.

3) Promote drainage and minimize erosion or abrasion of the cover.

4) Accomodate settling and subsidence so that the cover integrity is maintained.

5) Have a permeability less than or equal to the permeability of the underlying soils.

The cap installation and inspection will be performed as specified in § 264.303. The landfill will be surveyed and notice will be filed with the deed and given to the local land authority as specified in § 264.119 and § 264.120. The applicable closure requirements in § 264 Subpart G will be addressed. (Decontamination/ Disposal of Equipment, Certification by Professional Engineer, and Site Security will be provided as specified in § 264.117(b)). Post Closure Care and groundwater monitoring will be performed in accordance with 40 C.F.R. § 264 Subparts F and G and Subpart N § 264.310 (b).

If offsite leachate disposal is chosen as the most cost effective remedial action for source control, then leachate collection, transportation, and disposal will be performed in accordance with the applicable RCRA regulations at 40 C.F.R. § 262, Standards Applicable to Generators of Hazardous Waste and with 40 C.F.R. § 263, Standards Applicable to Transporters of Hazardous Waste. Leachate collection will be in compliance with 40 C.F.R. Part 262.34, Accumulation of Hazardous Waste on-site for 90 days or less, and will not require a RCRA permit. Even if treatment occurs onsite, a RCRA permit will be required. Offsite facilities used for the treatment and disposal of the leachate will be approved facilities which have a permit or interim status and are in compliance with the RCRA regulations. Proper manifesting of the wastes will be conducted.

The source control alternatives that satisfy all applicable or relevant environmental laws (primarily RCRA) are alternatives 1, 2, 3, 3B, 3C, 4, and 5. Alternatives 3A, 6, 7, and 8 do not provide adequate control of source material as required by 40 C.F.R. § 300.68 (h)(2) of the NCP.

Extension of a municipal water supply to area residents (Alternatives 9 and 10) is consistent with the appropriate extent of remedial action as defined in 40 C.F.R. § 300.68 (e)(3) of the NCP. Contamination has migrated beyond the area where the hazardous substances were originally located, and the installation of an alternate water supply is necessary to provide long term protection of public health and welfare by preventing ingestion of contaminated groundwater.

Since existing data are adequate to conclude that the hydrogeologic setting of the landfill precludes the ability to effectively intercept and extract contaminated groundwater, neither alternative 11 or 12 is technically practicable. In addition, since they provide little assurance of reducing offsite groundwater contamination, they are not cost effective in comparison to the level of remediation they provide. Under RCRA 40 C.F.R. Part 264, Subpart F, Groundwater Protection, contaminated groundwater leaving the waste management area must be remediated to background levels, to MCL's (Maximum Concentration Limits, which are enforcible), or to ACL's (Alternate Concentration Limits). The long term monitoring data to be provided by implementation of alternative 13 may form the basis for future establishment of ACL's. This determination will be made by the Regional Administrator in a future Decision Document if necessary.

RECOMMENDED ALTERNATIVE

Section 300.68 (j) of the National Contingency Plan (NCP) states that the appropriate extent of remedy shall be determined by the lead agency's (in this case EPA) selection of the alternative that is cost effective, i.e. the lowest cost alternative that is technologically feasible and reliable and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare, and the environment.

In order to meet the stated objectives of site remediation, both a source control remedy and an offsite remedy are necessary since neither can provide adequate protection of public health, welfare, and the environment without the other.

Based on the evaluation provided in the Feasibility Study Report, and after consideration of the comments expressed by the public, local officials, potentially responsible parties, and the State of Connecticut, EPA has determined that the following combination of source control and offsite remedies meets the aforementioned NCP criteria:

SOURCE CONTROL REMEDY :

- Excavation of outlying contaminated soils including the Betkoski's Dump area, leachate seep areas, and sludge disposal areas
- Consolidation of this material with the main landfill
- Capping of the landfill area in conformance with the technical requirements of RCRA
- Gas venting (with air pollution controls if determined to to be necessary during design phase)
- Perimeter leachate collection system
- Treatment of collected leachate either onsite or offsite, (discussed later)

- Enclosure of the site with security fencing
- Stormwater management controls
- Construction of a more extensive groundwater monitoring network to enable future evaluation of the effectiveness of the cap

OFFSITE REMEDY :

- Extension of municipal waterline to supply water to residents along Skokorat and Blackberry Hill Roads
- Long term monitoring of groundwater contaminant migration
- State and local institutional controls on groundwater use in the impacted area

The source control remedy is Alternative 3, described in the Feasibility Study Report and in the Detailed Evaluation section of this document. Source control Alternatives 1 (Offsite disposal) and 2 (Incineration) were eliminated during the initial screening on the basis of cost, engineering feasibility, and potential adverse environmental effects. Alternatives 3A (RCRA cap with no leachate collection/treatment), 6 (Soil cap), 7 (No action), and 8 (Monitoring) were also eliminated during the initial screening, since they would not achieve adequate source control.

The remaining source control alternatives, 3 and its options B and C (RCRA cap, leachate collection/treatment, post-closure monitoring), 4 (RCRA landfill, leachate collection/treatment to N.P.D.E.S. standards), and 5 (RCRA landfill, leachate collection/treatment to drinking water standards) all provide adequate source control. A comparison of the present worth costs for these alternatives clearly shows Alternative 3 to be cost effective since it is the lowest cost source control alternative that is technologically feasible and reliable and provides adequate control of source material. As indicated previously, a reconsideration of the option for leachate treatment will be made during the design phase of the project. Further data gathering and analysis is needed to refine the costs for treatment onsite with a permanent installation (Alternative 3), treatment onsite with a temporary installation (Alternative 3C), or offsite treatment (Alternative 3B). The present worth costs for 3 and 3B are virtually identical based on the level of analysis provided in the Feasibility Study (+50%, -30%). The refinement of stream discharge requirements, timeframes for landfill dewatering, offsite facility costs and requirements, and onsite treatment capabilities during the design phase will allow costs to be estimated to the $\pm$ 10% level. This will in turn verify or refute the existing analysis which shows that the onsite treatment Alternative 3 is the cost effective alternative. This design phase analysis will also provide the data to determine if a temporary (Alternative 3C) or a permanent (Alternative 3) installation is necessary. A Decision Memorandum will be prepared for the signature of the Regional Administrator to document the cost effectiveness of the recommended option. This memorandum will also detail the extent of excavation in those areas to be consolidated with the main landfill prior to capping.

The recommended offsite remedy is a combination of Alternatives 9 and 13 described earlier. Offsite alternative 11 (Groundwater extraction /treatment) was eliminated during the initial screening on the basis of engineering infeasibility . Alternatives 12 (Additional Study), 7 (No action), and 8 (Monitoring) were also screened out since they do not provide minimization or mitigation of the offsite migration threat.

The limited waterline extension (Alternative 10) was eliminated during the detailed evaluation because it would provide no protection to those residents beyond the extension limits who are threatened by offsite groundwater contaminant migration from the site. Thus, this alternative does not meet the requirements of 40 C.F.R. § 300.68 (h)(2) of the NCP.

The combination of municipal water supply extension to the present and inferred area of impact, long term groundwater monitoring, and state institutional controls over the withdrawal and use of groundwater in the area will provides minimization and mitigation of the threat posed by offsite contamination.

The estimated capital and present worth costs for the recommended alternatives are as follows:

Capital cost : $ 17,397,000

Present worth cost : $ 19,613,000

(These costs are less than the additive costs of Alternatives 3, 9, and 13 presented in the Feasibility Study and in this document because the well installation and monitoring costs of Alternative 13 duplicate those included in Alternatives 3 and 9).

OPERATION AND MAINTENANCE

Operation and maintenance costs (O & M) are those required to operate and maintain the remedial action throughout its lifetime. This activity ensures the lifetime effectiveness of the remedial alternative. A present worth analysis was done on the O & M costs for all remedial alternatives and is presented in appendix D. This present worth analysis represents expenditures that will occur in the future in terms of current dollar value. Unless otherwise specified, a 30 year project life was assumed for the O & M analysis for all alternatives.

The alternatives chosen for the cleanup of the Beacon Heights site are alternatives number 3, 9, and 13. These alternatives implement technologies to control the source of contaminant releases and to mitigate offsite migration. A complete breakdown of project costs, including both capital and O & M for the selected remedy is presented in figure 10.

Under source control alternative 3 a RCRA cap will be placed over the entire landfill to reduce the degree of leachate generation and migration. Maintenance of the source control alternative 3 will include lawnmowing of the grass cover overlying the cap, repair of damage to the security fence, removal of obstructions from the stormwater management and gas venting systems, and regrading as necessary. Monitoring will include sampling and analysis of upgradient and downgradient monitoring wells, surface waters, and collected leachate.

Alternative number 3 also provides for the collection and treatment of leachate. The different options for treatment of the leachate provided the basis for development of alternatives 3B and 3C. Since both these offshoots of alternative 3 provide the same degree of source control as alternative 3 itself, the final decision on the leachate treatment aspect of source control is being deferred to the design phase of this project. During this time additional data will be collected and analyzed and the cost effectiveness analysis refined to better compare the leachate treatment options. A Decision Memorandum will then be prepared to justify the selected option.

Annual O & M costs for leachate treatment will include labor for operation of the leachate collection system and materials and labor for operation of the onsite treatment system. If data gathered during design shows alternatives 3B or 3C are more cost effective than onsite treatment (alternative 3) O & M costs will include transportation of the leachate to a licensed hazardous waste treatment facility, or costs for rental of a temporary treatment system. Again, this decision will be documented in a Supplemental Decision Memorandum.

Leachate collection and treatment will be considered part of the approved action (not an operation and maintenance cost) and will be eligible for Trust Fund monies for a period of up to two years from completion of the source control remedial action. This action is considered part of the source control remedy since it may be a temporary action and control of leachate production is considered to be a vital component of adequate source control.

Water balance calculations indicate that a RCRA cap over the entire landfill will drastically reduce the amount of infiltration allowed to reach the waste material, and will therefore reduce leachate generation. However, in the interim, before the water level within the waste drops due to the influence

Figure 10

RECOMMENDED ALTERNATIVE COST SUMMARY

Remedial Action Alternative 3 - RCRA Cap Closure	
INITIAL CAPITAL COSTS	
Excavation of adjacent wastes - 43,000 CY	$ 1,010,000
Multimedia Capping System (Includes Fence)	$11,514,000
Leachate Collection System	$ 850,000
Leachate Treatment System	$ 263,000
Methane Venting System	$ 340,000
Stormwater Management System	$ 489,000
Monitoring Well Installation	$ 272,000
Upgrade Access Road	$ 540,000
Redesign Boring Program	$ 161,000
TOTAL, INITIAL CAPITAL COST (ALTERNATIVE 3)	$ 15,439,000
Operation and Maintenance (O&M) Cost	
Leachate Treatment System	$ 90,000
Site Maintenance	$ 23,000
Monitoring and Analysis (without residential wells)	$ 69,000
TOTAL O&M COSTS	$ 182,000
PRESENT WORTH O&M COSTS	$ 1,716,000
TOTAL ALTERNATIVE 3 COST	$ 17,155,000
Remedial Action Alternative 9 - Extended Waterline	
INITIAL CAPITAL COSTS	
Alternate Drinking Water System	$ 1,844,488
Monitoring Well Installation	$ 113,438
TOTAL, INITIAL CAPITAL COST (ALTERNATIVE 9)	$ 1,958,000
Operation and Maintenance Cost	
Inspection and Maintenance	$ 8,760
Monitoring and Analysis	$ 43,800
TOTAL O&M COSTS	$ 53,000
PRESENT WORTH O&M COSTS	$ 500,000
TOTAL ALTERNATIVE 9 COST	$ 2,458,000
TOTAL PROJECT INITIAL CAPITAL COST	$ 17,397,000
TOTAL O&M COST	$ 235,000
TOTAL PRESENT WORTH O&M COST	$ 2,216,000
TOTAL PROJECT COST	$ 19,613,000

* Note Alternative 13 costs not included because costs (well installation and monitoring) duplicate those included in Alternatives 3 and 9 above.

Figure 10A

COST SUMMARY FOR LEACHATE COLLECTION AND TREATMENT OPTIONS BEACON HEIGHTS LANDFILL SITE

Alternative/Option		Initial Capital Cost	Annual(1) O&M Cost	Present Worth(2) O&M Cost	Total Project Cost
Alternative 3:	RCRA Cap with Leachate Collection and Treatment (30 year O & M)	$15,439,000	$182,000	$1,716,000	$17,155,000
Option A:	RCRA Cap without Leachate Collection and Treatment	14,326,000	92,000	867,000	15,193,000
Option B:	RCRA Cap with use of POTW (30 years leachate treatment)	15,216,000	360,000 (275,000)(3)	3,394,000 (2,592,000)	18,610,000 (17,808,000)
Option B:	RCRA Cap with Use of POTW (5 years leachate treatment)	15,216,000	360,000 (275,000)	1,883,000 (1,561,000)	17,099,000 (16,777,000)
Option C:	RCRA Cap with Use of Mobile Units (5 years leachate treatment)	15,238,000	172,000	1,171,000	16,409,000

(1) O&M Costs include site maintenance at $23,000 per year and sampling and analysis of monitoring wells (no residential wells) at $69,000 per year, a total of $92,000.

(2) Includes 30 years of O&M for site maintenance and monitoring for all present worth calculations.

(3) These costs assume leachate treatment for $.06 per gallon, an average cost quoted by the treatment plant.

of the cap, leachate will continue to be produced. During this period the leachate production must be controlled. In the two years following completion of onsite construction the flowrate of leachate and the water level within the fill material will be monitored to see if a steady state has been reached. After the two years a decision will be made to either continue collection and treatment of leachate as an operation and maintenance activity or to terminate onsite treatment and pursue other treatment methods due to very low levels of production. These actions will be documented in a Decision Memorandum.

STATE ROLE

The state's role in this federal lead site is multiple. The state reviews documents to determine if they are in compliance with applicable state laws, and provides comments on all EPA funded studies at the site. The state of Connecticut, as represented by the Connecticut Department of Environmental Protection (DEP), concurs with EPA's chosen remedy for the cleanup of the Beacon Heights site located in Beacon Falls, Connecticut. The state will provide 10 percent of the initial capital costs of the chosen remedy and will assume responsibility for all O & M costs following completion of onsite construction activities.

SCHEDULE *

- Approve Remedial Action (sign ROD)	- September 20, 1985
- Complete Enforcement Negotiations	- November 20, 1985

Phase I - Alternate Water Supply, Water Main Extension

- Award Superfund Contract for Design	- November 21, 1985
- Start Design	- January 1, 1986
- Start Construction	- May 1, 1986
- Complete Construction	- September 1, 1986

Phase II - Source Control, Cap and Leachate Collection

- Send Interagency Agreement (IAG) to the Army Core of Engineers for Design	- November 21, 1985
- Start Design	- January 1, 1986
- Start Construction	- October 1, 1986
- Complete Construction	- March 1, 1988

* Pending availability of funds

FUTURE ACTIONS

Some additional field investigation work will be necessay during the design phase of this project to delineate the exact extent of coverage of the RCRA cap on the landfill and the areal extent and depth of the satellite areas (Betkoski's Dump, sludge disposal area, and leachate seep areas) to be excavated and consolidated on the main landfill. Requirements for handling these contaminated areas to meet RCRA requirements on free liquids content must also be determined. This contingency has been addressed within the cost sensitivity analysis in the Feasibility Study. Costing data included in Figure 10 and Appendix C assume highest cost, and hence, largest cap and largest excavation expected.

Future actions include monitoring the cap's effectiveness, as well as assuring the future effectiveness of the selected remedy through operation and maintenance. Monitoring for cap effectiveness is required under Post Closure Care and Groundwater Monitoring as defined in accordance with 40 C.F.R. Part 264 Subparts F and G and Subpart N § 264.310(b).

An additional possible future action may be a re-evaluation of offsite groundwater contamination. Contingent on monitoring results for the cap effectiveness and groundwater tracking, a decision to revisit the feasibility of groundwater extraction and treatment may be made by the Regional Administrator. This decision may include additional remedial actions to ensure adequate protection of public health welfare or the environment.

APPENDIX A - SITE LOCATION

Figure A-1

BASE MAP IS A PORTION OF U.S.G.S. NAUGATUCK, CONN. QUADRANGLE (7.5 MINUTE SERIES, 1964, PHOTOREVISED 1972)
CONTOUR INTERVAL 10'

LOCATION MAP

BEACON HEIGHTS LANDFILL SITE, BEACON FALLS, CT

SCALE: 1" : 2000'

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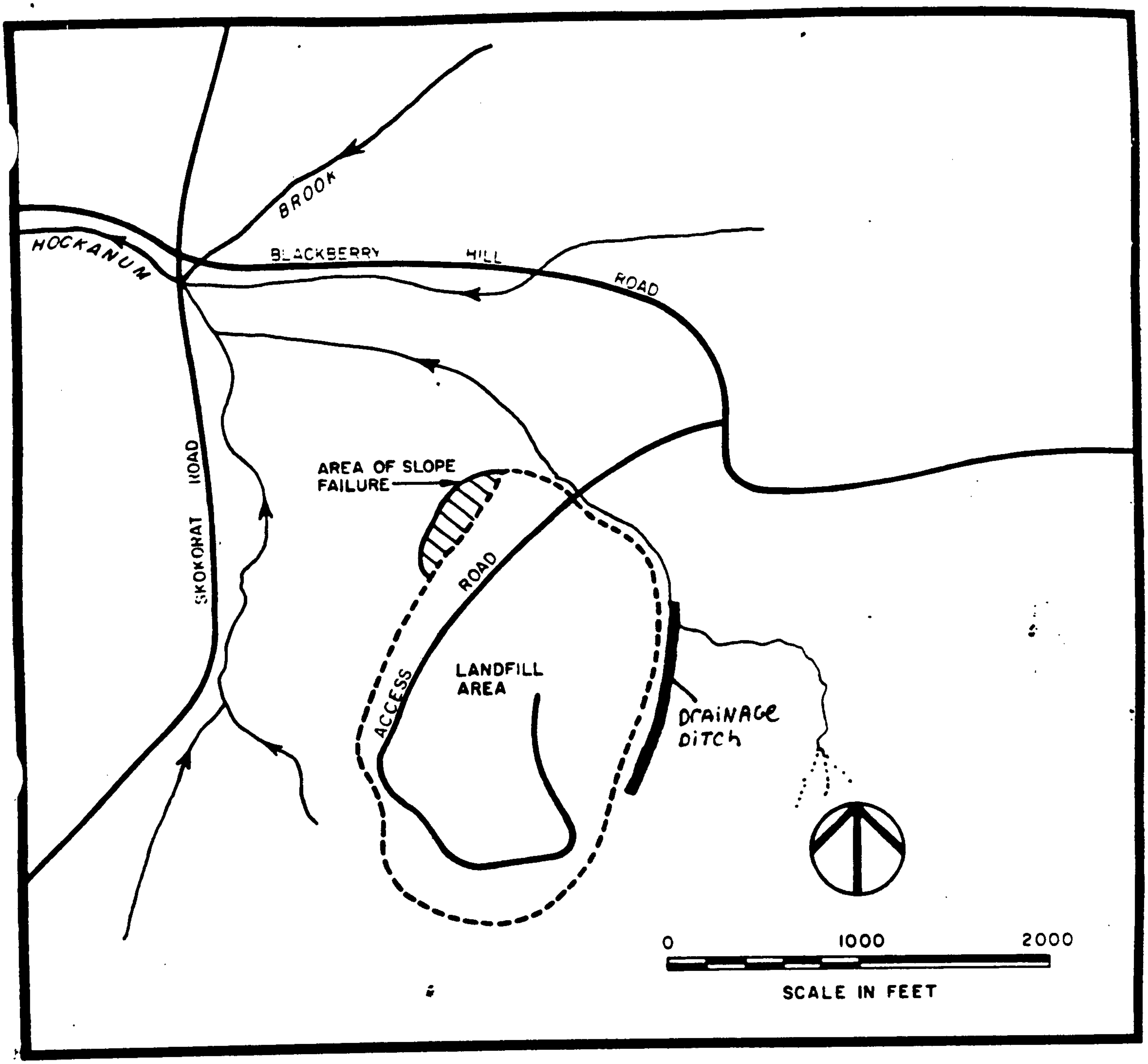


FIGURE A-2 BEACON HEIGHTS LANDFILL
PLAN OF SURFACE WATER FLOW

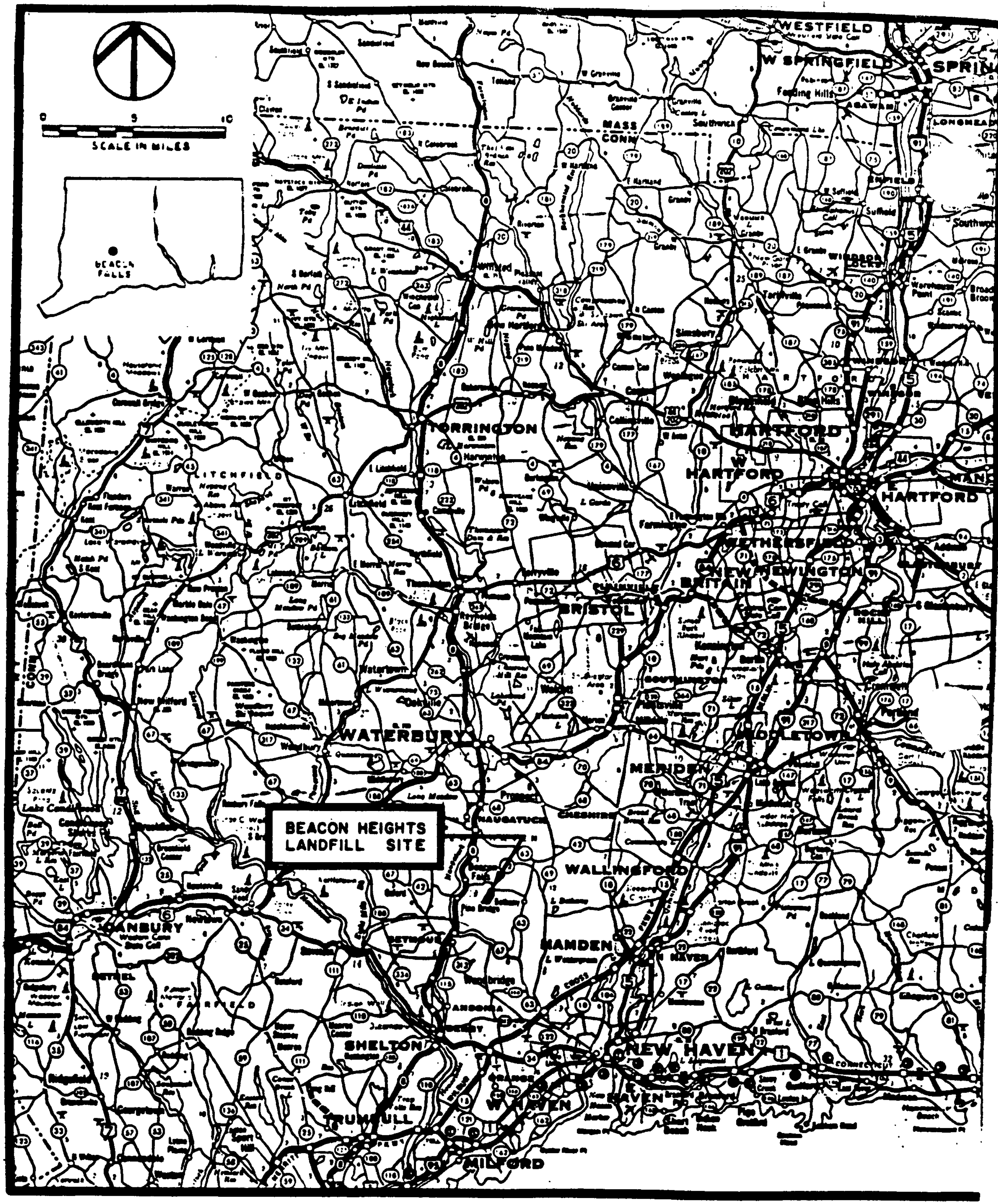
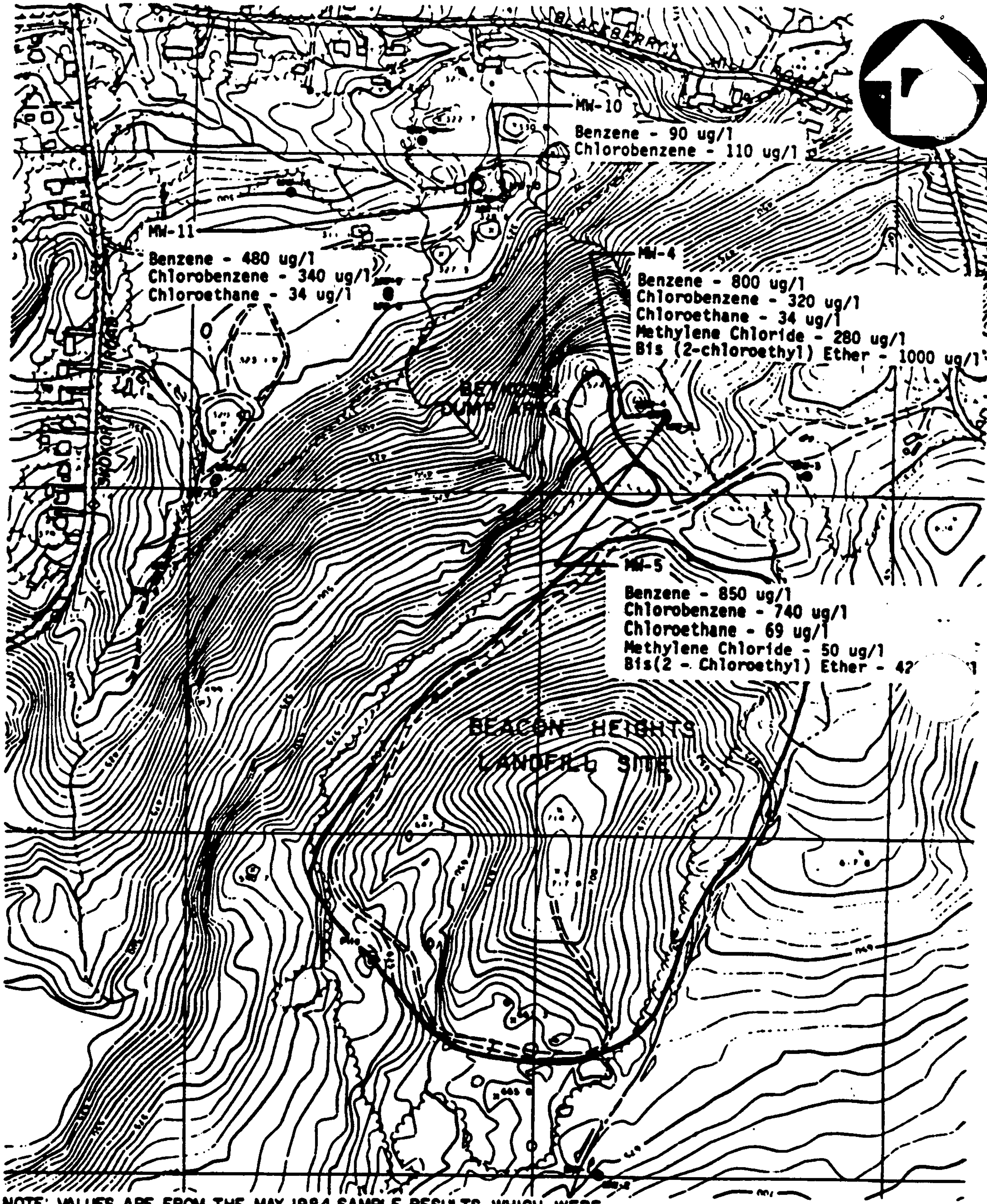


FIGURE A-3 REGIONAL MAP-BEACON HEIGHTS LANDFILL SITE
BEACON FALLS, CONNECTICUT

APPENDIX B - SITE CONTAMINANTS

Figure B-1



NOTE: VALUES ARE FROM THE MAY, 1984 SAMPLE RESULTS, WHICH WERE GENERALLY THE HIGHER VALUES.

SUMMARY OF MONITORING WELL CONTAMINATION
BEACON HEIGHTS LANDFILL SITE, BEACON FALLS, CT

SCALE: 1"=400'

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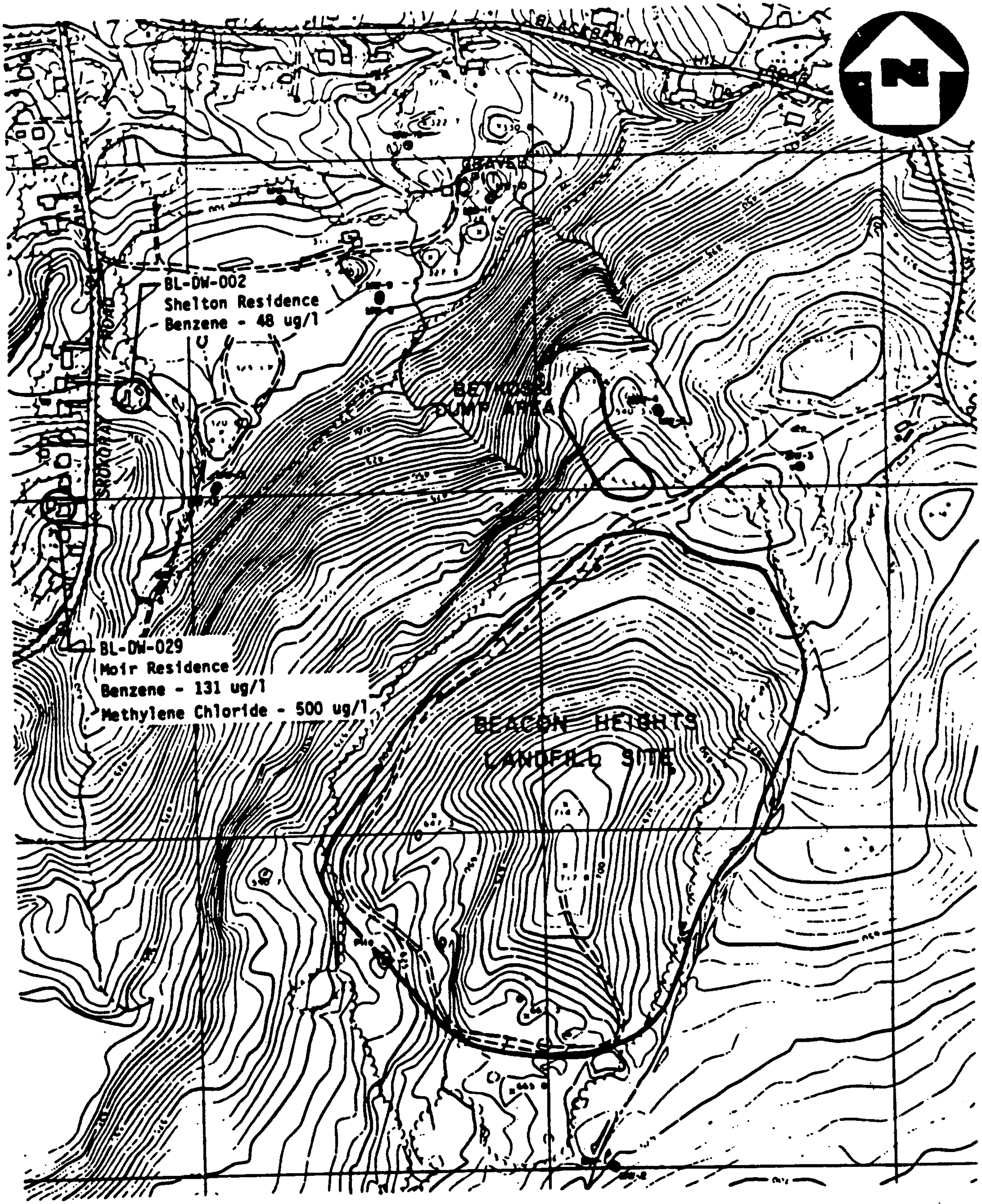
Figure B-2



SUMMARY OF RESIDENTIAL WELL CONTAMINATION
BEACON HEIGHTS LANDFILL SITE, BEACON FALLS, CT
SCALE : 1" = 400'

NUS CORPORATION
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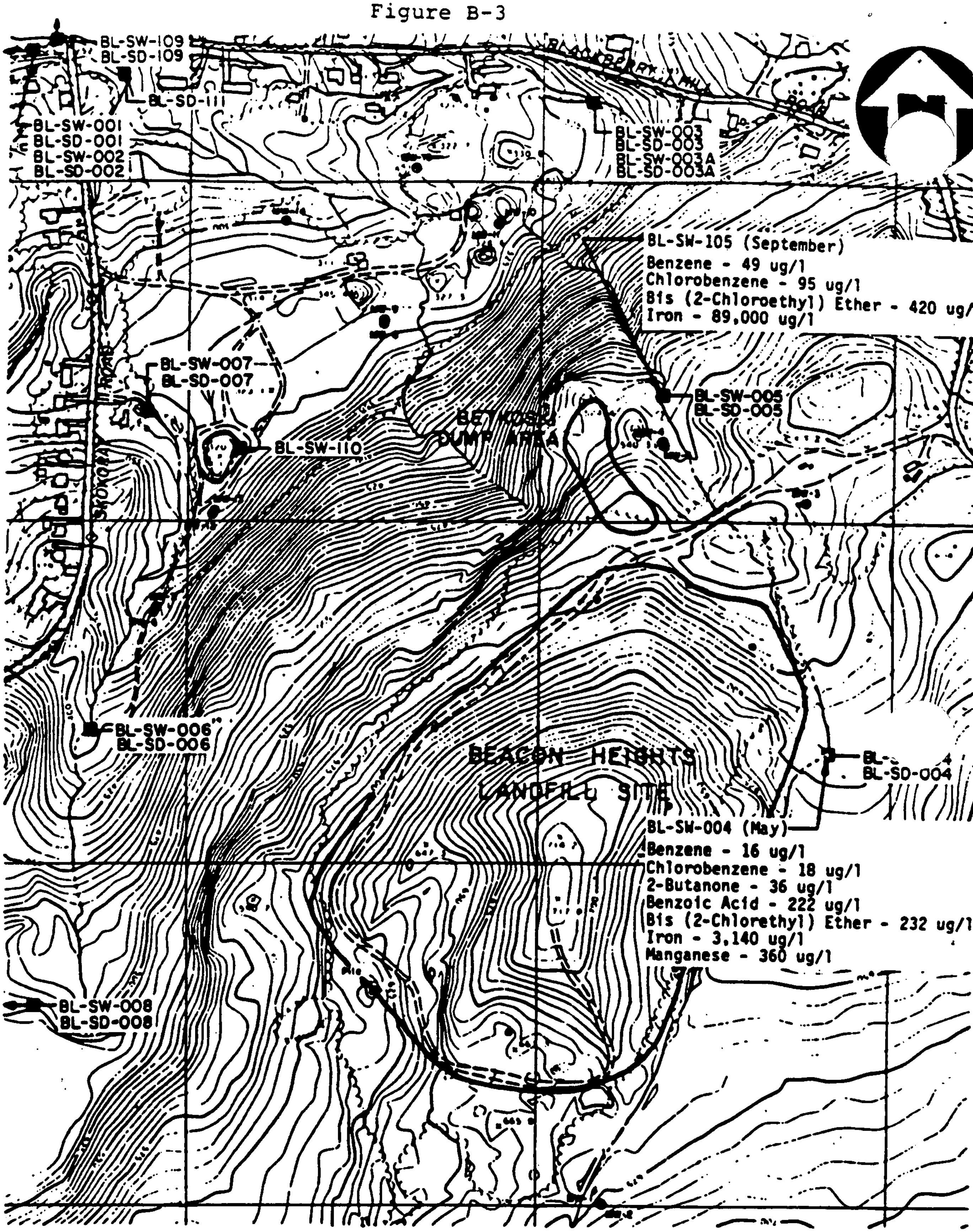
Figure B-3



SURFACE WATER SAMPLING LOCATIONS
BEACON HEIGHTS LANDFILL SITE, BEACON FALLS, CT

SCALE: 1"=400'

NUS CORPORATION
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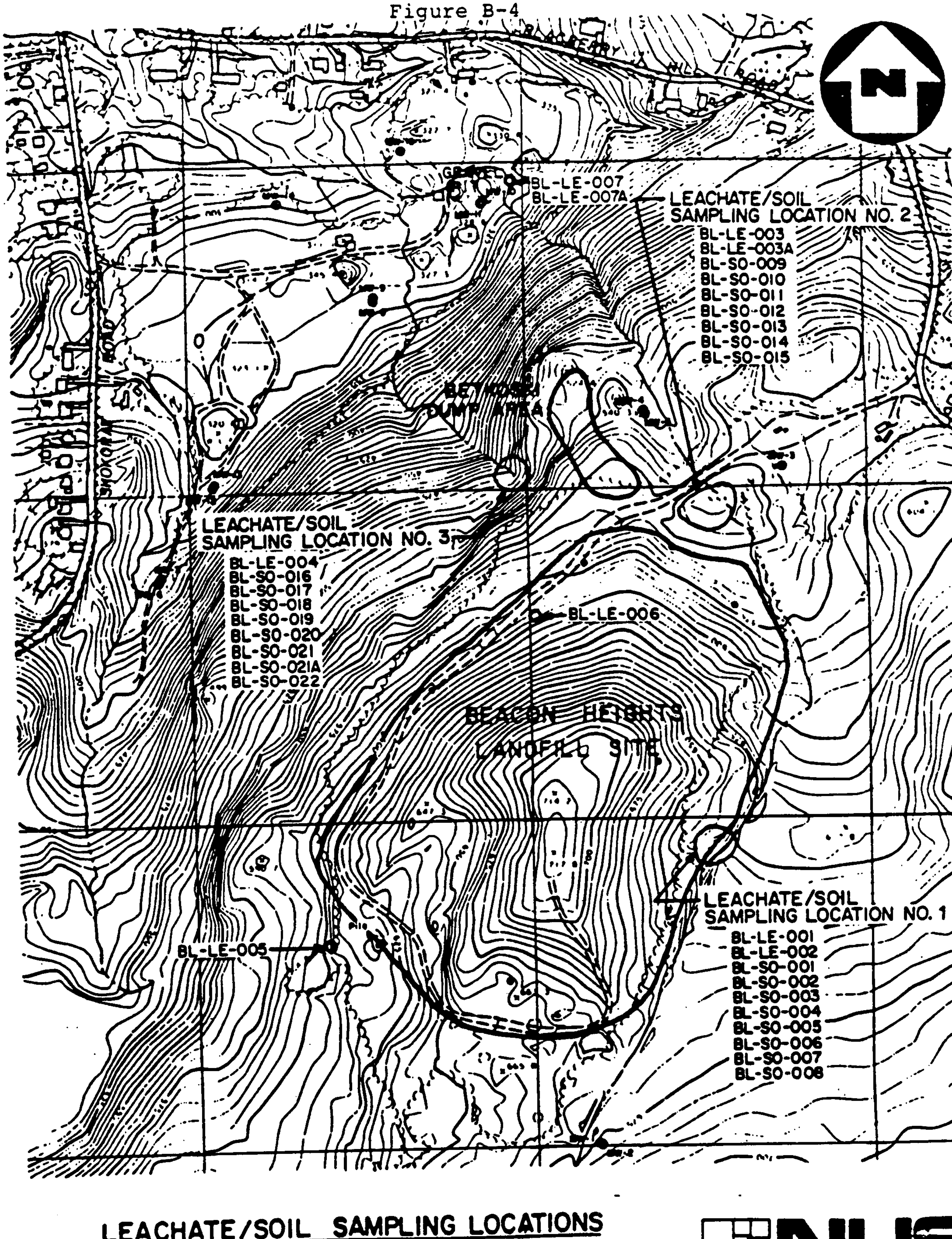
Figure B-4



LEACHATE/SOIL SAMPLING LOCATIONS
BEACON HEIGHTS LANDFILL SITE, BEACON FALLS, CT
SCALE : 1"=400'

NUS CORPORATION
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Table B-1

CRITICAL CONTAMINANTS - TOXICOLOGICAL DATA FOR HEALTH EFFECTS WITH ASSOCIATED THRESHOLD LIMITS

Critical Contamination	Maximum Observed Concentration (Media) µg/l	Acute Toxicity Indicators: Human[a] Inhal. TC_{LO} (ppm) Oral TD_{LO} (mg/kg)	Acute Toxicity Indicators: Dermal[b] Absorption Toxicity	Chronic Toxicity Does not Consider Carcinogenicity: Health Advisories[c] (µg/l)	Chronic Toxicity Does not Consider Carcinogenicity: Acceptable[d] Daily Intakes (µg/day)
1. Benzene CAS No. 71-43-2	35,100 µg/l Leachate	TC_{LO} = 100 TD_{LO} = 130	Moderate Penetration Moderate Local Potency Extreme Systematic (in liquid form)	1 day - 230 long term - 70	-
2. Chlorobenzene CAS No. 108-90-7	5,310 µg/l Leachate	-	Moderate Penetration Moderate Local and System Potency (in liquid form)	-	1,000
3. Ethylbenzene CAS No. 100-41-4	590 µg/l Leachate 3,800 µg/kg Sludge	TC_{LO} = 100/8M	Slight Penetration Moderate Local and Systematic Potency (in liquid form)	1 day - 21,500	9,500
4. Toluene CAS No. 108-88-3	2,400 µg/l Leachate 17,000 µg/kg Sludge	TC_{LO} = 100	Slight Penetration Slight Local and System Potency (Liquid)	1 day - 21,500 10 day - 2,200 long term - 620	30,000
5. Xylene, Total CAS No. 1330-20-7	447 µg/l Leachate 12,000 µg/kg Sludge	TC_{LO} = 200	-	1 day - 12,000 10 day - 1,300 long term - 620	[160]
Bis(2-chloroethyl)ether	4,680 µg/l Leachate	-	-	-	

Table B-1

CRITICAL CONTAMINANTS - TOXICOLOGICAL DATA
FOR HEALTH EFFECTS WITH ASSOCIATED THRESHOLD LIMITS
PAGE TWO

Critical Contamination	Maximum Observed Concentration (Media) µg/l	Acute Toxicity Indicators: Human[a] Inhal. TC_{LO} (ppm) Oral TD_{LO} (mg/kg)	Acute Toxicity Indicators: Dermal[b] Absorption Toxicity	Chronic Toxicity Does not Consider Carcinogenicity: Health Advisories[c] (µg/l)	Chronic Toxicity Does not Consider Carcinogenicity: Acceptable[d] Daily Intakes (µg/day)
7. Bis(2-ethylhexyl)phthalate CAS No. 117-81-7	58 µg/l Res. Wells 65,000 µg/kg Sludge	TD_{LO} = 143	-	-	42,000
8. 1,2-dichloroethane CAS No. 107-062	119 µg/l Leachate	TC_{LO} = 4000/H LD_{LO} = 714	-	-	
9. Trichloroethene CAS No. 79-01-6	17.4 µg/l Leachate	TC_{LO} = 110/8H LC_{LO} = 7000	-	1 day - 2,020 10 day - 200 long-term - 75	
10. Vinyl Chloride CAS No. 75-00-3	776 µg/l Leachate	TC_{LO} = 20/30M	High Penetration (Gas) Extreme System and Local Potency (Gas)	-	
11. Chloroethane CAS No. 75-00-3	1,450 µg/l Leachate	TC_{LO} = 13,000	-	-	
12. Methylene Chloride Cas No. 75-09-2	500 µg/l Residential Well	TC_{LO} = 500/8H	Moderate Penetration Moderate System and Local Potency (liquid)	1 day - 13,000 10 day - 1,300 long-term - 150	13,000
13. Acetone CAS No. 67-64-1	3,490 µg/l Leachate 47,000 µg/l Sludge	500 12,000/8H	-	-	[200,000]

Table B-1

CRITICAL CONTAMINANTS - TOXICOLOGICAL DATA
FOR HEALTH EFFECTS WITH ASSOCIATED THRESHOLD LIMITS
PAGE THREE

Critical Contamination	Maximum Observed Concentration (Media) µg/l	Acute Toxicity Indicators: Human[a] Inhal. TC_{LO} (ppm) Oral TD_{LO} (mg/kg)	Acute Toxicity Indicators: Dermal[b] Absorption Toxicity	Chronic Toxicity Does not Consider Carcinogenicity: Health Advisories[c] (µg/l)	Chronic Toxicity Does not Consider Carcinogenicity: Acceptable[d] Daily Intakes (µg/day)
14. 2-butanone (MEK) CAS No. 78-93-3	29,000 µg/l Sludge 6,090 µg/l Leachate	100/5M	-	1 day - 7,500 10 day - 750	[7,400]
15. 4-methyl-2-pentanone CAS No. 108-01-1	1,850 µg/l Leachate	-	-	-	[7,300]

Sources:

(a) USDHHS July 1984
(c) USEPA 1980a
(d) USEPA 1980b
\- None reported in toxicology data base
TC_{LO} Lowest reported toxic concentration (in ambient air) for an exposure duration (8M - 8 minutes, etc.).
TD_{LO} Lowest dose at which the toxic effect was observed
SNARLS Suggested no adverse reaction levies at which no adverse effects would be expected below this level.
LD_{LO} Lowest reported lethal dose

Notes:

1. The lack of available data does not imply associated health impacts are not present.

Table B-1

CRITICAL CONTAMINANTS - TOXICOLOGICAL DATA FOR HEALTH EFFECTS WITH NO ASSOCIATED THRESHOLD LIMITS

CRITICAL CONTAMINANT	Maximum Observed Concentrations (ug/L)	Carcinogenicity (e) (f)	Carcinogenic Potency (mg/kg/day)-1 (g)	Mutagenicity Bioassays (a)	Caused Reproductive Effects (a)	Reported Tumorigenic Activity (a)
1. Benzene (4V) CAS No. 71-43-2	35,000 Leachate	human-definite (e) based on epidemiological data by inhalation. Human & animal suspected (f)	0.052 (human occupational exposure	• in vitro - yeast • in vitro - human, rat, mouse, rabbit oral, inhalation 26 Studies	Caused reproductive effects in rats and mice. Oral-mouse LD_{LO} 12 gm/kg	Caused tumors - oral-rat LD_{LO} - 52 gm/kg. All other effects by inhalation route.
2. Chlorobenzene (7V) CAS No. 108-90-7	5,310 Leachate	none reported (a)	NR	NR	NR	NR
3. Ethylbenzene (38V) CAS No. 100-41-4	590 Leachate	presently being tested in the NTP (a)	NR	• sister chromatid exchange bioassay on human lymphatic tissue at 106 mg/L. Only 1 entry.	4 entries. Route of exposure by inhalation only.	None Reported
4. Toluene (86V) CAS No. 108-88-3	2,400 Leachate	presently being tested in the NTP (a)	NR	• in vitro - 3 bioassays in bacteria and yeast; 1 Mammalial cell bioassay • in vivo - inhalation only	Caused reproductive effects in mice - orally dosed at TD_{LO} of 9-30 gm/kg	None Reported
5. Total Xylenes CAS No. 1330-20-7	447 Leachate	none reported	NR	• in vivo-in yeast	Caused reproductive effects in mice - orally dosed at TD_{LO} - 31 mg/kg	None Reported
6. Bis(2-chloroethyl) Ether (18B) CAS No. 111-44-4	4,680 Leachate	animal positive (h)	1.14	• Ames Bioassay	NR	NR
7. Bis(2-ethylhexyl) Phthalate (66B) CAS No.	58 Residential Well	animal positive; human indefinite (f) expected to be a carcinogen (e)	NR	• Ames Bioassay • 2 Mamalian cell bioassays • in vivo mouse bioassay	Caused effects in mice and rats - orally dosed at TD_{LO} 35-7140 mg/kg	Caused tumors in mice and rats - orally adm @ rat/216 gm/kg mice/260 gm/kg

Table B-2

VOLATILE ORGANIC CONTAMINANTS FOUND ABOVE DETECTION LIMITS IN THE VARIOUS MEDIA
BEACON HEIGHTS LANDFILL SITE

PP3	CAS No.	Contaminant	Air (µg/m³)	Surface Soils (µg/Kg)	Leachates (µg/l)	Surface Water (µg/L)	Sediments (µg/Kg)
		Volatile Organics					
4V	71-43-2	benzene	16.6 - 21.5 (3)	35 - 2,200 (3)	27.8 - 35,000 (11)	16 - 49 (2)	-+
7V	108-90-7	chlorobenzene	-	20 - 1,030 (6)	15.5 - 5,310 (10)	17.5 - 95 (2)	-+
10V	107-06-2	1,2-dichloroethane	-	-	119 - 245 (2)	-	-+
11V	71-55-6	1,1,1-trichloroethane	-	-	283 (1)	-	-+
13V	75-34-3	1,1-dichloroethane	-	37 (1)	6.2 - 512 (5)	-	-+
16V	75-00-3	chloroethane	-	20 (1)	29 - 1,450 (8)	10 (1)	-+
38V	100-41-4	ethylbenzene	-	25 (1)	5 - 590 (8)	-	-+
44V	75-09-2	methylene chloride	-	6 - 120 (19)	4 - 126 (10)	5 - 22 (12)	31 - 210+ (7)
30V	156-60-5	1,2-trans-dichloroethene	-	-	139 (1)	-	-
49V	75-69-4	fluorotrichloroethene	-	-	20.6 (1)	-	-
86V	108-88-3	toluene	18 - 20.7 (3)	15 - 2,800 (6)	20.8 - 2,400 (9)	-	-
87V	79-01-6	trichloroethene	-	-	17.4 (1)	-	-
88V	75-01-4	vinyl chloride	-	12 (1)	776 (1)	-	-
	67-64-1	acetone	-	24 - 3,400 (5)	10 - 3,490 (10)	10 - 19.9 (8)	52+
	78-93-3	2-butanone (MEK)	-	140 - 20,000 (4)	6.3 - 6,090 (8)	8.3 - 36.4 (2)	17 - 163+ (5)
	108-10-1	4-methyl-2-pentanone (MIBK)	-	35 - 1,080 (4)	8.9 - 1,850 (6)	-	
	100-42-5	styrene	-	40 - 60 (2)	-	-	-
		Total xylenes	7.93 - 8.8 (3)	480 - 490 (2)	11 - 447 (5)	-	-
	519-78-6	2-hexanone	-	-	-	-	-

VOLATILE ORGANIC CONTAMINANTS FOUND ABOVE DETECTION LIMITS
IN THE VARIOUS MEDIA
BEACON HEIGHTS LANDFILL SITE
PAGE TWO

PP3	CAS No.	Contaminant	Groundwater (Shallow Wells) (µg/l)
		Volatile Organics	
4V	71-43-2	benzene	9 - 800 (4)
7V	108-90-7	chlorobenzene	1.3 - 320 (4)
10V	107-0602	1,2-dichloroethane	-
11V	71-55-6	1,1,1-trichloroethane	-
13V	75-34-3	1,1-dichloroethane	-
16V	75-00-3	chloroethane	34 90 (2)
38V	100-41-4	ethylbenzene	-
44V	75-09-2	methylene chloride	1 - 380 (7)
30V	156-60-5	1,2-trans-dichloroethane	-
49V	75-69-4	fluorotrichloromethane	-
86V	108-88-3	toluene	1.1 - 6 (2)
87V	79-01-6	trichloroethene	1.2 - 11 (2)
88V	75-01-4	vinyl chloride	-
	67-64-1	acetone	-
	78-93-3	2-butanone (MEK)	-
	108-01-1	4-methyl-2-pentanone (MIBK)	-
	100-42-5	styrene	-
		Total xylenes	4 - 34 (2)
	519-78-6	2-hexanone	-

Table B-2

VOLATILE ORGANIC CONTAMINANTS FOUND ABOVE DETECTION LIMITS
IN THE VARIOUS MEDIA
BEACON HEIGHTS LANDFILL SITE
PAGE THREE

Notes:

1) Numbers in parentheses (6) are the number of positive observations.

2) Background values for air contaminants are as follows: benzene (1.96 μg/m^3); toluene (5.36 μg/m^3); xylenes (3.53 μg/m^3).

3) Reported values are the minimum–maximum (35 - 2,200) contaminant concentration ranges.

4) Entries marked with a dash (-) indicate none were found above detection limits for that medium. For detection limits of the particular observations, see the tables in Appendix C.

5) (+) indicates only one sampling round. Results are included in this table.

Table B-2

SEMI-VOLATILE (BASE/NEUTRAL) ORGANIC CONTAMINANTS FOUND ABOVE DETECTION LIMITS IN THE VARIOUS MEDIA BEACON HEIGHTS LANDFILL SITE

PP No.	CAS No.	Contaminant	Air ($\mu g/m^3$)	Surface Soils (µg/kg)	Leachates (µg/L)	Surface Water (µg/L)	Sediments (µg/kg)	Groundwater (Shallow Monitoring Wells) (µg/L)	Groundwater (Bedrock Monitoring Wells) (µg/L)	Groundwater (Residential Wells) (µg/L)
12B	67-72-1	hexachloroethane	NA	-		232 (1)	-	-		
18B	111-44-4	bis(2-ethylhexyl)ether	NA	228 (2)	24 - 4,680 (4)	420 (1)	-	49 - 1,200(2)	45 - 4,360 (3)	-
25B	95-50-1	1,2-dichlorobenzene	NA	-	50 - 136 (2)	10 (1)	-	-	-	-
39B	206-44-0	fluoranthene	NA	-	-	-	1,100 - 11,000+ (5)	-	-	-
55B	91-20-3	naphthalene	NA	790 (1)	504 1	-	110 - 250+ (4)	-	-	-
66B	117-81-7	bis(2-ethylhexyl)phthalate	NA	1,990 (1)	-	26 - 30 (2)	-+	-	38 (1)	32 - 58 (3)
67B	85-68-7	butyl benzyl phthalate	NA	667 (1)	-	-	-+	-	-	-
68B	84-74-2	di-n-butyl phthalate	NA	-	-	-	-+	-	510 (1)	-
69B	117-81-7	di-n-octyl phthalate	NA	-	-	22 (1)	-+	-	-	22 - 44 (3)
72B	56-55-3	benzo(a)anthracene	NA	-	-	-	800 - 5,200+ (4)	-	-	-
73B	50-33-8	benzo(a)pyrene	NA	-	-	-	2,200 - 3,800+ (3)	-	-	-
74B	205-99-2	benzo(b)fluoranthene	NA	-	-	-	2,200 - 5,500+ (4)	-	-	-
75B	207-08-9	benzo(k)fluoranthene	NA	-	-	-	2,100 - 4,200+ (2)	-	-	-
76B	218-01-9	chrysene	NA	-	-	-	500 - 4,100+ (5)	-	-	-
77B	208-96-8	acenaphthylene	NA	-	-	-	460 - 730+ (3)	-	-	-
78B	120-12-7	anthracene	NA	-	-	-	97 - 650+ (5)	-	-	-
79B	181-24-2	benzo(ghi)perylene	NA	-	-	-	800 - 6,200+ (4)	-	-	-
80B	86-73-7	fluorene	NA	-	-	-	280 - 460+ (2)	-	-	-
81B	85-01-8	phenanthrene	NA	-	-	-	5,600 - 7,700+ (4)	-	-	-
82B	183-39-5	indeno(1,2,3-cd)pyrene	NA	-	-	-	2,030 - 3,400+ (4)	-	-	-
84B	129-00-0	pyrene	NA	-	-	-	670 - 10,000+ (5)	-	-	-
	132-64-9	dibenzofuran	NA	-	-	-	130 - 760+ (3)	-	-	-
	91-57-6	2-methylnaphthalene	NA	-	59 (1)	-	120+ (1)	-	-	-

(1) Numbers in parentheses (6) are the number of positive observations.
(2) Reported values are the minimum to maximum (35 - 2,200) contaminant concentration ranges.
(3) Entries marked with a dash (-) indicate none were found above detection limits for that medium. For detection limits at the particular observations, see the tables in Appendix C.
(4) (+) indicates only one sampling round results are included in this table.
NA Not Analyzed

Table B-2

SEMI-VOLATILE (ACID & PESTICIDE) ORGANIC CONTAMINANTS FOUND ABOVE DETECTION LIMITS IN THE VARIOUS MEDIA BEACON HEIGHTS LANDFILL SITE

PP3	CAS No.	Contaminant	Air (µg/m³)	Surface Soils (µg/Kg)	Leachates (µg/l)	Surface Water (µg/L	Sediments (µg/Kg)
Semi-Volatile Organics							
Acid Extractables							
65A	108-95-2	phenol	N/A	-	52 - 201 (3)	-	-+
	65-85-0	benzoic acid	N/A	-	1,44 - 3,220 (5)	272 (1)	-+
	95-48-7	2-methyl phenol	N/A	-	266 - 1,198 (2)	-	-+
	108-39-4	4-methyl phenol	N/A	-	42 - 603 (5)	-	-+
Pesticides Fraction							
90P	60-57-1	dieldrin	N/A	1.5 - 3.2 (2)	-	-	-+
103P	319-85-7	BHC-Beta	N/A	3.2 (1)	-	-	-+
105P	58-89-9	BHC-Gamma (lindane)	N/A	1.2 - 6.3 (3)	-	-	-+

Notes:

1. Numbers in parentheses (6) are the number of positive observations.
2. Reported values are the minimum-maximum (35 - 2,200) contaminant concentration ranges.
3. Entries marked with a dash (-) indicate none were found above detection limits for that medium. For detection limits at the particular observations, see the tables in Appendix C.
4. (+) indicates only one sampling round. Results a included in this table.
5. N/A - Not analyzed for.

APPENDIX C - REMEDIAL ALTERNATIVE COST DATA

Table C-1

REMEDIAL ACTION ALTERNATIVE
COST SUMMARY
BEACON HEIGHTS LANDFILL SITE

Alternative	Initial Capital Cost	Annual O&M* Costs	Present Worth O&M Costs	Total Project Cost
1	$100,459,000	$ 9,000/90,000**	$ 34,000/798,000	$100,493,000/101,257,000
2	51,201,000	4,751,000	12,854,000	64,055,000
3	15,439,000	182,000/254,000	1,716,000/2,394,000	17,155,000/17,833,000
4	38,240,000	191,000/263,000	1,800,000/2,479,000	40,040,000/40,719,000
5	38,246,000	191,000/263,000	1,800,000/2,479,000	40,046,000/40,725,000
6	6,175,000	223,000/295,000	2,102,000/2,781,000	8,277,000/8,956,000
7	0	0	0	0
8	272,000	180,000	1,697,000	1,969,000
9	1,958,000	53,000	500,000	2,458,000
10	370,000	53,000	500,000	870,000
11	1,544,000	216,000	2,036,000	3,580,000
12	197,000	-	-	
13	272,000	77,000	726,000	998,000

* Operation and maintenance
** Costs without/with residential well monitoring

Table C-2 REMEDIAL ACTION ALTERNATIVES
Beacon Heights Landfill

ALTERNATIVE	COMPONENTS	COSTING		
		Capital	O&M*	Total**
1. Offsite disposal	Offsite disposal of all contaminated material in a RCRA approved landfill (700,000 cubic yards)	100,459,000	9,000	100,493,000
2. Onsite incineration (RCRA)	Incineration of all contaminated material in four portable incinerators. Return of ash to a on-site RCRA landfill.	51,201,000	4,751,000	64,055,000
3. RCRA Cap, leachate collect and treat to NPDES standards	Construction of a 30 acre multi-media cap including gas venting and stormwater controls. Also, installation of leachate collection and treatment system.	15,439,000	182,000 254,000 (with monitoring)	17,155,000 17,833,000 (with monitoring)
4. Onsite RCRA landfill. leachate collect and treat to NPDES Standards	Placement of all contaminated material in an on-site RCRA approved, double lined landfill, with leachate collection and treatment	38,240,000	191,000	40,040,000

* annual operations and maintenance cost (excluding well monitoring costs)

** total present worth cost including O & M costs (30 year)

Table C-2

ALTERNATIVES	COMPONENTS	COSTING		
		Capital	O & M*	Total**
5. Onsite RCRA landfill. Leachate collect and treat to Drinking Water Standards.	Placement of all contaminated material in an on-site RCRA approved, double lined landfill, with leachate collection and treatment	38,246,000	191,000	40,046,000
6. Soil Cover, Leachate Collection and treatment to NPDES Standards	Two feet of soil cover, 6 inches of topsoil placed over entire site, Leachate collection system and treatment to NPDES discharge standards	6,175,000	223,000	8,277,000
7. No Action	Strict no action	0	0	0
8. Limited No Action with Long Term Monitoring	Sampling, analysis and review of groundwater, surface water and other media samples for a 30 year period.	272,000	180,000	1,969,000
9. Public Water Supply to an Extended Area	Extend Water Main up Skokorat Road to next municipal supply, up Blackberry Hill Road to demographic limits (54 total homes)	1,958,000	53,000	2,458,000

Table C-2

ALTERNATIVE	COMPONENTS	COSTING		
		Capital	O & M*	Total**
10. Public Water Supply to Affected Area	Partial Water Line extension up Skokorat Road (18 homes)	370,000	53,000	870,000
11. Grounwater Extraction and Treatment to Drinking Water Standards	Installation of 70 extraction wells in bedrock, pump and treat water for a 30 year period.	1,544,000	216,000	3,580,000
12. Additional Groundwater Hydrogeologic Investigation	Gather additional data on nature and extent of contaminant migration in the bedrock, recommend effective groundwater treatment schemes.	197,000	-	-
13. Limited No-Action with Long Term Monitoring	Establish a network of monitoring wells to track the groundwater contamination. If it poses s threat to public health, welfare, or the environment in the future, additional actions will be taken	272,000	77,000	998,000

Table C-3

COST SUMMARY FOR LEACHATE COLLECTION AND TREATMENT OPTIONS BEACON HEIGHTS LANDFILL SITE

	Alternative/Option	Initial Capital Cost	Annual(1) O&M Cost	Present Worth(2) O&M Cost	Total Project Cost
Alternative 3:	RCRA Cap with Leachate Collection and Treatment (30 year O & M)	$15,439,000	$182,000	$1,716,000	$17,155,000
Option A:	RCRA Cap without Leachate Collection and Treatment	14,326,000	92,000	867,000	15,193,000
Option B:	RCRA Cap with use of POTW (30 years leachate treatment)	15,216,000	360,000 (275,000)(3)	3,394,000 (2,592,000)	18,610,000 (17,808,000)
Option B:	RCRA Cap with Use of POTW (5 years leachate treatment)	15,216,000	360,000 (275,000)	1,883,000 (1,561,000)	17,099,000 (16,777,000)
Option C:	RCRA Cap with Use of Mobile Units (5 years leachate treatment)	15,238,000	172,000	1,171,000	16,409,000

(1) O&M Costs include site maintenance at $23,000 per year and sampling and analysis of monitoring wells (no residential wells) at $69,000 per year, a total of $92,000.

(2) Includes 30 years of O&M for site maintenance and monitoring for all present worth calculations.

(3) These costs assume leachate treatment for $.06 per gallon, an average cost quoted by the treatment plant.

APPENDIX D - COMMUNITY RELATIONS RESPONSIVENESS SUMMARY

COMMUNITY RELATIONS RESPONSIVENESS SUMMARY
BEACON HEIGHTS SITE
BEACON FALLS, CONNECTICUT

Introduction

This responsiveness summary for the Beacon Heights Site documents for the public record concerns and issues raised during remedial planning, comments raised during the comment period on the feasibility study, and the responses of EPA to these concerns.

Concerns Raised Prior to the Feasibility Study Comment Period

The predominant concern expressed by many members of the community was the immediate need for a new water supply for affected residents. Citizens expressed fear that their drinking wells might be contaminated leading to adverse health effects. Cleaning up the contamination at the site was viewed by many residents as a secondary activity, to take place after a new water supply was operating. Residents of two houses on Skokorat Road, where wells were found to be contaminated, expressed concern about the contaminated water but were more concerned about why they were not notified sooner that their water was unsafe to drink.

In response to concerns raised by some residents over prompt notification, EPA made certain that all new information (i.e., verified well test results) was immediately channelled through the State Health Department and the First Selectman of Beacon Falls, Leonard D'Amico.

Residents and local officials also expressed concern over the instability of the landfill due to its history of accepting unknown quantities of industrial waste. Several members of the community wanted to know what materials were in the landfill and how great a threat they posed.

In order to keep residents informed about the site, EPA set up an information repository at the Beacon Falls Town Hall and Public Library. EPA also informed concerned citizens and officials of the many dangers involved in direct onsite testing of the landfill because of the toxic nature of some of the chemicals buried in the landfill.

Community Relations Activities Conducted by EPA

Community relations activities were conducted by EPA to elicit citizen input and address concerns over remedial actions. Activities that took place include the following:

- o A Community Relations Plan was (CRP) prepared by EPA based on interviews with town residents and officials in September, 1983.

- o EPA briefed local officials by phone and in-person as new information concerning the Beacon Heights site became available.

- o A public meeting was held on March 26, 1984 by EPA at Laurel Ledge School in Beacon Falls to explain the work plan for the remedial investigation (RI) and the feasibility study (FS).

- An information repository was established in the Beacon Falls Town Hall and Public Library containing press releases, Remedial Action Master Plan (RAMP) fact sheets, engineering reports, RI/FS, and public hearing transcript.
- Press releases were issued, including results of the RI on April 25, 1985 and results of the FS on May 20, 1985.
- A Feasibility Study was released on May 20, 1985 for public review and comment.
- A second informational public meeting was held on June 5, 1985 by EPA at Laurel Ledge School in Beacon Falls to explain the results of the remedial investigation and feasibility study.
- A public hearing was held on June 11, 1985 by EPA at Laurel Ledge School in Beacon Falls to record comments and suggestions on the feasibility study for the Beacon Heights Landfill.
- The public comment period closed on June 14, 1985.

Concerns Raised During the Comment Period

The public comment period began on May 20, 1985 with the release of the feasibility study report. During the comment period, a public meeting was held on June 5, 1985, attended by approximately 30 people, to present results of the RI/FS and to answer questions from the public concerning the cleanup alternatives. On June 11, 1985 a formal public hearing was held to record comments on the cleanup alternatives for the Beacon Heights Landfill. Nine comments from public officials and local citizens were recorded at the hearing. These comments along with written comments received by EPA and concerns generated at the public meeting are summarized in the following section. In addition, the following section provides a summary of all Potentially Responsible Party (PRP) comments received by EPA.

Index to Community Comments

1. Providing New Water Supply
2. Onsite Incineration
3. Notification
4. Landfill Cleanup
5. Groundwater Cleanup
6. Monitoring
7. Offsite Contamination
8. Health Risks

COMMUNITY CONCERN	RESPONSE
1. <u>Providing New Water Supply</u>	
The overriding request of many citizens was to provide a new water supply first, clean up the site later. Getting clean water to affected and potentially affected citizens is their highest priority.	EPA intends to "fast track" the design and construction of the municipal water extension separately from the site closure design and construction.
Several citizens stated that Alternative 9 is the only alternative that will ensure that all residents are drinking uncontaminated water.	To ensure protection of public health and to account for uncertainties which exist in the understanding of groundwater contamination, the waterline extension will encompass all affected and potentially affected areas with a factor of safety to account for unknowns.

COMMUNITY CONCERN	RESPONSE
2. <u>Onsite Incineration</u> A major concern expressed by several citizens was that Alternative 2, Onsite Incineration, could lead to wastes from other areas being brought onsite for incineration purposes and the incinerator becoming a regional incinerator. These citizens were opposed to other wastes being treated onsite.	Onsite incineration was eliminated from consideration during the detailed evaluation of alternatives based on cost considerations and time required for implementation. However, the intent of Alternative 2 was to process only the Beacon Heights wastes and not to build a commercial disposal facility.

COMMUNITY CONCERN	RESPONSE
3. <u>Notification</u>	
Several residents felt that they were not promptly and properly notified that their wells were contaminated. One resident stated that he read of the contamination in the newspaper prior to being personally notified. Residents questioned why they could not be warned immediately if the water may be contaminated and unsafe to drink, instead of waiting for complete verification and validation of the results.	Communication to residents is through the State Department of Health Services, the Agency charged with protecting the health of Connecticut residents. Analytical results must be validated to ensure their legitimacy prior to release. Since the contaminants found present a risk from <u>long term</u> consumption, the additional 3-4 weeks to validate preliminary results were warranted to ensure that the contamination was real and not the result of laboratory or sampling problems.

COMMUNITY CONCERN	RESPONSE
4. <u>Landfill Cleanup</u> One citizen was concerned that contamination at the site cannot really be controlled unless the entire site is excavated and the contents of the landfill are disposed of offsite.	Site contamination <u>can</u> be controlled without complete excavation of all wastes. Due to the volume of wastes at the site (much of which is municipal waste) complete excavation and offsite disposal would be a very expensive alternative to implement. It is questionable if sufficient landfill space can be made available to implement this action within a reasonable time period. In addition to being prohibitively expensive, offsite disposal would cause major short term impacts due to heavy truck traffic, air emissions during excavation, and the length of time required for implementation. Futhermore, the use of a RCRA-type cap will create an impermeable barrier over the landfill and will minimize the volume of leachate that is generated from the site. A leachate collection system will control contamination emanating from the site, and when coupled with the provision of an alternate water supply, this system will effectively remediate the site problems.

COMMUNITY CONCERN	RESPONSE
5. <u>Groundwater Cleanup</u>	
One citizen felt that Alternative 11 is the most environmentally sound method to ensure against any future and long-range migration of contaminated groundwater to areas not served by a public water source.	The technical difficulties in implementing this alternative are several owing to the nature of the fractured bedrock and depth of contamination. Flow in the bedrock is through an extensive fracture system that must be totally intercepted to extract the groundwater. When the municipal water line is extended, the health threat resulting from groundwater contamination will be removed. Additional monitoring will be done to determine if groundwater contamination is migrating further.

COMMUNITY CONCERN	RESPONSE
6. <u>Monitoring</u> A citizen was concerned whether residents can be confident that wastes won't seep out after the monitoring program is completed.	A monitoring program of 30 years is proposed. It is expected that this is a sufficiently long period to evaluate the steady-state conditions that should develop following the implementation of remedial actions. After the site is capped the leachate generation should reduce quickly. Within a period of several years the rate may reduce further as the wastes within the landfill are dewatered. The resulting effect on the groundwater to reduce contaminant concentrations will lag somewhat, owing to the time it takes for flow to travel through the aquifer, but would be detected within the 30 year period. At the end of 30 years, the levels of contamination will be reevaluated to determine the need for additional monitoring.

COMMUNITY CONCERN	RESPONSE
7. <u>Offsite Contamination</u>	
Several citizens expressed concern that there is no way to tell whether wells just outside the immediate contamination area might be affected through further groundwater seepage. The feasibility study states that contamination was detected upgradient of the site. More testing should be done to explore the possibility of offsite sources of contamination. Citizens were concerned why wells were not being tested upgradient of the site. More information should be gathered on the possibility of deep bedrock contamination.	Results of the remedial investigation (RI) report indicate that some low level contamination was found in wells upgradient from the site. These wells were very close to the landfill and may have been contaminated by a mounding effect from the landfill, or were not truly upgradient wells (MW-3). Contaminant levels were very low and may have been a result of laboratory or sampling equipment. Although the results of the study do not indicate a major source of upgradient contamination, a continued monitoring program for the site would include the installation of additional upgradient monitoring wells and deep bedrock wells. Monitoring wells will be placed in the area to the northwest of the site where the public water supply is not available (Cook Lane).

COMMUNITY CONCERN	RESPONSE
8. <u>Health Risks</u>	
Several citizens commented about the potential health risk of drinking contaminated water.	A chemical analysis must be completed on the municipal water supply to actually compare it with the current well water. Municipal water supplies are subject to quality criteria and monitoring.
A citizen felt that the impact on residents in the affected area cannot be measured in numbers alone. Mental anguish is difficult to measure. Equally difficult to assess is the impact on property values. These two factors can be alleviated by bringing public water to the effected and extended area.	The risks associated with ingesting the well water were identified in the feasibility study. Only 2 samples from residences along Skokorat Road were identified as presently containing contaminants above levels that are considered safe. Those residents whose wells were contaminated with benzene were advised to discontinue use of their water supply for ingestion. Contaminants found in other wells were not determined to be above safe levels from an acute (short term) or chronic (long term) exposure scenario at the present time. Residents with health problems were advised at the public meetings to discuss these problems with the Connecticut Department of Health Services and/or their physicians.
A citizen was concerned over who sets the standards for allowable hazardous concentrations of chemicals? Why are the State and Federal standards different? Why are the standards always changing?	The Federal government sets standards for pollutants in various media (e.g., air, surface water, drinking water) through its process of issuing regulations. A state may adopt these standards or may set more stringent standards due to differences in philosophy, consideration of special state needs, or state legislative requirements.

COMMUNITY CONCERN	RESPONSE,
8. Health Risks (continued)	
	Regulatory standards do not exist for many hazardous chemicals. In the absence of regulations, both Federal and State governments may issue guidelines as an interim control measure based on existing information on chemical toxicity, persistence, likelihood of exposure, analytical detection limits and other factors. Standard setting is an evaluationary process because the understanding of chemicals and their effects on human health is also constantly evolving.

Index to State Comments

1. Providing New Water Supply
2. Onsite Incineration
3. Interpreting and Conveying Data
4. Landfill Cleanup
5. Access
6. Monitoring

STATE CONCERN	RESPONSE
1. Providing New Water Supply Several officials representing the State expressed the opinion that the first responsibility is to provide a safe public water supply as quickly as possible. The State supports Alternative 9 because of the potential for contamination of private wells within downgradient proximity of the landfill.	EPA Agrees that provision of a safe water supply should take preference over landfill closure and intends to phase in this aspect of the cleanup of accomplish it as rapidly as possible. EPA also supports the extended waterline, Alternative 9.

STATE CONCERN	RESPONSE
2. <u>Incineration</u> Similar to the concerns expressed by the citizens, the State opposes onsite incineration. The potential for further environmental damage during the burning process and the possibility that the area can be used in the future to incinerate hazardous waste brought in from other sources is too great for this plan to be considered.	Incineration has been ruled out on the basis of cost and time for implementation, thus obviating these concerns.

STATE CONCERN	RESPONSE
3. <u>Interpreting and Conveying Data</u>	
The State thinks that EPA should make sure proper resources are available to interpret data received at the dump site. This data needs to be quickly, accurately and clearly passed on to the community. Regardless of which solution is selected, a system should be available to feed back useful information to the residents.	EPA will disseminate information to the affected community through its community relations program of formal and informal meetings, press releases, fact sheets, and other means of communication.

STATE CONCERN	RESPONSE
4. <u>Landfill Cleanup</u> The State expressed the concern that remedial measures designed to divert groundwater and surface water will be ineffective. Therefore, the contents of the Betkoski Dump should be excavated and placed atop the main landfill. The landfill should then be regraded and covered with an impermeable cap.	EPA agrees that diversion of groundwater and surface waters around the Betkoski Dump area is not feasible and that these wastes should be excavated and consolidated with the larger landfill. This will also make possible a perimeter leachate collection system which encompasses all waste deposits. The contents of the Betkoski Dump will be placed atop the main landfill prior to placement of any cap. Alternative 6, placement of a soil cover, was revised to include this measure also.

STATE CONCERN	RESPONSE
5. <u>Access</u> The State thinks that access to the landfill should be restricted. Children and other unauthorized entrants must be prevented from going onsite.	Access to the landfill will be restricted to prevent contact with materials on site and to prevent vandalism of site facilities (treatment facilities, site cap, etc.) following implementation of remedial actions. The site area and additional working areas required for remediation will be fenced.

STATE CONCERN	RESPONSE
6. <u>Monitoring</u> The State commented that there needs to be a monitoring system in place for those residents who are not connected to a public water supply and are potentially at risk. Future studies and monitoring of offsite groundwater migration should be conducted.	The extension of the public water supply will include the area identified as the extended area in the FS report. This limit includes areas that are currently not affected by contamination above safe levels but could be affected in the future. Extension of the waterline includes provisions for installation of monitoring wells in areas outside the study area to the northwest of the site that currently do not have public water supply available. These areas are primarily along Cook Lane. The public water line will not be extended to these areas initially because no data is available to indicate they are contaminated and because concentrations should be diluted at this distance, which is approximately one mile from the site.

Index to PRP Comments

*For the full text of comments refer to the Written Comments of: The Beacon Heights Generators Committee, prepared by the Beacon Heights Generators Committee and the consulting firm of Malcolm Pirnie, Inc. ("MPI").

PRP CONCERN	RESPONSE
1. <u>Offsite Disposal</u> Does not meet Federal requirements: o Transportation from one CERCLA site to another is not consistent with intent of CERCLA. o Landfilling of wastes is not consistent with requirements of and policy underlying the Hazardous and Solid Waste Amendments of 1984 or EPA's Policy under RCRA. Offsite disposal is technically impractical and will cause adverse environmental impacts: o No hazardous waste landfills located in Connecticut. o Limited space in New York and New York has strict limits on total organics in waste. o Other states available (Ohio, Indiana, and South Carolina) but disposal will take much longer, cost much more and be a greater safety hazard. o Excavation and long-distance transport would take much longer than projected. o Would result in uncontrolled releases when site is uncovered for excavation. o Contact of stormwater with exposed wastes will increase during excavation, forming leachate and possible groundwater contamination.	CERCLA prohibits the use of offsite disposal remedies unless it is cost effective, it is necessary to protect public health, welfare, or the environment, or it creates new disposal capacity. The Beacon Heights situation does not meet these statutory requirements and offsite disposal is not the selected remedy. If the wastes were to be exhumed, it is possible that certain wastes would be encountered which are now or will be prohibited from land disposal in the present form. Rehandling to first treat or stabilize the wastes would be required prior to landfilling: this cannot be predicted based on existing information. Many of the hazards associated with excavation of the wastes and offsite disposal were considered during the preparation of the feasibility study and were implied in the FS report. The large volume of wastes at the Beacon Heights Landfill Site make any offsite disposal technology a limited option based on the risks involved with exposing the wastes, hazards of long-distance transport, and the potential lack of available landfill space, this alternative does have serious contraints as identified in the FS. The costs for implementing this alternative are excessive compared to benefits that can be achieved

PRP CONCERN	RESPONSE
1. <u>Offsite Disposal</u> (continued) o Potential risks excavating hazardous waste unknown. o Cannot move all wastes by bulk handling method as described in FS. o Drums will be uncovered that need testing, transporting and disposal. o Pooled or ponded free liquids will be encountered--cannot be placed in a landfill and will require offsite processing and treatment. o Costs are underestimated by $20-$30 million.	through placing a RCRA cap. Evaluation of this alternative was included to comply with EPA guidance to evaluate offsite disposal, storage, or destruction technologies. It has been screened out as a viable alternative.

PRP CONCERN	RESPONSE
2. <u>Onsite Incineration</u> Institutional issues should be considered and may pose significant drawbacks to onsite incineration: o Permits must be obtained from Connecticut Department of Environmental Protection (CDEP). o Formal siting application must be submitted to state's siting council. The council has not sited a new facility to date. o Construction and testing phase for incinerator may take 3-5 years. o Disposal of incinerated residue in new RCRA landfill is not encouraged under RCRA. o New land must be purchased to locate new landfill. o FS does not address new landfill in terms of ownership, financial assurance, property acquisition and buffer zones. Technical impracticalities for landfill discussed under offsite landfill also apply here (i.e., exposure risks, leachate formation). Other technical problems also exist: o FS does not address adverse effects from emissions from incinerator. o Need for scrubber and scrubber wastewater disposal is not discussed.	This alternative was screened out as a result of costs, and public opinion against this alternative.* As outlined under Alternative 1, offsite disposal, many of the points identified by the PRPs were considered during preparation of the feasibility study and were addressed in the report, although not elaborately. This alternative was included to comply with the FS guidance documents to identify alternatives that attain all applicable or relevant Federal public health or environmental standards, guidances, or advisories and to evaluate an alternative that provides destruction of the waste materials. The Connecticut Water Quality standards do allow for variances on a case by case basis. EPA recognizes that such a variance would be required for any discharge to Hockanum Brook or its tributaries. *NB. "CERCLA compliance with other environmental laws" policy states that Superfund remedies need only comply with the technical requirements of federal statutes. Neither state nor federal permits need be obtained.

PRP CONCERN	RESPONSE
2. <u>Onsite Incineration</u> (continued)	
o Discharge of even highly treated leachate from landfill into Hockanum Brook is prohibited by Connecticut Water Quality Standards and Criteria.	

PRP CONCERN	RESPONSE
3. <u>Landfill Adjacent to Site</u> Construction of a RCRA landfill adjacent to site is not technically practical to implement and presents significant adverse environmental, health, and safety risks: o High health risk from exposure to waste during excavation. o High cost but doesn't provide greater protection to public health and the environment than Alternative 3 or 6. o Similar health and safety risks as those presented under offsite disposal. o FS overestimated level of protection provided by leachate treatment system under Alternative 5. It will not meet primary drinking water standards for chloride or nitrate nitrogen. o Discharge to Hockanum Brook is prohibited. o Onsite RCRA landfill not consistent with Policy of Hazardous and Solid Waste Amendments of 1984 and EPA Policy under RCRA which discourages landfilling of hazardous waste. o Prohibition against siting landfills in Connecticut. o Must purchase property. o Given a reasonable estimate of construction activity and traffic, would take 2 years to construct landfill bottom, 4 years to construct cap, and 3-4 years to move waste. This lengthy	Development of an onsite landfilling alternative was used to satisfy many of the requirements of the FS guidance process. Several of the comments from the PRPs were discussed in the feasibility study and are valid concerns associated with implementation of this alternative. These concerns include the risks created by exposure of the wastes, the time period required for construction, and necessary purchase of additional property. Although landfilling of hazardous wastes may be discouraged under RCRA, the focus of the onsite RCRA landfill alternatives was to provide an onsite containment measure in contrast to onsite destruction technologies (incineration) that are more expensive and have adverse environmental impacts. By containing the wastes within a fully lined and capped system where all leachate can be collected and managed, this alternative would provide greater protection to the public health and environment than the capping Alternatives 3 and 6. However, difficulties in obtaining property, materials for construction, and time to implement, do not warrant the costs for Alternatives 4 and 5 ($38 million) versus the appreciable benefits that can be achieved for the cost of placing a RCRA cap in Alternative 3 ($15 million) since Alternative 3 adequately protects public health and the environment.

PRP CONCERN	RESPONSE
3. <u>Landfill Adjacent to Site</u> (continued)	
time greatly increase environmental and health risks. o Estimate on clay is too low. Low permeability clay would cost $25 per cubic yard in New York. This would increase costs $1.93 million for both Alternatives 4 and 5. o FS fails to mention costs of moving free liquids--could add $1 million to total costs. o FS does not address excavation and removal costs for liquid-filled drums.	Based on further discussion with Connecticut regulatory agency personnel, it does appear that discharge to Hockanum Brook may be allowed under its classification as a B/A stream. Discharge to Class B streams may be allowed when the treated discharge is an improvement over the quality of current discharges and will help to improve the stream class from B to A. The inplace cost of clay used in the estimate was approximately $20 per cubic yard, a direct cost prior to the addition of contingencies. The total cost for clay is derived from elements listed under material, labor, and equipment costs. The extent of free liquids within the wastes cannot be adequately determined prior to testing and sampling which will be included as part of the design. The additional costs for excavation and disposal of free liquids was addressed in the final FS in the sensitivity cost analysis. Excavation of the entire landfill contents would result in increased air emissions of volatile organics. However, exposure could be controlled by use of proper personnel protective equipment by the workers, an air monitoring network to determine periphery exposure levels in conjunction with a contingency plan, and a controlled work sequence.

PRP CONCERN	RESPONSE
3. <u>Landfill Adjacent to Site</u> (continued)	
	The 1984 RCRA Amendments do discourage landfilling. However, creation of a new landfill onsite or on adjacent property would not be inconsistent with those Amendments since it would merely upgrade the already existing landfill. Purchase of adjacent property for a RCRA landfill would be the responsibility of the State of Connecticut. Current EPA policy on feasibility studies does require that land acquisition costs be included in capital cost estimates. However, the additional cost would be relatively insignificant in comparison to the $15 million capital cost for this alternative. It is unclear if the "prohibition" on new landfills would apply to construction of a RCRA landfill adjacent to the existing Beacon Heights landfill. Under present EPA policy, remedial actions do not have to comply with the procedural and administrative aspects of other environmental laws, i.e., state siting. Construction of a new landfill would be a lengthy process requiring several years. The 11-12 years estimated by the PRPs neglects the ability to conduct discrete items concurrently.

PRP CONCERN	RESPONSE
4. <u>RCRA Cap With Leachate Collection and Treatment</u>	
Eight-foot RCRA cap is technically impractical: o One year construction would require 18 trucks per hour which is not feasible. o Cap would realistically take 4 years to construct. o Prohibition against discharge to Hockanum Brook. o Clay costs are underestimated by $2 million. o Leachate collection system cost is inconsistent with the estimate in Alternative 6. o Overall costs underestimated--not a cost-effective remedy.	The placement of a RCRA-approved cap would provide a cost-effective alternative for minimizing the generation of leachate from the landfill and subsequent contamination of the groundwater. The purpose of a RCRA cap is to place an impermeable layer that minimizes the degree of infiltration. The concept of a RCRA-approved cap allows for variability in the design and use of materials to create this impermeable layer. The proposed design (reduced from 8 feet to 6 feet thick) used both clay and synthetic membrane layers to illustrate the cost and design of a cap that could provide the greatest reduction of infiltration. Additional layers include a gas flow zone to vent methane gas from the landfill and surface drainage layers to direct runoff from the landfill. A large volume of material, approximately 450,000 cubic yards, would be required at the site for construction of a cap and liner. The increase in truck traffic may require upgrading of the local roads. The time required to obtain and transport the construction materials to the site may be several years. The cost for the use of clay in the cap was properly estimated and is derived from cost elements listed under materials, labor, and equipment. This cost accounts for hauling from within a 50-mile radius from the site.

PRP CONCERN	RESPONSE
4. <u>RCRA Cap With Leachate Collection and Treatment</u> (continued)	
	The cost for leachate collection systems was re-evaluated in the final FS and revised. The cost is essentially the same for both capping alternatives. Discharge of treated leachage to Hockanum Brook may be allowed in this case when the treated discharge will be improved over the quality of current discharge and will help to improve the quality of the stream from Class B to Class A.

PRP CONCERN	RESPONSE'
5. <u>Soil Cover and Leachate Collection and Treatment</u>	
PRPs are in favor of Alternative 6 for the following reasons: o Alternative 6 meets all CERCLA requirements. o Does not present technical impracticalities and adverse environmental health and safety impacts associated with Alternatives 1-5. o Less cost but just as much protection. o No risk of exposure as under excavation alternatives. o Can be implemented in 1-2 years. o Should discharge leachate to publicly-owned treatment works (POTW).	A soil cover will reduce infiltration but will not minimize it. The lack of a bottom line and the inability to extract contaminated ground-water from the fractured bedrock system support the need for a more impermeable cover than the soil cover described in Alternative 6. The Beacon Falls POTW is not designed to treat industrial wastes and is currently experiencing operating problems due to infiltration/inflow.
Several modifications to the soil capping proposal would further increae the level of protection. In addition the FS contains an erroneous figure for the estimate of leachate flow. It does not take into account any reduction in leachate flow resulting from the soil cap proposed under Alternative 6.	The FS did account for a decrease in the leachate flows as a result of placing the soil cover. Based on water balance calculations it was determined that this alternative may decrease the amount of leachate, but not to the level created by placement of a RCRA type cap. Based on variations in the calculation methods, the volume of leachate generation under this alternative may vary from 20,000 to 50,000 gallons per day. Although this alternative requires less material and can be implemented more quickly, it does not provide the same level of protection that would be provided by placing some variation of a RCRA cap that creates a more impermeable barrier. It does not meet CERCLA requirement since it does not provide "adequate source control" as required by the National Contigency Plan.

PRP CONCERN	RESPONSE
6. <u>Public Water Supply Extension</u> Technical basis for Alternative 9 is not clear from FS. Outer limit of potential downgradient flow of groundwater from site emcompasses a smaller area than that covered by Alternative 9. Should extend water line 4,500 linear feet along Skokorat Road and 3,200 feet along Blackberry Hill Road. This would encompass the area that could be affected.	The limits of downgradient flow cannot be fully characterized based on the nature of the fractured bedrock. Groundwater contamination has been identified along both Blackberry Hill and Skokorat Roads. Benzene levels in two of these wells have exceeded State and Federal guidelines and the other wells are clearly threatened. The limits of waterline extension proposed by the PRP's are based solely on surface topographic conditions which totally neglect the possible influence of pumping wells on local groundwater flow system boundaries and flow directions in fractured bedrock. Extension of the waterline along Skokorat Road to the next municipal water supply and along Blackberry Hill Road to the limit of residential development provides the only effective protection of public health and welfare to residents in the vicinity of the landfill.

PRP CONCERN	RESPONSE,
7. Long-Term Monitoring Monitoring for a full spectrum of organic and inorganic constituents is unnecessary. It is sufficient to monitor for volatile organics.	The data gathered in the remedial investigation indicate that compounds in the extractable fractions have also migrated offsite in addition to those in the volatile fraction. Furthermore, it is entirely possible that other fractions and/or heavy metals may migrate in the future due to chemical and physical processes occurring within the landfill. This cannot be predicted and, therefore, supports the need for broad spectrum testing.

PRP CONCERN	RESPONSE
8. Groundwater Treatment	
Further groundwater treatment at the site is not technically feasible. Treated water cannot be discharged to Hockanum Brook or accommodated by the Beacon Falls publicly-owned treatment works (POTW).	EPA is of the opinion that extraction of contaminated groundwater in deep bedrock fractures is impractical due to the impossibility of intercepting all fractures carrying contaminated groundwater. Therefore, the feasibility of treating the collected water is a moot issue.

Alternatives Not Evaluated in FS

There were no new remedial alternatives proposed by citizens, PRPs or the State that were not evaluated in the feasibility study.

Remaining Concerns

During remedial design and construction, community concern may be generated over noise from trucks entering and leaving the site. To help alleviate this problem, idling trucks will be parked in an area away from houses and people. The recommended alternative includes the installation of a new water line. This may require some blasting of bedrock, and measures will be taken to keep disturbance to nearby residents at a minimum. In addition, local access loads on Blackberry Hill will be upgraded to minimize damage and improve driving and safety conditions.

ENFORCEMENT CONFIDENTIAL

APPENDIX E - ENFORCEMENT ANALYSIS

APPENDIX F - CONNECTICUT COST SHARE LETTER

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

September 19, 1985

Mr. Michael DeLand
Regional Administrator
U. S. EPA
JFK Building
Boston, Massachusetts 02203

Dear Mr. DeLand:

The state of Connecticut concurs in the remedial actions for the Beacon Heights landfill as presented in the feasibility study and as discussed in the meeting between the EPA and DEP on September 12th. The state is taking steps to establish funding for its cost sharing proportion of the remedial action and agrees to provide the operation and maintenance costs for this project.

Sincerely yours,

John Anderson
for Stanley J. Pac
Commissioner

JA/cm

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