Record of Decision for Operable Unit One
for the Chemical Leaman Tank Lines Site

Richard L. Caspe, P.E., Director
Emergency and Remedial Response Division

Constantine Sidamon-Eristoff
Regional Administrator

Attached for your approval is the Record of Decision for the first operable unit for the Chemical Leaman Tank Lines site. The site is located in Gloucester County, New Jersey.

The selected remedial action represents the first of three planned operable units for the site. The initial action will address contaminated ground water underlying the site and the surrounding area.

The contaminated ground water will be extracted and treated to appropriate levels prior to discharge via pipeline to the Delaware River. Additional monitoring to ensure the effectiveness of the remedy will be required.

The estimated present worth cost to remediate the ground water at the site is 5.4 million.

Operable unit two will address contaminant source areas and contaminated soils. The third operable unit will deal with the impacts of site contamination on nearby surface waters and sediments.

The results of the Remedial Investigation and Feasibility Study, and the Proposed Plan for the site, were released to the public on July 15, 1990. In addition, a public meeting was held on July 24, 1990. The public supports the proposed remedial action for the site.

The Record of Decision was prepared by the U.S. Environmental Protection Agency and was reviewed by the New Jersey Department of Environmental Protection. The Department's input and comments are reflected in this document.

If you have any questions concerning this Record of Decision, I will be happy to discuss them at your convenience.

Attachment

SYMBOL --->	NJCB	ADNJP	ORC	DD	DD	OEP	DRA	RA
SURNAME --->	BASSO	FRISCO		CALLAHAN	CASPE	MARSHALL	MUSZYNSKI	SIDAMON-ERISTOFF
DATE --->	9/24	9/19	9/20		9/21/90		9/24	9/28

7635

Let's protect our earth

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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To John Frisco	From Tony Farro
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Constantine Sidamon-Eristoff
Regional Administrator
USEPA Region II
26 Federal Plaza
New York, NY 10278

Dear Regional Administrator Sidamon-Eristoff:

Re: Record of Decision - Chemical Leaman Tank Lines
Logan Township, Gloucester County, New Jersey

This is to formally notify the United States Environmental Protection Agency that the New Jersey Department of Environmental Protection has reviewed the undated final Record of Decision (including Responsiveness Summary) received September 20, 1990 for the Chemical Leaman Tank Lines Site and concurs with the recommended remedy as stated, provided that the remedy complies with New Jersey's Water Quality Standards.

The Record of Decision is for the first operable unit and focuses on the remediation of ground water contamination. It is understood that remediation of the on-site source areas and wetlands will be addressed in future operable units.

The ground water remediation will consist of the following components:

* Ground water extraction;

* Treatment of ground water in an on-site wastewater treatment plant; and

* Discharge of treated ground water via pipeline to the Delaware River.

New Jersey fully appreciates the importance of the Record of Decision in the cleanup process and will continue to take all necessary steps to ensure that the State's commitments in this area are met.

Sincerely,

Judith A. Yaskin

Judith A. Yaskin
Commissioner

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DECLARATION STATEMENT

RECORD OF DECISION - OPERABLE UNIT ONE

CHEMICAL LEAMAN TANK LINES

Site Name and Location

Chemical Leaman Tank Lines, Inc.
Logan Township, Gloucester County, New Jersey

Statement of Basis and Purpose

This decision document presents the selected remedial action for Operable Unit One of the Chemical Leaman Tank Lines site, in Logan Township, New Jersey, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision document explains the factual and legal basis for selecting the remedy for this site.

The New Jersey Department of Environmental Protection concurs with the selected remedy. The information supporting this remedial action decision is contained in the administrative record for this site.

Assessment of the Site

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial threat to public health, welfare or the environment.

Description of the Selected Remedy

The remedial action described in this document represents the first of three planned operable units for the site. This first operable unit action addresses the remediation of contaminated ground water underlying the site and the surrounding area. The goal of this action is to restore the aquifer to drinking water quality. Operable unit two will address contaminant source areas and contaminated soils. The third operable unit will deal with the impacts of site contamination on nearby surface waters and sediments.

The major components of the selected remedy include:

- Extraction and treatment of the contaminated ground water and discharge of the treated ground water via pipeline to the Delaware River; and

- Environmental monitoring to ensure the effectiveness of the remedy.

Investigative studies concerning the second operable unit (i.e., contaminant source areas and contaminated soils) and third operable unit (i.e., contamination in surface waters and sediments in proximity of the site) are currently being implemented.

<u>Declaration of Statutory Determinations</u>

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable, and it satisfies the statutory preference for remedies that employ treatment that reduce toxicity, mobility, or volume as their principal element.

At the conclusion of this remedy, there may be no hazardous substances remaining in the ground water above health-based levels. However, because the remedial goals will not be obtained within five years, the five-year review will apply to this remedial action.

Constantine Sidamon-Eristoff
Regional Administrator

9/28/90
Date

DECISION SUMMARY

RECORD OF DECISION - OPERABLE UNIT ONE

CHEMICAL LEAMAN TANK LINES

Site Location and Description

The Chemical Leaman Tank Lines, Inc. Bridgeport terminal property is located in Logan Township, Gloucester County, New Jersey, approximately two miles south of the Delaware River and one mile east of the town of Bridgeport (Figure 1). The Pennsylvania Reading Seashore Lines Railroad borders the Chemical Leaman property to the north and separates it from several private homes. Route 44 and Cedar Swamp Road parallel the railroad on its north and south sides, respectively. A reach of the Great Cedar Swamp and Moss Branch flank the site to the south and east, and Oak Grove Road runs through the western portion of the Chemical Leaman property (Figure 2). Cooper Lake, a small, privately owned lake, lies just north of the Chemical Leaman property between Route 44 and Route 130.

The Chemical Leaman site encompasses approximately 31.4 acres. The site includes, but is not limited to, the active terminal used for the dispatching, storage, maintenance and cleaning of tanker trucks and trailers; fallow farmland adjacent to the terminal; and the wetlands bordering the terminal to the south and east. Surface structures on the Chemical Leaman property include the terminal building, an enclosed stainless steel wastewater settling tank, and a concrete wastewater holding tank (Figure 2). Former subsurface structures include seven earthen settling and aeration lagoons considered to be the source areas for the ground-water contamination (Figure 2).

Ten residences have been located within 1200 feet of the Chemical Leaman property (Figure 3). The majority of these homes are due north or due south of the Chemical Leaman property. Until 1987, most of the residents in the vicinity of the site maintained individual water supply wells. Several of these wells have not been used for drinking water since levels of solvents and other chemicals and hazardous substances above drinking water standards were detected in the ground water in the late 1970s. However, some of these homes continue to use ground water for showering, washing and irrigation. During 1987, the U.S. Environmental Protection Agency (EPA) conducted a Removal Action and connected six homes north of the Chemical Leaman property on Route 44 to an extension of the Bridgeport Municipal Water System. During the interim between the late 1970s and the date of the completion of the municipal water line, Chemical Leaman provided potable water from Pureland Water Company (now Logan Water Well Company) to those homes in the area requesting it. Presently, one home receives bottled potable water from Pureland Water Company. EPA has recently authorized a Removal Action to connect four homes immediately south and west of the Chemical Leaman property to a municipal water line.

The private wells in the area of the site tap ground water from the upper hydrologic unit of the Potomac Group-Raritan Formation. Ground water in this unit tends to flow downward due to a downward vertical hydraulic gradient. The horizontal gradients in the area are very shallow making flow patterns difficult to determine. Ground-water mounding which occurred when the former lagoons were in use caused ground water to flow radially away from the lagoons. Based on the results of recent ground-water monitoring, however, it appears that the ground water presently flows slowly in a northerly/northeasterly direction.

Site History and Enforcement Activities

Chemical Leaman Tank Lines, Inc. transports chemical commodities in bulk quantities, some of which are classified as hazardous. Table 1 lists some of the hazardous materials historically transported by the company. The Chemical Leaman terminal has been in operation since 1961. Past wastewater handling and disposal practices at the site have resulted in organic and inorganic contamination of soil, ground water and the adjacent wetlands.

Prior to 1975, wastewater generated in the washing and rinsing operations was impounded in one of seven unlined settling and/or aeration lagoons before being discharged to the adjacent wetlands. These lagoons were taken out of service in August 1975, when Chemical Leaman installed a new rinse-water containment system at the terminal. In early 1977, liquid remaining in the settling and aeration lagoons was reportedly drained into the adjoining wetlands. Accumulated sludge in the bottoms of the settling lagoons was vacuumed prior to backfilling with clean fill and construction debris. Accumulated sludge in the aeration lagoons was not removed, and the lagoons were filled with perimeter diking materials and construction debris. In 1982, Chemical Leaman reportedly excavated visible sludge and contaminated soil from the former settling lagoons to an approximate depth of twelve feet below the surface, and the excavation was backfilled with clean sand. Residual contamination in the soils is currently being investigated by EPA.

In 1980-81, the New Jersey Department of Environmental Protection (NJDEP) documented volatile organic contamination in the ground water beneath the Chemical Leaman site, as well as in neighboring private wells. In 1981, Chemical Leaman conducted a hydrogeologic investigation to determine the extent of the ground-water contamination. Twenty-five monitoring wells were installed, and between 1981 and 1983, these wells were sampled on a quarterly basis.

In 1985, EPA included the Chemical Leaman Tank Lines site on the National Priorities List of Superfund sites when it was recognized that Chemical Leaman-related ground-water contamination of a number of residential wells posed an immediate threat to human health and the environment. An Administrative Order on Consent (Index No. II CERCLA-50111) between EPA and Chemical Leaman Tank Lines, Inc. was signed in July 1985 pursuant to which Chemical Leaman agreed to conduct a Remedial Investigation and Feasibility Study to delineate the nature and extent of site-related contamination in the ground water, soils and surface waters at and around the Chemical Leaman site.

Between 1985 and 1989, Chemical Leaman Tank Lines, Inc. conducted a Remedial Investigation and Feasibility Study at the site. In June 1989, EPA determined that the draft RI/FS documents prepared by Chemical Leaman were incomplete and inappropriate for public release and for preparing a Record of Decision. Consequently, EPA withdrew the studies from Chemical Leaman on June 15, 1989 and proceeded to revise the Remedial Investigation, Feasibility Study and Risk Assessment documents, unilaterally. EPA developed a Feasibility Study Addendum to present a more complete description of Chemical Leaman-related contamination in the ground water and alternative methods which could be used to remediate the ground water.

Highlights of Community Participation

The Operable Unit One Remedial Investigation and Feasibility Study Reports, Feasibility Study Addendum, Risk Assessment and Proposed Plan for the Chemical Leaman Tank Lines site were released to the public for comment on July 14, 1990. These documents were made available to the public in both the administrative record file located at EPA Region II's New York City office and at an information repository maintained at the Logan Township Municipal Building, 73 Main Street, Bridgeport, New Jersey. The notice of availability for these documents was published in the Gloucester County Times on July 15, 1990. A public comment period on the documents was held from July 15, 1990 to August 14, 1990. In addition, a public meeting was held on July 24, 1990. At this meeting, representatives from EPA answered questions about problems at the site and the remedial alternatives under consideration. A response to the comments received during this period is included in the Responsiveness Summary, which is part of this Record of Decision (ROD).

Scope and Role of Operable Unit One

As with many Superfund sites, the problems at the Chemical Leaman Site are complex. As a result, EPA has organized the remedial work into three phases or operable units. This ROD addresses the first planned remedial action at the site. This action addresses the remediation of the ground-water contamination associated with the site.

In this ROD, EPA is selecting a remedial action that will permanently mitigate the ground-water contamination at the site. This action will be the first operable unit of the remediation of the entire site. EPA has elected to address the contaminated ground water as the first operable unit because of the principal threat posed by the present and future potential for ingestion of, inhalation of, and dermal contact with contaminated ground water, and because sufficient information is presently available to select an appropriate remedy for this problem.

Future operable units will address the source of contamination, contaminated soils and site-related surface water and sediment contamination. EPA is currently conducting a Remedial Investigation and Feasibility Study to assess the sources of contamination, including the former lagoon areas (Operable Unit 2). EPA expects to sign a ROD for source contamination in late 1991. A Work Plan is currently in preparation to address surface water and sediment contamination at and around the site (Operable Unit 3). A ROD for site-related surface water and sediment contamination is planned for mid 1992.

Summary of Site Characteristics

Site Geology

Review of the geologic literature indicates that four geologic units underlie the Chemical Leaman Tank Lines site. From deepest to shallowest, these include the Wissahickon Formation (schist bedrock) located at a subsurface elevation of approximately -250 feet mean sea level (MSL); the lower zone of sediments of the undifferentiated Potomac Group-Raritan Formation at approximately -200 to -250 feet (MSL); a regionally continuous clay or series of regionally continuous clay units between approximately -150 and -200 feet (MSL); the upper zone of the undifferentiated Potomac Group-Raritan Formation and where locally present, the overlying Cap May Formation. The majority of geologic information obtained during the Remedial Investigation field activities pertains to the uppermost of these geologic units which occurs beneath the site in the interval from up to +20 feet (MSL) to subsurface elevations of approximately -150 feet (MSL).

Results of the hydrogeologic investigation indicate that the upper 150 feet of sediments can be separated into three water-bearing subzones (shallow (-20 ft), intermediate (-100 ft) and deep (-150 ft)) within the upper zone of the undifferentiated Potomac Group-Raritan Formation (Figure 4). These subzones are delineated by their subsurface elevation and their stratigraphic position relative to several semi-continuous clay layers. Drillers logs obtained by EPA indicate the presence of a regionally consistent water-bearing sand unit from approximately -200 feet (MSL) to approximately -250 feet (MSL) which is part of the lower zone of the undifferentiated Potomac Group-Raritan Formation.

Analysis of vertical hydraulic gradients at the Chemical Leaman site indicates a downward component of ground-water flow which may enhance the likelihood of vertical migration of contaminants. Horizontal hydraulic gradients in the various water-bearing zones are relatively low, ranging from 0.0003 - 0.002 feet/foot.

Ground-water Contamination

As part of the Remedial Investigation, 21 ground-water monitoring wells were installed: 6 in the upper subzone, 11 in the intermediate subzone, and four 4 in the deep subzone. Sampling of these wells indicated that the ground water in all three subzones of the upper aquifer is contaminated to varying extents by hazardous substances beneath the Chemical Leaman site. Contaminants include volatile organic compounds (VOCs), semi-volatile organic compounds and metals (Table 2). Solvents, including trichloroethene, trans-1,2-dichloroethene, and other volatile organic compounds are the contaminants present in the highest concentrations in the ground water. Table 3 provides a summary of the maximum concentrations of the major contaminants found in each subzone.

Site-related contaminants are concentrated in the shallow and intermediate subzones. The VOC concentration in the shallow subzone ranges from nondetectable levels to greater than 22,000 parts per billion (ppb) beneath the former settling lagoons. The VOC concentration in the intermediate subzone exceeds 75,000 ppb beneath the former settling lagoons. VOC concentrations in the deep subzone are relatively low compared to the other subzones (Table 3). However, these contaminant levels may not be representative of the maximum contamination present in the deep subzone since there are no deep subzone wells in the areas of the former wastewater lagoons.

The highest concentration of all contaminants in the ground water was detected in the vicinity of the former wastewater lagoons. The contaminant plumes radiate out from these apparent source areas, probably as a result of ground-water mounding that occurred while the lagoons were in use. The present extent of the contaminated ground-water plume is estimated to be 1000 feet long by 1000 feet wide in the shallow subzone, 1100 feet long by 1700 feet wide in the intermediate subzone, and 600 feet long by 500 feet wide in the deep subzone.

The contamination is spreading both laterally and vertically at a slow rate. The shallow horizontal hydraulic gradient has made direction of ground-water flow difficult to determine. However, the ground water and the associated contaminant plumes appear to be moving in a north to northeasterly direction at a rate of 20 feet/year. Samples collected from the deep subzone demonstrate that contaminants have migrated downward from the site soils and shallow ground water. The downward component of ground-water flow is responsible for this vertical contaminant migration.

Local residences surrounding the Chemical Leaman property, workers using contaminated ground water at the site and the surface waters nearby the site (Cedar Swamp, Cooper Lake, and Moss Branch) are all threatened by exposure to the ground-water contamination.

Soil Contamination

The soil sampling conducted in the Remedial Investigation included the collection of soil samples at various depths from a total of 49 locations at the site. The soil samples were collected to assess the extent of soil contamination in the vicinity of the former lagoons, the lagoon overflow area and the terminal truck parking lot/driveway area.

Results of the soil sampling indicate that soil with concentrations of priority pollutant inorganic and organic constituents occur in the vicinity of the lagoons, in the overflow area east of the former settling lagoons and at several locations in the gravel truck parking lot/driveway area.

Priority pollutant contaminants present at concentrations above NJDEP soil action levels at the site include volatile organics, base neutral extractable (semi-volatile) compounds and inorganic compounds. The concentrations of semi-volatiles in soil range from nondetectable levels in background areas to greater than 1,900 parts per million (ppm) in the vicinity of the former settling and aeration lagoons. Concentrations of VOCs (up to 396 ppm) (mainly solvents) and metals (mainly arsenic, lead and cadmium) in excess of NJDEP soil action levels occur in many of the same locations as elevated concentrations of semi-volatiles. Table 4 provides a summary of maximum concentrations of major contaminants detected in the soil samples.

A supplemental Remedial Investigation is being conducted by EPA to evaluate further the soil contamination in the active terminal/parking lot area and within the former aeration and settling lagoons.

Surface-Water and Sediment Contamination

The Operable Unit One Remedial Investigation included preliminary sampling and analyses of surface water and sediment from Cedar Swamp, Moss Branch and Cooper Lake. During a supplementary field effort in 1987, an electromagnetic conductivity survey was also conducted in Cedar Swamp to the southeast of the Chemical Leaman property. Both the sampling and the conductivity study suggest portions of the wetlands adjacent to the active terminal area have been contaminated by Chemical Leaman Tank Lines' past wastewater treatment/disposal practices. A separate RI/FS for Operable Unit 3 is underway to determine the nature and extent of the contamination in the wetlands area.

Summary of Site Risks

EPA conducted an Endangerment Assessment (EA) of the "no action" alternative to evaluate the potential risks to human health and the environment associated with the Chemical Leaman Tank Lines site in its current state. The EA focused on the ground-water contaminants (indicator chemicals) which are likely to pose the most significant risks to human health and the environment. These "indicator chemicals" and their concentrations in the ground water are shown in Table 5.

The residents living along Cedar Swamp Road and Oak Grove Road and workers involved in the Chemical Leaman trailer-rinsing operations at the active terminal were assumed to be two potentially exposed populations identified at the site. The contaminant pathways examined in the risk assessment were shallow/intermediate/deep subzone ground-water usage and ground-water contaminant emissions caused by the truck-rinsing operation at the Chemical Leaman property.

EPA's EA identified several potential exposure pathways by which the public may be exposed to contaminant releases from the Chemical Leaman site. These pathways and the populations potentially affected are shown in Table 6. The following exposure pathways were evaluated in the risk assessment for residents living near the site:

- Inhalation of volatilized compounds from ground water during trailer-rinsing operations

- Inhalation of and dermal contact during bathing activities with compounds detected in the shallow/intermediate subzone ground water

- Ingestion of compounds detected in shallow/intermediate subzone ground water

- Inhalation of and dermal contact during bathing activities with compounds detected in the deep subzone ground water

- Ingestion of compounds detected in the deep subzone ground water

Two exposure pathways were evaluated in the risk assessment for Chemical Leaman workers. These were:

- Inhalation of compounds detected in the ground water at the Chemical Leaman production well

- Dermal contact with compounds detected in the ground water at the Chemical Leaman production well

Exposures were likely to be different for adults and children living in the residential areas because of different behavioral patterns. For this reason, exposures were calculated separately for three age groups: children ages 2 to 6, children ages 6 to 12 and adults. Lifetime-weighted exposures were then calculated by combining exposures for all age groups in order to estimate the risk posed to an individual who might live near the site for a lifetime.

Under current EPA guidelines, the likelihood of carcinogenic (cancer causing) and noncarcinogenic effects due to exposure to site chemicals are considered separately. It was assumed that the toxic effects of the site-related chemicals would be additive. Thus, carcinogenic and noncarcinogenic risks associated with exposures to individual indicator compounds were summed to indicate the potential risks associated with mixtures of potential carcinogens and noncarcinogens, respectively.

Noncarcinogenic risks were assessed using a hazard index (HI) approach, based on a comparison of expected contaminant intakes and safe levels of intake (Reference Doses). Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects. RfDs, which are expressed in units of mg/kg-day, are estimates of daily exposure levels for humans which are thought to be safe over a lifetime (including sensitive individuals). Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) are compared with the RfD to derive the hazard quotient for the contaminant in the particular media. The hazard index is obtained by adding the hazard quotients for all compounds across all media. A hazard index greater than 1 indicates that potential exists for noncarcinogenic health effects to occur as a result of site-related exposures. The hazard index provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

The acceptable intake for subchronic exposures (AIS) and the RfDs for noncarcinogenic effects from ground-water exposure at the Chemical Leaman Tank Lines site are presented in Table 7. The hazard indices for noncarcinogenic effects from ground-water exposure are listed in Table 9. The hazard index for exposures to ground water in the shallow/intermediate subzone is 41.6, suggesting that noncarcinogenic effects may occur.

Potential carcinogenic risks were evaluated using the cancer potency factors developed by EPA for the indicator compounds. Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Risk Assessment Verification Endeavor for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to generate an upper-bound estimate of the excess lifetime cancer risk associated with exposure to the compound at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the risk highly unlikely. The CPFs for the indicator chemicals are presented in Table 8.

For known or suspected carcinogens, EPA considers excess upper bound individual lifetime cancer risks of between 1×10^{-4} to 1×10^{-6} to be acceptable. This level indicates that an individual has not greater than a one in ten thousand to one in a million chance of developing cancer as a result of exposure to site conditions. The risks associated with exposures at the site are presented in Table 9. The potential risks to residents due to carcinogens at the site are greater than the acceptable EPA risk range of 10^{-4} to 10^{-6} as defined by the National Oil and Hazardous Substances Pollution Contingency Plan.

Risks to public health include actual or potential risks to residents around the site and Chemical Leaman's workers. Residents may be impacted from the ingestion of contaminated ground water and inhalation of volatile contaminants in residential water supplies or from the trailer-rinsing operations at the site. Chemical Leaman's workers may be impacted from the inhalation of and dermal contact with contaminated ground water during trailer-rinsing operations. EPA has determined that actual or potential site-related risks warrant a remedial action for the site.

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, and/or the environment.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis
- environmental parameter measurement
- fate and transport modeling
- exposure parameter estimation
- toxicological data

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled. Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals of concern at the point of exposure. Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, EPA provides upper bound estimates of the risks to populations near the site, and is highly unlikely to underestimate actual risks related to the site.

For more specific information concerning public health risks, including quantitative evaluation of the degree of risk associated with various exposure pathways, please see the volume entitled Risk Assessment Report for Chemical Leaman Tank Lines, Inc. Superfund Site Operable Unit 1 located at EPA's information repository in the Township Clerk's Office at the Logan Township Municipal Building in Bridgeport, New Jersey.

Environmental Risks

The U.S. Fish and Wildlife Service characterizes the Chemical Leaman site and surrounding area as a Disturbed Upland Area, corresponding roughly to the Chemical Leaman terminal; Palustrine Forested Wetland, corresponding to the reach of the Great Cedar Swamp southeast of the Chemical Leaman terminal; and Palustrine Open Water Habitat, corresponding to Cooper Lake and its surrounding shoreline.

Vegetation within these areas include: various trees (crab apple, cherry, black cherry, red maple, white oak, red oak, pin oak, honey locust, black willow, southern white cedar and black oak), rose bush, broom sedge, goldenrod, dogbane, phragmites, cattail, blue vervain, poison ivy, green brier, arrowwood viburnum, water hemp, jewelweed, skunk cabbage, sensitive fern, elderberry, water lily, smooth alder, Japanese honeysuckle, arrowarum and various grasses.

Various forms of wildlife inhabit the areas surrounding the Chemical Leaman site. Representative species include: starling, red-winged blackbird, song sparrow, robin, purple finch, black and white warbler, yellow-rumped warbler, blue jay, dove, mocking bird, goldfinch, grackle, brown thrasher, white-throated sparrow, Carolina wren, house wren, tree swallow, common yellow-throat, rusty blackbird, wood duck, veery, flicker, cardinal, downy woodpecker, black duck, Canada goose, woodcock, squirrel, muskrat, skunk, rabbit, groundhog, raccoon, red fox, whitetail deer, black snake, green frog, tree frog, northern spring peeper, bull frog, box turtle, painted turtle, snapping turtle, bluegills, pumpkinseed, suckers, brown bullhead, black crappie, white crappie, minnows, carp, sunfish, catfish and bass.

In addition, Cedar Swamp and Cooper Lake provide a significant shelter for migratory bird species such as canada goose, wood duck, mallard, black duck, coot, lesser scaup and other waterfowl species.

Short-nosed sturgeon are present in the Delaware River and use the river in the vicinity of the site as a migratory corridor. The species is on the Federal Endangered and Threatened Wildlife and Plants list (Federal Register, 1983).

Endangered species suspected to inhabit the area surrounding the Chemical Leaman Site include the osprey, which was severely threatened in the 1960s but presently is recovering, the bog turtle and the eastern tiger salamander. The U.S. Department of the Interior, Fish and Wildlife Service has informed EPA that, with the exception of occasional transient species, no proposed or threatened endangered flora or fauna known to exist adjacent to the Chemical Leaman site.

Description of Alternatives

This section describes the remedial alternatives which were developed, using suitable technologies, to meet the objectives of the National Oil and Hazardous Substances Contingency Plan and the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended. These alternatives were developed by screening a wide range of technologies for their applicability to site-specific conditions and evaluating them for effectiveness, implementability and cost. A comprehensive list of remedial technologies was compiled to characterize each technology and determine its applicability to the site. The technologies remaining after preliminary screening were assembled into various combinations to form six ground-water treatment alternatives and four treated ground-water discharge alternatives in the Operable Unit One Feasibility Study. Of the six treatment combinations, only two have been retained for the proposed remediation plan. The point of discharge of the treated ground water specifies the degree of treatment which will be required. The treatment process EPA has proposed for the remediation of the contaminated ground water consists of metals precipitation, air stripping and granulated activated carbon. These technologies have traditionally proven to be effective in removing the types of contaminants present in the ground water. To meet the stringent total dissolved solids (TDS) requirements for the discharge of treated ground water into Moss Branch, a reverse osmosis process would have to be added to this treatment combination.

EPA did not propose the UV/peroxidation processes that were retained in the Operable Unit One Feasibility Study as part of the preferred treatment scenario as they have been less widely used than the above-mentioned technologies.

The treatment combinations and discharge options described separately in the Operable Unit One Feasibility Study were combined to develop comprehensive ground-water remedial alternatives. These include:

- Alternative 1: No Action with Ground-Water Monitoring
- Alternative 2: Ground-Water Extraction, Treatment and Discharge to Moss Branch

- Alternative 3: Ground-Water Extraction, Treatment and Reinjection into the Upper Aquifer

- Alternative 4: Ground-Water Extraction, Treatment and Injection into the Lower (Brine) Aquifer

- Alternative 5: Ground-Water Extraction, Treatment and Discharge to the Delaware River

Alternative 1: No Action

Construction Cost: $0
Annual Operation and Maintenance Cost: $30,000
Total Present Worth Cost: $300,000
Implementation Time: 30 years

A No Action alternative is evaluated at every Superfund site to establish a baseline for comparison with treatment remedial alternatives. Under the No Action alternative, EPA would not take any action to remediate or control the ground-water contamination at the site. The No Action alternative would consist of ground-water monitoring only. The operation and maintenance requirements include the labor and analytical services needed to conduct quarterly sampling of four on-site wells.

Alternative 2: Ground-Water Extraction, Treatment and Discharge to Moss Branch

Construction Cost: $3,289,400
Annual Operation and Maintenance Cost: $876,100
Total Present Worth Cost: $13,562,900
Implementation Time: 30 years

The major features of this alternative include: installation of ground-water extraction wells and a ground-water treatment system with discharge to Moss Branch. The extraction well network would consist of an estimated seven recovery wells with a combined pumping rate of 200 gallons per minute. Three wells would be screened in the shallow subzone, three in the upper intermediate subzone, and one in the lower intermediate subzone. The extraction gallery parameters (number of wells, well placement, pumping rate and aquifer characteristics) will be refined during the Operable Unit One Remedial Design.

This alternative was developed to produce a treated effluent that would meet the New Jersey Pollution Discharge Elimination System limitations for a discharge to Moss Branch. The extracted ground water would be pumped to a treatment system where chemical precipitation would be used to remove iron as well as heavy metals. Next, the ground water would be pumped through an air stripper to remove volatile organic compounds. The stripper off-gas would pass through a fume incinerator which would destroy the airborne volatile organic compounds. Alternatively, vapor phase carbon (VPC) or granulated activated carbon (GAC) could be utilized to capture airborne volatile organic compounds. The ground water leaving the stripper would be pumped through a granulated activated carbon system to remove residual organic contaminants. Following this treatment, the water would be passed through the reverse osmosis unit to remove dissolved solids or salts from the ground water. The waste stream produced by the reverse osmosis unit would be sent off site for treatment.

Subsequently, the treated ground water would be discharged to the Moss Branch at an estimated rate of 288,000 gallons per day via pumping or gravity flow. Minimal piping, engineering and construction would be necessary to discharge the treated ground water because Moss Branch is proximal to the site.

The final remedial goal of this alternative is to restore the quality of the ground water to the criteria published in the New Jersey Administrative Code, Title 7, Chapter 9, Subchapter 6, Section 6, Subsection (b) (N.J.A.C. 7:9-6.6 (b)), and to the Maximum Contaminant Levels (MCLs) established pursuant to the Federal and State Safe Drinking Water Acts (Table 10).

The treated ground-water discharge for this alternative would meet the limitations outlined on Table 11 which were derived from the New Jersey Pollution Discharge Elimination System (New Jersey Administrative Code Title 7, Chapter 14A (N.J.A.C. 7:14A)).

Alternative 3: Ground-Water Extraction, Treatment and Reinjection into the Upper Aquifer

Construction Cost: $1,731,000
Annual Operation and Maintenance Cost: $992,000
Total Present Worth Cost: $12,024,000
Implementation Time: 30 years

The extraction system used for this alternative would be similar to the extraction well gallery described for Alternative 2, above.

The treatment system in this alternative is similar to the one described above for Alternative 2 with the exception that reverse osmosis would not be utilized. The ground water would be treated to the levels presented in Table 10, which are also the restoration goals of the aquifer.

Due to the shallow water table, treated ground water would be re-injected into the upper aquifer's deep subzone which occurs from 100 feet to 150 feet below the ground surface. It is unlikely that the ground water could be reinjected above the deep subzone, without the water short-circuiting to the ground surface. It is envisioned that a re-injection gallery of six wells would be required, with a combined pumping rate of 200 gallons per minute. Prior to implementing this alternative, a reinjection-well pilot study would need to be conducted and a three-dimensional mathematical model would be developed to determine the effectiveness of this alternative. Due to the high iron content of the ground water, the reinjection system would require an aggressive well maintenance program to control scaling and clogging and ensure continuous operation. Each of the six wells would have a backup well to permit continuous operation during maintenance periods.

Alternative 4: Ground-Water Extraction, Treatment and Injection into the Lower (Brine) Aquifer

Construction Cost: $1,571,000
Annual Operation and Maintenance Cost: $858,000
Total Present Worth Cost: $10,593,000
Estimated Implementation Time: 30 years

The extraction system used for this alternative would be similar to the extraction well gallery described for Alternative 2 above.

The treatment in this alternative is the same as that described above for Alternative 3. The treatment requirements of Alternative 4 were conservatively estimated to be the same as those described for Alternative 3 (Table 10) despite the nonpotable nature of the ground water in the brine aquifer.

The treated ground water would be pumped into the brackish, lower aquifer located below the upper water table-aquifer at approximately 170 feet below the ground surface. This aquifer is separated from the three subzones of the upper aquifer by a regionally extensive clay and silt layer approximately 30 feet thick. The geophysical logs from deep wells in this aquifer indicate that the aquifer is composed of sands which could be suitable material for injection. An injection gallery of five wells (and five backup wells for use during maintenance periods) would be required, with a combined pumping rate of 200 gallons per minute. Unlike Alternative 3, injected water surfacing above ground is not a concern. As a result, each of the Alternative 4 wells could be operated at a higher pumping rate resulting in the need for one less well and one less backup well than required for Alternative 3. Alternative 4 would also require an aggressive well maintenance schedule as described in Alternative 3. The difference in costs between Alternatives 3 and 4 is attributed to the difference in the number of re-injection wells and the associated costs of long-term operation and maintenance of these wells.

Alternative 5: Ground-Water Extraction, Treatment and Discharge to the Delaware River

Construction Cost: $2,480,000
Annual Operation and Maintenance Cost: $320,000
Total Present Worth Cost: $5,420,000
Implementation Time: 30 years

The extraction system used for this alternative would be similar to the extraction well gallery described for Alternative 2, above.

Although the Delaware River discharge criteria have not been provided to date, the treatment in this alternative is assumed to be the same as that described for Alternative 3. The final goal of the alternative is to attain the published N.J.A.C. 7:9-6.6 (b) criteria, and the MCLs established pursuant to the Federal and State Safe Drinking Water Acts in the aquifer at the end of the remediation (Table 10).

The treated ground-water discharge for this alternative must meet limitations derived by the N.J.A.C. 7:14A. The NJDEP in conjunction with the Delaware River Basin Commission would generate the discharge limitations for this alternative prior to the Remedial Design.

The discharge from the treatment system would be pumped approximately three miles north of the site to the Delaware River. The route of a pipeline from the on-site treatment facility would be westward along Route 44 to Route 322 and then northerly to the river. The New Jersey Department of Transportation would require the installation of a "carrier pipe" to house the pipeline transmitting the treated ground water. This pipeline may be sized for excess capacity to accommodate a potential future treated ground-water flow from the Bridgeport Rental and Oil Service Superfund site, if required. This would allow for a combined resolution of the treated discharges from the Chemical Leaman and Bridgeport Rental and Oil Services sites. Property easements or procurements would be required, as well as the approval of New Jersey Department of Transportation. In addition, the New Jersey Department of Environmental Protection will issue a permit for discharge to the Delaware River. The permit requirements will be developed by the New Jersey Department of Environmental Protection in accordance with the

Delaware River Basin Commission requirements. The lower cost of this alternative compared with the reinjection alternatives is attributed to the lower costs associated with operating and maintaining the pipeline versus the reinjection systems.

Summary of Comparative Analysis of Alternatives

In accordance with the National Contingency Plan, a detailed analysis of each remedial alternative is conducted with respect to each of nine detailed evaluation criteria. All selected remedies must at least attain the Threshold Criteria. The Selected Remedy should provide the best trade-offs among the Primary Balancing Criteria. The Modifying Criteria were evaluated following the public comment period.

Threshold Criteria

Overall Protectiveness of Human Health and the Environment - This criterion evaluates the adequacy of protection that the remedy provides while describing how risks are eliminated, reduced or controlled through treatment, engineering controls, and/or institutional controls.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) - This criterion addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of other Federal and State environmental statutes and/or provide grounds for invoking a waiver.

There a several types of ARARs: action-specific, chemical-specific and location-specific. Action-specific ARARs are technology or activity-specific requirements or limitations related to various activities. Chemical-specific ARARs are usually numerical values which establish the amount or concentrations of a chemical that may be found in, or discharged to, the ambient environment. Location-specific requirements are restrictions placed on the concentrations of hazardous substances or the conduct of activities solely because they occur in a special location.

Primary Balancing Criteria

Reduction of Toxicity, Mobility or Volume - This criterion addresses the anticipated treatment performance of the remedy.

Short-Term Effectiveness - This criterion addresses the period of time required to achieve remedial goals and the risks to human health and the environment during the remedial action.

Long-Term Effectiveness and Permanence - This criterion evaluates the magnitude of residual risk and the ability of the remedy to maintain reliable protection of human health and the environment over time once remedial goals have been attained.

Implementability - This criterion examines the technical and administrative feasibility of executing a remedy, including the availability of materials and services needed to implement the chosen solution.

Cost - This criterion includes the capital and operation and maintenance costs of the remedy.

Modifying Criteria

State Acceptance - This criterion indicates whether, based on its review of the Remedial Investigation and Feasibility Study, Risk Assessment, Feasibility Study Addendum and Proposed Plan, the State of New Jersey concurs with, opposes, or has no comment on the Selected Remedy.

Community Acceptance - This criterion evaluates the reaction of the public to the remedial alternatives and EPA's Proposed Plan. Comments received during the public comment period and EPA's responses to those comments are summarized in the Responsiveness Summary attached to this document.

Analysis

Overall Protection of Human Health and the Environment

Alternative 1 would not be protective of human health and the environment since contaminants would remain in the aquifer and continue to migrate uncontrolled through uncontaminated portions of the aquifer. Alternatives 2, 3, 4 and 5 would provide adequate protection of human health by eliminating, reducing and controlling risk through extraction and treatment of the ground water and meeting respective discharge standards.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Chemical-specific ARARs - The applicable requirements under Federal and State environmental laws for ground-water remediation within the aquifer at the site are contained in the promulgated portions of N.J.A.C. 7:9-6.6 (b) and the MCLs established pursuant to the Federal and State Safe Drinking Water Acts (Table 10).

With the exception of Alternative 1, each of the alternatives incorporating ground-water treatment alternatives will attain the environmental regulatory standards. Compliance of ground-water treatment with applicable ARARs was assessed by qualitatively comparing required effluent quality with the best estimate of performance for each treatment option.

The contaminated ground water would be extracted and treatment would continue until the MCLs, established pursuant to Federal and State Safe Drinking Water Acts, and the New Jersey Water Pollution Control Act, are met in the aquifer. Alternatives 2 and 5 discharge would meet New Jersey Pollution Discharge Elimination System limitations for Moss Branch and the Delaware River, respectively.

Location-specific ARARs - Alternatives 2, 3, 4 and 5 may involve construction within regulated land areas. As result, all construction activities would have to comply with the Wetlands Protection Act and the Floodplain Management Act.

Activity-specific ARARs - Construction of Alternatives 2, 3, 4 and 5 would be in compliance with State and Federal ARARs governing the construction of the extraction/treatment/discharge systems and the off-site treatment and/or disposal of waste streams.

Long-Term Effectiveness and Permanence

Alternative 1 is not effective in the long or short term. Alternatives 2, 3, 4 and 5 would be effective in permanently controlling and reducing the concentration of ground-water contaminants migrating from the Chemical Leaman site once these alternatives are implemented, and should maintain their effectiveness for the expected duration of the remedial action. The treatment and discharge components of the alternatives would require maintenance to preserve their effectiveness. The surface-water discharge alternatives would require less maintenance than the ground-water injection alternatives.

Reduction of Toxicity, Mobility, or Volume Through Treatment

With the exception of Alternative 1, each alternative would reduce toxicity, mobility or volume of the contamination in the aquifer. The recovery of ground water for treatment would effect a reduction in contaminant mobility by preventing further migration of the contaminants. The toxicity and volume of contaminants in the ground water would be reduced via treatment, although the extent of overall toxicity and volume reduction would depend on the treatment process used.

Alternatives 2, 3, 4 and 5 would all attain Federal and State Safe Drinking Water Acts MCLs and N.J.A.C. 7:9-6.6 (b) in the ground water at the end of the remedial action.

Short-Term Effectiveness

During construction of the extraction and treatment systems, no short-term reduction of contaminants in the ground water would be afforded until system start-up and operation had commenced. Since the extraction and treatment systems would be located in a site area in which disturbance of soil during construction should not increase site-related risk, construction should not be a threat to Chemical Leaman's workers. Over the long term, the ground-water extraction/treatment systems would significantly reduce contaminant concentrations in the ground water. Each of the treatment-based alternatives utilize air strippers. The exhaust from these units would be directed to fume incinerators or other systems (e.g., VPC or GAC) where organic compounds would be destroyed or captured.

Short-term risks borne by the community and workers during implementation of ground-water extraction and treatment systems would be minimal, resulting from the transport of residuals off site for disposal or further treatment (e.g., metals-containing sludge and spent granulated activated carbon). In general, the discharge alternatives would cause minimal short-term effects on human health and the environment. The pipeline to the Delaware River would run through some populated areas, which may cause short-term disruptions to the community, such as construction noise, presence of construction equipment and debris, and construction dust. These construction related disruptions would be short-term and minimized as much as possible.

With the exception of the No Action alternative, implementation of each alternative is estimated to take approximately three years. This time frame reflects a one-year pre-design period to pilot the ground-water treatment and reinjection operations, a one-year design phase, and a one-year period to construct the treatment facility and pipelines or reinjection system.

Implementability

There is sufficient area on site for construction of the extraction and treatment systems proposed. In general, the technologies and equipment associated with treatment of the ground water are reliable and have proven performance. Reverse osmosis (Alternative 2), however, has been less widely used than the other technologies for long-term, full-scale applications and would require intensive operation and maintenance. Pilot studies would be required to define the ground-water treatment system's design and operating parameters for Alternatives 2, 3, 4 and 5. The actual installation of the extraction and treatment systems should not pose unusual problems, as the equipment for these systems is commercially available.

The technologies and equipment associated with discharge to surface water are reliable and have proven performance. These surface water discharge alternatives should be easy to construct. Construction of the pipeline to the Delaware River through flood-prone areas or wetlands, however, may be complicated due to permit requirements and restrictions by NJDEP. In addition, approval of organizations which have authority over the Delaware River and State highways would be required for the Delaware River discharge alternative.

The technology for constructing and operating injection wells is well known and, therefore, this discharge alternative should be fully implementable. However, the presence of high iron concentrations in the aquifer would promote the scaling and clogging of the injection wells. An aggressive maintenance program must be performed for these injection systems to operate continually. Due to the uncertainties of the hydrogeological setting and a high water table (Alternative 3), the reinjection alternatives may be somewhat less reliable than the surface-discharge alternatives. As a result, the reinjection alternatives would require the conduct of a pilot study and development of a three-dimensional model to confirm the effectiveness of these alternatives prior to design.

Cost

The total present worth of the remedial alternatives are:

- Alternative 1: $300,000
- Alternative 2: $13,562,900
- Alternative 3: $12,024,000
- Alternative 4: $10,593,000
- Alternative 5: $5,412,000

The primary constituents of the Alternative 1 costs are sample collection and analysis. Alternative 2 costs are primarily attributed to ground-water treatment with 40 percent ($5,429,900) of the costs associated with long-term operation and maintenance of the reverse osmosis unit. Approximately thirty percent ($3,300,000) of Alternatives 3 and 4 costs are associated with ground-water treatment. The remaining costs ($8,724,000 and $7,293,000, respectively) are attributed to construction of the reinjection systems and long-term operation and maintenance of the systems. The Alternative 5 costs consist of ground-water system construction and treatment ($3,300,000) and operation and maintenance of the pipeline ($2,112,000) to the Delaware River.

State Acceptance

Based on consideration of the criteria above and comments from the public, the State of New Jersey concurs with the selection of Alternative 5, Ground-Water Extraction, Treatment and Discharge to the Delaware River. Alternative 5 was presented in the Proposed Plan as the preferred alternative.

Community Acceptance

The objective of the community relations activities was to inform the public about the work being performed at the site and to seek input from the public on the remedy. Issues raised at the public meeting and during the public comment period are addressed in the Responsiveness Summary section of this Record of Decision.

Selected Remedy

After careful consideration of all reasonable alternatives, EPA has selected **Alternative 5: Ground-Water Extraction, Treatment and Discharge to the Delaware River** for the Operable Unit One remediation of the Chemical Leaman site. This alternative was chosen because it would rely on well proven technologies to remediate the contaminated ground water to attain Maximum Contaminant Levels established pursuant to Federal and State Safe Drinking Water Act and standards promulgated in N.J.A.C. 7:9-6.6 (b). The treated ground water would be discharged in accordance with the N.J.A.C. 7:14A. The Selected Remedy is technically implementable, will permanently reduce contaminant toxicity, mobility and volume of contaminants in the aquifer, is cost-effective, and will be protective of human health and the environment.

This alternative will require the approval of the New Jersey Department of Transportation, Delaware River Basin Commission and local municipalities and authorities to transport and discharge the treated ground water to the Delaware River. Rights-of-way, easements and other off-site property access agreements must be obtained during the conduct of the Operable Unit One Remedial Design. In determining the specific route of the pipeline to the Delaware River, EPA will consider minimizing adverse impacts to the community. The present worth cost of **Alternative 5** is estimated at $5,420,000. The cost estimate for this alternative may be revised to reflect the necessary treatment required to meet the N.J.A.C. 7:14A discharge limitations when they are developed, and to include the cost of attaining easements and permits for the pipeline. A detailed cost analysis is presented in Table 12.

The Selected Remedy would appear to provide the best balance of trade-offs among the alternatives with respect to the criteria that EPA uses to evaluate alternatives.

Additional studies will be required as part of the Remedial Design and Remedial Action activities for the remediation of the contaminated ground water. These studies include:

- Sampling and analysis of perimeter monitoring wells to determine whether migration of contaminants since the last round of sampling in 1989 has resulted in increased contaminant concentrations further away from the source areas.

- Delineation of the extent of the contaminant plume within each of the ground-water subzones beneath the site and obtaining additional information on aquifer characteristics and local hydrogeology. Techniques for these purposes would include, but would not limited to, ground-water flow modeling, additional monitoring wells and aquifer pump tests.

- Treatability studies to define the design and operating parameters of the ground-water treatment system.

- A wetlands assessment to delineate impacts associated with remedial activities.

- An assessment to delineate the boundary of the 500-year floodplain in the area affected by the remedial action (c.f., Executive Order 11988).

- A cultural resource assessment in compliance with the National Historic Preservation Act.

- A determination to assure that the remedial action complies with applicable regulations of the N.J. Coastal Management Program.

- Pilot testing of initial extraction wells emplaced during the remedial action to obtain more information on aquifer response to ground-water extraction and to monitor the effectiveness of the recovery system.

- An emissions study to fulfill NJDEP permit equivalency requirements and to develop contingency plans to reduce the possibility of potential impacts on nearby residents and Chemical Leaman employees caused by the operation of the air stripper.

- Ongoing perimeter monitoring throughout the remedial action. This monitoring program will minimize the potential for off-site impacts. The program will include effluent monitoring to assure compliance with discharge ARARs.

Statutory Determinations

EPA's selection of **Alternative 5** complies with the requirements of Section 121 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended.

Overall Protection of Human Health and the Environment

The alternative is protective of human health and the environment. It would achieve substantial risk reduction through treatment of the of the contaminated ground water, the principal threat to human health at the site. Cancer exposure levels would be reduced to within the acceptable range of 10^{-4} to 10^{-6} and hazard Indices for noncarcinogens will be reduced to less than one. The implementation of the Selected Remedy will pose no unacceptable risks to human health or the environment.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

The ARARs identified for the ground-water remediation are those published in N.J.A.C. 7:9-6.6 (b) and the MCLs under both the Federal and State Safe Drinking Water Acts. **Alternative 5**, at a minimum, will achieve these required concentrations in the aquifer by the end of the remedial action. The ground-water extraction system will meet the requirements of the Water Supply Management regulations, N.J.A.C. 7:19 et seq.

Air stripping will be done in conformance with state and federal air emission standards. EPA will conduct a permit equivalency process to fulfill the requirements of the promulgated NJDEP air pollution regulations as provided in N.J.A.C. 7:27-8.1 et seq. and N.J.A.C. 7:27-17.1 et seq.

The on-site implementation of the Operable Unit One remedy will meet the requirements of laws and regulations regarding wetlands, floodplains and stream encroachment.

The treated ground-water discharge will meet all requirements necessary for discharge into the Delaware River as provided in the New Jersey Water Pollution Control Act regulations, N.J.A.C. 7:14A-1 et seq. as developed in conjunction with the Delaware River Basin Commission requirements.

All off-site waste disposal will comply with the Resource Conservation and Recovery Act, 42 U.S.C. §6901 et seq., as amended, and will be consistant with the EPA's Off-site Policy.

The off-site implementation of the selected remedy will require compliance with laws and regulations regarding wetlands, floodplains and stream encroachment.

Cost-Effectiveness

The Selected Remedy is cost-effective since it achieves ground-water remediation goals at approximately half the cost of the other remedial alternatives considered.

Utilization of Permanent Solution and Alternative Treatment to the Maximum Extent Practicable

Alternative 5 utilizes available treatment technologies to the maximum extent necessary to provide a permanent solution to the ground-water contamination problem at the Chemical Leaman site. Its implementation will significantly reduce toxicity, mobility and/or volume of the contaminants found in the ground water at the Chemical Leaman site. The remedial action in **Alternative 5** will provide both long-term and short-term effectiveness. Furthermore, the alternative is implementable and cost-effective. It provides the best balance of trade-offs among the alternatives with respect to the evaluation criteria.

Preference for Treatment as a Principal Element

The Selected Remedy, which consists of extraction and treatment of the contaminated ground water with discharge to the Delaware River, is preferred because it addresses one of the principal threats posed by the site, ground-water contamination, in a cost-effective and efficient manner.

The Selected Remedy meets the statutory requirement to utilize permanent solutions and treatment technologies to the maximum extent practicable.

Documentation of Significant Changes

There have been no significant changes in the selected ground-water remedy from the preferred ground-water remedy described in the Proposed Plan.

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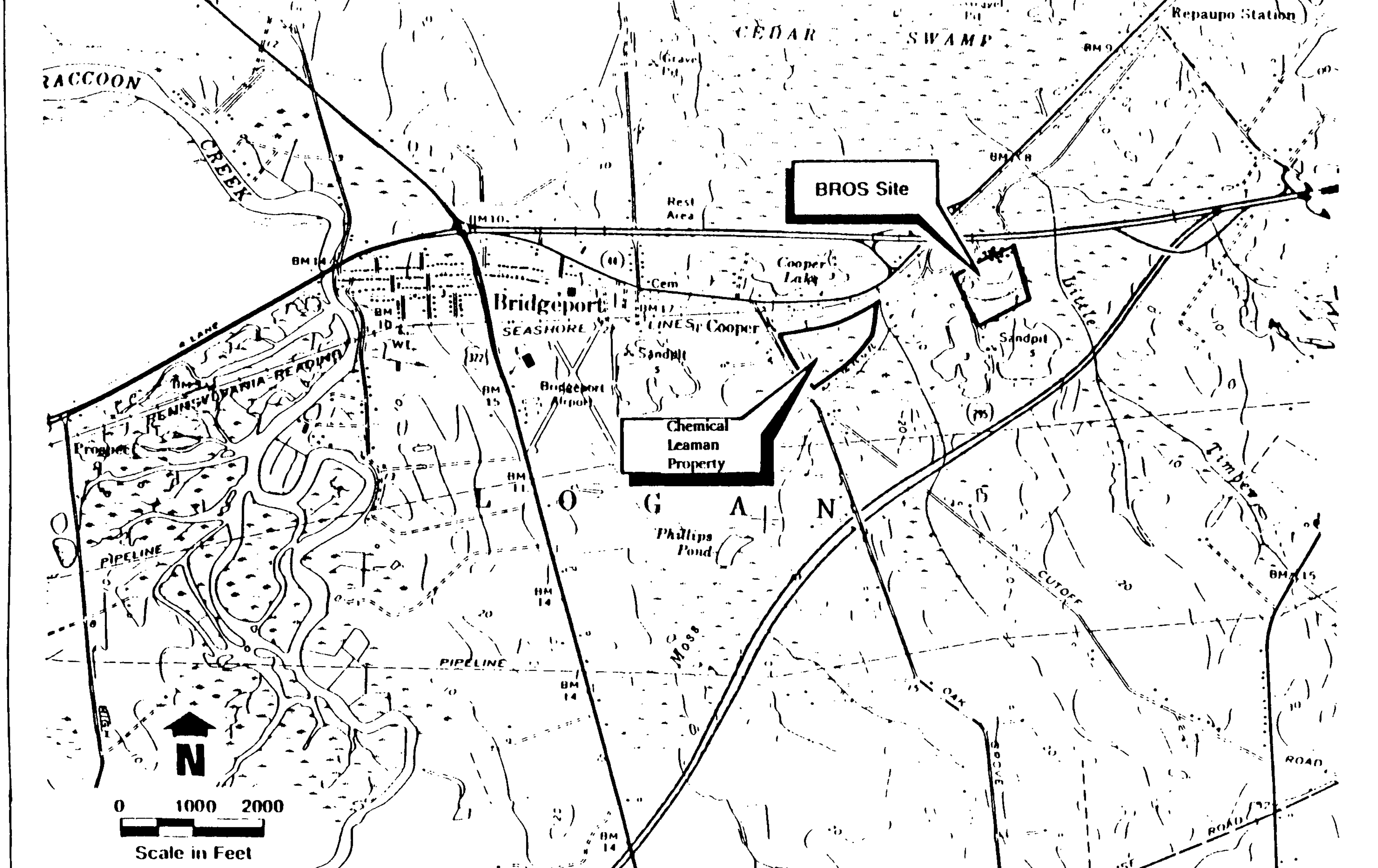
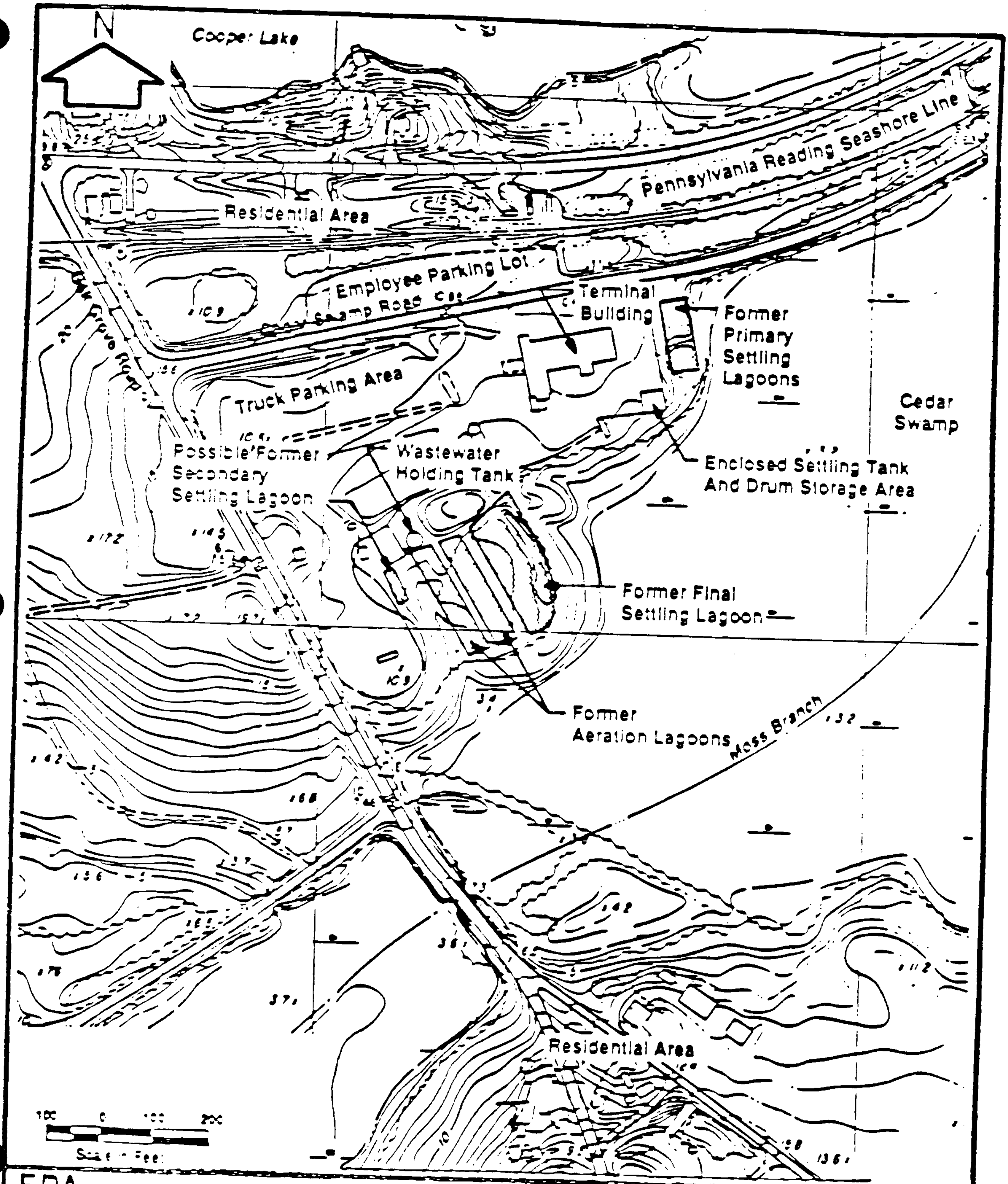
Figure 1

Chemical Leaman Site Location Map



Source: U.S.G.S Topographic Quadrangle; Bridgeport, NJ-PA



EPA Figure 2

Environmental Protection Agency

CDM

Camp Dresser & McKee

Chemical Leaman Tank Lines Site Map

Figure 3
Locations of Residential Wells in the Vicinity of the Chemical Leaman Property Included in the Monthly EPA Monitoring

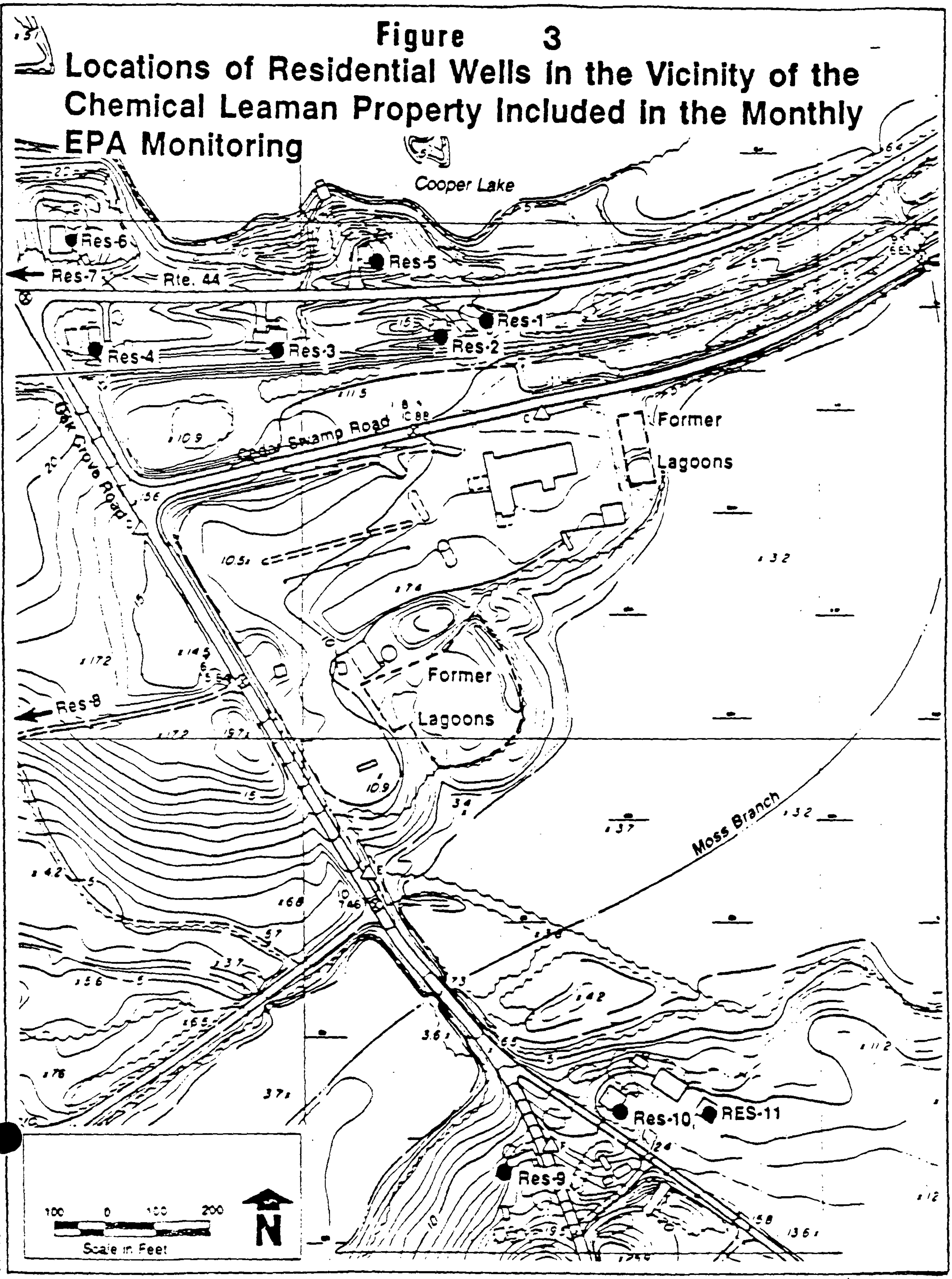


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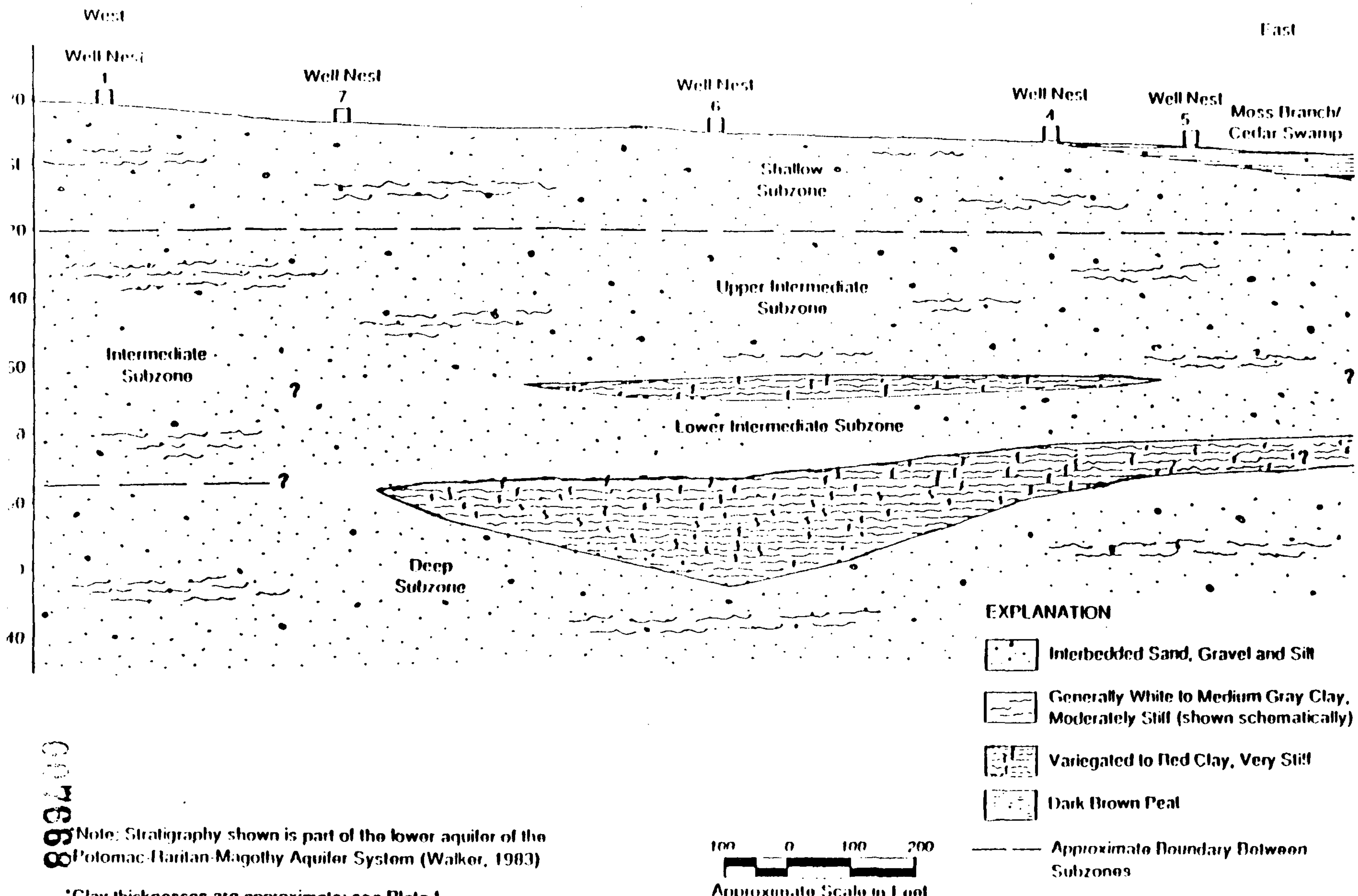
Figure 4

Schematic Geologic Cross Section
Showing the Various Water Bearing Subzones Beneath the CLTL Site



Note: Stratigraphy shown is part of the lower aquifer of the Potomac-Raritan-Magothy Aquifer System (Walker, 1983)

*Clay thicknesses are approximate; see Plate I

TABLE 1

Hazardous Materials Transported by Chemical Leaman Tank Lines, Inc.

Allyl alcohol
2-sec-Butyl-4,6,-dinitrophenol
p-Chloroaniline
Ethylenediamine
Acrylic Acid
Aniline
Benzene
n-Butyl alcohol
Chlorobenzene
Chloroethene
Chloroform
Chloromethane
2-Chlorophenol
Creosote
Cresols
Cresylic acid
Cumene
Cyclohexane
Di-n-Butyl phthalate
1,2-Dichlorobenzene
1,1-Dichloroethene
Diethyl phthalate
Dimethylamine
Dimethylcarbamoyl chloride
1,1-Dimethyl hydrazine
Dimethyl phthalate
Tetrachloromethane
Toluenediamine
Toxaphene
1,1,2-Trichloroethane
Urethane
2,3-Dinitrophenol
2,4-Dinitrotoluene
Di-n-Octyl phthalate
Dipropylamine
Ethyl acetate
Ethyl acrylate
Ethyl ether
Ethyl methacrylate
Formaldehyde
Formic acid
Furfural
Hydrazine
Isobutyl alcohol
Maleic anhydride
Maleic hydrazine
Methanol
Methyl ethyl ketone (MEK)
Methyl isobutyl ketone
Naphthalene
Nitrobenzene
Paraldehyde
Phenol
Phthalic anhydride
N-Propylamine
Pyridine
1,1,1,2-Tetrachloroethane
Toluene
Toluene diisocyanate
Tribromomethane
Trichloroethene
Xylene

TABLE 2

Chemical Leaman-Related
Ground-Water Contaminants
Detected in the Potomac-Raritan Aquifer

Shallow Subzone

Methylene chloride
Chloroform
Benzene
Vinyl chloride
Tetrachloroethene
Ethylbenzene
1,1,2-trichloroethane
1,2-dichlorobenzene
1,4-dichlorobenzene
Di-n-butylphthalate
n-nitrosodiphenylamine
2-chloronaphthalene
bis(2-ethylhexyl) phthalate
Chloroethane
Endosulfan 1
DDE
Arsenic
Beryllium
Copper
Mercury
Zinc
Trans-1,2-dichloroethene
Trichloroethene
Toluene
1,2-dichloroethane
Chlorobenzene
1,1-dichloroethene
1-2-dichloropropane
1,3-dichlorobenzene
Naphthalene
Diethyl phthalate
1,2,4-trichlorobenzene
Butyl benzyl phthalate
Phenols
2,4-dimethylphenol
Endosulfan sulfate
Heptachlor
DDT
Chromium
Lead
Nickel

Intermediate Subzone

Methylene chloride
Chloroform
Benzene
Vinyl chloride
Tetrachloroethene
Ethylbenzene
1,2-dichloropropane
1,2-dichlorobenzene
1,4-dichlorobenzene
Diethyl phthalate
Phenol
Dimethyl phthalate
2,4-dimethylphenol
Trans-1,2-dichloroethene
Trichloroethene
Toluene
1,2-dichloroethane
Chlorobenzene
1,1-dichloroethene
Fluorotrichloromethane
1,3-dichlorobenzene
Naphthalene
n-nitrosodiphenylamine
Isophorone
Nitrobenzene
2,4-dichlorophenol

TABLE 2 (continued)

Chemical Leaman-Related
Ground-Water Contaminants
Detected in the Potomac-Raritan Aquifer

Intermediate Subzone (continued)

4-nitrophenol	2-nitrophenol
Alpha BHC	Delta BHC
DDT	Endosulfan 1
DDE	Arsenic
Antimony	Beryllium
Chromium	Copper
Lead	Mercury
Nickel	Silver
Zinc	Phenols

Deep Subzone

Trans-1,2-dichloroethene	Toluene
Alpha BHC	DDT
Arsenic	Chromium
Copper	Lead
Mercury	Nickel
Zinc	Phenols

Residential Wells

Benzene	Chlorobenzene
1,2-dichloroethane	Chloroform
1,1-dichloroethylene	1,2-dichloropropane
Trans-1,2-dichloroethylene	Methylene chloride
Tetrachloroethylene	Toluene
Trichloroethylene	Vinyl chloride
2-butanone	

TABLE 3

Summary of Major Contaminant Concentrations From the Ground-Water Monitoring Wells

Contaminants	Maximum detected concentration (ppb)		
	Shallow	Intermediate	Deep
Volatile Organic Compounds			
Trans-1,2-dichloroethene	15,000	69,000	20
Trichloroethene	1,100	4,800	--
Vinyl chloride	8900	5,200	--
1,2-dichloroethane	1400	1,200	--
Methylene chloride	20	100	--
Chloroform	30	20	--
Benzene	290	300	--
Tetrachloroethene	830	160	--
Chlorobenzene	600	200	--
Toluene	310	200	40
Semi-volatile Organic Compounds			
1,2-dichlorobenzene	410	1,800	--
Naphthalene	2,500	520	--
Metals			
Arsenic	190	1,230	--
Chromium	690	100	60
Lead	650	3,500	--
Zinc	68,500	5,840	--

TABLE 4

Maximum Priority Pollutant Concentrations Detected in Soil Samples

Contaminant	Concentration (ppm)
Volatile Organic Compounds	
Trichloroethene	290
Chlorobenzene	53
Ethylbenzene	17
Tetrachloroethene	16
Trans-1,2-dichloroethene	10
Toluene	9
Semi-volatile Organic Compounds	
1,2-dichlorobenzene	220
Naphthalene	301
Bis(2-ethyl hexyl)phthalate	1,020
Butyl benzyl phthalate	639
N-nitrosodiphenylamine	88
Metals	
Lead	838
Arsenic	453
Cadmium	36
Zinc	1,320

Table 5

Indicator Chemicals

EXPOSURE MEDIA	INDICATOR	SHORT TERM CONCENTRATION (PPM)	LONG TERM CONCENTRATION (PPM)
GROUND WATER (shallow/intermediate subzones)	Trichloroethene	4.00E+00	4.30E-01
	trans-1,2 Dichloroethene	6.90E+01	3.97E+00
	Vinyl chloride	8.90E+00	1.00E-01
	Benzene	1.00E-01	1.05E-02
	1,2-Dichlorobenzene	1.00E+00	1.16E-01
	Arsenic	1.23E+00	5.64E-02
	Lead	3.50E+00	1.14E-01
	Zinc	6.85E+01	2.41E+00
	1,2-Dichloroethane	1.40E+00	7.67E-02
GROUND WATER (Deep subzone)	Trichloroethene	0.00E+00	0.00E+00
	trans-1,2-Dichloroethene	2.00E-02	3.96E-03
	Vinyl chloride	0.00E+00	0.00E+00
	Benzene	0.00E+00	0.00E+00
	1,2-Dichlorobenzene	0.00E+00	0.00E+00
	Arsenic	9.00E-03	5.33E-03
	Lead	1.10E-02	3.21E-03
	Zinc	1.7E+00	2.77E-01
	1,2-Dichloroethane	0.00E+00	0.00E+00
GROUND WATER CLTL Production well	Trichloroethene		4.05E-02
	trans-1,2-Dichloroethene		6.10E-02
	Vinyl chloride		4.26E-04
	Benzene		8.52E-04
	1,2-Dichlorobenzene		0.00E+00
	Arsenic		Not volatile
	Lead		Not volatile
	Zinc		Not volatile
	1,2-Dichloroethane		6.39E-04

Table 6

ROUTES OF EXPOSURE USED IN CALCULATION OF INTAKES

POPULATION	ROUTES OF DERMAL EXPOSURE	ROUTES OF INHALATION INTAKE	ROUTES OF INGESTION EXPOSURE
Adult	o Dermal contact with ground water while bathing	o Volatilization of compounds into the air from ground water while bathing o Volatilization of compounds into air from CLTL production well during trailer rinsing operation	o Ingestion of ground water as potable water supply
Children Age 2-6	o Dermal contact with ground water while bathing	o Volatilization of compounds into the air from ground water while bathing o Volatilization of compounds into air from CLTL production well during trailer rinsing operation	o Ingestion of ground water as potable water supply
Children Age 6-12	o Dermal contact with ground water while bathing	o Volatilization of compounds into the air from ground water while bathing o Volatilization of compounds into air from CLTL production well during trailer rinsing operation	o Ingestion of ground water as potable water supply
Adult (Workers)	o Dermal contact with CLTL production well water while rinsing trailers	o Volatilization of compounds into air from CLTL production well during trailer rinsing operation	Not Applicable

Table 7

Acceptable Intake for Subchronic Exposures (AIS) and Reference Doses (RfD) for the Indicator Chemicals (mg/kg/day)

Chemical	AIS (mg/kg/day)	RfD (mg/kg/day)
trans-1,2-Dichloroethene	2.00×10^{-1} 2.00×10^{-1} (1)	2.00×10^{-2} 2.00×10^{-2} (1)
1,2-Dichlorobenzene	4.00×10^{-1} 9.00×10^{-1} (1)	4.00×10^{-2} 9.00×10^{-2} (1)
Zinc	2.00×10^{-1} (1)	2.00×10^{-1} (1)

(1) Oral/dermal exposures

Table 8

Carcinogenic Potency Factors (CPF) for Indicator Chemicals
1/(mg/kg/day)

Chemicals	CPF 1/(mg/kg/day) Inhalation	Oral/Dermal
Trichloroethene	1.30×10^{-2}	1.10×10^{-2}
Vinyl Chloride	2.95×10^{-1}	2.3×10^{0}
Benzene	2.90×10^{-2}	2.90×10^{-2}
Arsenic	5.00×10^{-1}	1.80×10^{0}
1,2-Dichloroethane	9.10×10^{-2}	9.10×10^{-2}

Table 9

SUMMARY OF THE RISKS ASSOCIATED WITH
THE CLTL BRIDGEPORT, NJ TERMINAL

CONDITIONS	DESCRIPTION	LIFETIME WEIGHTED CARCINOGENIC RISK *
Resident	Ambient air from the ground water from the CLTL production well used for trailer rinsing.	6E-07
	Groundwater from the shallow/intermediate subzones used for bathing and drinking purposes	**6E-02**
	Groundwater from the deep subzone used for bathing and drinking purposes	**3E-04**
Worker	Ambient air from the groundwater from the CLTL production well used for trailer rinsing (inhalation and dermal contact)	1E-04

		LIFETIME WEIGHTED NONCARCINOGENIC HAZARD INDEX**	SUBCHRONIC NONCARCINOGENIC HAZARD INDEX**
Resident	EXPOSURES EXCLUDING DEEP GROUNDWATER SUBZONE	**Total 4.16E+01**	**1.15E+02**
	trans-1,2-dichloroethene	**4.07E+01**	**9.65E+01**
	1,2-dichlorobenzene	5.53E-01	**1.13E+00**
	zinc	3.09E-01	**1.17E+01**
	lead	***	***
	EXPOSURES TO DEEP GROUNDWATER SUBZONE	Total 9.93E-02	4.67E-01
	trans-1,2-dichloroethene	4.06E-02	2.80E-02
	1,2-dichlorobenzene	0	0
	zinc	3.55E-02	4.39E-01
	lead	***	***
Worker	trans-1,2-dichloroethene	2.90E-01	NA
	1,2-dichlorobenzene	0	NA
	zinc	4.87E-05	NA
	lead	***	NA

Bold values indicate that the calculated risk is greater than EPA's acceptable ranges.
Carcinogenic recommended guidelines - 1.00E-04 to 1.00E-07 (EPA)
Hazard Index - less than one (EPA)

* Indicators evaluated: trichloroethene, vinyl chloride, arsenic, benzene and 1,2-dichlorobenzene
** Indicators evaluated: trans-1,2-dichloroethene, 1,2-dichlorobenzene, zinc and lead
*** EPA has withdrawn the reference dose for lead for reconsideration. The hazard index for lead could not be evaluated. This does not imply an absence of health risk due to lead exposure at the CLTL site.
NA = Not Applicable

TABLE 10

Aquifer Restoration Criteria

Compound	Ground Water Quality (ug/l)	ARAR (ug/l)	Source
Aldrin/Dieldrin	ND	0.003	1
Ammonia	ND	500	1
Arsenic and compounds	1230	50	3
Barium	ND	1000	1
Benzene	300	1	2
Benzidine	ND	0.1	1
Beryllium	7	-	-
Bis (2-ethylhexyl) phthalate	820	-	-
Butyl benzyl phthalate	780	-	-
Cadmium and compounds	ND	10	1
Carbon tetrachloride	ND	2	2
Chemical Oxygen Demand	742,000	-	-
Chlordane	ND	0.5	2
Chlorobenzene	600	4	2
Chloride	ND	250,000	1
Chromium and compounds	690	50	1
Coliform Bacteria	ND	-	3
Color	ND	1 NTU	3
Copper	290	1000	1
Corrosivity	ND	Noncorrosive	3
Cyanide	ND	200	1
DDT and metabolites	ND	0.001	1
Dibutyl phthalate	30	-	-
m-dichlorobenzene	1800	600	1
p-dichlorobenzene	40	75	3
o-dichlorobenzene	ND	600	3
1,2-dichloroethane	1400	2	2
1,1-dichloroethene	20	-	-
1,1-dichloroethylene	ND	2	2
trans-1,2-dichloroethylene	69,000	10	2
2,4-dichlorophenoxyacetic acid	ND	100	3
1,2-dichloropropane	670	-	-
Diethyl phthalate	50	-	-
Dimethyl phthalate	20	-	-
Ethylbenzene	ND	0.1	4
Endosulfan	0.25	-	-
Endrin	ND	0.004	1
Fluoride	ND	2000	3

TABLE 10 (continued)

Aquifer Restoration Criteria

Compound	Ground Water Quality* (ug/l)	ARAR (ug/l)	Source
Foaming agents	ND	50	3
Gross alpha activity	ND	15 pCi/l	3
Gross beta activity	ND	50 pCi/l	3
Heptachlor	0.06	-	-
Hydrogen sulfide	ND	50	3
Iron	186,000	300	3
Lead and compounds	3500	15	6
Lindane	0.05	0.2	5
Manganese	4400	50	3
Mercury and compounds	ND	2	3
Methoxychlor	ND	100	3
Methylene chloride	100	2	2
Naphthalene	2500	-	-
Nickel	160	13.4	2
Nitrate-nitrogen	ND	10,000	1
Nitrobenzene	70	-	-
N-nitrosodiphenylamine	1050	-	-
Odor	ND	3**	3
pH	ND	5 - 9	1
Phenol	ND	300	1
Polychlorinated biphenyls	ND	0.001	1
Radionuclides	ND	-	3
Radium	ND	5 pCi/l	3
Selenium and compounds	ND	10	3
Silver and compounds	ND	50	3
Sodium	ND	50,000	1
Strontium	ND	8 pCi/l	3
Sulfate	ND	250,000	1
2,4,5-TP Silvex	ND	10	3
Tetrachloroethene	830	-	-
Tetrachloroethylene	ND	1	2
Toluene	ND	2000	3
Total Dissolved Solids	732,000	500,000	1
Total Hardness as $CaCO_3$	153,000	-	-
Total Organic Carbon	120,000	-	-
Toxaphene	ND	0.005	4

TABLE 10 (continued)

Aquifer Restoration Criteria

Compound	Ground Water Quality* (ug/l)	ARAR (ug/l)	Source
Trichlorobenzene	ND	8	2
1,2,4-trichlorobenzene	110	-	-
Trichloroethene	4800	-	-
Trichloroethylene	ND	1	2
Trihalomethanes	ND	100	3
Tritium	ND	20 nCi/l	3
Turbidity	ND	-	3
1,1,1-trichloroethane	ND	26	2
Vinyl chloride	8900	2	3
Xylenes	ND	10	5
Zinc and compounds	68,500	5000	1

* Maximum concentration detected during the ERM investigation.
** Threshold Odor Number.

ARAR - Applicable or relevant and appropriate requirement.
ND - Not detected during the ERM investigation.
NTU - Nephelometric Turbidity Unit.
pCi/l - picoCuries per liter.
nCi/l - nanoCuries per liter.
$CaCO_3$ - Calcium carbonate.

1. N.J.A.C. 7:9-6.6(b).
2. N.J.A.C. 7:10-5, N.J.A.C. 7:10-7, A-280.
3. 40 CFR 141, 40 CFR 143.
4. N.J.A.C. 7:14A-6.15(e)2.
5. Proposed MCL; FR Volume 54; Published May 22, 1990.
6. USEPA Memorandum from Henry L. Longest and Bruce M. Diamond to Patrick M. Tobin concerning Cleanup Level for Lead in Ground Water.

TABLE II
EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS
CHEMICAL LEAMAN TANK LINES (CLTL)

Receiving Stream: Moss Branch — Low Flow (7Q10): 0.6 cfs

Water Classification: FW2-NT — Treatment System Design Flow: 0.445 cfs (288,000 gpd)

POLLUTANT PARAMETER	EFFLUENT LIMITATIONS AVERAGE	EFFLUENT LIMITATIONS MAXIMUM	DISCHARGE COMPLIANCE LEVEL (1)	MONITORING REQUIREMENTS FREQUENCY	MONITORING REQUIREMENTS SAMPLE TYPE
CONVENTIONAL AND NON-CONVENTIONAL					
Flow, MGD	NL	NL	N/A	Continuous	
Total Organic Carbon (TOC), mg/l (lb/d)	NL	25 (60)	N/A	Weekly	Composite
% TOC Removal	90 Min. (2)	---	N/A	Weekly	Composite
Total Suspended Solids (TSS) mg/l (lb/d)	13.5 (32.5)	27 (65)	N/A	Weekly	Composite
Total Dissolved Solids (TDS) mg/l, (lb/d)	47.5 (114)	95 (228)	N/A	Weekly	Composite
Dissolved Oxygen, mg/l	4.0 Min.	---	N/A	Weekly	Grab
pH, Standard Unit (S.U.)	6.0 Min.	9.0	N/A	Weekly	Grab
Petroleum Hydrocarbons, mg/l (3)	10	15	N/A	Weekly	Grab
Iron, Total mg/l (lb/d)	1.5 (3.6)	3 (7.2)	N/A	Weekly	Composite
METALS					
Antimony, Total ug/l (lb/d)	11.5 (0.0276)	23 (0.0552)	N/A	Weekly	Composite
Arsenic, Total ug/l (lb/d)	16.5 (0.0396)	33 (0.0793)	N/A	Weekly	Composite
Beryllium, Total ug/l (lb/d)	0.0084 (0.00002)	0.017 (0.00004)	0.2	Weekly	Composite
Chromium, Hexavalent, ug/l (lb/d)	7 (0.0168)	14 (0.0336)	N/A	Weekly	Composite
Chromium, Total ug/l (lb/d)	16.5 (0.0396)	33 (0.0793)	N/A	Weekly	Composite
Copper, Total ug/l (lb/d)	5 (0.012)	10 (0.0240)	N/A	Weekly	Composite
Lead, Total ug/l (lb/d)	1.24 (0.00298)	2.49 (0.00598)	N/A	Weekly	Composite
Mercury, Total ug/l (lb/d)	0.008 (0.000019)	0.016 (0.000039)	0.2	Weekly	Composite
Nickel, Total ug/l (lb/d)	74 (0.178)	148 (0.355)	N/A	Weekly	Composite
Silver, Total ug/l (lb/d)	1.7 (0.00408)	3.4 (0.00817)	N/A	Weekly	Composite
Zinc, Total ug/l (lb/d)	34 (0.0824)	69 (0.165)	N/A	Weekly	Composite

TABLE II (cont.)

POLLUTANT PARAMETER	EFFLUENT LIMITATIONS AVERAGE	EFFLUENT LIMITATIONS MAXIMUM	DISCHARGE COMPLIANCE LEVEL (1)	MONITORING REQUIREMENTS FREQUENCY	MONITORING REQUIREMENTS SAMPLE TYPE
VOLATILE ORGANIC					
Benzene, ug/l (lb/d)	0.186 (0.000447)	0.373 (0.000896)	0.2	Weekly	Grab
Chlorobenzene, ug/l (lb/d)	15 (0.036)	28 (0.0673)	N/A	Weekly	Grab
Chloroethane, ug/l (lb/d)	104 (0.25)	268 (0.643)	N/A	Weekly	Grab
Chloroform, ug/l (lb/d)	7 (0.0169)	14 (0.0338)	N/A	Weekly	Grab
1,2-Dichloroethane, ug/l (lb/d)	0.361 (0.000867)	0.724 (0.00174)	N/A	Weekly	Grab
1,1-Dichloroethylene, ug/l (lb/d)	6 (0.0144)	12 (0.0288)	N/A	Weekly	Grab
1,2-Dichloropropane, ug/l (lb/d)	153 (0.368)	230 (0.552)	N/A	Weekly	Grab
Ethylbenzene, ug/l (lb/d)	32 (0.0769)	108 (0.259)	N/A	Weekly	Grab
Methylene chloride, ug/l (lb/d)	3 (0.00721)	6 (0.0144)	N/A	Weekly	Grab
Tetrachloroethylene, ug/l (lb/d)	0.5 (0.0012)	1.0 (0.0024)	N/A	Weekly	Grab
Toluene, ug/l (lb/d)	26 (0.0625)	80 (0.192)	N/A	Weekly	Grab
t-1,2-Dichloroethene, ug/l (lb/d)	21 (0.0504)	54 (0.130)	N/A	Weekly	Grab
1,1,2-Trichloroethane, ug/l (lb/d)	17 (0.0408)	34 (0.0817)	N/A	Weekly	Grab
Trichloroethylene, ug/l (lb/d)	1.5 (0.0036)	3.0 (0.0072)	N/A	Weekly	Grab
Vinyl chloride, ug/l (lb/d)	0.103 (0.000247)	0.207 (0.000497)	0.18	Weekly	Grab
SEMI-VOLATILE ORGANIC					
1,2-Dichlorobenzene, ug/l (lb/d)	77 (0.185)	163 (0.392)	N/A	Weekly	Grab
1,3-Dichlorobenzene, ug/l (lb/d)	31 (0.0745)	44 (0.106)	N/A	Weekly	Grab
1,4-Dichlorobenzene, ug/l (lb/d)	15 (0.036)	28 (0.0673)	N/A	Weekly	Grab
Dibutyl Phthalate, ug/l (lb/d)	27 (0.0649)	57 (0.137)	N/A	Weekly	Grab
Diethyl Phthalate, ug/l (lb/d)	81 (0.195)	203 (0.488)	N/A	Weekly	Grab
Dimethyl Phthalate, ug/l (lb/d)	19 (0.0456)	47 (0.113)	N/A	Weekly	Grab
N-Nitrosodiphenylamine, ug/l (lb/d)	6.2 (0.0149)	12.4 (0.0298)	N/A	Weekly	Grab
1,2,4-Trichlorobenzene, ug/l (lb/d)	29 (0.0697)	58 (0.139)	N/A	Weekly	Grab
Butylbenzyl Phthalate, ug/l (lb/d)	N/A	8 (0.019)	N/A	Weekly	Grab
Bis(2-ethylhexyl Phthalate), ug/l (lb/d)	2.2 (0.00528)	4.4 (0.0106)	2.5	Weekly	Grab
Isophorone, ug/l (lb/d)	N/A	30 (0.072)	N/A	Weekly	Grab
Nitrobenzene, ug/l (lb/d)	15 (0.036)	30 (0.072)	N/A	Weekly	Grab
Phenol, ug/l (lb/d)	15 (0.036)	26 (0.0625)	N/A	Weekly	Grab

TABLE II (cont.)

POLLUTANT PARAMETER	EFFLUENT LIMITATIONS AVERAGE	EFFLUENT LIMITATIONS MAXIMUM	DISCHARGE COMPLIANCE LEVEL (1)	MONITORING REQUIREMENTS FREQUENCY	MONITORING REQUIREMENTS SAMPLE TYPE
SEMI-VOLATILE ORGANIC (Continued)					
2,4-Dichlorophenol, ug/l (lb/d)	39 (0.0937)	112 (0.269)	N/A	Weekly	Grab
2,4-Dimethylphenol, ug/l (lb/d)	18 (0.0432)	36 (0.0865)	N/A	Weekly	Grab
Total Nitrophenols, ug/l (lb/d)	65 (0.156)	131 (0.315)	N/A	Weekly	Grab
Heptachlor, ug/l (lb/d)	0.00026 (0.0000006)	0.00052 (0.0000012)	1.9	Weekly	Grab
DDT, ug/l (lb/d)	0.00033 (0.0000007)	0.00066 (0.0000015)	0.012	Weekly	Grab
Endosulfan, ug/l (lb/d)	0.0185 (0.0000444)	0.0371 (0.0000891)	N/A	Weekly	Grab
				Weekly	Grab
DDE, ug/l (lb/d)	0.00022 (0.0000005)	0.00044 (0.000001)	0.004	Weekly	Grab
alpha-BHC, ug/l (lb/d)	0.00365 (0.0000087)	0.00732 (0.0000175)	0.003	Weekly	Grab
Naphthalene, ug/l (lb/d)	22 (0.0528)	59 (0.142)	N/A	Weekly	Grab
2-Chloronaphthalene, ug/l (lb/d)	N/A	60 (0.144)	N/A	Weekly	Grab
Chronic Toxicity	NOEC ≥ 43% Min.	N/A		See Pages 2 and 3 of 10 Pages	

NOEC = No Observable Effect Concentration

(1) Where specified, the Discharge Compliance Level (DCL) shall be used for purposes of determining discharge compliance. When the average and maximum effluent limitations are less than the DCL, the discharge must be less than or equal to the DCL to be considered in compliance with both limitations. When only the average limitation is less than the DCL, the discharge will be considered in compliance with both limitations if it is in compliance with the maximum effluent limitation.

(2) Required only when the influent TOC is above 250 mg/l.

(3) And no visible sheen.

(*) Information supplied by NJDEP.

TABLE 12

Detailed Cost Estimate of Alternative 5: Ground-Water Extraction, Treatment and Discharge to the Delaware River

Item	Cost ($)
Construction	
Extraction/Treatment System	
Extraction Wells, Chemical Precipitation, Air Stripping (with Fume Incineration), and Granular Activated Carbon, Mobilization, Installation and Start-up, Contingency, Engineering and Administrative Costs	
Discharge System	
Effluent Transfer Pump, Piping and Valves, Mobilization, Installation and Start-up, Contingency, Engineering and Administrative Costs	
Total Capital Cost	2,480,000
Annual Operation and Maintenance	
Extraction/Treatment System	
Extraction Wells, Chemical Precipitation, Air Stripping (with Fume Incineration), and Granular Activated Carbon	
Discharge System	
Energy, Man-Hours, Maintenance, Contingency	
Total Annual Operation and Maintenance Cost	313,000
Present Worth Operation and Maintenance (30 Years)	
Extraction/Treatment System	
Extraction Wells, Chemical Precipitation, Air Stripping (with Fume Incineration), and Granular Activated Carbon, Contingency	
Discharge System	
Energy, Man-Hours, Maintenance, Contingency	
Total Present Worth Operation and Maintenance	2,940,000
Cost Summary	
Total Capital Cost	
Total Present Worth Operation and Maintenance	
Total Present Worth	5,420,000

RESPONSIVENESS SUMMARY

RECORD OF DECISION - OPERABLE UNIT ONE

CHEMICAL LEAMAN TANK LINES

I. Introduction

The Chemical Leaman Tank Lines site, located in Logan Township, New Jersey, consists of an active terminal used for the dispatching, storage, maintenance and cleaning of tanker trucks and trailers; fallow farmland adjacent to the terminal; and wetlands bordering the terminal to the southeast. Past wastewater handling and disposal practices at the facility have resulted in organic and inorganic contamination of soil, ground water and the adjacent wetlands. The site was placed on the National Priorities List of uncontrolled hazardous waste sites in 1985. A Remedial Investigation and Feasibility Study were completed for the site in July 1990.

In accordance with the U.S. Environmental Protection Agency's (EPA's) community relations policy and guidance and the public participation requirements of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, the EPA Region II office established a public comment period from July 15, 1990 to August 14, 1990, to obtain comments on the Proposed Plan for the site.

On July 24, 1990, EPA held a public meeting to receive public comments on the Proposed Plan. Copies of the Proposed Plan were distributed at the meeting and placed in the information repositories for the site.

The Responsiveness Summary, required by the Superfund Law, provides a summary of citizens' comments and concerns identified and received during the public comment period, and EPA's responses to those comments and concerns. Section II of this document presents a summary of the significant questions and comments expressed by the public at the public meeting in regard to the proposed remedy selection. Each question or comment is followed by EPA's response. It is noted that EPA received no written comments regarding remedy selection during the public comment period. All comments expressed to EPA were considered in EPA's final decision for selecting the remedial alternative for addressing the ground-water contamination.

Attached are three appendices. Appendix A contains the Proposed Plan for the ground-water remedy. Appendix B contains the sign-in sheet of attendees at the public meeting. Appendix C contains the public notice issued to the Gloucester County Times, and printed on July 13, 1990, announcing the public comment period and availability of the Remedial Investigation and Feasibility Study and the Proposed Plan for public review.

II. Summary of Public Comments and EPA Response

This section contains questions and comments expressed at the July 24, 1990 public meeting.

1. **A representative of the Gloucester County Health Department asked whether a public water supply would be provided to a residence where the well was contaminated with volatile organics, and when that decision would be made.**

   EPA Response: During the public meeting, EPA indicated that a referral had recently been made to EPA's Removal Action Branch to evaluate extending the Bridgeport water line to affected or threatened residences south and west of the Chemical Leaman property. Subsequent to the public meeting, an Action Memorandum was signed on August 29, 1990, authorizing an additional four homes, which have contaminated well water or may be threatened by the contaminated ground-water plume, to be connected to the municipal water line.

2. **Several meeting attendees asked whether the proposed ground-water remediation for the Chemical Leaman site would be similar to the one in operation at the Bridgeport Rental and Oil Services (BROS) facility and, if so, whether the sites could utilize the same treatment facility and share costs.**

   EPA Response: The ground-water remediation planned at the Chemical Leaman site is a long-term effort, estimated to take 30 years. Currently, at the BROS site, contaminated rain water in the lagoon is being withdrawn, treated and discharged to a nearby stream. This effort is considered short-term and will end once all of the lagoon water is removed. The long-term remediation of the contaminated ground water at the BROS site will not begin for several years.

   Although some of the contaminants affecting the sites are similar, in general, the principal types of chemical contaminants are different for each site. The contamination at the BROS site is characterized as waste oils and related materials. At the Chemical Leaman site, the contamination consists of a wide variety of organic and inorganic substances. This contamination resulted from past wastewater treatment/disposal activities at the facility where wastewater was generated from tanker-truck cleaning operations. Distinct treatment processes, and hence separate treatment facilities, would be required to remediate effectively, the different types of contaminants in the ground water at each site. It is possible that Chemical Leaman and BROS may combine their treated ground-water discharge at some point in the future. That option would be considered further as part of the long-term, ground-water remediation for the BROS site. If such an option is feasible, EPA would determine how to allocate pipeline costs for the discharge between the two sites.

3. **A resident asked whether the ground-water extraction activities at the Chemical Leaman site could pull in contamination from the BROS site.**

   EPA Response: Geologic studies have indicated that there is a ground-water divide between the two sites. The natural ground-water flows are in opposite directions. Also, in designing ground-water extraction systems, an effort is made to capture contaminated ground water efficiently and minimize the quantity of clean or extraneous water collected. Although the Chemical Leaman and BROS sites are relatively near to each other (approximately 3000 feet apart), they are not so close whereby the extraction of ground water from one site would draw contaminated ground water from the other site.

4. **Several residents asked whether the treated ground water in the pipeline could mix with the public water supply.**

   EPA Response: The water in the public water system pipeline is under pressure, so if there were a leak in the water supply line, water would escape from the pipe, rather then other substances infiltrating the line. In addition, the pipeline transmitting the treated ground water to the Delaware River would be encased in a carrier pipe (in accordance with New Jersey Department of Transportation requirements) as a precaution to prevent any leakage or release.

5. **A resident asked why the treated water could not be transported to the Delaware River by trucks as opposed to a pipeline.**

   EPA Response: Due to the estimated daily quantity (nearly 300,000 gallons) of water to be extracted, treated and discharged, EPA believes that a pipeline is the most reliable and effective means of transporting the treated ground water. It is estimated that approximately 50 trucks per day would otherwise be required.

6. **Several meeting attendees were concerned about the proposed route of the pipeline, specifically, how Main Street in Bridgeport might be affected, since the roadway has been recently refurbished and repaved.**

   EPA Response: EPA is aware that the community does not want

Main Street excavated, as it has just been improved and resurfaced. The proposed plan is to transport treated water to the Delaware River via Route 44 and Route 322. As a preliminary effort, in response to the local residents concern, EPA tasked its contractor to identify alternative routes for the pipeline. During the Remedial Design phase, these and other routes will be explored in more detail. The Record of Decision states that in determining the final route of the pipeline to the Delaware River, EPA will consider minimizing adverse impacts to the community. As is customary at all Superfund sites, EPA will keep the public informed of the progress of the remedial activities, specifically regarding the determination of the pipeline route, as well as other issues of interest.

7. **Two residents asked why, as alternatives to the proposed discharge route along Route 44 and Route 322, the treated ground water could not be discharged to the Delaware River either via a pipeline through Cedar Swamp, or directly through natural drainage via Little Timber Creek.**

EPA Response: The State would have some restrictions on discharges through wetlands, especially since transporting water through Cedar Swamp would be a potentially long-term (30-year) disturbance to the wetlands.

The Delaware River has a greater assimilative capacity than the Little Timber Creek because it is a much larger body of water. The treated water would mix with the river water more readily and have less of an impact, than if it were discharged into the creek. The State has indicated that if Little Timber Creek or other smaller streams were to be the point of discharge, the treatment requirements would be more stringent. These treatment requirements would result in higher treatment costs, which would be similar to those for Alternative 2 (Discharge to Moss Branch) in the Proposed Plan. If a smaller stream other than the Delaware River were to be used as the point of discharge, it would be most practical to utilize Moss Branch, which is adjacent to the site and, therefore, would not necessitate the need for a pipeline of considerable length.

APPENDIX A

Chemical Leaman Tank Lines, Inc. Site

Logan Township, New Jersey

EPA

Region 2 — July 1990

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan describes the preferred option for remediating contaminated ground water originating from the Chemical Leaman Tank Lines, Inc. (CLTL) site in Logan Township, New Jersey. This document is issued by the United States Environmental Protection Agency (EPA), the lead agency for site activities, and the New Jersey Department of Environmental Protection (NJDEP), the support agency. EPA, in consultation with NJDEP, will select the final ground-water remedy for this site only after the public comment period has ended and information submitted during this time has been reviewed and considered.

THE COMMUNITY'S ROLE IN THE SELECTION PROCESS

EPA is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended by the Superfund Amendments and Reauthorization Act of 1986. This proposed plan summarizes information that can be found in greater detail in the Remedial Investigation (RI) report, Feasibility Study (FS), Feasibility Study Addendum, Risk Assessment and other documents contained in the administrative record file for this site. EPA and NJDEP encourage the public to review these documents in order to gain a more comprehensive understanding of the site and Superfund activities that have been conducted there. The administrative record file contains the information upon which the selection of the response action will be based. The file is available at the following locations:

Logan Township Municipal Building
Township Clerk's Office
73 Main Street
Bridgeport, New Jersey 08014
(609) 467-3424

Hours: M-F: 8:30am-4:00pm

and

U.S. Environmental Protection Agency
26 Federal Plaza, Room 2900A
New York, New York 10278

Hours: M-F: 9:00am-5:00pm

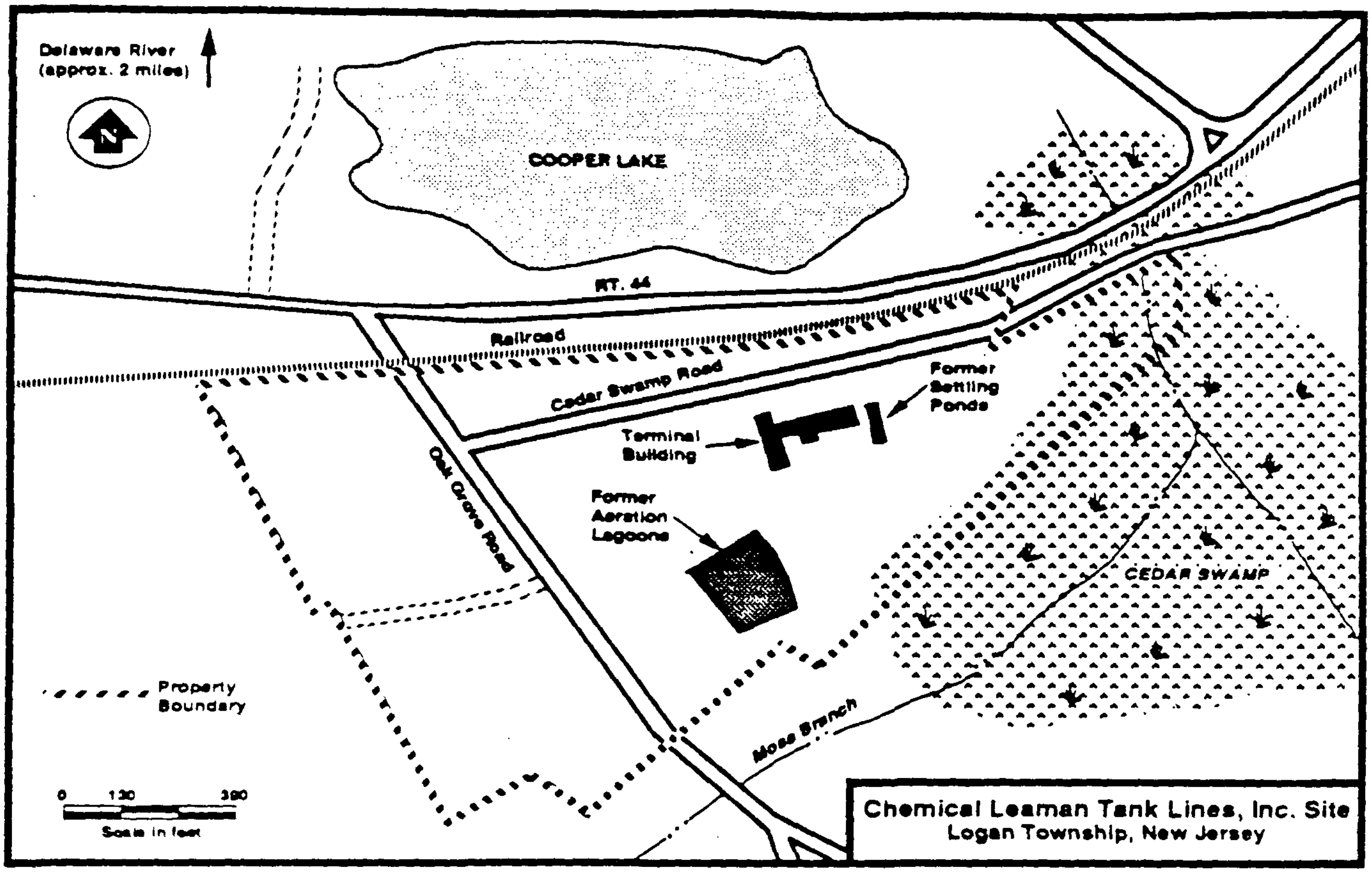
EPA, in consultation with the NJDEP, may modify the preferred alternative or select another response action presented in this Proposed Plan and the Feasibility Study or Feasibility Study Addendum based on new information or public comments. Therefore, the public is encouraged to review and comment on all of the alternatives identified in this document.

DATES TO REMEMBER

July 15, 1990 - August 14, 1990
Public comment period for contaminated ground-water preferred remedy

Tuesday July 24, 1990
7:00pm - 9:00pm
Public meeting at:

Logan Township Municipal Building
73 Main Street
Bridgeport, New Jersey 08014



EPA solicits input from the community on the cleanup methods proposed for each Superfund response action. EPA has set a public comment period from July 15, 1990 through August 14, 1990, to encourage public participation in the selection of the contaminated ground-water remedy for the CLTL site. The comment period includes a public meeting at which EPA will discuss the RI, Risk Assessment, FS, FS Addendum, Proposed Plan, answer questions, and accept both oral and written comments.

The public meeting for the CLTL site is scheduled for July 24, 1990, from 7:00pm to 9:00pm, and will be held at Logan Township Municipal Building, 73 Main Street, Bridgeport, New Jersey 08014.

Comments will be summarized and responses provided in the Responsiveness Summary section of the Record of Decision. The Record of Decision will be the document that presents EPA's final selection for the ground-water cleanup. To send written comments or obtain further information, contact:

Craig De Biase
Project Manager
U.S. Environmental Protection Agency
26 Federal Plaza, Room 720
New York, New York 10278

All comments must be postmarked on or before August 14, 1990 for consideration of inclusion in the Record of Decision Responsiveness Summary.

SITE BACKGROUND

The CLTL Bridgeport terminal is located in Logan Township, Gloucester County, New Jersey, approximately two miles south of the Delaware River and one mile east of the town of Bridgeport (see Site Location Map). The site consists of an active terminal used for the dispatching, storage, maintenance and cleaning of tanker trucks and trailers; fallow farmland adjacent to the terminal; and wetlands bordering the terminal to the southeast. The CLTL terminal has been in operation since the early 1960s. Past wastewater handling and disposal

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practices at the CLTL site have resulted in organic and inorganic contamination of soil, ground water and the adjacent wetlands.

Prior to 1975, wastewater generated in the washing and rinsing operations was impounded in a series of seven unlined settling and/or aeration lagoons and subsequently discharged to the adjacent wetlands. In 1975, the lagoons were taken out of service when CLTL was required to install a wastewater containment system at the terminal. In 1977, liquid and sludge in the settling lagoons were removed prior to backfilling with clean fill and construction debris. The aeration lagoons were drained, but no lagoon materials were removed prior to backfilling. In 1982, CLTL excavated visible sludge and contaminated soil from the former settling lagoons to an approximate depth of twelve (12) feet below the surface, and the excavation was backfilled with clean sand.

In 1980-81, NJDEP documented volatile organic contamination in the ground water beneath the CLTL site, as well as in neighboring private wells. In 1981, CLTL conducted a hydrogeologic investigation to determine the extent of the ground-water contamination. Twenty-five (25) monitoring wells were installed, and between 1981 and 1983, these wells were sampled on a quarterly basis.

In 1985, EPA included the CLTL site on the National Priorities List of Superfund sites when it was recognized that CLTL-related ground-water contamination in a number of residential wells posed an immediate threat to human health and the environment. An Administrative Order on Consent between EPA and CLTL was signed in July 1985 pursuant to which CLTL agreed to conduct a Remedial Investigation and Feasibility Study (RI/FS) to delineate the nature and extent of site-related contamination in the ground water, soils and surface water at the CLTL site.

In June 1989, EPA determined that the draft RI/FS documents prepared by CLTL were incomplete and inappropriate for public release and for preparing a Record of Decision (ROD) for the CLTL site. Consequently, EPA withdrew the studies from CLTL on June 15, 1989, and proceeded to revise the RI/FS and Risk Assessment documents unilaterally. EPA developed the FS Addendum to present a more complete description of CLTL-related contamination in the ground water and alternative methods which could be used to remediate the ground water.

SUMMARY OF THE REMEDIAL INVESTIGATION

The objectives of the RI were to: characterize the nature and extent of contamination associated with the CLTL site, identify off-site contamination and its impact on the environmental and public health, and determine the need for remedial measures to mitigate the impact of the site on public health and the environment. These objectives were met by examining all available information regarding the CLTL site and by performing field investigations to gather additional information.

The following tasks were accomplished during the RI:

- Pre-existing geological, geophysical, hydrogeological and chemical information were reviewed and evaluated;
- A hydrogeologic field investigation was conducted which included: the installation of 21 ground-water monitoring wells to define the site geology; 4 water-level studies to determine the direction of ground water flow; and an aquifer pump test to define the hydrologic characteristics of the aquifer and determine the effects of pumping on ground-water flow beneath the site;
- Collection and analysis of ground-water samples from on-site and off-site monitoring wells and residential wells to characterize the nature and extent of ground-water contamination;
- Collection and analysis of surface-water and sediment samples from Moss Branch and Cooper Lake; and,
- Collection of soil samples at various depths from a total of 49 locations at the CLTL site. The soil samples were collected to assess the extent of soil contamination in the vicinity of the lagoons, the lagoon overflow area and the terminal truck parking lot/driveway area.

The findings of the RI were:

- Analyses of vertical hydraulic gradients at the CLTL site indicated a downward component of ground-water flow;

- Ground-water sampling indicated that site-related contaminants are concentrated in the shallow and intermediate subzones. The highest concentration of contaminants in these subzones was detected in the vicinity of the former wastewater lagoons. Deep subzone wells in other areas of the site have detected elevated levels of site-related contaminants. Ground-water contaminants include volatile and semi-volatile organic compounds, as well as metals;

- Solvents, including trichloroethene, trans-1,2-dichloroethene, and other volatile organic compounds (VOCs), are the contaminants present at highest concentrations in ground water. The VOC concentration in the shallow subzone ranges from undetectable levels to greater than 22,000 parts per billion (ppb); the VOC concentration in the intermediate subzone exceeds 75,000 ppb; VOCs detected in the deep subzone include trans-1,2-dichloroethene (20,000 ppb) and toluene (40,000 ppb);

- Metals concentrations in the shallow subzone include chromium (1930 ppb), copper (2060 ppb), cadmium (180 ppb), arsenic (860 ppb), lead (1880 ppb), nickel (1220 ppb) and zinc (9760). Metals concentrations in the intermediate subzone include chromium (100 ppb), arsenic (165 ppb), lead (3500 ppb) and zinc (3300 ppb);

- The extent of the contaminated ground-water plume is estimated to be 1000 feet long by 1000 feet wide in the shallow subzone; 1100 feet long by 1700 feet wide in the intermediate subzone; and 600 feet long by 500 feet wide in the deep subzone;

- Concentrations of arsenic, cadmium, copper, lead, mercury and zinc were detected above appropriate Ambient Water Quality Criteria (AWQC) in Cedar Swamp. Concentrations of zinc exceeded AWQC in Moss Branch and concentrations of zinc and copper were observed to exceed AWQC in Cooper Lake; and,

- Results of the soil sampling indicate that soil with concentrations of inorganic and organic constituents above background levels occurs in the vicinity of the lagoons, in the overflow area east of the former settling lagoons and at several locations in the gravel truck parking lot/driveway area.

SCOPE AND ROLE OF OPERABLE UNITS

As is the case with many Superfund sites, the contamination at CLTL is complex and extensive; it consists of a wide range of chemicals emanating from several source areas. The contaminants are present in soils, sludges, sediments, surface water and ground water. The complexity of such a situation necessitates addressing the contamination in discrete phases, referred to as operable units. Ground water was selected as the first operable unit of this multi-phase remedy because the nature and extent of its contamination are better understood, the remedy can be promptly implemented and it will reduce the most significant risk to public health, while alternatives for source remediation are being evaluated. EPA's preferred alternative for the first operable unit focuses on the remediation of ground-water contamination.

The second operable unit will focus on contamination in the former lagoon source areas. Since available data obtained during the RI were limited, EPA is currently conducting a supplemental assessment in the former lagoon areas to define the nature and extent of soils and sludge contamination. This information will be used to evaluate appropriate alternatives for soil and sludge remediation. EPA is planning to complete this effort during the next year.

The third operable unit will address surface water and sediment contamination in Cooper Lake, Moss Branch and the wetlands adjacent to the site.

SUMMARY OF SITE RISKS

An endangerment assessment was conducted by EPA to determine the baseline risk attributable to the ground-water contamination originating from the CLTL site. The assessment began by selecting indicator compounds which would be representative of the site risks. Then environmental fate and transport mechanisms were evaluated for each of the nine indicator compounds which were identified for the site. Several contaminated ground-water exposure pathways were examined for residents living near CLTL:

1) Inhalation of volatilized compounds from the contaminated ground water (i.e., CLTL production well) during trailer rinsing operations;

2) Inhalation of and dermal contact with CLTL-related ground-water contaminants during bathing activities; and

3) Ingestion of CLTL-related ground-water contaminants.

Lifetime-weighted carcinogenic and non-carcinogenic risks are estimated by assuming that a potential residential ground-water user will ingest, inhale or come in contact with the ground-water contaminants on a regular basis for 70 years.

The lifetime-weighted carcinogenic risk to residents using contaminated ground water is calculated to be 6 x 10^{-2}. There are, however, no residents currently utilizing contaminated ground water which would result in a calculated risk of 6 x 10^{-2}. This value exceeds EPA's acceptable levels. Ingestion and inhalation of vinyl chloride and ingestion of arsenic detected in the ground water generate most of the cancer risk. Long-term non-carcinogenic risks are presented as a Hazard Index. The Hazard Index to residents using contaminated ground water is calculated to be 42. A Hazard Index of greater than 1 is considered to exceed the maximum recommended exposure.

Two exposure pathways were examined for CLTL workers. These were inhalation of and dermal contact with CLTL-related ground-water contaminants detected in the on-site production well during trailer rinsing operations. The lifetime-weighted cancer risk to workers due to contact with contaminants present in ground water from the CLTL production well is 1 x 10^{-4} assuming that no protective equipment is utilized by workers. Workers in the truck-rinsing areas, however, use protective equipment which would reduce this risk significantly.

Both carcinogenic and non-carcinogenic risks associated with CLTL-related ground-water contaminants exceed EPA's recommended guidelines for protection of human health. If remediation of the ground water is not conducted, elevated carcinogenic and non-carcinogenic risks will remain and further releases of contaminants into the surrounding environment will occur. The proposed remedy will achieve Maximum Contaminant Levels, established pursuant to Federal and State Safe Drinking Water Acts (i.e., drinking water standards), in the aquifer. Acceptable carcinogenic and non-carcinogenic risks will be achieved as a result of the implementation of the proposed remedy.

SUMMARY OF ALTERNATIVES

As part of the FS process, numerous remedial technologies were initially screened on the basis of effectiveness, implementability and cost. Following the remedial technology screening, five ground-water treatment alternatives and four treated ground-water discharge alternatives were considered for further evaluation.

This Proposed Plan presents the treatment and discharge alternatives described in the FS report as combined alternatives. The treatment and discharge components of these alternatives are numbered to correspond with the alternatives presented in the FS report. It is noted that all of the alternatives, with the exception of the No Action alternative, include the same extraction well system design.

Alternative 1: No Action

Construction Cost: $0
Annual Operation and Maintenance Cost: $30,000
Total Present Worth Cost: $300,000
Implementation Time: 30 years

The No Action alternative would consist only of ground-water monitoring. The operation and maintenance (O&M) requirements include the labor and analytical services needed to conduct quarterly sampling of four on-site wells. A No Action alternative is evaluated at every site to establish a baseline for comparison.

Alternative 2: Ground-Water Extraction, Treatment and Discharge to Moss Branch

Construction Cost: $3,289,400
Annual Operation and Maintenance Cost: $876,100
Total Present Worth Cost: $13,562,900
Implementation Time: 30 years

The extraction well network would consist of an estimated seven recovery wells with a combined pumping rate of 200 gallons per minute. Three wells would be screened in the shallow subzone, three in the upper intermediate subzone, and one in the lower intermediate subzone.

The treatment system for this alternative is presented in the FS report as Treatment Alternative 15. This alternative was specifically developed to produce a treated effluent to meet the stringent surface-water standards for discharge to Moss Branch. The extracted ground water would be pumped to a treatment system where chemical precipitation would be used to remove iron as well as heavy metals. Next, the ground water would be pumped through an air stripper to remove VOCs. The stripper off-gas would pass through a fume incinerator which would destroy the airborne VOCs. The ground water leaving the stripper would be pumped through a granulated activated carbon (GAC) system to remove residual organic contaminants. Following this treatment, the water would be passed through the reverse osmosis (RO) unit to remove dissolved solids or salts from the ground water. The waste stream produced by the RO unit would be sent off site for treatment.

Ground water treated on site would be discharged to the Moss Branch at a rate of 288,000 gallons per day via pumping or gravity flow (i.e., FS report Discharge Alternative 1). Minimal piping, engineering and construction would be necessary to implement this alternative.

Alternative 3: Ground-Water Extraction, Treatment and Reinjection into the Upper Aquifer

Construction Cost: $1,731,000
Annual Operation and Maintenance Cost: $992,000
Total Present Worth Cost: $12,024,000
Implementation Time: 30 years

The treatment component of this alternative is presented as Treatment Alternative 8 in the FS report. The treatment system in this alternative is similar to the one described above for Alternative 2 with the exception that reverse osmosis would not be utilized. Due to the shallow water table, treated ground water would be reinjected into the upper aquifer's deep subzone which occurs from 100 feet to 150 feet below the ground surface. It is unlikely that the ground water could be reinjected above the deep subzone without the water short-circuiting to the ground surface. It is envisioned that a reinjection gallery of six wells would be required, with a combined pumping rate of 200 gallons per minute. Prior to implementing this alternative, a reinjection-well pilot study would need to be conducted and a three-dimensional mathematical model would be developed to determine the effectiveness of this alternative. Due to the high iron content of the ground water, the reinjection system would require an aggressive well maintenance program to control scaling and clogging and ensure continuous operation. Each of the six wells would have a backup well to permit continuous operation during maintenance periods.

Alternative 4: Ground-Water Extraction, Treatment and Injection into the Lower (Brine) Aquifer

Construction Cost: $1,571,000
Annual Operation and Maintenance Cost: $858,000
Total Present Worth Cost: $10,593,000
Estimated Implementation Time: 30 years

The treatment in this alternative is the same as that described above for Alternative 3. The treated ground water would be pumped into the brackish (lower) aquifer located below the water table (upper) aquifer at approximately 170 feet below the ground surface. This aquifer is separated from the three subzones of the upper aquifer by a regionally extensive clay and silt layer approximately 30 feet thick. The geophysical logs from deep wells in this aquifer indicate that the aquifer is composed of sands which could be suitable material for injection. An injection gallery of five wells (and five backup wells for use during maintenance periods) would be required, with a combined pumping rate of 200 gallons per minute. Unlike in Alternative 3, reinjected water surfacing above ground is not a concern. As a result, each of the Alternative 4 wells could be operated at a higher pumping rate resulting in the need for one less well than would be required for Alternative 3. This alternative would also require an aggressive well maintenance schedule as described in Alternative 3. The difference in costs between Alternatives 3 and 4 is attributed to the difference in the number of reinjection wells and the associated costs of long-term operation and maintenance of these wells.

Alternative 5: Ground-Water Extraction, Treatment and Discharge to the Delaware River

Construction Cost: $2,480,000
Annual Operation and Maintenance Cost: $320,000
Total Present Worth Cost: $5,420,000
Implementation Time: 30 years

The treatment in this alternative is assumed to be the same as that described for Alternative 3, although NJDEP has not completed the development of the applicable or relevant and appropriate requirements (ARARs) for the Delaware River. The discharge from the treatment system would be pumped approximately 3 miles north of the CLTL site to the Delaware River. The route of a pipeline from the on-site treatment facility would be westward along Route 44 to Route 322 and then northerly to the river. The New Jersey Department of Transportation (NJDOT) would require the installation of a "carrier pipe" to house the pipeline transmitting the treated ground water. This pipeline may be sized for excess capacity to accommodate a potential future treated ground-water flow from the Bridgeport Rental and Oil Service (BROS) Superfund site, if required. This would allow for a combined resolution of the discharges from the CLTL and BROS sites. Property easements or procurements would be required, as well as the approval of NJDOT and the Delaware River Basin Commission (DRBC). The lower cost of this alternative compared with the reinjection alternatives is attributed to the lower costs associated with operating and maintaining the pipeline versus the reinjection system.

As described above, the series of treatment processes which EPA is proposing for ground-water remediation consists of metals precipitation, air stripping and granulated activated carbon. These technologies have traditionally proven to be effective in removing the types of contaminants present in the ground water. The FS report also discusses in detail two other treatment alternatives, namely Treatment Alternative 10: Extraction Wells; Ground-Water Treatment by Chemical Precipitation and Ultraviolet (UV)/Peroxidation and Treatment Alternative 12: Extraction Wells; Ground-Water Treatment by Chemical Precipitation, Air Stripping with Fume Incineration, and UV/Peroxidation. EPA is not proposing UV/peroxidation processes as a part of the treatment scenario as they have been less widely used than the other technologies. It is noted that during the first operable unit Remedial Design (the next phase in the remedial process), pilot studies will be conducted to determine the specific unit treatment processes required and define the operating parameters of the treatment system.

EVALUATION OF ALTERNATIVES

After careful consideration of all reasonable alternatives, EPA proposes utilizing the following alternatives for the remedial action for the CLTL site. The preferred alternative for cleanup of the ground water at the CLTL site is **Alternative 5: Ground-Water Extraction, Treatment and Discharge to the Delaware River**. This alternative was chosen because it would rely on well-proven technologies to remediate the contaminated ground water to attain Maximum Contaminant Levels established pursuant to the Federal and State Safe Drinking Water Acts and standards promulgated in N.J.A.C. 7:9-6.6(b). The treated ground water would be discharged in accordance with N.J.A.C. 7:14A (New Jersey Pollution Discharge Elimination System). The preferred alternative is technically implementable and will permanently reduce contaminant toxicity, mobility and volume of contaminants in the aquifer. This alternative will require the approval of NJDOT, DRBC and local municipalities to transport and discharge the treated ground water to the Delaware River. The total cost of **Alternative 5** is estimated at $5,420,000. The cost estimate for this alternative may be revised to reflect the necessary treatment required to meet the ARARs when they are developed.

The preferred alternative would appear to provide the best balance of trade-offs among the alternatives with respect to the criteria that EPA uses to evaluate alternatives. This section profiles the performance of the preferred alternative against the criteria which apply to this remedial action, noting how it compares to the other options under consideration.

Overall Protection of Human Health and the Environment: This criterion addresses whether an alternative provides adequate protection of human health and the environment and describes how risks posed by the contaminated ground water are eliminated, reduced or controlled through treatment, engineering controls or institutional controls.

Alternative 1 would not be protective of human health and the environment since contaminants would remain in the aquifer and continue to migrate into uncontaminated portions of the aquifer. Alternatives 2, 3, 4 and 5 would provide adequate protection of human health by eliminating, reducing and controlling risk through extraction and treatment of the ground water and meeting respective discharge standards.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs): This criterion addresses whether an alternative will meet ARARs under Federal and State environmental laws and/or provides a justification for a waiver. There a several types of ARARs: action-specific, chemical-specific and location-specific. Action-specific ARARs are technology or activity-specific requirements or limitations related to various activities. Chemical-specific ARARs are usually numerical values which establish the amount or concentration of a chemical that may be found in, or discharged to, the ambient environment. Location-specific requirements are restrictions placed on the concentrations of hazardous substances or the conduct of activities solely because they occur in a special location.

With the exception of Alternative 1, each of the alternatives incorporating ground-water treatment alternatives will attain specific environmental regulatory standards. Compliance of ground-water treatment with applicable ARARs was assessed by qualitatively comparing required effluent quality with the best estimate of performance for each treatment option.

The contaminated ground-water would be extracted and treatment would continue until the Maximum Contaminant Levels, established pursuant to Federal and State Safe Drinking Water Acts, and the New Jersey Water Pollution Control Act, were met in the aquifer.

Long-Term Effectiveness and Permanence: This criterion refers to expected residual risk and the ability of the alternative to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

Alternative 1 is not effective in the long or short term. Alternatives 2, 3, 4 and 5 will be effective in permanently controlling and reducing the concentration of contaminants migrating from the CLTL site once these alternatives are implemented, and should maintain their effectiveness for the expected duration of the remedial action. The treatment and discharge components of the alternatives will require maintenance to preserve their effectiveness. The surface-water discharge alternatives will require less maintenance than the ground-water injection discharge alternatives.

Reduction of Toxicity, Mobility or Volume Through Treatment: This criterion evaluates the anticipated performance of the treatment technologies an alternative may employ.

With the exception of Alternative 1, each alternative would reduce toxicity, mobility or volume of the contamination in the aquifer. The recovery of ground water for treatment would effect a reduction in contaminant mobility by preventing further migration of the contaminants. The toxicity and volume of contaminants in the ground water would be reduced via treatment, although the extent of overall toxicity and volume reduction would depend on the treatment process used.

Short-Term Effectiveness: This criterion addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until remedial goals are met.

During construction of the extraction and treatment systems, no short-term reduction of contaminants in the ground water would be afforded until system start-up and operation had commenced. Since the extraction and treatment systems would be located in a site area in which disturbance of soil during construction should not increase site-related risk, construction should not be a threat to site workers. Over the long term, the ground-water extraction/treatment systems would significantly reduce contaminant concentrations in the ground water. Each of the treatment-based alternatives utilize air strippers. The exhaust from these units would be directed to fume incinerators where organic compounds would be destroyed.

Short-term risks borne by the community and workers during implementation of ground-water remedial measures would be minimal, resulting from the transport of residuals off site for disposal or further treatment (e.g., metals-containing sludge and spent granulated activated carbon). All of the discharge alternatives should cause minimal short-term effects on human health and the environment.

With the exception of the No Action alternative, implementation of each alternative is estimated to take approximately three years. This time frame reflects a one-year predesign period to pilot the ground-water treatment and reinjection operations, a one-year design phase and a one-year period to construct the treatment facility and pipelines or reinjection system.

Implementability: This criterion evaluates the technical and administrative feasibility of an alternative, including the availability of materials and services needed to implement a particular technology.

There is sufficient area on site for construction of the extraction and treatment systems proposed. Pilot studies would be required to define the ground-water treatment system's design and operating parameters. The actual installation of the extraction and treatment systems should not pose unusual problems, as the equipment for these systems is commercially available.

The technologies and equipment associated with surface-water discharges are reliable and have proven performance. These surface-water discharge alternatives should be easy to construct. Approval of organizations which have authority over the Delaware River and State highways must be obtained for the Delaware River discharge alternative. The technology for constructing and operating injection wells is well-known and, therefore, this discharge alternative should be fully implementable. However, the presence of high iron concentrations in the aquifer would promote the scaling and clogging of the injection wells. An aggressive maintenance program must be performed for these injection systems to operate continually. Due to the uncertainties of the hydrogeological setting, the reinjection alternatives may be somewhat less reliable than the surface-discharge alternatives. As a result, the reinjection alternatives would require the conduct of a pilot study and development of a three-dimensional model to confirm the effectiveness of these alternatives prior to design. As stated above, with the exception of the No Action alternative, all alternatives are estimated to take approximately three years to implement.

Cost: Includes estimated construction, and operation and maintenance costs, also expressed as net present worth costs.

The total present worth of the remedial alternatives are:

- Alternative 1: $300,000
- Alternative 2: $13,562,900
- Alternative 3: $12,024,000
- Alternative 4: $10,593,000
- Alternative 5: $5,412,000

The primary constituents of the Alternative 1 costs are sample collection and analysis. Alternative 2 costs are primarily attributed to ground-water treatment with 40 percent ($5,429,900) of the costs associated with long-term operation and maintenance of the reverse osmosis unit. Approximately 30 percent ($3,300,000) of the Alternative 3 and 4 costs are associated with ground-water treatment. The remaining costs ($8,724,000 and $7,293,000, respectively) are attributed to construction of the reinjection systems and long-term operation and maintenance of the systems. The Alternative 5 costs consist of ground-water treatment ($3,300,000) and construction and operation and maintenance of the pipeline ($2,112,000) to the Delaware River.

State Acceptance: Indicates whether, based on its review of the RI/FS, Risk Assessment, FS Addendum and Proposed Plan, the State of New Jersey concurs with, opposes, or has no comment on the preferred alternative. The NJDEP concurs with the Proposed Plan.

Community Acceptance: Will be addressed in the Responsiveness Summary section of the Record of Decision following a review of the RI, FS, Risk Assessment, FS Addendum and Proposed Plan.

SUMMARY OF THE PREFERRED ALTERNATIVE

In summary, **Alternative 5** would achieve substantial risk reduction through treatment of contaminated ground water at the site. The extraction and treatment systems are expected to meet the cleanup goals for the ground water for aquifer restoration. The discharge to the Delaware River is more cost effective and easier to implement than Alternatives 2, 3 and 4. Therefore, the preferred alternative is believed to provide the best balance of trade-offs among alternatives with respect to the evaluation criteria. Based on the information available at this time, EPA believes the preferred alternative would be protective of human health and the environment, would comply with ARARs, would be cost effective, and would utilize permanent solutions and alternative treatment technologies to the maximum extent practicable.

APPENDIX B

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
PUBLIC INFORAMTION MEETING
FOR

Chemical Leaman Site

Logan Township

JULY 24 , 1990
ATTENDEES

(Please Print)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
George Tamaccio	401 E. State St 6th Floor	Trenton	08625	984-3081	NJDEP	✓
Paul R Noll	2 Broadacre Ct	Mt Laurel	08054	(609) 727-5854	Self	✓
Rick Westergaard	N. Delsea Dr.	Clayton	08312	609-863-6661	Glou Cty Plan. Dept.	✓
R S Sherry	S. Concord Rd	West Chester	19382	215 363 4204	CCTU	✓
Peter C VanKeuren	23 Ball Farm Way	Wilmington DE	19808	(302) 994-1986	Chemical Leaman	✓
Sarah DiPietro	82 Hoadgate Rd	Gibbstown	08027	609-467-2541	Logan Twp Environ. Comm. Chairman	
William Atkinson	Carpenter St	Woodbury	08096	(609) 853-3705	GCHD	✓
Lou Minella	P.O. Box 2349	Wilmington, DE	19899	302-479-2922	Rollins (NJ)	✓
[illegible]	NJDEP				NJDEP	
[illegible] Fulmer	47 Main St	Bridgeport		609-467-0388	[illegible]	
Nancy Wright	95 Main St	Bridgeport, NJ	08014	467-3473		
Esther Slusarski	High Hill Rd	Swedesboro	08085	609-467-6177	Self	✓

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
PUBLIC INFORAMTION MEETING
FOR

Chemical Leaman Site

Logan Township

JULY 24 , 1990
ATTENDEES

(Please Print)

NAME	STREET	CITY	ZIP	PHONE	REPRESENTING	MAILING LIST
Andy Williams					GC Times	
[illegible]	1193 St Andrews	W. Chester			CLTC	
[illegible] Mitchell	10 High Meadows	Mull. Hill				

APPENDIX C

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY INVITES PUBLIC COMMENT ON THE PROPOSED REMEDY FOR THE CHEMICAL LEAMAN TANK LINES, INC. SITE LOCATED IN LOGAN TOWNSHIP, NEW JERSEY

The United States Environmental Protection Agency (EPA), as lead agency for the Chemical Leaman Tank Lines, Inc. (CLTL) site, will hold a Public Meeting to discuss the Remedial Investigation/Feasibility Study (RI/FS) and the Proposed Plan for a first-phase Remedy at the site. The New Jersey Department of Environmental Protection (NJDEP), as the support agency, will also be in attendance. The meeting will be held on July 24, 1990, at 7:00 p.m. in the Logan Township Municipal Building, 73 Main Street, Bridgeport, New Jersey.

Among the options evaluated for addressing contaminated ground water at the site are the following:

1. No Action. This alternative would consist only of ground water monitoring.
2. Ground Water Extraction, Treatment, and Discharge to Moss Branch. Under this alternative, the contaminated ground water would be extracted and treated using air-stripping, chemical precipitation, granulated activated carbon, and reverse osmosis. The ground water would be treated on site and discharged to the Moss Branch.
3. Ground Water Extraction, Treatment, and Reinjection into the Upper Aquifer. This alternative is similar to Alternative 2, with the exception that reverse osmosis would not be utilized. The treated ground water would be reinjected into the upper aquifer.
4. Ground Water Extraction, Treatment, and Injection into the Lower Aquifer. This alternative is the same as Alternative 3, except that the treated ground water would be pumped into the lower (brackish) aquifer.
5. Ground Water Extraction, Treatment, and Discharge to the Delaware River. This alternative is the same as Alternative 3, except that the discharge would be pumped approximately 3 miles from the site into the Delaware River.

The No-Action alternative was evaluated as required by the National Oil and Hazardous Substances Pollution Contingency Plan.

Based on available information, the proposed first-phase Remedy at this time is Alternative 5. EPA proposes that this Remedy will be most protective of human health and the environment, as well as be most cost effective. EPA welcomes the public's comments on the Administrative Record and all alternatives identified above. EPA will choose the first-phase Remedy after the public comment period ends and consultation with NJDEP is concluded. EPA may select an option other than the proposed alternative after consideration of all comments received. Complete documentation of the project findings is presented in the Administrative Record File, which contains the RI/FS Reports and the Proposed Plan. These documents are available at either the Logan Township Municipal Building or EPA's Region II office in New York.

The public may comment in person at the public meeting and/or may submit written comments until August 14, 1990 to:

Craig De Biase
Remedial Project Manager
Emergency and Remedial Response Division
U.S. Environmental Protection Agency
26 Federal Plaza
New York, New York 10278