Chem Solv file

Department of Natural Resources and Environmental Control
Proposed Remedial Action Plan
for
Chem-Solv, Inc. Site
Cheswold, Kent County, Delaware

1. PURPOSE OF THE PROPOSED PLAN

This Proposed Plan identifies the preferred alternative for addressing contaminated soils and **ground water** at the Chem-Solv, Inc. **Superfund** Site located in Cheswold, Delaware. This document is issued by the Delaware Department of Natural Resources and Environmental Control (DNREC), the lead agency for site activities, in consultation with the United States Environmental Protection Agency (EPA), the support agency for this response action. The Proposed Plan describes the remedial alternatives considered for the site, identifies the preferred alternative for remedial action at the site, and explains the rationale for the proposed selection of the preferred alternative. DNREC and EPA are seeking public comments on those alternatives and EPA, after consultation with DNREC, will select a final remedy for the site only after the public comment period has ended and the information submitted during the comment period has been reviewed and considered.

DNREC is issuing this Proposed Plan as part of its public participation responsibilities under Sections 117(a) of the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**, as amended, 42 U.S.C. Section 9617(a), and Sections 300.430(f)(3), 300.800(c), and 300.815 of the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)**, 40 C.F.R. Sections 300.430(f)(3), 300.800(c), and 300.815, promulgated pursuant to CERCLA. This document summarizes information that can be found in greater detail in the **Remedial Investigation** and **Feasibility Study (RI/FS)** reports and other documents contained in the **Administrative Record** for the site. DNREC and EPA 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, which contains the information upon which the selection of the response action will be based, is available at the following locations:

William C. Jason Library
Delaware State College
Route 13
Dover, Delaware 19901
Mon. - Thurs. 8:00am to 12:00 midnight

Sat. 9:00am to 5:00pm
Sun. 2:00pm to 10:00pm

and

Delaware Department of Natural Resources and
Environmental Control (DNREC)
715 Grantham Lane
New Castle, Delaware 19720
(302) 323-4540
Mon. - Fri. 8:00am to 4:00pm

and

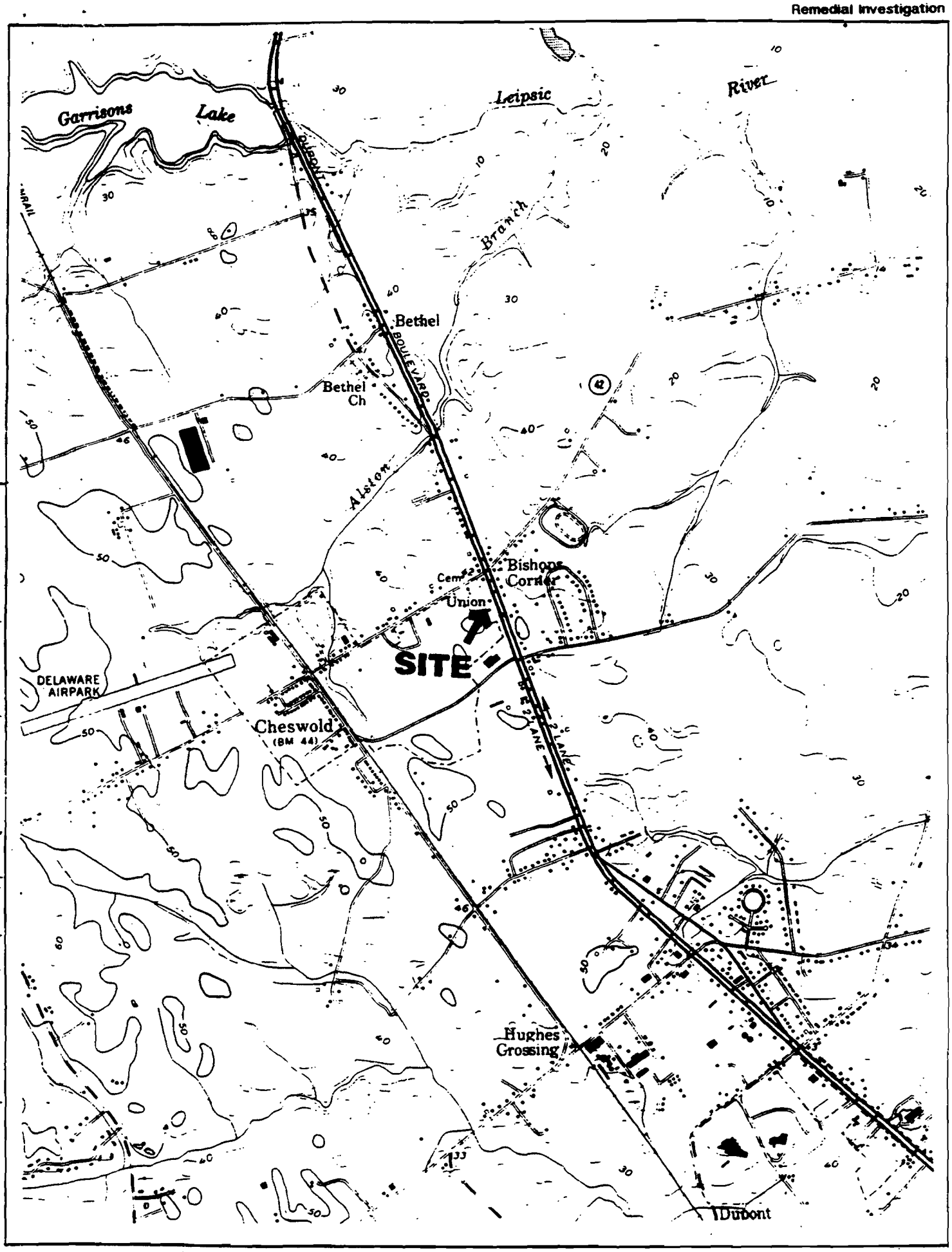
U.S. EPA Region III, Docket Room
Ms. Margaret Leva
841 Chestnut Building, 9th Floor
Philadelphia, PA 19107
(215) 597-3037
Mon. - Fri. 8:30am to 4:30pm

DNREC and EPA encourage comments from the public on all alternatives and on the information that supports the alternatives. Although a preferred alternative has been proposed, a final decision has not yet been made. Public comments can influence EPA's choice, after consultation with DNREC, of the selected remedy. As a result, the selected remedy as presented in the **Record of Decision (ROD)** may be different from the preferred alternative presented here. A glossary explaining terms that may be unfamiliar to the general public is provided at the end of this Proposed Plan. Glossary terms are noted by **bold** print in the text.

2. SITE DESCRIPTION AND BACKGROUND

The Chem-Solv, Inc. (Chem-Solv) site is located in Cheswold, Kent County, Delaware, approximately 3 miles north of Dover on the west side of U.S. Route 13 (DuPont Highway) and just south of Delaware Route 42 (Figure 1-1). The Chem-Solv facility occupied approximately the southern third of a 1.5 acre property and consisted of a one story concrete block building, a distillation process building, and a concrete pad. A two story wood frame apartment building, a storage barn, and a wood shed currently occupy the northern two thirds of the property. The Chem-Solv site is located in an area zoned for agricultural, commercial, and residential land use. Strip development, consisting of commercial establishments and private residences, is found on both sides of Route 13 in the immediate vicinity of the site (Figure 1-2).

The Chem-Solv facility was in operation from approximately 1982 to 1984. At the facility, spent industrial solvents were



Source: USGS Topo. Quad: Dover, DE(1956, photo revised 1981)

Figure 1-1
Site Location Map

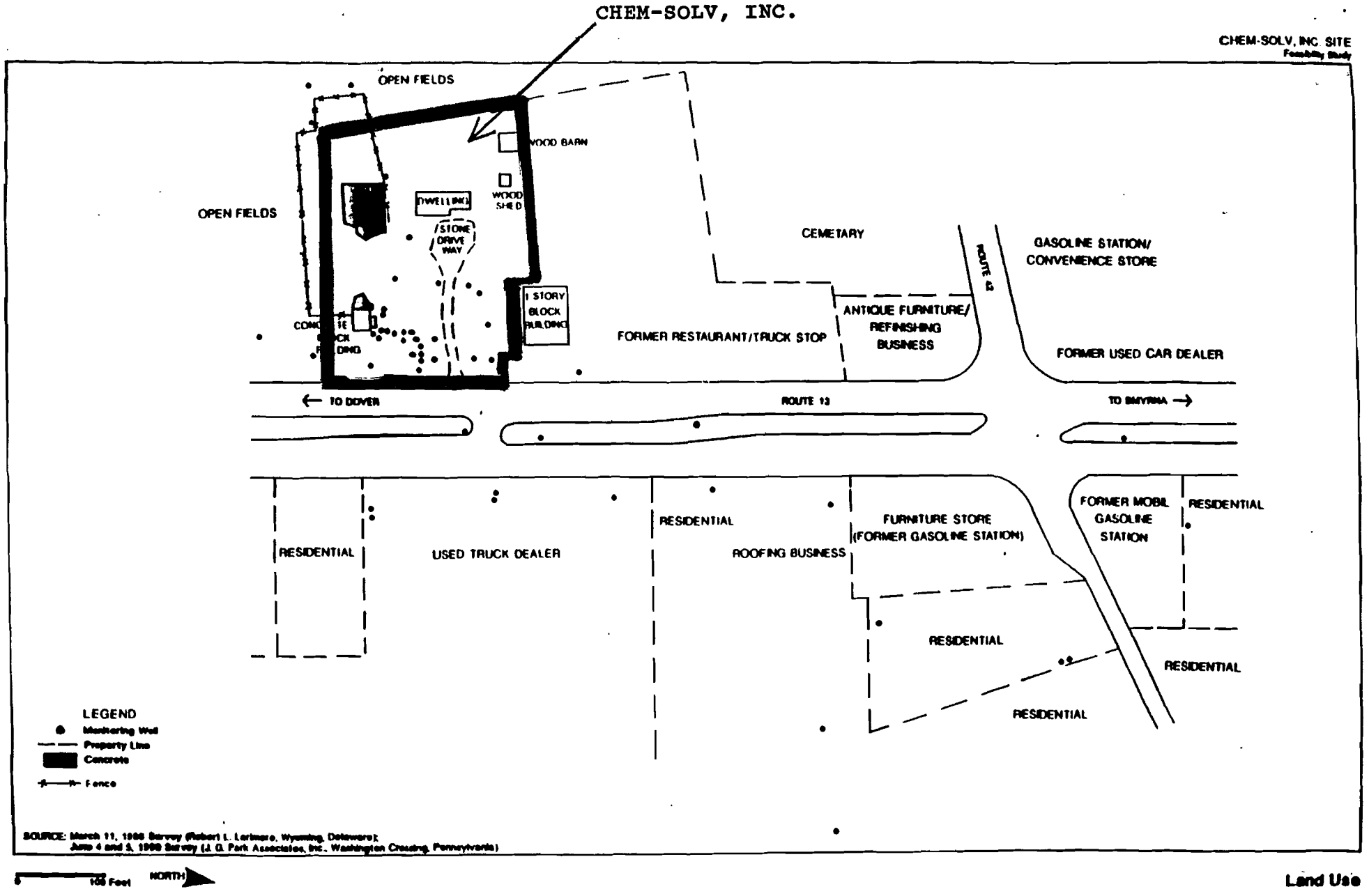

CHEM-SOLV, INC.
CHEM-SOLV, INC. SITE
Feasibility Study
OPEN FIELDS
OPEN FIELDS
WOOD BARN
WOOD SHED
DWELLING
STONE DRIVE WAY
1 STORY BLOCK BUILDING
CEMETARY
ROUTE 42
GASOLINE STATION/ CONVENIENCE STORE
ANTIQUE FURNITURE/ REFINISHING BUSINESS
FORMER RESTAURANT/TRUCK STOP
FORMER USED CAR DEALER
TO DOVER
ROUTE 13
TO SMYRNA
RESIDENTIAL
USED TRUCK DEALER
RESIDENTIAL
ROOFING BUSINESS
FURNITURE STORE (FORMER GASOLINE STATION)
FORMER MOBIL GASOLINE STATION
RESIDENTIAL
RESIDENTIAL
RESIDENTIAL
RESIDENTIAL
LEGEND
Monitoring Well
Property Line
Concrete
Fence
SOURCE: March 11, 1986 Survey (Robert L. Larimore, Wyoming, Delaware);
June 4 and 5, 1986 Survey (J. G. Park Associates, Inc., Washington Crossing, Pennsylvania)
0
100 Feet
NORTH
Land Use

Figure 1-2

distilled and purified. The recovered product was then returned to the original generator for reuse. The residues generated during the distillation process, referred to as "still bottoms", were collected in 55 gallon drums. These drums were stored on the concrete pad, awaiting disposal as hazardous waste. Chem-Solv was, therefore, classified as a hazardous waste storage facility that had **Resource Conservation and Recovery Act (RCRA)** interim status.

On September 7, 1984, an explosion and fire occurred at the facility which resulted in solvents running off the concrete pad and into the soil. DNREC was notified and immediately initiated an investigation to determine the nature and extent of potential soil and **ground water** contamination. At the time of the incident, DNREC conducted soil sampling and analysis and concluded that the soil contamination consisted primarily of the following **volatile organic compounds (VOCs):** trichloroethene (TCE); 1,1,1-trichloroethane (1,1,1-TCA); 1,2-dichloroethane (1,2-DCA); 1-chloroethane; ethylbenzene and toluene.

In 1985 DNREC removed a large portion of the drum storage pad and excavated 1300 cubic yards of contaminated soil to the depth of the water table. The soils were then aerated by passing them through a shredding mechanism which allowed the **VOCs** to more readily volatilize into the air. The soils were repeatedly aerated until no further reduction in VOC concentrations was seen by analysis. The soils were then placed back into the excavation pit.

DNREC also conducted an extensive investigation into **ground water** contamination associated with the Chem-Solv facility. Between September 1984 and June 1986, DNREC installed 43 monitoring wells and 7 **recovery wells** on and around the site. Beginning in October 1984 and continuing to the present, DNREC collected **ground water** samples from these wells and domestic wells in the vicinity of Chem-Solv and analyzed the samples for various contaminants, primarily **VOCs**.

Information gathered during this investigation allowed DNREC to assess the general **hydrogeologic** conditions underlying the site and to delineate the extent of VOC-contaminated **ground water.** DNREC subsequently implemented a **ground water** treatment system that included a pumping system and provided for treatment of the recovered **ground water** by **air stripping.** This recovery and treatment system was in operation from December 1985 to November 1988 and was successful in significantly reducing the concentrations of **VOCs** in the **ground water.**

EPA initially proposed the Chem-Solv site for inclusion on the **National Priorities List (NPL)** on January 22, 1987 and proposed it again on June 24, 1988. EPA placed the site on the NPL on August 30, 1990. In September 1988, DNREC, EPA and several of

the Chem-Solv **Potentially Responsible Parties (PRPs)** entered into an **Administrative Order on Consent (AOC)**. Under the AOC, the PRPs agreed to perform a **Remedial Investigation/Feasibility Study (RI/FS)**, with DNREC and EPA oversight, in accordance with CERCLA.

The **Remedial Investigation** characterized the nature and extent of the contamination present at the site. The **Feasibility Study** developed, evaluated, and screened various combinations of cleanup technologies that may address site contamination. A **Risk Assessment** was also performed as part of the **Remedial Investigation** to evaluate the risk to public health and the environment resulting from both present and future exposure to site contaminants. The preferred alternative outlined in this Proposed Plan is based on these studies and the documents that are part of the **Administrative Record** file for the Chem-Solv site.

The **Remedial Investigation** included extensive air, soil and **ground water** sampling on and around the site between October 1989 and August 1991. Some contamination was found in several soil samples on the Chem-Solv property but at such low levels that DNREC and EPA have determined that they are not a threat to human health or the environment. The results of the soil sampling conducted during the **Remedial Investigation** indicate that DNREC's shredding operation in 1985 was successful in remediating the contaminated soils.

Ground water, however, remains contaminated with several **VOCs**, primarily TCE and benzene, and the inorganic contaminant manganese. The **ground water** contamination exists at the Chem-Solv property and extends laterally some distance to the northeast in the direction of ground water flow. The highest concentrations of contaminants in the **ground water** have been found in one monitoring well on the Chem-Solv property and in one well on the adjacent property directly to the north. Vertically the contamination has been detected in the uppermost water table **aquifer** beneath the site, the Columbia Formation, with the majority present within the upper 20 feet. Very low concentrations of contaminants have been found at depths of approximately 50 feet.

3. SCOPE AND ROLE OF REMEDIAL ACTION

The alternatives in this Proposed Plan are presented as remedial actions which would address the contaminated **ground water**, the main threat at the site. As stated previously, the soils have not been found to pose a threat to human health or the environment. The remedial action objectives are to restore **ground water** to its beneficial use and to prevent exposure to the contaminated **ground water** until cleanup goals are achieved.

4. SUMMARY OF SITE RISKS

A **Risk Assessment** was prepared as part of the **Remedial Investigation** to assess the potential public health and environmental impacts that may result from exposure to chemicals associated with the site in the absence of active remediation. To determine whether there is an actual exposure or potential for exposure, a complete exposure pathway must be established. A complete exposure pathway consists of the following components:

1. A source or mechanism for chemicals to be released to the environment.

2. A medium through which contaminants may be transported such as water, soil, or air.

3. A point of actual or potential exposure or contact for humans or the environment.

4. A route or mechanism such as ingestion, inhalation, or dermal contact for exposure at the contact point.

As stated previously, the **Risk Assessment** indicated no unacceptable risks related to exposure from soils; therefore, at this site, the only medium of concern is **ground water**, and the chemicals of concern are several **VOCs**, primarily TCE and benzene, and the inorganic chemical manganese. The only complete exposure pathway identified is residential use of contaminated **ground water**. Potential routes of exposure include ingestion of **ground water**, inhalation of indoor air containing volatilized organic compounds, and dermal absorption during showering and bathing.

Table 1 provides a summary of the **Risk Assessment** for site risks from both **carcinogenic** and noncarcinogenic contaminants associated with the wells nearest to the Chem-Solv property, the area where the contaminant concentrations are highest and therefore where the greatest risk exists. Remedial action is generally warranted at a site when the calculated **carcinogenic** risk level exceeds EPA's target risk range of 1×10^{-4} to 1×10^{-6}. A carcinogenic risk level of 1×10^{-4} means that one additional person out of 10,000 is at risk of developing cancer if the site is not cleaned up. The potential for adverse health effects resulting from exposure to noncarcinogenic compounds is estimated by comparing an estimated dose to an acceptable level. If this ratio exceeds 1.0, there is a potential health risk associated with exposure to that chemical. The ratios can be added for exposures to multiple contaminants. The sum, known as the **Hazard Index**, is not a mathematical prediction of the severity of toxic effects but rather a numerical indicator of the transition from acceptable to unacceptable levels.

As shown in Table 1, the risk presented by the contaminants in the **ground water** exceeds both the acceptable target risk range of 1×10^{-4} to 1×10^{-6} for carcinogens and the **Hazard Index** of 1.0 for noncarcinogens. The **carcinogenic** risks for individual routes of exposure (i.e., inhalation, ingestion, and dermal absorption) do not exceed 1×10^{-4}. However, the cumulative risk of all the possible routes of exposure presents a risk of 1.1×10^{-4} which does exceed EPA's target risk range of 1×10^{-4} to 1×10^{-6}. The **carcinogenic** risk is attributable to the **VOCs** in the **ground water.** For the noncarcinogenic risk, the Hazard Indices for both adults and children exceed 1.0 for ingestion only. Separate calculations for the noncarcinogens were performed for adults and children because children are considered to be a more sensitive subpopulation. The majority of the risk due to noncarcinogens is attributable to manganese.

An environmental **Risk Assessment** was also performed for this site using essentially the same approach as the **Hazard Index** value assessment used for human health. Additionally, a site biological survey was conducted to describe the plant communities and plant distribution patterns on the Chem-Solv property. The environmental assessment indicated no adverse environmental impacts from the site.

Actual or threatened releases of hazardous substances from this site, if not addressed by the preferred alternative or one of the other active measures considered, may present a current or potential threat to public health or welfare.

Remediation Goals for Ground Water

The **Risk Assessment** indicates that the **carcinogenic** and noncarcinogenic risks associated with the site exceed acceptable levels and therefore warrant remedial action. In many cases, **Maximum Contaminant Levels (MCLs)** would be used as remediation goals for **ground water.** At this site, however, since there are multiple contaminants, the cumulative **carcinogenic** risk associated with the **MCLs** for those contaminants exceeds 1×10^{-6}, meaning the probability of an increase in the incidence of cancer in the exposed population would be greater than one in one million. Under such circumstances risk- or health-based levels are used as remediation goals. Therefore, the remediation goals for this site are as follows:

1. To restore **ground water** to health-based levels (i.e., to a level where the cumulative **carcinogenic** risk does not exceed 1×10^{-6} and the **Hazard Index** does not exceed 1.0) through active remediation.

2. To prevent exposure to contaminated **ground water** which results in a cumulative **carcinogenic** risk greater than 1×10^{-6} or a **Hazard Index** greater than 1.0 until cleanup goals are achieved.

TABLE 1
SUMMARY OF RISK
CHEM-SOLV, INC. SITE

	CARCINOGENIC RISK	NON-CARCINOGENIC RISK (HAZARD INDEX)	
		ADULTS	CHILDREN
INGESTION	5×10^{-5}	4.0	11.0
INHALATION	5×10^{-5}	2×10^{-2}	5×10^{-2}
DERMAL	8×10^{-6}	5×10^{-3}	7×10^{-3}
TOTAL	1.1×10^{-4}	4.0	11.0

5. SUMMARY OF ALTERNATIVES

Five alternatives were evaluated to deal with the risks posed by **ground water** contamination at the Chem-Solv site. The alternatives for the **ground water** cleanup are the following:

Alternative 1:	No Action, **Ground Water** Monitoring
Alternative 2:	**Ground Water** Monitoring, **Ground Water** Restriction Zone
Alternative 3:	**Ground Water** Monitoring, **Ground Water** Restriction Zone, Alternate Water Supply
Alternative 4:	**Ground Water** Monitoring, **Ground Water** Restriction Zone, Alternate Water Supply, **Ground Water** Collection, Direct Discharge to **Publicly Owned Treatment Works (POTW)**
Alternative 5:	**Ground Water** Monitoring, **Ground Water** Restriction Zone, Alternate Water Supply, **Ground Water** Collection, Onsite Treatment, Discharge to Surface Water

Common Elements

The alternatives being considered for the site would include several common elements. First, all alternatives would include a monitoring program for evaluation of **ground water** quality. The monitoring would include sampling of onsite and offsite wells and residential wells.

Second, all alternatives would include removal of seven existing **recovery wells** located on the Chem-Solv property. These wells are constructed of galvanized steel which is believed to be contributing to levels of zinc above background in the immediate vicinity of the recovery system installed by DNREC in 1985. Since the recovery system is no longer operable, the existing **recovery wells** will be removed.

Third, Alternatives 2 through 5 would include the institution of a **ground water** restriction zone by DNREC in the vicinity of the site to restrict future installation of residential wells in the water table **aquifer** in the area that is contaminated until remediation goals are achieved. Alternatives 3 through 5 would also include provisions for an alternate water supply to existing users should **ground water** monitoring indicate that remediation goals are exceeded in a residential well situated in the contaminated area.

The following is a brief summary of each of the alternatives. The cost summaries presented are estimates and should be used for comparative purposes only.

Alternative 1: No Action, Ground Water Monitoring

Capital Cost: $13,500
Annual Operation and Maintenance (O&M) Cost: $138,000
Present Worth: $385,000

The **Superfund** program requires that the "no action" alternative be evaluated at every site to establish a baseline for comparison. Under this alternative, no further action would be taken to remediate the **ground water** contamination or to prevent exposure to the contaminated **ground water** either from existing residential wells or residential wells which might be installed in the future. However, a monitoring program would be included to monitor **ground water** quality. The costs presented for this alternative are based on the **ground water** monitoring program being in effect for 17 years.

Alternative 2: Ground Water Monitoring, Ground Water Restriction Zone

Capital Cost: $18,500
Annual O&M: $138,000
Present Worth: $391,000

As in Alternative 1, this alternative would not include any action to remediate the **ground water** contamination or to prevent exposure to contaminated **ground water** from existing residential wells. A **ground water** restriction zone would be instituted by DNREC to restrict future installation of residential wells in the contaminated area until VOCs have naturally attenuated to remediation goals. Natural attenuation of VOC contamination is expected to take approximately 14 years. A ground water monitoring program would also be included as in Alternative 1.

Costs for this alternative were based on the assumption that the remediation goals would be achieved through natural attenuation within 14 years. The actual time required for this to occur cannot be accurately predicted, but the monitoring program and the restriction zone would remain in effect until the remediation goals are achieved.

Alternative 3: Ground Water Monitoring, Ground Water Restriction Zone, Alternate Water Supply

Capital Costs: $30,500 - $34,500
Annual O & M: $138,000 - $141,000
Present Worth: $410,000 - $431,000

In addition to **ground water** monitoring and the **ground water** restriction zone discussed in Alternatives 1 and 2, this alternative would provide an alternate water supply to residences where **ground water** monitoring indicates that remediation goals are exceeded. The alternate water supply would consist of **well head treatment** at the existing affected well or replacement of the affected well with a deeper well drilled into an uncontaminated **aquifer**. The final decision as to which option would be implemented would be made by DNREC and EPA. Again, the alternate water supply contingency would be in effect in the contaminated area until **VOCs** have naturally attenuated to remediation goals, which is expected to take approximately 14 years. The cost estimates listed above reflect the range in costs for the alternate water supply options.

Alternative 4: Ground Water Monitoring, Ground Water Restriction Zone, Alternate Water Supply, Ground Water Collection, Discharge to POTW

Capital Costs: $110,000 - $234,000
Annual O & M: $170,000 - $205,000
Present Worth: $660,000 - $686,000

Alternative 4 is essentially Alternative 3 with active remediation incorporated to address the **ground water** contamination. **Ground water** would be extracted from the **aquifer** through the pumping of additional **recovery wells** to be installed onsite. The extracted ground water would then be discharged to the Kent County **POTW** through an existing onsite sanitary sewer line. In contrast to Alternatives 1 through 3, Alternative 4 uses the collection of contaminated **ground water** and treatment at the **POTW** to reduce the toxicity, mobility, and volume of the contaminants in the **aquifer**.

The **POTW** has proposed a 5 gallon per minute limit for discharge from the site but a 20 gallon per minute variance may be granted. Using this range in pumping rates, it is estimated that the **aquifer** would be restored in 2 to 8 years. The range in costs listed above is indicative of the range in pumping rates which were considered for this alternative.

Alternative 5: Ground Water Monitoring, Ground Water Restriction Zone, Alternate Water Supply, Ground Water Collection, Onsite Treatment, Discharge to Local Surface Water

Capital Cost: $181,000 - $185,000
Annual O & M: $105,000 - $108,000
Present Worth: $687,000 - $688,000

Like Alternative 4, this alternative includes the provisions of Alternative 3 and incorporates active remediation of contaminated

ground water by extraction via a well recovery system. In this case, however, the **ground water** would be treated onsite to reduce contaminant levels and would be discharged to local surface water by way of a storm sewer located about 10 feet south of the Chem-Solv property. A discharge pipeline would be constructed to connect to the storm sewer system.

In order to meet remediation goals, extracted **ground water** would be treated onsite in a two step process. The first step would involve **filtration** of the **ground water** to remove manganese and other inorganic contaminants. The **effluent** from the **filtration** system would then enter an **air stripper** column for removal of **VOCs**. The treated **ground water** would then be discharged to a storage tank where it would be sampled and analyzed before discharge to the storm sewer system for transport into local surface waters. Solids from the **filtration** process would be collected and disposed of offsite. Presently it is unknown whether air emissions of **VOCs** from the **air stripper** would exceed federal and state requirements; however, air emissions controls would be implemented as necessary.

Through onsite treatment, Alternative 5 reduces the mobility, toxicity, and volume of the contaminants in the **ground water**. At an estimated pumping rate of 20 gallons per minute, the **ground water** would be expected to be remediated to meet remediation goals in approximately 2 years.

6. EVALUATION OF ALTERNATIVES

DNREC's preferred alternative to address the **ground water** contamination at the site is Alternative 4 (**Ground Water** Monitoring, **Ground Water** Restriction Zone, Alternate Water Supply, **Ground Water** Collection, Discharge to **POTW**). Pursuant to Section 300.515(e)(1) of the **NCP**, 40 C.F.R. Section 300.515(e)(1), EPA agrees with the preferred alternative proposed by DNREC. Based on current information, this alternative appears to provide the best balance of trade-offs among the alternatives with respect to the nine criteria set forth in Section 300.430(e)(9)(iii) of the **NCP**, 40 C.F.R. Section 300.430(e)(9)(iii), that EPA uses to evaluate alternatives. EPA believes the preferred alternative will satisfy the statutory requirements of Section 121(b) of CERCLA, 42 U.S.C. Section 9621(b), which provides that the selected alternative be protective of human health and the environment, comply with **Applicable or Relevant and Appropriate Requirements (ARARs)**, be cost effective, and utilize permanent solutions and treatment to the maximum extent practicable.

The following summary profiles the performance of the preferred alternative in terms of the nine evaluation criteria listed in the glossary to this Proposed Plan, noting how it compares to the other alternatives under consideration.

Overall Protection of Human Health and the Environment

Because no environmental risks were identified at this site, this section will be limited to discussing protection of human health only. Alternatives 3 through 5 provide adequate protection of human health by preventing exposure to contaminated **ground water** through an alternate water supply and a well restriction zone. However, Alternatives 4 and 5 also provide for active treatment of **ground water** which helps to minimize migration of the contamination and therefore have advantages over Alternative 3.

Alternative 1, No Action, with no provisions for preventing human exposure to contamination, is not protective of human health. Alternative 2 prevents exposure to future users of the **ground water**, but does nothing to prevent exposure of current users should their wells become contaminated. Since these two alternatives are not protective of human health, they will not be considered as viable options in the remainder of this section.

Compliance with ARARs

Alternatives 3, 4 and 5 would meet their respective **Applicable or Relevant and Appropriate Requirements (ARARs)** of federal and state environmental laws. They would comply with state and federal requirements associated with **ground water** monitoring, drinking water standards and well construction. Treatment residues generated under these alternatives would be handled in accordance with the disposal requirements of 40 C.F.R. Part 261 and land disposal restrictions contained in 40 C.F.R. Part 268. Alternatives 4 and 5 would also comply with state and federal requirements pertaining to point source discharges to surface water including **effluent** limitations, state water quality standards, and federal ambient water quality criteria.

Alternative 5 would result in VOC emissions to ambient air and may require additional air emission controls to meet state and federal requirements concerning air emissions from **air strippers**. These would include National Ambient Air Quality Standards (NAAQS) (40 C.F.R. Part 50) and National Emissions Standards for Hazardous Air Pollutants (NESHAPS) (40 C.F.R. Part 61).

Contaminated **ground water** discharged to the **POTW** under Alternative 4 would comply with general pretreatment regulations for discharge to a **POTW** (40 C.F.R. Part 403).

Site activities for all alternatives would be conducted in accordance with the Occupational Safety and Health Administration regulations applicable to activities at hazardous waste sites (29 C.F.R. Section 1910.120).

Long-Term Effectiveness and Permanence

Since Alternative 3 might provide active treatment of **ground water** only at the **well head** and would do nothing to reduce contaminants in the **aquifer**, it would provide a low degree of long-term effectiveness and permanence. Alternatives 4 and 5, however, would provide treatment of the contaminated **ground water** in the **aquifer** which would reduce contaminant concentrations and therefore would reduce risk. Any residual contamination remaining in the **ground water** after remediation goals have been met would be present at levels which would not exceed an acceptable risk. Alternatives 4 and 5 therefore provide a high degree of long-term effectiveness and permanence by extracting and treating contaminated **ground water**.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternatives 3, 4 and 5 would reduce the toxicity of the **ground water** at a particular residential well through wellhead treatment if necessary. This is the only provision for active remediation and treatment in Alternative 3. In contrast, Alternatives 4 and 5, through **ground water** extraction would effectively reduce the toxicity, mobility, and volume of contaminated **ground water** in the **aquifer**. These two alternatives would treat a much larger volume of **ground water** and therefore a greater volume of contamination.

Treatment at the **POTW** included in Alternative 4 would reduce the toxicity and volume of both manganese and **VOCs** in the extracted **ground water**. No treatment residues would be produced at the site.

Onsite treatment by **filtration** in Alternative 5 would reduce toxicity and volume of contaminants in the extracted **ground water** by removing manganese but would result in treatment residues which would require offsite disposal. The toxicity and volume of **VOCs** in extracted **ground water** would be reduced by **air stripping** onsite but emissions would ultimately be transferred to the ambient air. Controls for reducing the level of air emissions to the atmosphere would be implemented if determined necessary.

Short-Term Effectiveness

Alternatives 3 through 5 provide a high degree of short-term effectiveness by employing controls (i.e., **ground water** monitoring, **ground water** restriction zone, and alternate water supply) during the period until remediation goals are achieved, thereby preventing exposure to contaminated **ground water** in residential wells.

Implementation of these alternatives could result in a slight potential for exposure of workers during installation of new wells through direct contact with and inhalation of vapors from the contaminated **ground water**. In addition, workers would be

exposed to normal construction hazards. However, these risks could be mitigated by following proper health and safety practices for well drilling and construction.

Alternative 5 would pose an additional risk to workers due to construction and operation of the onsite treatment system and the offsite disposal of treatment residues. Air emissions may pose an added risk to workers and residents. Proper emission controls would be implemented if necessary.

The advantage of the preferred alternative, Alternative 4, over Alternative 5 is that the added risks due to the air emissions and construction of the onsite treatment system under Alternative 5 do not exist under Alternative 4 because treatment would be provided at an offsite facility.

Implementability

The institutional controls included in Alternatives 3 through 5 should not pose any major implementation problems. **Ground water** monitoring and replacement of existing wells would be performed using widely practiced techniques. Well replacement would be conducted in accordance with state regulations. Wellhead treatment systems have been shown to be effective in removing the contaminants associated with this site. Residuals from wellhead treatment would need to be disposed of properly. Cooperation from property owners would be necessary for well installation and maintenance. A **ground water** restriction zone would have to be established and enforced by DNREC but is considered administratively feasible.

For Alternatives 4 and 5, installation of new recovery wells is easily implementable because of information generated during the installation of the DNREC recovery system. Discharge to the **POTW** in Alternative 4 would require meeting the pretreatment requirements of the **POTW**. Kent County **POTW** has stated that discharge from the site could be accepted untreated but that the capacity of the treatment plant might be a limiting factor in determining the acceptable pumping rate. For this reason, a range of pumping rates has been considered in the evaluation of this alternative.

Alternative 5, while considered feasible, would be more complicated to implement. For this alternative, a treatment system for the contaminants of concern would have to be designed, installed, and operated. The technologies being considered have been demonstrated successfully in full scale operations for the contaminants of concern. A **treatability study** would need to be performed before treatment system design to optimize the process and ensure that discharge requirements would be met. In addition, discharge of treated **effluent** to surface water would require compliance with the substantive requirements of the

National Pollutant Discharge Elimination System (NPDES) Program. Solids removed by treatment processes would require disposal as hazardous waste but are expected to be minimal.

Cost

The **present worth** of the preferred alternative (Alternative 4) is estimated to be between $660,000 and $686,000. The lowest cost alternative of those that are considered protective of human health is Alternative 3 whose **present worth** is estimated to be between $410,000 and $431,000. The **present worth** for Alternative 5 is estimated to be between $687,000 and $688,000.

Support Agency Acceptance

The United States Environmental Protection Agency supports the preferred alternative (Alternative 4), but will take comments received during the public comment period into account before finalizing its position on the proposed remedy.

Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the **Record of Decision (ROD)** for the site.

7. COMMUNITY PARTICIPATION IN THE SELECTION PROCESS

DNREC has identified Alternative 4 as the preferred alternative for the site. It is important to note that although DNREC has selected a preferred alternative, no final decision has been made. DNREC and EPA rely on public input to make sure that the alternative selected for each **Superfund** site is not only effective but meets the needs of the local community. For this reason, DNREC is providing a public comment period on the Proposed Plan. This comment period will allow the public to comment on the alternatives in the **Feasibility Study** and on the preferred alternative in particular. EPA, after consultation with DNREC, will select a remedy based on the findings of the **Feasibility Study** and the comments received during the public comment period. The selected remedy will be documented in a **Record Of Decision** that summarizes the decision process and responds to comments received from the public.

Copies of the **Feasibility Study** and other site-related documents are available for public review in the **Administrative Record** file, the locations of which are identified in Section 1 of this Proposed Plan.

DNREC will hold a public meeting at 7:00 p.m., on February 6, 1992, at the Auditorium of the Richardson and Robbins Building, 89 Kings Highway, Dover, Delaware, to present a summary of the

Remedial Investigation/Feasibility Study and the preferred alternative. Interested citizens will have an opportunity to ask questions and provide comments. The public comment period begins on January 15, 1992, and concludes on February 14, 1992. Written comments must be postmarked on or before February 14, 1992. DNREC and EPA encourage citizens to review site-related documents and submit written comments to one of the following people:

Dilip Hansalia Project Officer DNREC - CERCLA Mgmt. Branch 715 Grantham Lane New Castle, DE 19720 (302) 323-4585	or	Stephanie Dehnhard (3HW25) Remedial Project Manager U. S. EPA Region III 841 Chestnut Building Philadelphia, PA 19107 (215) 597-3167

GLOSSARY OF EVALUATION CRITERIA

Overall Protection of Human Health and the Environment: Addresses whether the remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

Compliance with ARARs: Refers to whether a remedy will meet all **Applicable or Relevant and Appropriate Requirements (ARARs)** of Federal and State environmental statutes and/or provides grounds for invoking a waiver. It also addresses whether or not the remedy complies with advisories, criteria and guidance that EPA and DNREC have agreed to follow.

Long-Term Effectiveness and Permanence: Refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

Reduction of Toxicity, Mobility, or Volume Through Treatment: Relates to the anticipated performance of the treatment technologies with respect to these criteria.

Short-Term Effectiveness: Refers to 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, until cleanup goals are achieved.

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

Cost: The following costs are evaluated: estimated capital, operation and maintenance, and net present worth.

Support Agency Acceptance: Indicates whether, based on its review of the FS and the Proposed Plan, the support agency concurs with or opposes the preferred alternative.

Community Acceptance: Will be assessed in the **Record of Decision** following a review of the public comments received on the **Administrative Record** and the Proposed Plan.

GLOSSARY

Administrative Order on Consent (AOC): A legal agreement between EPA and **potentially responsible parties (PRP's)** whereby PRP's agree to perform or pay the cost of a **Remedial Investigation/ Feasibility Study** at a site cleanup. The agreement describes actions to be taken at a site.

Administrative Record: An official compilation of documents, data, reports, and other information that form the basis of response actions selected for a Superfund site. The record is placed in the information repository to allow public access to the material. The preparation of such a record is required by **CERCLA.**

Air Stripping: A treatment system that removes, or "strips," **volatile organic compounds** from contaminated **ground water** by forcing an airstream through the water and causing the compounds to evaporate.

Aquifer: An underground formation composed of materials such as sand, soil, or gravel that can store and supply ground water to wells and springs.

Applicable or Relevant and Appropriate Requirements (ARARs): The federal and state requirements that a selected remedy must attain. These requirements may vary among sites and alternatives.

Carcinogenic: Cancer causing.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act. The Acts created a special tax that goes into a trust fund, commonly known as **Superfund**, to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Effluent: Waste water flowing out of a treatment system such as an air stripper or filtration unit.

Filtration: A process used for the removal of solids and metals such as manganese from **ground water** by passing it through a porous material.

Ground Water: The water beneath the earth's surface that flows through the soil and rock openings and often serves as a principal source of drinking water.

Hazard Index: The ratio between the average estimated dose of a toxicant received by a human population and the reference dose. The reference dose is an average daily lifetime dose believed to

be without adverse effects in human populations.

Hydrogeologic: Refers to the properties and movement of **ground water** in the **aquifer** underlying the site and the surrounding area.

Maximum Contaminant Levels (MCLs): Enforceable standards for public drinking water supplies under the Safe Drinking Water Act. Also referred to as drinking water standards.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): The Federal regulation that guides the **Superfund** program.

National Priorities List: EPA's list of the nation's top priority hazardous waste sites that are eligible to receive federal money for response under **Superfund.**

Potentially Responsible Party (PRP): An individual(s) or company(ies) (such as owners, operators, transporters, or generators) potentially responsible for, or contributing to, the contamination problems at a **Superfund** site. Whenever possible, EPA requires PRPs, through administrative and legal actions, to clean up hazardous waste sites they have contaminated.

Present Worth: A term used to indicate the discounting of sums to be received in the future to their present value equivalent, or the amount which will accumulate to the required sum if invested at prevailing interest rates.

Publicly Owned Treatment Works (POTW): Publicly owned facility which provides treatment of waste waters from public water systems.

Record of Decision (ROD): A legal document that describes the final remedy selected for a Superfund site and the reasons why the remedy was selected. It summarizes the results of the RI/FS reports and the comments received during the comment period for the proposed plan.

Recovery Well: A well used to extract contaminated ground water from the aquifer for subsequent treatment.

Remedial Investigation/Feasibility Study (RI/FS): A two part study of a hazardous waste site that supports the selection of a remedial action for a site. The first part, the RI, identifies the nature and extent of contamination at the site. The second part, the FS identifies and evaluates alternatives for addressing the contamination.

Resource Conservation and Recovery Act (RCRA): A federal law that established a regulatory system to track hazardous substances from the time of generation to disposal. The law requires safe and secure procedures to be used in treating, transporting, storing, and disposing of hazardous substances. RCRA is designed to prevent new, uncontrolled hazardous waste sites.

Risk Assessment: A means of estimating the amount of harm which a Superfund site could cause to human health and the environment. The objectives of a risk assessment are (1) to help determine the need for action by estimating the harm if the site is not cleaned up, (2) to help determine the levels of chemicals that can remain on the site and still protect health and the environment, and (3) to provide a basis for comparing different cleanup methods.

Superfund: The common name used for **CERCLA**.

Treatability Study: A study conducted before implementation of a particular technology (e.g., **filtration**) to gather further information needed to evaluate technology performance.

Volatile Organic Compound (VOC): An organic (carbon-containing) compound that readily evaporates (volatilizes) under atmospheric conditions.

Well Head Treatment: Treatment of groundwater which is provided in individual residences or commercial establishments, as opposed to large scale treatment as in a public water supply.