



## PROPOSED PLAN OF REMEDIAL ACTION

Millsboro TCE Groundwater Contamination Site  
(a k a Millsboro Public Well TCE Site)  
Millsboro, Delaware  
DNREC Project No. DE-1361



August 2007

Delaware Department of Natural Resources and Environmental Control  
Division of Air and Waste Management  
Site Investigation & Restoration Branch  
391 Lukens Drive  
New Castle, Delaware 19720

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**Approval:**

This Proposed Plan meets the requirements of the Hazardous Substance Cleanup Act.

	Approved by:
James D. Werner, Director Division of Air & Waste Management	
24 AUG 2007	Date

## Millsboro TCE Groundwater Contamination Site



### What is the Millsboro TCE Groundwater Contamination Site?

The Site is a Hazardous Substance Cleanup Act (HSCA) site located in Millsboro, Delaware (Figure 1). The Site itself consists of a source area for trichloroethylene (TCE), located at the intersection of Wharton Street and S. DuPont Highway, a TCE recovery area, located at Church Street, and the impacted groundwater plume under the privately owned properties in between the source area and the two (2) public supply wells (Figure 2). The TCE source area is currently an open, vacant lot (Figure 3). The TCE source area was the former location of poultry vaccine manufacturing plant. The TCE recovery area currently consists of two (2) public water supply wells in the surficial aquifer in the Town of Millsboro (TOM)'s present well field.

**Affected Tax Parcels include all or part of:** 1-33-17.13-11.00; 1-33-17.13-12.00; 1-33-17.13-12.01; 1-33-17.13-14.00; 1-33-17.13-14.01; 1-33-17.13-15.00; 1-33-17.13-15.01; 1-33-17.13-15.02; 1-33-17.13-17.00; 1-33-17.13-150.00; 1-33-17.13-150.01; 1-33-17.13-151.00; 1-33-17.13-152.00; 1-33-17.13-154.01; 1-33-17.13-155.00.

**Nearest major intersections:** Wharton Street & S. DuPont Highway and Church Street & Sussex Alley.

**Area:** The area of known TCE impacted groundwater is approximately 1500 feet long by 300 feet wide.

**Surrounding Property:** Surrounding land use is primarily a mix of residential (houses, apartments and townhomes) and light commercial.

**Site Utilities:** These properties have city water and sewer service.

**Nearest surface water body:** Millsboro Pond, 3,000 ft. north from the source area. The Site is not within the 100-year flood plain. It is flat.

**Groundwater:** Shallow groundwater at the Site flows to the north towards Millsboro Pond. The City of Millsboro water supply wells are located within the recovery area of the Site.

### What happened at the Millsboro TCE Groundwater Contamination Site?

The TCE source area was used for the manufacturing of poultry vaccines between 1952 and August 1999. Previous owners and/or operators of the source area property included: Delaware Poultry Laboratories, Inc., Sterwin Laboratories, Mallinckrodt Veterinary, Inc. and Schering-Plough Animal Health Corporation. The poultry vaccine manufacturing building was demolished in December 1999. The operation of the TCE source area as a poultry vaccine manufacturing plant

resulted in the release of hazardous substances, including TCE, into the soil and groundwater.

### **What is the environmental problem at the Millsboro TCE Groundwater Contamination Site?**

Due to the operation of the TCE source area as a poultry vaccine manufacturing facility, surface and subsurface soils have become contaminated with TCE, a man-made chlorinated volatile organic compound. The groundwater underneath the source area, and within the plume emanating to the north, has also been contaminated with TCE at levels exceeding the Maximum Contaminant Level (MCL) for TCE in drinking water of 5 parts per billion (ppb). The groundwater is currently being used for drinking water by the TOM and is currently being treated with granulated activated carbon (GAC) to meet the drinking water standard in order to be protective of human health.

The TCE source area was subject to the removal of several underground storage tanks (USTs) and aboveground tanks (ASTs) containing fuel oil, propane and diesel between the late 1980's and late 1990's. A Phase I and a Phase II Investigation was conducted on properties, which included the TCE source area, by Metcalf & Eddy in 1997. The investigation included soil borings, and soil and ground water sampling of the TCE source area. This investigation showed that the only adverse environmental impact on the property at the time was from the release of petroleum hydrocarbons from a UST. A hydrogeologic investigation of former UST locations on several properties, which included the TCE source area, was then conducted by Environmental Resources Management in 1998. Additional groundwater investigation and groundwater monitoring were also conducted at the property between 1998 and 2001 leading to the issuance of a No Further Action (NFA) letter from the Tank Management Branch (TMB) in 2001.

During the week of October 17, 2005, routine Division of Public Health Office (DPH) Office of Drinking Water (ODW) sampling in the Dagsboro area identified TCE contamination in a new connection to the TOMs supply wells. The DPH issued a Public Notice requiring the contaminated supply wells to be taken offline and the use of supplied water by residents of Millsboro and Dagsboro. GAC treatment systems were installed on the impacted Millsboro water supply wells in November 2005 and the Public Notice was lifted by the DPH in late November and early December 2005.

In December 2005, DNREC's consultant, EA Engineering, Inc. (EA), initiated a Site Investigation (SI) to determine the source of the TCE contamination in the TOM supply wells. The sampling program began with the collection of groundwater grab samples from multiple depths at locations on the TOMs Water Plant property (Figure 2), which is located on Church Street. Groundwater grab samples were then collected from multiple depths at sample locations to the east, west and south of the impacted water supply wells in an upgradient direction. An exceptionally high concentration of TCE was found in the shallow groundwater sample from a property that was later identified as the source area. A geophysical survey was conducted on that

property and several anomalies were identified, investigated and subsequently removed. Two (2) USTs that may have served as dry wells and/or septic systems were found on the TCE source area property with very high concentrations of TCE in their sludge as well as in the surrounding soils. Approximately 209 tons of contaminated media including these tanks were subsequently removed as part of an interim action. Additional groundwater samples were also collected in the vicinity of Wharton Street and DuPont Highway to further define the source of the TCE groundwater contamination.

In August 2006, four (4) indoor air samples were collected by EA from the residence adjacent to the TCE source area property to determine if volatilization of TCE from groundwater would pose an unacceptable human health risk to the occupants. There was no TCE or its degradation products detected in any of the indoor air samples collected.

As a result of the SI sampling, DNREC determined that surface and subsurface soils in the source area were contaminated with TCE. Unless the source area contamination is remediated, it could pose an unacceptable human health risk to people residing at the site or to construction workers who would perform redevelopment activities at the TCE source area property. The groundwater flowing beneath the TCE source area property towards the TOMs supply wells is contaminated with TCE and poses an unacceptable human health risk to people drinking the water unless it is remediated.

### **What does the owner want to do at the Millsboro TCE Groundwater Contamination Site?**

The property owner, H. Dennis Lasher, was planning to develop the TCE source area property into a commercial business site after remediation of the most heavily contaminated soils has been completed, necessary for safe redevelopment of the site.

The plans for site redevelopment, following the environmental cleanup, will most likely include debris removal, re-grading, and then construction of the new site structures and landscaping.

### **What clean-up actions have been taken at the former Millsboro TCE Groundwater Contamination Site?**

In order to remove the sources of contamination and mitigate any potential off-site migration of contamination, as well as reduce on-site hazards, a series of interim actions have taken place at the site. In June 2006, in order to prevent further groundwater degradation, surface and subsurface soils in the vicinity of the two (2) USTs containing TCE sludge at the source area property were excavated and properly disposed of off-site. In addition, a septic tank system and all subsurface piping encountered by DNREC during the investigation of the source area property were also excavated and properly disposed of off-site.

## **What additional clean-up actions are needed at the former Millsboro TCE Groundwater Contamination Site?**

A final Focused Feasibility Study (FFS) for groundwater was approved by DNREC in May 2007. An addendum to the FFS to include soil was approved by DNREC in July 2007.

DNREC's clean-up plans include: the in-situ chemical oxidation treatment of soil and groundwater at the TCE source area property and in the TCE groundwater plume; the injection of a zero valent iron (ZVI) into the groundwater to form a permeable reactive barrier (Figures 4 & 5); continued pumping and point-of-use treatment with GAC for the impacted water supply wells; additional investigation and site characterization; the installation of monitoring wells and additional recovery wells within the TCE groundwater plume if necessary and land-use controls.

The following cleanup actions are proposed for the Millsboro TCE groundwater contamination site:

1. Treatment of surface and subsurface soils at the TCE source area property via in-situ chemical oxidation injection to be protective of human health and the environment.
2. Treatment of groundwater at the TCE source area property and within the TCE groundwater contaminant plume via in-situ chemical oxidation and injection of zero valent iron to meet cleanup standards at the point(s) of exposure and within the plume.
3. Continued pumping and point-of-use treatment with GAC for the impacted water supply wells and any additional recovery wells installed within the TCE groundwater contaminant plume.
4. An operation and maintenance plan (O & M plan) for the site will be drafted to assure that any protective measures are properly maintained.
5. Additionally, environmental covenants will be placed on the source area property limiting its reuse to industrial or commercial use only.

## **What are the long term plans for the Millsboro TCE Groundwater Contamination site after the cleanup?**

The long term plans, or requirements by DNREC for the TCE source area property may include commercial redevelopment, with site reuse limited through the use of an environmental covenant to restrict the property to industrial or commercial reuse. Additionally, an O&M plan will be prepared and submitted to DNREC for approval in order to maintain the integrity of the remedy at the site and the safety and future site redevelopment. Current and future owners of the property will be responsible for the implementation of all aspects and costs of the approved remedy, including all requirements of the final plan of remedial action, the DNREC

approved contaminated materials management plan and O&M plan, and the adherence to the requirements and conditions established in the uniform environmental covenants for the site. All costs to date have been have been paid by DNREC from the HSCA Fund. DNREC will pursue cost recovery for all expenses from the former and current owners and/or operators of the property.

DNREC plans to issue a Certificate of Completion of Remedy for the site after the completion of clean-up, the redevelopment of the property, and the implementation of the uniform environmental covenants at the site.

### **How can I find additional information or comment on the Proposed Plan?**

The complete file on the site including the Site Investigation/Focused Feasibility Study is available at the DNREC office, 391 Lukens Drive in New Castle. Most documents are also found on:

<http://www.dnrec.state.de.us/dnrec2000/Divisions/AWM/sirb/>

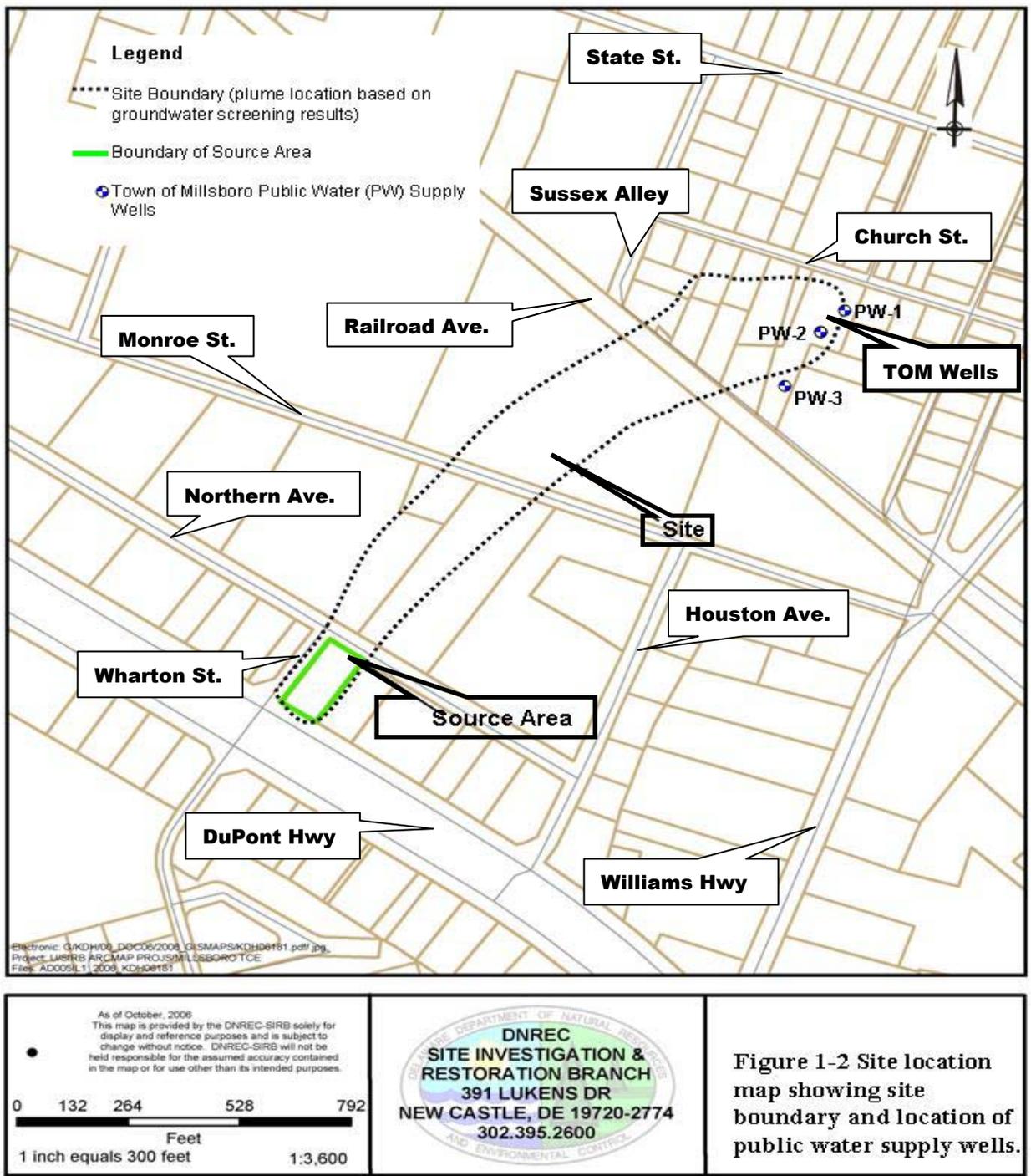
The 20-day public comment period begins on August 29, 2007 and ends at close of business (4:30 pm) on September 17, 2007. Please send written comments to the DNREC office or call Robert C. Asreen, Jr., Project Manager, at: 302-395-2600.

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RCA07058.doc  
DE 1361 II B 8



<p>As of August 2007</p> <p>This map is provided by the DNREC-SIRB solely for display and reference purposes and is subject to change without notice. DNREC-SIRB will not be held responsible for the assumed accuracy contained in the map or for use other than its intended purposes.</p> <p>0 0.25 0.5 Miles</p> <p>1 inch equals 1,250 feet 1:15,000</p>	<p>DEPARTMENT OF NATURAL RESOURCES  <b>DNREC</b>  <b>SITE INVESTIGATION &amp; RESTORATION BRANCH</b>      391 LUKENS DR      NEW CASTLE, DE 19720-2774      302.395.2600</p> <p>AND ENVIRONMENTAL CONTROL</p>	<p><b>FIGURE 1</b>  <b>SITE LOCATION MAP</b></p>
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**Figure 1: Millsboro TCE Groundwater Contamination Site Location Map**

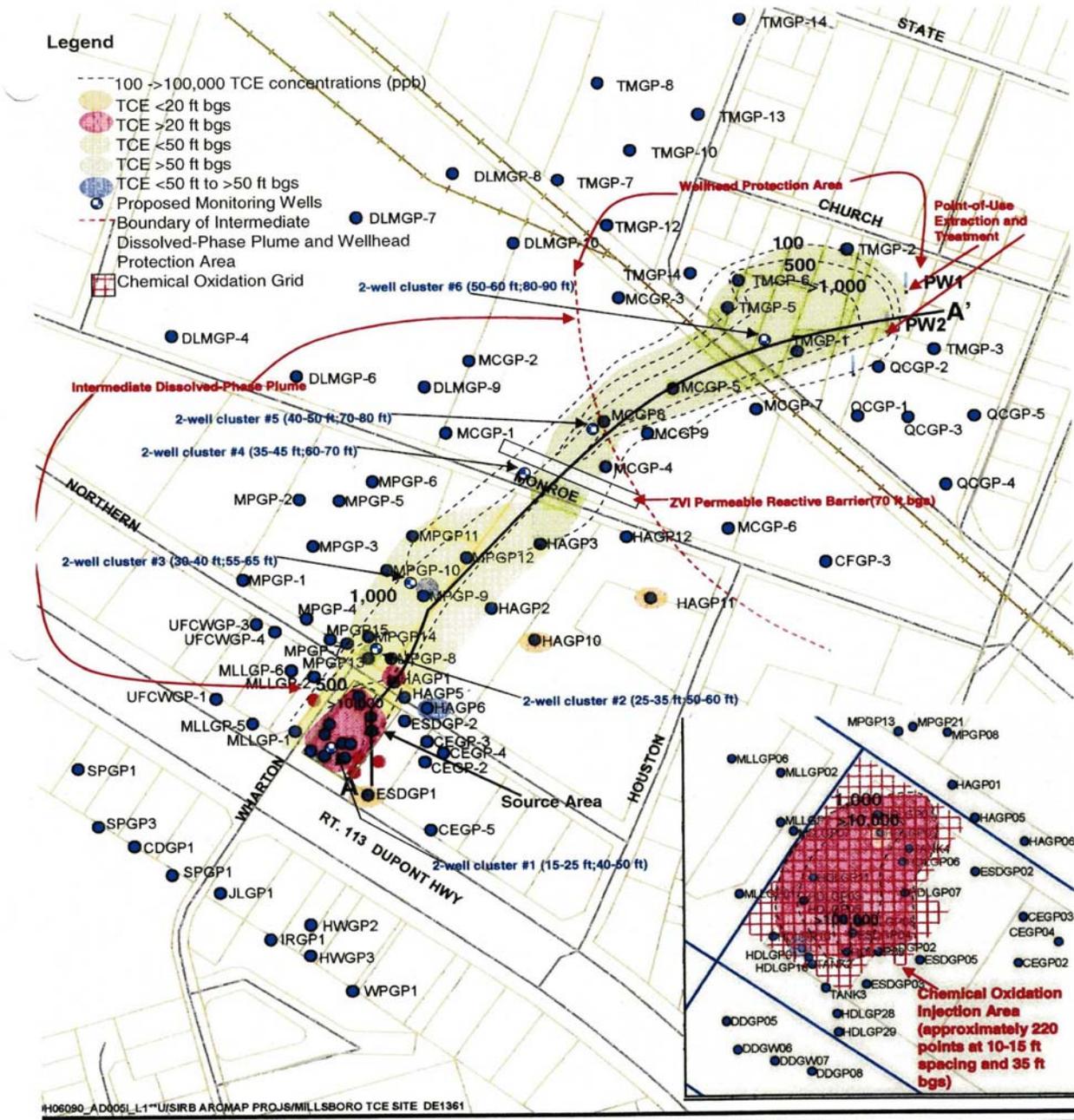


**Figure 2. Site Location Map showing site boundary based on groundwater screening results, source area and location of public supply wells.**

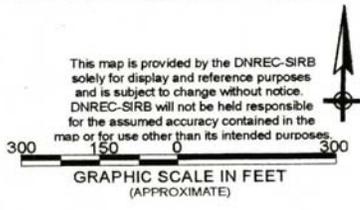


**Figure 3. View of Millsboro's Water Tower from the TCE source area at Wharton Street and 225 W. DuPont Highway.**





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DNREC  
 SITE INVESTIGATION &  
 RESTORATION BRANCH  
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Figure 3-2  
 Alternative 3, *In Situ* Chemical  
 Oxidation/Zero Valent Iron (ZVI)  
 Barrier/Point-of-Use  
 Treatment

Figure 5. Proposed Remedial Alternatives for Groundwater for Millsboro TCE Groundwater Contamination Site

## Glossary of Terms Used in this Proposed Plan

<b>Brownfield</b>	Property that is vacant or underutilized because of the perception or presence of an environmental problem
<b>Certificate of Completion of Remedy (COCR)</b>	Upon completion of all tasks (except operations and maintenance) specified in the Final Plan, the person cleaning up a site, or the owner of a site, may apply for a COCR. When issued, a COCR is recorded on the county tax records for a property, identifying the property as having been cleaned up as specified in the Final Plan. A COCR may include conditions or restrictions.  A checklist of the requirements for a COCR is at <a href="http://www.dnrec.state.de.us/dnrec2000/Divisions/AWM/sirb/misc%5CJGC07004.pdf">http://www.dnrec.state.de.us/dnrec2000/Divisions/AWM/sirb/misc%5CJGC07004.pdf</a>
<b>Contaminant of Concern (COC)</b>	These are potentially harmful substances at concentrations above acceptable levels (e.g. metals and PAH).
<b>Contamination</b>	The introduction of harmful or hazardous matter into the environment
<b>Exposure</b>	Contact with a substance through inhalation, ingestion, or direct contact with the skin. Exposure may be short term (acute) or long term (chronic).
<b>Environment</b>	The navigable waters, the waters of the contiguous zone, ocean waters, and any other surface water, groundwater, drinking water supply, land surface or subsurface strata or ambient air within the State.
<b>Facility Evaluation (FE)</b>	If the initial investigation indicates a release or imminent threat of release, DNREC conducts an FE to assess the related risk. This may consist of a review of general facility and existing information and/or a field investigation, including sampling of soil, air, groundwater, surface water, sediments, and animals or plants as appropriate. The scope is flexible and depends on the specific conditions of the facility.
<b>Feasibility Study (FS)</b>	A study undertaken to develop, screen and evaluate options for remedial action, performed after or in combination with a Remedial Investigation (RI).
<b>Final Plan of Remedial Action (“Final Plan” or FPRA)</b>	DNREC’s plan for cleaning up a hazardous site after it has been reviewed by the public; the written determination by the Secretary, of appropriate action for remediation of a release at or from a facility to protect public health, welfare, or the environment.
<b>Groundwater</b>	Water below the land surface in the zone of saturation.
<b>Groundwater Management Zone (GMZ)</b>	A geographical area where DNREC restricts drilling for ground water because it is or may be contaminated.

<b>Hazardous Substance Cleanup Act (HSCA)</b>	7 <i>Delaware Code</i> , Chapter 91. Found at <a href="http://www.delcode.state.de.us/title7/c091/index.htm#P-1_0">http://www.delcode.state.de.us/title7/c091/index.htm#P-1_0</a> In 1990, Delaware enacted HSCA to deal with potentially harmful sites in the state that will not receive the attention of the federal government. In July of 1995, HSCA was amended to encourage voluntary cleanup of sites and restoration of “brownfields.”
<b>Interim Action</b> <i>or</i> <b>Interim Response Activity</b>	The containment, cleanup, or removal of a release or imminent threat of release of hazardous substances from a facility, or the taking of other actions, prior to the selection of a remedial action, as may be necessary to prevent, minimize, or mitigate threat to public health, welfare, or the environment.  If DNREC determines that an interim measure is necessary, it may require interim response activities to be conducted. These activities may occur any time during the cleanup process.
<b>No Further Action (NFA)</b>	A No Further Action decision can be issued at the end of an investigation or the completion of the remedy. NFA means that no known danger exists at the site.
<b>Operations &amp; Maintenance (O&amp;M)</b>	The activities necessary to provide for continued effectiveness and integrity of a remedial action after it is completed.  O&M includes all activities needed to ensure effective operation of the remedy under both normal conditions and emergencies. Post-cleanup compliance monitoring (regular testing to determine if the prescribed cleanup levels have been met and if the treated effluent or emission meets discharge requirements) is often included under O&M.
<b>Owner or Operator</b>	(a) Any person owning or operating a facility.  (b) Any person who previously owned, operated, or otherwise controlled activities at a facility.  (c) The term "owner or operator" does not include an agency of the State or unit of local government that acquired title or control of the facility involuntarily through bankruptcy, tax delinquency, abandonment or other circumstances.  (d) The term "control" does not include regulation of the activity by a federal, state or local government agency.  (e) The term "owner or operator" does not include a person, who, without participating in the management of a facility, holds indicia of ownership primarily to protect his security interest in the facility.
<b>Proposed Plan of Remedial Action (“Proposed Plan” or PPRA)</b>	A plan for cleaning up a hazardous site submitted by DNREC for public review and comments; a detailed plan describing cleanup actions and related information for the containment or permanent removal and disposal of hazardous substances from a facility, or other measures to protect public health, welfare, and the environment.

<b>Regulations</b>	As used under HSCA, the Delaware <i>Regulations Governing Hazardous Substance Cleanup</i> , found at <a href="http://www.dnrec.state.de.us/dnrec2000/Divisions/AWM/sirb/DOCS/PDFS/Misc/fdb99085.pdf">http://www.dnrec.state.de.us/dnrec2000/Divisions/AWM/sirb/DOCS/PDFS/Misc/fdb99085.pdf</a>
<b>Remedial Action (RA)</b>	The containment, contaminant mass or toxicity reduction, isolation, treatment, removal, cleanup, or monitoring of hazardous substances released into the environment, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate harm or risk of harm to the public health, welfare, or the environment which may result from a release or an imminent threat of a release of hazardous substances.  After the remedy selected in the Final Plan has been designed and specified, its implementation becomes the RA. The RA should follow the approved design and achieve all performance measures.
<b>Site Investigation and Restoration Branch (SIRB)</b>	The branch within DNREC's Division of Air and Waste Management (DAWM) which carries out HSCA and the Regulations, overseeing cleanup and restoration of hazardous substance sites..
<b>Surface Water</b>	The waters of the State of Delaware, occurring on the surface of the earth.
<b>Uniform Environmental Covenants Act (UECA)</b>	A standardized form of a land use restriction that is recorded on the deed and runs with the land.

## **What is a *Proposed Plan*?**

A Proposed Plan of Remedial Action (Proposed Plan) is a summary of how DNREC plans to clean up a contaminated site. A Final Plan of Remedial Action (Final Plan) is the adoption of the Proposed Plan, after all comments made by the public within the comment period of twenty days have been considered and addressed by DNREC.

The Delaware State Legislature passed the Hazardous Substance Cleanup Act (HSCA) in 1990. The Legislature made sure that members of the public would be informed about environmental problems in their own neighborhoods and have a chance to express their opinion concerning the clean up of those environmental problems before DNREC takes action.

After DNREC studies a site, it summarizes the problems there and proposes one or more possible solutions in a Proposed Plan. The Proposed Plan contains enough information to allow lay persons to understand the site. More detailed information can be found in the reports and documents approved by DNREC. All of the documents and reports created by DNREC or consultants during the course of the investigation of the site are available to the public at the offices of DNREC-SIRB or at DNREC's website:

<http://www.dnrec.state.de.us/dnrec2000/Divisions/AWM/sirb/sitefiles.asp> .

DNREC issues the Proposed Plan by advertising it in at least one newspaper in the county where the site is located. The legal notices for the Proposed Plans and the Final Plans usually run on Wednesdays or Sundays in the legal classified section of the News Journal and/or the Delaware State News. The public comment period begins on the day (Wednesday), or the day after (Sunday) the newspaper publishes the legal notice for the Proposed Plan.

DNREC frequently holds public meetings during the comment period. Those meetings are usually held near the site in the evening. Citizens can request a public meeting if DNREC did not already schedule one.

Comments are collected at the public meetings, by phone or in writing. DNREC considers all comments and questions from the public before the Proposed Plan is finalized and adopted as a Final Plan.

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