HAZARD RANKING SYSTEM DOCUMENTATION PACKAGE
CAYUGA COUNTY GROUND WATER CONTAMINATION
TOWNS OF AURELIUS, FLEMING AND SPRINGPORT
CAYUGA COUNTY, NEW YORK

CERCLIS ID No.: NYN000204289

VOLUME 1 of 1

August 2001

Prepared by:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
290 Broadway
New York, New York 10007

SITE SUMMARY

The Cayuga County Ground Water Contamination site (Site) consists of a plume of contaminated ground water from an unknown source(s). The Site is located west of Syracuse in a rural area of Cayuga County, between the Village of Union Springs to the west and the City of Auburn to the northeast. The Site is in a rural area consisting of residential properties intermingled with extensive farmland and patches of woodlands. The homes in the area use private wells for potable water supply and septic systems for sanitary waste water disposal. The affected area is not serviced by a public water supply.

Through investigations conducted by the New York Departments of Health and Environmental Conservation and by the EPA, over 300 drinking water supplies have been sampled as of April 2001. As a result of these sampling events, EPA determined that 51 residential wells are contaminated with volatile organic compounds (VOCs), primarily vinyl chloride, Trichloroethylene (TCE) and cis-1,2,dichloroethylene (cis-1,2,DCE), in concentrations above the Federal maximum contaminant levels (MCLs). Twenty-four of these drinking water supply wells are contaminated above EPA's Removal Action Levels (RALs) for vinyl chloride and/or cis-1,1,DCE of 2 ppb and 400 ppb, respectively.

As of July 2001, EPA has installed 55 treatment systems to treat contaminated water from 52 wells as part of a time critical Removal Action. Two large dairy farms in the impacted area have had air-stripper treatment systems installed; at these farms water is used for both residential drinking water and for livestock (approximately 1500 dairy cows). A treatment system installed on a well at a child day care facility exhibited partial breakthrough of contaminants in May, 2001, however, contamination was contained due to built-in redundancy in the treatment system.

The suspected extent of the plume covers an area of approximately 3,050 acres or 4.8 square miles and falls within three townships, Aurelius, Fleming and Springport. The plume extends from the Village of Union Springs to the Auburn City limits, a distance of seven miles, and has approximately 120 homes within its boundaries.

The ground water flow system consists of three hydrological units: the overburden, shallow bedrock (Onondaga, Oriskany, and Manlius Formations) and the deep bedrock (Rondout, Cobleskill and Bertie Formations). Downward hydraulic gradients exist throughout, but are particularly strong between the shallow and deep bedrock units, with water-level differences in excess of 40 feet observed during dry periods of the year.

An observed release of vinyl chloride, TCE and cis-1,2 DCE has been documented by chemical analysis of ground water samples collected from private wells during an April, 2001 sampling event. Level 1 contamination is documented for 49 wells during an April 2001, EPA sampling event. According to information provided by NYSDEC and preliminary information gathered by EPA, the source of the groundwater contamination at the Site has not been determined. Due to these conditions, the State of New York requested that EPA place the site on the NPL on June 7, 2001.

HRS DOCUMENTATION RECORD--REVIEW COVER SHEET

Name of Site: Cayuga County Ground Water Contamination

Contact Persons

Site Investigation: Ildefonso Acosta (212) 637-4344
U.S. Environmental Protection Agency
New York, NY

Documentation Record: Dennis Munhall (212) 637-4343
U.S. Environmental Protection Agency
New York, NY

Pathways, Components, or Threats Not Evaluated

An observed release to ground water by chemical analysis is documented. The Ground Water Migration Pathway alone produces an overall score well above the minimum required for the site to qualify for the National Priorities List; The surface water, soil exposure, and air pathways were not evaluated at this time due to a lack of sufficient documentation to support a scoring analysis.

HRS DOCUMENTATION RECORD

Name of Site: Cayuga County Ground Water Contamination

EPA ID No. : NYN000204289

EPA Region: 2 Date Prepared: August 2001

Street Address of Site: State Route 326

County and State: Cayuga, NY

General Location in the State: Finger Lakes

Topographic Map: Cayuga, New York, quadrangle, 1954, 7.5 minute series

Latitude: 42°52'50" Longitude: 76°38'33" (Ref. 19, pp. 1-3)

Reference Point: This site is a plume with no known source(s). Therefore, the latitude and longitude was chosen at a point approximately in the center of the area of known contamination.

Scores

Ground Water Pathway	100.00
Surface Water Pathway	Not Scored
Soil Exposure Pathway	Not Scored
Air Pathway	Not Scored
HRS SITE SCORE	50.00

WORKSHEET FOR COMPUTING HRS SITE SCORE

		S	S^2
1.	Ground Water Migration Pathway Score (S_{gw}) (from Table 3-1, line 13)	100.00	10,000
2a.	Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	Not Scored	
2b.	Ground Water to Surface Water Migration Component (from Table 4-25, line 28)	Not Scored	
2c.	Surface Water Migration Pathway Score (S_{sw}) Enter the larger of lines 2a and 2b as the pathway score.	Not Scored	
3.	Soil Exposure Pathway Score (S_s) (from Table 5-1, line 22)	Not Scored	
4.	Air Migration Pathway Score (S_a) (from Table 6-1, line 12)	Not Scored	
5.	Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$	10,000	
6.	**HRS Site Score** Divide the value on line 5 by 4 and take the square root	50.00	

REFERENCES

Reference
Number Description of the Reference

1. U.S. EPA Hazard Ranking System, 55 FR51 333 (40 CFR Part 300, Appendix A), December 14, 1990. (165 pages)

2. USEPA, Superfund Chemical Data Matrix, SCDM Data Version: JUN96, February 18, 1997. [4 pp.]

3. USGS, Cayuga, New York, 1954 quadrangle, 7.5 minute series, topographic map. (1 map)

4. Harmon, Jack, USEPA, Removal Action Branch, MEMORANDUM: Documentation of Verbal Authorizations and Request for a Ceiling Increase for a Removal Action at the Union Springs Wells Road Groundwater Contamination Site, Union Springs, Cayuga County, New York, May 21, 2001. [22 pp.]

5. Cahill, John P., New York State Department of Environmental Conservation, Letter to William J. Muszynski, Acting Regional Administrator USEPA Region 2 Requesting Cayuga County Groundwater Contamination Site be nominated to National Priorities List, June 7, 2001. [1 p.]

6. Severn Trent Services, Laboratory Report, Analytical Package for Earth Tech Inc. Cayuga County Groundwater Site (project 43583), Cayuga County, NY, Water Samples, April, 2001, May 3, 2001 [51 pp.]

7. Severn Trent Services, Laboratory Report, Analytical Package for Earth Tech Inc. Cayuga County Groundwater Site (43583), Cayuga County, NY, Water Samples, April, 2001, May 9, 2001. [66 pp.]

8. Severn Trent Services, Laboratory Report, Analytical Package for Earth Tech Inc. Cayuga County Groundwater Site (43583), Cayuga County, NY, Water Samples, April, 2001, May 10, 2001. [39 pp.]

9. Severn Trent Services, Laboratory Report, Analytical Package for Earth Tech Inc. Cayuga County Groundwater Site (43583), Cayuga County, NY, Water Samples, April, 2001. [37 pp.]

10. Capriglione, Michele, Region II Superfund Site Assessment Team (SAT)(Roy F. Weston, Inc.), Project Note: Global Positioning System (GPS) Collection Methodology, July 2, 2001. [53 pp.]

11. Van Diver, Bradford B., Roadside Geology of New York, Mountain Press Publishing Company, Missoula, MT, April, 1994. [12 pp.]

12. Isachsne, Y.W., et. Al., Geology of New York, A Simplified Account (Educational Leaflet No. 28), New York State Museum/Geological Survey, The State Education Department, The University of the State of New York, Albany, NY, 1991. [26 pp.]

13. Dunn Geoscience Corp, Phase IV Subsurface Investigation Report: Former Powerex, Inc. Facility, Auburn, New York, September 13, 1991. [89 pp.]

14. Harding Lawson Associates, Preliminary Assessment Data Summary Report, Wellfield Contamination Investigation, Union Springs, New York, June 2001. [137 pp.]

15. Welling, W.B., Engineering Geologist, Cross-Section Projected along Bluefield and Experimental Roads, February 5, 2001. [1 p.]

16. Acosta, Ildesfonso, U.S. EPA, Project Note to Cayuga County Groundwater Contamination site file: Well Treatment System - System Breakthrough, July 18, 2001. [1 p.]

17. New York State Department of Health (NYSDOH), Environmental Exposure Investigation Laboratory Report, December 2000, March 2001, and May 2001. [33 pp.]

18. Roy F. Weston, Inc., Sampling Trip Report, Union Springs Wells Site, Towns of Aurelius, Fleming, and Springport, Cayuga County, New York, April 30, 2001. [44 pp.]

19. Munhall, Dennis, U.S. EPA, Sample Number Cross Reference, August 8, 2001. [1 p.]

20. Cutt, Diana, U.S. EPA Region 2, Worksheet for Calculating Latitude and Longitude, Cayuga Co. Groundwater Contamination Site, NY, August 2001. [3 pp.]

21. Roy W. Weston, Inc, map of Impacted Drinking Wells - TCE, DCE, and Vinyl Chloride, for USEPA Region 2, August 2001. [1 map]

22. U. S. EPA National Primary Water Regulations: Analytical Methods for Regulated Drinking Water Contaminants, 63 FR 47097 (40 CFR Parts 141 and 143), September 3, 1998 with attached analytical methods 502.2 and 524.2. [101 pp.]

SOURCE DESCRIPTION

2.2 SOURCE CHARACTERIZATION

Number of the source: 1

Name and description of the source:

Ground Water Plume (other)

Source 1 is considered to be a contaminated ground water plume because an observed release attributable to a specific source has not been documented.

The Cayuga County Ground Water Contamination site consists of a contamination plume defined by Level I vinyl chloride, trichloroethylene (TCE) and cis-1,2,dichloroethylene (cis-1,2,DCE) concentrations. The plume is defined as containing residential and agricultural wells identified as contaminated by vinyl chloride, TCE, and cis-1,2,DCE and meeting the criteria for an observed release (see Section 3.1). The contaminated wells are located in the Towns of Aurelius, Fleming and Springport, Cayuga County, New York. The plume is situated between the Village of Union Springs and the City of Auborn (Ref. 4).

In April 2001 EPA collected samples from the wells that had previously been documented as contaminated. Analytical results from samples collected indicated that many of the wells in the area were contaminated with volatile organic compounds (VOCs), primarily vinyl chloride, TCE and cis-1,2,DCE (Ref.4).

The April 2001, sampling indicated 41 wells contaminated as Level 1, though additional wells have been documented as contaminated in previous sampling events. To date, fifty four water treatment systems have been installed by EPA to remove VOCs at the well from impacted ground water. However, partial breakthrough has occurred at two of these wells (Ref 16).

The plume is approximately 4.77 miles long, or about 3,050 acres (Ref. 4, p. 3)

The New York State Department of Environmental Conservation (NYSDEC) conducted an investigation of several suspected sources in early 2001. NYSDEC concluded that the potential sources identified were not sources of the contamination evidenced in the impacted wells (Ref. 4, p. 4, Ref. 14 p. 4-1). As yet, no source has been identified; therefore the plume is being evaluated as a source.

Based on the these events, the State of New York requested that EPA include this area of contamination on the National Priorities List (NPL) on June 7, 2001 (Ref. 5 p. 1)

Location of the source, with reference to a map of the site:

The location of the site has been referenced as State Route 326 and Lockwood Rd, a point approximately in the center of the area of known contamination (Ref. 21). As this site is a plume with no known source, there is no source location information.

Containment

Release to ground water:

An observed release of contaminants (i.e., vinyl chloride, trichloroethylene (TCE) and cis-1,2,dichloroethylene (cis-1,2,DCE)) to ground water at concentrations significantly above background is documented by chemical analyses of samples collected from private wells by EPA in April, 2001. (Ref 4 pp. 2, Attachment C) Based on the fact that there is evidence of hazardous substance migration (as evidenced in the 41 Level I wells documented), and the fact that the source(s) is unknown, the containment factor for the ground water pathway is 10 (Ref. 1, Table 3-2).

2.4.1 Hazardous Substances

Hazardous Substance	Evidence	Reference
Vinyl Chloride	EPA Sampling Event, April, 2001	
(Max. conc. in water = 21 ppb) DL=0.5	Sample: 227993-13	Ref 9, p. 24
TCE	EPA Sampling Event April, 2001	
(Max. Conc. in water = 230D ppb) DL=25	Sample: 227862-31	Ref. 6, p. 35
cis-1,2,DCE	EPA Sampling Event April, 2001	
(Max. Conc. in water = 1200D ppb) DL=25	Sample: 227862-31	Ref. 6, p. 35

"D" indicates all compounds identified in an analysis at a secondary dilution fact

2.4.2 Hazardous Waste Quantity

2.4.2.1.1 Hazardous Constituent Quantity

The information available is not sufficient to evaluate Tier A source hazardous waste quantity; therefore, hazardous waste constituent is not scored (NS).

Hazardous Constituent Quantity Value (S): NS

2.4.2.1.2 Hazardous Wastestream Quantity

The information available is not sufficient to evaluated Tier B source hazardous waste quantity.

Hazardous Wastestream Quantity Value (W): NS

2.4.2.1.3 Volume

Based on analytical results of ground water samples collected by EPA in April 2001, it is apparent that a significant amount of contamination is present; however, the exact volume is unknown. A source waste quantity of >0 will therefore be assigned.

Volume Assigned Value: >0

Reference: 10, p. 4, 11, p. 1

2.4.2.1.4 Area

Area measurement (Tier D)cannot be evaluated, since Hazardous Waste Quantity Table 2-5 does not provide a divisor for the source type "other" in this tier.

Area of source (ft^2): not evaluated

Area Assigned Value: N/A

2.4.2.1.5 Source Hazardous Waste Quantity Value

The contaminated ground water plume in the vicinity of the Cayuga County Ground Water Contamination site is considered to be the source. To date, no source has been identified (Ref. 4 p. 4, Ref 14 p. 4-1). Analytical results of ground water samples collected by EPA in April 2001, indicate that some amount of contamination is present; however, the exact volume is unknown (Ref. 6-9, multiple pages). Therefore, a source waste quantity of >0 is assigned.

Source Hazardous Waste Quantity Value: >0

SITE SUMMARY OF SOURCE DESCRIPTIONS

Source Number	Source Hazardous Waste Quantity Value	Containment			
		Ground Water	Surface Water	Air	
				Gas	Particulate
1	>0	10	NE	NE	NE

NE = Not Evaluated

3.0 GROUND WATER MIGRATION PATHWAY

3.0.1 General Considerations

The site is located at the northern edge of the Allegheny Plateau physiographic province in the Finger Lakes region. This province is marked to the north by an escarpment known as the Onondaga Scarp, which marks the boundary between the Allegheny Plateau and the Erie Lowlands. The northern boundary of the scarp in the project area occurs just to the north of the site and trends in a southwesterly direction along the western edge of the site to Cayuga Lake and the Union Springs area (Refs. 13, p. 5-1; 12). The bedrock in the project area dips generally to the south at approximately 35 to 100 feet per mile (Refs. 13, p. 5-1,15). Middle Devonian age limestone bedrock of the Onondaga Formation subcrops in the northern portion of the site, just below a layer (5-25 feet) of glacial deposits, which are generally comprised of a) glaciolacustrine deposits composed of clay silt and fine sand and b) glacial till, a poorly sorted mixture of gravel, cobbles and boulders in a clayey silt matrix (Refs. 11, 12 and 13, pp. 5-12, 5-13 and 5-20). Thin (approx. 3 inches) remnants of the Devonian age Oriskany Sandstone Formation exist locally below the Onondaga Limestone (Ref 13,
p. 5-21). To the south, younger shale bedrock of the Hamilton Group lies below the glacial material and above the Onondaga limestone (Refs. 11 and 15). These rocks are underlain by limestone of the early Devonian age Manlius Formation, which are in turn underlain by Silurian age carbonates (predominantly dolomite) of the Rondout, Cobleskill and Bertie Formations (Refs. 12 and 13, p. 5-20).

The ground water system of concern at this site consists of the overburden (glacial deposits) and carbonate bedrock aquifers. The project area is not serviced by a public water supply. Ground water is the only source of water supply, with most of the ground water pumpage occurring within the bedrock aquifer (Ref. 14, Appendix B). Recharge occurs to the upper bedrock from the overburden deposits and to the lower bedrock from the upper bedrock, thus the aquifers are hydraulically connected (Ref. 13, page 6-6). The deep bedrock may also receive some localized recharge due to sinking streams in the area (Ref. 13, p. 6-6).

The water table in the glacial deposits is located just below ground surface, except during the summer when significant desaturation occurs. Ground water flow in the overburden aquifer is influenced by underground utilities (i.e., storm sewers) and surface features such as drainage ditches and streams. There is also a downward flow component into the underlying bedrock. Typical hydraulic conductivity values in the overburden in the northeastern portion of the site range from 1.8×10^{-5} to 1.9×10^{-3} cm/sec. (Ref. 13, pp. 6-4, 6-6 and 6-22)

Ground water levels in the shallow bedrock, which is generally comprised of the Devonian age limestones (approximately the upper 45 feet of bedrock), in the northeastern portion of the project area generally mimic those in the overburden. Ground water in the shallow bedrock discharges locally at streams where the bedrock outcrops with some flow downward to deeper bedrock units due to large vertical gradients. Shallow bedrock horizontal hydraulic conductivity values in the northeastern portion of the site range from 7.8×10^{-6} to 6.4×10^{-3} cm/sec and those in the deeper bedrock range from 1.8×10^{-5} to 6.4×10^{-3} cm/sec. (Ref. 13, p. 6-6, 6-27 and 6-31).

Regional ground water flow in the lower bedrock in the project area is generally to the west-southwest toward Cayuga Lake, which likely acts as a local to sub-regional ground water discharge area. Artesian conditions have been observed in bedrock wells and springs in the Union Springs area. Localized flow patterns are likely influenced by residential and agricultural pumping wells. It has been reported that ground water in the southeast portion of the project area flows to the northwest and converges with ground water flowing to the southwest, resulting in an overall southwesterly flow direction. Residential wells within this area of convergence reportedly produce large volumes of water, which is likely attributed to large fractures and solution channels that trend along the strike of the bedding. The two Union Springs municipal water supply wells, which are located 2,500 feet north of the town center along Route 90, have a specific capacity of 34 to 52 gpm/ft and each well pumps at an average rate of 180 gpm. The wells extend 160 and 210 feet below ground surface (bgs) and both are 8 inches in diameter. Cavernous openings approximately 85 to 120 feet bgs have been reported in area of these wells. (Ref. 14, pp. 2-1, 2-3, 2-4, 3-6 and 3-9)

3.1 LIKELIHOOD OF RELEASE

3.1.1 Observed Release

Aquifers Being Evaluated: Surficial and Bedrock (Carbonate Rock) Aquifers

In April, 2001, EPA Collected ground water samples from private (residential and agricultural) potable wells. A review of the analytical data indicates that there is an observed release of vinyl chloride, TCE and cis-1,2,DCE to the aquifer of concern (Refs. 6, 7, 8, 9)

Based on a review of local and regional geologic publications, and interviews with local residents, the majority of the private wells at the site draw from the carbonate rock aquifer . However, shallower wells in the area may be screened in the overlying surficial aquifer (Ref. 14, Appendix B). Background information indicates that the surficial and bedrock aquifers are hydraulically interconnected. Stratified deposits of lacustrine clays and silts in the surficial aquifer may act as local semi-confining beds; however, it is thought that no continuous confining layers exist between the aquifers. Therefore, the surficial and bedrock aquifers are evaluated as a single hydrologic unit (i.e., the aquifer of concern) for HRS scoring purposes (Ref. 13).

Chemical Analysis

An observed release of vinyl chloride, TCE, and cis-1,2,DCE to ground water is documented by chemical analysis of ground water samples collected from private wells during the April, 2001, EPA sampling event (Ref. 6-9). Vinyl chloride was detected in contaminated samples exceeding the cancer risk benchmark concentration of 0.045 ppb (Ref. 2 p. 6) with a maximum concentration of 25 ppb detected in a residential well (Ref. 8 p. 22, Ref. 18 p. 37). Vinyl Chloride was not detected in the background sample. TCE was detected in contaminated samples exceed the MCL of 5 ppb (Ref 2 p. 5) with a maximum concentration of 230 ppb (Ref. 6 p. 35, Ref. 18 p. 40). TCE was not detected in background samples. Cis-1,2,DCE was detected above the MCL of 70 ppb (Ref. 2 p. 4)in residential wells with a maximum concentration of 1200 ppb (Ref. 5 p. 35, Ref. 18 p. 40). Cis,1,2-DCE was not detected in background samples. Release samples were analyzed for specific Volatile Organic Compounds (VOCs) in accordance with EPA Method 524.2, Background samples were analyzed using EPA Method 502.2. The analytical method used for the background samples has the same SQL as method 524.2 (Refs. 6, 7, 8, 9, 17 and 22). Therefore, while the methods are different, they both produce data of equivalent quality and are comparable quantitatively (Ref. 22).

Additional ground water sampling was conducted as part of NYSDEC's Preliminary Site Assessment in 2001. Using NYSDEC analytical method 95-4, a series of wells with comparable depths were found to have non-detected levels of vinyl chloride, TCE and DCE (Ref. 14, Appendix B, C, D). The data from this report further supports the use of non-detect background levels for the hazardous substances of concern.

Background Concentrations

Sample ID	Well Depth (feet)	Sample Location (On map)	Date of sample	References
200004438	225	BK1	12/2000	Ref. 17 p. 10, 12
200100712	225	BK1	3/2001	Ref. 17 p. 1, 3
200101451	225	BK1	5/2001	Ref. 17 p. 19, 21
200004403	250	BK2	12/2000	Ref. 17 p. 13, 15
200100714	250	BK2	3/2001	Ref. 17 p. 4, 6
200101402	250	BK2	5/2001	Ref. 17 p. 25, 27
200004560	293	BK3	12/2000	Ref. 17 p. 7, 9
200100727	293	BK3	3/2001	Ref. 17 p. 28, 30
200101403	293	BK3	5/2001	Ref. 17 p. 22, 24
200100709	200+	BK4	3/2001	Ref. 17 p. 31, 33

* Background samples were chosen for their comparability of well depths with target wells in the area of contamination

Sample ID	Hazardous Substance	Conc (ppb)	Quantitation Limit (ppb)	Reference
200004438	Vinyl Chloride	not detected	0.5	Ref. 17 p. 10
	TCE	not detected	0.5	Ref. 17 p. 10
	DCE	not detected	0.5	Ref. 17 p. 10
200100712	Vinyl Chloride	not detected	0.5	Ref. 17 p. 1
	TCE	not detected	0.5	Ref. 17 p. 1
	DCE	not detected	0.5	Ref. 17 p. 1
200101451	Vinyl Chloride	not detected	0.5	Ref. 17 p. 19
	TCE	not detected	0.5	Ref. 17 p. 19
	DCE	not detected	0.5	Ref. 17 p. 19
200004403	Vinyl Chloride	not detected	0.5	Ref. 17 p. 13
	TCE	not detected	0.5	Ref. 17 p. 13
	DCE	not detected	0.5	Ref. 17 p. 13
200100714	Vinyl Chloride	not detected	0.5	Ref. 17 p. 4
	TCE	not detected	0.5	Ref. 17 p. 4
	DCE	not detected	0.5	Ref. 17 p. 4

				GW-Observed Release
200101402	Vinyl Chloride	not detected	0.5	Ref. 17 p. 25
	TCE	not detected	0.5	Ref. 17 p. 25
	DCE	not detected	0.5	Ref. 17 p. 25
200004560	Vinyl Chloride	not detected	0.5	Ref. 17 p. 7
	TCE	not detected	0.5	Ref. 17 p. 7
	DCE	not detected	0.5	Ref. 17 p. 7
200100727	Vinyl Chloride	not detected	0.5	Ref. 17 p. 28
	TCE	not detected	0.5	Ref. 17 p. 28
	DCE	not detected	0.5	Ref. 17 p. 28
200101403	Vinyl Chloride	not detected	0.5	Ref. 17 p. 22
	TCE	not detected	0.5	Ref. 17 p. 22
	DCE	not detected	0.5	Ref. 17 p. 22
200100709	Vinyl Chloride	not detected	0.5	Ref. 17 p. 31
	TCE	not detected	0.5	Ref. 17 p. 31
	DCE	not detected	0.5	Ref. 17 p. 31

Samples analyzed for New York State Superfund Program by the New York State Department of Health using EPA Method 502.2

Contaminated Samples

Sample ID	Well Depth* (feet)	Location No. on map (Reference 21)	Date of sample	References
227862-09	200	1	4/2001	Ref. 18 p. 34
227862-52	225	2	4/2001	Ref. 18 p. 35
227862-43	323	3	4/2001	Ref. 18 p. 41
227992-34	190	4	4/2001	Ref. 18 p. 44
227862-18	220	5	4/2001	Ref. 18 p. 40
227992-31	220	6	4/2001	Ref. 18 p. 44
227922-51	275	7	4/2001	Ref. 18 p. 37
227922-54	320	8	4/2001	Ref. 18 p. 43
227862-12	220	9	4/2001	Ref. 18 p. 41
227862-37	220	10	4/2001	Ref. 18 p. 41
227992-25	200 (approx)	11	4/2001	Ref. 10 p. 11
227992-19	280	12	4/2001	Ref. 18 p. 38
227922-31	120	13	4/2001	Ref. 18 p. 42

			GW-Observed Release	
227862-58	235	14	4/2001	Ref. 18 p. 35
227993-01	200	15	4/2001	Ref. 18 p. 44
227922-10	250	16	4/2001	Ref. 18 p. 41
227992-13	200	17	4/2001	Ref. 18 p. 37
227862-55	180	18	4/2001	Ref. 18 p. 35
227922-37	225	19	4/2001	Ref. 18 p. 43
227862-21	182	20	4/2001	Ref. 18 p. 34
227922-25	220	21	4/2001	Ref. 18 p. 36
227922-22	221	22	4/2001	Ref. 18 p. 42
227862-31	220	23	4/2001	Ref. 18 p. 40
227862-15	305	24	4/2001	Ref. 18 p. 40
227993-19	220	25	4/2001	Ref. 18 p. 39
227992-04	225	26	4/2001	Ref. 18 p. 37
227993-16	>200 (approx)	27	4/2001	Ref. 10 p. 25
227993-13	300	28	4/2001	Ref. 18 p. 39
227862-28	232	29	4/2001	Ref. 18 p. 40
227922-16	232	30	4/2001	Ref. 10 p. 28
227922-57	285	31	4/2001	Ref. 18 p. 43
227862-34	260	32	4/2001	Ref. 18 p. 40
227993-04	230	33	4/2001	Ref. 18 p. 44
227862-06	180	34	4/2001	Ref. 18 p. 34
227922-07	200	35	4/2001	Ref. 18 p. 36
227922-19	290	36	4/2001	Ref. 18 p. 36
227862-46	280	37	4/2001	Ref. 18 p. 35
227862-49	360	38	4/2001	Ref. 18 p. 35
227922-13	220	39	4/2001	Ref. 18 p. 36
227922-40	190	40	4/2001	Ref. 18 p. 43
227922-01	180	41	4/2001	Ref. 18 p. 34

* Well depth information supplied by property owner

Contaminated Samples (continued)

Sample ID	Hazardous Substance	Conc (ppb)	Sample Quantitation Limit (ppb)	Reference
227862-09	TCE	8.6	0.5	Ref. 6, p. 23, 18 p.34
227862-09DL	DCE	81D	2.5	Ref. 6, p. 24, 18 p.34
227862-52	TCE	80	0.5	Ref. 6, p. 46, 18 p. 35
227862-52DL	DCE	680D	25.0	Ref. 6, p. 47, 18 p. 35
227862-43	VC	12.0	0.5	Ref. 6, p. 40, 18 p. 41
227992-34DL	TCE	140D	25.0	Ref. 8, p. 27, 18 p. 44
227992-34DL	DCE	860D	25.0	Ref. 8, p. 27, 18 p. 44
227862-18	TCE	38	0.5	Ref. 6, p. 29, 18 p. 40
227862-18DL	DCE	550D	10.0	Ref. 6, p. 30, 18 p. 40
227992-31	TCE	19	0.5	Ref. 8, p. 24, 18 p. 44
227992-31DL	DCE	170D	5.0	Ref. 8, p. 25, 18 p. 44
227922-51	TCE	12	0.5	Ref. 7, p. 53, 18 p. 37
227922-51DL	DCE	100D	2.5	Ref. 7, p. 52, 18 p. 37
227922-54	VC	5.6	0.5	Ref. 7, p. 22, 18 p. 43
227862-12	TCE	35	0.5	Ref. 6, p. 25, 18 p. 41
227862-12DL	DCE	570D	13.0	Ref. 6, p. 26, 18 p. 41
227862-37DL	TCE	59D	25.0	Ref. 6, p. 39, 18 p. 41
227862-37DL	DCE	600D	25.0	Ref. 6, p. 39, 18 p. 41
227992-25	VC	6.2	0.5	Ref. 8, p. 19, 18 p. 44
227992-19	VC	11	0.5	Ref. 8, p. 23, 18 p. 38
227922-31DL	TCE	150D	25.0	Ref. 7, p. 38, 18 p. 42
227922-31DL	DCE	1000D	25.0	Ref. 7, p. 38, 18 p. 42
227862-58	TCE	24	0.5	Ref. 6, p. 50, 18 p. 35
227862-58DL	DCE	350D	10.0	Ref. 6, p. 51, 18 p. 35
227993-01	TCE	5.3	0.5	Ref. 9, p. 17, 18 p. 44
227922-10	TCE	25	0.5	Ref. 7, p. 32, 18 p. 41
227922-10DL	DCE	340D	10.0	Ref. 7, p. 31, 18 p. 41
227992-13DL	TCE	200D	25.0	Ref. 8, p. 21, 18 p. 37
227992-13DL	DCE	1100D	25.0	Ref. 8, p. 21, 18 p. 37
227862-55	TCE	7.1	0.5	Ref. 6, p. 48, 18 p. 35
227922-37	TCE	10	0.5	Ref. 7, p. 34, 18 p. 43
227922-37DL	DCE	150D	5.0	Ref. 7, p. 33, 18 p. 43
227862-21	TCE	5.0	0.5	Ref. 6, p. 31, 18 p. 34
227922-25	TCE	23	0.5	Ref. 7, p. 42, 18 p. 36
227922-25DL	DCE	310D	10.0	Ref. 7, p. 41, 18 p. 36
227922-22	TCE	75	0.5	Ref. 7, p. 44, 18 p. 42
227922-22DL	DCE	750D	25.0	Ref. 7, p. 43, 18 p. 42

227862-31DL	TCE	230D	25.0		Ref. 6, p. 35, 18 p. 40
227862-31DL	DCE	1200D	25.0		Ref. 6, p. 35, 18 p. 40
227862-15	TCE	6.9	0.5		Ref. 6, p. 27, 18 p. 40
227993-19	VC	4.2	0.5		Ref. 9, p. 27, 18 p. 39
227992-04	VC	26	0.5		Ref. 8, p. 22, 18 p. 37
227993-16	VC	1.3	0.5		Ref. 9, p. 25, 18 p. 39
227993-16	TCE	26	0.5		Ref. 9, p. 25, 18 p. 39
227993-16DL	DCE	340D	10.0		Ref. 9, p. 26, 18 p. 39
227993-13	VC	21	0.5		Ref. 9, p. 24, 18 p. 39
227862-28DL		TCE	57D	25.0	Ref. 6, p. 33, 18 p. 40
227862-28DL	DCE	650D	25.0		Ref. 6, p. 33, 18 p. 40
227922-16	TCE	26	0.5		Ref. 7, p. 28, 18 p. 42
227922-16DL	DCE	290D	10.0		Ref. 7, p. 27, 18 p. 42
227922-57	TCE	21	0.5		Ref. 7, p. 51, 18 p. 43
227922-57DL	DCE	200D	5.0		Ref. 7, p. 50, 18 p. 43
227862-34	TCE	8.0	0.5		Ref. 6, p. 36, 19 p. 40
227993-04	TCE	23	0.5		Ref. 9, p. 19, 18 p. 44
227993-04DL	DCE	330D	10.0		Ref. 9, p. 21, 18 p. 44
227862-06	TCE	5.5	0.5		Ref. 6, p. 22, 18 p. 34
227922-07	TCE	50	0.5		Ref. 7, p. 24, 18 p. 36
227922-07-DL	DCE	540D	25.0		Ref. 7, p. 23, 18 p. 36
227922-19	TCE	51	0.5		Ref. 7, p. 46, 18 p. 36
227922-19DL	DCE	710D	25.0		Ref. 7, p. 45, 18 p. 36
227862-46	TCE	9.6	0.5		Ref. 6, p. 42, 18 p. 35
227862-46DL	DCE	82D	2.5		Ref. 6, p. 43, 18 p. 35
227862-49	TCE	7.4	0.5		Ref. 6, p. 44, 18 p. 35
227922-13	TCE	55	0.5		Ref. 7, p. 30, 18 p. 36
227922-13DL	DCE	710D	25.0		Ref. 7, p. 29, 18 p. 36
227922-40	TCE	59	0.5		Ref. 7, p. 49, 18 p. 43
227922-40DL	DCE	650D	10.0		Ref. 7, p. 48, 18 p. 43
227922-01	TCE	13	0.5		Ref. 7, p. 25, 18 p. 34
227922-01DL	DCE	130D	5.0		Ref. 7, p. 26, 18 p. 34

Notes:

“D” indicates all compounds identified in an analysis at a secondary dilution fact

Level I Samples

Sample ID: All contaminated samples listed above

Reference for Benchmarks: No. 2, pp. 4, 5, 6

Hazardous Substance	Cancer-risk Benchmark Concentration
Vinyl Chloride	0.045 ppb

	MCL
TCE	5 ppb
DCE	70 ppb

Attribution:

The origin of the contamination is unknown (Ref. 4). The plume of contaminated ground water is being evaluated as the source.

Hazardous Substances Released:

vinyl chloride, TCE, DCE

Based on analytical results from the EPA sampling events conducted from April, 2001, an observed release (by chemical analysis) to ground water is documented; therefore, a ground water observed release factor value of 550 is assigned.

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Ground water Observed Release Factor Value: 550

3.2 WASTE CHARACTERISTICS

3.2.1 Toxicity/Mobility

Hazardous Substance	Source No.	Toxicity Factor Value	Mobility Factor Value	Toxicity/ Mobility	Reference
vinyl-chloride	1	10000	1	10000	Ref 2, p. 3
TCE	1	10	1	10	Ref 2, p. 2
DCE	1	100	1	100	Ref 2, p. 1

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Toxicity/Mobility Factor Value: 10000

3.2.2 Hazardous Waste Quantity

Source Number	Source Hazardous Waste Quantity Value (Section 2.4.2.1.5)	Is source hazardous constituent quantity data complete? (yes/no)
1	>0	No
Sum of Values:	>0	

The hazardous waste quantity value is >0. Based on the fact that targets are subject to Level I concentrations of vinyl chloride, TCE, cis-1,2,DCE, a hazardous waste quantity factor value of 100 can be assigned if it is greater than the hazardous waste quantity value. Therefore, a hazardous waste quantity factor value of 100 is assigned for the ground water pathway.

3.2.3 Waste Characteristics Factor Category Value

Toxicity/Mobility Factor Value (10000) x Hazardous Waste Quantity Factor Value (100): 1×10^6

The product 1×10^6 corresponds to a waste characteristics factor category value of 100 in Table 2-7 of the HRS rule.

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Hazardous Waste Quantity Factor Value: 100
Waste Characteristics Factor Category Value: 100

3.3 TARGETS

Notes

All wells evaluated are Level I contaminated, therefore, distance from center is not calculated.

The aquifer systems of concern are treated as the same aquifer due to their documented interconnection (Refs. 13, pp. 6-7, 6-14; 14, p. 3-5)

3.3.1 **Nearest Well**

Well: 227862-06

The well located at 227862-06 is evaluated as the nearest well. This well has been determined to be located closest to center of the contamination (Ref. 21) and is evaluated as a Level 1 target for TCE (Ref. 6, p. 22, 19 p. 1); therefore, a nearest well value of 50 is assigned (Ref. 1, Table 3-11).

Level of Contamination (I, II, or potential): Level I

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Nearest Well Factor Value: 50

3.3.2 Population

3.3.2.2 Level I Concentrations

Level I Well	Population	Reference
227862-09	2	Ref. 10, p. 2, Ref. 20, p. 1
227862-52	4	Ref. 10, p. 3, Ref. 20, p. 1
227862-43	4	Ref. 10, p. 4, Ref. 20, p. 1
227992-34	3	Ref. 10, p. 38, Ref. 20, p. 1
227862-18	3	Ref. 10, p. 5, Ref. 20, p. 1
227992-31	5	Ref. 10, p. 6, Ref. 20, p. 1
227922-51	3	Ref. 10, p. 7, Ref. 20, p. 1
227922-54	5	Ref. 10, p. 9, Ref. 20, p. 1
227862-12	5	Ref. 10, p. 8, Ref. 20, p. 1
227862-37	1	Ref. 10, p. 10, Ref. 20, p. 1
227992-25	2	Ref. 10, p. 11, Ref. 20, p. 1
227992-19	1	Ref. 10, p. 44, Ref. 20, p. 1
227922-31	3	Ref. 10, p. 13, Ref. 20, p. 1
227862-58	4	Ref. 10, p. 39, Ref. 20, p. 1
227993-01	5	Ref. 10, p. 14, Ref. 20, p. 1
227922-10	3	Ref. 10, p. 15, Ref. 20, p. 1
227992-13	4	Ref. 10, p. 16, Ref. 20, p. 1
227862-55	10	Ref. 10, p. 17, Ref. 20, p. 1
227922-37	3	Ref. 10, p. 18, Ref. 20, p. 1
227862-21	4	Ref. 10, p. 50, Ref. 20, p.1
227922-25	4	Ref. 10, p. 19, Ref. 20, p. 1
227922-22	14	Ref. 10, p. 20, Ref. 20, p. 1
227862-31	2	Ref. 10, p. 21, Ref. 20, p. 1
227862-15	2	Ref. 10, p. 22, Ref. 20, p. 1
227993-19	2	Ref. 10, p. 23, Ref. 20, p. 1
227992-04	2	Ref. 10, p. 24, Ref. 20, p. 1
227993-16	2 (+farm)	Ref. 10, p. 25, Ref. 20, p. 1
227993-13	6 (+farm)	Ref. 10, p. 45, Ref. 20, p. 1
227862-28	3	Ref. 10, p. 26, Ref. 20, p. 1

227922-16	12	Ref. 10, p. 28, Ref. 20, p. 1
227922-57	5	Ref. 10, p. 27, Ref. 20, p. 1
227862-34	3	Ref. 10, p. 29, Ref. 20, p. 1
227993-04	3	Ref. 10, p. 30, Ref. 20, p. 1
227862-06	2	Ref. 10, p. 40, Ref. 20, p. 1
227922-07	5	Ref. 10, p. 52, Ref. 20, p. 1
227922-19	1	Ref. 10, p. 31, Ref. 20, p. 1
227862-46	4	Ref. 10, p. 33, Ref. 20, p. 1
227862-49	4	Ref. 10, p. 32, Ref. 20, p. 1
227922-13	2	Ref. 10, p. 34, Ref. 20, p. 1
227922-40	3	Ref. 10, p. 35, Ref. 20, p. 1
227922-01	2	Ref. 10, p. 36, Ref. 20, p. 1
Total population served	157	

Based on the above information, the Level I concentration factor value is . This value is obtained by multiplying the total population served by wells subject to Level I concentrations by 10 (157 x 10 = 1570)

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Population Served by
Level I Wells: Level I Concentrations Factor Value: 1570

3.3.2.3 Level II Concentrations

Level II contamination was not scored (NS), as a maximum score for the ground water pathway was achieved by evaluating only Level I populations.

Level II Well	Population	Reference
Not Scored (NS)	NS	N/A

Population Served by
Level II Wells: 0 Level II Concentrations Factor Value: NSGW-Potential Contamination

3.3.2.4 Potential Contamination

Potential Contamination was not scored (NS), as a maximum score for the ground water pathway was achieved by evaluating only Level I populations.

Distance Category	Population	Reference	Distance-Weighted Population Value
NS	NS	N/A	NS

Potential Contamination Factor Value: NS

3.3.3 Resources

Groundwater from the aquifer of concern is used to supply water for commercial livestock (Ref 10, p. 25, 45). Therefore a resource value of 5 is assigned.

Resources Factor Value: 5

3.3.4 Wellhead Protection Area

Wellhead protections Areas were not scored, as a maximum score for the ground water pathway was achieved by evaluating only Level I populations.

Wellhead Protection Area Factor Value: NS