DUPONT STINE-HASKELL RESEARCH CENTER

PROPOSED PLAN OF REMEDIAL ACTION

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Division of Air & Waste Management
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INTRODUCTION

This Proposed Plan of Remedial Action ("Proposed Plan") is issued by the Delaware Department of Natural Resources and Environmental Control (DNREC) under the Hazardous Substance Cleanup Act, 7 Del. C. Chapter 91 ("HSCA"). The purpose of the Proposed Plan is to present to the public DNREC's decision regarding the need for remedial action at the DuPont Stine-Haskell Research Center in Newark, Delaware (the "site").

The contents of a Proposed Plan are discussed in Subsection 8.7 of the Regulations Governing Hazardous Substance Cleanup (April 1995) ("Regulations"). The contents of this Proposed Plan include a summary of the results of the remedial investigation, a review of actions already undertaken at the site, DNREC's assessment of the health and environmental risks posed by the site, and the rationale for selection of limited further action. This Proposed Plan will be available for public review and comment for a period of twenty (20) days. After review and consideration of all written comments received, DNREC will issue a Final Plan of Remedial Action. The proposed plan, all written public comments, DNREC's responses to those comments, and the final plan will constitute the Remedial Decision Record.

SITE DESCRIPTION

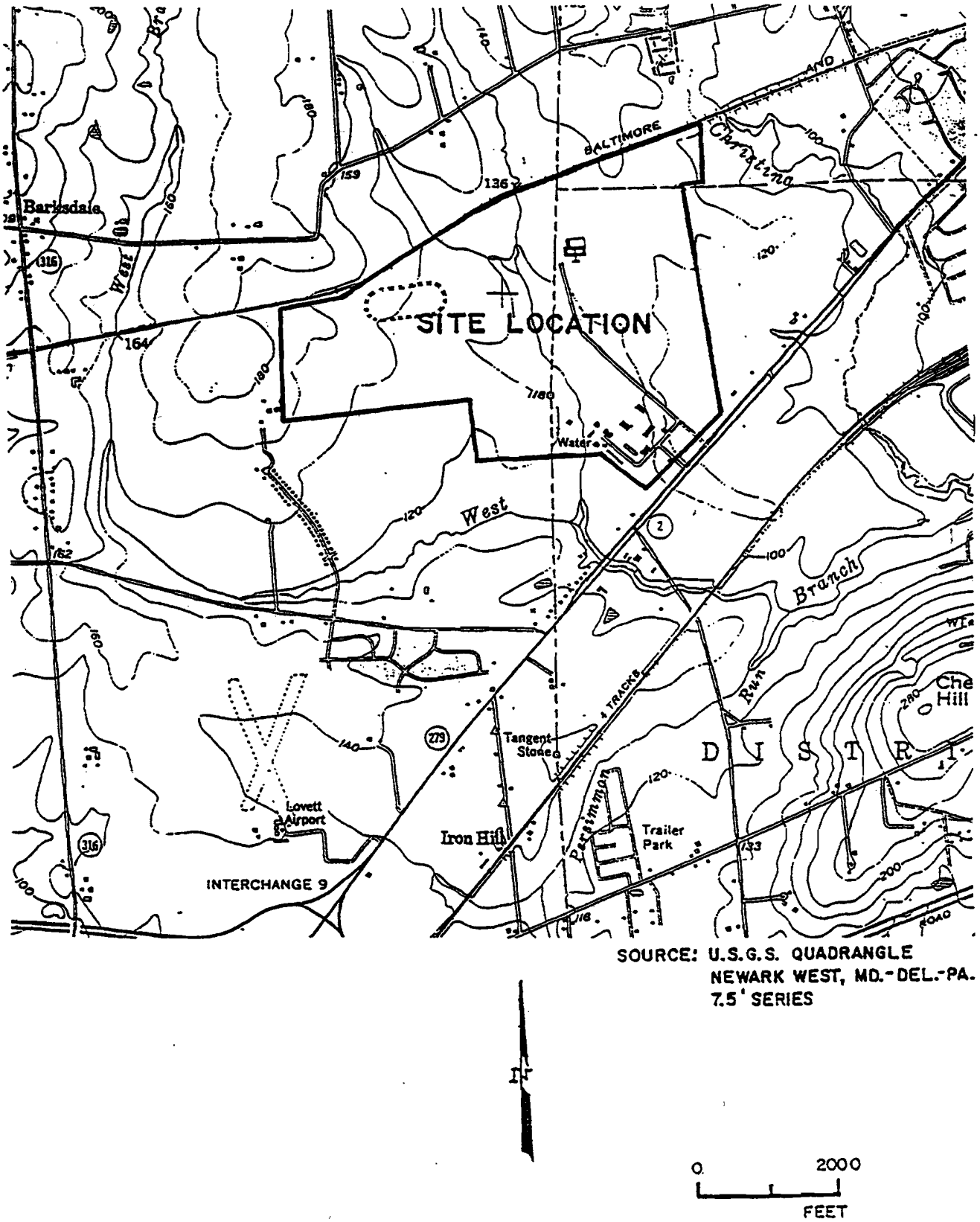
DuPont Stine-Haskell Research Center is located on Elkton Road in Newark, Delaware. The site occupies approximately 535 acres which are situated in New Castle County, Delaware and Cecil County, Maryland (Figure 1). The facility is utilized for research and development of agricultural products and consists of numerous laboratories and greenhouses with surrounding agricultural fields. The original farmland was purchased by DuPont in 1954 and through subsequent property acquisitions the facility reached its current size.

The site is bounded on the east and south by woodlands, homes, light industry and businesses, and to the north and west by the Baltimore and Ohio rail lines. The site lies within the Christina River watershed. An unnamed tributary to the West Branch of the Christina River bisects the site and controls surface drainage patterns. The unnamed tributary joins the West Branch south of the site property boundary.

Research and development activities at Stine-Haskell have consisted of experimental synthesis and application of herbicides, pesticides and industrial medicines, and performance of toxicological studies. Waste disposal practices at the site included incineration of non-toxic wastes, on-site treatment of sanitary and lab wastes until 1983 (now discharged to the public sewer system), and shipment of hazardous wastes to other DuPont facilities for disposal. In addition, an evaporation pond was utilized from 1979-81 for reduction in volume of water used in aquatic toxicity testing, and six gravel-lined herbicide rinse basins were used from 1969-77. DuPont also has two permitted discharge outfalls to the unnamed tributary.

Figure 1 - Site Location: DuPont Stine-Haskell Research Center

Reproduced from Remedial Investigation Report (DERS, 1995)



PREVIOUS INVESTIGATIONS

Investigations conducted by NUS Corporation on behalf of the U.S. Environmental Protection Agency (EPA) and DNREC (1987) and by Groundwater Technology, Inc. on behalf of DuPont (Phase 1, 1991 and Phase 2, 1992) focused on several areas of potential impact. These were the rinse basins, the chemical waste handling area, a solvent storage shed (now eliminated), the incinerator (no longer in operation), the former locations of the settling pond and the evaporation pond, the spray farm areas, and the area around the removed gasoline and diesel tanks. Sampling of soils, groundwater, and surface water and sediments of the unnamed tributary was conducted. Several areas of contamination were identified which required further investigation as described below.

REMEDIAL INVESTIGATION

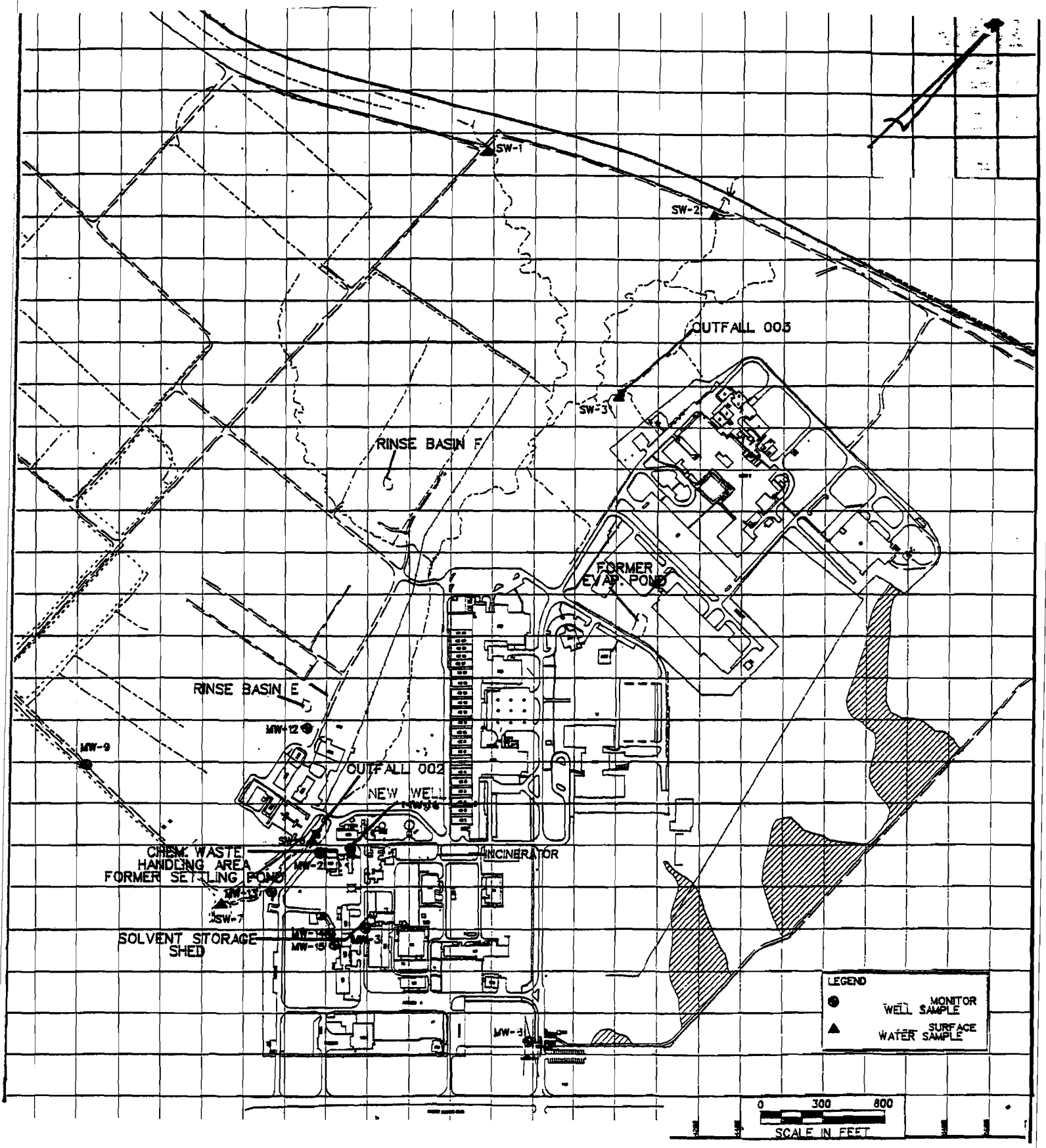
DNREC reviewed the NUS and Groundwater Technology reports and identified several data gaps which required a third phase of investigation, which was conducted pursuant to a consent decree under HSCA. The remedial investigation (RI), conducted by DuPont Environmental Remediation Services (DERS), focused on the following tasks:

- confirmation of previously collected pesticide data (questionable due to quality control problems)
- confirmation of data on lead and volatile organic compounds in surface water
- confirmation of data on volatile organic compounds in groundwater
- additional information on the extent and movement of dense non-aqueous phase liquids (DNAPLs) in the shallow groundwater (the Columbia Aquifer)

Groundwater sampling was conducted at the site in November, 1994 after re-development of the existing monitoring wells and installation of one new well. Surface water sampling in the unnamed tributary was also conducted in November, 1994. Sample locations are shown in Figure 2. The analytical results for the RI sampling generally confirmed the findings of previous investigations.

Figure 2. - Site Layout with Monitoring well & Stream Sampling Locations

Reproduced from Remedial Investigation Work Plan (DERS, 1995)



Various chlorinated volatile organic compounds, primarily trichloroethene (TCE) and related degradation products 1,2 dichloroethene (1,2 DCE) and 1,2 dichlorethane (1,2 DCA), were detected in well MW-16. This well is located in the vicinity of the former solvent storage shed and the former chemical waste handling area. Similar compounds were also detected in well MW-2, but at considerably lower concentrations. Well MW-2 is located approximately 150 ft. downgradient of MW-16. Results for these wells are summarized in Table 1. No volatile organic compounds were detected in well MW-13 or in the surface water of the unnamed tributary. This tends to indicate that the groundwater contamination from these compounds is localized and is probably degrading in place before any significant movement towards the tributary (Figures 3 and 4).

Groundwater samples from well MW-3, located near the former fuel tanks, contained fuel-related compounds including benzene, toluene, ethylbenzene, and xylene ("BTEX"). Benzene was detected at a low (estimated) concentration in well MW-14, located downgradient. Another downgradient well, MW-15, had no detections of BTEX compounds. The detection of a trace concentration of only one of these compounds in only one downgradient well indicates the likelihood that no significant migration is occurring from the area where the fuel tanks were formerly located.

A small plume of TCE was identified as a result of sampling of groundwater from well MW-8. The concentration of TCE was relatively low, but still above the Maximum Contaminant Level (the concentration which is used as the drinking water standard). The contaminant plume was further evaluated through groundwater modeling, and it was determined that movement of the groundwater is so slow that the TCE plume has been and would be expected to continue to degrade virtually in place.

Surface water samples were collected from five locations in the unnamed tributary on the site. Concentrations of copper and lead exceeding Delaware surface water quality standards were detected at location SW-3. Downstream locations SW-6 and SW-7 were within normal background ranges for copper and lead, however. This indicates that contamination is localized and is probably related to the former permitted discharge point at this location, which now discharges only stormwater. Results for SW-6 and SW-7 are summarized in Table 2.

RISK ASSESSMENT SUMMARY

Utilizing the data collected from the three phases of investigation, DERS performed a risk assessment to evaluate the possible effects to human health posed by the site as it is currently used and as it is anticipated to be used in the future. Potential ecological effects were also evaluated.

Figure 3. - Decreasing trends of contaminants observed in dug well/MW-16
Reproduced from RI Reports (DERS, 1995)

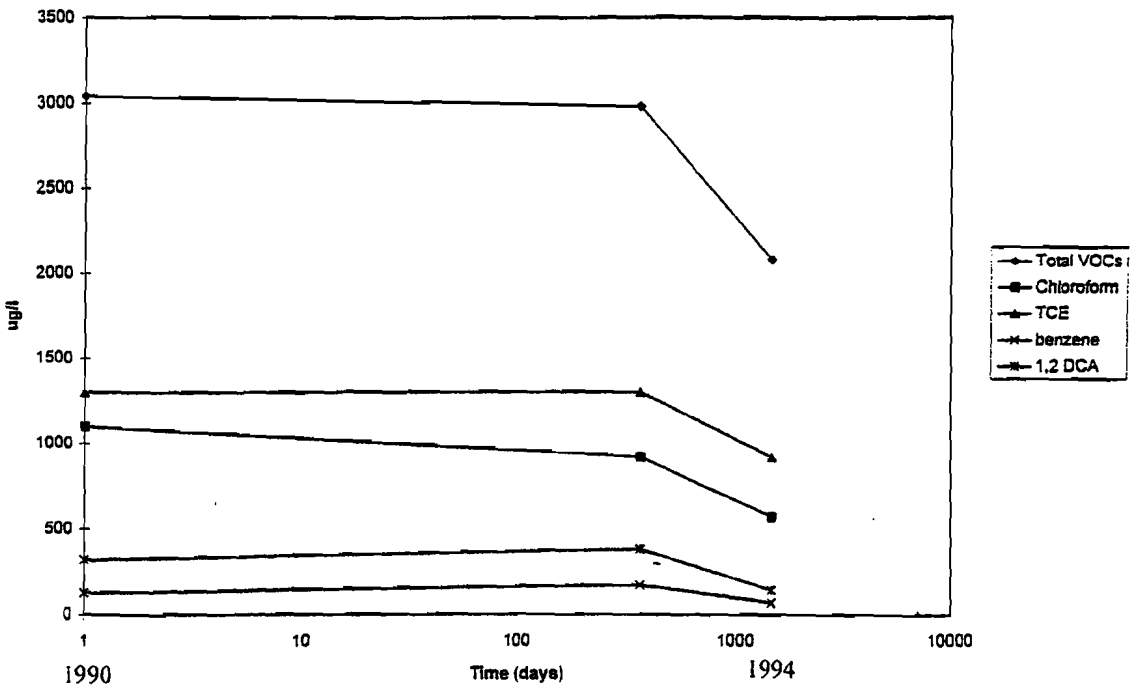


Figure 4. - Decreasing trends of contaminants observed in MW-2

Reproduced from RI Reports (DERS, 1995)

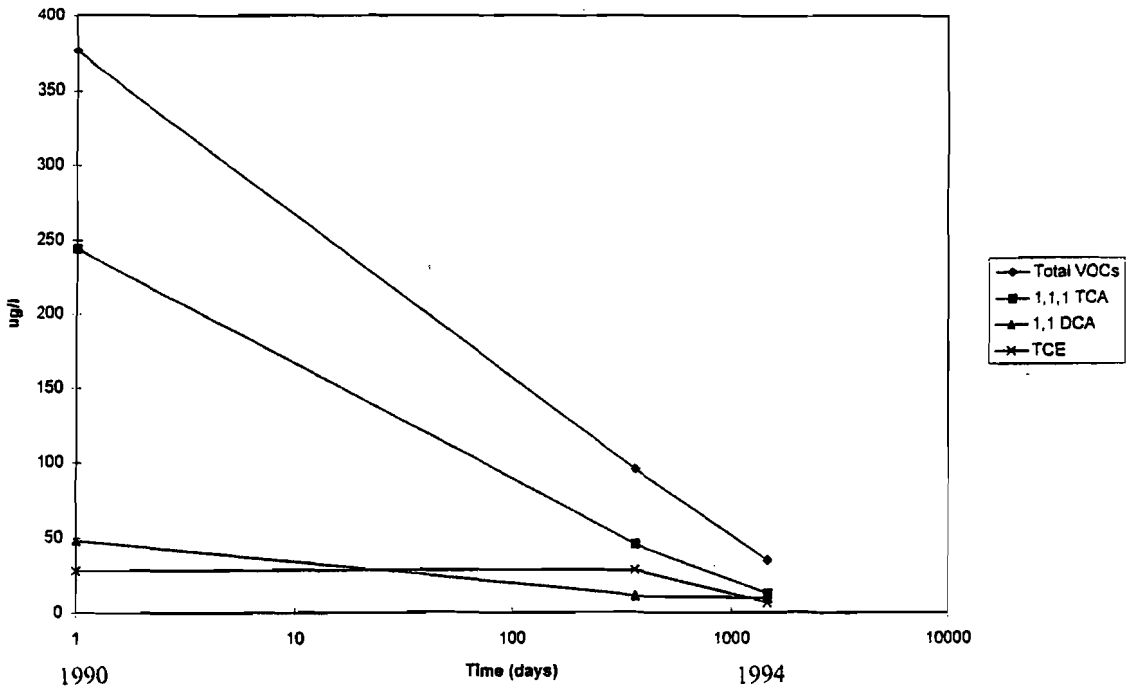


Table 1 - Groundwater Monitoring Data Summary for the Dug Well/MW-16 and MW-2

Analyte Compound	Dug Well/MW-16			MW-2		
	1990	1991	1994	1990	1991	1994
1,1,1-trichloroethane	ND	ND	3J	244	45	12
1,2-dichloroethane	320	380	140	ND	ND	ND
1,1-dichloroethane	ND	ND	7	48	11	9
1,1-dichloroethene	ND	ND	19	27	6	4J
1,2-dichloroethene	130	210	290D	16	3J	3J
1,1,2,2-tetrachloroethane	ND	ND	ND	ND(<5)	ND(<5)	5J
Benzene	130	170	68	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	31	ND(<5)	ND(<1)
Chloroform	1,100	920	570D	7J	ND(<5)	ND(<1)
Methylene chloride	47	ND(<5)	8	6	2JB	ND(<2)
Tetrachloroethene	15	ND(<5)	34	ND	ND	ND
Trichloroethene	1,300	1,300	920D	28	28	6
Vinyl chloride	ND	ND	22	ND	ND	ND
Total VOCs	3,042	2,980	2,081	376	95	34

Note:
All values reported in µg/l

J = Analyte detected below the practical quantitation limit
B = Analyte detected in method blank
D = A dilution factor was used in calculating the result
ND = Not detected

Table 2 - Surface-Water Monitoring Data Summary for SW-6 and SW-7

Analyte	SW-6			SW-7		
	1990	1991	1994	1990	1991	1994
1,1,1-trichloroethane	3J	ND(<5)	ND(<1)	3J	2J	ND(<1)
Acetone	ND(<10)	ND(<10)	3J	ND	ND	ND
Chloroform	6	ND(<5)	ND(<1)	ND(<5)	1J	ND(<1)

Note:
All values reported in µg/l

J = Analyte detected below the practical quantitation limit for the method
ND = Not detected

The risk assessment concluded that no human health risk exists because there are no complete exposure pathways. Groundwater contamination is restricted to a few small, isolated areas and appears to be undergoing biodegradation, as evidenced by the apparent decline in concentrations of the chemicals of concern over time. In addition, the sources of contamination (former fuel storage tanks, solvent storage shed, chemical waste handling area) have been eliminated.

The groundwater at and in the vicinity of the site is not used as a drinking water supply. No detectable concentrations of volatile organic compounds were detected in the unnamed tributary. Therefore, all contamination is being naturally attenuated before reaching any potential human receptors.

The ecological risk evaluation determined that there was no risk to receptors in the unnamed tributary. Localized surface water contamination by lead and copper was identified at location SW-3 which exceeded Delaware surface water quality criteria for the protection of aquatic life. However, the qualitative stream survey conducted by DuPont indicated that the stream was not impacted. Sediment lead and copper at this location, although elevated above expected background concentrations, were less than the screening values at which ecological impacts would be expected. Suspected sources of contaminants (the permitted discharge and parking lot runoff) have been eliminated.

In summary, no human health impacts are expected under the existing and future use scenarios, and no significant ecological effects are expected.

PROPOSED REMEDIAL ACTION

Base on the results of the remedial investigation, previous investigations, and the risk assessment, the following actions are proposed for the Stine-Haskell site:

- Implement deed restrictions requiring that, if the property is sold or converted to a use other than the existing use, additional groundwater monitoring shall be conducted to confirm that contaminant concentrations have continued to decrease over time through natural attenuation and biodegradation. If sampling data indicates that the contaminant concentrations have not decreased, or have increased or migrated significantly, then the need for additional remedial action shall be evaluated.

- Develop a groundwater management zone (GMZ) which will restrict groundwater withdrawals in the vicinity of the site. The GMZ will be administered via a memorandum of understanding between DNREC's Division of Air & Waste Management and Division of Water Resources.

DNREC believes that these institutional controls will be protective of human health and the environment to a degree which is consistent with HSCA and the Regulations.

PUBLIC PARTICIPATION

The Proposed Plan is available for public review at the address below. DNREC solicits public comment on this Proposed Plan, and all written comments received by DNREC will be considered before development of a Final Plan of Remedial Action. The public comment period closes on June 30, 1996. Comments or questions regarding the Proposed Plan should be directed to:

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