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Five-Year Review Report

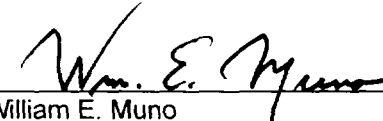
**Second Five-Year Review Report
for the
Old Mill Superfund Site
Rock Creek, Ohio**

September 2001

Prepared by:

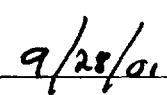
**United States Environmental Protection Agency
Region 5
Chicago, Illinois**

Approved by:



William E. Muno
Superfund Division Director
U.S. EPA, Region 5

Date:



9/28/01

**Old Mill Superfund Site
Rock Creek, Ohio
Second Five-Year Review Report**

I. Introduction

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this Five-Year Review report pursuant to CERCLA § 121 and the National Contingency Plan (NCP). CERCLA § 121 states:

"If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the Present that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such review."

The Agency interpreted this requirement further in the NCP; 40 CFR § 300.430(f)(4)(ii) states:

"If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."

The EPA, Region 5, conducted the five-year review of the remedy implemented at the Old Mill Superfund Site in Rock Creek, Ohio. This report is the second five-year review for the Old Mill Site. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

II. Background

The Old Mill Superfund Site is located in the Village of Rock Creek in Ashtabula County, Ohio. The site consists of two parcels of land, the Henfield property and the Kraus property. The Henfield property is approximately 3 acres in size, and the Kraus property is approximately 10 acres in size. (See Figure 1). The site is in a rural village setting with the closest residences approximately 75 feet from the property boundary. Land use in the vicinity of the site is represented by a mixture of residential, agricultural, and commercial/industrial developments. The Henfield property was the former location of a feed mill and later a potting soil operation.

Response activity at the Old Mill site began in 1979 when EPA and Ohio EPA learned that approximately 1,200 drums of toxic waste, including solvents, oils, resins, and polychlorinated biphenyl (PCBs), were stored on the two properties. A significant quantity of the drummed waste was flammable, and many of the drums were in poor condition and had leaked their contents into the soil.

Superfund emergency removal activities and enforcement action resulted in drum removal that began in November 1981 and was completed in October 1982. Some of the Potentially Responsible Parties (PRPs), who may have contributed to the contamination at the site, participated in removal activities by removing 580 of the drums.

Also under removal authorities, 80 cubic yards of contaminated soil was removed in November 1982 from the drum storage area of the Henfield property, and a fence was installed around a portion of the site in 1984.

The site was proposed for inclusion on the National Priorities List (NPL) on December 30, 1982 (Federal Register, Vol. 47, No. 251, Page 58484). This list was made final on September 8, 1983 (Federal Register, Vol. 48, No. 175, Page 40673).

Between August 1983 and December 1984, a Remedial Investigation was conducted at the site. Soil on the Henfield and Kraus properties was found to be contaminated with organic chemicals, especially trichloroethene (TCE), as well as with heavy metals, such as lead. Ground water was contaminated with TCE and other organic chemicals.

In September 1983, Notice Letters were sent to approximately 30 PRPs giving notice of the Remedial Investigation/Feasibility Study (RI/FS) and requesting information regarding waste handling practices at the site. On February 23, 1984, a CERCLA Section 106 Administrative Order was issued to a former operator of the site requiring the installation of a fence around "hot spots" containing hazardous substances on site. The former operator failed to comply with the Order, and EPA installed the fence to limit public access to the site. On November 2, 1984, Demand Letters were sent to several PRPs outlining their liability for payment of all past response costs as well as any other costs arising from remedial activities at the site. Negotiations were held, but no acceptable offers of settlement were received.

A complete summary of the results of site sampling and analyses can be found in the Final RI Report (December 3, 1984) and the Addendum to the RI Report (May 31, 1985).

The FS, which discussed various possible alternatives for remediating the contamination found on site, was released for public comment on May 21, 1985. On August 7, 1985, consistent with the Initial Remedy Delegation Report of March 8, 1985, the Regional Administrator approved a Record of Decision (ROD) for the site. The remedy selected for the site consisted of:

- Removal and off-site disposal of 95% of the contaminants in the soil (the amount of soil removed was 12,100 cubic yards);
- Demolition of buildings and silos located on the site and disposal of the debris;

- Ground water extraction and treatment (using air stripping and carbon adsorption) for an estimated period of 30 years, until a target ground water concentration of 10^{-5} is reached; and
- Placement of use restrictions on the ground water by the State of Ohio for as long as concentrations in the plum remain above a 10^{-6} carcinogenic risk level.

The design of this remedy was conducted from April 1986 through September 1987.

III. Remedial Actions

The RA was fund-financed by U.S. EPA, with the Ohio EPA contributing its 10% cost share under terms of a State Superfund Contract. The United States Army Corps of Engineers (USACE) conducted oversight of the RA, which was performed by their contractor, Aptus, Inc. The Notice to Proceed was issued to Aptus on April 28, 1988. On-site mobilization activities began during the week of May 9, 1988.

On-site excavation of contaminated soil began on the Kraus property; following site preparation activities on the Henfield property, excavation began there as well. Verification sampling was performed following excavation to ensure that Allowable Residual Contaminant (ARC) levels, or cleanup levels, were achieved. If they were not, additional soil was removed. On portions of the Henfield property, it was decided to excavate to the clay layer plus three additional inches, to a total excavation depth of approximately 2.5 feet. In some areas, contamination persisted well into the barrier clay, and in other areas, well below the water table. By the end of the project, approximately 12,100 cubic yards of contaminated soil had been removed. The ROD originally estimated that 4,300 cubic yards would require removal.

Five wooden buildings and four concrete silos located on the Henfield property were demolished and the debris shipped off-site. The portions of the debris that were found to be hazardous were shipped to the Envirosafe facility in Oregon, Ohio, while those that were non-hazardous were sent to the Doherty Landfill in Geneva, Ohio.

A ground water extraction system was installed to recover contaminated ground water from both the shallow and deep aquifers. The extracted ground water is pumped through a 2-inch diameter stainless steel underground pipe to a treatment plant located on the southern edge of the Henfield property. The treatment plant includes a holding tank that collected ground water pumped from the extraction system. An air stripper is utilized for the removal of volatile organic compounds (VOCs). An activated carbon column provides additional removal of organics from the air stripper effluent. Final effluent is discharged by gravity to an underground storm water drain leading to Rock Creek.

A final inspection was held on August 18, 1989, by EPA, the Ohio Environmental Protection Agency (Ohio EPA), USACE, and Aptus. A punch list was developed, and final modifications were requested. All work was essentially completed on March 9, 1990. The USACE accepted the project as final from Aptus on June 29, 1990. EPA (on July 17, 1990) and Ohio EPA independently inspected the site to determine that the modifications had indeed been made and that all items on the punch list had been addressed. The RA was determined to have been successfully executed.

It was later determined that a Remedial Action Report (RAR) was needed from the USACE before the Interagency Agreement (IAG) between EPA and USACE could be closed out. The USACE submitted a RAR signifying successful completion of construction activities. The report documents and discusses the 15 contract modifications which were issued throughout the project. The RAR was approved on April 24, 1991.

A field sampling investigation to delineate the extent of VOC contamination at the Kraus property was completed during February 1993. This investigation was conducted because compliance monitoring well sampling indicated that the existing shallow aquifer intercepting trench system was not sufficient to extract

the existing VOC plume. The investigation indicated that the VOC plume was migrating beyond the shallow aquifer intercepting trench known as the Kraus modified sump, and the installation of an additional shallow aquifer intercepting trench was necessary to contain this migrating plume. After the completion of this investigation, eight piezometers were installed within the shallow aquifer at the Kraus property in May 1993. Water levels in the piezometers and in the Klaus shallow aquifer compliance monitoring wells were measured weekly from June 1993 to July 1995 to determine whether there is a westward component to the ground water flow direction. Monthly measurements of ground water levels in all compliance monitoring wells and piezometers began in August 1995.

Construction of the additional shallow aquifer intercepting trench at the Kraus property was completed in July 1994. Two additional monitoring wells (RASK-9 and RASK-10) were installed to assess the effectiveness of the intercepting trenches in preventing migration of the VOC plume.

IV. Progress Since Last Five Year Review

The first five-year review for this site was completed on January 17, 1996. Since that time, the site has been in the O&M phase. The O&M activities are summarized in the following section.

V. Long Term Response Actions

Roy F. Weston, Inc., U.S. EPA's contractor, operated the ground water extraction and treatment system from August 1989 through September 2000. The system was temporarily shut down from September 15, 2000 to January 11, 2001. Based on the available information regarding the existing plume configurations and shallow aquifer characteristics, it is expected that the leading edge of the plumes are within the capture zones of the furthest downgradient collection trenches. IT Corporation, as a contractor to Ohio EPA, is currently performing O&M activities at the site. Ohio EPA will continue to be responsible for O&M until the transfer of responsibilities to the Old Mill Potentially Responsible Parties (PRPs) Group. The PRPs have agreed to assume the O&M responsibilities as set forth in the Statement of Work, which is an attachment to the Consent Decree. The Consent Decree was lodged with the Court on September 14, 2001. The PRPs will assume O&M responsibilities within 30 days of entry of the Consent Decree.

Compliance monitoring wells are located on both the Kraus and Henfield properties. These wells are used to determine the levels of contamination that remain in the ground water. The annual sampling events occurred as follows:

1 st	October, 1991
2 nd	September, 1992
3 rd	September, 1993
4 th	September, 1994
5 th	September, 1995
6 th	September, 1996
7 th	September, 1997
8 th	September, 1998
9 th	January, 2000

Monitoring wells, extraction system sampling ports, and treatment plant influent/effluent were sampled during this annual sampling event. The year 2001 annual sampling event will be performed in October, 2001 by the Old Mill Potentially Responsible Parties (PRPs) Group.

As part of the PRPs assumption of O&M activities at the Old Mill site, the PRPs will perform all work in accordance with the terms of the Consent Decree, Statement of Work, and Work Plan for Long-Term Operation and Maintenance at the site. In general, the PRPs' O&M contractor will perform the following tasks for the ground water extraction and treatment system:

- ▶ Operate and maintain all systems at the site, including the ground water collection and monitoring system; the ground water treatment system, buildings/structures, roads, and parking areas; the grounds and utilities; waste disposal; and the security system.
- ▶ Perform compliance monitoring and reporting (i.e., collection and analysis of ground water samples and treatment facility influent and effluent samples, collection of ground water elevation data, record keeping, evaluation of system data, and preparation of reports for delivery to U.S. and Ohio EPA. Monitoring frequencies and parameters are included in Tables 1, 2, and 3.
- ▶ Perform preventive maintenance of equipment to minimize the potential for shut down of the system and implement contingency measures to address a shut down condition or an excursion should one occur.
- ▶ Maintain and, where necessary, modify the effectiveness of the current collection and treatment system and recognize potential design changes which may enhance the system's efficiency, cost-effectiveness and protectiveness of the environment. An example of this, is the installation of five new monitoring wells at the site.

The Old Mill PRP Group have also developed a scope of work for evaluation of the applicability of a Monitored Natural Attenuation Evaluation (MNA) approach at the site. Additional sampling will be performed and presented to the Agencies for review. If the initial evaluation demonstrates that MNA is a viable remedial alternative for the site, a scope of work for full- or pilot-testing will be developed and submitted to the Agencies for their review.

VI. Applicable or Relevant and Appropriate Requirements (ARARs) Review

Five-Year Review guidance established policy for EPA to review and analyze the RA at a site as it is affected by newly promulgated or modified Federal and State environmental laws. ARARs, as such, did not exist at the time the Old Mill ROD was written, since it was written prior to SARA. (However, the ROD did recommend that the technical aspects of the remedial alternative implemented at the Old Mill site be consistent with other applicable and relevant environmental laws.) Current policy requires that remedies must meet all identified applicable or relevant and appropriate Federal or more stringent State requirements. ARARs for the selected remedy are discussed below.

The provisions of RCRA applicable to remediation at the Old Mill Site identified in the ROD were the 40 CFR Part 264 technical standards for closure, and the Subpart F Ground Water Protection Standards. RCRA requires that contaminated soil either be removed to background levels or another standard protective of human health and the environment, or be capped. The remedy selected at the Old Mill Site was to remove soil to levels protective of public health and the environment. The ARC criteria, or cleanup levels, were determined based on risk calculations and comparisons to background levels of contamination found in the soil. As part of the five-year review process, these ARC criteria were

examined and have been found to be still protective of human health and the environment.

The ROD for the Old Mill site discusses containment of the contaminated ground water plume and treating of the water to a risk-based "target" Alternate Concentration Limit (ACL). The ROD states that 40 CFR section 264.94 requires that the concentration of a hazardous constituent must not exceed the background level of that constituent in the ground water, or an ACL for that constituent which will not pose a substantial present or potential hazard to human health or the environment as long as that ACL is not exceeded. The ROD stated that the acceptable level for ground water remediation is to a level which poses no greater than a 1×10^{-6} , or 1 in 1,000,000 excess cancer risk, but that under certain circumstances, levels other than 1×10^{-6} can be considered "target" ACLs. At the Old Mill site, reaching 1×10^{-6} levels was considered cost and time prohibitive, so "target" ACLs were established during the Remedial Design. These criteria represented the level of contamination which could remain in the ground water while posing an excess cancer risk of 1×10^{-5} , or 1 in 100,000, or less. The criteria were set only for those four contaminants for which the endangerment assessment had indicated an on-site concentration which exceeded the 1×10^{-6} excess lifetime cancer risk value or exceeded the allowable daily intake value which existed at the time. These levels were identified as ARC criteria, and it was estimated that it would require 30 years of ground water extraction and treatment to meet them. Then, the ground water would be allowed to attenuate naturally for an estimated 100 years after that, an excess cancer risk of 1×10^{-6} or less. After operational data had been evaluated, "actual" ACLs (as opposed to "target" ACLs) were to be set. The ROD states that the remedy is to be considered "interim" until an "actual" ACL is set.

After the ROD was issued, MCLs for TCE and tetrachloroethene, the main contaminants of concern, and other VOCs found in site ground water, were proposed and finalized in the Safe Drinking Water Act (SDWA), 40 CFR Parts 141-143. The NCP at §300.430(e)(2)(i)(B) and (C) (March 8, 1990) states that cleanup levels for restoration of ground water or surface water will be set at the Maximum Contaminant Level Goals (MCLGs) whenever these values are relevant and appropriate and are non-zero values. (MCLGs are non-enforceable concentrations of a drinking water contaminant that are protective of adverse human health effects and allow an adequate margin of safety; they do not take cost or feasibility into account, but are strictly health-based standards.) When the MCLG is equal to zero, the MCL is to serve as the cleanup level. For the contaminants of concern at the Old Mill site, the MCLGs are either zero or are the same as the MCLs, so MCLs will be the cleanup levels. The excess cancer risk level associated with most MCLs is 1×10^{-5} , which corresponds with the cleanup level required by the ROD. Since MCLs are now ARARs (they are relevant and appropriate as in situ cleanup standards where either surface water or ground water is or may be used for drinking water), the MCLs which are available will be used as cleanup criteria at the Old Mill site instead of creating site-specific "actual" ACLs for the contaminants. Where a contaminant has an ARC level but no MCL, the ARC criterion remains in effect.

The levels of contaminants found in the site ground water must be below the MCLs (i.e., below a carcinogenic risk level of 1×10^{-5}) before the treatment system can be turned off, and below a carcinogenic risk level of 1×10^{-6} before consumption of the water can be allowed again. The levels found at the Old Mill Site still exceed these levels, but the consumption of ground water is not occurring. Therefore, the remedy continues to be in compliance with the SDWA ARAR.

Contaminated ground water is extracted and treated prior to discharge by gravity to an underground storm water drain which ultimately flows to Rock Creek. This activity is regulated by the requirements of the NPDES permit issued for discharge. The provisions of the NPDES permit were established by Ohio EPA and U.S. EPA. The NPDES permit establishes site discharge limits for VOCs, which are monitored in accordance with the requirements of the permit, and reported to EPA and Ohio EPA. In July 2000, it was determined that discharge criteria for xylene was exceeded based on effluent sample results and the treatment system was shut down. New carbon was installed in the carbon unit and the treatment system was re-started.

The treatment plant removes VOCs from the extracted ground water during its treatment in the air stripper. Based on past calculations of estimated daily maximum and minimum emissions of VOCs and

air blower capacities, the amount of air emissions from the treatment plant is extremely low and will not have any impact to residents living near the treatment plan.

Therefore, the remedy for the Old Mill Site continues to comply with ARARs.

VII. Five-Year Review Findings

A review of the Monthly Operational Reports for the Ground Water Treatment Plant and the Annual Performance Evaluation Reports for the Old Mill Site was performed in the preparation of this report. Based upon this review, the treatment plant at the Old Mill site has performed efficiently in removing VOCs during the first ten years of operation at the site.

Ground Water Treatment System:

The average monthly flows treated at the plant during the ten years of operation are as follows:

Year	Months	Gallons/Month
1	September 1989 to July 1990	183,447
2	August 1990 to July 1991	170,507
3	August 1991 to July 1992	118,294
4	August 1992 to July 1993	158,315
5	August 1993 to July 1994	124,069
6	August 1994 to July 1995	101,127
7	August 1995 to July 1996	96,734
8	August 1996 to July 1997	126,348
9	August 1997 to July 1998	164,266
10	August 1998 to July 1999	148,151

The data indicates a decreasing trend in the average monthly flow for the first seven years. The average monthly flow for the following years is comparatively higher as a result of one carbon adsorption tank was installed to replace two carbon adsorption tanks that were clogged with sediment.

The total volumes of ground water (in gallons) extracted from both the shallow and deep aquifers until July 1999 are shown below:

Property	Shallow Aquifer	Deep Aquifer	Total
Henfield	7,628,992 (37.06%)	3,239,536 (15.76%)	10,868,528
Kraus	8,521,373 (41.40%)	1,194,043 (5.80%)	9,715,416
Total	16,150,365 (78.46%)	4,433,579 (21.54%)	20,583,942

Treatment Plant Influent and Effluent:

Contaminant levels of VOCs frequently **detected** in the treatment plant influent (S1) and the effluent (S3 - air stripper effluent and currently S4 or S5 - carbon effluent) during the annual sampling events are shown in Table 4. A comparison of the final effluent (S5) with the discharge criteria is presented in Table 5. On July 18, 2000 it was determined that the discharge criteria for xylene was exceeded based on the effluent sample results. The treatment plant was temporarily shutdown and the carbon in the carbon unit was replaced on August 1, 2000. Subsequent sampling of the effluent indicated that the treatment plant was operating effectively.

Monitoring Wells:

The historical trends of principal VOCs **detected** during the annual sampling events are presented in Table 6. The results of annual sampling **demonstrate** that the shallow aquifer intercepting trenches appear to be positioned appropriately for intercepting VOC contamination at the Henfield property. The non-detection of VOCs in RWSK-9 and RWSK-10 **indicate** that the Kraus additional trench in the shallow aquifer appears to be positioned correctly to **intercept** the VOC plume migrating in a northwesterly direction from the Kraus modified sump.

Levels of SVOCs (phthalates) have **shown to be present** in several monitoring wells located on the Kraus and Henfield properties. Table 7 provides a comparison of diethylphthalate levels detected during then annual sampling events in selected compliance monitoring wells. The results indicate that the diethylphthalate levels in compliance monitoring wells have shown considerable fluctuations during the annual sampling events with no discernable trend.

Temporal Contamination Trends:

To estimate the decay rate, it is assumed that contaminant concentrations in the ground water will decline exponentially over time. The exponential **decay rate** for the Old Mill Site was determined by plotting the logarithmic influent concentrations of **selected VOCs** (1,2-DCE, 1,1,1-trichloroethene, TCE, and tetrachloroethene) with time. Based on the **trend of data**, the calculated first order exponential rate is 0.0002/day. Figure 2 presents logarithmic influent concentrations of **selected VOCs** (total 1,2-DCE, 1,1,1-trichloroethene, TCE, and tetrachloroethene) with time. The predicted VOC levels in the treatment plant influent, based on the first order rate, is **shown** in Figure 3. To achieve a residual VOC of 11.4 ppb for the four VOCs (summation of individual discharge criteria as indicated in Table 1) used in the plot, treatment of ground water for a period greater than **25 years** from September 1999 would be necessary. The average daily flow rate for the treatment plant during the ninth annual event was 4,989 gallons/day. This would require treatment of an additional **45.52 million gallons** for at least 25 years, based on the daily average flow of 4,989 gallons/day.

The VOC concentrations in the extracted ground water have thus far shown slow reduction. Therefore, additional ground water must be extracted **before** a decreasing trend can be observed. The estimated period for the termination of ground water extraction may likely be longer because the principal contaminant (TCE) in ground water is a **dense non-aqueous phase liquid (DNAPL)**.

Spatial Contamination Trends:

Currently, the shallow aquifer at both the Henfield and Kraus properties is the principal region of ground water contamination at the site, with TCE, **tetrachloroethene**, and 1,2-DCE representing the main VOC contaminants. Because of the limited number of monitoring wells on the Henfield property, VOC plume maps have not been developed. However, **there have been** low levels of VOCs detected in a limited number of the shallow aquifer compliance monitoring wells.

The trends in VOC plume migration in the Kraus shallow aquifer have indicated that the ground water VOC plume is migrating in a north westward direction towards the Kraus additional sump. This sump appears to be positioned correctly to **intercept** the vast majority of the contamination.

VIII. Site Inspection

A site inspection was conducted on August 17, 2000 by EPA, Ohio EPA, representatives from the Old Mill Defense Group, County representatives, and the Ohio Railroad Company to discuss property access issues. The Ohio EPA currently is maintaining O&M responsibilities until the Old Mill Defense Group takes over O&M at the site. The site has been visited several times during the Ohio EPA's assumption of O&M responsibilities. The last site visit was conducted by Ohio EPA and the Defense Group contractor on September 17, 2001.

IX. Recommendations

EPA recommends that the operation of the ground water extraction and treatment system continue. Based on a review of the data, it appears that the ground water remedy selected remains operational and functional. Review of ground water monitoring data indicates that TCE and other contaminants have been found at levels above the cleanup standards in several monitoring wells. TCE and other contaminants in ground water at levels above the cleanup criteria still represent a risk to human health, if ingestion of contaminated ground water were to occur. Please note that the contaminated plume is located within the site property boundaries, and that there are no drinking water wells on the property. In addition, residents in the vicinity of the site obtain drinking water from the municipal water system.

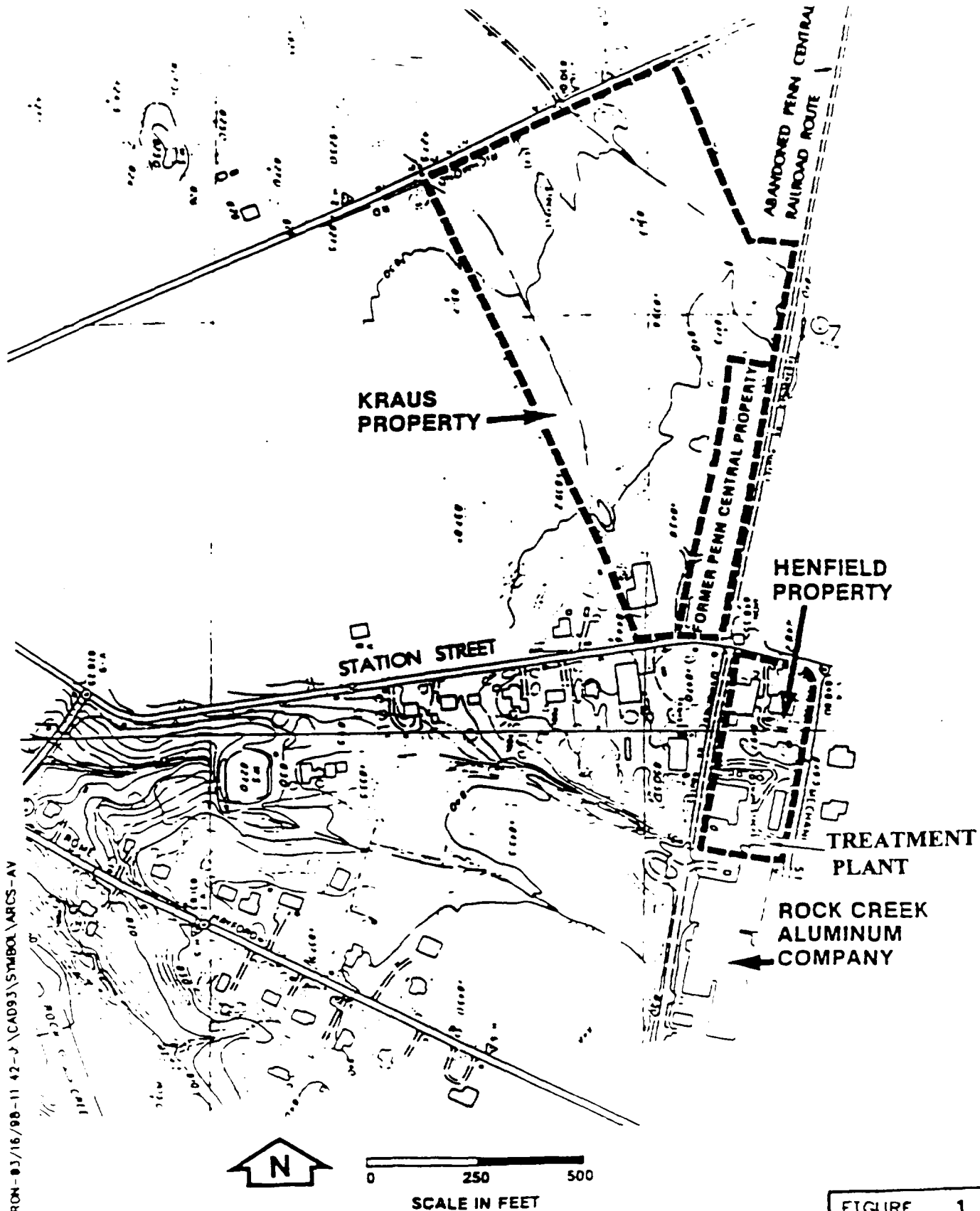
It is the goal of the treatment system to contain the ground water contaminant plume beneath the site, and to reduce contaminant concentrations in the shallow and deep aquifers through extraction and treatment of the water. Monitoring of the ground water should continue to evaluate data trends.

X. Statement of Protectiveness

Hazardous substances, pollutants, or contaminants remain at the Old Mill Superfund Site which require continued O&M of the RA, as well as access controls. All exposure pathways that could result in unacceptable risks are being controlled through the implemented RA. The remedy continues to operate effectively and is protective of human health and the environment. Long-term protectiveness of the remedial action will be verified by continued monitoring at the site.

XI. Next Five-Year Review

The next five-year review for the Old Mill Superfund Landfill Site is required by September 2006, five years from the date of this review.



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FIGURE 1

RESPONSE ACTION CONTRACT
 U.S. EPA CONTRACT No. 68-W7-0026
 WORK ASSIGNMENT No. 006-RARA-0525
 DOCUMENT CONTROL No. RFW006-2A-

SITE LOCATION MAP
 OLD MILL SITE
 Rock Creek, Ohio

TABLE 1
HENFIELD PROPERTY
SAMPLE POINTS AND SCHEDULE
OLD MILL SITE
ROCK CREEK, OHIO

Sampling Point	Water Levels	VOCs	Phthalates
RWSH-1	Q	A	BA
RWDH-1	Q	A	BA
RWSH-2	Q	A	A
RWDH-2	Q	A	A
RWSH-3	Q	A	A
RWDH-3	Q	A	A
RWSH-4	Q	A	A
RWDH-4	Q	A	A
RWSH-5 ^a	Q	A	A
RWDH-5 ^a	Q	A	A
Martin Sump	--	A	BA
Henfield Sump	--	A	BA
Henfield Well	--	A	BA

^aMonitoring wells RWSH-5 and RWDH-5 have not been installed at the time this FSAP was prepared.

Q Quarterly
A Annually
BA Once per two years
-- Not monitored

TABLE 2
KRAUS PROPERTY
SAMPLE POINTS AND SCHEDULE
OLD MILL SITE
ROCK CREEK, OHIO

Sampling Point	Water Levels	VOCs	Phthalates
RWSK-1	Q	A	BA
RWDK-1	Q	A	BA
RWSK-2	Q	A	BA
RWDK-2	Q	--	--
RWSK-3	Q	A	BA
RWDK-3	Q	--	--
RWSK-4	Q	A	BA
RWDK-4	Q	--	--
RWSK-5	Q	A	BA
RWDK-5	Q	A	BA
RWSK-6	Q	A	BA
RWDK-6	Q	A	BA
RWSK-7	Q	A	BA
RWDK-7	Q	A	BA
RWSK-8	Q	A	BA
RWDK-8	Q	A	BA
RWSK-9	Q	A	A
RWSK-10	Q	A	A
RWSK-11 ^a	Q	A	A
RWSK-12 ^a	Q	A	A
P-1	Q	--	--
P-2	Q	--	--
P-3	Q	--	--
P-4	Q	A	BA
P-5	Q	A	BA
P-6	Q	--	--
P-8	Q	A	A
P-9	Q	--	--
Kraus Sump	--	A	BA
Kraus Well	--	A	BA
Kraus Modified Sump	--	A	BA
Kraus Modified Well	--	A	BA
Kraus Additional Sump	--	A	BA

^aMonitoring wells RWSK-11 and RWSK-12 have not been installed at the time this ESAP was prepared.

Q Quarterly
A Annually
BA Once per two years
-- Not monitored

TABLE 3

**GROUNDWATER TREATMENT SYSTEM
SAMPLE POINTS AND SCHEDULE**

**OLD MILL SITE
ROCK CREEK, OHIO**

Sampling Point	Water Levels	VOCs	Phthalates
S1	--	Q	Q
S5	--	Q	Q

Q - Quarterly
-- Not monitored

TABLE 4

**Volatile Organic Compounds in Treatment Plant Influent/Effluent
Old Mill Site
Rock Creek, Ohio
(All Concentrations in ppb)**

Volatiles	S1	S3	S4/S5
1,2-Dichloroethene (total)**	--/--/--/68/360/88/46	--/--/--/1U/1U/1U/1U	--/--/--/1U/1U/1U/1U
Cis 1,2-Dichloroethene*	80.45/80/390/150/320/--/--/--	0.4U/1U/1U/1U/1U/--/--/--	0.4U/1U/1U/1U/1U/--/--/--
Trans 1,2-Dichloroethene*	1.82/0.6J/1U/1/3/--/--/--	0.4U/1U/1U/1U/1U/--/--/--	0.4U/1U/1U/1U/1U/--/--/--
1,1,1-Trichloroethane	0.4U/7/8/4/11/9/50/22/48	0.4U/1U/1U/1U/1U/1U/1U/1U/1U	0.4U/1U/1U/1U/1U/1U/1U/1U/1U
Trichloroethene	270J/740/1,700/740/1,100/790/4,900/1,500/ 1,900	0.56J/1U/1U/1U/1U/1U/1U/1U/1U	0.68/1U/1U/1U/1U/1U/1U/1U/1U
Tetrachloroethene	6.05/35/53/26/37/32/160/90/33	0.4U/1U/1U/1U/1U/1U/1U/1U/1U	0.4U/1U/1U/1U/1U/1U/1U/1U/1U

Note: The results are for nine annual sampling events - Jan.00 / Sept. 98 / Sept. 97 / Sept. 96 / Sept.95 / Sept.94 / Sept.93 / Sept.92 / Oct.91

S1 - Plant Influent

S3 - Air Stripper Effluent.

S5 - Carbon Column Effluent.

U - Analyte was not detected at or above the reporting limit.

J - Estimated value.

-- - Not analyzed.

* - Measured only during the September 1995, September 1996, **September 1997**, September 1998 and January 2000 annual sampling events.

** - Measured during the October 1991, September 1992, **September 1993**, and September 1994 annual sampling events.

1 - Since the replacement of the two carbon tanks with one carbon tank, the sampler locations S₄ and S₅ are effluent samples from the carbon tank.

TABLE 5
Treatment Plant Discharge Criteria
Old Mill Site
Rock Creek, Ohio

Parameter	Discharge Criteria (ppb)
Trichloroethene	1.9
Tetrachloroethene	4.1
1,1,1-Trichloroethane	3.8
Acetone	100
Ethylbenzene	7.2
Phthalates	2.5
Phenols	1.5
Vinyl chloride	1.0
1,1-Dichloroethene	2.8
1,1-Dichloroethane	4.7
Trans-1,2-dichloroethene	1.6
Chloroform	1.6
Total xylenes	1.0
Benzoic Acid	2.0
Methylene chloride	2.8

TABLE 6

**Historical Trends of Principal VOCs Detected During
Annual Sampling
Old Mill Site
Rock Creek, Ohio**

	TCE, ppb									Tetrachloroethene, ppb									1,2-DCE, ppb								
	9A	8A	7A	6A	5A	4A	3A	2A	1A	9A	8A	7A	6A	5A	4A	3A	2A	1A	9A	8A	7A	6A	5A	4A	3A	2A	1A
RWSH-1	0.4U	1U	1U	1U	1U	1U	1U	1U	1U	0.4U	1U	1U	1U	1U	1U	1U	1U	1U	0.4U	1U	1U	1U	1U	1U	1U	1U	1U
RWSH-2	0.4U	1U	1U	1U	1U	1U	1U	1U	1U	0.4U	1U	1U	1U	1U	1U	1U	1U	1U	0.4U	1U	1U	1U	1U	1U	1U	1U	1U
RWSH-3	0.4U	1U	1U	1U	1U	1U	1U	1U	1U	0.4U	1U	1U	1U	1U	1U	1U	1U	1U	0.4U	1U	1U	1U	1U	1U	1U	1U	1U
RWSH-4	3.42	1	1	4	1	1	2	2	NS	0.4U	1U	1U	1U	1U	1U	1U	2	NS	1.85	0.61	1U	8	1U	1U	1U	1U	NS
RWSK-1	0.4U	1U	1U	1U	1U	1U	1U	1U	1U	0.4U	1U	1U	1U	1U	1U	1U	1	1U	0.4U	1U	1U	1U	1U	1U	1U	1U	1U
RWSK-2	1.10	1	1	1	1U	1U	1U	1	NS	0.4U	1U	1U	1U	1U	1U	1	1U	NS	0.4U	1U	1U	1U	1U	1U	1U	1U	NS
RWSK-3	2.67	6	5	6	6	6	7	7	NS	0.4U	1U	1U	1U	1U	1U	1U	1U	NS	0.49	2	2	2	2	2	2	1U	NS
RWSK-4	0.4U	NS	1U	1U	NS	1U	NS	1U	NS	0.4U	NS	1U	1U	NS	1U	NS	1U	NS	0.4U	NS	1U	1U	NS	1U	NS	1U	NS
RWSK-5	313	230	340	260	810	780	520	250	NS	0.46	1U	1U	1U	1U	1	1U	1U	NS	746	384	696	383	1412	1700	610	58	NS
RWDK-5	1.90	2	1	2	1U	1	1U	1U	1U	0.4U	1U	1U	1U	1U	1U	10	1U	1U	51.3	36	18	57	5	11	13	5	8
RWSK-6	0.4U	1U	1U	1U	1U	1U	1U	1U	1U	0.4U	1U	1U	1U	1U	1U	1U	1U	1U	0.4U	1U	1U	1U	1U	1U	1U	1U	1U
RWSK-7	49.8	170	140	190	130	160	130	210	110	0.4U	1U	1U	1U	1U	1U	1U	1U	2U	13.6	72	69	89	75	120	110	9	200
RWSK-8	3.04	.12	.13	.8	.16	.12	.20	.27	.28	1.36	4	5	1U	18	5	8	10	11	2.49	9	10	13	12	11	26	13	31
RWSK-9	0.4U	NS	NS	1U	1U	1U	*	*	*	0.4U	NS	NS	1U	1U	1U	*	*	*	0.4U	NS	NS	1U	1U	2	*	*	*
RWSK-10	0.4U	1U	1U	1U	1U	1U	*	*	*	0.4U	1U	1U	1U	1U	1U	*	*	*	0.4U	1U	1U	1U	1U	1U	*	*	*
R1	82.0	NS	57	97	86	NS	NS	NS	NS	0.4U	NS	1U	1U	1U	NS	NS	NS	NS	254	NS	141	170	140	NS	NS	NS	NS
R2	24.6	29	39	32	NS	NS	NS	NS	NS	0.4U	1U	1U	1U	NS	NS	NS	NS	NS	64	100.7	92	60	NS	NS	NS	NS	NS
R3	NS	NS	NS	1U	NS	NS	NS	NS	NS	NS	NS	NS	1U	NS	NS	NS	NS	NS	NS	NS	NS	1U	NS	NS	NS	NS	NS
R4	45.2	66	73	58	NS	NS	NS	NS	NS	0.4U	1U	1U	1U	NS	NS	NS	NS	NS	17.2	31.7	46	54	NS	NS	NS	NS	NS

TABLE 6
Historical Trends of Principal VOCs Detected During
Annual Sampling
Old Mill Site
Rock Creek, Ohio
(Continued)

	TCE, ppb									Tetrachloroethene, ppb									1,2-DCE, ppb								
	9A	8A	7A	6A	5A	4A	3A	2A	1A	9A	8A	7A	6A	5A	4A	3A	2A	1A	9A	8A	7A	6A	5A	4A	3A	2A	1A
P-5	0.4U	0.75	1	1U	1U	NS	NS	NS	NS	0.4U	1U	1U	1U	1U	NS	NS	NS	NS	0.49	1	5	2	2	NS	NS	NS	NS
P-6	0.4U	1U	1U	1U	1U	NS	NS	NS	NS	0.4U	1U	1U	1U	1U	NS	NS	NS	NS	0.4U	1U	1U	1U	1U	NS	NS	NS	NS
P-8	0.4U	1U	1U	1U	NS	NS	NS	NS	NS	0.4U	1U	1U	1U	NS	NS	NS	NS	NS	0.4U	1U	1U	1U	NS	NS	NS	NS	NS
P-9	0.4U	NS	NS	1U	NS	NS	NS	NS	NS	0.4U	NS	NS	1U	NS	NS	NS	NS	NS	0.4U	NS	NS	1U	NS	NS	NS	NS	NS
Martin Sump	3.73	2	5	20	3	6	5	9	6	0.4U	1U	1U	1U	1U	1U	1U	1U	1U	0.4U	1U	1U	1U	1U	1U	1	1	1U
Henfield Sump	254	2,300	1,700	1,000	1,600	2,400	4,700	3,500	3,900	8.53	140	93	623	120	110	190	140	180	18.2	211	730	99	152	310	280	78	110
Henfield Well	110	390	82	1,400	180	300	610	1,500	260	1.73	3	2	3	5U	1U	1U	2	1U	310	543	372	810	740	380	560	300	98
Kraus Sump	4.73	5	4	4	3	4	10	5	1	0.4U	1U	1U	1U	1U	1U	1U	2	1U	1.48	4	2	2	1U	1	2	2	1U
Kraus Mod Sump	801	1,900	1,400	2,100	1,800	2,700	3,100	2,400	2,500	26.2	56	53	72	69	75	67	100	86	140	365	44	417	446	630	880	690	1,000
Kraus Addl Sump	12.3	10	7	13	3	2	*	*	*	0.4U	1U	1U	1U	1U	1U	*	*	*	7.15	12	11	14	10	11	*	*	*
MCL	5									5									70 (for Cis isomer)								

TABLE 6

Historical Trends of Principal VOCs Detected During
Annual Sampling
Old Mill Site
Rock Creek, Ohio
(Continued)

	TCE, ppb									Tetrachloroethene, ppb									1,2-DCE, ppb								
	9A	8A	7A	6A	5A	4A	3A	2A	1A	9A	8A	7A	6A	5A	4A	3A	2A	1A	9A	8A	7A	6A	5A	4A	3A	2A	1A
P-5	0.4U	0.75	1	1U	1U	NS	NS	NS	NS	0.4U	1U	1U	1U	1U	NS	NS	NS	NS	0.49	1	5	2	2	NS	NS	NS	NS
P-6	0.4U	1U	1U	1U	1U	NS	NS	NS	NS	0.4U	1U	1U	1U	1U	NS	NS	NS	NS	0.4U	1U	1U	1U	1U	NS	NS	NS	NS
P-8	0.4U	1U	1U	1U	NS	NS	NS	NS	NS	0.4U	1U	1U	1U	NS	NS	NS	NS	NS	0.4U	1U	1U	1U	NS	NS	NS	NS	NS
P-9	0.4U	NS	NS	1U	NS	NS	NS	NS	NS	0.4U	NS	NS	1U	NS	NS	NS	NS	NS	0.4U	NS	NS	1U	NS	NS	NS	NS	NS
Martin Sump	3.73	2	5	20	3	6	5	9	6	0.4U	1U	1U	1U	1U	1U	1U	1U	1U	0.4U	1U	1U	1U	1U	1U	1	1	1U
Hienfield Sump	254	2,300	1,700	1,000	1,600	2,400	4,700	3,500	3,900	8.53	140	93	623	120	110	190	140	180	18.2	211	730	99	152	310	280	78	110
Hienfield Well	110	390	82	1,400	180	300	610	1,500	260	1.73	3	2	3	5U	1U	1U	2	1U	310	543	372	810	740	380	560	300	98
Kraus Sump	4.73	5	4	4	3	4	10	5	1	0.4U	1U	1U	1U	1U	1U	1U	2	1U	1.48	4	2	2	1U	1	2	2	1U
Kraus Mod Sump	801	1,900	1,400	2,100	1,800	2,700	3,100	2,400	2,500	26.2	56	53	72	69	75	67	100	86	140	365	44	417	446	630	880	690	1,000
Kraus Addl Sump	12.3	10	7	13	3	2	•	•	•	0.4U	1U	1U	1U	1U	1U	•	•	•	7.15	12	11	14	10	11	•	•	•
MCL					5									5													70 (for Cis isomer)

TABLE 6

Historical Trends of Principal VOCs Detected During Annual Sampling Old Mill Site Rock Creek, Ohio (Continued)

Note: 1,2-DCE is summation of trans 1,2-DCE and cis 1,2-DCE. The samples were analyzed for total 1,2-DCE during the first through fourth annual sampling events. During the fifth, sixth, seventh, and eighth annual sampling events, all samples were analyzed for cis 1,2-DCE and trans 1,2-DCE. 1

ND - Analyte was not detected at or above the reporting limit
NS - Not sampled
• - Wells not in existence
A - Refers to annual sampling

1A - Sampling performed in October 1991
2A - Sampling performed in September 1992
3A - Sampling performed in September 1993
7A - Sampling performed in September 1997

4A - Sampling performed in September 1994
5A - Sampling performed in September 1995
6A - Sampling performed in September 1996
8A - Sampling performed in September 1998
9A - Sampling performed in January 2000

RWSK-4, P-1, P-3, and P-9 were not sampled during the September 1998 sampling event because the well was dry

TABLE 7

**Diethylphthalate Levels in Selected Compliance
Monitoring Wells
Old Mill Site
Rock Creek, Ohio
(All Concentrations in ppb)**

Monitoring Well	Annual Sampling Events								
	First Oct. 1991	Second Sept. 1992	Third Sept. 1993	Fourth Sept. 1994	Fifth Sept. 1995	Sixth Sept. 1996	Seventh Sept. 1997	Eighth Sept. 1998	Ninth Jan. 2000
RWSH-1	6	11	4	19	12	1	1U	1U	1U
RWDH-1	18	59	4	12	9	1U	1U	1U	1U
RWSH-2	59	6	2	20	4	1U	1U	1U	1U
RWSH-3	45	23	0.6J	2	7	1U	1U	1U	1U
RWDH-3	54	5	8	27	42	2	1U	11	1U
RWSH-4	NS	6	0.1J	2	5	3	1U	12	1U
RWDH-4	15	17	4	11	8	3	1U	1U	1U
RWSK-2	NS	8	0.5	19	14	3	1U	1U	1U
RWDK-2	39	43	3	13	12	1U	NS	1U	1U
RWSK-3	39	2	0.3JBU	2	80	1U	2	1U	1U
RWDK-3	130	14	5	15	11	1U	1U	1U	1U
RWSK-4	NS	3	NS	37	NS	1U	1U	NS	1U
RWDK-4	13	29	2	27	11	1U	1U	1U	1U
RWSK-6	16	1	2	8	130	1U	1U	1U	1.3
RWDK-5	62	12	2	14	6	1U	1U	1U	1U
RWDK-6	22	24	4	20	11	1U	1U	1U	0.6J
RWDK-7	21	14	11	1	6	1U	1UJ	1.1J	1U
RWSK-8	35	2	2	2	15	3	1U	1U	1U
RWDK-8	11	65	6	17	14	1U	1U	2.4	1U
P-4	NS	NS	NS	NS	NS	11	1U	1U	2.8

TABLE 7

**Diethylphthalate Levels in Selected Compliance
Monitoring Wells
Old Mill Site
Rock Creek, Ohio
(All Concentrations in ppb)
(Continued)**

Monitoring Well	Annual Sampling Events								
	First Oct. 1991	Second Sept. 1992	Third Sept. 1993	Fourth Sept. 1994	Fifth Sept. 1995	Sixth Sept. 1996	Seventh Sept. 1997	Eighth Sept. 1998	Ninth Jan. 2000
P-5	NS	NS	NS	NS	1U	12	1U	1U	1.8
P-6	NS	NS	NS	NS	1U	12	1U	1U	0.9J
P-8	NS	NS	NS	NS	NS	18	1U	1.4	2

NS - Not sampled.

B - Present in blank.

J - Result is an estimated value below the reporting limit.

U - Analyte was not detected at or above the reporting limit.

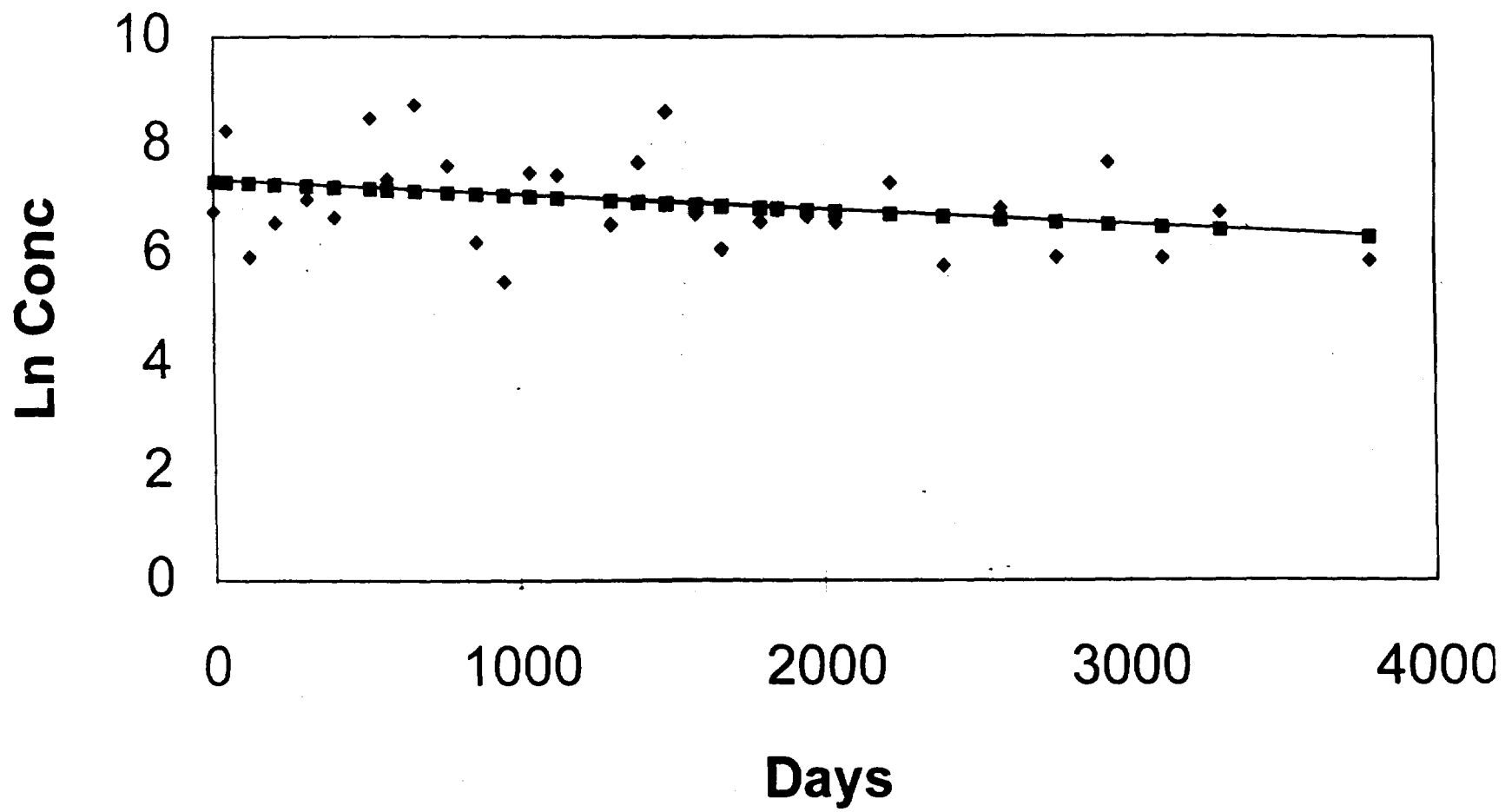


FIGURE 2

RESPONSE ACTION CONTRACT
 U.S. EPA CONTRACT No. 68-W7-0026
 WORK ASSIGNMENT No. 006-RARA-0525
 DOCUMENT CONTROL No. RFW006-2A-

VOC REMOVAL RATE PLOT
 OLD MILL SITE
 Rock Creek, Ohio

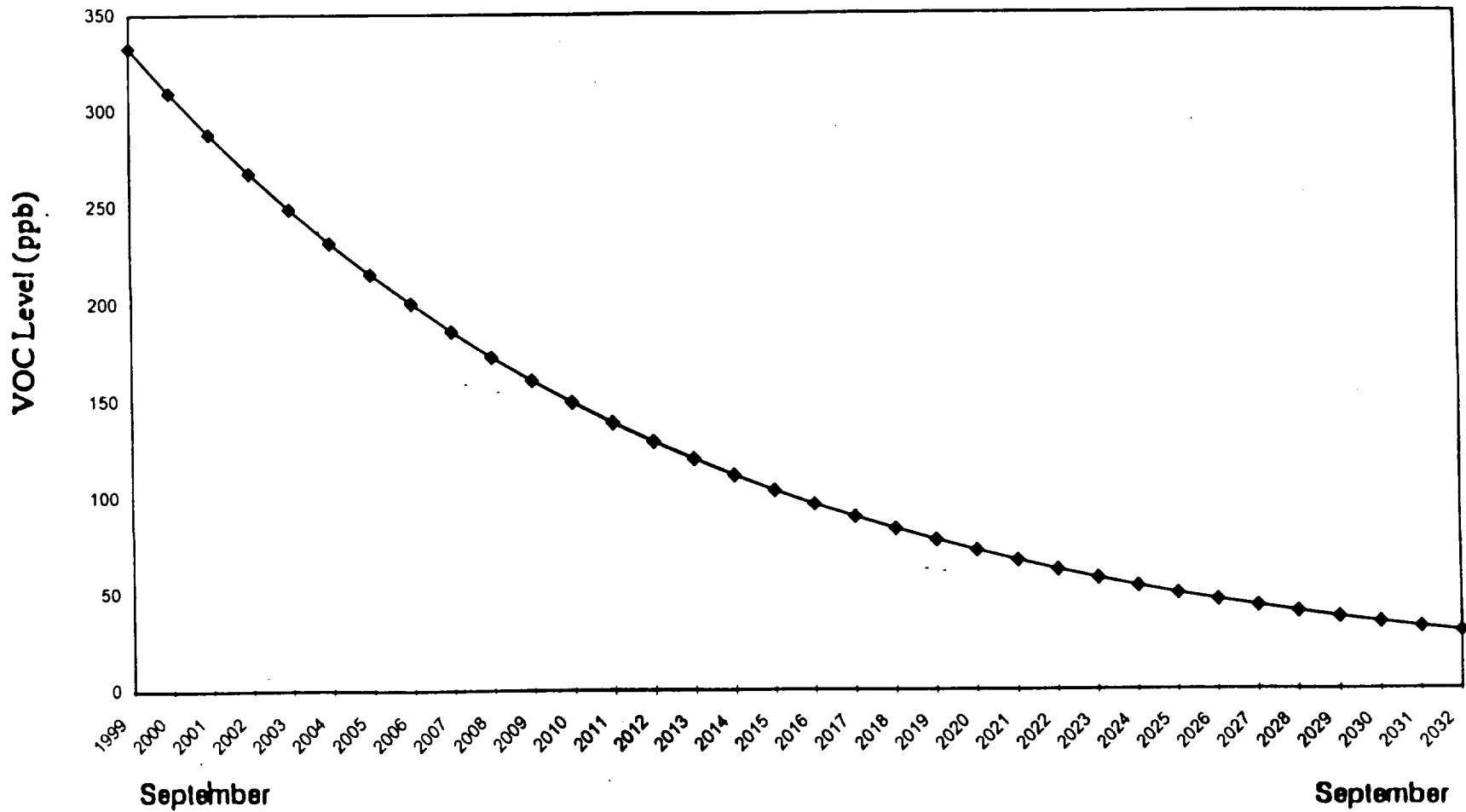


FIGURE 3

RESPONSE ACTION CONTRACT
 U.S. EPA CONTRACT No. 68-W7-0026
 WORK ASSIGNMENT No. 006-RARA-0525
 DOCUMENT CONTROL No. RFW006-2A-

PREDICTED VOC LEVELS IN
 TREATMENT PLANT INFLUENT
 OLD MILL SITE
 Rock Creek, Ohio