United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R07-93/071
May 1993
PB94-964304

EPA

Superfund Record of Decision:

Syntex Facility, MO

RECORD OF DECISION

GROUND WATER OPERABLE UNIT # 2

SYNTEX AGRIBUSINESS, INC.

VERONA, MISSOURI

Prepared by:

U.S. ENVIRONMENTAL PROTECTION AGENCY

April 8, 1993

RECORD OF DECISION DECLARATION

SITE NAME AND LOCATION

The Syntex Agribusiness, Inc. site is located west of the city of Verona in Lawrence County, Missouri.

STATEMENT AND BASIS OF PURPOSE

This decision document represents the selected remedial action for the ground water at the Syntex Agribusiness, Inc. site near Verona, Missouri. This remedy was chosen in accordance with the Comprehensive Environmental Responsibilities, Compensation, and Liabilities Act (CERCLA), as amended by the Superfund Amendments Reauthorization Act (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for this site. The remedial action activities conducted under operable unit 1 at the site greatly mitigated the potential threat to public health and the environment from this site. The selected remedy for this subsequent ground water operable unit is to take no further action at this time with continued ground water monitoring.

DECLARATION

EPA believes that no further remedial action is necessary for ground water at the site to ensure protection of human health and the environment. Previous and ongoing remedial responses under operable unit 1 have greatly reduced the threat from past sources of contamination. Ground water contaminant levels at this site are within the acceptable risk range established by the NCP.

Ground and surface water monitoring will continue for two years following the issuance of this record of decision. An assessment will be conducted by EPA at the end of the monitoring program to ensure that this remedy remains protective of human health and the environment.

A five-year review for this operable unit will be performed as hazardous substances, pollutants, or contaminants remain at the site. A separate five-year review will be conducted in 1993 for the remedial action for operable unit 1 which was initiated in 1988.

William W. Rice
Acting Regional Administrator

5/7/93
Date

DECISION SUMMARY

SITE DESCRIPTION

The Syntex Agribusiness, Inc. facility is located west of the city of Verona, (population 500) in south-central Lawrence County in extreme southwest Missouri. The facility occupies approximately 180 acres, primarily along the east bank of the Spring River (Figure 1), which flows northward through the length of the property.

Most of the active portion of the facility is located within protected areas of the 100-year Spring River floodplain. The area is characterized by karst topographic features such as solution cavities and springs. The maximum floodplain elevations (1260 feet above Mean Sea Level (MSL)) occur at the south end of the property, decreasing to approximately 1252 feet MSL near the northern property boundary at a gradient of approximately 0.002 feet/mile. The highest elevations on the property are located west of Spring River where bluffs rise to approximately 1350 feet near the north end of the trench area.

The industrial facility is surrounded on three sides by property used for agricultural purposes. A predominantly residential setting is located to the east of the site in the city of Verona. Scattered residences are located within the Spring River floodplain down-gradient from the site. The Spring River is used for recreational and industrial purposes within southwestern Missouri.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

In the 1960's, Hoffman-Taff, Inc. owned and operated the facility at Verona, Missouri. Hoffman-Taff produced 2,4,5-trichlorophenoxy-acetic acid (2,4,5-T) for the U.S. Army as part of the production of the defoliant commonly known as Agent Orange. In 1968, Hoffman-Taff leased a portion of a building at the facility to Northeastern Pharmaceutical and Chemical Company (NEPACCO) for the production of hexachlorophene. In 1969, Syntex Agribusiness, Inc. (Syntex) purchased the facility from Hoffman-Taff at Verona.

The production of 2,4,5-T and hexachlorophene involved the intermediate production of 2,4,5-Trichlorophenol (TCP) and subsequently the potential formation of 2,3,7,8-tetrachlorodibenzo-p-dioxin (dioxin). However, these materials were removed from the pharmaceutical grade hexachlorophene, thus producing waste streams containing TCP and dioxin. These waste streams were managed in storage tanks and lagoons located onsite.

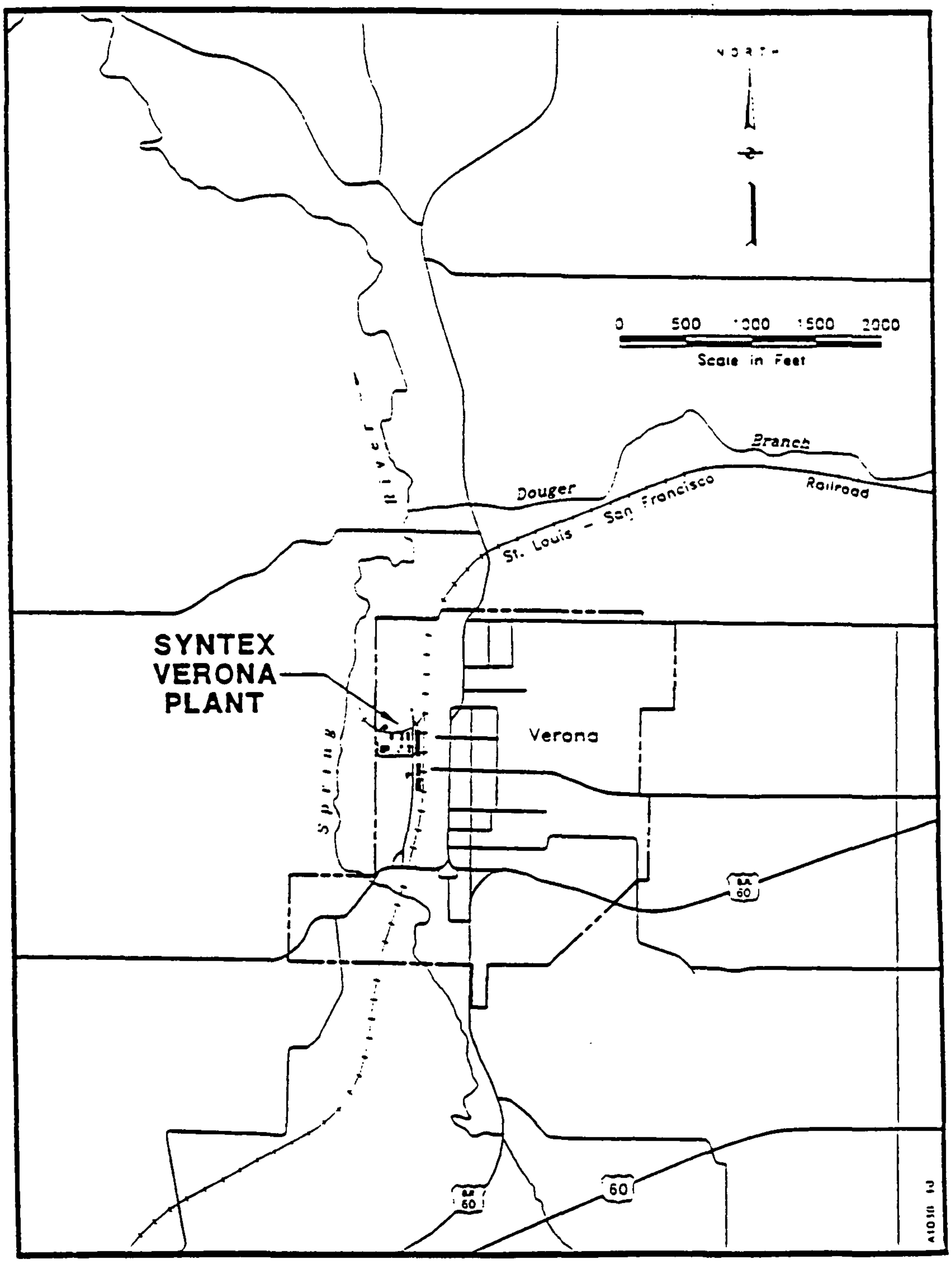

Figure 1. Site Location Map

A Consent Order was signed between EPA and Syntex pursuant to Section 3013 of RCRA 42, U.S.C. δ6934, on August 6, 1982. The agreement provided for "...monitoring, testing, analyses, and reporting regarding the disposal areas on the Facility."

A subsequent administrative order on consent between Syntex and EPA was signed September 6, 1983, pursuant to Section 106 of CERCLA, 42 U.S.C. §9607, and Section 3013 of RCRA, 42 U.S.C. §6934. The order required the following actions:

- posting of warning signs around specified disposal areas;
- development and submittal of a Sampling and Analysis Plan (SAP) to define the nature and extent of dioxin contamination;
- implementation of the SAP upon approval by EPA;
- development and submittal of a Fish and Sediment Sampling Plan for the dioxin contamination in Spring River;
- implementation of the Fish and Sediment Sampling Plan upon approval by EPA;
- preparation and submittal of a Remedial Alternatives Report;
- preparation and submittal of an implementation plan that would include plans and specifications for the preferred remedial alternative(s), schedule for implementation and reporting, description of the necessary reports and safety plans.

In May 1988, EPA issued a Record of Decision (ROD) that selected remedial actions for cleanup of contaminated soils and equipment at the facility and associated ground water monitoring. Pursuant to the 1983 administrative order, EPA, the Missouri Department of Natural Resources (MDNR) and Syntex developed an Implementation Plan to achieve the cleanup measures proposed in the ROD for operable unit #1 (OU 1).

In accordance with the ROD, dioxin-contaminated soils from four areas within the Spring River floodplain (Figure 2) were excavated and transported to the EPA Mobile Incineration System for thermal treatment and disposal. The excavated areas were then backfilled with clean topsoil and a vegetative cover was established. Remediation of contaminated soils located east of Spring River was completed in 1989.

Dioxin-contaminated soils associated with the trench area located on bluffs west of Spring River were capped in place with a 12-inch clay layer and an overlying 12-inch topsoil layer which has supported a vegetative cover. In addition, a gravel drainage interception channel was installed upgradient of the trench area. A five-year review will be conducted in 1993 for the remediation of the dioxin-contaminated soils conducted under the ROD for OU 1.

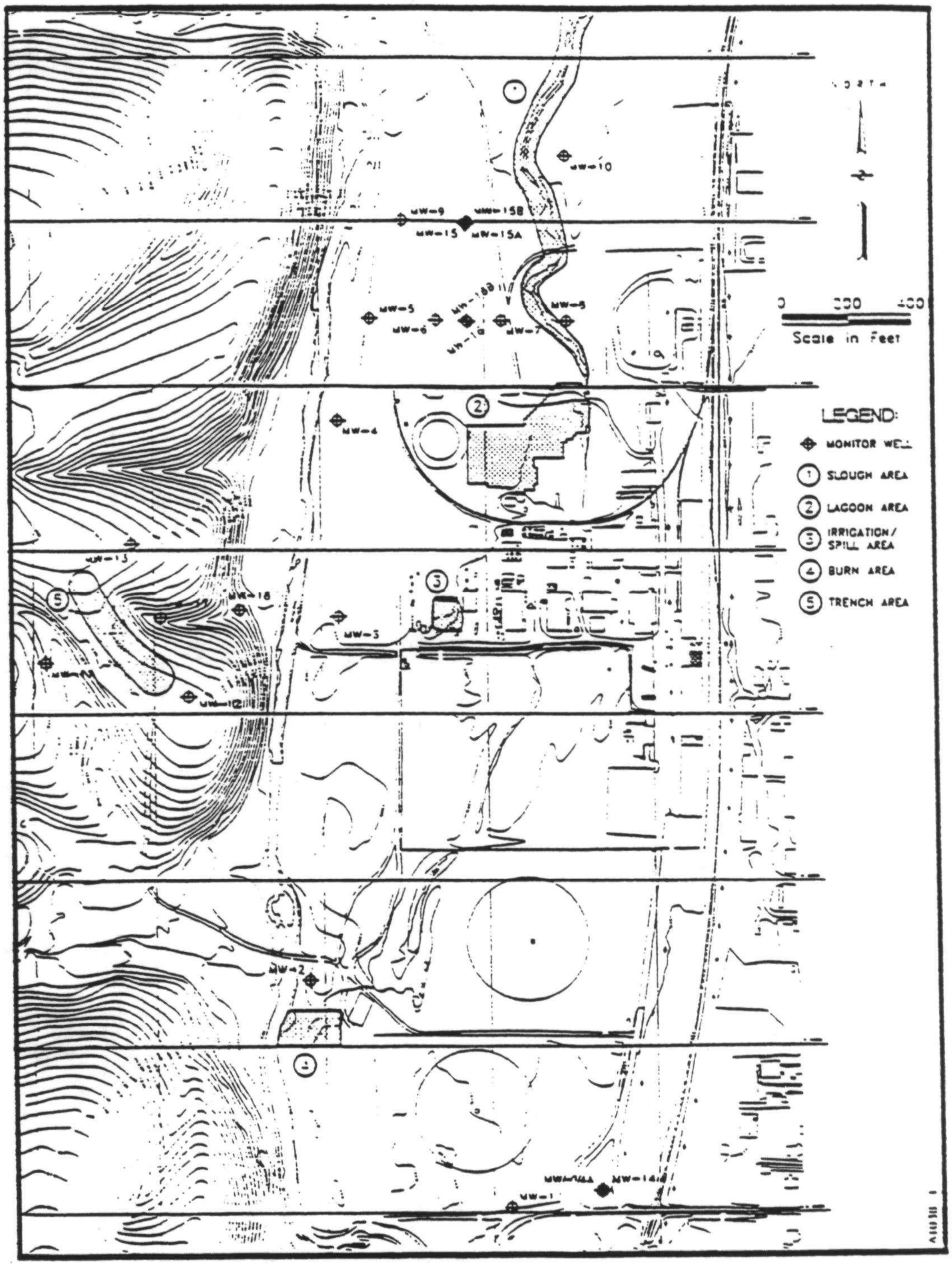

Figure 2. Former Areas of Dioxin Surface Contamination

The Implementation Plan included land-use restrictions at the site to maintain an industrial-use status for the property. Additionally, the site is included on the state of Missouri Registry of Abandoned or Uncontrolled Hazardous Waste Disposal Sites.

COMMUNITY PARTICIPATION

Public participation in the selection of a final remedial action for the Syntex Agribusiness site in Verona, Missouri began with the release of the Syntex "Remedial Alternatives Report," EPA's "Proposed Plan for Final Management of Dioxin Contaminated Soil and Equipment, Syntex-Verona" and Administrative Record on March 21, 1988. The Syntex-Report evaluated remedial alternatives for the dioxin-contaminated soil and equipment and presented general plans for future monitoring of ground water. The ROD for operable unit 1 provided for the excavation and treatment above an action level of 20 parts per billion (ppb) dioxin in surface soils and maintenance of a vegetative cover over soils containing between 1 ppb and 20 ppb dioxin.

Ground water data collected from the monitoring well network was presented for public comment in the Remedial Investigation/ Feasibility Study (RI/FS) prepared by Syntex for the ground water operable unit. The RI/FS and the Proposed Plan for OU 2 were released for public review and comment on August 11, 1992 through September 10, 1992. A public meeting was held on August 18, 1992, to present and discuss the Proposed Plan for the ground water operable unit. Response to comments received on the selected remedy at the public meeting and during the public comment period are included in the attached Responsiveness Summary.

The documents EPA relied upon for selecting this remedial alternative are included within the Administrative Record. A repository for the administrative record file has been established at the Lawrence County Courthouse in Mt. Vernon, Missouri for public review.

SCOPE AND ROLE OF THE OPERABLE UNIT

The OU 1 ROD stated that existing ground water data was insufficient to determine ground water remediation needs at that time. The ROD required further monitoring to characterize the nature and extent of potential ground water contamination at the Site. Accordingly, additional ground water monitoring wells were installed at the facility to obtain the necessary data upon which to base a decision.

An operable unit is a discrete action that comprises an incremental step towards comprehensively addressing site problems. At this site, EPA has defined the soils and equipment remediation as OU #1 and the ground water investigation as OU #2. Ground water monitoring of the uppermost aquifer (alluvium/

shallow carbonate bedrock) beneath the Syntex Verona Facility began in 1985 following installation of monitoring wells MW-1 through MW-10 in the floodplain alluvium (Figure 3). Monitoring was performed to detect potential releases, if any, of volatile organic contaminants to the shallow ground water at the site through 1988. Several organic compounds were tentatively identified in the ground water at the site.

Subsequent to the 1988 ROD for OU 1, the Verona Implementation Plan was developed to define additional ground water characterization needs, determine the effectiveness of soils remediation for OU 1, provide post-remediation monitoring, and to characterize ground water flow beneath the site.

To determine whether further remedial action was necessary with respect to the ground water, eleven additional monitoring wells (Figure 3) were installed at the site. The resulting 21-monitoring well network has been used to help determine the flow characteristics of ground water at the site and to more accurately define the extent of low-level organic and inorganic constituents in the ground water at the Site. Several floodplain monitoring wells have been sampled on a quarterly basis since 1989.

SITE CHARACTERISTICS

The facility overlies alluvial deposits which rest unconformably upon an eroded carbonate bedrock surface. The alluvium consists of fine to coarse-grained clastic sediment ranging from 10 to 30 feet in thickness. The alluvial deposits are underlain by carbonate bedrock which consists of fractured cherty limestone. The Northview Shale which underlies the carbonate bedrock, acts as a confining bed for vertical ground water movement in this area. The thickness of the shallow bedrock is controlled largely by position of its erosional surface, and is approximately 90 feet in thickness below the facility. There is no confining layer between the alluvium and the shallow bedrock suggesting that these two units act as a single aquifer.

Static water measurements from alluvial monitoring wells MW-1 to MW 10 were used to determine the potentiometric surface of the shallow unconfined aquifer. The data collected indicates that ground water flow in the alluvial aquifer moves in a north-northwesterly direction at the site (Figure 4). The direction of ground water flow may be influenced by the presence of a buried channel which parallels the Spring River at the site.

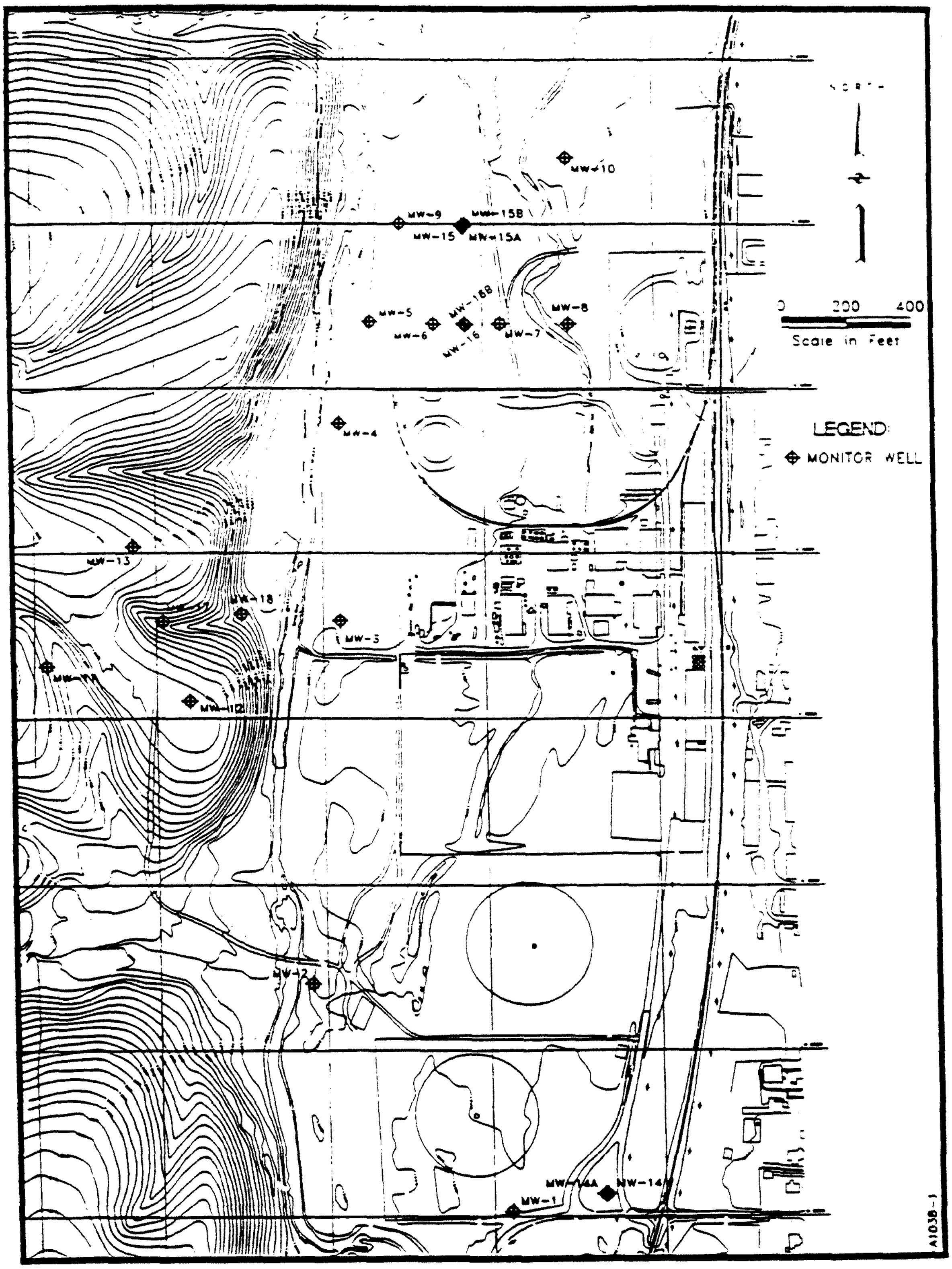

Figure 3. Site Monitoring Well Location Map

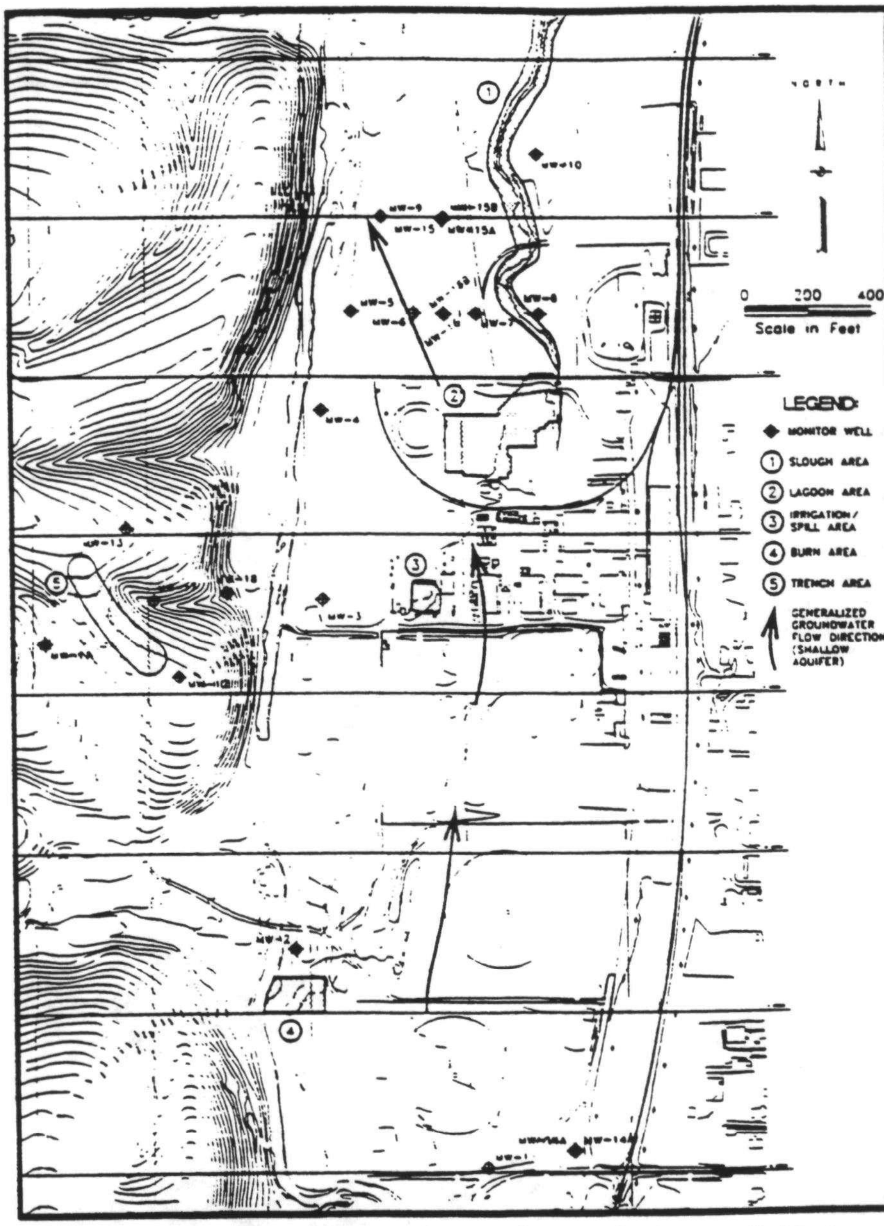

Figure 4. Generalized Direction of Ground Water Flow

Ground water flow velocity data was also collected from monitoring wells MW 1-10. These tests indicate hydraulic conductivities that range from $4.78x10^{-4}$ to $9x10^{-2}$ cm/sec (Table 1). These values are consistent with typical hydraulic conductivities for deposits consisting of silty sands and gravels. Ground water flow velocities for the bedrock aquifer were significantly lower than those of the alluvial aquifer, with hydraulic conductivities ranging from $3.9x10^{-7}$ to $8.9x10^{-6}$ cm/sec (Table 2). These low conductivities suggest that ground water flow in the bedrock aquifer is likely controlled by fracture porosity where wide variations in velocity may exist depending on the extent of fracturing in a particular section.

Well #	Calculated K(cm/sec) From Slug Testing
MW-1	1.19×10^{-3}
MW-2	2×10^{-2}
MW-3	3.9×10^{-3}
MW-4	2×10^{-2}
MW-5	1×10^{-2}
MW-6	4×10^{-2}
MW-7	9×10^{-2}
MW-8	4.78×10^{-4}
MW-9	1.23×10^{-2}
MW-10	5.38×10^{-3}

Table 1. Slug Test Results of the Alluvial Section of the Shallow Aquifer

Well	K cm/sec
MW-12	1.1×10^{-6}
MW-12	5.4×10^{-6}
MW-12	1.2×10^{-6}
MW-13	8.3×10^{-7}
MW-13	3.9×10^{-7}
MW-13	6.5×10^{-7}
MW-17	6.4×10^{-7}
MW-17	8.9×10^{-6}
MW-17	6.0×10^{-7}

Table 2. Estimated Hydraulic Conductivity of Bedrock Based on Packer Test Results

Ground water monitoring to characterize the water quality of the shallow aquifer began in October 1985, following installation of monitor wells MW-1 through MW-10 in the floodplain alluvium. Syntex was required to analyze ground water samples for the following minimum list of parameters:

pH	Lead
Conductivity	Manganese
Total Organic Carbon	Selenium
Calcium	Sodium
Magnesium	Acetone
Chloride	Dichloromethane
Sulfate	Toluene
Nitrate	Chlorobenzene
Phenol	Ethylbenzene
Arsenic	1,4 Dichlorobenzene
Barium	Tetrachloroethane
Chromium	Tetrachloroethene
Xylenes	Iron

A total of twenty-one wells have been installed at the Verona site to collect physical and chemical data relating to ground water flow and quality. Based on data collected prior to 1988, monitoring wells 6 and 7 were determined to be situated to intercept contaminants downgradient from the potential source areas.

Well #1 was originally designed to determine ground water background concentrations. However, analysis of data for well #1 indicates that it may be affected by on-site conditions and may not truly represent background water quality.

Ground water sampling results indicate the presence of several volatile organic compounds which exceed Maximum Contaminant Levels (MCLs). Table 3 shows the volatile organic compounds detected above MCLs in the wells which were sampled between January 1991 and April 1992. MCLs for dichloromethane, 1,1 dichloroethane, and toluene were exceeded. MCLs are standards utilized by municipal water supplies for safe drinking water and are noted here for comparison purposes. In addition, the compounds acetone and chlorobenzene, for which no MCLs are available, have been detected in shallow ground water samples (Table 4).

Nine inorganic constituents were detected in concentrations above MCLs established for drinking water supplies. They include arsenic, barium, cadmium, chromium, lead, selenium, antimony, nitrate, and fluoride. Three additional inorganic analytes, iron, chlorides and manganese, were present above secondary MCLs.

Table 3

Volatile Organic Compounds Detected Above MCLs in Shallow Groundwater Samples, January 1991 to April 1992, Syntex Verona Facility

Well No.	1/30/91	Sampling Date 4/25/91	7/31/91	10/31/91	1/28/92	4/7/92
MW-1	ND*	Dichloromethane (110)**	ND	Dichloromethane (13)	ND	ND
MW-2	NS***	NS	NS	NS	NS	NS
MW-3	NS	NS	NS	NS	NS	NS
MW-4	NS	NS	NS	NS	NS	NS
MW-5	ND	NS	ND	NS	ND	ND
MW-6	ND	Dichloromethane (441)	ND	ND	ND	ND
MW-7	ND	Dichloromethane (25)	ND	ND	ND	ND
MW-8	NS	NS	NS	NS	NS	NS
MW-9	ND	ND	ND	ND	ND	ND
MW-10	NS	NS	NS	NS	NS	NS
MW-11	ND	ND	NS	NS	NS	NS
MW-12	Dry	Dry	Dry	Dry	Dry	Dry
MW-13	Dry	Dry	Dry	Dry	Dry	Dry
MW-14	ND	ND	Dichloromethane (603) 1,2-Dichloroethane (643)	ND	ND	ND
MW-14A	ND	ND	ND	ND	ND	ND
MW-15	ND	ND	ND	ND	ND	ND
MW-15A	ND	Dichloromethane (364)	ND	ND	ND	Dichloromethane (19)
MW-15B	ND	ND	ND	ND	ND	ND
MW-16	ND	ND	Dichloromethane (1000) Toluene (1000)	ND	ND	ND
MW-16B	ND	ND	ND	ND	ND	ND
MW-17	Dry	Dry	Dry	Dry	Dry	Dry
MW-18	ND	Dichloromethane (66)	NS	NS	NS	NS

* ND - None detected above MCL. ** ( ) - Concentration in µg/L. *** NS - Not sampled.

Table 4

Other Volatile Organic Compounds Detected in Shallow Groundwater Samples, January 1991 to April 1992, Syntex Verona Facility

Well No.	Sampling Date					
	1/30/91	4/25/91	7/31/91	10/31/91	1/28/92	4/7/92
MW-1	Acetone (73)**	Acetone (1370)	Acetone (525)	ND*	ND	ND
MW-2	NS***	NS	NS	NS	NS	NS
MW-3	NS	NS	NS	NS	NS	NS
MW-4	NS	NS	NS	NS	NS	NS
MW-5	Acetone (22) Chlorobenzene (30)	NS	Acetone (693)	Chlorobenzene (18)	Chlorobenzene (58) Carbon disulfide (21)	Chlorobenzene (57)
MW-6	Chlorobenzene (215) Ethylbenzene (23) Xylenes (76)	Acetone (3470) Chlorobenzene (231) Xylenes (21)	Acetone (12,291)	Acetone (22) Chlorobenzene (446) Ethylbenzene (68) Toluene (273) Xylenes (211)	Chlorobenzene (261) Ethylbenzene (21) Xylenes (51)	Chlorobenzene (224) Ethylbenzene (22) Xylenes (37)
MW-7	Acetone (11) Chlorobenzene (10)	Acetone (123)	Acetone (1591)	Acetone (10)	Chlorobenzene (12)	Chlorobenzene (15)
MW-8	NS	NS	NS	NS	NS	NS
MW-9	Acetone (12) Chlorobenzene (116)	Chlorobenzene (13)	Acetone (1993) Chlorobenzene (162)	Acetone (337) Chlorobenzene (305) Carbon disulfide (28)	Chlorobenzene (236)	Chlorobenzene (217)
MW-10	NS	NS	NS	NS	NS	NS
MW-11	Acetone (4949)	Acetone (3930)	NS	NS	NS	NS
MW-12	Dry	Dry	Dry	Dry	Dry	Dry
MW-13	Dry	Dry	Dry	Dry	Dry	Dry
MW-14	Acetone (3706)	Acetone (4470)	Acetone (18,149)	Acetone (55)	ND	ND
MW-14A	Acetone (1083)	Acetone (870)	ND	ND	Acetone (38)	ND
MW-15	Acetone (31)	ND	Acetone (2728)	ND	ND	ND
MW-15A	Acetone (20)	Acetone (8290)	Acetone (3130)	Acetone (14)	ND	ND
MW-15B	Acetone (54) Chlorobenzene (71) Xylenes (7)	Acetone (560) Chlorobenzene (64)	Acetone (2585)	Acetone (4505)	Chlorobenzene (57)	Chlorobenzene (107)
MW-16	Acetone (556)	Acetone (330)	Acetone (11,796)	Acetone (246)	ND	ND
MW-16B	ND	Acetone (68,300)	Acetone (8377)	ND	ND	ND
MW-17	Dry	Dry	Dry	Dry	Dry	Dry
MW-18	Acetone (46)	Acetone (960)	NS	NS	NS	NS

* ND - None detected. ** ( ) - Concentration in $\mu g/L$. *** NS - Not sampled.

Upon review of the ground water analytical data, it appears that an inexactly defined area of metals and organic ground water contaminants is present at various times at a location downgradient of the former OU 1 contaminated soils areas. The affected area is located north of the waste water treatment plant and former Lagoon Area, and is approximately bounded to the east and west by the former Slough Area and Spring River, respectively. Acetone, dichloromethane, and chlorobenzene were among the organic contaminants most commonly detected in monitoring wells in this area (MW-5, 6, 7, 9, 15, 15A, 15B, 16, and 16B). In 1989, dioxin was reported at 5.3 part per trillion (ppt) from well 16. However, since dioxin has not been consistently found in the ground water and was not evaluated in the risk assessment, further monitoring will be conducted to better define its presence. Acetone and chlorinated solvents, such as dichloromethane and chlorobenzene, are volatile compounds. As such they readily volatilize during transport. These compounds also readily biodegrade in waste water treatment processes and may biodegrade in ground water. The lack of persistence exhibited by these compounds in the ground water beneath the site indicates that they may not be attributable to historic soils contamination at the facility.

The confining layer at the base of the shallow aquifer appears to restrict movement of contaminants into the deep bedrock aquifer. The shallow ground water beneath the floodplain at the site discharges to the Spring River along and downstream of the Syntex facility, thus the river defines the westernmost aerial extent of ground water contaminants in the shallow aquifer below the floodplain. Due to the general ground water flow direction, the river would also be expected to intercept any contaminated ground water leaving the site within a short distance of the northern property boundary. Further, due primarily to biodegradation and volatilization, some of the historically detected organic contaminants may be permanently removed from the ground water system before the ground water discharges to the Spring River.

Because dioxin has the tendency to bioaccumulate in fish, Syntex has sampled fish and sediment annually for dioxin from locations in the Spring River downgradient of the site. Analysis of fish filets indicated a maximum level of 40 parts per trillion (ppt) dioxin in 1982, and had decreased to a level of 4.8 ppt by 1987. The Food and Drug Administration advisory level for dioxin in edible portions of fish is 25 ppt for reduced consumption and curtailment at 50 ppt. Table 5 illustrates the decline of dioxin levels in fish between 1988 and 1992, after the implementation of OU 1.

Site	1988	1989	1990	1992[1]
1	3.0/3.2	4.7/3.3	1.8/2.1	(1.6)[2]/2.2
2	4.2/5.9	3.5/4.1	1.9/2.0	1.0/1.9

Note: The two values presented for each site and year represent an independent analysis of duplicate composite samples

Table 5. Dioxin Concentrations (ppt) in Fish Filets From the Spring River, Missouri

SUMMARY OF SITE RISKS

As part of the remedial investigation activities, an analysis was conducted to estimate the human health or environmental problems which could result from exposure to ground water at the site. This analysis is commonly known as a baseline risk assessment. The purpose of the baseline risk assessment is to provide a public health evaluation of potential ground water contamination remaining following the cleanup of contaminated soils onsite. The risk assessment was prepared using data acquired during the remedial investigation for the past two years and using assumptions regarding maximum exposures that could be reasonably expected for an individual at or near the site. This scenario is defined as the Reasonable Maximum Exposure (RME) scenario. The Baseline Risk Assessment conducted for OU 2 is included in the Administrative Record.

For the purposes of this risk assessment, EPA considered the RME scenario to be a family living immediately downgradient of the site and relying on a water well completed within the shallow alluvial aquifer as a sole source of water for drinking and other purposes. Such persons would be exposed to the ground water by ingestion of drinking water, and through dermal exposure and inhalation while showering. The additive carcinogenic risk for this scenario based upon exposure to ground water located immediately downgradient of the site would result in less than 5 excess cancers per 100,000 people exposed for an adult over 30 years of chronic exposure, and less than 3 excess cancers per 100,000 for children living adjacent to the site. The additive non-carcinogenic risk is 0.844 for an adult over 30 years of exposure and 0.372 for a child. When evaluating risk resulting from exposure to hazardous substances for people at or near a Superfund site, EPA considers the exposure to be unacceptable if it results in a carcinogenic risk greater than one additional cancer per 10,000 people exposed or a non-carcinogenic hazard index greater than 1. Thus, EPA believes that the risk posed to the individuals in this scenario falls within an acceptable risk range at this time.

Significant uncertainties exist with this RME scenario which may result in an overestimation of the risk. These uncertainties include the assumptions that a residence would be established immediately adjacent to the area of ground water contamination and that a municipal water supply would be unavailable. Land use restrictions have been established for the site that will limit the property to industrial use and ensure residential exposure does not occur. Additionally, the level of contaminants used in this assessment was developed by combining contaminants detected across several wells in the monitoring well network and projecting those concentrations to the RME well. Lesser concentrations of each contaminant could reasonably be expected at a point down-gradient from the source of contamination.

In an attempt to better define potential downgradient receptors, EPA identified and sampled three residential wells within approximately one mile downstream of the site. Analysis of these samples found no contamination in these downgradient residential wells. Thus, under current site conditions it does not appear that any contaminants have migrated to any potential downgradient receptors.

SUMMARY OF ALTERNATIVES

The primary purpose of a Feasibility Study (FS) is to ensure that appropriate remedial alternatives are developed and evaluated for consideration in selecting a remedial action. The FS for OU 2 identified the following alternatives for this site: 1.) No action; 2.) No action with continued ground water monitoring; 3.) Ground water pumping and treatment.

Alternative 1: No Action

The no action alternative provides a baseline for comparing other alternatives. Because no remedial action would be implemented, long-term human health and environmental risks for the site essentially would remain the same as those identified in the baseline risk assessment.

Alternative 2: No Action With Continued Ground Water Monitoring

Alternative 2 entails no further action with continued monitoring of the of the monitoring well network and installation of additional monitoring well clusters. As with Alternative 1, potential long-term human health and environmental risks for the site essentially would remain the same as those identified in the baseline risk assessment. In this alternative, monitoring would be done for a dozen additional compounds (Table 2) on a quarterly basis for the flood plain monitoring wells. However, after the first year, all parameters whose levels have remained constant would be monitored semi-annually. Surface water sampling of Spring River upstream and downstream of the facility and the formerly contaminated areas would be conducted in coordination with the ground water monitoring program. A risk assessment would be conducted at the end of the two-year monitoring program to ensure that the "no action" approach remains protective of human health and the environment.

TABLE 6. Additional Compounds to be Analyzed for Alternative #2

1. Dioxin (2,3,7,8 Tetrachlorodibenzo-p)
2. Heptachlor
3. Heptachlor Epoxide
4. 1,4 Dichlorobenzene
5. Bis (2-Ethylhexyl) phthlate
6. Antimony
7. Tetrachlorobenzene (1,2,4,5)
8. Triclorobenzene (1,2,4)
9. 1,3 Dichlorobenzene
10. Naphthalene
11. Hexachlorophene
12. 1,4 Dioxane

Additional monitoring wells would be installed both upgradient and downgradient from the facility. One upgradient monitoring well would be installed to ensure background conditions are fully characterized upgradient (south) from the facility and formerly contaminated areas. The purpose of installing the downgradient monitoring wells would be to confirm the leading edge of any potentially migrating plume downgradient (north) of the facility and formerly contaminated areas.

This alternative is readily implementable. Sufficient labor and analytical services exist to meet the requirements of the alternative. There would be no additional risks posed to the community, workers, or the environment as the result of this alternative being implemented. The two-year present worth cost of this alternative is estimated to be $120,000, with a projected $50,000 for capital expenditures.

Alternative 3: Ground Water Pump and Treatment

This alternative involves pumping groundwater from extraction wells and treating the water using chemical precipitation to remove the inorganic fraction of the groundwater and air stripping to remove the organic fraction. Precipitation is a process by which the chemical equilibrium of the water is altered to reduce the solubility of metals. The metals precipitate out as a solid and are removed from the ground water by solids removal processes such as clarification and filtration. The resulting sludge would be transported to an off-site disposal facility. After the metals are removed, the ground water would be routed to an air stripper to remove any organic contaminants that may be present.

This alternative would reduce the toxicity, mobility, and volume of contaminants which might be present in the water. However, due to the inconsistent contaminant levels detected at each well within the target volume, the need for a pump and treat system has not been established at this time. This alternative is readily implementable should contaminants be discovered at levels which pose an unacceptable risk. The present worth cost for of this alternative is estimated to be $3,500,000 with a projected $1,100,000 for capital expenditures.

DESCRIPTION OF THE SELECTED ALTERNATIVE

Based on current information, Alternative #2 -- No Action with Continued Ground Water Monitoring is EPA's preferred alternative. EPA believes that no significant health threat currently exists as a result of the residual ground water contamination attributable to historic waste disposal practices at the facility. Therefore, no remedial action is warranted for the ground water at this time. This alternative includes a two-year program to monitor ground water quality at the site. A ground water assessment will be conducted at the end of the monitoring program to ensure that ground water contamination does not pose an unacceptable risk to human health or the environment.

Where a site poses an unacceptable risk to human health or the environment, Section 121 of CERCLA, as amended by SARA, requires EPA to evaluate selected remedial alternatives against nine criteria. The first step is to ensure that the alternative satisfies the threshold criteria. The two threshold criteria are overall protection of public health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs). Alternatives that do not satisfy these criteria are rejected and not evaluated further. The second step is to compare the alternative against a set of balancing criteria. The NCP established five balancing criteria which include long-term effectiveness and permanence; reduction in toxicity, mobility, or volume achieved through treatment; implementability; short-term effectiveness; and cost. The third and final step is to evaluate the alternative on the basis of modifying criteria. The two modifying criteria are state and community acceptance.

However, in some situations, such as the case for OU 2, the Baseline Risk Assessment conducted during the RI demonstrates that conditions at the site pose little current or potential threat to human health or the environment. Under such circumstances, the statutory standards of CERCLA Section 121 (e.g., compliance with ARARs, cost effectiveness) are not triggered and these requirements need not be addressed in documenting that a "no action" decision is appropriate for a site or operable unit.

The 1988 remedial action greatly removed dioxin and associated volatile organic compound (VOC) soil contamination at this site. Reported concentrations of contaminants are currently present at low levels and represent little risk to human health and the environment. Based upon trends observed from historical data, the low levels of contaminants present should continue to attenuate over time.

As part of a separate National Pollutant Discharge Elimination System (NPDES) permit requirement, three additional monitoring wells are planned to be installed directly downgradient from the spray irrigation system located on the south end of the facility property. These three monitoring wells will be completed in the shallow alluvium to characterize any possible ground water contamination which may be attributable to the current land application of treated waste water at the facility.

The selected remedy presented in this record of decision represents the final remedy selection at this site. The five-year review will include an assessment of the additional ground water monitoring information collected subsequent to the issuance of this decision document. This review will be conducted in accordance with CERCLA, and applicable guidance and in a manner that will assure the continued protection of public health and the environment. A five-year review is required for all sites where hazardous substances, pollutants, or contaminants remain above levels that allow for unlimited use and unlimited exposure.