STATEMENT OF BASIS

FOR

FRANKLIN POWER PRODUCTS/AMPHENOL FACILITY
FRANKLIN, INDIANA
IND 044 587 848

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
(U.S. EPA)

STATEMENT OF BASIS

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INTRODUCTION

This Statement of Basis for the Franklin Power Products/Amphenol (FPP/Amphenol) facility discusses several viable remedies for site remediation and explains the remedy proposed by the United States Environmental Protection Agency (U.S.EPA) to clean up the site. U.S. EPA will select a final remedy for the facility only after the public comment period has ended and the information submitted by the public has been reviewed and considered.

This Statement of Basis is being issued by U.S. EPA as part of its public participation responsibilities under the Resource Conservation and Recovery Act (RCRA). This Statement of Basis summarizes information that can be found in greater detail in the final RCRA Facility Investigation (RFI) and Corrective Measures Study (CMS) reports and other pertinent documents contained in the Administrative Record for this facility. U.S. EPA and the State of Indiana encourage the public to review these documents in order to gain a more comprehensive understanding of the facility and the activities that have been conducted under the authority of RCRA.

U.S. EPA may modify the proposed remedy or select another remedy based on public comments or new information obtained. Therefore the public is encouraged to review and comment on the alternatives proposed. If a public meeting is requested, U.S. EPA will publish a newspaper notice of the meeting prior to the meeting date.

PROPOSED REMEDY

U.S. EPA proposes the removal of contaminated groundwater by an on-site groundwater recovery system, treatment of the recovered water and discharge to the City of Franklin sanitary sewer/water treatment system, and additional remediation of soil and groundwater by an on-site air sparging/soil vapor extraction (SVE) system. The proposed remedy includes enactment of institutional controls to prevent contact with contaminants, and enactment of environmental monitoring programs to assess the effectiveness of the remedy implementation.

FACILITY BACKGROUND

The FPP/Amphenol facility consists of 15 acres and is located in the north east part of the city of Franklin, Indiana. The facility is bounded on the east by Hurricane road, on the south by Hamilton Avenue, on the north by an abandoned railroad, and on the west by industrial/commercial properties. Hurricane Creek, which lies about 1/4 mile south of the facility and drains to Youngs Creek, is the nearest surface water body. The location of the facility is shown in Figure 1 (see Attachment A - Figures).

The facility was built in 1961 by Dage electric and acquired by Bendix in 1963. After operations at the facility ceased in 1983 several acquisitions/mergers occurred. The facility was eventually acquired by Amphenol Corporation and sold to Franklin, Power Products, Inc. in 1989, the current owner and operator of the facility.

Facility Operations and Waste Handling

Past operations at the facility included degreasing, plating, metal working and painting. The following hazardous wastes were handled at the facility:

(1) spent halogenated solvents including tetrachloroethylene, trichloroethane, methylene chloride, carbon tetrachloride used in degreasing operations, and chlorinated fluorocarbon and sludges from the recovery of the solvents;

(2) spent non-halogenated solvents including toluene, methyl ethyl ketone, carbon disulfide, isobutanol, pyridine, and the still bottoms from the recovery of these solvents;

(3) waste water treatment sludges from electroplating operations;

(4) spent cyanide plating bath solutions from electroplating operations;

Areas where hazardous materials were stored:

(1) an above-ground 500 gallon tank for trichloroethane storage and drum storage area at west central side of plant building;

(2) a chemical container storage room along the southwest side of the building;

(3) an above-ground 500 gallon tank for trichloroethene storage and a 1000 gallon tank for hydrochloric acid storage;

(4) a 1000 gallon in-ground concrete overflow vault for cyanide storage.

Previous Investigations and Remedial Activities

Investigations and remedial activities were performed at the facility in 1984 and 1985. The investigative activities included borehole drilling and monitoring well installation, and sampling/analysis of soil and ground water. This investigation revealed that a faulty drainage system at the plating room located at the southwest corner of the plant building had caused contaminant releases at the plating room. The investigation also revealed that significant contaminant releases had occurred at the facility sanitary sewer line leading to the main sewer line at Hamilton Avenue. Inspection by video camera of the sewer revealed numerous separated joints and crushed tile about 175 feet north of Hamilton Avenue. Further inspection also revealed that the sanitary sewer manhole at the corner of Hamilton Avenue and Forsythe Street was severely damaged.

Remedial activities in 1985 included removal of the plating room floor and underlying soil containing cyanide and solvent constituents. Soil exceeding 10 parts per million (ppm) of cyanide was removed and disposed in a RCRA permitted landfill. The damaged sanitary sewer on the property was also replaced with a new sewer line. The new line was offset 35 feet to the east of the old sewer line which was left in place. Additional remedial activities included drainage and decontamination of the plant waste water treatment system and plating room tanks. The underground cyanide overflow tank was drained and decontaminated and the pipes capped at the discharge ends. Twelve monitoring wells believed to be improperly constructed were removed and the boreholes grouted. The damaged sewer manhole at Forsythe and Hamilton was also repaired.

A six foot diameter storm sewer that transects the facility is a significant drainage feature at the site. The storm sewer captures drainage north of the facility becoming an underground culvert at the northwest corner of the facility and extending along the entire western property boundary, turning 90 degrees eastward at the southwest corner of the property and extending across the southern part of the facility, and ultimately discharging to Hurricane Creek through a 200 foot open channel.

RCRA FACILITY INVESTIGATION (RFI)

The RFI, the investigative activities performed under the authority of RCRA, included a soil gas survey, analysis of borehole soil samples, installation and sampling/analysis of monitoring wells, sampling/analysis of surface water, and measurement of static water levels in the monitoring wells. Soil samples were collected at areas of known and suspected releases, and at locations not impacted by facility operations to provide background concentration levels. The RFI data was collected over the period extending from 1992 to 1996 and provided the data base for describing the site geology/hydrology and the extent and degree of contamination in soils and groundwater at the site.

Four distinct strata, Units A,B,C, and D (in descending order), comprise the upper geologic strata at the site. Unit A, averaging in thickness of about 5 feet, forms the surficial soil layer. Unit B, comprised of silty/sandy material ranging in thickness from 5 to 20 feet, forms the shallow aquifer at the site. Unit C, a dense compacted unit about 25 feet thick, yields minimal amounts of water and acts as a semi-confining layer or aquitard between Unit B and Unit D. Unit D is a sandy layer about 20 feet thick that forms a lower aquifer. Unit D is underlain by shale.

Unit B under normal hydrologic conditions is only partially saturated with water forming a shallow water table (top of the saturated zone) in the aquifer. Groundwater water data indicate groundwater flow (seepage) is southward (downgradient) towards Hurricane Creek.

Sample analytical results shows that significant soil and groundwater contamination exists on-site (on facility property), and to a lesser extent, off-site. The principal constituents of concern are chlorinated hydrocarbon compounds which were used as solvents at the facility. These compounds have a high degree of volatility and are commonly referred to as volatile organic compounds (VOC)s. The principal VOCs found at the site are tetrachloroethene (PCE), trichloroethene (TCE), trichoroethane (TCA) and dichloroethane (DCA). Due to natural biodegration mechanisms, PCE, which is the most highly chlorinated compound and termed the "parent compound", may be striped of chloride to form "daughter compounds", which maybe further stripped of chloride. Daughter compounds such as TCE, and DCA, may also enter the environment directly from spillage.

Soil Contamination

Soils were sampled and analyzed for VOCs, cyanide and metal constituents. The data indicates that the degree of VOC soil contamination differs considerably for depths above and below the seasonably fluctuating water table. At depths above the water table, (less than 12 feet) VOC soil contamination is mostly restricted to on site areas with concentrations as high as 1080 micrograms per kilogram (ug/kg). A ug/kg is equivalent to one part per billion. However, due to the movement of contaminated groundwater and soil-water interaction, at depths below the water table (over 12 feet), soil contamination is more widely dispersed and extends off-site. The highest total VOC concentration of 127,800 ug/kg was found near the old sanitary sewer line. PCE is the principal VOC constituent in soils at the facility. The distribution of total VOCs in soils at the site is shown in Sheets 5A and 5B of the RFI report titled "Report of RCRA Facility Investigation Activities at the Former Amphenol Site, Franklin, Indiana, Volume 1". The VOC distribution is depicted by concentration contour lines which represent equal lines of VOC concentration in the soil as inferred from the available data.

Due to the physical and chemical characteristics of the VOCs found at the site (low miscibility with water and a specific gravity greater than water), there is a potential for these chemicals to exist as separate phase liquids in the subsurface. Such liquids are referred to as dense non-aqueous phase liquids. Each monitoring well was tested for non-aqueous phase liquids by a special sensing probe; the testing did not identify any such liquids in the subsurface. However, the high soil and groundwater VOC concentrations near the sanitary sewer suggest that the such separate liquids, though probably occurring only in small discrete amounts or droplets rather than distinct pools, may exist to some extent in the subsurface.

At Forsythe Street, where contaminants were apparently released by the sanitary sewer line under the street, VOC concentrations in soils are much lower than levels at the facility property. PCE with a concentration of 37 ug/kg was the highest VOC detected.

The highest cyanide concentration in soils sampled during the RFI investigation was 21.6 milligrams per kilogram (mg/kg). As noted in the Risk Summary section of this document, this concentration level does not exceed base line protection standards established by U.S. EPA. At Forsythe Street the highest cyanide concentration in soils was 1.5 mg/kg. Data indicates that metal concentrations at release areas are similar to background concentrations, and do not exhibit a statistically significant difference when compared to background concentrations.

Groundwater Contamination

Samples of groundwater were collected from monitoring wells and also through the geoprobe sampling device. Geoprobe sampling, which is accomplished by forcing a truck mounted small diameter sampling device through the soil, is a relatively non-invasive sampling procedure and was used primarily for off-site locations. The groundwater samples were analyzed for the Appendix IX (40 CFR 264) list of VOCs and semi-volatile analytes (organo-chlorine pesticides excluded), metal constituents, and cyanide.

Analytical results of groundwater samples indicate that the contamination is restricted to the shallow aquifer, Unit B, and consists primarily of VOCs leached from overlying soils. The extent of VOC concentration distribution as defined in March, 1993 is shown in Sheets 6A, 6B, 6C, 6D and 6E of Volume 1 of the RFI report. Sheets 6A-6D show the concentrations for the individual VOC constituents DCA, PCE, TCA, and TCE, and Sheet 6E shows the total VOC concentration distribution. Total VOC concentrations in groundwater sampled in 1993 were as high as 21,000 micrograms per liter (ug/l)[a ug/l is equivalent to one part per billion]. The configuration of the groundwater contaminant plume suggests that the storm sewer transecting the southern part of the facility has provided some control on the contaminant plume. During wetter hydrologic conditions, the water table is above the base of the storm sewer and contaminated groundwater seeps into the sewer through breaks in the line. The contaminated groundwater intercepted by the storm sewer is discharged to Hurricane Creek.

Groundwater data collected at Forsythe Street, though limited due to the off-site location, indicate that VOC contaminated groundwater occurs in a relatively narrow band in Unit B, extending from Hamilton Avenue to a few hundred feet south of Ross court. Total VOCs in samples collected by the geoprobe sampling method were as high as 1950 ug/l in geoprobe samples collected at Forsythe Street in 1993. VOC concentrations in samples collected in April, 1996 from recently constructed monitoring wells were considerably lower; the highest total VOC concentration was 245 ug/l. The VOC concentration distribution near Forsythe Street as defined in April 1996 is illustrated in the report titled "Report of Additional Corrective Measures Studies for the Former Amphenol Facility Franklin, Indiana"; Sheets 3A, 3B, 3C, 3D show the individual VOC constituent concentrations in groundwater, and sheet 3E shows the total VOC concentrations.

Cyanide concentrations in groundwater samples collected at the site did not exceed the analytical detection limits of 0.010 milligrams per liter (mg/l) and are below drinking water standards. Though some metal constituents in groundwater exceeded the standards for drinking water, the constituents were also found in up gradient wells (background levels). Also, comparison of filtered to unfiltered sample results suggest that the higher concentration levels may be attributed to suspended solids (native soil material) in the sample.

Since there is a potential for the contaminated storm sewer to infiltrate the aquifer near the disharge point at Hurricane Creek, groundwater samples were collected near the sewer outfall and at a downstream sampling point, and a soil sample was collected at a further downstream location. No VOCs were detected in these samples indicating there has been minimal impact to groundwater by the storm sewer. ("Report of Shallow Groundwater Sampling Along Hurricane Creek - November, 1996).

Surface Water and Sediment

To evaluate the impact of the storm sewer discharge on surface water and sediment in Hurricane Creek, water and sediment samples were collected at strategic points and analyzed for VOCs, metals, and cyanide. Analytical results of the sediment samples show that metal concentrations downstream of the discharge point and at the outfall of the sewer are consistent with concentrations at upstream and infall locations. The VOC data and overall impact to Hurricane Creek is discussed in the Ecologic Risk Assessment segment of this Statement of Basis.

Sampling was not conducted along the storm sewer line portion downstream of facility property extending to the outfall. Contamination at this part of the sewer line is not expected since groundwater normally seeps into the sewer line rather than sewer water infiltrating to the groundwater.

RISK SUMMARY

To quantify the risk to human health and the environment imposed by the contaminants at the site, risk assessments were performed for chemicals of concern in soil and groundwater media. Risk resulting from carcinogenic compounds (cancer causing) is expressed as a probability; a risk quantified as 1E-06 is defined as a risk level at which one additional person in one million would develop cancer due to exposure to the compound or group of compounds. Non-carcinogenic risks are expressed as a hazard quotient or hazard indice, with the sum of the hazard quotients representing the total hazard. U.S. EPA generally recognizes a carcinogenic risk of less than 1E-06 as acceptable and not requiring corrective action, whereas carcinogenic risks between 1E-04 (1 in 10,000) and 1E-06 are closely scrutinized in the decision process. A total hazard below 1.0 is recognized as an acceptable non-carcinogenic risk.

As a means to streamline the risk assessment process, soil screening levels (SSL)s are also used by U.S. EPA in the assessment process. SSLs are conservative risk based concentration levels established by U.S. EPA (1996), which if not exceeded for a single constituent, the risk is deemed to be acceptable and soil remediation for the constituent is not required. Since different SSLs are provided for ingestion, inhalation, and potential migration to groundwater exposure routes, the lowest of the SSL value for a constituent must not be exceeded to screen out the constituent. It should be noted that SSLs are used as a screening tool; exceedence of a SSL does not necessarily call for remediation, rather it indicates that the level of contamination needs a more detailed evaluation.

No sensitive populations (schools, hospitals, or nursing homes) were identified as potential receptors to site contaminants.

Soils - Inorganic Constituents

The results of a risk evaluation for inorganic soil constituents are presented in the document "Risk Evaluation for Inorganic Constituents", U.S. EPA 1996, and are summarized below.

A risk evaluation based on a residential land use projection and incorporating ingestion, dermal, and inhalation exposure routes was performed for 24 inorganic soil constituents, all of which may occur naturally in soils. The risk calculations were developed for constituent concentrations in soil samples collected at locations where contaminant releases had occurred or expected to have occurred at the facility (site risks), and also for constituent concentrations in samples collected at locations not impacted by the facility (background risks). The site risks were then compared to the background risks to evaluate the risk posed by the inorganic constituents evaluated. The results of the risk evaluation are presented in Table 4 (see Attachment B - tables).

For risk calculations in which maximum concentrations were applied (Reasonable Maximum Exposure), the site-related total risk for adults was 2E-05 (2 out of 100,000) and the total hazard was 0.4, as compared to the adult background risk of 1E-05 and total hazard of 0.1. For a child, the site-related total risk was 3E-05 and total hazard was 1.0, as compared to a background total risk of 2E-05 and total hazard of 0.6.

For calculations in which average concentrations were applied (central tendency values), the site risk for adults was 8E-07 (8 out of 10 million) and total hazard was 0.04; whereas the adult background total risk was 1E-06 and total hazard was 0.04. For a child, the site-related total risk was 4E-06 and total hazard was 0.2; as compared to a background total risk of 6E-06 and total hazard of 0.2.

The excess risk, which is defined as a risk greater than 1E-06, is attributed to arsenic and beryllium concentrations in the soil. However, the comparative risk results show there is little difference in site related risk and background risk, in fact the central tendency risks for background were slightly higher than the central tendency site-related risks. It is also noted that the risk calculations were based on a residential land use scenario even though it is likely the facility will remain under industrial use over the long term. Human exposure to contaminants at industrial sites is considerably less than at residential sites. Also, a statistical analysis demonstrated that there were no significant statistical differences between site-related and background concentrations of metals in soils.

Cyanide concentrations in soils were well below SSLs based on the ingestion exposure route and were not detected in groundwater.

Soils - Organic constituents

PCE, TCE, and TCA concentrations exceeded SSLs at the more highly impacted areas. PCE, with a high end concentration of 120,000 ug/kg exceeded the SSLs for ingestion, inhalation, and migration to groundwater of 12,000 ug/kg, 11,000 ug/kg, and 3 ug/kg respectively. Since the VOCs occur at considerable depth, the exceedance of conservative SSLs does not suggest that ingestion or inhalation of VOCs at the site pose an immediate health risk.

At Forsythe Street VOC levels in soils are much lower, the only compound exceeding SSLs was TCE (37 ug/kg, SSL for groundwater = 3 ug/kg).

Groundwater

VOC concentrations in groundwater at the site, both on-site and off-site, exceed Drinking Water Standards. Drinking water standards generally serve as a benchmark in decision making for groundwater remediation. Wide spread contamination and exceedance of standards in most cases requires cleanup for restoration of the groundwater.

In-door air risk

VOCs contained in groundwater and soil tend to volatilize, move upward through the soil and discharge to the air. In situations where housing directly overlies VOC contamination, there is a potential for VOCs to enter the homes with the greatest potential for accumulation in basements. A risk evaluation was performed by U.S. EPA to evaluate the indoor air risk at residential homes. The results of the risk evaluation are provided in the document "Franklin Power Products/Amphenol Franklin, Indiana-Indoor Air Risk Evaluation" - U.S. EPA, 1996, and summarized below.

The risk evaluation entailed a series of calculations in which different values of residential air exchange rates, soil permeabilities, and inhalation rates were applied. VOC contamination at residential areas is primarily due to transport by groundwater movement, consequently groundwater would be the primary source for VOCs in homes. The representative groundwater source concentrations, extrapolated from a 1996 sampling/analysis of a monitoring well at Forsythe Street (MW-31), was held constant in the calculations.

The results of the calculations showed a total cancer risk ranging from 5E-07 (5 per 10 million) to 9E-06 (9 per 1 million) for an adult; and 3E-07 to 6E-06 for a child. The hazard indices (total hazard in this case) for child and adult ranged from 0.00004 to 0.002 which are well below the acceptable level of 1. The uncertainty discussion in the risk report notes that all the parameter inputs to the risk calculations are conservative in nature thereby tending to overstate the risk. It is also noted that the groundwater concentration value which was held constant, in actuality will very likely decrease over the 30 year exposure period applied thereby further reducing the risk. The risk evaluation indicates that the risk imposed by indoor air is below 1E-05, and considering the conservative assumptions of the evaluation, very likely below 1E-06 and at acceptable levels.

Ecological Risk

Soil and groundwater contamination at the site is mostly confined to the subsurface, the only ecological receptors expected at the site is at Hurricane Creek near the storm sewer discharge. A qualitative risk assessment was performed to evaluate the impact to ecosystems in Hurricane Creek. Populations potentially impacted include small fish species, crayfish, and aquatic macro invertebrates. Concentrations of VOCs in the storm sewer discharge water were compared to the Lowest Observed Effect Levels (LOEL) established by U.S. EPA. The LOELs are maximum levels at which no adverse affect to a population is observed. This comparison revealed only one incident when these levels were exceeded. In May 1986 the PCE concentration of 1500 ug/l at the sewer outfall exceeded the LOEL level of 840 ug/l. Data indicates that contaminant concentrations in the storm drain are decreasing over time.

The risk to humans through contact with VOCs, primarily children wading the creek, was calculated to be 1E-07.

SCOPE OF CORRECTIVE ACTION

Interim Corrective Measures

Several corrective measures have been implemented to provide immediate protection of Human Health and the Environment at the site. In response to an October 28, 1992, inquiry by the Johnson County Health Department, two private wells located in the potentially impacted area were identified, but these wells were not used as a drinking water source. Residents in the potentially impacted area are supplied by a commercial water supply system which draws water from wells located upgradient of the facility.

A groundwater recovery system consisting of three on site recovery wells and a groundwater treatment system became operational in February 1995. The treatment system removes VOCs through an air stripping process and the treated water is discharged to the Franklin sewer system as permitted by the city. The VOCs stripped from the groundwater are discharged to the atmosphere at a rate below that requiring a permit by the State of Indiana.

SUMMARY OF ALTERNATIVES

The Corrective Measures Report developed by FPP/Amphenol partitioned the site into three operable areas (Operable Areas 1,2, and 3) for evaluation of alternative remedies. The three operable areas are delineated in Figure 5-1 (see Attachment A). Operable Area 1 is the impacted area lying within the facility property boundary; Operable Area 2 is the area adjacent to the storm drain; and Operable Area 3 is the contaminated area at Forsythe street and Hamilton Avenue. Six principal alternatives actions were discussed in the CMS Report.

Alternative 1 - No Action
This alternative was provided as a basis for comparison for the

other alternatives. No cost incurred.

Alternative 2 - Institutional Controls; and Monitoring.
This Alternative includes enactment of institutional controls by the following means: a deed restriction for the facility limiting access to soils and groundwater at the facility; restriction of water well drilling permits; and advisories for confined space entry to the storm and sanitary sewer manholes. Monitoring includes semi-annual sampling/analysis of on-site and off-site monitoring wells, annual soil analysis or soil gas monitoring, and sampling/analysis of storm sewer water. The institutional and monitoring elements of this alternative apply to all subsequent alternatives discussed.

Costs

Capital -	$ 24,000
5 years of operation	85,000
Total	109,000

Alternative 2A - Alternative incorporates the corrective measures of Alternate 2 and includes groundwater extraction by continued operation of the existing on-site groundwater recovery system.

Costs

Capital	$ 24,000
5 years of operation	300,000
Total	324,000

Alternative 3 - Institutional Controls; monitoring; groundwater extraction; and sparge/soil vapor extraction.
This Alternative incorporates operation of the existing groundwater recovery system and includes a groundwater sparging and soil vapor extraction system (SVE) installed at on-site locations to remediate impacted groundwater and soils. Operation of a sparge/SVE system involves injecting air to the aquifer by sparge wells to enhance the volatilization of the VOCs in groundwater. SVE wells located near the sparge wells withdraw the VOC gas created by the sparging. Operation of a sparge/SVE system may also cause significant removal of VOCs in the unsaturated soil zone overlying the water table.

The sparge/SVE system consists of an east-west row of sparging and SVE wells located near the southern boundary of the facility, and a double row of sparge and SVE wells located near the old sanitary sewer. The configuration of this sparge/SVE system is attached and identified as Figure 5-4. A structure to accommodate SVE system equipment would be located adjacent to the existing groundwater treatment system.

Costs

Capital	$182,000
5 years operation	505,000
Total	687,000

Alternative 4 - Institutional controls; monitoring; groundwater extraction; and soil excavation with aeration and backfilling. This Alternative includes operation of the recovery system and excavation of severely impacted soils near the old sanitary sewer. An area extending about 25 by 50 feet is proposed for excavation. The contaminated soils would be placed on-site in windrows and aerated by tilling. Following sufficient reduction of contaminants, the excavated area would be backfilled with the treated soil. Excavation likely would extend below the water table requiring dewatering and treatment of the pumped groundwater.

Costs

Capital	$125,000
5 years operation	300,000
Total	425,000

Alternative 4A - Alternate 4 is modified by off-site disposal of contaminated soil instead of on-site treatment.

Costs

Capital	$1,347,000
5 years operation	300,000
	1,647,000

Alternative 5 - Institutional controls; monitoring; groundwater extraction; and focused sparging/SVE.
This Alternative incorporates groundwater recovery and a focused sparging/SVE system. The sparge/SVE system would be limited to the severely impacted area at the old sanitary sewer and have the same configuration as depicted in Figure 5-4. Treatment of off-gas from the SVE system would likely not be required because of the reduced amount of VOC gas generated.

Costs

Capital	$119,000
5 years operation	475,000
Total	594,000

Alternate 6 - Institutional controls; monitoring; groundwater water recovery with additional water treatment by carbon adsorption; and reinjection of treated water.
This Alternative incorporates groundwater recovery with

reinjection of the treated groundwater. If needed, water treatment would be enhanced by passing the water through a series of connected activated carbon cells so as to meet water quality requirements for reinjection. The treated groundwater would be injected through a network of wells, infiltration trenches, or ponds located up gradient of the contaminated area. The reinjection of treated water would promote flushing of soil contaminants which would eventually be captured by the recovery system. However, this Alternative would raise the water table thereby countering somewhat the recovery system's objective of lowering the water table at the storm sewer.

Costs	
Capital	$ 72,000
5 years operation	340,000
Total	412,000

Alternatives 2A through 6 propose monitoring as the remedial action for Operable Area 3. If data indicates a significant increase in contaminant concentration or migration, implementation of a groundwater recovery system for this operable area will be considered. The groundwater recovery system would be implemented by conversion of existing monitoring wells at Forsythe Street to recovery wells, and installation of a pipeline to transport the recovered water to the on-site treatment system. The remedy alternatives for Operable Area 3 are discussed in the supplemental CMS report "Report of Additional Corrective Measures Studies for the Former Amphenol Facility, Franklin, Indiana", November, 1996.

Alternative Proposed by FPP/Amphenol The alternative proposed by FPP/Amphenol to remediate the site is Alternative 5.

EVALUATION OF THE ALTERNATIVES

In order to determine the most appropriate remediation for the facility, corrective measure alternatives are evaluated pursuant to the nine criteria presented below.

1. Short-Term Effectiveness - This criterion addresses the remedial alternative's effect on human health and the environment during the construction and implementation phase of the remedial action. Short-Term effectiveness is based on the following four factors:

- protection of community during remedial actions;
- protection of the workers during remedial actions;
- potential for adverse impacts on the environment due to

implementing the remedial action; and

- time required to meet the remedial response objectives.

2. Long-Term Reliability and Effectiveness - This evaluation criterion addresses the results of a remedial alternative in terms of the risks remaining to human health and the environment at the site after remediation goals have been met. The following factors characterize the potential risks remaining at the site following completion of the implementation:

- the magnitude of potential risk remaining due to treated waste of treatment residuals following the completion of the remedial alternative; and
- the adequacy and reliability of controls that are used to manage untreated wastes or treatment residuals remaining at the site.

3. Implementability - this criterion refers to the ease of implementation and the following factors are taken into consideration:

- ability to construct and operate the technology;
- reliability of the technology;
- ease of undertaking additional corrective measures if necessary;
- ability to monitor effectiveness of remedy;
- coordination with other agencies;
- availability of off-site treatment, storage and disposal services; and
- availability of prospective technologies.

4. Reduction of Mobility, Toxicity, or Volume of Wastes or Contaminants. This evaluation criterion assesses the level to which the remedial alternative reduces the potential toxicity, mobility, or volume of wastes or contaminants based on the following factors:

- treatment process used and materials treated;
- amount of hazardous materials destroyed or treated;
- degree of expected reductions in toxicity, mobility, or volume;
- degree to which treatment is irreversible; and
- type and quantity of residuals remaining after treatment.

5. Costs - The costs criteria assesses capital (construction) costs, operating and maintenance costs for 5 years, and total costs for capital and 5 years of operation.

6. Overall Protection of Human Health and the Environment - This criterion assesses how alternatives provide protection to human health and the environment.

7. Attain Media Cleanup Standards - this criterion assesses the alternatives ability to achieve the media cleanup standards prescribed in the enforcement order.

8. Control the Sources of Releases - This Criterion assesses the ability of alternatives to reduce or eliminate to the maximum extent possible further releases.

9. Comply with Standards for Management of Wastes - This criterion assesses how alternatives assure that management of wastes during corrective measures is conducted in a protective manner.

Discussion of Corrective Measures Study Alternatives

As noted previously, the CMS Report submitted by FPP/Amphenol delineated three separate operable areas (Operable Areas 1, 2, and 3) for evaluation of remedial alternatives. Data indicates that Operable Area 2, except the part of the area adjacent to Area 1, has had minimal impact. Since the six alternatives evaluated are applicable to a consolidated area comprised of Area 1 and adjacent part of Area 2, this consolidated area is discussed as a single operable area. A discussion of Alternatives applicable to Operable Area 3 (Forsythe Street and Hamilton Avenue) is provided at end of this segment.

1. Short term effectiveness
The implementation of Alternatives 3, 5, and 6, which requires well drilling and some construction activities, will not pose a risk to the community and workers greater than that normally incurred with these operations. Workers will be required to follow a health and safety plan. The implementation of these alternatives would not be expected to cause an adverse impact to the environment. However, implementation of Alternative 6 which involves reinjection, would require careful monitoring to ensure that the reinjection does not cause widening of the groundwater plume. Implementation of Alternatives 4 and 4A, which entail deep soil excavation, may pose a higher risk to construction workers than the other alternatives.

As to the time needed to achieve remedial objectives, Alternative 3, which includes the expanded sparging/SVE system and provides the most expansive remediation of the site will obtain overall remedial objectives in the least time.

2. Long term Reliability and Effectiveness
Alternatives 4, 4A, 5, and 6 will have minimal impact on the western portion of the facility, consequently these alternatives would leave a higher level of residual contamination at this part of the facility. Alternatives 4 and 4A, by removal of contaminated soil at the most severely impacted area near the sanitary sewer would result in the least residual contamination in this area, but would not provide significant contaminant reduction at the western portion of the facility. Alternative 3, which includes the expanded sparge/SVE system that extends to the western edge of the contaminated area, would leave the least overall residual contamination and provide the best control of contaminant migration and long term effectiveness.

3. Implementability
Alternative 1 which prescribes no action, Alternative 2 with institution controls and monitoring, and Alternative 2A, which adds the operation of the existing recovery system, do not pose any implementation difficulties. The sparge/SVE systems of Alternatives 3 and 5 can be readily installed. Alternatives 4 and 4A, which may require special construction features to maintain excavation side walls, presents greater implementation difficulties. Implementation of the reinjection system will require balancing groundwater withdrawal and reinjection to the aquifer and has considerable potential for operational problems. Though the sparge/SVE systems are expected to require considerable preliminary testing and development, Alternative 3 and 5 are considered to have a higher degree of Implementability than Alternatives 4, 4A and 6.

The reliability, availability, ease of which the corrective measure can be expanded, and the ability to monitor the results, are generally comparable for the technologies evaluated. Both sparge/SVE and recovery/treatment systems are widely applied technologies, can be expanded as space permits, and can be readily monitored to evaluate the effectiveness of the systems. The reinjection alternative may be less reliable in that injection wells may become clogged and pumping systems may breakdown. Providing that excavation walls are maintained, Alternative 4 and 4A would be highly reliable in that a major portion of contaminated soil would be eliminated.

4. Reduction of Mobility, Toxicity, or Volume of Wastes/Contaminants

The Alternatives are discussed in the context of their effectiveness in reducing the mobility, toxicity, or volume of hazardous waste constituents (contaminants) remaining in soils and groundwater. Alternatives 1 and 2 will not impact site contamination other than that created by natural attenuation mechanisms. Alternatives 2A, 3, 4, 4A, 5, and 6 will reduce the mobility, toxicity, and volume of contaminants. Alternate 3, with the groundwater recovery and expanded sparge/SVE systems, will have the greatest impact by reducing contaminant concentration at the western part of the facility and at the most severely impacted area. Operation of the groundwater recovery system will minimize off-site migration of contaminated groundwater from the facility and essentially eliminate discharge of contaminants to Hurricane Creek.

5. Cost
Alternative costs are presented for the initial capitol cost, 5 years of operation, and the sum of capitol and 5 year operational costs. Alternative 4A has the highest capital costs for the off-site soil disposal and highest total cost. Alternative 3, which includes the full scale sparge/SVE system, is about 80 percent higher than Alternative 2A which proposes operation of the existing recovery system, and about 15% higher than Alternative 5 which proposes the focused sparge/SVE system.

6. Overall Protection of Human Health and the Environment
Alternate 2 provides protection to human health and the environment through implementation of institutional controls and monitoring. Alternative 2A-6 offer additional protection to human health and the environment over the long term by reducing the mobility, toxicity, and volume of contaminants at the site. Alternative 3, which offers the greatest reduction in contaminants also provides the highest degree of protection of Human Health and the Environment.

7. Attain Media Cleanup Standards
Alternative 3 has the greatest potential to reduce groundwater concentration levels to below maximum concentration levels (MCL)s of the Safe Drinking Water Act, and also reduce soil concentrations to cleanup levels.

8. Control Sources of releases
The cleanup activities performed in 1985 eliminated the primary sources of releases to the environment. Any current waste generation and handling at the facility is subject to RCRA

regulations. Alternative 3 provides the greatest control of reducing remaining contamination resulting from past releases.

9. Comply with Standards for Management of Wastes
The activities discussed in all alternatives provide for adequate management of wastes handled or generated during implementation of the corrective measure. A Water Pollution Control Facility Construction Permit was granted by the State for installation of the groundwater recovery treatment system; the system discharges VOCs to the atmosphere at rates allowed by the State. Permission was granted by the City of Franklin to discharge the treated water to the municipal sanitary sewer system. Monthly monitoring of VOCs in the treated effluent was initially required which may eventually by modified to quarterly monitoring. Data indicates that the levels of toxic metals in the treated water discharged to the city sewer/water treatment system are below drinking water standards. Discharge of VOCs to the atmosphere by the sparge/SVE systems would be controlled as needed to meet State standards. Treatment of excavated soil by placing the soils containing volatile compounds in windrows may require a State permit. Off-site disposal of excavated soil must be performed in accordance with RCRA regulations.

PROPOSED REMEDY

Alternative 3 which includes institutional controls, monitoring, the expanded sparge/SVE system combined with an on-site groundwater recovery system, is deemed to best satisfy the nine criteria noted above and is the remedy proposed by U.S. EPA. The configuration of the sparging/SVE system and the existing groundwater recovery system is shown in Figure 5-4 (see Attachment A). The incorporation of the expanded sparge/SVE system is in keeping with Agency policy. Agency policy is that groundwater be restored to the extent practicable, and that soils that act as contaminant feed source to groundwater be treated so as to minimize this effect.

Operation of the groundwater recovery system will lower the water table at the storm sewer and when operated to maximum capacity will essentially eliminate discharge of contaminated water to Hurricane Creek. The groundwater recovery system will capture the major part of the contaminant plume of groundwater containing VOCs and any toxic metals exceeding limits, and act as a barrier to downgradient migration. Though site conditions may not be ideal for a sparge/SVE system, this technology is perceived as the way to augment the groundwater recovery system.
The expanded version of the sparge/SVE system will provide expansive remediation of soil and ground water at the site. Non-aqueous phase liquids, if extensive in subsurface, may

require long term operation of the groundwater and sparge/SVE systems. Through aeration and groundwater withdrawal which enhances volatilization and solution of these liquids, significant removal of non-aqueous phase liquids is expected.

The proposed remedy does not remediate contaminated groundwater that has migrated down gradient beyond the reach of the groundwater and sparge/SVE systems. Ideally, the sparge/SVE system and groundwater recovery wells would also be installed at off-site locations to provide more expansive remediation of the site. However these target locations are comprised of residential properties and construction of these systems would be highly invasive to these properties. In weighing the benefit of extending remedial action into residential areas against the invasive nature of such action, limiting construction to on-site locations is deemed the most advisable approach.

The on-site recovery system will undergo a detailed evaluation and will be upgraded as needed to maximize the effectiveness of the system. Monitoring of water quality at the storm sewer outfall will provide data to evaluate the effectiveness of the recovery system in preventing discharge of contaminated water to Hurricane Creek. Sampling/analysis of monitoring wells and soils will provide a broad assessment of the impact of the remedial measures on groundwater and soils.

Sparge/SVE systems in particular tend to achieve high contaminant reduction during the initial period of operation with significant decline in contaminant removal thereafter. Though cost estimates were based on a 5 year operational period, U.S. EPA does not intend that either the sparge/SVE or groundwater recovery systems continue to operate if no longer effective. It is anticipated that the systems will eventually change to alternate periods of operation and shutdown and ultimate shutdown of operations when monitoring data indicates that operations no longer result in appreciable impact to the environment.

Long term enactment of institutional controls are an important part of the remedy. A deed restriction limiting access to contaminants at the facility and restrictions for off-site water well drilling will prevent contact with contaminants.
Over the long term, natural attenuation is expected to reduce contaminant levels at off-site areas not addressed by pro-active remediation.

Operable Area 3 (Forsythe Street and Hamilton Avenue)
Institutional controls and monitoring are the alternative

corrective measures proposed for Operable Area 3. Proposed remedial activities for this area are limited to institutional controls and monitoring due to the serious restrictions that would be encountered in implementing an effective remedy at this location. The long and relatively narrow band of contamination in the thin water bearing zone likely could best be remediated by a lateral drainage system (horizontal collector wells) placed parallel to the roadway; or by a vacuum driven well point system of numerous closely spaced small diameter wells similar to that used in dewatering operations. Operation of these systems would likely achieve relatively rapid and uniform reduction of groundwater contaminants at this location. However, construction of lateral drainage systems, recovery wells and sparge/SVE systems would be highly invasive to the neighborhood. Further, operation of all of these technologies require pipeline construction which creates a high potential for damage to the utility supply lines leading to residential homes. Therefore, monitoring of groundwater coupled with institutional controls is deemed the most appropriate remedy for the Forsythe Street area.

The monitoring program for Operable Area 3 Forsythe Street includes the installation of an additional well screened in the deep aquifer (Unit D) at Forsythe Street. If monitoring data indicates significant contaminant concentration increase or migration, corrective measures to remove or contain the contamination will be given further consideration. Since the contaminant source input has been essentially eliminated at this area, contaminant concentrations are expected to decline over time.

FUTURE CORRECTIVE ACTION

Pursuant to the Administrative Order on Consent under which the RFI and CMS were performed, a new Administrative Order on Consent will be developed following the final selection of the remedy by U.S. EPA. Under this new Order, corrective measure design details, monitoring program specifics, and cleanup standards will be established.

PUBLIC PARTICIPATION

U.S. EPA solicits input from the community on the cleanup methods proposed for each of the corrective measure alternatives discussed and also invites the public to comment on alternatives not addressed in this Statement of Basis. The public comment period will be extended for fourty five days, and if requested

U.S. EPA will hold a public meeting in Franklin, Indiana to discuss the alternatives.

The Administrative Record for the FPP/Amphenol facility is available at the following locations:

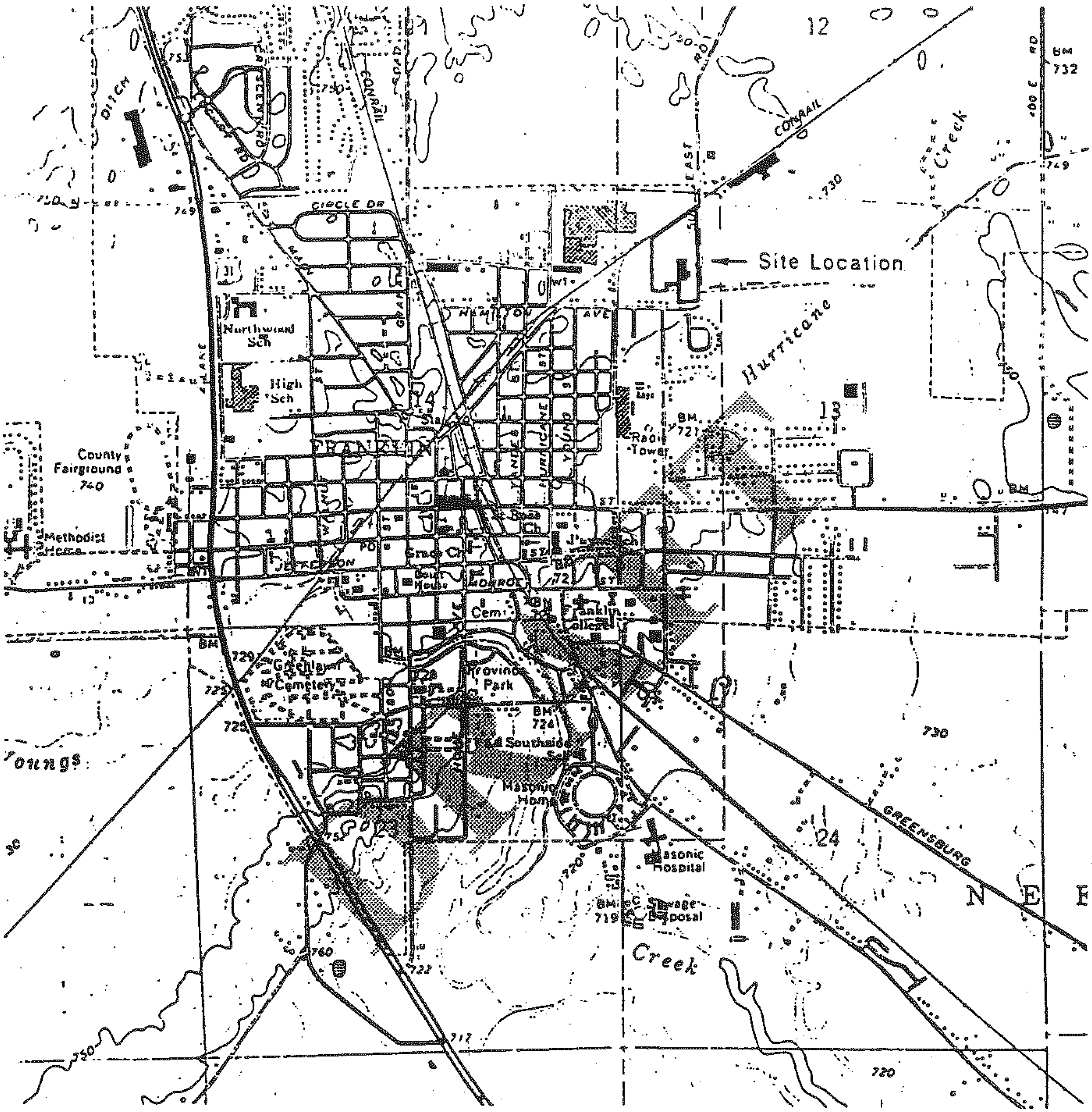
Johnson County Library
401 State Street
Franklin, Indiana 46131

U.S. EPA, Region 5
Waste, Pesticides and Toxics Division Record Center
77 West Jackson Boulevard, 7th Floor
Chicago, Illinois 60604
(312) 353-5821
Hours: Mon-Fri, 8 a.m. - 4p.m.

After consideration of the comments received, U.S. EPA will summarize the comments and its responses to the comments, select and document the remedial selection in a Response to Comments (RTC). The RTC will be incorporated into the Administrative Record. To send written comments or obtain further information, contact:

David Novak
Community Relations Coordinator
U.S. Environmental Protection Agency
77 West Jackson Boulevard, P-19J
Chicago, Illinois 60604
(312) 886-8963

ATTACHMENT A
FIGURES



Base taken from USGS Franklin, Ind. 7.5' topographic quadrangle

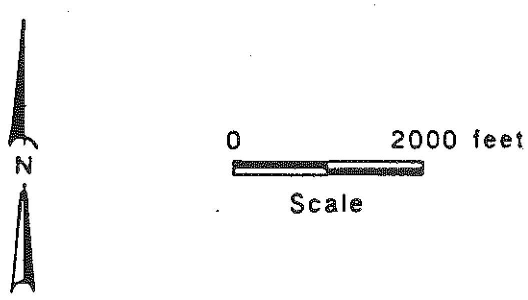


Figure 1

Former Franklin, IN Amphenol Facility
Site Location Map

WW Engineering & Science
5010 Stone Mill Road
Bloomington, Indiana 47408 • (812) 336-0972
A Summit Environmental Group Company

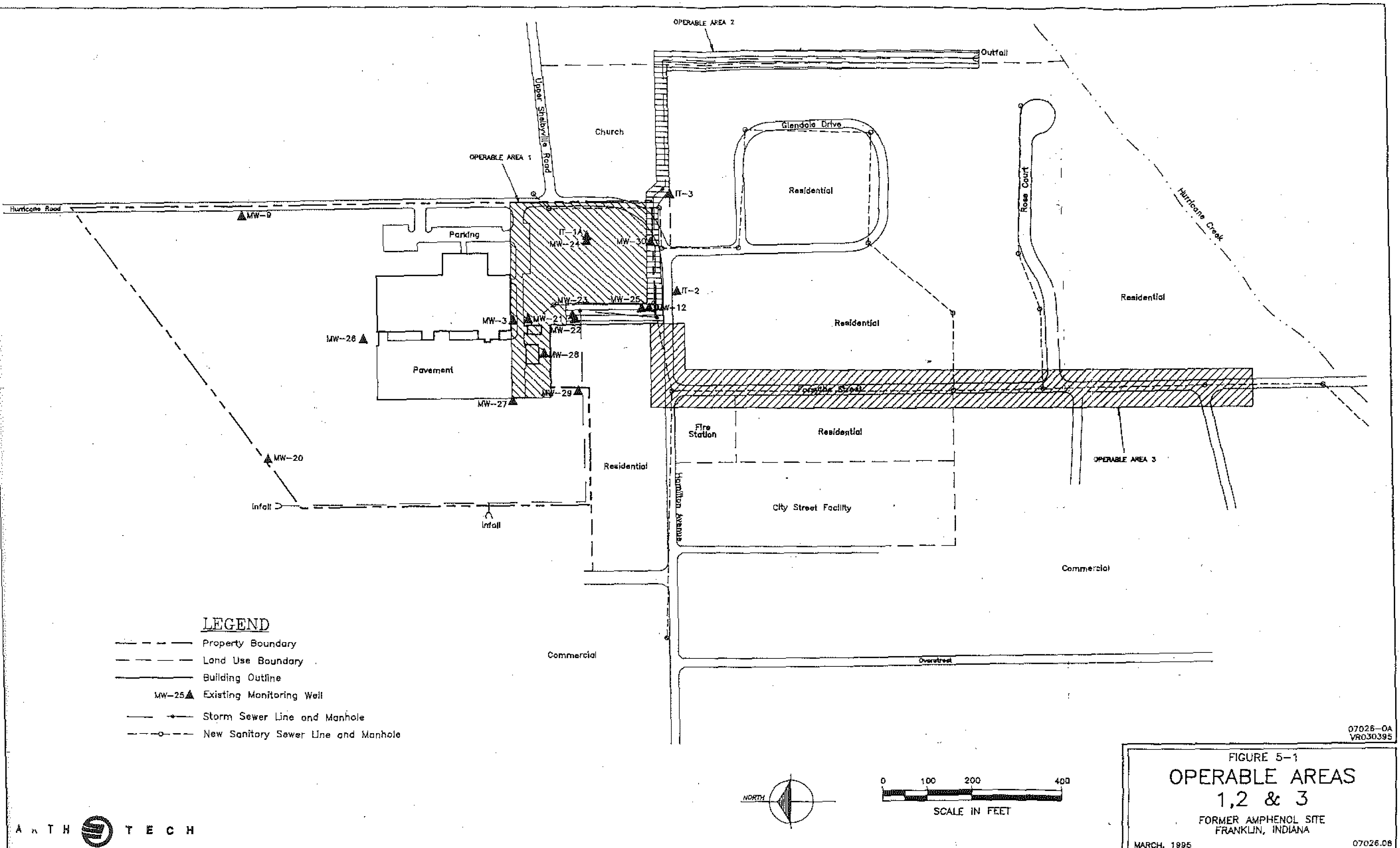
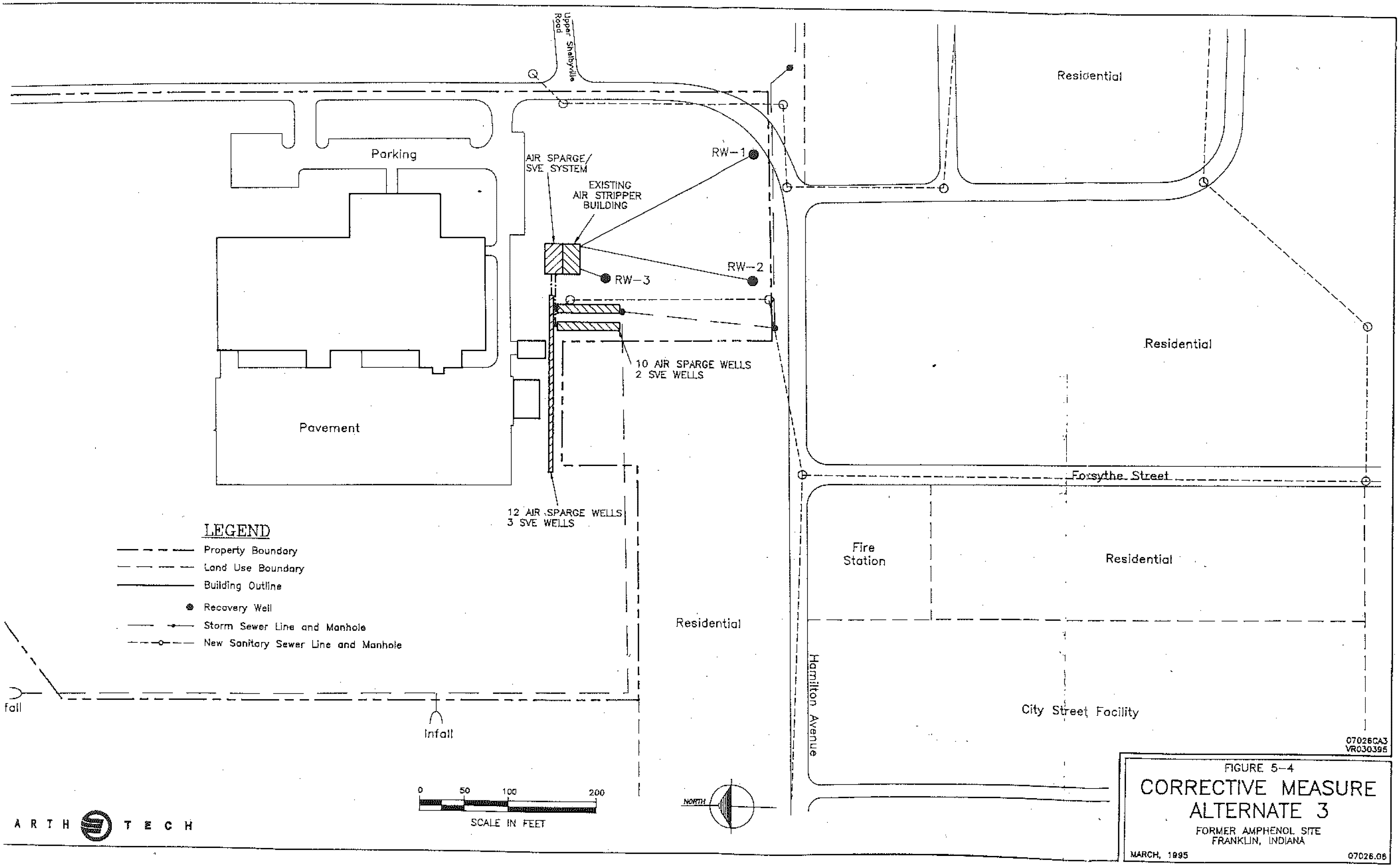


FIGURE 5-1
OPERABLE AREAS 1,2 & 3
FORMER AMPHENOL SITE
FRANKLIN, INDIANA
MARCH, 1995
07026.08



Upper Shelbyville Road
Residential
Parking
AIR SPARGE/ SVE SYSTEM
EXISTING AIR STRIPPER BUILDING
RW-1
RW-2
RW-3
10 AIR SPARGE WELLS
2 SVE WELLS
Pavement
12 AIR SPARGE WELLS
3 SVE WELLS
LEGEND
Property Boundary
Land Use Boundary
Building Outline
Recovery Well
Storm Sewer Line and Manhole
New Sanitary Sewer Line and Manhole
Residential
Forsythe Street
Fire Station
Residential
Residential
Hamilton Avenue
City Street Facility
fall
Infall
0 50 100 200
SCALE IN FEET
NORTH
ARTH TECH
07026CA3
VR030395
FIGURE 5-4
CORRECTIVE MEASURE ALTERNATE 3
FORMER AMPHENOL SITE
FRANKLIN, INDIANA
MARCH, 1995
07026.06

ATTACHMENT B
TABLES

Table 4 Summary of Risk and Hazard Calculations for the Former Amphenol Site

RESIDENTIAL ADULT (LONG TERM)		SITE-SPECIFIC 95% UCL		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	9E-06	9E-02	1E-05	7E-02
	Dermal	2E-06	4E-02	2E-06	5E-02
	Inhalation	8E-07	1E-02	1E-06	1E-02
Total		1E-05	1E-01	1E-05	1E-01

RESIDENTIAL CHILD (SHORT TERM)		SITE-SPECIFIC 95% UCL		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	2E-05	6E-01	2E-05	4E-01
	Dermal	7E-07	5E-02	6E-07	7E-02
	Inhalation	8E-07	4E-02	9E-07	6E-02
Total		2E-05	7E-01	2E-05	6E-01

RESIDENTIAL ADULT (LONG TERM)		SITE-SPECIFIC MAXIMUM		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	1E-05	3E-01	1E-05	7E-02
	Dermal	3E-06	1E-01	2E-06	5E-02
	Inhalation	1E-06	2E-02	1E-06	1E-02
Total		2E-05	4E-01	1E-05	1E-01

RESIDENTIAL CHILD (SHORT TERM)		SITE-SPECIFIC MAXIMUM		BACKGROUND MAXIMUM	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	3E-05	1E+00	2E-05	4E-01
	Dermal	1E-06	1E-01	6E-07	7E-02
	Inhalation	1E-06	9E-02	9E-07	6E-02
Total		3E-05	1E+00	2E-05	6E-01

RESIDENTIAL ADULT (LONG TERM)		SITE-SPECIFIC AVERAGE		BACKGROUND AVERAGE	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	6E-07	2E-02	9E-07	2E-02
	Dermal	1E-07	1E-02	2E-07	2E-02
	Inhalation	6E-08	4E-03	1E-07	5E-03
Total		8E-07	4E-02	1E-06	4E-02

RESIDENTIAL CHILD (SHORT TERM)		SITE-SPECIFIC AVERAGE		BACKGROUND AVERAGE	
Matrix	Route	Risk	Hazard	Risk	Hazard
SOIL	Ingestion	3E-06	1E-01	5E-06	1E-01
	Dermal	2E-07	1E-02	2E-07	3E-02
	Inhalation	2E-07	2E-02	3E-07	2E-07
Total		4E-06	2E-01	6E-06	2E-01