APPENDIX A

Ohio Environmental Protection Agency's

Decision Document
for the

Tomkins Industries Site
Malta, Ohio

December 2000

Declaration for the Decision Document
Tomkins Industries
Malta, Ohio

Introduction

This Decision Document presents the selected remedial action for the Tomkins Industries Site in Malta, Ohio. This document summarizes the site history including the Remedial Investigation (RI), which took place from September 1993 through June 1996, and the Feasibility Study (FS), which was completed in June 2000. The Decision Document also summarizes the cleanup alternatives evaluated in the FS and presented in the Preferred Plan for the Site. The Decision Document presents Ohio EPA's selected alternative to clean-up the site contamination and the rationale and justification for that preference. The Decision Document also incorporates the responses to comments received during the public comment period on the Preferred Plan. Ohio EPA's Responsiveness Summary, detailing the comments received and Ohio EPA's responses, is attached to this document.

Community Participation

Documents pertaining to the investigation at the Site including the RI/FS and subsequent documents are public documents in the Ohio EPA files. Public documents pertaining to activities at Tomkins Industries Site are available to the public at the Ohio EPA Southeast District Office in Logan, Ohio.

A document repository has been established in the Kate Love Simpson Library in McConnelsville. The document repository contains copies of the RI/FS and the Preferred Plan. A copy of this Decision Document will be added to the repository. Copies of all final design documents and site reports will also be added to the repository after they are received and approved by the Ohio EPA.

Description of the Selected Remedy

The RI identified the dip tanks as the source of pentachlorophenol (PCP) in soils and groundwater and the storm water catch basin as the source of 1,1,1 trichloroethane (TCA) and 1,1 dichloroethylene (DCE) in soils and groundwater. Based on these results, Tomkins proposed to address some of this contamination through interim removal measures (IRMs). In August 1996, Tomkins performed an IRM that included removing the catch basin and excavating TCA-impacted soils. As a result, the TCA source area was essentially removed. In August 1998 and April 1999, Tomkins initiated in-situ chemical oxidation treatment of PCP-impacted soils and groundwater in the former dip tank area. As a result, significant reductions in PCP concentrations were observed in groundwater.

The selected remedial action for the Tomkins Industries Site addresses the remaining contamination in the soils and groundwater. The contaminated soils around the dip tanks will be excavated and treated on-site by chemical oxidation and replaced on-site. Based on results from a pilot study, it is anticipated that the soil will be treated in batches, with one

on results from a pilot study, it is anticipated that the soil will be treated in batches, with one treatment cycle per batch required.

Remaining groundwater contamination will be addressed through monitored natural attenuation. The volume and mass of PCP in groundwater has significantly declined from the time of the RI to the present. The mass of PCP in groundwater has been reduced by approximately 80%. The mass reduction is attributed to in-situ chemical oxidation treatment of groundwater performed during 1998 and 1999 as Interim Removal Measures. Data presented in the FS indicates that Maximum Contaminant Levels (MCLs) could be achieved within five years via monitored natural attenuation. However, additional data are needed to better estimate the time to achieve MCLs for PCP as well as dioxins and furans by monitored natural attenuation. If concentrations of contaminants do not decrease within an acceptable time-frame to be established in the Operation and Maintenance Plan, additional chemical oxidation treatment of groundwater will be required.

The mass of contaminants in groundwater associated with the catch basin area (TCA and DCE) has reduced substantially with time. The volume of TCA-impacted shallow groundwater remained relatively constant through March 1998, and then declined significantly (43 percent) from March 1998 to June 1999. The mass of TCA in shallow groundwater declined by approximately 80 percent from the time of the RI to the present. This is most likely due to removal of the TCA source area soils in 1996. The FS Report estimates that MCLs for TCA would be achieved in approximately five years via monitored natural attenuation.

Finally, containment of groundwater impacted by contaminants from the former catch basin and dip tank areas will be required. The Village of Malta currently pumps a public water supply well (Malta Well M1) to the Muskingum River to protect the Malta Wellfield. As part of the selected remedy, Tomkins will be required to maintain this containment of the plume. Additional hydrological (water level and river gauging) data will be collected to assess the need for continued, or modified, pumping of the extraction well to contain the plume and protect the Malta Wellfield.

Christopher Jones, Director
Ohio Environmental Protection Agency

January 19, 2001
Date

Decision Summary
for the

Tomkins Industries Site
Malta, Ohio

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1.0 SITE BACKGROUND

The Tomkins Industries Site which covers approximately 15 acres is located along the northwestern edge of the Village of Malta in Morgan County, Ohio (Figure 1). Undeveloped privately-owned property is located to the north and northwest of the Site and upland woodlands are located to the west of the Site. To the south and southwest are residential properties and to the east is the Muskingum River. A former railroad line (presently owned by CSX Transportation) is situated immediately east of the facility.

1.1 Prior Land Use and Ownership History

Malta Manufacturing was founded in 1889 and was incorporated in 1901. The Malta Manufacturing facility located at the corner of 13th and Main Streets was constructed on 6 acres of land purchased from Northrup Farm in 1913. Prior to this date most of the Site was used for agricultural purposes. A tannery was present on a portion of the property at some time prior to 1913.

Malta Manufacturing became a subsidiary of Athens Flooring Company in 1932 and at this time, complete window unit production began. The Malt-A-Matic wood window unit was introduced in 1952, featuring a fully weather-stripped unit requiring no pulley or balances and containing a removable sash. A new building was constructed on 6 acres of land adjacent to the north side of the existing factory to accommodate this new production line. In 1969, an additional 82,080 square feet of plant area was constructed to accommodate the manufacture of insulated glass units.

Malta Manufacturing merged with Philips Industries, Inc. of Dayton, Ohio in 1969 and then, in 1990, Tomkins Industries PLC of England (Tomkins) purchased Philips Industries, Inc. On January 23, 1991, the Malta Manufacturing operation name changed from Philips to the Malta Division of Tomkins Industries.

1.2 Operational History

Use of Wood Protectant

A wood protectant with the trade name of "Woodlife" was used at the Malta Manufacturing facility since around 1969 for treating window frames. Woodlife contained approximately 95 to 97 percent mineral spirits and 3 to 5 percent pentachlorophenol (PCP). Also at this time, the facility began manufacturing insulated glass units, which involved the first reported use of 1,1,1 -trichloroethane (TCA) at the Site.

In the past, the wood treatment system, located in former Building No. 9, consisted of two in-floor dip tanks and an overhead conveyor (Figure 2). Dip tank dimensions are approximately 4 feet wide by 8 feet long by 5.5 feet high (T1) and 4 feet wide by 12 feet long by 5.5 feet high (T2). Wood frame pieces were either dipped by hand or were placed on a platform and lowered into the dip tanks by means of the overhead conveyor.

According to facility personnel, the northern dip tank (T1) was filled by manually pumping new product from 55-gallon drums into the tank. T1 maintenance activities were performed by pumping liquids into 55-gallon drums, shoveling sludges into 55-gallon drums which were disposed off-site, and refilling the tank with the pumped-out liquids.

The southern dip tank (T2) was installed in approximately 1960 and, around this time, a rail tank car was buried adjacent to the dip tanks to store Woodlife in bulk. According to facility personnel, T1 and T2 were connected via piping at the top of each tank. The dip tanks were filled by pumping Woodlife via overhead lines from the tank car to T2, which would then flow via piping at the top of T2 to T1. Dip tank clean out was performed by opening a valve located in a sub-grade valve box immediately east of T2, draining product back to the tank car. Sludge at the base of the dip tanks was shoveled into drums and disposed off-site.

Usage of the in-floor dip tanks was discontinued and decommissioned in late 1979 when a new Dri-Vac wood treatment system was installed. The dip tanks were reportedly emptied and cleaned. The dip tanks were then covered with a steel plate and then roughly 20 inches of sand were placed over the original floor. Concrete was poured over the sand base, creating a new floor that was nearly 2 feet above the original floor.

In 1987, the facility discontinued its use of the wood treatment product that contained PCP, and switched to a non-PCP type of wood product called "Woodlife F". A new vaulted aboveground 10,000 gallon tank was installed in 1989 to store "Woodlife F". During September 1991, the rail tank car was pumped and cleaned of any residual Woodlife. The interior of the tank was visually inspected and found to be structurally sound.

Former Use of TCA

The facility expanded its operations to include the manufacturing of insulated glass units in 1969. Part of the insulated glass manufacturing process involves cutting strips of aluminum for the insulated glass windows to serve as spacers between the window panes. The spacers, which become coated with the lubricant and aluminum shavings when cut, were formerly cleaned with TCA solvent. This process use of TCA was discontinued in May of 1994.

The TCA was used primarily in facility Building No. 15, with secondary usage in the southeastern portion of Building No. 4. TCA was reportedly stored in 55-gallon drums outside the east and south side of Building No. 4. The drums rested on saddles and had spigots for dispensing the TCA. Additionally, a storm water catch basin was identified in the vicinity of the receiving loading docks off the southwest corner of facility Building No. 15 near where the TCA trough was located.

Reported Releases of Woodlife

Three releases of PCP-containing Woodlife treatment product have been reported at the facility. The three reported releases occurred in October 1973, June 1974 and May 1980. The releases were caused by storm water runoff from heavy rainstorms that flowed through Building No. 9 and entered the in-floor dip tanks, causing the tanks to overflow. In each

event, the overflow exited the building and subsequently flowed over the ground surface to the east. The impacted storm water flowed downslope from the dip tanks, across State Route 669 and the railroad tracks and impacted a portion of the gravel parking lot located north of State Route 669. During the 1980 release, impacts to soils on adjacent properties were reported as well. Soils impacted by these releases were excavated, removed from the Site and replaced with clean soil. Woodlife releases from these events were estimated at 1,200 gallons in 1973, 1,200 to 1,500 gallons in 1974 and 500 gallons in 1980.

1.3 History of Village of Malta Water Supply Wells

There are six municipal drinking water supply wells for the Village of Malta. The two original water supply wells (M1 and M2) were installed in the early 1900's and are located on the Muskingum River flood plain, approximately 30 feet west of the river on the south side of State Route 669 across from the gravel parking lot, 500 feet east of the Dip Tank Area and 800 feet east of the Catch Basin Area.

Groundwater samples from the Village of Malta production wells are periodically collected and analyzed for water quality as part of an existing environmental program. Groundwater samples collected from M1 and M2 in September of 1988 indicated the presence of DCE and TCA. As a result, the Village of Malta installed a third drinking water well (M3) in October 1988. M3 is located approximately 500 feet north of M1 and M2 along the west side of State Route 669 (Figure 3).

In October 1988, March 1989 and April 1989, the Village of Malta sampled M1, M2 and M3. Results indicated the presence of DCE, TCA and PCP in M1 and DCE and TCA in M2. Due to these results, the Village of Malta stopped using M1 as a drinking water source in April 1989. Additionally, Ohio EPA instructed the Village of Malta to continuously pump water from M1 to control the migration of contaminated groundwater. Malta Wells M2 and M3 remained the two sources of drinking water until February 1991, when pumping of M2 was discontinued.

Beginning in 1992, the Village of Malta installed a new well field comprised of three production wells. The well field is located approximately 400 feet west of the Muskingum River, 1,300 feet from the Dip Tank Area and 1,400 feet north of the Catch Basin Area. Malta Well M4 was activated in October 1992. Malta Well M5 was activated in February 1993 and Malta Well M6 was activated in October 1996. The Village of Malta is currently monitoring Malta Wells M1, M4, M5 and M6.

As a result of the contamination in the groundwater and soils, Ohio EPA invited Tomkins to negotiate Director's Final Findings and Orders (Orders) whereby Tomkins would perform a remedial investigation and feasibility study. The orders were finalized and became effective on August 11, 1992.

2.0 SUMMARY OF THE REMEDIAL INVESTIGATION

In September of 1993, RMT conducted a remedial investigation (RI) at the Site, pursuant to the Orders finalized in August 1992, to evaluate releases of contaminants of concern (COCs) from the facility to define the nature and extent of groundwater and soil contamination. COCs identified in the RI Report include PCP, dioxins/furans (D/F), total xylenes, ethylbenzene, TCA, dichloroethene (DCE) and 1,1-dichloroethane (DCA). Field activities included collecting soil gas samples at 309 locations, drilling 78 boreholes and installing 38 monitoring wells.

2.1 Soils Investigation

Soils were evaluated to identify source areas, determine the lateral extent of contamination and determine the volume of soil impacted by PCP and TCA. The in-floor dip tanks located in Building No. 9 were identified as the source of PCP, D/F, xylenes and ethylbenzene and a storm water catch basin located near the southwest corner of facility Building No. 15 was identified as the source for TCA, DCA, and DCE (Figure 3).

Impacted media volume calculations for PCP are as follows:

- The estimated total volume of soil impacted by PCP at a concentration of 1 milligram per kilogram (mg/Kg) is approximately 13,000 cubic yards (cy). Of this total, approximately 1,500 cy are contained within 6 feet below ground surface (bgs).

- The estimated total volume of soil impacted by PCP at a concentration of 10 mg/Kg is approximately 7,000 cy. Approximately 600 cy are contained within 6 feet bgs.

- The estimated total volume of soil impacted by PCP at a concentration of 100 mg/Kg is approximately 400 cy, all of which is contained within 6 feet bgs (Figure 4).

Based on the data in the RI Report, the extent of D/F concentrations in soil is within the extent defined by PCP volume calculations.

Impacted media volume calculations for TCA are as follows:

- The estimated total volume of soil impacted by TCA at a concentration of 1 mg/Kg is approximately 3,000 cy.

- The estimated total volume of soil impacted by TCA at a concentration of 10 mg/Kg is approximately 80 cy, all of which is contained within 10 feet bgs.

Based on the RI data there are no TCA soil impacts above 100 mg/Kg.

2.2 Groundwater Investigation

Hydrogeology and Groundwater Flow

The Site is situated on a sand and gravel terrace overlooking the flood plain of the Muskingum River. The sand and gravel terrace overlies a relatively narrow valley of bedrock. In the vicinity of the Site, the bedrock dips steeply east, north-eastward towards the Muskingum River, which flows to the southeast. The bedrock consists of Pennsylvanian-aged shale and sandstone with thin beds of limestone and coal.

Groundwater level data collected during September of 1994 indicated typical groundwater flow to the east towards the Muskingum River in both shallow and deep monitoring wells. A high level of connectivity between shallow and deep groundwater was observed, indicating the aquifer is relatively homogeneous. Additionally, groundwater flow was influenced by the pumping from Malta Well M1.

Groundwater Quality

Groundwater quality was evaluated in the RI and in subsequent monitoring events. Groundwater quality trends were evaluated to: 1) verify the lateral extent of groundwater impacts; 2) estimate the volume of impacted groundwater and mass of each COC dissolved in groundwater; and 3) determine if groundwater quality is improving with time. PCP and D/F impacts in groundwater were evaluated collectively because they originate from the same source (former dip tanks). TCA and DCE impacts in groundwater were evaluated collectively because they also originate from the same source (catch basin area).

In general, groundwater quality trends are as follows (Figure 5):

- Based on a limit of 1 microgram per liter (ug/L) for PCP and 30 nanograms per liter (ng/L) for D/F, the lateral extent of impacts is defined by PCP.

- Based on a limit of 200 ug/l for TCA and 7 ug/l for DCE, the lateral extent of TCA/DCE impacted shallow groundwater was estimated to extend approximately 660 feet east, southeast towards the Muskingum River (downgradient) and 300 feet in the north-south direction (crossgradient). Overall, groundwater quality is improving, as demonstrated by the significant decrease in the lateral extent, volume and mass of TCA and DCE in shallow groundwater with time.

- The lateral extent of TCA/DCE impacted deep groundwater was estimated to extend approximately 880 feet east, southeast towards the Muskingum River (downgradient) and 230 feet in the north-south direction. Overall, groundwater quality is improving, as demonstrated by the decrease in the lateral extent, volume and mass of TCA and DCE in deep groundwater with time.

2.3 Risk Assessment

The risk assessment evaluated the current and potential future risks to human health and the environment from the contaminants at the Site. The risk assessment included:

- Identification of Constituents of Concern
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization

Identification of Constituents of Concern

Data collected from sampling soils and groundwater was used to identify Constituents of Concern (COC) to be evaluated in the risk assessment. The COCs for the Site areas are as follows:

- Catch basin area: TCA, DCE, and DCA;
- Dip Tank area: PCP, dioxins, furans, xylenes, ethylbenzene; and
- Malta Well M1: TCA, DCE, and DCA

Exposure Assessment

The exposure assessment identified potential receptors, evaluated relevant exposure pathways, and estimated potential intakes by receptors resulting from these pathways. Exposure pathways were defined and identified in terms of sources and receiving media, fate and transport in the source media, and exposure points and exposure routes. Three areas were identified as affected by the COCs:

- The storm water catch basin area;
- The Woodlife Dip Tank Area; and
- Groundwater discharge from Malta Well M1

Exposure in each of these areas was evaluated for current land use, unrestricted hypothetical future land use (residential), and expected future land use (industrial). Under current land use, all pathways were considered incomplete (Table 1).

Under the hypothetical future land use scenario, the surface water pathway was deemed incomplete because surface water was unaffected except at the discharge from M1. The ambient air pathway was deemed incomplete because ambient air was not an affected medium at the Site. The groundwater and soil pathways were assumed to be complete under future land use, and were therefore evaluated further. The soil pore gas pathway was potentially completed under future land use and was evaluated qualitatively in the risk assessment.

Following a determination of relevant exposure pathways, chemical-specific exposures, also called intakes, were estimated. These estimated chemical intakes were calculated

using equations that include variables for exposure concentration, contact rate, exposure frequency and body weight.

Table 1. Potential Exposure Pathways

Migration Pathway	Exposure Point	Exposure Routes	Potential Receptors	Pathway Complete?		Pathway Quantified?	Rationale/ Comment
				Current	Future		
Groundwater	Future potable well	Ingestion Inhalation Dermal absorption	Residents	No	Yes	Yes (future)	Current adjacent residents have municipal water supply. Future well installation is possible.
Surface soil	Malta property	Ingestion Inhalation Dermal absorption	Residents, site workers, site visitors	No	Yes	Yes (future)	Surface soil has been remediated on Malta's property and on adjacent property. Future land use could disturb soil cover or bring deeper soil to surface
Subsurface soil	Malta property	Ingestion Inhalation Dermal absorption	Residents, site workers, site visitors	No	Yes	Yes (future)	Future land use exposure includes subsurface and surface soil because future land use could disturb soil. Affected adjacent subsurface soil is too deep for current or future exposure concern.
Surface water/ Sediment	Muskingum River	Ingestion Inhalation Dermal absorption	Residents and workers	No	No	No	Media not affected.
Malta Well No. 1 discharge	Muskingum River	Dermal absorption	Future worker	No	Yes	Yes (future)	Exposure limited to quarterly sampling events in the future.
Surface water runoff	Muskingum River	Dermal absorption	Future residents (swimming)	No	No	No	Surface water runoff from soil is expected to be insignificant due to cover on Malta's property. Pathway quantified in the Conceptual Site Model (RMT, 1995a).
Ambient air	Adjacent property	Inhalation	Residents, site workers	No	No	No	Medium not affected.
Soil pore gas	Malta and adjacent property	Inhalation	Residents	No	Yes	No	Future land use could include a residence in the source areas. Pathway qualitatively assessed.

Toxicity Assessment

The risks associated with exposure to COCs are a function of the adverse health effects characteristic of a specific constituent and the exposure dose. The toxicity assessment considers carcinogenic effects and non-carcinogenic effects of the COCs.

Risk Characterization

The risk characterization involves calculating estimates of carcinogenic (cancer causing) and non-carcinogenic risks from the COCs for the different exposure pathways. Cancer risk is defined as the probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen in addition to the probability of cancer risks from all other causes. As a benchmark in developing clean-up goals at contaminated sites, an acceptable range of excess lifetime cancer risk from one in one million (1×10^{-6}) to one in ten thousand (1×10^{-4}) has been established, with 10^{-6} as the point of departure.

The non-carcinogenic risk was determined by adding the hazard quotients for each COC. The hazard quotient is a quantitative estimate of the hazard associated with individual non-carcinogens. The sum of the hazard quotients is the hazard index for a particular exposure pathway. The hazard indexes for each exposure pathway are added together to calculate a site hazard index. A total site hazard index of less than 1.0 indicates that adverse effects are unlikely even with sensitive members of the population. A hazard index of greater than 1.0 indicates that there may be a potential hazard at the site associated with the COCs.

No exposure pathways were considered complete for the current land use scenario. For the hypothetical residential future land use and for the industrial future land use scenarios, the estimated excess upper bound lifetime cancer risks and the hazard index were above acceptable levels, primarily due to hypothetical exposure to the COCs in groundwater (Tables 2 and 3). In the Woodlife dip tank area, hypothetical exposure to soil would also result in an unacceptable risk. The storm water catch basin area has the potential to pose an unquantified risk due to soil pore gas. The risk and hazard associated with sampling the Malta Well M1 discharge were equal to or below the levels of concern (Table 4).

Table 2. Residential Land Use - Risk Characterization

Site Area	Media	Cumulative Risk	Hazard Index
Woodlife dip tank area	Soil Groundwater	3×10^{3} 2×10^{1}	0.5 10
Storm water catch basin area	Soil Groundwater	NA* 8×10^{3}	0.008 9

* NA - Not Applicable

Table 3. Industrial Future Land Use - Risk Characterization

Site Area	Media	Cumulative Risk	Hazard Index
Woodlife dip tank area	Soil Groundwater	4×10^{4} 1×10^{2}	0.1 1
Storm water catch basin area	Soil Groundwater	NA* 2×10^{3}	0.002 3

* NA - Not Applicable

Table 4. Sampler of Malta Well M1 - Risk Characterization

Site Area	Media	Cumulative Risk	Hazard Index
Malta Well No. 1	Groundwater	1×10^{-6}	0.0009

3.0 SUMMARY OF INTERIM ACTIONS AND TREATABILITY STUDIES

3.1 Interim Actions in Catch Basin Area

In August 1996, Tomkins performed interim remedial measure (IRM) activities at the catch basin area to improve soil and groundwater conditions at the Site. The IRM included removing the catch basin, excavating TCA-impacted soils, installing a shallow soil venting loop and deep soil venting point in the event additional remedial action efforts would be required in the former catch basin area, and backfilling the excavated area. As a result, the source area for TCA-impacted soils was essentially removed.

3.2 Treatability Studies and IRM Activities in the Former Dip Tank Area

Bench-scale and pilot-scale treatability studies were conducted to evaluate specific technologies for the treatment of PCP-impacted soil and groundwater at the Site.

In November 1996, Tomkins contracted Secor to conduct a bench-scale treatability study to evaluate biological degradation and chemical oxidation (CO) technologies for the

treatment of PCP-impacted soil and groundwater at the Site. The results of the study indicated *in-situ* CO technology may be effective for treating PCP-impacted groundwater and soil at the Site and should be further evaluated for full-scale use. The results of the study also indicated *in-situ* biological degradation technology may be ineffective for treating PCP-impacted groundwater and soil near the source due to excessively high PCP concentrations. Based on favorable bench-scale testing results, *in-situ* pilot testing was performed to evaluate *in-situ* CO treatment technology.

In August 1997, SECOR conducted a pilot test for *in-situ* CO treatment of PCP-impacted soil and groundwater at the Site to further characterize the effectiveness of this technology, obtain design parameters necessary for a full-scale system, and obtain data for estimating costs associated with a full-scale system in the event this technology is selected as the remedial alternative. Results of the pilot test indicated that *in-situ* CO treatment was effective at treating PCP in saturated soils at the Site.

As a result of successful bench and pilot study results, Tomkins initiated full-scale CO IRM activities at the Site in August 1998 and April 1999. Hydrogen peroxide and ferrous sulfate (Fenton's Reagent) were injected in both the vadose zone and beneath the water table to treat Site soil and groundwater impacted by contaminants in the vicinity of the dip tanks. As a result of all IRM activities at the Site, significant reductions in COC concentrations were observed in shallow groundwater. The IRM activities were not effective at significantly reducing the concentrations of COCs in vadose zone soils.

4.0 SUMMARY OF THE FEASIBILITY STUDY

The Feasibility Study (FS) was conducted to identify and screen technologies and alternatives for addressing the contaminated soil and groundwater at the Site. The FS also identified Remedial Action Objectives (RAOs) and evaluated methods to meet these RAOs.

4.1 Remedial Action Objectives

Remedial Action Objectives (RAOs) are media-specific goals for protecting human health and the environment. RAOs for soils and groundwater are presented below.

Soils

1. Minimize or eliminate continuing source of contaminants from soils to groundwater in order to meet MCLs for groundwater.
2. Remove or reduce concentrations of contaminants in soils to health-based cleanup levels specified in Region III Risk-Based Industrial Concentrations, Ohio EPA Voluntary Action Program Industrial Direct Contact Standards, RCRA Action Levels, Site specific Risk Based Concentrations and Site-specific Leach-Based Cleanup Levels (Table 5).

3. Minimize direct contact, inhalation, or ingestion of PCP, D/F and DCE in dip tank soils.

Table 5. Preliminary Remediation Goals for Soils

Contaminant	Site Specific Leach-Based Level (mg/Kg)	Site Specific Risk Based Concentration (mg/Kg)	Maximum Concentration Detected in Soils (mg/Kg)
PCP	115	16.8	1,700
D/F	0.215	2.58×10^{-5}	0.002

Groundwater

1. Provide adequate protection against ingestion of groundwater containing contaminants at total concentrations which exceed a 10^{-5} risk. The contaminants in groundwater are PCP, D/F, DCE and TCA. The Preliminary Remediation Goals of these contaminants are their respective MCLs (Table 6).
2. Provide adequate protection against human consumption of groundwater containing non-carcinogens with a total hazard index (HI) of greater than 1.0. PCP was the only non-carcinogenic contaminant which contributed to the exceedance of a total HI of 1.0 in the dip tank area groundwater. Non-carcinogenic contaminants contributing to the exceedance of a total HI of 1.0 in the catch basin area groundwater are TCA and DCE.
3. Reduce concentrations of contaminants in groundwater using the best available technology, with a goal of achieving MCLs and non-zero Maximum Contaminant Level Goals (MCLGs). Contaminants with detected concentrations greater than MCLs and non-zero MCLGs in the dip tank area groundwater are PCP and D/F while those in the catch basin area are TCA and DCE.
4. Prevent migration of impacted groundwater to downgradient receptors, including the Muskingum River, consistent with risk levels developed in the baseline risk assessment and consistent with State, Federal and Local laws and regulations.
5. Confirm through long-term groundwater quality monitoring that impacted groundwater does not extend within the Village of Malta production wellfield capture zone.

Table 6. Preliminary Remediation Goals for Groundwater

Contaminant	MCL (mg/L)	Maximum Concentration of Contaminant in Groundwater during RI (mg/L)	Maximum Concentrations of Contaminant in Groundwater in 12/99 (mg/L)
PCP	0.001	4	0.575
D/F	3×10^{-8}	6.276×10^{-6}	ND*
DCE	0.007	0.990	0.229
TCA	0.2	18	4.98

* Groundwater monitored for D/F in June 1999 monitoring event, contaminants were not detected.

4.2 Description of Remedial Alternatives

Remedial alternatives, including the No Further Action alternative, were evaluated for both soils and groundwater.

4.2.1 No Further Action

The No Further Action alternative was evaluated as the baseline case for comparative purposes. If the No Further Action alternative were selected, no remedial actions or monitoring would be implemented.

4.2.2 Groundwater Monitoring

This alternative consists of the groundwater monitoring program currently in place. Monitoring data would be used to track the extent and migration of the contaminants in groundwater in the former dip tank and catch basin areas. Groundwater monitoring would continue, with semiannual monitoring for years 0 through 5 and annual monitoring thereafter, until RAOs are achieved.

4.2.3 Containment with Institutional Controls

Institutional controls would consist of deed restrictions to notify and restrict land owners from future actions which would disturb impacted soils and from installation of wells in impacted groundwater. The deed restrictions would serve as notice to future property owners of potential hazards and would inform them of actions that are prohibited on the property.

Containment would be implemented for contaminated soils associated with the former Dip Tanks and would consist of an asphalt cover, placed over the impacted area that is not beneath Building No. 9 or the paved loading dock (approximate 400 square foot area). The area would be regraded to prevent surface water from ponding, prepared with a compacted sub-base, and sealed with asphalt. The condition of the new asphalt cover as

well as the existing concrete and asphalt covers would be monitored yearly and maintenance performed as required to repair the damage.

The current groundwater monitoring program, as outlined in the Groundwater Monitoring alternative, would continue. Containment of groundwater impacted by contaminants from the Site would consist of continued pumping of Malta Well M1, with discharge to the Muskingum River. Additional hydrological data (water level and river gauging) would be collected to assess the need for continued pumping of Malta Well M1 to prevent impacted groundwater from migrating to the capture zone of the Village of Malta wellfield.

The Malta Well M1 is currently pumping groundwater to waste at approximately 210 gpm on a continuous basis. The performance of this system would be monitored on an annual basis and the system would be modified (increased or decreased pumping, discontinued pumping) as appropriate.

4.2.4 Institutional Controls and Chemical Oxidation (CO) of Soil and Groundwater

This alternative includes treatment of soil and groundwater in the former dip tank area using *in-situ* chemical oxidation (CO). *In-situ* CO is a technology in which oxidizers (hydrogen peroxide) and catalysts (ferrous sulfate) are introduced into the subsurface using infiltration galleries or injection wells. The injected oxidizer forms hydroxyl radicals which in turn react to remove the chlorines and subsequently cleave the carbon chains of a chlorinated organic compound to compounds that are more stable, less mobile and/or inert. The catalyst controls the rate at which decomposition of the oxidizer occurs. This increases the potential for hydroxyl radical formation and allows the oxidant to travel further downgradient throughout the impacted area.

The most common oxidizer/catalyst combination used for remediation work is peroxide and ferrous sulfate (Fenton's Reagent). Fenton's Reagent was tested on soils from the Site and on groundwater impacted with PCP during bench-scale and pilot-scale treatability studies, as well as during two full-scale IRMs. The results of these studies demonstrated that this technology was effective for reducing the mass of PCP in groundwater. *In-situ* CO was minimally effective at reducing the concentration of PCP in vadose zone soils, however, bench-scale CO treatment of PCP impacted soils were successful, demonstrating that *ex-situ* treatment may be more effective than *in-situ* treatment.

The CO treatment system components were previously installed as part of the IRM activities at the Site. Two CO injections of reagent mixture to soil and groundwater have already been completed (September 1998 and May 1999). The reduction in the total mass of contaminants in the soil is estimated to be less than 10%, and the reduction in total mass of the contaminants in groundwater is estimated at 80%.

Monitored Natural Attenuation (MNA) would be implemented for groundwater to confirm that detected concentrations of contaminants continue to decrease. Natural attenuation

includes a variety of physical, chemical and biological processes that reduce the mass, toxicity, volume or concentration of contaminants in soil and groundwater. MNA refers to the reliance on natural attenuation processes to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by more active methods.

The mass of contaminants in groundwater associated with the catch basin area (TCA and DCE) has reduced substantially with time. The mass of groundwater associated with the former dip tanks (PCP and D/F) was significantly reduced by IRMs, and additional groundwater quality monitoring data over time would be needed to evaluate the viability of MNA for this plume.

Hydraulic containment of impacted groundwater would be implemented as described in Section 4.2.3.

4.2.5 Chemical Oxidation of Groundwater and Soil Excavation with Off-Site Disposal

This alternative would consist of *in-situ* CO of groundwater but not soils. MNA would be implemented to confirm that concentrations of contaminants continue to decrease. Additionally, hydraulic containment of impacted groundwater would be implemented as described in Section 4.2.3.

Under this alternative, the former dip tanks and associated piping and valving would be removed and disposed off-site. Contaminated vadose-zone soils would be excavated and disposed of off-site in a permitted landfill. Additional shoring precautions or special excavating procedures may be required to ensure the stability of adjacent Buildings No. 8 and 2.

4.2.6 Chemical Oxidation of Groundwater and Soil Excavation with On-Site Treatment and Replacement of Soils

This alternative consists of the same components as the alternative described in Section 4.2.5, except the excavated soils would be treated on-site by CO and replaced on the Site. Based on the results of prior bench-scale testing of ex-situ CO treatment of soils, reductions of contaminants in soil of up to 93% can be expected through ex-situ soil treatment. It is anticipated that soil would be treated in batches, with only one treatment cycle per batch required.

5.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting the preferred remedial alternative, Ohio EPA considers the following eight criteria:

1. Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection, and describes how risks are eliminated, reduced or controlled through treatment, engineering controls, and/or institutional controls.

2. Compliance with all State, Federal and Local laws and regulations addresses whether or not a remedy will meet all of the applicable State, Federal and Local environmental statutes and regulations.

3. Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once clean-up goals have been met.

4. Reduction of toxicity, mobility, or volume is the anticipated performance of the treatment technologies to yield a permanent solution. This includes the ability of the selected alternative to reduce the toxic characteristics of the chemicals of concern or remove the quantities of those chemicals to an acceptable risk concentration or regulatory limit and/or decrease the ability of the contaminants to migrate through the environment.

5. Short-term effectiveness involves the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until clean-up goals are achieved.

6. Implementability is the technical and administrative feasibility of a remedy, including the availability of goods and services needed to implement the chosen solution.

7. Cost includes capital and operation and maintenance costs.

8. Community acceptance is assessed in the Decision Document following review of the public comments received on the Remedial Investigation Report, the Feasibility Study and the Preferred Plan.

5.1 Evaluation of Remedial Alternatives

5.1.1 Overall Protection of Human Health and the Environment

Overall protection of human health and the environment would be achieved by implementation of the CO Treatment of Soil and Groundwater alternative or the two CO Treatment of Groundwater and Soil Excavation alternatives. Implementation of these alternatives would result in the reduction of potential risks associated with soil and groundwater to acceptable levels. The two alternatives involving soil excavation would result in the elimination of potential risks associated with soil. The alternative that includes CO treatment of soil would likely require multiple soil CO injections to reduce soil concentrations to acceptable levels. *In-situ* CO treatment of groundwater during the IRM resulted in a reduction of approximately 80% of the mass of contaminants.

The Institutional Controls with Containment alternative would reduce the risks associated with groundwater to acceptable levels. Construction of an asphalt cover over the area of soil contaminated with PCP would control risks associated with direct exposure to soil. Risks associated with potential future construction activities in the former dip tank area would be controlled by deed restrictions.

The No Further Action alternative and Groundwater Monitoring alternative do not include measures to reduce or control risk at the Site and, therefore, are not protective of human health and the environment.

5.1.2 Compliance with All State, Federal and Local Laws and Regulations

Implementation of the CO Treatment of Soil and Groundwater alternative or the two CO Treatment of Groundwater and Soil Excavation alternatives would result in compliance with all identified State, Federal and Local laws and regulations. Federal and State regulations regarding treatment, storage and transportation of hazardous waste would apply when handling drill cuttings and excavated soils identified as hazardous waste. Injection activities require an Underground Injection Permit from the Ohio EPA and specific requirements concerning construction and operation of the injection wells would apply. When excavating soils, Federal ambient air quality standards and State regulations establishing standards and notification requirements for particulates from excavation activities would apply.

Under the No Further Action alternative and the Groundwater Monitoring alternative, leaving contaminated soils associated with the former dip tank area in place with no post closure care would not meet Federal or State requirements.

The Institutional Controls with Containment alternative involves leaving waste in place and installing a final cover system. Federal and State closure and capping requirements would

apply. Placement of an asphalt cover over contaminated soils would not meet the design and operating requirements for surface impoundments.

5.1.3 Long Term Effectiveness and Permanence

Components of this criterion include:

- Magnitude of risks remaining after completion of remedial action;
- The type, degree, and duration of post-closure care required to protect human health and the environment;
- Potential of exposure of humans and environmental receptors to contaminants remaining at the facility;
- Long-term reliability of engineering and voluntary institutional controls; and
- Potential need for replacement of components of the remedy

Magnitude of risks remaining after completion of the remedial action:

CO Treatment of Soil and Groundwater and the CO Treatment of Groundwater and Soil Excavation would be permanent remedies, thus resulting in acceptable human health and environmental risks after the remedial actions are complete. These alternatives would permanently reduce concentrations of contaminants in Site media, eliminating potential risk of exposure to human and environmental receptors after RAOs are achieved.

The Institutional Controls with Containment alternative does not include technologies to reduce concentrations of contaminants in Site media and, therefore, would not reduce potential exposure risks below acceptable levels. Deed and access restrictions would control the risk of exposure to impacted soils and groundwater.

The No Further Action alternative and the Groundwater Monitoring alternative would not reduce potential exposure risks below acceptable levels.

The type, degree, and duration of post-closure care required to protect human health and the environment:

Because CO Treatment of Soil and Groundwater and the CO Treatment of Groundwater and Soil Excavation are permanent remedies, post-closure care would not be required following attainment of RAOs. Post-closure care for the Institutional Controls with Containment alternative would include annual inspections of the asphalt and concrete covers to monitor their integrity. Repairs to the covers would be made as necessary. This alternative and the Groundwater Monitoring alternative would require ongoing groundwater quality monitoring for over 30 years. A monitoring program to insure that all institutional controls are effectively enforced would also be required.

Potential of exposure of human and environmental receptors to contaminants remaining at the facility:

The potential exposure to contaminated soil and groundwater after implementation of the CO Treatment of Soil and Groundwater alternative or either of the two CO Treatment of Groundwater and Soil Excavation alternatives would be eliminated after RAOs are achieved. The potential for exposure of human and environmental receptors to unacceptable risks after implementation of the Institutional Controls with Containment alternative would be controlled by implementing deed and access restrictions. Additionally, the potential for exposure to soil after implementation of this alternative would be reduced by construction of an asphalt cover. The potential for exposure by human or environmental receptors to unacceptable risks would not be reduced by implementing the No Further Action or Groundwater Monitoring alternatives.

Long-term reliability of engineering and voluntary institutional controls:

Engineering controls are not part of the CO Treatment of Soil and Groundwater alternative or either of the two CO Treatment of Groundwater and Soil Excavation alternatives, and the potential reliability of engineering controls is, therefore, not a factor as to the long-term effectiveness or permanence of the alternatives. Voluntary institutional controls would be implemented as part of these alternatives until RAOs are achieved, but are not considered the primary means by which exposure would be reduced.

Engineering controls included in the Institutional Controls with Containment alternative would include an asphalt cover. Annual inspections and repairs as necessary would maintain the integrity of the cover. Institutional controls would be implemented as part of this alternative to reduce the potential for exposure. Adherence to deed restrictions that limit construction southeast of Building No. 9 will be required to limit the risks for exposure to soil in the construction scenario. The No Further Action or Groundwater Monitoring alternatives would not include any engineering controls or voluntary institutional controls.

Potential need for replacement of components of the remedy:

Based on results of the pilot study and the CO IRM, replacement of components for the CO Treatment of Soil and Groundwater alternative or either of the two CO Treatment of Groundwater and Soil Excavation alternatives is not anticipated. Operation of remediation equipment would not be included in the No Further Action alternative, the Groundwater Monitoring alternative or the Institutional Controls with Containment alternative.

5.1.4 Reduction of Toxicity, Mobility, or Volume

The evaluation of this criterion will focus on the following factors:

- Treatment or recycling processes and the materials they will treat;
- Amount of contaminants treated or destroyed;
- Degree of expected reduction of toxicity, mobility, or volume;
- The type, quantity, toxicity, and mobility of contaminants remaining after treatment;
- Degree to which treatment is irreversible; and
- Degree to which treatment would reduce the principle risks at the Site.

Treatment or recycling processes and the materials they will treat:

The two CO Treatment of Groundwater and Soil Excavation alternatives include *in-situ* MNA and *in-situ* CO treatment of groundwater to destroy contaminants, and excavation and either on-site treatment and soil replacement or off-site disposal of impacted vadose-zone soil. The CO Treatment of Soil and Groundwater alternative includes *in- situ* CO treatment of soil and groundwater to chemically destroy contaminants. There are no treatment or recycling processes associated with the No Further Action alternative, the Groundwater Monitoring alternative or the Institutional Controls with Containment alternative.

Amount of contaminants treated or destroyed:

The two CO Treatment of Groundwater and Soil Excavation alternatives include excavation and either CO treatment or off-site disposal of approximately 500 cubic yards of soil, *in-situ* MNA of approximately 5.9 million (M) gallons of groundwater and *in-situ* CO treatment of approximately 2 M gallons of groundwater. The CO Treatment of Soil and Groundwater alternative includes *in-situ* CO treatment of approximately 500 cubic yards of soil and 2 M gallons of groundwater. There are no treatment or recycling processes associated with the No Further Action alternative, the Groundwater Monitoring alternative or the Institutional Controls with Containment alternative.

Degree of expected reduction of toxicity, mobility, or volume:

The two CO Treatment of Groundwater and Soil Excavation alternatives would employ treatment technologies to destroy (i.e. oxidize) contaminants in groundwater. Mobility of contaminants in soil and groundwater would be eliminated by removal (excavation) and destruction (*in-situ* CO), respectively. The volume of contaminants in all media at the Site would be reduced. Previous CO treatment performed at the Site as part of IRMs resulted in an 80% reduction of the mass of contaminants in groundwater, and a 10% reduction of the mass of contaminants in soil in the former dip tank area. With three additional CO treatments, it is anticipated that an overall reduction of 25 - 99% (based on achieving 10 -

100% of the average bench-scale reductions) in the mass of contaminants in soil could be achieved.

The CO Treatment of Soil and Groundwater alternative would employ treatment technologies to destroy contaminants in soil and groundwater. Mobility of contaminants in soil and groundwater would be significantly reduced (*in-situ* CO). The volume of contaminants in all media at the Site would be reduced.

The Institutional Controls with Containment alternative would not reduce the toxicity and volume of contaminants in soil. Mobility of constituents in soil and groundwater would be reduced by construction of an asphalt cover. The cover would reduce infiltration from precipitation and thus the migration of contaminants to groundwater from impacted soil. The toxicity and volume of contaminants in groundwater would be reduced by natural attenuation processes.

The toxicity, mobility, and volume of contaminants in soil would not be reduced by the No Further Action or Groundwater Monitoring alternatives. The toxicity and volume of contaminants in groundwater would be reduced by natural attenuation processes.

The type, quantity, toxicity, and mobility of contaminants remaining after treatment:

Treatment residues resulting from implementation of the CO Treatment of Groundwater and Soil Excavation alternative would include treated soils from CO if on-site batch treatment of soil is employed. Treated soil would be analyzed to verify that leachable concentrations of contaminants are less than TCLP requirements as well as RAOs prior to replacement on-site. Residues from the CO of soil would include detoxified soils and spent reagents. The volume of spent reagent would be approximately the same as the volume added.

No treatment residues would result from implementation of the CO Treatment of Soil and Groundwater alternative, the Institutional Controls with Containment alternative, the Groundwater Monitoring alternative or the No Further Action alternative.

Degree to which treatment is irreversible:

CO Treatment of Soil and Groundwater and the CO Treatment of Groundwater and Soil Excavation alternatives employ technologies for treating soil and groundwater that are irreversible. The No Further Action alternative, the Groundwater Monitoring alternative and the Institutional Controls with Containment alternative do not include treatment technologies.

Degree to which treatment would reduce the principle risks at the Site:

Implementation of CO Treatment of Soil and Groundwater alternative or CO Treatment of Groundwater and Soil Excavation alternatives would eliminate human health and environmental risks associated with the identified contaminants in soil and groundwater once RAOs are achieved. These alternatives would control the risks associated with exposure to groundwater by implementing deed restrictions until RAOs are achieved.

Implementation of the Institutional Controls with Containment alternative would reduce human health and environmental risks corresponding to soil and groundwater. Risks associated with contaminants in soil would be controlled by constructing an asphalt cover, thus reducing mobility. This alternative also would control risks associated with exposure to Site media by implementing deed and access restrictions.

The No Further Action alternative and the Groundwater Monitoring alternative would not reduce risks posed by the Site.

5.1.5 Short Term Effectiveness

Short term effectiveness addresses the following:

- Protection of the community, workers and the environment during remedial actions; and
- Length of time until remedial action objectives are achieved.

Protection of the community, workers and the environment during remedial actions:

Risks to the community and remediation workers during implementation of the CO Treatment of Groundwater and Soil Excavation alternatives include exposure to soil during excavation and during transport to an off-site disposal facility, exposure to chemicals used in the CO process, and worker exposure to groundwater during groundwater quality monitoring.

The CO Treatment of Soil and Groundwater alternative would include short-term risks associated with exposure to chemicals used in the CO process and worker exposure to groundwater during groundwater quality monitoring.

The Institutional Controls with Containment alternative includes risks associated with exposure to soil during construction of the asphalt cover and exposure to groundwater during groundwater quality monitoring.

The Groundwater Monitoring alternative includes risks associated with exposure to groundwater during groundwater quality monitoring.

There are no additional risks associated with the No Further Action alternative since no additional activities would be conducted as part of this alternative.

Length of time until remedial action objectives are achieved:

Alternative	Approximate period of time to achieve RAOs
CO Treatment of Groundwater and Soil Excavation alternatives (4.2.5 and 4.2.6)	5 years
CO Treatment of Soil and Groundwater alternative (4.2.4)	5 years
Institutional Controls with Containment alternative (4.2.3)	over 30 years (dip tank area) 5 years (catch basin area)
Groundwater Monitoring alternative (4.2.2)	over 30 years (dip tank area) 5 years (catch basin area)
No Further Action alternative (4.2.1)	over 30 years (dip tank area) 5 years (catch basin area)

5.1.6 Implementability

Potential implementability concerns associated with construction of alternatives include:

Excavation of Site soils would be complicated by the proximity of adjacent Buildings No. 2 and 8.

Expected operational reliability of the remedy:

Groundwater treatment technologies included as part of the CO Treatment of Soil and Groundwater alternative and the CO Treatment of Groundwater and Soil Excavation alternatives would be expected to be reliable and can be expected to meet performance specifications. Soil treatment technologies for excavation and batch treatment and replacement or off-site disposal would be expected to be reliable and can be expected to meet performance specifications. *In-situ* CO soil treatment may have difficulty achieving RAOs, based on the results of the Phase 1 and Phase 2 IRM. Proper inspection and repair of the asphalt cover for the Institutional Controls with Containment alternative would increase reliability.

Availability of necessary equipment and specialists:

The equipment and specialists necessary to implement all alternatives are expected to be readily available.

Available capacity and location of needed treatment, storage and disposal services:

The area available for the CO treatment system is expected to be sufficient to meet demand. The area available for staging excavated soil is expected to be sufficient to meet demand.

Administrative implementability:

The CO Treatment of Soil and Groundwater alternative and the CO Treatment of Groundwater and Soil Excavation alternatives are expected to be administratively implementable as they enable RAOs to be achieved in more reasonable time frames than for the Institutional Controls with Containment alternative, the Groundwater Monitoring alternative and the No Further Action alternative.

5.1.7 Cost

A comparison of costs (capital, O&M and present worth) is presented in the following table (Table 7).

Table 7. Cost Evaluation Summary for Remedial Alternatives

Alternative	Capital Cost	O&M Present Worth	Total Present Worth	Previously Expended Costs*	Future Costs to be Expended
No Further Action (4.2.1)	$0	$0	$0	$0	$0
Groundwater Monitoring (4.2.2)	$14,200	$230,206	$244,406	$ 0	$244,406
Institutional Controls with Containment (4.2.3)	$51,150	$579,654	$630,804	$ 0	$630,804
CO treatment of soils and groundwater (4.2.4)	$504,525	$368,424	$872,949	$380,000	$492,949
CO treatment of groundwater; soils excavation with off-site disposal (4.2.5)	$702,995	$401,449	$1,104,444	$380,000	$724,444
CO treatment of groundwater; soils excavation with on-site treatment (4.2.6)	$754,300	$401,449	$1,155,749	$380,000	$775,749
Chemical Oxidation Contingency**		$110,000	$110,000		$110,000

* Previously expended costs include costs associated with the IRM that consisted of CO treatment of groundwater and soils.

**The Chemical Oxidation Contingency consists of two additional injection treatment cycles. Based on the FS Report, the approximate cost of each injection is $ 55,000. The treatment system and injection network are already in place.

6.0 SELECTED REMEDY

The selected remedial action for the Site addresses remaining contamination in soils and groundwater. Ohio EPA's selected remedy consists of four main components: excavation of contaminated dip tank soils and treatment of those soils through ex situ CO treatment, MNA of PCP contaminated groundwater with a CO contingency, MNA of TCA contaminated groundwater and containment of contaminated groundwater.

Excavation of Contaminated Dip Tank Soils and Ex Situ CO Treatment of the Soils

Contaminated soils around the dip tanks will be excavated and treated on-site by CO and replaced on-site. Based on the results of prior bench-scale testing of *ex-situ* CO treatment of soils, reductions of contaminants in soil of up to 93% can be expected through *ex-situ* soil treatment. It is anticipated that soil would be treated in batches, with one treatment cycle per batch required. In addition to excavating soils, the former dip tanks and associated piping and valving will be removed and disposed off-site. This soils remedy is protective of human health and the environment and is implementable. The remedy is effective in both the short-term and long-term.

Performance Standards:

- At a minimum, soils in the dip tank area that exceed site specific leach based cleanup levels will be excavated.
- Excavated soils will be treated by *ex situ* chemical oxidation.
- At a minimum, treated soils will meet site specific leach based cleanup levels before replacing on-site.
- If concentrations in remaining soils exceed site specific risk based levels, exposure to those soils will be minimized through institutional controls.

Contaminant	Site Specific Leach-Based Level (mg/Kg)	Site Specific Risk Based Concentration (mg/Kg)
PCP	115	16.8
D/F	0.215	2.58×10^{-5}

MNA of PCP Contaminated Groundwater with a CO Contingency

Remaining groundwater contamination associated with the dip tank area will be addressed through monitored natural attenuation. The volume and mass of PCP in groundwater has significantly declined from the time of the RI to the present. The mass of PCP in groundwater has been reduced by approximately 80%. This mass reduction is attributed to *in-situ* chemical oxidation treatment of groundwater performed during 1998 and 1999 as IRMs. Data presented in the FS Report indicates that MCLs for PCP could be achieved within five years. However, additional data are needed to better estimate the time to achieve MCLs for PCP as well as for dioxins and furans by monitored natural attenuation.

Additional CO treatment of groundwater will be required if natural attenuation does not effectively address the groundwater contamination.

Performance Standards:

- Routine groundwater monitoring will confirm that natural attenuation is occurring.
- Adequate protection against human consumption of groundwater exceeding the MCLs will be provided.
- MCLs will be achieved within 5 years of the effective date of this Decision Document.

Contaminant	MCL (mg/L)
PCP	0.001
D/F	3×10^{-8}

MNA of TCA Contaminated Groundwater

Remaining groundwater contamination will be addressed through monitored natural attenuation. The mass of contaminants in groundwater associated with the catch basin area (TCA and DCE) has reduced substantially with time. The volume of TCA-impacted shallow groundwater remained relatively constant through March 1998, and then declined significantly (43 percent) from March 1998 to June 1999. The mass of TCA in shallow groundwater declined by approximately 80 percent from the time of the RI to the present. This is believed to be due to removal of the TCA source area soils. The FS Report estimates that MCLs for TCA would be achieved in approximately five years. Additional data, including monitored natural attenuation parameters are needed to verify the projected time-frame for achieving groundwater RAOs.

Performance Standards:

- Routine groundwater monitoring will confirm that natural attenuation is occurring.
- Adequate protection against human consumption of groundwater exceeding the MCLs will be provided.
- MCLs will be achieved within 5 years of the effective date of this Decision Document.

Contaminant	MCL (mg/L)
DCE	0.007
TCA	0.2

Containment of Contaminated Groundwater

Containment of groundwater impacted by contaminants from the former catch basin and dip tank areas will be required to protect the Village of Malta water supply. This currently is accomplished by pumping Malta Well M1 to waste, with discharge to the Muskingum River. Additional hydrological (water level and river gauging) data will be collected to

assess the need for continued, or modified, pumping of Malta Well M1 (or equivalent containment well) to contain the plume and protect the Malta Wellfield.

Performance Standards:

- Migration of impacted groundwater to downgradient receptors, including the Muskingum River, will be prevented.
- Impacted groundwater will not extend within the Village of Malta production wellfield capture zone.

Ohio Environmental Protection Agency's

Responsiveness Summary
for the

Tomkins Industries Site
Malta, Ohio

Responsiveness Summary

This Responsiveness Summary has been prepared to address each of the comments submitted in written form on the Preferred Plan for remedial action at the Tomkins Industries Site. No oral comments were made during the hearing on the Preferred Plan.

Written Comments from Eagon & Associates submitted on behalf of the Village of Malta

1. *Wells M4, M5, and M6 which provide the public water supply for Malta are located about 1300 feet north of the northern limit of groundwater contamination thus far delineated at the Tomkins Site. Thirteen hundred feet is also the distance to the downgradient (southern) limit of the five-year capture zone (WHPA) for Wells M4, M5, and M6 at 500,000 gallons per day (GPD) production. It should be noted that the model scenario for WHPA delineation included Malta Well 1 pumping at 210 gpm. Well M1 is located southeast of the Tomkins Site and has been pumped to the Muskingum River since 1989 as a contamination containment measure. Malta's Well M3 is located east of the Tomkins Site along the river and is currently unused. The Village currently uses 200,000 to 300,000 GPD. The capacity of the new water treatment plant will be 1 MGD. Should the Village's water demand increase beyond 500,000 gpd, the southern limit of the capture zone could extend farther south than the current WHPA.*

Ohio EPA Response:

If Malta informs Ohio EPA and Tomkins of any increases in water demand, Tomkins can take necessary measures to ensure that contamination is not migrating towards Malta Wells M4, M5 and M6. If demand exceeds 500,000 gpd, then the Village of Malta must submit a revised Wellhead Protection Plan to the agency. At that time, the village should also send a notice of the increased water demand to the Ohio EPA - Southeast District Office, Division of Emergency and Remedial Response (DERR) Site Coordinator for the Tomkins Industries Site so the Site Coordinator can ensure that Tomkins is aware of the changes and is responding appropriately to any potential unacceptable risk arising from the modifications.

2. *During the RI the divide between the capture zone from Well M1 and the Wells M4, M5, and M6 was not defined. The main reason for this is that no monitoring wells were positioned around the northern half of the Tomkins facility. This is the part of the facility that is within the WHPA that has been endorsed by Ohio EPA. Monitoring wells positioned north of the existing monitoring wells along the east side of buildings B5, B10, B11, and B14 and north of building B22 would help to define the groundwater divide between the capture zone from Well M1 and the capture zone from Wells M4, M5, and M6.*

Ohio EPA Response:

Monitoring wells were not placed in these areas because, based on historical information, soil and/or groundwater contamination was not expected. If the Village of Malta is aware of any new information, please let Ohio EPA and Tomkins know so appropriate measures can be taken to ensure that there is no unacceptable risk.

During the RI, it was decided that it was not necessary to fully define the groundwater divide since the data indicates that contamination from the two source areas is migrating towards Malta M1. If pumping scenarios change (pumping of M1 and/or increases in production above 500,000 gpd), there may be a need to further investigate the groundwater divide.

3. *Given the long history of industrial activity at the Tomkins Site, it is possible that other groundwater or soil contamination exists around the northern part of the site. Additional monitoring wells could identify other problems or provide some assurance to the Village of Malta that there are no other problems. Additional monitoring wells also would provide significant data regarding changes in the existing wellfield and Well M1 capture zones in the event that Malta's wellfield production is increased.*

Ohio EPA Response:

As stated above, this area was not investigated because historical data did not indicate activity that would have caused contamination of soils and/or groundwater. If the Village of Malta is concerned that there may be additional sources in this portion of the site that could impact the wellfield, the Village may want to install monitoring wells to serve as an early warning system. However, because there is no information indicating that soils and groundwater in this portion of the site may be contaminated, Ohio EPA will not require that Tomkins investigate this area. If, at some point in the future, further information reveals that contaminated soils and groundwater exist in this area, Tomkins would need to investigate and take measures to ensure no unacceptable risks exist on or off site.

If the Village of Malta plans to increase production above 500,000 gpd, it may be necessary for Tomkins to conduct additional groundwater studies to determine how the increased pumping would affect the capture zone of M1 and the existing wellfield. Any changes in the Wellhead Protection Plan should be made available to the Ohio EPA DERR Site Coordinator and Tomkins so a determination can be made as to whether or not modifications in pumping are need to contain the plume.

4. *An additional groundwater concern is the recent routing of surface water drainage from the Tomkins facility to Millers Run. Millers Run is located between the Tomkins facility and the Malta Wellfield, and passes within a few hundred feet of Wells M4, M5, and M6. This is within the one-year capture zone for the wellfield and is within the 300 foot isolation barrier around the supply wells owned by the Village. The aquifer in this area is overlain by relatively porous materials and is susceptible to*

contamination from surface water. Surface water drainage from the Tomkins facility should be redirected toward the south end of the facility, away from the Malta wellfield capture zone.

Ohio EPA Response:

Ohio EPA will work with the Village of Malta and Tomkins to ensure that surface water from the site is not impacted by the contaminated soils and groundwater at the site. As required by their NPDES permit, Tomkins has a Stormwater Pollution Prevention Plan. The plan should include alternate plans for surface water discharge if it is determined that the surface water is impacted by contaminated soils or groundwater from the Tomkins Industries Site. Based on historical information regarding industrial activities at the Site, the surface water discharging to Millers Run is not likely exposed to areas of soil and groundwater contamination. However, Steve Pfister (Tomkins Industries) stated, during a 10/23/00 telephone call, that Tomkins plans to collect and analyze a sample of the surface water discharge to Millers Run for verification purposes. In addition, Tomkins is currently updating the plan and will submit the revised copy to Ohio EPA. Once Ohio EPA receives the revised Stormwater Pollution Prevention Plan and the sample results, we will contact the Village of Malta to provide an update.

5. *As a result of groundwater contamination caused by Tomkins Industries, the Village of Malta has incurred significant costs to maintain and operate Well M1 in addition to paying for an NPDES permit and groundwater quality monitoring at M1. The Village realizes that it is not within the jurisdiction of the Ohio EPA to direct reimbursement of funds. However, the Village of Malta should not be financially responsible for continued operation and maintenance of Well M1 or Well M3 if it is to be kept only as a safeguard against potential contaminant migration. It would be appropriate in this circumstance for ownership of and therefore, responsibility for the wells to be transferred to Tomkins Industries. At a minimum, the Ohio EPA should relieve the Village of Malta from the responsibility to continue water-quality monitoring at wells M1 and M3. It may be within the power of Ohio EPA to transfer these responsibilities to Tomkins Industries as part of the Remedial Action at the site.*

Ohio EPA Response:

The Decision Document requires containment of groundwater impacted by contaminants from the former catch basin and dip tank areas. It states that this is currently accomplished by pumping Malta Well M1 to waste with discharge to the Muskingum River. Containment of the plume is a component of the remedy. Ohio EPA will invite Tomkins Industries to negotiate a remedial design/remedial action agreement. As part of the agreement, Tomkins would implement the remedy, including containment of the plume. Ohio EPA encourages Tomkins and the Village of Malta to work together so that Tomkins can operate the existing well M1 as the containment well. Water quality monitoring will also be a component of the remedy. If it is determined that M1 and M3 are needed as part of the groundwater monitoring network, Tomkins will need to ensure that these wells are sampled

or that wells in a similar location and at similar depths are sampled in place of M1 and M3. Again, Ohio EPA encourages Tomkins and the Village of Malta to work together to make use of existing resources.

6. *All groundwater quality and groundwater level data generated by Tomkins should be provided to the Village of Malta. This information as well as progress reports on the clean-up activities will be necessary so that Malta can make informed decisions regarding wellfield production changes or the need for precautionary measures to prevent contaminant migration toward the wellfield, should it occur.*

Ohio EPA Response

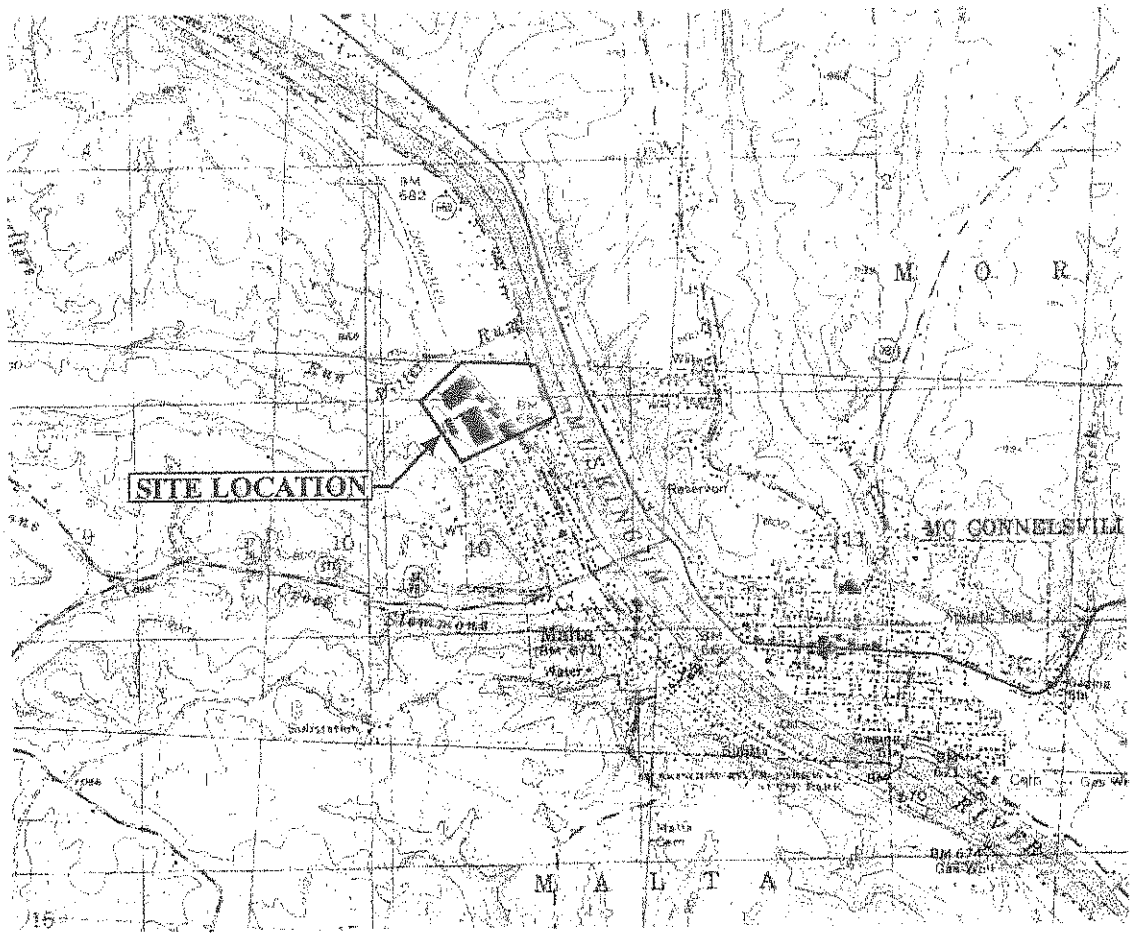
Ohio EPA agrees that this data would be very important for the Village of Malta to make decisions regarding operation of the wellfield. Ohio EPA encourages Tomkins and Malta to work together and to share any data generated and plans drafted that could potentially impact either Malta's wellfield operations or Tomkins cleanup activities. The Village of Malta also has access to review and copy any of Ohio EPA's public files and documents. Most of Ohio EPA's records concerning the Tomkins Industries Site are located at the Ohio EPA's Southeast District Office at 2195 Front Street in Logan, Ohio. Arrangements for reviewing and copying the records can be made by contacting Brenda Wadsworth at (740) 380-5276.

7. *A final comment regards the projected five-year time frame for achieving clean-up goals for groundwater contaminants. Monitored natural attenuation (MNA) has been proposed to complete remediation of groundwater contamination at the site. Data from the last five years does not support the idea that five more years will be an adequate amount of time for remediation of groundwater at the site. The Ohio EPA Preferred Plan focuses on TCA and PCP as principal contaminants, but dioxins and furans were detected well above the MCLs and are identified as constituents of concern. The behavior of these compounds with regard to natural attenuation is not well known. Additionally, no study has been conducted at the site demonstrating that the conditions are favorable for natural attenuation to occur. The Preferred Plan should include an option clean-up method for groundwater in the event that conditions are not favorable for natural attenuation or if clean-up of groundwater does not proceed as anticipated.*

Ohio EPA Response

Ohio EPA acknowledges that more groundwater data is needed to identify a more accurate time frame for cleanup. Additional data will be collected and time frames will be adjusted accordingly.

If contaminants from the dip tank source area, including PCP, dioxins and furans do not decrease within an acceptable time frame (to be established in the O&M Plan), then additional chemical oxidation treatment of groundwater would be required to address remaining contamination.



U.S.G.S. 7.5 MINUTE SERIES (TOPOGRAPHIC)

ROKEBY LOCK QUADRANGLE AND
MC CONNELSVILLE QUADRANGLE
OHIO

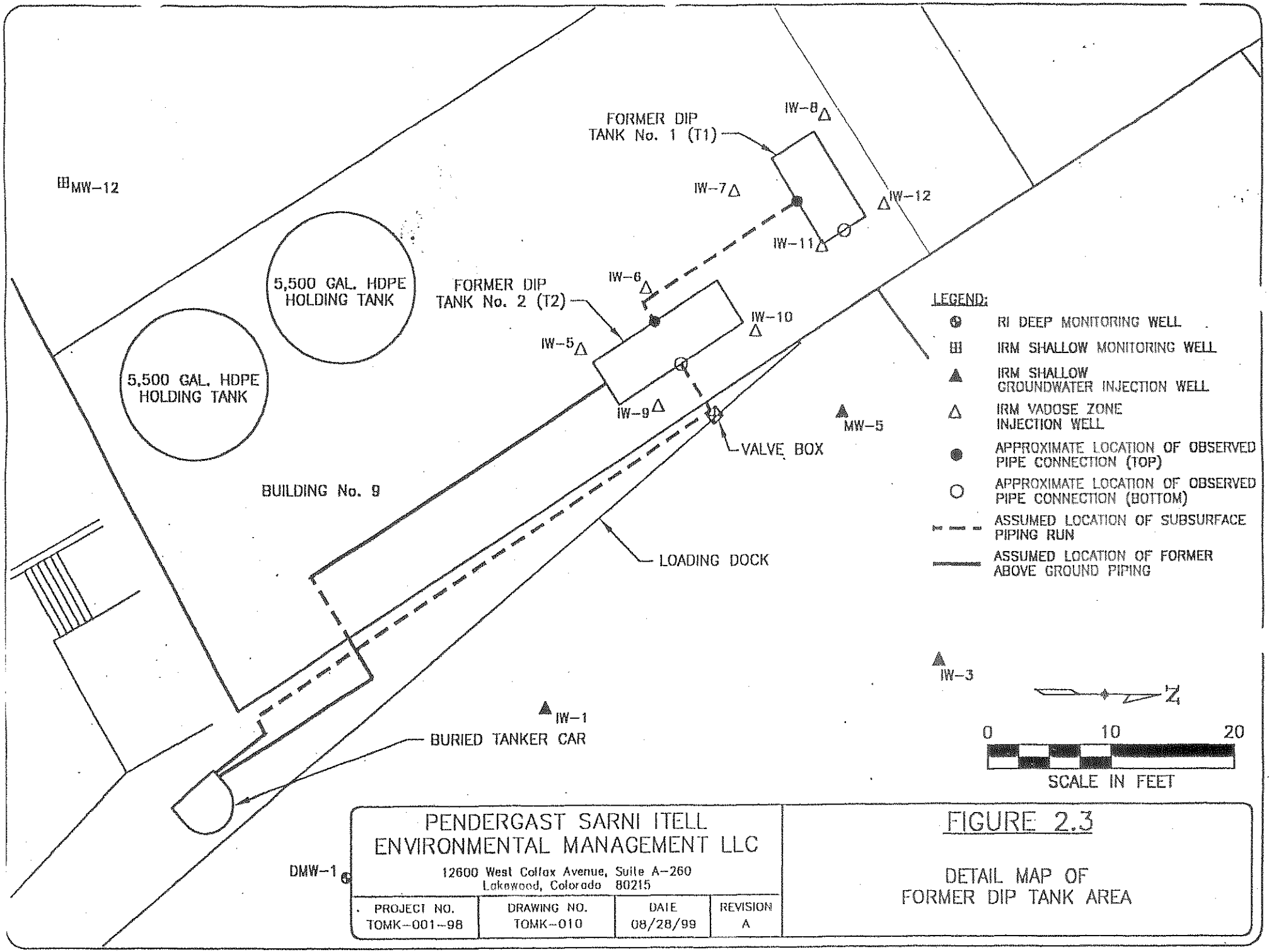
0 2,000 4,000

SCALE IN FEET
CONTOUR INTERVAL: 10 FEET
1994

N

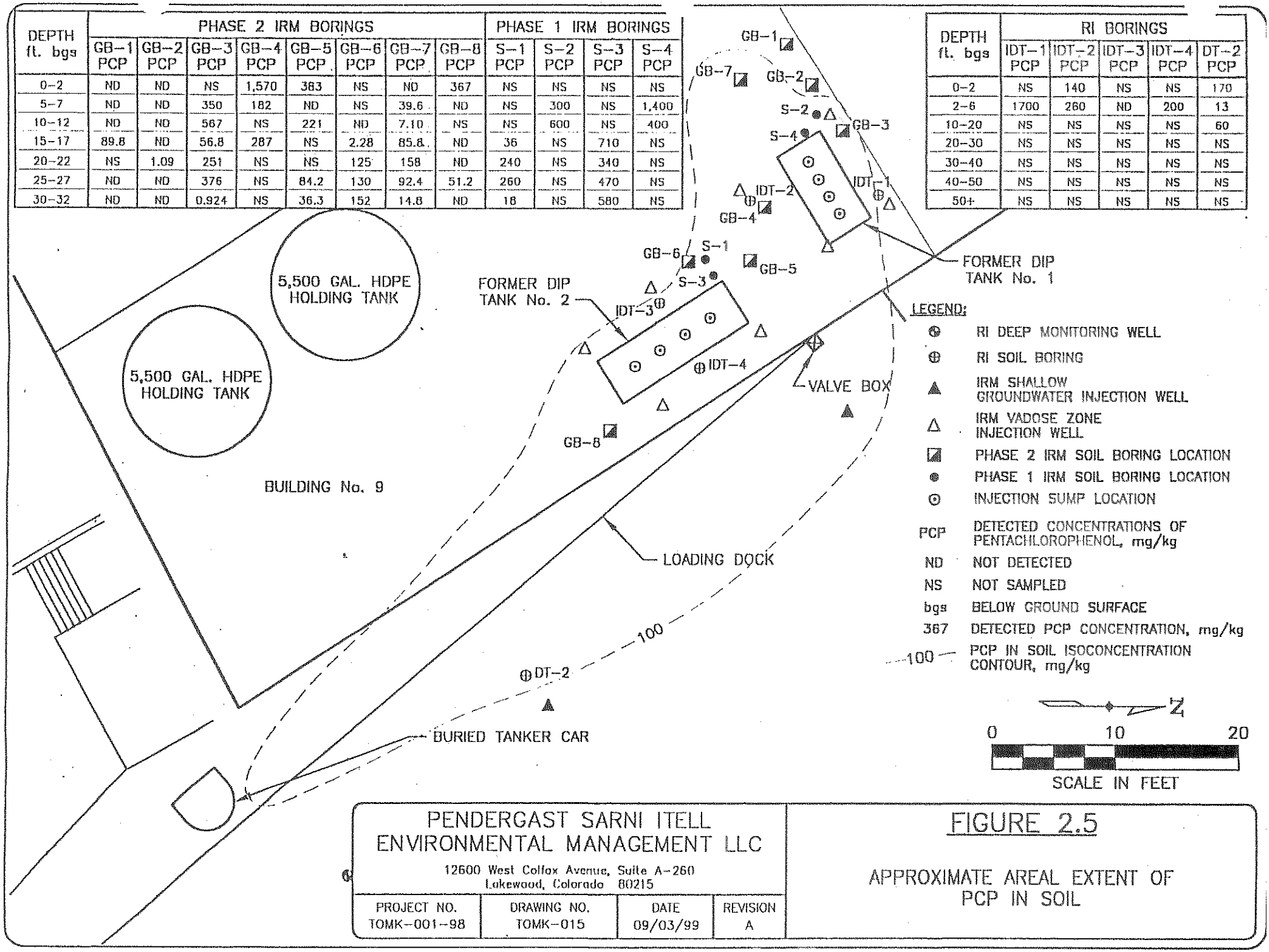
PENDERGAST SARNI ITELL ENVIRONMENTAL MANAGEMENT LLC 12600 West Colfax Avenue, Suite A-260 Lakewood, Colorado 80215			Figure 2.1 SITE LOCATION MAP
PROJECT NO.	DATE	REVISION	
TOMK-001-98	09/03/99	A	

DECISION DOCUMENT
FIGURE 1
SITE LOCATION MAP


MW-12
5,500 GAL. HDPE HOLDING TANK
5,500 GAL. HDPE HOLDING TANK
BUILDING No. 9
FORMER DIP TANK No. 1 (T1)
FORMER DIP TANK No. 2 (T2)
IW-8
IW-7
IW-12
IW-11
IW-6
IW-10
IW-5
IW-9
MW-5
VALVE BOX
LOADING DOCK
IW-3
IW-1
BURIED TANKER CAR
DMW-1
LEGEND:
RI DEEP MONITORING WELL
IRM SHALLOW MONITORING WELL
IRM SHALLOW GROUNDWATER INJECTION WELL
IRM VADOSE ZONE INJECTION WELL
APPROXIMATE LOCATION OF OBSERVED PIPE CONNECTION (TOP)
APPROXIMATE LOCATION OF OBSERVED PIPE CONNECTION (BOTTOM)
ASSUMED LOCATION OF SUBSURFACE PIPING RUN
ASSUMED LOCATION OF FORMER ABOVE GROUND PIPING
N
0
10
20
SCALE IN FEET
PENDERGAST SARNI ITELL ENVIRONMENTAL MANAGEMENT LLC
12600 West Colfax Avenue, Suite A-260
Lakewood, Colorado 80215
PROJECT NO. TOMK-001-98
DRAWING NO. TOMK-010
DATE 08/28/99
REVISION A
FIGURE 2.3
DETAIL MAP OF FORMER DIP TANK AREA

DEPTH ft. bgs	PHASE 2 IRM BORINGS								PHASE 1 IRM BORINGS			
	GB-1 PCP	GB-2 PCP	GB-3 PCP	GB-4 PCP	GB-5 PCP	GB-6 PCP	GB-7 PCP	GB-8 PCP	S-1 PCP	S-2 PCP	S-3 PCP	S-4 PCP
0-2	ND	ND	NS	1,570	383	NS	ND	367	NS	NS	NS	NS
5-7	ND	ND	350	182	ND	NS	39.6	ND	NS	300	NS	1,400
10-12	ND	ND	567	NS	221	ND	7.10	NS	NS	600	NS	400
15-17	89.8	ND	56.8	287	NS	2.28	85.8	ND	36	NS	710	NS
20-22	NS	1.09	251	NS	NS	125	158	ND	240	NS	340	NS
25-27	ND	ND	376	NS	84.2	130	92.4	51.2	260	NS	470	NS
30-32	ND	ND	0.924	NS	36.3	152	14.8	ND	18	NS	580	NS

DEPTH ft. bgs	RI BORINGS				
	IDT-1 PCP	IDT-2 PCP	IDT-3 PCP	IDT-4 PCP	DT-2 PCP
0-2	NS	140	NS	NS	170
2-6	1700	260	ND	200	13
10-20	NS	NS	NS	NS	60
20-30	NS	NS	NS	NS	NS
30-40	NS	NS	NS	NS	NS
40-50	NS	NS	NS	NS	NS
50+	NS	NS	NS	NS	NS



PENDERGAST SARNI ITELL ENVIRONMENTAL MANAGEMENT LLC

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Lakewood, Colorado 80215

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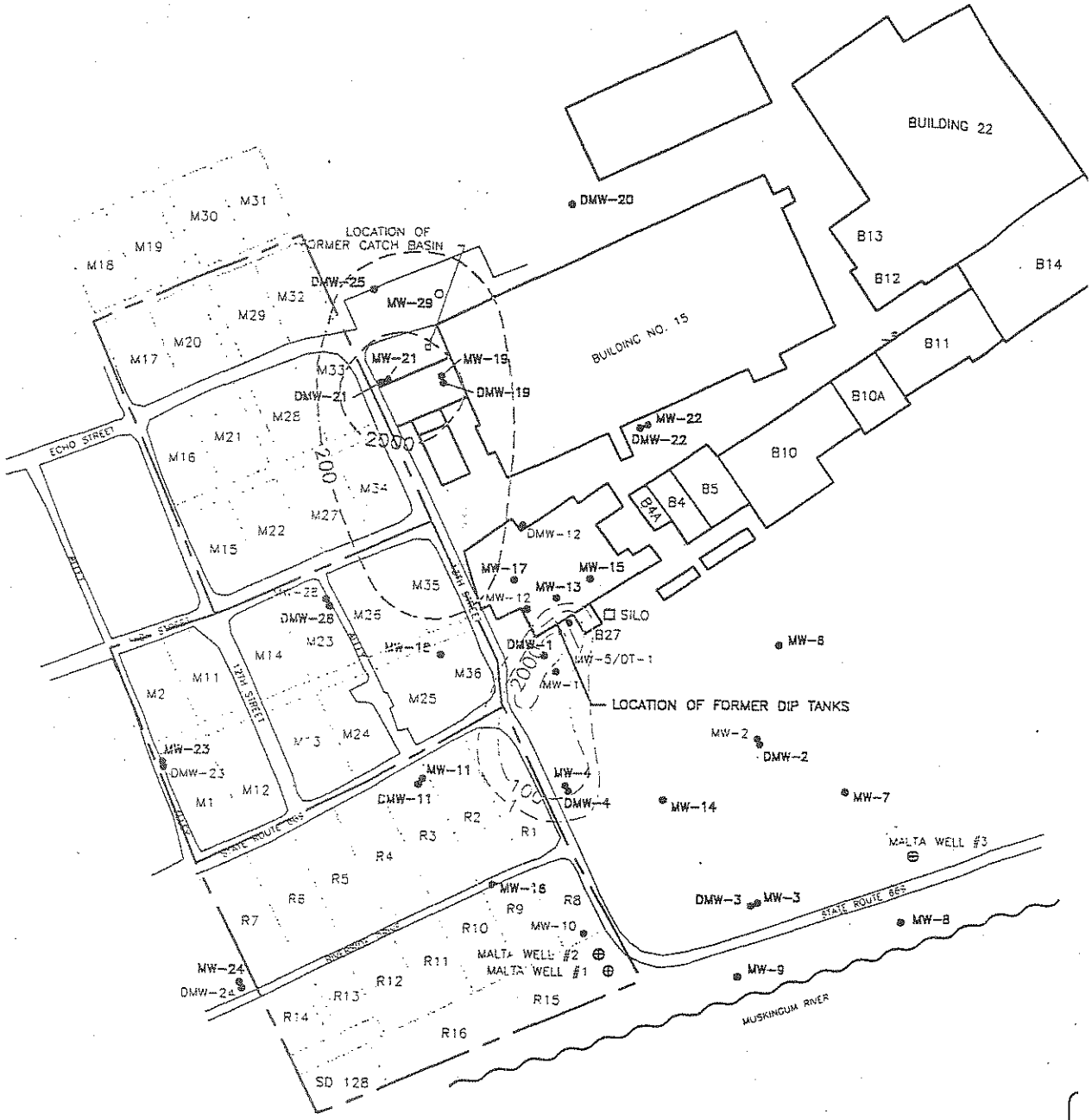
FIGURE 2.5

APPROXIMATE AREAL EXTENT OF PCP IN SOIL



REFERENCE:
BASE MAP PROVIDED BY W.J. BIEDENBACH AND ASSOCIATES SURVEYING AND MAPPING, ZANESVILLE, OHIO (1994).