STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
Division of Remediation
William R. Snodgrass TN Tower
312 Rosa L. Parks Avenue, 14th Floor
Nashville, Tennessee 37243

PUBLIC NOTICE
OF
RECORD OF DECISION
FOR
FORMER DEZURIK FACILITY

SITE NUMBER #89-509

MCMINNVILLE, WARREN COUNTY, TENNESSEE

The Tennessee Department of Environment and Conservation (TDEC) Division of Remediation (DoR) has signed a Record of Decision for the former DeZurick site (the Site). The Record of Decision (ROD) is a document used to explain the clean-up plan for the Site.

The Former Dezurik Facility ("the Site") is located at 1226 Belmont Drive, northeast of McMinnville, Tennessee in Warren County. The Site consists of 16.52 acres. Surrounding land uses are industrial/commercial and residential. The nearest residential populations are located 1,500 feet north of the Site. The Site has two Areas of Contamination (AOCs). A loading dock, referred to as Area of Contamination 1 (AOC 1) is located on the east side of the building and the former solvent storage area (referred to as AOC 2) was located south of the building.

Investigations conducted between 1988 and 2003 found petroleum related compounds and chlorinated VOCs in the soil in AOC 1 and chlorinated VOCs in groundwater at both AOCs. In October 2003, a Focused Feasibility Study was submitted to the TDEC that selected interim remedial actions. Excavation and disposal were selected as the interim action for contaminated soil in AOC 1. For AOCs 1 and 2, the preferred interim action for groundwater was monitored natural attenuation. Following implementation of these interim actions and five years of groundwater monitoring, a 2013 feasibility study and remedial action work plan for AOC 1 selected additional soil excavation and in situ chemical reduction (ISCR) injections. ISCR was also selected as the preferred alternative for AOC 2. The further remedial activities completed at AOC 1 and AOC 2 from 2011 to 2016 achieved MCLs for all VOCs except 1,1 DCE and vinyl chloride. The concentrations of 1,1 DCE and vinyl chloride are stable and have been declining for the past three years approaching MCLs.

Land use controls limiting future use to commercial or industrial purposes and restricting groundwater usage are part of the remedy for the Site. A Notice of Land Use Restriction will be finalized and recorded upon finalization of the ROD.

The Record of Decision detailing the above selected remedy and rationale may be viewed at https://www.tn.gov/environment/ppo-public-participation/ppo-public-participation/ppo-

remediation.html. For further information about the Site or to request a paper copy of the Record of Decision, please contact the DoR project manager, Chris Seifert at 615-687-7065 or at Chris.Seifert@tn.gov.

If it is hard for you to read, speak, or understand English, TDEC may be able to provide translation or interpretation services free of charge. Please contact DoR at 615-532-0900 for more information.

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF REMEDIATION

RECORD OF DECISION (ROD)
DEZURIK FACILITY
WARREN COUNTY, TENNESSEE
SITE ID #89-509

SITE DESCRIPTION

The Former Dezurik Facility ("the Site") is located at 1226 Belmont Drive, northeast of McMinnville, Tennessee in Warren County. The Site, consisting of 16.52 acres, is bordered to the north and west by commercial properties and to the east and south by rail lines. The nearest surface water body, Barren Fork River, is located approximately 4,000 feet south of the Site. The main structure located on the Site is a 126,000 ft^2 plant building with an open floored lean-to addition, making the total facility size approximately 198,000 square feet (under roof). A loading dock, referred to as Area of Contamination 1 (AOC 1) is located on the east side of the building and the solvent storage area (referred to as AOC 2) was located south of the building (Figure 1). The land uses around the Site are industrial/commercial and residential. The nearest residential populations are located 1,500 feet north of the Site.

Site Wide Geology

The regolith (overburden) at the Site is typically highly variable and heterogenous and is several tens of feet thick. The regolith consists of clay-rich residuum and silts that may be mixed and interbedded with sands, gravels, and chert fragments derived from insoluble materials left behind by the dissolution of the limestone units. In review of the McMinnville Geologic Quadrangle, site data and the structure contours of the top of the Warsaw Limestone, it appears that the St. Louis Limestone and the Upper Warsaw Limestone have completely eroded into the Middle Warsaw Limestone at the Site. The St. Louis Limestone is fine-grained, medium gray to dark-gray and brownish gray, fine-grained limestone which is dolomitic in part that weathers readily to a clayey residuum and contains abundant chert, which accounts for the abundance of chert gravels noticed in the regolith. The weathered irregular surface of the Middle Warsaw Limestone has been well documented in borings completed at the Site to occur between 35 to 66 feet below ground surface (bgs) (between 895 and 915 feet above mean sea level [amsl]). Variations in the bedrock surface can be as much as 10 feet or more over very short distances which is characteristic of epikarst dissolution. Below the St. Louis Limestone is the Warsaw Limestone, which is divided into three components: The Upper Warsaw, the Middle Warsaw, and the Lower Warsaw. The Upper Warsaw is a coarsely crystalline siliceous, calcareous siltstone to sandstone which appears to be 10 to 15 feet in thickness and is completely weathered on this Site. The Middle Warsaw is a microcrystalline silty to sandy, gray and brownish-gray limestone predominantly crinoidal in the upper part and is thin-to-thick bedded with crossbedding which weathers readily to a thick, clayey soil horizon. The Lower Warsaw is a siliceous, calcareous, cherty siltstone. The Warsaw Limestone is reportedly 45 to 80 feet thick in this area. Below the Warsaw Limestone is the Fort Payne Formation which is a very cherty, largely dolomitic limestone which has discontinuous thin and thick beds. No bedrock outcrops occur on the Site. Two faults that appear to have limited displacement occur approximately 1 mile south of the

DeZurik site. Although these faults do not appear to have any impact with respect to the Site, they may indicate regional planes of weakness within the bedrock.

Site-wide Hydrogeology

No residential area or private water supply wells have been identified within 1 mile of the Site in a downgradient direction. Groundwater at the Site is not used as a source of potable or non-potable water. Surface water flows off the DeZurik site radially with the two largest components being towards the southeast and northeast. Surface water from the eastern portion of the Site flows northeast into a topographic depression. Surface water from the western portion of the Site flows southwest into a Warsaw Sinkhole Basin Lowland, which has formed in the Middle Warsaw Limestone, while the remainder of the Site flows south to southeast towards the railroad easement. The nearest permanent downgradient surface water body, the Barren Fork River, is located approximately 4,000 feet south of the Site.

The subsurface flow system can be divided into three zones: the vadose zone, the shallow water bearing zone, and the groundwater zone which can be subdivided into the overburden/bedrock interval and the bedrock interval. The vadose zone consists of residuum composed mainly of clay and silt, most of which is derived from the weathering of bedrock materials, and which has significant water storage capacity. The shallow water bearing zone is within the weathered residuum overlying bedrock but appears to be perched on a less permeable layer. This perched water bearing zone exists under unconfined conditions and has an average elevation of 945 feet amsl with a high-water mark of 955.65 feet amsl and a low at 929.24 feet amsl across the Site. The groundwater zone is characterized by two separate intervals: the overburden/bedrock interval and the bedrock interval. The overburden/bedrock interval is a perennially saturated zone at the top of bedrock within the epikarst of the Warsaw Limestone. This saturated zone exists under semiconfined conditions and is located within the Middle Warsaw aquifer. The overburden/bedrock interval has an average elevation of 942 feet amsl with a high-water mark of 952.2 feet amsl and a low at 928.69 feet amsl across the Site. The Middle Warsaw Limestone is an aquifer characterized by dissolution enlarged fractures and joints. The bedrock interval is intercepted by one well located in a generally downgradient position near AOC 2. It is completed within the basal portion of the Middle Warsaw aquifer and is interpreted to exist under unconfined conditions.

Potentiometric data collected from Site monitoring wells since 2004 indicate that Sitewide groundwater flow in the shallow perched zone is to the southeast. The data was limited to monitoring wells screened in the shallower perched water table (MW-01, MW-02, MW-03, MW-04, and MW-12). The average estimated groundwater flow velocity within the shallow perched zone is estimated to be approximately $3x10^{-5}$ centimeters per second (cm/sec), based on a total porosity of 0.4054 from MW-04 and the calculated hydraulic gradient of 0.0197 foot per foot (ft/ft) between MW-04 and MW-02.

In the Loading Dock Area The shallow perched groundwater flow is complex and differs somewhat from the Sitewide shallow groundwater flow direction. Shallow groundwater flow in the Loading Dock Area is generally to the south toward MW-8 and MW-11. However, a component of the shallow groundwater flow in the Loading Dock Area occurs within the silty sandy layer at 6 to 8.3 ft bgs that is underlain by a low plasticity clay causing water accumulation just above that transition. This localized

perched groundwater flows generally to the east toward monitoring well MW-03. This perched water zone appears to respond rapidly to precipitation events.

Potentiometric data collected from Site monitoring wells since 2004 indicate bimodal flow of groundwater in the overburden/bedrock interval, based on monitoring wells screened at the overburden/bedrock interval (MW-05, MW-07, MW-08, MW-09, MW-10, MW-11, PZ-1, PZ-1D, PZ-2D, PZ-3D, PZ-4D, PZ-5D, and PZ-6D). It does not include the shallower perched water table. Groundwater in the overburden/bedrock interval on the northeastern portion of the Site flows to the east towards the large topographic depression. The remainder of the Site overburden/bedrock groundwater flows to the south-southeast toward a Warsaw Sinkhole Basin Lowland located approximately 250 feet south and southwest of the Site. The average groundwater flow velocity within the overburden/bedrock interval is calculated to be approximately $2.4x10^{-4}$ cm/sec, based on a total porosity of 0.3988 from MW-05 and the calculated hydraulic gradient of 0.05 ft/ft between PZ-3D and MW-07.

As previously indicated, the bedrock soil interface is highly irregular and is typical of epikarst. Depth to groundwater in bedrock well MW-06D is approximately 37 feet bgs, which is above the soil bedrock interface, indicating there may be some communication between the overburden and bedrock water bearing units. This type of soil bedrock groundwater interaction may be a product of previously indicated highly irregular epikarstic bedrock soil interface.

SITE OPERATIONAL HISTORY

Dezurik was a division of General Signal Corporation, which is a wholly owned subsidiary of SPX Corporation. Dezurik operated the Site from 1963 to 2001 and manufactured valves for various industrial sectors. Additions were made to the site building in 1973 and 1976. Former manufacturing processes included machining metal casings, metal fabricating, rubber processing and coating, painting, powder coating, assembly, and shipping. Dezurik's plant operations stopped in 2000. General Signal sold the Site on April 19, 2001 to T&K Enterprises, LLC. The site property is currently owned by Tennessee Bottling, which is owned by T&K Enterprises. The site is currently occupied by McMinnville Stamping Incorporated.

DOCUMENTS REVIEWED

- Consent Order, May 2001
- Site Investigation Report, Harding ESE, a MacTec Company, February 2001
- Background Information, Harding ESE, a MacTec Company, May 2001
- Remedial Action Report, Harding ESE, a MacTec Company, April 2002
- Site Evaluation Report and Focused Feasibility Study, MacTec, November 2003
- Remedial Action Work Plan, MacTec, February 2004
- Soil Excavation Report, MacTec, August 2004
- Free-Phase Product Investigation Letter Report, MacTec, January 2005
- 2004 Groundwater Monitoring Letter Report and Recommendations, MacTec, May 2005
- June 2005 Groundwater Monitoring Letter Report, MacTec, September 2005
- Soil Excavation Report, MacTec, September 2005
- Risk Assessment Report, MacTec, January 2007

- Land Use Restriction, December 2007
- Status of Remedial Activities, TDEC Letter, January 2008
- Year One Annual Groundwater Monitoring Report, AMEC, May 2008
- Year Two (April 2009) Annual Groundwater Monitoring Report, AMEC, May 2009
- Year Three (March 2010) Annual Groundwater Monitoring Report, AMEC, August 2010
- Year Four (2011) Annual Groundwater Monitoring Report, AMEC, August 2011
- Remedial Action Work Plan for the Former Solvent Storage Area, AMEC, April 2012
- Year Five (2012) Annual Groundwater Monitoring Report, AMEC, June 2012
- Loading Dock Investigation (2012) Former Solvent Storage Area, AMEC, June 2012
- Additional Investigation Former Solvent Storage area, AMEC, June 2012
- Remedial Action Progress report, AMEC, September 2012
- Monitoring Well Installation Report, AMEC, November 2012
- Remedial Action Work Plan for the Loading Dock Area, AMEC, July 2013
- 2013 Annual Groundwater Monitoring Report, AMEC, August 2013
- 2014 Annual Groundwater Monitoring Report, AMEC, June 2014
- 2015 Annual Groundwater Monitoring Report, AMEC, July 2015
- In-Situ Chemical Reduction (ISCR) Polishing Injection Work Plan for the Solvent Storage Area, AMEC, February 2015
- Request for No Further Action, Wood, September 2021

DISCUSSION OF PREVIOUS INVESTIGATIONS AND RESPONSE ACTIONS

A 2001 report, from Harding ESE detailing the background information and site history with regards to environmental investigations prior to 2000, was reviewed. In March 1988, ERM-Southeast, Inc. completed a Preliminary Soils Investigation Report. The purpose of that preliminary investigation was to obtain data to develop a preliminary assessment of the concentrations of potential contaminants in the surface soils in small areas believed to have been impacted by past plant operations. The preliminary soils investigation determined, through a shallow soils sampling and laboratory analytical program, that volatile organic compounds (VOCs) , including perchloroethylene (PCE), trichloroethylene (TCE) and their daughter products, including 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethylene (1,1-DCE), cis-1,2-dichloroethylene (cis-1,2-DCE), 1,1,1-trichloroethane (1,1,1-TCA) were detected in the soil in AOC 1 and petroleum compounds, including 2-butanone, ethylbenzene, and toluene, were found in AOC 1. The soil boring collected in AOC 2 contained 1,1-DCA, 1,1-DCE, and toluene. However their concentrations were below residential action levels.

Due to the limited surficial nature of the initial investigation, the areal extent and depth of the VOCs could not be ascertained. Therefore, in 1989 and 1990, additional borings were drilled at the site as part of a supplemental investigation to further define the vertical distribution of volatile organic compounds in the soil in the previously investigated areas. The investigation determined the total horizontal extent of residual VOCs in the near surface soil material was found to be confined to AOC 1 and AOC 2. AOC 1 had three defined areas: An approximately 100 foot by 30-foot section in the area immediately down slope and east-northeast of the former waste bin, a section of about 50 feet by 15 feet in the low, wooded area, and an approximately 30 foot by 15-foot section in the area immediately south and contiguous to

the concrete loading dock. Notable levels of 1,1,1TCA, toluene and ethylbenzene were found in shallow soil samples at the AOC 1. The vertical extent of residual VOCs was found to extend to a depth of approximately 42.5 feet to the top of the underlying consolidated bedrock. The vertical extent of the soil that exceeded action levels, detailed in the Federal Register 7-27-90- Corrective Action for Solid Waste Management Units, was not definitively determined but was noted around a maximum depth of 5.5 feet; the contamination was not expected to exceed 8 to 10 feet.

Based on visual evidence of soil staining, the contamination zone identified in AOC 2 was approximately 40 feet by 15 feet. In AOC 2, very limited concentrations of 1,2-DCA (0.182 mg/kg), 1,1-DCE (0.178 mg/kg), 1,1,1-TCA (0.192 mg/kg), TCE (0.014 mg/kg) and methyl ethyl ketone were detected in the two samples from that boring. None of the detected VOCs at AOC 2 were above soil action levels considered at that time and the detections are also below current direct exposure pathways for residential uses. A groundwater investigation was recommended for the site.

It was reported, in the 2001 document labeled Background Information provided by Harding ESE, that as a result of the first two investigations at the site, a remedial action, consisting of the excavation and disposal of eight truckloads of soil, was completed in 1991. A letter from the facility to TDEC in 1991 requested that three to eight truckloads of stained soil located near AOC 1 be granted a special waste approval for disposal at the Warren County landfill. Soil excavation would have likely been in AOC 1 since there was not any indication of VOC or total petroleum hydrocarbons (TPH) contamination in the soils at AOC 2.

In 2000, three temporary piezometers were installed, and soil samples collected in AOC 1. The analytical results of the soil samples collected indicated the presence of extractable petroleum hydrocarbons (EPH) and confirmed the presence of chlorinated compounds, including PCE, TCE, and their daughter compounds, in the Site soil. The groundwater samples collected indicated the presence of EPH and chlorinated compounds in the Site groundwater.

A February 2001 Site Investigation Report from Harding ESE indicated the piezometers were abandoned in 2001 due to poor well construction and inadequate record keeping. Three new monitoring wells were installed in the soil overburden during a subsequent 2001 Site investigation in AOC 1. Soil and groundwater samples collected during the investigation again confirmed EPH was present in the soil at AOC 1 and EPH and VOCs were present in the groundwater at the Site. The VOCs in the groundwater at the Site included PCE, TCE, chloroethane, 1,1-DCA, 1,1-DCE cis -1,2 DCE, 1,2-DCA, and 1,1,2-trichloroethane (1,1,2-TCA). The soil borings in AOC 1 exhibited VOC contamination but the boring in the AOC 2 did not have VOCs. However, the groundwater samples in both AOCs exhibited VOC contamination.

In February 2001, SPX was accepted into the Tennessee Department of Environment and Conservation Division of Superfund (TDEC-DSF), now called the Division of Remediation (TDOR), Voluntary Oversight and Assistance Program (VOAP). SPX and TDEC-DSF entered into a voluntary consent order in May of 2001.

From August 2001 to July 2003, field activities for a Site evaluation were conducted in AOC 1 and AOC 2 that included collecting soil samples and installation of additional monitoring wells. Groundwater samples collected during these field activities indicated chlorinated compounds above maximum contaminant levels (MCLs) in AOC 1 and AOC 2 and EPH above cleanup levels for the Tennessee Division of Underground Storage Tanks (TDUST) Guidance of 1,000 mg/kg, in AOC 1.

In August 2001, twelve soil borings were installed, and samples collected in the AOC 2 to identify a source of the groundwater VOC contamination. These 12 borings were installed in the area from 4 to 16 ft below ground surface (bgs) with spacing between borings of approximately 30 feet. Samples from the twelve borings were analyzed for EPH, PCE, and TCE. Four samples were also quantified for those parameters in a fixed laboratory. There was not any evidence of chlorinated volatile organic compound (CVOC) contamination in the unsaturated zone in AOC 2.

An additional groundwater investigation was also completed at AOC 2 in September 2001. The results of the groundwater analysis determined that the groundwater at AOC 2 was contaminated with chlorinated VOCs above MCLs including 1,1-DCE 1,1 DCA ,1,2-DCA and TCE.

In September 2001, a Site Evaluation Program was conducted to supplement information collected during the previous site investigations and 28 borings were installed from 4-8 ft bgs. Results indicated that concentrations of EPH up to 7,000 mg/kg were present in the central area of the borings to the north and east of AOC 1. Only limited concentrations of PCE and TCE were found in the soil borings.

An additional investigation was conducted in February 2002 that included the installation of 15 borings to depths of 10 ft bgs for collection of soil samples at selected locations inside the building in an attempt to identify a potential source for the chlorinated groundwater contamination present in AOC 2. Based on PID readings only two samples were sent for analyses and the results were less than 1 mg/kg for any VOC. In September 2002, two off-site boring locations were chosen on the downgradient railroad property where temporary wells were installed in order to collect groundwater samples. No detections were found in these two samples

An April 2002 Remedial Action Report again confirmed the presence of EPH and VOCs in the soil and groundwater in AOC 1. The soil results for AOC 1, compared to TDUST Guidance of 1,000 mg/kg, indicated the depths of contamination in this area ranged from 2 feet bgs to 7.5 feet bgs. EPH concentrations ranged from 87.5 mg/kg to 7015 mg/kg. None of the VOCs detected in soil were above the Environmental Protection Agency's (EPA) Region 9 preliminary remediation goals (PRG) referenced in the report.

In 2003, TDEC required four additional wells to be installed to further evaluate potential groundwater conditions. One well (MW-09) was installed upgradient of the existing wells at the north corner of the property. Well MW-10 was installed downgradient from AOC 1. Well MW-11 was installed to the east of AOC 2. Following the installation and development of these wells, they were sampled for VOCs and EPH. Previously installed well MW-03 was also sampled as part of this event. VOCs and EPH were not detected at MW-11. EPH was detected at both MW-03 and MW-10. At MW-03, 1,1-DCE and 1,2-DCA were above MCLs. TCE and vinyl chloride were also detected above MCLs at MW-03. At MW-10, 1,1-DCE and 1,2-DCA

were above MCLs. Vinyl chloride was also detected above its MCLs at MW-10. Other VOCs detected at both MW-03 and MW-10 included 1,1-DCA and chloroethane.

In October 2003, a draft Site Evaluation/Focused Feasibility Study (SER/FFS) Report was submitted to the TDEC-DSF. The results from the SE/FFS Report indicated soils in AOC 1 were impacted with EPH above the TDUST cleanup guidance of 1,000ppm. The groundwater investigation in AOC 1 indicated the presence of chlorinated compounds that exceeded the July 2002 EPA Primary Drinking Water Standards, MCLs. EPH was also detected in the groundwater of AOC 1. The groundwater investigation in AOC 2 again confirmed the presence of chlorinated compounds that exceeded the EPA MCLs. Monitored natural attenuation (MNA) with enhanced groundwater monitoring was selected as the preferred alternative for AOCs 1 and 2 from the 2003 SE/FFS. In addition, excavation and disposal was selected as an interim action for contaminated soil in AOC 1. Section 4 of the FFS indicated that after a 2-year monitoring program if the conditions were favorable and adequate reduction in contaminants had been achieved, the site would be proposed for closure.

In June/July 2004, 655 tons of contaminated soil was removed from AOC 1. Free product was discovered in AOC 1 during the interim action. A subsequent investigation attempted to define the lateral and vertical extent of the free phase product in AOC 1, and the report stated that the most likely source of the free phase product was an adjacent waste oil tank. In June, July and August 2005, the waste oil tank was pumped out, removed, and an additional 656 tons of EPH contaminated soil was excavated from under the loading dock in AOC 1. Following the 2005 excavation residual EPH contaminated soil was determined to be present. A follow up investigation was completed in 2012, and further excavation completed in 2014 to address residual impacts. Confirmation samples following the 2014 excavation showed that the EPH contaminated soil and free phase product were removed from the loading dock area, eliminating the likely EPH source for soil and groundwater contamination in AOC 1.

In September 2005, SPX decided to pursue a risk-based closure option. In January 2007, SPX submitted a Risk Assessment Report and placed a land use restriction on the property in December 2007. The land use restriction included restricting the site's groundwater use, maintaining the building foundation as a cap over the AOC 1 and AOC 2 contaminated areas, ensuring no invasive activity near the AOCs, and requiring notification of TDoR of a site usage change.

The 2007 risk assessment found the Excess Lifetime Cancer Risk (ELCR) from incidental ingestion of soil, dermal contact with soil, inhalation of dust, and inhalation of vapors from soil was $8x10^{-7}$. The total cancer risk associated with direct contact with groundwater contact was determined to be $1x10^{-7}$. The reasonable maximum exposure scenario was for construction and utility workers. The Hazard Index (HI) value for exposure to soil (ingestion, dermal contact, and inhalation of dust and vapors) and groundwater (dermal contact) was determined to be 1.0 which is equivalent to the USEPA risk threshold value. It should be noted the majority of non-cancer risk was contributed by the ambient vapor inhalation pathways and related to exposure to EPH. The hazard index associated with direct contact with contaminants other than extractable petroleum hydrocarbons was 0.02. The 2007 Risk Assessment also included an exposure pathway for groundwater for on-site industrial workers via vapor intrusion. The 2007 Risk Assessment determined that the ELCR from vapor intrusion was $2x10^{-7}$ and the hazard index

associated with vapor intrusion was 0.005. Both the ELCR and HI were below the lower bound of the CERCLA risk range.

DoR required that "at a minimum, groundwater will be sampled annually in the spring followed by a data report. A review of the site groundwater conditions will occur at intervals not to exceed five (5) years until groundwater contamination stabilizes or declines to levels meeting the exposure limits established in the 2007 Risk Assessment and migration off the property is controlled." In 2006 and 2008, DoR indicated that "monitoring to support closure based on natural attenuation would have to continue until MCLs were met or an alternative remedy would have to be implemented. Closure of the site can progress once groundwater meets the above criteria." A five-year groundwater monitoring only program was instituted in April 2008.

Additional investigations and Additional Actions

In the Year Four (2011) Annual Groundwater Report, the conclusions stated that the plume was not stable and although reductive dechlorination was occurring in AOC 1, it was "unlikely" in AOC 2 without additional remedial action. In the Year Five (2012) Annual Groundwater Report, the conclusions stated that reductive dechlorination was "unlikely to occur" without additional actions at both AOCs 1 and 2. The five -year monitoring program did not prove MNA was achieving its goals. Therefore, additional investigations and actions were conducted in both AOCs.

AOC 1 has 2 operable units (soil and groundwater) whereas AOC 2 only has a groundwater operable unit. As noted below, residual contamination remaining after the excavation in 2004 was the basis for both the additional investigation in the AOC 1 in 2012 and the subsequent excavation in 2014.

In September 2011, SPX submitted an application for underground injections to conduct a one-time pilot test to assess injections as a potential technology for future remediation. In November 2011, SPX submitted a Remedial Action Work Plan (RAWP) to TDEC that evaluated potential additional remedial actions in AOC 2. In order to develop that RAWP, a pre-design investigation was completed in AOC 2 in August 2011 to attempt to identify a residual source for the groundwater impacts observed in MW-02, MW-06D, and MW-07. That investigation involved installation of eight soil borings in the AOC 2 to bedrock and collection of samples from selected intervals based on PID readings for analyses of VOCs. The samples had no significant evidence of VOC contamination to a depth of at least 14 feet and detections in the soil samples from the saturated zone were at concentrations significantly below their respective direct exposure RSLs. However, the VOC concentrations in those samples were sufficient to contribute to groundwater impacts in AOC 2. In 2012, In-Situ Chemical Reduction (ISCR) was chosen to supplement MNA at the Site to address residual contaminants in the groundwater. ISCR was chosen as the preferred remedial technology based on an evaluation of effectiveness, implementation and costs, and regulatory acceptance. Between July and August 2012, ISCR injections were completed in AOC 2. In June 2015 and September 2016, additional ISCR polishing injections were completed in AOC 2.

To help delineate the groundwater contamination in AOCs 1 and 2 prior to injections, additional subsurface investigations were completed in March 2012 with additional investigation reports

completed for AOC 1 and AOC 2 in June 2012. A 2013 work plan for AOC 1 suggested implementing a combination of soil excavation and ISCR injections. The injections consisted of zero valent iron and an organic substrate. An excavation took place from October to November of 2014 with 990.52 tons of contaminated soil excavated. Concurrently, ISCR injections in AOC 1 were completed in January 2015.

In March 2019, soil vapor samples were collected in AOC 1 and AOC 2. The soil gas survey involved collection of soil gas samples at four locations in AOC 1 and four locations in AOC 2. The estimated indoor air concentrations of benzene at five locations exceeded the residential RSL. The attenuation factor corrected concentration for benzene at sampling location SV-2 was at the industrial RSL and is not considered to indicate the potential of any unacceptable risks due to vapor intrusion. Attenuation factor adjusted PCE concentrations at all locations were below residential RSLs for indoor air. Therefore, there does not appear to be a potential vapor intrusion issue that would necessitate engineering controls. The land use restriction should be revised prior to closure at the site being granted.

CURRENT SITE CONDITIONS

The site is currently being monitored for contaminant concentrations in groundwater above the EPA MCLs. Historically, the contaminants of concern are chlorinated VOCs including PCE, TCE, chloroethane, 1,1-DCA 1,1-DCE c-1,2-DCE 1,2-DCA TCE, and 1,1,2-TCA, and vinyl chloride. Remedial activities completed at AOC 1 and AOC 2 conducted from 2011 to 2016 achieved MCLs for all VOCs except 1,1 DCE and vinyl chloride. Groundwater monitoring has indicated concentrations of 1,1 DCE and vinyl chloride have been stable and declining for three years and are approaching MCLs. . The areas impacted are AOC 1, the loading dock area, and AOC 2, the solvent storage area. Soil impacts have been removed in AOC 1 but were estimated to be approximately one acre with a similar area in AOC 1 where groundwater was formerly impacted. Soil impacts have never been identified in AOC 2 but the area of former groundwater impacts in AOC 2 was estimated at approximately 5000 square feet. The current land use for the property is industrial/commercial and the media impacted is the groundwater. The impacted soil the property was excavated and properly disposed of during several remedial actions completed at the site.

SITE RISK THAT THIS RECORD OF DECISION ADDRESSES

Given the activities and cleanup performed to date, the remaining site risks include:

Incidental direct contact with contaminated soil or groundwater by visitors, facility employees, trespassers or maintenance workers was determined in the 2007 risk assessment to be unlikely since the contamination was in the subsurface. Therefore, the exposure pathways to soil or groundwater contaminants were determined to be incomplete for those receptors. The potentially complete pathways and receptors evaluated in the risk assessment included vapor intrusion for facility employees (commercial or industrial facility) and exposure to soil and groundwater contaminants for construction and utility workers. Exposure pathways for the construction and utility worker included dermal contact, inhalation of vapors or dusts and incidental ingestion of soils. Potential soil exposure pathways have been mitigated through source area removal excavations completed in 2004, 2005 and 2014 in AOC 1. Evaluation of potential vapor intrusion exposure risk was completed in 2007 and 2019 and determined

that concentrations of contaminants of concern are below EPA VISL screening and CERCLA risk thresholds.

The contaminants of concern (COCs) present in the groundwater currently at the site are PCE, 1,2-DCA, 1,1-DCE, vinyl chloride, and cis-1,2-DCE. TCE, 1,1 DCA, chloroethane, and trans-1,2 DCA are also present in the groundwater but are below MCLs.

REMEDIATION GOALS

The remedial goals for the site are to prevent groundwater concentrations at the site from exceeding the exposure limits established in the 2007 Risk Assessment and prevention of the contaminated groundwater exceeding EPA MCLs from migrating off the property. Any groundwater migrating off-site which exceeds the EPA MCLs must be addressed if the groundwater monitoring indicates increasing concentrations.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Applicable or relevant and appropriate requirements (ARARs) for site groundwater are the EPA MCLs for COCs at the site.

PROPOSED ALTERNATIVES

The 2004 SER/FFS evaluated the following alternatives:

Alternative 1: No action.
Taking no action regarding the contaminants at the site.

Alternative 2: Monitored Natural Attenuation with Enhanced Groundwater Monitoring.
Monitored natural attenuation (MNA) depends upon natural processes in the subsurface to degrade and disperse contaminants.

Alternative 3: Excavation and Disposal.
This alternative consists of excavating the contaminated soil and hauling the soil to an approved disposal facility. The excavation and disposal alternatives are specific to AOC 1

Alternative 4: Vacuum Extraction.
This technology is an aggressive extraction technology that could be used as a contingency to support or replace in-situ alternatives

Alternative 5: Capping.
This activity reduces or eliminates potential for infiltration to extend existing plume, increases the property values allowing for better use for the owner, and no waste is generated. The capping alternative is specific to AOC 1

Alternative 6: In-Situ Chemical Oxidation/Reduction.
In-situ treatment technology involves the direct mixing of reactive chemicals into the groundwater and soil in order to quickly eliminate contaminants within the subsurface.

Alternative 7: Enhanced Bioremediation.
This technology is a process in which indigenous or inoculated micro-organisms (e.g., fungi, bacteria, and other microbes) degrade (metabolize) organic contaminants found in soil and/or ground water, converting them to innocuous end products. Enhanced Bioremediation involves the introduction of amendments (and possibly microbes) into the subsurface to aerobically or anaerobically degrade contaminants

CRITERIA FOR EVALUATION OF ALTERNATIVES
TDOR rules contain nine criteria to be considered in evaluating remedial alternatives. These criteria are set forth in Chapter 0400-15-01-.09 of the Tennessee Rules, are similar to, but not identical with, those in Title 40 of the Code of Federal Regulations (Protection of the Environment) part 300.430(2)(e)(9)(iii). These criteria are:

- Overall protection of human health and the environment - determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
- Attainment of the remediation goals and compliance with applicable state and federal laws - evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.
- Short-term effectiveness - considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.
- Long-term effectiveness - considers the ability of an alternative to maintain protection of human health and the environment over time.
- Permanent reduction of toxicity, mobility and volume through treatment - evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
- Implementability - considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
- Cost Effectiveness - includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
- Community Acceptance - considers whether the local community agrees with analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance; and,
- The degree to which recycling, residue and waste minimization are employed - these should be evaluated in concert with the alternative selection.

These nine criteria are the standards by which all alternatives are evaluated and form the basis for remedy selection. Overall protection of human health and the environment, and compliance with applicable state and federal laws and regulations are considered threshold criteria. The substantive requirement of these two criteria must be satisfied in order for an alternative to be eligible for selection. The next five criteria are referred to as primary balancing criteria. They provide a mechanism to evaluate all options against the criteria and select one that provides the best overall balance. DoR must also consider the last two criteria, which afford the community input into the selection process.

EVALUATION OF THE PROPOSED ALTERNATIVES

The November 2003 SER/FFS proposed the following six preferred alternatives: (1) excavation and disposal, (2) capping, (3) vacuum extraction, (4) chemical oxidation/reduction, (5) monitored natural attenuation, and (6) enhanced bioremediation. The first two alternatives strictly address soil contamination in AOC 1 while the last four preferred alternatives were evaluated for groundwater in both AOC 1 and 2.

Factors that were considered during the evaluation of the preferred six remedial alternatives in the SER/FFS included 1) a gross evaluation of effectiveness, 2) implementation and costs, and 3) community/regulatory acceptance.

The remedial alternatives are evaluated in Tables 1 and 2 (Appendix A) with respect to the nine criteria by which all alternatives are evaluated and form the basis for remedy selection. These include: Overall protection of human health and the environment; Compliance with applicable or relevant and appropriate requirements (ARARs); Long-term effectiveness and permanence; Reduction of toxicity, mobility, or volume through treatment; Short-term effectiveness; Implementability; State acceptance; Cost; and Community acceptance. A comparative analysis of the remedial alternatives for soil and groundwater can be found in Tables 1 and 2 in Appendix A. Compliance with applicable or relevant and appropriate requirements (ARARs). State acceptance, and community acceptance were not included in the Tables 1 and 2.

PUBLIC PARTICIPATION

The consent order called for public participation activities to consist of a minimum of two activities: public notice when the site enters the program and public notice prior to the Department's finalization of the ROD. Each public notice was to be placed in a newspaper by the Respondent after Department approval of the wording of the public notice, the newspaper(s) selected for the publishing of the notice, and the proposed schedule for publication.

The consent order required the Respondent to submit proposed wording for the initial public notice, the newspaper name(s), and the publication date(s) for the initial notice within thirty (30) days of all parties signing the consent order. The initial public notice goal was to provide the public the opportunity to be placed on a mailing list concerning the Site. The initial public notice declaring the site was entered into the program was not completed within the required 30 days and has not been completed as of the completion of this ROD. The Division determined that completing the 30 days' notice for the initial public

notice at this point would not be necessary.

For the second public notice, the Consent Order required the Respondent submit to the Department the proposed wording, the newspaper name(s) and the publication date(s) for the second public notice within thirty (30) days of submittal of the Focused Feasibility Study to the Department. The second public notice was to provide the public with the opportunity to request a public meeting and/or provide comments on the Remedial Alternatives. The comment period for the Remedial Alternatives was to continue for at least thirty (30) days after the date of the public notice or public meeting, whichever was later. All comments were to be received by the Department initially, not the Respondent, the Department would then forward copies to the Respondent. The Respondent was to be required to forward three copies of the actual notice, as received from the newspaper(s) to the Department. Any additional public notice or community relations activities to be performed by the Respondent was to be established through mutual agreement between the Respondent and the Department.

The second public notice was not completed subsequent to the submittal of the Focused Feasibility Study however, is being completed prior to finalization of the Record of Decision (ROD). The Division determined that completing the 30 days' notice for the Focused Feasibility Study at this point would not be necessary.

The Division has determined that the DoR project Manager or designee ensures the Public Notice is published in the local newspaper(s). The Notice is published at least two weeks prior to the beginning of the official public comment period and in situations where formal comments are not solicited, the Division can accept any written comments received. The decision to respond to comments shall be made by Senior Leadership. If a Formal Response to Comments is done, the office of general council (OGC) must conduct a final review before the Formal Response to Comments document is issued. If formal comments are received the PRP must be provided an opportunity to have input to the response

The Division is allowed perform any additional public notice, public meeting, or community relations it deemed appropriate for the Site. However, except in an emergency, the Division was to provide the Respondent with at least ten (10) days advance notice of any additional community relations activities.

The DoR Project Manager will email division.remediation@tn.gov at least two weeks before the Public Notice is issued to ensure the site file documents meet the requirements of the Tennessee Public Records Act (T.C.A. § 10-7-504) for release to the public (i.e. redaction). The following information should be included in the email:

- A public notice is being issued for DOR site 89-509.
- Please begin preparing the site file in advance of any public information requests.

In addition, the DoR project manager will put the ROD on the Department website for a minimum of 30 days.

SELECTED ALTERNATIVE(S) AND RATIONALE FOR SELECTION

Interim Actions and Initial Selected Remedy

Interim remedial actions were selected from the 2003 SE/FFS. In AOCs 1 and 2, the preferred alternative was MNA with enhanced groundwater monitoring. In addition, excavation and disposal was selected as an interim action for contaminated soil in AOC 1. The SE/FFS was amended, in a February 2004 Remedial Action Work Plan, to include soil excavation of AOC 1 to remove the petroleum impacted soils having EPH equal to or greater than 1000mg/kg, installation of four (4) monitoring wells in support of MNA, and semiannual groundwater sampling.

Excavation was selected for AOC 1 because it could be implemented as an interim measure based on immediate effectiveness in removing the petroleum source of contamination in groundwater; is most effective remedial action for contaminated soil; and it was anticipated that additional actions may not be needed.

MNA was selected initially as the most practical technology in the SE/FFS because it would reduce higher levels of contamination over time, does not generate additional waste streams, and can result in the complete degradation of contaminants. This alternative was considered to be the most practical and cost effective way to address the chlorinated contamination in the groundwater at the site for the following reasons: 1) no source materials were present; 2) the contamination does not pose any risk to human health and the environment since there are no identifiable receptors on site or downgradient; 3) the contamination has not migrated off site and is unlikely to migrate off-site in the conceivable future; 4) the least destructive to the surrounding environment; and 5) costs for implementation and long-term monitoring would be considered the lowest of the alternatives identified.

Implementation of this initial remedy required development of a supplemental monitoring program; including installation of additional wells to fulfill the monitoring requirements under the MNA program. Regulatory/community acceptance was considered moderate because the overall cost-benefit analysis renders this alternative more favorable than other more intrusive and costly options. MNA was believed to be the most practical and effective remedy at the site and, when coupled with enhanced groundwater monitoring program, would adequately protect public health and the environment.

A review of a January 2008 letter from the Division of Remediation, titled *Status of Remedial Activities,* provided some benchmarks for site closure. The letter indicated that "[a]t a minimum, groundwater will be sampled annually in the spring followed by a data report. A review of the site groundwater conditions will occur at intervals not to exceed five (5) years until groundwater contamination stabilizes or declines to levels meeting the exposure limits established in the 2007 Risk Assessment and migration off the property is controlled. Closure of the site can progress once the groundwater contamination meets the above criteria." In addition, a land use restriction was to be placed on the property and was completed in January 2008

Results observed after implementation of the initial selected remedy did not indicate that the benchmarks set in the 2008 letter would be met. An additional remedy was determined to be necessary.

Final Selected Remedy

Investigations conducted in 2011 did not find any source of contamination relating to the groundwater contamination in AOC 2 and the investigation in 2012 in the Loading Dock did not find any significant exceedances of RSLs for direct contact. In the Year Five (2012) Annual Groundwater Report, the conclusions stated that reductive dechlorination was "unlikely to occur" at both AOCs 1 and 2 without active remedial measures. Remedial alternatives were reviewed in 2011 and 2012 work plans for AOCs 1 and 2, and the selected alternative was injection of a zero-valent iron suspension to create reducing conditions. In-Situ Chemical Oxidation/Reduction (ISCR) was chosen as the preferred supplemental remedial technology based on an evaluation of effectiveness, implementation and costs, and regulatory acceptance. ISCR was implementable on Site and was determined that it could meet remedial action objectives (RAOs), described in the report, in the most effective manner.

In 2013, a remedial action work plan was written for the AOC 1. The preferred remedial alternative chosen was a combination of excavation of contaminated soil and ISCR injections. Excavation would remove the areas of highest EPH concentration, eliminate mobile free product and reduce the overall mass of petroleum hydrocarbons by ~80% and ~88%. This would reduce the risk of the COCs leaching into the shallower groundwater. The excavation does not directly address chlorinated VOCS in the soil below 10 feet. Therefore, the ISCR alternative would address this residual mass in the deeper interval and would be expected to mineralize more that 70% of that contamination. Chlorinated VOCs that remain in the upper intervals would be treated over time as the COCs migrate vertically downward and laterally through the treatment zones.

ISCR was selected as the preferred alternative for AOC 2 due to its longevity in the subsurface and its capacity to address the primary contaminants of concern. ISCR has been demonstrated to develop and maintain dechlorinating geochemistry for up to five (5) years. Additionally, ISCR would establish a reductive zone that would extend beyond the site boundary to meet MCLs in the off-site groundwater. A single application of ISCR should attain the remedial goals for the area for an extended period of time. As such, the preferred alternative, ISCR, provided the most protective and practical alternative to remediation of this area. ISCR injections in AOC 1 were completed in January 2015 and in AOC 2 between July and August 2012. Polishing injections were completed in 2015 and 2016 in AOC 2 to supplement the previous ISCR injections.

FINANCIAL ASSURANCE

None required

DECLARATION

Consistent with Part 2 of the Hazardous Waste Management Act as amended, it has been determined that the selected remedy will be cost effective and provide adequate protection of public health and the environment.

James S. Sanders Date
Director
Division of Remediation
Tennessee Department of Environment & Conservation

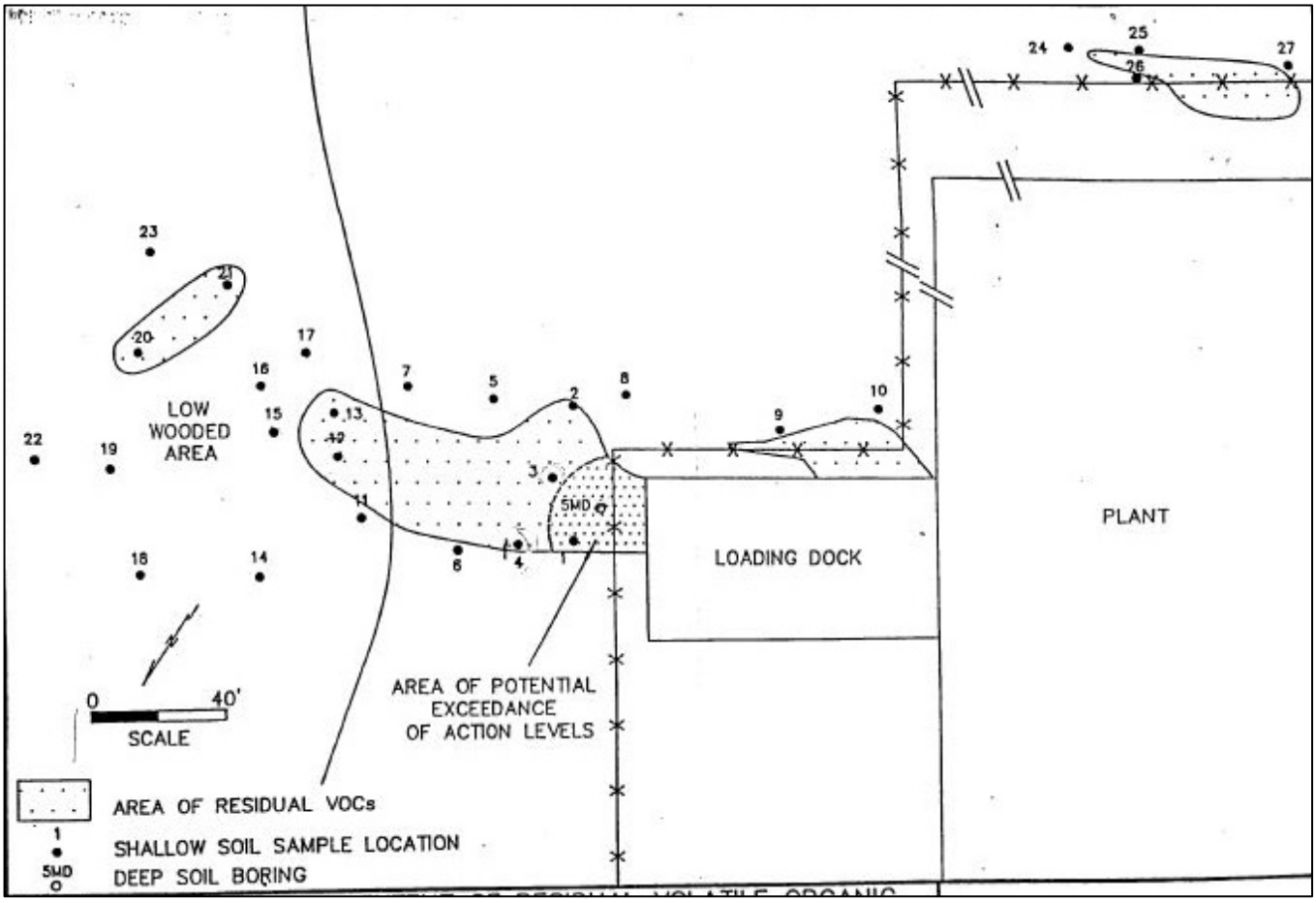

Figure 1. Loading dock and Solvent Storage Area *figure is from February 2001 Site Investigation Report