

**SURFACE SOIL SCREENING ASSESSMENT REPORT**

**AT**

**TARRANT ELEMENTARY, INTERMEDIATE, AND HIGH SCHOOLS  
TARRANT, ALABAMA**


**PREPARED FOR:**

**TARRANT CITY SCHOOLS  
1318 ALABAMA STREET  
TARRANT, ALABAMA 35217**

**PPM PROJECT NO. 40097001**

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## **1.0 INTRODUCTION**

PPM Consultants, Inc. (PPM) was retained by Tarrant City Schools to conduct a Surface Soil Screening Assessment at the Tarrant Elementary, Intermediate, and High Schools located in Tarrant, Alabama. The purpose of the assessment was to determine if certain heavy metals and polynuclear aromatic hydrocarbons (PAHs) were present in surface soils in selected areas at each school property at levels that warrant environmental concern. Although previous sampling activities at the schools did not indicate the presence of elevated concentrations, Tarrant City Schools voluntarily implemented this investigation to further evaluate conditions on the school properties. This report provides background information on the school properties, summarizes previous environmental studies conducted in the area, describes PPM's field activities, and presents analytical results, findings, and conclusions from the assessment.

## **2.0 BACKGROUND**

### **2.1 SITE LOCATION AND DESCRIPTION**

Tarrant Elementary School is located at 1269 Portland Street. The site is located in a large residential area developed in the 1920s. The school was constructed in 1976, and consists of one building located on approximately 5 acres. The site was vacant prior to construction of the school. Approximately 317 children attend the school in grades Pre-Kindergarten to Second Grade.

Tarrant Intermediate School is located at 1 Wildcat Drive, approximately 1,000 feet from the elementary school. The site is also located in a large residential area, and was developed between the 1920s-1940s. The school was constructed in 1995, and consists of three buildings located on approximately 5 acres. A youth baseball field was previously located on the site prior to construction of the current school. According to school employees, when the original school and lunchroom were torn down in 1995, demolition debris was piled on a section of the grounds and regularly "watered down" to minimize dust. Currently, 403 children attend the school in grades 3 through 6.

Tarrant High School is located at 91 Black Creek Road. The site is located in a mostly wooded area with sparse residential development area, and was constructed in 2008 on the site of the former Glenn Ireland Development Center, a mental health facility. The school complex consists of six buildings with the main building comprising 112,484 square feet.



The Tarrant High School complex is located on 98 acres. Approximately 459 children attend the school in grades 7 through 12. The High School is located 2.3 miles from the Intermediate School, outside the likely area of impact from the potential contaminant source areas identified by the Environmental Protection Agency (EPA) and discussed in **Section 2.2.2.**

## **2.2 PREVIOUS INVESTIGATIONS IN THE STUDY AREA**

### **2.2.1 April 2013 Surface Soil Sampling Event**

In April 2013, Goodwin Mills & Cawood collected and analyzed three surface soil samples at or near each of the schools to serve as background samples in support of another project in the area. One sample was collected from each of the three Tarrant schools and analyzed for arsenic and PAHs. The laboratory results were provided to Tarrant Schools as a courtesy. Arsenic concentrations ranged from 2.5 to 3.3 milligrams per kilogram (mg/kg). PAH was not detected in any of the samples. Goodwin Mills & Cawood reported that the arsenic concentrations were below the cleanup goal established by the EPA at the nearby 35<sup>th</sup> Avenue Superfund site. Based on these concentrations, no further investigation was conducted.

### **2.2.2 35<sup>th</sup> Avenue Superfund Site and South Tarrant Neighborhood Site Investigations**

The 35th Avenue Superfund site is located approximately 1 mile southwest of the study area, and has been the subject of extensive environmental investigation and soil removal efforts by the EPA. Proposed to the National Priorities List (NPL) in 2014, the site is located in a mixed industrial and residential area similar to that where the Elementary and Intermediate schools are located. Arsenic and lead (heavy metals), and benzo(a)pyrene (B(a)P), a PAH, were detected in shallow soils in the designated Superfund area. The EPA has indicated multiple possible sources of the impact, including nearby industrial facilities, flooding along Five Mile Creek, and the nearby Birmingham Shuttlesworth Airport. The results of these investigations and subsequent soil removal actions have been well documented by the EPA.

In 2014, a non-profit group and two area citizens petitioned the EPA to conduct a Preliminary Assessment (PA) in a residential area beyond the designated Superfund site boundary. Labeled as the “Pinson Valley Neighborhood,” it was defined as an area generally east and southeast of State Highway 79, north and northwest of the Birmingham-Shuttlesworth Airport, and west of 57th Street North. Tarrant Elementary and



Intermediate Schools are both located in this area. The EPA relied on existing information on potential releases within this area, as well as information gathered as part of the nearby 35th Avenue Superfund site in conducting the PA. EPA completed the PA in June 2015, and the results indicated that further investigation was warranted.

The EPA then conducted a Site Investigation (SI) in this area, and submitted their final report in July 2016. The report documented the results of additional surface soil sampling activities conducted in the area, now referred to as the "South Tarrant Neighborhood" rather than the "Pinson Valley Neighborhood." The purpose of the investigation was to determine if metals and B(a)P concentrations in areas sampled during the initial PA were elevated, that is if they met the Hazard Ranking System (HRS) definition of an *Observed Release*, and to determine if the impact was statistically significant. The EPA evaluated groundwater migration, surface water migration, soil exposure, and air migration pathways, and the targets associated with each pathway. They then performed an HRS evaluation and developed pathway-specific conclusions. The Soil Exposure Pathway was considered to be of primary concern due to the residential nature of the South Tarrant Neighborhood.

Surface soil samples were collected in February 2016 from 23 different properties in the study area. Five background samples were collected in March 2016 from a neighborhood 2.2 to 2.9 miles away from the site outside the potential source areas. The 2016 samples were used in addition to the samples collected during the 2011 "Robinwood Background Study" conducted by the EPA to establish background concentrations in the area.

Surface soil samples were collected from 0 to 6 inches below ground surface (BGS) during the SI. All samples were analyzed for low-level PAHs and the eight Resource Conservation and Recovery Act (RCRA) metals. Non-background sample results were compared both to the highest value of each constituent determined from the March 2016 background data set, and separately to the 2011 Robinwood Background Study values for B(a)P Toxic Equivalency Quotient (TEQ), lead, and arsenic. In the Robinwood study, the individual PAHs were converted to a TEQ for B(a)P to facilitate comparison to benchmarks. Concentrations were considered to be elevated when the detected concentration exceeded three times the highest background concentration. In the event the constituent was not detected in the background, any concentration exceeding the undetected value was considered elevated.

To determine if the detected constituents of concern (COCs), including arsenic, lead, and B(a)P were statistically significant to allow for inferring contamination among the entire South Tarrant Neighborhood study area, and to develop defensible conclusions regarding

the level and extent of contamination, a statistical sampling method was used to sample the study area. This sampling was designed to determine whether the median (mean) contaminant concentrations found in residential soils meet the HRS definition of an *Observed Release* of a hazardous substance. To meet this threshold, median (mean) contaminant levels would need to exceed 3-times the highest level of each analyte detected in the previously mentioned Robinwood background data, with a confidence level of 95 percent. For purposes of designing the sampling, the highest levels of the COCs arsenic, B(a)P and lead from the Robinwood Neighborhood background study were selected as the background level of comparison. The March 2016 site-specific background sample set was also collected from residential yards outside the area of influence to provide additional levels of comparison specifically for the South Tarrant Neighborhood SI.

The results indicated with 95 percent confidence that there is not widespread contamination in the South Tarrant Neighborhood that meets the HRS definition of an *Observed Release* of a hazardous substance. Samples collected from the South Tarrant Neighborhood are similar to background data sets for arsenic, lead, and the benzo(a)pyrene TEQ. The data was also compared to Superfund Removal Management Levels (RMLs) in order to identify any immediate health risks. RMLs are conservative, long-term risk-based screening values developed by the EPA to determine whether sample concentrations are sufficiently elevated that they may warrant an immediate removal action. None of the COCs in the South Tarrant Neighborhood residential soil samples (arsenic, lead, benzo(a)pyrene) exceeded its residential soil RML, and therefore, the means are less than the RML as well. Although when comparing the surface soil samples to the 2011 Robinwood background set, it was concluded that eight samples exceeded three times the background level for arsenic, none of these levels indicate an immediate health risk. The study concluded that the potential for any adverse health effects are within EPA's acceptable risk range.

The South Tarrant Neighborhood soil data was then evaluated using the HRS. The HRS evaluation was conducted twice, once utilizing background data from the Robinwood Neighborhood and again utilizing the background data that was obtained during the South Tarrant Neighborhood SI. Both analyses concluded that the South Tarrant Neighborhood would not score sufficiently high enough based on the HRS to qualify for the National Priorities List.

Based on these results, the SI concluded that the South Tarrant Neighborhood does not appear to have been negatively impacted by the contaminants of concern. No further Remedial Action under Superfund was recommended. The school locations in relation to the EPA areas of investigation are depicted on **Figure 1, Area Map of Tarrant Schools,**



35th Avenue Superfund Site, and South Tarrant Neighborhood Site Investigation Area, in Appendix A, Figures.

### 3.0 SCOPE OF WORK

The objective of the Surface Soil Screening Assessment was to determine if the eight RCRA metals and PAHs were present in surface soils in selected areas at each school property. Since a significant amount of research and investigation has been undertaken by the EPA to study shallow soils in the area during the 35th Avenue Superfund site, PA, and subsequent SI, PPM used similar sampling methods in conducting the Tarrant School investigation. PPM compared the findings from these studies to concentrations detected during this assessment, as well as conducting additional risk assessment calculations to determine if the detected concentrations warrant environmental concern.

Surface soil samples were collected for laboratory analysis from the grass areas at each school as specified on site sketches provided by Tarrant Schools. The work was conducted in general conformance with the technical standards described in the August 21, 2014, *Operating Procedure - Soil Sampling (SESDPROC-300-R3)*, prepared by the EPA Science and Ecosystem Support Division. This document is referenced as the technical standard in the October 12, 2012, *USEPA Quality Assurance Project Plan - Non-Industrial Use Property Sampling Event* that was prepared for the 35<sup>th</sup> Avenue Removal Site sampling effort at the North Birmingham Superfund Site.

The following scope of work was conducted:

- Development of a site-specific Health and Safety Plan (HASP) prior to mobilization.
- Collection of composite surface soil samples from the grass areas at each of the three schools and submittal to an independent laboratory for analysis.
- Laboratory analysis for the eight RCRA metals per EPA Methods 6010/7471, and PAHs per EPA Method 8270.
- Preparation of a summary report that describes the sampling methods and analytical results.





Analytical results were compared to the most current EPA Region 4 Regional Screening Levels (RSLs) and RMLs, which is the same methodology established by the EPA for the 35<sup>th</sup> Avenue Superfund Site and subsequent Site Investigation conducted in the South Tarrant Neighborhood in 2016. To further evaluate detected concentrations, PPM also conducted a Risk Assessment per the procedures described in the Alabama Department of Environmental Management (ADEM) Alabama Risk-Based Corrective Action (ARBCA) guidance, dated February 2017. This additional analysis was considered a change in scope, but was requested by Tarrant Schools to further evaluate the risks associated with detected concentrations above the RSLs.

## **4.0 FIELD INVESTIGATION AND RISK ASSESSMENT METHODOLOGY**

### **4.1 SURFACE SOIL SAMPLING**

Tarrant Schools provided PPM with maps indicating the areas at each facility that were not covered by pavement or structures. PPM then subdivided and labeled these grass and soil areas into logical areas based on usage, location, and total square footage in that area. Soil samples were then collected from that designated area using hand tools at 0 to 4 inches BGS at an approximate frequency of five per ¼ acre. The five samples from each approximate ¼ acre were composited into one sample (a “five-point composite”), and submitted to an independent laboratory for analysis. Samples were not collected from areas beneath pavement or structures. This methodology was used by the EPA during the 35<sup>th</sup> Avenue Removal Site Sampling effort at the North Birmingham Superfund Site.

Grab samples were composited by thoroughly mixing in a stainless steel bowl. Each sample was then containerized in a clean prepared glass jar for laboratory analysis. Each glass container was tightly sealed with a Teflon lid. Clean disposable nitrile gloves were worn during sample collection and were changed between each sample acquisition interval. The samples were preserved in an iced cooler or a refrigerator until delivery to the laboratory.

Soil sampling equipment was thoroughly decontaminated between each sample acquisition. Decontamination consisted of washing the equipment in an Alconox® and distilled water solution and rinsing with distilled water. Each piece of equipment was allowed to air dry between sample acquisitions.

Soil cuttings were returned to the area from which they originated. Decontamination water was placed on the ground in the vicinity of the boring in which the equipment was used.

Each ¼-acre sampling area was designated with a label that reflected the specific school and sequence in which samples were collected (e.g., ES-1 for sampling conducted in Area 1 at the Elementary School, IS-2 for Area 2 at the Intermediate School, etc.). The composited samples were submitted to an independent laboratory for analysis. The soil sampling locations for each school are shown in **Figure 2, Surface Soil Sampling Locations - Tarrant Elementary School**; **Figure 3, Surface Soil Sampling Locations - Tarrant Intermediate School**, and **Figure 4, Surface Soil Sampling Locations - Tarrant High School** in Appendix A.

#### 4.2 LABORATORY ANALYSIS AND SAMPLE HANDLING

Each sample retained for possible laboratory analysis was immediately placed on ice and preserved at 4° Celsius (C). These samples were labeled to document the appropriate project name, soil boring number, sample number, date and time sampled, and analyses requested. Samples were packed in individual plastic protective envelopes (bubble pack) to avoid breakage during shipment. The samples were subsequently sealed in insulated coolers and delivered to Sutherland Environmental Company, Inc., in Birmingham, Alabama, for laboratory analysis. Each soil sample was analyzed for the eight RCRA metals per EPA Methods 6010/7471, and PAHs per EPA Method 8270.

The coolers were submitted to the laboratory with chain of custody forms. Chain of custody forms include the same information included on sample labels as well as container size, the collector's signature, and signatures of persons whom maintained custody of the samples.

#### 4.3 RISK ASSESSMENT

PPM conducted a Risk Assessment per the procedures described in the ADEM ARBCA program. The purpose of the Risk Assessment was to evaluate if the cumulative Hazard Index (HI) and Individual Excess Lifetime Cancer Risk (IELCR) for surface soil at the Tarrant Elementary and Intermediate Schools will meet applicable levels determined by the ADEM. The Risk Assessment included the following work tasks:

1. Compilation and evaluation of all available soil analytical data.
2. Comparison of soil data to current EPA RSLs.
3. Elimination of constituents below RSLs to establish COCs for further evaluation.

4. Development of a Site Conceptual Exposure Model (SCEM) to determine complete pathways based on historical data.
5. Determination of whether the cumulative risk at the site exceeds appropriate risk levels (i.e. Hazard Index = 1.0 and Individual Lifetime Cancer Risk = 1E-05) based on chemical-specific data. PPM utilized software prepared by Risk Assessment & Management Group, Inc. (RAM Group), Version 4.0, dated July 2017 to complete the calculations.

The Risk Assessment was not conducted on soils collected from the High School since no metal or PAHs were detected above RSLs.

## 5.0 FINDINGS OF FIELD INVESTIGATION

### 5.1 SOIL DESCRIPTION

In general, surface soils appeared to consist of clayey or silty-clay soil with chert fragments, derived from dolomite known to underlie the Tarrant area. Fill material may have been present in some of the areas, as well as imported topsoil. Further descriptions of site soils or underlying lithology was beyond the scope of this assessment.

### 5.2 CONSTITUENT CONCENTRATIONS IN SOIL

Metal and PAH concentrations detected in the soil samples are summarized in **Table 1, Surface Soil Data Summary, Appendix B, Tables**. The detected COCs were initially compared to the most current (November 2018) RSLs established by the EPA for residential sites and the November 2018 EPA Superfund RMLs. In the case of arsenic, detected values were compared to the background concentration determined from the Robinwood Neighborhood Study (18.6 mg/kg). COCs with concentrations exceeding the RSLs, or the background concentration in the case of arsenic, were further evaluated and compared to calculated risk levels established by the ARBCA risk assessment. Findings are summarized below.

#### 5.2.1 Elementary School

Seven composite samples were collected and analyzed from grass and soil areas at the Elementary School. All detected metal concentrations were below the EPA RSLs except arsenic, which was below background, and all were below the EPA RMLs. PAH

concentrations were also below the RSLs and RMLs in samples ES-01, ES-02, and ES-03. The following PAHs exceeded the RSLs:

- benzo(a)anthracene: Samples ES-05 and ES-06
- benzo(b)fluoranthene: Samples ES-05 and ES-06
- benzo(a)pyrene: Samples ES-04, ES-05, ES-06, and ES-07
- dibenzo(a,h)anthracene: Samples ES-05 and ES-06
- indeno(1,2,3-cd)pyrene: Sample ES-05

All of the concentrations for these detected constituents were well below the RML. Metal and PAH concentrations detected in the soil samples are summarized in **Table 1, Surface Soil Data Summary (Appendix B)**.

The concentrations over the RSLs were further evaluated per the ADEM ARBCA program using Risk Management Level 1 (RM-1). This level utilizes default assumptions for exposure factors and the fate and transport of the COCs. The on-site cumulative Hazard Index for each exposure domain was calculated. The maximum Hazard Index was from the Residential Child exposure domain and was calculated to be 0.206, which is below the acceptable Hazard Index of 1.0. The maximum cumulative IELCR was from the Residential Child exposure domain and was calculated to be 7.43E-06, which is below the acceptable IELCR of 1.0E-05. Therefore, representative COC concentrations in surface soil are protective of all exposure domains. Representative COC concentrations were also compared to the groundwater use soil source values that are established to be protective of groundwater through leaching. All of the COC representative concentrations were well below the calculated values. Therefore, leaching of COCs to groundwater should not adversely impact groundwater at the site. The RM-1 data are presented in **Table 2, RM-1 Calculated Cumulative Risk within Each Exposure Domain – Tarrant Elementary School** and **Table 3, Comparison to Groundwater Use Soil Values – Tarrant Elementary School**. The complete Risk Assessment is included in **Appendix C, Alabama Risk-Based Corrective Action Report - Tarrant Elementary School**.

### 5.2.2 Intermediate School

Thirteen composite samples were collected from grass and soil areas at the Intermediate School. All detected metal concentrations were below the EPA RSLs except arsenic, which was below background, and all were below the EPA RMLs. PAH concentrations were also below the RSLs except for the following:

- benzo(a)anthracene: Sample IS-09 and IS-11

- benzo(b)fluoranthene: Samples ES-09 and ES-11
- benzo(a)pyrene: Sample IS-03; IS-04, IS-05, IS-07, IS-09, IS-10, IS-11, IS-12, IS-13.
- dibenzo(a,h)anthracene: Sample IS-09 and IS-11
- indeno(1,2,3-cd)pyrene: exceeded the RSL in sample IS-09.

Metal and PAH concentrations detected in the soil samples are summarized in **Table 1, Surface Soil Data Summary (Appendix B)**.

The concentrations over the RSLs were further evaluated per the ADEM ARBCA program using RM-1. The on-site cumulative Hazard Index for each exposure domain was calculated. The maximum Hazard Index was from the Residential Child exposure domain and was calculated to be 0.432, which is below the acceptable Hazard Index of 1.0. The maximum cumulative IELCR was from the Residential Child exposure domain and was calculated to be 1.68E-05, which is above the acceptable IELCR of 1.0E-05. The IELCRs for the remaining exposure domains were below the acceptable level.

Representative COC concentrations were also compared to the groundwater use soil source values that are established to be protective of groundwater through leaching. All of the COC representative concentrations were well below the calculated values. Therefore, leaching of COCs to groundwater should not adversely impact groundwater at the site.

Based on the RM-1 IELCR for the Residential Child exceeding the acceptable level, PPM continued the ARBCA process and proceeded to the Risk Management Level 2 (RM-2) stage of evaluation, in which site-specific assumptions for exposure factors and fate and transport parameters are utilized. During the RM-2 evaluation, the on-site cumulative Hazard Index for the Residential Child exposure domain was calculated. The Hazard Index from the Residential Child exposure domain was calculated to be 0.126, which is below the acceptable Hazard Index of 1.0. The cumulative IELCR from the Residential Child exposure domain was calculated to be 4.90E-06, which is below the acceptable IELCR of 1.0E-05. Therefore, representative COC concentrations in surface soil are protective of all exposure domains.

The RM-1 and RM-2 data are presented in **Table 4, RM-1 and RM-2 Calculated Cumulative Risk within Each Exposure Domain – Tarrant Intermediate School**, and **Table 5, Comparison to Groundwater Use Soil Values – Tarrant Intermediate School**.

The complete Risk Assessment is included in **Appendix D, Alabama Risk-Based Corrective Action Report – Tarrant Intermediate School**.

### 5.2.3 High School

Sixteen composite samples were collected from grass and soil areas at the High School. All detected metal and PAH concentrations were below the EPA RSLs except arsenic, which was below background, and all were below the EPA RMLs.

Laboratory reports are included in **Appendix E, Soil Analytical Reports**.

## 6.0 CONCLUSIONS

PPM utilized a conservative approach to determine if detected metal and PAH concentrations were present at the Elementary, Intermediate, and High Schools at levels which warrant environmental concern or further action. Sampling methods were consistent with those used by the EPA at the nearby 35<sup>th</sup> Avenue Superfund Site studies and removal actions, and the subsequent PA and SI, which were conducted in the same neighborhood where the Elementary and Intermediate Schools are located. The methodology used in these studies was based on published standards for conducting such work, and PPM utilized the same methods during this assessment.

Detected metal and PAH concentrations were initially compared to both the EPA RMLs and the Region 4 RSLs. At Tarrant High School, all detected metal and PAH concentrations were below the EPA RSLs except arsenic, which was below background, and all were below the EPA RMLs. At the Elementary and Intermediate schools, metal and PAH concentrations were below the RMLs for all constituents.

Although all samples were below the RMLs established by the EPA, Tarrant Schools requested that PPM further evaluate concentrations that exceeded the RSLs at the Elementary and Intermediate schools out of an abundance of caution. PPM then conducted a Risk Assessment at these two schools per the ADEM ARBCA program to determine if the cumulative HI and IELCR for surface soils at the schools will meet applicable levels determined by ADEM.

The Risk Assessment revealed that COC concentrations in surface soils at the Elementary and Intermediate Schools site are protective of Residential Children and Adults, Commercial Workers, and Construction Workers. Additionally, representative COC concentrations in surface soils will not adversely impact groundwater at the site. Therefore, no additional assessment or remediation of shallow soils is recommended.