SITE INSPECTION REPORT

SOUTH TARRANT NEIGHBORHOOD SITE
TARRANT, JEFFERSON COUNTY, ALABAMA
EPA ID No. ALN0004043036

Revision 1

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APPENDICES

1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) has tasked the Oneida Total Integrated Enterprises (OTIE) Superfund Technical Assessment and Response Team (START) to perform a Site Inspection (SI) under Contract Number (No.) EP-S4-15-01, Technical Direction Document (TDD) No. 05/OT-05-012, at the South Tarrant Neighborhood Site (the Site, formerly the Pinson Valley Neighborhood site), EPA Identification (ID) No. ALN0004043036, located in Tarrant, Jefferson County, Alabama.

Under authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), the EPA tasked OTIE to conduct an SI at the South Tarrant Neighborhood Site. The purpose of the SI was to collect soil samples to determine the presence or absence of contamination, assess the threat posed to human health and environment, to determine the need for additional investigation under CERCLA, and support the site evaluation using the Hazard Ranking System (HRS).

Specifically, the objectives of an SI are:

- Obtain, review, and summarize relevant file material including analytical data;
- Organize a project team and develop a SI Quality Assurance Project Plan (QAPP), and health and safety plan (HASP);
- Perform field activities to visually inspect the site, document conditions, and collect samples to evaluate groundwater, surface water, air migration, and/or soil exposure pathways;
- Evaluate all data and prepare the SI report, including the generation of an HRS score, and identifying and summarizing human and ecological target populations.

2.0 SITE BACKGROUND

This section describes the site and its present and past operations, waste disposal practices, regulatory history, previous investigations, and potential source areas.

2.1 SITE DESCRIPTION

The South Tarrant Neighborhood Site is located in the western portion of Tarrant, Jefferson County, Alabama, northwest of the Birmingham-Shuttlesworth International Airport (Ref. 1, See Figures 1 and 2). The Site consists of a large area of Tarrant that is potentially impacted by potential source l areas located to the northwest of the Site. As provided by Superfund, citizens may petition the EPA to conduct a Preliminary Assessment (PA) of suspected hazards to public health and the environment resulting from the release or threatened release of hazardous substances. The EPA received a PA petition on July 1, 2014, from the non-profit GASP and two citizens who reside in Tarrant. The PA petition specifically requested that the EPA assess the impacts of potential releases of hazardous substances from nearby facilities, and the impact of those releases on the neighborhoods (Refs. 1, p. 1; 2, pp. 1-11). EPA completed a PA in June 2015 that indicated further action was warranted (Ref. 1, pp. i, 13). The Site is a neighborhood in close proximity to, and possibly impacted by, releases from the ABC Coke facility, National Cast Iron and Pipe Company, and the Vulcan Rivet and Bolt Company, located west of the neighborhood (Refs. 1, p. 2; 3). Historical releases or use of backfill materials from the facilities may have resulted in soil contamination from metals such as arsenic and lead, and polycyclic aromatic hydrocarbons (PAHs) including benzo(a)pyrene (B(a)P) (Refs. 1, pp. 2; 4, pp. 1-3).

As defined in the PA, the South Tarrant Neighborhood Site consisted of an area generally east and southeast of State Highway 79, north and northwest of the Birmingham-Shuttlesworth Airport, and west of 57th Street North (See Figure 1). The facilities that were identified in the PA as potentially impacting the Site are specifically located west of the Site. The Site area as defined by the petitioners encompassed an area approximately 1,434 acres. Due to the large size of the area as defined in the original petition, the Site was divided according to the proximity with the identified facilities. The first area, identified as Phase 1, was approximately 118.72 acres and consisted of the residential area within approximately ¼-mile to the facilities (See Figure 2) (Ref. 5, p. 6).

The geographic coordinates for the South Tarrant Neighborhood are set at the first named petitioner's residence in the PA. The geographic coordinates at the approximate center of the property are 33°34' 41" North latitude and 86°46'42" West longitude (Ref. 1, p. 2).

Jefferson County's climate is humid subtropical with hot summers, mild winters, and precipitation during all months of the year. The average annual rainfall for Tarrant, Alabama, is 53.39 inches. The average annual summer is 73.6°Farenheit (°F); the average winter temperature is 52.0°F (Ref. 6).

The area of the Site consists of residential, municipal, commercial, and industrial areas (See Figures 1 and 2). Sampling within the Site was concentrated within the residential areas (Ref. 5, p. 5).

2.2 SITE OPERATIONS AND HISTORY

A PA for the Pinson Valley Neighborhood (currently referred to as South Tarrant Neighborhood Site) was prepared by the EPA, in response to a petition submitted pursuant to CERCLA 42 U.S.C. § 9605(d) (Ref. 1, p. 1). The petition was addressed to the EPA Region 4 Regional Administrator, Heather McTeer Toney, and dated July 1, 2014 (Ref. 2, pp. 1-11). The petition specifically requested that EPA conduct a PA to determine potential releases of hazardous substances from the ABC Coke Division of Drummond Company, Inc., located at 900 Railroad Avenue, in Tarrant, Jefferson County, Alabama, and the impact of those releases on the neighborhoods surrounding the facility (Refs. 1, p. 1; 2, pp. 1-11). The 35th Avenue Superfund site is located less than 1-mile southwest of the South Tarrant Neighborhood (Ref. 1, p. 2). EPA has documented the presence of hazardous substances, including B(a)P and other PAHs, as well as arsenic and lead in residential soils in the area of the 35th Avenue Superfund site, above levels which pose a threat to public health (Refs. 1, p. 2; 7, pp. 2, 3, Figure 1). During the PA, the National Cast Iron and Pipe Company and Vulcan Rivet and Bolt Company were identified as additional potential sources of soil contamination in the area of the neighborhood (Ref. 1, p. 2).

ABC Coke Division

ABC Coke division (ABC Coke) has operated at the facility location, variously listed as 900 Railroad Avenue, 900 Huntsville Road, 1 Railroad Avenue, and Alabama Street at Huntsville Street, since 1919, although the names and ownership have changed hands several times (Ref. 8, pp. 5-13). Coke is produced from the destructive distillation of coal (Ref. 9, p. 2). B(a)P is a known contaminant from coke ovens, and arsenic, while also present in local soils, is present at high concentrations in the coal from Birmingham and north Alabama, the same coal used in many of the coke ovens (Refs. 10, p. 3; 11, p. 1; 12). ABC Coke produces foundry coke and furnace coke from three coke oven batteries. The Wilputte Battery (#1A) contains 78 ovens and produces 75% of the total coke; the two remaining Koppers-Becker batteries (#5 and #6) contain 54 ovens and produce the remaining 25% of the coke (Refs. 13, p. 4; 14, p. 57). Coal is placed in the coke batteries, in the absence of air, at a temperature of approximately 2,100 °F (Ref. 13, p. 4). The coal breaks down in this destructive distillation process, creating coke oven gas and

coke (Ref. 13, p. 4). The volatile products from the coal and coal tar derivatives are recovered and separated in the coke by-products plant and other solid wastes are recycled into the coke ovens using a waste recycling process, called the Kipin process (Ref. 13, p. 4).

Former National Cast Iron and Pipe

The former National Cast Iron and Pipe facility formerly occupied the property which is currently the city of Tarrant Municipal Complex (Municipal Complex) (Ref. 1, p. 6). A CERCLA Brownfield Site Inspection (BF-SI), dated August 1, 2005, was prepared for the Municipal Complex (Ref. 15). The Municipal Complex is located off of Valley Parkway (Highway 79) and Commerce Way (Ref. 15, p. 3).

In 1913, the National Cast Iron and Pipe Company acquired the property and constructed a cast and ductile iron foundry to manufacture pipe fittings for the waterworks industry. In 1938, the name changed due to new ownership to Clow Corporation (Ref. 15, p. 4). The Clow Corporation eventually closed in June 1980 (Ref. 16). During its years of operations, the property contained a settling pond and a landfill used to control foundry wastes (Ref. 15, p. 4). In 1984, the property was sold to McWane Steel Corporation (McWane Cast Iron). The manufacturing facilities were demolished by McWane Steel Corporation leaving only five buildings (Ref. 17). In 1986, McWane Steel Corporation donated the property to the City of Tarrant (Ref. 15, p. 4).

During the 2005 BF-SI, groundwater, soil, sediment, and surface water samples were collected (Ref. 15, p. 4). Analytical results from the 2005 BF-SI indicated that arsenic, cadmium, chromium, lead, and naphthalene were present above their EPA Regional Screening Levels (RSLs) for tap water and the Alabama Department of Environmental Management (ADEM) drinking water standards in three groundwater samples. Naphthalene was detected in one sample above its RSL. Soil sample results indicated that lead exceeded the RSL of 400 milligrams per kilogram (mg/kg) in all surface and subsurface soil samples. PAHs were detected above RSLs between 0 and 13 feet in one boring. Seven surface water and sediment samples were collected from Five Mile Creek. Arsenic and the PAHs fluoranthene, pyrene, B(a)P, benzo(a)anthracene, and chrysene were detected in concentrations above their regulatory values (Ref. 1). Cyanide and polychlorinated biphenyls (PCBs) were also detected in sediment samples (Ref. 1).

The BF-SI report determined that environmental sampling of each medium indicated the presence of hazardous constituents above the applicable screening values. It also stated that additional sampling may be warranted depending on future land use (Ref. 15, p. 4). At present, it is not known what happened to any ponds or waste material onsite (Ref. 1, p. 7).

Former Vulcan Rivet and Bolt

The former Vulcan Rivet and Bolt Company property is composed of 7.5 acres located at 1020 and 1040 Pinson Valley Parkway (Ref. 18, p. 6). The facility manufactured rivets and bolts from 1919 until October 2000 (Ref. 18, p. 8). The property is now owned by the City of Tarrant (Ref. 18, p. 6). The City of Tarrant entered into the State Brownfield – Voluntary Cleanup Program on June 9, 2008 (Ref. 18, p. 38). A report of the Voluntary Cleanup Closure of the property was submitted to ADEM by MACTEC Engineering and Constructing on May 16, 2011, documenting cleanup actions at the property (Ref. 18).

A Phase I Environmental Site Assessment (ESA) of the Vulcan Rivet and Bolt property was conducted in 2005 as part of the Five Mile Creek Greenway Project. This report indicated that the buildings in the south had been used for storage and packaging of finished goods. The central buildings housed the forge and tapping area while the cold forging, wastewater neutralization parts, and materials storage area were located in the northern buildings. Wastes from site operations included spent acid containing a combination of heavy metals such as iron, nickel, copper, zinc, chromium, lead, and arsenic; drums of oil and oily material; and general debris. Limited areas of visibly stained surficial soils were observed around the facility (Ref. 18, p. 9).

A 2006 Phase II ESA of the property indicated that arsenic, lead, iron, and manganese were detected in surface soil samples at concentrations that exceeded the RSLs (Refs. 18, pp. 11-12, 23-24; 19). Site remediation activities included building demolition and asbestos removal; debris and drum removal; removal of the top 18 to 24 inches of soil in hot-spot locations, the placement of a geotextile liner and a six-inch compacted clay layer, and site backfilling with clean fill material. Additionally, an environmental covenant was implemented that specified the use of engineering controls to prohibit onsite water well installation, as well as residential, and certain commercial uses (Refs. 18, pp. 17-22; 19).

2.3 PREVIOUS RELEASES AND INVESTIGATIONS

The EPA completed a PA on June 29, 2015, at the request of the public (Ref. 1, p. i). The EPA received a petition on July 1, 2014 from the non-profit GASP and two citizens who reside in Tarrant (Refs. 1, p, 1; 2, pp. 1-11). The PA petition specifically requested that the EPA assess the impacts of potential releases of hazardous substances from nearby facilities, and the impact of those releases on the neighborhoods (Ref. 2, pp. 1-11).

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 while developing the PA. The PA concluded

that, based upon available file information, further assessment under Superfund is recommended (Ref. 1, pp. 1, 13).

2.4 POTENTIAL SOURCE AREAS

The conceptual model developed for the South Tarrant Neighborhood site describes contamination that may have been wind deposited or used as fill, into neighborhood yards (Ref. 5, p. 12). The South Tarrant Neighborhood is less than 1 mile northeast of the 35th Avenue Superfund site (Ref. 5, p. 7). EPA has documented the presence of hazardous substances, including B(a)P and other PAHs, arsenic, and lead in residential soils in the 35th Avenue Superfund site above levels which pose a threat to public health. ABC Coke, National Cast Iron and Pipe Company, and Vulcan Rivet and Bolt Company were identified as potential sources during the PA for the South Tarrant Neighborhood (formerly Pinson Valley Neighborhood) (Refs. 1, p. 2; 7, pp. 2, 3, Figure 1). B(a)P is a known contaminant from coke ovens used at ABC Coke; metals and PAHs were documented at National Cast Iron and Pipe during the 2005 BF-SI; and heavy metals were documented around the Vulcan Rivet and Bolt property during the 2005 Phase I ESA (Refs. 10, p. 3; 11, p. 1; 12; 15, p. 4; 18, p. 9).

The source area of contaminated soil in the South Tarrant Neighborhood is presented in Section 4.3.3.

ABC Coke

ABC Coke operates a biological wastewater treatment system, including tanks with secondary containment, an equalization basin, post aeration basin, and a separate storm water runoff basin, whose discharge to Five Mile Creek is regulated by a National Priority Discharge Elimination System (NPDES) permit (Refs. 13; 20, pp. 3-6, 22). ABC Coke bi-annually removes all sludge and sediments from the ponds and units, dewaters the materials, and recycles the remainder through the process (Ref. 8, p. 17). The biological wastewater treatment system is considered a surface impoundment for the purposes of the HRS.

An area near Five Mile Creek was used for tar storages, a practice that ended in approximately 1950. Coke is now stored in this area (Refs. 20, pp. 3-6, 22-23; 21, pp. 16-17). This area of tar storage is considered soil contamination for the purposes of the HRS.

ABC Coke produces foundry coke and furnace coke from three coke oven batteries. Coal is placed in the coke batteries, in the absence of air, at a temperature of approximately 2,100 °F. ABC Coke produces foundry coke from three coke oven batteries, all of which use coke oven gas for fuel. Factors affecting emissions from the combustion stack include incomplete combustion in the flues or cracks in the brickwork between an oven chamber and flue. ABC Coke practices periodic silica dusting, the spraying

of a silica-containing dust inside an oven before charging it with coal. The dust fuses to the silica brick lining the oven and sealing any small cracks. Repairs to brickwork, jambs, through-walls and end flues are reportedly conducted as needed (Ref. 14, pp. 57-59). The batteries are considered an HRS source of "other".

Water is used to quench the glowing coke. The process consumes water and uses up all water internally in the process (Ref. 8, p. 17). The quenching process and the process air emissions are both regulated under 40 Code of Federal Regulations (C.F.R.) §§ 63.7280—63.7352, whose requirements are incorporated into the Facility's Title V permit (Ref. 13, p. 17). ABC Coke's air emissions have been regulated by the Jefferson County Department of Health (JCDH) since the mid-1970s (Refs. 8, p. 15; 22, pp. 36-37, 49). A Major Source Operating Permit in 2003 replaced 22 existing permits and reduced the emissions sources to 14; this permit was replaced in 2008 (Refs. 8, p. 15; 22, pp. 36-37, 105-107).

Multiple violations and corrective actions were brought against ABC Coke over its operating history (Refs. 23, p. 16; 24, pp. 10-12, 759-1116; 25, pp. 1-9, 407; 26, pp. 1-24; 27, pp. 1-10). In 1975, legal action was first brought against ABC Coke for failure to implement Clean Air Act provisions (Ref. 27, p.161). On October 31, 1980, USA and ABC Coke a Consent Decree was ordered that included detailed requirements to control door, standpipe, and charging hole lid emissions (Ref. 27, pp. 295-315). The 1980 Consent Decree was subsequently modified in 1982 to include schedules for engineering, construction, start-up and demonstration of compliance for new boilers and a new pushing emission control system (Ref. 27, pp. 317-345). The terms of the 1982 Consent Decree expired in 1985; the one exception was that the 20% maximum opacity, as established as a standard for pushing emissions in the Consent Decree, remained in effect until between 1997 and 1998 (Ref. 27, pp. 155-156, 159). Following a NOV from JCHD citing five observed violations between January 6 and April 22, 1987, a Settlement Agreement was entered in April 1988 that included extensive requirements to repair and replace door jambs, door plugs, and valves, as well as demonstrations of compliance with Jefferson County Air Pollution Control Rules (Ref. 27, p. 160). In March, 1988, JCDH received a letter indicating that after repair and modification of the system, ABC Coke could not meet the 20% opacity limits as dictated by the 1982 Consent Decree (Ref. 27, p. 33). Additional violations and complaints were received between 1989 and 2005, including a Notice of Violation in 1999 and 2005 (Ref. 27, pp. 12, 23, 45-76, 98, 102, 117, 119, 157, 254, 290). Multiple violations were also noted with the NPDES permit (Refs. 25, pp. 1-9; 28, pp. 1-9). A Consent Order was submitted in 2004 by ADEM for exceeding the maximum daily discharge limit for B(a)P 37 times, exceeding the monthly average for B(a)P four times, and failure to report the daily maximum for B(a)P once, a total of 42 violations (Ref. 28, pp. 271-279).

The HRS source area for the water quenching process is considered to be an HRS source type of "other".

Former National Cast Iron and Pipe

In 1913, the National Cast Iron and Pipe Company acquired the property and constructed a cast and ductile iron foundry to manufacture pipe fittings for the waterworks industry. During its years of operations, the property contained a settling pond and a landfill used to control foundry wastes (Ref. 15, p. 4). The manufacturing facilities were demolished by McWane leaving only five buildings (Ref. 17). In 1986, McWane Corporation donated the property to the City of Tarrant (Ref. 15, p. 4).

During the 2005 BF-SI, groundwater, soil, sediment, and surface water samples were collected (Ref. 15, pp. 5-12). Analytical results from the 2005 BF-SI indicated that arsenic, cadmium, chromium, lead, and naphthalene were present above their EPA RSLs for tap water and the ADEM drinking water standards in three groundwater samples. Naphthalene was detected in one sample above its RSL (Refs. 15, pp. 6, 13; 19; 29). Soil sample results indicated that lead exceeded the RSL of 400 mg/kg in all surface and subsurface soil samples RSL (Refs. 15, pp. 6, 13; 19). PAHs were detected above RSLs between 0 and 13 feet in one boring RSL (Ref. 15, p. 13). Seven surface water and sediment samples were collected from Five Mile Creek (Ref. 15, p. 8). Arsenic and the PAHs fluoranthene, pyrene, B(a)P, benzo(a)anthracene, and chrysene were detected at concentrations above their regulatory values. Cyanide and PCBs were also detected in sediment samples (Refs. 15, p. 9; 30).

The HRS source types for the Former Cast Iron and Pipe facility is a backfilled surface impoundment and former landfill. The area of these sources is unknown.

Former Vulcan Rivet and Bolt

The former Vulcan Rivet and Bolt Company manufactured rivets and bolts from 1919 until October 2000 (Ref. 18, p. 8). The 2005 Phase I ESA of the Vulcan Rivet and Bolt property indicated that the buildings in the south had been used for storage and packaging of finished goods. The central buildings housed the forge and tapping area while the cold forging, wastewater neutralization parts, and materials storage area were located in the northern buildings. Wastes from site operations included spent acid containing a combination of heavy metals such as iron, nickel, copper, zinc, chromium, lead, and arsenic; drums of oil and oily material; and general debris. Limited areas of visibly stained surficial soils were observed around the facility (Ref. 18, p. 9). The 2006 Phase II ESA of the property indicated the presence of arsenic, lead, iron, and manganese surface soil samples at concentrations that exceeded the RSLs (Refs. 18, pp. 11-12, 23-24; 19). Site remediation activities included building demolition and asbestos removal; debris and drum removal; removal of the top 18 to 24 inches of soil in hot-spot locations, the placement of a geotextile liner and a six-inch compacted clay layer, and site backfilling with clean fill material. Additionally, an environmental covenant was implemented that specified the use of engineering controls

to prohibit onsite water well installation, as well as residential, and certain commercial uses (Refs. 18, pp. 17-22; 19). The HRS source type for the Former Vulcan Rivet and Bolt source is contaminated soil in unknown quantities.

3.0 INVESTIGATIVE EFFORTS

This section discusses the methodology behind the investigative efforts undertaken during the SI including the sample collection methodology, analytical methodology, data quality, and data qualifiers. This section also discusses the groundwater migration, surface water migration, soil exposure, and air migration pathways associated with an HRS evaluation, the targets associated with each pathway, and pathway-specific conclusions. Appendix B provides the Tables associated with the sampling event. Appendix B, Table 1 provides the Surface Soil Sampling Results for the Phase 1 Sampling Event; Table 2 provides the Background Data and Statistical Analysis; and Table 3 provides a Summary of the Surface Soil Data, and Table 4 provides a Sample Location Summary. Logbooks and Field Logs for the Phase 1 sampling event are provided in Appendix C. The Analytical Results are provided in Appendix D.

3.1 SAMPLE COLLECTION DESIGN

START personnel collected samples in the Phase 1 area of the South Tarrant Neighborhood to identify the presence or absence of contamination in residential properties. START completed a QAPP for the South Tarrant Neighborhood in December 2015 (Ref. 5). The QAPP was prepared in accordance with the EPA *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA QA/G-4), Requirements for Quality Assurance Project Plans (QA/R-5), and the *Guidance for Quality Assurance Project Plans* (EPA QA/G-5), (Refs. 31; 32; 33). The QAPP was designed to guide field work including the collection of soil samples and associated field Quality Assurance/Quality Control (QA/QC) samples.

The Data Quality Objective (DQO) process specified project decisions, the data quality required to support those decisions, specific data types needed, data collection requirements, and analytical techniques necessary to generate the specified data quality. The process also ensured that the resources required to generate the data were justified. The DQO process consisted of the following seven steps:

1. State the problem,
2. Identify the goal of the study,
3. Identify the information inputs,
4. Define the boundaries of the study,
5. Develop the analytic approach,
6. Specify performance or acceptance criteria, and
7. Develop the plan for obtaining data.

During the first six steps of the process, the planning team developed decision performance criteria that were used to develop the data collection design. The final step of the process involved developing the data collection design based on the DQOs. A brief discussion of these steps and their application to this project were provided in the QAPP (Ref. 5).

Sampling was conducted in accordance with the QAPP. The sampling was designed to determine if the levels of metals and B(a)P in the initial sampling areas were HRS-elevated (3x background, or greater than a non-detect) when compared to background samples. In addition, to determine if the level of contamination was statistically significant to allow for inferring contamination among the study area, sample placement was designed in the Visual Sample Plan, version 7.4 (VSP7.4) program (Ref. 34). Further discussion of the statistical analysis is presented in Sections 4.0 and 5.0 of this SI Report. The VSP7.4 program statistical analysis report is provided in Appendix E.

3.2 SAMPLING COLLECTION METHODOLOGY

START collected, with oversight from the EPA Region IV Science and Ecosystems Division (SESD) Field Team, a total of 27 samples February 2 through 4, 2016, including three duplicate samples and one background sample collected outside of the Phase 1 area (Refs. 35; 36) (See Appendix A, Figure 3). A total of 23 different properties were sampled during the February sampling event, as two samples were collected from the same property address. However, prior to receiving the data, the background sample collected was determined to be inadequate for comparison purposes as it was too near an area of potential contamination. It is not used for comparison purposes in this SI report.

On March 16, 2016, START collected 5 additional background samples, including one duplicate, from a neighborhood approximately 2.2 to 2.9 miles south of the facility. Four different properties were sampled during the March sampling event. These March 2016 samples will be used for comparison purposes in addition to the samples collected during the 2010 Robinwood Background Study (Refs. 5; 9).

All samples were collected, containerized, preserved, handled, and documented in accordance with the EPA Region 4 Field Branches Quality System and Technical Procedures (FBQSTP) and documented in accordance with the Sampler's Guide: Contract Laboratory Program (CLP) Guidance for Field Samplers (October 2014) (Refs. 7; 10). Additional QA/QC samples such as blanks, duplicates, and matrix spike/matrix spike duplicate (MS/MSD) samples were also collected in accordance with FBSQTP for Field Sampling Quality Control (SESDPROC-011-R4) (Ref. 7). All samples were handled and custody maintained in accordance with the FBQSTP Operating Procedure for Sample Evidence Management (SESDPROC-005-R2) and Packing, Marking, Labeling, and Shipping of Environmental and Waste Samples (SESDPROC-209-R3) (Ref. 2). Samples were analyzed using a CLP laboratory for low-level PAHs in accordance with CLP Scope of Work (SOW) SOM02.3 Modified and Resource Conservation and Recovery Act (RCRA) 8 metals in accordance with CLP SOW ISM02.3.

Soil samples for semi-volatile organic compound (SVOC) analysis and RCRA 8 metals analysis were each placed into one 8-ounce (oz) glass jar, respectively. Quality control water aliquots were placed in two one-liter (L) amber bottles and one 1-L poly bottle for low-level PAH and RCRA 8 metals, respectively.

Sample containers used for soil and groundwater sample collection were purchased from Environmental Sampling Supply (ESS) and meet the QC grade standard required by the EPA Specifications and Guidance for Obtaining Contaminant-Free Sample Containers (OSWER Directive 93240.0-05). This document specifies the acceptable types of containers, the specific cleaning procedures to be used before samples are collected, and QA/QC requirements relevant to the containers and cleaning procedures.

3.3 ANALYTICAL SUPPORT AND METHODOLOGY

Soil and QC water samples were submitted to a CLP laboratory for low-level Target Compound List (TCL) PAH analysis and RCRA 8 metals. The CLP provides a comprehensive quality assurance QA program with an established infrastructure, documented processes and system flexibility. It utilizes on-site audits, performance evaluation (PE) samples, quarterly performance reports, fraud detection mechanisms, performance-based scheduling, and continuous inspection of laboratory data for technical and contractual completeness and compliance.

All samples collected during the SI were processed using the EPA Scribe© software. EPA selected the analytical service providers through the CLP. A complete copy of the analytical results is presented as Appendix D.

3.4 ANALYTICAL DATA QUALITY AND DATA QUALIFIERS

All analytical data are subject to a QA review, as described in the U.S. EPA laboratory data evaluation guidelines. In the text and analytical data tables in this SI report, some concentrations of organic and inorganic parameters are qualified with a “J”. A “J” qualifier indicates that the qualitative analysis is acceptable; although the quantitative value is only estimated. Results of some sample analyses are qualified with a “U”, meaning that the constituent was analyzed for but not detected. The reported number is the laboratory-derived sample quantitation limit (SQL) for the constituent in that sample. A “UJ” qualifier indicates that the constituent was analyzed for but not detected, and the reported quantitation limit is approximate and may be inaccurate or imprecise.

4.0 PATHWAYS

This section discusses the groundwater migration, surface water migration, soil exposure, and air migration pathways associated with an HRS evaluation, the targets associated with each pathway, and pathway-specific conclusions.

4.1 GROUNDWATER MIGRATION PATHWAY

The Groundwater Migration Pathway is of minimal concern because all municipal water for the drinking water supply is provided by surface water intakes. See Appendix A, Figure 4, for the 4-mile Radius Map.

4.1.1 Hydrogeologic Setting

The South Tarrant Neighborhood Site is located in the Opossum Valley southeast of the Opossum Fault within the Valley and Ridge physiographic province of the State (Refs. 37; 38). More specifically, the Site is within the Birmingham-Big Canoe Valley District with elevations ranging from approximately 500 feet in Jefferson County to approximately 600 feet in neighboring St. Clair County. The geology and physiography of this province is quite complex because the region was strongly affected by large-scale tectonic activity during the Appalachian orogeny. The site is in the Appalachian fold and thrust belt, consisting of shallow marine to deltaic Paleozoic sedimentary strata deposited on a continental platform (Ref. 38). Regionally, strata generally strike to the northeast-southwest with southeast dip. Across strike, the fold and thrust belt is characterized by folds associated with large thrust-fault ramps. Regionally, the ridges dividing the valleys and the rock types that cap them are as follows: Weisner ridges, quartzite; western edge of the Northern Piedmont, slate; Cahaba ridges, sandstone and conglomerate; and Blount Mountain, sandstone. These rocks are highly resistant to weathering, are not significantly faulted, and are relatively impermeable (Ref. 38).

The Site is in an outcrop area of the Ketona Dolomite and, in the more hilly terrain of the neighborhoods southwest of Highway 79, the Chepultepec and Copper ridge Dolomite Formations (Ref. 37). The Ketona comprises 400 to 600 feet of relatively thick-bedded dolomite, while the Copper Ridge and Chepultepec Formations are members of the Knox Group that range to 2,000 feet thick in the Site area (Ref. 39, p. 3). These rock types are susceptible to dissolution by groundwater, with beds that are folded and fractured, further increasing the amount of dissolution and porosity (Ref. 40, p. 3).

The Site is underlain by the Valley and Ridge aquifer system. The Valley and Ridge aquifer system is comprised of aquifers consisting of limestone, sandstone, and fractured rock that are exposed in valleys

and separated by ridges. The complex geologic structure of the area has caused regional discontinuity of rock units so major aquifers or aquifer systems are not continuous. A given major aquifer may be present in adjacent valleys; however, the two valleys may not be hydraulically connected due to faulting or folding (Ref. 38). The Copper Ridge and Chepultepec Formations, which underlie most of the Site area, are considered good aquifers with well yields in Jefferson County ranging up to 750 gallons per minute (Ref. 41).

4.1.2 Groundwater Targets

Drinking water within a 4-mile radius of the Site is obtained through the Birmingham Water Works Board System No. AL0000738. They do not utilize groundwater for the municipal water supply. Public drinking water is readily available and the property does not lie within a Wellhead Protection area (Ref. 42). There are no known private wells within the 4-mile target distance limit (TDL) (See Appendix A, Figure 4).

4.1.3 Groundwater Analytical Results

No groundwater samples were collected during the SI.

4.2 SURFACE WATER MIGRATION PATHWAY

The Surface Water Migration Pathway is of minimal concern because no surface water intakes providing drinking water and few ecological target areas are located within the 15-mile TDL. The Surface Water Migration Pathway is depicted in Appendix A, Figure 5.

4.2.1 Hydrologic Setting

The Site is located in the Birmingham-Big Canoe Valley District of the Alabama Valley and Ridge Province. Relief is characterized by a series of broad, flat valleys and low, narrow ridges that expose limestones, dolomites, shales, sandstones, and chert. Total relief can be up to 400 feet from the valley floor to ridge top, but is normally less. The immediate area is relatively flat in the valley; however, to the east of the City of Tarrant, the terrain becomes more hilly (Ref. 20, p. 10).

Runoff from the surrounding area drains to Five Mile Creek. Five Mile Creek receives treated wastewater from several neighboring industries. The ABC Coke facility constructed a dam to pool the water for a process water inlet. This dam was constructed across Five Mile Creek at the NPDES Discharge point. The plant's discharge point is located on the downstream side of the overflow dam. The pump house for process water is upstream of the dam (Ref. 43, pp. 10, 23). ABC Coke lies within the 100-year floodplain (Ref. 44).

The 15-mile surface water pathway TDL begins at the northwest corner of the ABC Coke property (probable point of entry [PPE]-1) where it drains into Five Mile Creek (Refs. 45, pp. 5-6, Figure 2; 46, p. 2). Drainage ditches along the northern, western, and southwestern portion of the Pinson Valley Neighborhood also flows into Five Mile Creek (Ref. 1, p. 10). The entire 15-mile surface water TDL is within Five Mile Creek (See Appendix A, Figure 5). No municipal surface water intakes are located within the 15-mile TDL of the Site.

Five Mile Creek has an annual average flow rate of 94.68 cubic feet per second (cfs) at the U.S. Geologic Survey (USGS) (02457595) real-time streamflow gauging station near Republic located 8.5 miles downstream from the ABC Coke Plant. The two-year, seven-day low flow value is 19.33 cfs and the 10-year, 7-day low flow value is 15.08 cfs at the USGS (02457595) real-time streamflow gauge on Five Mile Creek near Republic (Ref. 47).

4.2.2 Surface Water Targets

Five Mile Creek is part of the Black Warrior River Basin. Water use within Five Mile Creek is classified for fish and wildlife (Ref. 29, pp. 339, 386). Specifically the area between Old Jasper Highway and Alabama Highway 79, which includes the entirety of the 15-mile TDL, is classified for fish and wildlife use (Ref. 29, pp. 339, 386). There is no fish advisory for Five Mile Creek, but it is not known if recreational fishing is occurring within the 15-mile TDL (Ref. 48, pp. 21-23).

There are no drinking water intakes along the 15-mile surface water TDL (Ref. 49, pp. 6-7). ABC Coke lies within the 100-year floodplain (Ref. 44).

The nearest wetland along the 15-mile TDL is 9.7 miles downstream from the PPE on Five Mile Creek. There are 5,741.2 feet (1.09 miles) of HRS-qualified wetlands along the 15-mile TDL (Ref. 50).

Although there are several endangered or threatened species located in Jefferson County, no species are known to inhabit the 15-mile TDL (Ref. 51).

4.2.3 Surface Water Analytical Results

No surface water samples were collected during the SI.

4.3 SOIL EXPOSURE PATHWAY

The Soil Exposure Pathway is of primary concern at the Site, due to the residential nature of the South Tarrant Neighborhood.

4.3.1 Physical Conditions

Surface soil at the Site consists of clayey or silty-clay soil with chert fragments, derived from the underlying dolomite, and classified as Urban Land-Tupelo-Decatur Series (Ref. 52, pp. 7-9). Surface drainage at the Site tends to be poor and during periods of heavy rain, the soil becomes saturated and flooding periodically occurs (Ref. 53).

4.3.2 Soil Targets

The population surrounding the Site is as follows: 0 to ¼-mile, 871 persons; ¼ to ½-mile, 1,731 persons; ½ to 1-mile, 3,973 persons (Ref. 50). The nearest daycare facility is 0.05-mile east of the sources; the nearest school is located 0.33-mile from the sources. Both the nearest daycare facility and school are located within the Phase 1 sampling area (Ref. 53, pp. 1-2). There are 2.48 persons per household in Jefferson County (Ref. 54).

4.3.3 Soil Analytical Results

Twenty-seven properties were sampled during the Phase 1 sampling events, conducted in February and March 2016, for a total of 32 surface soil samples, including four duplicates. However, one background sample, collected in February, will not be used for comparison purposes, as it was determined to be too near areas of contamination. Four properties and one duplicate were collected as background samples during the March 2016 background sampling event and will be used for comparison purposes for this SI, in addition to the 2010 Robinwood Background Study. (See Figure 4 for approximate locations of Background study areas) All of the samples collected were surface soil samples, collected from 0 to 6 inches below ground surface (bgs). All samples were analyzed for low level PAHs and RCRA 8 metals through the EPA CLP. See Appendix B, Table 1, for the complete summary of Phase 1 surface soil results and Table 3 for a summary of results with comparison to both the March 2016 background samples and the 2010 Robinwood Background Study. Appendix B, Table 4 provides a summary of sample locations.

Samples were compared both to the highest value of each constituent from the March 2016 background set and the 2011 Background Study values for B(a)P Toxic Equivalency Quotient (TEQ), lead, and arsenic (Ref. 9). The individual PAHs are converted to a TEQ for B(a)P to facilitate comparison to benchmarks. Concentrations were considered to be elevated when the detected concentration exceeded 3-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. Each

background set was evaluated separately. When comparing the Phase 1 release samples to the March 2016 background set, the following was determined:

- There were no elevated concentrations of RCRA 8 metals detected.
- One sample, collected from Station Location ST1-7, had elevated concentrations of acenaphthene, anthracene, and phenanthrene.
- There were no elevated concentrations of the primary contaminants of concern (COC), arsenic, lead, and B(a)P.
- The area of contaminated soil is considered >0 as no area can be triangulated.

When comparing the Phase 1 surface soil samples to the 2010 Robinwood background set, the following was determined:

- Arsenic was detected at elevated concentrations in 8 samples, at concentrations ranging from 19J to 29J mg/kg.
- Lead was not detected at elevated concentrations in any of the samples.
- The B(a)P TEQ was not detected at elevated concentrations in any of the samples.
- The area of contaminated soil is calculated to triangulated between the 8 elevated samples. Using those eight properties, an area of 1,524,633 square feet was determined for the source for HRS purposes.

4.4 AIR MIGRATION PATHWAY

The air migration pathway is of concern at the Site, as that is one of the routes of exposure from the Source areas. However, no air samples have been collected and therefore the air migration pathway was not evaluated.

5.0 STATISTICAL ANALYSIS

To determine if the levels of the contaminants of concern (arsenic, lead, and B(a)P) are statistically significant, a statistical sampling method was used to sample the South Tarrant Neighborhood. The following sections describe the statistical design, inputs, and analysis. The statistical analysis provided in the VSP 7.4 program is provided in Appendix E.

5.1 INPUTS TO STATISTICAL SAMPLE DESIGN AND DATA ANALYSIS

The South Tarrant Neighborhood QAPP presents all of the decision input used to design the sampling effort for the SI using the VSP 7.4 program (Ref. 34). To determine if the levels of the contaminants of concern are 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 South Tarrant Neighborhood. This sampling was designed to determine whether the median (mean) contaminant concentrations found in residential soils meet the HRS definition of 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 in the Robinwood background data, with a confidence level of 95%. For purposes of designing the sampling, the highest levels of the COCs arsenic, B(a)P and lead from the available 2011 Robinwood Neighborhood background study were selected as the background level of comparison (Refs. 5; 9). The summary COC data used to design the sampling is provided in Appendix B, Table 2.

During field work for this SI, a new site-specific background sample set was collected. These samples were collected to provide additional levels of comparison specifically for the South Tarrant Neighborhood SI. In accordance with EPA guidance for collecting background samples, four new residential sample locations were selected, outside of the area of influence of the suspected source areas, in residential yards similar to the South Tarrant Neighborhood (Ref. 35). The summary COC results are presented in Appendix B, Tables 1, 2, and 3.

The working hypothesis (or “null” hypothesis) for the South Tarrant SI was that the median (mean) value of the COCs collected in the South Tarrant Neighborhood residential soils would equal or exceed 3-times the highest background levels for each COC. The alternate hypothesis was that the median (mean) value of each COC was less than 3-times background. To define the null hypothesis, two types of decision errors were defined:

- Decision Error A: Concluding that the mean concentration of the COC in the study area is not statistically significantly higher than 3-times background, when it actually is.
- Decision Error B: Concluding that the mean concentration of the COCs in the study area is statistically significantly higher than 3-times background, when it actually is not.

The consequences of Decision Error A, incorrectly deciding that the source areas did not contribute increased concentrations of the COCs to the study area, would result in a preliminary HRS score that would not support further assessment under the Superfund remedial program. The consequences of Decision Error B, incorrectly deciding that the sources did increase the concentrations of the COCs in the study area, would result in needless expenditure of resources to pursue additional Phases of assessments, or recommendation for further assessment by the Superfund Remedial program.

After examining the consequences of both decision errors, the EPA decided that Decision Error A posed more severe consequences, because the true state of soil contamination could go undetected and may cause health risks to the neighborhood residents. Therefore, the null hypothesis chosen for this site was that the average concentrations of the COCs within the study area are greater than 3-times background.

After completion of the field work, data obtained from the SI sampling was imported back to VSP 7.4 for statistical analysis. The resulting reports are included in Appendix E. The analysis was performed using data from both background studies as the Level of Comparison:

3-Times Highest Background Levels for Robinwood Neighborhood

- Arsenic: 18.6 mg/kg
- Lead: 840 mg/kg
- B(a)P: 1.59 mg/kg

3-Times Highest Background Levels for South Tarrant SI Background study

- Arsenic: 69.6 mg/kg
- Lead: 1,353 mg/kg
- B(a)P: 2.91 mg/kg

A false rejection (Type I Error Rate or alpha) decision error occurs when the null hypothesis is falsely rejected. A false acceptance (Type II Error Rate or beta) decision error occurs when the null hypothesis is falsely accepted. The EPA decided that a 95% confidence level was an acceptable false rejection rate. In other words, the EPA wanted to be 95% confident that the site would be determined contaminated and require further investigation if the true median was at or above the Level of Comparison for each COC.

The boundaries of the gray region (delta) defines a range that shows the average of each COC in the study area is higher than the Level of Comparison, but not statistically different, given the uncertainty in the

data. When the null hypothesis assumes that the study area is contaminated and requires further investigation, the upper limit of the gray region is bounded by the Level of Comparison for each COC.

The EPA evaluated the potential of making false acceptance errors (beta) and decided it was very important not to make false acceptance errors (beta). However, to decrease the likelihood of committing false acceptance errors (beta), the team would need greater confidence in the data that is collected, which increases sampling and analysis. The team decided that the gray region would be defined as one standard deviation of each COC from the Level of Comparison.

Standard Deviation of Robinwood Neighborhood Data

- Arsenic: 1.27 mg/kg
- Lead: 61.91 mg/kg
- B(a)P: 0.13 mg/kg

Standard Deviation of South Tarrant Background Data

- Arsenic: 4.52 mg/kg
- Lead: 151.73 mg/kg
- B(a)P: 0.31 mg/kg

The EPA determined that the false acceptance rate (beta) should be defined as 10%. In other words, the EPA wanted no more than a 10% chance of incorrectly accepting the hypothesis that the site is contaminated and requires further investigation.

5.2 STATISTICAL ANALYSIS

The following paragraphs describe the statistical analysis that was conducted on the data obtained during the South Tarrant Neighborhood SI. Sampling results were compared to both of the background sets and histogram diagrams were prepared for each COC. A histogram is a graphical representation of the distribution of numerical data and provides a rough sense of the density of the underlying distribution of data.

The individual PAHs are converted to a TEQ for B(a)P to facilitate comparison to benchmarks. The B(a)P TEQ levels in the South Tarrant Neighborhood residential soils ranged from 0.148 mg/kg to 1.03 mg/kg, with a mean of 0.39 mg/kg and a median value of 0.28 mg/kg. (Appendix E) The data do not appear to be normally distributed, so a value of 0.61 mg/kg is recommended as the 95% upper confidence level (UCL) on the mean. (Appendix E)

The Diagram 5-1 below provides a summary histogram of the B(a)P TEQ data.

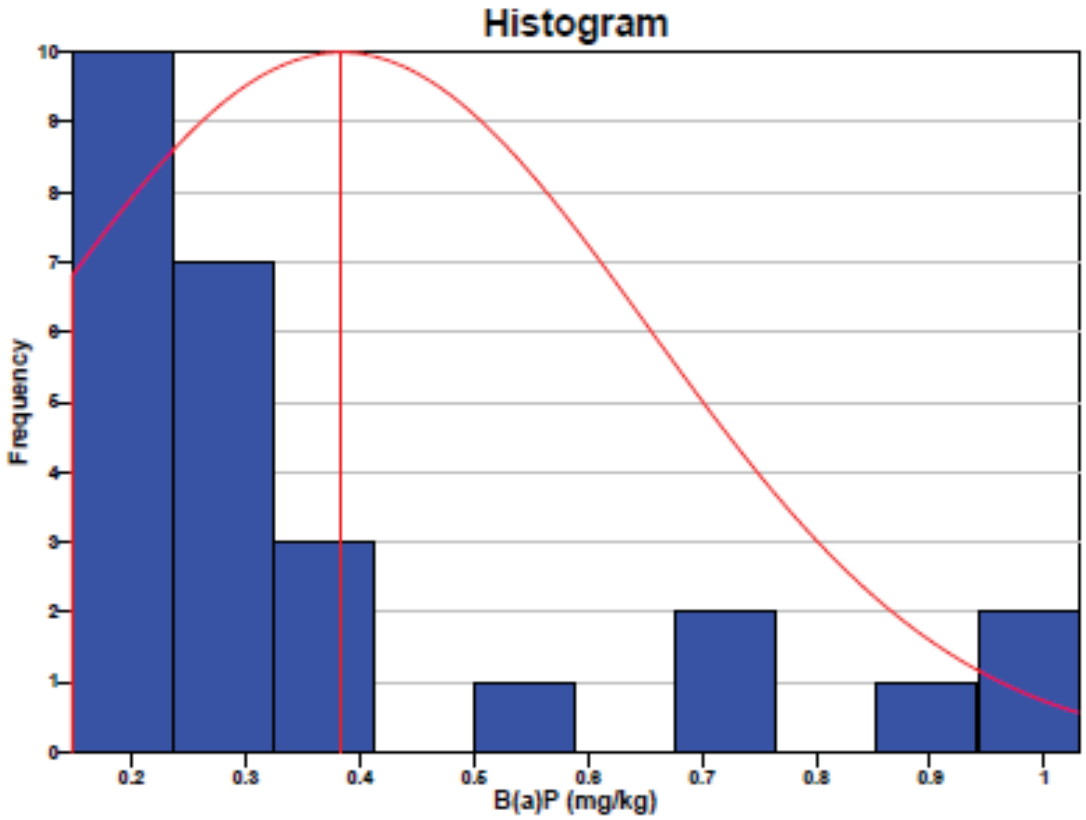

Diagram 5-1 B(a)P Histogram

The arsenic levels in the South Tarrant Neighborhood residential soils ranged from 6.4 mg/kg to 28.6 mg/kg, with a mean of 16.39 mg/kg and a median value of 16.20 mg/kg. (Appendix E) The 95% UCL on the mean is 18.14 mg/kg. (Appendix E)

The Diagram 5-2 below provides a summary histogram of the arsenic data.

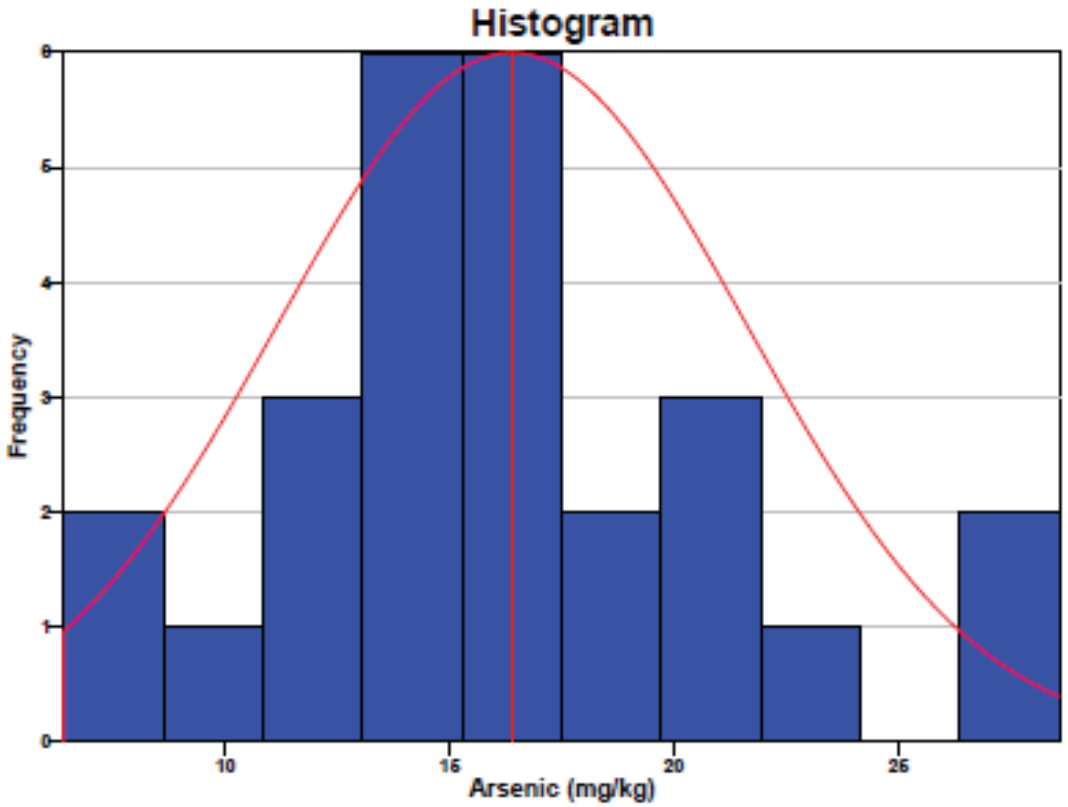

Diagram 5-2 Arsenic Histogram

The lead values in the South Tarrant Neighborhood residential soils ranged from 26.3 mg/kg to 323 mg/kg, with a mean of 151.36 and a median value of 139 mg/kg. (Appendix E) The 95% UCL on the mean is 207.12. (Appendix E)

Diagram 5-3 provides a summary histogram of the lead data.

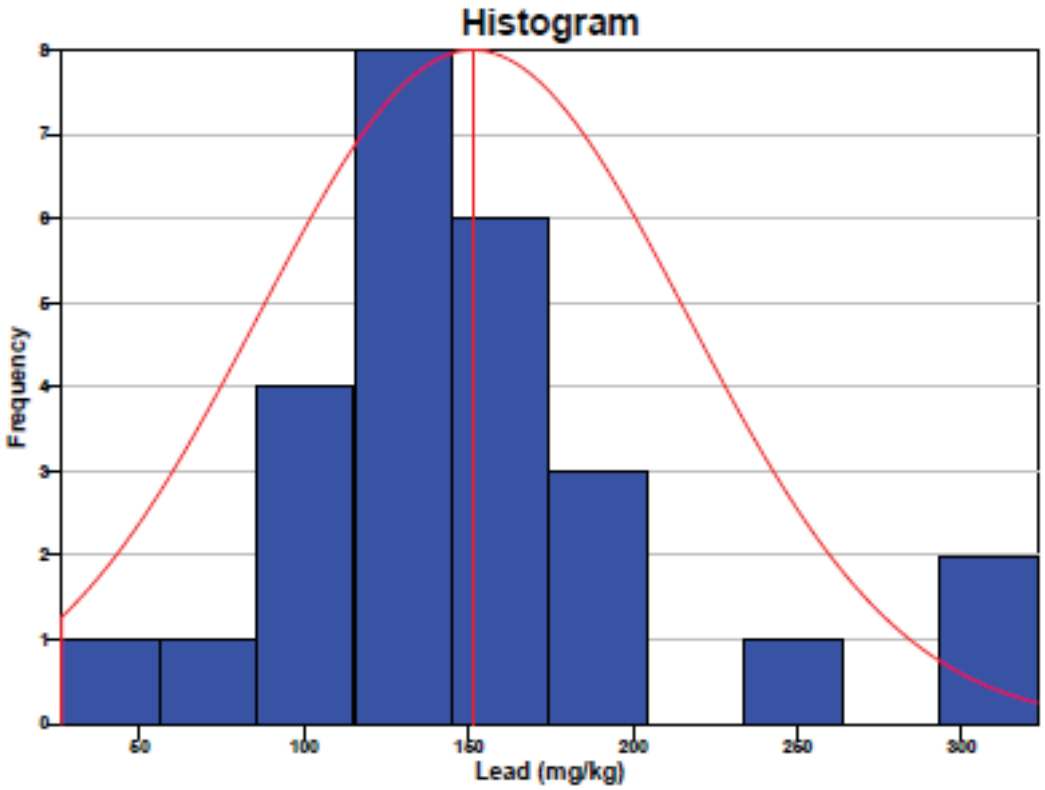

Diagram 5-3 Lead Histogram

All of the mean and median values for B(a)P, arsenic and lead in the South Tarrant Neighborhood residential soils are below the 3-times background level of comparisons derived using the Robinwood Neighborhood background data set. Additionally, all mean and median values are below the 3-times background level of comparison for the new background study conducted for the SI.

The South Tarrant Neighborhood residential soil data was also compared to Removal Management Levels (RMLs) (Ref. 55). 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. The RMLs are presented below:

Removal management Levels (RMLs)

- Arsenic: 68 mg/kg
- Lead: 400 mg/kg
- B(a)P: 1.6 mg/kg

None of the data collected from residential soils in the South Tarrant Neighborhood exceeded RMLs (Ref. 55).

To graphically present the data, box-plot diagrams were created (Ref. 55). Diagrams 5-4, 5-5, and 5-6 present the summary box-plots for B(a)P, arsenic, and lead, respectively. The South Tarrant Neighborhood residential soil data is shown on the left, the new South Tarrant background data is shown in the center, and the Robinwood Neighborhood background data is presented at the right.

The Diagram 5-4 (below) presents the B(a)P TEQ data. The box plots show that the mean values (the center line within the boxes) for the South Tarrant Neighborhood residential soil data is similar to the mean value of the South Tarrant background data. Both means are higher than the mean of the Robinwood community background. All of the B(a)P TEQ values are less than the B(a)P residential soil RML (1.60 mg/kg). The RML is not shown on the diagram due to scale. The RML is approximately 0.6 mg/kg higher than the highest detected concentration (Ref. 55).

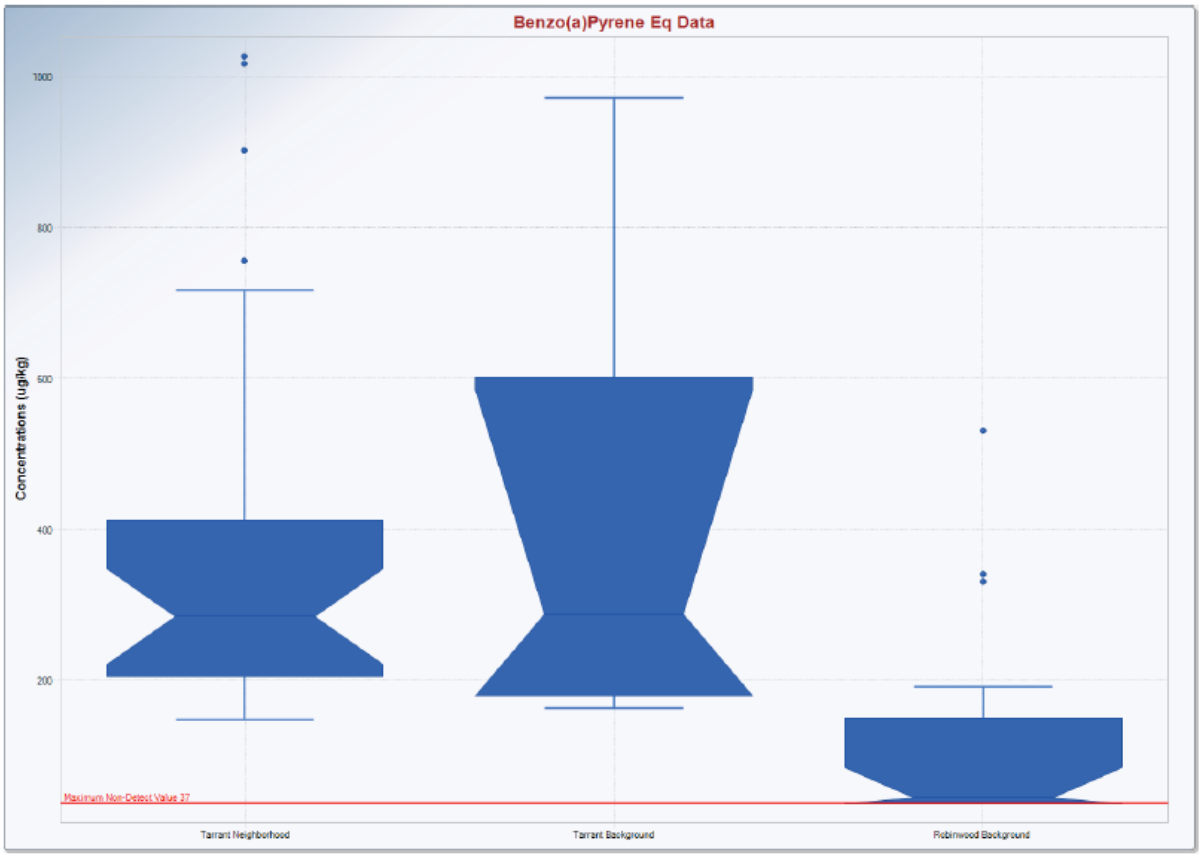

Diagram 5-4 B(a)P Box Plots

Diagram 5-5 (below) graphically presents the arsenic data. The box plots show that the mean values (the center line within the boxes) for the South Tarrant Neighborhood residential soil data is similar to the mean value of the South Tarrant background data. The South Tarrant Neighborhood residential soil data have some values that are higher than the two background data sets, but all of the values shown are less than the residential soil arsenic RML (68 mg.kg). The RML for arsenic is not shown on the figure due to scale (the RML is approximately twice as high as the highest detected concentration shown in the figure) (Ref. 55).

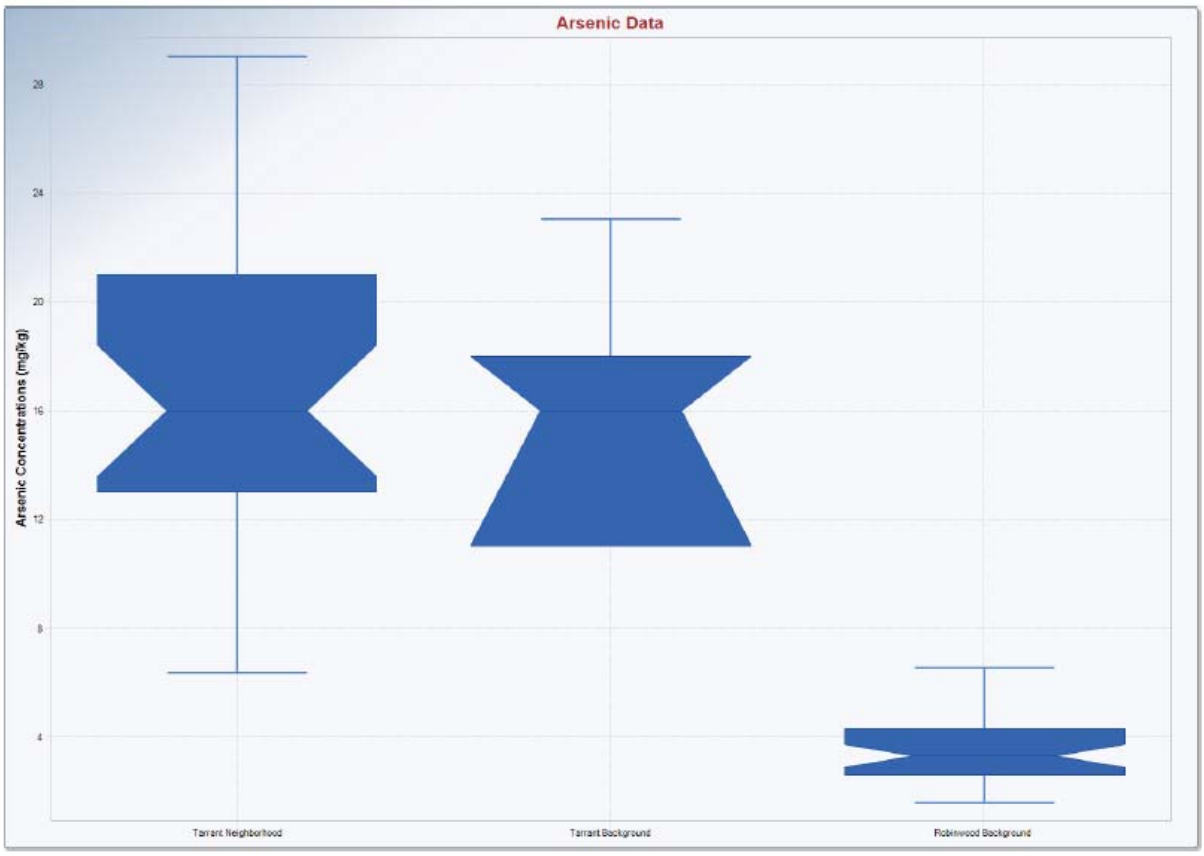

Diagram 5-5 Arsenic Box Plots

Diagram 5-6 (below) presents the lead data. The plots show that the mean values for the South Tarrant Neighborhood residential soil data (the center line within the boxes) is similar to the mean value of the South Tarrant background data; however, the upper range of the background data extends higher than the site data. The mean of the Robinwood background data is less than South Tarrant Background data, but the range of values is similar to the South Tarrant Neighborhood residential soil data. All of the lead concentrations in the South Tarrant Neighborhood residential soil data and the Robinwood Neighborhood background data are below the residential soil lead RML (400 mg/kg), which is shown on the figure for comparison. One sample in the South Tarrant background data exceeded the RML.

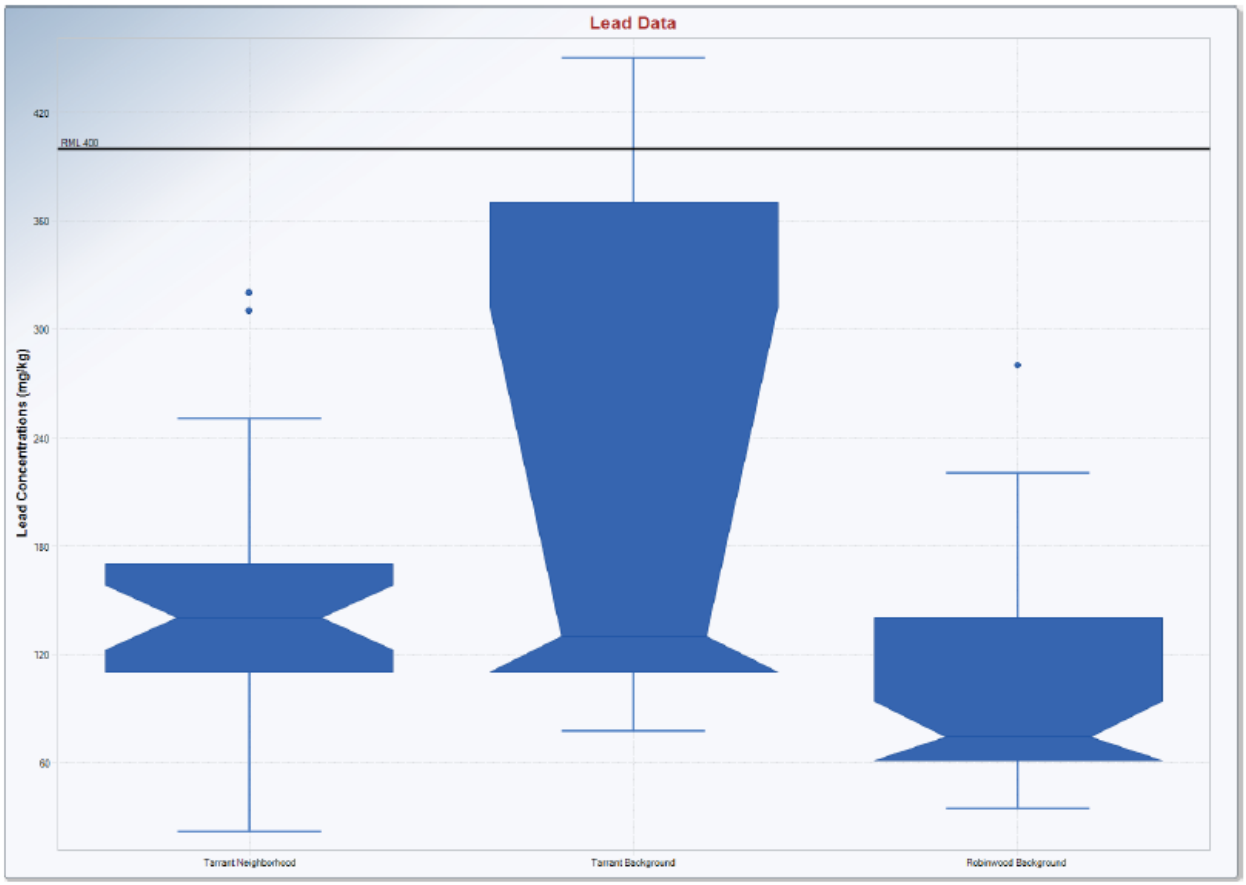

Diagram 5-6 Lead Box Plots

6.0 SUMMARY AND CONCLUSIONS

To determine if the levels of the contaminants of concern are 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 South Tarrant Neighborhood. This sampling was designed to determine whether the median (mean) contaminant concentrations found in residential soils meet the HRS definition of 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 in the Robinwood background data, with a confidence level of 95%. The results indicate with 95% 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. Graphical analyses indicate that samples collected from the South Tarrant Neighborhood are similar to background data sets for arsenic, lead, and benzo(a)pyrene TEQ.

In addition, this analysis compared the data to RMLs in order to identify any immediate health risks (Ref. 55). None of the COCs in the South Tarrant Neighborhood residential soil samples (arsenic, lead, benzo(a)pyrene) exceed its residential soil RML. The results indicate that all samples collected during Phase 1 are less than the RML (and therefore the means are less than the RML as well). Although when comparing the Phase 1 surface soil samples to the 2011 Robinwood background set, it can be concluded that 8 samples exceed 3-times the background level for arsenic, none of these levels indicate an immediate health risk. We conclude that the potential for any adverse health effects are within EPA's acceptable risk range.

The South Tarrant Neighborhood soil data was evaluated using the Hazard Ranking System (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 analysis conclude 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 South Tarrant Neighborhood does not appear to have been negatively impacted by the contaminants of concern. No-further Remedial Action under Superfund is recommended.

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