TETRA TECH

May 15, 2018

Mr. Todd Davis
Site Assessment Manager
U.S. Environmental Protection Agency, Region 7
11201 Renner Boulevard
Lenexa, Kansas 66219

Subject: Analysis of Brownfields Cleanup Alternatives
Old St. Elizabeth Hospital, Hannibal, Missouri
EPA Region 7, START 4, Contract No. EP-S7-13-06, Task Order No. 0002.048
Task Monitor: Todd Davis, Site Assessment Manager

Dear Mr. Davis:

Tetra Tech, Inc. is submitting the attached Analysis of Brownfields Cleanup Alternatives (ABCA) report regarding the Old St. Elizabeth Hospital in Hannibal, Missouri. If you have any questions or comments, please contact the Project Manager at (816) 412-1742.

Sincerely,

Kaitlyn Mitchell

Kaitlyn Mitchell
START Project Manager

Ted Faile

Ted Faile, PG, CHMM
START Program Manager

Enclosures

cc: Debra Dorsey, START Project Officer (cover letter only)

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ANALYSIS OF BROWNFIELDS CLEANUP ALTERNATIVES

OLD ST. ELIZABETH HOSPITAL
HANNIBAL, MISSOURI

Superfund Technical Assessment and Response Team (START) 4 Contract
Contract No. EP-S7-13-06, Task Order No. 0002.048

Prepared For:

U.S. Environmental Protection Agency
Region 7
Superfund Division
11201 Renner Boulevard
Lenexa, Kansas 66219

May 15, 2018

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1.0 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) was tasked by the U.S. Environmental Protection Agency (EPA), under the Superfund Technical Assessment and Response Team (START) 4 contract, to complete an Analysis of Brownfields Cleanup Alternatives (ABCA) report regarding the Old St. Elizabeth Hospital site (the site) in Hannibal, Missouri. This ABCA examines alternatives for cleanup and disposal of asbestos-containing materials (ACM), lead-based paint (LBP), polychlorinated biphenyls (PCB) in caulk, and household hazardous waste (HHW) materials, including preliminary cost estimates.

2.0 SITE LOCATION AND DESCRIPTION

The site is in Hannibal, Missouri, in east-southeast Marion County. This site is included on the Hannibal East Missouri, U.S. Geological Survey (USGS) 7.5-minute topographic series map (USGS 1973) (see Appendix A, Figure 1). The site is bordered north by residential development; east by Virginia Street, with residential development and a parking lot beyond; south by Broadway Street, with residential development beyond; and west by Magnolia Avenue, with residential development beyond (see Appendix B, Figure 2).

The site hosts five buildings at 109 Virginia Street in Hannibal, Missouri. Three of the buildings, the main building, the north building, and the 5-story building, are connected, although these were constructed at different times. Two outbuildings on the west side of the subject property are referred to as the northwest and southwest buildings throughout this report.

According to the Asbestos Inspection and Management Plan Report prepared by Building Assessment Services, Inc. (BAS) in October 1992, the original St. Elizabeth Hospital was constructed in 1913. The original building encompassed 29,750 square feet (SF), and three additions ensued: a 1936 addition of 20,000 SF, a 1956 addition of 33,758 SF, and a 1973 addition of 57,850 SF. The original construction, and 1936 and 1956 additions, have four floors. The 1956 addition has an equipment room on a fifth floor. The 1973 addition has six floors and two penthouses above. The buildings are constructed of brick and concrete, with exterior surface of masonry.

Interiors of the main building and the north building are constructed with drywall and plaster walls and ceilings. Flooring materials include terrazzo floors, carpet, floor tile, and linoleum. The interior of the 5-story building is constructed with drywall walls and drop ceilings with lay-in ceiling tiles. Flooring materials include concrete, carpet, floor tile, and linoleum. The interior of the northwest building is constructed with cinderblock and plaster walls. Flooring throughout the northwest building is concrete. The interior of the southwest building is constructed with drywall and plaster walls and ceilings. Flooring materials include carpet, floor tile, and linoleum.

3.0 POTENTIAL CLEANUP ALTERNATIVES

The overall goal of any Brownfields cleanup action is to address any environmental conditions preventing or impeding the preferred type of site redevelopment, and to do so in a manner protective of human health and the environment. Brownfields cleanup alternatives were evaluated to address ACM, LBP, PCBs in caulk, and HHW identified at the site. A Hazardous Materials Survey Targeted Brownfields Assessment (TBA) completed in May 2018 included inspections for asbestos, LBP, PCBs in caulk, and HHW (Tetra Tech 2018). Findings from the Hazardous Materials Survey TBA indicated presence of ACM, LBP, and PCBs in structural materials of the site buildings. The Hazardous Materials Survey TBA also found HHW, consisting of the following types of materials: fluorescent light bulbs and thermostats (potentially containing metals, including mercury), electrical ballasts (potentially containing PCBs), exit signs and smoke detectors (potentially containing low-level radiation sources and metals), elevator equipment, and white goods (microwaves, etc.).

Tetra Tech understands that the main building, north building, northwest building, and southwest building will be rehabilitated/renovated, and the 5-story building will be demolished. Planned future use of the buildings is residential apartment units. For the purposes of this ABCA, alternatives discussed for cleanups of buildings are appropriate for both rehabilitation/renovation and demolition (unless specifically noted).

The following sections describe Brownfields cleanup alternatives for addressing ACM, LBP, PCBs, and HHW identified at the site, including a "No Action" alternative. Following the description, each alternative is evaluated in terms of its effectiveness, implementability, and cost.

"Effectiveness" of an alternative refers to its ability to meet objectives of the Brownfields cleanup. Specific criteria applied to assess effectiveness of an alternative include the following:

- Overall protection of public health and the environment
- Compliance with applicable or relevant and appropriate requirements (ARAR) and other criteria, advisories, and guidance
- Long-term effectiveness (includes resilience to impacts associated with natural disasters, climate change, etc.); specific effects of climate change evaluated for the site were increased/decreased temperatures and precipitation, as well as extreme weather events (e.g., storms of unusual intensity, and increased frequency and intensity of localized flooding events)

- Reduction of toxicity, mobility, or volume through treatment/removal
- Short-term effectiveness.

The implementability criterion addresses technical and administrative feasibility of implementing an alternative, and availability of various services and materials required during implementation of that alternative. Specific criteria used to assess implementability of an alternative are:

- Technical feasibility
- Administrative feasibility
- Availability of services and materials
- State acceptance
- Community acceptance.

Each alternative is evaluated to determine its estimated cost. The evaluations compare each alternative's direct capital costs, which include equipment, services, and contingency allowances. The purpose of evaluating each alternative is to determine its advantages and disadvantages relative to the other alternatives in order to identify key tradeoffs that would affect selection of the preferred alternative.

3.1 EVALUATED CONTAMINATION

Contaminants and items potentially containing hazardous materials evaluated as part of this ABCA include ACM, LBP, PCBs in caulk, and HHW. The sections below discuss contaminants/materials identified during the 2018 Hazardous Materials Survey TBA at the site. Site photographs are in Appendix B.

3.1.1 Asbestos-containing Materials

During the Hazardous Materials Survey TBA, 405 samples of building materials suspected to contain ACM were collected for laboratory analysis. The following materials were determined to contain asbestos: roof tar sealant, 9- by 9-inch vinyl tile and associated mastic, 12- by 12-inch vinyl tile and associated mastic, linoleum, transite cement board, thermal system insulation (TSI), wall mastic, and window caulk (Tetra Tech 2018). In those materials, asbestos (chrysotile and amosite) was detected at concentrations that ranged from 1.75 to 45 percent (%). EPA defines ACM as any material containing asbestos at a concentration above 1%. Figures 3A through 3E in Appendix A show ACM locations. Table 1 summarizes ACM identified during the Phase II TBA.

TABLE 1

ASBESTOS-CONTAINING MATERIALS
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Material	Location	Estimated Quantity	Asbestos Result
5-Story Building			
12" X 12" Brown Floor Tile	Basement Southwest Room	200 SF	Floor Tile – 5% Chrysotile Black Mastic – 10% Chrysotile
Off White Linoleum	Throughout 1st Floor Under Carpet, Throughout 2nd Floor (under carpet in some areas), 3rd-Floor Southeast Room, and 5th-Floor North Wing	28,950 SF	Linoleum – 25% Chrysotile White Leveling Compound – No Asbestos Present Grey Leveling Compound – No Asbestos Present Yellow Mastic – No Asbestos Present
12" X 12" Tan with Grey Streaks Floor Tile with Black Mastic	3rd-Floor West Wing – North Offices, 5th-Floor West Wing and Northeast Offices	9,000 SF	Floor Tile – No Asbestos Present Black Mastic – 10% Chrysotile
12" X 12" Tan with Brown Streaks Floor Tile	1st-Floor Offices Near Elevator Hallway, and 5th-Floor East Office	300 SF	Floor Tile – 5% Chrysotile Brown Mastic
Green Squares Linoleum	1st-, 2nd-, and 5th-Floor Bathrooms	210 SF	Linoleum – 25% Chrysotile White Compound – No Asbestos Present
Tan/Yellow Square Linoleum	1st-, 2nd-, and 5th-Floor Bathrooms	210 SF	Linoleum – 20% Chrysotile Yellow Mastic – No Asbestos Present
Main Building			
TSI Runs	Basement Boiler Room	200 LF	45% – Chrysotile 10% – Amosite
TSI Joints	Basement Boiler Room	20 LF	45% – Chrysotile 10% – Amosite
TSI Runs	Basement and Minor Spills Throughout Building	400 LF	45% – Chrysotile 10% – Amosite
TSI Joints	Basement	40 LF	45% – Chrysotile 10% – Amosite
Brown Linoleum	Basement – Northwest Room	230 SF	20% – Chrysotile
Tan Wall Mastic	2nd-Floor Northwest Patient Room, behind Wood Paneling	300 SF	15% – Chrysotile
Floor Material with Pink and Tan Spots	2nd-Floor East-Central Patient Bathroom	10 SF	2.25% – Chrysotile
Yellow Linoleum	Basement under Brown Linoleum	230 SF	Linoleum – 15% Chrysotile Yellow Mastic – No Asbestos Present

TABLE 1 (Continued)

ASBESTOS-CONTAINING MATERIALS
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Material	Location	Estimated Quantity	Asbestos Result
5-Story Building			
Roof Tar	Roof Penetrations and Walls	1,200 SF	20% – Chrysotile
9" x 9" Green Floor Tile	3rd -Floor Room 2	100 SF	5%–Chrysotile
North Building			
TSI Runs	Basement, 2nd Floor, and 3rd Floor	155 LF	30% – Amosite 8% – Chrysotile
TSI Joints	Basement, 2nd Floor, and 3rd Floor	15 LF	30% – Amosite 8% – Chrysotile
Black Wall Mastic (large round pucks)	3rd-Floor Sterilizing Room, Room 306, and Hallway	40 SF	20% – Chrysotile
Black Wall Mastic	3rd Floor Room 324	120 SF	15% – Chrysotile
TSI Runs	Attic	250 LF, TSI Spilled Throughout Attic – Approx. 2,500 SF	40% – Amosite 5% – Chrysotile
TSI Joints	Attic	25 LF	30% – Amosite 5% – Chrysotile
Transite Panels	Stored in Attic Boiler Room and on Roof	300 SF	20% – Chrysotile
TSI Runs	Tunnels (three pipe runs that run the length of the building in an "L" shape)	750 LF	30% – Amosite 5% – Chrysotile
TSI Joints	Tunnels	75 LF	30% – Amosite 5% – Chrysotile
Northwest Building			
TSI Joints	South Room	10 LF	15% – Chrysotile 5% – Amosite
TSI Run	Northeast Room, East Central Room, and South Room	30 LF	10% – Amosite 5% – Chrysotile
Window Caulk	Exterior Windows	300 LF	Brown Caulk – 1.75% Chrysotile Cream Caulk with Off-white Surface – No Asbestos Present Green Caulk with White Paint – No Asbestos Present
Southwest Building			
TSI Runs	TSI Runs (laying on floors) and TSI Debris Throughout Floors	250 LF (TSI runs) 2,625 SF (debris throughout floors)	30% – Chrysotile 10% – Amosite
Yellow Linoleum	Hallway (middle layer between carpet and floor tile)	120 SF	15% – Chrysotile
9" X 9" Green Floor Tile	Northwest Room	180 SF	Floor Tile – 0.5% Chrysotile Black Mastic – 2% Chrysotile Yellow Mastic – No Asbestos Present
9" X 9" Red Floor Tile	Southwest Room Under Carpet	180 SF	Floor Tile – 0.75% Chrysotile Black Mastic – 2.25% Chrysotile

TABLE 1 (Continued)

ASBESTOS-CONTAINING MATERIALS
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Material	Location	Estimated Quantity	Asbestos Result
5-Story Building			
			Yellow Mastic – No Asbestos Present
9" X 9" Grey Floor Tile	Hallway and East Room	2,000 SF	Floor Tile – 0.5% Chrysotile Black Mastic – 2.25% Chrysotile Yellow Mastic – No Asbestos Present

Notes:

"	Inches
%	Percent
LF	Linear Feet
SF	Square Feet
TSI	Thermal System Insulation

3.1.2 Lead-based Paint

An LBP inspection was completed during the Hazardous Materials Survey TBA. An Innov-X x-ray fluorescence (XRF) spectrometer was used to perform the LBP inspection. Paint-covered surfaces indicated by the XRF unit to contain lead at concentration equal to or greater than (≥) 1 milligram per square centimeter (mg/cm^2) were considered LBP. No LBP was identified in the 5-story building or in the northwest building. LBP was identified on ceramic wall tile throughout the north building, on various substrates throughout the main building, and on one ceramic tile wall in the southwest building. XRF readings from those components ranged up to approximately 5.0 mg/cm^2. Figures 3A through 3E in Appendix A show LBP locations. Table 2 below summarizes materials determined to contain LBP during the Hazardous Materials Survey TBA.

TABLE 2

MATERIALS CONTAINING LEAD-BASED PAINT
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Paint Color	Location	Component	Substrate	XRF Reading (mg/cm^2)	Damaged*	Quantity
North Building						
Teal	3rd-Floor Hallway	Wall	Ceramic Tile	3.77	No	4,500 SF
White	3rd-Floor Room 306	Wall	Ceramic Tile	>5.00	No	100 SF
Yellow	3rd-Floor Room 310/314	Wall	Ceramic Tile	>5.00	No	800 SF
Black	3rd-Floor Room 326 and 1st Floor by Entrances	Wall	Ceramic Tile	>5.00	No	200 SF
Peach	3rd-Floor Restroom next to Room 324	Wall	Ceramic Tile	>5.00	No	150 SF
Blue	3rd-Floor Room 328/324	Wall	Ceramic Tile	>5.00	No	800 SF
Blue	2nd-Floor Room 227/234	Wall	Ceramic Tile	4.69	No	160 SF
Light Yellow	2nd-Floor Room 232	Wall	Ceramic Tile	>5.00	No	60 SF
Pink	2nd-Floor Northwest Bathroom	Wall	Ceramic Tile	>5.00	No	50 SF
Yellow	1st-Floor North Room	Wall	Ceramic Tile	>5.00	No	100 SF
Off-White	Basement North Room	Wall	Ceramic Tile	4.06	No	200 SF
Teal	Basement South Rooms	Wall	Ceramic Tile	>5.00	No	300 SF
Main Building						
Black	Chapel – 3rd-Floor West Room	Wall	Ceramic Tile	>5.00	No	100 SF
Blue	Chapel – 2nd-Floor South Room	Wall	Ceramic Tile	>5.00	No	50 SF
Brown	Chapel – Exterior	Window Frame	Wood	2.9	Yes	600 SF
Brown	Exterior	Window Frame	Wood	>5.00	Yes	1,500 SF
Yellow	Attic Closet	Wall	Plaster	>5.00	Yes	200 SF
Peach	3rd-Floor Room 311	Wall	Plaster	>5.00	No	400 SF
Green	3rd-Floor Rooms 316, 318, 320, 325, 327, 329, 330	Wall	Ceramic Tile	>5.00	No	1,000 SF
Beige	3rd-Floor Hallway between Rooms 322 and 326	Wall/Ceiling	Plaster	3.5	Yes	600 SF
Beige	3rd-Floor Room 326	Wall	Plaster	>5.00	Yes	400 SF
Beige	3rd-Floor Room 324	Ceiling	Plaster	>5.00	Yes	400 SF
Beige	3rd-Floor Hallway (north end)	Cabinets	Wood	1.54	Yes	30 SF

TABLE 2 (Continued)

MATERIALS CONTAINING LEAD-BASED PAINT
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Paint Color	Location	Component	Substrate	XRF Reading (mg/cm^2)	Damaged*	Quantity
Beige	3rd-Floor Hallway Transition to North Building	Wall	Plaster	>5.00	Yes	200 SF
Beige	3rd-Floor Room 329	Wall	Plaster	>5.00	Yes	400 SF
Beige	3rd-Floor Room 330	Wall	Plaster	>5.00	Yes	400 SF
Off-White	2nd-Floor Hallway	Wall	Plaster	2.00	Yes	1,500 SF
Dark Green	2nd-Floor Hallway	Wall	Plaster	3.00	No	
Dark Yellow	2nd-Floor North Rooms	Wall	Plaster	2.98	Yes	400 SF
Peach	2nd-Floor North Room on East Side	Wall	Plaster	2.93	Yes	200 SF
Blue	2nd-Floor North Room on East Side	Wall	Plaster	2.01	Yes	200 SF
Peach	2nd-Floor North Hallway Bathroom	Wall	Ceramic tile	3.58	Yes	50 SF
Beige	2nd-Floor North Hallway	Ceiling	Plaster	3.49	Yes	750 SF
Pink	1st-Floor South Rooms	Wall	Plaster	>5.00	Yes	2,000 SF
Peach	1st-Floor Southeast Rooms	Wall	Plaster	1.39	Yes	600 SF
Beige	1st-Floor North Hallway	Wall	Plaster	4.44	Yes	3,600 SF
Tan	1st-Floor North Hallway Restroom	Wall	Ceramic Tile	>5.00	No	200 SF
Pink	1st-Floor North Hallway East Room	Wall	Plaster	2.70	Yes	300 SF
Yellow	1st-Floor North Hallway East Room	Wall	Plaster	>5.00	Yes	200 SF
Green	1st-Floor North Hallway and West Room	Wall	Plaster	2.26	Yes	500 SF
Brown	1st-Floor North Hallway West Room	Wall	Plaster	1.78	Yes	200 SF
Purple	1st-Floor North Hallway West Room	Wall	Plaster	2.95	Yes	200 SF
White	1st-Floor North Hallway and Rooms	Ceiling	Plaster	3.11	Yes	4,500 SF
Beige	Basement Throughout	Wall/Ceiling	Plaster	>5.00	Yes	11,800 SF
Off-White	Basement Throughout	Wall/Ceiling	Plaster	>5.00	Yes	
Green	Basement East Rooms	Wall	Ceramic Tile	4.66	No	500 SF
Beige	Basement Rooms	Door Frame	Wood	3.00	Yes	300 SF
Beige	Basement Rooms	Door Frame	Metal	4.00	Yes	

TABLE 2 (Continued)

MATERIALS CONTAINING LEAD-BASED PAINT
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Southwest Building						
Peach	North Bathroom	Wall	Ceramic tile	4.95	No	50 SF

Notes:

* This column identifies damaged LBP surfaces. If no damage is present prior to renovation activities, preliminary removal of chipping and peeling paint is not necessary prior to the encapsulation process.

>	Greater than	NA	Not applicable	ID	Identification	SF	Square feet
mg/cm^2	Milligrams per square centimeter	No.	Number	LBP	Lead-based paint	XRF	X-ray fluorescence

3.1.3 Polychlorinated Biphenyls

A PCB survey was completed during the Hazardous Materials Survey TBA to quantify suspect PCB-containing caulk materials at the site buildings. EPA has set an action level of 50 parts per million (ppm) for PCBs in materials, and that was the benchmark used for the survey. PCB-containing caulk was identified only on the exterior of the North Building in window and expansion joint caulk. Figures 3A through 3E in Appendix A show PCB locations. Table 3 summarizes PCB-containing caulk materials identified during the Phase II TBA.

TABLE 3

IDENTIFIED PCB-CONTAINING CAULK
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Material Description	Material Locations	Analyte Description	Analytical Result (ppm)	Quantity
North Building				
Window Caulk	Exterior	PCB-1254 (Aroclor 1254)	35,600	2,900 LF
Tan Expansion Joints	Exterior – Entrance	PCB-1254 (Aroclor 1254)	26,200	100 LF
Light Tan Expansion Joint	Exterior – Entrance Side Walls	PCB-1254 (Aroclor 1254)	233	30 LF

Notes:

LF Linear feet
PCB Polychlorinated biphenyl
ppm Parts per million

3.1.4 Household Hazardous Waste

A hazardous materials survey of the buildings was completed during the Hazardous Materials Survey TBA to quantify items/materials potentially containing hazardous materials inside the site buildings. Table 4 below summarizes HHW identified inside the site buildings.

TABLE 4

IDENTIFIED HOUSEHOLD HAZARDOUS WASTE
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Type of Household Hazardous Waste	Assessed Quantity
5-Story Building	
Lamps	
Fluorescent	
Compact Fluorescent (CFL)	
Neon	
Non-PCB Ballasts	
Fluorescent	
Compact Fluorescent (CFL)	
Neon	
Batteries	
Smoke Detectors	
Emergency Lighting System	3
Exit Signs	
Automobile	
Heating, Ventilation, and Air Conditioning	
Thermostats	
Boilers, Furnaces, Water Heaters, and Tanks	
Mercury flame sensor (adjacent to pilot lights)	
Control Switches	
Polychlorinated Biphenyls (PCB): transformers, light ballasts	
Transformers	
PCB Ballasts	
Non-PCB Ballasts	
Chlorofluorocarbons (CFC) and Hydrochlorofluorocarbons (HCFC) Refrigerants	
Air Conditioners	
Water Fountains	
Fire Extinguishers	3
Others	

TABLE 4 (Continued)

IDENTIFIED HOUSEHOLD HAZARDOUS WASTE
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Type of Household Hazardous Waste	Assessed Quantity
5-Story Building	
Other: misc. hazardous wastes, household hazardous wastes, oils	
Computers	
Other electronic recyclables	
Oils, containers	
Paints	1
Solvents	
Hydraulic lifts	
Elevator	2
Tanks (aboveground, underground)	
Others (describe) Tire Guard Sealer	1
Others (describe) Cleaning Supplies (Glass Cleaner)	2
Others (describe) Lime A-Away	1
Others (describe) Aerosol Cans	2
Main Building	
Lamps	
Fluorescent	
Compact Fluorescent (CFL)	
Neon	
PCB Ballasts	
Fluorescent	10
Compact Fluorescent (CFL)	
Neon	
Others (describe) Ballasts	2
Others (describe)	
Batteries	
Smoke Detectors	
Exit Signs	1
Automobile	
Emergency Lighting System	3
Heating, Ventilation, and Air Conditioning	
Thermostats	1
Boilers, Furnaces, Water Heaters, and Tanks	
Mercury flame sensor (adjacent to pilot lights)	
Control Switches	
Polychlorinated Biphenyls (PCB): transformers, light ballasts	
Transformers	
PCB Ballasts	
Non-PCB Ballasts	

TABLE 4 (Continued)

IDENTIFIED HOUSEHOLD HAZARDOUS WASTE
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Type of Household Hazardous Waste	Assessed Quantity
Main Building	
Chlorofluorocarbons (CFC) and Hydrochlorofluorocarbons (HCFC)	
Air Conditioners	
Water Fountains	
Fire Extinguishers	
Other: misc. hazardous wastes, household hazardous wastes, oils	
Computers	
Other electronic recyclables: TV, Printer	2
Oils, containers	1
Paints	
Solvents	6
Hydraulic lifts	
Tanks (aboveground, underground): approximately 50-gallon tank in boiler room pit	1
White goods: Microwave	1
Elevator	2
Chemicals spilled on floor in Room 321 (sodium phosphate, potassium acetate, ferrous sulfate, and others)	1
North Building	
Lamps	
Fluorescent	
Compact Fluorescent (CFL)	
Neon	
PCB Ballasts	
Fluorescent	3
Compact Fluorescent (CFL)	4
Neon	
Batteries	
Smoke Detectors	
Exit Signs	
Automobile	
Emergency Lighting System	2
Elevator Shaft	2
Heating, Ventilation, and Air Conditioning	
Thermostats	
Boilers, Furnaces, Water Heaters, and Tanks	
Mercury flame sensor (adjacent to pilot lights)	
Control Switches	

TABLE 4 (Continued)

IDENTIFIED HOUSEHOLD HAZARDOUS WASTE
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Type of Household Hazardous Waste	Assessed Quantity
North Building	
Polychlorinated Biphenyls (PCB): transformers, light ballasts	
Transformers	
PCB Ballasts	
Non-PCB Ballasts	
Chlorofluorocarbons (CFC) and Hydrochlorofluorocarbons (HCFC)	
Air Conditioners	
Water Fountains	
Fire Extinguishers	2
Other: misc. hazardous wastes, household hazardous wastes, oils	
Computers	
Other electronic recyclables	
Oils, containers	
Paints	
Solvents	
Hydraulic lifts	
Tanks (aboveground, underground)	
Other (describe) Ammonia Hydroxide	2
Other (describe) Aerosol	1
Northwest Building	
Lamps	
Fluorescent	
Compact Fluorescent (CFL)	
Neon	
Non-PCB Ballasts	
Fluorescent	
Compact Fluorescent (CFL)	
Neon	
Batteries	
Smoke Detectors	
Exit Signs	
Automobile	
Others (describe) Buffer Machine	1
Heating, Ventilation, and Air Conditioning	
Thermostats	
Boilers, Furnaces, Water Heaters, and Tanks	
Mercury flame sensor (adjacent to pilot lights)	
Control Switches	
Polychlorinated Biphenyls (PCB): transformers, light ballasts	

TABLE 4 (Continued)

IDENTIFIED HOUSEHOLD HAZARDOUS WASTE
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Type of Household Hazardous Waste	Assessed Quantity
Northwest Building	
Transformers	
PCB Ballasts	
Non-PCB Ballasts	
Chlorofluorocarbons (CFC) and Hydrochlorofluorocarbons (HCFC)	
Air Conditioners	
Water Fountains	
Fire Extinguishers	
Other: misc. hazardous wastes, household hazardous wastes, oils	
Computers	
Other electronic recyclables	
Oils, containers	
Paints	
Solvents	
Hydraulic lifts	
Tanks (aboveground, underground)	
Southwest Building	
Lamps	
Fluorescent	
Compact Fluorescent (CFL)	
Neon	
Non-PCB Ballasts	
Fluorescent	
Compact Fluorescent (CFL)	
Neon	
Batteries	
Smoke Detectors	1
Exit Signs	
Automobile	
Security system and alarms	1
Heating, Ventilation, and Air Conditioning	
Thermostats	1
Boilers, Furnaces, Water Heaters, and Tanks	
Mercury flame sensor (adjacent to pilot lights)	
Control Switches	
Polychlorinated Biphenyls (PCB): transformers, light ballasts	
Transformers	
PCB Ballasts	
Non-PCB Ballasts	

TABLE 4 (Continued)

IDENTIFIED HOUSEHOLD HAZARDOUS WASTE
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Type of Household Hazardous Waste	Assessed Quantity
Southwest Building	
Chlorofluorocarbons (CFC) and Hydrochlorofluorocarbons (HCFC)	
Air Conditioners	
Water Fountains	
Fire Extinguishers	
Other: misc. hazardous wastes, household hazardous wastes, oils	
Computers	
Other electronic recyclables	
Oils, containers	
Paints	
Solvents	
Hydraulic lifts	
Tanks (aboveground, underground)	
Others (describe) white goods, refrigerator	1

3.2 EVALUATION OF CLEANUP ALTERNATIVES

Evaluated cleanup alternatives include three options for ACM, three options for LBP, two options for PCBs, and two options for HHW. Evaluations have been developed with specific considerations of procedural requirements of the Missouri Department of Natural Resources (MDNR) Brownfields/Voluntary Cleanup Program (BVCP), and technical guidance via Missouri Risk-Based Corrective Action (MRBCA). These considerations were appropriate because cleanup projects implemented with EPA Brownfields Cleanup funding generally require participation in a state voluntary cleanup program (or equivalent).

3.2.1 Asbestos-containing Materials

For addressing ACM, three options were evaluated: (1) no action, (2) Operations and Maintenance (O&M) Plan, and (3) proper abatement.

Alternative 1: No Action

Alternative 1 (no action) would leave ACM in place at the site.

Effectiveness

This alternative would not be effective regarding demolition or rehabilitation of the site buildings that contain ACM. In accordance with National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations, demolition or rehabilitation/renovation of the site buildings cannot precede proper abatement; therefore, rehabilitation/renovation or demolition could not occur if this alternative would be selected. This alternative would also be ineffective in achieving the goal of reducing health risks.

Implementation

Implementation of this alternative is straightforward—the ACM would be left in place. Rehabilitation/renovation or demolition of the on-site buildings could not occur prior to abatement.

Cost

This alternative would not involve any direct costs.

Alternative 2: O&M Plan

Alternative 2 (O&M Plan) would leave in place at the site ACM not damaged or spilled. The damaged or spilled ACM would require proper abatement by a State of Missouri Licensed Asbestos Abatement Contractor in accord with applicable local, state, and federal regulations.

Effectiveness

This alternative would be effective regarding rehabilitation of the site buildings that contain ACM—all site buildings except the 5-story building that will be demolished. This alternative would also be effective in achieving the goal of reducing health risks. However, ACM that remains in place would have to be regularly monitored to ensure that it is not damaged, and future redevelopment plans would have to consider locations and condition of the ACM, and ensure those materials would not be disturbed.

Implementation

Implementation of this alternative would include leaving ACM in place and properly abating damaged or spilled ACM. An O&M Plan would be developed to document presence and locations of ACM, and future maintenance procedures regarding the ACM. In addition, filing the O&M Plan on the property's chain of title as an institutional control would be required.

Cost

Cost of completing an O&M Plan described above would be $3,500. This cost does not include abatement of damaged or spilled ACM.

Alternative 3: Abatement of Asbestos-containing Material

Alternative 3 would involve proper abatement of ACM identified at the site, which includes roof tar sealant, 9- by 9-inch vinyl tile and associated mastic, 12- by 12-inch vinyl tile and associated mastic, linoleum, transite cement board, TSI, wall mastic, and window caulk. Abatement by a State of Missouri Licensed Asbestos Abatement Contractor would accord with applicable local, state, and federal regulations. Regulatory clearance would be obtained through successful implementation of a pre-approved Remedial Action Plan (RAP), including clearance sampling (if necessary) and pre-/post-abatement inspections.

Effectiveness

If all identified ACM could be removed, Alternative 3 would be most effective in reducing risk to human health posed by ACM. In addition, full abatement would allow redevelopment of the site without restrictions concerning disturbance of ACM.

Implementation

Abatement by a State of Missouri Licensed Asbestos Abatement Contractor would accord with applicable local, state, and federal regulations.

Cost

Estimated abatement costs were gathered from local vendors. Costs per square foot (SF) are provided, and include removal and disposal costs. Abatement cost for the ACM associated with the 5-story building is estimated at $218,880. Abatement cost for the ACM associated with the main building is estimated at $26,227.50. Abatement cost for the ACM associated with the north building is estimated at $95,340. Abatement cost for the ACM associated with the northwest building is estimated at $2,800. Abatement cost for the ACM associated with the southwest building is estimated at $80,035. No restoration costs have been accounted for. Table 5 below summarizes abatement costs for ACM identified in all five buildings at the site.

TABLE 5

ACM ABATEMENT COSTS
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

5-Story Building				
Material	**Location**	**Estimated Quantity**	**Cost/Unit ($/SF)**	**Total Cost**
Vinyl Floor Tile and Mastic	Throughout Building	9,200 SF	$3.00	$27,600
Vinyl Floor Tile	Throughout Building	300 SF	$1.25	$375
Linoleum Flooring	Throughout Building	29,370 SF	$6.50	$190,905
			Total ACM Abatement Cost for 5-Story Building	**$218,880.00**
Main Building				
Material	**Location**	**Estimated Quantity**	**Cost/Unit ($/SF or $/LF)**	**Total Cost**
Vinyl Floor Tile	3rd-Floor Room 2	100 SF	$1.25	$125
TSI	Throughout Building	660 LF	$25.00	$16,500
Linoleum	Basement – Northwest Room	460 SF	$6.50	$2,990
Wall Mastic	2nd-Floor Northwest Patient Room, behind Wood Paneling	300 SF	$4.00	$1,200
Flooring Material	2nd-Floor East-Central Patient Bathroom	10 SF	$1.25	$12.50
Roof Tar	Roof Penetrations and Walls	1,200 SF	$4.50	$5,400
			Total ACM Abatement Cost for Main Building	**$26,227.50**
North Building				
Material	**Location**	**Estimated Quantity**	**Cost/Unit ($/SF or $/LF)**	**Total Cost**
TSI	Throughout Building	3,770 LF	$25.00	$94,250
Wall Mastic	3rd-Floor Sterilizing Room, Room 306, Hallway, and Room 324	160 SF	$4.00	$640
Transite Panels	Stored in Attic Boiler Room and on Roof	300 SF	$1.50	$450
			Total ACM Abatement Cost for North Building	**$95,340**
Northwest Building				
Material	**Location**	**Estimated Quantity**	**Cost/Unit ($/LF)**	**Total Cost**
TSI	Northeast Room, East Central Room, and South Room	40 LF	$25.00	$1,000
Window Caulk	Exterior Windows	300 LF	$6.00	$1,800
			Total ACM Abatement Cost for Northwest Building	**$2,800**

TABLE 5 (Continued)

ACM ABATEMENT COSTS
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Southwest Building				
Material	**Location**	**Estimated Quantity**	**Cost/Unit ($/SF or $/LF)**	**Total Cost**
Vinyl Floor Tile and Mastic	Northwest Room, Southwest Room, East Room, and Hallway	2,460 SF	$3.00	$7,380
TSI	TSI Runs (laying on floors) and TSI Debris Throughout Floors	2,875 LF	$25.00	$71,875
Linoleum	Hallway (middle layer between carpet and floor tile)	120 SF	$6.50	$780
Total ACM Abatement Cost for Southwest Building				**$80,035.00**

Notes:

ACM	Asbestos-containing material
ft^2 or SF	Square foot/feet
LF	Linear feet
TSI	Thermal System Insulation

3.2.2 Lead-based Paint

Three cleanup alternatives were evaluated to address LBP found on building materials. The alternatives include no action, removal through demolition, and removal through chemical stripping. Implementing the latter two approaches (excluding no action) can achieve clearance under the MDNR BVCP.

As previously discussed, LBP was identified on ceramic tile throughout the north building, on various substrates throughout the main building, and on one ceramic tile wall in the southwest building. For sites enrolled in the BVCP, MDNR requires creation of an O&M Plan to document existence, location, and future maintenance procedures regarding LBP left in place.

Alternative 1: No Action

Alternative 1 (no action) would leave LBP in place at the site.

Effectiveness

This alternative would not be effective regarding redevelopment of the property. Proposed redevelopment of the areas containing LBP would be restricted to ensure that those materials would not be disturbed. This alternative would also be ineffective in achieving the goal of reducing health risks.

Implementation

Implementation of this alternative is straightforward—LBP would be left in place. Redevelopment would have to consider locations and condition of LBP, and ensure those materials would not be disturbed.

Cost

This alternative would not involve any direct costs.

Alternative 2: Interior Demolition of LBP Surfaces

Alternative 2 includes complete demolition of all interior surfaces that contain LBP, and removal of all building components that contain LBP. This is the most direct approach, because all LBP would be removed. Regulatory clearance would be obtained through successful implementation of a pre-approved RAP. Disposal characterization testing would be required prior to disposal via Toxicity Characterization Leaching Procedure (TCLP) analysis. Any materials not passing the TCLP analysis would have to be disposed of as hazardous waste. Moreover, implementing this alternative would imply that the building will undergo some type of renovation; therefore, collection of dust-wipe samples in accordance with MDNR clearance regulations would be necessary after completion of all interior renovations in order to verify that all lead dust levels are below MDNR clearance levels.

Effectiveness

LBP would be permanently removed. This alternative would allow redevelopment of the site without need for restrictions to avoid disturbance of LBP.

Implementation

Demolition and disposal by State of Missouri Licensed Lead Abatement Contractors would accord with applicable state and federal regulations. Approximately 42,520 SF of LBP is present on multiple surfaces within interiors and on exteriors of site buildings.

Cost

Cost to remove/dispose of LBP-containing components associated with the main building, the north building, and the southwest building are listed in Table 6 below. Removal/disposal cost for the LBP associated with the main building is estimated at $87,625. Removal/disposal cost for the LBP associated with the north building is estimated at $18,550. Removal/disposal cost for the LBP associated with the southwest building is estimated at $125.

TABLE 6

LEAD-BASED PAINT INTERIOR DEMOLITION COSTS
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Main Building				
Material	**Location**	**Estimated Quantity**	**Cost/Unit**	**Total Cost**
Glazing on ceramic tile (various colors), plaster walls and ceilings, wood window frames, wood and metal door frames	Interior walls and ceilings, and exterior window frames throughout the main building	35,050 SF	$2.50/ft^2	$87,625
Total LBP Interior Demolition of LBP Surfaces Cost for Main Building				**$87,625**
North Building				
Material	**Location**	**Estimated Quantity**	**Cost/Unit**	**Total Cost**
Glazing on ceramic wall tile (various colors)	Throughout building	7,420 SF	$2.50/ft^2	$18,550
Total LBP Interior Demolition of LBP Surfaces Cost for North Building				**$18,550**
Southwest Building				
Material	**Location**	**Estimated Quantity**	**Cost/Unit**	**Total Cost**
Glazing on ceramic wall tile (peach)	North Bathroom	50 SF	$2.50/ft^2	$125
Total LBP Interior Demolition of LBP Surfaces Cost for Southwest Building				**$125**

Notes:

ft^2 or SF Square foot/feet
LBP Lead-based paint

Alternative 3: Lead-based Paint Stabilization and Application of Encapsulation

Alternative 3 includes stabilization of LBP in poor condition (peeling, flaking, etc.) and application of an encapsulant to all LBP surfaces. The encapsulant would be a durable, air- and dust-tight, surface coating material. Application of the encapsulant would ensure that LBP remaining could not leach to the surface and pose a threat to future occupants.

Compared to Alternative 2, waste generation and disposal would be reduced. Regulatory clearance would be obtained through successful implementation of a pre-approved RAP and pre-/post-encapsulation inspections by MDNR. In addition, collection of dust-wipe samples in accordance with MDNR clearance regulations would be necessary after completion of all interior renovations in order to verify that all lead dust levels are below MDNR clearance levels.

Effectiveness

Encapsulation is a relatively simple process that does not significantly alter structural conditions. This alternative would allow redevelopment of the site; however, restrictions (institutional controls) would apply concerning future disturbance of LBP. For sites enrolled in the MDNR BVCP, MDNR requires creation of an O&M Plan to document presence and locations of LBP, and future maintenance procedures regarding the LBP. In addition, filing the O&M Plan on the property's chain of title as an institutional control would be required.

Implementation

Stabilization and encapsulation by a State of Missouri Licensed Lead Abatement Contractor would accord with applicable state and federal regulations. Encapsulation is not a viable alternative for surfaces subject to impact or friction. Encapsulation requires follow-up inspections, maintenance, and possible building restrictions. Abatement by a registered lead paint contractor would accord with applicable state and federal regulations. This alternative is not a viable option for removing LBP from ceramic tile in the buildings. Therefore, this option would apply only to surfaces (except ceramic tile) in the main building.

Cost

Estimated costs were gathered from local vendors. Costs per SF are provided and include removal and disposal costs. Estimated cost of scraping and encapsulating is $10 per SF. Based on that estimated cost, stabilization cost for the LBP associated with the main building is estimated at $332,500. No restoration costs have been accounted for. Costs to stabilize paint in the main building are included in Table 7.

TABLE 7

LEAD-BASED PAINT STABILIZATION COSTS
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Main Building				
Material	**Location**	**Estimated Quantity**	**Cost/Unit**	**Total Cost**
Plaster walls and ceilings, wood window frames, wood and metal door frames	Interior walls and ceilings, and exterior window frames throughout the main building	33,250 SF	$10.00/SF	$332,500
Total LBP Stabilization Cost for Main Building				**$332,500**

Notes:

SF Square feet

3.2.3 Polychlorinated Biphenyl-containing Caulk

For addressing PCBs in caulk, two options were evaluated: no action and proper abatement.

Alternative 1: No Action

Alternative 1 (no action) would leave PCB-containing caulk in place at the site.

Effectiveness

This alternative would not be effective regarding demolition or rehabilitation of site buildings that contain PCB-containing caulk. Because of the PCBs in the caulk, if renovations or demolition activities impact these materials and they are to be disposed of, disposal must comply with the regulations under 40 *Code of Federal Regulations* (CFR) 761 Subpart N addressing PCBs. Therefore, rehabilitation/renovation or demolition could not occur if this alternative would be selected. This alternative would also be ineffective in achieving the goal of reducing health risks.

Implementation

Implementation of this alternative is straightforward—the PCB-containing caulk would be left in place. Rehabilitation/renovation or demolition of the on-site buildings could not occur prior to abatement.

Cost

This alternative would not involve any direct costs.

Alternative 2: Abatement of PCB-containing Caulk

Alternative 2 would involve proper abatement of PCB identified at the site, which includes window and expansion joint caulk on the exterior of the north building. Abatement would accord with applicable local, state, and federal regulations. Regulatory clearance would be obtained through successful implementation of a pre-approved RAP, including clearance sampling (if necessary) and pre-/post-abatement inspections.

Effectiveness

If all identified PCB-containing caulk could be removed, Alternative 2 would be most effective in reducing risk to human health posed by the PCB-containing caulk. In addition, full abatement would allow redevelopment of the site without restrictions concerning disturbance of PCB-containing caulk.

Implementation

Abatement would accord with applicable local, state, and federal regulations.

Cost

Estimated abatement costs were gathered from local vendors. Costs per linear foot are provided and include removal and disposal costs. Abatement cost for the PCB-containing caulk associated with the north building is estimated at $15,410. Table 8 below lists abatement costs for PCB-containing caulk identified in the north building at the site.

TABLE 8

PCB-CONTAINING CAULK ABATEMENT COSTS
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

North Building				
Material	**Location**	**Estimated Quantity**	**Cost/Unit ($/ft^2)**	**Total Cost**
Window Caulk	Exterior Windows	2,900 LF	$5.00	$14,500
Expansion Joint Caulk	Exterior Entrance Walls	130 LF	$7.00	$910
Total PCB-Containing Caulk Abatement Cost for North Building				**$15,410**

Notes:

ft^2 Square foot
LF Linear feet
PCB Polychlorinated biphenyl

3.2.4 Household Hazardous Waste

Two cleanup alternatives were evaluated to address HHW, which includes fluorescent light bulbs and thermostats (potentially containing metals, including mercury), electrical ballasts (potentially containing PCBs), exit signs and smoke detectors (potentially containing low-level radiation sources and metals), elevator equipment, and white goods (microwaves, etc.). Two options were evaluated: (1) no action, and (2) proper removal and disposal.

Alternative 1: No Action

Alternative 1 (no action) would leave the HHW in place at the site.

Effectiveness

This alternative would not be effective regarding rehabilitation/renovation or demolition of site buildings.

Implementation

Implementation of this alternative is straightforward—the HHW would be left in place.

Cost

This alternative would not involve any direct costs.

Alternative 2: Removal of HHW

Alternative 2 would involve removing the HHW for proper disposal/recycling prior to rehabilitation or demolition activities. Typically, these materials are classified as universal waste and should be handled by a qualified waste management company.

Effectiveness

Alternative 2 would be effective in removing the items potentially containing hazardous materials.

Implementation

Disposal would be arranged by a qualified waste management company. HHW inside site buildings would be removed for proper disposal/recycling.

Cost

Estimated disposal/recycling costs were gathered from local vendors. Estimated disposal/recycling cost for the HHW associated with the 5-story building is $20,675. Estimated disposal/recycling cost for the HHW associated with the main building is $26,108.75. Estimated disposal/recycling cost for the HHW associated with the north building is $20,336.50. Estimated disposal/recycling cost for the HHW associated with the northwest building is $1,000. Estimated disposal/recycling cost for the HHW associated with the southwest building is $595. Table 9 below lists removal costs for HHW identified in site buildings.

TABLE 9

HHW REMOVAL COSTS
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

5-Story Building			
Items	**Quantity**	**Costs Per Unit**	**Estimated Costs**
Emergency Lighting System	3	$50.00	$150.00
Fire Extinguisher	3	$20.00	$60.00
Paints	1	$15.00	$15.00
Elevator	2	$10,000.00	$20,000.00
Tire Guard Sealer	1	$250.00	$250.00
Cleaning Supplies (Glass Cleaner)	2	$50.00	$100.00
Lime A-Away	1	$50.00	$50.00
Aerosol Cans	2	$25.00	$50.00
Total Estimated Removal/Disposal Cost for 5-Story Building			**$20,675**

TABLE 9 (Continued)

HHW REMOVAL COSTS
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

Main Building			
Items	**Quantity**	**Costs Per Unit**	**Estimated Costs**
Fluorescent Light Bulbs	10	$3.00	$30.00
Electrical Ballasts	2	$20.00	$40.00
Exit Signs	1	$20.00	$20.00
Emergency Lighting System	3	$18.75	$56.25
Mercury-Containing Thermostats	1	$12.50	$12.50
Other electronic recyclables: TV, Printer	2	$25.00	$50.00
Oils, containers	1	$100.00	$100.00
Solvents	6	$33.33	$200.00
Approximately 50-gallon tank in boiler room pit	1	$5,000.00	$5,000.00
White goods: Microwave	1	$100.00	$100.00
Elevator	2	$10,000.00	$20,000.00
Chemicals spilled on floor in Room 321 (sodium phosphate, potassium acetate, ferrous sulfate, and others)	1	$500.00	$500.00
Total Estimated Removal/Disposal Cost for Main Building			**$26,108.75**
North Building			
Items	**Quantity**	**Costs Per Unit**	**Estimated Costs**
Fluorescent Light Bulbs	3	$3.00	$9.00
Compact Fluorescent (CFL)	4	$6.25	$25.00
Emergency Lighting System	2	$18.75	$37.50
Fire Extinguisher	2	$20.00	$40.00
Elevator	2	$10,000.00	$20,000.00
Ammonia Hydroxide	2	$100.00	$200.00
Aerosol	1	$25.00	$25.00
Total Estimated Removal/Disposal Cost for North Building			**$20,336.50**
Northwest Building			
Items	**Quantity**	**Costs Per Unit**	**Estimated Costs**
Buffer Machine	1	$1,000.00	$1,000.00
Total Estimated Removal/Disposal Cost for Northwest Building			**$1,000.00**
Southwest Building			
Items	**Quantity**	**Costs Per Unit**	**Estimated Costs**
Smoke Detector	1	$20.00	$20.00
Security System and Alarms	1	$150.00	$150.00
Thermostats	1	$25.00	$25.00
Refrigerator	1	$400.00	$400.00
Total Estimated Removal/Disposal Cost for Southwest Building			**$595.00**

3.3 RECOMMENDED CLEANUP ALTERNATIVES

Recommended cleanup alternatives are consistent with the preferred future plan for the site, which involves rehabilitation/renovation of the main building, north building, northwest building and southwest building, and demolition of the 5-story building.

3.3.1 Asbestos-containing Materials

Alternative 3—abatement of ACM—is the recommended cleanup alternative for ACM associated with all site buildings. Future plans at the site include either rehabilitation/renovation or demolition of those buildings; therefore, removal of the identified ACM would be required prior to commencing those activities.

3.3.2 Lead-based Paint

Alternative 3—removal by renovation/demolition—is the recommended cleanup alternative for LBP associated with the main building, north building, and southwest building. Building materials containing LBP would be demolished and disposed of as demolition waste. This alternative could be implemented by general construction/demolition workers. Based on presence of lead, construction/demolition work must accord with Occupational Safety and Health Administration (OSHA) guidelines for protection of workers.

3.3.3 PCB-containing Caulk Materials

Alternative 2—abatement of PCB-containing caulk materials—is the recommended cleanup alternative for PCB-containing caulk materials associated with the north building. Future plans at the site include rehabilitation/renovation; therefore, removal of the identified PCB-containing caulk material would be required prior to commencing those activities.

3.3.4 Household Hazardous Waste

Alternative 2—removal and disposal/recycling—is the recommended cleanup alternative for HHW in all of site buildings.

3.3.5 Total Cleanup Cost

Total cleanup costs summarized in Table 10 below are detailed for each building. Whether the site will be enrolled in the MDNR BVCP program is unknown; however, fees associated with the program have been included for planning purposes.

Based on the recommended cleanup alternatives for ACM, LBP, PCBs, and HHW, estimated total cleanup cost for all site buildings is $613,707.75. If the site is enrolled in the MDNR BVCP, additional fees should be considered and are included in Table 11. Total estimated cost of MDNR BVCP enrollment is $21,700, which includes fees associated with enrollment, preparation of required technical plans/reports, and cleanup-related sampling.

Abatement of ACM associated with the 5-story building is estimated at $218,800. Proper removal and disposal of the HHW associated with the 5-story building is estimated at $20,675. Abatement of ACM associated with the main building is estimated at $26,227.50. Removal and disposal of LBP associated with the main building is estimated at $87,625. Proper removal and disposal of HHW associated with the main building is estimated at $26,108.75. Abatement of ACM associated with the north building is estimated at $95,340. Removal and disposal of LBP associated with the north building is estimated at $18,550. Abatement of PCB-containing caulk associated with the north building is estimated at $15,410. Proper removal and disposal of HHW associated with the north building is estimated at $20,336.50. Abatement of ACM associated with the northwest building is estimated at $2,800. Proper removal and disposal of HHW associated with the northwest building is estimated at $1,000. Abatement of ACM associated with the southwest building is estimated at $80,035. Removal and disposal of LBP associated with the southwest building is estimated at $125. Proper removal and disposal of HHW associated with the southwest building is estimated at $595.

Fees for enrolling the site in the MDNR BVCP program are $5,200, while fees associated with preparation of technical reports would be $8,000 ($3,500 for a RAP and $4,500 for a Final Cleanup Report). Additionally, clearance sampling for ACM (if required) is estimated at $8,500, including labor and analytical fees.

TABLE 10

SUMMARY OF COSTS
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

5-Story Building		
Contaminant/Material	**Recommended Alternative**	**Total Cost**
ACM	Alternative 3 – Abatement	$218,800.00
HHW	Alternative 2 – Removal of HHW	$20,675.00
Total Cost		**$239,555**
Main Building		
Contaminant/Material	**Recommended Alternative**	**Total Cost**
ACM	Alternative 3 – Abatement	$26,227.50
LBP	Alternative 3 – Removal by Renovation/Demolition	$87,625.00
HHW	Alternative 2 – Removal of HHW	$26,108.75
Total Cost		**$139,961.25**
North Building		
Contaminant/Material	**Recommended Alternative**	**Total Cost**
ACM	Alternative 3 – Abatement	$95,340.00
LBP	Alternative 3 – Removal by Renovation/Demolition	$18,550.00
PCBs	Alternative 2 – Abatement	$15,410.00
HHW	Alternative 2 – Removal of HHW	$20,336.50
Total Cost		**$149,636.50**
Northwest Building		
Contaminant/Material	**Recommended Alternative**	**Total Cost**
ACM	Alternative 3 – Abatement	$2,800.00
HHW	Alternative 2 – Removal of HHW	$1,000.00
Total Cost		**$3,800.00**
Southwest Building		
Contaminant/Material	**Recommended Alternative**	**Total Cost**
ACM	Alternative 3 – Abatement	$80,035.00
LBP	Alternative 3 – Removal by Renovation/Demolition	$125.00
HHW	Alternative 2 – Removal of HHW	$595.00
	Total Cost	**$80,755.00**

Notes:

ACM Asbestos-containing materials
HHW Household hazardous waste
LBP Lead-based paint
PCB Polychlorinated biphenyl

TABLE 11

SUMMARY OF MDNR BVCP COSTS
OLD ST. ELIZABETH HOSPITAL
109 VIRGINIA STREET, HANNIBAL, MISSOURI

MDNR BVCP Costs	
MDNR Brownfields/Voluntary Cleanup Program Fees	$5,200
Technical Documents Preparation (RAP and Final Cleanup Report)	$8,000
Clearance Sampling for ACM (if required)	$8,500
Total Cost	**$21,700**

Notes:

BVCP Brownfields/ Voluntary Cleanup Program
MDNR Missouri Department of Natural Resources
RAP Remedial Action Plan

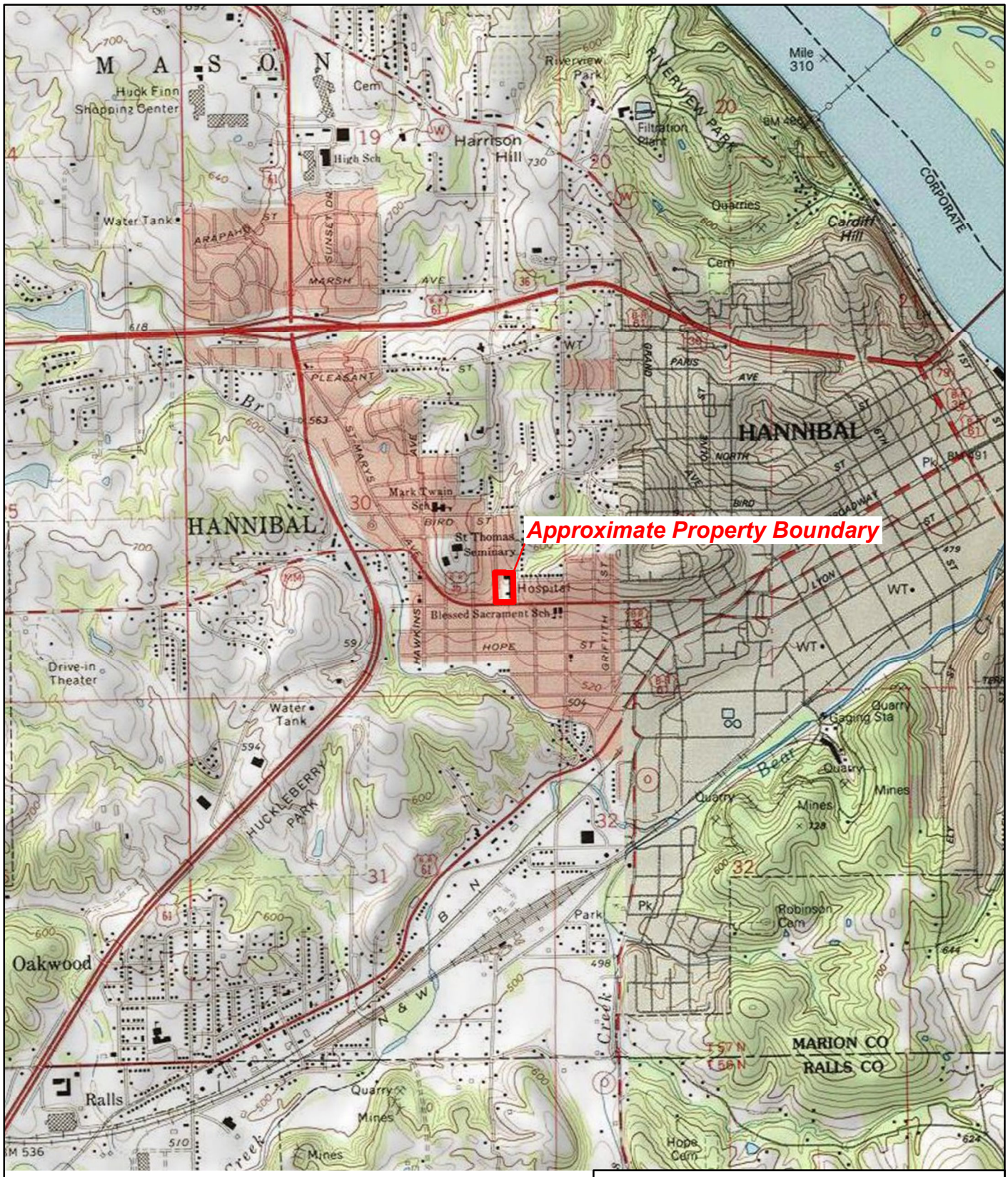
4.0 REFERENCES

Tetra Tech, Inc. (Tetra Tech). 2018. Target brownfields Assessment, Hazardous Materials Survey, Old St. Elizabeth Hospital, Hannibal, Missouri. May.

U.S. Geological Survey (USGS). 1973. Hannibal East, Missouri, 7.5-minute Series Topographic Quadrangle Map.

APPENDIX A

FIGURES



Source: USGS Hannibal East, MO 7.5 Minute Topo Quad, 1973;
USGS Hannibal West, MO 7.5 Minute Topo Quad, 1973

Old St. Elizabeth Hospital
109 Virginia Street
Hannibal, Missouri

Figure 1
Site Location Map

TETRA TECH

Date: 12/19/2017 Drawn By: Nick Wiederholt Project No: X9025.0002.048

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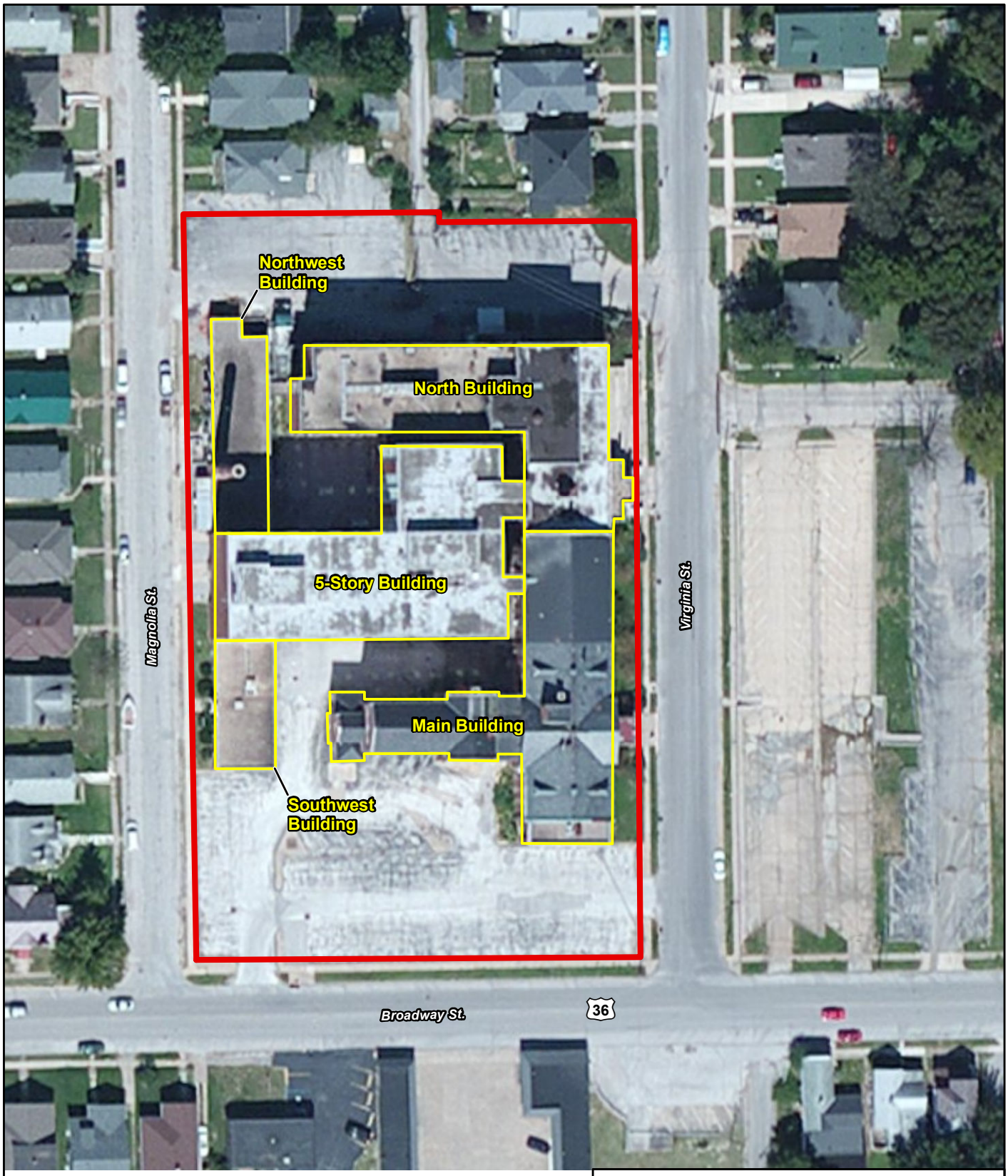

Legend

Approximate property boundary

Building footprint

N

0 40 80

Feet

Source: ESRI, ArcGIS Online, World Imagery, 2016.

Old St. Elizabeth Hospital
109 Virginia Street
Hannibal, Missouri

Figure 2
Site Layout Map

TETRA TECH

Date: 5/15/2018 Drawn By: Nick Wiederholt Project No: X9025.0002.048

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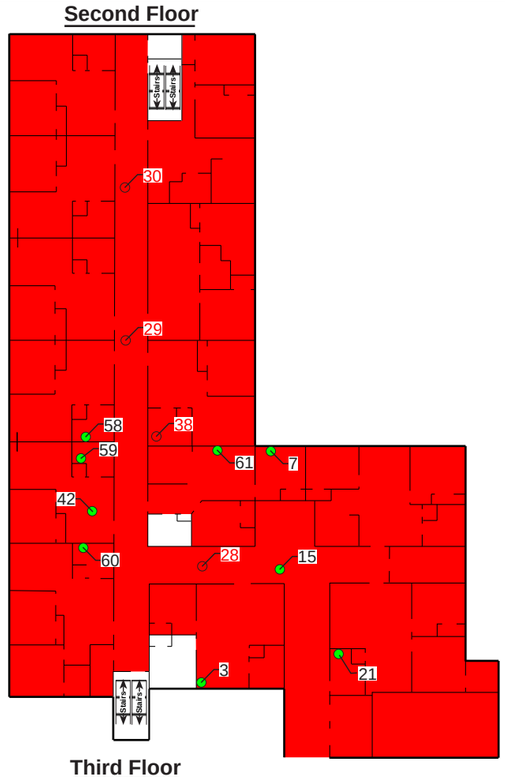
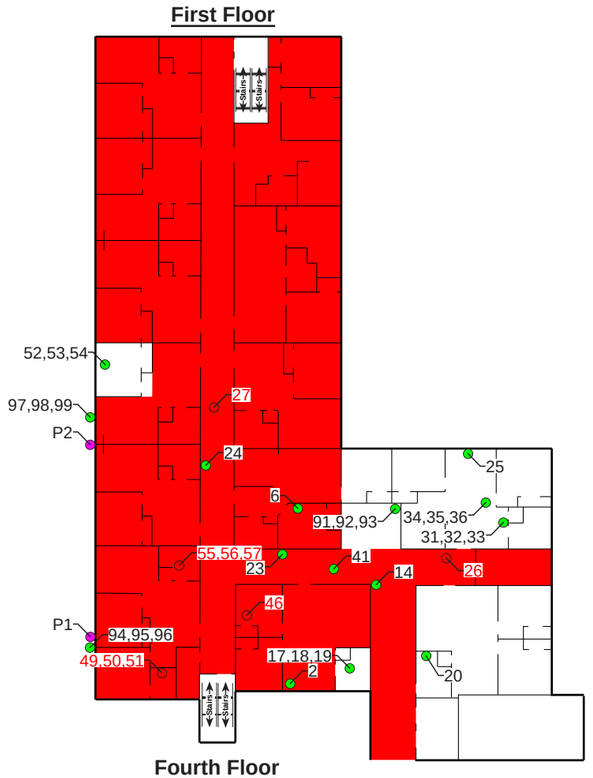
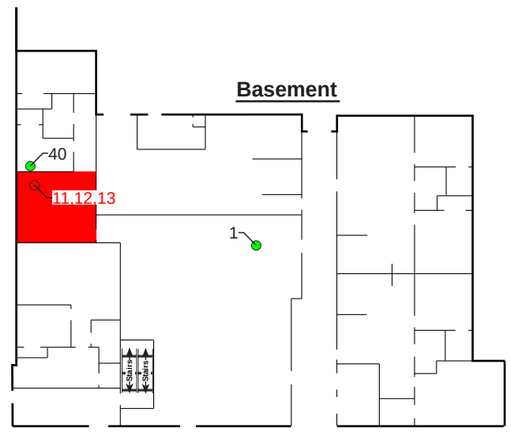
Sample Key Table

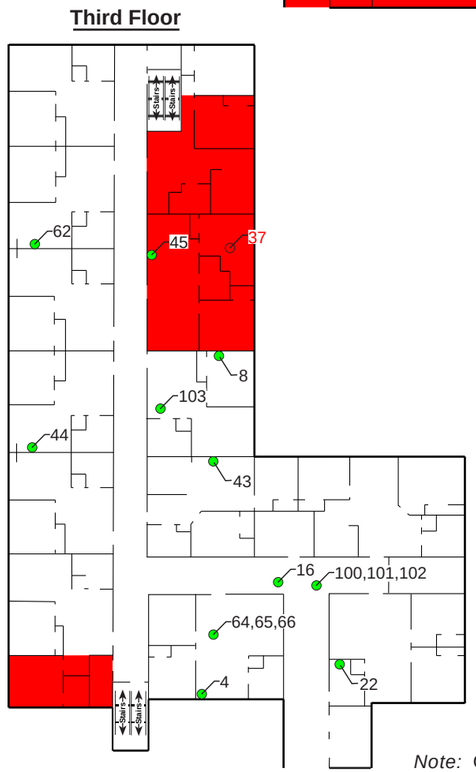
Key	Sample No.
Asbestos	
1	5-FP-1
2	5-FP-2
3	5-FP-3
4	5-FP-4
5	5-FP-5
6	5-DWJC-1
7	5-DWJC-2
8	5-DWJC-3
9	5-DWJC-4
10	5-DWJC-5
11	5-FT-1
12	5-FT-2
13	5-FT-3
14	5-CA-1
15	5-CA-2
16	5-CA-3
17	5-FT2-1
18	5-FT2-2
19	5-FT2-3
20	5-CRTM-1
21	5-CRTM-2
22	5-CRTM-3
23	5-CBM-1
24	5-CBM-2
25	5-CBM-3
26	5-LIN-1
27	5-LIN-2
28	5-LIN-3
29	5-LIN-4
30	5-LIN-5
31	5-LIN2-1
32	5-LIN2-2
33	5-LIN2-3
34	5-CBM2-1
35	5-CBM2-2
36	5-CBM2-3
37	5-FT3-1
38	5-FT3-2
39	5-FT3-3
40	5-CT-1
41	5-CT-2
42	5-CT-3
43	5-CBM3-1
44	5-CBM3-2
45	5-CBM3-3
46	5-FT4-1
47	5-FT4-2
48	5-FT4-3
49	5-LIN3-1
50	5-LIN3-2
51	5-LIN3-3

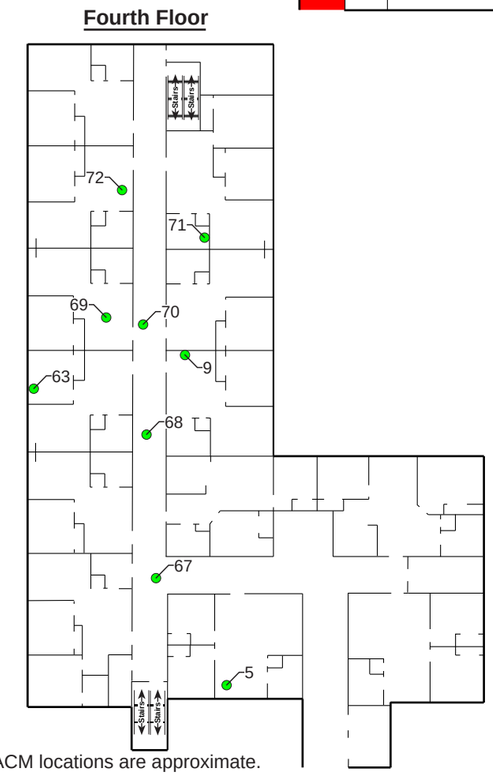
52	5-LIN4-1
53	5-LIN4-2
54	5-LIN4-3
55	5-LIN5-1
56	5-LIN5-2
57	5-LIN5-3
58	5-WM-1
59	5-WM-2
60	5-WM-3
61	5-CBM4-1
62	5-CBM4-2
63	5-CBM4-3
64	5-SU-1
65	5-SU-2
66	5-SU-3
67	5-CA2-1
68	5-CA2-2
69	5-CA2-3
70	5-PLSC-1
71	5-PLSC-2
72	5-PLSC-3
73	5-FT3-1
74	5-FT3-2
75	5-FT3-3
76	5-CBM5-1
77	5-CBM5-2
78	5-CBM5-3
79	5-FT6-1
80	5-FT6-2
81	5-FT6-3
82	5-TSI-1
83	5-TSI-2
84	5-TSI-3
85	5-RM-1
86	5-RM-2
87	5-RM-3
88	5-RT-1
89	5-RT-2
90	5-RT-3
91	5-LIN6-1
92	5-LIN6-2
93	5-LIN6-3
94	5-C-1
95	5-C-2
96	5-C-3
97	5-C2-1
98	5-C2-2
99	5-C2-3
100	5-FT7-1
101	5-FT7-2
102	5-FT7-3
103	5-FT8-1
Polychlorinated Biphenyl	
P1	5-C-1
P2	5-C2-1

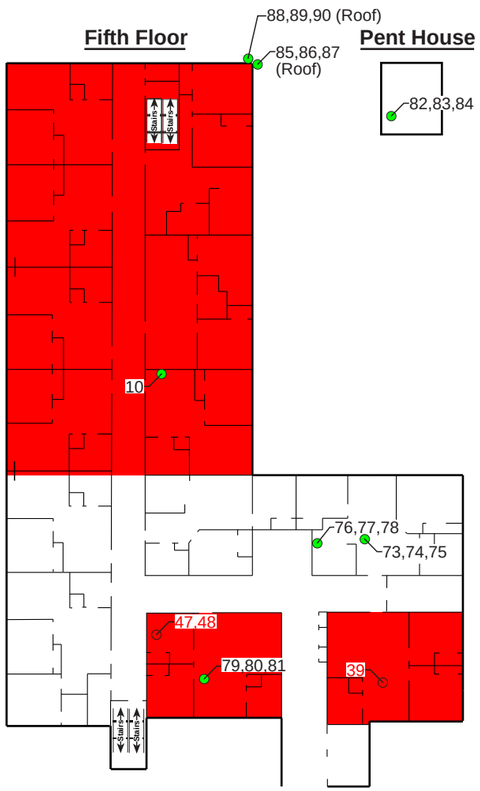












Legend

- Negative ACM Sample Location
- Positive ACM Sample Location
- Negative PCB Sample Location
- Positive ACM Floor Tile / Linoleum

ACM Asbestos Containing Material

PCB Polychlorinated Biphenyl

Source: Stock Design Architecture, St. Elizabeth's Hospital Remodel/Renovation Project, 2012.

Note: Confirmed ACM locations are approximate.

Not to Scale

Limited Asbestos Survey
Old St. Elizabeth Hospital
109 Virginia Street
Hannibal, Missouri

Figure 3A - 5-Story Building
Sample Location Map

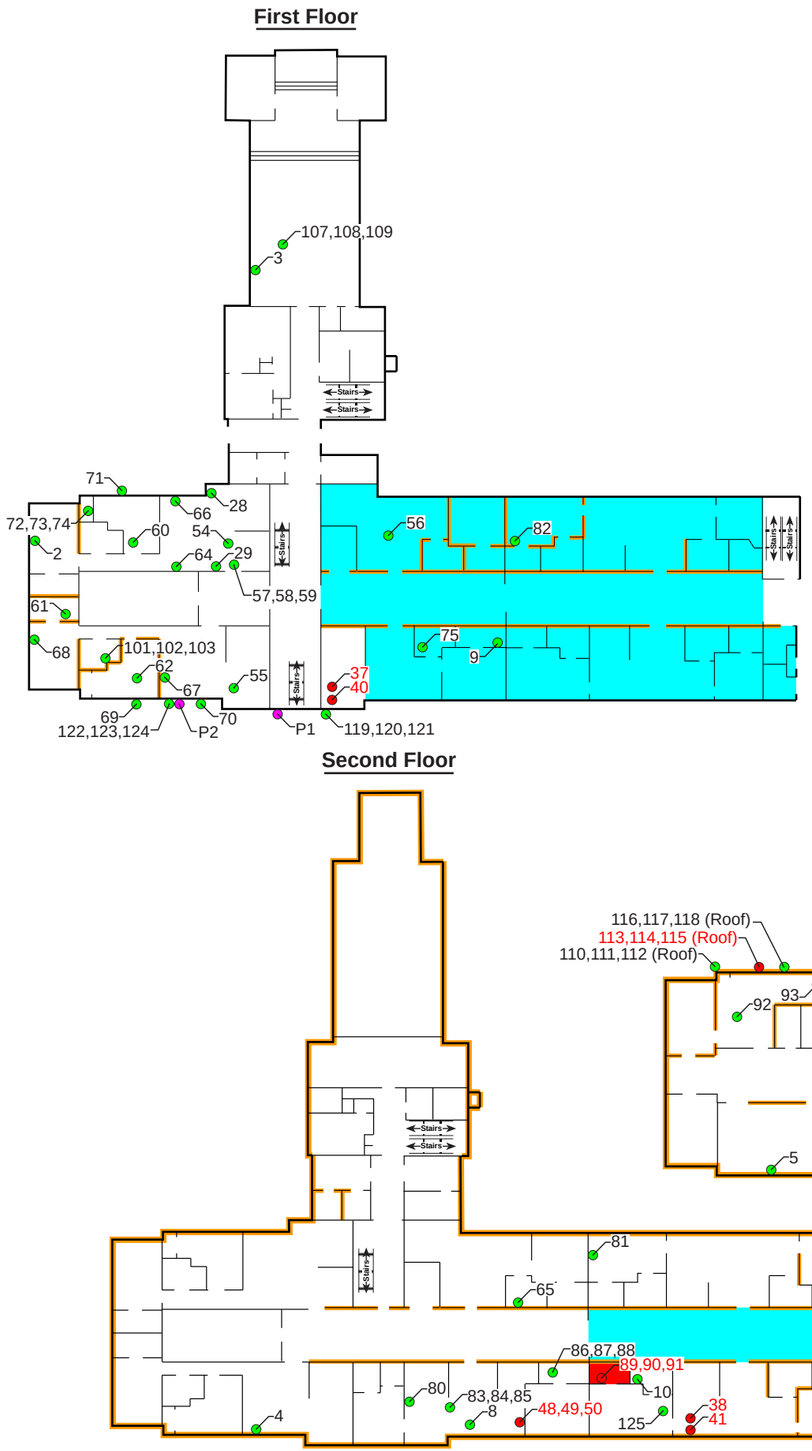
TETRA TECH

Date: 5/3/18 Drawn By: Nick Wiederholt Project No: X9025.14.0002.048

X:\GIS\9025\0002\048\PH1\0048091.8\Figure\3A_5StoryBldg.PH10

Sample Key Table

Key	Sample No.
Asbestos	
1	M-PLSC-1
2	M-PLSC-2
3	M-PLSC-3
4	M-PLSC-4
5	M-PLSC-5
6	M-TR-1
7	M-TR-2
8	M-TR-3
9	M-CRTM-1
10	M-CRTM-2
11	M-CRTM-3
12	M-CT-1
13	M-CT-2
14	M-CT-3
15	M-TSI-1
16	M-TSI-2
17	M-TSI-3
18	M-TSI2-1
19	M-TSI2-2
20	M-TSI2-3
21	M-DWJC-1
22	M-DWJC-2
23	M-DWJC-3
24	M-FT-1
25	M-FT-2
26	M-FT-3
27	M-CBM-1
28	M-CBM-2
29	M-CBM-3
30	M-FT2-1
31	M-FT2-2
32	M-FT2-3
33	M-CT2-1
34	M-CT2-2
35	M-CT2-3
36	M-TSI3-1
37	M-TSI3-2
38	M-TSI3-3
39	M-TSI4-1
40	M-TSI4-2
41	M-TSI4-3
42	M-CA-1
43	M-CA-2
44	M-CA-3
45	M-LIN-1
46	M-LIN-2
47	M-LIN-3
48	M-WM-1
49	M-WM-2
50	M-WM-3
51	M-FP-1
52	M-FP-2
53	M-FP-3
54	M-CA2-1
55	M-CA2-2
56	M-CA2-3
57	M-CT3-1
58	M-CT3-2
59	M-CT3-3
60	M-CT4-1
61	M-CT4-2
62	M-CT4-3
63	M-WM2-1
64	M-WM2-2
65	M-WM2-3
66	M-CBM2-1
67	M-CBM2-2
68	M-CBM2-3
69	M-WG-1
70	M-WG-2
71	M-WG-3
72	M-SU-1
73	M-SU-2
74	M-SU-3
75	M-FT3-1
76	M-FT3-2
77	M-FT3-3
78	M-DWJC2-1
79	M-DWJC2-2
80	M-DWJC2-3
81	M-DWJC2-4
82	M-DWJC2-5
83	M-DWJC3-1
84	M-DWJC3-2
85	M-DWJC3-3
86	M-LIN2-1
87	M-LIN2-2
88	M-LIN2-3
89	M-FM-1
90	M-FM-2
91	M-FM-3
92	M-TR2-1
93	M-TR2-2
94	M-TR2-3
95	M-FT4-1
96	M-FT4-2
97	M-FT4-3
98	M-TR3-1
99	M-TR3-2
100	M-TR3-3
101	M-DWJC4-1
102	M-DWJC4-2
103	M-DWJC4-3
104	M-LIN3-1
105	M-LIN3-2
106	M-LIN3-3
107	M-TR4-1
108	M-TR4-2
109	M-TR4-3
110	M-RM-1
111	M-RM-2
112	M-RM-3
113	M-RT-1
114	M-RT-2
115	M-RT-3
116	M-ST-1
117	M-ST-2
118	M-ST-3
119	M-C-1
120	M-C-2
121	M-C-3
122	M-C2-1
123	M-C2-2
124	M-C2-3
125	M-WM3-1
126	M-FT5-1
127	M-FT5-2
128	M-FT5-3
Polychlorinated Biphenyl	
P1	M-C-1
P2	M-C2-1



Legend

- Negative ACM Sample Location
- Positive ACM Sample Location
- PCB Sample Location
- Positive LBP on Walls / Exterior Windows
- Positive LBP on Ceilings
- Positive ACM Floor Tile / Linoleum

ACM Asbestos Containing Material
LBP Lead-based Paint
PCB Polychlorinated Biphenyl

Source: Stock Design Architecture, St. Elizabeth's Hospital Remodel/Renovation Project, 2012.

Note: Confirmed ACM and LBP locations are approximate.

Not to Scale

Limited Asbestos Survey
Old St. Elizabeth Hospital
109 Virginia Street
Hannibal, Missouri

Figure 3B - Main Building
Sample Location Map

TETRA TECH

Date: 5/3/18 Drawn By: Nick Wiederholt Project No: X9025.14.0002.048

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Sample Key Table

Key	Sample No.
Asbestos	
1	N-PLSC-1
2	N-PLSC-2
3	N-PLSC-3
4	N-PLSC-4
5	N-PLSC-5
6	N-TR-1
7	N-TR-2
8	N-TR-3
9	N-DWJC-1
10	N-DWJC-2
11	N-DWJC-3
12	N-DWJC-4
13	N-DWJC-5
14	N-CRTM-1
15	N-CRTM-2
16	N-CRTM-3
17	N-FT-1
18	N-FT-2
19	N-FT-3
20	N-TR2-1
21	N-TR2-2
22	N-TR2-3
23	N-CA-1
24	N-CA-2
25	N-CA-3
26	N-TSI-1
27	N-TSI-2
28	N-TSI-3
29	N-TSI2-1
30	N-TSI2-2
31	N-TSI2-3
32	N-CBM-1
33	N-CBM-2
34	N-CBM-3
35	N-WM-1
36	N-WM-2
37	N-WM-3
38	N-CT-1
39	N-CT-2
40	N-CT-3
41	N-LIN-1
42	N-LIN-2
43	N-LIN-3
44	N-FB-1
45	N-FB-2
46	N-FB-3
47	N-FB-4
48	N-FB-5

49	N-WM2-1
50	N-WM2-2
51	N-WM2-3
52	N-WM3-1
53	N-WM3-2
54	N-WM3-3
55	N-TSI-3-1
56	N-TSI3-2
57	N-TSI3-3
58	N-TSI4-1
59	N-TSI4-2
60	N-TSI4-3
61	N-TRANS-1
62	N-TRANS-2
63	N-TRANS-3
64	N-TSI5-1
65	N-TSI5-2
66	N-TSI5-3
67	N-TSI6-1
68	N-TSI6-2
69	N-TSI6-3
70	N-RM-1
71	N-RM-2
72	N-RM-3
73	N-RT-1
74	N-RT-2
75	N-RT-3
76	N-C-1
77	N-C-2
78	N-C-3
79	N-C2-1
80	N-C2-2
81	N-C2-3
82	N-C3-1
83	N-C3-2
84	N-C3-3
85	N-TSI7-1
86	N-TSI7-2
87	N-TSI7-3
88	N-C4-1
89	N-C4-2
90	N-C4-3
Polychlorinated Biphenyl	
P1	N-C-1
P2	N-C2-1
P3	N-C3-1
P4	N-C4-1

Legend

- Negative ACM Sample Location
- Positive ACM Sample Location
- Negative PCB Sample Location
- Positive PCB Sample Location
- Positive LBP on Walls / Exterior Windows
- TSI Spilled Throughout Floor

ACM Asbestos Containing Material
LBP Lead-based Paint
PCB Polychlorinated Biphenyl
TSI Thermal System Insulation

Note: Confirmed ACM and LBP locations are approximate.

Source: Stock Design Architecture, St. Elizabeth's Hospital Remodel/Renovation Project, 2012.

Limited Asbestos Survey
Old St. Elizabeth Hospital
109 Virginia Street
Hannibal, Missouri

Figure 3C - North Building
Sample Location Map

TETRA TECH

Date: 5/3/18 Drawn By: Nick Wiederholt Project No: X9025.14.0002.048

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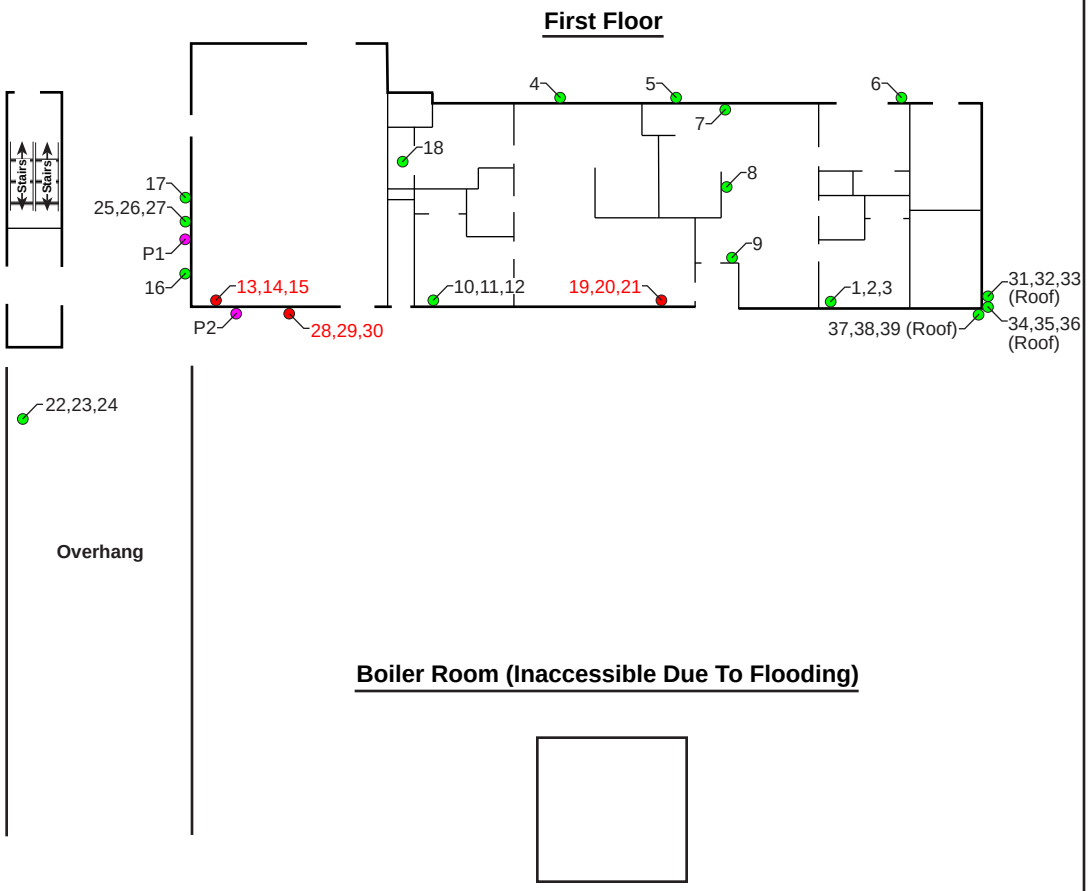
Sample Key Table

Key	Sample No.
Asbestos	
1	NW-DWJC-1
2	NW-DWJC-2
3	NW-DWJC-3
4	NW-WG-1
5	NW-WG-2
6	NW-WG-3
7	NW-CBM-1
8	NW-CBM-2
9	NW-CBM-3
10	NW-CBM2-1
11	NW-CBM2-2
12	NW-CBM2-3
13	NW-TSI-1
14	NW-TSI-2
15	NW-TSI-3
16	NW-PLSC-1
17	NW-PLSC-2
18	NW-PLSC-3
19	NW-TSI2-1
20	NW-TSI2-2
21	NW-TSI2-3
22	NW-DW-1
23	NW-DW-2
24	NW-DW-3
25	NW-C-1
26	NW-C-2
27	NW-C-3
28	NW-C2-1
29	NW-C2-2
30	NW-C2-3
31	NW-RT-1
32	NW-RT-2
33	NW-RT-3
34	NW-RM-1
35	NW-RM-2
36	NW-RM-3
37	NW-RM2-1
38	NW-RM2-2
39	NW-RM2-3
Polychlorinated Biphenyl	
P1	NW-C-1
P2	NW-C2-1



Legend

- Negative ACM Sample Location
- Positive ACM Sample Location
- Negative PCB Sample Location

ACM Asbestos Containing Material

PCB Polychlorinated Biphenyl

Note: Confirmed ACM locations are approximate.

Source: Stock Design Architecture, St. Elizabeth's Hospital Remodel/ Renovation Project, 2012.

N

Not to Scale

Limited Asbestos Survey
Old St. Elizabeth Hospital
109 Virginia Street
Hannibal, Missouri

Figure 3D - Northwest Building
Sample Location Map

TETRA TECH

Date: 5/3/18 | Drawn By: Nick Wiederholt | Project No: X9025.14.0002.048

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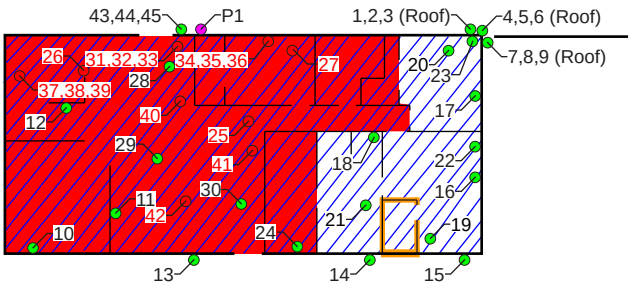
Sample Key Table

Key	Sample No.
Asbestos	
1	SW-RT-1
2	SW-RT-2
3	SW-RT-3
4	SW-RP-1
5	SW-RP-2
6	SW-RP-3
7	SW-RF-1
8	SW-RF-2
9	SW-RF-3
10	SW-PLSC-1
11	SW-PLSC-2
12	SW-PLSC-3
13	SW-WG-1
14	SW-WG-2
15	SW-WG-3
16	SW-DWJC-1
17	SW-DWJC-2
18	SW-DWJC-3
19	SW-FT-1
20	SW-FT-2
21	SW-FT-3
22	SW-CBM-1
23	SW-CBM-2
24	SW-CBM-3
25	SW-TSI-1
26	SW-TSI-2
27	SW-TSI-3
28	SW-CA-1
29	SW-CA-2
30	SW-CA-3
31	SW-LIN-1
32	SW-LIN-2
33	SW-LIN-3
34	SW-FT2-1
35	SW-FT2-2
36	SW-FT2-3
37	SW-FT3-1
38	SW-FT3-2
39	SW-FT3-3
40	SW-FT4-1
41	SW-FT4-2
42	SW-FT4-3
43	SW-C-1
44	SW-C-2
45	SW-C-3
Polychlorinated Biphenyl	
P1	SW-C-1

First Floor



Legend

- Negative ACM Sample Location
- Positive ACM Sample Location
- Negative PCB Sample Location
- Positive LBP on Walls
- Positive ACM Black Mastic / Linoleum
- TSI Spilled Throughout Floor

ACM Asbestos Containing Material

PCB Polychlorinated Biphenyl

TSI Thermal System Insulation

Note: Confirmed ACM locations are approximate.

Source: Stock Design Architecture, St. Elizabeth's Hospital Remodel/ Renovation Project, 2012.

Not to Scale

Limited Asbestos Survey
Old St. Elizabeth Hospital
109 Virginia Street
Hannibal, Missouri

Figure 3E - Southwest Building
Sample Location Map

TETRA TECH

Date: 5/3/18 | Drawn By: Nick Wiederholt | Project No: X9025.14.0002.048

X:\G\9025\0002\048\FH10\040918\Figure1E_SWBldg.FH10

APPENDIX B

PHOTOGRAPHIC DOCUMENTATION

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows the entrance to the main building.	1
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: West	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows the slate tile roof and asbestos-containing roof tar of the main building	2
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: Southeast	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows the slate tile roof and asbestos-containing roof tar on the chapel portion of the main building.	3
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: South	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows carpet with associated mastic, plaster and associated skim coat, and ceiling tile on the 1st floor of the main building.	4
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows pink drywall in the 1st floor south offices of the main building.	5
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing thermal system insulation (TSI) on pipes (red arrow), and ceramic tile with associated mastic in a 1st floor bathroom of the main building.	6
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows yellow wall mastic behind wood paneling in the 1st floor south offices of the main building.	7
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 12” x 12” white floor tile and 4” grey cove base with associated mastic in a 1st floor bathroom of the main building.	8
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows off-white pebble pattern linoleum in a 2nd-floor patient bathroom of the main building.	9
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing tan wall mastic behind wood paneling in a 2nd floor patient room and throughout the main building.	10
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 12” x 12” tan floor tile adjacent to the north stairwell in the basement of the main building.	11
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 9” x 9” tan floor tile and 4” brown cove base and associated mastic in the basement bathroom of the main building.	12
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows yellow wall mastic behind wood paneling and 12” x 12” off-white floor tile in a 3rd-floor patient room of the main building.	13
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing 9” x 9” green floor tile in room 2 on the 3rd floor of the main building.	14
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

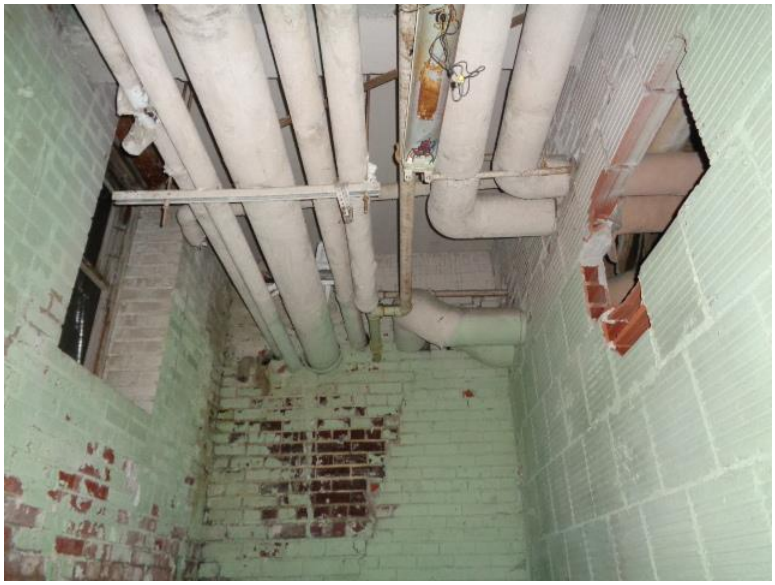
TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing brown linoleum in the basement of the main building.	15
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows carpet and associated mastic in the basement of the main building.	16
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 2’ x 4’ gypsum ceiling tile in the basement of the main building.	17
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 2’ x 4’ ceiling tile (pinhole and fissured) in the basement of the main building.	18
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018



TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing TSI pipe runs and joints in the basement boiler room of the main building.	19
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing TSI pipe runs and joints in the basement boiler room of the main building.	20
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

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TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows a tank beneath the floor in the boiler room of the main building.	21
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows brown terrazzo flooring in the main building.	22
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows fiberglass ceiling tiles and plaster and associated skim coat in the chapel of the main building.	23
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows sink undercoat in the 1st-floor south offices of the main building.	24
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows window glaze on windows of the main building.	25
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows black wall mastic in a 2nd-floor patient room of the main building.	26
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows expansion caulk on the exterior of the main building.	27
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows beige lead-based paint (LBP) on walls in the basement hallway of the main building.	28
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

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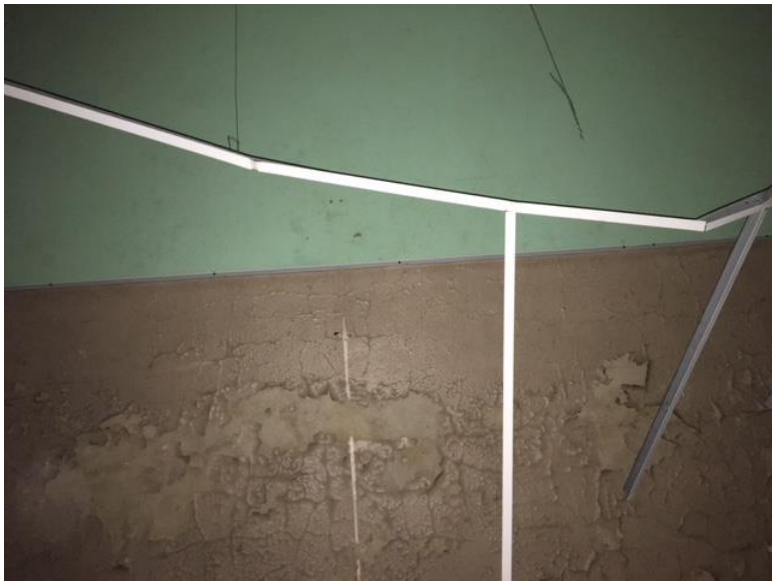

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows brown LBP on walls in the 1st-floor north hallway and west room of the main building.	29
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows white LBP on the ceiling in the 1st-floor north hallway and rooms of the main building.	30
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows peach LBP on walls in the 1st-floor southeast rooms of the main building.	31
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows pink LBP on walls in the 1st-floor south rooms of the main building.	32
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows pink LBP on walls in the 1st-floor east rooms of the main building.	33
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows purple LBP on walls in the 1st-floor west rooms of the main building.	34
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

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TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows yellow LBP on walls in the 1st-floor east rooms of the main building.	35
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows green LBP on walls in the 1st-floor north hallway and west room of the main building.	36
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

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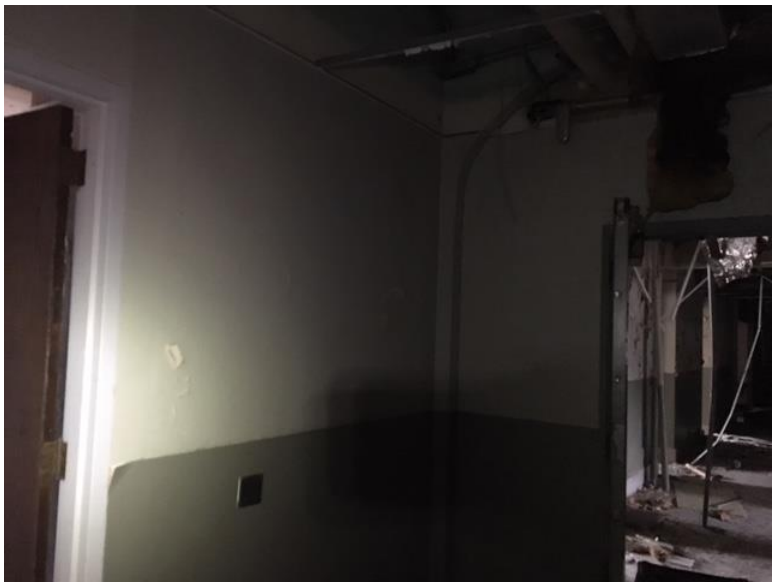
TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows blue LBP on walls in the 2nd-floor east side north room of the main building.	37
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018



TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows off-white LBP on walls in the 2nd-floor hallway of the main building.	38
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows beige LBP on the ceiling in the 2nd-floor north hallway of the main building.	39
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows dark yellow LBP on walls in the 2nd-floor north rooms of the main building.	40
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

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TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows peach LBP on walls in the 2nd-floor east side north room of the main building.	41
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows beige LBP on walls and ceiling in the 3rd-floor hallway between rooms 322 and 326 of the main building.	42
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows brown LBP on window frames on the exterior of the main building.	43
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows green LBP on ceramic tile in the 3rd-floor rooms of the main building.	44
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows beige LBP on cabinets in the 3rd-floor north hallway of the main building.	45
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows beige LBP on walls in the 3rd-floor room 326 of the main building.	46
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

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TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows yellow LBP on walls in the attic closet of the main building.	47
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows peach LBP on walls in 3rd-floor room 311 of the main building.	48
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows fire proofing on the 2nd floor of the 5-story building.	49
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows drywall and associated joint compound, carpet and associated mastic, and 4" black cove base and associated mastic in the 2nd-floor hallway of the 5-story building.	50
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing, off-white linoleum under carpet on the 2nd floor of the 5-story building.	51
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing green linoleum in a 2nd-floor bathroom of the 5-story building.	52
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 12” x 12” tan with grey streaks floor tile and associated asbestos-containing black mastic in the 2nd-floor staff bathroom of the 5-story building.	53
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing, off-white linoleum in the 3rd-floor southeast room of the 5-story building.	54
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows carpet and associated mastic, 4” dark grey cove base and associated mastic, and fire proofing on the 4th floor of the 5-story building.	55
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows drywall and associated joint compound, carpet and associated mastic, and 4” black cove base and associated mastic in the 5th-floor hallway of the 5-story building.	56
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing 12” x 12” brown floor tile in the basement of the 5-story building.	57
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 12” x 12” off-white floor tile on the 1st floor near the elevators of the 5-story building.	58
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing 12” x 12” tan with brown streaks floor tile in a 1st-floor office of the 5-story building.	59
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 12” x 12” white with tan streaks floor tile in the 5th-floor northwest room of the 5-story building.	60
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 12” x 12” “wood” floor tile in a 5th-floor office of the 5-story building.	61
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows blue/green linoleum in a 1st-floor office of the 5-story building.	62
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing tan/yellow linoleum in a 1st-floor bathroom of the 5-story building.	63
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows white squares linoleum in a 1st-floor bathroom of the 5-story building.	64
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 12” x 12” tan with grey streaks floor tile and associated asbestos-containing black mastic in the 5th-floor northwest rooms of the 5-story building.	65
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows ceramic tile and associated mastic in a 1st-floor bathroom of the 5-story building.	66
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

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TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows TSI in the penthouse of the 5-story building.	67
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows the roof of the 5-story building.	68
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows window and expansion caulk on the exterior of the 5-story building.	69
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows the southwest side of the 5-story building.	70
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: Northeast	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows east side of the north building.	71
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: Northwest	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows carpet and associated mastic in the basement of the north building.	72
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows plaster and associated skim coat and terrazzo floors on the 3rd floor of the north building.	73
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows spilled chemicals on the 3rd floor of the north building.	74
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

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TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows brown wall mastic on the 3rd floor of the north building.	75
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows drywall and associated joint compound in the 2nd-floor hallway of the north building.	76
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

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TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows plaster and associated skim coat, 4" brown cove base and associated mastic, and water intrusion in a 2nd-floor hallway of the north building.	77
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing black wall mastic on the 3rd floor of the north building.	78
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

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TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing black wall mastic in 3rd-floor room 324 of the north building.	79
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing TSI in the attic of the north building.	80
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing Transite panels stored in the attic of the north building.	81
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows fire blocks on the 2nd floor of the north building.	82
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows terrazzo flooring on the 1st floor of the north building.	83
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows ceramic tile and associated mastic in the basement of the north building.	84
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

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TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 4” brown cove base and associated mastic on the 1st floor of the north building.	85
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows green terrazzo flooring in the basement of the north building.	86
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows linoleum in the 2nd-floor northeast bathrooms of the north building.	87
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 12” x 12” tan floor tile in the basement bathroom of the north building.	88
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

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TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing TSI runs and joints in the basement of the north building.	89
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows the roof of the north building.	90
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

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TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows polychlorinated biphenyl (PCB)-containing tan expansion joint caulk (red arrow) around a door frame of the north building.	91
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows PCB-containing window caulk on the exterior of the north building.	92
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

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TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows PCB-containing light tan expansion caulk on the exterior entrance side walls of the north building.	93
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows black LBP on ceramic tile on 3rd-floor room 326 of the north building.	94
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

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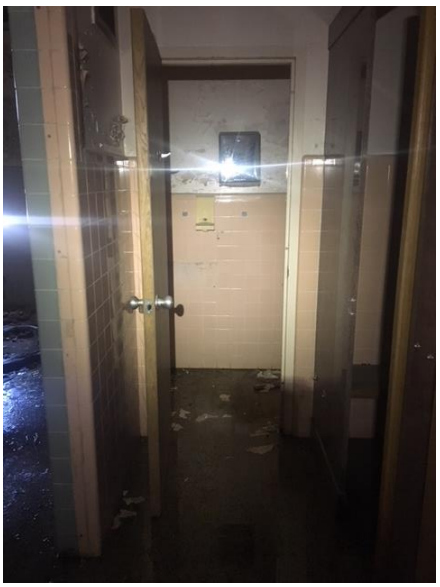
TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows blue LBP on ceramic tile in 3rd-floor rooms 324 and 328 of the north building.	95
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018



TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows peach LBP on ceramic tile in the restroom on the 3rd floor next to room 324 of the north building.	96
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

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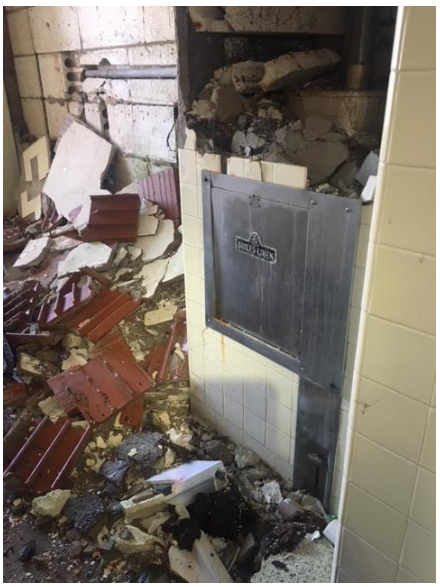
TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows teal LBP on ceramic tile in the 3rd-floor hallway of the north building.	97
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018



TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows white LBP on ceramic tile in 3rd-floor room 306 of the north building.	98
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

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TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows yellow LBP on ceramic tile in 3rd-floor rooms 310 and 314 of the north building.	99
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows blue LBP on ceramic tile in 2nd-floor rooms 227 and 235 of the north building.	100
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Jeffrey Mitchell	2/27/2018

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TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing TSI in the northwest building.	101
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 4” brown cove base and associated mastic and drywall, and associated joint compound in the northwest building.	102
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows asbestos-containing TSI joints in the northwest building.	103
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows window caulk in the northwest building.	104
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows the roof of the northwest building.	105
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows plaster with skim coat on the exterior of the northwest building.	106
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows caulk around exterior vents on the northwest building.	107
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows window caulk on the exterior of the northwest building.	108
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/6/2018

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows the southwest building.	109
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: Northeast	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 9” x 9” green floor tile, 9” x 9” grey floor tile, linoleum, and carpet with associated adhesive in the hallway/north room of the southwest building.	110
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 12” x 12” grey floor tile under carpet in the north room of the southwest building.	111
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 12” x 12” grey floor tile and 4” black cove base and associated mastic in the northwest room of the southwest building.	112
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows spilled TSI throughout the southwest building.	113
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows spilled TSI throughout the southwest building.	114
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows spilled TSI throughout the southwest building.	115
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows spilled TSI throughout the southwest building.	116
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows 9” x 9” red floor tile in the southwest room under carpet in the southwest building.	117
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows expansion joint caulk (red arrow) on the exterior of the southwest building.	118
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

Old St. Elizabeth Hazardous Materials Survey
Hannibal, Missouri

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows the roof of the southwest building.	119
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018

TETRA TECH PROJECT NO. 103X9025140002.048	DESCRIPTION	This photograph shows silver roof flashing on the roof of the southwest building.	120
	CLIENT	U.S. Environmental Protection Agency Region 7	Date
Direction: NA	PHOTOGRAPHER	Kaitlyn Mitchell	3/30/2018