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Environmental Assessment of the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005

Open-File Report 2007–1100

U.S. Department of the Interior
U.S. Geological Survey

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By Martin R. Risch, Amanda L. Ulberg, and Bret A. Robinson

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Conversion Factors, Vertical Datum, and Abbreviations

Multiply	By	To obtain
	Length	
inch (in.)	2.54	centimeter (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
acre	4,047	square meter (m^2)
	Volume	
gallon (gal)	3.785	liter (L)
	Flow rate	
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
gallon per minute (gal/min)	0.06309	liter per second (L/s)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$°F=(1.8×°C)+32$$

Temperature in degrees Fahrenheit (°F) may be converted to degrees Celsius (°C) as follows:

$$°C=(°F-32)/1.8$$

Vertical coordinate information is referenced to North American Vertical Datum of 1988 (NAVD 88)

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Altitude, as used in this report, refers to distance above the vertical datum.

Specific conductance is given in microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25°C).

Concentrations of constituents in water are given in milligrams per liter (mg/L) and micrograms per liter (µg/L).

Concentrations of constituents in soil or sediment are given in micrograms per kilogram (µg/kg) or milligrams per kilogram (mg/kg).

Abbreviations

AOC's — Areas of Concern

$CaCo_3$ — calcium carbonate

CAS — Chemical Abstract Services

CERCLA — Comprehensive Environmental Response, Compensation, and Liability Act of 1980

ESA — Environmental Site Assessment

MUTC — Muscatatuck Urban Training Center

PVC — polyvinyl chloride

RPD — relative percent difference

SVOC's — semivolatile organic compounds

USGS — U.S. Geological Survey

VOC's — volatile organic compounds

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By Martin R. Risch, Amanda L. Ulberg, and Bret A. Robinson

Abstract

An environmental assessment of the Muscatatuck Urban Training Center near Butlerville in Jennings County, Indiana, was completed during October and November 2005. As part of the Department of Defense Earth Science Program, the U.S. Geological Survey collected information about environmental conditions at the 825-acre former State of Indiana mental health facility prior to its conversion by the Indiana National Guard into an urban training center. The assessment was designed to investigate the type and extent of potential contamination associated with historical activities in selected areas of the facility.

Samples of surface water, ground water, surface soil, and buried sediment were collected for the assessment in seven geographic study areas. Surface-water samples were collected from flowing and pooled surface water, as well as seeps and springs where ground water discharged at the land surface. Ground-water samples were collected from temporary wells installed in boreholes drilled to bedrock. Surface-soil samples were collected near sites of possible contamination. Buried-sediment samples were taken from core material collected near the top of bedrock at depths of 6.4 to 26 feet. For the assessment, 59 environmental, 22 quality-assurance, and 46 laboratory-blank samples were analyzed for as many as 65 volatile organic compounds, 62 semivolatile organic compounds, 20 trace elements, 10 inorganic cations and anions, 3 nutrients, and 4 water-quality characteristics.

Concentrations of constituents detected in these samples were compared with regulatory standards (the Indiana Surface-Water-Quality Standards and Indiana Ground-Water-Quality Standards) and guidance criteria from the Indiana Department of Environmental Management's Risk Integrated System of Closures for contaminated soil and ground water. Standards or criteria were exceeded by 17 constituent concentrations in 11 environmental samples from 5 of the 7 geographic study areas. Standards or criteria were exceeded for 10 constituents: ammonia, arsenic, benzo(a)pyrene, beryllium, chloride, chloroform, copper, lead, sulfate, and zinc.

Introduction

The Muscatatuck Urban Training Center (MUTC) includes the buildings and grounds of a former State of Indiana mental health facility in southeastern Indiana. The facility was closed and the property was transferred to the Indiana National Guard in July 2005, who converted it into an urban warfare training center.

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), amended by the Superfund Amendment Reauthorization Act of 1986, established requirements for the cleanup of contaminated sites (U.S. Code, 2006). To absolve responsibility for contamination and cleanup, a landowner must perform "due diligence" to investigate and document contamination at the time of transfer of real estate. These requirements led to the environmental assessment described in this report, which was conducted by the U.S. Geological Survey (USGS) in cooperation with the Indiana National Guard.

Purpose and Scope

This report describes an environmental assessment of the MUTC from October 24 through November 19, 2005. Background information about the facility history and environmental conditions are included. Methods for collection and analysis of surface-water, ground-water, surface-soil, buried-sediment, and quality-assurance samples are discussed. Analytical data for all these samples are presented. Concentrations of constituents detected in these samples are discussed, organized by geographic location, sample matrix, and constituent group. Concentrations of constituents are compared with regulatory standards and guidance criteria for the State of Indiana.

Previous Investigations

In 2003, the State of Indiana acted to have a Phase I Environmental Site Assessment (ESA) completed for the MUTC, following the American Society of Testing and Materials (1998) standard E1527-05. The Phase I ESA was designed

to determine the potential presence or absence of hazardous substances with respect to the range of contaminants within the scope of the CERCLA. It included historical information; a review of local, State and Federal environmental regulatory documents; and a report from a visual investigation of the property (Indiana Department of Administration, 2003). The Phase I ESA identified 25 areas of concern (AOCs) where hazardous substances were likely to be present. In 2005, Indiana National Guard personnel made a physical inspection of the MUTC to update conditions identified in the Phase I ESA (Walter Anderson, Indiana National Guard, written commun., 2005). This inspection concluded that 12 AOCs should receive further investigation in a Phase II ESA, which was part of the USGS study during October and November 2005.

In 2005, a Source-Water Assessment for the MUTC public-water supply was completed by the USGS as part of a statewide program to evaluate each area that contributes surface water used by individual public-water-supply systems (D. Cohen, U.S. Geological Survey, written commun., 2006). The source-water assessment identified pesticides associated with agricultural land use as potential contaminants of concern within the emergency management zone of the MUTC water supply, which is the area within ¼ mi from the shoreline that drains into the Vernon Fork Muscatatuck River within 1,000 ft upstream from the intake. None of the areas of concern from the environmental assessment by the USGS in October and November 2005 were addressed directly by the Source-Water Assessment, although relevant background information was identified for the MUTC public-water supply.

Description of the Muscatatuck Urban Training Center

The study area is described with its history, physical setting, and hydrology. The physical setting includes topography, physiography, geology, soils, and climate. Data from periodic testing of the public-water system at the MUTC provides an indication of the historical quality of water in the Vernon Fork Muscatatuck River at the property boundary.

History

The property and buildings of the MUTC were owned by the State of Indiana and operated as the Muscatatuck State Developmental Center from 1920 until 2005. The Center was a residential mental-health facility that included a hospital, school, laboratories, and residences. Historically self-sufficient, it utilized onsite facilities for sanitary-waste treatment, potable-water supply, solid-waste disposal, power generation, maintenance, laundry, food service, and recreation (Indiana Department of Administration, 2003). Facilities in use during October and November 2005 included water treatment, wastewater treatment, and coal-fired steam generation, along with carpentry, plumbing, paint, lawn, and electrical shops.

Physical Setting

The MUTC property consists of approximately 825 acres within Jennings County in southeastern Indiana. It is approximately 1 mi northwest of the town of Butlerville, Ind. and ¼ mile north of the Purdue University Southeast Agricultural Research Center (fig. 1). Most of the buildings are located on approximately 200 acres in the central part of the property on level ground at an altitude of 800 ft. Land surface slopes away in all directions, to altitudes of 700 ft north and west along the Vernon Fork Muscatatuck River, 715 ft east at Brush Creek Reservoir and 750 ft south at Pleasant Run (U.S. Geological Survey, 1994).

The MUTC lies within the Muscatatuck Plateau, described by Gray (2000) as till-covered uplands with deeply entrenched streams, with the possibility of underlying karst development. Underlying bedrock in the area consists of Devonian Limestone and Dolomite (Gray, 1972).

The predominant soil association in the MUTC is Cincinnati-Rossmoyne silt loams. These soils typically occur in rolling areas in the eastern portion of the pre-Wisconsinan till plain (U.S. Department of Agriculture, 1982). Parent material includes Wisconsinan loess and pre-Wisconsinan till. These soils are well drained to moderately well drained. The Cincinnati-Rossmoyne silt loam covers most of the central and western portions of the property. Other soil types present on the site include Hickory loam and Grayford silt loam. Hickory loams are deep, well-drained soils, found on hillsides adjacent to natural drainageways. Hickory loams are present in the northeastern portion of the MUTC, primarily on slopes adjacent to Brush Creek Reservoir. Grayford silt loams are found on undulating ridges and hillsides and are present in the southeastern portion of the property (Nickell, 1976).

The climate of the study area is characteristic humid continental with no dry season and long, hot summers (Lewis, 1961). Monthly average temperatures range from about 30°F during January to 76°F during July, and the average annual temperature is approximately 54°F (Indiana State Climate Office, 2006). Summary data from a rain gauge in North Vernon, Ind., approximately 7 mi southwest of the MUTC, shows average annual precipitation was 44.5 in. from 1971 through 2000 (Midwestern Regional Climate Center, 2006). Monthly average precipitation ranged from a low in February of 2.7 in. to a high in May of 4.7 in. In general, average monthly precipitation was highest in the spring and summer and lowest in the fall and winter. Continuous precipitation data collected since 1999 at the Purdue University Southeast Agricultural Research Center (fig. 1) indicate that October 1 to November 14, 2005, was a period of below normal precipitation (Indiana State Climate Office, 2006). When most of the environmental samples were collected at the MUTC in October and November 2005, 1.82 in. of rain fell, compared with a normal of 5 in.

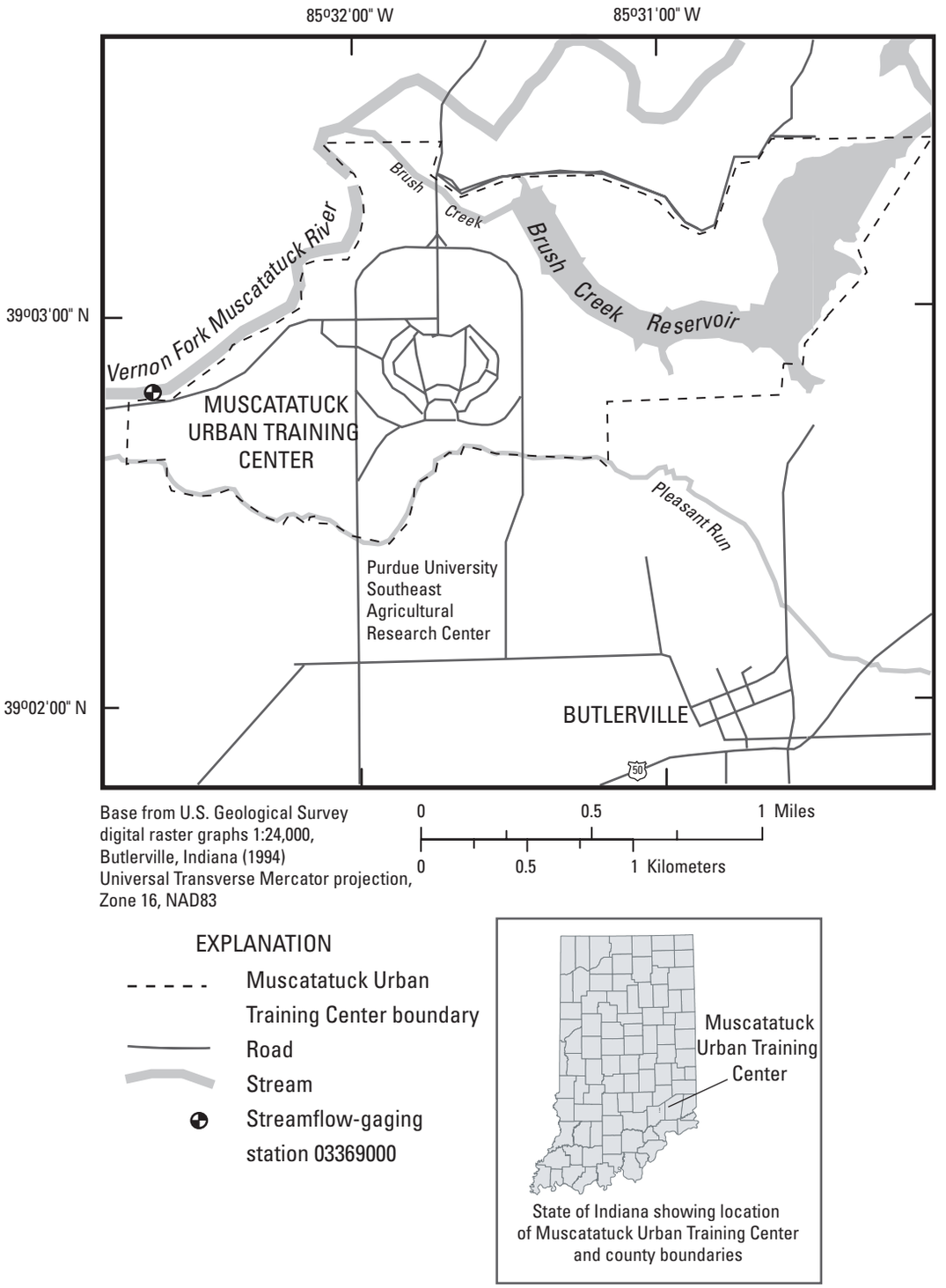

Figure 1. Location of the Muscatatuck Urban Training Center near Butlerville, Indiana.

Hydrology

The MUTC is in the East Fork White River Basin. Depending upon topography, surface drainage is generally to the west and northwest into the Vernon Fork Muscatatuck River, north into Brush Creek, northeast into Brush Creek Reservoir, or south to Pleasant Run (fig. 1). The USGS streamflow-gaging station 03369000 on the Vernon Fork Muscatatuck River near the western boundary of the MUTC was in operation from 1942 through 2001. The 60 years of streamflow record collected show that mean daily streamflow for the Vernon Fork Muscatatuck River ranged from a low of 5.37 ft^3/s in the fall to a high of 318 ft^3/s in the winter and spring (U.S. Geological Survey, 2006). Brush Creek Reservoir was constructed in 1953 as a water-supply reservoir that provides recreational opportunities. At a normal pool elevation, the surface area of the reservoir is approximately 150 acres. The dam and most of the property associated with the reservoir are owned by the State of Indiana (Indiana Department of Natural Resources, 2006a).

The source of the public water supply for the MUTC is the Vernon Fork Muscatatuck River (fig. 1) from an intake constructed in 1956 near the north boundary. The location of surface-water intakes are not identified by coordinates or shown on maps in accordance with USGS policy and Indiana Code IC 5-14-3-4(b)(19)(G) (Indiana Legislative Services Agency, 2006). A capacity of 800 gal/min piped to a water-treatment facility at the MUTC historically served a population of 800 persons. According to the Source-Water Assessment for the MUTC public-water supply (D. Cohen, written commun., 2006), the northern part of the MUTC property lies within the water-supply emergency-management zone (the area of land within ¼ mi from the shoreline that drains into the stream within 1,000 ft upstream from the intake).

Public-water-supply operators are required to periodically test the water for contaminants. The results of the tests for the Muscatatuck State Developmental Center represent the quality of the treated water provided to the population served. Although the water was treated[1], these test results may be an indication of the historical quality of water in the Vernon Fork Muscatatuck River. These data for the period January 1993 to November 2002 show that atrazine, cadmium, and thallium were contaminants detected once or twice at concentrations equal to or greater than their respective state drinking-water standards. Atrazine was detected at a concentration of 3.1 micrograms per liter (µg/L) on July 28, 1997—the standard for atrazine is 3.0 µg/L. Cadmium was detected at 5 µg/L, a concentration equal to its standard, on February 16, 1994. Thallium was detected at 5 µg/L on July 25, 1995, and at concentrations equal to its 2 µg/L standard on April 1, 1993 and February 16, 1994.

Ground-water resources near the MUTC generally are found in the bedrock. The Indiana Water Well Record Database (Indiana Department of Natural Resources, 2006b) and the Hydrogeologic Atlas of Aquifers in Indiana (Fenelon, Bobay, and others, 1994) indicate that most domestic wells in the area draw ground water from a bedrock aquifer. Beneath the MUTC, the uppermost bedrock is Devonian limestone under 8 to 40 ft of clay-rich till.

Study Methods

The methods for the environmental assessment involved the designation of geographic study areas, locations of sampling sites, and types of samples. Other methods described include sample collection, sample analysis, and quality assurance. In general, the methods used at the MUTC followed the American Society for Testing and Materials (1998) standard E1903-97 for a Phase II ESA and the USGS National Field Manual for the Collection of Water-Quality Data (Wilde and Radtke, 1998).

Assessment Design

The environmental assessment was designed to appraise the nature and extent of potential contamination at the MUTC that could be associated with the 12 AOC's identified in the Phase I ESA that the Indiana National Guard had determined required further investigation. (The AOC numbers in this report correspond to the numbers in the Phase I ESA [1-25].) These 12 AOC's were grouped into seven geographic study areas (table 1, figs. 2 and 3). The geographic study areas designated where contaminants associated with activities at one or more AOC's might be present. Within these geographic study areas, 49 sampling sites were selected for collection of surface-water, ground-water, surface-soil, or buried-sediment samples. Sampling sites were designated with letters and numbers: SW for surface water, B for borehole (ground water and buried sediment were collected at boreholes), and SOIL for surface soil. Characteristics of the sampling sites are shown in appendix 1. The identification of environmental samples is described later in this section.

[1] According to an interview with the water-system operator in June 2003 for the Source-Water Assessment, treatment may include aeration, flocculation, settling, chlorination, and carbon filtration (K. Fowler, U.S. Geological Survey, written, commun., 2006)

Table 1. Geographic study areas and areas of concern at the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

Geographic study area	Area of Concern name	Area of Concern number[a]
1	Former Stone Quarry	21
2	Vegetation Disposal Area	18
3	Lawn Shop	6
4	Laundry	5
5	Maintenance Utility Building #77	7
	Maintenance Utility Building #78	8
	Carpenter and Paint Shops	9
	Electrical and Plumbing Shops	10
6	Existing Wastewater Treatment Plant	2
	Former Wastewater Treatment Plant	13
7	Power House	3
	Storeroom	4

[a]Area of Concern number from Indiana Department of Administration (2003).

Surface-water samples were collected from all identified surface water, including pools, natural and constructed channels, and seeps and springs where ground water discharged to the land surface. Ground-water samples were collected from boreholes that produced a quantity of water sufficient for sampling. Surface-soil samples were collected where spills or disposal of contaminants may have occurred. Buried-sediment samples were collected from boreholes that were expected to be downgradient from potential contaminant sources. Buried-sediment samples were analyzed to identify the presence of contaminants that were transported by ground water and that had an affinity for organic material or sediments. A hand-held global positioning system receiver was used to record the geographic coordinates of the sampling locations.

A total of 59 environmental samples were collected by the USGS from October 24 through November 19, 2005, at the MUTC. These consisted of 12 surface-water samples, 8 ground-water samples, 20 surface-soil samples, and 19 buried-sediment samples (figs. 2 and 3, table 2, and appendix 2.) Environmental samples were identified with letters and numbers corresponding to the type of media collected at the sampling sites: SW for surface water, GW for ground water, SOIL for surface soil, and SED for buried sediment. In some cases, more than one type of sample was collected at a sampling site, such as ground-water, surface-soil, and buried-sediment samples from the same borehole. When more than one type of sample was collected at a sampling site, the sampling site was added to the environmental sample identification (B for borehole and SW for surface water). SOIL and SW have two meanings as a sampling site or sample type. Some examples follow:

Sample ID	Sample type site	Sampling site
SW1	Surface water	SW1
GW-B4	Ground water	Borehole B4
SED-B4	Buried sediment	Borehole B4
SOIL-B4	Surface soil	Borehole B4
SOIL7	Surface soil	SOIL7
SOIL-SW6	Surface soil	SW6

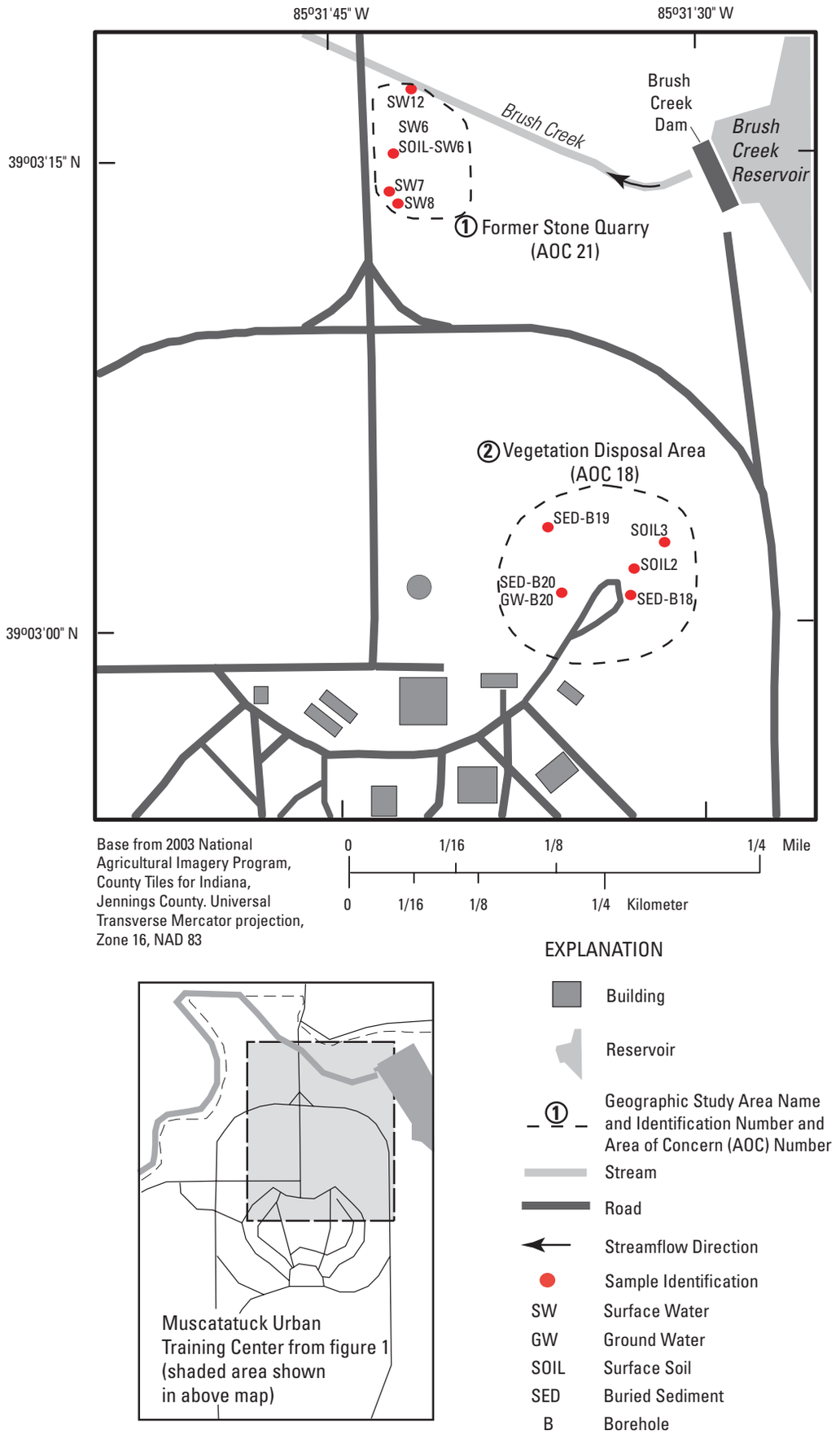

Figure 2. Geographic study areas 1 and 2 and sampling sites at the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

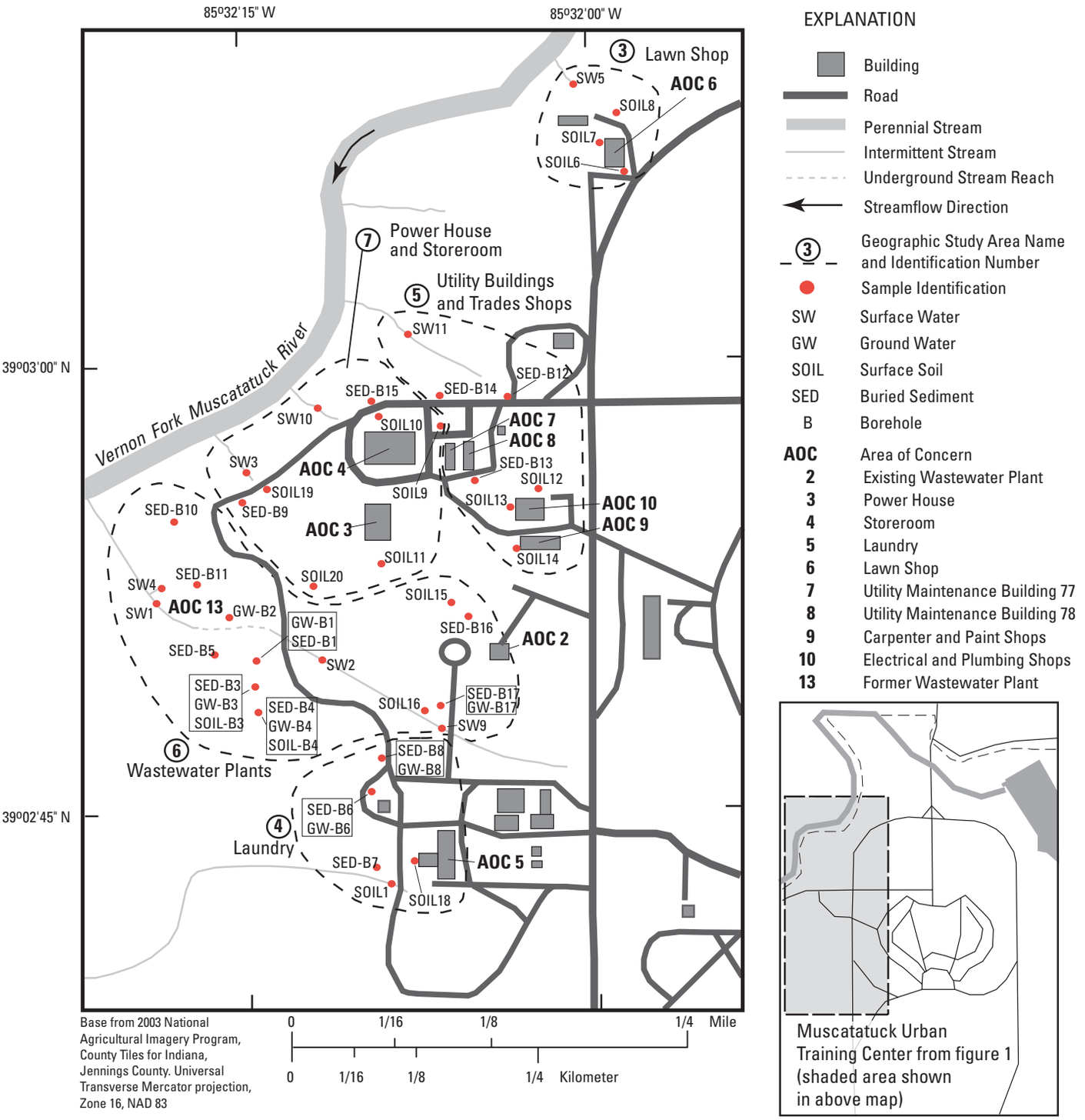

Figure 3. Geographic study areas 3 through 7 and sampling sites at the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

Table 2. Environmental samples at the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

Geographic study area		Sample type and sample identification			
Number	**Name**	**Surface water**	**Ground water**	**Surface soil**	**Buried sediment**
1	Former Stone Quarry	SW6 SW7 SW8 SW12		SOIL-SW6	
2	Vegetation Disposal Area		GW-B20	SOIL2 SOIL3	SED-B18 SED-B19 SED-B20
3	Lawn Shop	SW5		SOIL6 SOIL7 SOIL8	
4	Laundry		GW-B6 GW-B8	SOIL1 SOIL18	SED-B6 SED-B7 SED-B8
5	Utility Buildings and Trades Shops	SW11		SOIL12 SOIL13 SOIL14	SED-B12 SED-B13 SED-B14
6	Existing / Former Wastewater Treatment Plants	SW1 SW2 SW4 SW9	GW-B1 GW-B2 GW-B3 GW-B4 GW-B17	SOIL-B3 SOIL-B4 SOIL15 SOIL16	SED-B1 SED-B3 SED-B4 SED-B5 SED-B10 SED-B11 SED-B16 SED-B17
7	Power House and Storeroom	SW3 SW10		SOIL9 SOIL10 SOIL11 SOIL19 SOIL20	SED-B9 SED-B15

Sample Collection

Twenty boreholes were made with a truck-mounted, direct-push drill rig (fig. 4). Nearly continuous cores were collected in acrylic sample tubes as boreholes were advanced to bedrock. Borehole depths ranged from 7.4 ft (at B3) to 26 ft (at B18) below land surface and a written description of the sediment cores was completed by a USGS geologist (appendix 3). In boreholes that had water, temporary wells with 1-in. diameter polyvinyl chloride (PVC) casing and 5-ft PVC screens were placed immediately above bedrock (appendix 3).

Drilling and coring equipment was power-washed between each borehole. Coring drive caps, points, and cutting shoes were cleaned sequentially with a detergent wash, scrubbing, and tap-water rinse. After ground-water samples were collected, the temporary wells were removed and the boreholes were filled to land surface with bentonite chips.

Surface- and ground-water samples were collected using a peristaltic pump with Teflon intake and discharge tubing pumping at a rate of approximately 0.2 gal/min. Sample containers were obtained from the laboratory and contained the required preservatives. Water from the discharge tubing went directly into the sample containers, which were not field rinsed. Water samples were not filtered. For surface-water samples, the intake end of the tubing was placed into the pooled or flowing water (fig. 5). For ground-water samples, the intake end of the tubing was placed into the screened interval of a temporary well. Ground-water-sample containers were filled inside a processing chamber, consisting of a plastic frame suspending a clear polyethylene bag (fig. 6). Ground-water samples were collected from boreholes that produced a total volume of at least 0.75 gal of water. Wells were not developed or purged prior to sampling because of the limited volume of water available.

Surface-soil samples were collected with a hand-operated soil auger; depths ranged from 6 to 18 in. Buried-sediment samples were obtained from core materials near the top of the bedrock at depths from 6.4 to 26 ft. Sediment samples were removed from cores collected in a new acrylic liner for the coring tube that was advanced to bedrock by the drill rig.

Water, soil, and sediment-sampling equipment was cleaned between samples with a sequential detergent wash, tap-water rinse, deionized-water rinse, hydrochloric-acid rinse (excluding metal components), methanol rinse, and laboratory-grade blank-water rinse. Disposable nitrile gloves were worn by field personnel during sampling and changed between sites. Samples were kept in closed coolers in a refrigerated room under custody control until they were shipped by overnight freight to the analytical laboratory.

Figure 4. (*A*) Direct-push drill rig and (*B*) typical sediment cores collected at the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

Figure 5. Typical sampling techniques for surface-water samples collected at the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

Figure 6. Typical sampling techniques for ground-water and field blank samples collected at the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

Sample Analysis

Surface-water, ground-water, surface-soil, buried-sediment, and quality-assurance samples were analyzed at a laboratory for as many as 6 constituent groups (table 3)—65 volatile organic chemicals (VOC's), 62 semivolatile organic chemicals (SVOC's), 20 trace elements, and 6 inorganic cations, along with (in water only) 4 inorganic anions and 3 nutrients. Analysis was completed by the USGS Department of Defense Earth Science Program laboratory in Denver, Colorado. Information for individual constituents in each group (name, Chemical Abstract Services (CAS) number, the long-term laboratory reporting limit, and analytical method) are shown in appendix 4. Four water-quality characteristics—pH, specific conductance, dissolved oxygen, and water temperature—were measured in surface- and some ground-water samples. Measurements were made with an electronic multimeter in a flow-through chamber attached to the discharge line of the sampling pump. Values were recorded following collection of water samples.

Quality Assurance

Six field-duplicate samples were collected, including two surface-water, two surface-soil, and two buried-sediment samples. Duplicate samples consisted of an environmental sample and a quality-assurance sample. Duplicate surface-water samples were collected sequentially. To collect duplicate surface-soil and buried-sediment samples, material from the soil auger or sediment core was split between the environmental and duplicate-sample containers. Field-duplicate samples were used to evaluate the natural variability of constituent concentrations in water and soil/sediment and, to a lesser degree, precision in the analysis of water and soil/sediment samples. Concentrations of constituents detected in the field-duplicate samples (appendix 5) were evaluated with the relative percent difference (RPD). RPD was computed as the absolute value of the difference of the concentrations divided by the average of the concentrations, expressed as a percentage. (For this comparison, the reporting limit was used if a constituent was not detected in one of the two samples.)

Trace elements, inorganic cations, inorganic anions, and nutrients were detected in the duplicate water samples. The greatest variability (more than 50 RPD) was in concentrations of lead and tin at SW8 and in concentrations of copper and iron at SW12. The high RPD for these constituents could be attributed to the estimated concentrations. Trace elements and inorganic cations were detected in the duplicate surface-soil and buried-sediment samples. In surface-soil, the greatest variability (more than 50 RPD) was in concentrations of beryllium, cobalt, manganese, and nickel at SOIL2 and in concentrations of beryllium and strontium at SOIL20. The high RPD for beryllium was computed for both duplicate soil samples. In buried sediment, the greatest variability (more than 50 RPD) was in concentrations of boron, cobalt, manganese, nickel, aluminum, and sodium at B19. Duplicate samples at B20 did not have concentrations with more than 50 RPD.

Two sets of water samples (one surface water—SW1 and one ground water—GWB2) were collected as matrix spike and matrix-spike duplicates. These samples were prepared at the laboratory by spiking the water samples with known amounts of selected VOC's, SVOC's, and trace elements. Matrix-spike samples were evaluated with the percent recovery of the spiked constituents and matrix-spike duplicates were evaluated with the RPD (appendix 6). This

evaluation did not indicate apparent interference from the sample matrix on analysis of VOC's and trace elements in the water samples. The VOC's had percent recoveries of 60 to 114 and less than 8 RPD. The trace elements had percent recoveries of 95 to 110 and less than 2 RPD. Some SVOC's had potential matrix interference—the percent recoveries were 60 to 81; duplicates had less than 9 RPD.

Field blanks were prepared by pumping certified, laboratory-grade blank water from its original container through clean sampling-pump tubing into a sample container (fig. 6). Field blanks were used to evaluate the adequacy of cleaning procedures and to detect possible artifacts introduced during sample collection and processing. Field blanks were analyzed for all constituent groups. Trip blanks for analysis of VOC's were supplied by the analytical laboratory and consisted of sealed vials of certified, laboratory-grade blank water. Trip blanks were used to detect possible artifacts introduced during transport and storage of sample containers. In addition to the field and trip blanks, 46 laboratory blanks were analyzed for all constituent groups. These blanks were prepared in the laboratory with certified blank water and were used to detect possible artifacts introduced during analysis of the samples. Concentrations of constituents detected in field blanks, trip blanks, or laboratory blanks were used to qualify concentrations in water samples collected for the environmental assessment.

Concentrations of Constituents

Concentrations of constituents detected in the environmental and blank samples are summarized in tables contained in appendixes 7 through 10. The detections, along with the type and source of the standards or criteria, are listed for organic and inorganic constituent groups in surface water (appendix 7), ground water (appendix 8), surface soil (appendix 9), and buried sediment (appendix 10). For each sample matrix (water, soil, sediment), the constituents are ordered by geographic study area. The constituents that were not detected in any sample from the MUTC are not included in appendixes 7 through 10, although a complete list of all the constituents analyzed, along with the reporting limits, is shown in appendix 4. Complete analytical data for the samples at the MUTC are archived in the USGS National Water Information System (URL *http://waterdata.usgs.gov/in/nwis/gw)* according to the station numbers listed in appendix 1.

Some constituents were detected in environmental samples at concentrations less than the laboratory reporting limit and the concentrations are qualified as estimated. Some constituents were detected in field-blank, trip-blank, or laboratory-blank samples. The highest blank concentrations and number of blank samples with detections are listed for these constituents in appendixes 7 through 10. Consistent with procedures used by the Indiana Department of Environmental Management, the non-estimated concentrations in environmental samples that were greater than five times the highest concentration detected in the blank samples were

Table 3. Constituent groups and methods of laboratory analysis for environmental samples collected at the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

[USEPA, U.S. Environmental Protection Agency; GC, gas chromatography; MS, mass spectrometry; ICP, inductively coupled plasma; IC, ion chromatography]

Constituent group[a]	Matrix	Type of method	USEPA analytical method number
Volatile organic compounds	water / solid	GC/ MS	[b]8260B
Semivolatile organic compounds	water / solid	GC/ MS	[b]8270C
Trace elements	water solid	ICP-MS ICP-MS	[b]6020B [b]6010B
Inorganic cations	water solid	ICP-MS ICP-MS	[b]6010B [b]6010B
Inorganic anions	water	IC	[c]300.0A
Nutrients (ammonia, nitrate-nitrite, total phosphorous)	water	colorimetric	[c]350.1, [c]350.1, [c]365.3

[a]Individual constituents in each group are in appendix 4.

[b]U.S. Environmental Protection Agency, 1986.

[c]U.S. Environmental Protection Agency, 1983.

identified as valid for comparison with regulatory standards or guidance criteria. In the subsequent sections of the report, the concentrations discussed will be those considered valid based on the above criteria. Concentrations that are not valid will be noted as estimated concentrations,

Comparisons to Regulatory Standards and Guidance Criteria

Concentrations of constituents detected in environmental samples were compared with State of Indiana regulatory standards and guidance criteria to identify a level of contamination. The standards and criteria that were compared to the concentrations of constituents in surface-water, ground-water, surface-soil, and buried-sediment samples are described below.

1. Surface-water concentrations were compared with the regulatory Indiana Surface-Water-Quality standards from Indiana Administrative Code (2006) title 327 article 2 (327 IAC 2). If more than one criteria concentration was listed for aquatic life and human-health protection, the lowest concentration was used for comparison.

2. Ground-water concentrations were compared with the regulatory Indiana ground-water-quality standards from 327 IAC 2-1 If a regulatory standard was unavailable, guidance criteria were used from the table of default levels for residential closure in the Risk Integrated System of Closure for sites in the Indiana voluntary remediation and leaking underground storage tank programs, effective July 2004 (Indiana Department of Environmental Management, 2006).

3. Surface-soil or buried-sediment concentrations were compared with guidance criteria from the table of default levels for industrial closure in the Risk Integrated System of Closure for sites in the Indiana voluntary remediation program and leaking underground storage tank programs, effective July 2004 (Indiana Department of Environmental Management, 2006). Indiana regulatory standards have not been promulgated for surface soil or buried sediment.

Environmental Assessment

In the following discussion of the environmental assessment, the constituent detections are ranked in two levels of importance. First, the detections with the highest level of importance are concentrations of constituents greater than the regulatory standards or guidance criteria. Second, the detections of interest are the highest concentrations of a constituent in water, soil, or sediment samples at the MUTC or multiple constituent detections associated with a geographic study area.

The detections with the highest level of importance are 17 constituent concentrations greater than Indiana regulatory standards or guidance criteria in 11 environmental samples from 5 of the 7 geographic study areas, excluding study areas 2 and 5 (table 4, figs. 7 and 8). Standards or criteria were exceeded for 10 constituents: ammonia nitrogen, arsenic, benzo(a)pyrene, beryllium, chloride, chloroform, copper, lead, sulfate, and zinc. The soil/sediment criteria for arsenic was exceeded in four samples. The standard for lead was exceeded in one surface-water sample and one ground-water sample. The standard for ammonia nitrogen in surface water was exceeded in two samples. Standards or criteria were exceeded by seven other constituent concentrations in one sample each.

The following discussion summarizes the environmental assessment by geographic study area. Data from both levels of importance are described—the constituent concentrations greater than standards or criteria and the detections of interest that comprise the highest concentrations or multiple constituent detections in an area.

Geographic Study Area 1 (the former stone quarry, AOC 21)

Four surface-water samples (appendix 7) and one surface-soil sample (appendix 9) were collected at the former stone quarry (fig. 2). Surface-water sample SW6 had the largest concentrations of nine trace elements among all the surface-water samples collected at the MUTC. These trace elements are arsenic, barium, chromium, cobalt, lead, manganese, nickel, vanadium, and zinc. The concentrations of three of these trace elements were greater than a regulatory standard: 24 µg/L arsenic, 15 µg/L lead, and 120 µg/L zinc. The corresponding regulatory standards are 0.02 µg/L arsenic, 2.5 µg/L lead, and 100 µg/L zinc. Sample SW6 contained the largest concentrations of aluminum, calcium, and iron among all the surface-water samples collected at the MUTC. The concentrations of aluminum (4,100 µg/L) and iron (28,000 µg/L) in this sample were nearly 20 times greater than the next largest concentrations of these cations in surface-water samples collected at the MUTC. Sample SW6 had 0.16 mg/L ammonia-nitrogen, a concentration greater than the 0.06 mg/L computed regulatory standard. This sample also contained one concentration of a VOC, 1.8 µg/L ethylbenzene, which was less than the 1,400 µg/L regulatory standard.

Sample SW6 was collected from a shallow pool on the floor of the former stone quarry downstream from a large pile of construction debris and trash along the south wall of the quarry. A surface-soil sample collected near this pool (SOIL-SW6) did not represent the same level of constituent concentrations and detections as sample SW6. Sample SOIL-SW6 had concentrations of trace elements that were among the lowest detected in surface-soil samples at the MUTC. If water in the multiple pools on the floor of the

former stone quarry (represented by water samples SW6, SW7, and SW8) moved horizontally, a potential area for the water to appear as seep springs would be along the stone outcrops of the Brush Creek stream bank north of the quarry. The only seep spring identified during October and November 2005 was sampled at SW12. Concentrations of VOC's, trace elements, cations, and nutrients were substantially less than those in SW6 and similar to those in SW7 and SW8.

Geographic Study Area 2 (the vegetation disposal area, AOC 18)

The vegetation disposal area (fig. 2) did not have a constituent concentration greater than a regulatory standard or guidance criteria. Ground-water sample GW-B20 (appendix 8), surface-soil samples SOIL2 and SOIL3 (appendix 9), and buried-sediment samples SED-B18, SED-B19, and SED-B20 (appendix 10) were collected. Concentrations of trace elements in the soil and buried-sediment samples were similar to other samples at the MUTC. Estimated concentrations of tetrachloroethene were reported in SOIL2 (0.52 µg/L) and SED-B20 (0.23 µg/L).

Geographic Study Area 3 (including the lawn shop, AOC 6)

One surface-water sample (appendix 7) and three surface-soil samples (appendix 9) were collected near the lawn shop (fig. 3). Surface-soil sample SOIL7 had a concentration of arsenic of 24 mg/kg, which exceeded the 20 mg/kg guidance criteria. Sample SOIL7 also had a detection of a non-target volatile organic compound that was identified as P,p'-DDE, a chlorinated pesticide, at an estimated concentration of 1,200 µg/kg. Pesticides were not among the list of target constituents for the assessment. Sample SOIL7 had 10 unknown SVOC's with an estimated concentration sum of 14,240 µg/kg. Unknown SVOC's were detected in the other two surface-soil samples in study area 3—18 in SOIL6 (estimated concentration sum 13,170 µg/kg) and 6 in SOIL8 (estimated concentration sum 10,040 µg/kg). Data were unavailable to determine if any of the unknown SVOC's detected in the three surface-soil samples near the lawn shop included pesticides. Also in geographic area 3, surface-soil sample SOIL8 contained a concentration of lead of 220 mg/kg, which was nearly equal to the guidance criteria of 230 mg/kg.

Table 4. Concentrations of constituents detected in environmental samples collected at the Muscatatuck Urban Training Center in October and November 2005, that were greater than Indiana regulatory standards or guidance criteria.

[µg/L, microgram per liter; mg/L, milligram per liter; ISWQS, Indiana Surface-Water-Quality Standard; mg/kg, milligram per kilogram; RISC, Risk Integrated System of Closure; IGWQS, Indiana Ground-Water-Quality Standard]

Geographic study area	Sample type	Sample identification	Constituent	Concentration	Standard or criteria	Units	Source
1	Surface water	SW6	Arsenic	24	0.02	µg/L	ISWQS
	Surface water	SW6	Lead	15	[a]2.5	µg/L	ISWQS
	Surface water	SW6	Zinc	120	100[a]	µg/L	ISWQS
	Surface water	SW6	Ammonia nitrogen	.16	.06	µg/L	ISWQS[b]
3	Surface soil	SOIL7	Arsenic	24	20	mg/kg	RISC
4	Surface soil	SOIL1	Arsenic	36	20	mg/kg	RISC
	Buried sediment	SED-B7	Arsenic	22	20	mg/kg	RISC
6	Surface water	SW1	Chloroform	2.0	1.9	µg/L	ISWQS
	Surface water	SW1	Chloride	270	230	mg/L	ISWQS
	Ground water	GW-B2	Sulfate	320	250	mg/L	IGWQS
	Ground water	GW-B17	Beryllium	4.6	4.0	µg/L	IGWQS
	Ground water	GW-B17	Lead	97	15	µg/L	IGWQS
7	Surface soil	SOIL9	Benzo(a)pyrene	3,500	1,500	µg/kg	RISC
	Surface soil	SOIL11	Lead	620	230	mg/kg	RISC
	Surface soil	SOIL20	Arsenic	30	20	mg/kg	RISC
	Surface water	SW10	Copper	18	[a]11	µg/L	ISWQS
	Surface water	SW10	Ammonia nitrogen	1.5	.04	mg/L	ISWQS[b]

[a]ISWQS chronic aquatic criteria based on a table of values with water hardness assumed to be 100 mg/L.

[b]ISWQS concentrations for ammonia (un-ionized ammonia as nitrogen) vary, based on water temperature and pH, as described in Indiana Administrative Code (2006). Water temperature and pH measured during sample collection were used to find the ISWQS ammonia value in a table. If the sample water temperature was between two values in the table, the average of corresponding ammonia standards was applied.

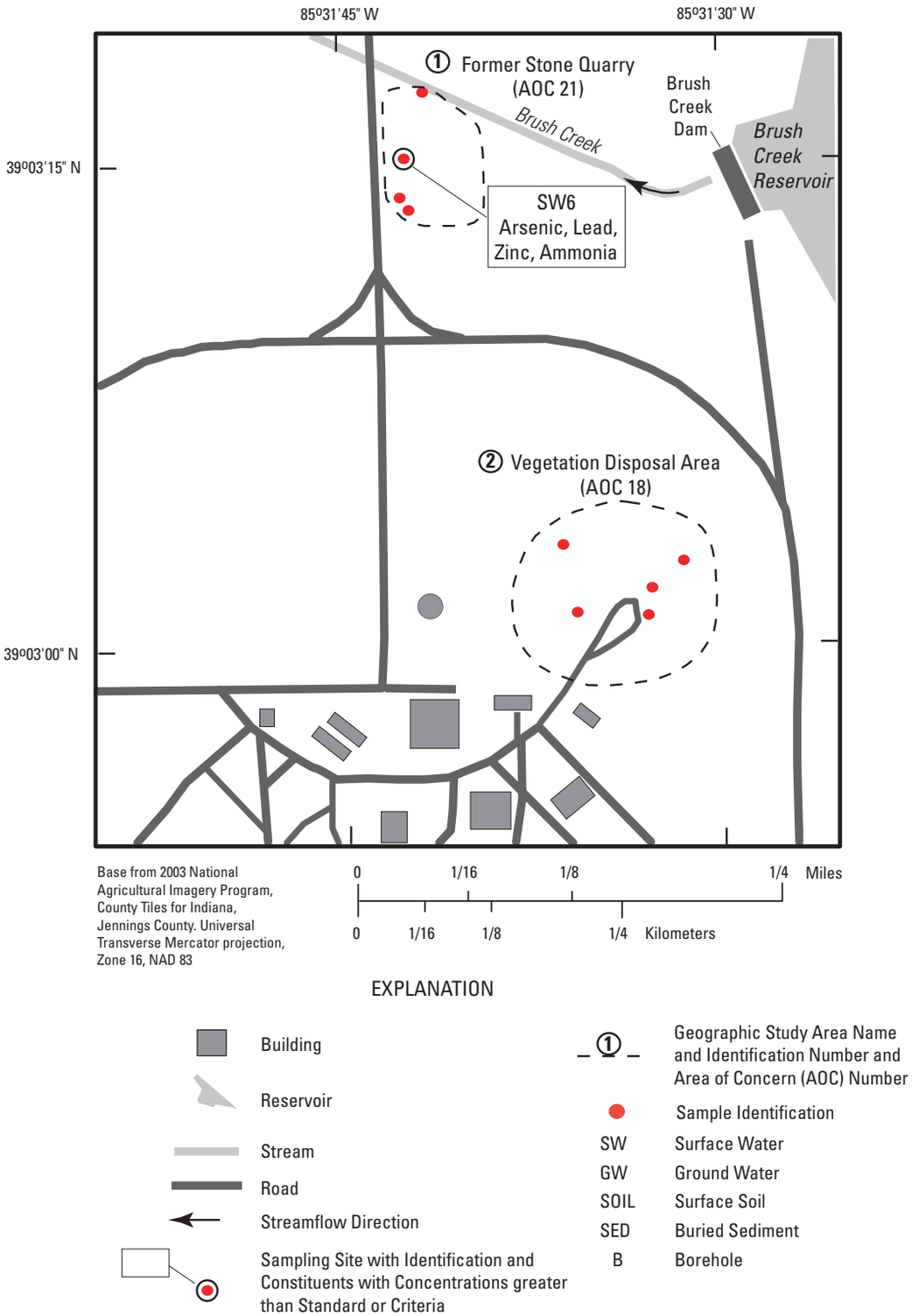

Figure 7. Locations of environmental samples with concentrations of constituents greater than an Indiana regulatory standard or guidance critieria in geographic study areas 1 and 2 at the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

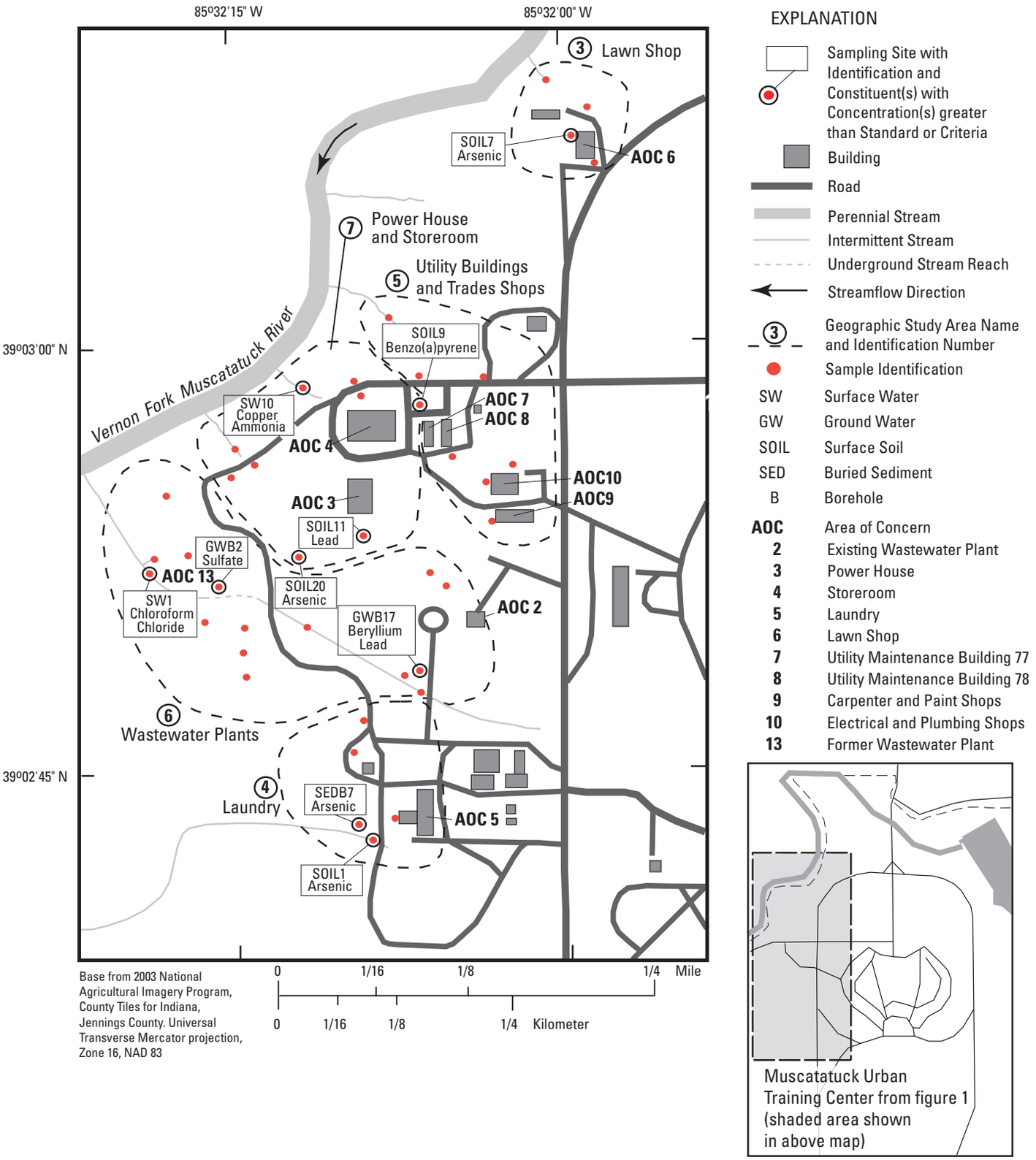

Figure 8. Locations of environmental samples with concentrations of constituents greater than an Indiana regulatory standard or guidance critieria in geographic study areas 3 through 7 at the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

Geographic Study Area 4 (including the laundry, AOC 5)

Two ground-water samples (appendix 8), two surface-soil samples (appendix 9), and three buried-sediment samples (appendix 10) were collected near the laundry (fig. 3). The concentration of arsenic in a surface-soil sample (SOIL1, 36 mg/kg) and a buried-sediment sample (SED-B7, 22 mg/kg) exceeded the 20 mg/kg guidance criteria. Sample SOIL1, collected in the drainage swale downstream of the laundry, also contained 420 µg/kg of the SVOC benzo(b)fluoranthene and the largest concentrations of manganese (3,500 mg/kg) and molybdenum (3.9 mg/kg) detected in surface soil at the MUTC. The guidance criteria for benzo(b)fluoranthene (15,000 µg/kg) was not exceeded; guidance criteria for manganese and molybdenum in soil are not available.

Geographic Study Area 5 (including utility buildings, AOC's 7 and 8, and trades shops, AOC's 9 and 10)

One surface-water sample (appendix 7), three surface-soil samples (appendix 9), and three buried-sediment samples (appendix 10) were collected near the utility buildings and trades shops (fig. 3). This area did not have a constituent concentration greater than a regulatory standard or guidance criteria. The concentration of copper (260 mg/kg) in surface-soil sample SOIL12, collected outside the electrical and plumbing shop (AOC 10), was more than 7 times greater than any other concentration of copper reported in surface soil at the MUTC, but less than the 2,700 mg/kg guidance criteria. Soil sample SOIL14, collected outside the carpenter and paint shops (AOC 9) had 440 µg/kg benzo(b)fluoranthene, which was less than the 15,000 µg/kg guidance criteria.

Geographic Study Area 6 (including the existing wastewater-treatment plant, AOC 2, and the former wastewater-treatment plant, AOC 13)

A total of 21 surface-water, ground-water, surface-soil, and buried-sediment samples (appendixes 7 through 10) were collected in the largest geographic study area that includes the existing and former wastewater-treatment plants (fig. 3). This area had detections of VOC's, SVOC's, trace elements, and ammonia in ground-water and buried-sediment samples. In the area near the existing wastewater-treatment plant (AOC 2), buried-sediment sample SED-B17 had 25,000 µg/kg of an unknown SVOC and some of the largest concentrations of 12 trace elements, including arsenic equal to the guidance-criteria concentration of 20 mg/kg. Ground-water sample GW-B17, collected from the temporary well in the same borehole as SED-B17, contained estimated concentrations of the VOC's commonly associated with petroleum fuels—benzene, toluene, ethylbenzene, and xylenes. Sample GW-B17 also contained the largest concentrations of 14 trace elements detected in any ground-water sample at the MUTC, including two concentrations greater than regulatory standards—4.6 µg/L beryllium and 97 µg/L lead. The corresponding regulatory standards are 4.0 µg/L beryllium and 15 µg/L lead. The concentration of lead in sample GW-B3 from this study area was equal to the 15 µg/L regulatory standard. Also near the existing wastewater-treatment plant, buried-sediment sample SED-B16 contained estimated concentrations of 5 VOC's not detected in a blank, including (like GW-B17) benzene, toluene, ethylbenzene, and xylenes, and 5 unknown VOC's with an estimated concentration sum of 104 µg/kg.

In the area near the former wastewater-treatment plant (AOC 13) in geographic study area 6, ground-water sample GW-B1 contained 2.1 µg/L chlorobenzene and the largest concentration of ammonia nitrogen detected in ground water at the MUTC. The 48 mg/L ammonia nitrogen in GW-B1 was considerably greater than the 0.03 mg/L computed regulatory standard for surface water in Indiana that was used for comparison. Concentrations of ammonia nitrogen in two other ground-water samples near the former wastewater-treatment plant also were considerably greater than the 0.03 mg/L standard—9.2 mg/L in GW-B2 and 15 mg/L in GW-B3. In addition to ammonia nitrogen, the concentration of sulfate in sample GW-B2 was greater than the 250 mg/L regulatory standard for ground water.

Buried-sediment sample SED-B3 had detections of 5 VOC's not detected in a blank, including the largest concentration of acetone detected in buried sediment at the MUTC (35 µg/kg). In sample GW-B3, from the same borehole as SED-B3, 1.8 µg/L ethylbenzene was detected along with estimated concentrations of 4 other VOC's. Similar compounds, chlorobenzene and 1,4-dichlorobenzene were detected in GW-B3 while 1,4-dichlorobenzene and 1,2,4-trimethylbenzene were detected in SED-B3.

Surface-water sample SW1 was collected from the flow downstream of AOC 13 and presumably contained treated effluent. The sample had 2.0 µg/L chloroform, which exceeded the 1.9 µg/L regulatory standard, and 270 mg/L chloride, which exceeded the 230 mg/L regulatory standard. Surface-water sample SW4, from a seep spring flowing into the stream represented by sample SW1, had 1.2 µg/L trichloroethene; the regulatory standard for trichloroethene is 27 µg/L.

Geographic Study Area 7 (including the power house, AOC 3, and store room, AOC 4)

Two surface-water samples (appendix 7), five surface-soil samples (appendix 9), and two buried-sediment samples (appendix 10) were collected near the power house and store room (fig. 3). This area had two surface-soil samples with the largest numbers of SVOC's detected in any of the surface-soil samples at the MUTC. Sample SOIL9, collected east of the gas pump by the storeroom (AOC 4), contained 13 concentrations of SVOC's, including the largest concentra-

tions of any of these compounds detected at the MUTC. The concentration of one of the compounds detected in SOIL9, 3,500 µg/kg benzo(a)pyrene, was greater than the guidance criteria of 1,500 µg/kg. This surface-soil sample also had detections of 28 unknown SVOC's with an estimated concentration sum of 20,860 µg/kg. Similarly, SOIL11 contained 9 concentrations of SVOC's and 19 unknown SVOC's with an estimated concentration sum of 17,510 µg/kg. Surface-soil sample SOIL11 contained concentrations of 4.6 mg/kg cadmium, 620 mg/kg lead, and 350 mg/kg zinc, which were the largest concentrations of these trace elements detected in any surface-soil sample at the MUTC. The concentration of lead in SOIL11 was greater than the 230 mg/kg guidance criteria. Sample SOIL11 was collected near a diesel-fuel pump south of the MUTC power house (AOC 3). Surface-soil sample SOIL20, south of the coal storage area, had a concentration of arsenic of 30 mg/kg, which exceeded the 20 mg/kg guidance criteria. Sample SOIL19, northwest of the coal storage area, had 15 mg/kg arsenic.

Also in geographic study area 7, surface-water sample SW10 contained the largest concentrations of copper (18 µg/L) and ammonia-nitrogen (1.5 mg/L) detected in surface-water samples at the MUTC. This concentration of copper was greater than the 11 µg/L regulatory standard, and the concentration of ammonia-nitrogen was greater than the computed regulatory standard. In addition, sample SW10 had 3 unknown SVOC's detected with an estimated concentration sum of 489.9 µg/L, which was 10 times larger than the next largest estimated concentration of unknown SVOC's in any surface-water sample at the MUTC. Water from SW10 emerged from a pipe that had an unknown origin, assumed to be in study area 7.

Summary

The Muscatatuck Urban Training Center (MUTC) includes the buildings and grounds of a former 825-acre State of Indiana mental-health facility in Jennings County near Butlerville in southeastern Indiana. The facility was closed, and the property was transferred to the Indiana National Guard in July 2005, then converted into an urban warfare training center. The U.S. Geological Survey, in cooperation with the Indiana National Guard, completed the environmental assessment of the MUTC during October and November 2005.

The MUTC was investigated as 7 geographic study areas in which 59 environmental samples were collected—12 surface-water, 8 ground-water, 20 surface-soil, and 19 buried-sediment samples. Twenty boreholes were made with a truck-mounted, direct-push drill rig. Nearly continuous sediment cores were collected as boreholes were drilled to bedrock at depths that ranged from 7.4 to 26 feet below land surface.

Surface-water samples were collected from all identified surface water, including pools, natural and constructed channels, and seeps and springs where ground water discharged to the land surface. Ground-water samples were collected from temporary wells in boreholes that produced a quantity of water sufficient for sampling. Surface-soil samples were collected where spills or disposal of potential contaminants may have occurred. Buried-sediment samples were collected from boreholes to identify the presence of contaminants that were transported by ground water and that had an affinity for organic material or sediments.

Surface-water, ground-water, surface-soil, buried-sediment, and quality-assurance samples were analyzed for 65 volatile organic chemicals, 62 semivolatile organic chemicals, 20 trace elements, and 6 inorganic cations. Water samples also were analyzed for 4 inorganic anions, 3 nutrients, and 4 water-quality characteristics. Quality-assurance samples included duplicates, matrix spike and matrix-spike duplicates, field blanks, trip blanks, and laboratory blanks. Field duplicate samples were used to evaluate the variability of constituent concentrations. Analysis of the spiked samples helped evaluate possible interference from the sample matrix on constituent concentrations.

Some constituents were detected in environmental samples at concentrations less than the laboratory reporting limit, and the concentrations were qualified as estimated. Some constituents were detected in field-blank, trip-blank, or laboratory-blank samples. Consistent with procedures used by the Indiana Department of Environmental Management, the non-estimated concentrations in environmental samples that were greater than five times the highest concentration detected in the blank samples were identified as valid for comparison with regulatory standards or guidance criteria.

For this environmental assessment, the constituent detections were ranked in two levels of importance. First, the detections with the highest level of importance are constituent concentrations greater than the regulatory standards or guidance criteria. Second, the detections of interest are the highest concentrations of a constituent in water, soil, or sediment samples at the MUTC or multiple constituent detections associated with a geographic study area.

A total of 17 valid constituent concentrations in 11 environmental samples from 5 of the 7 geographic study areas were greater than State of Indiana regulatory standards or guidance criteria. Standards or criteria were exceeded for 10 constituents: ammonia, arsenic, benzo(a)pyrene, beryllium, chloride, chloroform, copper, lead, sulfate, and zinc.

Detections of interest were identified in three geographic study areas that also had constituent concentrations which exceeded Indiana standards or criteria.

- A water sample from a pool in the former stone quarry in the northeastern MUTC contained the largest concentrations of nine trace elements detected in any water sample, including arsenic, lead, and zinc concentrations that exceeded the Indiana standard.

- Two soil samples near the power house in the northwestern MUTC contained concentrations of at least nine SVOC's that were among the largest detected in

any soil samples, including a benzo(a)pyrene concentration that exceeded Indiana guidance criteria.

- In the area near the existing wastewater-treatment plant in the eastern MUTC, a buried-sediment sample had a large concentration of an unknown SVOC and some of the largest concentrations of 12 trace elements, including arsenic, equal to the guidance-criteria concentration. A ground-water sample, collected from the temporary well in the same borehole as this buried-sediment sample, contained estimated concentrations of the four VOC's commonly associated with petroleum fuels. This ground-water sample also contained the largest concentrations of 14 trace elements detected in any ground-water sample, including beryllium and lead concentrations that exceeded the Indiana standards.
- In the area near the former wastewater-treatment plant in the eastern MUTC, a ground-water sample contained the largest concentration of ammonia nitrogen detected in any ground-water sample; the concentration was considerably greater than the computed regulatory standard for surface water used for comparison. Concentrations of ammonia nitrogen in two other ground-water samples in this area also were considerably greater than the standard.
- A surface-soil sample collected near the lawn shop in the northern MUTC had a detection of a chlorinated pesticide, although pesticides were not among the list of target constituents for the assessment. This sample and two other surface-soil samples in this area contained as many as 18 unknown SVOC's with substantial estimated concentrations.

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Appendixes 1–10

1. Characteristics of Sampling Sites
2. Characteristics of Samples
3. Descriptions of Boreholes and Buried-Sediment Cores
4. Characteristics of Analytical Constituents for Samples
5. Field-Duplicate Sample Data
6. Matrix-Spike Sample Data
7. Concentrations of Constituents Detected in Surface-Water Samples and Selected Quality-Assurance Samples
8. Concentrations of Constituents Detected in Ground-Water Samples and Selected Quality-Assurance Samples
9. Concentrations of Constituents Detected in Surface-Soil Samples
10. Concentrations of Constituents Detected in Buried-Sediment Samples

Appendix 1. Characteristics of Sampling Sites at the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

[NWIS, National Water Information System; MUTC, Muscatatuck Urban Training Center]

Site name	NWIS station number	Location	Description
SW1	390300085321901	Gravel road near west property line; upstream of culvert; upstream of flow from spring SW4	Combines treated wastewater treatment plant effluent and spring at property line.
SW2	390258085321201	Road by lift station; pool in ditch above wastewater treatment plant outfall	Minimal flow velocity.
SW3	390304085321501	In ravine north of northern pond below coal pile; pool at base of spring	Pond outfall was reported to flow into the ravine at times.
SW4	390300085322001	Gravel road near western property line; upstream of culvert; large wet area from perennial spring	Perennial spring was reported to never dry up; does not include effluent.
SW5	390317085320101	Old spring house, east of stairs leading to river from water plant	Water flows from pipe in old spring house; standing water in pool.
SW6	390323085314201	Pool and wetland on quarry floor	Bear to the right after entering gated road.
SW7	390323085314201	Pool at west quarry wall	Dripping spring fills pool at base of wall.
SW8	390322085314301	Pool near south end of quarry	Pool at base of debris dumped over wall; water discolored and has odor.
SW9	390255085320701	Ditch southwest of wastewater treatment plant	Pooled water with no visible flow velocity; near wastewater plant.
SW10	390306085321201	Water from unknown source, starting at a 10-inch iron pipe, above Vernon Fork	Water from northwest part of MUTC, located northwest of the power house.
SW11	390309085320801	Series of seep springs flowing in bedrock channel, tributary to Vernon Fork	Water from northwestern part of MUTC.
SW12	390325085314201	Seep spring along Brush Creek below former stone quarry	Receives water from former stone quarry.
B1	390257085321501	Near south edge of old anaerobic digester; north of dirt lane to land application site; west of lone tree	Edge of filled area.
B2	390259085321601	Southwest of old final clarifiers; near current tree line; north of buried effluent drain	Filled area, but outside concrete pits.
B3	390257085321502	Northernmost old wastewater lagoon; south of dirt lane to land application site	Not a filled area; should be possible to sample near old sludge.
B4	390256085321501	Southernmost old wastewater lagoon; south of dirt lane to land application site	Not a filled area; should be possible to sample near old sludge.
B5	390258085321501	Northwest of old final clarifiers; near current tree line; south of buried effluent drain	Filled area, but outside concrete pits.
B6	390253085321001	Northwest corner of former electric shop	Transformers stacked on south side of building.
B7	390250085321001	Southwest of laundry and south of former electric shop; low area	Appears to be downgradient of laundry and many of the MUTC buildings.
B8	390254085320901	West edge of gravel road below new wastewater plant	Should represent area that includes sewer lines from main part of MUTC and laundry.
B9	390303085321501	North of wall, north of north pond at power plant	Should be downgradient from power plant coal pile.
B10	390302085321801	West of north pond, west of power plant; near tree line at former home site	Should be downgradient from power plant coal pile.
B11	390300085321701	Southwest of south pond, west of power plant; near tree line	Should be downgradient from power plant coal pile.
B12	390306085320401	In grass north of east-west lane, north of plumbing and electrical buildings	Should be downgradient from trade shops.

Appendix 1. Characteristics of Sampling Sites at the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[NWIS, National Water Information System; MUTC, Muscatatuck Urban Training Center]

Site name	NWIS station number	Location	Description
B13	390304085320501	Northwest of plumbing shop; northeast of power plant	Should be downgradient from trade shops.
B14	390303085320701	North of gas pumps near power plant; in grass north of east-west lane	Should be downgradient of underground tanks.
B15	390306085321001	North of store room loading docks; in grass north of east-west lane	Should be downgradient from power plant.
B16	390259085320601	Low grassy area north of clarifiers at new wastewater plant	May represent leaks from new wastewater plant.
B17	390256085320701	W of road to new wastewater plant; low grassy area southwest of clarifiers	May represent leaks from new wastewater plant.
B18	390309085313301	East edge of vegetation dump	Should represent ground water beneath vegetation dump.
B19	390311085313701	Northwest corner of vegetation disposal area	Should represent ground water beneath vegetation dump.
B20	390308085313601	West edge of vegetation disposal area	Should represent ground water beneath vegetation dump.
SOIL1	390250085320901	West of road, west of laundry; catch basin below culvert	Downstream of main campus and laundry.
SOIL2	390309085313101	Patch of wet soils at northeast edge of vegetation disposal area	Should represent surface runoff from vegetation dump.
SOIL3	390310085313101	Shallow swale at northeast edge of vegetation disposal area	Should represent surface runoff from vegetation dump.
SOIL6	390314085315801	Southeast corner of lawn shop	Should represent activity at lawn shop.
SOIL7	390315085315901	NW corner of Lawn Shop, 25’ west of building	Should represent activity at lawn shop.
SOIL8	390316085315901	Swale 30 feet north of lawn shop parking lot	Should represent activity at lawn shop.
SOIL9	390305085320701	17 feet east of gas pump, east of Building 17 store room	
SOIL10	390306085320901	Northwest of loading docks at Building 17 store room	Should represent surface activity near loading docks at Building 17.
SOIL11	390301085320901	South of power house, 50 feet south of diesel fuel pump, under lone Sycamore	Should represent surface activity near diesel fuel pump at the power house.
SOIL12	390303085320201	Electrical shop back door (north side, lower level)	Should represent surface activity at electrical shop.
SOIL13	390302085320301	Plumbing shop front door (west side, lower level)	Should represent surface activity at plumbing shop.
SOIL14	390301085320301	Paint shop side yard (southwest of front door)	Should represent surface activity at paint shop.
SOIL15	390300085320601	Swale northwest of clarifiers at new wastewater plant	Should catch surface runoff from wastewater plant.
SOIL16	390256085320801	Swale southwest of clarifiers at new wastewater plant	Should catch surface runoff from wastewater plant.
SOIL18	390251085320801	Laundry back door, west side	Should represent surface activity at laundry.
SOIL19	390304085321401	Northeast of final lagoon, northwest of coal pile	Should represent coal runoff that is bypassing the lagoon system.
SOIL20	390300085321201	Rush-grass wetland southwest of coal pile	Should represent coal-pile runoff.

Appendix 2. Characteristics of Samples Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

[Identification code: GW, ground water; SW, surface water; SOIL, surface soil; SED, buried sediment; B, borehole; MS, matrix spike; MSD, matrix spike duplicate; REP, replicate; FB, field blank. Borehole depth is in feet below land surface.]

Sample identification	Sample site	Sample type[a]	Matrix	Sample date	Sample time
SW1	SW1	Environmental	Water	10/27/2005	1145
SW2	SW2	Environmental	Water	10/27/2005	1450
SW3	SW3	Environmental	Water	10/27/2005	1400
SW4	SW4	Environmental	Water	10/27/2005	1230
SW5	SW5	Environmental	Water	10/27/2005	0905
SW6	SW6	Environmental	Water	10/27/2005	0815
SW7	SW7	Environmental	Water	10/26/2005	1550
SW8	SW8	Environmental	Water	10/26/2005	1630
SW9	SW9	Environmental	Water	10/27/2005	1650
SW10	SW10	Environmental	Water	10/28/2005	0915
SW11	SW11	Environmental	Water	10/27/2005	0950
SW12	SW12	Environmental	Water	11/9/2005	0955
GW-B1	B1	Environmental	Water	10/26/2005	1145
GW-B2	B2	Environmental	Water	11/9/2005	1300
GW-B3	B3	Environmental	Water	10/28/2005	1055
GW-B4	B4	Environmental[b]	Water	10/28/2005	1130
GW-B6	B6	Environmental[b]	Water	10/28/2005	0820
GW-B8	B8	Environmental[b]	Water	10/26/2005	1315
GW-B17	B17	Environmental[b]	Water	11/18/2005	1700
GW-B20	B20	Environmental[b]	Water	11/9/2005	1145
SED-B1	B1	Environmental	Sediment	10/25/2005	1425
SED-B3	B3	Environmental	Sediment	10/26/2005	1440
SED-B4	B4	Environmental	Sediment	10/26/2005	1250
SED-B5	B5	Environmental	Sediment	10/25/2005	1550
SED-B6	B6	Environmental	Sediment	10/25/2005	0900
SED-B7	B7	Environmental	Sediment	11/19/2005	0800
SED-B8	B8	Environmental	Sediment	10/24/2005	0940
SED-B9	B9	Environmental	Sediment	10/24/2005	1150
SED-B10	B10	Environmental	Sediment	10/24/2005	1300
SED-B11	B11	Environmental	Sediment	10/26/2005	1110
SED-B12	B12	Environmental	Sediment	10/25/2005	1100
SED-B13	B13	Environmental	Sediment	10/25/2005	1250
SED-B14	B14	Environmental	Sediment	10/24/2005	1730
SED-B15	B15	Environmental	Sediment	10/24/2005	1445
SED-B16	B16	Environmental	Sediment	11/18/2005	1600
SED-B17	B17	Environmental	Sediment	11/18/2005	1450
SED-B18	B18	Environmental	Sediment	11/19/2005	1600
SED-B19	B19	Environmental	Sediment	11/19/2005	1055
SED-B20	B20	Environmental	Sediment	11/7/2005	1345

Appendix 2. Characteristics of Samples Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[Identification code: GW, ground water; SW, surface water; SOIL, surface soil; SED, buried sediment; B, borehole; MS, matrix spike; MSD, matrix spike duplicate; REP, replicate; FB, field blank. Borehole depth is in feet below land surface.]

Sample identification	Sample site	Sample type[a]	Matrix	Sample date	Sample time
SOIL1	SOIL1	Environmental	Soil	10/26/2005	1640
SOIL2	SOIL2	Environmental	Soil	11/7/2005	0910
SOIL3	SOIL3	Environmental	Soil	10/26/2005	1600
SOIL-B3	B3	Environmental	Soil	10/26/2005	1430
SOIL-B4	B4	Environmental	Soil	10/26/2005	1310
SOIL6	SOIL6	Environmental	Soil	10/27/2005	0810
SOIL7	SOIL7	Environmental	Soil	10/27/2005	0825
SOIL8	SOIL8	Environmental	Soil	10/27/2005	0835
SOIL9	SOIL9	Environmental	Soil	10/27/2005	0935
SOIL10	SOIL10	Environmental	Soil	10/27/2005	0955
SOIL11	SOIL11	Environmental	Soil	10/27/2005	1155
SOIL12	SOIL12	Environmental	Soil	10/27/2005	1225
SOIL13	SOIL13	Environmental	Soil	10/27/2005	1250
SOIL14	SOIL14	Environmental	Soil	10/27/2005	1320
SOIL15	SOIL15	Environmental	Soil	10/27/2005	1400
SOIL16	SOIL16	Environmental	Soil	10/27/2005	1420
SOIL-SW6	SW6	Environmental	Soil	10/27/2005	1510
SOIL18	SOIL18	Environmental	Soil	10/27/2005	1605
SOIL19	SOIL19	Environmental	Soil	10/27/2005	1635
SOIL20	SOIL20	Environmental	Soil	11/7/2005	0935
FBSW10	SW10	Field blank	Water	10/28/2005	0840
FBGW-B1	B1	Field blank	Water	10/26/2005	1100
FBSW12	SW12	Field blank	Water	11/9/2005	0950
FBSED-B2	B2	Equipment blank	Water	10/26/2005	1015
MSDSW1	SW1	Matrix-spike duplicate	Water	10/27/2005	1155
MSSW1	SW1	Matrix spike	Water	10/27/2005	1150
MSGW-B2	B2	Matrix spike	Water	11/9/2005	1305
MSDGW-B2	B2	Matrix-spike duplicate	Water	11/9/2005	1310
REPSW8	SW8	Duplicate	Water	10/26/2005	1645
REPSW12	SW12	Duplicate	Water	11/9/2005	1000
REPSOIL2	SOIL2	Duplicate	Soil	11/7/2005	0915
REPSOIL20	SOIL20	Duplicate	Soil	11/7/2005	0940
REPSED-B19	B19	Duplicate	Sediment	11/19/2005	1100
REPSED-B20	B20	Duplicate	Sediment	11/7/2005	1350

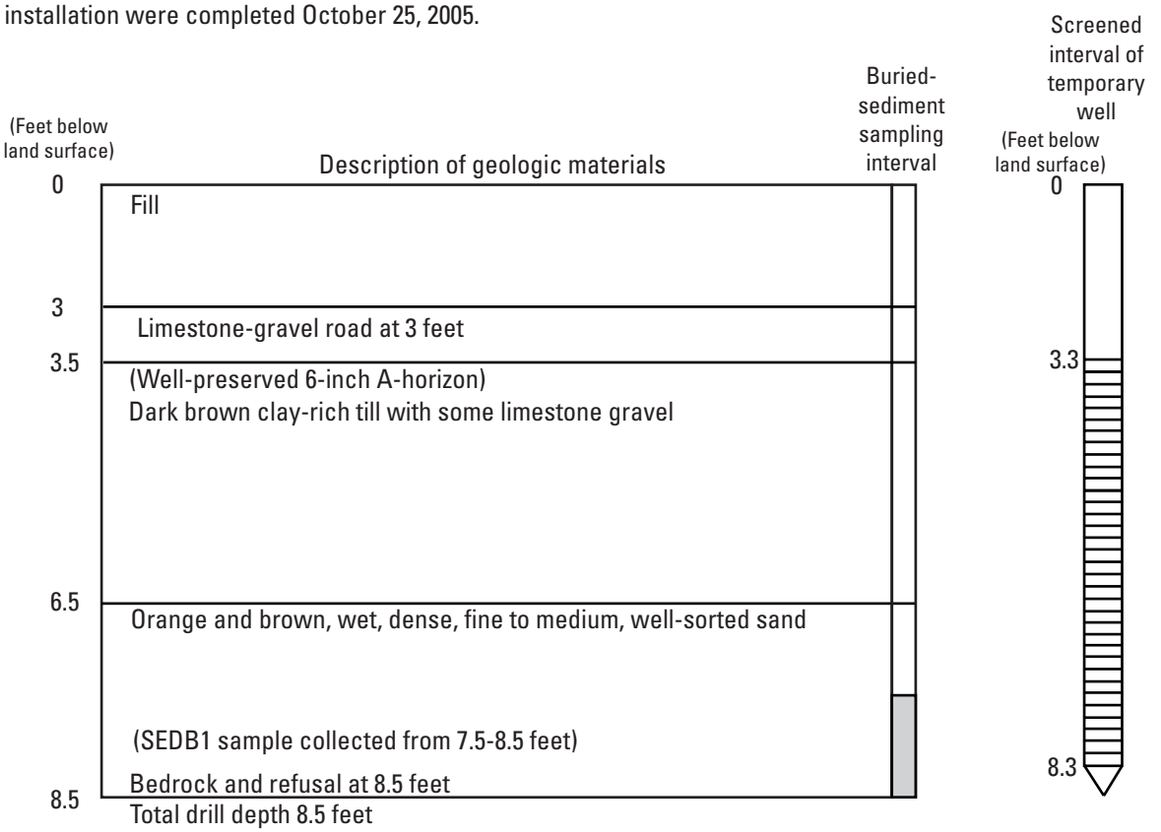
[a] Eight trip blanks are not included. Trip blanks were prepared by the laboratory and transported with empty and filled sample bottles. Trip blanks were included with each sample shipment to the laboratory and analyzed by the laboratory for volatile organic compounds.

[b] Partial sample set collected due to limited volume of water available in temporary well.

Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

Borehole B1 (Sampling site for SEDB1 and GWB1, figure 3)

Located at southeast corner of the former wastewater-treatment plant, west of existing wastewater-treatment plant. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, SW1/4. Unit contacts and screened intervals are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling, sediment sampling, and well installation were completed October 25, 2005.

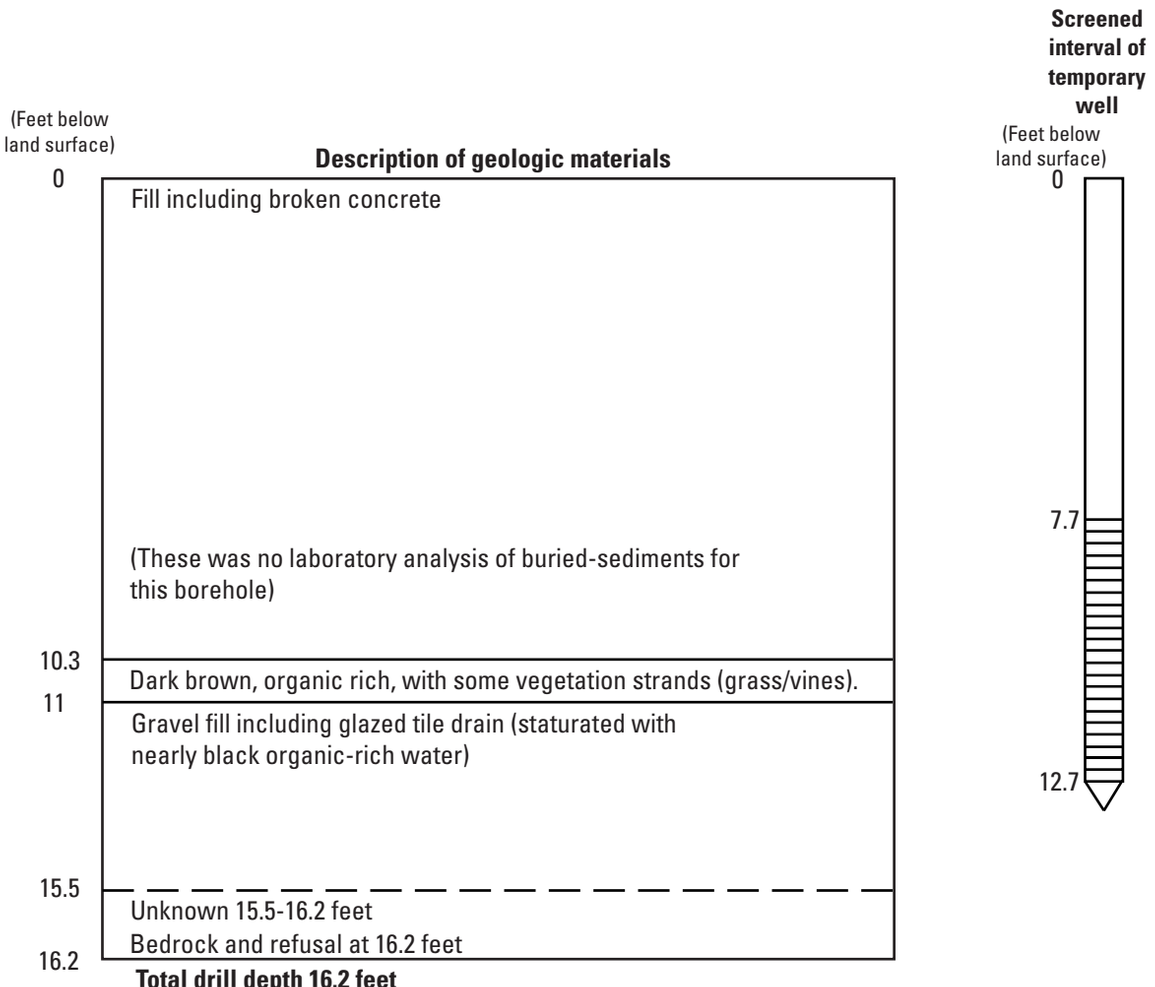


Temporary wells were constructed with 1.0-inch diameter polyvinyl chloride (PVC) casing and a 5-foot long 0.10-inch slot-size PVC screen.

Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B2 (Sampling site for GWB2, figure 3)

Located at northwest corner of the former wastewater treatment plant, west of existing wastewater treatment plant. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, SW1/4. Unit contacts and screened intervals are shown in feet below land surface (dashed where approximate). Drilling and well installation activities were completed October 26, 2005.

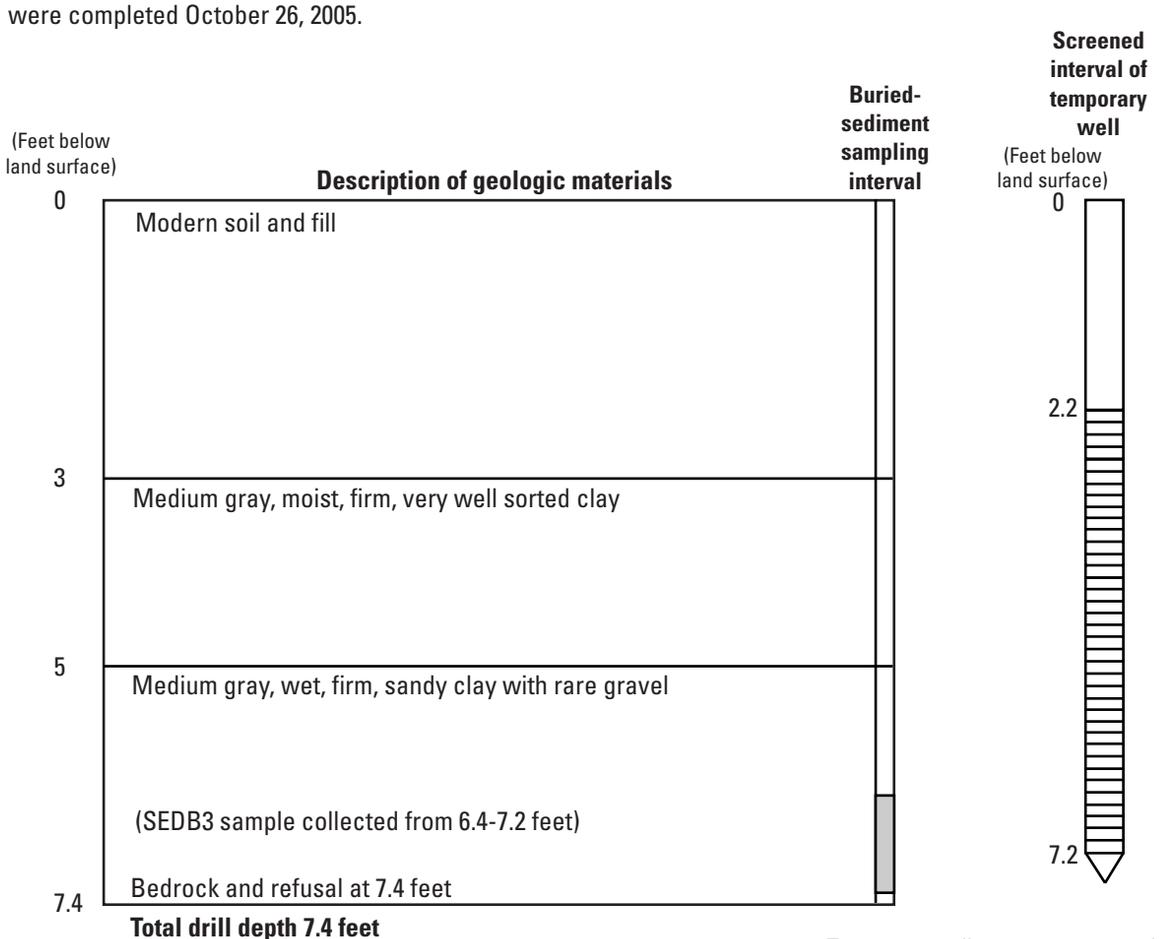


Temporary wells were constructed with 1.0-inch diameter polyvinyl chloride (PVC) casing and a 5-foot long 0.10-inch slot-size PVC screen.

Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B3 (Sampling site for SEDB3, SOILB3, and GWB3, figure 3)

Located south of the former wastewater treatment plant, at the approximate location of the former settling lagoons. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, SW1/4. Unit contacts and screened intervals are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling, sediment sampling, and well installation were completed October 26, 2005.

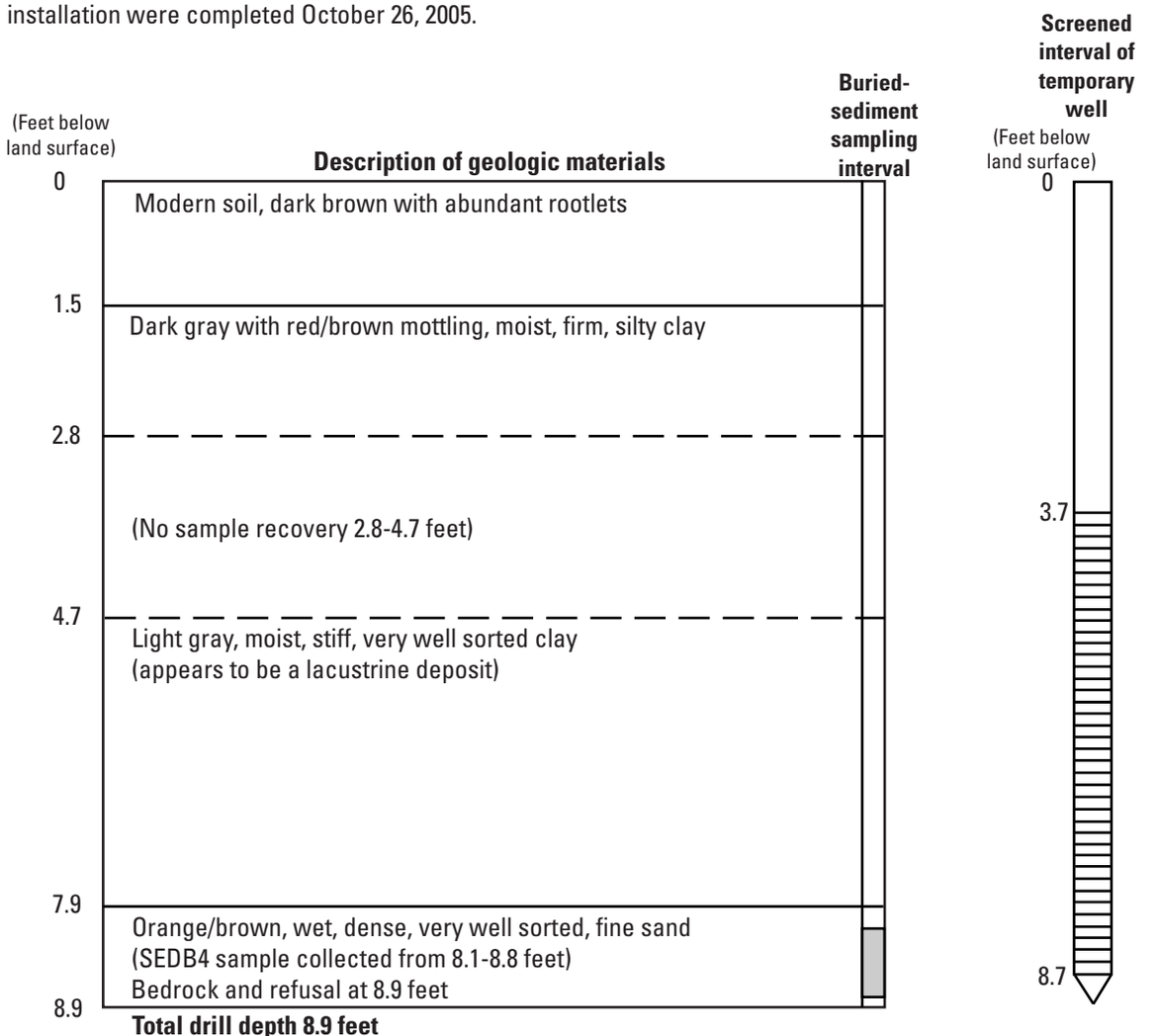


Temporary wells were constructed with 1.0-inch diameter polyvinyl chloride (PVC) casing and a 5-foot long 0.10-inch slot-size PVC screen.

Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B4 (Sampling site for SEDB4, SOILB4, and GWB4, figure 3)

Located south of the former wastewater treatment plant, at the approximate location of the former settling lagoons. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, SW1/4. Unit contacts and screened intervals are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling, sediment sampling, and well installation were completed October 26, 2005.

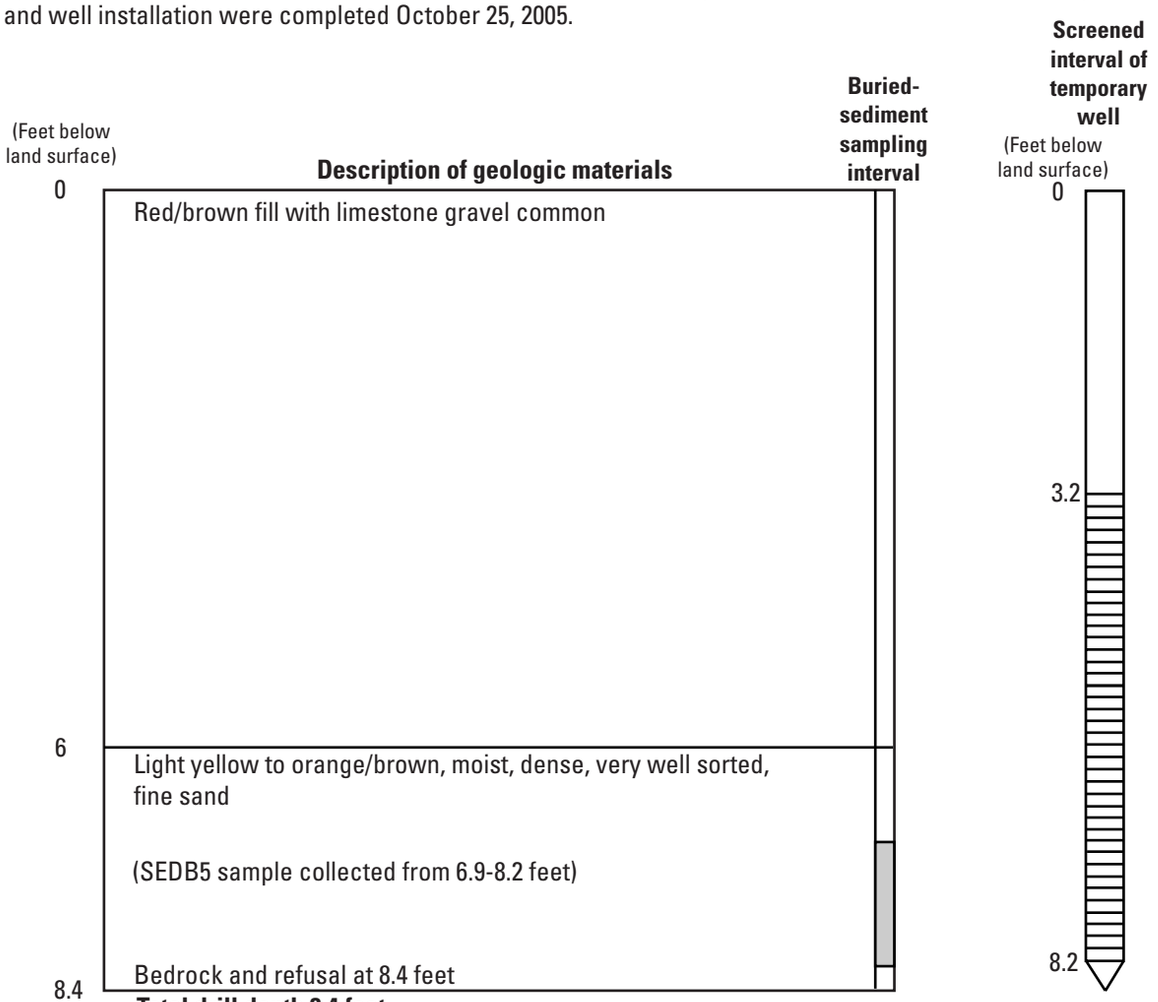


Temporary wells were constructed with 1.0-inch diameter polyvinyl chloride (PVC) casing and a 5-foot long 0.10-inch slot-size PVC screen.

Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B5 (Sampling site for SEDB5, figure 3)

Located at the southwest corner of the former wastewater treatment plant, west of the existing wastewater treatment plant. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, SW1/4. Unit contacts and screened intervals are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling, sediment sampling, and well installation were completed October 25, 2005.

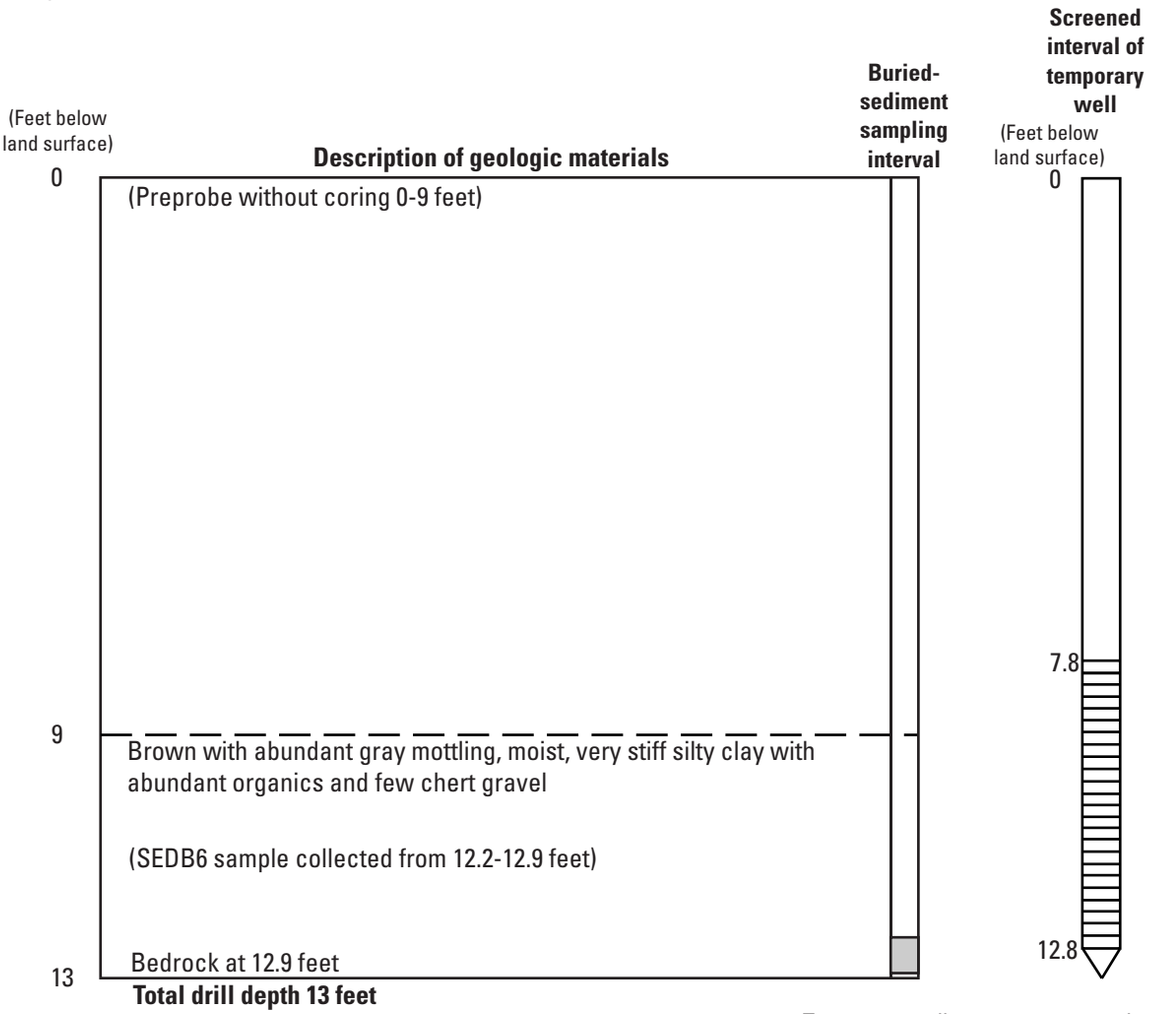


Temporary wells were constructed with 1.0-inch diameter polyvinyl chloride (PVC) casing and a 5-foot long 0.10-inch slot-size PVC screen.

Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B6 (Sampling site for SEDB6 and GWB6, figure 3)

Located near the northwest corner of the former carpentry shop and northwest of the laundry. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, SW1/4. Unit contacts and screened intervals are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling, sediment sampling, and well installation were completed October 25, 2005.

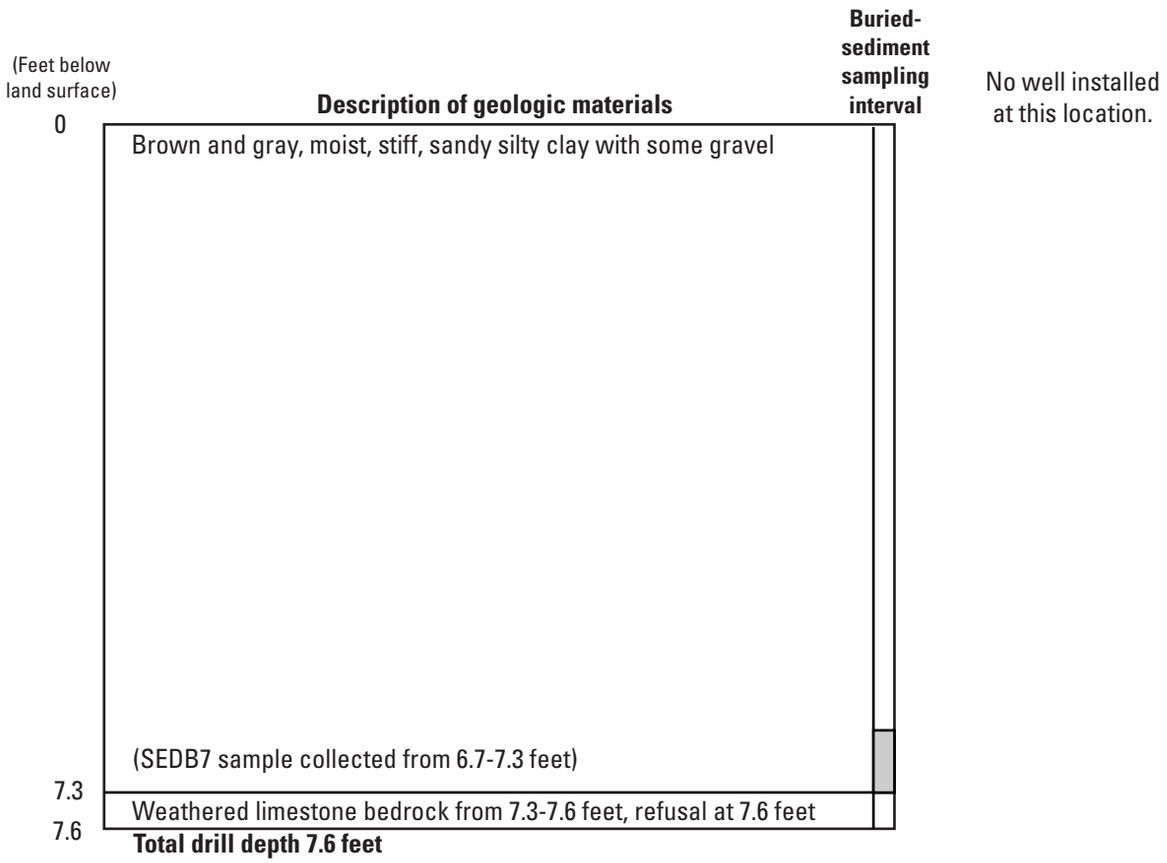


Temporary wells were constructed with 1.0-inch diameter polyvinyl chloride (PVC) casing and a 5-foot long 0.10-inch slot-size PVC screen.

Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B7 (Sampling site for SEDB7, figure 3)

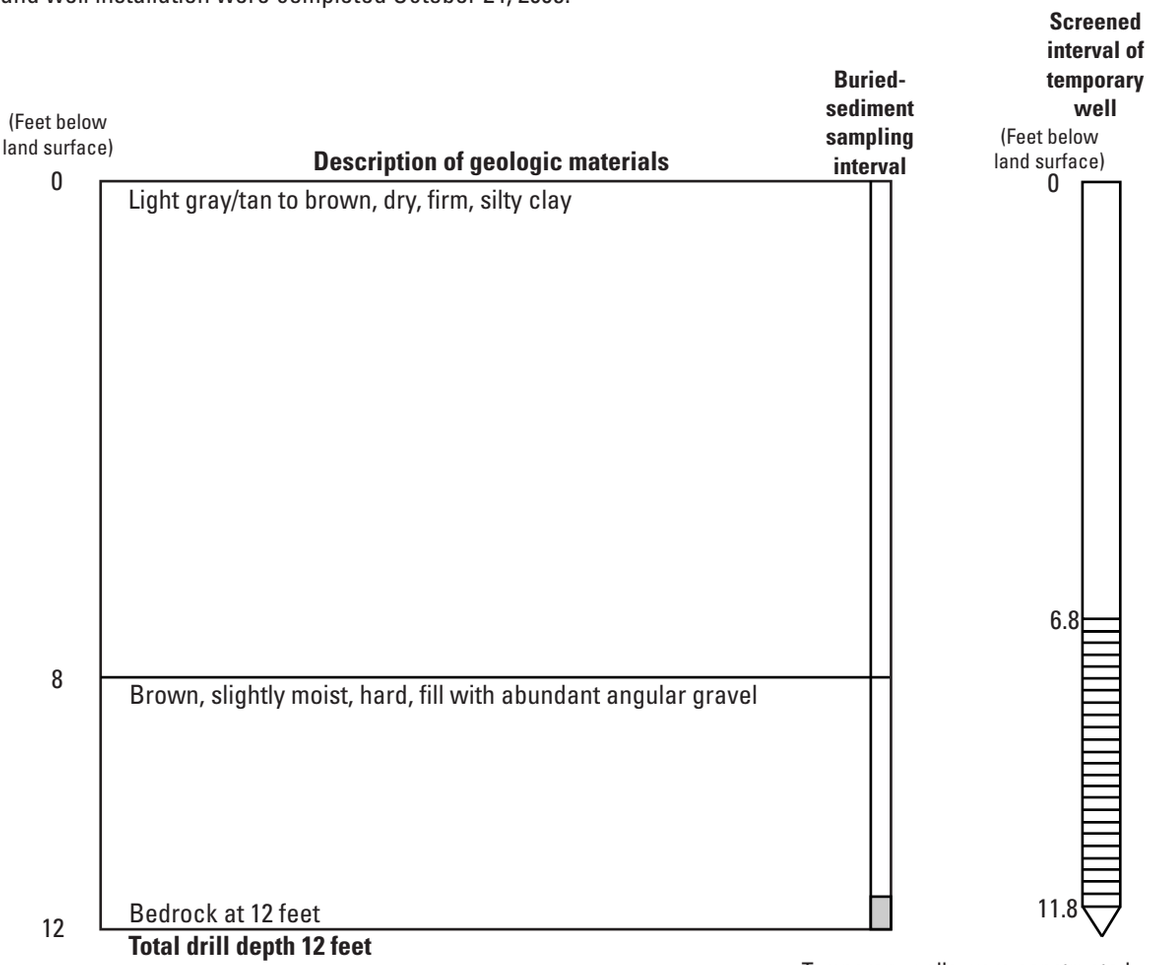
Located south of the former carpentry building and west of the laundry. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, SW1/4. Unit contacts and screened intervals are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling and sediment sampling were completed November 19, 2005.



Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B8 (Sampling site for SEDB8 and GWB8, figure 3)

Located north of the former carpentry shop, northwest of the laundry and southwest of the existing wastewater-treatment plant. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, SW1/4. Unit contacts and screened intervals are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling, sediment sampling, and well installation were completed October 24, 2005.

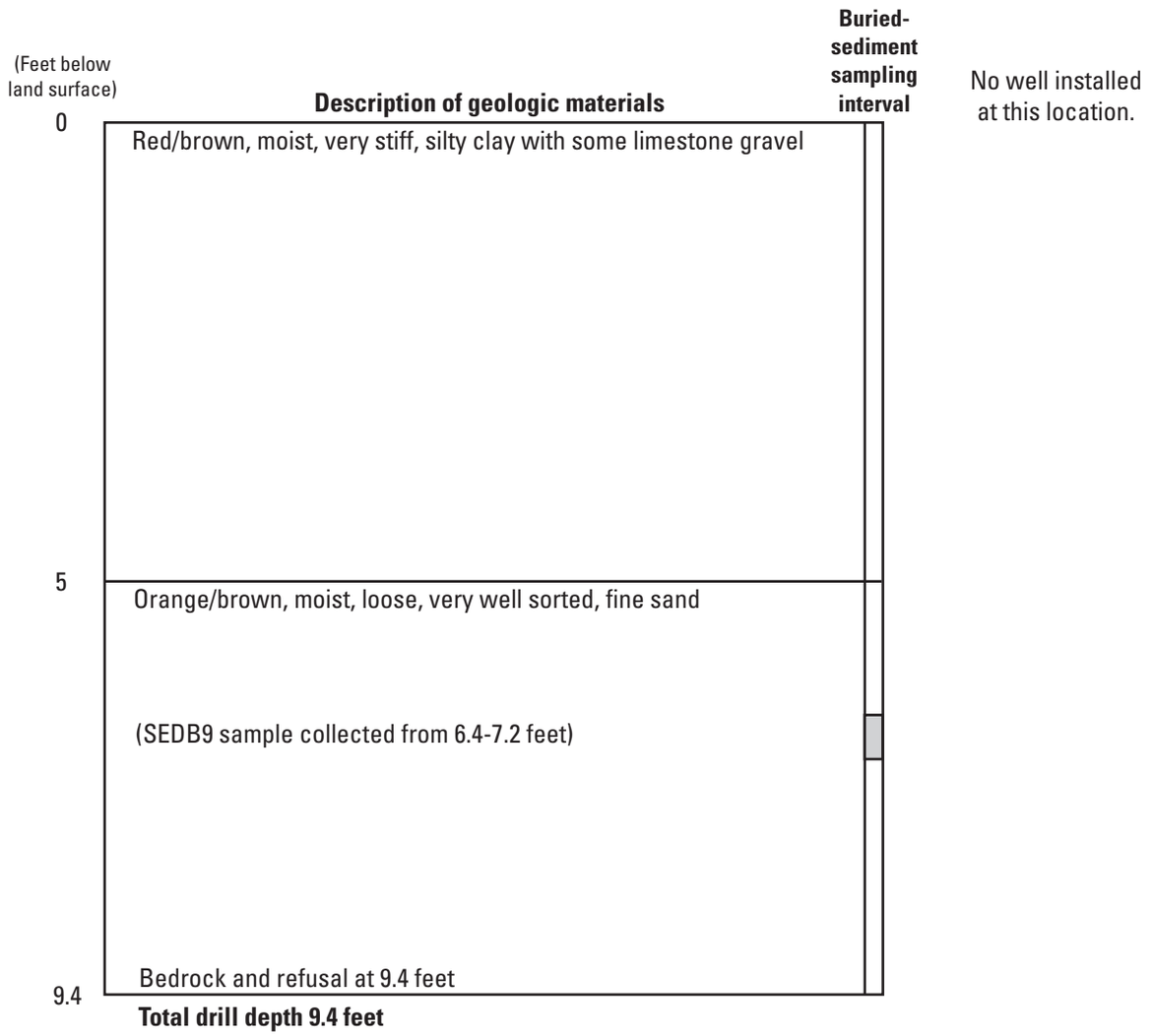


Temporary wells were constructed with 1.0-inch diameter polyvinyl chloride (PVC) casing and a 5-foot long 0.10-inch slot-size PVC screen.

Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B9 (Sampling site for SEDB9, figure 3)

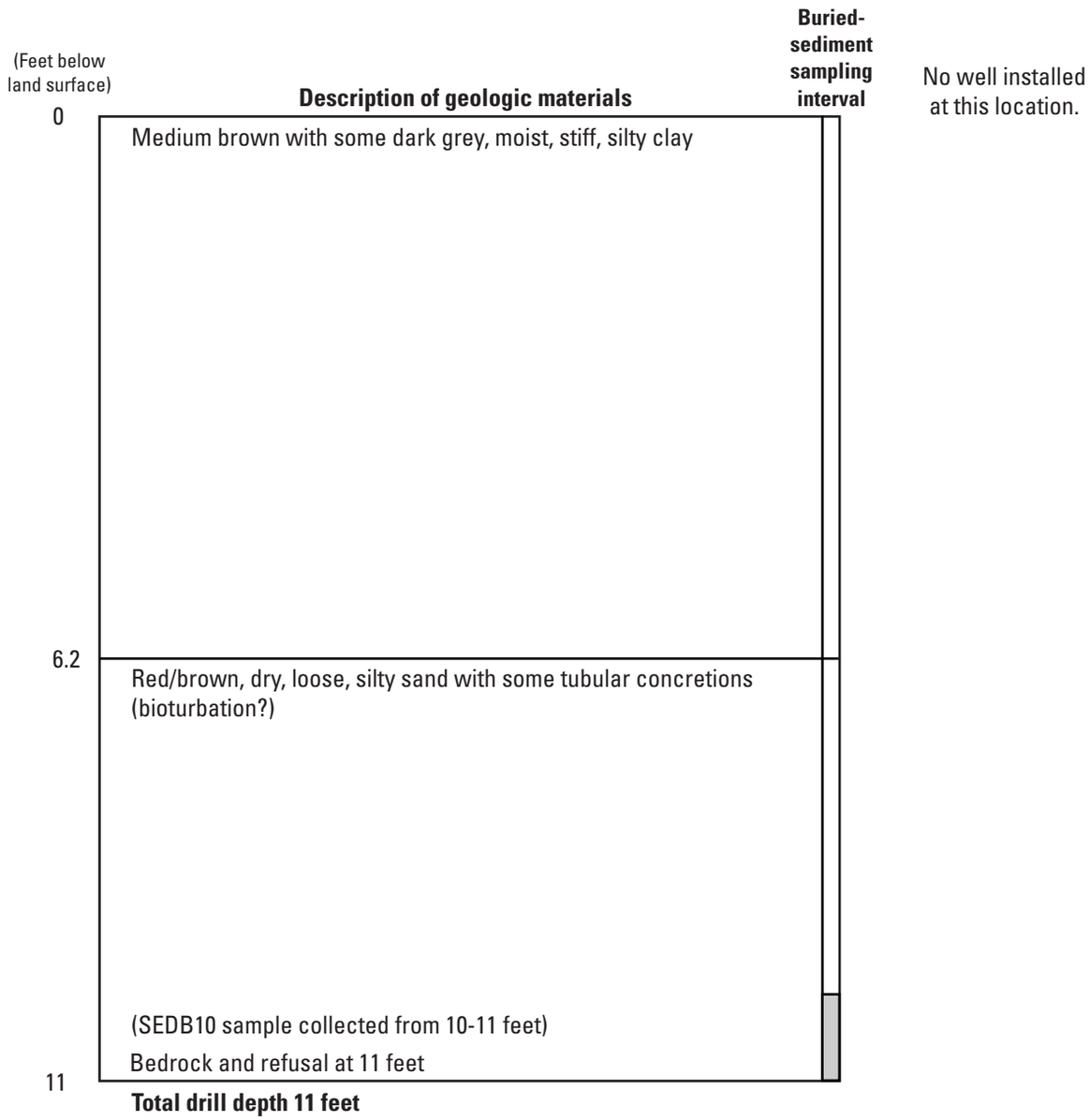
Located at the northwest corner of the northernmost settling pond west of the Power House. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, SW1/4. Unit contacts are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling and sediment sampling were completed October 24, 2005.



Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B10 (Sampling site for SEDB10, figure 3)

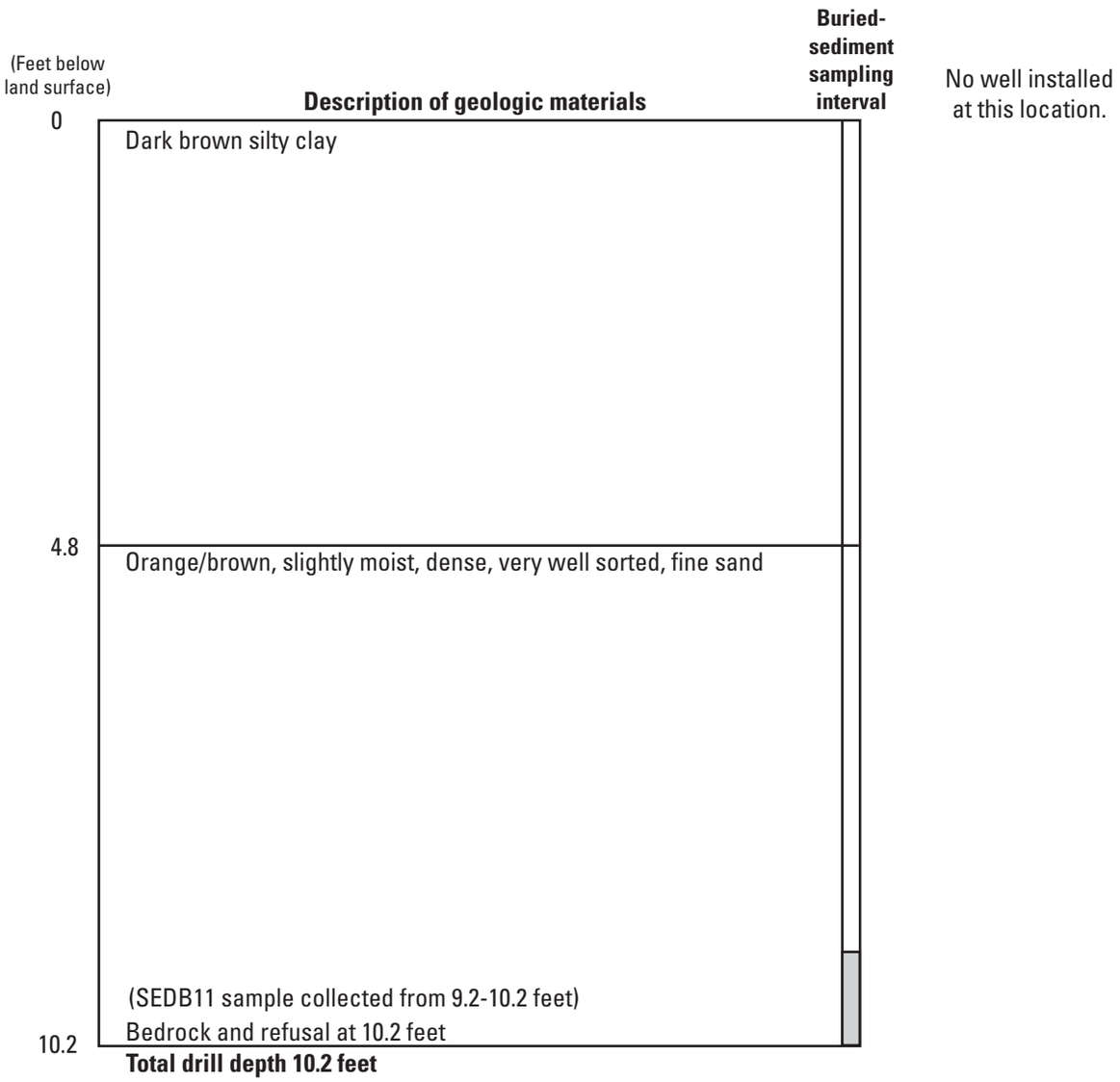
Located northwest of the northernmost settling pond west of the Power House, in the vicinity of an old house foundation. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 17, SE1/4. Unit contacts are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling and sediment sampling were completed October 24, 2005.



Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B11 (Sampling site for SEDB11, figure 3)

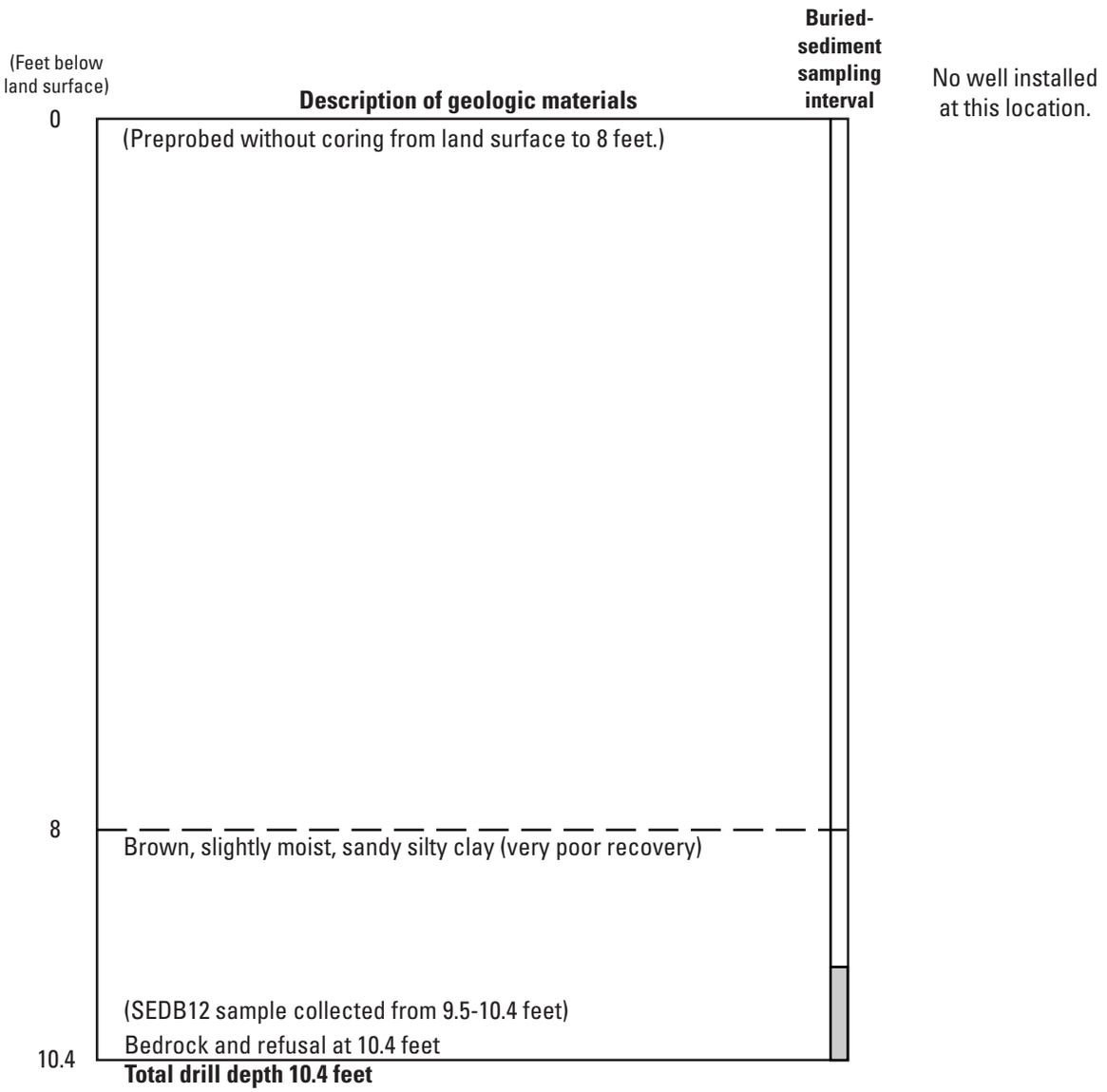
Located west of the settling ponds and the Power House, adjacent to the treeline. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 17, SE1/4. Unit contacts are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling and sediment sampling were completed October 26, 2005.



Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B12 (Sampling site for SEDB12, figure 3)

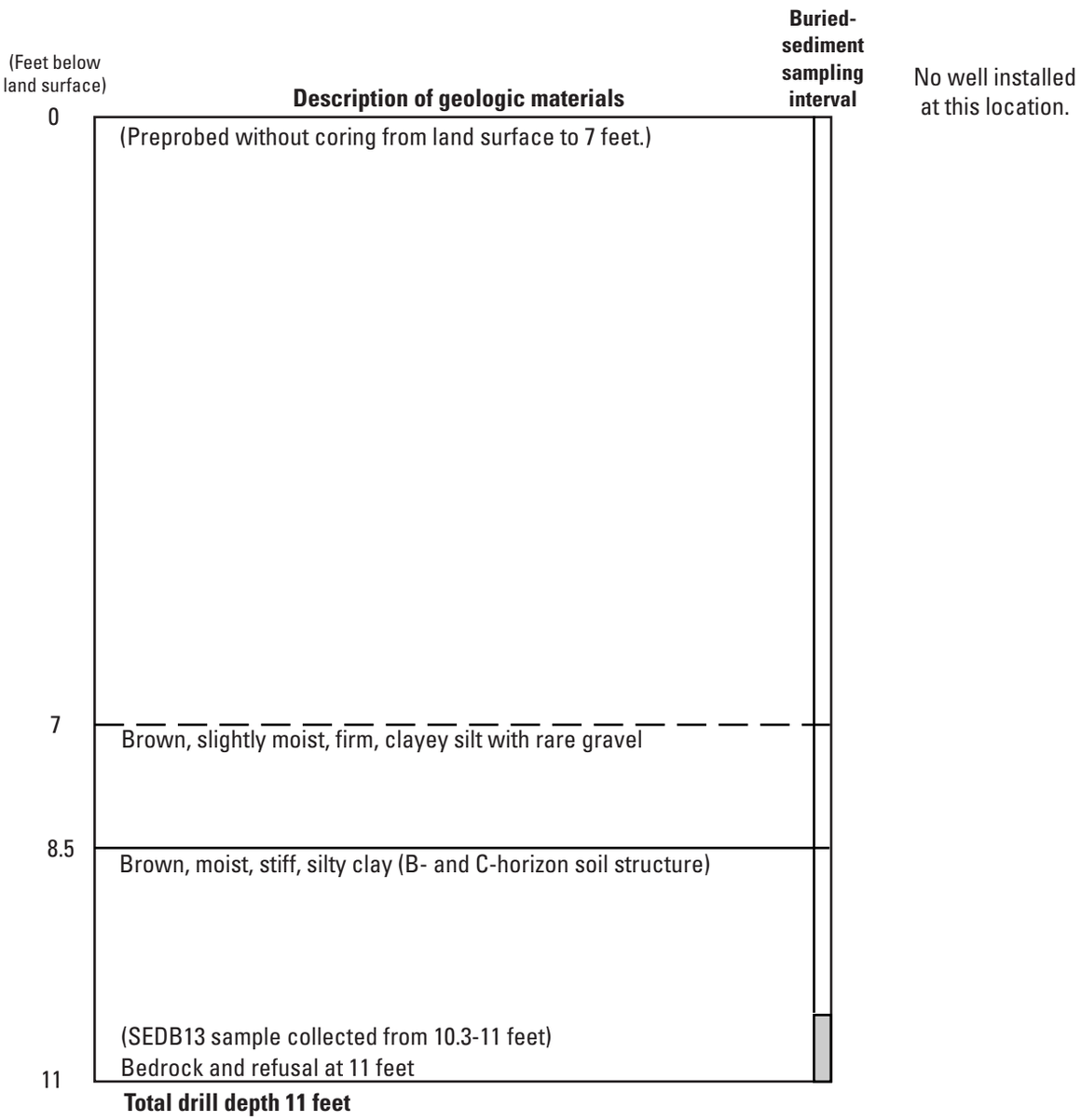
Located northeast of utility buildings 77 and 78. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, NW1/4. Unit contacts are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling and sediment sampling were completed October 25, 2005.



Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B13 (Sampling site for SEDB13, figure 3)

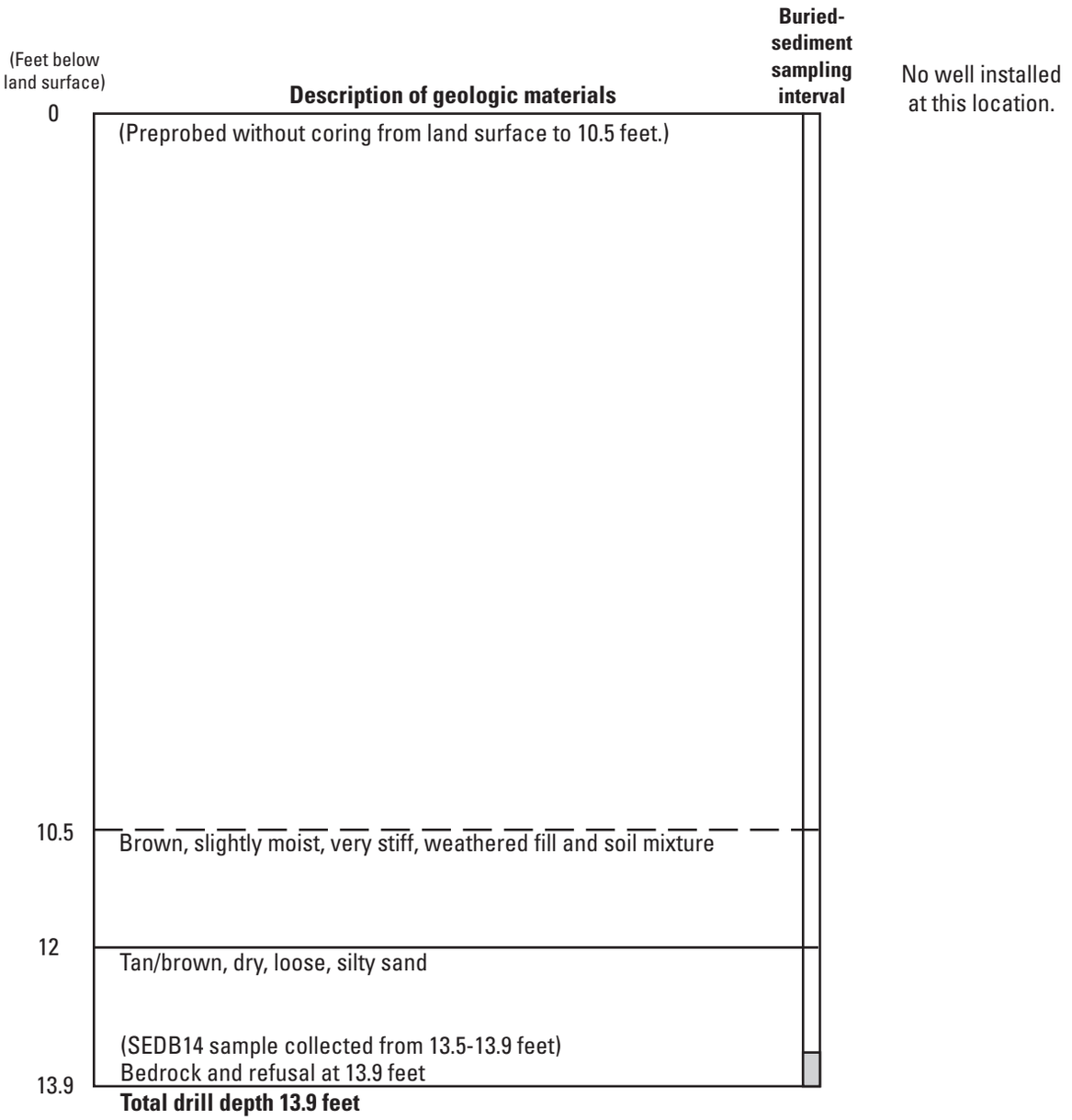
Located south of utility buildings 77 and 78 and northwest of the plumbing/electric shop. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, SW1/4. Unit contacts are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling and sediment sampling were completed October 25, 2005.



Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B14 (Sampling site for SEDB14, figure 3)

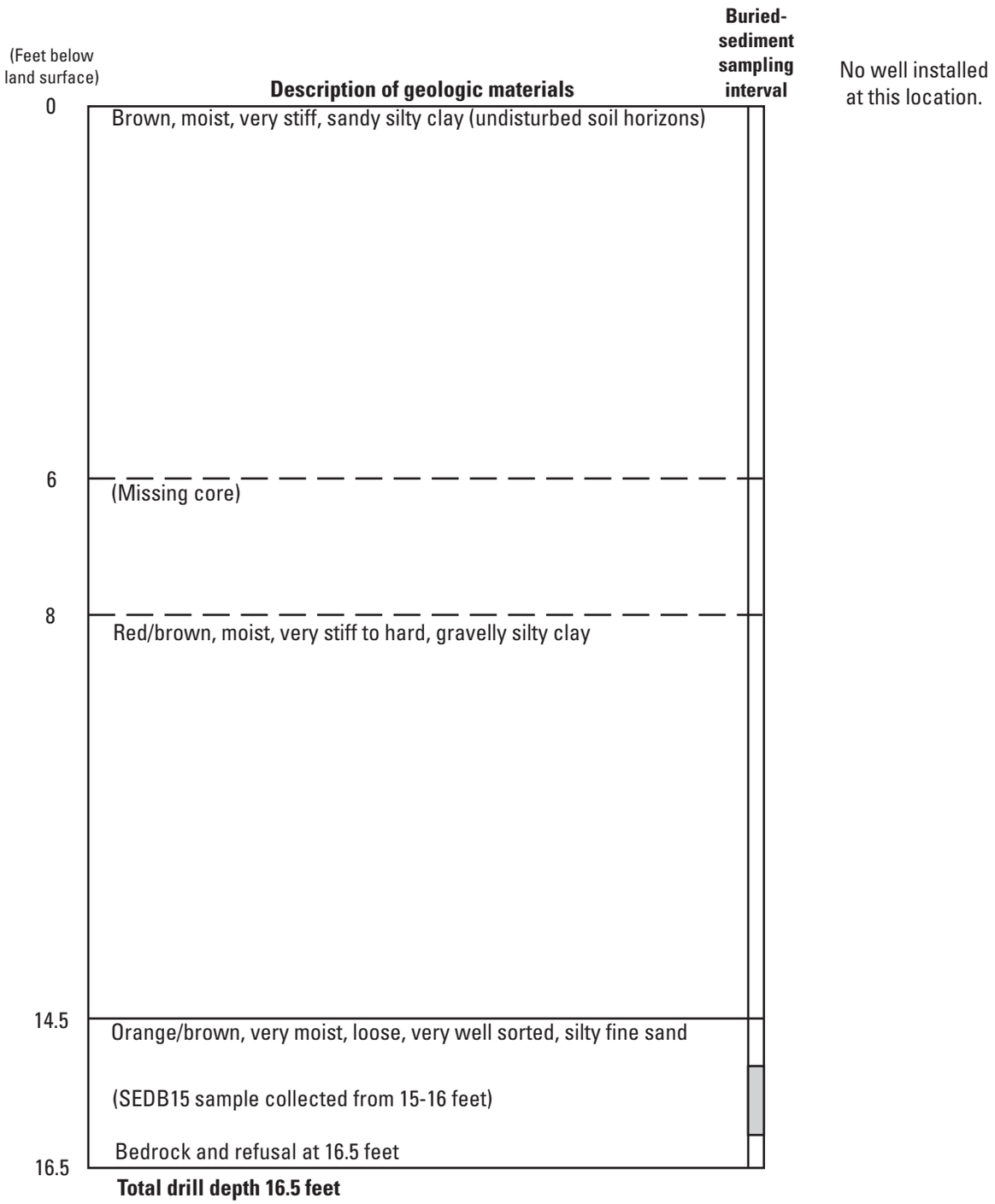
Located north of utility buildings 77 and 78, on northside of the adjacent roadway. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, NW1/4. Unit contacts are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling and sediment sampling were completed October 24, 2005.



Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B15 (Sampling site for SEDB15, figure 3)

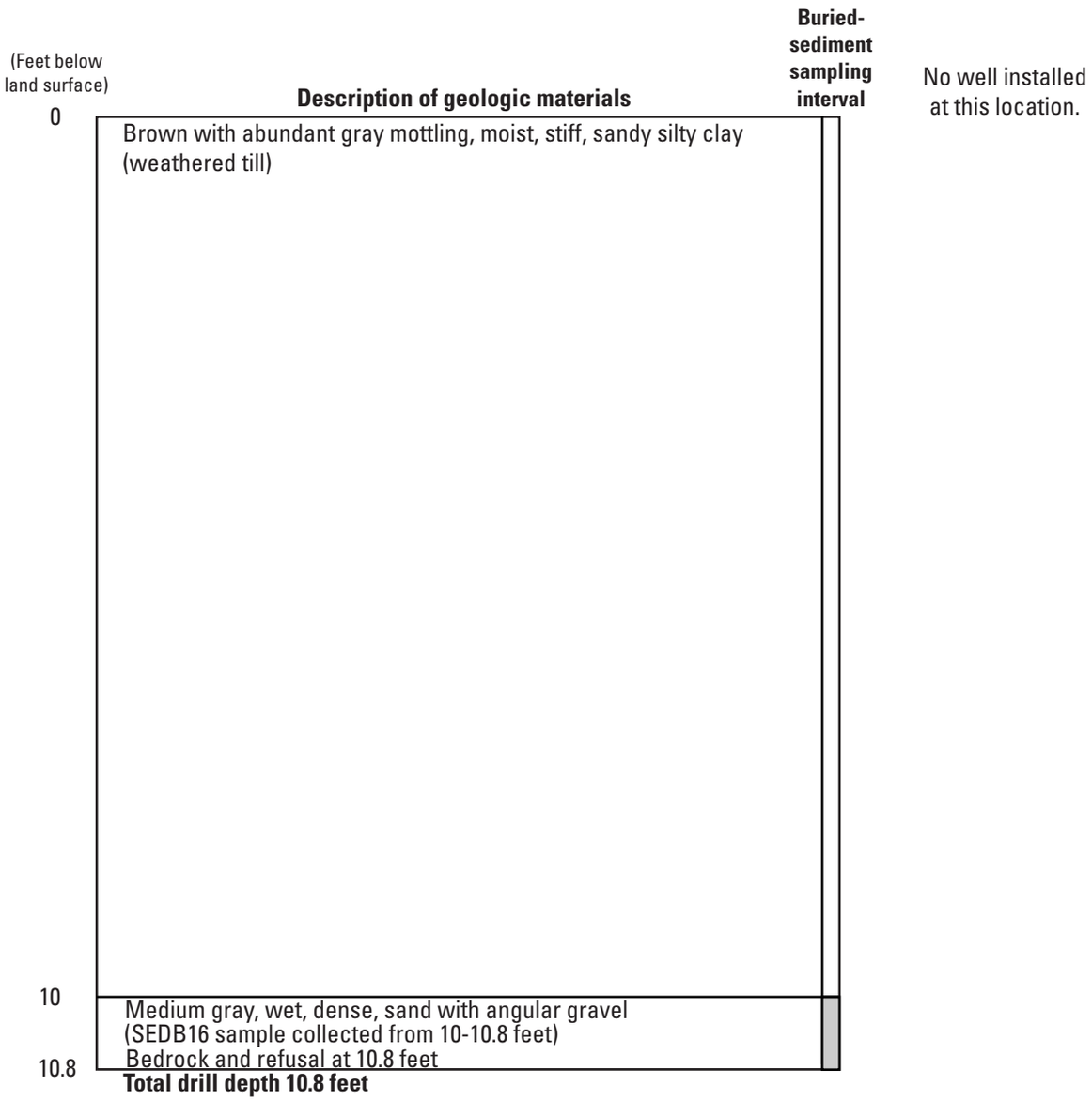
Located north of Storeroom (building 17), on northside of the adjacent roadway. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, NW1/4. Unit contacts are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling and sediment sampling were completed October 24, 2005.



Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B16 (Sampling site for SEDB16, figure 3)

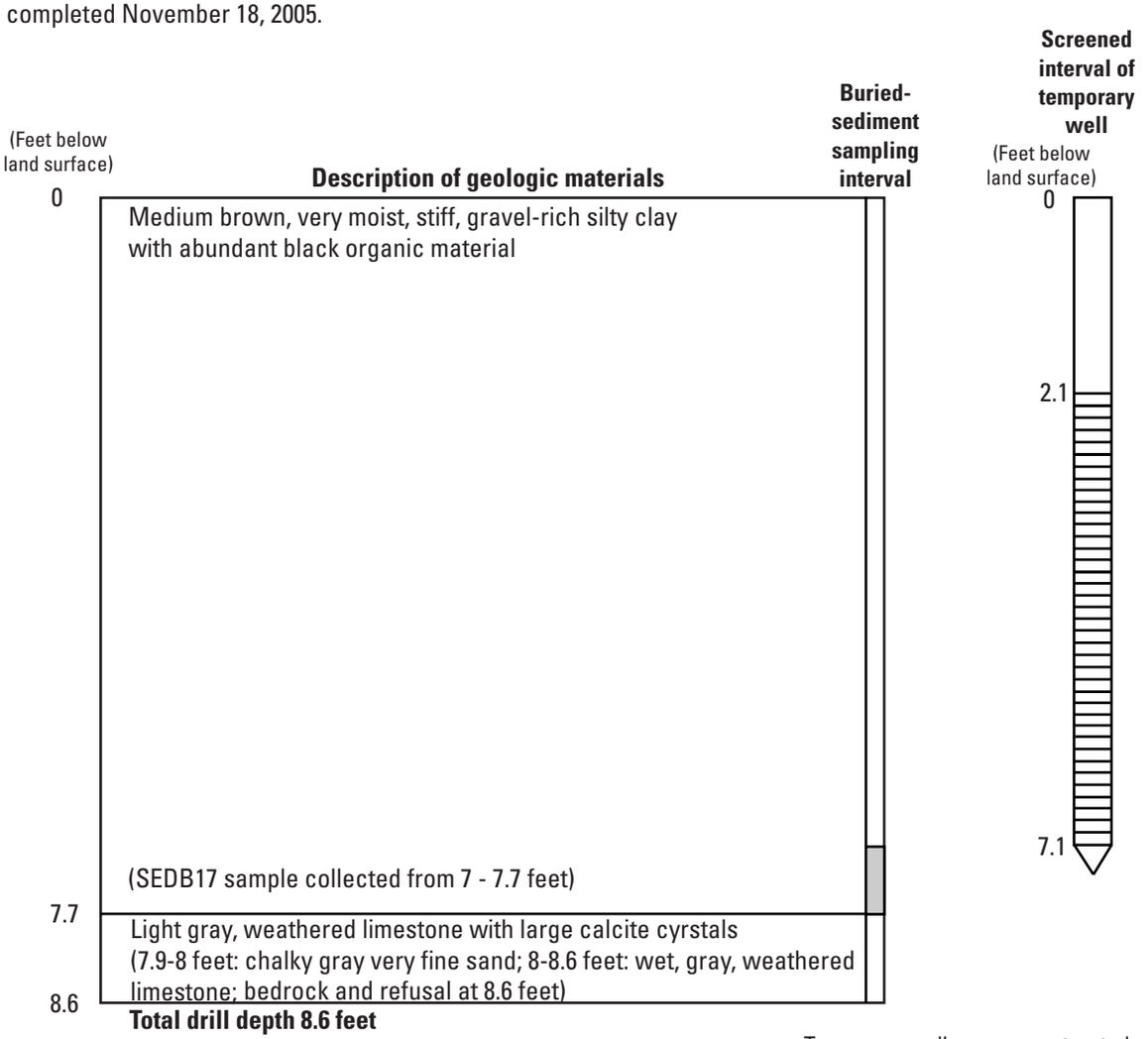
Located north of existing wastewater-treatment plant and southwest of paint shop. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, SW1/4. Unit contacts are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling and sediment sampling were completed November 18, 2005.



Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B17 (Sampling site for SEDB17 and GWB17, figure 3)

Located southwest of the existing wastewater-treatment plant and north of the laundry. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, SW1/4. Unit contacts and screened intervals are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling, sediment sampling, and well installation were completed November 18, 2005.

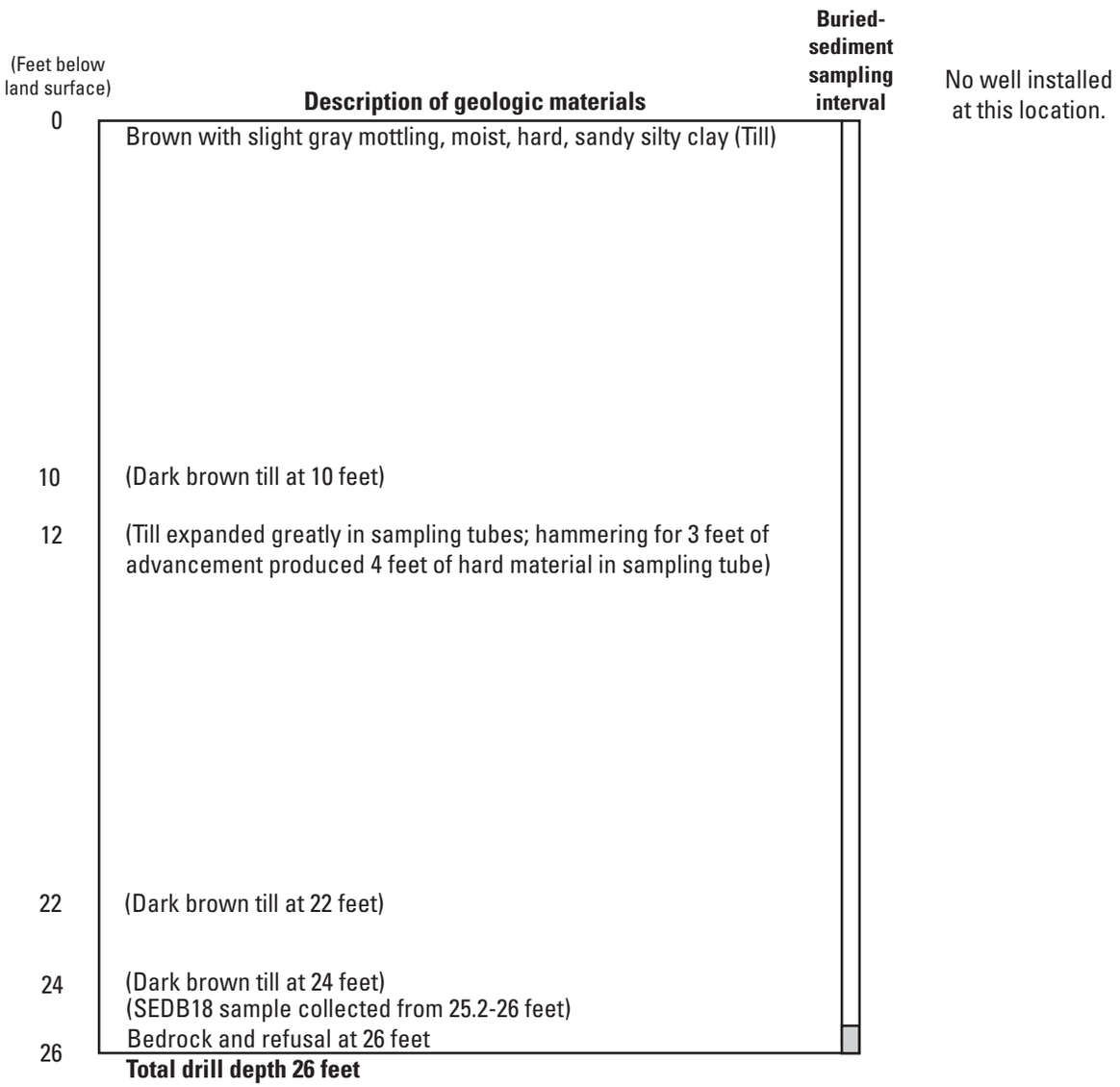


Temporary wells were constructed with 1.0-inch diameter polyvinyl chloride (PVC) casing and a 5-foot long 0.10-inch slot-size PVC screen.

Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B18 (Sampling site for SEDB18, figure 2)

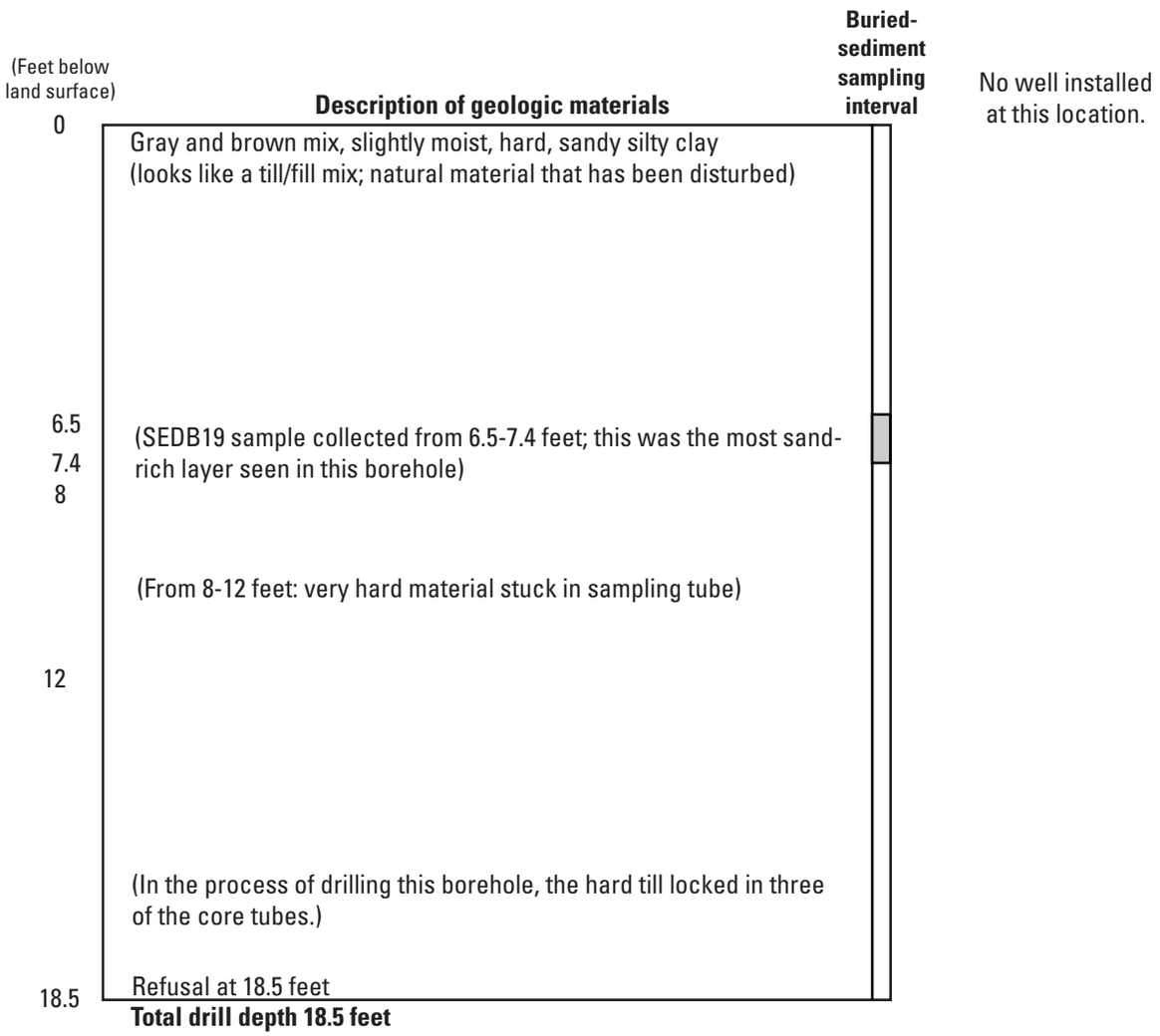
Located at the eastern edge of the vegetation disposal area, next to the treeline. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, NE1/4. Unit contacts are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling and sediment sampling were completed November 19, 2005.



Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B19 (Sampling site for SEDB19, figure 2)

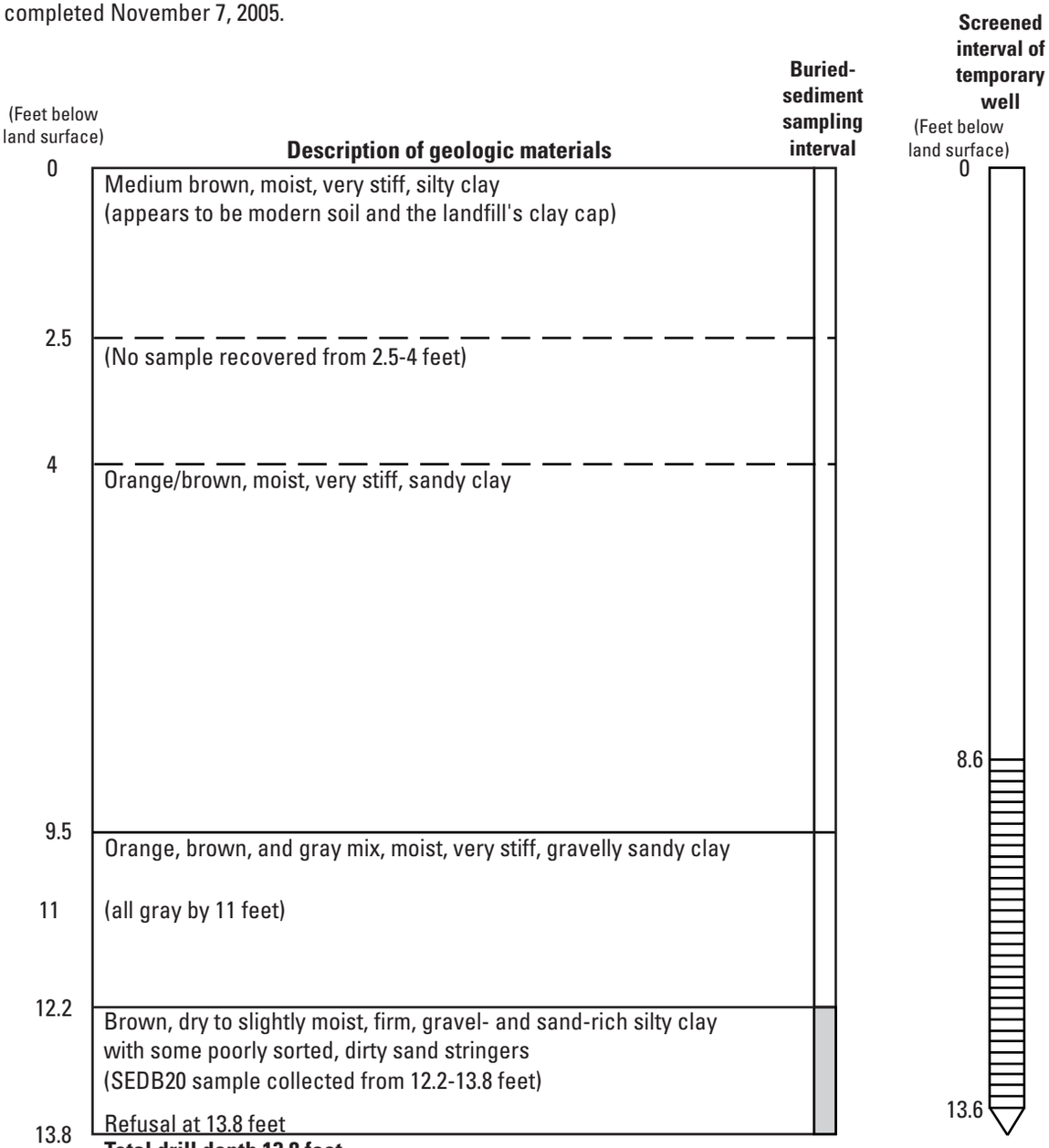
Located near the northwestern corner of the vegetation disposal area, next to the treeline. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, NE1/4. Unit contacts are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling and sediment sampling were completed November 19, 2005.



Appendix 3. Descriptions of Boreholes and Buried-Sediment Cores Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

Borehole B20 (Sampling site for SEDB20 and GWB20, figure 2)

Located near the southwestern corner of the vegetation disposal area, next to the treeline. U.S. Geological Survey (1994) 7.5-minute topographic map, Butlerville quadrangle, T7N, R9E, Sect 16, NE1/4. Unit contacts and screened intervals are shown in feet below land surface (dashed where approximate). Gray-shaded box identifies the buried-sediment sampling interval. Drilling, sediment sampling, and well installation were completed November 7, 2005.



Temporary wells were constructed with 1.0-inch diameter polyvinyl chloride (PVC) casing and a 5-foot long 0.10-inch slot-size PVC screen.

Appendix 4. Characteristics of Analytical Constituents for Samples Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

[USEPA, U.S. Environmental Protection Agency; CAS, Chemical Abstract Services; µg/L, micrograms per liter; µg/kg, micrograms per kilogram; mg/L, milligrams per liter; mg/kg, milligram per kilogram]

Volatile organic compounds in water by USEPA method 8260B		
Constituent	**CAS number**	**Reporting limit (µg/L)**
1,1,1,2-Tetrachloroethane	630-20-6	1
1,1,1-Trichloroethane	71-55-6	1
1,1,2,2-Tetrachloroethane	79-34-5	1
1,1,2-Trichloroethane	79-00-5	1
1,1-Dichloroethane	75-34-3	1
1,1-Dichloroethene	75-35-4	1
1,1-Dichloropropene	563-58-6	1
1,2,3-Trichlorobenzene	87-61-6	1
1,2,3-Trichloropropane	96-18-4	1
1,2,4-Trichlorobenzene	120-82-1	1
1,2,4-Trimethylbenzene	95-63-6	1
1,2-Dibromo-3-chloropropane	96-12-8	2
1,2-Dibromoethane	106-93-4	1
1,2-Dichlorobenzene	95-50-1	1
1,2-Dichloroethane	107-06-2	1
1,2-Dichloroethene (total)	540-59-0	1
1,2-Dichloropropane	78-87-5	1
1,3,5-Trimethylbenzene	108-67-8	1
1,3-Dichlorobenzene	541-73-1	1
1,3-Dichloropropane	142-28-9	1
1,4-Dichlorobenzene	106-46-7	1
2,2-Dichloropropane	594-20-7	5

Volatile organic compounds in water by USEPA method 8260B		
Constituent	**CAS number**	**Reporting limit (µg/L)**
2-Butanone (MEK)	78-93-3	5
2-Chlorotoluene	95-49-8	1
2-Hexanone	591-78-6	5
4-Chlorotoluene	106-43-4	1
4-Isopropyltoluene	99-87-6	1
4-Methyl-2-pentanone	108-10-1	5
Acetone	67-64-1	10
Benzene	71-43-2	1
Bromobenzene	108-86-1	1
Bromochloromethane	74-97-5	1
Bromodichloromethane	75-27-4	1
Bromoform	75-25-2	1
Bromomethane	74-83-9	2
Carbon tetrachloride	56-23-5	1
Chlorobenzene	108-90-7	1
Chloroethane	75-00-3	2
Chloroform	67-66-3	1
Chloromethane	74-87-3	2
cis-1,2-Dichloroethene	156-59-2	1
cis-1,3-Dichloropropene	10061-01-5	1
Dibromochloromethane	124-48-1	1
Dibromomethane	74-95-3	1

Volatile organic compounds in water by USEPA method 8260B		
Constituent	**CAS number**	**Reporting limit (mg/L)**
Dichlorodifluoromethane	75-71-8	1
Ethylbenzene	100-41-4	1
Hexachlorobutadiene	87-68-3	1
m-Xylene & p-Xylene	136777-61-2	2
Methyl tert-butyl ether	1634-04-4	5
Methylene chloride	75-09-2	5
n-Butylbenzene	104-51-8	1
n-Propylbenzene	103-65-1	1
Naphthalene	91-20-3	1
o-Xylene	95-47-6	1
sec-Butylbenzene	135-98-8	1
Styrene	100-42-5	1
tert-Butylbenzene	98-06-6	1
Tetrachloroethene	127-18-4	1
Toluene	108-88-3	1
trans-1,2-Dichloroethene	156-60-5	1
trans-1,3-Dichloropropene	10061-02-6	1
Trichloroethene	79-01-6	1
Trichlorofluoromethane	75-69-4	2
Vinyl chloride	75-01-4	1
Xylenes (total)	1330-20-7	2

Appendix 4. Characteristics of Analytical Constituents for Samples Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[USEPA, U.S. Environmental Protection Agency; CAS, Chemical Abstract Services; µg/L, micrograms per liter; µg/kg, micrograms per kilogram; mg/L, milligrams per liter; mg/kg, milligram per kilogram]

Volatile organic compounds in soil or sediment by USEPA method 8260B		
Constituent	**CAS number**	**Reporting limit (µg/kg)**
1,1,1,2-Tetrachloroethane	630-20-6	5
1,1,1-Trichloroethane	71-55-6	5
1,1,2,2-Tetrachloroethane	79-34-5	5
1,1,2-Trichloroethane	79-00-5	5
1,1-Dichloroethane	75-34-3	5
1,1-Dichloroethene	75-35-4	5
1,1-Dichloropropene	563-58-6	5
1,2,3-Trichlorobenzene	87-61-6	5
1,2,3-Trichloropropane	96-18-4	5
1,2,4-Trichlorobenzene	120-82-1	5
1,2,4-Trimethylbenzene	95-63-6	5
1,2-Dibromo-3-chloropropane	96-12-8	10
1,2-Dibromoethane (EDB)	106-93-4	5
1,2-Dichlorobenzene	95-50-1	5
1,2-Dichloroethane	107-06-2	5
1,2-Dichloroethene (total)	540-59-0	5
1,2-Dichloropropane	78-87-5	5
1,3,5-Trimethylbenzene	108-67-8	5
1,3-Dichlorobenzene	541-73-1	5
1,3-Dichloropropane	142-28-9	5
1,4-Dichlorobenzene	106-46-7	5
2,2-Dichloropropane	594-20-7	5

Volatile organic compounds in soil or sediment by USEPA method 8260B		
Constituent	**CAS number**	**Reporting limit (µg/kg)**
2-Butanone (MEK)	78-93-3	20
2-Chlorotoluene	95-49-8	5
2-Hexanone	591-78-6	20
4-Chlorotoluene	106-43-4	5
4-Isopropyltoluene	99-87-6	5
4-Methyl-2-pentanone	108-10-1	20
Acetone	67-64-1	20
Benzene	71-43-2	5
Bromobenzene	108-86-1	5
Bromochloromethane	74-97-5	5
Bromodichloromethane	75-27-4	5
Bromoform	75-25-2	5
Bromomethane	74-83-9	10
Carbon tetrachloride	56-23-5	5
Chlorobenzene	108-90-7	5
Chloroethane	75-00-3	10
Chloroform	67-66-3	10
Chloromethane	74-87-3	10
cis-1,2-Dichloroethene	156-59-2	2.5
cis-1,3-Dichloropropene	10061-01-5	5
Dibromochloromethane	124-48-1	5
Dibromomethane	74-95-3	5

Volatile organic compounds in soil or sediment by USEPA method 8260B		
Constituent	**CAS number**	**Reporting limit (µg/kg)**
Dichlorodifluoromethane	75-71-8	10
Ethylbenzene	100-41-4	5
Hexachlorobutadiene	87-68-3	5
Isopropylbenzene	98-82-8	5
m-Xylene & p-Xylene	136777-61-2	2.5
Methyl tert-butyl ether	1634-04-4	20
Methylene chloride	75-09-2	5
n-Butylbenzene	104-51-8	5
n-Propylbenzene	103-65-1	5
Naphthalene	91-20-3	5
o-Xylene	95-47-6	2.5
sec-Butylbenzene	135-98-8	5
Styrene	100-42-5	5
tert-Butylbenzene	98-06-6	5
Tetrachloroethene	127-18-4	5
Toluene	108-88-3	5
trans-1,2-Dichloroethene	156-60-5	2.5
trans-1,3-Dichloropropene	10061-02-6	5
Trichloroethene	79-01-6	5
Trichlorofluoromethane	75-69-4	10
Vinyl chloride	75-01-4	5
Xylenes (total)	1330-20-7	5

Appendix 4. Characteristics of Analytical Constituents for Samples Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[USEPA, U.S. Environmental Protection Agency; CAS, Chemical Abstract Services; µg/L, micrograms per liter; µg/kg, micrograms per kilogram; mg/L, milligrams per liter; mg/kg, milligram per kilogram]

Semivolatile organic compounds in water by USEPA method 8270C		
Constituent	**CAS number**	**Reporting limit (µg/L)**
2,4,5-Trichlorophenol	95-95-4	1.6
2,4,6-Trichlorophenol	88-06-2	1.5
2,4-Dichlorophenol	120-83-2	1.3
2,4-Dimethylphenol	105-67-9	1.4
2,4-Dinitrophenol	51-28-5	10
2,4-Dinitrotoluene	121-14-2	1.8
2,6-Dinitrotoluene	606-20-2	1.6
2-Chloronaphthalene	91-58-7	1.7
2-Chlorophenol	95-57-8	1.7
2-Methylnaphthalene	91-57-6	1.6
2-Methylphenol	95-48-7	1.4
2-Nitroaniline	88-74-4	1.3
2-Nitrophenol	88-75-5	1.5
3,3'-Dichlorobenzidine	91-94-1	0.63
3-Nitroaniline	99-09-2	3.6
4,6-Dinitro-2-methylphenol	534-52-1	9.8
4-Bromophenyl phenyl ether	101-55-3	2.1
4-Chloro-3-methylphenol	59-50-7	1.3
4-Chloroaniline	106-47-8	7.5
4-Chlorophenyl phenyl ether	7005-72-3	2.0

Semivolatile organic compounds in water by USEPA method 8270C		
Constituent	**CAS number**	**Reporting limit (µg/L)**
4-Methylphenol	106-44-5	1.6
4-Nitroaniline	100-01-6	2.3
4-Nitrophenol	100-02-7	11
Acenaphthene	83-32-9	1.7
Acenaphthylene	208-96-8	1.8
Acetophenone	98-86-2	2.0
Anthracene	120-12-7	1.9
Atrazine	1912-24-9	13
Benzo(a)anthracene	56-55-3	1.7
Benzo(a)pyrene	50-32-8	1.3
Benzo(b)fluoranthene	205-99-2	1.4
Benzo(ghi)perylene	191-24-2	2.0
Benzo(k)fluoranthene	207-08-9	2.1
bis(2-Chloroethoxy)methane	111-91-1	1.4
bis(2-Chloroethyl) ether	111-44-4	1.8
bis(2-Chloroisopropyl) ether	108-60-1	1.4
bis(2-Ethylhexyl) phthalate	117-81-7	1.4
Butyl benzyl phthalate	85-68-7	1.7
Caprolactam	105-60-2	11
Carbazole	86-74-8	1.9
Chrysene	218-01-9	2.0

Semivolatile organic compounds in water by USEPA method 8270C		
Constituent	**CAS number**	**Reporting limit (µg/L)**
Dibenz(a,h)anthracene	53-70-3	1.4
Dibenzofuran	132-64-9	1.7
Diethyl phthalate	84-66-2	1.8
Dimethyl phthalate	131-11-3	1.7
Di-n-butyl phthalate	84-74-2	1.9
Di-n-octyl phthalate	117-84-0	1.1
Fluoranthene	206-44-0	1.8
Fluorene	86-73-7	1.7
Hexachlorobenzene	118-74-1	2.1
Hexachlorobutadiene	87-68-3	1.3
Hexachlorocyclopentadiene	77-47-4	5.0
Hexachloroethane	67-72-1	1.4
Indeno(1,2,3-cd)pyrene	193-39-5	1.5
Naphthalene	91-20-3	1.5
Nitrobenzene	98-95-3	1.2
N-Nitrosodi-n-propylamine	621-64-7	1.4
N-Nitrosodiphenylamine	86-30-6	2.6
Pentachlorophenol	87-86-5	10
Phenanthrene	85-01-8	2.0
Phenol	108-95-2	1.4
Pyrene	129-00-0	2.1

Appendix 4. Characteristics of Analytical Constituents for Samples Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[USEPA, U.S. Environmental Protection Agency; CAS, Chemical Abstract Services; µg/L, micrograms per liter; µg/kg, micrograms per kilogram; mg/L, milligrams per liter; mg/kg, milligram per kilogram]

Semivolatile organic compounds in soil or sediment by USEPA method 8270C		
Constituent	**CAS number**	**Reporting limit (µg/kg)**
2,4,5-Trichlorophenol	95-95-4	330
2,4,6-Trichlorophenol	88-06-2	330
2,4-Dichlorophenol	120-83-2	330
2,4-Dimethylphenol	105-67-9	330
2,4-Dinitrophenol	51-28-5	1,600
2,4-Dinitrotoluene	121-14-2	330
2,6-Dinitrotoluene	606-20-2	330
2-Chloronaphthalene	91-58-7	330
2-Chlorophenol	95-57-8	330
2-Methylnaphthalene	91-57-6	330
2-Methylphenol	95-48-7	330
2-Nitroaniline	88-74-4	1,600
2-Nitrophenol	88-75-5	330
3,3'-Dichlorobenzidine	91-94-1	660
3-Nitroaniline	99-09-2	1,600
4,6-Dinitro-2-methylphenol	534-52-1	1,600
4-Bromophenyl phenyl ether	101-55-3	330
4-Chloro-3-methylphenol	59-50-7	330
4-Chloroaniline	106-47-8	330
4-Chlorophenyl phenyl ether	7005-72-3	330

Semivolatile organic compounds in soil or sediment by USEPA method 8270C		
Constituent	**CAS number**	**Reporting limit (µg/kg)**
4-Methylphenol	106-44-5	330
4-Nitroaniline	100-01-6	1,600
4-Nitrophenol	100-02-7	1,600
Acenaphthene	83-32-9	330
Acenaphthylene	208-96-8	330
Acetophenone	98-86-2	330
Anthracene	120-12-7	330
Atrazine	1912-24-9	330
Benzo(a)anthracene	56-55-3	330
Benzo(a)pyrene	50-32-8	330
Benzo(b)fluoranthene	205-99-2	330
Benzo(ghi)perylene	191-24-2	330
Benzo(k)fluoranthene	207-08-9	330
bis(2-Chloroethoxy)methane	111-91-1	330
bis(2-Chloroethyl) ether	111-44-4	330
bis(2-Chloroisopropyl) ether	108-60-1	330
bis(2-Ethylhexyl) phthalate	117-81-7	330
Butyl benzyl phthalate	85-68-7	330
Caprolactam	105-60-2	1,600
Carbazole	86-74-8	330
Chrysene	218-01-9	330

Semivolatile organic compounds in soil or sediment by USEPA method 8270C		
Constituent	**CAS number**	**Reporting limit (µg/kg)**
Dibenz(a,h)anthracene	53-70-3	330
Dibenzofuran	132-64-9	330
Diethyl phthalate	84-66-2	660
Dimethyl phthalate	131-11-3	330
Di-n-butyl phthalate	84-74-2	330
Di-n-octyl phthalate	117-84-0	330
Fluoranthene	206-44-0	330
Fluorene	86-73-7	330
Hexachlorobenzene	118-74-1	330
Hexachlorobutadiene	87-68-3	330
Hexachlorocyclopentadiene	77-47-4	1,600
Hexachloroethane	67-72-1	330
Indeno(1,2,3-cd)pyrene	193-39-5	330
Naphthalene	91-20-3	330
Nitrobenzene	98-95-3	330
N-Nitrosodi-n-propylamine	621-64-7	330
N-Nitrosodiphenylamine	86-30-6	330
Pentachlorophenol	87-86-5	1,600
Phenanthrene	85-01-8	330
Phenol	108-95-2	330
Pyrene	129-00-0	330

Appendix 4. Characteristics of Analytical Constituents for Samples Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[USEPA, U.S. Environmental Protection Agency; CAS, Chemical Abstract Services; µg/L, micrograms per liter; µg/kg, micrograms per kilogram; mg/L, milligrams per liter; mg/kg, milligram per kilogram]

Trace elements in water by USEPA method 6020B

Constituent	CAS number	Reporting limit (mg/L)
Antimony	7440-36-0	2.0
Arsenic	7440-38-2	5.0
Barium	7440-39-3	1.0
Beryllium	7440-41-7	1.0
Boron	7440-42-8	1.0
Cadmium	7440-43-9	1.0
Chromium	7440-47-3	2.0
Cobalt	7440-48-4	1.0
Copper	7440-50-8	2.0
Lead	7439-92-1	1.0
Manganese	7439-96-5	1.0
Molybdenum	7439-98-7	2.0
Nickel	7440-02-0	2.0
Selenium	7782-49-2	5.0
Silver	7440-22-4	5.0
Strontium	7440-24-6	1.0
Thallium	7440-28-0	1.0
Tin	7440-31-5	1.0
Vanadium	7440-62-2	5.0
Zinc	7440-66-6	10

Trace elements and inorganic cations in soil or sediment by USEPA method 6010B

Constituent	CAS number	Reporting limit (mg/L)
Aluminum	7429-90-5	10
Antimony	7440-36-0	1.0
Arsenic	7440-38-2	1.0
Barium	7440-39-3	1.0
Beryllium	7440-41-7	0.5
Boron	7440-42-8	12
Cadmium	7440-43-9	0.5
Calcium	7440-70-2	20
Chromium	7440-47-3	1.0
Cobalt	7440-48-4	1.0
Copper	7440-50-8	2.0
Iron	7439-89-6	10
Lead	7439-92-1	0.8
Magnesium	7439-95-4	20
Manganese	7439-96-5	1.0
Molybdenum	7439-98-7	2.0
Nickel	7440-02-0	4.0
Potassium	7440-09-7	300
Selenium	7782-49-2	1.3
Silver	7440-22-4	1.0
Sodium	7440-23-5	500
Strontium	7440-24-6	1.2
Thallium	7440-28-0	1.2
Tin	7440-31-5	12
Vanadium	7440-62-2	2.0
Zinc	7440-66-6	2.0

Inorganic cations in water by USEPA method 6010B

Constituent	CAS number	Reporting limit (mg/L)
Aluminum	7429-90-5	0.1
Calcium	7440-70-2	0.2
Iron	7439-89-6	0.1
Magnesium	7439-95-4	0.2
Potassium	7440-09-7	3.0
Sodium	7440-23-5	5.0

Inorganic anions in water by EPA method 300.0A

Chloride	16887-00-6	3.0
Fluoride	16984-48-8	0.5
Sulfate	14808-79-8	5.0

Nutrients in water by EPA methods 350.1, 353.2, 365.3

Ammonia	7664-41-7	0.1
Nitrate-nitrite	17778-88-0	0.1
Total phosphorus	7723-14-0	0.1

Appendix 5. Field-Duplicate Sample Data Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

[mg/L, milligrams per liter; µg/L, micrograms per liter; mg/kg, milligram per kilogram; RPD, relative percent difference; ND, not detected; E, estimated concentration less than reporting limit; %, percent; <, less than reporting limit listed; gray cell indicates value greater than 50 RPD]

Surface water									
	Trace elements								
Sample ID	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Lead (µg/L)
SW8	ND	ND	54	ND	ND	0.53 E	0.16 E	ND	0.18 E
REPSW8	ND	ND	57	ND	ND	0.69 E	0.17 E	ND	<1.0
RPD	0%	0%	5%	0%	0%	26%	6%	0%	139%
SW12	0.42 E	0.29 E	88	ND	ND	0.38 E	0.30 E	2.00 E	0.19 E
REPSW12	0.35 E	0.41 E	88	ND	ND	0.45 E	0.32 E	0.71 E	0.30 E
RPD	18%	34%	0%	0%	0%	17%	6%	95%	45%

Sample ID	Manganese (µg/L)	Molybdenum (µg/L)	Nickel (µg/L)	Selenium (µg/L)	Silver (µg/L)	Thallium (µg/L)	Tin (µg/L)	Vanadium (µg/L)	Zinc (µg/L)
SW8	15	0.070 E	1.7 E	ND	ND	ND	0.30 E	0.21 E	4.3 E
REPSW8	15	0.071 E	1.9 E	ND	ND	ND	0.06 E	0.23 E	3.3 E
RPD	0%	1%	11%	0%	0%	0%	131%	9%	26%
SW12	20	0.72 E	2.1	ND	ND	ND	0.14 E	0.27 E	5.8 E
REPSW12	26	0.72 E	2.1	ND	ND	ND	0.11 E	0.35 E	6.7 E
RPD	26%	0%	0%	0%	0%	0%	24%	26%	14%

	Inorganic cations					
Sample ID	Aluminum (µg/L)	Calcium (µg/L)	Iron (µg/L)	Magnesium (µg/L)	Potassium (µg/L)	Sodium (µg/L)
SW8	ND	63,000	76 E	31,000	1,400 E	15,000
REPSW8	ND	61,000	90 E	29,000	1,300 E	14,000
RPD	0%	3%	17%	7%	7%	7%
SW12	70 E	70	60 E	26,000	3,100	17,000
REPSW12	99 E	99	110	26,000	3,000	17,000
RPD	34%	34%	59%	0%	3%	0%

	Inorganic anions			
Sample ID	Bromide (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Sulfate (mg/L)
SW8	ND	30	0.11 E	13
REPSW8	ND	30	0.12 E	13
RPD	0%	0%	9%	0%
SW12	0.065 E	28	0.12 E	14
REPSW12	0.065 E	28	0.12 E	14
RPD	0%	0%	0%	0%

	Nutrients		
Sample ID	Ammonia nitrogen (mg/L)	Nitrate-nitrite (mg/L)	Total phosphorus (mg/L)
SW8	0.087 E	0.73	0.0050 E
REPSW8	0.085 E	0.79	0.0046 E
RPD	2%	8%	8%
SW12	0.034 E	ND	0.0072 E
REPSW12	0.038 E	ND	0.0074 E
RPD	11%	0%	3%

Appendix 5. Field-Duplicate Sample Data Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[mg/L, milligrams per liter; µg/L, micrograms per liter; mg/kg, milligram per kilogram; RPD, relative percent difference; ND, not detected; E, estimated concentration less than reporting limit; %, percent; <, less than reporting limit listed; gray cell indicates value greater than 50 RPD]

Surface soil								
	Trace elements							
Sample ID	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Boron (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Lead (mg/kg)
SOIL2	7.9	93	0.7	3.2 E	16	11	14	20
REPSOIL2	11	120	1.6	2.8 E	23	80	22	31
RPD	33%	25%	78%	13%	36%	152%	44%	43%
SOIL20	30	87	0.22 E	18	18	3.5	27	19
REPSOIL20	20	73	0.41 E	15	20	4.7	26	21
RPD	40%	18%	60%	18%	11%	29%	4%	10%

Sample ID	Manganese (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Strontium (mg/kg)	Tin (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
SOIL2	350	1.3 E	12	ND	7.8	1.4 E	32	38
REPSOIL2	840	1.6 E	22	ND	12	1.4 E	41	47
RPD	82%	21%	59%	0%	42%	0%	25%	21%
SOIL20	57	2.6 E	16	2.4	5.7	1.3 E	43	54
REPSOIL20	87	3.1	24	2.1	11	1.5 E	45	47
RPD	42%	18%	40%	13%	63%	14%	5%	14%

	Inorganic cations				
Sample ID	Aluminum (mg/kg)	Calcium (mg/kg)	Iron (mg/kg)	Magnesium (mg/kg)	Potassium (mg/kg)
SOIL2	16,000	1,700	19,000	1800	720
REPSOIL2	24,000	2,600	28,000	2500	850
RPD	40%	42%	38%	33%	17%
SOIL20	14,000	340	54,000	1400	1100
REPSOIL20	12,000	270	40,000	1300	1000
RPD	15%	23%	30%	7%	10%

Appendix 5. Field-Duplicate Sample Data Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[mg/L, milligrams per liter; µg/L, micrograms per liter; mg/kg, milligram per kilogram; RPD, relative percent difference; ND, not detected; E, estimated concentration less than reporting limit; %, percent; <, less than reporting limit listed; gray cell indicates value greater than 50 RPD]

Buried sediment									
	Trace elements								
Sample ID	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Boron (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Lead (mg/kg)
SEDB19	11	100	0.82	1.2 E	ND	16	4.9	20	10
REPSEDB19	7.9	100	0.78	<12	ND	22	2.9	18	6.9
RPD	33%	0%	5%	164%	0%	32%	51%	11%	37%
SEDB20	5.1	27	0.39 E	3.5 E	0.049 E	14	7.1	11	15
REPSEDB20	5.8	21	0.37 E	4.0 E	0.05 E	15	6.8	14	13
RPD	13%	25%	5%	13%	2%	7%	4%	24%	14%

Sample ID	Manganese (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Strontium (mg/kg)	Tin (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
SEDB19	130	1.8 E	25	ND	9.8	1.1 E	29	51
REPSEDB19	57	1.8 E	14	ND	10	1.1 E	36	31
RPD	78%	0%	56%	0%	2%	0%	22%	49%
SEDB20	850	1.7 E	11	1.0 E	60	ND	26	30
REPSEDB20	720	1.7 E	12	1.1 E	48	ND	26	28
RPD	17%	0%	9%	10%	22%	0%	0%	7%

	Inorganic cations					
Sample ID	Aluminum (mg/kg)	Calcium (mg/kg)	Iron (mg/kg)	Magnesium (mg/kg)	Potassium (mg/kg)	Sodium (mg/kg)
SEDB19	13,000	2,000	28,000	2,000	540	<500
REPSEDB19	23,000	1,700	25,000	1,900	600	70 E
RPD	56%	16%	11%	5%	11%	151%
SEDB20	5,900	84,000	16,000	21,000	640	76 E
REPSEDB20	5,200	69,000	17,000	22,000	680	120 E
RPD	13%	20%	6%	5%	6%	45%

Appendix 6. Matrix-Spike Sample Data Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

[%, percent; µg/L, micrograms per liter; RPD, relative percent difference; NA, not analyzed]

	Volatile organic compounds											
	1,1-Dichloroethene			1,2,4-Trichlorobenzene			1,4-Dichlorobenzene			2,4-Dinitrotoluene		
Sample ID	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery
MSSW1	10	9.89	99	99.6	64.7	65	99.6	60.9	61	99.6	71.6	72
MSDSW1	10	10.3	103	97.7	60.8	62	97.7	59.6	61	97.7	66.0	68
RPD		4%			6%			2%			8%	
MSGWB2	10	9.96	100	101	64.0	63	101	63.9	63	101	66.9	66
MSDGWB2	10	10.5	105	103	62.6	61	103	60.9	60	103	64.4	62
RPD		5%			2%			5%			4%	
	Benzene			Chlorobenzene			Toluene			Trichloroethene		
Sample ID	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery
MSSW1	10	9.46	95	10	9.22	92	10	9.43	94	10	9.22	92
MSDSW1	10	9.63	96	10	9.41	94	10	9.36	94	10	9.26	93
RPD		2%			2%			1%			0%	
MSGWB2	10	9.23	92	10	10.3	103	10	9.42	94	10	11.2	112
MSDGWB2	10	9.36	94	10	10.1	101	10	9.5	95	10	11.4	114
RPD		1%			2%			1%			2%	
	Semivolatile organic compounds											
	4-Chloro-3-methylphenol			4-Nitrophenol			Acenaphthene			N-Nitrosodi-n-propylamine		
Sample ID	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery
MSSW1	149	97.7	65	149	110	73	99.6	63.6	64	99.6	70.9	71
MSDSW1	146	92.6	63	146	103	70	97.7	59.5	61	97.7	68	70
RPD		5%			7%			7%			4%	
MSGWB2	152	100	66	152	107	71	101	63.5	63	101	71.9	71
MSDGWB2	155	101	65	155	109	70	103	62.5	60	103	69.4	67
RPD		1%			2%			2%			4%	
	2-Chlorophenol			Pentachlorophenol			Phenol			Pyrene		
Sample ID	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery
MSSW1	149	97.9	66	149	121	81	149	95.1	64	99.6	72.4	73
MSDSW1	146	93.3	64	146	111	76	146	93	63	97.7	66	68
RPD		5%			9%			2%			9%	
MSGWB2	152	100	66	152	110	72	152	94.8	62	101	67.6	67
MSDGWB2	155	98.3	63	155	109	70	155	95.6	62	103	71.2	69
RPD		2%			1%			1%			5%	

Appendix 6. Matrix-Spike Sample Data Collected from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[%, percent; µg/L, micrograms per liter; RPD, relative percent difference; NA, not analyzed]

	Trace elements											
	Antimony			Arsenic			Barium			Cadmium		
Sample ID	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery
MSSW1	40	42.6	106	40	42.1	103	40	87.8	104	40	40.1	100
MSDSW1	40	42.4	105	40	41.4	101	40	87.6	103	40	40.1	100
RPD		0%			2%			0%			0%	
MSGWB2	40	41.7	104	40	41.9	102	40	74.3	99	40	39.4	98
MSDGWB2	40	41.3	103	40	41.7	102	40	76.5	104	40	39.7	99
RPD		1%			0%			3%			1%	
	Chromium			Cobalt			Copper			Lead		
Sample ID	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery
MSSW1	40	44.5	110	40	42.4	105	40	50.4	99	40	40.7	100
MSDSW1	40	44.6	110	40	42.5	105	40	49.9	98	40	40.3	99
RPD		0%			0%			1%			1%	
MSGWB2	40	43.2	107	40	42.6	104	40	40.4	88	40	40.3	101
MSDGWB2	40	43.0	106	40	43	105	40	40.4	88	40	39.9	100
RPD		0%			1%			0%			1%	
	Manganese			Molybdenum			Nickel			Selenium		
Sample ID	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery
MSSW1	40	109	109	40	44.8	109	40	44.9	104	40	39.5	98
MSDSW1	40	108	106	40	44.1	107	40	43.9	101	40	39.5	98
RPD		1%			2%			2%			0%	
MSGWB2	40	3,300	NA[a]	40	44.4	110	40	44.8	97	40	39.7	98
MSDGWB2	40	3,500	NA[a]	40	44.2	110	40	45.5	99	40	40.2	99
RPD		6%			0%			2%			1%	
	Thallium			Tin			Vanadium			Zinc		
Sample ID	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery	Spike (µg/L)	Reported (µg/L)	Percent Recovery
MSSW1	40	40.3	101	40	41.3	102	40	45.8	112	40	54.5	97
MSDSW1	40	39.7	99	40	41.4	102	40	45.8	112	40	54.7	98
RPD		1%			0%			0%			0%	
MSGWB2	40	42.3	106	40	43.1	107	40	44.4	110	40	40.2	95
MSDGWB2	40	42.0	105	40	43.4	107	40	44.3	110	40	40.1	95
RPD		1%			1%			0%			0%	

[a]Sample concentration was more than four times the spike amount; percent recovery not calculated.

Appendix 7. Concentrations of Constituents Detected in Surface-Water Samples and Selected Quality-Assurance Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

[µg/L, microgram per liter; VOC's, volatile organic compounds; SVOC's, semivolatile organic compounds; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); yellow cells indicate valid concentrations greater than criteria; conc., concentration; — no data; NA, not available; POI -T, Point of water supply intake for protection of human health from toxic effects; POI - C, Point of water supply intake for protection of human health from carcinogenic effects; ISWQS, Indiana Surface-Water-Quality Standards]

		Volatile and semivolatile organic compounds												
Gegraphic study area	Sample ID	Acetone (µg/L)	Chloro-benzene (µg/L)	Chloroform (µg/L)	Ethyl-benzene (µg/L)	Methylene chloride (mg/L)	Styrene (µg/L)	Toluene (µg/L)	Trichloro-ethene (µg/L)	Number of unknown VOC's	Sum[a] of unknown VOC's (µg/L)	Number of unknown SVOC's	Sum[a] of unknown SVOC's (µg/L)
1	SW6	ND	ND	ND	1.8	0.38 E	0.7 E	0.29 E	ND	2	4.0	4	19.8
	SW7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW8	13	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	SW12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	49.0
3	SW5	ND	ND	ND	ND	0.35 E	ND	ND	ND	2	22.6	ND	ND
5	SW11	ND	0.31 E	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6	SW1	3.6 E	ND	2.0	ND	0.35 E	ND	ND	ND	ND	ND	1	5.3
	SW2	ND	ND	ND	ND	ND	ND	ND	ND	1	5.1	ND	ND
	SW4	ND	ND	ND	ND	0.33 E	ND	ND	1.2	3	42.3	ND	ND
	SW9	4.6 E	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
7	SW3	ND	ND	0.2 E	ND	ND	ND	ND	1.7	ND	ND	ND	ND
	SW10	7.8 E	0.40 E	ND	ND	ND	ND	ND	ND	ND	ND	3	489.9
Reporting limit conc.		10	1.0	1.0	1.0	5.0	1.0	1.0	1.0	—	—	—	—
Laboratory blank conc.		ND	ND	ND	ND	1.4	ND	ND	ND	—	9	—	60
Detections in lab blanks		—	—	—	—	4 of 5	—	—	—	—	NA	—	NA
Trip blank conc.		2.0	ND	ND	ND	0.58	ND	ND	ND	—	32.2	—	—
Detections in trip blanks		1 of 8	—	—	—	4 of 8	—	—	—	—	4 of 8	—	—
Field blank conc.		ND	ND	ND	ND	0.32	ND	ND	ND	—	44.4	—	42
Detections in field blanks		—	—	—	—	1 of 3	—	—	—	—	2 of 3	—	2 of 3
5 times blank conc.		10.0	—	—	—	7.0	—	—	—	—	222	—	300
Standard or criteria		NA	NA	1.9	1,400	—	NA	14,300	27	—	NA	—	NA
Type		—	—	POI - C	POI - T	—	—	POI - T	POI - C	—	—	—	—
Source		—	—	ISWQS	ISWQS	—	—	ISWQS	ISWQS	—	—	—	—

[a] Estimated concentrations.

Appendix 7. Concentrations of Constituents Detected in Surface-Water Samples and Selected Quality-Assurance Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[µg/L, microgram per liter; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); yellow cells indicate valid concentrations greater than criteria; conc., concentration; — no data; NA, not available; POI –T, Point of water supply intake for protection of human health from toxic effects; POI – C, Point of water supply intake for protection of human health from carcinogenic effects; POI – DW, Point of water supply intake drinking water standard; CAC, Chronic Aquatic life Criteria continuous concentration for protection of aquatic life; ISWQS, Indiana Surface-Water-Quality Standards]

		Trace elements										
Geographic study area	Sample ID	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Lead (µg/L)	Manganese (µg/L)	Molybdenum (µg/L)
1	SW6	0.78 E	24	180	0.21 E	0.19 E	5.1	6.2	5.6	15	1,600	1.0 E
	SW7	0.31 E	0.35 E	62	ND	ND	0.39 E	0.20 E	1.0 E	0.09 E	20	0.25 E
	SW8	ND	ND	54	ND	ND	0.53 E	0.16 E	ND	0.18 E	15	0.07 E
	SW12	0.42 E	0.29 E	88	ND	ND	0.38 E	0.30 E	ND	0.19 E	20	0.72 E
3	SW5	ND	ND	60	ND	ND	0.96 E	0.25 E	ND	0.20 E	34	0.58 E
5	SW11	ND	0.27 E	79	ND	ND	1.40 E	0.20 E	0.84 E	0.21 E	5.0	0.28 E
6	SW1	0.27 E	1.1 E	46	ND	0.07 E	0.72 E	0.37 E	11	0.79 E	65	1.2 E
	SW2	0.06 E	0.58 E	62	ND	ND	0.28 E	1.1	ND	0.12 E	1,100	0.52 E
	SW4	ND	ND	22	ND	0.26 E	0.58 E	0.37 E	3.2	0.14 E	5.4	ND
	SW9	0.04 E	0.27 E	50	ND	ND	0.56 E	0.23 E	1.9 E	0.19 E	25	0.91 E
7	SW3	ND	ND	42	ND	0.06 E	0.54 E	0.27 E	0.86 E	0.11 E	7.6	0.05 E
	SW10	ND	0.46 E	6.2	ND	0.07 E	0.71 E	0.37 E	18	0.87 E	140	0.06 E
Reporting limit conc.		2.0	5.0	1.0	1.0	1.0	2.0	1.0	2.0	1.0	1.0	2.0
Laboratory blank conc.		ND	ND	0.1	ND	ND	ND	ND	ND	0.15	0.18	ND
Detections in lab blanks		—	—	1 of 3	—	—	—	—	—	2 of 3	3 of 3	—
Field blank conc.		ND	ND	0.87	ND	0.064	0.61	0.012	1.9	0.14	0.81	ND
Detections in field blanks		—	—	3 of 3	—	1 of 3	3 of 3	1 of 3	1 of 3	3 of 3	3 of 4	—
5 times blank conc.		—	—	4.35	—	0.32	3.05	0.06	9.5	0.75	4.0	—
Standard or criteria		146	0.02	1,000	0.068	1	11[a]	NA	11	2.5	NA	NA
Type		POI - T	POI - C	POI -DW	POI - C	CAC[b]	CAC[b]	—	CAC[b]	CAC[b]	—	—
Source		ISWQS	ISWQS	ISWQS	ISWQS	ISWQS	ISWQS	—	ISWQS	ISWQS	—	—

[a] Criteria concentration for chromium-III.

[b] Hardness of 100 mg/L $CaCO_3$ assumed for selection of appropriate criteria level.

Appendix 7. Concentrations of Constituents Detected in Surface-Water Samples and Selected Quality-Assurance Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[µg/L, microgram per liter; std. unit, standard unit; uS/cm, microsiemen per centimeter; mg/L, milligram per liter; ° C, degrees Celsius; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); yellow cells indicate valid concentrations greater than criteria; conc., concentration; — no data; NA, not available; POI –T, Point of water supply intake for protection of human health from toxic effects; POI – DW, Point of water supply intake drinking water standard; CAC, Chronic Aquatic life Criteria continuous concentration for protection of aquatic life; ISWQS, Indiana Surface-Water-Quality Standards]

		Trace elements												Water-quality characteristics			
Geographic study area	Sample ID	Nickel (µg/L)		Selenium (µg/L)		Thallium (µg/L)		Tin (µg/L)		Vanadium (µg/L)		Zinc (µg/L)		pH (std. unit)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	Water temperature (° C)
1	SW6	6.7		0.66	E	0.07	E	0.32	E	9.8		120		7.4	695	2.0	7.7
	SW7	1.9	E	ND		ND		0.18	E	0.35	E	4.6	E	7.3	600	5.2	9.5
	SW8	1.7	E	ND		ND		0.30	E	0.21	E	4.3	E	7.4	538	5.7	10.5
	SW12	2.1		ND		ND		0.14	E	0.27	E	5.8	E	7.5	697	6.6	14.2
3	SW5	2.4		0.41	E	ND		0.14	E	0.43	E	6.4	E	7.9	666	6.0	12.8
5	SW11	2.2		0.69	E	ND		0.13	E	0.33	E	5.2	E	8.2	647	9.3	10.0
6	SW1	3.4		0.44	E	0.03	E	0.48	E	1.1	E	16		8.0	1,216	8.7	13.5
	SW2	2.0		ND		0.02	E	0.18	E	0.14	E	5.8	E	7.4	498	5.1	12.7
	SW4	5.0		0.95	E	0.04	E	ND		ND		6.1	E	6.6	999	3.0	15.5
	SW9	1.7	E	ND		ND		0.12	E	0.64	E	3.5	E	8.6	329	12.0	12.8
7	SW3	3.2		0.97	E	0.03	E	0.18	E	0.10	E	4.3	E	7.0	902	3.6	16.5
	SW10	2.2		ND		ND		0.10	E	0.24	E	20		6.7	73	4.7	16.9
Reporting limit conc.		2.0		5.0		1.0		10		5.0		10		—	—	—	—
Laboratory blank conc.		0.13		ND		ND		0.23		ND		ND		—	—	—	—
Detections in lab blanks		2 of 3		—		—		1 of 3		—		—		—	—	—	—
Field blank conc.		0.12		ND		ND		0.17		ND		2.6		—	—	—	—
Detections in field blanks		2 of 3		—		—		1 of 3		—		1 of 3		—	—	—	—
5 times blank conc.		0.65		—		—		1.15		—		13		—	—	—	—
Standard or criteria		13.4		10		13		NA		NA		100		NA	NA	NA	NA
Type		POI - T		POI - DW		POI - T		—		—		CAC[b]		—	—	—	—
Source		ISWQS		ISWQS		ISWQS		—		—		ISWQS		—	—	—	—

[b] Hardness of 100 mg/L $CaC)_3$ assumed for selection of appropriate criteria.

Appendix 7. Concentrations of Constituents Detected in Surface-Water Samples and Selected Quality-Assurance Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[µ/L, microgram per liter; mg/L, milligrams per liter; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); yellow cells indicate concentrations greater than criteria; conc., concentration; —, no data; NA, not available; POI – DW, Point of water supply intake drinking water standard; CAC, Chronic Aquatic life Criteria continuous concentration for protection of aquatic life; ISWQS, Indiana Surface-Water-Quality Standards]

		Inorganic cations						Inorganic anions				Nutrients		
Geographic study area	Sample ID	Aluminum (µg/L)	Calcium (µg/L)	Iron (µg/L)	Magnesium (µg/L)	Potassium (µg/L)	Sodium (µg/L)	Bromide (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Sulfate (mg/L)	Ammonia-Nitrogen (mg/L)	Nitrate-Nitrite (mg/L)	Total Phosphorus (mg/L)
1	SW6	4,100	120,000	28,000	31,000	2,900 E	15,000	0.086 E	30	0.12 E	5.5	0.160	ND	0.10
	SW7	ND	64,000	51 E	30,000	1,900 E	26,000	ND	35	0.12 E	28	0.020 E	ND	ND
	SW8	ND	63,000	76 E	31,000	1,400 E	15,000	ND	30	0.11 E	13	0.087 E	0.73	0.005 E
	SW12	70 E	88,000	60 E	26,000	3,100	17,000	0.065 E	28	0.12 E	14	0.034 E	ND	0.007 E
3	SW5	100	72,000	140	31,000	1,400 E	28,000	0.092 E	64	0.13 E	23	ND	3.7	ND
5	SW11	17 E	78,000	ND	32,000	2,300 E	25,000	0.081 E	49	0.12 E	28	0.022 E	2.4	ND
6	SW1	94 E	68,000	240	21,000	7,800	180,000	0.130 E	270	0.16 E	74	ND	5.5	0.76
	SW2	27 E	61,000	400	24,000	1,100 E	17,000	0.092 E	32	0.13 E	27	0.039 E	0.07 E	ND
	SW4	ND	120,000	28 E	49,000	3,700	33,000	0.096 E	58	0.10 E	280	0.021 E	2.0	ND
	SW9	240	47,000	130	15,000	1,400 E	8,200	ND	9.2	0.15 E	32	ND	0.16	ND
7	SW3	ND	99,000	ND	43,000	2,000 E	42,000	0.140 E	78	0.12 E	110	ND	2.1	ND
	SW10	46 E	3,000	1,500	310	ND	ND	ND	0.11 E	0.11 E	ND	1.50	0.18	0.006 E
Reporting limit conc.		100	200	100	200	3,000	5,000	0.2	3.0	0.5	5	0.1	0.1	0.05
Laboratory blank conc.		ND	55	ND	ND	ND	ND	0.12	ND	ND	0.34	ND	ND	0.0035
Detections in lab blanks		—	1 of 3	—	—	—	—	1 of 3	—	—	2 of 3	—	—	1 of 3
Field blank conc.		80	690	70	ND	ND	1,100	ND	ND	ND	ND	ND	ND	ND
Detections in field blanks		2 of 3	3 of 3	1 of 3	—	—	1 of 3	—	—	—	—	—	—	—
5 times blank conc.		400	3,450	350	—	—	5,500	0.60	—	—	1.7	—	—	0.0175
Standard or criteria		NA	NA	NA	NA	NA	NA	NA	230	2	1,000	Computed[a]	10	NA
Type		—	—	—	—	—	—	—	CAC	CAC	CAC	CAC	POI-DW	—
Source		—	—	—	—	—	—	—	ISWQS	ISWQS	ISWQS	ISWQS	ISWQS	—

[a]ISWQS concentrations for ammonia (un-ionized ammonia as nitrogen) vary, based on water temperature and pH, as described in Indiana Administrative Code (2006). Water temperature and pH measured during sample collection were used to find the ISWQS ammonia value in a table (0.06 mg/L for SW6 and 0.04 mg/L for SW10). If the sample water temperature was between two values in the table, the average of corresponding ammonia standards was applied.

Appendix 8. Concentrations of Constituents Detected in Ground-Water Samples and Selected Quality-Assurance Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

µg/L, microgram per liter; VOC's, volatile organic compounds; SVOC's, semivolatile organic compounds; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); conc., concentration; —, no data; NA, not available; MCL, Maximum Contaminant Level for drinking water; IGWQS, Indiana Ground-Water-Quality Standards (327 IAC 2-11)]

		Volatile and semivolatile organic compounds												
Geographic study area	Sample ID	Acetone (µg/L)	Benzene (µg/L)	Chloro-benzene (µg/L)	1,2-Dichloro-benzene (µg/L)	1,4-Dichloro-benzene (µg/L)	Ethyl-benzene (µg/L)	Methylene chloride (µg/L)	Toluene (µg/L)	Total xylenes (µg/L)	Number of unknown VOC's	Sum[a] of unknown VOC's (µg/L)	Number of unknown SVOC's	Sum[a] of unknown SVOC's (µg/L)
2	GW-B20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	48.5
4	GW-B6	4.6 E	0.24 E	ND	ND	ND	ND	0.32 E	0.34 E	ND	3	9.5	8	62.4
	GW-B8	5.2 E	0.21 E	ND	ND	ND	ND	ND	0.39 E	ND	1	6.8	8	67.4
6	GW-B1	5.2 E	0.19 E	2.1	ND	0.68 E	ND	0.35 E	0.47 E	ND	ND	ND	1	6.7
	GW-B2	ND	ND	ND	0.28 E	ND	ND	ND	ND	ND	1	1.1	6	103.3
	GW-B3	2.6 E	ND	0.17 E	ND	0.79 E	1.8	0.34 E	ND	ND	2	11.5	3	24.4
	GW-B4	4.9 E	0.23 E	ND	ND	ND	ND	0.33 E	0.46 E	ND	3	13.1	1	7.5
	GW-B17	2.9 E	0.39 E	ND	ND	ND	0.21 E	ND	0.99 E	0.4 E	ND	ND	2	75.6
Reporting limit conc.		10	1.0	1.0	1.0	1.0	1.0	5.0	1.0	2.0	—	—	—	—
Laboratory blank conc.		ND	ND	ND	ND	ND	ND	1.4	ND	ND	—	9	—	60
Detections in lab blanks		—	—	—	—	—	—	4 of 5	—	—	—	NA	—	NA
Trip blank conc.		2.0	ND	ND	ND	ND	ND	0.58	ND	ND	—	32.2	—	—
Detections in trip blanks		1 of 8		—				4 of 8	—	—	—	4 of 8	—	—
Field blank conc.		ND	ND	ND	ND	ND	ND	0.32	ND	ND	—	44.4	—	42
Detections in field blanks		—	—	—	—	—	—	1 of 3	—	—	—	2 of 3	—	2 of 3
5 times blank conc.		10	—	—	—	—	—	7	—	—	—	222	—	300
Standard or Criteria		NA	5.0	NA	600	75	700		1,000	10,000	—	NA	—	NA
Type		—	MCL	—	MCL	MCL	MCL	—	MCL	MCL	—	—	—	—
Source		—	IGWQS	—	IGWQS	IGWQS	IGWQS	—	IGWQS	IGWQS	—	—	—	—

[a]Estimated concentrations.

Appendix 8. Concentrations of Constituents Detected in Ground-Water Samples and Selected Quality-Assurance Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[µg/L, microgram per liter; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); yellow cells indicate valid concentrations greater than criteria; conc., concentration; —, no data; NA, not available; MCL, Maximum Contaminant Level for drinking water; IGWQS, Indiana Ground-Water-Quality Standards (Indiana Administrative Code, 2006); trace elements not analyzed because of low sample volume in GW-B4, GW-B6, GW-B8, and GW-B20]

		Trace elements								
Geographic study area	Sample ID	Antimony (µg/L)	Arsenic (µg/L)	Barium (µg/L)	Beryllium (µg/L)	Cadmium (µg/L)	Chromium (µg/L)	Cobalt (µg/L)	Copper (µg/L)	Lead (µg/L)
6	GW-B1	0.13 E	11	620	0.14 E	0.14 E	6.5	19	3.1	3.6
	GW-B2	0.14 E	0.96 E	35	ND	ND	0.55 E	1.1	5.2	0.11 E
	GW-B3	0.16 E	12	330	0.48 E	0.45 E	10	30	9.4	15
	GW-B17	0.40 E	24	1,700	4.6	1.9	88	110	51	97
Reporting limit conc.		2.0	5.0	1.0	1.0	1.0	2.0	1.0	2.0	1.0
Laboratory blank conc.		ND	ND	0.1	ND	ND	ND	ND	ND	0.15
Detections in lab blanks		—	—	1 of 3	—	—	—	—	—	—
Field blank conc.		ND	ND	0.87	ND	0.064	0.61	0.012	1.9	0.14
Detections in field blanks		—	—	3 of 3	—	1 of 3	3 of 3	1 of 3	1 of 3	3 of 3
5 times blank conc.		—	—	4.35	—	0.32	3.05	0.06	9.5	0.75
Standard or criteria		6.0	50	2,000	4.0	5.0	100[a]	NA	NA	15
Type		MCL	MCL	MCL	MCL	MCL	MCL	—	—	MCL
Source		IGWQS	IGWQS	IGWQS	IGWQS	IGWQS	IGWQS	—	—	IGWQS

[a]Regulatory standard for total chromium

Appendix 8. Concentrations of Constituents Detected in Ground-Water Samples and Selected Quality-Assurance Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[µg/L, microgram per liter; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); conc., concentration; —, no data; NA, not available; MCL, Maximum Contaminant Level for drinking water; IGWQS, Indiana Ground-Water-Quality Standards (Indiana Administrative Code, 2006); GWC, ground water criteria for residential closure; RISC, Risk Integrated System of Closure (Indiana Department of Environmental Management, 2006); trace elements not analyzed because of low sample volume in GW-B4, GW-B6, GW-B8, and GW-B20]

Geographic study area	Sample ID	Trace elements								
		Manganese (mg/L)	Molydenum (mg/L)	Nickel (mg/L)	Selenium (mg/L)	Silver (mg/L)	Thallium (mg/L)	Tin (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
6	GW-B1	5,300	3.4	20	0.39 E	0.02 E	0.64 E	0.61 E	6.9	58
	GW-B2	3,400	0.3 E	5.9	0.63 E	ND	ND	0.48 E	0.3 E	2.1 E
	GW-B3	11,000	1.7 E	21	0.70 E	0.45 E	0.35 E	1.1 E	20	66
	GW-B17	17,000	7.6	110	3.4 E	0.20 E	1.4	0.16 E	160	210
Reporting limit conc.		1.0	2.0	2.0	5.0	5.0	1.0	10	5.0	10
Laboratory blank conc.		0.18	ND	0.13	ND	ND	ND	0.23	ND	ND
Detections in lab blanks		3 of 3	—	2 of 3	—	—	—	1 of 3	—	—
Field blank conc.		0.81	ND	0.12	ND	ND	ND	0.17	ND	2.6
Detections in field blanks		3 of 4	—	2 of 3	—	—	—	1 of 3	—	1 of 3
5 times blank conc.		4.0	—	0.65	—	—	—	1.15	—	13.0
Standard or criteria		NA	NA	730	50	180	2.0	NA	715	11000
Type		—	—	GWC	MCL	GWC	MCL	—	GWC	GWC
Source		—	—	RISC	IGWQS	RISC	IGWQS	—	RISC	RISC

Appendix 8. Concentrations of Constituents Detected in Ground-Water Samples and Selected Quality-Assurance Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[mg/L, milligram per liter; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); yellow cells indicate valid concentrations greater than criteria; —, no data; NA, not available; MCL, Maximum Contaminant Level for drinking water; IGWQS, Indiana Ground Water Quality Standards (Indiana Administrative Code, 2006); trace elements not analyzed because of low sample volume in GW-B4, GW-B6, GW-B8, and GW-B20]

		Inorganic cations						Inorganic anions			
Geographic study area	Sample ID	Alminum (mg/L)	Cacium (mg/L)	Iron (mg/L)	Magnsium (mg/L)	Potasium (mg/L)	Sodium (mg/L)	Bromide (mg/L)	Chloride (mg/L)	Fluoride (mg/L)	Sulfate (mg/L)
6	GW-B1	2,900	59,000	14,000	24,000	7,800	12,000	0.18 E	16	0.17 E	40
	GW-B2	ND	190,000	5,200	69,000	11,000	12,000	0.21	15	ND	320
	GW-B3	10,000	45,000	29,000	14,000	5,100	5,000	0.15 E	5.1	0.12 E	68
	GW-B17	72,000	130,000	150,000	60,000	4,300	4,300 E	0.06 E	3.6	ND	17
Reporting limit conc.		100	200	100	200	240	5,000	0.2	3.0	0.5	5.0
Laboratory blank conc.		ND	55	ND	ND	ND	ND	0.12	ND	ND	0.3
Detections in lab blanks		—	1 of 3	—	—	—	—	1 of 3	—	—	1 of 3
Field blank conc.		80	690	70	ND	ND	1100	ND	ND	ND	ND
Detections in field blanks		2 of 3	3 of 3	1 of 3	—	—	1 of 3		—	—	
5 times blank conc.		400	3450	350	—	—	5500	0.60	—	—	1.5
Standard or criteria		NA	NA	NA	NA	NA	NA	NA	250	4.0	250
Type		—	—	—	—	—	—	—	MCL	MCL	MCL
Source		—	—	—	—	—	—	—	IGWQS	IGWQS	IGWQS

Appendix 8. Concentrations of Constituents Detected in Ground-Water Samples and Selected Quality-Assurance Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[mg/L, milligram per liter; E, estimated concentration less than reporting limit; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); ND, not detected; conc., concentration; —, no data; NA, not available; MCL, Maximum Contaminant Level for drinking water; IGWQS, Indiana Ground-Water-Quality Standards (Indiana Administrative Code, 2006); std. unit, standard unit; µS/cm, microsiemen per centimeter; ° C, degrees Celsius; trace elements not analyzed because of low sample volume in GW-B4, GW-B6, GW-B8, and GW-B20; water-quality characteristics not analyzed in GW-B17 because of low sample volume]

		Nutrients			Water-quality characteristics			
Geographic study area	Sample ID	Ammonia-Nitrogen (mg/L)	Nitrate-nitrite (mg/L)	Total Phosphorus (mg/L)	pH (std. unit)	Specific conductance (µS/cm)	Dissolved oxygen (mg/L)	Water temperature (° C)
6	GW-B1	48	ND	0.12	6.7	860	1.60	17.72
	GW-B2	9.2	ND	14	6.5	1,430	0.82	17.41
	GW-B3	15	ND	0.27	6.6	500	2.03	16.77
	GW-B17	0.046 E	3.2	0.39	—	—	—	—
Reporting limit conc.		0.1	0.1	0.05	—	—	—	—
Laboratory blank conc.		ND	ND	0.003	—	—	—	—
Detections in lab blanks		—	—	1 of 3	—	—	—	—
Field blank conc.		ND	ND	—	—	—	—	—
Detections in field blanks		—	—	—	—	—	—	—
5 times blank conc.		—	—	0.015	—	—	—	—
Standard or criteria		NA[a]	10	NA	—	—	—	—
Type		—	MCL	—	—	—	—	—
Source		—	IGWQS		—	—	—	—

[a]ISWQS concentrations for ammonia (un-ionized ammonia as nitrogen) can be computed for comparison. These ISWQS concentrations vary, based on water temperature and pH, as described in Indiana Administrative Code (2006). Average water temperature and pH for the three ground-water samples were used to find the ISWQS ammonia value in a table (0.03 mg/L).

Appendix 9. Concentrations of Constituents Detected in Surface-Soil Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

[µg/kg, microgram per kilogram; E, estimated concentration less than reporting limit; ND, not detected; yellow cells indicate valid concentrations greater than criteria; conc., concentration; —, no data; NA, not available; criteria are for soil for industrial closure in the Risk Integrated System of Closure (Indiana Department of Environmental Management, 2006)]

		Volatile organic compounds							
Geographic study area	Sample ID	1,2,4-Trimethyl-benzene (µg/kg)	1,4-Dichloro-benzene (µg/kg)	2-Butanone (MEK) (µg/kg)	4-Isopropyl toluene (µg/kg)	Acetone (µg/kg)	Benzene (µg/kg)	Chlorobenzene (µg/kg)	Chloroform (µg/kg)
1	SOILSW6	ND	ND	ND	ND	6.9 E	ND	ND	ND
2	SOIL2	ND	ND	ND	ND	ND	ND	ND	ND
	SOIL3	ND	ND	ND	ND	2.6 E	ND	ND	ND
3	SOIL6	ND	ND	ND	ND	2.1 E	ND	ND	ND
	SOIL7	ND	ND	ND	ND	ND	ND	ND	ND
	SOIL8	ND	ND	ND	ND	ND	ND	ND	ND
4	SOIL1	ND	ND	ND	0.63	ND	ND	ND	ND
	SOIL18	ND	ND	ND	ND	ND	ND	ND	ND
5	SOIL12	ND	ND	ND	ND	ND	ND	ND	ND
	SOIL13	ND	ND	ND	ND	ND	ND	ND	ND
	SOIL14	ND	ND	ND	ND	ND	ND	ND	ND
6	SOILB3	ND	4.7 E	6.3	ND	33	ND	0.26 E	ND
	SOILB4	ND	ND	ND	ND	3 E	ND	ND	ND
	SOIL15	ND	ND	ND	ND	2.3 E	ND	ND	ND
	SOIL16	ND	ND	ND	ND	ND	ND	ND	ND
7	SOIL9	ND	ND	ND	ND	ND	ND	ND	ND
	SOIL10	ND	ND	ND	ND	2.4 E	ND	ND	ND
	SOIL11	0.19	ND	ND	ND	ND	ND	ND	0.11 E
	SOIL19	ND	ND	ND	ND	ND	0.3 E	ND	0.22 E
	SOIL20	ND	ND	ND	ND	ND	ND	ND	ND
Reporting limit conc.		5.0	5.0	20	5.0	20	5.0	5.0	10
Laboratory blank conc.		0.16	ND	ND	ND	3.1	ND	0.14	ND
Detections in lab blanks		2 of 4	—	—	—	2 of 4	—	3 of 4	—
5 times blank conc.		0.80	—	—	—	15.5	—	0.70	—
Criteria concentration		170,000	3,400	NA	NA	370,000	350	27,000	1,200

Appendix 9. Concentrations of Constituents Detected in Surface-Soil Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[µg/kg, microgram per kilogram; E, estimated concentration less than reporting limit; VOC's, volatile organic compounds; ND, not detected; conc., concentration; —, no data; NA, not available; criteria are for soil for industrial closure in the Risk Integrated System of Closure (Indiana Department of Environmental Management, 2006)]

		Volatile organic compounds								
Geographic study area	Sample ID	Methylene chloride (mg/kg)	Naphthalene (mg/kg)	sec-Butylbenzene (mg/kg)	Tetrachloro-ethene (mg/kg)	Toluene (mg/kg)	Total xylenes (mg/kg)		Number of unknown VOC's	Sum[a] of unknown VOC's (mg/kg)
1	SOILSW6	ND	ND	ND	ND	ND	ND			
2	SOIL2	ND	ND	ND	0.52 E	ND	ND		4	61.8
	SOIL3	ND	ND	ND	ND	ND	ND			
3	SOIL6	ND	0.7 E	ND	ND	0.12 E	ND		3	29.7
	SOIL7	ND	0.46 E	ND	ND	0.16 E	ND		P,p'-DDE[b]	1,200 E
	SOIL8	ND	0.62 E	ND	ND	ND	ND		2	14.4
4	SOIL1	ND	0.43 E	0.38 E	ND	ND	ND		3	56
	SOIL18	ND	ND	ND	ND	ND	ND			
5	SOIL12	ND	ND	ND	ND	ND	ND			
	SOIL13	ND	0.53 E	ND	ND	ND	ND		2	34
	SOIL14	ND	ND	ND	ND	0.16 E	ND		3	25.3
6	SOILB3	ND	ND	ND	ND	0.15 E	ND			
	SOILB4	ND	ND	ND	ND	ND	ND			
	SOIL15	ND	ND	ND	ND	ND	ND			
	SOIL16	ND	ND	ND	ND	ND	ND		1	6.6
7	SOIL9	ND	0.53 E	ND	ND	0.22 E	ND			
	SOIL10	ND	ND	ND	ND	ND	ND			
	SOIL11	ND	0.72 E	ND	ND	0.51 E	0.47 E		3	31
	SOIL19	2.7 E	1.7 E	ND	ND	1.8 E	0.99 E		4	68
	SOIL20	ND	ND	ND	ND	ND	ND		5	161.3
Reporting limit conc.		5.0	5.0	5.0	5.0	5.0	5.0		NA	NA
Laboratory blank conc.		ND	1.1	ND	ND	0.2	ND			92
Detections in lab blanks		—	4 of 9	—	—	3 of 4	—		—	—
5 times blank conc.		—	5.5	—	—	1.0	—		—	460
Criteria concentration		1,800	170,000	NA	640	240,000	170,000			NA

[a]Estimated concentrations.

[b]Non-target constituent identified as P,p'-DDE; criteria concentration 86,000 µg/kg.

Appendix 9. Concentrations of Constituents Detected in Surface-Soil Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[µg/kg, microgram per kilogram; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); yellow cells indicate valid, non-estimated concentrations greater than criteria; conc., concentration; —, no data; criteria are for soil for industrial closure in the Risk Integrated System of Closure (Indiana Department of Environmental Management, 2006)]

		Semivolatile organic compounds															
Geographic study area	Sample ID	2-Methyl-naphthalene (µg/kg)		Acenaphthene (µg/kg)		Acenaph-thylene (µg/kg)		Anthracene (µg/kg)		Benzo(a) anthracene (µg/kg)		Benzo(a) pyrene (µg/kg)		Benzo(b) fluoranthene (µg/kg)		Benzo(ghi) perylene (µg/kg)	
1	SOILSW6	ND		ND		ND		ND		150	E	180	E	ND		130	E
2	SOIL2	ND		ND		ND		ND		ND		ND		ND		ND	
	SOIL3	ND		ND		ND		ND		ND		ND		ND		ND	
3	SOIL6	65	E	ND		ND		ND		89	E	160	E	270	E	140	E
	SOIL7	ND		ND		ND		ND		ND		ND		ND		ND	
	SOIL8	ND		ND		ND		ND		ND		ND		ND		ND	
4	SOIL1	ND		ND		ND		ND		200	E	250	E	420		160	E
	SOIL18	ND		ND		ND		ND		ND		ND		ND		ND	
5	SOIL12	ND		ND		ND		ND		ND		ND		ND		ND	
	SOIL13	ND		ND		ND		ND		ND		ND		ND		ND	
	SOIL14	ND		ND		76	E	55	E	240	E	350	E[c]	440		270	E
6	SOILB3	ND		ND		ND		ND		ND		ND		ND		ND	
	SOILB4	ND		ND		ND		ND		ND		ND		ND		ND	
	SOIL15	ND		ND		ND		ND		ND		ND		ND		ND	
	SOIL16	ND		ND		ND		ND		ND		ND		ND		ND	
7	SOIL9	150	E	63	E	1,200		480		2,900		3,500		5,600		2,400	
	SOIL10	ND		ND		ND		ND		38	E	ND		ND		ND	
	SOIL11	120	E	ND		ND		110	E	720		830		1,500		580	
	SOIL19	130	E	ND		ND		68	E	110	E	70	E	ND		51	E
	SOIL20	ND		ND		ND		ND		ND		ND		ND		ND	
Reporting limit conc.		330		330		330		330		330		330		330		330	
Laboratory blank conc.		ND		ND		ND		ND		ND		ND		ND		ND	
Detections in lab blanks		—		—		—		—		—		—		—		—	
5 times blank conc.		—		—		—		—		—		—		—		—	
Criteria concentration		210,000		1,200,000		180,000		51,000		15,000		1,500		15,000		16,000	

[c]Reporting limit was 440 µg/kg.

Appendix 9. Concentrations of Constituents Detected in Surface-Soil Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[µg/kg, microgram per kilogram; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); conc., concentration; —, no data; criteria are for soil for industrial closure in the Risk Integrated System of Closure (Indiana Department of Environmental Management, 2006)]

		Semivolatile organic compounds															
Geographic study area	Sample ID	Benzo(k) fluoranthene (µg/kg)		bis(2-Ethylhexyl) phthalate (µg/kg)		Butyl benzyl phthalate (µg/kg)		Carbazole (µg/kg)		Chrysene (µg/kg)		Dibenz(a,h)-anthracene (µg/kg)		Dibenzofuran (µg/kg)		Fluoranthene (µg/kg)	
1	SOILSW6	ND		ND		ND		ND		180	E	ND		ND		290	E
2	SOIL2	ND		ND		ND		ND		ND		ND		ND		ND	
	SOIL3	ND		ND		ND		ND		ND		ND		ND		ND	
3	SOIL6	ND		ND		ND		ND		120	E	ND		52	E	110	E
	SOIL7	ND		ND		ND		ND		ND		ND		ND		ND	
	SOIL8	ND		ND		ND		ND		ND		ND		ND		ND	
4	SOIL1	ND		ND		ND		ND		210	E	ND		ND		270	E
	SOIL18	ND		ND		ND		ND		43	E	ND		ND		ND	
5	SOIL12	ND		270	E	ND		ND		ND		ND		ND		65	E
	SOIL13	ND		ND		ND		ND		ND		ND		ND		ND	
	SOIL14	280	E	69	E	ND		ND		300	E	66	E	ND		350	E[d]
6	SOILB3	ND		ND		ND		ND		ND		ND		ND		ND	
	SOILB4	ND		ND		ND		ND		ND		ND		ND		ND	
	SOIL15	ND		ND		ND		ND		ND		ND		ND		ND	
	SOIL16	ND		ND		ND		ND		ND		ND		ND		ND	
7	SOIL9	ND		410		75	E	110	E	3,000		690		100	E	4,000	
	SOIL10	ND		ND		ND		ND		45	E	ND		ND		76	E
	SOIL11	ND		91	E	ND		74	E	750		ND		ND		1,200	
	SOIL19	ND		67	E	ND		ND		130	E	ND		100	E	240	E
	SOIL20	ND		ND		ND		ND		ND		ND		ND		ND	
Reporting limit conc.		330		330		330		330		330		330		330		330	
Laboratory blank conc.		ND		52		ND		ND		ND		ND		ND		ND	
Detections in lab blanks		—		1 of 5		—		—		—		—		—		—	
5 times blank conc.		—		260		—		—		—		—		—		—	
Criteria concentration		39,000		980,000		310,000		20,000		25,000		1,500		65,000		880,000	

[d]Reporting limit was 440 µg/kg.

Appendix 9. Concentrations of Constituents Detected in Surface-Soil Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[SVOC's, semivolatile organic compounds; µg/kg, microgram per kilogram; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); conc., concentration; —, no data; NA, not available; criteria are for soil for industrial closure in the Risk Integrated System of Closure (Indiana Department of Environmental Management, 2006)]

		Semivolatile organic compounds													
Geographic study area	Sample ID	Fluorene (µg/kg)		Indeno(1,2,3-cd)pyrene (µg/kg)		Naphthalene (µg/kg)		Phenanthrene (µg/kg)		Pyrene (µg/kg)		Number of unknown SVOC's	Sum[e] of unknown SVOC's (µg/kg)
1	SOILSW6	ND		120	E	ND		130	E	310	E	9	19,340
2	SOIL2	ND		ND		ND		ND		ND		7	17,490
	SOIL3	ND		ND		ND		ND		ND		11	19,110
3	SOIL6	ND		130	E	ND		250	E	ND		18	13,170
	SOIL7	ND		ND		ND		ND		ND		10	14,240
	SOIL8	ND		ND		ND		46	E	ND		6	10,040
4	SOIL1	ND		160	E	ND		70	E	230	E	5	13,310
	SOIL18	ND		ND		ND		ND		ND		6	9,230
5	SOIL12	ND		ND		ND		44	E	ND		19	17,500
	SOIL13	ND		ND		ND		ND		ND		3	9,850
	SOIL14	ND		260	E	ND		190	E	400	E[f]	9	21,580
6	SOILB3	ND		ND		ND		ND		ND		2	7,780
	SOILB4	ND		ND		ND		ND		ND		8	14,110
	SOIL15	ND		ND		ND		ND		ND		3	7,160
	SOIL16	ND		ND		ND		ND		ND		8	15,090
7	SOIL9	81	E	2,500		160	E	1,000		3,500		28	20,860
	SOIL10	ND		ND		ND		ND		ND		3	8,210
	SOIL11	ND		530		ND		620		1,200		19	17,510
	SOIL19	ND		ND		ND		560		280	E	10	38,530
	SOIL20	ND		ND		ND		ND		ND		13	24,680
Reporting limit conc.		330		330		330		330		330		—	NA
Laboratory blank conc.		ND		ND		ND		ND		ND		—	9,300
Detections in lab blanks		—		—		—		—		—		—	—
5 times blank conc.		—		—		—		—		—		—	46,500
Criteria concentration		1,100,000		3,100		170,000		170,000		570,000		NA	NA

[e]Estimated concentrations.

[f]Reporting limit was 440 µg/kg.

Appendix 9. Concentrations of Constituents Detected in Surface-Soil Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[mg/kg, milligram per kilogram; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); yellow cells indicate valid, non-estimated concentrations greater than criteria; conc., concentration; —, no data; NA, not available; criteria are for soil for industrial closure in the Risk Integrated System of Closure (Indiana Department of Environmental Management, 2006)]

Geographic study area	Sample ID	Trace elements								
		Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Boron (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Lead (mg/kg)
1	SOILSW6	7.5	140	0.61	5.7 E	0.36 E	13	6.1	16	31
2	SOIL2	7.9	93	0.7	3.2 E	ND	16	11	14	20
	SOIL3	8.9	93	0.71	3.6 E	ND	22	7.5	13	14
3	SOIL6	7.6	83	1.9	37	0.46 E	18	7.1	19	22
	SOIL7	24	100	0.95	5.8 E	0.29 E	16	9.7	19	87
	SOIL8	14	150	2.1	15	0.90	17	9.6	33	220
4	SOIL1	36	550	1.6	ND	0.53 E	37	43	18	56
	SOIL18	7.1	130	0.88	2.7 E	ND	17	13	9.8	17
5	SOIL12	11	110	0.81	6.9 E	1.2	24	11	260	71
	SOIL13	8.4	120	0.78	5.2 E	0.29 E	20	9.1	21	31
	SOIL14	7.6	82	0.95	12 E	0.35 E	19	7.6	20	51
6	SOILB3	4.4	100	0.84	1.8 E	ND	16	8.6	6.9	15
	SOILB4	5.9	100	0.73	2.4 E	0.06 E	16	9.6	13	18
	SOIL15	6.3	76	0.61	1.7 E	ND	16	9.4	9.6	13
	SOIL16	12	120	1.1	2.2 E	0.20 E	31	13	20	34
7	SOIL9	18	70	1.0	8.4 E	1.8	22	7.5	35	86
	SOIL10	7.0	74	0.71	6.0 E	0.26 E	14	9.7	17	27
	SOIL11	19	75	0.93	21	4.6	15	8.3	71	620
	SOIL19	15	59	2.0	60	0.07 E	13	6.1	24	16
	SOIL20	30	87	0.22 E	18	ND	18	3.5	27	19
Reporting limit conc.		1.0	1.0	0.50	12	0.50	1.0	1.0	2.0	0.8
Laboratory blank conc.		ND	ND	ND	ND	0.025	ND	ND	ND	ND
Detections in lab blanks		—	—	—	—	1 of 4	—	—	—	—
5 times blank conc.		—	—	—	—	0.13	—	—	—	—
Criteria concentration		20	5,900	2,300	NA	77	120[g]	NA	2,700	230

[g]Criteria concentration for chromium-VI.

Appendix 9. Concentrations of Constituents Detected in Surface-Soil Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[mg/kg, milligram per kilogram; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); conc., concentration; —, no data; NA, not available; criteria are for soil for industrial closure in the Risk Integrated System of Closure (Indiana Department of Environmental Management, 2006)]

Geographic study area	Sample ID	Trace elements									
		Manganese (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Strontium (mg/kg)	Thallium (mg/kg)	Tin (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
1	SOILSW6	440	0.74 E	11	ND	ND	110	ND	2.3 E	26	140
2	SOIL2	350	1.3 E	12	ND	ND	7.8	ND	1.4 E	32	38
	SOIL3	450	1.3 E	12	ND	ND	8.9	ND	2.5 E	43	45
3	SOIL6	380	2.7	15	ND	ND	21	ND	2.5 E	33	90
	SOIL7	940	0.95 E	15	ND	ND	11	0.83 E	1.7 E	28	98
	SOIL8	890	2.9	19	ND	ND	19	0.90 E	3.2 E	32	200
4	SOIL1	3,500	3.9	17	ND	ND	7.1	0.81 E	2.8 E	71	100
	SOIL18	1,300	0.71 E	15	ND	ND	7.7	1.5	1.7 E	32	46
5	SOIL12	1,000	1.9 E	16	1.2 E	ND	12	ND	2.2 E	36	340
	SOIL13	990	1.1 E	14	ND	ND	23	0.90 E	2.3 E	35	77
	SOIL14	510	2.3 E[h]	13	ND	ND	15	1.3 E[i]	2.1 E	28	85
6	SOILB3	520	0.61 E	8.7	ND	ND	4.3	0.84 E	1.8 E	32	32
	SOILB4	1,100	1.2 E	10	ND	ND	6.4	ND	4.5 E	34	52
	SOIL15	650	1.1 E	9.9	ND	ND	5.8	ND	1.6 E	34	32
	SOIL16	1,200	1.8 E	16	ND	ND	5.3	1.2 E	4.9 E	47	93
7	SOIL9	650	1.7 E	15	ND	ND	20	0.99 E	3.6 E	31	140
	SOIL10	850	2.1 E[h]	13	ND	ND	9.0	ND	1.5 E	28	82
	SOIL11	700	2.5	37	2.0	1.4	67	ND	2.3 E	25	350
	SOIL19	390	3.0	35	ND	ND	25	ND	2.5 E	30	39
	SOIL20	57	2.6	16	2.4	ND	5.7	ND	1.3 E	43	54
Reporting limit conc.		1.0	2.0	4.0	1.3	1.0	1.2	1.2	12	2.0	2.0
Laboratory blank conc.		0.21	ND	ND	ND	ND	ND	ND	1.3	ND	ND
Detections in lab blanks		3 of 4	—	—	—	—	—	—	4 of 4	—	—
5 times blank conc.		1.1	—	—	—	—	—	—	6.50	—	—
Criteria concentration		NA	NA	2,700	53	87	NA	10	NA	NA	10,000

[h]Reporting limit was 2.4 mg/kg.

[i]Reporting limit was1.4 mg/kg

Appendix 10. Concentrations of Constituents Detected in Buried-Sediment Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.

[µg/kg, microgram per kilogram; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); conc., concentration; —, no data; NA, not available; criteria are for soil for industrial closure in the Risk Integrated System of Closure (Indiana Department of Environmental Management, 2006)]

Geographic study area	Sample ID	Volatile organic compounds							
		1,2,4-Trichlorobenzene (mg/kg)	1,2,4-Trimethylbenzene (mg/kg)	1,2-Dichlorobenzene (mg/kg)	1,3,5-Trimethylbenzene (mg/kg)	1,4-Dichlorobenzene (mg/kg)	2-Butanone (mg/kg)	Acetone (mg/kg)	Benzene (mg/kg)
2	SED-B18	ND	ND	ND	ND	ND	ND	13 E	ND
	SED-B19	ND	ND	ND	ND	ND	ND	5.3 E	ND
	SED-B20	ND	0.12 E	ND	ND	ND	ND	4.4 E	ND
4	SED-B6	ND	ND	ND	ND	ND	ND	4.0 E	ND
	SED-B7	0.44 E	0.17 E	0.14 E	ND	ND	ND	ND	ND
	SED-B8	ND	ND	ND	ND	ND	ND	5.3 E	ND
5	SED-B12	ND	ND	ND	ND	ND	3.7 E	24 E[b]	ND
	SED-B13	ND	0.63 E	ND	0.19 E	ND	ND	ND	ND
	SED-B14	ND	ND	ND	ND	ND	ND	ND	ND
6	SED-B1	ND	ND	ND	ND	ND	ND	7.3 E	ND
	SED-B3	ND	0.37 E	ND	ND	5.1 E[a]	6.9 E	35	ND
	SED-B4	ND	ND	ND	ND	ND	ND	4.9 E	ND
	SED-B5	ND	ND	ND	ND	ND	ND	2.3 E	ND
	SED-B10	ND	ND	ND	ND	ND	ND	3.3 E	ND
	SED-B11	ND	ND	ND	ND	ND	ND	4.3 E	ND
	SED-B16	ND	0.6 E	ND	0.25 E	ND	ND	3.1 E	0.46 E
	SED-B17	ND	ND	ND	ND	ND	ND	9 E	ND
7	SED-B9	ND	ND	ND	ND	ND	ND	2.8 E	ND
	SED-B15	ND	ND	ND	ND	ND	ND	4.2 E	ND
Reporting limit conc.		5.0	5.0	5.0	5.0	5.0	20	20	5.0
Laboratory blank conc.		0.57	0.16	0.17	ND	ND	ND	3.1	ND
Detections in lab blanks		2 of 4	2 of 4	2 of 4	—	—	—	2 of 4	—
5 times blank conc.		2.85	0.8	0.85	—	—	—	15.5	—
Criteria concentration		77,000	170,000	220,000	68,000	3,400	NA	370,000	350

[a]Reporting limit was 7.5 µg/kg.

[b]Reporting limit was 25 µg/kg.

Appendix 10. Concentrations of Constituents Detected in Buried-Sediment Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[µg/kg, microgram per kilogram; E, estimated concentration less than reporting limit; VOC's, volatile organic compounds; ND, not detected; conc., concentration; —, no data; NA, not available; criteria are for soil for industrial closure in the Risk Integrated System of Closure (Indiana Department of Environmental Management, 2006)]

Geographic study area	Sample ID	Volatile organic compounds							
		Chloro-benzene (mg/kg)	Ethyl-benzene (mg/kg)	Naphthalene (mg/kg)	Tetrachloro-ethene (mg/kg)	Toluene (mg/kg)	Total xylenes (mg/kg)	Number of unknown VOC's	Sum[c] of unknown VOC's (mg/kg)
2	SED-B18	ND	ND	ND	ND	ND	ND	1	7.0
	SED-B19	ND	ND	ND	ND	ND	ND	3	47
	SED-B20	ND	ND	ND	0.23 E	0.33 E	ND	3	32.1
4	SED-B6	ND	ND	ND	ND	0.20 E	ND	3	67
	SED-B7	ND	ND	1.0 E	ND	0.16 E	ND	1	9.6
	SED-B8	ND	ND	0.68 E	ND	0.12 E	ND	1	10.
5	SED-B12	ND	ND	ND	ND	ND	ND	ND	ND
	SED-B13	ND	0.31 E	0.78 E	ND	0.57 E	1.2 E	ND	ND
	SED-B14	ND	ND	ND	ND	ND	ND	1	9.9
6	SED-B1	ND	ND	ND	ND	0.11 E	ND	ND	ND
	SED-B3	0.56 E	0.25 E	0.64 E	ND	0.64 E	1.0 E	ND	ND
	SED-B4	ND	ND	ND	ND	0.17 E	ND	1	6.6
	SED-B5	ND	ND	ND	ND	ND	ND	ND	ND
	SED-B10	ND	ND	ND	ND	ND	ND	3	30.9
	SED-B11	ND	ND	ND	ND	ND	ND	3	46
	SED-B16	ND	0.62 E	0.93 E	ND	2.0 E	2.0 E	5	104
	SED-B17	ND	ND	0.56 E	ND	0.17 E	ND	4	113
7	SED-B9	0.13 E	ND	ND	ND	0.13 E	ND	2	32.3
	SED-B15	ND	ND	ND	ND	0.09 E	ND	5	85.3
Reporting limit conc.		5.0	5.0	5.0	5.0	5.0	5.0	NA	NA
Laboratory blank conc.		0.14	ND	1.1	ND	0.20	ND	—	92
Detections in lab blanks		3 of 4	—	4 of 9	—	3 of 4	—	—	
5 times blank conc.		0.7	—	5.5	—	1.0	—	—	460
Criteria concentration		27,000	160,000	170,000	640	240,000	170,000	NA	NA

[c]Estimated concentrations.

Appendix 10. Concentrations of Constituents Detected in Buried-Sediment Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[µg/kg, microgram per kilogram; E, estimated concentration less than reporting limit; SVOC's, semivolatile organic compounds; ND, not detected; conc., concentration; —, no data; NA, not available; criteria are for soil for industrial closure in the Risk Integrated System of Closure (Indiana Department of Environmental Management, 2006)]

		Semivolatile organic compounds			
Geographic study area	Sample ID	bis(2-Ethylhexyl) phthalate (µg/kg)		Number of unknown SVOC's	Sum[d] of unknown SVOC's (µg/kg)
2	SED-B18	ND		1	16,000
	SED-B19	ND		1	17,000
	SED-B20	ND		4	10,600
4	SED-B6	ND		2	14,270
	SED-B7	ND		1	13,000
	SED-B8	110 E		3	9,950
5	SED-B12	ND		1	8,600
	SED-B13	ND		4	11,980
	SED-B14	ND		2	8,370
6	SED-B1	ND		2	8,490
	SED-B3	ND		5	13,980
	SED-B4	ND		2	7,000
	SED-B5	ND		2	9,050
	SED-B10	ND		2	9,120
	SED-B11	ND		4	10,700
	SED-B16	ND		1	12,000
	SED-B17	ND		1	25,000
7	SED-B9	ND		2	9,440
	SED-B15	ND		1	7,300
Reporting limit conc.		330		—	NA
Laboratory blank conc.		52		—	9,300
Detections in lab blanks		1 of 5		—	—
5 times blank conc.		260		—	46,500
Criteria concentration		980,000		NA	NA

[d]Estimated concentrations.

Appendix 10. Concentrations of Constituents Detected in Buried-Sediment Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[mg/kg, milligram per kilogram; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); conc., concentration; —, no data; NA, not available; criteria are for soil for industrial closure in the Risk Integrated System of Closure (Indiana Department of Environmental Management, 2006)]

Geographic study area	Sample ID	Trace elements								
		Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Boron (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Lead (mg/kg)
2	SED-B18	4.3	42	0.49 E	4.0 E	ND	17	7.9	19	15
	SED-B19	11	100	0.82	1.2 E	ND	16	4.9	20	10
	SED-B20	5.1	27	0.39 E	3.5 E	0.05 E	14	7.1	11	15
4	SED-B6	9.3	300	1.5	3.2 E	3.7	22	5.7	16	19
	SED-B7	22	340	2.0 E[e]	1.6 E	ND	35	8.1	39	26
	SED-B8	4.2	33	0.45 E	2.4 E	0.30 E	9.8	2.3	5.8	3.9
5	SED-B12	8.7	240	1.5	3.5 E	3.7	24	10	5.0	16
	SED-B13	6.1	65	0.95	2.4 E	2.6	15	3.5	12	12
	SED-B14	ND	5.7	0.23 E	ND	ND	1.5	0.18 E	0.8 E	0.68 E
6	SED-B1	0.94 E	11	ND	ND	ND	4.5	0.56 E	1.6 E	1.2
	SED-B3	10	250	0.91	3.9 E	3.0	26	5.5	8.4	10
	SED-B4	2.9	3.1	ND	ND	ND	4.9	0.99 E	1.5 E	0.98
	SED-B5	ND	21	ND	ND	ND	23	0.59 E	2.1 E	1.0
	SED-B10	3.7	34	0.64	1.5 E	ND	8.6	1.6	5.6	4.6
	SED-B11	2.4	21	0.26 E	ND	ND	4.7	0.98 E	4.0	2.9
	SED-B16	ND	8.6	ND	2.5 E	ND	2.6	0.24 E	1.7 E	1.2
	SED-B17	20	210	2.5	ND	ND	42	7.2	29	22
7	SED-B9	1.8	18	0.30 E	1.5 E	ND	5.0	1.5	4.4	2.1
	SED-B15	ND	3.7	ND	ND	0.03 E	1.9	0.26 E	4.7	0.97
Reporting limit conc.		1.0	1.0	0.50	12	0.50	1.0	1.0	2.0	0.08
Laboratory blank conc.		ND	ND	ND	ND	0.03	ND	ND	ND	ND
Detections in lab blanks		—	—	—	—	1 of 4	—	—	—	—
5 times blank conc.		—	—	—	—	0.13	—	—	—	—
Criteria concentration		20	5,900	2,300	NA	77	120[f]	NA	2,700	230

[e]Reporting limit was 3.7 mg/kg.

[f]Criteria for chromium-VI.

Appendix 10. Concentrations of Constituents Detected in Buried-Sediment Samples from the Muscatatuck Urban Training Center near Butlerville, Indiana, October and November 2005.—Continued

[mg/kg, milligram per kilogram; E, estimated concentration less than reporting limit; ND, not detected; gray cells indicate valid concentration (greater than reporting limit and greater than 5 times highest blank concentration, or concentration greater than reporting limit with no detection in blank); conc., concentration; —, no data; NA, not available; criteria are for soil for industrial closure in the Risk Integrated System of Closure (Indiana Department of Environmental Management, 2006)]

Geographic study area	Sample ID	Trace elements																	
		Manganese (mg/kg)		Molybdenum (mg/kg)		Nickel (mg/kg)		Selenium (mg/kg)		Strontium (mg/kg)		Thallium (mg/kg)		Tin (mg/kg)		Vanadium (mg/kg)		Zinc (mg/kg)	
2	SED-B18	730		2.0	E[g]	17		1.0	E	43		ND		1.2	E	30		48	
	SED-B19	130		1.8	E	25		ND		9.8		ND		1.1	E	29		51	
	SED-B20	850		1.7	E	11		1.0	E	60		ND		ND		26		30	
4	SED-B6	4,600		3.3		52		ND		26		ND		1.9	E	54		120	
	SED-B7	4,400		5.9		54		ND		13		ND		ND		81		210	
	SED-B8	490		1.5	E	21		ND		48		0.82	E	1.7	E	16		140	
5	SED-B12	4,500		0.43	E	25		ND		14		0.94	E	1.2	E	47		66	
	SED-B13	1,500		0.74	E	32		2.1		41		ND		1.1	E	34		81	
	SED-B14	260		0.38	E	9.3		ND		2.2		ND		ND		2.3		11	
6	SED-B1	410		0.78	E	4.6		1.2	E	15		ND		ND		3.8		11	
	SED-B3	2,300		1.2	E	32.		2.6		45		ND		ND		42		58	
	SED-B4	130		0.64	E	7.9		ND		15		ND		1.0	E	8.9		16	
	SED-B5	550		9.0		5.6		ND		2.8		ND		0.96	E	3.8		6.5	
	SED-B10	400		0.56	E	11		ND		3.7		ND		ND		20		24	
	SED-B11	420		0.42	E	4.6		ND		2.7		ND		ND		10		16	
	SED-B16	350		0.41	E	4.2	E[h]	3.7		62		ND		ND		6.7		14	
	SED-B17	2,500		5.1		67		ND		9.7		ND		2.0	E	69		130	
7	SED-B9	370		0.30	E	5.3		ND		1.1	E	ND		1.2	E	12		26	
	SED-B15	220		ND		3.1	E	ND		10		ND		ND		2.4		11	
Reporting limit conc.		1.0		2.0		4.0		1.3		1.2		1.2		12		2.0		2.0	
Laboratory blank conc.		0.21		ND		ND		ND		ND		ND		1.3		ND		ND	
Detections in lab blanks		3 of 4		—		—		—		—		—		4 of 4		—		—	
5 times blank conc.		1.05		—		—		—		—		—		6.50		—		—	
Criteria concentration		NA		NA		2,700		53		NA		10		NA		NA		10,000	

[g]Reporting limit was 2.3 mg/kg.

[h]Reporting limit was 4.7 mg/kg.

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