USGS
science for a changing world

Prepared in cooperation with the U.S. Department of the Army Environmental and Natural Resources Management Office of the U. S. Army Signal Center and Fort Gordon

Assessment of Soil-Gas and Soil Contamination at the Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010

Open-File Report 2011–1081

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

Cover. *Photograph:* Manmade earthen mound at Patterson Anti-Tank Range, Fort Gordon, Georgia.

Assessment of Soil-Gas and Soil Contamination at the Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010

By Andral W. Caldwell, W. Fred Falls, Wladmir B. Guimaraes, W. Hagan Ratliff, John B. Wellborn, and James E. Landmeyer

Prepared in cooperation with the U.S. Department of the Army Environmental and Natural Resources Management Office of the U.S. Army Signal Center and Fort Gordon

Open-File Report 2011–1081

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

U.S. Department of the Interior
KEN SALAZAR, Secretary

U.S. Geological Survey
Marcia K. McNutt, Director

U.S. Geological Survey, Reston, Virginia: 2011

Suggested citation:
Caldwell, A.W., Falls, W.F., Guimaraes, W.B., Ratliff, W.H., Wellborn, J.B., and Landmeyer, J.E., 2011, Assessment of soil-gas and soil contamination at the Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010: U.S. Gelogical Survey Open-File Report 2011–1081, 40 p.

Contents

Figures

Tables

Conversion Factors

Inch/Pound to SI

Multiply	By	To obtain
	Length	
inch (in.)	2.54	centimeter (cm)
inch (in.)	25.4	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
yard (yd)	0.9144	meter (m)

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

Selected acronyms and abbreviations used in this report:

BTEX	Benzene, toluene, ethylbenzene, and xylene (total)
GC/MS	Gas chromatography/mass spectrometry
ICP-MS	Inductively coupled plasma – mass spectrometry
mg/kg	milligram per kilogram
mL	milliliter
µg	microgram
µg/g	microgram per gram
µg/L	microgram per liter
MDL	Method detection level
MTBE	Methyl tert-butyl ether
OMHA	Old Metal Workshop Hog Farm Area
PATR	Patterson Anti-Tank Range
PAH	Polycyclic aromatic hydrocarbon
PCE	Perchloroethylene (also known as tetrachloroethylene)
RCRA	Resource Conservation and Recovery Act
RSL	Regional screening level
SCDHEC	South Carolina Department of Health and Environmental Control
SVOC	Semivolatile organic compound
TCE	Trichloroethylene
TPH	Total petroleum hydrocarbon
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VOC	Volatile organic compound

Assessment of Soil-Gas and Soil Contamination at the Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010

By Andral W. Caldwell,[1] W. Fred Falls,[1] Wladmir B. Guimaraes,[1] W. Hagan Ratliff,[2] John B. Wellborn,[3] and James E. Landmeyer[1]

Abstract

Soil gas and soil were assessed for contaminants at the Patterson Anti-Tank Range at Fort Gordon, Georgia, from October 2009 to September 2010. The assessment included identifying and delineating organic contaminants present in soil-gas samplers from the area estimated to be the Patterson Anti-Tank Range and in the hyporheic zone and floodplain of Brier Creek. This assessment was conducted to provide environmental contamination data to Fort Gordon personnel pursuant to requirements for the Resource Conservation and Recovery Act Part B Hazardous Waste Permit process.

Soil-gas samplers in the hyporheic zone and floodplain of Brier Creek contained total petroleum hydrocarbons, benzene, octane, and pentadecane concentrations above method detection levels. All soil-gas samplers within the boundary of the Patterson Anti-Tank Range contained total petroleum hydrocarbons above the method detection level. The highest total petroleum hydrocarbon mass detected was 147.09 micrograms in a soil-gas sampler located near the middle of the site and near the remnants of a manmade earthen mound and trench. The highest toluene mass detected was 1.04 micrograms and was located in the center of the Patterson Anti-Tank Range and coincides with a manmade earthen mound. Some soil-gas samplers installed detected undecane masses greater than the method detection level of 0.04 microgram, with the highest detection of soil-gas undecane mass of 58.64 micrograms collected along the southern boundary of the site.

Some soil-gas samplers were installed in areas of high-contaminant mass to assess for explosives and chemical agents. Explosives or chemical agents were not detected above their respective method detection levels for all soil-gas samplers installed.

Inorganic concentrations in the soil samples did not exceed regional screening levels established by the U.S. Environmental Protection Agency. Barium concentrations, however, were up to nine times higher than the background concentrations reported in similar Coastal Plain sediments of South Carolina. Potassium concentrations were up to eight times higher than the background concentrations reported in similar Coastal Plain sediments of South Carolina.

Introduction

Fort Gordon is a U.S. Department of the Army facility located approximately 10 miles southwest of Augusta in east-central Georgia (fig. 1). A cantonment (military housing) area is located at the northwestern boundary of Fort Gordon. The Patterson Anti-Tank Range (PATR) is located on a relatively flat, wooded area in the south-western part of Fort Gordon adjacent to the Brier Creek floodplain. Historically, little information is available for the PATR other than the knowledge that anti-tank warfare training was conducted at the site (Hagan Ratliff, U.S. Department of the Army, Environmental Branch, Fort Gordon, Georgia, oral commun. January 29, 2009). However, physical evidence includes the remnants of several elongated manmade earthen mounds and trenches used to train troops in anti-tank warfare.

Because of the lack of historical information, the effects of past activities on environmental resources at the PATR are currently unknown. The current assessment was conducted to provide environmental contamination data to Fort Gordon personnel to comply with the requirements of the Resource Conservation and Recovery Act (RCRA) Part B Hazardous Waste Permit process. An initial investigation to assess potential environmental effects is warranted because the PATR is located in the outcrop area of the Cretaceous-age aquifer system, which is used for drinking water farther downgradient. Moreover, surface water and groundwater from the PATR may discharge to the adjacent floodplain and channel of Brier Creek and enable potential contaminants to be transported off of the Fort Gordon property.

[1]U.S. Geological Survey, Columbia, South Carolina.

[2]Environmental Branch, Fort Gordon, Georgia.

[3]Environmental and Natural Resources, Fort Gordon, Georgia.

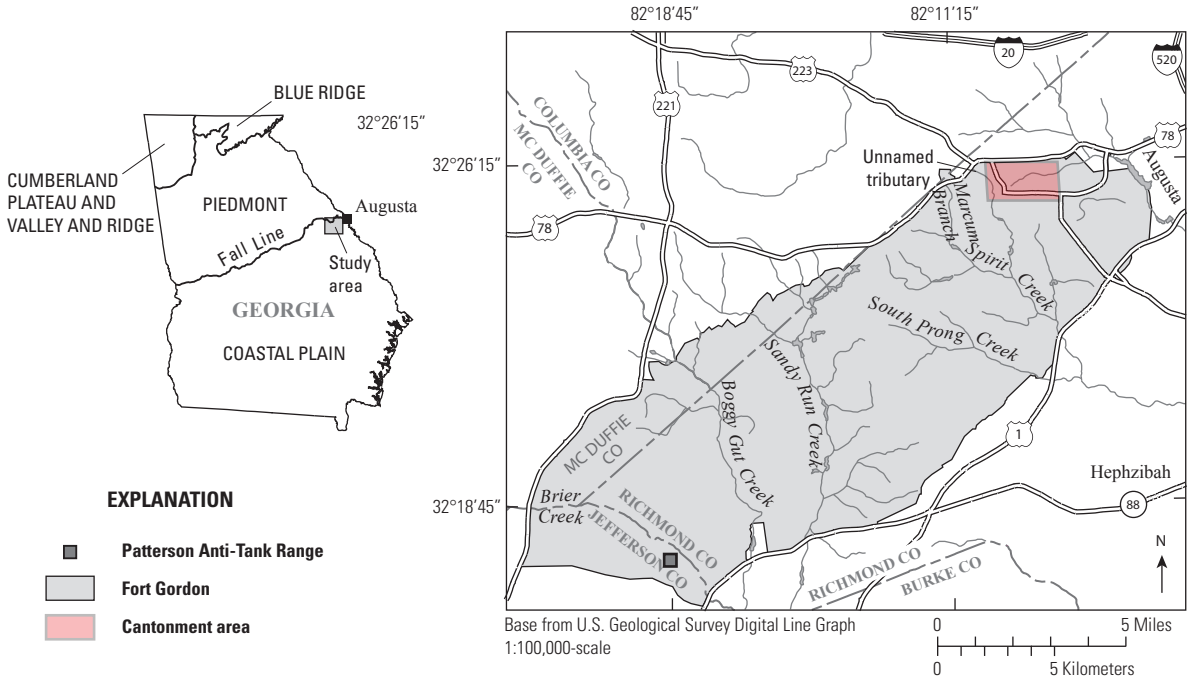


Figure 1. Generalized location of Patterson Anti-Tank Range, Fort Gordon, Georgia.

Purpose and Scope

From October 2009 to September 2010, the U.S. Geological Survey (USGS), in cooperation with the U.S. Department of the Army (U.S. Army) Environmental and Natural Resources Management Office of the U.S. Army Signal Center and Fort Gordon, Georgia, assessed soil gas and soil for contaminants at the PATR. This assessment was conducted to provide environmental contamination data to the U.S. Army at Fort Gordon. The assessment included the identification and delineation of organic contaminants present in soil-gas samplers from the PATR and in the hyporheic zone and floodplain of Brier Creek. The assessment also included the delineation of inorganic contaminants in soil samples. This report presents the analytical results of the soil-gas and soil samples and delineates the area of contamination in the study area.

Description of the Study Area

Fort Gordon is a U.S. Army facility located approximately 10 miles southwest of Augusta in east-central Georgia (fig. 1). Fort Gordon is located in the northern part of the Coastal Plain Physiographic Province and south of the Fall Line. Surficial soil and sediments are characterized by unconsolidated sands, indurated sands, and semi-consolidated sandstones and layers of clay that include kaolinite (Gregory and others, 2001; Williams, 2007).

Methods

The methods used in this assessment were selected to provide data to determine the presence or absence of contamination of soil gas and soil at the PATR. The soil-gas method that was used provides results that are qualitative, and the soil samples provide quantitative data that can be compared to standards.

Passive Hyporheic Zone and Floodplain Survey

The assessment of soil-gas contamination was conducted using a passive soil-gas survey based on the GORE® Module, a commercially available passive diffusion sampler based on GORE-TEX® membrane technology (U.S. Environmental Protection Agency, 1998; W.L. Gore & Associates, Inc., 2004; American Society for Testing and Materials, 2006). The module is an adsorbent material placed inside a shoestring-shaped GORE-TEX® tube (fig. 2*A*) inside a 20-milliliter (mL) gas-tight vial (fig. 2*B*). The material can adsorb a wide variety of volatile organic compounds (VOCs), including solvents such as perchloroethylene (PCE; also known as tetrachloroethylene); trichloroethylene (TCE); benzene, toluene, ethylbenzene, and xylenes (collectively referred to as BTEX); methyl *tert*-butyl ether (MTBE); semivolatile organic compounds (SVOCs); total petroleum hydrocarbons (TPHs); and polycyclic aromatic hydrocarbons (PAHs) such as naphthalene. The modules were tied to a string, attached to a cork plug to prevent the entrance of surface water and ambient surface sources of contamination, and inserted into a shallow borehole. After 5 to 7 days, the modules were removed from the field, placed in their original 20 mL gas-tight vial, and sent to the commercial laboratory (W.L. Gore & Associates, Inc.) for analysis by gas chromatography/mass spectrometry using a modification of U.S. Environmental Protection Agency (USEPA) method 8260/8270 to include thermal desorption of the adsorbed soil gas sampler. The laboratory is in compliance with Good Laboratory Practices and ISO Guide 25 (International Organization for Standardization, 1990). The soil-gas contaminant results are expressed as mass of contaminant (micrograms) and provide qualitative screening-level data; whereas, the modules placed in water provide contaminant levels expressed as a concentration (micrograms per liter).

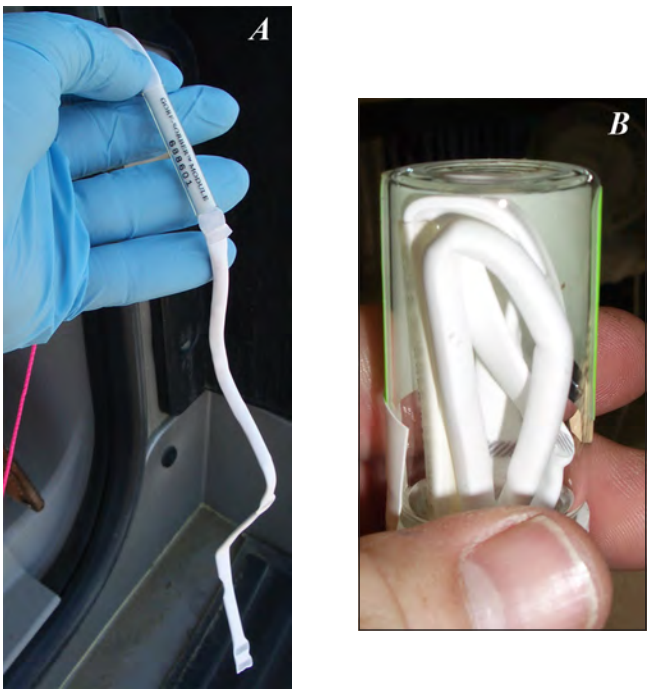


Figure 2. Soil-gas sampler (*A*) prior to being installed in a drive point, and (*B*) following retrieval and prior to shipping to the laboratory for analysis.

Passive soil-gas results can indicate the presence of particular contaminants. The results however, do not reveal whether the detection was derived from free product, from residual-phase adsorbed material or vapors in the unsaturated zone, or from the dissolved-phase material in shallow and deep groundwater (unless the sampler is placed in water). In general, higher soil-gas mass in a sampler tends to be related to the presence of residual contamination or free product that is close to the land surface where the soil-gas sampler is located.

If such source material is located at greater depths, however, the soil-gas contaminant mass generally will be lower. A lower value near known sources may be caused by various attenuation processes that affect the soil-gas mass prior to detection. In both cases, however, the samplers help to rapidly indicate the presence or absence of contaminants. The passive soil-gas approach was approved for use at Fort Gordon by the Hazardous Waste Management Branch, Georgia Environmental Protection Division (William Powell, P.E., Environmental Engineer, Department of Defense Remediation Unit, oral commun., December 10, 2008).

The passive soil-gas samplers were installed in the hyporheic zone and floodplain sediments at the PATR on April 14, 2010, and July 19, 2010 (fig. 3). The 13 soil-gas samplers were deployed inside stainless-steel drivepoints with screened openings that allowed the drivepoint to act as a well (fig. 4). The drivepoints were installed by hand no more than 1 foot (ft) into the hyporheic zone or floodplain sediments. The water in the drivepoint well exposed to the soil-gas sampler consists of groundwater rather than surface water and, therefore, provides a way to assess the presence of groundwater contamination without conventional monitoring well installation.

Passive Soil-Gas Survey

A passive soil-gas survey was conducted at the PATR during July and August 2010, when 57 soil-gas samplers were deployed (fig. 5). The soil-gas samplers were placed in a grid pattern that encompased the remnants of elongated manmade earthen mounds and trenches that were used to train troops. Five additional soil-gas samplers were used as trip-blank samplers and were not deployed. Each sampler was placed in a borehole that was 0.5 inch (in.) in diameter and 15 in. long, and created by a stainless-steel ship-auger bit attached to a cordless drill. This depth is within the range recommended by the USEPA for soil-gas investigations (U.S. Environmental Protection Agency, 1998). The auger was cleaned with a

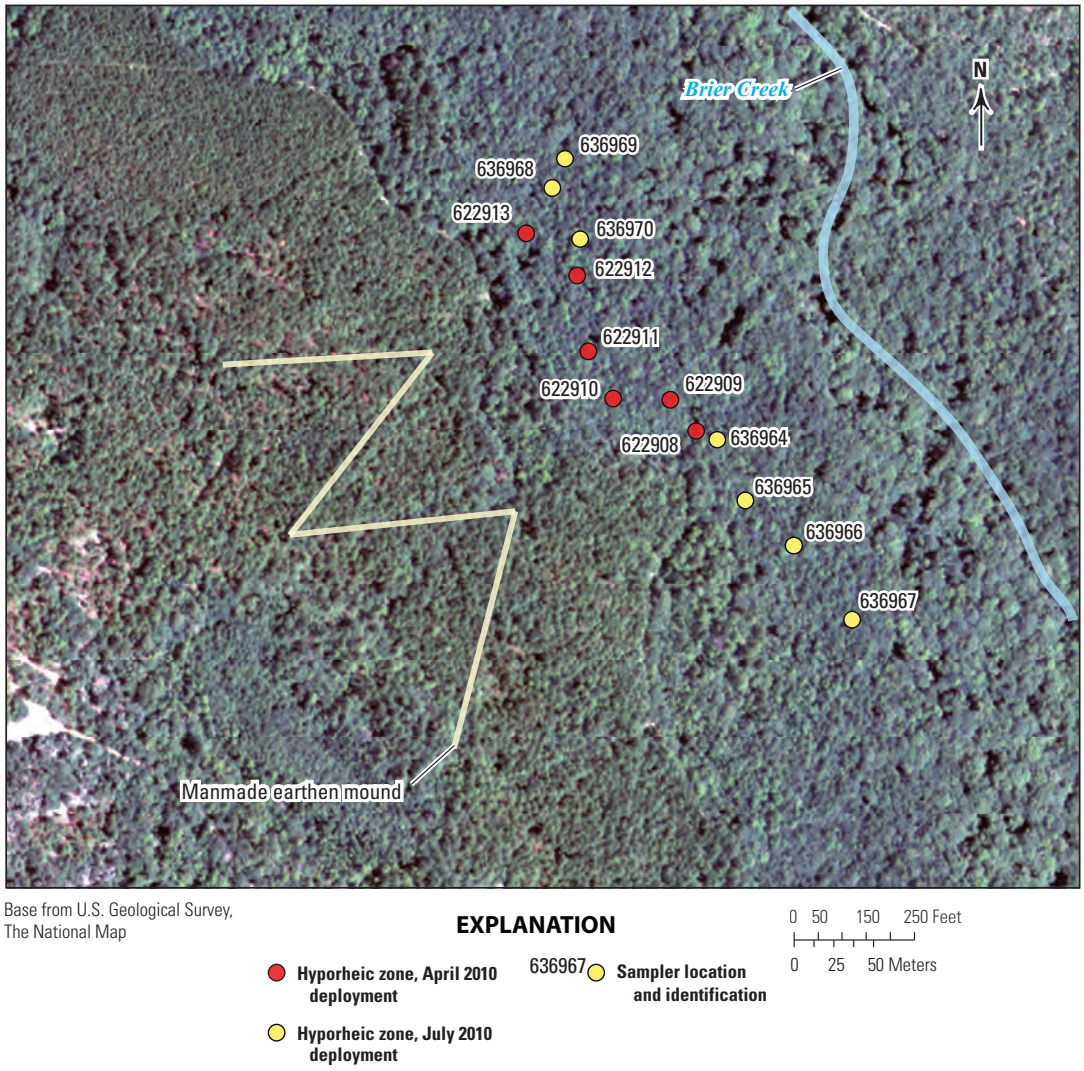


Figure 3. Locations of the hyporheic zone and floodplain samplers, Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.

Figure 4. Drivepoint sampler (*A*) prior to being installed, and (*B*) installed in the hyporheic zone.

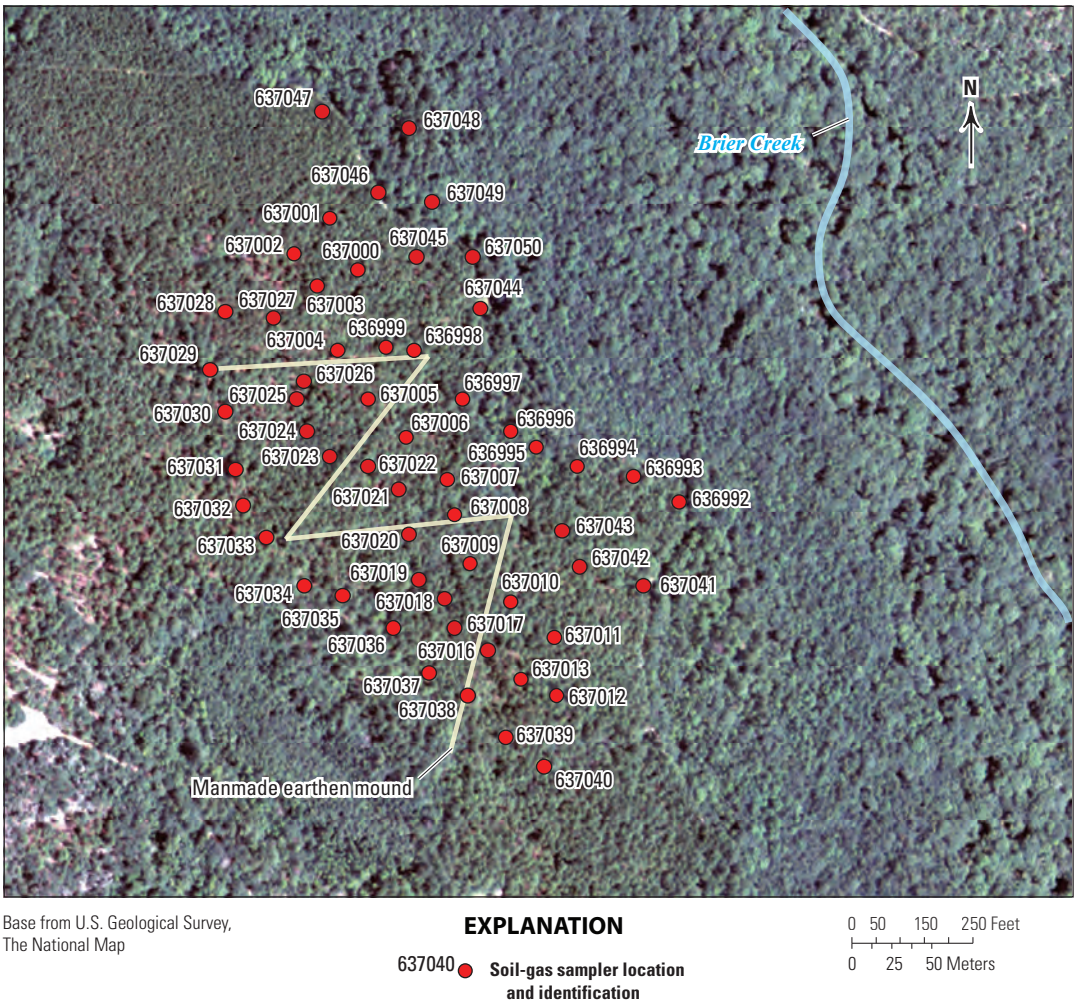


Figure 5. Locations of soil-gas samplers and sampler identification numbers, Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.

paper towel between each drilling. Twenty-two modules were deployed on July 8, 2010, and removed on July 13, 2010, while the remaining 35 modules were deployed on August 2, 2010, and removed on August 6, 2010. The modules then were placed in their original 20 mL gas-tight vial immediately upon retrieval from the field, and sent to the W.L. Gore & Associates, Inc., laboratory for analysis.

On September 16, 2010, six soil-gas samplers were installed and retrieved, as previously described, and analyzed for organic compounds classified as explosives and chemical agents (fig. 6). Five of the soil-gas samplers were deployed in areas defined by high contaminant mass as detected in the initial soil-gas survey performed in July and August 2010. The remaining sampler was a background sampler deployed in an area where no contaminants were detected. Five additional samplers were used as trip blank samplers and were not deployed.

Soil Samples

Composite soil samples were collected using a stainless-steel hand auger (fig. 7 *A* and *B*) on September 22, 2010, to a depth of 6 in. at six locations (fig. 6). The soil samples were analyzed for 37 inorganic constituents. Soil samples were analyzed by using Inductively Coupled Plasma–Mass Spectrometry (ICP-MS; LaDonna Choate, Research Chemist, U.S. Geological Survey, Denver, Colorado, written commun., February 8, 2009). The samples were ground to powder and processed by a multi-acid digestion technique prior to analysis (Briggs and Meier, 2002). The multi-acid digestion technique combined with ICP-MS is suited for the analysis of metals in rocks, soils, and sediments (Briggs and Meier, 2002).

Soil-sample concentrations were compared to USEPA regional screening levels (RSLs) for industrial soils (U.S. Environmental Protection Agency, 2009) to determine the extent of contamination. Soil-sample metal concentrations

Figure 6. Locations of soil samples, and explosives and chemical agent samplers, Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.

Figure 7. Soil sample (*A*) extracted with stainless-steel auger, and (*B*) transferred to sample container.

also were compared to values for ambient, uncontaminated (background) levels for soils across the adjacent State of South Carolina (South Carolina Department of Health and Environmental Control, 2002) because no similar values were available for the State of Georgia. The comparison is valid because the geologic features of Georgia and South Carolina are similar and the States share similar physiographic provinces.

Results

The results of the passive soil-gas survey and soil samples analyses were used to further delineate the area of contamination related to the PATR. The results indicate that past activities at the PATR have resulted in an environmental effect.

Passive Hyporheic Zone and Floodplain Survey

Of the six soil-gas samplers that were installed for this study in the hyporheic zone and floodplain of Brier Creek on April 14, 2010, all had TPH concentrations greater than the method detection level (MDL) of 3.03 micrograms per liter (µg/L; fig. 8; table 1). These six soil-gas samplers were deployed during a period when active groundwater discharge was observed on the floodplain. TPH concentrations ranging from 138.22 to 236.32 µg/L were detected in the floodplain sediments of these samples. Concentrations greater than the MDL of 3.03 µg/L also were detected for benzene, octane, and pentadecane.

Seven additional soil-gas samplers were deployed on July 19, 2010 in the floodplain of Brier Creek at the PATR. These seven samplers were deployed during a period when groundwater discharge was not as prominent as previously observed during the April 2010 deployment. TPH concentrations were below the MDL of 1.21 µg/L and benzene, octane, or pentadecane concentrations were either not detected or were below detection levels (table 1).

The MDLs reported for the April and July 2010 analyses differ for each volatile organic compound. The MDLs for the soil-gas samplers collected in the hyporheic zone and floodplain of Brier Creek in April were higher because higher levels of contamination were detected. Typically, soil-gas samplers characterized by higher contamination lead to a higher reported MDL.

Passive Soil-Gas Survey

All of the 57 soil-gas samplers installed for this study at the PATR detected TPH mass greater than the MDL of 0.02 microgram (µg; fig. 9; table 2). The highest detection of soil-gas TPH mass was 371.48 µg and was collected near the center of the PATR close to the remnants of a manmade earthen mound and trench. Detections of soil-gas TPH mass of 92.36 and 133.80 µg were collected in two samplers located along the southern boundary of the PATR and near the end of a manmade earthen mound, respectively. Detections of soil-gas TPH mass between 4 and 90 µg were collected in numerous samplers throughout the PATR, and most of these were located near the manmade earthen mounds and trenches. Because all 57 soil-gas samplers contained detections of TPH mass at levels greater than the MDL, it is likely that the boundary of the PATR has not been fully assessed with respect to TPH. All five TPH trip blanks were at or below the MDL of 0.02 µg (table 2).

Less than one-half of the soil-gas samplers installed at the PATR detected toluene mass greater than or equal to the MDL of 0.02 µg (fig. 10). The highest soil-gas toluene mass detected was 1.04 µg, located in the center of the PATR, which coincides with a manmade earthen mound. Another high detection of toluene mass in soil gas of 0.89 µg was collected along the northern boundary of the PATR. Toluene soil-gas masses between 0.02 and 0.8 µg were detected by numerous samplers all across the PATR, with most of these detections being located near the manmade earthen mounds. No detections of toluene were reported in the trip blanks (table 2).

Only 13 of the 57 soil-gas samplers detected undecane (a petroleum derived product) mass equal to or greater than the MDL of 0.04 µg (fig. 11; table 2). The highest detection of undecane soil-gas mass of 58.64 µg was collected along the southern boundary of the PATR. Detections of undecane soil-gas mass between 34.19 and 46.53 µg were collected in samplers located at the northernmost boundary of the PATR and in the center of the PATR near a manmade earthen mound. Undecane soil-gas mass between 0.04 and 18.24 µg was detected in samplers located in the center of the PATR and associated with the manmade earthen mounds and trenches.

Explosives or chemical agents were not detected above their respective MDLs for all soil-gas samplers installed

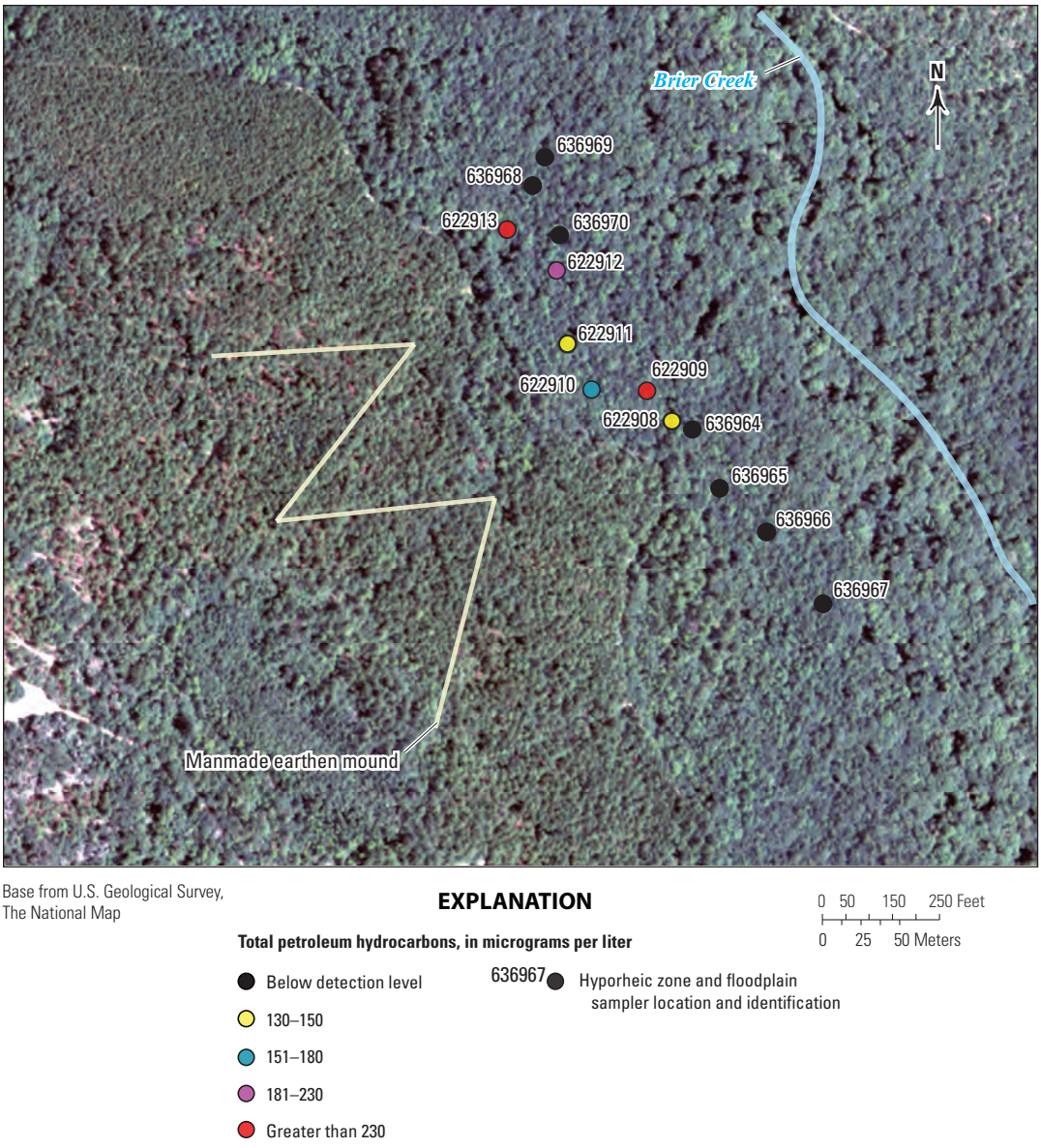


Figure 8. Detections of total petroleum hydrocarbon concentrations in the hyporheic zone and floodplain samplers, Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010. Method detection level is 3.03 micrograms per liter.

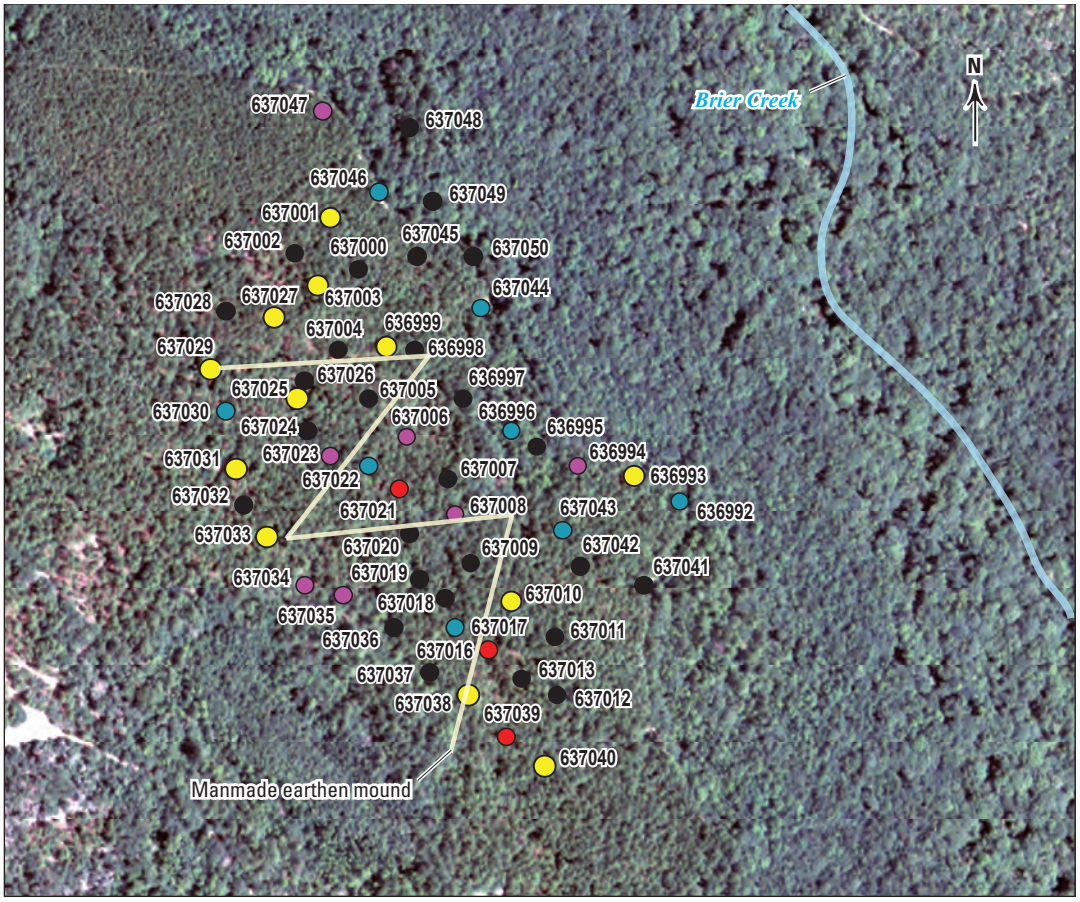


Figure 9. Detections of total petroleum hydrocarbon mass in soil-gas samplers, Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010. Method detection level is 0.02 microgram.

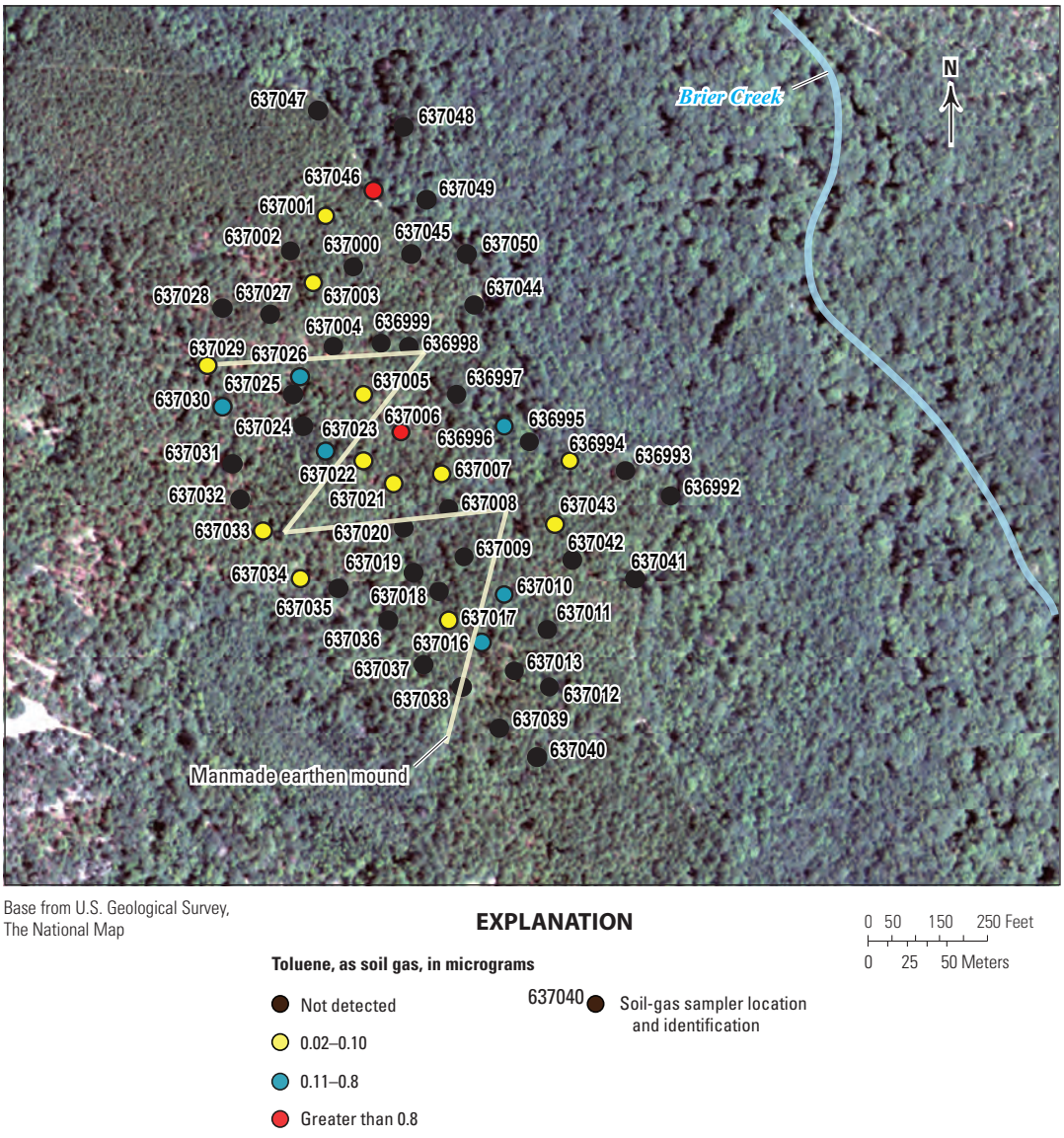
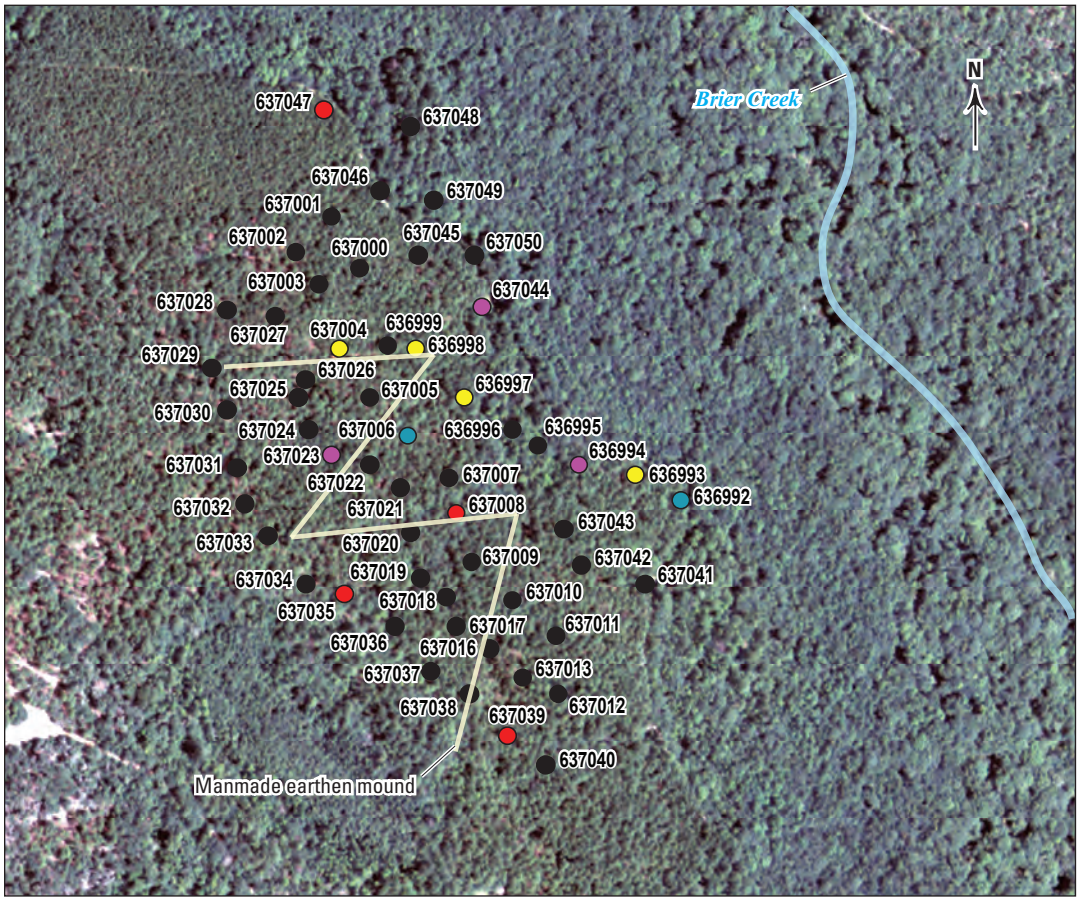


Figure 10. Detections of toluene mass in soil-gas samplers, Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010. Method detection level is 0.02 microgram.



Base from U.S. Geological Survey, The National Map

EXPLANATION

Undecane, as soil gas, in micrograms

- Not detected or below detection level
- 0.04–1
- 1.1–5
- 6–30
- Greater than 30

637040 Soil-gas sampler location and identification

0 50 150 250 Feet

0 25 50 Meters

Figure 11. Detections of undecane mass in soil-gas samplers, Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010. Method detection level is 0.04 microgram.

in areas of high contaminant mass. Some explosives and chemical agents had masses below the MDL but were above the non-detection level, indicating a trace level of presence (fig. 6; table 3). However, the reliability of the results for some constituents may become suspect when their associated trip blanks report detections. This is particularly so for the constituent, *p*-Chlorophenyl methyl sulfone, when all of the trip blanks reported trace levels below the MDL (table 3). One other constituent, 2,4-Dinitrotoluene, which was detected below the MDL in a sampler, had one trip blank that reported a trace level below the MDL. No detections were reported in the remaining trip blanks.

For all soil-gas analyses, the presence of a contaminant above the MDL at a particular soil-gas sampler location suggests an environmental effect. Moreover, because all soil-gas samplers were installed to the same depth, a higher result for a particular contaminant in soil-gas may indicate a closer proximity to a contaminant source.

Soil Samples

Inorganic concentrations in all six soil samples did not exceed the RSLs (table 4). Barium concentrations, however, were up to nine times higher than the background concentrations reported in similar Coastal Plain sediments of South Carolina, and potassium concentrations were up to eight times higher.

Summary

The U.S. Geological Survey, in cooperation with the U.S. Department of the Army Environmental and Natural Resources Management Office of the U.S. Army Signal Center and Fort Gordon, Georgia, assessed soil gas, the hyporheic zone and floodplain of Brier Creek, and soil for contaminants at the Patterson Anti-Tank Range (PATR) at Fort Gordon, Georgia, from October 2009 to September 2010. The soil-gas samplers installed in the hyporheic zone and floodplain of Brier Creek on April 14, 2010, detected elevated concentrations above the method detection level (MDL) of 3.03 micrograms per liter (µg/L) for total petroleum hydrocarbons (TPHs), benzene, octane, and pentadecane. However, the soil-gas samplers installed on July 19, 2010, in the hyporheic zone and floodplain indicated no detections or concentrations above the MDL of 1.21 µg/L for all volatile organic compounds. Of the 57 soil-gas samplers installed throughout the PATR boundary, all had elevated masses above the MDL of 0.02 micrograms (µg) for TPH. The highest detection of soil-gas TPH mass was 371.48 µg, which was collected near the center of the PATR near the remnants of a manmade earthen mound and trench. The highest detection of soil-gas toluene mass of 1.04 µg was collected in the center of the PATR and is associated with a manmade earthen mound. Some soil-gas samplers detected undecane mass greater than the MDL of 0.04 µg with the highest soil-gas mass of 58.64 µg collected along the southern boundary of the PATR. Soil-gas samplers installed in areas of high contaminant mass had no detections of explosives or chemical agents above their respective MDLs.

Inorganic concentrations for the six soil samples did not exceed U.S. Environmental Protection Agency values for their regional screening levels. Barium concentrations, however, were up to nine times higher than the background concentrations reported in similar Coastal Plain sediments of South Carolina, and potassium concentrations were up to eight times higher.

References Cited

American Society for Testing and Materials, 2006, Standard guide for soil gas monitoring in the vadose zone: ASTM D5314-92, 36 p.

Briggs, P.H., and Meier, A.L., 2002, The determination of forty-two elements in geological materials by inductively coupled plasma – mass spectrometry, *in* Taggart, J.E., Jr., ed., 2002, Analytical methods for chemical analysis of geologic and other materials, U.S. Geological Survey: U.S. Geological Survey Open-File Report 02-223-I, 14 p.

Gregory, M.B., Stamey, T.C., and Wellborn, J.B., 2001, Ecological characterization of streams, and fish-tissue analysis for mercury and lead at selected locations, Fort Gordon, Georgia, June 1999 to May 2000: U.S. Geological Survey Open-File Report 01-203, 24 p.

International Organization for Standardization, 1990, ISO Guide 25. General requirements for the competence of calibration and testing laboratories (3rd ed.): New York, American National Standards Institute.

South Carolina Department of Health and Environmental Control, 2002, Environmental Surveillance and Oversight Program data report, 2002, accessed February 11, 2010, at *http://www.scdhec.gov/environment/envserv/docs/esop_datarpt_02.pdf*.

U.S. Environmental Protection Agency, 1998, Innovative Technology Verification Report Soil Gas Sampling Technology: EPA/600/R-98/095.

U.S. Environmental Protection Agency, 2009, Regional screening level tables, accessed January 12, 2010, at *http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm.*

Williams, L.J., 2007, Hydrogeology and potentiometric surface of the Dublin and Midville aquifer systems in Richmond County, Georgia, January 2007: U.S. Geological Survey Scientific Investigations Map 2982, 1 sheet.

W.L. Gore & Associates, Inc., 2004, GORE™ surveys for site assessment & monitoring, accessed February 28, 2011, at *http://www.gore.com/MungoBlobs/239/659/surveys_environmental_brochure.pdf*.

Table 1. Concentration of volatile organic compounds detected in soil-gas samplers from the hyporheic zone and floodplain of Brier Creek, April 14, 2010 and July 19, 2010, Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.

[see figure 3 for sampler locations; µg/L, micrograms per liter; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl *tert*-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE, dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c,* cis*; t,* trans*; m,* meta*; p,* para*; o,* ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	TPH (µg/L)	BTEX (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	*m*-,*p*-Xylene (µg/L)	*o*-Xylene (µg/L)
			April 14, 2010				
MDL=	**3.03**	–	**3.03**	**3.03**	**3.03**	**4.54**	**3.03**
622908	138.22	5.27	5.27	nd	nd	nd	nd
622909	236.32	4.08	4.08	nd	nd	nd	nd
622910	175.47	7.22	7.22	nd	nd	bdl	nd
622911	143.89	3.68	3.68	nd	nd	nd	nd
622912	211.59	4.30	4.30	nd	nd	nd	nd
622913	235.86	4.06	4.06	nd	nd	nd	nd
			Trip blanks				
622914	nd	nd	nd	nd	nd	nd	nd
622915	nd	nd	nd	nd	nd	nd	nd
			July 19, 2010				
MDL=	**1.21**	–	**1.21**	**1.21**	**1.21**	**1.81**	**1.21**
636964	bdl	nd	nd	nd	nd	nd	nd
636965	bdl	nd	nd	nd	nd	nd	nd
636966	bdl	nd	nd	nd	nd	nd	nd
636967	bdl	nd	nd	nd	nd	nd	nd
636968	bdl	nd	nd	nd	nd	nd	nd
636969	bdl	nd	nd	nd	nd	nd	nd
636970	bdl	nd	nd	nd	nd	nd	nd
			Trip blanks				
636971	bdl	nd	nd	nd	nd	nd	nd
636972	nd	nd	nd	nd	nd	nd	nd

Table 1. Concentration of volatile organic compounds detected in soil-gas samplers from the hyporheic zone and floodplain of Brier Creek, April 14, 2010 and July 19, 2010, Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Contiued.

[see figure 3 for sampler locations; µg/L, micrograms per liter; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl *tert*-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE, dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c,* cis*; t,* trans*; m,* meta*; p,* para*; o,* ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	Naphthalene (µg/L)	2-Methyl-Naphthalene (µg/L)	MTBE (µg/L)	Octane (µg/L)
		April 14, 2010		
MDL=	**3.03**	**3.03**	**9.08**	**3.03**
622908	nd	nd	nd	4.27
622909	nd	nd	nd	nd
622910	nd	nd	nd	5.24
622911	nd	nd	nd	4.16
622912	nd	nd	nd	bdl
622913	nd	nd	nd	7.60
		Trip blanks		
622914	nd	nd	nd	nd
622915	nd	nd	nd	nd
		July 19, 2010		
MDL=	**1.21**	**1.21**	**3.62**	**1.21**
636964	nd	nd	nd	bdl
636965	nd	nd	nd	nd
636966	nd	nd	nd	nd
636967	nd	nd	nd	nd
636968	nd	nd	nd	bdl
636969	nd	nd	nd	nd
636970	nd	nd	nd	nd
		Trip blanks		
636971	nd	nd	nd	nd
636972	nd	nd	nd	nd

Table 1. Concentration of volatile organic compounds detected in soil-gas samplers from the hyporheic zone and floodplain of Brier Creek, April 14, 2010 and July 19, 2010, Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 3 for sampler locations; µg/L, micrograms per liter; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl *tert*-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE, dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c,* cis*; t,* trans*; m,* meta*; p,* para*; o,* ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	C_{11}, C_{13}, &C_{15} (µg/L)	Undecane (µg/L)	Tridecane (µg/L)	Pentadecane (µg/L)
		April 14, 2010		
MDL=	–	**6.05**	**3.03**	**3.03**
622908	nd	nd	nd	nd
622909	4.95	nd	bdl	4.95
622910	nd	nd	nd	nd
622911	nd	nd	nd	nd
622912	nd	nd	nd	nd
622913	nd	nd	nd	nd
		Trip blanks		
622914	nd	nd	nd	nd
622915	nd	nd	nd	nd
		July 19, 2010		
MDL=	–	**2.42**	**1.21**	**1.21**
636964	nd	nd	nd	nd
636965	nd	nd	nd	nd
636966	nd	nd	nd	nd
636967	nd	nd	nd	nd
636968	nd	nd	nd	nd
636969	nd	nd	nd	nd
636970	nd	nd	nd	nd
		Trip blanks		
636971	nd	nd	nd	nd
636972	nd	nd	nd	nd

Table 1. Concentration of volatile organic compounds detected in soil-gas samplers from the hyporheic zone and floodplain of Brier Creek, April 14, 2010 and July 19, 2010, Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.

[see figure 3 for sampler locations; µg/L, micrograms per liter; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl *tert*-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE, dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c,* cis*; t,* trans*; m,* meta*; p,* para*; o,* ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	Trimethyl benzenes (µg/L)	1,2,4-Trimethyl benzene (µg/L)	1,3,5-Trimethyl benzene (µg/L)	1,1-DCA (µg/L)	Chloroform (µg/L)	1,1,1-TCA (µg/L)	1,2-DCA (µg/L)
April 14, 2010							
MDL=	**–**	**3.03**	**4.54**	**3.03**	**3.03**	**4.54**	**3.03**
622908	nd	nd	nd	nd	nd	nd	nd
622909	nd	nd	nd	nd	nd	nd	nd
622910	nd	nd	nd	nd	nd	nd	nd
622911	nd	nd	nd	nd	nd	nd	nd
622912	nd	nd	nd	nd	nd	nd	nd
622913	nd	nd	nd	nd	nd	nd	nd
Trip blanks							
622914	nd	nd	nd	nd	nd	nd	nd
622915	nd	nd	nd	nd	nd	nd	nd
July 19, 2010							
MDL=	**–**	**1.21**	**1.81**	**1.21**	**1.21**	**1.81**	**1.21**
636964	nd	nd	nd	nd	nd	nd	nd
636965	nd	nd	nd	nd	nd	nd	nd
636966	nd	nd	nd	nd	nd	nd	nd
636967	nd	nd	nd	nd	nd	nd	nd
636968	nd	nd	nd	nd	nd	nd	nd
636969	nd	nd	nd	nd	nd	nd	nd
636970	nd	nd	nd	nd	nd	nd	nd
Trip blanks							
636971	nd	nd	nd	nd	nd	nd	nd
636972	nd	nd	nd	nd	nd	nd	nd

Table 1. Concentration of volatile organic compounds detected in soil-gas samplers from the hyporheic zone and floodplain of Brier Creek, April 14, 2010 and July 19, 2010, Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 3 for sampler locations; µg/L, micrograms per liter; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl *tert*-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE, dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c,* cis*; t,* trans*; m,* meta*; p,* para*; o,* ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	TCE (µg/L)	*c,t*-1,2-DCE (µg/L)	*t*-1,2-DCE (µg/L)	*c*-1,2-DCE (µg/L)	PCE (µg/L)
			April 14, 2010		
MDL=	**3.03**	**–**	**6.95**	**4.68**	**3.03**
622908	nd	nd	nd	nd	nd
622909	nd	nd	nd	nd	nd
622910	nd	nd	nd	nd	nd
622911	nd	nd	nd	nd	nd
622912	nd	nd	nd	nd	nd
622913	nd	nd	nd	nd	nd
			Trip blanks		
622914	nd	nd	nd	nd	nd
622915	nd	nd	nd	nd	nd
			July 19, 2010		
MDL=	**1.21**	**–**	**2.78**	**1.87**	**1.21**
636964	nd	nd	nd	nd	nd
636965	nd	nd	nd	nd	nd
636966	nd	nd	nd	nd	nd
636967	nd	nd	nd	nd	bdl
636968	nd	nd	nd	nd	nd
636969	nd	nd	nd	nd	nd
636970	nd	nd	nd	nd	nd
			Trip blanks		
636971	nd	nd	nd	nd	nd
636972	nd	nd	nd	nd	nd

Table 1. Concentration of volatile organic compounds detected in soil-gas samplers from the hyporheic zone and floodplain of Brier Creek, April 14, 2010 and July 19, 2010, Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 3 for sampler locations; µg/L, micrograms per liter; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl *tert*-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE, dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c,* cis*; t,* trans*; m,* meta*; p,* para*; o,* ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler Number	1,4-DCB (µg/L)	CCl_4 (µg/L)	1,1,2-TCA (µg/L)	Chlorobenzene (µg/L)	1,1,1,2-Tetrachloroethane (µg/L)	1,1,2,2-Tetrachloroethane (µg/L)
			April 14, 2010			
MDL=	**3.03**	**4.54**	**3.03**	**3.03**	**4.54**	**3.03**
622908	nd	nd	nd	nd	nd	nd
622909	nd	nd	nd	nd	nd	nd
622910	nd	nd	nd	nd	nd	nd
622911	nd	nd	nd	nd	nd	nd
622912	nd	nd	nd	nd	nd	nd
622913	nd	nd	nd	nd	nd	nd
			Trip blanks			
622914	nd	nd	nd	nd	nd	nd
622915	nd	nd	nd	nd	nd	nd
			July 19, 2010			
MDL=	**1.21**	**1.81**	**1.21**	**1.21**	**1.81**	**1.21**
636964	nd	nd	nd	nd	nd	nd
636965	nd	nd	nd	nd	nd	nd
636966	nd	nd	nd	nd	nd	nd
636967	nd	nd	nd	nd	nd	nd
636968	nd	nd	nd	nd	nd	nd
636969	nd	nd	nd	nd	nd	nd
636970	nd	nd	nd	nd	nd	nd
			Trip blanks			
636971	nd	nd	nd	nd	nd	nd
636972	nd	nd	nd	nd	nd	nd

Table 1. Concentration of volatile organic compounds detected in soil-gas samplers from the hyporheic zone and floodplain of Brier Creek, April 14, 2010 and July 19, 2010, Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 3 for sampler locations; µg/L, micrograms per liter; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl *tert*-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE, dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c,* cis*; t,* trans*; m,* meta*; p,* para*; o,* ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	1,3-Dichlorobenzene (µg/L)	1,2-Dichlorobenzene (µg/L)
	April 14, 2010	
MDL=	**3.03**	**3.03**
622908	nd	nd
622909	nd	nd
622910	nd	nd
622911	nd	nd
622912	nd	nd
622913	nd	nd
	Trip blanks	
622914	nd	nd
622915	nd	nd
	July 19, 2010	
MDL=	**1.21**	**1.21**
636964	nd	nd
636965	nd	nd
636966	nd	nd
636967	nd	nd
636968	nd	nd
636969	nd	nd
636970	nd	nd
	Trip blanks	
636971	nd	nd
636972	nd	nd

Table 2. Mass of volatile organic compounds detected in soil-gas samplers from Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.

[see figure 5 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl tert-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE,dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c*, cis; *t*, trans; *m*, meta; *p*, para; *o*, ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	TPH (µg)	BTEX (µg)	Benzene (µg)	Toluene (µg)	Ethylbenzene (µg)	*m*-,*p*-Xylene (µg)	*o*-Xylene (µg)
MDL=	**0.02**	–	**0.02**	**0.02**	**0.02**	**0.03**	**0.02**
636992	22.24	nd	nd	nd	nd	nd	nd
636993	4.68	nd	nd	nd	nd	nd	nd
636994	43.92	0.03	nd	0.03	nd	nd	nd
636995	0.13	nd	nd	nd	nd	nd	nd
636996	39.16	0.17	nd	0.17	nd	nd	nd
636997	1.86	nd	nd	nd	nd	nd	nd
636998	0.50	nd	nd	nd	nd	nd	nd
636999	5.76	nd	nd	nd	nd	nd	nd
637000	0.05	nd	nd	nd	nd	nd	nd
637001	15.19	0.03	nd	0.03	nd	nd	nd
637002	1.39	nd	nd	nd	nd	nd	nd
637003	18.13	0.04	nd	0.04	nd	nd	nd
637004	0.24	nd	nd	nd	nd	nd	nd
637005	0.74	0.04	nd	0.04	nd	nd	nd
637006	43.69	1.04	nd	1.04	nd	nd	nd
637007	1.10	0.02	nd	0.02	nd	nd	bdl
637008	53.55	nd	nd	nd	nd	nd	nd
637009	2.53	nd	nd	nd	nd	nd	nd
637010	17.20	0.52	nd	0.52	nd	nd	nd
637011	2.15	nd	nd	nd	nd	nd	nd
637012	0.73	nd	nd	nd	nd	nd	nd
637013	0.56	nd	nd	nd	nd	nd	nd
637016	133.80	0.25	nd	0.25	nd	nd	nd
637017	34.36	0.08	nd	0.08	nd	nd	nd
637018	1.41	nd	nd	nd	nd	nd	nd
637019	1.70	nd	nd	nd	nd	nd	nd
637020	1.70	nd	nd	nd	nd	nd	nd
637021	371.48	0.08	nd	0.08	nd	nd	nd
637022	29.07	0.04	nd	0.04	nd	nd	nd
637023	45.97	0.13	nd	0.13	nd	nd	nd
637024	0.59	nd	nd	nd	nd	nd	nd
637025	4.41	nd	nd	nd	nd	nd	nd
637026	2.17	0.22	bdl	0.22	nd	nd	nd
637027	13.51	nd	nd	nd	nd	nd	nd
637028	0.76	nd	nd	nd	nd	nd	nd
637029	4.06	0.10	0.03	0.07	bdl	nd	nd
637030	36.61	0.15	nd	0.15	nd	nd	nd

Table 2. Mass of volatile organic compounds detected in soil-gas samplers from Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 5 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl tert-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE,dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c*, cis; *t*, trans; *m*, meta; *p*, para; *o*, ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	TPH (µg)	BTEX (µg)	Benzene (µg)	Toluene (µg)	Ethylbenzene (µg)	*m*-,*p*-Xylene (µg)	*o*-Xylene (µg)
MDL=	**0.02**	–	**0.02**	**0.02**	**0.02**	**0.03**	**0.02**
637031	8.51	nd	nd	nd	nd	nd	nd
637032	0.98	nd	nd	nd	nd	nd	nd
637033	12.50	0.03	nd	0.03	nd	nd	nd
637034	41.33	0.04	nd	0.04	nd	nd	nd
637035	74.45	nd	nd	nd	nd	nd	nd
637036	0.68	nd	nd	nd	nd	nd	nd
637037	1.17	nd	nd	nd	nd	nd	nd
637038	10.26	nd	nd	nd	nd	nd	nd
637039	92.36	nd	nd	nd	nd	nd	nd
637040	16.68	nd	nd	nd	nd	nd	nd
637041	0.98	nd	nd	nd	nd	nd	nd
637042	0.21	nd	nd	nd	nd	nd	nd
637043	39.62	0.06	nd	0.06	nd	nd	nd
637044	27.21	nd	nd	nd	nd	nd	nd
637045	0.33	nd	nd	nd	nd	nd	nd
637046	22.79	0.89	nd	0.89	nd	nd	nd
637047	51.80	nd	nd	nd	nd	nd	nd
637048	2.70	nd	nd	nd	nd	nd	nd
637049	1.81	nd	nd	nd	nd	nd	nd
637050	0.36	nd	nd	nd	nd	nd	nd
				Trip blanks			
637014	nd	nd	nd	nd	nd	nd	nd
637015	nd	nd	nd	nd	nd	nd	nd
637051	nd	nd	nd	nd	nd	nd	nd
637052	bdl	nd	nd	nd	nd	nd	nd
637053	0.02	nd	nd	nd	nd	nd	nd

Table 2. Mass of volatile organic compounds detected in soil-gas samplers from Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 5 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl tert-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE,dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c*, cis; *t*, trans; *m*, meta; *p*, para; *o*, ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler Number	Naphthalene (µg)	2-Methyl-Naphthalene (µg)	MTBE (µg)	Octane (µg)
MDL=	**0.02**	**0.02**	**0.03**	**0.02**
636992	bdl	nd	nd	nd
636993	nd	nd	nd	nd
636994	0.07	nd	nd	nd
636995	nd	nd	nd	nd
636996	0.14	nd	nd	nd
636997	nd	nd	nd	nd
636998	nd	nd	nd	nd
636999	nd	nd	nd	nd
637000	nd	nd	nd	nd
637001	bdl	nd	nd	nd
637002	nd	nd	nd	nd
637003	bdl	nd	nd	nd
637004	nd	nd	nd	nd
637005	nd	nd	nd	nd
637006	0.03	nd	nd	nd
637007	nd	nd	nd	nd
637008	nd	nd	nd	nd
637009	nd	nd	nd	nd
637010	bdl	nd	nd	nd
637011	nd	nd	nd	nd
637012	nd	nd	nd	nd
637013	nd	nd	nd	nd
637016	nd	nd	nd	nd
637017	nd	nd	nd	bdl
637018	nd	nd	nd	nd
637019	nd	nd	nd	nd
637020	nd	nd	nd	nd
637021	nd	nd	nd	nd
637022	nd	nd	nd	nd

Table 2. Mass of volatile organic compounds detected in soil-gas samplers from Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 5 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl tert-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE,dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c*, cis; *t*, trans; *m*, meta; *p*, para; *o*, ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler Number	Naphthalene (µg)	2-Methyl-Naphthalene (µg)	MTBE (µg)	Octane (µg)
MDL=	**0.02**	**0.02**	**0.03**	**0.02**
637023	nd	nd	nd	nd
637024	nd	nd	nd	nd
637025	nd	nd	nd	nd
637026	nd	nd	nd	nd
637027	nd	nd	nd	nd
637028	nd	nd	nd	nd
637029	nd	nd	nd	0.08
637030	nd	nd	nd	nd
637031	nd	nd	nd	nd
637032	nd	nd	nd	nd
637033	nd	nd	nd	nd
637034	nd	nd	nd	nd
637035	nd	nd	nd	nd
637036	nd	nd	nd	nd
637037	nd	nd	nd	nd
637038	nd	nd	nd	nd
637039	nd	nd	nd	nd
637040	nd	nd	nd	nd
637041	nd	nd	nd	nd
637042	nd	nd	nd	nd
637043	nd	nd	nd	nd
637044	nd	nd	nd	nd
637045	nd	nd	nd	nd
637046	nd	nd	nd	nd
637047	nd	nd	nd	nd
637048	nd	nd	nd	nd
637049	nd	nd	nd	nd
637050	nd	nd	nd	nd
		Trip blanks		
637014	nd	nd	nd	nd
637015	nd	nd	nd	nd
637051	nd	nd	nd	nd
637052	nd	nd	nd	nd
637053	nd	nd	nd	nd

Table 2. Mass of volatile organic compounds detected in soil-gas samplers from Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 5 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl tert-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE,dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c*, cis; *t*, trans; *m*, meta; *p*, para; *o*, ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	C_{11}, C_{13}, &C_{15} (µg)	Undecane (µg)	Tridecane (µg)	Pentadecane (µg)
MDL=	–	**0.04**	**0.02**	**0.02**
636992	5.75	4.95	0.49	0.30
636993	0.10	0.10	nd	nd
636994	17.47	15.22	0.91	1.35
636995	nd	nd	nd	nd
636996	0.00	nd	nd	bdl
636997	0.22	0.22	nd	nd
636998	0.04	0.04	nd	nd
636999	nd	nd	nd	nd
637000	nd	nd	nd	nd
637001	0.02	nd	0.02	nd
637002	nd	nd	nd	nd
637003	nd	nd	nd	nd
637004	0.04	0.04	nd	nd
637005	nd	nd	nd	nd
637006	1.46	1.35	0.11	nd
637007	nd	nd	nd	nd
637008	35.75	34.19	1.56	nd
637009	0.00	bdl	nd	nd
637010	0.00	nd	bdl	nd
637011	nd	nd	nd	nd
637012	nd	nd	nd	nd
637013	nd	nd	nd	nd
637016	nd	nd	nd	nd
637017	0.00	nd	bdl	nd
637018	0.00	bdl	nd	nd
637019	nd	nd	nd	nd
637020	nd	nd	nd	nd
637021	nd	nd	nd	nd
637022	nd	nd	nd	nd
637023	19.56	18.24	1.32	nd
637024	nd	nd	nd	nd

Table 2. Mass of volatile organic compounds detected in soil-gas samplers from Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 5 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl tert-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE,dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c*, cis; *t*, trans; *m*, meta; *p*, para; *o*, ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	C_{11}, C_{13}, &C_{15} (µg)	Undecane (µg)	Tridecane (µg)	Pentadecane (µg)
MDL=	–	**0.04**	**0.02**	**0.02**
637025	0.03	nd	0.03	nd
637026	0.00	nd	nd	bdl
637027	nd	nd	nd	nd
637028	nd	nd	nd	nd
637029	nd	nd	nd	nd
637030	0.00	nd	bdl	nd
637031	nd	nd	nd	nd
637032	nd	nd	nd	nd
637033	nd	nd	nd	nd
637034	nd	nd	nd	nd
637035	47.52	46.53	1.00	nd
637036	nd	nd	nd	nd
637037	nd	nd	nd	nd
637038	nd	nd	nd	nd
637039	59.35	58.64	0.71	nd
637040	nd	nd	nd	nd
637041	nd	nd	nd	nd
637042	nd	nd	nd	nd
637043	0.00	nd	bdl	nd
637044	19.52	19.21	0.31	nd
637045	nd	nd	nd	nd
637046	nd	nd	nd	nd
637047	35.38	34.35	1.03	nd
637048	nd	nd	nd	nd
637049	nd	nd	nd	nd
637050	nd	nd	nd	nd
		Trip blanks		
637014	nd	nd	nd	nd
637015	nd	nd	nd	nd
637051	nd	nd	nd	nd
637052	nd	nd	nd	nd
637053	nd	nd	nd	nd

Table 2. Mass of volatile organic compounds detected in soil-gas samplers from Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 5 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl tert-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE,dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c*, cis; *t*, trans; *m*, meta; *p*, para; *o*, ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	Trimethyl benzenes (µg)	1,2,4-Trimethyl benzene (µg)	1,3,5-Trimethyl benzene (µg)	1,1-DCA (µg)	Chloroform (µg)	1,1,1-TCA (µg)	1,2-DCA (µg)
MDL=	**–**	**0.02**	**0.03**	**0.02**	**0.02**	**0.03**	**0.02**
636992	nd	nd	nd	nd	nd	nd	nd
636993	nd	nd	nd	nd	0.03	nd	nd
636994	nd	nd	nd	nd	nd	nd	nd
636995	nd	nd	nd	nd	nd	nd	nd
636996	nd	nd	nd	nd	nd	nd	nd
636997	nd	nd	nd	nd	nd	nd	nd
636998	nd	nd	nd	nd	nd	nd	nd
636999	nd	nd	nd	nd	nd	nd	nd
637000	nd	nd	nd	nd	nd	nd	nd
637001	nd	nd	nd	nd	nd	nd	nd
637002	nd	nd	nd	nd	nd	nd	nd
637003	0.00	bdl	nd	nd	nd	nd	nd
637004	nd	nd	nd	nd	nd	nd	nd
637005	nd	nd	nd	nd	nd	nd	nd
637006	nd	nd	nd	nd	nd	nd	nd
637007	nd	nd	nd	nd	nd	bdl	nd
637008	nd	nd	nd	nd	nd	nd	nd
637009	nd	nd	nd	nd	nd	nd	nd
637010	nd	nd	nd	nd	nd	nd	nd
637011	nd	nd	nd	nd	nd	nd	nd
637012	nd	nd	nd	nd	nd	nd	nd
637013	nd	nd	nd	nd	nd	nd	nd
637016	nd	nd	nd	nd	nd	nd	nd
637017	nd	nd	nd	nd	nd	nd	nd
637018	nd	nd	nd	nd	nd	nd	nd
637019	nd	nd	nd	nd	nd	nd	nd
637020	nd	nd	nd	nd	nd	nd	nd
637021	nd	nd	nd	nd	nd	nd	nd
637022	nd	nd	nd	nd	nd	nd	nd

Table 2. Mass of volatile organic compounds detected in soil-gas samplers from Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 5 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl tert-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE,dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c*, cis; *t*, trans; *m*, meta; *p*, para; *o*, ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	Trimethyl benzenes (µg)	1,2,4-Trimethyl benzene (µg)	1,3,5-Trimethyl benzene (µg)	1,1-DCA (µg)	Chloroform (µg)	1,1,1-TCA (µg)	1,2-DCA (µg)
MDL=	–	**0.02**	**0.03**	**0.02**	**0.02**	**0.03**	**0.02**
637023	0.00	bdl	nd	nd	nd	nd	nd
637024	nd	nd	nd	nd	nd	nd	nd
637025	nd	nd	nd	nd	nd	nd	nd
637026	nd	nd	nd	nd	nd	nd	nd
637027	nd	nd	nd	nd	nd	nd	nd
637028	nd	nd	nd	nd	nd	nd	nd
637029	nd	nd	nd	nd	nd	nd	nd
637030	nd	nd	nd	nd	nd	nd	nd
637031	nd	nd	nd	nd	nd	nd	nd
637032	nd	nd	nd	nd	nd	nd	nd
637033	nd	nd	nd	nd	0.10	nd	nd
637034	nd	nd	nd	nd	nd	nd	nd
637035	nd	nd	nd	nd	nd	nd	nd
637036	nd	nd	nd	nd	nd	nd	nd
637037	nd	nd	nd	nd	nd	nd	nd
637038	nd	nd	nd	nd	nd	nd	nd
637039	nd	nd	nd	nd	nd	nd	nd
637040	nd	nd	nd	nd	nd	nd	nd
637041	nd	nd	nd	nd	nd	nd	nd
637042	nd	nd	nd	nd	nd	nd	nd
637043	nd	nd	nd	nd	nd	nd	nd
637044	nd	nd	nd	nd	nd	nd	nd
637045	nd	nd	nd	nd	nd	nd	nd
637046	nd	nd	nd	nd	nd	nd	nd
637047	nd	nd	nd	nd	nd	nd	nd
637048	nd	nd	nd	nd	nd	nd	nd
637049	nd	nd	nd	nd	nd	nd	nd
637050	nd	nd	nd	nd	nd	nd	nd
			Trip blanks				
637014	nd	nd	nd	nd	nd	nd	nd
637015	nd	nd	nd	nd	nd	nd	nd
637051	nd	nd	nd	nd	nd	nd	nd
637052	nd	nd	nd	nd	nd	nd	nd
637053	nd	nd	nd	nd	nd	nd	nd

Table 2. Mass of volatile organic compounds detected in soil-gas samplers from Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 5 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl tert-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE,dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c*, cis; *t*, trans; *m*, meta; *p*, para; *o*, ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	TCE (µg)	*c,t*-1,2-DCE (µg)	*t*-1,2-DCE (µg)	*c*-1,2-DCE (µg)	PCE (µg)
MDL=	**0.02**	**–**	**0.04**	**0.03**	**0.02**
636992	nd	nd	nd	nd	nd
636993	nd	nd	nd	nd	nd
636994	nd	nd	nd	nd	nd
636995	nd	nd	nd	nd	nd
636996	nd	nd	nd	nd	nd
636997	nd	nd	nd	nd	nd
636998	nd	nd	nd	nd	nd
636999	nd	nd	nd	nd	nd
637000	nd	nd	nd	nd	nd
637001	nd	nd	nd	nd	nd
637002	nd	nd	nd	nd	0.02
637003	nd	nd	nd	nd	nd
637004	nd	nd	nd	nd	nd
637005	nd	nd	nd	nd	nd
637006	nd	nd	nd	nd	nd
637007	nd	nd	nd	nd	nd
637008	nd	nd	nd	nd	nd
637009	nd	nd	nd	nd	nd
637010	0.02	0.10	nd	0.10	nd
637011	nd	nd	nd	nd	nd
637012	nd	nd	nd	nd	nd
637013	nd	nd	nd	nd	nd
637016	nd	nd	nd	nd	nd
637017	nd	nd	nd	nd	nd
637018	0.34	nd	nd	nd	nd
637019	0.09	nd	nd	nd	nd
637020	nd	nd	nd	nd	nd
637021	nd	nd	nd	nd	nd
637022	bdl	0.11	nd	0.11	nd
637023	nd	nd	nd	nd	nd
637024	nd	nd	nd	nd	nd

Table 2. Mass of volatile organic compounds detected in soil-gas samplers from Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 5 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl tert-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE,dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c*, cis; *t*, trans; *m*, meta; *p*, para; *o*, ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	TCE (µg)	*c,t*-1,2-DCE (µg)	*t*-1,2-DCE (µg)	*c*-1,2-DCE (µg)	PCE (µg)
MDL=	**0.02**	**–**	**0.04**	**0.03**	**0.02**
637025	nd	nd	nd	nd	nd
637026	nd	nd	nd	nd	nd
637027	nd	nd	nd	nd	nd
637028	0.02	nd	nd	nd	nd
637029	nd	nd	nd	nd	nd
637030	nd	nd	nd	nd	nd
637031	nd	nd	nd	nd	nd
637032	nd	nd	nd	nd	nd
637033	nd	nd	nd	nd	nd
637034	0.04	nd	nd	nd	nd
637035	nd	nd	nd	nd	nd
637036	nd	nd	nd	nd	nd
637037	0.09	nd	nd	nd	nd
637038	nd	nd	nd	nd	nd
637039	nd	nd	nd	nd	nd
637040	nd	nd	nd	nd	nd
637041	nd	nd	nd	nd	nd
637042	nd	nd	nd	nd	nd
637043	0.11	nd	nd	nd	nd
637044	nd	nd	nd	nd	nd
637045	nd	nd	nd	nd	nd
637046	nd	nd	nd	nd	nd
637047	nd	nd	nd	nd	nd
637048	nd	nd	nd	nd	nd
637049	nd	nd	nd	nd	nd
637050	nd	nd	nd	nd	nd
			Trip blanks		
637014	nd	nd	nd	nd	nd
637015	nd	nd	nd	nd	nd
637051	nd	nd	nd	nd	nd
637052	nd	nd	nd	nd	nd
637053	nd	nd	nd	nd	nd

Table 2. Mass of volatile organic compounds detected in soil-gas samplers from Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 5 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl tert-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE,dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c*, cis; *t*, trans; *m*, meta; *p*, para; *o*, ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	1,4-DCB (µg)	CCl_4 (µg)	1,1,2-TCA (µg)	Chlorobenzene (µg)	1,1,1,2-Tetrachloroethane (µg)	1,1,2,2-Tetrachloroethane (µg)
MDL=	**0.02**	**0.03**	**0.02**	**0.02**	**0.03**	**0.02**
636992	nd	nd	nd	nd	nd	nd
636993	nd	nd	nd	nd	nd	nd
636994	nd	nd	nd	nd	nd	nd
636995	nd	nd	nd	nd	nd	nd
636996	nd	nd	nd	nd	nd	nd
636997	nd	nd	nd	nd	nd	nd
636998	nd	nd	nd	nd	nd	nd
636999	nd	nd	nd	nd	nd	nd
637000	nd	nd	nd	nd	nd	nd
637001	nd	nd	nd	nd	nd	nd
637002	nd	nd	nd	nd	nd	nd
637003	nd	nd	nd	nd	nd	nd
637004	nd	nd	nd	nd	nd	nd
637005	nd	nd	nd	nd	nd	nd
637006	nd	nd	nd	nd	nd	nd
637007	nd	nd	nd	nd	nd	nd
637008	nd	nd	nd	nd	nd	nd
637009	nd	nd	nd	nd	nd	nd
637010	nd	nd	nd	nd	nd	nd
637011	nd	nd	nd	nd	nd	nd
637012	nd	nd	nd	nd	nd	nd
637013	nd	nd	nd	nd	nd	nd
637016	nd	nd	nd	nd	nd	nd
637017	nd	nd	nd	nd	nd	nd
637018	nd	nd	nd	nd	nd	nd
637019	nd	nd	nd	nd	nd	nd
637020	nd	nd	nd	nd	nd	nd
637021	nd	nd	nd	nd	nd	nd
637022	nd	nd	nd	nd	nd	nd
637023	nd	nd	Nd	nd	nd	nd

Table 2. Mass of volatile organic compounds detected in soil-gas samplers from Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 5 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl tert-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE,dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c*, cis; *t*, trans; *m*, meta; *p*, para; *o*, ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	1,4-DCB (µg)	CCl_4 (µg)	1,1,2-TCA (µg)	Chlorobenzene (µg)	1,1,1,2-Tetrachloroethane (µg)	1,1,2,2-Tetrachloroethane (µg)
MDL=	**0.02**	**0.03**	**0.02**	**0.02**	**0.03**	**0.02**
637024	nd	nd	nd	nd	nd	nd
637025	nd	nd	nd	nd	nd	nd
637026	nd	nd	nd	nd	nd	nd
637027	nd	nd	nd	nd	nd	nd
637028	nd	nd	nd	nd	nd	nd
637029	nd	nd	nd	nd	nd	nd
637030	nd	nd	nd	nd	nd	nd
637031	nd	nd	nd	nd	nd	nd
637032	nd	nd	nd	nd	nd	nd
637033	nd	nd	nd	nd	nd	nd
637034	nd	nd	nd	nd	nd	nd
637035	nd	nd	nd	nd	nd	nd
637036	nd	nd	nd	nd	nd	nd
637037	nd	nd	nd	nd	nd	nd
637038	nd	nd	nd	nd	nd	nd
637039	nd	nd	nd	nd	nd	nd
637040	nd	nd	nd	nd	nd	nd
637041	nd	nd	nd	nd	nd	nd
637042	nd	nd	nd	nd	nd	nd
637043	nd	nd	nd	nd	nd	nd
637044	nd	nd	nd	nd	nd	nd
637045	nd	nd	nd	nd	nd	nd
637046	nd	nd	nd	nd	nd	nd
637047	nd	nd	nd	nd	nd	nd
637048	nd	nd	nd	nd	nd	nd
637049	nd	nd	nd	nd	nd	nd
637050	nd	nd	nd	nd	nd	nd
			Trip blanks			
637014	nd	nd	nd	nd	nd	nd
637015	nd	nd	nd	nd	nd	nd
637051	nd	nd	nd	nd	nd	nd
637052	nd	nd	nd	nd	nd	nd
637053	nd	nd	nd	nd	nd	nd

Table 2. Mass of volatile organic compounds detected in soil-gas samplers from Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 5 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl tert-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE,dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c*, cis; *t*, trans; *m*, meta; *p*, para; *o*, ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	1,3-Dichlorobenzene (µg)	1,2-Dichlorobenzene (µg)
MDL=	**0.02**	**0.02**
636992	nd	nd
636993	nd	nd
636994	nd	nd
636995	nd	nd
636996	nd	nd
636997	nd	nd
636998	nd	nd
636999	nd	nd
637000	nd	nd
637001	nd	nd
637002	nd	nd
637003	nd	nd
637004	nd	nd
637005	nd	nd
637006	nd	nd
637007	nd	nd
637008	nd	nd
637009	nd	nd
637010	nd	nd
637011	nd	nd
637012	nd	nd
637013	nd	nd
637016	nd	nd
637017	nd	nd
637018	nd	nd
637019	nd	nd
637020	nd	nd
637021	nd	nd
637022	nd	nd
637023	nd	nd

Table 2. Mass of volatile organic compounds detected in soil-gas samplers from Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 5 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; TPH, total petroleum hydrocarbons; BTEX, benzene, toluene, ethylbenzene, and xylenes; MTBE, methyl tert-butyl ether; DCA, dichloroethane; TCA, trichloroethane; TCE, trichloroethylene; DCE,dichloroethylene; PCE, perchloroethylene; DCB, dichlorobenzene; *c*, cis; *t*, trans; *m*, meta; *p*, para; *o*, ortho; CCl_4, carbon tetrachloride; C_{11}, C_{13}, and C_{15}, undecane, tridecane, and pentadecane, respectively; –, not applicable]

Sampler number	1,3-Dichlorobenzene (µg)	1,2-Dichlorobenzene (µg)
MDL=	**0.02**	**0.02**
637024	nd	nd
637025	nd	nd
637026	nd	nd
637027	nd	nd
637028	nd	nd
637029	nd	nd
637030	nd	nd
637031	nd	nd
637032	nd	nd
637033	nd	nd
637034	nd	nd
637035	nd	nd
637036	nd	nd
637037	nd	nd
637038	nd	nd
637039	nd	nd
637040	nd	nd
637041	nd	nd
637042	nd	nd
637043	nd	nd
637044	nd	nd
637045	nd	nd
637046	nd	nd
637047	nd	nd
637048	nd	nd
637049	nd	nd
637050	nd	nd
Trip blanks		
637014	nd	nd
637015	nd	nd
637051	nd	nd
637052	nd	nd
637053	nd	nd

Table 3. Mass of explosives and chemical agents detected in soil-gas samplers from the Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.

[see figure 6 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; *p,* para; –, not applicable]

Sampler number	Site number	Dimethyldisulfide (µg)	Dimethylmethylphosphonate (µg)	1,4-Thioxane (µg)
MDL=		**0.10**	**0.10**	**0.10**
644241	1	nd	nd	nd
644242	2	nd	nd	nd
644243	3	nd	nd	nd
644244	4	nd	nd	nd
644245	5	nd	nd	nd
644246	6	nd	nd	nd
		Trip blanks		
644252	–	nd	nd	nd
644253	–	nd	nd	nd
644254	–	nd	nd	nd
644255	–	nd	nd	nd
644256	–	nd	nd	nd

Table 3. Mass of explosives and chemical agents detected in soil-gas samplers from the Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 6 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; *p,* para; –, not applicable]

Sample number	Site number	Nitrobenzene (µg)	Diisopropyl-methylphos-phonate (µg)	1,4-Dithiane (µg)	2-Nitrotoluene (µg)
MDL=		**0.10**	**0.10**	**0.10**	**0.10**
644241	1	nd	nd	nd	nd
644242	2	nd	nd	nd	nd
644243	3	nd	nd	nd	nd
644244	4	nd	nd	nd	nd
644245	5	nd	nd	nd	nd
644246	6	nd	nd	nd	nd
		Trip blanks			
644252	–	nd	nd	nd	nd
644253	–	nd	nd	nd	nd
644254	–	nd	nd	nd	nd
644255	–	nd	nd	nd	nd
644256	–	nd	nd	nd	nd

Table 3. Mass of explosives and chemical agents detected in soil-gas samplers from the Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 6 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; *p,* para; –, not applicable]

Sampler number	Site number	3-Nitrotoluene (µg)	4-Nitrotoluene (µg)	Thiodiglycol (µg)	Benzothiazole (µg)
MDL=		**0.10**	**0.10**	**0.20**	**0.10**
644241	1	nd	nd	nd	nd
644242	2	nd	nd	nd	bdl
644243	3	nd	nd	nd	bdl
644244	4	nd	nd	nd	bdl
644245	5	nd	nd	nd	bdl
644246	6	nd	nd	nd	bdl
			Trip blanks		
644252	–	nd	nd	nd	nd
644253	–	nd	nd	nd	nd
644254	–	nd	nd	nd	nd
644255	–	nd	nd	nd	nd
644256	–	nd	nd	nd	nd

Table 3. Mass of explosives and chemical agents detected in soil-gas samplers from the Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 6 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; *p,* para; –, not applicable]

Sampler number	Site number	Chloroacetophenones (µg)	*p*-Chlorophenylmethylsulfide (µg)	1,3-Dinitrobenzene (µg)
MDL=		**0.10**	**0.10**	**0.10**
644241	1	nd	nd	nd
644242	2	bdl	bdl	nd
644243	3	nd	nd	nd
644244	4	bdl	bdl	bdl
644245	5	nd	nd	nd
644246	6	nd	nd	nd
		Trip blanks		
644252	–	nd	nd	nd
644253	–	nd	nd	nd
644254	–	nd	nd	nd
644255	–	nd	nd	nd
644256	–	nd	nd	nd

Table 3. Mass of explosives and chemical agents detected in soil-gas samplers from the Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 6 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; *p,* para; –, not applicable]

Sampler number	Site number	2,6-Dinitrotoluene (µg)	2,4-Dinitrotoluene (µg)	1,3,5-Trinitrobenzene (µg)
MDL=		**0.10**	**0.10**	**0.10**
644241	1	nd	nd	nd
644242	2	nd	nd	nd
644243	3	nd	nd	nd
644244	4	nd	bdl	bdl
644245	5	nd	nd	nd
644246	6	nd	nd	nd
		Trip blanks		
644252	–	nd	nd	nd
644253	–	nd	nd	nd
644254	–	nd	nd	nd
644255	–	nd	nd	nd
644256	–	nd	bdl	nd

Table 3. Mass of explosives and chemical agents detected in soil-gas samplers from the Patterson Anti-Tank Range, Fort Gordon, Georgia, 2009–2010.—Continued

[see figure 6 for sampler locations; µg, micrograms; MDL, method detection level; nd, not detected; bdl, below detection level; *p,* para; –, not applicable]

Sampler number	Site number	*p*-chlorophenyl-methylsulfoxide (µg)	*p*-chlorophenyl-methylsulfone (µg)	2,4,6-Trinitrotoluene (µg)
MDL=		**0.10**	**0.10**	**0.10**
644241	1	nd	nd	nd
644242	2	nd	bdl	nd
644243	3	nd	nd	nd
644244	4	bdl	bdl	bdl
644245	5	bdl	bdl	nd
644246	6	nd	nd	nd
		Trip blanks		
644252	–	nd	bdl	nd
644253	–	nd	bdl	nd
644254	–	nd	bdl	nd
644255	–	nd	bdl	nd
644256	–	nd	bdl	nd

Table 4. Inorganic constituents detected in soil samples collected at the Patterson Anti-Tank Range from land surface to 6 inches below land surface, Fort Gordon, Georgia, September 22, 2010.

[see figure 6 for site locations; USEPA RSL, U.S. Environmental Protection Agency Regional Screening Level, Industrial Soil; SCDHEC, South Carolina Department of Health and Environmental Control; µg/g, micrograms per gram; mg/kg, milligrams per kilogram; --, not applicable; nr, not reportable; for soil, 1 µg/g is equivalent to 1 mg/kg, and 1 mg/kg is equivalent to 1 part per million (ppm); yellow highlight indicates value higher than SCDHEC background; *, Resource Conservation and Recovery Act (RCRA) metal; <, less than. Note: selenium and mercury were not analyzed]

Constituent	Site 1 (µg/g)	Site 2 (µg/g)	Site 3 (µg/g)	Site 4 (µg/g)	Site 5 (µg/g)	Site 6 (µg/g)	USEPA RSL (mg/kg)	SCDHEC Background (mg/kg)
Aluminum	26,400	17,700	39,200	16,600	11,200	9,400	990,000	13,528
Antimony	0.26	0.29	0.5	1.1.	6.9	0.1	410	–
Arsenic*	<1	1.3	1.6	<1	<1	<1	260	6.1
Barium*	335	212	239	176	154	137	190,000	38
Beryllium	0.66	0.43	0.61	0.3	0.21	0.36	2,000	0.6
Bismuth	nr	nr	nr	nr	nr	nr	–	–
Cadmium*	0.01	0.02	<0.007	0.008	0.01	<0.007	800	1
Calcium	872	355	330	342	318	152	–	699
Cerium	68	62.8	57	32.7	29.3	37.5	–	–
Cesium	1.9	1	2.1	0.98	0.66	0.76	–	–
Chromium*	16.6	13.9	23.5	11.2	8.8	7.2	1,500,000	16
Cobalt	2.6	1.1	2.2	0.88	0.68	1.2	300	4
Copper	8	6.1	13.1	7.4	5	5.2	41,000	9
Gallium	7.2	5.2	10.9	4.5	3.1	2.5	–	–
Iron	5,010	3,840	7,850	3,650	2,200	2,820	720,000	15,608
Lanthanium	31.2	29.9	27.9	15.6	14.9	15.9	–	–
Lead*	14.4	13.7	32.3	31.8	18	5.88	800	16
Lithium	7.1	4.5	10.4	3.8	2.6	3.4	2,000	–
Magnesium	460	255	583	256	180	271	–	988
Manganese	495	150	80.1	82.7	118	188	23,000	120
Molybdenum	0.44	0.39	0.63	0.33	0.23	0.2	5,100	–
Nickel	4.1	2.4	6.6	2.6	1.9	3	47,000	6
Niobium	10	9.1	9.9	6.5	6.3	3.2	–	–
Phosphorus	166	145	142	144	105	181	–	–
Potassium	7,320	6,230	7,230	5,600	4,460	1,340	–	856
Rubidium	42.7	28.3	40.3	25.1	19.3	11.1	–	–
Scandium	4.3	3.3	5.3	2.4	1.7	1.4	–	–
Silver*	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5,100	4
Sodium	752	583	659	595	535	120	–	194
Strontium	39.9	28.2	34.4	24.3	21.1	18.5	610,000	–
Thallium	0.29	0.17	0.26	0.16	0.11	<0.08	–	4.5
Thorium	8.64	10.1	10.3	6.15	5.34	2.72	–	–
Titanium	3,600	3,380	3,430	2,430	1,730	1,130	–	–
Uranium	1.98	2.2	2.11	1.28	1.17	0.87	–	–
Vanadium	27.6	21.2	39.6	17.7	11.5	10.4	5,200	–
Yttrium	12.7	10.1	8.7	4.3	3.8	10.7	–	–
Zinc	16.7	12.3	22	11.9	8.9	10.4	310,000	23

Prepared by:
USGS Publishing Network
Raleigh Publishing Service Center
3916 Sunset Ridge Road
Raleigh, NC 27607

For additional information regarding this publication, contact:
USGS South Carolina Water Science Center
Stephenson Center, Suite 129
720 Gracern Road
Columbia, SC 29210-7651

Or visit the USGS South Carolina Water Science Center Web site at:
http://sc.water.usgs.gov