



DEPARTMENT of ENVIRONMENT  
and NATURAL RESOURCES

JOE FOSS BUILDING  
523 EAST CAPITOL  
PIERRE, SOUTH DAKOTA 57501-3182

denr.sd.gov

October 22, 2018

Ms. Amy Hawbaker  
Casey's General Stores  
3305 SE Delaware  
Ankeny, IA 50021

FILE COPY

RE: No Further Action, Casey's General Store, 701 N. Main St., Mitchell, South Dakota  
DENR File # 2002.237

Dear Ms. Hawbaker:

Staff from the South Dakota Department of Environment and Natural Resources (DENR) have reviewed the tank removal information provided for the above referenced property. Based upon the information provided, it appears that the contamination identified during the tank removal is associated with previously identified contamination. Therefore, the department will not initiate a new case file, will include the tank removal report in the department's 2002.237 file, and will not require further assessment or cleanup.

It should be noted that soil contamination above department action levels exists on site; therefore the site will continue to be assigned a No Further Action designation. If future construction activities result in contaminated soil being removed, it must be properly disposed at a permitted facility. In addition if future exposure pathways are created, or if problems arise from remaining contamination associated with this release, Casey's General Stores will be responsible for doing any additional assessment or cleanup activities. Casey's General Stores may also be responsible for further assessment and cleanup actions if there is a change in the use of this property or adjacent affected properties that increases the risk to human health and the environment from contamination associated with this release.

If you have questions regarding this matter, please contact Scott Bickler of my staff at (605) 362-3500. Thank you for your cooperation in protecting South Dakota's water resources.

Sincerely,

Kim McIntosh, Administrator  
Ground Water Quality Program

CC: Jeff Bathke, Davison County Emergency Management, Mitchell  
Alan Bakeberg, DENR Petroleum Release Compensation Fund, Pierre  
Jerry K Zutz, PE, CPRR #5083, Geotek Engineering & Testing Services Inc, Sioux Falls



**GEOTEK ENGINEERING  
& TESTING SERVICES, INC.**  
909 East 50<sup>th</sup> Street North  
Sioux Falls, South Dakota 57104  
605-335-5512 Fax 605-335-0773

July 11, 2018

Casey's General Stores  
3305 SE Delaware  
Ankeny, IA 50021

Attn: Ms. Amy Hawbaker

Subj: Tier 1 Assessment  
UST Removal Observations  
Casey's General Store #1170  
701 N. Main St  
Mitchell, SD  
GeoTek #18-775  
PRCF #6643  
DENR # pending

Dear Ms. Hawbaker:

This correspondence presents the written report on the Tier 1 Assessment for the referenced site. We are enclosing one copy of the report. Additional copies are being sent as noted below.

We thank you for the opportunity of providing our services on this project. Please let us know if you have questions or if we may be of further assistance.

Respectfully submitted,

Jerald K. Zutz  
Senior Project Manager  
PE/Remediator #5083

cc: DENR, Sioux Falls, Mr. Scott Bickler  
PRCF, Pierre, Mr. John McVey  
PRCF, Mitchell, Mr. Brett Schutte

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**TIER 1 ASSESSMENT  
CASEY'S GENERAL STORE #1170  
701 N. MAIN ST  
MITCHELL, SOUTH DAKOTA  
GEOTEK #18-775**

**INTRODUCTION**

**Purpose and Scope**

The purpose of our work was to conduct a Tier 1 Assessment. The scope of our work was limited to:

1. Mobilizing environmental personnel to the site.
2. Collecting soil samples from below or adjacent to the removed USTs, piping and dispensers.
3. Scanning soil samples in the field with a photoionization detector (PID) for total organic vapors.
4. Obtaining and submitting six soil samples to a chemistry laboratory for benzene, toluene, ethylbenzene, xylenes, MTBE, TPH as gasoline.
5. Preparing a report presenting the field and laboratory data, along with our opinions and recommendations.

**Authorization**

This work was performed in accordance with our June 4, 2018 contract. The contract was reviewed and approved by the Petroleum Release Compensation Fund (PRCF) letter of June 27, 2018.

**BACKGROUND INFORMATION**

**Site Description**

The site had two underground storage tanks (USTs). There was one 6000 gallon gasoline UST, and one 10,000 gallon gasoline UST. The USTs were installed in 1978. There was (2002 age) fiberglass underground piping to two dispensers. SD Department of Environment and Natural Resources (DENR) rules require soil sampling and analysis for UST system removals. Figure 2 is a site map.

### **Location**

The site is located at the northwest corner of the intersection of N. Main Street and W. 7<sup>th</sup> Avenue in the central part of the City of Mitchell, Davison County, South Dakota (NW1/4, NW1/4, Section 22, Township 103 North, Range 60 West).

Topographic map coverage of the site is provided by the U.S. Geological Survey (USGS) Mitchell Quadrangle 7.5 minute Series Map (Figure 1; 1957, photorevised 1974). The site is within an area of building omission tint. The elevation of the site is approximately 1310-1320' above mean sea level. Contour lines indicate the area is nearly flat. The nearest surface water is Dry Run Creek, located approximately 3200' south, flowing east.

### **Previous Assessment**

One previous release is known for the site (DENR #2002.237, Casey's General Store – Line Leaks, 701 N. Main St). The old dispensers and piping were removed, and new piping, dispensers, and a canopy installed in October 2002. A soil sample collected at the time had petroleum concentrations above the SD DENR Tier 1 Action Levels. A Tier 2 assessment was conducted. Several soil borings were advanced, with five completed as groundwater monitoring wells. Free phase product has been measured in MW2 on each of five events in 2003-2005, and in MW5 on one event in 2005. Excavation of saturated petroleum impacted soils was conducted on November 7, 2005. Approximately 420 in-place cubic yards of soil was removed from the south edge of the property. The excavation did not remove all petroleum contaminated soils. Petroleum saturated soils around MW5 were left in place. MW6 was installed across the street to the south, and sampled. Groundwater from the well had some gasoline concentrations, with benzene slightly above state standards. The August 31, 2007 DENR letter required no further action. Five monitoring wells (MW1, MW3, MW4, MW5, MW6) were plugged on October 10, 2007.

## **HYDROGEOLOGIC SETTING**

### **Geology**

The subject site is underlain by Quaternary (glacial) Till, Ground Moraine. It is a heterogeneous mixture of boulders, sand, silt, and clay. It forms a smooth and level to gently rolling topography, and contains many sloughs. Outwash (sand and gravel) deposits are often found within clay glacial till (Christensen, 1989).

There is a poor probability of finding sand or gravel deposits within 25' of the land surface for the site or vicinity (Hammond, 1982).

Below the till is the bedrock Cretaceous Niobrara Formation. The top of the unit is estimated to be at an elevation of about 1150-1200', and it is perhaps 20' thick (Christensen, 1989). The top of the unit would be about 110-170' deep. The Niobrara Formation is a fractured marl (calcareous clay rock).

## **Groundwater**

Shallow groundwater is likely present within about 10' of the land surface. The groundwater gradient is often in the direction of the surface topographic gradient. As the site are is nearly flat, the gradient cannot be estimated from a large scale topographic map. Normally, groundwater within glacial till is not considered an aquifer due to poor quality and quantity. Nevertheless, tile wells are common in glacial till areas without other shallow aquifers.

There are no identified (shallow) glacial aquifers in the immediate site vicinity, but there are three identified bedrock aquifers in the site vicinity (Niobrara, Codell, and Dakota Aquifers). The top of the Niobrara is approximately 1200-1300'; Hansen, 1983). Another publication indicates all 3 bedrock aquifers are below the approximate 110-170' thick Quaternary deposits (Christensen, 1989). Newer information suggests the first aquifer below the site is the Niobrara Formation at greater than 50' but less than 100' below the land surface (Schulz, 2004).

The City of Mitchell gets water from the Bon Homme-Yankton Rural Water System (water source is Missouri River), with Lake Mitchell for an emergency use (SD DENR, 2015).

According to the SD DENR, Davison County does not have Wellhead or Aquifer Protection Zoning Ordinances. The SD DENR identifies Davison County as having county zoning ordinance for other items (reportedly for plat language regarding ground water protection)

## **Soils**

The native soil on the site is Clarno-Houdek Loams, 0 to 3% slopes. The series consists of deep, well-drained, nearly level to undulating loamy soils. The soil formed in glacial till on uplands. Runoff is medium, and permeability is moderate in the subsoil and moderately slow in the underlying material (Johnson, 1974).

## **TIER 1 ASSESSMENT**

### **General**

A GeoTek representative was on-site on June 19, 2018 from approximately 1:00 pm to 6:00 pm and on June 20, 2018 from 9:00 am to 10:30 am. The canopy, concrete surfacing, dispensers, underground storage tank (UST) system piping, and piping backfill were removed prior to our arrival on-site. Figure 2 is a site map and shows the location of the USTs, removed piping, excavation, and soil sample locations.

The UST backfill was mostly brown sand. The piping backfill was mostly pea rock. The exposed UST excavation sidewalls revealed approximately 4' of fill soils, 3' of mixed alluvium (silty sand), and then glacial till (lean clay with sand). There was some groundwater in the excavation at about 11' deep. Groundwater had a petroleum sheen/oil. The excavation had a strong odor of gasoline, and backfill soil (and much of the sidewalls) appeared discolored gray.

### **Soil Excavation**

Visibly contaminated backfill soils were removed from the UST excavation. The soil was excavated on June 19-20, 2018, and taken to the City of Mitchell Landfill. The landfill received 247.76 tons of soil.

### **Soil Sample Scanning**

Soil samples collected from the excavation were scanned with a photoionization detector (PID) for organic vapors as an indication of petroleum contamination. The soil sample PID readings are listed in Table 1. The soil sample locations are shown on Figure 2.

Elevated organic vapors (>1.0 parts per million, ppm) were detected in all but one soil sample. Soil samples from below the removed USTs (#1-5) had significantly elevated PID readings. Three soil samples (#7, 10, & 11) from the bottom had low PID readings. Soil samples from the sidewalls had elevated readings.

### **Soil Sample Laboratory Analysis**

After discussion with DENR, additional soil samples (1 below a removed UST, 2 from the excavation bottom, and 3 sidewall samples) were submitted to a chemistry laboratory for analysis. The samples were analyzed for benzene, toluene, ethylbenzene, xylenes, MTBE, and Total Petroleum Hydrocarbons (TPH) as gasoline. The laboratory report is attached in Appendix A. The laboratory data is summarized on Table 2. The soil sample locations are shown on Figure 2.

Petroleum concentrations were detected in each soil sample at up to 6840 ppm TPH as gasoline. The soil sample analyses were compared to state standards. Three of the six soil samples exceeded the SD DENR Tier 1 Action Levels. One soil sample exceeded both the SD DENR Trigger Level of 500 ppm TPH and the SD DENR Look Up Table values for residential, commercial or construction worker exposure.

## **DISCUSSION**

Of the 5 soil samples collected immediately below the USTs, the highest PID reading one (#3-12') was submitted for analysis; it had 68.8 ppm TPH as gasoline. The two soil samples analyzed from the bottom of the excavation (#7-13', and #11-13') had 27.9 and 9.31 ppm TPH as gasoline respectively. The three sidewall samples (#6-8', #8-8', and #12-8') had 244, <9.74, and 6840 ppm TPH as gasoline respectively.

Sidewall sample #12-8' (6840 ppm TPH as gasoline) was collected near to the (horizontal) location of a previous dispenser. Sample #12-8' was compared to previous soil samples collected during piping work in 2002 (highest was 4075 ppm), previous assessment work in 2003-2006 (highest was 1673 ppm), or excavation in 2005 (no TPH detected in soil samples). Sample #12-8' is the highest TPH as gasoline concentration yet detected in soil on-site. Sample #12-8' may represent the previous release detected in 2002, a previously unknown release since 2002, or a possible inadvertent (presumably minor) release during recent piping removal. We were not on-site when piping was removed. Given that the on-site excavation company and staff are well experienced, and that two former monitoring wells in the area previously had free product, the mostly likely possibility is that sample #12-8' represents the old 2002 release.

In accordance with the DENR handbook, when the SD Tier 1 Action Levels are exceeded or when a site has soil contaminate levels in excess of 500 ppm Total Petroleum Hydrocarbons, either remedial action or a Tier 2 Assessment is required. However, in this case, the petroleum concentrations in soil appears to represent a former previously assessed release.

### **CONCLUSIONS**

Petroleum concentrations were detected in each of six soil samples, at up to 6840 ppm TPH as gasoline. Three of the six soil samples exceeded the SD DENR Tier 1 Action Levels. One soil sample exceeded both the SD DENR Trigger Level of 500 ppm TPH and the SD DENR Look Up Table values for residential, commercial or construction worker exposure.

### **RECOMMENDATIONS**

We recommend no further assessment or clean-up. This recommendation is subject to DENR review.

Future potential subsurface work at the site may encounter remaining petroleum contaminated soil. If encountered, excavated construction-derived petroleum contaminated soil may need to be taken to a permitted landfill or landfarm for disposal.

Elevated substance concentrations in soil could affect potential future use of site groundwater (i.e. water supply, building heating or cooling), water generated from drain tiles, sumps, infiltration of elevator pits, de-watering, etc. If so, water may be required to be tested, treated, and properly disposed during construction and/or the life of a building. If de-watering will be conducted, or if groundwater use was desired at the site, a review of the situation would be recommended. While testing could be done to assess the current groundwater quality, conditions could change over time, and pumping may induce contaminants to flow into a well.



### **STANDARD OF CARE**

Recommendations contained in this report represent our professional opinions. These opinions are based on information currently available and arrived at in accordance with currently accepted hydrogeologic and engineering practices at this time and location. Other than this, no warranty is implied or intended.

### **REMARKS**

A description of the methods used during this project is attached in Appendix B. Soil samples obtained during our work will be retained in this office for a period of thirty days from the date of this report. They will then be discarded unless we are notified otherwise.

GeoTek Engineering and Testing Services, Inc. appreciates the opportunity to have been of service on this project. Please contact us if we can be of further assistance or if you have questions.

Respectfully submitted,



Jerald K. Zutz  
Senior Project Manager  
PE/Remediator #5083

This report reviewed by:



Daniel R. Hanson  
General Manager  
PE/Remediator #4829

### **REFERENCES**

Christensen, C.M., Geology of Davison and Hanson Counties, South Dakota, SD Geological Survey Bulletin 33, 1989.

Hammond, Richard H., Sand and Gravel Resources in Davison County, South Dakota, South Dakota Geological Survey Information Pamphlet No. 24, 1982.

Hansen, Donald S., Water Resources of Hanson and Davison Counties, South Dakota, US Geological Survey Water Resources Investigation Report 83-4108, 1983.

Hoff, Jerald H., and Fred V. Steece, Geology of the Mitchell Quadrangle, South Dakota Geological Survey Map, 1961.

Johnson, Warren F., & others, Soil Survey of Davison County, South Dakota, USDA Soil Conservation Service, 1974.

SD Department of Environment and Natural Resources, Public Water System Data Handbook, October 14, 2015.

Schulz, Layne. D., and Smith, Kyle N., First Occurrence of Aquifer Materials in Davison County, South Dakota, SD Geological Survey Aquifer Materials Map 16, 2004.

US Geological Survey, Mitchell, South Dakota Quadrangle, 7.5-minute series map, 1957, photorevised 1974.

**TABLE 1**  
**SOIL SAMPLE PID READINGS**

<b>Soil Profile</b>	<b>Depth (feet)</b>	<b>Parts Per Million</b>
<u>June 19, 2018</u>		
1	12	173 #
2	12	319 #
3	12	386 #
4	12	161 #
5	12	162 #
6	4	24
6	8	417
6	12	256
7	13	12
8	4	55
8	8	361
9	4	146
9	8	296
<u>June 20, 2018</u>		
10	13	1
11	13	4
12	4	244
12	8	443
12	12	428

Notes: All readings are in parts per million (ppm) total organic vapors. Soil vapor headspace analysis was performed at the site with a photoionization detector (PID) calibrated to a benzene standard.

See Figure 2 for soil sample locations.

\* = additional soil sample from this location submitted for laboratory analysis.

# = removed by overexcavation.

**TABLE 2**  
**SOIL SAMPLE ANALYTICAL DATA**

Sample	Depth (feet)	Benzene	Toluene	Ethyl- Benzene	Xylenes	MTBE	Naphthalene	Total Petroleum Hydrocarbons as Gasoline	as Diesel Fuel
#3	12	<b>2.30</b>	2.98	1.50	8.74	<0.492	---	68.8	---
#6	8	<b>0.562</b>	7.35	2.78	17.1	<2.36	---	244	---
#7	13	<b>0.230</b>	0.886	0.334	2.37	<0.466	---	27.9	---
#8	8	0.124	0.774	0.129	0.923	<0.487	---	<9.74	---
#11	13	<0.0923	<0.0923	<0.0923	<0.277	<0.461	---	9.31	---
#12	8	<b>29.0</b>	<b>346</b>	<b>134</b>	<b>654</b>	<9.55	---	<b>6840</b>	---

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Tier 1 Action/ Trigger Levels	0.2	15	10	300	---	25	500	500
----------------------------------	-----	----	----	-----	-----	----	-----	-----

Surface Soil Look-up Table - 0-3.2' deep, except 0-9' deep for construction worker

Residential	17	>750	>630	>500	200	---	---	---
Commercial	28	>750	>630	>500	280	---	---	---
Construction Worker	19	>750	>630	>500	371	---	---	---

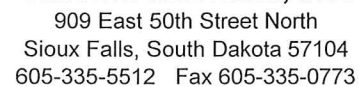
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Notes: All analytical values are in mg/kg which is equivalent to parts per million (ppm).

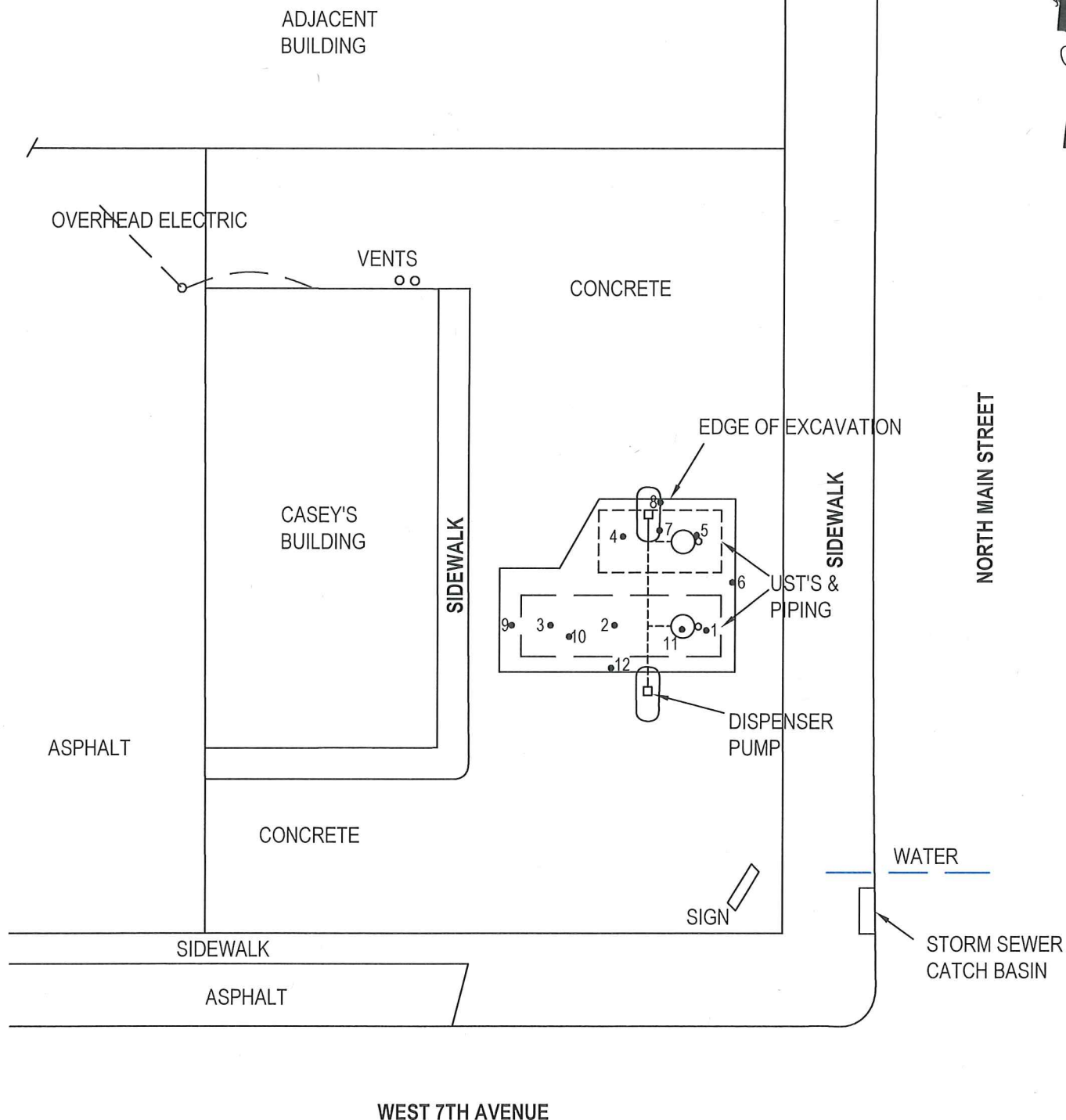
Laboratory report attached.

See Figure 2 for soil sample locations.









## LEGEND

- SOIL SAMPLE LOCATION

FIGURE 2  
SOIL SAMPLE LOCATIONS  
CASEY'S GENERAL STORE #1170  
701 N. MAIN ST  
MITCHELL, SD

ACAD/GEOTEK/JERRY/18-775

PROJECT#: 18-775

DRAWN BY: PLH



**GEOTEK ENGINEERING &  
TESTING SERVICES, INC.**

909 East 50th Street North  
Sioux Falls, South Dakota 57104  
605-335-5512 Fax 605-335-0773

## **APPENDIX A**

# TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

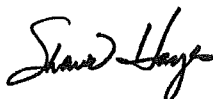
## ANALYTICAL REPORT

TestAmerica Laboratories, Inc.  
TestAmerica Cedar Falls  
704 Enterprise Drive  
Cedar Falls, IA 50613  
Tel: (319)277-2401

TestAmerica Job ID: 310-133002-1  
TestAmerica Sample Delivery Group: 18-775  
Client Project/Site: Casey's General Store #1170

For:  
GeoTek Engineering & Testing Services  
909 E. 50th Street  
Sioux Falls, South Dakota 57104

Attn: Jerry Zutz



Authorized for release by:  
6/28/2018 1:59:40 PM

Shawn Hayes, Senior Project Manager  
(319)229-8211  
shawn.hayes@testamericainc.com

### LINKS

Review your project  
results through

**Total Access**

Have a Question?



Visit us at:

[www.testamericainc.com](http://www.testamericainc.com)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*



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## Case Narrative

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

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**Job ID: 310-133002-1**

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**Laboratory: TestAmerica Cedar Falls**

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**Narrative**

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**Job Narrative**  
**310-133002-1**

**Comments**

No additional comments.

**Receipt**

The samples were received on 6/21/2018 9:55 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.5° C.

**GC VOA**

Method(s) OA-1 (GC): The following sample was diluted due to the nature of the sample matrix: #12-8' (310-133002-6). Elevated reporting limits (RLs) are provided for Methyl tert-butyl ether. Due to the nature of the sample matrix, this sample was not rejected/reran at a lesser dilution for being "over-diluted."

Method(s) OA-1 (GC): The following sample was diluted due to the nature of the sample matrix: #6-8' (310-133002-2). Elevated reporting limits (RLs) are provided for Methyl tert-butyl ether. Due to the nature of this matrix, this sample was not rejected/reran at a lesser dilution for being "over-diluted."

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

**VOA Prep**

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

## Sample Summary

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-133002-1	#3-12'	Solid	06/19/18 00:00	06/21/18 09:55
310-133002-2	#6-8'	Solid	06/19/18 00:00	06/21/18 09:55
310-133002-3	#7-13'	Solid	06/19/18 00:00	06/21/18 09:55
310-133002-4	#8-8'	Solid	06/19/18 00:00	06/21/18 09:55
310-133002-5	#11-13'	Solid	06/20/18 00:00	06/21/18 09:55
310-133002-6	#12-8'	Solid	06/20/18 00:00	06/21/18 09:55

## Detection Summary

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

### Client Sample ID: #3-12'

### Lab Sample ID: 310-133002-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	2.30		0.0985		mg/Kg	1		OA-1 (GC)	Total/NA
Toluene	2.98		0.0985		mg/Kg	1		OA-1 (GC)	Total/NA
Ethylbenzene	1.50		0.0985		mg/Kg	1		OA-1 (GC)	Total/NA
Xylenes, Total	8.74		0.295		mg/Kg	1		OA-1 (GC)	Total/NA
TPH (as Gasoline)	68.8		9.85		mg/Kg	1		OA-1 (GC)	Total/NA

### Client Sample ID: #6-8'

### Lab Sample ID: 310-133002-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	0.562		0.473		mg/Kg	5		OA-1 (GC)	Total/NA
Toluene	7.35		0.473		mg/Kg	5		OA-1 (GC)	Total/NA
Ethylbenzene	2.78		0.473		mg/Kg	5		OA-1 (GC)	Total/NA
Xylenes, Total	17.1		1.42		mg/Kg	5		OA-1 (GC)	Total/NA
TPH (as Gasoline)	244		47.3		mg/Kg	5		OA-1 (GC)	Total/NA

### Client Sample ID: #7-13'

### Lab Sample ID: 310-133002-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	0.230		0.0932		mg/Kg	1		OA-1 (GC)	Total/NA
Toluene	0.886		0.0932		mg/Kg	1		OA-1 (GC)	Total/NA
Ethylbenzene	0.334		0.0932		mg/Kg	1		OA-1 (GC)	Total/NA
Xylenes, Total	2.37		0.280		mg/Kg	1		OA-1 (GC)	Total/NA
TPH (as Gasoline)	27.9		9.32		mg/Kg	1		OA-1 (GC)	Total/NA

### Client Sample ID: #8-8'

### Lab Sample ID: 310-133002-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	0.124		0.0974		mg/Kg	1		OA-1 (GC)	Total/NA
Toluene	0.774		0.0974		mg/Kg	1		OA-1 (GC)	Total/NA
Ethylbenzene	0.129		0.0974		mg/Kg	1		OA-1 (GC)	Total/NA
Xylenes, Total	0.923		0.292		mg/Kg	1		OA-1 (GC)	Total/NA

### Client Sample ID: #11-13'

### Lab Sample ID: 310-133002-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
TPH (as Gasoline)	9.31		9.23		mg/Kg	1		OA-1 (GC)	Total/NA

### Client Sample ID: #12-8'

### Lab Sample ID: 310-133002-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Benzene	29.0		1.91		mg/Kg	20		OA-1 (GC)	Total/NA
Toluene	346		1.91		mg/Kg	20		OA-1 (GC)	Total/NA
Ethylbenzene	134		1.91		mg/Kg	20		OA-1 (GC)	Total/NA
Xylenes, Total	654		5.73		mg/Kg	20		OA-1 (GC)	Total/NA
TPH (as Gasoline)	6840		191		mg/Kg	20		OA-1 (GC)	Total/NA

This Detection Summary does not include radiochemical test results.

TestAmerica Cedar Falls

## Client Sample Results

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

Client Sample ID: #3-12'

Lab Sample ID: 310-133002-1

Date Collected: 06/19/18 00:00

Matrix: Solid

Date Received: 06/21/18 09:55

### Method: OA-1 (GC) - Volatile Petroleum Hydrocarbons (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	2.30		0.0985		mg/Kg		06/22/18 12:55	06/24/18 00:07	1
Toluene	2.98		0.0985		mg/Kg		06/22/18 12:55	06/24/18 00:07	1
Ethylbenzene	1.50		0.0985		mg/Kg		06/22/18 12:55	06/24/18 00:07	1
Xylenes, Total	8.74		0.295		mg/Kg		06/22/18 12:55	06/24/18 00:07	1
TPH (as Gasoline)	68.8		9.85		mg/Kg		06/22/18 12:55	06/24/18 00:07	1
Methyl tert-butyl ether	<0.492		0.492		mg/Kg		06/22/18 12:55	06/24/18 00:07	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	89		48 - 150	06/22/18 12:55	06/24/18 00:07	1

TestAmerica Cedar Falls

## Client Sample Results

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

**Client Sample ID: #6-8'**

Date Collected: 06/19/18 00:00

Date Received: 06/21/18 09:55

**Lab Sample ID: 310-133002-2**

Matrix: Solid

**Method: OA-1 (GC) - Volatile Petroleum Hydrocarbons (GC)**

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.562		0.473		mg/Kg		06/27/18 11:45	06/28/18 02:56	5
Toluene	7.35		0.473		mg/Kg		06/27/18 11:45	06/28/18 02:56	5
Ethylbenzene	2.78		0.473		mg/Kg		06/27/18 11:45	06/28/18 02:56	5
Xylenes, Total	17.1		1.42		mg/Kg		06/27/18 11:45	06/28/18 02:56	5
TPH (as Gasoline)	244		47.3		mg/Kg		06/27/18 11:45	06/28/18 02:56	5
Methyl tert-butyl ether	<2.36		2.36		mg/Kg		06/27/18 11:45	06/28/18 02:56	5

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	89		48 - 150	06/27/18 11:45	06/28/18 02:56	5

## Client Sample Results

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

**Client Sample ID: #7-13'**

Date Collected: 06/19/18 00:00

Date Received: 06/21/18 09:55

**Lab Sample ID: 310-133002-3**

Matrix: Solid

### Method: OA-1 (GC) - Volatile Petroleum Hydrocarbons (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.230		0.0932		mg/Kg		06/22/18 12:55	06/23/18 20:17	1
Toluene	0.886		0.0932		mg/Kg		06/22/18 12:55	06/23/18 20:17	1
Ethylbenzene	0.334		0.0932		mg/Kg		06/22/18 12:55	06/23/18 20:17	1
Xylenes, Total	2.37		0.280		mg/Kg		06/22/18 12:55	06/23/18 20:17	1
TPH (as Gasoline)	27.9		9.32		mg/Kg		06/22/18 12:55	06/23/18 20:17	1
Methyl tert-butyl ether	<0.466		0.466		mg/Kg		06/22/18 12:55	06/23/18 20:17	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	87		48 - 150	06/22/18 12:55	06/23/18 20:17	1

TestAmerica Cedar Falls

## Client Sample Results

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

Client Sample ID: #8-8'

Lab Sample ID: 310-133002-4

Date Collected: 06/19/18 00:00

Matrix: Solid

Date Received: 06/21/18 09:55

### Method: OA-1 (GC) - Volatile Petroleum Hydrocarbons (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	0.124		0.0974		mg/Kg		06/22/18 12:55	06/23/18 23:29	1
Toluene	0.774		0.0974		mg/Kg		06/22/18 12:55	06/23/18 23:29	1
Ethylbenzene	0.129		0.0974		mg/Kg		06/22/18 12:55	06/23/18 23:29	1
Xylenes, Total	0.923		0.292		mg/Kg		06/22/18 12:55	06/23/18 23:29	1
TPH (as Gasoline)	<9.74		9.74		mg/Kg		06/22/18 12:55	06/23/18 23:29	1
Methyl tert-butyl ether	<0.487		0.487		mg/Kg		06/22/18 12:55	06/23/18 23:29	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	84		48 - 150	06/22/18 12:55	06/23/18 23:29	1



## Client Sample Results

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

**Client Sample ID: #11-13'**

**Lab Sample ID: 310-133002-5**

Date Collected: 06/20/18 00:00

Matrix: Solid

Date Received: 06/21/18 09:55

### Method: OA-1 (GC) - Volatile Petroleum Hydrocarbons (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	<0.0923		0.0923		mg/Kg		06/22/18 12:55	06/23/18 20:55	1
Toluene	<0.0923		0.0923		mg/Kg		06/22/18 12:55	06/23/18 20:55	1
Ethylbenzene	<0.0923		0.0923		mg/Kg		06/22/18 12:55	06/23/18 20:55	1
Xylenes, Total	<0.277		0.277		mg/Kg		06/22/18 12:55	06/23/18 20:55	1
TPH (as Gasoline)	9.31		9.23		mg/Kg		06/22/18 12:55	06/23/18 20:55	1
Methyl tert-butyl ether	<0.461		0.461		mg/Kg		06/22/18 12:55	06/23/18 20:55	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	80		48 - 150	06/22/18 12:55	06/23/18 20:55	1

## Client Sample Results

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

Client Sample ID: #12-8'

Lab Sample ID: 310-133002-6

Date Collected: 06/20/18 00:00

Matrix: Solid

Date Received: 06/21/18 09:55

### Method: OA-1 (GC) - Volatile Petroleum Hydrocarbons (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	29.0		1.91		mg/Kg		06/22/18 12:55	06/24/18 02:02	20
Toluene	346		1.91		mg/Kg		06/22/18 12:55	06/24/18 02:02	20
Ethylbenzene	134		1.91		mg/Kg		06/22/18 12:55	06/24/18 02:02	20
Xylenes, Total	654		5.73		mg/Kg		06/22/18 12:55	06/24/18 02:02	20
TPH (as Gasoline)	6840		191		mg/Kg		06/22/18 12:55	06/24/18 02:02	20
Methyl tert-butyl ether	<9.55		9.55		mg/Kg		06/22/18 12:55	06/24/18 02:02	20

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	97		48 - 150	06/22/18 12:55	06/24/18 02:02	20

TestAmerica Cedar Falls

## Definitions/Glossary

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

### Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
$\alpha$	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

## Surrogate Summary

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

**Method: OA-1 (GC) - Volatile Petroleum Hydrocarbons (GC)**

**Matrix: Solid**

**Prep Type: Total/NA**

### Percent Surrogate Recovery (Acceptance Limits)

Lab Sample ID	Client Sample ID	BFB (48-150)
310-133002-1	#3-12'	89
310-133002-2	#6-8'	89
310-133002-3	#7-13'	87
310-133002-4	#8-8'	84
310-133002-5	#11-13'	80
310-133002-6	#12-8'	97
LCS 310-207393/2-A	Lab Control Sample	93
LCS 310-207393/3-A	Lab Control Sample	91
LCS 310-207852/2-A	Lab Control Sample	98
LCS 310-207852/3-A	Lab Control Sample	96
LCSD 310-207852/24-A	Lab Control Sample Dup	99
MB 310-207393/1-A	Method Blank	80
MB 310-207852/1-A	Method Blank	87

#### Surrogate Legend

BFB = 4-Bromofluorobenzene (Surr)

## QC Sample Results

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

### Method: OA-1 (GC) - Volatile Petroleum Hydrocarbons (GC)

Lab Sample ID: MB 310-207393/1-A

Matrix: Solid

Analysis Batch: 207415

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 207393

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	<0.0977		0.0977		mg/Kg		06/22/18 12:55	06/23/18 10:40	1
Toluene	<0.0977		0.0977		mg/Kg		06/22/18 12:55	06/23/18 10:40	1
Ethylbenzene	<0.0977		0.0977		mg/Kg		06/22/18 12:55	06/23/18 10:40	1
Xylenes, Total	<0.293		0.293		mg/Kg		06/22/18 12:55	06/23/18 10:40	1
TPH (as Gasoline)	<9.77		9.77		mg/Kg		06/22/18 12:55	06/23/18 10:40	1
Methyl tert-butyl ether	<0.489		0.489		mg/Kg		06/22/18 12:55	06/23/18 10:40	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	80		48 - 150	06/22/18 12:55	06/23/18 10:40	1

Lab Sample ID: LCS 310-207393/2-A

Matrix: Solid

Analysis Batch: 207415

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 207393

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Benzene	3.81	4.270		mg/Kg		112	80 - 124
Toluene	3.81	4.266		mg/Kg		112	80 - 123
Ethylbenzene	3.81	4.211		mg/Kg		111	80 - 125
Xylenes, Total	11.4	13.20		mg/Kg		116	79 - 123
Methyl tert-butyl ether	3.81	4.526		mg/Kg		119	72 - 139

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	93		48 - 150

Lab Sample ID: LCS 310-207393/3-A

Matrix: Solid

Analysis Batch: 207415

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 207393

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
TPH (as Gasoline)	48.7	52.86		mg/Kg		109	53 - 150

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	91		48 - 150

Lab Sample ID: MB 310-207852/1-A

Matrix: Solid

Analysis Batch: 207822

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 207852

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	<0.0994		0.0994		mg/Kg		06/27/18 11:45	06/27/18 12:46	1
Toluene	<0.0994		0.0994		mg/Kg		06/27/18 11:45	06/27/18 12:46	1
Ethylbenzene	<0.0994		0.0994		mg/Kg		06/27/18 11:45	06/27/18 12:46	1
Xylenes, Total	<0.298		0.298		mg/Kg		06/27/18 11:45	06/27/18 12:46	1
TPH (as Gasoline)	<9.94		9.94		mg/Kg		06/27/18 11:45	06/27/18 12:46	1
Methyl tert-butyl ether	<0.497		0.497		mg/Kg		06/27/18 11:45	06/27/18 12:46	1

TestAmerica Cedar Falls

## QC Sample Results

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

### Method: OA-1 (GC) - Volatile Petroleum Hydrocarbons (GC) (Continued)

Lab Sample ID: MB 310-207852/1-A  
Matrix: Solid  
Analysis Batch: 207822

Client Sample ID: Method Blank  
Prep Type: Total/NA  
Prep Batch: 207852

Surrogate	MB MB %Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	87		48 - 150	06/27/18 11:45	06/27/18 12:46	1

Lab Sample ID: LCS 310-207852/2-A  
Matrix: Solid  
Analysis Batch: 207822

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 207852  
%Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
Benzene	3.92	4.217		mg/Kg		108	80 - 124
Toluene	3.92	4.087		mg/Kg		104	80 - 123
Ethylbenzene	3.92	3.935		mg/Kg		100	80 - 125
Xylenes, Total	11.8	12.44		mg/Kg		106	79 - 123
Methyl tert-butyl ether	3.92	4.576		mg/Kg		117	72 - 139

Surrogate	LCS LCS %Recovery	Qualifier	Limits
4-Bromofluorobenzene (Surr)	98		48 - 150

Lab Sample ID: LCS 310-207852/3-A  
Matrix: Solid  
Analysis Batch: 207822

Client Sample ID: Lab Control Sample  
Prep Type: Total/NA  
Prep Batch: 207852  
%Rec.

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	Limits
TPH (as Gasoline)	49.4	47.55		mg/Kg		96	53 - 150

Surrogate	LCS LCS %Recovery	Qualifier	Limits
4-Bromofluorobenzene (Surr)	96		48 - 150

Lab Sample ID: LCSD 310-207852/24-A  
Matrix: Solid  
Analysis Batch: 207822

Client Sample ID: Lab Control Sample Dup  
Prep Type: Total/NA  
Prep Batch: 207852  
%Rec. RPD

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	Limits	RPD	Limit
Benzene	3.79	4.018		mg/Kg		106	80 - 124	5	10
Toluene	3.79	3.973		mg/Kg		105	80 - 123	3	13
Ethylbenzene	3.79	3.762		mg/Kg		99	80 - 125	4	12
Xylenes, Total	11.4	11.90		mg/Kg		105	79 - 123	4	16
Methyl tert-butyl ether	3.79	4.136		mg/Kg		109	72 - 139	10	13

Surrogate	LCSD LCSD %Recovery	Qualifier	Limits
4-Bromofluorobenzene (Surr)	99		48 - 150

TestAmerica Cedar Falls

## QC Association Summary

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

### GC VOA

#### Prep Batch: 207393

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-133002-1	#3-12'	Total/NA	Solid	5035	
310-133002-3	#7-13'	Total/NA	Solid	5035	
310-133002-4	#8-8'	Total/NA	Solid	5035	
310-133002-5	#11-13'	Total/NA	Solid	5035	
310-133002-6	#12-8'	Total/NA	Solid	5035	
MB 310-207393/1-A	Method Blank	Total/NA	Solid	5035	
LCS 310-207393/2-A	Lab Control Sample	Total/NA	Solid	5035	
LCS 310-207393/3-A	Lab Control Sample	Total/NA	Solid	5035	

#### Analysis Batch: 207415

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-133002-1	#3-12'	Total/NA	Solid	OA-1 (GC)	207393
310-133002-3	#7-13'	Total/NA	Solid	OA-1 (GC)	207393
310-133002-4	#8-8'	Total/NA	Solid	OA-1 (GC)	207393
310-133002-5	#11-13'	Total/NA	Solid	OA-1 (GC)	207393
310-133002-6	#12-8'	Total/NA	Solid	OA-1 (GC)	207393
MB 310-207393/1-A	Method Blank	Total/NA	Solid	OA-1 (GC)	207393
LCS 310-207393/2-A	Lab Control Sample	Total/NA	Solid	OA-1 (GC)	207393
LCS 310-207393/3-A	Lab Control Sample	Total/NA	Solid	OA-1 (GC)	207393

#### Analysis Batch: 207822

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-133002-2	#6-8'	Total/NA	Solid	OA-1 (GC)	207852
MB 310-207852/1-A	Method Blank	Total/NA	Solid	OA-1 (GC)	207852
LCS 310-207852/2-A	Lab Control Sample	Total/NA	Solid	OA-1 (GC)	207852
LCS 310-207852/3-A	Lab Control Sample	Total/NA	Solid	OA-1 (GC)	207852
LCSD 310-207852/24-A	Lab Control Sample Dup	Total/NA	Solid	OA-1 (GC)	207852

#### Prep Batch: 207852

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-133002-2	#6-8'	Total/NA	Solid	5035	
MB 310-207852/1-A	Method Blank	Total/NA	Solid	5035	
LCS 310-207852/2-A	Lab Control Sample	Total/NA	Solid	5035	
LCS 310-207852/3-A	Lab Control Sample	Total/NA	Solid	5035	
LCSD 310-207852/24-A	Lab Control Sample Dup	Total/NA	Solid	5035	

# Lab Chronicle

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

**Client Sample ID: #3-12'**

Date Collected: 06/19/18 00:00

Date Received: 06/21/18 09:55

**Lab Sample ID: 310-133002-1**

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			207393	06/22/18 12:55	CMM	TAL CF
Total/NA	Analysis	OA-1 (GC)		1	207415	06/24/18 00:07	CMM	TAL CF

**Client Sample ID: #6-8'**

Date Collected: 06/19/18 00:00

Date Received: 06/21/18 09:55

**Lab Sample ID: 310-133002-2**

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			207852	06/27/18 11:45	CMM	TAL CF
Total/NA	Analysis	OA-1 (GC)		5	207822	06/28/18 02:56	CMM	TAL CF

**Client Sample ID: #7-13'**

Date Collected: 06/19/18 00:00

Date Received: 06/21/18 09:55

**Lab Sample ID: 310-133002-3**

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			207393	06/22/18 12:55	CMM	TAL CF
Total/NA	Analysis	OA-1 (GC)		1	207415	06/23/18 20:17	CMM	TAL CF

**Client Sample ID: #8-8'**

Date Collected: 06/19/18 00:00

Date Received: 06/21/18 09:55

**Lab Sample ID: 310-133002-4**

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			207393	06/22/18 12:55	CMM	TAL CF
Total/NA	Analysis	OA-1 (GC)		1	207415	06/23/18 23:29	CMM	TAL CF

**Client Sample ID: #11-13'**

Date Collected: 06/20/18 00:00

Date Received: 06/21/18 09:55

**Lab Sample ID: 310-133002-5**

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			207393	06/22/18 12:55	CMM	TAL CF
Total/NA	Analysis	OA-1 (GC)		1	207415	06/23/18 20:55	CMM	TAL CF

**Client Sample ID: #12-8'**

Date Collected: 06/20/18 00:00

Date Received: 06/21/18 09:55

**Lab Sample ID: 310-133002-6**

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5035			207393	06/22/18 12:55	CMM	TAL CF
Total/NA	Analysis	OA-1 (GC)		20	207415	06/24/18 02:02	CMM	TAL CF

TestAmerica Cedar Falls



## Lab Chronicle

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

### Laboratory References:

TAL CF = TestAmerica Cedar Falls, 704 Enterprise Drive, Cedar Falls, IA 50613, TEL (319)277-2401

## Accreditation/Certification Summary

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

### Laboratory: TestAmerica Cedar Falls

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
AIHA-LAP, LLC	IHLAP		101044	11-01-18
Georgia	State Program	4	IA100001 (OR)	09-29-18
Illinois	NELAP	5	200024	11-29-18
Iowa	State Program	7	007	12-01-19
Kansas	NELAP	7	E-10341	01-31-19
Minnesota	NELAP	5	019-999-319	12-31-18
Minnesota (Petrofund)	State Program	1	3349	08-22-18
North Dakota	State Program	8	R-186	09-29-18
Oregon	NELAP	10	IA100001	09-29-18

## Method Summary

Client: GeoTek Engineering & Testing Services  
Project/Site: Casey's General Store #1170

TestAmerica Job ID: 310-133002-1  
SDG: 18-775

Method	Method Description	Protocol	Laboratory
OA-1 (GC)	Volatile Petroleum Hydrocarbons (GC)	Iowa DNR	TAL CF
5035	Purge and Trap for Methanol Extractions	SW846	TAL CF

### Protocol References:

Iowa DNR = Iowa Department of Natural Resources

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

### Laboratory References:

TAL CF = TestAmerica Cedar Falls, 704 Enterprise Drive, Cedar Falls, IA 50613, TEL (319)277-2401

**Hayes, Shawn M.**

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**From:** Muehling, Angela  
**Sent:** Thursday, June 21, 2018 10:43 AM  
**To:** Cedar Falls - Sample Receiving  
**Cc:** Bovy, Lorraine L.; Hayes, Shawn M.  
**Subject:** FW: Casey's General Store #1170  
**Attachments:** SCEDPRN0218052110370.pdf

This is for the job we received today. Please log in for the below analyses.

**SHIPPING ALERT: Independence Day, Wednesday July 4<sup>th</sup> 2018**

For the upcoming Independence Day holiday (observed Wednesday, July 4<sup>th</sup>) FedEx and UPS will not have scheduled service on Wednesday July 4<sup>th</sup>.

If you have BOD samples or any short hold samples arriving over the weekend or being delivered Monday July 2<sup>nd</sup> or Tuesday July 3<sup>rd</sup> we ask that you contact your Project Manager in advance to ensure your samples meet all holding time criteria.

We are thankful for your business and hope that you have a wonderful and safe holiday!

**ANGELA MUEHLING**  
Project Manager

**TestAmerica**  
THE LEADER IN ENVIRONMENTAL TESTING  
  
704 Enterprise Drive  
Cedar Falls, IA 50613  
Tel 319.277.2401 | Fax 319.277.2425  
[www.testamericainc.com](http://www.testamericainc.com)

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**From:** Jerry Zutz [<mailto:JZutz@geotekeng.com>]  
**Sent:** Thursday, June 21, 2018 10:42 AM  
**To:** Muehling, Angela  
**Subject:** RE: Casey's General Store #1170

**-External Email-**

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Sorry, We need BETX, MTBE, & TPH as gasoline.

Thanks.

Jerry Zutz  
GeoTek

**From:** Muehling, Angela [<mailto:Angela.Muehling@testamericainc.com>]  
**Sent:** June 21, 2018 10:40 AM  
**To:** Jerry Zutz <[JZutz@geotekeng.com](mailto:JZutz@geotekeng.com)>  
**Cc:** Bovy, Lorraine L. <[Lorraine.bovy@TestAmericainc.com](mailto:Lorraine.bovy@TestAmericainc.com)>  
**Subject:** Casey's General Store #1170

Good Morning Jerry,

Attached is the COC for the Casey's General Store #1170 project. No analyses are listed on the COC for any of the soil samples. Please let me know what analyses are needed for this job at your earliest convenience.

Thank you,  
Angie

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**ANGELA MUEHLING**  
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### Cooler/Sample Receipt and Temperature Log Form

<b>Client Information</b>			
Client: <u>Qeotek Engineering</u>			
City/State: <u>Salt Lake City</u>		Project: <u>Casey's General</u>	
<b>Receipt Information</b>			
Date/Time Received: <u>6/21/18 9:55</u>		Received By: <u>HM</u>	
Delivery Type: <input type="checkbox"/> UPS <input checked="" type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> TA Courier <input type="checkbox"/> TA Field Services <input type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____			
<b>Condition of Cooler/Containers</b>			
Sample(s) received in Cooler?		If yes: Cooler ID:	
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No			
Multiple Coolers?		If yes: Cooler # ____ of ____	
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Cooler Custody Seals Present?		If yes: Cooler custody seals intact?	
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Sample Custody Seals Present?		If yes: Sample custody seals intact?	
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		<input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank Present?		If yes: Which VOA samples are in cooler? ↓	
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
<b>Temperature Record</b>			
Coolant: <input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE			
Thermometer ID: <u>K</u>		Correction Factor (°C): <u>+0.0</u>	
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C): <u>5.5</u>		Corrected Temp (°C): <u>5.5</u>	
• Sample Container Temperature			
Container type(s) used:			
Uncorrected Temp (°C):		Corrected Temp (°C):	
<b>Exceptions Noted</b>			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No			
a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No			
NOTE: If yes, contact PM before proceeding. If no, proceed with login			
<b>Additional Comments</b>			

Phone: 319 - 277 - 2401 or 1 - 800 - 750 - 2401  
Fax: 319 - 277 - 2425

Your PO #:

Invoice To:

Project Name: Casey's General Store #1170

Project Number: 18-775

Fax: 605-335-0773

Email Address: zyt2 @geotekeng.com

(Signature) James J. [illegible]

Email Address: zyt2 @geotekeng.com

[illegible]

## Login Sample Receipt Checklist

Client: GeoTek Engineering & Testing Services

Job Number: 310-133002-1

SDG Number: 18-775

Login Number: 133002

List Source: TestAmerica Cedar Falls

List Number: 1

Creator: Meisheid, Heidi N

Question	Answer	Comment
Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



## **APPENDIX B**

## METHODS

### DECONTAMINATION

Prior to mobilization of the drill rig, the down-hole drilling equipment and associated tools are steam cleaned. Additionally, the down-hole drilling equipment and associated tools are steam cleaned after each boring where contamination is encountered. Also, the split barrel sampler is washed with a tri-sodium phosphate solution and rinsed in potable water after each contaminated sample.

### SOIL BORING AND SAMPLING

The boreholes are advanced with a truck-mounted, rotary, drill rig using flight auger or hollow stem auger drilling methods. Flight auger and hollow stem auger soil samples are obtained directly from the auger flights during drilling. Split barrel soil samples are obtained by advancing a 2" outside diameter split barrel sampler into the soil a distance of 2 1/2'.

Soil samples for field petroleum vapor scanning are placed in clean, 8 oz. glass jars covered with aluminum foil, and sealed with lids. Sample jar identification labels are completed indicating the job number, boring number, sample number, sample depth, date sampled, and the sampling personnel's initials.

Soil samples for laboratory chemical analysis are placed in laboratory provided containers. Sample container identification labels are completed indicating the job number, sample location, boring number, boring depth, date sampled, analysis required, and sampling personnel's initials.

### SOIL SAMPLE ORGANIC VAPOR SCANNING

The recovered soil samples are scanned with a photoionization detector (PID) equipped with a 10.2 eV lamp. The instrument is calibrated for direct readings in parts per million (ppm) of benzene. The instrument has a reported accuracy range under ideal operating conditions of 1 to 2000 ppm.

Following a minimum 10-minute delay after sample collection, the jar is agitated and the PID probe is used to penetrate the aluminum foil following removal of the sample jar lid. The peak reading (usually within 10 seconds) is recorded on the identification label. Samples obtained during unfavorable weather conditions (below 40°F or during precipitation) are warmed and stored in a vehicle or building prior to taking PID readings.

### MONITORING WELL DEVELOPMENT

Monitoring well development is performed with dedicated bottom loading bailers. The wells are bailed until relatively sediment free water is produced or until the well became dry. Groundwater level data and sampling information forms are completed during development.

### MONITORING WELL EVACUATION AND WATER QUALITY SAMPLING

Stagnant water is evacuated from the wells prior to water quality sampling using a dedicated bottom loading bailer. Water is bailed from the well until three well volumes were removed or until the well becomes dry. Groundwater level data and sampling information forms are completed during sampling.

### WATER LEVELS

Water levels in monitoring wells are obtained by using a water level meter (dip meter). The meter consists of a stainless steel electrode or a brass plated probe connected to a polyethylene flap tape (permanently marked to 1/20 of a foot) containing two stainless steel conductors. The probe is lowered into the monitoring well and, when contact is made with the water, the circuit is completed activating a clearly audible buzzer. The distance between the water surface and the top of the riser is measured using the flat tape. All measurements are reported to the nearest 0.01 foot.

### PRODUCT THICKNESS

Product thickness in monitoring wells is obtained by using an oil-water interface gauge. The gauge consists of a sonic probe connected to a gauging tape (permanently marked to 1/32 of a foot). The probe is lowered into the monitoring well and when the gap in the sonic probe is fully immersed in product, a continuous audible signal will be heard. The distance between the air/product and product/water interfaces and the top of riser is measured using the gauging tape. The product thickness is then determined by subtraction and air/product and product/water interface measurements. All measurements are reported to the nearest 0.01'.

### WATER QUALITY SAMPLING

Stagnant water in the wells is removed prior to water quality sampling by using a dedicated, bottom loading bailer. Water is bailed from the well until a minimum of three well volumes are removed or until the well becomes dry. Groundwater level data and sampling information forms are then completed during sampling.

Water quality samples are obtained using the dedicated, bottom loading bailers. Volatile samples are transferred directly from the bailers into laboratory provided, 40 milliliter, purge and trap vials. Semi-volatile samples are collected in laboratory provided containers. Sample container identification labels are then completed indicating the job number, sample location, date sampled, analysis required, and sampling personnel's initials.

### CHAIN OF CUSTODY

Analytical sample information is recorded on a chain of custody form following sample collection. The chain of custody record accompanies the samples during transit back to GeoTek's office, during storage, and during any subsequent shipment to a contract laboratory. A copy of the record is always kept by GeoTek. Upon completion of the laboratory analysis, the completed chain of custody record is returned to GeoTek.