HEP SHALEWATER SOLUTIONS

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FOR THE:
MORRIS FACILITY

PERMIT DETERMINATION FORM
WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY

HARRISON COUNTY, WEST VIRGINIA

PREPARED BY:
HULL & ASSOCIATES, INC.
6397 EMERALD PARKWAY, SUITE 200
DUBLIN, OH 43016

MAY 2016

HULL

MAY 2016
SHW009.300.0002

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PERMIT DETERMINATION FORM

WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF AIR QUALITY
601 57th Street, SE
Charleston, WV 25304
Phone: (304) 926-0475
www.dep.wv.gov/daq

PERMIT DETERMINATION FORM (PDF)

FOR AGENCY USE ONLY: PLANT I.D. # _____

PDF # _____ PERMIT WRITER: _____

1. NAME OF APPLICANT (AS REGISTERED WITH THE WV SECRETARY OF STATE'S OFFICE):
HEP-Shalewater Solutions

2. NAME OF FACILITY (IF DIFFERENT FROM ABOVE):
Morris Facility

3. NORTH AMERICAN INDUSTRY CLASSIFICATION SYSTEM (**NAICS**) CODE:
213112

4A. MAILING ADDRESS:
37 Grande Meadows Dr, St 201
Bridgeport, WV 26330

4B. PHYSICAL ADDRESS:
Sardis-Katy Lick Run
Reynoldsville, WV

5A. DIRECTIONS TO FACILITY (PLEASE PROVIDE **MAP** AS **ATTACHMENT A**):
Exit Route 50-West to Wilsonburg Rd by way of TR-5040. Travel Northwest on Wilsonburg Rd 1.5 miles, then take a right on CR-7 (Sardis-Katy Lick Run). Facility is located 1 mile North on CR-7.

5B. NEAREST ROAD:
CR-7 (Sardis-Katy Lick Run)

5C. NEAREST CITY OR TOWN:
Reynoldsville

5D. COUNTY:
Harrison

5E. UTM NORTHING (KM):
4350.528

5F. UTM EASTING (KM):
548.929

5G. UTM ZONE:
17 S

6A. INDIVIDUAL TO CONTACT IF MORE INFORMATION IS REQUIRED:
Ryan Hall

6B. TITLE:
Technical Director

6C. TELEPHONE:
724-289-7475

6D. FAX:
N/A

6E. E-MAIL:
rhall@shalewater.com

7A. DAQ PLANT I.D. NO. (FOR AN EXISTING FACILITY ONLY):
___ ___ ___ - ___ ___ ___ ___ ___

7B. PLEASE LIST ALL CURRENT 45CSR13, 45CSR14, 45CSR19 AND/OR TITLE V (45CSR30) PERMIT NUMBERS ASSOCIATED WITH **THIS** PROCESS (FOR AN EXISTING FACILITY ONLY):
N/A

7C. IS THIS PDF BEING SUBMITTED AS THE RESULT OF AN ENFORCEMENT ACTION? IF YES, PLEASE LIST:
YES

8A. TYPE OF EMISSION SOURCE (CHECK ONE):
☐ **NEW SOURCE** ☐ **ADMINISTRATIVE UPDATE**
☐ **MODIFICATION** ☒ **OTHER** (PLEASE EXPLAIN IN 11B)

8B. IF ADMINISTRATIVE UPDATE, DOES DAQ HAVE THE APPLICANT'S CONSENT TO UPDATE THE EXISTING PERMIT WITH THE INFORMATION CONTAINED HEREIN?
☐ **YES** ☐ **NO**

9. IS *DEMOLITION* OR PHYSICAL *RENOVATION* AT AN EXISTING FACILITY INVOLVED? ☐ **YES** ☒ **NO**

10A. DATE OF ANTICIPATED INSTALLATION OR CHANGE:
____/____/20__.

10B. DATE OF ANTICIPATED START-UP:
____/____/20__.

11A. PLEASE PROVIDE A **DETAILED PROCESS FLOW DIAGRAM** SHOWING EACH PROPOSED OR MODIFIED PROCESS EMISSION POINT AS **ATTACHMENT B**.

11B. PLEASE PROVIDE A **DETAILED PROCESS DESCRIPTION** AS **ATTACHMENT C**.

12. PLEASE PROVIDE **MATERIAL SAFETY DATA SHEETS (MSDS)** FOR ALL MATERIALS PROCESSED, USED OR PRODUCED AS **ATTACHMENT D**. FOR CHEMICAL PROCESSE, PLEASE PROVIDE A MSDS FOR EACH COMPOUND EMITTED TO AIR.

13A. **REGULATED AIR POLLUTANT EMISSIONS:**

⇒ **FOR A NEW FACILITY,** PLEASE PROVIDE PLANT WIDE EMISSIONS BASED ON THE POTENTIAL TO EMIT (PTE) FOR THE FOLLOWING AIR POLLUTANTS INCLUDING ALL PROCESSES.

⇒ **FOR AN EXISTING FACILITY,** PLEASE PROVIDE THE PROPOSED CHANGE IN EMISSIONS BASED ON THE PTE OF ALL PROCESS CHANGES FOR THE FOLLOWING AIR POLLUTANTS.

PTE FOR A GIVEN POLLUTANT IS TYPICALLY BEFORE AIR POLLUTION CONTROL DEVICES AND IS COLLECTED BASED ON THE MAXIMUM DESIGN CAPACITY OF PROCESS EQUIPMENT.

POLLUTANT	HOURLY PTE (LB/HR)	YEARLY PTE (TON/YR) (HOURLY PTE MULTIPLIED BY HR/YR) DIVIDED BY 2000 LB/TON
PM	2.6	11.3
PM_{10}	0.64	2.8
VOCs	0.18	0.8
CO	3.8	16.8
NO_x	2.3	9.8
SO_2	0	0
Pb	0	0
HAPs (AGGREGATE AMOUNT)	0.004	0.019
TAPs - BENZENE	0.001	.009
OTHER (INDIVIDUALLY)*	0	0

* ATTACH ADDITIONAL PAGES AS NEEDED

13B. PLEASE PROVIDE ALL **SUPPORTING CALCULATIONS** AS **ATTACHMENT E.**

CALCULATE AN HOURLY AND YEARLY PTE OF EACH PROCESS EMISSION POINT (SHOWN IN YOUR DETAILED PROCESS FLOW DIAGRAM) FOR ALL AIR POLLUTANTS LISTED ABOVE INCLUDING INDIVIDUAL HAP'S (LISTED IN SECTION 112[b] OF THE 1990 CAAA), TAP'S (LISTED IN 45CSR27), AND OTHER AIR POLLUTANTS (E.G. POLLUTANTS LISTED IN TABLE 45-13A OF 45CSR13, MINERAL ACIDS PER 45CSR7, ETC.).

14. **CERTIFICATION OF DATA**

I, Anthony Gutta (*TYPE NAME*) ATTEST THAT ALL THE REPRESENTATIONS CONTAINED IN THIS APPLICATION, OR APPENDED HERETO, ARE TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE BASED ON INFORMATION AND BELIEF AFTER REASONABLE INQUIRY, AND THAT I AM A ***RESPONSIBLE OFFICIAL*** (*PRESIDENT, VICE PRESIDENT, SECRETARY OR TREASURER, GENERAL PARTNER OR SOLE PROPRIETOR*) OF THE APPLICANT.

SIGNATURE OF RESPONSIBLE OFFICIAL: [signature]

TITLE: NE President DATE: 5 / 20 / 2016

** THE DEFINITION OF THE PHRASE '***RESPONSIBLE OFFICIAL***' CAN BE FOUND AT 45CSR13, SECTION 2.23.

NOTE: PLEASE CHECK ENCLOSED ATTACHMENTS

☒ **ATTACHMENT A** ☒ **ATTACHMENT B** ☒ **ATTACHMENT C** ☒ **ATTACHMENT D** ☒ **ATTACHMENT E**

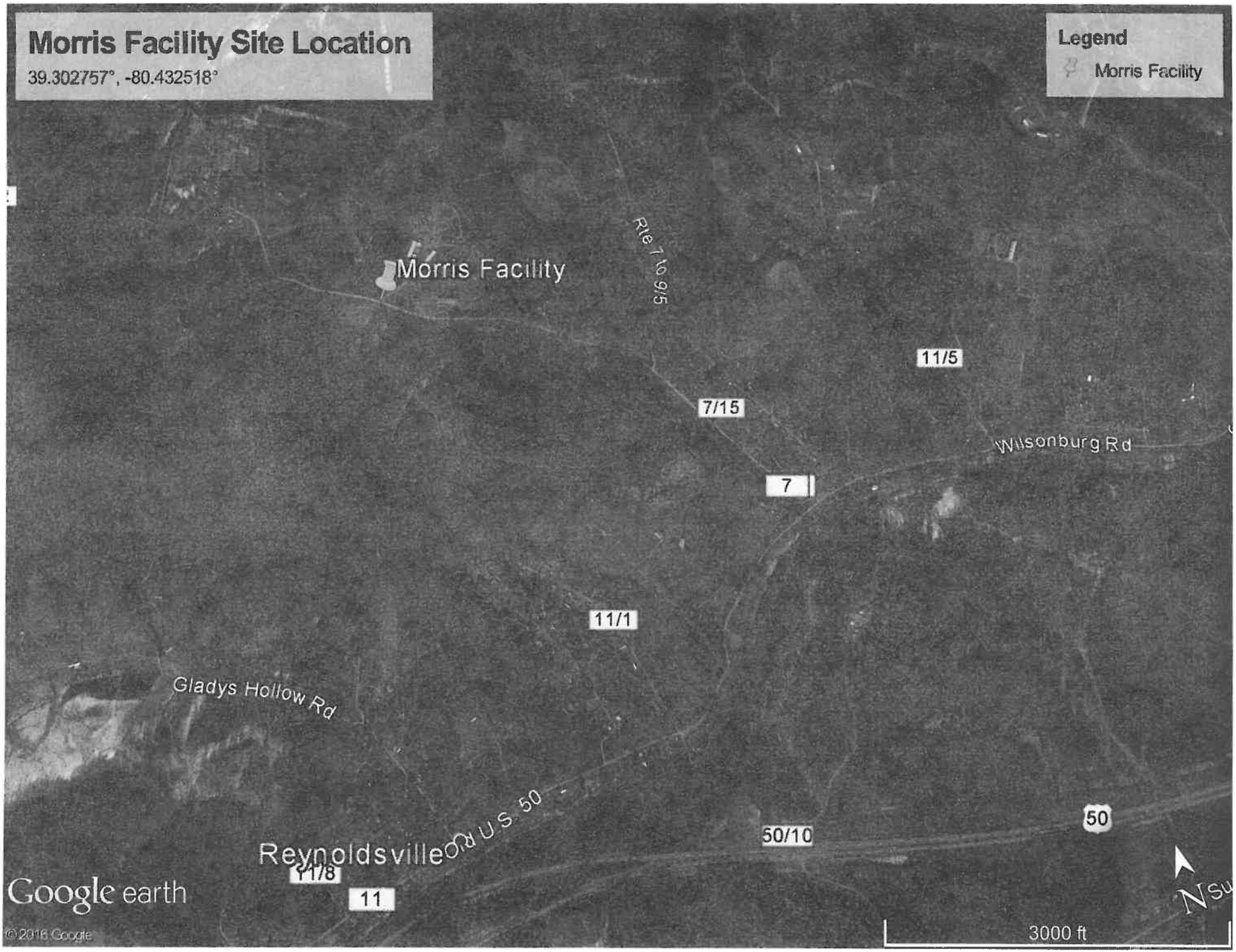
RECORDS ON ALL CHANGES ARE REQUIRED TO BE KEPT AND MAINTAINED ON-SITE FOR TWO (2) YEARS.

THE PERMIT DETERMINATION FORM WITH THE INSTRUCTIONS CAN BE FOUND ON DAQ'S PERMITTING SECTION WEB SITE:

www.dep.wv.gov/daq

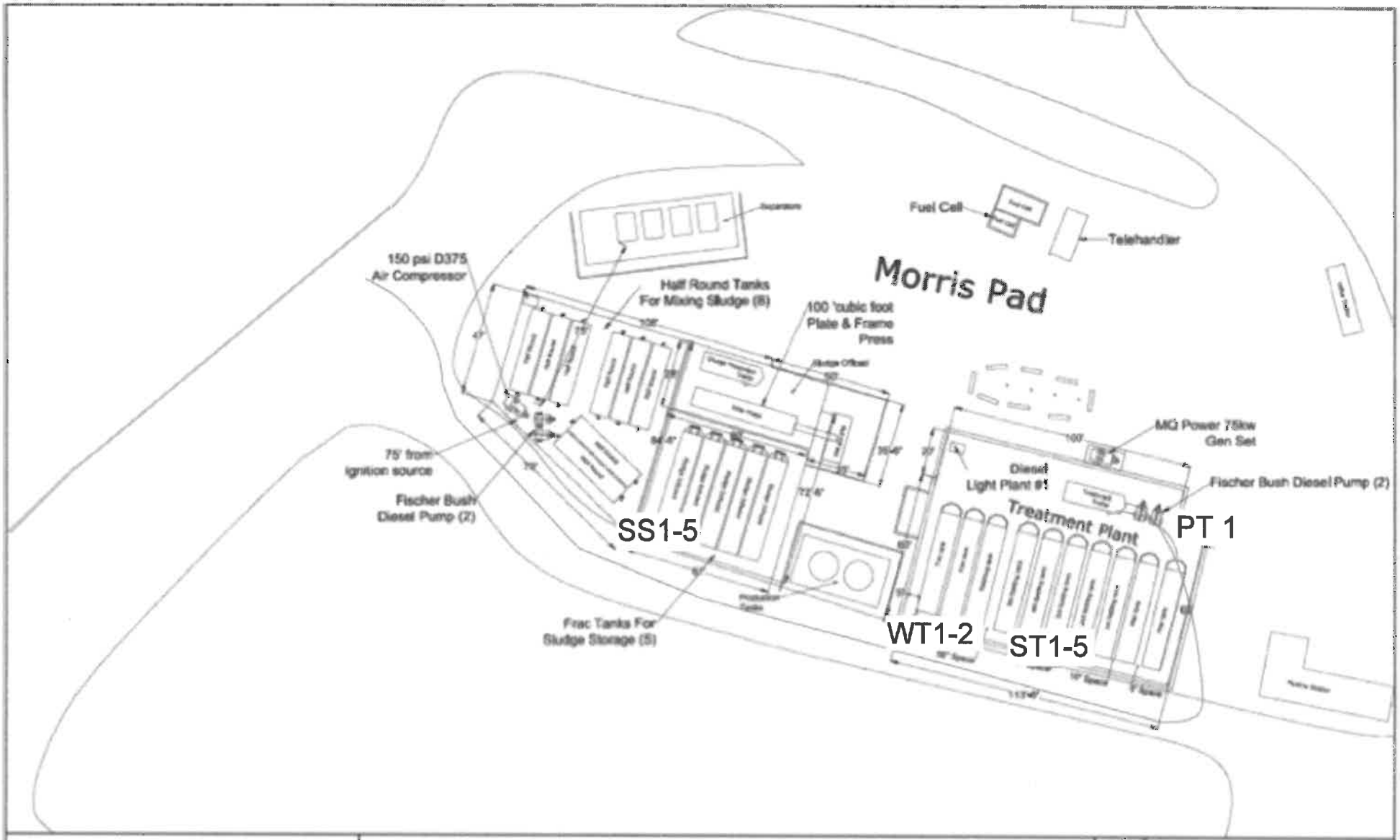
ATTACHMENT A-1

Site Map


Morris Facility Site Location
39.302757°, -80.432518°
Legend
Morris Facility
Morris Facility
Rte 7 to 9/5
11/5
7/15
Wilsonburg Rd
7
11/1
Gladys Hollow Rd
U.S. 50
50/10
50
Reynoldsville
11/8
11
Google earth
© 2016 Google
3000 ft

ATTACHMENT A-2

Facility Plan



Morris Pad Layout

SCALE: NONE	DRAWN BY: J. LAFFERRE	CHK BY:	APPRVD. BY:
PLOT DATE: 11 MAY 2016 - 3:56 PM	FILE NAME:		

HILLSTONE ENVIRONMENTAL

37 GRAND MEADOWS DR.
STE 201
BRIDGEPORT, WV 26330
PH: 304.592.2794 WWW.SHALEWATER.COM

ATTACHMENT B

Process Description

Attachment B – Morris Facility Process Description

Waters typically high in Total Suspended Solids (TSS) generated by Oil and Gas Exploration and Production activities are transferred by means of a diesel powered pump from the client's influent storage system into Hillstone Environmental's process for toll treatment. The pump introduces the water into a treatment trailer where coagulant is added and mixed with the aid of static mixers. The water then moves through the initial weir tank (WT-1) where a second diesel pump takes the water back into the trailer where the pH is adjusted and a flocculant is added. All chemistry is delivered and stored in totes within secondary containment. The chemistry is added to 300 gallon day tanks and metered into the treatment stream.

The water then flows into the second weir tank (WT-2) and then to a series of five settling tanks (ST1-ST5) allowing sufficient residence time for the solids to settle out. From there the water flows to a final polishing tank (ET1) where trucks pump the water and take it off site for reuse at oil and gas facilities.

Periodically as sludge builds up in the system it is pumped to a dewatering operation. A diesel pump will transfer the sludge from one of the five storage tanks (SI1-SI5) through a treatment trailer where a sludge conditioning agent is added. This will be transferred by a second diesel pump into one of 8 half rounds to allow contact time and then introduced into a one hundred cubic foot plate and frame press. The press is operated by a 150PSI diesel air compressor. Once dewatered the filtrate is collected and taken off site by water trucks for reuse at oil and gas facilities. The dry cake is conveyed into a roll off box and landfilled.

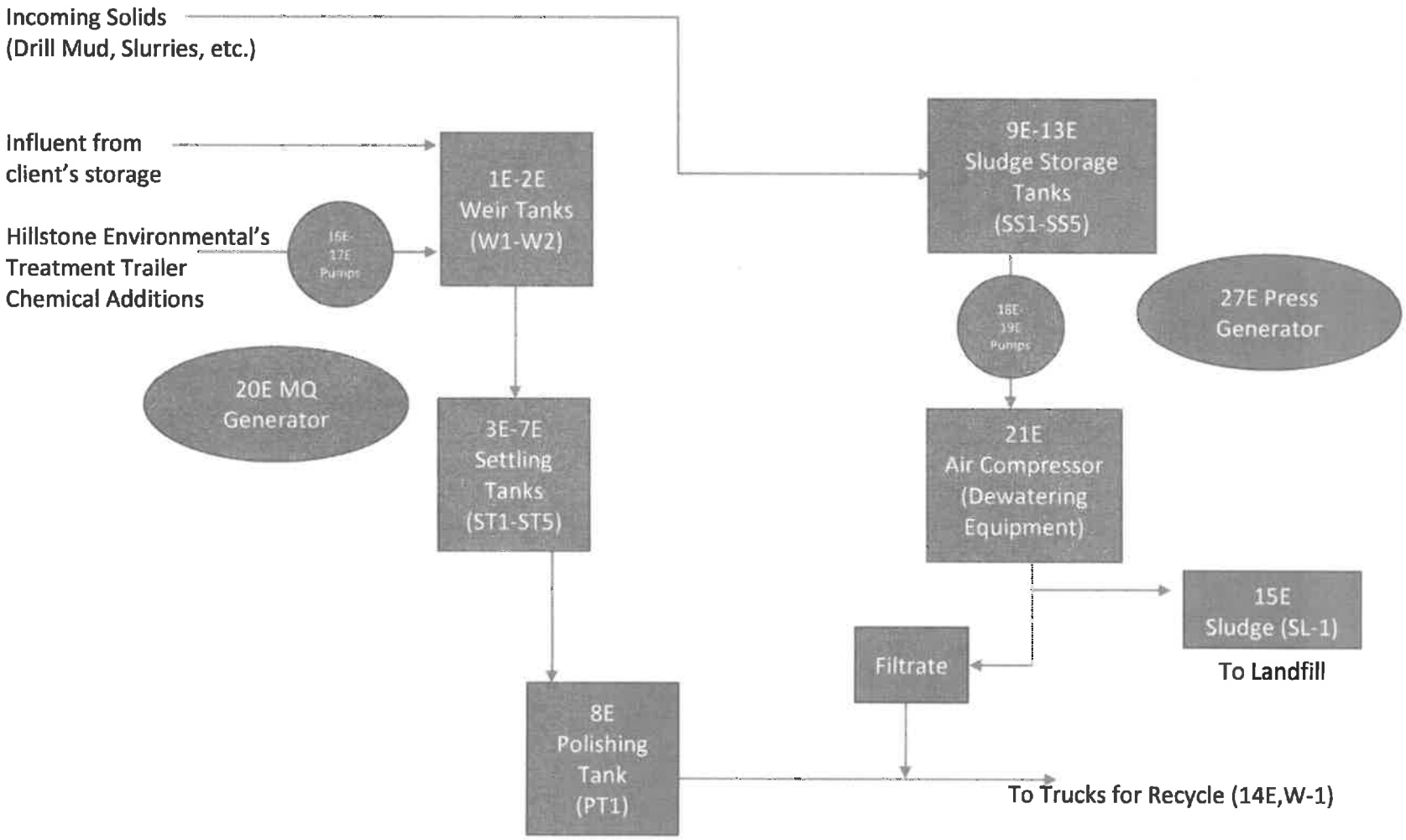
In addition, high solids content slurries may be sent directly to the press and bypass the water treatment operation.

All diesel engines associated with our process are certified engines and the Certificates of Conformity are attached.

ATTACHMENT C

Process Flow Diagram

Attachment C – Morris Facility Process Flow Diagram



ATTACHMENTS D-1 through D-4

Safety Data Sheets

ATTACHMENT D-1

SAFETY DATA SHEET

1. Identification

Product identifier	**Sodium Hydroxide Solutions**
Other means of identification	Not available.
Synonyms	Caustic Soda, Caustic Alkali, Lye, Caustic Soda Liquid 50%, Soda Lye, Liquid Caustic, Sodium Hydrate
Recommended use	Pulping and bleaching, pH neutralizer, welding, detergent
Recommended restrictions	None known.

Manufacturer / Importer / Supplier / Distributor information

Company name	KA Steel Chemicals, Inc	
Address	15185 Main Street Lemont, IL 60439	
Telephone	630-257-3900	
E-mail	http://www.kasteelchemicals.com/	
Contact person	SDS Review Group	
Emergency phone number	CHEMTREC	(US) 1-800-424-9300 (Canada) 1-800-567-7455

Distributed by:
SAL Chemical
3036 Birch Drive
Weirton, WV 26062
304-748-6200

2. Hazard(s) identification

Physical hazards	Corrosive to metals	Category 1
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 1
	Serious eye damage/eye irritation	Category 1
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	May be corrosive to metals. Harmful if swallowed. Causes severe skin burns and eye damage.
Precautionary statement	
Prevention	Wear protective gloves/protective clothing/eye protection/face protection. Do not breathe mist or vapor. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Keep only in original container.
Response	If swallowed: Rinse mouth. Do NOT induce vomiting. If inhaled: Remove person to fresh air and keep comfortable for breathing. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor/. Wash contaminated clothing before reuse. Absorb spillage to prevent material damage.
Storage	Store in corrosive resistant container with a resistant inner liner. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	Not classified.
Environmental hazards	Hazardous to the aquatic environment, acute hazard — Category 3

Supplemental information

Hazard statement	Harmful to aquatic life.
Precautionary statement	
Prevention	Avoid release to the environment.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Sodium hydroxide	1310-73-2	49 - 51
Sodium chloride	7647-14-5	< 1

4. First-aid measures

Inhalation

Move to fresh air. If breathing is difficult, give oxygen. If breathing stops, provide artificial respiration. Do not use mouth-to-mouth method if victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Call a physician or poison control center immediately.

Skin contact

Take off immediately all contaminated clothing. Wash off IMMEDIATELY with plenty of water for at least 15-20 minutes. Get medical attention immediately! Wash clothing separately before reuse. Destroy or thoroughly clean contaminated shoes.

Eye contact

Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a physician or poison control center immediately.

Ingestion

Call a physician or poison control center immediately. Do not induce vomiting. Immediately rinse mouth and drink plenty of water. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Never give anything by mouth to an unconscious person. Do not use mouth-to-mouth method if victim ingested the substance.

Most important symptoms/effects, acute and delayed

Burning pain and severe corrosive skin damage. Permanent eye damage including blindness could result. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Shortness of breath.

Indication of immediate medical attention and special treatment needed

Provide general supportive measures and treat symptomatically. Symptoms may be delayed. Keep victim under observation.

General information

In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media

Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2). Use extinguishing agent suitable for type of surrounding fire.

Unsuitable extinguishing media

Do not use a solid water stream as it may scatter and spread fire. Do not use halogenated extinguishing agents.

Specific hazards arising from the chemical

During fire, gases hazardous to health may be formed. The product itself does not burn. May decompose upon heating to produce corrosive and/or toxic fumes. Contact with metal may release flammable hydrogen gas.

Special protective equipment and precautions for firefighters

Fire fighters should enter the area only if they are protected from all contact with the material. Full protective clothing, including self-contained breathing apparatus, coat, pants, gloves, boots and bands around legs, arms, and waist, should be worn. No skin surface should be exposed. Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire-fighting equipment/instructions

In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk. Use water spray to cool unopened containers.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Ensure adequate ventilation. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Local authorities should be advised if significant spillages cannot be contained.

Methods and materials for containment and cleaning up

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb spill with inert material (e.g., dry sand or earth), then place in a chemical waste container. Following product recovery, flush area with water.

Small Spills: Absorb spill with vermiculite or other inert material. Clean surface thoroughly to remove residual contamination.

Never return spills in original containers for re-use. For waste disposal, see Section 13 of the SDS.

Environmental precautions

Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Use caution when combining with water; DO NOT add water to caustic; ALWAYS add caustic to water while stirring to minimize heat generation. Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Do not breathe mist or vapor. Use only with adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities	Keep container tightly closed. Store in a cool, dry, well-ventilated place. Store in corrosive resistant container with a resistant inner liner. Store away from incompatible materials (See Section 10). Do not allow material to freeze.

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Sodium hydroxide (CAS 1310-73-2)	PEL	2 mg/m3

US. ACGIH Threshold Limit Values

Components	Type	Value
Sodium hydroxide (CAS 1310-73-2)	Ceiling	2 mg/m3

US NIOSH Pocket Guide to Chemical Hazards: Ceiling Limit Value and Time Period (if specified)

Components	Type	Value
Sodium hydroxide (CAS 1310-73-2)	Ceiling	2 mg/m3

Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection	Wear chemical goggles and face shield.
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves.
Other	Wear appropriate chemical resistant clothing.
Respiratory protection	If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Respirator type: Chemical respirator with organic vapor cartridge and full facepiece.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	When using, do not eat, drink or smoke. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state	Liquid.
Form	Viscous liquid.
Color	Clear to light grey.
Odor	Odorless.
Odor threshold	Not available.
pH	14
Melting point/freezing point	50 - 53 °F (10 - 11.67 °C) (50% solution)
Initial boiling point and boiling range	266 - 284 °F (130 - 140 °C) (50% solution)
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not available.

Upper/lower flammability or explosive limits

Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.

Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	23.76 mm Hg (25°C/77°F)
Vapor density	Not available.
Relative density	1.53
Relative density temperature	60 °F (15.56 °C)
Solubility(ies)	Completely miscible with water.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.
Other information	
Density	12.76 lb/gal (15.5°C / 60°F)
Molecular formula	NaOH
Molecular weight	40.1 g/mol

10. Stability and reactivity

Reactivity	Contact with metal may release flammable hydrogen gas.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Hazardous polymerization does not occur.
Conditions to avoid	Reacts violently with strong acids. This product may react with oxidizing agents. Do not mix with other chemicals. Corrosive to aluminum, tin, zinc, copper and most alloys in which they are present including brass and bronze. Corrosive to steels at elevated temperatures above 40°C (104°F).
Incompatible materials	Oxidizing agents. Acids. Phosphorus. Aluminum. Zinc. Tin. Initiates or catalyzes violent polymerization of acetaldehyde, acrolein or acrylonitrile.
Hazardous decomposition products	Contact with metals (aluminum, zinc, tin) and sodium tetrahydroborate liberates hydrogen gas.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Causes digestive tract burns. Harmful if swallowed.
Inhalation	May cause irritation to the respiratory system.
Skin contact	Causes severe skin burns.
Eye contact	Causes severe eye burns. Causes serious eye damage.
Symptoms related to the physical, chemical and toxicological characteristics	Burning pain and severe corrosive skin damage. Permanent eye damage including blindness could result.

Information on toxicological effects

Acute toxicity Harmful if swallowed.

Product	Species	Test Results
Sodium Hydroxide Solutions (CAS Mixture)		
Acute		
Dermal		
LD50	Rabbit	1350 mg/kg, (Sodium hydroxide)
Oral		
LD50	Rat	140 - 340 mg/kg, (Sodium hydroxide)

Skin corrosion/irritation	Causes severe skin burns and eye damage.
Serious eye damage/eye irritation	Causes severe eye burns. Causes serious eye damage.
Respiratory sensitization	No data available.
Skin sensitization	No data available.

Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.
Reproductive toxicity	No data available.
Specific target organ toxicity - single exposure	Not available.
Specific target organ toxicity - repeated exposure	Not available.
Aspiration hazard	Droplets of the product aspirated into the lungs through ingestion or vomiting may cause a serious chemical pneumonia.
Chronic effects	Prolonged exposure may cause chronic effects.

12. Ecological information

Ecotoxicity Harmful to aquatic life.

Components		Species	Test Results
Sodium hydroxide (CAS 1310-73-2)			
Aquatic			
Crustacea	EC50	Water flea (Ceriodaphnia dubia)	34.59 - 47.13 mg/l, 48 hours
Fish	LC50	Bluegill (Lepomis macrochirus)	99 mg/l, 48 hours
		Western mosquitofish (Gambusia affinis)	125 mg/l, 96 hours

Persistence and degradability	Expected to degrade rapidly in air.
Bioaccumulative potential	The product is not expected to bioaccumulate.
Mobility in soil	Not available.
Other adverse effects	No other adverse environmental effects (e.g. ozone depletion, photochemical ozone creation potential, endocrine disruption, global warming potential) are expected from this component.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. This material and its container must be disposed of as hazardous waste. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN number	UN1824
UN proper shipping name	Sodium hydroxide solution
Transport hazard class(es)	8
Subsidiary class(es)	-
Packing group	II
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	B2, IB2, N34, T7, TP2
Packaging exceptions	154
Packaging non bulk	202
Packaging bulk	242

IATA

UN number	UN1824
UN proper shipping name	Sodium hydroxide solution
Transport hazard class(es)	8
Subsidiary class(es)	-
Packaging group	II
Environmental hazards	No
Labels required	8
ERG Code	8L

Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number	UN1824
UN proper shipping name	SODIUM HYDROXIDE SOLUTION
Transport hazard class(es)	8
Subsidiary class(es)	-
Packaging group	II
Environmental hazards	
Marine pollutant	No
Labels required	8
EmS	F-A, S-B
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	This substance/mixture is not intended to be transported in bulk.

15. Regulatory information

US federal regulations

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Sodium hydroxide (CAS 1310-73-2) LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - Yes Delayed Hazard - No Fire Hazard - No Pressure Hazard - No Reactivity Hazard - Yes
SARA 302 Extremely hazardous substance	No
SARA 311/312 Hazardous chemical	Yes

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA)	Not regulated.
Food and Drug Administration (FDA)	Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Sodium hydroxide (CAS 1310-73-2)

US. New Jersey Worker and Community Right-to-Know Act

Not regulated.

US. Pennsylvania RTK - Hazardous Substances

Sodium hydroxide (CAS 1310-73-2)

US. Rhode Island RTK

Sodium hydroxide (CAS 1310-73-2)

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

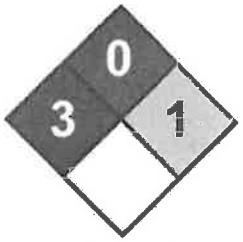
16. Other information, including date of preparation or last revision

Issue date 09-January-2014

Revision date -

Version # 01

NFPA Ratings



List of abbreviations

LD50: Lethal Dose, 50%.
LC50: Lethal Concentration, 50%.
EC50: Effective concentration, 50%.
TWA: Time weighted average.

References

EPA: AQUIRE database
HSDB® - Hazardous Substances Data Bank
US. IARC Monographs on Occupational Exposures to Chemical Agents
IARC Monographs. Overall Evaluation of Carcinogenicity
ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices

Disclaimer

This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.

ATTACHMENT D-2

SAFETY DATA SHEET

DATE PREPARED: 10/22/15
SDS No: ShaleBind

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifier: ShaleBind

MANUFACTURER:
HEP Shalewater Solutions, LLC
37 Grande Meadows Drive
Suite 201
Bridgeport, WV 26330
Ph: (855) 463-7224
Website: www.hillstone-ep.com

24 HR. EMERGENCY TELEPHONE
Emergency Phone 800-535-5053

2. HAZARDS IDENTIFICATION

Classification of the substance or mixture

Classification according to paragraph (d) of Regulation 29 CFR 1910.1200:
Not classified.

Label elements
Labelling according to paragraph (f) of Regulation 29 CFR 1910.1200:
Hazard symbol(s): None.
Signal word: None.
Hazard statement(s): None.
Precautionary statement(s): None.

Other hazards
Spills produce extremely slippery surfaces.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances
Not applicable, this product is not a substance.

Mixtures
Hazardous components
Distillates (petroleum), hydrotreated light
Concentration/ gamme : 20- 30%
CAS Number: 64742-47-8
Classification according to paragraph (d) of Regulation 29 CFR 1910.1200:
Asp. Tox. 1;H304

Notes
Does not result in classification of the mixture if the kinematic viscosity is greater than 20.5 mm^2/s measured at 40°C.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched
CAS Number: 69011-36-5
Classification according to paragraph (d) of Regulation 29 CFR 1910.1200:
Acute Tox. 4;H302, Eye Dam. 1;H318

Concentration/ gamme : < 3%
For explanation of abbreviations see section 16

4. FIRST AID MEASURES

Description of first aid measures
Inhalation:
Move to fresh air. No hazards which require special first aid measures.
Skin contact:
Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. In case of persistent skin irritation, consult a physician.
Eye contact:
Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Get medical attention immediately.
Ingestion:
Rinse mouth with water. Do NOT induce vomiting. Call a physician or poison control centre immediately.

Most important symptoms and effects, both acute and delayed
None under normal use.

Indication of any immediate medical attention and special treatment needed.
None reasonably foreseeable.

Other information:
None.

5. FIRE FIGHTING MEASURES

Extinguishing media
Suitable extinguishing media:
Water. Water spray. Foam. Carbon dioxide (CO2). Dry powder.
Unsuitable extinguishing media:
None.

Special hazards arising from the substance or mixture
Hazardous decomposition products:
Ammonia. Carbon oxides (COx). Nitrogen oxides (NOx). Hydrogen chloride. Hydrogen cyanide (hydrocyanic acid) may be produced in the event of combustion in an oxygen deficient atmosphere.

Advice for fire-fighters
Protective measures: Wear self-contained breathing apparatus and protective suit.
Other information: Spills produce extremely slippery surfaces.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures
Personal precautions: Do not touch or walk through spilled material. Spills produce extremely slippery surfaces.
Protective equipment: Wear adequate personal protective equipment (see Section 8 Exposure Controls/Personal Protection).
Emergency procedures: Keep people away from spill/leak.

Environmental precautions
Do not contaminate water.

Methods and material for containment and cleaning up
Small spills:
Do not flush with water. Soak up with inert absorbent material. Sweep up and shovel into suitable containers for disposal.
Large spills:
Do not flush with water. Dam up. Clean up promptly by scoop or vacuum.
Residues:
Soak up with inert absorbent material. After cleaning, flush away traces with water.

Reference to other sections
SECTION 7: Handling and storage; SECTION 8: Exposure controls/personal protection; SECTION 13: Disposal considerations;

7. HANDLING AND STORAGE

Precautions for safe handling
Avoid contact with skin and eyes. Renders surfaces extremely slippery when spilled. When using, do not eat, drink or smoke.

Conditions for safe storage, including any incompatibilities.
Keep away from heat and sources of ignition. Freezing will affect the physical condition and may damage the material.
Incompatible with oxidizing agents.

Specific end use(s)
None.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters
Occupational exposure limits:
Distillates (petroleum), hydrotreated light
ACGIH: 200 mg/m3 (8-hour)

Exposure controls
Appropriate engineering controls:
Ensure adequate ventilation, especially in confined areas. Use local exhaust if misting occurs. Natural ventilation is adequate in absence of mists.

Individual protection measures, such as personal protective equipment:
Eye/face protection:
Safety glasses with side-shields.
Skin protection:
Wear coveralls and/or chemical apron and rubber footwear where physical contact can occur.
Hand protection:
PVC or other plastic material gloves.
Respiratory protection:
No personal respiratory protective equipment normally required.
Additional advice:

Wash hands and face before breaks and immediately after handling the product. Wash hands before breaks and at the end of workday.

Environmental exposure controls:
Do not allow uncontrolled discharge of product into the environment.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties
Appearance: Viscous liquid, Milky.
Odor: Aliphatic.
Odor Threshold: No data available.
pH: 4 - 6 @ 5 g/L
Melting point/freezing point: < 5°C
Initial boiling point and boiling range: > 100°C
Flash point: Does not flash.
Evaporation rate: No data available.
Flammability (solid, gas): Not applicable.
Upper/lower flammability or explosive limits: Not expected to create explosive atmospheres.
Vapor pressure: 2.3 kPa @ 20°C
Relative density: 1.0 - 1.1
Solubility(ies): Completely miscible.
Partition coefficient: Not applicable.
Autoignition temperature: Not applicable.
Decomposition temperature: > 150°C
Viscosity: > 20.5 mm^2/s @ 40°C
Explosive properties: Not expected to be explosive based on the chemical structure.
Oxidizing properties: Not expected to be oxidizing based on the chemical structure.

Other information
None.

10. STABILITY AND REACTIVITY

Reactivity
Stable under recommended storage conditions.

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
Oxidizing agents may cause exothermic reactions.

Conditions to avoid
Protect from frost, heat and sunlight.

Incompatible materials
Oxidizing agents.

Hazardous decomposition products

Thermal decomposition may produce: hydrogen chloride gas, nitrogen oxides (NOx), carbon oxides (COx). Ammonia.
Hydrogen cyanide (hydrocyanic acid).

11. TOXICOLOGICAL INFORMATION

Information on toxicological effects
Information on the product as supplied:
Acute oral toxicity: LD50/oral/rat > 5000 mg/kg
Acute dermal toxicity: LD50/dermal/rat > 5000 mg/kg
Acute inhalation toxicity: The product is not expected to be toxic by inhalation.
Skin corrosion/irritation: Non-irritating to skin.
Serious eye damage/eye irritation: May cause eye irritation with susceptible persons.
Respiratory/skin sensitization: Not sensitizing.
Mutagenicity: Not mutagenic.
Carcinogenicity: Not carcinogenic.
Reproductive toxicity: Not toxic for reproduction.
STOT - single exposure: No known effects.
STOT - repeated exposure: No known effects.
Aspiration hazard: Due to the viscosity, this product does not present an aspiration hazard.
Relevant information on the hazardous components:

Distillates (petroleum), hydrotreated light
Acute oral toxicity: LD50/oral/rat > 5000 mg/kg (OECD 401)
Acute dermal toxicity: LD50/dermal/rabbit > 5000 mg/kg (OECD 402)
Acute inhalation toxicity: LC50/inhalation/4 h/rat = 4951 mg/m3 (OECD 403)
Skin corrosion/irritation: Not irritating. (OECD 404) Repeated exposure may cause skin dryness or cracking.
Serious eye damage/eye irritation: Not irritating. (OECD 405)
Respiratory/skin sensitization: By analogy with similar products, this product is not expected to be sensitizing.
(OECD 406)

Mutagenicity: Not mutagenic. (OECD 471, 473, 474, 476, 478, 479)
Carcinogenicity: Carcinogenicity study in rats (OECD 451): Negative
Reproductive toxicity: By analogy with similar substances, this substance is not expected to be toxic for reproduction. NOAEL/rat = 300 ppm (OECD 421)

STOT - single exposure:No known effects.
STOT - repeated exposure: NOAEL/oral/rat/90 days >= 3000 mg/kg/day (OECD 408) (Based on results obtained from tests on analogous products.).
Aspiration hazard: May be fatal if swallowed and enters airways.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched
Acute oral toxicity: LD50/oral/rat = 200 - 300 mg/kg
Acute dermal toxicity: LD50/dermal/rabbit > 2000 mg/kg
Acute inhalation toxicity: No data available.
Skin corrosion/irritation: Not irritating.
Serious eye damage/eye irritation: Causes serious eye irritation.
Respiratory/skin sensitization: The results of testing on guinea pigs showed this material to be non-sensitizing.

Mutagenicity: Not mutagenic.
Carcinogenicity: Not carcinogenic.
Reproductive toxicity: Two-Generation Reproduction Toxicity (OECD 416)
NOAEL/rat > 250 mg/kg/day
Prenatal Development Toxicity Study (OECD 414) NOAEL/Maternal toxicity/rat > 50 mg/kg/day
NOAEL/Developmental toxicity/rat > 50 mg/kg/day

STOT - single exposure:No known effects.
STOT - repeated exposure: NOAEL/oral/rat/600 days = 50 mg/kg/day
Aspiration hazard: No known effects.

12. ECOLOGICAL INFORMATION

Toxicity
Information on the product as supplied:
Acute toxicity to fish: LC50/Fish/96 hours = 10 - 100 mg/L (Estimated)
Acute toxicity to invertebrates: EC50/Daphnia/48 hours = 10 - 100 mg/L (Estimated)
Acute toxicity to algae: Algal inhibition tests are not appropriate. The flocculation characteristics of the product interfere directly in the test medium preventing homogenous distribution which invalidates the test.
Chronic toxicity to fish: No data available.
Chronic toxicity to invertebrates: No data available.
Toxicity to microorganisms: No data available.
Effects on terrestrial organisms: No data available. Readily biodegradable, exposure to soil is unlikely.
Sediment toxicity: No data available. Readily biodegradable, exposure to sediment is unlikely.
Relevant information on the hazardous components:
Distillates (petroleum), hydrotreated light

Acute toxicity to fish: LC0/Oncorhynchus mykiss/96 hours > 1000 mg/L (OECD 203)
Acute toxicity to invertebrates: EC0/Daphnia magna/48 hours > 1000 mg/L (OECD 202)
Acute toxicity to algae: IC0/Pseudokirchneriella subcapitata/72 hours > 1000 mg/L (OECD 201)

Chronic toxicity to fish: NOEC/Oncorhynchus mykiss/28 days > 1000 mg/L
Chronic toxicity to invertebrates:NOEC/Daphnia magna/21 days > 1000 mg/L
Toxicity to microorganisms: EC50/Tetrahymena pyriformis/ 48h > 1000 mg/L
Effects on terrestrial organisms: No data available.
Sediment toxicity: No data available. Readily biodegradable, exposure to sediment is unlikely.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched

Acute toxicity to fish: LC50/Cyprinus carpio/96 hours = 1 - 10 mg/L (OECD 203)
Acute toxicity to invertebrates: EC50/Daphnia/48 hours = 1 - 10 mg/L (OECD 202)
Acute toxicity to algae: IC50/Desmodesmus subspicatus/72 hours = 1 - 10 mg/L (OECD 201)

Chronic toxicity to fish: No data available.
Chronic toxicity to invertebrates: No data available.
Toxicity to microorganisms: EC10/activated sludge/17 h > 10000 mg/L (DIN 38412-8)
Effects on terrestrial organisms: No data available.
Sediment toxicity: No data available.

Persistence and degradability
Information on the product as supplied:
Degradation: Readily biodegradable.
Hydrolysis: At natural pHs (>6) the polymer degrades due to hydrolysis to more than 70% in 28 days. The hydrolysis products are not harmful to aquatic organisms.
Photolysis: No data available.

Relevant information on the hazardous components:
Distillates (petroleum), hydrotreated light
Degradation: Readily biodegradable.
Hydrolysis: Does not hydrolyse.
Photolysis: No data available.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched
Degradation: Readily biodegradable. > 60% / 28 days (OECD 301 B)
Hydrolysis: Does not hydrolyse.
Photolysis: No data available.

Bioaccumulative potential
Information on the product as supplied:
The product is not expected to bioaccumulate.

Partition co-efficient (Log Pow): Not applicable. Bioconcentration factor (BCF): No data available.
Relevant information on the hazardous components:

Distillates (petroleum), hydrotreated light
Partition co-efficient (Log Pow): 3 - 6
Bioconcentration factor (BCF): No data available. Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched Partition co-efficient (Log Pow):> 3
Bioconcentration factor (BCF): No data available.

Mobility in soil
Information on the product as supplied:
No data available.

Relevant information on the hazardous components:
Distillates (petroleum), hydrotreated light
Koc: No data available.
Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched
Koc: > 5000

Other adverse effects
None

13. DISPOSAL CONSIDERATIONS

Waste treatment methods
Waste from residues / unused products:
Dispose of in accordance with local regulations.

Contaminated packaging: If recycling is not practicable, dispose of in compliance with local regulations.

Recycling: Store containers and offer for recycling of material when in accordance with the local regulations.

14. TRANSPORT INFORMATION

Land transport (DOT)
Not classified.
Sea transport (IMDG)
Not classified.
Air transport (IATA)
Not classified.

15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture
Information on the product as supplied:
TSCA Chemical Substances Inventory:
All components of this product are either listed on the inventory or are exempt from listing.

US SARA Reporting Requirements:
SARA (Section 311/312) hazard class:
Not concerned.
RCRA status: Not RCRA hazardous.

California Proposition 65 Information:
WARNING! This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm, Acrylamide.

16. OTHER INFORMATION

NFPA:
Health: 0
Flammability: 1
Instability: 0

HMIS:
Health: 0
Flammability: 1
Physical Hazard: 0
PPE Code: B

REVISION SUMMARY
New SDS

Key or legend to abbreviations and acronyms used in the safety data sheet:
Abbreviations
Acute Tox. 4 = Acute toxicity Category Code 4
Asp. Tox. 1 = Aspiration hazard Category Code 1
Eye Dam 1 = Serious eye damage/eye irritation Category Code 1
H-Phrases
H302 - Harmful if swallowed
H304 - May be fatal if swallowed and enters airways

H318 - Causes serious eye damage

MANUFACTURER DISCLAIMER:
This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of manufacturer. The data on this sheet relates only to the specific material designated herein. Manufacturer assumes no legal responsibility for use or reliance upon this data.

ATTACHMENT D-3

SAFETY DATA SHEET

DATE PREPARED: 04/05/16
SDS No: ShaleClear Marcellus

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifier: Shaleclear Marcellus

MANUFACTURER:
HEP Shalewater Solutions, LLC
37 Grande Meadows Drive
Suite 201
Bridgeport, WV 26330
Ph: (855) 463-7224
Website: www.hillstone-ep.com

24 HR. EMERGENCY TELEPHONE
Emergency Phone 800-535-5053

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200).

Skin corrosion/irritation	Category 1
Serious eye damage/eye irritation	Category 1
Corrosive to metals	Category 1

GHS Label elements, including precautionary statements

EMERGENCY OVERVIEW

Physical state	liquid
Color	colorless to yellow
Appearance	clear to slightly hazy
Odor	slight amine

Hazard statements
Causes severe skin burns and eye damage
May be corrosive to metals

Precautionary Statements - Prevention
Do not breathe dusts or mists
Wash face, hands and any exposed skin thoroughly after handling
Wear protective gloves/protective clothing/eye protection/face protection
Keep only in original container

Precautionary Statements - Response
Immediately call a POISON CENTER or doctor
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower
Wash contaminated clothing before reuse
IF INHALED: Remove person to fresh air and keep comfortable for breathing
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
Absorb spillage to prevent material damage

Precautionary Statements - Storage
Store locked up
Store in corrosive resistant container with a resistant inner liner
Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

Other information
May be harmful if swallowed
Unknown acute toxicity
5% of the mixture consists of ingredient(s) of unknown toxicity

3. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS-No	weight-%	TRADE SECRET
Trade Secret Ingredient	PROPRIETARY	40 - 50%	*

If CAS number is "proprietary", the specific chemical identity and percentage of composition has been withheld as a trade secret

*The exact percentage (concentration) of composition has been withheld as a trade secret

4. FIRST AID MEASURES

Eye contact
Remove contact lenses, if worn. Immediately flush with plenty of water for at least 15 minutes, holding eyelids apart to ensure flushing of the entire surface. Washing within one minute is essential to achieve maximum effectiveness. Seek medical attention immediately

Skin contact
Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Wash contaminated clothing before reuse. If skin irritation occurs: Get medical advice/attention.

Ingestion
Seek medical attention immediately. Give large amounts of water to drink. If vomiting should occur spontaneously, keep airway clear. Never give anything by mouth to an unconscious person.

Inhalation
Remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen. Call a physician imediately

Most important symptoms and effects, both acute and delayed

Acute effects
Possible eye, skin and respiratory tract irritation or burns

Chronic effects
May aggravate existing skin, eye, and lung conditions. Persons with kidney disorders have an increased risk from exposure based on general information found on aluminum salts.

Indication of any immediate medical attention and special treatment needed

Note to physicians

Treat symptomatically.

5. FIRE FIGHTING MEASURES

Extinguishing media

Suitable extinguishing media
Water Spray, Carbon Dioxide, Foam, Dry Chemical.

Extinguishing media which must not be used for safety reasons
No information available

Special hazards arising from the substance or mixture

Special Hazard
Use water spray to cool fire exposed surfaces.

Firefighting measures
Product is a water solution and nonflammable. In a fire, this product may build up pressure and rupture a sealed container; cool exposed containers with water spray. Use self-contained breathing apparatus in confined areas; avoid breathing mist or spray.

Special protective equipment for firefighters
Full protective clothing and approved self-contained breathing apparatus required for firefighting personnel.

Sensitivity to Mechanical Impact
None.

Sensitivity to Static Discharge
None.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions
Wear adequate personal protective clothing and equipment. Approved breathing apparatus may be necessary.

Environmental precautions
Do not allow liquid to enter streams or waterways.

Methods and material for containment and cleaning up

Methods for containment
Prevent further leakage or spillage if safe to do so. Build dikes as necessary to contain flow of large spills.

Methods for cleaning up
Clear spills immediately. For small spills, use soda ash or lime to neutralize, an inert material to absorb, or wash product to a chemical sewer. Place contaminated materials into containers and store in a safe place to await proper disposal. Caution: Use of soda ash or lime may generate carbon dioxide gas. Provide adequate ventilation to spill area.

7. HANDLING AND STORAGE

Advice on safe handling
Keep away from heat and open flame.
Keep container closed when not in use
Avoid contact with eyes, skin and clothing
Wear chemical splash goggles, gloves, and protective clothing when handling.
Wash thoroughly after handling
Avoid breathing vapor or mist
Use with adequate ventilation and employ respiratory protection where mist or spray may be generated.
Do not take internally
FOR INDUSTRIAL USE ONLY.

Conditions for safe storage, including any incompatibilities

Technical measures and storage conditions
Keep container tightly closed when not in use.
Product may slowly corrode iron, brass, copper, aluminum, mild steel, and stainless steel.
Do not store in unlined metal containers.
Store in a cool, dry place away from direct heat.

Incompatible products
Alkalis.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines
This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies.

Engineering controls
Local exhaust ventilation as necessary to maintain exposures to within applicable limits. Please refer to the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details. If there are no applicable or established exposure limit requirements or guidelines, general ventilation should be sufficient.

Individual protection measures, such as personal protective equipment

Eye/face Protection
Wear chemical splash goggles and face shield (when eye and face contact is possible due to splashing or spraying of material).

Hand Protection
Appropriate chemical resistant gloves should be worn.

Skin and body protection
Standard work clothing and work shoes.

Respiratory protection
If exposures exceed the PEL or TLV, use NIOSH/MSHA approved respirator in accordance with OSHA Respiratory Protection Requirements under 29 CFR 1910.134. If there are no applicable or established exposure limit requirements or guidelines, general ventilation should be sufficient.

Other personal protection data
Eyewash fountains and safety showers must be easily accessible.

Hygiene measures
Take off contaminated clothing and wash before reuse.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state liquid
Color colorless to yellow
Appearance clear to slightly hazy
Odor slight amine
Odor threshold No information available

Property	Values
pH	0.5 - 1.5
Melting / freezing point	No information available
Boiling point / boiling range	No information available
Flash point	Not applicable
Evaporation rate	No information available
Flammability (solid, gas)	Not applicable
Flammability Limit in Air	
Upper flammability limit	Not applicable
Lower flammability limit	Not applicable
Vapor pressure	No information available
Vapor density	No information available
Specific gravity	1.342 - 1.364
Solubility (water)	Soluble below pH 4
Solubility in other solvents	No information available
Partition coefficient: n-octanol/water	No information available
Autoignition temperature	Not applicable
Decomposition temperature	No information available
Kinematic viscosity	No information available
Dynamic viscosity	50 - 80 cps

Density 11.19 - 11.38 lb/gal
Bulk Density No information available
Explosive properties No information available.
Oxidizing properties No information available
Softening point No information available
Molecular weight No information available
Volatile organic compounds (VOCs) content No information available
Percent Volatile, wt.% 40 - 65 % (Water)

10. STABILITY AND REACTIVITY

Reactivity
No data available.

Chemical stability
Stable under normal conditions of handling, use and transportation.

Possibility of hazardous reactions
None under normal processing.

Hazardous polymerization
Not anticipated under normal or recommended handling and storage conditions.

Conditions to avoid
None known

Materials to avoid
Alkalis.

Hazardous decomposition products
Thermal decomposition may release toxic and/or hazardous gases such as Cl2 and HCl.

11. TOXICOLOGICAL INFORMATION

Eye contact
Based on pH, this product is expected to cause severe eye irritation, possibly resulting in burns and eye damage. Prolonged exposure to Aluminum salts may cause conjunctivitis

Skin contact
Prolonged and/or repeated contact will cause severe skin irritation and burns.

Ingestion
May be harmful if swallowed. May cause irritation of the mouth, throat and stomach. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Inhalation
Inhalation of mist or spray may irritate respiratory tract and may cause burns and difficulty breathing.

Acute toxicity - Product Information
Oral LD50 No information available
Dermal LD50 No information available
Inhalation LC50 No information available

Component	weight-%	Oral LD50	Dermal LD50	Inhalation LC50
Trade Secret Ingredient	40 - 50%	> 2000 mg/kg (Rat)	--	--

Delayed and immediate effects as well as chronic effects from short and long-term exposure
Skin corrosion/irritation
Causes severe burns

Serious eye damage/eye irritation
Risk of serious damage to eyes

Sensitization
No information available

Germ cell mutagenicity
No information available

Carcinogenicity
This product does not contain any components in concentrations greater than or equal to 0.1% that are listed as known or suspected carcinogens by NTP, IARC, ACGIH, or OSHA.

Reproductive toxicity
No information available

Specific target organ toxicity - Single exposure
No information available.

Specific target organ toxicity - Repeated exposure
No information available

Aspiration hazard
No information available.

Numerical measures of toxicity - Product Information
5% of the mixture consists of ingredient(s) of unknown toxicity
The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral) 4489 mg/kg

Other information
Data is based on a product of similar composition and conclusions are drawn from sources other than direct testing.

12. ECOLOGICAL INFORMATION

Acute aquatic toxicity - Product Information
Fish No information available
Crustacea No information available
Algae/aquatic plants No information available

Persistence and degradability
No information available

Bioaccumulative potential
No information available.

Mobility
No information available

PBT and vPvB assessment
No information available

Other information
No other ecological studies have been carried out on this product.

13. DISPOSAL CONSIDERATIONS

Disposal of wastes

Dispose of product in an approved chemical waste landfill or incinerate in accordance with applicable Federal, state and local regulations.

Contaminated packaging
Since empty containers retain product residue, follow label warnings even after container is emptied.

14. TRANSPORT INFORMATION

DOT Regulated

DOT UN/NA Number UN3264
Proper shipping name Corrosive Liquid, Acidic, Inorganic, N.O.S. (Polyaluminum Chloride Solution)
Hazard class 8
Packing group III
ERG Number 154

ICAO/IATA Regulated
UN number UN3264
Proper shipping name Corrosive Liquid, Acidic, Inorganic, N.O.S. (Polyaluminum Chloride Solution)
Hazard class 8
Packing group III
ERG Code 8L

IMDG Regulated

UN number UN3264
Proper shipping name Corrosive Liquid, Acidic, Inorganic, N.O.S. (Polyaluminum Chloride Solution)
Hazard class 8
Packing group III
EmS F-A; S-B

Harmonized Tariff Number 3824.90

15. REGULATORY INFORMATION

International Inventories

TSCA (United States)
All ingredients are on the inventory or exempt from listing
Australia (AICS)
All ingredients are on the inventory or exempt from listing
Canada (DSL)
All ingredients are on the inventory or exempt from listing
Canada (NDSL)
None of the ingredients are on the inventory.

China (IECSC)
All ingredients are on the inventory or exempt from listing
EINECS (European Inventory of Existing Chemical Substances)
All ingredients are on the inventory or exempt from listing
ELINCS (European List of Notified Chemical Substances)
None of the ingredients are on the inventory.

ENCS (Japan)
All ingredients are on the inventory or exempt from listing
South Korea (KECL)
All ingredients are on the inventory or exempt from listing
Philippines (PICCS)
All ingredients are on the inventory or exempt from listing

Legend

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
AICS - Australian Inventory of Chemical Substances
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
IECSC - China Inventory of Existing Chemical Substances
EINECS/ELINCS - European Inventory of Existing Commercial Chemical Substances/EU List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances

U.S. Federal Regulations

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material.

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

SARA 311/312 Hazard Categories
Acute health hazard Yes
Chronic health hazard No
Fire hazard No
Sudden release of pressure hazard No
Reactive hazard No

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

U.S. State Regulations

California Proposition 65
This product may contain traces of a substance(s) known to the State of California to cause cancer and/or reproductive toxicity.

U.S. State Right-to-Know Regulations

Polyaluminum Chloride
1327-41-9

Minnesota Hazardous Substance List	Present
Pennsylvania Right to Know List	Present

16. OTHER INFORMATION

NFPA Rating
- Health - 2
- Flammability - 0
- Instability - 0
- Special Hazard -

HMIS Rating
- Health - 2
- Flammability - 0
- Physical hazard - 0
- Personal protection - B

REVISION SUMMARY

Revision date:4-5-16
Revisions number: 2

MANUFACTURER DISCLAIMER:
This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of manufacturer. The data on this sheet relates only to the specific material designated herein. Manufacturer assumes no legal responsibility for use or reliance upon this data.

ATTACHMENT D-4

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Identifier: ShaleFloc

MANUFACTURER:
HEP Shalewater Solutions, LLC
37 Grande Meadows Drive
Suite 201
Bridgeport, WV 26330
Ph: (855) 463-7224
Website: www.hillstone-ep.com

24 HR. EMERGENCY TELEPHONE
Emergency Phone 800-535-5053

2. HAZARDS IDENTIFICATION

Classification according to paragraph (d) of 29 CFR 1910.1200: Not classified.

Label Elements
Label hazard symbol(s): None.
Signal word: None
Hazard statement(s): Precautionary statement(s): None

Other Hazards: Spills produce extremely slippery surfaces.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substances: not applicable, this product is not a substance.

Hazardous components:
Distillates (petroleum), hydrotreated light

Concentration	CAS#	Classification according to paragraph (d) of 29 CFR 1910.1200:
20-45%	64742-47-8	Asp.Tox. I ;H304

Notes
Does not result in classification of the mixture if the kinematic viscosity is greater than 20.5 mm^2/s measured at 40°C.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched

Concentration	CAS#	Classification according to paragraph (d) of 29 CFR 1910.1200:
<3%	69011-36-5	Acute Tox. 4;H302, Eye Dam 1;H318

For explanation of abbreviations see section 16

4. FIRST AID MEASURES

Inhalation: Move to fresh air. No hazards which require special first aid measures.

Skin contact: Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. In case of Persistent skin irritation, consult a physician.

Eye contact: Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Alternatively, rinse immediately with Diphoterine ®. Get prompt medical attention.

Ingestion: Rinse mouth with water. Do NOT induce vomiting. Call a physician or poison control center immediately.

Symptoms and effects, both acute and delayed: None under normal use.

Immediate medical attention and special treatment needed: None reasonably foreseeable

5. FIRE FIGHTING MEASURES

Suitable extinguishing media:
Water. Water spray. Foam. Carbon dioxide (C02). Dry powder.

Unsuitable extinguishing media:
None.

Special hazards arising from the substance or mixture Hazardous decomposition products:
Carbon oxides (COx). Nitrogen oxides (NOx). Hydrogen cyanide (hydrocyanic acid) may be produced in the event of combustion in an oxygen deficient atmosphere.

Advice for fire-fighters Protective measures:
Wear self-contained breathing apparatus and protective suit.

Other information:
Spills produce extremely slippery surfaces.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions: Do not touch or walk through spilled material. Spills produce extremely slippery surfaces.

Protective equipment: Wear suitable protective clothing, gloves and eye/face protection.

Emergency procedures: Keep people away from spill/leak.

Environmental precautions: Do not contaminate water.

Methods and material for containment and cleaning up Small spills:
Do not flush with water. Soak up with inert absorbent material. Sweep up and shovel into suitable containers for disposal.

Large spills:
Do not flush with water. Dam up. Clean up promptly by scoop or vacuum.

Residues:
Soak up with inert absorbent material. After cleaning, flush away traces with water.

Reference to other sections
SECTION 8: Exposure controls/personal protection; SECTION 13: Disposal considerations; SECTION 7: Handling and storage;

7. HANDLING AND STORAGE

Precautions for safe handling: Avoid contact with skin and eyes. Renders surfaces extremely slippery when spilled. When using, do not eat, drink or smoke.
Conditions for safe storage, including any incompatibilities:
Keep away from heat and sources of ignition. Freezing will affect the physical condition and may damage the material. Incompatible with oxidizing agents.

Specific end use(s): None.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters Occupational exposure limits:

Distillates (petroleum). Hydrotreated light
ACG/H: 200 mg/ml (8-hour)

Appropriate engineering controls:
Use local exhaust if misting occurs. Natural ventilation is adequate in absence of mists.

Individual protection measures, such as personal protective equipment:

Eye/face protection: Safety glasses with side-shields.

Skin protection: Wear coveralls and/or chemical apron and rubber footwear where physical contact can occur.

Hand protection: PVC or other plastic material gloves.

Respiratory protection: No personal respiratory protective equipment normally required.

Additional advice: Wash hand s before breaks and at the end of workday. Handle in accordance with good industrial hygiene and safety practice. Wash hands and face before breaks and immediately after handling the product.

Environmental exposure controls: Do not allow uncontrolled discharge of product into the environment.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Viscous liquid. Milky
Odor: Aliphatic.
Odor Threshold: No data available.
pH: 5-8 @ 5g/L
Melting point/freezing point: <5 C
Initial boiling point and boiling range: >100 C
Flash point: Does not flash.
Evaporation rate: No data available.
Flammability (solid, gas): Not applicable.
Upper/Tower flammability or explosive limits: Not expected to create explosive atmospheres.
Vapor pressure: 2.3 kPa @ 20°C
Relative density: 1.0 - 1.1
Solubility(ies): Completely miscible.

Partition coefficient: Not applicable.
Autoignition temperature: No data available.
Decomposition temperature: >150 C
Viscosity: >20.5mm 2/s @ 40C
Explosive properties: Not expected to be explosive based on the chemical structure.
Oxidizing properties: Not expected to be oxidizing based on the chemical structure.

10. STABILITY AND REACTIVITY

Reactivity
Stable under recommended storage conditions.

Chemical stability
Stable under recommended storage conditions.

Possibility of hazardous reactions
None known.

Conditions to avoid
Protect from frost, heat and sunlight.

Incompatible materials
Incompatible with oxidizing agents.

Hazardous decomposition products
Thermal decomposition may produce: nitrogen oxides (NOx), carbon oxides (COx). Hydrogen cyanide (hydrocyanic acid) may be produced in the event of combustion in an oxygen deficient atmosphere.

11. TOXICOLOGICAL INFORMATION

Information on the product as supplied:

Acute oral toxicity: LD50/oral/rat > 5000 mg/kg

Acute dermal toxicity: LD50/dermal/rat > 5000 mg/kg

Acute inhalation toxicity: The product is not expected to be toxic by inhalation.
Skin corrosion/irritation: Non-irritating to skin.
Serious eye damage/eye irritation: Slightly irritating.
Respiratory/skin sensitization: Not sensitizing.
Mutagenicity: Not mutagenic.
Carcinogenicity: Not carcinogenic.
Reproductive toxicity: Not toxic for reproduction.
STOT- single exposure: No known effects.
STOT- repeated exposure: No known effects.
Aspiration hazard: Due to the viscosity, this product does not present an aspiration hazard.

Relevant information on the hazardous components:
Distillates (petroleum), hydrotreated light

Acute oral toxicity: LD50/oral/rat > 5000 mg/kg (OECD 40 I)

Acute dermal toxicity: LD50/derma/rabbit > 5000 mg/kg (OECD 402)
Acute inhalation toxicity: LC50/inhalation/4 h/rat 4951 mg/m3 (OECD 403)
Skin corrosion/irritation: Not irritating. (OECD 404) Repeated exposure may cause skin dryness or cracking.
Serious eye damage/eye irritation: Not irritating. (OECD 405)
Respiratory/skin sensitization: By analogy with similar products, this product is not expected to be sensitizing. (OECD406)

Mutagenicity: Not mutagenic. (OECD 471, 473, 474, 476, 478, 479)
Carcinogenicity: Carcinogenicity study in rats (OECD 451): Negative
Reproductive toxicity: By analogy with similar substances, this substance is not expected to be toxic for reproduction. NOAEL/rat=300 ppm (OECD 421)

STOT- single exposure: No known effects.
STOT- repeated exposure: NOAEL/oral/rat/90 days >= 3000 mg/kg/day (OECD 408) (Based on results obtained from tests on analogous products.).

Aspiration hazard: May be fatal if swallowed and enters airways.

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydraxy- , branched

Acute oral toxicity: LD50/oral/rat = 200 - 300 mg/kg
Acute dermal toxicity: LD50/dermal/rabbit > 2000 mg/kg
Acute inhalation toxicity: No data available.
Skin corrosion/irritation: Not irritating.
Serious eye damage/eye irritation: Causes serious eye irritation.

Respiratory/skin sensitization: The results of testing on guinea pigs showed this material to be non-sensitizing.

Mutagenicity: Not mutagenic.

Carcinogenicity: Not carcinogenic.

Reproductive toxicity: Two-Generation Reproduction Toxicity (OECD 416) NOAEL/rat > 250 mg/kg/day
Prenatal Development Toxicity Study (OECD 414) NOAEL/Maternal toxicity/rat > 50 mg/kg/day
NOAEL/Developmental toxicity/rat > 50 mg/kg/day

STOT- single exposure: No known effects.
STOT - repeated exposure: NOAEL/oral/rat/600 days - 50 mg/kg/day
Aspiration hazard: No known effects.

12. ECOLOGICAL INFORMATION

Toxicity
Acute toxicity to fish: LC50/Fish/96 hours > 100 mg/L
Acute toxicity to invertebrates: EC50/Daphnia/48 hours > 100 mg/L
Acute toxicity to algae: IC50/Algae/72 hours > 100 mg/L
Chronic toxicity to fish: No data available.

Chronic toxicity to invertebrates: No data available.
Toxicity to microorganisms: No data available.
Effects on terrestrial organisms: No data available.
Sediment toxicity: No data available.

Persistence and degradability
Information on the product as supplied:

Degradation: Not readily biodegradable.
Hydrolysis: Does not hydrolyse.
Photolysis: No data available.

Relevant information on the hazardous components:
Distillates (petroleum), hydrotreated light
Chronic toxicity to fish:
Acute toxicity to fish: LC50/Cyprinus carpio/96 hours = 1 - 10 mg/L (OECD 203)
NOEC/Oncorhynchus mykiss/28 days > 1000 mg/L

Degradation: Readily biodegradable.
Hydrolysis: Does not hydrolyse.
Acute toxicity to invertebrates: EC50/Daphnia/48 hours = 1 - 10 mg/L (OECD 202)
Photolysis: No data available.

Acute toxicity to fish: LC0/*Oncorhynchus mykiss*/96 hours> 1000 mg/L (OECD 203)

Acute toxicity to invertebrates: EC0/*Daphnia magna*/48 hours > 1000 mg/L (OECD 202)

Acute toxicity to algae: IC0/*Pseudokirchneriella subcapitata*/72 hours> 1000 mg/L (OECD 201)
Chronic toxicity to fish: NOEC/*Oncorhynchus mykiss*/28 days> 1000 mg/L

Chronic toxicity to invertebrates: NOEC/*Daphnia magna*/21 days > 1000 mg/L

Toxicity to microorganisms: EC50 *Tetrahymena pyriformis*/ 48h > 1000 mg/L

Effects on terrestrial organisms: No data available.

Sediment toxicity: No data available. Readily biodegradable, exposure to sediment is unlikely.

Bioaccumulative potential
Information on the product as supplied: The product is not expected to bioaccumulate.

Partition co-efficient (Log Pow): Not applicable.

Bioconcentration factor (BCF): No data available.

Relevant information on the hazardous components:
Distillates (petroleum), hydrotreated light
Partition co-efficient (Log Pow): 3-6

Bioconcentration factor (BCF): No data available

Poly(oxy-1,2-ethanediyl), a-tridecyl-w-hydroxy-, branched

Partition co-efficient (Log Pow): > 3
Bioconcentration factor (BCF): No data available.

Mobility in soil: no data available

Distillates (petroleum), hydrotreated light
Koc:No data available.

Poly(oxy-1,2-ethanediy/), a-tridecyl-w-hydroxy-, branched
Koc:> 5000

Other adverse effects: None

13. DISPOSAL CONSIDERATIONS

Waste treatment methods: Waste from residues/unused products:
Dispose of in accordance with local regulations.

Contaminated packaging: If recycling is not practicable, dispose of in compliance with local regulations.

Recycling: The product and its packaging are not suitable for recycling.

14. TRANSPORT INFORMATION

Land transport (DOT)
Not classified.

Sea transport (IM>G)
Not classified.

Air transport (IATA)
Not classified.

15. REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture
Information on the product as supplied:

TSCA Chemical Substances Inventory:
All components of this product are either listed on the inventory or are exempt from listing.

US SARA Reporting Requirements: SARA (Section 311/312) hazard class:
Not concerned.

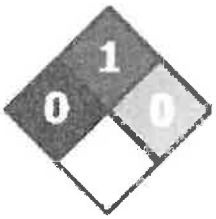
RCRA status:
Not RCRA hazardous.

California Proposition 651nformation:
WARNING! This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm, Acrylamide.

16. OTHER INFORMATION

NFPA and HMIS Ratings:

Health: 0
Flammability: 1
Instability: 0



Health: 0
Flammability: 1
Physical Hazard: 0
PPECode: B

This data sheet contains changes from the previous version in section(s}:

SECTION l. Identification of the substance/mixture and of the company/undertaking. SECTION 2. Hazards identification, SECTION 3. Composition of information on ingredients, SECTION 4. First aid measures, SECTION 5. Fir fighting measures, SECTION 6. Accidental release measures, SECTION 7. Handling and storage, SECTION 8. Exposure controls. Personal protection, SECTION 9. Physical and chemical properties, SECTION 10. Stability and reactivity, SECTION 11. Toxicological information, SECTION 12. Ecological information, SECTION 13. Disposal considerations, SECTION 14. Transport information, SECTION 15. Regulatory information, SECTION 16. Other Information.
Key or legend to abbreviations and acronyms used in the safety data sheet Abbreviations
Acute Tox. 4 "" Acute toxicity Category Code 4
Asp. Tox. I = Aspiration hazard Category Code I
Eye Dam l = Serious eye damage/eye irritation Category Code 1

H-Phrases
H302 -Harmful if swallowed
H304 - May be fatal if swallowed and enters airways H318 - Causes serious eye damage

REVISION SUMMARY
New SDS

MANUFACTURER DISCLAIMER:
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ATTACHMENT E-1

Emissions Calculations

Emissions Summary - Morris Facility

POLLUTANT	HOURLY PTE (LB/HR)	YEARLY PTE (TON/YR) (HOURLY PTE MULTIPLIED BY 8760 HR/YR) DIVIDED BY 2000 LB/TON	
PM	2.6	11.3	Engines + Fugitive Emissions
PM_{10}	0.64	2.8	Engines + Fugitive Emissions
VOCs	0.18	0.8	Tanks + Engines
CO	3.8	16.8	Engines
NO x	2.3	9.8	Engines
SO_2	0	0	N/A
Pb	0	0	N/A
HAPs (AGGREGATE AMOUNT)	0.004	0.019	Tanks
TAPs (INDIVIDUALLY)*	0.001	0.009	BENZENE
OTHER (INDIVIDUALLY)*	0	0	N/A

Fugitive Dust Emissions - Morris Facility

Distance per Trip (miles)	Trips per Day	Trips per Year	VMT/Year (miles)
0.1	100.0	36500	3650

Variables	PM-10	PM
s, surface material silt content (%)	4.8	
W, mean vehicle weight (tons)	40	
k, particle size multiplier	1.5	4.9
a, constant	0.9	0.7
b, constant	0.45	
P	160	
E = annual size-specific emission factor extrapolated for natural mitigation, lb/VMT	**1.18**	**4.63**
Annual Uncontrolled Emissions (tons)	**2.2**	**8.5**
Uncontrolled Emissions (lbs/hr)	**0.49**	**1.93**

$$E=\left[k\left(\frac{s}{12}\right)^{a}\times\left(\frac{W}{3}\right)^{b}\right]\times(365-P/365)$$

Tank Emissions - Morris Facility

Based on: 10,000 bbl/day 153,300,000 gal /yr total throughput

Emission Point #	Source	Tank Characteristics: Volume (Gal)	Tank Characteristics: Dimensions (D x H ft)	Tank Characteristics: Material	Throughput (Gal/Yr)	Emission Results: VOC Emissions (lb/hr)	Emission Results: VOC Emissions (ton/yr)	Emission Results: HAPs (lb/hr)	Emission Results: HAPs (ton/yr)	Comments	Assumptions	TANKS Results: Benzene (lb/yr)	TANKS Results: Ethylbenzene (lb/yr)	TANKS Results: VOC's (lb/yr)	TANKS Results: Xylene (lb/yr)	TANKS Results: Toluene (lb/yr)	TANKS Results: Methanol (lb/yr)	TANKS Results: Hexane (lb/yr)	TANKS Results: Cumene (lb/yr)	TANKS Results: TOTAL (lb/yr)
1E	Weir Tank 1 (WT 1)	21,000	8.5 x 45	Steel	153,300,000	0.002	0.008	0.000	0.001	100% of influent through each tank	Assuming 1,000ppm VOC (0.1%); RVP 6 plus BTEX	3062.29	2.52	15.43	1.73	0.16	0.49	0.14	12.91	3077.72
2E	Weir Tank 2 (WT 2)	21,000	8.5 x 45	Steel	153,300,000	0.002	0.008	0.000	0.001			3062.29	2.52	15.43	1.73	0.16	0.49	0.14	12.91	3077.72
3E	Settling Tank 1 (ST 1)	21,000	8.5 x 45	Steel	153,300,000	0.002	0.008	0.000	0.001	100% of influent through each tank	Assuming 1,000ppm VOC (0.1%); RVP 6 plus BTEX	3062.29	2.52	15.43	1.73	0.16	0.49	0.14	12.91	3077.72
4E	Settling Tank 2 (ST 2)	21,000	8.5 x 45	Steel	153,300,000	0.002	0.008	0.000	0.001			3062.29	2.52	15.43	1.73	0.16	0.49	0.14	12.91	3077.72
5E	Settling Tank 3 (ST 3)	21,000	8.5 x 45	Steel	153,300,000	0.002	0.008	0.000	0.001			3062.29	2.52	15.43	1.73	0.16	0.49	0.14	12.91	3077.72
6E	Settling Tank 4 (ST 4)	21,000	8.5 x 45	Steel	153,300,000	0.002	0.008	0.000	0.001			3062.29	2.52	15.43	1.73	0.16	0.49	0.14	12.91	3077.72
7E	Settling Tank 5 (ST 5)	21,000	8.5 x 45	Steel	153,300,000	0.002	0.008	0.000	0.001			3062.29	2.52	15.43	1.73	0.16	0.49	0.14	12.91	3077.72
8E	Polishing Tank 1 (PT 1)	21,000	8.5 x 45	Steel	153,300,000	0.002	0.008	0.000	0.001	100% of influent through the tank	Assuming 1,000ppm VOC (0.1%); RVP 6 plus BTEX	3062.29	2.52	15.43	1.73	0.16	0.49	0.14	12.91	3077.72
9E	Sludge Storage Tank 1 (SS 1)	21,000	8.5 x 45	Steel	6,132,000	0.000	0.001	0.000	0.001	20% of sludge slurry goes through each tank (2,000bbl/day total)	Assuming 1,000ppm VOC (0.1%); RVP 6 plus BTEX	223.53	1.12	1.13	0.94	0.13	0.01	0.04	0.01	224.66
10E	Sludge Storage Tank 2 (SS 2)	21,000	8.5 x 45	Steel	6,132,000	0.000	0.001	0.000	0.001			223.53	1.12	1.13	0.94	0.13	0.01	0.04	0.01	224.66
11E	Sludge Storage Tank 3 (SS 3)	21,000	8.5 x 45	Steel	6,132,000	0.000	0.001	0.000	0.001			223.53	1.12	1.13	0.94	0.13	0.01	0.04	0.01	224.66
12E	Sludge Storage Tank 4 (SS 4)	21,000	8.5 x 45	Steel	6,132,000	0.000	0.001	0.000	0.001			223.53	1.12	1.13	0.94	0.13	0.01	0.04	0.01	224.66
13E	Sludge Storage Tank 5 (SS 5)	21,000	8.5 x 45	Steel	6,132,000	0.000	0.001	0.000	0.001			223.53	1.12	1.13	0.94	0.13	0.01	0.04	0.01	224.66
14E - Water Loadout (WL-1)						0.008	0.001	0.000	0.001	(see "Water Loadout" tab)										
15E - Sludge Loadout (SL-1)						0.001	0.007	0.000	0.001	(see "Sludge Loadout" tab)										

VOC emissions		HAP emissions	
lb/hr	ton/yr	lb/hr	ton/yr
0.024	0.104	0.004	0.019

Diesel Engine Emissions - Morris Facility

		Component	#	Engine	Power	Man. Date	Max kW
1	16E-19E	Fischer Bush Water Transfer Pumps	2 treatment, 2 press	JD4045	19-37 kW	Sep-13	37
2	20E	MQ Generator	1 for treatment	Isuzu	19 < kW < 37	Aug-12	37
3	21E	Sullivan Palatek D375 Portable Compressor	1 for press	JD4045	86-104 kW @ 2400 rpm; 86-93 kW @ 2200 rpm	May-14	104
4	22E	Press Generator	1 for press	JD4024 / Isuzu	19-37 kW / 89.6 HP	Apr-13	37

TOTAL Emissions from Engines		
Pollutant	ton/yr	lb/hr
CO	7.6	1.7
NOx	9.8	2.2
VOC	0.7	0.2
PM-10	0.6	0.15

hours = 8760 24 hours a day for transfer pumps/generators

19-37kW

Pollutant	g/kw-hr	g/kw	1	4	TOTAL (in kg/yr)	in ton/yr	in lb/hr	Poll.
CO	1.2	10512.0	1353776.0	388944.0	1944.7	2.1	0.5	CO
NOx + NMHC	4.6	40296.0	5963808.0	1490952.0	7454.8	8.2	1.9	NOx + NMHC (VOC)
PM-10	0.29	2540.4	375979.2	93994.8	470.0	0.5	0.12	PM-10

	in ton/yr	in lb/hr
NOx	7.8	1.8
VOC	0.4	0.1

Pollutant	g/kw-hr	g/kw	2	TOTAL (in kg/yr)	in ton/yr	in lb/hr	Poll.
CO	2.0	17520.0	388944.0	406.5	0.4	0.1	CO
NOx + NMHC	6.6	57816.0	1490952.0	1548.8	1.7	0.4	NOx + NMHC (VOC
PM-10	0.25	2190.0	93994.8	96.2	0.1	0.02	PM-10

	in ton/yr	in lb/hr
NOx	1.6	0.4
VOC	0.1	0.0

*NO x makes up 95% of "NO x + NMHC" for Tier II engines, VOC = NHMC for Tier II engines, source: http://epa.ohio.gov/portals/27/genpermit/CI.calcs.pdf

hours = 8760 24 hours a day for the compressor

56-130kW

Pollutant	g/kw-hr	g/kw	3	TOTAL (in kg/yr)	in ton/yr	in lb/hr	Poll.
CO	5.0000	43800.0	4555200.0	4555.2	5.0	1.15	CO
NOx	0.4000	3504.0	364416.0	364.4	0.4	0.09	NOx
NMHC	0.1900	1664.4	173097.6	173.1	0.2	0.04	NMHC (VOC)
PM-10	0.0200	175.2	18220.8	18.2	0.02	0.005	PM-10

Water Loadout (W-1) Calculations - Morris Facility

Equation: 12.46 SPM/T

Emissions from PT - TANKS Calculation			W-1 Emissions based on Loadout		
lbs/year	%total		lb/day	ton/year	
3077.72	1.0000	TOTAL	36.09	6.59	
1.73	0.0006	**Benzene**	0.02	0.00	
0.16	0.0001	**Ethylbenzene**	0.00	0.000	
12.91	0.0042	**Gasoline**	0.15	0.03	
0.49	0.0002	**Toluene**	0.01	0.00	
3062.29	0.9950	**Water**	35.91	6.55	
0.14	0.0000	**Xylene**	0.00	0.00	
		HAPS	**0.030**	**0.005**	**HAPS Loadout Emissions in Tons/YR**
		VOCs	**0.181**	**0.033**	**VOCs Loadout Emissions in Tons/YR**

Variable	Value	Unit	
T	517.22	R	Liquid Bulk Temperature from TANKS
M	22	lb/lb - mole	Conservative Molecular Weight
P	0.2702	psia	Average at Liquid Bulk Temperature
S	0.6	saturation factor	

0.09 lb/10^3 gal

36.09 lb/day based on 10,000 bbl / day

6.59 ton/yr

Total Emissions

Sludge Loadout (SL-1) Calculations - Morris Facility

Emissions from SS - TANKS Calculation			W-1 Emissions based on Loadout	
lbs/year	%total		lb/day	ton/year
224.66	1.0000	TOTAL	7.22	1.32
0.13	0.0006	**Benzene**	0.00	0.00
0.01	0.0000	**Ethylene**	0.00	0.000
0.94	0.0042	**Gasoline**	0.03	0.01
0.04	0.0002	**Toluene**	0.00	0.00
223.53	0.9950	**Water**	7.18	1.31
0.01	0.0000	**Xylene**	0.00	0.00
		HAPS	**0.006**	**0.001**
		VOCs	**0.036**	**0.007**

Equation: 12.46 SPM/T

Variable	Value	Unit	
T	517.22	R	Bulk Temperature from TANKS
M	22	lb/lb - mole	Conservative Molecular Weight
P	0.2702	psia	Average at Liquid Bulk Temperature
S	0.6	saturation factor	

0.09 lb/10^3 gal

7.22 lb/day based on 2,000 bbl / day

1.32 ton/yr

Total Emissions

ATTACHMENT E-2

TANKS Data

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	WT 1-2
City:	
State:	West Virginia
Company:	HEP Shalewater Solutions LLC.
Type of Tank:	Horizontal Tank
Description:	2 - 21,000gal Weir Tanks (closed-roof frac tanks)

Tank Dimensions

Shell Length (ft):	45.00
Diameter (ft):	8.50
Volume (gallons):	20,000.00
Turnovers:	7,665.00
Net Throughput(gal/yr):	153,300,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

WT 1-2 - Horizontal Tank
, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
1,000 ppm Influent	All	61.57	52.97	70.18	57.22	0.2702	0.1980	0.3614	18.0627			18.03	
Benzene						1.2187	0.9578	1.5385	78.1100	0.0001	0.0006	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1146	0.0846	0.1634	106.1700	0.0001	0.0001	106.17	Option 2: A=6.973, B=1424.255, C=213.21
Gasoline (RVP 6)						3.0318	2.5304	3.6112	69.0000	0.0005	0.0042	92.00	Option 4: RVP=6, ASTM Slope=3
Toluene						0.3466	0.2642	0.4469	92.1300	0.0001	0.0002	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Water						0.2699	0.1977	0.3641	18.0150	0.9990	0.9950	18.02	Option 2: A=8.07131, B=1730.63, C=233.426
Xylenes (mixed isomers)						0.0955	0.0703	0.1281	106.1700	0.0001	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

WT 1-2 - Horizontal Tank
, West Virginia

Annual Emission Calculations	
Standing Losses (lb):	35.8931
Vapor Space Volume (cu ft):	1,626.4495
Vapor Density (lb/cu ft):	0.0009
Vapor Space Expansion Factor:	0.0736
Vented Vapor Saturation Factor:	0.9426
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,626.4495
Tank Diameter (ft):	8.5000
Effective Diameter (ft):	22.0740
Vapor Space Outage (ft):	4.2500
Tank Shell Length (ft):	45.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0009
Vapor Molecular Weight (lb/lb-mole):	18.0827
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2702
Daily Avg. Liquid Surface Temp. (deg. R):	521.2427
Daily Average Ambient Temp. (deg. F):	54.9833
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	516.8833
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,250.5726
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0736
Daily Vapor Temperature Range (deg. R):	34.4127
Daily Vapor Pressure Range (psia):	0.1664
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2702
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.1980
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.3644
Daily Avg. Liquid Surface Temp. (deg R):	521.2427
Daily Min. Liquid Surface Temp. (deg R):	512.6395
Daily Max. Liquid Surface Temp. (deg R):	528.6458
Daily Ambient Temp. Range (deg. R):	21.5333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9426
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.2702
Vapor Space Outage (ft):	4.2500
Working Losses (lb):	3,041.7967
Vapor Molecular Weight (lb/lb-mole):	18.0827
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2702
Annual Net Throughput (gal/yr.):	153,300,000.0000
Annual Turnovers:	7,665.0000
Turnover Factor:	0.1706
Tank Diameter (ft):	8.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	3,077.7249

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

WT 1-2 - Horizontal Tank
, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
1,000 ppm Influent	3,041.74	35.99	3,077.72
Gasoline (RVP 6)	12.76	0.15	12.91
Benzene	1.71	0.02	1.73
Ethylbenzene	0.16	0.00	0.16
Toluene	0.49	0.01	0.49
Xylenes (mixed isomers)	0.13	0.00	0.14
Water	3,026.48	35.81	3,062.29

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	ST 1-5
City:	
State:	West Virginia
Company:	HEP Shalewater Solutions LLC.
Type of Tank:	Horizontal Tank
Description:	5 - 21,000gal Settling Tanks (closed-roof frac tanks)

Tank Dimensions

Shell Length (ft):	45.00
Diameter (ft):	8.50
Volume (gallons):	20,000.00
Turnovers:	7,665.00
Net Throughput(gal/yr):	153,300,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

ST 1-5 - Horizontal Tank
, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
1,000ppm VOC	All	61.57	52.97	70.18	57.22	0.2702	0.1980	0.3844	18.0827			18.03	
Benzene						1.2137	0.9578	1.5385	78.1100	0.0001	0.0006	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1146	0.0846	0.1534	106.1700	0.0001	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Gasoline (RVP 6)						3.0318	2.5304	3.6112	69.0000	0.0005	0.0042	62.00	Option 4: RVP=6, ASTM Slope=3
Toluene						0.3466	0.2642	0.4499	92.1300	0.0001	0.0002	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Water						0.2699	0.1977	0.3641	18.0160	0.9990	0.9950	18.02	Option 2: A=8.07131, B=1730.63, C=233.426
Xylenes (mixed isomers)						0.0855	0.0703	0.1281	106.1700	0.0001	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

ST 1-5 - Horizontal Tank
, West Virginia

Annual Emission Calculations	
Standing Losses (lb):	35.8881
Vapor Space Volume (cu ft):	1,626.4495
Vapor Density (lb/cu ft):	0.0009
Vapor Space Expansion Factor:	0.0738
Vented Vapor Saturation Factor:	0.9426
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,626.4495
Tank Diameter (ft):	8.5000
Effective Diameter (ft):	22.0740
Vapor Space Outage (ft):	4.2500
Tank Shell Length (ft):	45.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0009
Vapor Molecular Weight (lb/lb-mole):	18.0627
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2702
Daily Avg. Liquid Surface Temp. (deg. R):	521.2427
Daily Average Ambient Temp. (deg. F):	54.9833
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	516.6938
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sq ft day):	1,250.5723
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0738
Daily Vapor Temperature Range (deg. R):	34.4127
Daily Vapor Pressure Range (psia):	0.1664
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2702
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.1960
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.3644
Daily Avg. Liquid Surface Temp. (deg R):	521.2427
Daily Min. Liquid Surface Temp. (deg R):	512.8395
Daily Max. Liquid Surface Temp. (deg R):	528.8458
Daily Ambient Temp. Range (deg. R):	21.5333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9426
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.2702
Vapor Space Outage (ft):	4.2500
Working Losses (lb):	3,041.7367
Vapor Molecular Weight (lb/lb-mole):	18.0627
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2702
Annual Net Throughput (gal/yr.):	153,300,000.0000
Annual Turnovers:	7,665.0000
Turnover Factor:	0.1706
Tank Diameter (ft):	8.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	3,077.7249

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

ST 1-5 - Horizontal Tank
, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
1,000ppm VOC	3,041.74	35.99	3,077.72
Gasoline (RVP 6)	12.76	0.15	12.91
Benzene	1.71	0.02	1.73
Ethylbenzene	0.16	0.00	0.16
Toluene	0.49	0.01	0.49
Xylenes (mixed isomers)	0.13	0.00	0.14
Water	3,026.48	35.81	3,062.29

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	SS 1-5
City:	
State:	West Virginia
Company:	HEP Shalewater Solutions LLC.
Type of Tank:	Horizontal Tank
Description:	5 - 21,000gal Sludge Settling Tanks

Tank Dimensions

Shell Length (ft):	45.00
Diameter (ft):	8.50
Volume (gallons):	20,000.00
Turnovers:	306.60
Net Throughput(gal/yr):	6,132,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

SS 1-5 - Horizontal Tank
, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
1,000 ppm VOC	All	61.57	52.97	70.18	57.22	0.2702	0.1980	0.3644	18.0827			18.03	
Benzene						1.2197	0.9575	1.5385	78.1100	0.0001	0.0006	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1146	0.0846	0.1534	106.1700	0.0001	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Gasoline (RVP 6)						3.0318	2.5304	3.6112	60.0000	0.0005	0.0042	92.00	Option 4: RVP=6, ASTM Slope=3
Toluene						0.3466	0.2642	0.4499	92.1300	0.0001	0.0002	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Water						0.2599	0.1977	0.3641	18.0150	0.9990	0.9950	18.02	Option 2: A=8.07131, B=1730.63, C=233.426
Xylenes (mixed isomers)						0.0855	0.0703	0.1281	106.1700	0.0001	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

SS 1-5 - Horizontal Tank
, West Virginia

Annual Emission Calculations	
Standing Losses (lb):	35.8881
Vapor Space Volume (cu ft):	1,628.4495
Vapor Density (lb/cu ft):	0.0009
Vapor Space Expansion Factor:	0.0736
Vented Vapor Saturation Factor:	0.9426
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,628.4495
Tank Diameter (ft):	8.5000
Effective Diameter (ft):	22.0740
Vapor Space Outage (ft):	4.2500
Tank Shell Length (ft):	45.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0009
Vapor Molecular Weight (lb/lb-mole):	18.0827
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2702
Daily Avg. Liquid Surface Temp. (deg. R):	521.2427
Daily Average Ambient Temp. (deg. F):	54.8933
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	516.8933
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,250.5726
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0736
Daily Vapor Temperature Range (deg. R):	34.4127
Daily Vapor Pressure Range (psia):	0.1684
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2702
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.1680
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.3644
Daily Avg. Liquid Surface Temp. (deg R):	521.2427
Daily Min. Liquid Surface Temp. (deg R):	512.6395
Daily Max. Liquid Surface Temp. (deg R):	529.8458
Daily Ambient Temp. Range (deg. R):	21.5333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9426
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.2702
Vapor Space Outage (ft):	4.2500
Working Losses (lb):	188.6691
Vapor Molecular Weight (lb/lb-mole):	18.0827
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2702
Annual Net Throughput (gal/yr.):	6,132,000.0000
Annual Turnovers:	306.6000
Turnover Factor:	0.2845
Tank Diameter (ft):	8.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	224.5572

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

SS 1-5 - Horizontal Tank
, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
1,000 ppm VOC	188.67	35.99	224.66
Gasoline (RVP 6)	0.79	0.15	0.94
Benzene	0.11	0.02	0.13
Ethylbenzene	0.01	0.00	0.01
Toluene	0.03	0.01	0.04
Xylenes (mixed isomers)	0.01	0.00	0.01
Water	187.72	35.81	223.53

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	PT 1
City:	
State:	West Virginia
Company:	HEP Shalewater Solutions LLC.
Type of Tank:	Horizontal Tank
Description:	1 - 21,000gal Influent Storage Tanks (closed-roof frac tanks)

Tank Dimensions

Shell Length (ft):	45.00
Diameter (ft):	8.50
Volume (gallons):	20,000.00
Turnovers:	7,665.00
Net Throughput(gal/yr):	153,300,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Charleston, West Virginia (Avg Atmospheric Pressure = 14.25 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

PT 1 - Horizontal Tank
, West Virginia

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
1,000 ppm VOC	All	61.57	52.97	70.18	57.22	0.2702	0.1880	0.3544	18.0927			18.03	
Benzene						1.2167	0.9578	1.5385	78.1100	0.0001	0.0005	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Ethylbenzene						0.1140	0.0846	0.1534	106.1700	0.0001	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Gasoline (RVP 6)						3.0318	2.5304	3.6112	66.0000	0.0005	0.0042	62.00	Option 4: RVP=6, ASTM Slope=3
Toluene						0.3466	0.2542	0.4499	92.1300	0.0001	0.0002	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Water						0.2699	0.1977	0.3641	18.0150	0.9990	0.9950	18.02	Option 2: A=8.07131, B=1730.63, C=233.426
Xylenes (mixed isomers)						0.0955	0.0703	0.1281	106.1700	0.0001	0.0003	106.17	Option 2: A=7.009, B=1462.266, C=215.11

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

PT 1 - Horizontal Tank
, West Virginia

Annual Emission Calculations	
Standing Losses (lb):	35.9881
Vapor Space Volume (cu ft):	1,626.4495
Vapor Density (lb/cu ft):	0.0009
Vapor Space Expansion Factor:	0.0736
Vented Vapor Saturation Factor:	0.9426
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,626.4495
Tank Diameter (ft):	8.5000
Effective Diameter (ft):	22.0740
Vapor Space Outage (ft):	4.2500
Tank Shell Length (ft):	45.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0009
Vapor Molecular Weight (lb/lb-mole):	18.0827
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2702
Daily Avg. Liquid Surface Temp. (deg. R):	521.2427
Daily Average Ambient Temp. (deg. F):	54.9833
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	516.8933
Tank Paint Solar Absorptance (Shell):	0.5400
Daily Total Solar Insulation Factor (Btu/sqft day):	1,250.5726
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.0736
Daily Vapor Temperature Range (deg. R):	34.4127
Daily Vapor Pressure Range (psia):	0.1664
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2702
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.1980
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.3644
Daily Avg. Liquid Surface Temp. (deg R):	521.2427
Daily Min. Liquid Surface Temp. (deg R):	512.6385
Daily Max. Liquid Surface Temp. (deg R):	529.8458
Daily Ambient Temp. Range (deg. R):	21.5333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.9426
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0.2702
Vapor Space Outage (ft):	4.2500
Working Losses (lb):	3,041.7367
Vapor Molecular Weight (lb/lb-mole):	18.0827
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.2702
Annual Net Throughput (gal/yr.):	153,300,000.0000
Annual Turnovers:	7,665.0000
Turnover Factor:	0.1708
Tank Diameter (ft):	8.5000
Working Loss Product Factor:	1.0000
Total Losses (lb):	3,077.7249

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

PT 1 - Horizontal Tank
, West Virginia

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
1,000 ppm VOC	3,041.74	35.99	3,077.72
Gasoline (RVP 6)	12.76	0.15	12.91
Benzene	1.71	0.02	1.73
Ethylbenzene	0.16	0.00	0.16
Toluene	0.49	0.01	0.49
Xylenes (mixed isomers)	0.13	0.00	0.14
Water	3,026.48	35.81	3,062.29

ATTACHMENT F

Sample Data (04/27/2016)

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Pittsburgh
301 Alpha Drive
RIDC Park
Pittsburgh, PA 15238
Tel: (412)963-7058

TestAmerica Job ID: 180-54234-1
Client Project/Site: HEP Shalewater Solutions

For:
Shalewater Solutions, LLC
37 Grande Meadows Dr
Ste 201
Bridgeport, West Virginia 26330

Attn: Ryan Hall

Authorized for release by:
5/2/2016 1:05:12 PM

Debra Bowen, Project Manager I
(412)963-2445
debra.bowen@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: 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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Job ID: 180-54234-1

Laboratory: TestAmerica Pittsburgh

Narrative

Job Narrative
180-54234-1

Receipt
The samples were received on 4/28/2016 6:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.6° C.

GC/MS VOA
Samples MORRIS INFLUENT (180-54234-1) and MORRIS EFFLUENT (180-54234-2) were analyzed at a dilution due to the abundance of target analytes. The reporting limits have been adjusted accordingly.

GC/MS Semi VOA
Internal standard responses were outside of acceptance limits for the following samples: MORRIS SLUDGE (180-54234-3), (180-54234-A-3-A MS) and (180-54234-A-3-B MSD). The samples show evidence of matrix interference and samples were analyzed at a dilution. Matrix interference is confirmed by the MS/MSD/Sample. Data will be qualified and reported. No reanalysis will be done due to analyzing at a higher dilution will not improve the quality of the results.

Surrogate recovery for the following samples was outside control limits: MORRIS SLUDGE (180-54234-3), (180-54234-A-3-A MS) and (180-54234-A-3-B MSD). Evidence of matrix interference is present and samples were analyzed at a dilution. The MS/MSD/Sample confirm the matrix therefore, re-extraction and/or re-analysis was not performed. Data will be qualified and reported.

Surrogate 2-Fluorobiphenyl recovery for the following sample was outside control limits: MORRIS EFFLUENT (180-54234-2). Evidence of matrix interference is present; therefore, re-extraction and/or re-analysis was not performed. Data will be qualified and reported.

The matrix spike / matrix spike duplicate (MS/MSD) recoveries for sample MORRIS SLUDGE (180-54234-3) were outside control limits. Sample matrix interference is suspected because the associated laboratory control sample (LCS) recovery was within acceptance limits. The presence of the '4' qualifier indicates analytes where the concentration in the unspiked sample exceeded four times the spiking amount. Also, several analytes exceeded the relative percent difference (RPD) limits.

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

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

GC/MS VOA TICs

Qualifier	Qualifier Description
J	Indicates an Estimated Value for TICs
N	This flag indicates the presumptive evidence of a compound.
T	Result is a tentatively identified compound (TIC) and an estimated value.

GC/MS Semi VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.
X	Surrogate is outside control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
*	ISTD response or retention time outside acceptable limits
F1	MS and/or MSD Recovery is outside acceptance limits.
F2	MS/MSD RPD exceeds control limits
*	LCS or LCSD is outside acceptance limits.
E	Result exceeded calibration range.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

GC/MS Semi VOA TICs

Qualifier	Qualifier Description
J	Indicates an Estimated Value for TICs
N	This flag indicates the presumptive evidence of a compound.
T	Result is a tentatively identified compound (TIC) and an estimated value.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	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, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
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
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)

Glossary (Continued)

Abbreviation	These commonly used abbreviations may or may not be present in this report.
TEQ	Toxicity Equivalent Quotient (Dioxin)

Certification Summary

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

Laboratory: TestAmerica Pittsburgh

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
West Virginia DEP	State Program	3	142	01-31-17

The following analytes are included in this report, but are not certified under this certification:

Analysis Method	Prep Method	Matrix	Analyte
2540G		Solid	Percent Moisture
2540G		Solid	Percent Solids

Sample Summary

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
180-54234-1	MORRIS INFLUENT	Water	04/27/16 16:30	04/28/16 06:00
180-54234-2	MORRIS EFFLUENT	Water	04/27/16 16:30	04/28/16 06:00
180-54234-3	MORRIS SLUDGE	Solid	04/27/16 16:30	04/28/16 06:00
180-54234-4	TRIB BLANK	Water	04/27/16 00:00	04/28/16 06:00

Method Summary

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

Method	Method Description	Protocol	Laboratory
8260C	Volatile Organic Compounds by GC/MS	SW846	TAL PIT
8270D LL	Semivolatile Organic Compounds by GC/MS - Low Level	SW846	TAL PIT
2540G	SM 2540G	SM22	TAL PIT

Protocol References:

SM22 = SM22

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

Laboratory References:

TAL PIT = TestAmerica Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Lab Chronicle

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

Client Sample ID: MORRIS INFLUENT

Lab Sample ID: 180-54234-1
Date Collected: 04/27/16 16:30
Matrix: Water
Date Received: 04/28/16 06:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		10	5 mL	5 mL	174823	04/29/16 12:44	PJJ	TAL PIT
	Instrument ID: CHHP4									
Total/NA	Prep	3520C			960 mL	1.0 mL	174719	04/28/16 09:57	BJT	TAL PIT
Total/NA	Analysis	8270D LL		1	960 mL	1.0 mL	174783	04/29/16 14:15	SAB	TAL PIT
	Instrument ID: CH722									

Client Sample ID: MORRIS EFFLUENT

Lab Sample ID: 180-54234-2
Date Collected: 04/27/16 16:30
Matrix: Water
Date Received: 04/28/16 06:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	5 mL	5 mL	174682	04/28/16 12:58	PJJ	TAL PIT
	Instrument ID: CHHP4									
Total/NA	Analysis	8260C	DL	5	5 mL	5 mL	174682	04/28/16 15:45	PJJ	TAL PIT
	Instrument ID: CHHP4									
Total/NA	Prep	3520C			990 mL	1.0 mL	174719	04/28/16 09:57	BJT	TAL PIT
Total/NA	Analysis	8270D LL		1	990 mL	1.0 mL	174783	04/29/16 14:43	SAB	TAL PIT
	Instrument ID: CH722									

Client Sample ID: MORRIS SLUDGE

Lab Sample ID: 180-54234-3
Date Collected: 04/27/16 16:30
Matrix: Solid
Date Received: 04/28/16 06:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	2540G		1			174728	04/28/16 10:23	CAK	TAL PIT
	Instrument ID: NOEQUIP									

Client Sample ID: MORRIS SLUDGE

Lab Sample ID: 180-54234-3
Date Collected: 04/27/16 16:30
Matrix: Solid
Date Received: 04/28/16 06:00
Percent Solids: 72.5

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	5030C			5.0005 g	5 mL	174800	04/29/16 05:28	KLG	TAL PIT
Total/NA	Analysis	8260C		10	5.0005 g	5 mL	174794	04/29/16 09:35	KLG	TAL PIT
	Instrument ID: CHHP3									
Total/NA	Prep	3541			15.0 g	1.0 mL	174740	04/28/16 11:09	CBY	TAL PIT
Total/NA	Analysis	8270D LL		5	15.0 g	1.0 mL	174781	04/29/16 12:48	SAB	TAL PIT
	Instrument ID: CH71									

Lab Chronicle

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

Client Sample ID: TRIB BLANK
Date Collected: 04/27/16 00:00
Date Received: 04/28/16 06:00

Lab Sample ID: 180-54234-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	5 mL	5 mL	174682	04/28/16 11:34	PJJ	TAL PIT
	Instrument ID: CHHP4									

Laboratory References:
TAL PIT = TestAmerica Pittsburgh, 301 Alpha Drive, RIDC Park, Pittsburgh, PA 15238, TEL (412)963-7058

Analyst References:
Lab: TAL PIT
Batch Type: Prep
BJT = Bill Trout
CBY = Charles Yushinski
KLG = Kathy Gordon
Batch Type: Analysis
CAK = Chuck Kieda
KLG = Kathy Gordon
PJJ = Patrick Journet
SAB = Sharon Bacha

Client Sample Results

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

Client Sample ID: MORRIS INFLUENT
Date Collected: 04/27/16 16:30
Date Received: 04/28/16 06:00

Lab Sample ID: 180-54234-1
Matrix: Water

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	6.5	U	50	6.5	ug/L			04/29/16 12:44	10
1,1,2,2-Tetrachloroethane	9.7	U	50	9.7	ug/L			04/29/16 12:44	10
1,1,2-Trichloro-1,2,2-trifluoroethane	22	U	50	22	ug/L			04/29/16 12:44	10
1,1,2-Trichloroethane	15	U	50	15	ug/L			04/29/16 12:44	10
1,1-Dichloroethane	8.4	U	50	8.4	ug/L			04/29/16 12:44	10
1,1-Dichloroethene	11	U	50	11	ug/L			04/29/16 12:44	10
1,2-Dibromo-3-Chloropropane	22	U	50	22	ug/L			04/29/16 12:44	10
1,2-Dichlorobenzene	17	U	50	17	ug/L			04/29/16 12:44	10
1,2-Dichloroethane	8.5	U	50	8.5	ug/L			04/29/16 12:44	10
1,2-Dichloropropane	9.6	U	50	9.6	ug/L			04/29/16 12:44	10
1,2,4-Trichlorobenzene	22	U	50	22	ug/L			04/29/16 12:44	10
1,3-Dichlorobenzene	13	U	50	13	ug/L			04/29/16 12:44	10
1,4-Dichlorobenzene	14	U	50	14	ug/L			04/29/16 12:44	10
2-Butanone (MEK)	**41**	**J**	50	21	ug/L			04/29/16 12:44	10
2-Hexanone	21	U	50	21	ug/L			04/29/16 12:44	10
4-Methyl-2-pentanone (MIBK)	20	U	50	20	ug/L			04/29/16 12:44	10
Acetone	**74**	**J**	200	50	ug/L			04/29/16 12:44	10
Benzene	**40**	**J**	50	8.2	ug/L			04/29/16 12:44	10
Bromoform	25	U	50	25	ug/L			04/29/16 12:44	10
Bromomethane	13	U	50	13	ug/L			04/29/16 12:44	10
Carbon disulfide	12	U	50	12	ug/L			04/29/16 12:44	10
Carbon tetrachloride	7.4	U	50	7.4	ug/L			04/29/16 12:44	10
Chlorobenzene	9.1	U	50	9.1	ug/L			04/29/16 12:44	10
Chlorodibromomethane	14	U	50	14	ug/L			04/29/16 12:44	10
Chloroform	7.7	U	50	7.7	ug/L			04/29/16 12:44	10
Chloromethane	12	U	50	12	ug/L			04/29/16 12:44	10
Chloroethane	24	U	50	24	ug/L			04/29/16 12:44	10
cis-1,2-Dichloroethene	15	U	50	15	ug/L			04/29/16 12:44	10
cis-1,3-Dichloropropene	7.9	U	50	7.9	ug/L			04/29/16 12:44	10
Dichlorobromomethane	8.3	U	50	8.3	ug/L			04/29/16 12:44	10
Dichlorodifluoromethane	14	U	50	14	ug/L			04/29/16 12:44	10
Ethylbenzene	**15**	**J**	50	11	ug/L			04/29/16 12:44	10
1,2-Dibromoethane	12	U	50	12	ug/L			04/29/16 12:44	10
Cyclohexane	9.6	U	50	9.6	ug/L			04/29/16 12:44	10
Isopropylbenzene	8.4	U	50	8.4	ug/L			04/29/16 12:44	10
Methyl acetate	72	U	250	72	ug/L			04/29/16 12:44	10
Methyl tert-butyl ether	12	U	50	12	ug/L			04/29/16 12:44	10
Methylcyclohexane	**34**	**J**	50	9.5	ug/L			04/29/16 12:44	10
Methylene Chloride	41	U	50	41	ug/L			04/29/16 12:44	10
Styrene	11	U	50	11	ug/L			04/29/16 12:44	10
Tetrachloroethene	9.4	U	50	9.4	ug/L			04/29/16 12:44	10
Toluene	**200**		50	7.5	ug/L			04/29/16 12:44	10
trans-1,2-Dichloroethene	11	U	50	11	ug/L			04/29/16 12:44	10
trans-1,3-Dichloropropene	10	U	50	10	ug/L			04/29/16 12:44	10
Trichloroethene	9.0	U	50	9.0	ug/L			04/29/16 12:44	10
Trichlorofluoromethane	12	U	50	12	ug/L			04/29/16 12:44	10
Vinyl chloride	13	U	50	13	ug/L			04/29/16 12:44	10
Xylenes, Total	**220**		100	14	ug/L			04/29/16 12:44	10

Client Sample Results

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

Client Sample ID: MORRIS INFLUENT
Date Collected: 04/27/16 16:30
Date Received: 04/28/16 05:00

Lab Sample ID: 180-54234-1
Matrix: Water

Tentatively Identified Compound	Est. Result	Qualifier	Unit	D	RT	CAS No.	Prepared	Analyzed	Dil Fac
Octane, 2-methyl-	72	T J N	ug/L		9.21	3221-61-2		04/29/16 12:44	10
Nonane	120	T J N	ug/L		9.72	111-84-2		04/29/16 12:44	10
Decane	120	T J N	ug/L		11.06	124-18-5		04/29/16 12:44	10
Benzene, 1,2,4-trimethyl-	60	T J N	ug/L		11.38	95-63-6		04/29/16 12:44	10
Decane, 2-methyl-	54	T J N	ug/L		11.85	6975-98-0		04/29/16 12:44	10
Undecane	190	T J N	ug/L		12.27	1120-21-4		04/29/16 12:44	10
Decane, 3,6-dimethyl-	74	T J N	ug/L		12.88	17312-53-7		04/29/16 12:44	10
Undecane, 2-methyl-	62	T J N	ug/L		12.98	7045-71-8		04/29/16 12:44	10
Dodecane	200	T J N	ug/L		13.37	112-40-3		04/29/16 12:44	10
Undecane, 2,6-dimethyl-	120	T J N	ug/L		13.51	17301-23-4		04/29/16 12:44	10
Hexadecane, 7-methyl-	64	T J N	ug/L		14.11	26730-20-1		04/29/16 12:44	10
Tridecane	63	T J N	ug/L		14.39	629-50-5		04/29/16 12:44	10
Unknown	94	T J	ug/L		15.14			04/29/16 12:44	10

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	81		62 - 123		04/29/16 12:44	10
4-Bromofluorobenzene (Surr)	97		75 - 120		04/29/16 12:44	10
Dibromofluoromethane (Surr)	91		80 - 120		04/29/16 12:44	10
Toluene-d8 (Surr)	97		80 - 120		04/29/16 12:44	10

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthene	0.015	U	0.21	0.015	ug/L		04/28/16 09:57	04/29/16 14:15	1
Acenaphthylene	0.016	U	0.21	0.016	ug/L		04/28/16 09:57	04/29/16 14:15	1
Anthracene	0.016	U	0.21	0.016	ug/L		04/28/16 09:57	04/29/16 14:15	1
Benzo[a]anthracene	0.015	U	0.21	0.015	ug/L		04/28/16 09:57	04/29/16 14:15	1
Benzo[a]pyrene	0.014	U	0.21	0.014	ug/L		04/28/16 09:57	04/29/16 14:15	1
Benzo[b]fluoranthene	0.016	U	0.21	0.016	ug/L		04/28/16 09:57	04/29/16 14:15	1
Benzo[g,h,i]perylene	0.016	U	0.21	0.016	ug/L		04/28/16 09:57	04/29/16 14:15	1
Benzo[k]fluoranthene	0.057	U	0.21	0.057	ug/L		04/28/16 09:57	04/29/16 14:15	1
Bis(2-chloroethyl)ether	0.026	U	0.21	0.026	ug/L		04/28/16 09:57	04/29/16 14:15	1
Bis(2-chloroethoxy)methane	0.061	U	1.0	0.061	ug/L		04/28/16 09:57	04/29/16 14:15	1
2,2'-oxybis[1-chloropropane]	0.021	U	0.21	0.021	ug/L		04/28/16 09:57	04/29/16 14:15	1
Bis(2-ethylhexyl) phthalate	1.3	U	2.1	1.3	ug/L		04/28/16 09:57	04/29/16 14:15	1
4-Bromophenyl phenyl ether	0.066	U	1.0	0.066	ug/L		04/28/16 09:57	04/29/16 14:15	1
Butyl benzyl phthalate	0.15	U	1.0	0.15	ug/L		04/28/16 09:57	04/29/16 14:15	1
4-Chloroaniline	0.092	U	1.0	0.092	ug/L		04/28/16 09:57	04/29/16 14:15	1
2-Chloronaphthalene	0.016	U	0.21	0.016	ug/L		04/28/16 09:57	04/29/16 14:15	1
4-Chlorophenyl phenyl ether	0.052	U	1.0	0.052	ug/L		04/28/16 09:57	04/29/16 14:15	1
Chrysene	0.015	U	0.21	0.015	ug/L		04/28/16 09:57	04/29/16 14:15	1
Dibenz(a,h)anthracene	0.016	U	0.21	0.016	ug/L		04/28/16 09:57	04/29/16 14:15	1
Dibenzofuran	0.064	U	1.0	0.064	ug/L		04/28/16 09:57	04/29/16 14:15	1
Di-n-butyl phthalate	0.13	U	1.0	0.13	ug/L		04/28/16 09:57	04/29/16 14:15	1
3,3'-Dichlorobenzidine	0.12	U	1.0	0.12	ug/L		04/28/16 09:57	04/29/16 14:15	1
Diethyl phthalate	0.15	U	1.0	0.15	ug/L		04/28/16 09:57	04/29/16 14:15	1
Dimethyl phthalate	0.080	U	1.0	0.080	ug/L		04/28/16 09:57	04/29/16 14:15	1
2,4-Dinitrotoluene	0.056	U	1.0	0.056	ug/L		04/28/16 09:57	04/29/16 14:15	1
2,6-Dinitrotoluene	0.083	U	1.0	0.083	ug/L		04/28/16 09:57	04/29/16 14:15	1
Di-n-octyl phthalate	0.22	U	1.0	0.22	ug/L		04/28/16 09:57	04/29/16 14:15	1
Fluoranthene	0.017	U	0.21	0.017	ug/L		04/28/16 09:57	04/29/16 14:15	1

Client Sample Results

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

Client Sample ID: MORRIS INFLUENT
Date Collected: 04/27/16 16:30
Date Received: 04/28/16 06:00

Lab Sample ID: 180-54234-1
Matrix: Water

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Fluorene	0.023	U	0.21	0.023	ug/L		04/28/16 09:57	04/29/16 14:15	1
Hexachlorobenzene	0.019	U	0.21	0.019	ug/L		04/28/16 09:57	04/29/16 14:15	1
Hexachlorobutadiene	0.017	U	0.21	0.017	ug/L		04/28/16 09:57	04/29/16 14:15	1
Hexachlorocyclopentadiene	0.054	U	1.0	0.054	ug/L		04/28/16 09:57	04/29/16 14:15	1
Hexachloroethane	0.065	U	1.0	0.065	ug/L		04/28/16 09:57	04/29/16 14:15	1
Indeno[1,2,3-cd]pyrene	0.021	U	0.21	0.021	ug/L		04/28/16 09:57	04/29/16 14:15	1
Isophorone	0.067	U	1.0	0.067	ug/L		04/28/16 09:57	04/29/16 14:15	1
2-Methylnaphthalene	0.013	U	0.21	0.013	ug/L		04/28/16 09:57	04/29/16 14:15	1
Naphthalene	0.015	U	0.21	0.015	ug/L		04/28/16 09:57	04/29/16 14:15	1
2-Nitroaniline	0.37	U	5.2	0.37	ug/L		04/28/16 09:57	04/29/16 14:15	1
3-Nitroaniline	0.33	U	5.2	0.33	ug/L		04/28/16 09:57	04/29/16 14:15	1
4-Nitroaniline	0.18	U	5.2	0.18	ug/L		04/28/16 09:57	04/29/16 14:15	1
Nitrobenzene	0.088	U	2.1	0.088	ug/L		04/28/16 09:57	04/29/16 14:15	1
N-Nitrosodi-n-propylamine	0.032	U	0.21	0.032	ug/L		04/28/16 09:57	04/29/16 14:15	1
N-Nitrosodiphenylamine	0.089	U	1.0	0.089	ug/L		04/28/16 09:57	04/29/16 14:15	1
Phenanthrene	0.044	U	0.21	0.044	ug/L		04/28/16 09:57	04/29/16 14:15	1
Pyrene	0.016	U	0.21	0.016	ug/L		04/28/16 09:57	04/29/16 14:15	1
Carbazole	0.016	U	0.21	0.016	ug/L		04/28/16 09:57	04/29/16 14:15	1
Acetophenone	**2.3**		1.0	0.083	ug/L		04/28/16 09:57	04/29/16 14:15	1
Atrazine	0.093	U	1.0	0.093	ug/L		04/28/16 09:57	04/29/16 14:15	1
Benzaldehyde	0.16	U	1.0	0.16	ug/L		04/28/16 09:57	04/29/16 14:15	1
1,1'-Biphenyl	0.043	U	1.0	0.043	ug/L		04/28/16 09:57	04/29/16 14:15	1
Caprolactam	1.2	U	5.2	1.2	ug/L		04/28/16 09:57	04/29/16 14:15	1
4-Chloro-3-methylphenol	0.079	U	1.0	0.079	ug/L		04/28/16 09:57	04/29/16 14:15	1
2-Chlorophenol	0.17	U	1.0	0.17	ug/L		04/28/16 09:57	04/29/16 14:15	1
2-Methylphenol	**1.9**		1.0	0.090	ug/L		04/28/16 09:57	04/29/16 14:15	1
Methylphenol, 3 & 4	**22**		1.0	0.094	ug/L		04/28/16 09:57	04/29/16 14:15	1
2,4-Dichlorophenol	0.035	U	0.21	0.035	ug/L		04/28/16 09:57	04/29/16 14:15	1
2,4-Dimethylphenol	**1.3**		1.0	0.089	ug/L		04/28/16 09:57	04/29/16 14:15	1
2,4-Dinitrophenol	0.64	U	5.2	0.64	ug/L		04/28/16 09:57	04/29/16 14:15	1
4,6-Dinitro-2-methylphenol	0.23	U	5.2	0.23	ug/L		04/28/16 09:57	04/29/16 14:15	1
2-Nitrophenol	0.18	U	1.0	0.18	ug/L		04/28/16 09:57	04/29/16 14:15	1
4-Nitrophenol	0.67	U	5.2	0.67	ug/L		04/28/16 09:57	04/29/16 14:15	1
Pentachlorophenol	0.069	U	1.0	0.069	ug/L		04/28/16 09:57	04/29/16 14:15	1
Phenol	**10**		0.21	0.061	ug/L		04/28/16 09:57	04/29/16 14:15	1
2,4,5-Trichlorophenol	0.16	U	1.0	0.16	ug/L		04/28/16 09:57	04/29/16 14:15	1
2,4,6-Trichlorophenol	0.18	U	1.0	0.18	ug/L		04/28/16 09:57	04/29/16 14:15	1

Tentatively Identified Compound	*Est. Result*	*Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
Unknown	*120*	*T J*	*ug/L*		*5.09*		*04/28/16 09:57*	*04/29/16 14:15*	*1*
Unknown	*35*	*T J*	*ug/L*		*5.88*		*04/28/16 09:57*	*04/29/16 14:15*	*1*
Unknown	*22*	*T J*	*ug/L*		*5.92*		*04/28/16 09:57*	*04/29/16 14:15*	*1*
Unknown	*28*	*T J*	*ug/L*		*6.90*		*04/28/16 09:57*	*04/29/16 14:15*	*1*
Unknown	*15*	*T J*	*ug/L*		*7.21*		*04/28/16 09:57*	*04/29/16 14:15*	*1*
Unknown	*22*	*T J*	*ug/L*		*7.54*		*04/28/16 09:57*	*04/29/16 14:15*	*1*
Tetradecane	*14*	*T J N*	*ug/L*		*8.41*	*629-59-4*	*04/28/16 09:57*	*04/29/16 14:15*	*1*
Unknown	*27*	*T J*	*ug/L*		*8.77*		*04/28/16 09:57*	*04/29/16 14:15*	*1*
Unknown	*25*	*T J*	*ug/L*		*9.17*		*04/28/16 09:57*	*04/29/16 14:15*	*1*
Unknown	*16*	*T J*	*ug/L*		*10.28*		*04/28/16 09:57*	*04/29/16 14:15*	*1*
Unknown	*18*	*T J*	*ug/L*		*11.86*		*04/28/16 09:57*	*04/29/16 14:15*	*1*

Client Sample ID: MORRIS INFLUENT

Lab Sample ID: 180-54234-1
Matrix: Water

Date Collected: 04/27/16 16:30
Date Received: 04/28/16 06:00

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Tentatively Identified Compound	Est. Result	Qualifier	Unit	D	RT	CAS No.	Prepared	Analyzed	Dil Fac
Unknown	39	T J	ug/L		12.27		04/28/16 09:57	04/29/16 14:15	1
Unknown	19	T J	ug/L		13.42		04/28/16 09:57	04/29/16 14:15	1
Unknown	44	T J	ug/L		13.92		04/28/16 09:57	04/29/16 14:15	1
Unknown	26	T J	ug/L		15.82		04/28/16 09:57	04/29/16 14:15	1

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorobiphenyl	47		31 - 100	04/28/16 09:57	04/29/16 14:15	1
2-Fluorophenol (Surr)	51		20 - 100	04/28/16 09:57	04/29/16 14:15	1
2,4,6-Tribromophenol (Surr)	81		28 - 107	04/28/16 09:57	04/29/16 14:15	1
Nitrobenzene-d5 (Surr)	58		33 - 100	04/28/16 09:57	04/29/16 14:15	1
Phenol-d5 (Surr)	61		26 - 100	04/28/16 09:57	04/29/16 14:15	1
Terphenyl-d14 (Surr)	35		20 - 109	04/28/16 09:57	04/29/16 14:15	1

Client Sample ID: MORRIS EFFLUENT

Lab Sample ID: 180-54234-2
Matrix: Water

Date Collected: 04/27/16 16:30
Date Received: 04/28/16 06:00

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	0.65	U	5.0	0.65	ug/L			04/28/16 12:58	1
1,1,2,2-Tetrachloroethane	0.97	U	5.0	0.97	ug/L			04/28/16 12:58	1
1,1,2-Trichloro-1,2,2-trifluoroethane	2.2	U	5.0	2.2	ug/L			04/28/16 12:58	1
1,1,2-Trichloroethane	1.5	U	5.0	1.5	ug/L			04/28/16 12:58	1
1,1-Dichloroethane	0.84	U	5.0	0.84	ug/L			04/28/16 12:58	1
1,1-Dichloroethene	1.1	U	5.0	1.1	ug/L			04/28/16 12:58	1
1,2-Dibromo-3-Chloropropane	2.2	U	5.0	2.2	ug/L			04/28/16 12:58	1
1,2-Dichlorobenzene	1.7	U	5.0	1.7	ug/L			04/28/16 12:58	1
1,2-Dichloroethane	0.85	U	5.0	0.85	ug/L			04/28/16 12:58	1
1,2-Dichloropropane	0.96	U	5.0	0.96	ug/L			04/28/16 12:58	1
1,2,4-Trichlorobenzene	2.2	U	5.0	2.2	ug/L			04/28/16 12:58	1
1,3-Dichlorobenzene	1.3	U	5.0	1.3	ug/L			04/28/16 12:58	1
1,4-Dichlorobenzene	1.4	U	5.0	1.4	ug/L			04/28/16 12:58	1
2-Butanone (MEK)	**17**		5.0	2.1	ug/L			04/28/16 12:58	1
2-Hexanone	**2.7**	**J**	5.0	2.1	ug/L			04/28/16 12:58	1
4-Methyl-2-pentanone (MIBK)	**8.5**		5.0	2.0	ug/L			04/28/16 12:58	1
Benzene	**73**		5.0	0.82	ug/L			04/28/16 12:58	1
Bromoform	2.5	U	5.0	2.5	ug/L			04/28/16 12:58	1
Bromomethane	1.3	U	5.0	1.3	ug/L			04/28/16 12:58	1
Carbon disulfide	1.2	U	5.0	1.2	ug/L			04/28/16 12:58	1
Carbon tetrachloride	0.74	U	5.0	0.74	ug/L			04/28/16 12:58	1
Chlorobenzene	0.91	U	5.0	0.91	ug/L			04/28/16 12:58	1
Chlorodibromomethane	1.4	U	5.0	1.4	ug/L			04/28/16 12:58	1
Chloroform	0.77	U	5.0	0.77	ug/L			04/28/16 12:58	1
Chloromethane	1.2	U	5.0	1.2	ug/L			04/28/16 12:58	1
Chloroethane	2.4	U	5.0	2.4	ug/L			04/28/16 12:58	1
cis-1,2-Dichloroethene	1.5	U	5.0	1.5	ug/L			04/28/16 12:58	1
cis-1,3-Dichloropropene	0.79	U	5.0	0.79	ug/L			04/28/16 12:58	1
Dichlorobromomethane	0.83	U	5.0	0.83	ug/L			04/28/16 12:58	1
Dichlorodifluoromethane	1.4	U	5.0	1.4	ug/L			04/28/16 12:58	1

Client Sample ID: MORRIS EFFLUENT — **Lab Sample ID: 180-54234-2**

Date Collected: 04/27/16 16:30 — **Matrix: Water**

Date Received: 04/28/16 06:00

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ethylbenzene	**26**		5.0	1.1	ug/L			04/28/16 12:58	1
1,2-Dibromoethane	1.2	U	5.0	1.2	ug/L			04/28/16 12:58	1
Cyclohexane	**28**		5.0	0.96	ug/L			04/28/16 12:58	1
Isopropylbenzene	**4.3**	**J**	5.0	0.84	ug/L			04/28/16 12:58	1
Methyl acetate	**29**		25	7.2	ug/L			04/28/16 12:58	1
Methyl tert-butyl ether	1.2	U	5.0	1.2	ug/L			04/28/16 12:58	1
Methylcyclohexane	**37**		5.0	0.95	ug/L			04/28/16 12:58	1
Methylene Chloride	4.1	U	5.0	4.1	ug/L			04/28/16 12:58	1
Styrene	1.1	U	5.0	1.1	ug/L			04/28/16 12:58	1
Tetrachloroethene	0.94	U	5.0	0.94	ug/L			04/28/16 12:58	1
trans-1,2-Dichloroethene	1.1	U	5.0	1.1	ug/L			04/28/16 12:58	1
trans-1,3-Dichloropropene	1.0	U	5.0	1.0	ug/L			04/28/16 12:58	1
Trichloroethene	0.90	U	5.0	0.90	ug/L			04/28/16 12:58	1
Trichlorofluoromethane	1.2	U	5.0	1.2	ug/L			04/28/16 12:58	1
Vinyl chloride	1.3	U	5.0	1.3	ug/L			04/28/16 12:58	1
Xylenes, Total	**260**		10	1.4	ug/L			04/28/16 12:58	1

Tentatively Identified Compound	*Est. Result*	*Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
Butane	*40*	*T J N*	*ug/L*		*1.40*	*106-97-8*		*04/28/16 12:58*	*1*
Butane, 2-methyl-	*21*	*T J N*	*ug/L*		*1.77*	*78-78-4*		*04/28/16 12:58*	*1*
Pentane	*25*	*T J N*	*ug/L*		*1.99*	*109-66-0*		*04/28/16 12:58*	*1*
Ethanol	*18*	*T J N*	*ug/L*		*2.11*	*64-17-5*		*04/28/16 12:58*	*1*
Hexane	*17*	*T J N*	*ug/L*		*3.65*	*110-54-3*		*04/28/16 12:58*	*1*
Unknown Benzene Derivative	*46*	*T J*	*ug/L*		*10.91*			*04/28/16 12:58*	*1*
Benzene, 1,3,5-trimethyl-	*47*	*T J N*	*ug/L*		*11.01*	*108-67-8*		*04/28/16 12:58*	*1*
Decane	*15*	*T J N*	*ug/L*		*11.07*	*124-18-5*		*04/28/16 12:58*	*1*
Benzene, 1,2,4-trimethyl-	*63*	*T J N*	*ug/L*		*11.38*	*95-63-6*		*04/28/16 12:58*	*1*
Unknown Benzene Derivative	*18*	*T J*	*ug/L*		*11.78*			*04/28/16 12:58*	*1*
Undecane	*29*	*T J N*	*ug/L*		*12.26*	*1120-21-4*		*04/28/16 12:58*	*1*
Undecane, 5-methyl-	*31*	*T J N*	*ug/L*		*12.88*	*1632-70-8*		*04/28/16 12:58*	*1*
Dodecane	*35*	*T J N*	*ug/L*		*13.37*	*112-40-3*		*04/28/16 12:58*	*1*
Undecane, 2,6-dimethyl-	*18*	*T J N*	*ug/L*		*13.51*	*17301-23-4*		*04/28/16 12:58*	*1*
Tridecane	*16*	*T J N*	*ug/L*		*14.39*	*629-50-5*		*04/28/16 12:58*	*1*

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*91*		*62 - 123*		*04/28/16 12:58*	*1*
4-Bromofluorobenzene (Surr)	*97*		*75 - 120*		*04/28/16 12:58*	*1*
Dibromofluoromethane (Surr)	*95*		*80 - 120*		*04/28/16 12:58*	*1*
Toluene-d8 (Surr)	*103*		*80 - 120*		*04/28/16 12:58*	*1*

Method: 8260C - Volatile Organic Compounds by GC/MS - DL

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acetone	**110**		100	25	ug/L			04/28/16 15:45	5
Toluene	**260**		25	3.8	ug/L			04/28/16 15:45	5

Tentatively Identified Compound	*Est. Result*	*Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
Tentatively Identified Compound	*None*		*ug/L*					*04/28/16 15:45*	*5*

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*84*		*62 - 123*		*04/28/16 15:45*	*5*
4-Bromofluorobenzene (Surr)	*97*		*75 - 120*		*04/28/16 15:45*	*5*

Client Sample ID: MORRIS EFFLUENT — **Lab Sample ID: 180-54234-2**
Date Collected: 04/27/16 16:30 — **Matrix: Water**
Date Received: 04/28/16 06:00

Method: 8260C - Volatile Organic Compounds by GC/MS - DL (Continued)

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Dibromofluoromethane (Surr)	*95*		*80 - 120*		*04/28/16 15:45*	*5*
Toluene-d8 (Surr)	*97*		*80 - 120*		*04/28/16 15:45*	*5*

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthene	0.015	U	0.20	0.015	ug/L		04/28/16 09:57	04/29/16 14:43	1
Acenaphthylene	0.015	U	0.20	0.015	ug/L		04/28/16 09:57	04/29/16 14:43	1
Anthracene	0.016	U	0.20	0.016	ug/L		04/28/16 09:57	04/29/16 14:43	1
Benzo[a]anthracene	0.015	U	0.20	0.015	ug/L		04/28/16 09:57	04/29/16 14:43	1
Benzo[a]pyrene	0.014	U	0.20	0.014	ug/L		04/28/16 09:57	04/29/16 14:43	1
Benzo[b]fluoranthene	0.016	U	0.20	0.016	ug/L		04/28/16 09:57	04/29/16 14:43	1
Benzo[g,h,i]perylene	0.015	U	0.20	0.015	ug/L		04/28/16 09:57	04/29/16 14:43	1
Benzo[k]fluoranthene	0.055	U	0.20	0.055	ug/L		04/28/16 09:57	04/29/16 14:43	1
Bis(2-chloroethyl)ether	0.025	U	0.20	0.025	ug/L		04/28/16 09:57	04/29/16 14:43	1
Bis(2-chloroethoxy)methane	0.059	U	1.0	0.059	ug/L		04/28/16 09:57	04/29/16 14:43	1
2,2'-oxybis[1-chloropropane]	0.020	U	0.20	0.020	ug/L		04/28/16 09:57	04/29/16 14:43	1
Bis(2-ethylhexyl) phthalate	**9.0**		2.0	1.3	ug/L		04/28/16 09:57	04/29/16 14:43	1
4-Bromophenyl phenyl ether	0.064	U	1.0	0.064	ug/L		04/28/16 09:57	04/29/16 14:43	1
Butyl benzyl phthalate	0.14	U	1.0	0.14	ug/L		04/28/16 09:57	04/29/16 14:43	1
4-Chloroaniline	0.089	U	1.0	0.089	ug/L		04/28/16 09:57	04/29/16 14:43	1
2-Chloronaphthalene	0.015	U	0.20	0.015	ug/L		04/28/16 09:57	04/29/16 14:43	1
4-Chlorophenyl phenyl ether	0.051	U	1.0	0.051	ug/L		04/28/16 09:57	04/29/16 14:43	1
Chrysene	0.014	U	0.20	0.014	ug/L		04/28/16 09:57	04/29/16 14:43	1
Dibenz(a,h)anthracene	0.016	U	0.20	0.016	ug/L		04/28/16 09:57	04/29/16 14:43	1
Dibenzofuran	0.062	U	1.0	0.062	ug/L		04/28/16 09:57	04/29/16 14:43	1
Di-n-butyl phthalate	0.13	U	1.0	0.13	ug/L		04/28/16 09:57	04/29/16 14:43	1
3,3'-Dichlorobenzidine	0.11	U	1.0	0.11	ug/L		04/28/16 09:57	04/29/16 14:43	1
Diethyl phthalate	0.15	U	1.0	0.15	ug/L		04/28/16 09:57	04/29/16 14:43	1
Dimethyl phthalate	0.077	U	1.0	0.077	ug/L		04/28/16 09:57	04/29/16 14:43	1
2,4-Dinitrotoluene	0.054	U	1.0	0.054	ug/L		04/28/16 09:57	04/29/16 14:43	1
2,6-Dinitrotoluene	0.081	U	1.0	0.081	ug/L		04/28/16 09:57	04/29/16 14:43	1
Di-n-octyl phthalate	0.21	U	1.0	0.21	ug/L		04/28/16 09:57	04/29/16 14:43	1
Fluoranthene	0.016	U	0.20	0.016	ug/L		04/28/16 09:57	04/29/16 14:43	1
Fluorene	0.022	U	0.20	0.022	ug/L		04/28/16 09:57	04/29/16 14:43	1
Hexachlorobenzene	0.018	U	0.20	0.018	ug/L		04/28/16 09:57	04/29/16 14:43	1
Hexachlorobutadiene	0.017	U	0.20	0.017	ug/L		04/28/16 09:57	04/29/16 14:43	1
Hexachlorocyclopentadiene	0.052	U	1.0	0.052	ug/L		04/28/16 09:57	04/29/16 14:43	1
Hexachloroethane	0.063	U	1.0	0.063	ug/L		04/28/16 09:57	04/29/16 14:43	1
Indeno[1,2,3-cd]pyrene	0.020	U	0.20	0.020	ug/L		04/28/16 09:57	04/29/16 14:43	1
Isophorone	0.065	U	1.0	0.065	ug/L		04/28/16 09:57	04/29/16 14:43	1
2-Methylnaphthalene	0.012	U	0.20	0.012	ug/L		04/28/16 09:57	04/29/16 14:43	1
Naphthalene	0.014	U	0.20	0.014	ug/L		04/28/16 09:57	04/29/16 14:43	1
2-Nitroaniline	0.36	U	5.1	0.36	ug/L		04/28/16 09:57	04/29/16 14:43	1
3-Nitroaniline	0.32	U	5.1	0.32	ug/L		04/28/16 09:57	04/29/16 14:43	1
4-Nitroaniline	0.17	U	5.1	0.17	ug/L		04/28/16 09:57	04/29/16 14:43	1
Nitrobenzene	0.085	U	2.0	0.085	ug/L		04/28/16 09:57	04/29/16 14:43	1
N-Nitrosodi-n-propylamine	**16**		0.20	0.031	ug/L		04/28/16 09:57	04/29/16 14:43	1
N-Nitrosodiphenylamine	0.086	U	1.0	0.086	ug/L		04/28/16 09:57	04/29/16 14:43	1
Phenanthrene	0.043	U	0.20	0.043	ug/L		04/28/16 09:57	04/29/16 14:43	1

Client Sample ID: MORRIS EFFLUENT — **Lab Sample ID: 180-54234-2**

Date Collected: 04/27/16 16:30 — **Matrix: Water**

Date Received: 04/28/16 06:00

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Pyrene	0.016	U	0.20	0.016	ug/L		04/28/16 09:57	04/29/16 14:43	1
Carbazole	0.016	U	0.20	0.016	ug/L		04/28/16 09:57	04/29/16 14:43	1
Acetophenone	0.081	U	1.0	0.081	ug/L		04/28/16 09:57	04/29/16 14:43	1
Atrazine	0.090	U	1.0	0.090	ug/L		04/28/16 09:57	04/29/16 14:43	1
Benzaldehyde	0.15	U	1.0	0.15	ug/L		04/28/16 09:57	04/29/16 14:43	1
1,1'-Biphenyl	0.042	U	1.0	0.042	ug/L		04/28/16 09:57	04/29/16 14:43	1
Caprolactam	1.2	U	5.1	1.2	ug/L		04/28/16 09:57	04/29/16 14:43	1
4-Chloro-3-methylphenol	0.076	U	1.0	0.076	ug/L		04/28/16 09:57	04/29/16 14:43	1
2-Chlorophenol	0.17	U	1.0	0.17	ug/L		04/28/16 09:57	04/29/16 14:43	1
2-Methylphenol	**0.72**	**J**	1.0	0.087	ug/L		04/28/16 09:57	04/29/16 14:43	1
Methylphenol, 3 & 4	**18**		1.0	0.091	ug/L		04/28/16 09:57	04/29/16 14:43	1
2,4-Dichlorophenol	0.034	U	0.20	0.034	ug/L		04/28/16 09:57	04/29/16 14:43	1
2,4-Dimethylphenol	0.086	U	1.0	0.086	ug/L		04/28/16 09:57	04/29/16 14:43	1
2,4-Dinitrophenol	0.62	U	5.1	0.62	ug/L		04/28/16 09:57	04/29/16 14:43	1
4,6-Dinitro-2-methylphenol	0.22	U	5.1	0.22	ug/L		04/28/16 09:57	04/29/16 14:43	1
2-Nitrophenol	0.17	U	1.0	0.17	ug/L		04/28/16 09:57	04/29/16 14:43	1
4-Nitrophenol	0.65	U	5.1	0.65	ug/L		04/28/16 09:57	04/29/16 14:43	1
Pentachlorophenol	0.067	U	1.0	0.067	ug/L		04/28/16 09:57	04/29/16 14:43	1
Phenol	**6.0**		0.20	0.059	ug/L		04/28/16 09:57	04/29/16 14:43	1
2,4,5-Trichlorophenol	0.15	U	1.0	0.15	ug/L		04/28/16 09:57	04/29/16 14:43	1
2,4,6-Trichlorophenol	0.18	U	1.0	0.18	ug/L		04/28/16 09:57	04/29/16 14:43	1

Tentatively Identified Compound	*Est. Result*	*Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
Unknown	*72*	*T J*	*ug/L*		*5.08*		*04/28/16 09:57*	*04/29/16 14:43*	*1*
Unknown	*41*	*T J*	*ug/L*		*5.89*		*04/28/16 09:57*	*04/29/16 14:43*	*1*
Unknown	*21*	*T J*	*ug/L*		*6.14*		*04/28/16 09:57*	*04/29/16 14:43*	*1*
Unknown	*49*	*T J*	*ug/L*		*6.65*		*04/28/16 09:57*	*04/29/16 14:43*	*1*
Unknown	*16*	*T J*	*ug/L*		*7.01*		*04/28/16 09:57*	*04/29/16 14:43*	*1*
Unknown	*15*	*T J*	*ug/L*		*7.12*		*04/28/16 09:57*	*04/29/16 14:43*	*1*
Unknown	*29*	*T J*	*ug/L*		*7.62*		*04/28/16 09:57*	*04/29/16 14:43*	*1*
Unknown	*33*	*T J*	*ug/L*		*7.73*		*04/28/16 09:57*	*04/29/16 14:43*	*1*
Unknown	*34*	*T J*	*ug/L*		*7.90*		*04/28/16 09:57*	*04/29/16 14:43*	*1*
Unknown	*34*	*T J*	*ug/L*		*8.19*		*04/28/16 09:57*	*04/29/16 14:43*	*1*
Unknown	*17*	*T J*	*ug/L*		*8.71*		*04/28/16 09:57*	*04/29/16 14:43*	*1*
Unknown	*21*	*T J*	*ug/L*		*8.96*		*04/28/16 09:57*	*04/29/16 14:43*	*1*
Heneicosane	*14*	*T J N*	*ug/L*		*14.03*	*629-94-7*	*04/28/16 09:57*	*04/29/16 14:43*	*1*
Heneicosane	*17*	*T J N*	*ug/L*		*15.42*	*629-94-7*	*04/28/16 09:57*	*04/29/16 14:43*	*1*
Nonacosane	*15*	*T J N*	*ug/L*		*16.91*	*630-03-5*	*04/28/16 09:57*	*04/29/16 14:43*	*1*

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*20*	*X*	*31 - 100*	*04/28/16 09:57*	*04/29/16 14:43*	*1*
2-Fluorophenol (Surr)	*50*		*20 - 100*	*04/28/16 09:57*	*04/29/16 14:43*	*1*
2,4,6-Tribromophenol (Surr)	*92*		*28 - 107*	*04/28/16 09:57*	*04/29/16 14:43*	*1*
Nitrobenzene-d5 (Surr)	*74*		*33 - 100*	*04/28/16 09:57*	*04/29/16 14:43*	*1*
Phenol-d5 (Surr)	*55*		*26 - 100*	*04/28/16 09:57*	*04/29/16 14:43*	*1*
Terphenyl-d14 (Surr)	*34*		*20 - 109*	*04/28/16 09:57*	*04/29/16 14:43*	*1*

Client Sample Results

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

Client Sample ID: MORRIS SLUDGE
Date Collected: 04/27/16 16:30
Date Received: 04/28/16 06:00

Lab Sample ID: 180-54234-3
Matrix: Solid
Percent Solids: 72.5

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	710	U	3400	710	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
1,1,2,2-Tetrachloroethane	640	U	3400	640	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
1,1,2-Trichloro-1,2,2-trifluoroethane	230	U	3400	230	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
1,1,2-Trichloroethane	800	U	3400	800	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
1,1-Dichloroethane	700	U	3400	700	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
1,1-Dichloroethene	740	U	3400	740	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
1,2,4-Trichlorobenzene	260	U	3400	260	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
1,2-Dibromo-3-Chloropropane	240	U	3400	240	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
1,2-Dichlorobenzene	470	U	3400	470	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
1,2-Dichloroethane	660	U	3400	660	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
1,2-Dichloropropane	880	U	3400	880	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
1,3-Dichlorobenzene	350	U	3400	350	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
1,4-Dichlorobenzene	360	U	3400	360	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
2-Butanone (MEK)	750	U	3400	750	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
2-Hexanone	390	U	3400	390	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
4-Methyl-2-pentanone (MIBK)	410	U	3400	410	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Acetone	3400	U	14000	3400	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Benzene	**1200**	**J**	3400	680	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Bromoform	740	U	3400	740	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Bromomethane	1100	U	3400	1100	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Carbon disulfide	740	U	3400	740	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Carbon tetrachloride	750	U	3400	750	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Chlorobenzene	360	U	3400	360	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Chlorodibromomethane	450	U	3400	450	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Chloroform	700	U	3400	700	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Chloromethane	960	U	3400	960	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Chloroethane	520	U	3400	520	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
cis-1,2-Dichloroethene	460	U	3400	460	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
cis-1,3-Dichloropropene	500	U	3400	500	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Cyclohexane	410	U	3400	410	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Dichlorobromomethane	640	U	3400	640	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Dichlorodifluoromethane	440	U	3400	440	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Ethylbenzene	**3800**		3400	430	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
1,2-Dibromoethane	420	U	3400	420	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Isopropylbenzene	**1500**	**J**	3400	370	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Methyl acetate	850	U	17000	850	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Methyl tert-butyl ether	710	U	3400	710	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Methylcyclohexane	**57000**		3400	380	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Methylene Chloride	750	U	3400	750	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Styrene	440	U	3400	440	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Tetrachloroethene	570	U	3400	570	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Toluene	**17000**		3400	580	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
trans-1,2-Dichloroethene	520	U	3400	520	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
trans-1,3-Dichloropropene	400	U	3400	400	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Trichloroethene	550	U	3400	550	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Trichlorofluoromethane	770	U	3400	770	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Xylenes, Total	**47000**		6900	1400	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10
Vinyl chloride	890	U	3400	890	ug/Kg	☼	04/29/16 05:28	04/29/16 09:35	10

Client Sample Results

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

Client Sample ID: MORRIS SLUDGE

Date Collected: 04/27/16 16:30
Date Received: 04/28/16 06:00

Lab Sample ID: 180-54234-3
Matrix: Solid
Percent Solids: 72.5

Tentatively Identified Compound	Est. Result	Qualifier	Unit	D	RT	CAS No.	Prepared	Analyzed	Dil Fac
Hexane	13000	T J N	ug/Kg	☼	5.09	110-54-3	04/29/16 05:28	04/29/16 09:35	10
Unknown	17000	T J	ug/Kg	☼	6.67		04/29/16 05:28	04/29/16 09:35	10
Hexane, 3-methyl-	15000	T J N	ug/Kg	☼	6.88	589-34-4	04/29/16 05:28	04/29/16 09:35	10
Heptane, 2-methyl-	18000	T J N	ug/Kg	☼	8.63	592-27-8	04/29/16 05:28	04/29/16 09:35	10
Heptane, 3-methyl-	19000	T J N	ug/Kg	☼	8.77	589-81-1	04/29/16 05:28	04/29/16 09:35	10
Octane	57000	T J N	ug/Kg	☼	9.21	111-65-9	04/29/16 05:28	04/29/16 09:35	10
Cyclohexane, 1,2-dimethyl-, trans-	11000	T J N	ug/Kg	☼	9.33	6876-23-9	04/29/16 05:28	04/29/16 09:35	10
Cyclohexane, ethyl-	15000	T J N	ug/Kg	☼	9.92	1678-91-7	04/29/16 05:28	04/29/16 09:35	10
Octane, 4-methyl-	44000	T J N	ug/Kg	☼	10.23	2216-34-4	04/29/16 05:28	04/29/16 09:35	10
Octane, 3-methyl-	25000	T J N	ug/Kg	☼	10.34	2216-33-3	04/29/16 05:28	04/29/16 09:35	10
Cyclohexane, propyl-	12000	T J N	ug/Kg	☼	11.34	1678-92-8	04/29/16 05:28	04/29/16 09:35	10
Benzene, 1-ethyl-4-methyl-	19000	T J N	ug/Kg	☼	11.96	622-96-8	04/29/16 05:28	04/29/16 09:35	10
Benzene, 1,3,5-trimethyl-	37000	T J N	ug/Kg	☼	12.05	108-67-8	04/29/16 05:28	04/29/16 09:35	10
Benzene, 1,2,4-trimethyl-	23000	T J N	ug/Kg	☼	12.42	95-63-6	04/29/16 05:28	04/29/16 09:35	10
Benzene, 1-methyl-3-(1-methylethyl)-	14000	T J N	ug/Kg	☼	13.13	535-77-3	04/29/16 05:28	04/29/16 09:35	10

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	79		52 - 124	04/29/16 05:28	04/29/16 09:35	10
4-Bromofluorobenzene (Surr)	89		63 - 120	04/29/16 05:28	04/29/16 09:35	10
Dibromofluoromethane (Surr)	95		68 - 121	04/29/16 05:28	04/29/16 09:35	10
Toluene-d8 (Surr)	100		72 - 127	04/29/16 05:28	04/29/16 09:35	10

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthene	8.8	U * F1 F2	92	8.8	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Acenaphthylene	11	U * F1 F2	92	11	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Anthracene	9.0	U *	92	9.0	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Benzo[a]anthracene	12	U	92	12	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Benzo[a]pyrene	9.2	U	92	9.2	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Benzo[b]fluoranthene	14	U	92	14	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Benzo[g,h,i]perylene	9.2	U F2	92	9.2	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Benzo[k]fluoranthene	19	U	92	19	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Bis(2-chloroethyl)ether	12	U F1 F2	92	12	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Bis(2-chloroethoxy)methane	30	U * F1 F2	460	30	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
2,2'-oxybis[1-chloropropane]	9.9	U F1 F2	92	9.9	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Bis(2-ethylhexyl) phthalate	**4300**		920	74	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
4-Bromophenyl phenyl ether	40	U *	460	40	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Butyl benzyl phthalate	63	U F1 F2	460	63	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
4-Chloroaniline	37	U * F1	460	37	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
2-Chloronaphthalene	9.6	U * F1 F2	92	9.6	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
4-Chlorophenyl phenyl ether	51	U * F1	460	51	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Chrysene	11	U	92	11	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Dibenz(a,h)anthracene	10	U	92	10	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Dibenzofuran	45	U * F1 F2	460	45	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Di-n-butyl phthalate	58	U * F1 F2	460	58	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
3,3'-Dichlorobenzidine	49	U F1 F2	460	49	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Diethyl phthalate	50	U * F1 F2	460	50	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Dimethyl phthalate	50	U * F1 F2	460	50	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
2,4-Dinitrotoluene	37	U * F1 F2	460	37	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
2,6-Dinitrotoluene	47	U * F1 F2	460	47	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5

Client Sample ID: MORRIS SLUDGE — **Lab Sample ID: 180-54234-3**

Date Collected: 04/27/16 16:30 — **Matrix: Solid**

Date Received: 04/28/16 06:00 — **Percent Solids: 72.5**

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Di-n-octyl phthalate	48	U	460	48	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Fluoranthene	9.8	U * F1	92	9.8	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Fluorene	12	U * F1 F2	92	12	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Hexachlorobenzene	9.8	U * F2	92	9.8	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Hexachlorobutadiene	10	U * F1	92	10	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Hexachlorocyclopentadiene	50	U *	460	50	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Hexachloroethane	33	U F1	460	33	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Indeno[1,2,3-cd]pyrene	9.5	U F2	92	9.5	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Isophorone	35	U * F1 F2	460	35	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
2-Methylnaphthalene	8.3	U * F1 F2	92	8.3	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Naphthalene	7.9	U * F1 F2	92	7.9	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
2-Nitroaniline	210	U * F1 F2	2300	210	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
3-Nitroaniline	190	U * F1 F2	2300	190	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
4-Nitroaniline	190	U * F1 F2	2300	190	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Nitrobenzene	38	U * F1 F2	920	38	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
N-Nitrosodi-n-propylamine	11	U F1	92	11	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
N-Nitrosodiphenylamine	43	U * F1	460	43	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Phenanthrene	15	U * F1 F2	92	15	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Pyrene	9.3	U F2	92	9.3	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Carbazole	8.5	U * F1 F2	92	8.5	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Acetophenone	38	U F1 F2	460	38	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Atrazine	45	U * F1 F2	460	45	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Benzaldehyde	69	U * F1 F2	460	69	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
1,1'-Biphenyl	41	U * F1 F2	460	41	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Caprolactam	350	U * F1	2300	350	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
4-Chloro-3-methylphenol	42	U * F1 F2	460	42	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
2-Chlorophenol	38	U F1 F2	460	38	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
2-Methylphenol	32	U F1 F2	460	32	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Methylphenol, 3 & 4	45	U F1 F2	460	45	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
2,4-Dichlorophenol	9.2	U * F1 F2	92	9.2	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
2,4-Dimethylphenol	72	U * F1 F2	460	72	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
2,4-Dinitrophenol	550	U * F1 F2	2300	550	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
4,6-Dinitro-2-methylphenol	180	U * F1 F2	2300	180	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
2-Nitrophenol	51	U * F1 F2	460	51	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
4-Nitrophenol	170	U * F1 F2	2300	170	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Pentachlorophenol	41	U * F1 F2	460	41	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
Phenol	11	U F1 F2	92	11	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
2,4,5-Trichlorophenol	49	U * F1	460	49	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5
2,4,6-Trichlorophenol	69	U * F1 F2	460	69	ug/Kg	☼	04/28/16 11:09	04/29/16 12:48	5

Tentatively Identified Compound	*Est. Result*	*Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
Unknown	*12000*	*T J*	*ug/Kg*	☼	*5.81*		*04/28/16 11:09*	*04/29/16 12:48*	*5*
Decane, 5-methyl-	*6900*	*T J N*	*ug/Kg*	☼	*6.23*	*13151-35-4*	*04/28/16 11:09*	*04/29/16 12:48*	*5*
Decane, 2-methyl-	*6900*	*T J N*	*ug/Kg*	☼	*6.29*	*6975-98-0*	*04/28/16 11:09*	*04/29/16 12:48*	*5*
Undecane	*18000*	*T J N*	*ug/Kg*	☼	*6.54*	*1120-21-4*	*04/28/16 11:09*	*04/29/16 12:48*	*5*
Unknown	*9100*	*T J*	*ug/Kg*	☼	*7.45*		*04/28/16 11:09*	*04/29/16 12:48*	*5*
Unknown	*9500*	*T J*	*ug/Kg*	☼	*7.56*		*04/28/16 11:09*	*04/29/16 12:48*	*5*
Tridecane	*21000*	*T J N*	*ug/Kg*	☼	*7.72*	*629-50-5*	*04/28/16 11:09*	*04/29/16 12:48*	*5*
Unknown	*8800*	*T J*	*ug/Kg*	☼	*7.97*		*04/28/16 11:09*	*04/29/16 12:48*	*5*
Tetradecane	*20000*	*T J N*	*ug/Kg*	☼	*8.24*	*629-59-4*	*04/28/16 11:09*	*04/29/16 12:48*	*5*

Client Sample ID: MORRIS SLUDGE

Lab Sample ID: 180-54234-3
Date Collected: 04/27/16 16:30
Matrix: Solid
Date Received: 04/28/16 06:00
Percent Solids: 72.5

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Tentatively Identified Compound	Est. Result	Qualifier	Unit	D	RT	CAS No.	Prepared	Analyzed	Dil Fac
Unknown	7500	T J	ug/Kg	☼	8.47		04/28/16 11:09	04/29/16 12:48	5
Hexadecane	7200	T J N	ug/Kg	☼	8.91	544-76-3	04/28/16 11:09	04/29/16 12:48	5
Hexadecane	13000	T J N	ug/Kg	☼	9.16	544-76-3	04/28/16 11:09	04/29/16 12:48	5
Unknown	6300	T J	ug/Kg	☼	9.35		04/28/16 11:09	04/29/16 12:48	5
Heptadecane	10000	T J N	ug/Kg	☼	9.58	629-78-7	04/28/16 11:09	04/29/16 12:48	5
Octadecane	8200	T J N	ug/Kg	☼	9.98	593-45-3	04/28/16 11:09	04/29/16 12:48	5

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorobiphenyl	82	*	38 - 103	04/28/16 11:09	04/29/16 12:48	5
2-Fluorophenol (Surr)	262	X	34 - 103	04/28/16 11:09	04/29/16 12:48	5
2,4,6-Tribromophenol (Surr)	151	*X	20 - 113	04/28/16 11:09	04/29/16 12:48	5
Nitrobenzene-d5 (Surr)	866	*X	41 - 108	04/28/16 11:09	04/29/16 12:48	5
Phenol-d5 (Surr)	258	X	35 - 103	04/28/16 11:09	04/29/16 12:48	5
Terphenyl-d14 (Surr)	45		28 - 109	04/28/16 11:09	04/29/16 12:48	5

General Chemistry

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	**27.5**		0.1	0.1	%			04/28/16 10:23	1
Percent Solids	**72.5**		0.1	0.1	%			04/28/16 10:23	1

Client Sample ID: TRIB BLANK

Lab Sample ID: 180-54234-4
Date Collected: 04/27/16 00:00
Matrix: Water
Date Received: 04/28/16 06:00

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	0.65	U	5.0	0.65	ug/L			04/28/16 11:34	1
1,1,2,2-Tetrachloroethane	0.97	U	5.0	0.97	ug/L			04/28/16 11:34	1
1,1,2-Trichloro-1,2,2-trifluoroethane	2.2	U	5.0	2.2	ug/L			04/28/16 11:34	1
1,1,2-Trichloroethane	1.5	U	5.0	1.5	ug/L			04/28/16 11:34	1
1,1-Dichloroethane	0.84	U	5.0	0.84	ug/L			04/28/16 11:34	1
1,1-Dichloroethene	1.1	U	5.0	1.1	ug/L			04/28/16 11:34	1
1,2-Dibromo-3-Chloropropane	2.2	U	5.0	2.2	ug/L			04/28/16 11:34	1
1,2-Dichlorobenzene	1.7	U	5.0	1.7	ug/L			04/28/16 11:34	1
1,2-Dichloroethane	0.85	U	5.0	0.85	ug/L			04/28/16 11:34	1
1,2-Dichloropropane	0.96	U	5.0	0.96	ug/L			04/28/16 11:34	1
1,2,4-Trichlorobenzene	2.2	U	5.0	2.2	ug/L			04/28/16 11:34	1
1,3-Dichlorobenzene	1.3	U	5.0	1.3	ug/L			04/28/16 11:34	1
1,4-Dichlorobenzene	1.4	U	5.0	1.4	ug/L			04/28/16 11:34	1
2-Butanone (MEK)	2.1	U	5.0	2.1	ug/L			04/28/16 11:34	1
2-Hexanone	2.1	U	5.0	2.1	ug/L			04/28/16 11:34	1
4-Methyl-2-pentanone (MIBK)	2.0	U	5.0	2.0	ug/L			04/28/16 11:34	1
Acetone	5.0	U	20	5.0	ug/L			04/28/16 11:34	1
Benzene	0.82	U	5.0	0.82	ug/L			04/28/16 11:34	1
Bromoform	2.5	U	5.0	2.5	ug/L			04/28/16 11:34	1
Bromomethane	1.3	U	5.0	1.3	ug/L			04/28/16 11:34	1
Carbon disulfide	1.2	U	5.0	1.2	ug/L			04/28/16 11:34	1
Carbon tetrachloride	0.74	U	5.0	0.74	ug/L			04/28/16 11:34	1
Chlorobenzene	0.91	U	5.0	0.91	ug/L			04/28/16 11:34	1
Chlorodibromomethane	1.4	U	5.0	1.4	ug/L			04/28/16 11:34	1

Client Sample Results

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

Client Sample ID: TRIB BLANK
Date Collected: 04/27/16 00:00
Date Received: 04/28/16 06:00

Lab Sample ID: 180-54234-4
Matrix: Water

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloroform	0.77	U	5.0	0.77	ug/L			04/28/16 11:34	1
Chloromethane	1.2	U	5.0	1.2	ug/L			04/28/16 11:34	1
Chloroethane	2.4	U	5.0	2.4	ug/L			04/28/16 11:34	1
cis-1,2-Dichloroethene	1.5	U	5.0	1.5	ug/L			04/28/16 11:34	1
cis-1,3-Dichloropropene	0.79	U	5.0	0.79	ug/L			04/28/16 11:34	1
Dichlorobromomethane	0.83	U	5.0	0.83	ug/L			04/28/16 11:34	1
Dichlorodifluoromethane	1.4	U	5.0	1.4	ug/L			04/28/16 11:34	1
Ethylbenzene	1.1	U	5.0	1.1	ug/L			04/28/16 11:34	1
1,2-Dibromoethane	1.2	U	5.0	1.2	ug/L			04/28/16 11:34	1
Cyclohexane	0.96	U	5.0	0.96	ug/L			04/28/16 11:34	1
Isopropylbenzene	0.84	U	5.0	0.84	ug/L			04/28/16 11:34	1
Methyl acetate	7.2	U	25	7.2	ug/L			04/28/16 11:34	1
Methyl tert-butyl ether	1.2	U	5.0	1.2	ug/L			04/28/16 11:34	1
Methylcyclohexane	0.95	U	5.0	0.95	ug/L			04/28/16 11:34	1
Methylene Chloride	4.1	U	5.0	4.1	ug/L			04/28/16 11:34	1
Styrene	1.1	U	5.0	1.1	ug/L			04/28/16 11:34	1
Tetrachloroethene	0.94	U	5.0	0.94	ug/L			04/28/16 11:34	1
Toluene	0.75	U	5.0	0.75	ug/L			04/28/16 11:34	1
trans-1,2-Dichloroethene	1.1	U	5.0	1.1	ug/L			04/28/16 11:34	1
trans-1,3-Dichloropropene	1.0	U	5.0	1.0	ug/L			04/28/16 11:34	1
Trichloroethene	0.90	U	5.0	0.90	ug/L			04/28/16 11:34	1
Trichlorofluoromethane	1.2	U	5.0	1.2	ug/L			04/28/16 11:34	1
Vinyl chloride	1.3	U	5.0	1.3	ug/L			04/28/16 11:34	1
Xylenes, Total	1.4	U	10	1.4	ug/L			04/28/16 11:34	1

Tentatively Identified Compound	*Est. Result*	*Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
Tentatively Identified Compound	*None*		*ug/L*					*04/28/16 11:34*	*1*

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*81*		*62 - 123*		*04/28/16 11:34*	*1*
4-Bromofluorobenzene (Surr)	*83*		*75 - 120*		*04/28/16 11:34*	*1*
Dibromofluoromethane (Surr)	*87*		*80 - 120*		*04/28/16 11:34*	*1*
Toluene-d8 (Surr)	*103*		*80 - 120*		*04/28/16 11:34*	*1*

QC Sample Results

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 180-174682/7
Matrix: Water
Analysis Batch: 174682

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	0.65	U	5.0	0.65	ug/L			04/28/16 11:06	1
1,1,2,2-Tetrachloroethane	0.97	U	5.0	0.97	ug/L			04/28/16 11:06	1
1,1,2-Trichloro-1,2,2-trifluoroethane	2.2	U	5.0	2.2	ug/L			04/28/16 11:06	1
1,1,2-Trichloroethane	1.5	U	5.0	1.5	ug/L			04/28/16 11:06	1
1,1-Dichloroethane	0.84	U	5.0	0.84	ug/L			04/28/16 11:06	1
1,1-Dichloroethene	1.1	U	5.0	1.1	ug/L			04/28/16 11:06	1
1,2-Dibromo-3-Chloropropane	2.2	U	5.0	2.2	ug/L			04/28/16 11:06	1
1,2-Dichlorobenzene	1.7	U	5.0	1.7	ug/L			04/28/16 11:06	1
1,2-Dichloroethane	0.85	U	5.0	0.85	ug/L			04/28/16 11:06	1
1,2,4-Trichlorobenzene	2.2	U	5.0	2.2	ug/L			04/28/16 11:06	1
1,2-Dichloropropane	0.96	U	5.0	0.96	ug/L			04/28/16 11:06	1
1,3-Dichlorobenzene	1.3	U	5.0	1.3	ug/L			04/28/16 11:06	1
1,4-Dichlorobenzene	1.4	U	5.0	1.4	ug/L			04/28/16 11:06	1
2-Butanone (MEK)	2.1	U	5.0	2.1	ug/L			04/28/16 11:06	1
2-Hexanone	2.1	U	5.0	2.1	ug/L			04/28/16 11:06	1
4-Methyl-2-pentanone (MIBK)	2.0	U	5.0	2.0	ug/L			04/28/16 11:06	1
Acetone	5.0	U	20	5.0	ug/L			04/28/16 11:06	1
Benzene	0.82	U	5.0	0.82	ug/L			04/28/16 11:06	1
Bromoform	2.5	U	5.0	2.5	ug/L			04/28/16 11:06	1
Bromomethane	1.3	U	5.0	1.3	ug/L			04/28/16 11:06	1
Carbon disulfide	1.2	U	5.0	1.2	ug/L			04/28/16 11:06	1
Carbon tetrachloride	0.74	U	5.0	0.74	ug/L			04/28/16 11:06	1
Chlorobenzene	0.91	U	5.0	0.91	ug/L			04/28/16 11:06	1
Chlorodibromomethane	1.4	U	5.0	1.4	ug/L			04/28/16 11:06	1
Chloroform	0.77	U	5.0	0.77	ug/L			04/28/16 11:06	1
Chloromethane	1.2	U	5.0	1.2	ug/L			04/28/16 11:06	1
Chloroethane	2.4	U	5.0	2.4	ug/L			04/28/16 11:06	1
cis-1,2-Dichloroethene	1.5	U	5.0	1.5	ug/L			04/28/16 11:06	1
cis-1,3-Dichloropropene	0.79	U	5.0	0.79	ug/L			04/28/16 11:06	1
Cyclohexane	0.96	U	5.0	0.96	ug/L			04/28/16 11:06	1
Dichlorobromomethane	0.83	U	5.0	0.83	ug/L			04/28/16 11:06	1
Dichlorodifluoromethane	1.4	U	5.0	1.4	ug/L			04/28/16 11:06	1
Ethylbenzene	1.1	U	5.0	1.1	ug/L			04/28/16 11:06	1
1,2-Dibromoethane	1.2	U	5.0	1.2	ug/L			04/28/16 11:06	1
Isopropylbenzene	0.84	U	5.0	0.84	ug/L			04/28/16 11:06	1
Methyl acetate	7.2	U	25	7.2	ug/L			04/28/16 11:06	1
Methyl tert-butyl ether	1.2	U	5.0	1.2	ug/L			04/28/16 11:06	1
Methylcyclohexane	0.95	U	5.0	0.95	ug/L			04/28/16 11:06	1
Methylene Chloride	4.1	U	5.0	4.1	ug/L			04/28/16 11:06	1
Styrene	1.1	U	5.0	1.1	ug/L			04/28/16 11:06	1
Tetrachloroethene	0.94	U	5.0	0.94	ug/L			04/28/16 11:06	1
Toluene	0.75	U	5.0	0.75	ug/L			04/28/16 11:06	1
trans-1,2-Dichloroethene	1.1	U	5.0	1.1	ug/L			04/28/16 11:06	1
trans-1,3-Dichloropropene	1.0	U	5.0	1.0	ug/L			04/28/16 11:06	1
Trichloroethene	0.90	U	5.0	0.90	ug/L			04/28/16 11:06	1
Trichlorofluoromethane	1.2	U	5.0	1.2	ug/L			04/28/16 11:06	1
Xylenes, Total	1.4	U	10	1.4	ug/L			04/28/16 11:06	1
Vinyl chloride	1.3	U	5.0	1.3	ug/L			04/28/16 11:06	1

QC Sample Results

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

Tentatively Identified Compound	MB Est. Result	MB Qualifier	Unit	D	RT	CAS No.	Prepared	Analyzed	Dil Fac
Tentatively Identified Compound	None		ug/L					04/28/16 11:06	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
1,2-Dichloroethane-d4 (Surr)	92		62 - 123		04/28/16 11:06	1
4-Bromofluorobenzene (Surr)	106		75 - 120		04/28/16 11:06	1
Dibromofluoromethane (Surr)	102		80 - 120		04/28/16 11:06	1
Toluene-d8 (Surr)	103		80 - 120		04/28/16 11:06	1

Lab Sample ID: LCS 180-174682/15
Matrix: Water
Analysis Batch: 174682

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,1-Trichloroethane	40.0	39.3		ug/L		98	69 - 134
1,1,2,2-Tetrachloroethane	40.0	39.4		ug/L		98	59 - 136
1,1,2-Trichloro-1,2,2-trifluoroethane	40.0	37.2		ug/L		93	70 - 131
1,1,2-Trichloroethane	40.0	37.2		ug/L		93	75 - 126
1,1-Dichloroethane	40.0	39.2		ug/L		98	77 - 122
1,1-Dichloroethene	40.0	37.2		ug/L		93	69 - 127
1,2-Dibromo-3-Chloropropane	40.0	40.7		ug/L		102	28 - 150
1,2-Dichlorobenzene	40.0	39.4		ug/L		98	75 - 125
1,2-Dichloroethane	40.0	38.5		ug/L		96	63 - 140
1,2,4-Trichlorobenzene	40.0	40.5		ug/L		101	35 - 150
1,2-Dichloropropane	40.0	35.6		ug/L		89	75 - 114
1,3-Dichlorobenzene	40.0	37.7		ug/L		94	76 - 125
1,4-Dichlorobenzene	40.0	37.4		ug/L		93	76 - 123
2-Butanone (MEK)	40.0	33.6		ug/L		84	31 - 139
2-Hexanone	40.0	37.3		ug/L		93	35 - 129
4-Methyl-2-pentanone (MIBK)	40.0	41.1		ug/L		103	33 - 135
Acetone	40.0	35.0		ug/L		88	10 - 141
Benzene	40.0	37.2		ug/L		93	80 - 120
Bromoform	40.0	35.5		ug/L		89	49 - 137
Bromomethane	40.0	42.3		ug/L		106	45 - 150
Carbon disulfide	40.0	39.1		ug/L		98	62 - 126
Carbon tetrachloride	40.0	38.7		ug/L		97	63 - 139
Chlorobenzene	40.0	36.3		ug/L		91	83 - 120
Chlorodibromomethane	40.0	37.4		ug/L		94	64 - 124
Chloroform	40.0	39.4		ug/L		98	77 - 119
Chloromethane	40.0	36.9		ug/L		92	49 - 133
Chloroethane	40.0	37.5		ug/L		94	33 - 150
cis-1,2-Dichloroethene	40.0	39.9		ug/L		100	82 - 116
cis-1,3-Dichloropropene	40.0	34.0		ug/L		85	74 - 123
Cyclohexane	40.0	37.8		ug/L		95	69 - 124
Dichlorobromomethane	40.0	37.2		ug/L		93	71 - 119
Dichlorodifluoromethane	40.0	33.5		ug/L		84	28 - 140
Ethylbenzene	40.0	38.2		ug/L		95	79 - 124
1,2-Dibromoethane	40.0	37.5		ug/L		94	57 - 124
Isopropylbenzene	40.0	37.2		ug/L		93	73 - 130
Methyl acetate	200	203		ug/L		102	34 - 127
Methyl tert-butyl ether	40.0	39.3		ug/L		98	53 - 122
Methylcyclohexane	40.0	39.9		ug/L		100	67 - 120
Methylene Chloride	40.0	37.4		ug/L		94	75 - 120

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 180-174682/15
Matrix: Water
Analysis Batch: 174682

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
m-Xylene & p-Xylene	40.0	37.7		ug/L		94	78 - 124
o-Xylene	40.0	38.8		ug/L		97	78 - 124
Styrene	40.0	37.7		ug/L		94	78 - 124
Tetrachloroethene	40.0	36.8		ug/L		92	78 - 126
Toluene	40.0	37.1		ug/L		93	80 - 124
trans-1,2-Dichloroethene	40.0	39.3		ug/L		98	78 - 120
trans-1,3-Dichloropropene	40.0	36.6		ug/L		92	63 - 122
Trichloroethene	40.0	37.2		ug/L		93	80 - 120
Trichlorofluoromethane	40.0	32.3		ug/L		81	14 - 150
Xylenes, Total	80.0	76.5		ug/L		96	81 - 121
Vinyl chloride	40.0	38.3		ug/L		96	57 - 128

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*98*		*62 - 123*
4-Bromofluorobenzene (Surr)	*96*		*75 - 120*
Dibromofluoromethane (Surr)	*98*		*80 - 120*
Toluene-d8 (Surr)	*94*		*80 - 120*

Lab Sample ID: MB 180-174800/1-A
Matrix: Solid
Analysis Batch: 174794

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 174800

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	51	U	250	51	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
1,1,2,2-Tetrachloroethane	47	U	250	47	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
1,1,2-Trichloro-1,2,2-trifluoroethane	17	U	250	17	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
1,1,2-Trichloroethane	58	U	250	58	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
1,1-Dichloroethane	51	U	250	51	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
1,1-Dichloroethene	53	U	250	53	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
1,2-Dibromo-3-Chloropropane	18	U	250	18	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
1,2-Dichlorobenzene	34	U	250	34	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
1,2-Dichloroethane	48	U	250	48	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
1,2,4-Trichlorobenzene	19	U	250	19	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
1,2-Dichloropropane	64	U	250	64	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
1,3-Dichlorobenzene	25	U	250	25	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
1,4-Dichlorobenzene	26	U	250	26	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
2-Butanone (MEK)	54	U	250	54	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
2-Hexanone	28	U	250	28	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
4-Methyl-2-pentanone (MIBK)	30	U	250	30	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Acetone	250	U	1000	250	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Benzene	49	U	250	49	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Bromoform	53	U	250	53	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Bromomethane	79	U	250	79	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Carbon disulfide	54	U	250	54	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Carbon tetrachloride	54	U	250	54	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Chlorobenzene	26	U	250	26	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Chlorodibromomethane	32	U	250	32	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Chloroform	50	U	250	50	ug/Kg		04/29/16 05:28	04/29/16 09:12	1

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 180-174800/1-A
Matrix: Solid
Analysis Batch: 174794

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 174800

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloromethane	70	U	250	70	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Chloroethane	37	U	250	37	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
cis-1,2-Dichloroethene	33	U	250	33	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
cis-1,3-Dichloropropene	36	U	250	36	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Cyclohexane	30	U	250	30	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Dichlorobromomethane	47	U	250	47	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Dichlorodifluoromethane	32	U	250	32	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Ethylbenzene	31	U	250	31	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
1,2-Dibromoethane	31	U	250	31	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Isopropylbenzene	27	U	250	27	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Methyl acetate	61	U	1300	61	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Methyl tert-butyl ether	51	U	250	51	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Methylcyclohexane	28	U	250	28	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Methylene Chloride	54	U	250	54	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Styrene	32	U	250	32	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Tetrachloroethene	41	U	250	41	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Toluene	42	U	250	42	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
trans-1,2-Dichloroethene	38	U	250	38	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
trans-1,3-Dichloropropene	29	U	250	29	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Trichloroethene	40	U	250	40	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Trichlorofluoromethane	56	U	250	56	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Xylenes, Total	98	U	500	98	ug/Kg		04/29/16 05:28	04/29/16 09:12	1
Vinyl chloride	65	U	250	65	ug/Kg		04/29/16 05:28	04/29/16 09:12	1

Tentatively Identified Compound	*MB Est. Result*	*MB Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
Tentatively Identified Compound	*None*		*ug/Kg*				*04/29/16 05:28*	*04/29/16 09:12*	*1*

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*82*		*52 - 124*	*04/29/16 05:28*	*04/29/16 09:12*	*1*
4-Bromofluorobenzene (Surr)	*93*		*63 - 120*	*04/29/16 05:28*	*04/29/16 09:12*	*1*
Dibromofluoromethane (Surr)	*95*		*68 - 121*	*04/29/16 05:28*	*04/29/16 09:12*	*1*
Toluene-d8 (Surr)	*103*		*72 - 127*	*04/29/16 05:28*	*04/29/16 09:12*	*1*

Lab Sample ID: LCS 180-174800/2-A
Matrix: Solid
Analysis Batch: 174794

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 174800

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,1-Trichloroethane	2000	1570		ug/Kg		79	67 - 126
1,1,2,2-Tetrachloroethane	2000	2110		ug/Kg		105	60 - 139
1,1,2-Trichloro-1,2,2-trifluoroetha ne	2000	1920		ug/Kg		96	55 - 130
1,1,2-Trichloroethane	2000	2010		ug/Kg		101	70 - 128
1,1-Dichloroethane	2000	1770		ug/Kg		89	66 - 124
1,1-Dichloroethene	2000	2170		ug/Kg		109	59 - 129
1,2-Dibromo-3-Chloropropane	2000	1740		ug/Kg		87	35 - 136
1,2-Dichlorobenzene	2000	2080		ug/Kg		104	71 - 124
1,2-Dichloroethane	2000	1530		ug/Kg		77	61 - 127

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 180-174800/2-A
Matrix: Solid
Analysis Batch: 174794

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 174800

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,2,4-Trichlorobenzene	2000	2160		ug/Kg		108	51 - 136
1,2-Dichloropropane	2000	1890		ug/Kg		94	72 - 122
1,3-Dichlorobenzene	2000	2010		ug/Kg		101	75 - 118
1,4-Dichlorobenzene	2000	1990		ug/Kg		99	77 - 116
2-Butanone (MEK)	2000	1680		ug/Kg		84	35 - 149
2-Hexanone	2000	1890		ug/Kg		95	32 - 150
4-Methyl-2-pentanone (MIBK)	2000	1920		ug/Kg		96	44 - 148
Acetone	2000	1830		ug/Kg		91	20 - 150
Benzene	2000	1930		ug/Kg		97	77 - 120
Bromoform	2000	2200		ug/Kg		110	53 - 140
Bromomethane	2000	2320		ug/Kg		116	25 - 150
Carbon disulfide	2000	1940		ug/Kg		97	50 - 127
Carbon tetrachloride	2000	1790		ug/Kg		89	69 - 122
Chlorobenzene	2000	2040		ug/Kg		102	79 - 120
Chlorodibromomethane	2000	2050		ug/Kg		102	70 - 132
Chloroform	2000	1790		ug/Kg		89	72 - 120
Chloromethane	2000	1960		ug/Kg		98	44 - 131
Chloroethane	2000	2370		ug/Kg		119	22 - 150
cis-1,2-Dichloroethene	2000	1970		ug/Kg		99	80 - 118
cis-1,3-Dichloropropene	2000	2050		ug/Kg		103	73 - 120
Cyclohexane	2000	1840		ug/Kg		92	64 - 130
Dichlorobromomethane	2000	1780		ug/Kg		89	70 - 125
Dichlorodifluoromethane	2000	1750		ug/Kg		88	25 - 150
Ethylbenzene	2000	1960		ug/Kg		98	78 - 125
1,2-Dibromoethane	2000	2070		ug/Kg		103	70 - 131
Isopropylbenzene	2000	1980		ug/Kg		99	70 - 133
Methyl acetate	10000	8550		ug/Kg		85	27 - 142
Methyl tert-butyl ether	2000	2040		ug/Kg		102	48 - 132
Methylcyclohexane	2000	1900		ug/Kg		95	66 - 135
Methylene Chloride	2000	1940		ug/Kg		97	58 - 127
m-Xylene & p-Xylene	2000	2030		ug/Kg		101	75 - 126
o-Xylene	2000	2020		ug/Kg		101	83 - 127
Styrene	2000	2050		ug/Kg		103	83 - 129
Tetrachloroethene	2000	2050		ug/Kg		103	78 - 129
Toluene	2000	1980		ug/Kg		99	78 - 124
trans-1,2-Dichloroethene	2000	2020		ug/Kg		101	77 - 121
trans-1,3-Dichloropropene	2000	2000		ug/Kg		100	74 - 129
Trichloroethene	2000	2040		ug/Kg		102	76 - 119
Trichlorofluoromethane	2000	1680		ug/Kg		84	20 - 150
Xylenes, Total	4000	4050		ug/Kg		101	83 - 126
Vinyl chloride	2000	1940		ug/Kg		97	63 - 124

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*77*		*52 - 124*
4-Bromofluorobenzene (Surr)	*92*		*63 - 120*
Dibromofluoromethane (Surr)	*94*		*68 - 121*
Toluene-d8 (Surr)	*97*		*72 - 127*

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 180-174800/3-A
Matrix: Solid
Analysis Batch: 174794

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 174800

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1,1-Trichloroethane	2000	1530		ug/Kg		77	67 - 126	3	31
1,1,2,2-Tetrachloroethane	2000	2090		ug/Kg		105	60 - 139	1	24
1,1,2-Trichloro-1,2,2-trifluoroethane	2000	1930		ug/Kg		97	55 - 130	1	37
1,1,2-Trichloroethane	2000	2020		ug/Kg		101	70 - 128	0	22
1,1-Dichloroethane	2000	1780		ug/Kg		89	66 - 124	0	23
1,1-Dichloroethene	2000	2190		ug/Kg		109	59 - 129	1	25
1,2-Dibromo-3-Chloropropane	2000	1800		ug/Kg		90	35 - 136	3	40
1,2-Dichlorobenzene	2000	2070		ug/Kg		104	71 - 124	0	22
1,2-Dichloroethane	2000	1550		ug/Kg		78	61 - 127	1	23
1,2,4-Trichlorobenzene	2000	2220		ug/Kg		111	51 - 136	2	40
1,2-Dichloropropane	2000	1920		ug/Kg		96	72 - 122	2	20
1,3-Dichlorobenzene	2000	2050		ug/Kg		102	75 - 118	2	20
1,4-Dichlorobenzene	2000	2030		ug/Kg		102	77 - 116	2	20
2-Butanone (MEK)	2000	1610		ug/Kg		81	35 - 149	4	36
2-Hexanone	2000	1820		ug/Kg		91	32 - 150	4	32
4-Methyl-2-pentanone (MIBK)	2000	1930		ug/Kg		97	44 - 148	1	30
Acetone	2000	1720		ug/Kg		86	20 - 150	6	40
Benzene	2000	1980		ug/Kg		99	77 - 120	2	20
Bromoform	2000	2130		ug/Kg		106	53 - 140	3	23
Bromomethane	2000	2230		ug/Kg		111	25 - 150	4	40
Carbon disulfide	2000	1900		ug/Kg		95	50 - 127	2	23
Carbon tetrachloride	2000	1760		ug/Kg		88	69 - 122	2	22
Chlorobenzene	2000	2000		ug/Kg		100	79 - 120	2	20
Chlorodibromomethane	2000	2030		ug/Kg		101	70 - 132	1	20
Chloroform	2000	1770		ug/Kg		89	72 - 120	1	25
Chloromethane	2000	1920		ug/Kg		96	44 - 131	2	27
Chloroethane	2000	2430		ug/Kg		121	22 - 150	2	40
cis-1,2-Dichloroethene	2000	1960		ug/Kg		98	80 - 118	1	20
cis-1,3-Dichloropropene	2000	2050		ug/Kg		102	73 - 120	0	20
Cyclohexane	2000	1840		ug/Kg		92	64 - 130	0	21
Dichlorobromomethane	2000	1850		ug/Kg		93	70 - 125	4	21
Dichlorodifluoromethane	2000	1740		ug/Kg		87	25 - 150	1	34
Ethylbenzene	2000	1970		ug/Kg		98	78 - 125	0	21
1,2-Dibromoethane	2000	2070		ug/Kg		103	70 - 131	0	20
Isopropylbenzene	2000	1960		ug/Kg		98	70 - 133	1	22
Methyl acetate	10000	8670		ug/Kg		87	27 - 142	1	40
Methyl tert-butyl ether	2000	2070		ug/Kg		103	48 - 132	2	36
Methylcyclohexane	2000	1960		ug/Kg		98	66 - 135	3	23
Methylene Chloride	2000	1990		ug/Kg		100	58 - 127	2	28
m-Xylene & p-Xylene	2000	1980		ug/Kg		99	75 - 126	3	21
o-Xylene	2000	1980		ug/Kg		99	83 - 127	2	20
Styrene	2000	2030		ug/Kg		101	83 - 129	1	20
Tetrachloroethene	2000	2020		ug/Kg		101	78 - 129	2	20
Toluene	2000	1960		ug/Kg		98	78 - 124	1	21
trans-1,2-Dichloroethene	2000	2040		ug/Kg		102	77 - 121	1	20
trans-1,3-Dichloropropene	2000	1980		ug/Kg		99	74 - 129	1	20
Trichloroethene	2000	2050		ug/Kg		103	76 - 119	1	21

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 180-174800/3-A
Matrix: Solid
Analysis Batch: 174794

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 174800

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Trichlorofluoromethane	2000	1650		ug/Kg		82	20 - 150	2	40
Xylenes, Total	4000	3960		ug/Kg		99	83 - 126	2	20
Vinyl chloride	2000	1930		ug/Kg		96	63 - 124	1	27

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*76*		*52 - 124*
4-Bromofluorobenzene (Surr)	*88*		*63 - 120*
Dibromofluoromethane (Surr)	*92*		*68 - 121*
Toluene-d8 (Surr)	*92*		*72 - 127*

Lab Sample ID: MB 180-174823/8
Matrix: Water
Analysis Batch: 174823

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	0.65	U	5.0	0.65	ug/L			04/29/16 10:34	1
1,1,2,2-Tetrachloroethane	0.97	U	5.0	0.97	ug/L			04/29/16 10:34	1
1,1,2-Trichloro-1,2,2-trifluoroethane	2.2	U	5.0	2.2	ug/L			04/29/16 10:34	1
1,1,2-Trichloroethane	1.5	U	5.0	1.5	ug/L			04/29/16 10:34	1
1,1-Dichloroethane	0.84	U	5.0	0.84	ug/L			04/29/16 10:34	1
1,1-Dichloroethene	1.1	U	5.0	1.1	ug/L			04/29/16 10:34	1
1,2-Dibromo-3-Chloropropane	2.2	U	5.0	2.2	ug/L			04/29/16 10:34	1
1,2-Dichlorobenzene	1.7	U	5.0	1.7	ug/L			04/29/16 10:34	1
1,2-Dichloroethane	0.85	U	5.0	0.85	ug/L			04/29/16 10:34	1
1,2,4-Trichlorobenzene	2.2	U	5.0	2.2	ug/L			04/29/16 10:34	1
1,2-Dichloropropane	0.96	U	5.0	0.96	ug/L			04/29/16 10:34	1
1,3-Dichlorobenzene	1.3	U	5.0	1.3	ug/L			04/29/16 10:34	1
1,4-Dichlorobenzene	1.4	U	5.0	1.4	ug/L			04/29/16 10:34	1
2-Butanone (MEK)	2.1	U	5.0	2.1	ug/L			04/29/16 10:34	1
2-Hexanone	2.1	U	5.0	2.1	ug/L			04/29/16 10:34	1
4-Methyl-2-pentanone (MIBK)	2.0	U	5.0	2.0	ug/L			04/29/16 10:34	1
Acetone	5.0	U	20	5.0	ug/L			04/29/16 10:34	1
Benzene	0.82	U	5.0	0.82	ug/L			04/29/16 10:34	1
Bromoform	2.5	U	5.0	2.5	ug/L			04/29/16 10:34	1
Bromomethane	1.3	U	5.0	1.3	ug/L			04/29/16 10:34	1
Carbon disulfide	1.2	U	5.0	1.2	ug/L			04/29/16 10:34	1
Carbon tetrachloride	0.74	U	5.0	0.74	ug/L			04/29/16 10:34	1
Chlorobenzene	0.91	U	5.0	0.91	ug/L			04/29/16 10:34	1
Chlorodibromomethane	1.4	U	5.0	1.4	ug/L			04/29/16 10:34	1
Chloroform	0.77	U	5.0	0.77	ug/L			04/29/16 10:34	1
Chloromethane	1.2	U	5.0	1.2	ug/L			04/29/16 10:34	1
Chloroethane	2.4	U	5.0	2.4	ug/L			04/29/16 10:34	1
cis-1,2-Dichloroethene	1.5	U	5.0	1.5	ug/L			04/29/16 10:34	1
cis-1,3-Dichloropropene	0.79	U	5.0	0.79	ug/L			04/29/16 10:34	1
Cyclohexane	0.96	U	5.0	0.96	ug/L			04/29/16 10:34	1
Dichlorobromomethane	0.83	U	5.0	0.83	ug/L			04/29/16 10:34	1
Dichlorodifluoromethane	1.4	U	5.0	1.4	ug/L			04/29/16 10:34	1
Ethylbenzene	1.1	U	5.0	1.1	ug/L			04/29/16 10:34	1

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 180-174823/8
Matrix: Water
Analysis Batch: 174823

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

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,2-Dibromoethane	1.2	U	5.0	1.2	ug/L			04/29/16 10:34	1
Isopropylbenzene	0.84	U	5.0	0.84	ug/L			04/29/16 10:34	1
Methyl acetate	7.2	U	25	7.2	ug/L			04/29/16 10:34	1
Methyl tert-butyl ether	1.2	U	5.0	1.2	ug/L			04/29/16 10:34	1
Methylcyclohexane	0.95	U	5.0	0.95	ug/L			04/29/16 10:34	1
Methylene Chloride	4.1	U	5.0	4.1	ug/L			04/29/16 10:34	1
Styrene	1.1	U	5.0	1.1	ug/L			04/29/16 10:34	1
Tetrachloroethene	0.94	U	5.0	0.94	ug/L			04/29/16 10:34	1
Toluene	0.75	U	5.0	0.75	ug/L			04/29/16 10:34	1
trans-1,2-Dichloroethene	1.1	U	5.0	1.1	ug/L			04/29/16 10:34	1
trans-1,3-Dichloropropene	1.0	U	5.0	1.0	ug/L			04/29/16 10:34	1
Trichloroethene	0.90	U	5.0	0.90	ug/L			04/29/16 10:34	1
Trichlorofluoromethane	1.2	U	5.0	1.2	ug/L			04/29/16 10:34	1
Xylenes, Total	1.4	U	10	1.4	ug/L			04/29/16 10:34	1
Vinyl chloride	1.3	U	5.0	1.3	ug/L			04/29/16 10:34	1

Tentatively Identified Compound	*MB Est. Result*	*MB Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
Tentatively Identified Compound	*None*		*ug/L*					*04/29/16 10:34*	*1*

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*86*		*62 - 123*		*04/29/16 10:34*	*1*
4-Bromofluorobenzene (Surr)	*98*		*75 - 120*		*04/29/16 10:34*	*1*
Dibromofluoromethane (Surr)	*98*		*80 - 120*		*04/29/16 10:34*	*1*
Toluene-d8 (Surr)	*101*		*80 - 120*		*04/29/16 10:34*	*1*

Lab Sample ID: LCS 180-174823/5
Matrix: Water
Analysis Batch: 174823

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,1-Trichloroethane	40.0	42.5		ug/L		106	69 - 134
1,1,2,2-Tetrachloroethane	40.0	36.9		ug/L		92	59 - 136
1,1,2-Trichloro-1,2,2-trifluoroetha ne	40.0	42.5		ug/L		106	70 - 131
1,1,2-Trichloroethane	40.0	33.2		ug/L		83	75 - 126
1,1-Dichloroethane	40.0	41.6		ug/L		104	77 - 122
1,1-Dichloroethene	40.0	42.8		ug/L		107	69 - 127
1,2-Dibromo-3-Chloropropane	40.0	37.0		ug/L		92	28 - 150
1,2-Dichlorobenzene	40.0	38.1		ug/L		95	75 - 125
1,2-Dichloroethane	40.0	36.0		ug/L		90	63 - 140
1,2,4-Trichlorobenzene	40.0	37.5		ug/L		94	35 - 150
1,2-Dichloropropane	40.0	34.5		ug/L		86	75 - 114
1,3-Dichlorobenzene	40.0	37.3		ug/L		93	76 - 125
1,4-Dichlorobenzene	40.0	36.6		ug/L		92	76 - 123
2-Butanone (MEK)	40.0	35.2		ug/L		88	31 - 139
2-Hexanone	40.0	41.7		ug/L		104	35 - 129
4-Methyl-2-pentanone (MIBK)	40.0	38.9		ug/L		97	33 - 135
Acetone	40.0	47.1		ug/L		118	10 - 141

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 180-174823/5
Matrix: Water
Analysis Batch: 174823

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	40.0	37.9		ug/L		95	80 - 120
Bromoform	40.0	33.0		ug/L		83	49 - 137
Bromomethane	40.0	48.6		ug/L		122	45 - 150
Carbon disulfide	40.0	45.6		ug/L		114	62 - 126
Carbon tetrachloride	40.0	40.8		ug/L		102	63 - 139
Chlorobenzene	40.0	36.2		ug/L		91	83 - 120
Chlorodibromomethane	40.0	34.7		ug/L		87	64 - 124
Chloroform	40.0	40.0		ug/L		100	77 - 119
Chloromethane	40.0	42.1		ug/L		105	49 - 133
Chloroethane	40.0	46.6		ug/L		117	33 - 150
cis-1,2-Dichloroethene	40.0	40.2		ug/L		101	82 - 116
cis-1,3-Dichloropropene	40.0	32.1		ug/L		80	74 - 123
Cyclohexane	40.0	42.0		ug/L		105	69 - 124
Dichlorobromomethane	40.0	35.3		ug/L		88	71 - 119
Dichlorodifluoromethane	40.0	36.3		ug/L		91	28 - 140
Ethylbenzene	40.0	39.5		ug/L		99	79 - 124
1,2-Dibromoethane	40.0	33.2		ug/L		83	57 - 124
Isopropylbenzene	40.0	39.4		ug/L		99	73 - 130
Methyl acetate	200	190		ug/L		95	34 - 127
Methyl tert-butyl ether	40.0	37.7		ug/L		94	53 - 122
Methylcyclohexane	40.0	42.9		ug/L		107	67 - 120
Methylene Chloride	40.0	40.4		ug/L		101	75 - 120
m-Xylene & p-Xylene	40.0	38.0		ug/L		95	78 - 124
o-Xylene	40.0	40.1		ug/L		100	78 - 124
Styrene	40.0	38.4		ug/L		96	78 - 124
Tetrachloroethene	40.0	36.1		ug/L		90	78 - 126
Toluene	40.0	37.6		ug/L		94	80 - 124
trans-1,2-Dichloroethene	40.0	43.1		ug/L		108	78 - 120
trans-1,3-Dichloropropene	40.0	33.4		ug/L		83	63 - 122
Trichloroethene	40.0	36.3		ug/L		91	80 - 120
Trichlorofluoromethane	40.0	48.4		ug/L		121	14 - 150
Xylenes, Total	80.0	78.1		ug/L		98	81 - 121
Vinyl chloride	40.0	45.1		ug/L		113	57 - 128

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*92*		*62 - 123*
4-Bromofluorobenzene (Surr)	*94*		*75 - 120*
Dibromofluoromethane (Surr)	*96*		*80 - 120*
Toluene-d8 (Surr)	*95*		*80 - 120*

Lab Sample ID: LCSD 180-174823/6
Matrix: Water
Analysis Batch: 174823

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1,1-Trichloroethane	40.0	40.6		ug/L		101	69 - 134	5	24
1,1,2,2-Tetrachloroethane	40.0	41.6		ug/L		104	59 - 136	12	20

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 180-174823/6
Matrix: Water
Analysis Batch: 174823

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
1,1,2-Trichloro-1,2,2-trifluoroethane	40.0	39.0		ug/L		97	70 - 131	9	30
1,1,2-Trichloroethane	40.0	36.3		ug/L		91	75 - 126	9	23
1,1-Dichloroethane	40.0	40.3		ug/L		101	77 - 122	3	22
1,1-Dichloroethene	40.0	39.0		ug/L		97	69 - 127	9	20
1,2-Dibromo-3-Chloropropane	40.0	40.8		ug/L		102	28 - 150	10	20
1,2-Dichlorobenzene	40.0	39.5		ug/L		99	75 - 125	4	20
1,2-Dichloroethane	40.0	37.8		ug/L		95	63 - 140	5	25
1,2,4-Trichlorobenzene	40.0	38.4		ug/L		96	35 - 150	3	30
1,2-Dichloropropane	40.0	35.4		ug/L		88	75 - 114	3	20
1,3-Dichlorobenzene	40.0	38.1		ug/L		95	76 - 125	2	21
1,4-Dichlorobenzene	40.0	37.5		ug/L		94	76 - 123	2	20
2-Butanone (MEK)	40.0	33.6		ug/L		84	31 - 139	5	35
2-Hexanone	40.0	38.6		ug/L		96	35 - 129	8	24
4-Methyl-2-pentanone (MIBK)	40.0	42.4		ug/L		106	33 - 135	9	29
Acetone	40.0	37.0		ug/L		93	10 - 141	24	32
Benzene	40.0	37.9		ug/L		95	80 - 120	0	20
Bromoform	40.0	35.1		ug/L		88	49 - 137	6	20
Bromomethane	40.0	44.9		ug/L		112	45 - 150	8	23
Carbon disulfide	40.0	41.4		ug/L		104	62 - 126	10	20
Carbon tetrachloride	40.0	38.5		ug/L		96	63 - 139	6	25
Chlorobenzene	40.0	36.2		ug/L		91	83 - 120	0	20
Chlorodibromomethane	40.0	36.1		ug/L		90	64 - 124	4	20
Chloroform	40.0	39.3		ug/L		98	77 - 119	2	20
Chloromethane	40.0	38.4		ug/L		96	49 - 133	9	20
Chloroethane	40.0	40.9		ug/L		102	33 - 150	13	24
cis-1,2-Dichloroethene	40.0	40.3		ug/L		101	82 - 116	0	20
cis-1,3-Dichloropropene	40.0	34.2		ug/L		85	74 - 123	6	20
Cyclohexane	40.0	40.2		ug/L		101	69 - 124	4	20
Dichlorobromomethane	40.0	36.0		ug/L		90	71 - 119	2	20
Dichlorodifluoromethane	40.0	33.2		ug/L		83	28 - 140	9	20
Ethylbenzene	40.0	39.0		ug/L		98	79 - 124	1	25
1,2-Dibromoethane	40.0	36.7		ug/L		92	57 - 124	10	20
Isopropylbenzene	40.0	38.4		ug/L		96	73 - 130	3	20
Methyl acetate	200	218		ug/L		109	34 - 127	14	29
Methyl tert-butyl ether	40.0	39.8		ug/L		99	53 - 122	5	20
Methylcyclohexane	40.0	41.6		ug/L		104	67 - 120	3	20
Methylene Chloride	40.0	38.8		ug/L		97	75 - 120	4	20
m-Xylene & p-Xylene	40.0	38.2		ug/L		96	78 - 124	1	24
o-Xylene	40.0	38.8		ug/L		97	78 - 124	3	22
Styrene	40.0	38.1		ug/L		95	78 - 124	1	22
Tetrachloroethene	40.0	35.0		ug/L		87	78 - 126	3	25
Toluene	40.0	37.4		ug/L		94	80 - 124	1	20
trans-1,2-Dichloroethene	40.0	40.5		ug/L		101	78 - 120	6	20
trans-1,3-Dichloropropene	40.0	36.8		ug/L		92	63 - 122	10	20
Trichloroethene	40.0	36.3		ug/L		91	80 - 120	0	20
Trichlorofluoromethane	40.0	44.1		ug/L		110	14 - 150	9	20
Xylenes, Total	80.0	77.0		ug/L		96	81 - 121	1	20

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 180-174823/6
Matrix: Water
Analysis Batch: 174823

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Vinyl chloride			40.0	41.1		ug/L		103	57 - 128	9	26

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*94*		*62 - 123*
4-Bromofluorobenzene (Surr)	*93*		*75 - 120*
Dibromofluoromethane (Surr)	*94*		*80 - 120*
Toluene-d8 (Surr)	*91*		*80 - 120*

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level

Lab Sample ID: MB 180-174719/1-A
Matrix: Water
Analysis Batch: 174922

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 174719

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthene	0.014	U	0.20	0.014	ug/L		04/28/16 09:57	05/02/16 10:16	1
Acenaphthylene	0.015	U	0.20	0.015	ug/L		04/28/16 09:57	05/02/16 10:16	1
Anthracene	0.015	U	0.20	0.015	ug/L		04/28/16 09:57	05/02/16 10:16	1
Benzo[a]anthracene	0.015	U	0.20	0.015	ug/L		04/28/16 09:57	05/02/16 10:16	1
Benzo[a]pyrene	0.013	U	0.20	0.013	ug/L		04/28/16 09:57	05/02/16 10:16	1
Benzo[b]fluoranthene	0.016	U	0.20	0.016	ug/L		04/28/16 09:57	05/02/16 10:16	1
Benzo[g,h,i]perylene	0.015	U	0.20	0.015	ug/L		04/28/16 09:57	05/02/16 10:16	1
Benzo[k]fluoranthene	0.055	U	0.20	0.055	ug/L		04/28/16 09:57	05/02/16 10:16	1
Bis(2-chloroethyl)ether	0.025	U	0.20	0.025	ug/L		04/28/16 09:57	05/02/16 10:16	1
Bis(2-chloroethoxy)methane	0.058	U	1.0	0.058	ug/L		04/28/16 09:57	05/02/16 10:16	1
2,2'-oxybis[1-chloropropane]	0.020	U	0.20	0.020	ug/L		04/28/16 09:57	05/02/16 10:16	1
Bis(2-ethylhexyl) phthalate	1.3	U	2.0	1.3	ug/L		04/28/16 09:57	05/02/16 10:16	1
4-Bromophenyl phenyl ether	0.064	U	1.0	0.064	ug/L		04/28/16 09:57	05/02/16 10:16	1
Butyl benzyl phthalate	0.14	U	1.0	0.14	ug/L		04/28/16 09:57	05/02/16 10:16	1
4-Chloroaniline	0.089	U	1.0	0.089	ug/L		04/28/16 09:57	05/02/16 10:16	1
2-Chloronaphthalene	0.015	U	0.20	0.015	ug/L		04/28/16 09:57	05/02/16 10:16	1
4-Chlorophenyl phenyl ether	0.050	U	1.0	0.050	ug/L		04/28/16 09:57	05/02/16 10:16	1
Chrysene	0.014	U	0.20	0.014	ug/L		04/28/16 09:57	05/02/16 10:16	1
Dibenz(a,h)anthracene	0.016	U	0.20	0.016	ug/L		04/28/16 09:57	05/02/16 10:16	1
Dibenzofuran	0.062	U	1.0	0.062	ug/L		04/28/16 09:57	05/02/16 10:16	1
Di-n-butyl phthalate	0.12	U	1.0	0.12	ug/L		04/28/16 09:57	05/02/16 10:16	1
3,3'-Dichlorobenzidine	0.11	U	1.0	0.11	ug/L		04/28/16 09:57	05/02/16 10:16	1
Diethyl phthalate	0.15	U	1.0	0.15	ug/L		04/28/16 09:57	05/02/16 10:16	1
Dimethyl phthalate	0.077	U	1.0	0.077	ug/L		04/28/16 09:57	05/02/16 10:16	1
2,4-Dinitrotoluene	0.054	U	1.0	0.054	ug/L		04/28/16 09:57	05/02/16 10:16	1
2,6-Dinitrotoluene	0.080	U	1.0	0.080	ug/L		04/28/16 09:57	05/02/16 10:16	1
Di-n-octyl phthalate	0.21	U	1.0	0.21	ug/L		04/28/16 09:57	05/02/16 10:16	1
Fluoranthene	0.016	U	0.20	0.016	ug/L		04/28/16 09:57	05/02/16 10:16	1
Fluorene	0.022	U	0.20	0.022	ug/L		04/28/16 09:57	05/02/16 10:16	1
Hexachlorobenzene	0.018	U	0.20	0.018	ug/L		04/28/16 09:57	05/02/16 10:16	1
Hexachlorobutadiene	0.017	U	0.20	0.017	ug/L		04/28/16 09:57	05/02/16 10:16	1
Hexachlorocyclopentadiene	0.052	U	1.0	0.052	ug/L		04/28/16 09:57	05/02/16 10:16	1
Hexachloroethane	0.063	U	1.0	0.063	ug/L		04/28/16 09:57	05/02/16 10:16	1

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Lab Sample ID: MB 180-174719/1-A
Matrix: Water
Analysis Batch: 174922

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 174719

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Indeno[1,2,3-cd]pyrene	0.020	U	0.20	0.020	ug/L		04/28/16 09:57	05/02/16 10:16	1
Isophorone	0.064	U	1.0	0.064	ug/L		04/28/16 09:57	05/02/16 10:16	1
2-Methylnaphthalene	0.012	U	0.20	0.012	ug/L		04/28/16 09:57	05/02/16 10:16	1
Naphthalene	0.014	U	0.20	0.014	ug/L		04/28/16 09:57	05/02/16 10:16	1
2-Nitroaniline	0.35	U	5.0	0.35	ug/L		04/28/16 09:57	05/02/16 10:16	1
3-Nitroaniline	0.32	U	5.0	0.32	ug/L		04/28/16 09:57	05/02/16 10:16	1
4-Nitroaniline	0.17	U	5.0	0.17	ug/L		04/28/16 09:57	05/02/16 10:16	1
Nitrobenzene	0.084	U	2.0	0.084	ug/L		04/28/16 09:57	05/02/16 10:16	1
N-Nitrosodi-n-propylamine	0.031	U	0.20	0.031	ug/L		04/28/16 09:57	05/02/16 10:16	1
N-Nitrosodiphenylamine	0.085	U	1.0	0.085	ug/L		04/28/16 09:57	05/02/16 10:16	1
Phenanthrene	0.043	U	0.20	0.043	ug/L		04/28/16 09:57	05/02/16 10:16	1
Pyrene	0.016	U	0.20	0.016	ug/L		04/28/16 09:57	05/02/16 10:16	1
Carbazole	0.016	U	0.20	0.016	ug/L		04/28/16 09:57	05/02/16 10:16	1
Acetophenone	0.080	U	1.0	0.080	ug/L		04/28/16 09:57	05/02/16 10:16	1
Atrazine	0.089	U	1.0	0.089	ug/L		04/28/16 09:57	05/02/16 10:16	1
Benzaldehyde	0.15	U	1.0	0.15	ug/L		04/28/16 09:57	05/02/16 10:16	1
1,1'-Biphenyl	0.042	U	1.0	0.042	ug/L		04/28/16 09:57	05/02/16 10:16	1
Caprolactam	1.2	U	5.0	1.2	ug/L		04/28/16 09:57	05/02/16 10:16	1
4-Chloro-3-methylphenol	0.075	U	1.0	0.075	ug/L		04/28/16 09:57	05/02/16 10:16	1
2-Chlorophenol	0.17	U	1.0	0.17	ug/L		04/28/16 09:57	05/02/16 10:16	1
2-Methylphenol	0.086	U	1.0	0.086	ug/L		04/28/16 09:57	05/02/16 10:16	1
Methylphenol, 3 & 4	0.090	U	1.0	0.090	ug/L		04/28/16 09:57	05/02/16 10:16	1
2,4-Dichlorophenol	0.033	U	0.20	0.033	ug/L		04/28/16 09:57	05/02/16 10:16	1
2,4-Dimethylphenol	0.085	U	1.0	0.085	ug/L		04/28/16 09:57	05/02/16 10:16	1
2,4-Dinitrophenol	0.61	U	5.0	0.61	ug/L		04/28/16 09:57	05/02/16 10:16	1
4,6-Dinitro-2-methylphenol	0.22	U	5.0	0.22	ug/L		04/28/16 09:57	05/02/16 10:16	1
2-Nitrophenol	0.17	U	1.0	0.17	ug/L		04/28/16 09:57	05/02/16 10:16	1
4-Nitrophenol	0.65	U	5.0	0.65	ug/L		04/28/16 09:57	05/02/16 10:16	1
Pentachlorophenol	0.066	U	1.0	0.066	ug/L		04/28/16 09:57	05/02/16 10:16	1
Phenol	0.058	U	0.20	0.058	ug/L		04/28/16 09:57	05/02/16 10:16	1
2,4,5-Trichlorophenol	0.15	U	1.0	0.15	ug/L		04/28/16 09:57	05/02/16 10:16	1
2,4,6-Trichlorophenol	0.17	U	1.0	0.17	ug/L		04/28/16 09:57	05/02/16 10:16	1

Tentatively Identified Compound	*MB Est. Result*	*MB Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
n-Decane	*0.512*	*J*	*ug/L*		*5.79*	*124-18-5*	*04/28/16 09:57*	*05/02/16 10:16*	*1*
Benzoic acid	*2.56*	*J*	*ug/L*		*6.85*	*65-85-0*	*04/28/16 09:57*	*05/02/16 10:16*	*1*
Ethanol, 2-(2-butoxyethoxy)-	*2.83*	*T J N*	*ug/L*		*7.05*	*112-34-5*	*04/28/16 09:57*	*05/02/16 10:16*	*1*
Hexadecane	*0.173*	*J*	*ug/L*		*9.13*	*544-76-3*	*04/28/16 09:57*	*05/02/16 10:16*	*1*
Unknown	*0.402*	*T J*	*ug/L*		*10.23*		*04/28/16 09:57*	*05/02/16 10:16*	*1*
n-Hexadecanoic acid	*3.07*	*T J N*	*ug/L*		*10.56*	*57-10-3*	*04/28/16 09:57*	*05/02/16 10:16*	*1*
Unknown	*0.654*	*T J*	*ug/L*		*10.75*		*04/28/16 09:57*	*05/02/16 10:16*	*1*
1-Eicosanol	*0.884*	*T J N*	*ug/L*		*13.09*	*629-96-9*	*04/28/16 09:57*	*05/02/16 10:16*	*1*
1-Eicosanol	*0.515*	*T J N*	*ug/L*		*13.11*	*629-96-9*	*04/28/16 09:57*	*05/02/16 10:16*	*1*

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*70*		*31 - 100*	*04/28/16 09:57*	*05/02/16 10:16*	*1*
2-Fluorophenol (Surr)	*75*		*20 - 100*	*04/28/16 09:57*	*05/02/16 10:16*	*1*

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Lab Sample ID: MB 180-174719/1-A
Matrix: Water
Analysis Batch: 174922

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 174719

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
2,4,6-Tribromophenol (Surr)	88		28 - 107	04/28/16 09:57	05/02/16 10:16	1
Nitrobenzene-d5 (Surr)	79		33 - 100	04/28/16 09:57	05/02/16 10:16	1
Phenol-d5 (Surr)	82		26 - 100	04/28/16 09:57	05/02/16 10:16	1
Terphenyl-d14 (Surr)	95		20 - 109	04/28/16 09:57	05/02/16 10:16	1

Lab Sample ID: LCS 180-174719/2-A
Matrix: Water
Analysis Batch: 174922

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 174719

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acenaphthene	20.0	10.8		ug/L		54	42 - 100
Acenaphthylene	20.0	11.3		ug/L		56	41 - 100
Anthracene	20.0	12.4		ug/L		62	44 - 100
Benzo[a]anthracene	20.0	14.0		ug/L		70	44 - 100
Benzo[a]pyrene	20.0	13.6		ug/L		68	43 - 100
Benzo[b]fluoranthene	20.0	13.4		ug/L		67	39 - 100
Benzo[g,h,i]perylene	20.0	13.3		ug/L		66	41 - 109
Benzo[k]fluoranthene	20.0	14.1		ug/L		70	42 - 100
Bis(2-chloroethyl)ether	20.0	11.6		ug/L		58	38 - 100
Bis(2-chloroethoxy)methane	20.0	11.7		ug/L		59	39 - 100
2,2'-oxybis[1-chloropropane]	20.0	11.4		ug/L		57	32 - 100
Bis(2-ethylhexyl) phthalate	20.0	15.3		ug/L		77	24 - 129
4-Bromophenyl phenyl ether	20.0	12.6		ug/L		63	42 - 100
Butyl benzyl phthalate	20.0	16.0		ug/L		80	38 - 110
4-Chloroaniline	20.0	11.9		ug/L		60	39 - 100
2-Chloronaphthalene	20.0	10.5		ug/L		53	38 - 100
4-Chlorophenyl phenyl ether	20.0	10.8		ug/L		54	43 - 100
Chrysene	20.0	13.2		ug/L		66	45 - 100
Dibenz(a,h)anthracene	20.0	13.6		ug/L		68	42 - 110
Dibenzofuran	20.0	11.4		ug/L		57	42 - 100
Di-n-butyl phthalate	20.0	14.0		ug/L		70	42 - 106
3,3'-Dichlorobenzidine	20.0	12.4		ug/L		62	33 - 102
Diethyl phthalate	20.0	13.0		ug/L		65	40 - 106
Dimethyl phthalate	20.0	12.6		ug/L		63	43 - 100
2,4-Dinitrotoluene	20.0	13.1		ug/L		66	44 - 105
2,6-Dinitrotoluene	20.0	13.2		ug/L		66	45 - 100
Di-n-octyl phthalate	20.0	15.1		ug/L		76	31 - 111
Fluoranthene	20.0	13.4		ug/L		67	43 - 100
Fluorene	20.0	9.82		ug/L		49	43 - 100
Hexachlorobenzene	20.0	12.2		ug/L		61	41 - 100
Hexachlorobutadiene	20.0	9.38		ug/L		47	35 - 100
Hexachlorocyclopentadiene	20.0	2.61		ug/L		13	10 - 141
Hexachloroethane	20.0	9.54		ug/L		48	29 - 100
Indeno[1,2,3-cd]pyrene	20.0	13.6		ug/L		68	42 - 105
Isophorone	20.0	12.1		ug/L		60	42 - 100
2-Methylnaphthalene	20.0	11.0		ug/L		55	39 - 100
Naphthalene	20.0	10.6		ug/L		53	39 - 100
2-Nitroaniline	20.0	12.9		ug/L		64	41 - 110

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Lab Sample ID: LCS 180-174719/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 174922 — **Prep Batch: 174719**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
3-Nitroaniline	20.0	14.2		ug/L		71	41 - 100
4-Nitroaniline	20.0	13.5		ug/L		68	41 - 107
Nitrobenzene	20.0	11.2		ug/L		56	40 - 100
N-Nitrosodi-n-propylamine	20.0	12.8		ug/L		64	38 - 100
N-Nitrosodiphenylamine	20.0	12.7		ug/L		63	20 - 122
Phenanthrene	20.0	12.7		ug/L		63	43 - 100
Pyrene	20.0	14.0		ug/L		70	38 - 100
Carbazole	20.0	13.2		ug/L		66	42 - 100
Acetophenone	20.0	11.4		ug/L		57	38 - 100
Atrazine	20.0	7.57		ug/L		38	34 - 100
Benzaldehyde	20.0	10.9		ug/L		54	10 - 125
1,1'-Biphenyl	20.0	10.7		ug/L		54	40 - 100
Caprolactam	20.0	13.1		ug/L		66	35 - 110
4-Chloro-3-methylphenol	20.0	13.5		ug/L		67	40 - 100
2-Chlorophenol	20.0	11.5		ug/L		58	31 - 100
2-Methylphenol	20.0	12.0		ug/L		60	37 - 100
Methylphenol, 3 & 4	20.0	12.3		ug/L		62	38 - 100
2,4-Dichlorophenol	20.0	11.9		ug/L		60	37 - 100
2,4-Dimethylphenol	20.0	9.91		ug/L		50	20 - 107
2,4-Dinitrophenol	40.0	26.2		ug/L		66	26 - 100
4,6-Dinitro-2-methylphenol	40.0	27.2		ug/L		68	39 - 103
2-Nitrophenol	20.0	12.4		ug/L		62	35 - 100
4-Nitrophenol	40.0	25.7		ug/L		64	17 - 138
Pentachlorophenol	40.0	25.4		ug/L		64	28 - 109
Phenol	20.0	11.3		ug/L		56	33 - 100
2,4,5-Trichlorophenol	20.0	12.6		ug/L		63	41 - 102
2,4,6-Trichlorophenol	20.0	12.4		ug/L		62	37 - 105

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2-Fluorobiphenyl	*54*		*31 - 100*
2-Fluorophenol (Surr)	*53*		*20 - 100*
2,4,6-Tribromophenol (Surr)	*69*		*28 - 107*
Nitrobenzene-d5 (Surr)	*58*		*33 - 100*
Phenol-d5 (Surr)	*59*		*26 - 100*
Terphenyl-d14 (Surr)	*72*		*20 - 109*

Lab Sample ID: LCSD 180-174719/3-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 174922 — **Prep Batch: 174719**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Acenaphthene	20.0	12.2		ug/L		61	42 - 100	12	17
Acenaphthylene	20.0	12.6		ug/L		63	41 - 100	11	17
Anthracene	20.0	13.6		ug/L		68	44 - 100	9	18
Benzo[a]anthracene	20.0	15.9		ug/L		79	44 - 100	13	19
Benzo[a]pyrene	20.0	14.8		ug/L		74	43 - 100	8	20
Benzo[b]fluoranthene	20.0	14.7		ug/L		74	39 - 100	10	19
Benzo[g,h,i]perylene	20.0	14.4		ug/L		72	41 - 109	8	21

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Lab Sample ID: LCSD 180-174719/3-A
Matrix: Water
Analysis Batch: 174922

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 174719

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzo[k]fluoranthene	20.0	14.7		ug/L		73	42 - 100	4	19
Bis(2-chloroethyl)ether	20.0	13.1		ug/L		65	38 - 100	12	21
Bis(2-chloroethoxy)methane	20.0	12.9		ug/L		64	39 - 100	10	27
2,2'-oxybis[1-chloropropane]	20.0	13.0		ug/L		65	32 - 100	13	19
Bis(2-ethylhexyl) phthalate	20.0	17.6		ug/L		88	24 - 129	14	32
4-Bromophenyl phenyl ether	20.0	13.4		ug/L		67	42 - 100	6	18
Butyl benzyl phthalate	20.0	18.1		ug/L		91	38 - 110	13	18
4-Chloroaniline	20.0	12.8		ug/L		64	39 - 100	7	35
2-Chloronaphthalene	20.0	11.7		ug/L		58	38 - 100	10	17
4-Chlorophenyl phenyl ether	20.0	12.4		ug/L		62	43 - 100	14	17
Chrysene	20.0	14.9		ug/L		75	45 - 100	13	19
Dibenz(a,h)anthracene	20.0	14.5		ug/L		72	42 - 110	6	27
Dibenzofuran	20.0	13.0		ug/L		65	42 - 100	12	16
Di-n-butyl phthalate	20.0	15.1		ug/L		75	42 - 106	7	18
3,3'-Dichlorobenzidine	20.0	14.3		ug/L		71	33 - 102	14	35
Diethyl phthalate	20.0	14.6		ug/L		73	40 - 106	11	17
Dimethyl phthalate	20.0	14.1		ug/L		70	43 - 100	11	18
2,4-Dinitrotoluene	20.0	15.0		ug/L		75	44 - 105	13	18
2,6-Dinitrotoluene	20.0	14.8		ug/L		74	45 - 100	11	18
Di-n-octyl phthalate	20.0	16.5		ug/L		82	31 - 111	8	25
Fluoranthene	20.0	14.6		ug/L		73	43 - 100	9	19
Fluorene	20.0	11.2		ug/L		56	43 - 100	13	17
Hexachlorobenzene	20.0	12.8		ug/L		64	41 - 100	5	18
Hexachlorobutadiene	20.0	10.1		ug/L		50	35 - 100	7	19
Hexachlorocyclopentadiene	20.0	2.68		ug/L		13	10 - 141	3	35
Hexachloroethane	20.0	10.7		ug/L		53	29 - 100	11	22
Indeno[1,2,3-cd]pyrene	20.0	14.5		ug/L		72	42 - 105	6	27
Isophorone	20.0	13.3		ug/L		67	42 - 100	10	21
2-Methylnaphthalene	20.0	12.5		ug/L		62	39 - 100	13	17
Naphthalene	20.0	12.2		ug/L		61	39 - 100	14	17
2-Nitroaniline	20.0	14.4		ug/L		72	41 - 110	11	20
3-Nitroaniline	20.0	15.7		ug/L		79	41 - 100	10	26
4-Nitroaniline	20.0	15.3		ug/L		77	41 - 107	12	20
Nitrobenzene	20.0	12.9		ug/L		65	40 - 100	14	18
N-Nitrosodi-n-propylamine	20.0	14.4		ug/L		72	38 - 100	12	21
N-Nitrosodiphenylamine	20.0	13.5		ug/L		68	20 - 122	6	31
Phenanthrene	20.0	13.3		ug/L		67	43 - 100	5	18
Pyrene	20.0	15.6		ug/L		78	38 - 100	11	19
Carbazole	20.0	14.4		ug/L		72	42 - 100	8	28
Acetophenone	20.0	12.7		ug/L		64	38 - 100	12	20
Atrazine	20.0	8.37		ug/L		42	34 - 100	10	35
Benzaldehyde	20.0	11.1		ug/L		55	10 - 125	2	35
1,1'-Biphenyl	20.0	12.0		ug/L		60	40 - 100	11	19
Caprolactam	20.0	13.5		ug/L		67	35 - 110	2	19
4-Chloro-3-methylphenol	20.0	14.5		ug/L		72	40 - 100	7	27
2-Chlorophenol	20.0	13.1		ug/L		66	31 - 100	13	35
2-Methylphenol	20.0	13.6		ug/L		68	37 - 100	12	23
Methylphenol, 3 & 4	20.0	13.8		ug/L		69	38 - 100	11	28

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Lab Sample ID: LCSD 180-174719/3-A
Matrix: Water
Analysis Batch: 174922

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 174719

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
2,4-Dichlorophenol	20.0	13.2		ug/L		66	37 - 100	10	35
2,4-Dimethylphenol	20.0	10.2		ug/L		51	20 - 107	3	35
2,4-Dinitrophenol	40.0	30.0		ug/L		75	26 - 100	13	35
4,6-Dinitro-2-methylphenol	40.0	30.0		ug/L		75	39 - 103	10	30
2-Nitrophenol	20.0	14.0		ug/L		70	35 - 100	12	35
4-Nitrophenol	40.0	28.5		ug/L		71	17 - 138	10	25
Pentachlorophenol	40.0	28.3		ug/L		71	28 - 109	11	33
Phenol	20.0	12.6		ug/L		63	33 - 100	11	35
2,4,5-Trichlorophenol	20.0	14.1		ug/L		70	41 - 102	11	35
2,4,6-Trichlorophenol	20.0	13.9		ug/L		69	37 - 105	11	35

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
2-Fluorobiphenyl	*59*		*31 - 100*
2-Fluorophenol (Surr)	*60*		*20 - 100*
2,4,6-Tribromophenol (Surr)	*73*		*28 - 107*
Nitrobenzene-d5 (Surr)	*64*		*33 - 100*
Phenol-d5 (Surr)	*64*		*26 - 100*
Terphenyl-d14 (Surr)	*77*		*20 - 109*

Lab Sample ID: MB 180-174740/1-A
Matrix: Solid
Analysis Batch: 174781

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 174740

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Acenaphthene	0.64	U	6.7	0.64	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Acenaphthylene	0.76	U	6.7	0.76	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Anthracene	0.65	U	6.7	0.65	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Benzo[a]anthracene	0.84	U	6.7	0.84	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Benzo[a]pyrene	0.67	U	6.7	0.67	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Benzo[b]fluoranthene	1.0	U	6.7	1.0	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Benzo[g,h,i]perylene	0.66	U	6.7	0.66	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Benzo[k]fluoranthene	1.3	U	6.7	1.3	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Bis(2-chloroethyl)ether	0.90	U	6.7	0.90	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Bis(2-chloroethoxy)methane	2.2	U	33	2.2	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
2,2'-oxybis[1-chloropropane]	0.72	U	6.7	0.72	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Bis(2-ethylhexyl) phthalate	5.4	U	67	5.4	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
4-Bromophenyl phenyl ether	2.9	U	33	2.9	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Butyl benzyl phthalate	4.6	U	33	4.6	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
4-Chloroaniline	2.7	U	33	2.7	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
2-Chloronaphthalene	0.70	U	6.7	0.70	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
4-Chlorophenyl phenyl ether	3.7	U	33	3.7	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Chrysene	0.79	U	6.7	0.79	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Dibenz(a,h)anthracene	0.74	U	6.7	0.74	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Dibenzofuran	3.3	U	33	3.3	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Di-n-butyl phthalate	4.2	U	33	4.2	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
3,3'-Dichlorobenzidine	3.5	U	33	3.5	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Diethyl phthalate	3.6	U	33	3.6	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Dimethyl phthalate	3.6	U	33	3.6	ug/Kg		04/28/16 11:09	04/29/16 05:25	1

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Lab Sample ID: MB 180-174740/1-A
Matrix: Solid
Analysis Batch: 174781

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 174740

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2,4-Dinitrotoluene	2.7	U	33	2.7	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
2,6-Dinitrotoluene	3.4	U	33	3.4	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Di-n-octyl phthalate	3.5	U	33	3.5	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Fluoranthene	0.71	U	6.7	0.71	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Fluorene	0.88	U	6.7	0.88	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Hexachlorobenzene	0.71	U	6.7	0.71	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Hexachlorobutadiene	0.75	U	6.7	0.75	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Hexachlorocyclopentadiene	3.6	U	33	3.6	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Hexachloroethane	2.4	U	33	2.4	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Indeno[1,2,3-cd]pyrene	0.69	U	6.7	0.69	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Isophorone	2.5	U	33	2.5	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
2-Methylnaphthalene	0.60	U	6.7	0.60	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Naphthalene	0.58	U	6.7	0.58	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
2-Nitroaniline	15	U	170	15	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
3-Nitroaniline	14	U	170	14	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
4-Nitroaniline	14	U	170	14	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Nitrobenzene	2.8	U	67	2.8	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
N-Nitrosodi-n-propylamine	0.78	U	6.7	0.78	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
N-Nitrosodiphenylamine	3.1	U	33	3.1	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Phenanthrene	1.1	U	6.7	1.1	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Pyrene	0.67	U	6.7	0.67	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Carbazole	0.61	U	6.7	0.61	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Acetophenone	2.7	U	33	2.7	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Atrazine	3.2	U	33	3.2	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Benzaldehyde	5.0	U	33	5.0	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
1,1'-Biphenyl	3.0	U	33	3.0	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Caprolactam	25	U	170	25	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
4-Chloro-3-methylphenol	3.1	U	33	3.1	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
2-Chlorophenol	2.7	U	33	2.7	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
2-Methylphenol	2.3	U	33	2.3	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Methylphenol, 3 & 4	3.3	U	33	3.3	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
2,4-Dichlorophenol	0.67	U	6.7	0.67	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
2,4-Dimethylphenol	5.2	U	33	5.2	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
2,4-Dinitrophenol	40	U	170	40	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
4,6-Dinitro-2-methylphenol	13	U	170	13	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
2-Nitrophenol	3.7	U	33	3.7	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
4-Nitrophenol	12	U	170	12	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Pentachlorophenol	3.0	U	33	3.0	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
Phenol	0.79	U	6.7	0.79	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
2,4,5-Trichlorophenol	3.6	U	33	3.6	ug/Kg		04/28/16 11:09	04/29/16 05:25	1
2,4,6-Trichlorophenol	5.0	U	33	5.0	ug/Kg		04/28/16 11:09	04/29/16 05:25	1

Tentatively Identified Compound	*MB Est. Result*	*MB Qualifier*	*Unit*	*D*	*RT*	*CAS No.*	*Prepared*	*Analyzed*	*Dil Fac*
Tentatively Identified Compound	*None*		*ug/Kg*				*04/28/16 11:09*	*04/29/16 05:25*	*1*

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
2-Fluorobiphenyl	*76*		*38 - 103*	*04/28/16 11:09*	*04/29/16 05:25*	*1*

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Lab Sample ID: MB 180-174740/1-A
Matrix: Solid
Analysis Batch: 174781

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 174740

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
2-Fluorophenol (Surr)	89		34 - 103	04/28/16 11:09	04/29/16 05:25	1
2,4,6-Tribromophenol (Surr)	83		20 - 113	04/28/16 11:09	04/29/16 05:25	1
Nitrobenzene-d5 (Surr)	86		41 - 108	04/28/16 11:09	04/29/16 05:25	1
Phenol-d5 (Surr)	85		35 - 103	04/28/16 11:09	04/29/16 05:25	1
Terphenyl-d14 (Surr)	95		28 - 109	04/28/16 11:09	04/29/16 05:25	1

Lab Sample ID: LCS 180-174740/2-A
Matrix: Solid
Analysis Batch: 174781

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 174740

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Acenaphthene	667	383		ug/Kg		57	34 - 100
Acenaphthylene	667	466		ug/Kg		70	34 - 100
Anthracene	667	479		ug/Kg		72	35 - 100
Benzo[a]anthracene	667	478		ug/Kg		72	37 - 100
Benzo[a]pyrene	667	494		ug/Kg		74	36 - 100
Benzo[b]fluoranthene	667	502		ug/Kg		75	31 - 100
Benzo[g,h,i]perylene	667	470		ug/Kg		70	29 - 106
Benzo[k]fluoranthene	667	490		ug/Kg		73	34 - 100
Bis(2-chloroethyl)ether	667	499		ug/Kg		75	31 - 100
Bis(2-chloroethoxy)methane	667	481		ug/Kg		72	31 - 100
2,2'-oxybis[1-chloropropane]	667	507		ug/Kg		76	29 - 100
Bis(2-ethylhexyl) phthalate	667	490		ug/Kg		73	32 - 106
4-Bromophenyl phenyl ether	667	483		ug/Kg		72	33 - 100
Butyl benzyl phthalate	667	438		ug/Kg		66	33 - 105
4-Chloroaniline	667	455		ug/Kg		68	33 - 100
2-Chloronaphthalene	667	436		ug/Kg		65	29 - 100
4-Chlorophenyl phenyl ether	667	397		ug/Kg		59	35 - 100
Chrysene	667	462		ug/Kg		69	37 - 100
Dibenz(a,h)anthracene	667	485		ug/Kg		73	31 - 106
Dibenzofuran	667	438		ug/Kg		66	35 - 100
Di-n-butyl phthalate	667	517		ug/Kg		78	36 - 102
3,3'-Dichlorobenzidine	667	388		ug/Kg		58	29 - 100
Diethyl phthalate	667	448		ug/Kg		67	36 - 103
Dimethyl phthalate	667	468		ug/Kg		70	36 - 100
2,4-Dinitrotoluene	667	510		ug/Kg		77	36 - 102
2,6-Dinitrotoluene	667	533		ug/Kg		80	37 - 100
Di-n-octyl phthalate	667	461		ug/Kg		69	26 - 112
Fluoranthene	667	489		ug/Kg		73	36 - 100
Fluorene	667	362		ug/Kg		54	35 - 100
Hexachlorobenzene	667	458		ug/Kg		69	30 - 104
Hexachlorobutadiene	667	490		ug/Kg		74	30 - 104
Hexachlorocyclopentadiene	667	517		ug/Kg		78	21 - 113
Hexachloroethane	667	525		ug/Kg		79	31 - 100
Indeno[1,2,3-cd]pyrene	667	482		ug/Kg		72	31 - 103
Isophorone	667	468		ug/Kg		70	34 - 100
2-Methylnaphthalene	667	447		ug/Kg		67	33 - 100
Naphthalene	667	468		ug/Kg		70	32 - 100

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Lab Sample ID: LCS 180-174740/2-A
Matrix: Solid
Analysis Batch: 174781

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 174740

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
2-Nitroaniline	667	490		ug/Kg		73	34 - 108
3-Nitroaniline	667	479		ug/Kg		72	35 - 100
4-Nitroaniline	667	432		ug/Kg		65	34 - 104
Nitrobenzene	667	521		ug/Kg		78	30 - 100
N-Nitrosodi-n-propylamine	667	474		ug/Kg		71	33 - 100
N-Nitrosodiphenylamine	667	484		ug/Kg		73	32 - 100
Phenanthrene	667	434		ug/Kg		65	33 - 100
Pyrene	667	491		ug/Kg		74	32 - 100
Carbazole	667	461		ug/Kg		69	34 - 100
Acetophenone	667	386		ug/Kg		58	31 - 100
Atrazine	667	214		ug/Kg		32	30 - 130
Benzaldehyde	667	162	*	ug/Kg		24	30 - 130
1,1'-Biphenyl	667	443		ug/Kg		66	32 - 100
Caprolactam	667	498		ug/Kg		75	37 - 103
4-Chloro-3-methylphenol	667	490		ug/Kg		73	37 - 100
2-Chlorophenol	667	517		ug/Kg		78	31 - 100
2-Methylphenol	667	472		ug/Kg		71	33 - 100
Methylphenol, 3 & 4	667	483		ug/Kg		72	33 - 100
2,4-Dichlorophenol	667	525		ug/Kg		79	34 - 100
2,4-Dimethylphenol	667	487		ug/Kg		73	34 - 100
2,4-Dinitrophenol	1330	843		ug/Kg		63	30 - 100
4,6-Dinitro-2-methylphenol	1330	944		ug/Kg		71	36 - 100
2-Nitrophenol	667	550		ug/Kg		82	33 - 100
4-Nitrophenol	1330	934		ug/Kg		70	23 - 138
Pentachlorophenol	1330	972		ug/Kg		73	24 - 106
Phenol	667	473		ug/Kg		71	34 - 100
2,4,5-Trichlorophenol	667	486		ug/Kg		73	34 - 103
2,4,6-Trichlorophenol	667	499		ug/Kg		75	34 - 103

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
2-Fluorobiphenyl	*67*		*38 - 103*
2-Fluorophenol (Surr)	*77*		*34 - 103*
2,4,6-Tribromophenol (Surr)	*81*		*20 - 113*
Nitrobenzene-d5 (Surr)	*80*		*41 - 108*
Phenol-d5 (Surr)	*71*		*35 - 103*
Terphenyl-d14 (Surr)	*75*		*28 - 109*

Lab Sample ID: 180-54234-3 MS
Matrix: Solid
Analysis Batch: 174781

Client Sample ID: MORRIS SLUDGE
Prep Type: Total/NA
Prep Batch: 174740

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Acenaphthene	8.8	U * F1 F2	920	883	*	ug/Kg	☼	96	34 - 100
Acenaphthylene	11	U * F1 F2	920	1190	* F1	ug/Kg	☼	130	34 - 100
Anthracene	9.0	U *	920	882		ug/Kg	☼	96	35 - 100
Benzo[a]anthracene	12	U	920	841		ug/Kg	☼	91	37 - 100
Benzo[a]pyrene	9.2	U	920	599		ug/Kg	☼	65	36 - 100
Benzo[b]fluoranthene	14	U	920	662		ug/Kg	☼	72	31 - 100

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Lab Sample ID: 180-54234-3 MS
Matrix: Solid
Analysis Batch: 174781

Client Sample ID: MORRIS SLUDGE
Prep Type: Total/NA
Prep Batch: 174740

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzo[g,h,i]perylene	9.2	U F2	920	546		ug/Kg	☼	59	29 - 106
Benzo[k]fluoranthene	19	U	920	625		ug/Kg	☼	68	34 - 100
Bis(2-chloroethyl)ether	12	U F1 F2	920	4400	F1	ug/Kg	☼	478	31 - 100
Bis(2-chloroethoxy)methane	30	U * F1 F2	920	10500	* F1	ug/Kg	☼	1138	31 - 100
2,2'-oxybis[1-chloropropane]	9.9	U F1 F2	920	2150	F1	ug/Kg	☼	234	29 - 100
Bis(2-ethylhexyl) phthalate	4300		920	4630	4	ug/Kg	☼	35	32 - 106
4-Bromophenyl phenyl ether	40	U *	920	891		ug/Kg	☼	97	33 - 100
Butyl benzyl phthalate	63	U F1 F2	920	3110	F1	ug/Kg	☼	339	33 - 105
4-Chloroaniline	37	U * F1	920	5410	* F1	ug/Kg	☼	588	33 - 100
2-Chloronaphthalene	9.6	U * F1 F2	920	1010	* F1	ug/Kg	☼	109	29 - 100
4-Chlorophenyl phenyl ether	51	U * F1	920	931	* F1	ug/Kg	☼	101	35 - 100
Chrysene	11	U	920	781		ug/Kg	☼	85	37 - 100
Dibenz(a,h)anthracene	10	U	920	701		ug/Kg	☼	76	31 - 106
Dibenzofuran	45	U * F1 F2	920	965	* F1	ug/Kg	☼	105	35 - 100
Di-n-butyl phthalate	58	U * F1 F2	920	3450	F1	ug/Kg	☼	375	36 - 102
3,3'-Dichlorobenzidine	49	U F1 F2	920	5610	F1	ug/Kg	☼	610	29 - 100
Diethyl phthalate	50	U * F1 F2	920	4910	* F1	ug/Kg	☼	534	36 - 103
Dimethyl phthalate	50	U * F1 F2	920	5620	* F1	ug/Kg	☼	611	36 - 100
2,4-Dinitrotoluene	37	U * F1 F2	920	4100	* F1	ug/Kg	☼	446	36 - 102
2,6-Dinitrotoluene	47	U * F1 F2	920	6600	* F1	ug/Kg	☼	717	37 - 100
Di-n-octyl phthalate	48	U	920	810		ug/Kg	☼	88	26 - 112
Fluoranthene	9.8	U * F1	920	1030	F1	ug/Kg	☼	112	36 - 100
Fluorene	12	U * F1 F2	920	1020	* F1	ug/Kg	☼	111	35 - 100
Hexachlorobenzene	9.8	U * F2	920	368		ug/Kg	☼	40	30 - 104
Hexachlorobutadiene	10	U * F1	920	1880	* F1	ug/Kg	☼	204	30 - 104
Hexachlorocyclopentadiene	50	U *	920	465	*	ug/Kg	☼	51	21 - 113
Hexachloroethane	33	U F1	920	1630	F1	ug/Kg	☼	177	31 - 100
Indeno[1,2,3-cd]pyrene	9.5	U F2	920	584		ug/Kg	☼	64	31 - 103
Isophorone	35	U * F1 F2	920	15700	* F1	ug/Kg	☼	1703	34 - 100
2-Methylnaphthalene	8.3	U * F1 F2	920	2730	* F1	ug/Kg	☼	297	33 - 100
Naphthalene	7.9	U * F1 F2	920	2810	* F1	ug/Kg	☼	305	32 - 100
2-Nitroaniline	210	U * F1 F2	920	9420	* F1	ug/Kg	☼	1024	34 - 108
3-Nitroaniline	190	U * F1 F2	920	5200	* F1	ug/Kg	☼	566	35 - 100
4-Nitroaniline	190	U * F1 F2	920	9520	* F1	ug/Kg	☼	1035	34 - 104
Nitrobenzene	38	U * F1 F2	920	10600	* F1	ug/Kg	☼	1148	30 - 100
N-Nitrosodi-n-propylamine	11	U F1	920	6700	F1	ug/Kg	☼	728	33 - 100
N-Nitrosodiphenylamine	43	U * F1	920	3860	F1	ug/Kg	☼	420	32 - 100
Phenanthrene	15	U * F1 F2	920	1000	F1	ug/Kg	☼	109	33 - 100
Pyrene	9.3	U F2	920	668		ug/Kg	☼	73	32 - 100
Carbazole	8.5	U * F1 F2	920	5310	F1	ug/Kg	☼	578	34 - 100
Acetophenone	38	U F1 F2	920	3420	F1	ug/Kg	☼	371	31 - 100
Atrazine	45	U * F1 F2	920	3490	F1	ug/Kg	☼	379	30 - 130
Benzaldehyde	69	U * F1 F2	920	1600	F1	ug/Kg	☼	174	30 - 130
1,1'-Biphenyl	41	U * F1 F2	920	1440	* F1	ug/Kg	☼	157	32 - 100
Caprolactam	350	U * F1	920	350	U * F1	ug/Kg	☼	0	37 - 103
4-Chloro-3-methylphenol	42	U * F1 F2	920	19000	E * F1	ug/Kg	☼	2062	37 - 100
2-Chlorophenol	38	U F1 F2	920	7240	F1	ug/Kg	☼	787	31 - 100
2-Methylphenol	32	U F1 F2	920	6920	F1	ug/Kg	☼	752	33 - 100

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Lab Sample ID: 180-54234-3 MS — **Client Sample ID: MORRIS SLUDGE**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 174781 — **Prep Batch: 174740**

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Methylphenol, 3 & 4	45	U F1 F2	920	7980	F1	ug/Kg	☼	868	33 - 100
2,4-Dichlorophenol	9.2	U * F1 F2	920	20400	E * F1	ug/Kg	☼	2220	34 - 100
2,4-Dimethylphenol	72	U * F1 F2	920	19400	E * F1	ug/Kg	☼	2108	34 - 100
2,4-Dinitrophenol	550	U * F1 F2	1840	2320	* F1	ug/Kg	☼	126	30 - 100
4,6-Dinitro-2-methylphenol	180	U * F1 F2	1840	2680	F1	ug/Kg	☼	146	36 - 100
2-Nitrophenol	51	U * F1 F2	920	8970	* F1	ug/Kg	☼	975	33 - 100
4-Nitrophenol	170	U * F1 F2	1840	28400	* F1	ug/Kg	☼	1543	23 - 138
Pentachlorophenol	41	U * F1 F2	1840	10500	F1	ug/Kg	☼	568	24 - 106
Phenol	11	U F1 F2	920	7770	F1	ug/Kg	☼	844	34 - 100
2,4,5-Trichlorophenol	49	U * F1	920	5560	* F1	ug/Kg	☼	605	34 - 103
2,4,6-Trichlorophenol	69	U * F1 F2	920	5900	* F1	ug/Kg	☼	641	34 - 103

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
2-Fluorobiphenyl	*160*	**X*	*38 - 103*
2-Fluorophenol (Surr)	*894*	*X*	*34 - 103*
2,4,6-Tribromophenol (Surr)	*524*	*X*	*20 - 113*
Nitrobenzene-d5 (Surr)	*1196*	**X*	*41 - 108*
Phenol-d5 (Surr)	*868*	*X*	*35 - 103*
Terphenyl-d14 (Surr)	*79*		*28 - 109*

Lab Sample ID: 180-54234-3 MSD — **Client Sample ID: MORRIS SLUDGE**
Matrix: Solid — **Prep Type: Total/NA**
Analysis Batch: 174781 — **Prep Batch: 174740**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Acenaphthene	8.8	U * F1 F2	920	1550	* F1 F2	ug/Kg	☼	169	34 - 100	55	23
Acenaphthylene	11	U * F1 F2	920	1650	* F1 F2	ug/Kg	☼	179	34 - 100	32	23
Anthracene	9.0	U *	920	719	*	ug/Kg	☼	78	35 - 100	20	20
Benzo[a]anthracene	12	U	920	811		ug/Kg	☼	88	37 - 100	4	20
Benzo[a]pyrene	9.2	U	920	715		ug/Kg	☼	78	36 - 100	18	21
Benzo[b]fluoranthene	14	U	920	720		ug/Kg	☼	78	31 - 100	8	22
Benzo[g,h,i]perylene	9.2	U F2	920	781	F2	ug/Kg	☼	85	29 - 106	35	20
Benzo[k]fluoranthene	19	U	920	635		ug/Kg	☼	69	34 - 100	2	21
Bis(2-chloroethyl)ether	12	U F1 F2	920	2110	F1 F2	ug/Kg	☼	230	31 - 100	70	20
Bis(2-chloroethoxy)methane	30	U * F1 F2	920	3150	* F1 F2	ug/Kg	☼	343	31 - 100	107	20
2,2'-oxybis[1-chloropropane]	9.9	U F1 F2	920	1040	F1 F2	ug/Kg	☼	113	29 - 100	70	20
Bis(2-ethylhexyl) phthalate	4300		920	4910	4	ug/Kg	☼	65	32 - 106	6	20
4-Bromophenyl phenyl ether	40	U *	920	795	*	ug/Kg	☼	86	33 - 100	11	20
Butyl benzyl phthalate	63	U F1 F2	920	1380	F1 F2	ug/Kg	☼	150	33 - 105	77	20
4-Chloroaniline	37	U * F1	920	5400	* F1	ug/Kg	☼	587	33 - 100	0	20
2-Chloronaphthalene	9.6	U * F1 F2	920	770	* F2	ug/Kg	☼	84	29 - 100	27	25
4-Chlorophenyl phenyl ether	51	U * F1	920	1030	* F1	ug/Kg	☼	112	35 - 100	10	22
Chrysene	11	U	920	871		ug/Kg	☼	95	37 - 100	11	20
Dibenz(a,h)anthracene	10	U	920	831		ug/Kg	☼	90	31 - 106	17	26
Dibenzofuran	45	U * F1 F2	920	4200	* F1 F2	ug/Kg	☼	457	35 - 100	125	23
Di-n-butyl phthalate	58	U * F1 F2	920	1910	* F1 F2	ug/Kg	☼	208	36 - 102	57	20
3,3'-Dichlorobenzidine	49	U F1 F2	920	2530	F1 F2	ug/Kg	☼	275	29 - 100	76	21
Diethyl phthalate	50	U * F1 F2	920	2920	* F1 F2	ug/Kg	☼	318	36 - 103	51	20

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Lab Sample ID: 180-54234-3 MSD
Matrix: Solid
Analysis Batch: 174781

Client Sample ID: MORRIS SLUDGE
Prep Type: Total/NA
Prep Batch: 174740

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Dimethyl phthalate	50	U * F1 F2	920	2890	* F1 F2	ug/Kg	☼	314	36 - 100	64	23
2,4-Dinitrotoluene	37	U * F1 F2	920	1170	* F1 F2	ug/Kg	☼	127	36 - 102	111	21
2,6-Dinitrotoluene	47	U * F1 F2	920	1470	* F1 F2	ug/Kg	☼	159	37 - 100	127	20
Di-n-octyl phthalate	48	U	920	696		ug/Kg	☼	76	26 - 112	15	20
Fluoranthene	9.8	U * F1	920	1010	* F1	ug/Kg	☼	109	36 - 100	3	20
Fluorene	12	U * F1 F2	920	1390	* F1 F2	ug/Kg	☼	151	35 - 100	31	21
Hexachlorobenzene	9.8	U * F2	920	468	* F2	ug/Kg	☼	51	30 - 104	24	21
Hexachlorobutadiene	10	U * F1	920	1610	* F1	ug/Kg	☼	176	30 - 104	15	20
Hexachlorocyclopentadiene	50	U *	920	521	*	ug/Kg	☼	57	21 - 113	11	30
Hexachloroethane	33	U F1	920	1660	F1	ug/Kg	☼	181	31 - 100	2	20
Indeno[1,2,3-cd]pyrene	9.5	U F2	920	806	F2	ug/Kg	☼	88	31 - 103	32	25
Isophorone	35	U * F1 F2	920	12500	* F1 F2	ug/Kg	☼	1356	34 - 100	23	20
2-Methylnaphthalene	8.3	U * F1 F2	920	1660	* F1 F2	ug/Kg	☼	180	33 - 100	49	21
Naphthalene	7.9	U * F1 F2	920	1290	* F1 F2	ug/Kg	☼	141	32 - 100	74	20
2-Nitroaniline	210	U * F1 F2	920	3780	* F1 F2	ug/Kg	☼	411	34 - 108	85	23
3-Nitroaniline	190	U * F1 F2	920	2980	* F1 F2	ug/Kg	☼	324	35 - 100	54	20
4-Nitroaniline	190	U * F1 F2	920	3980	* F1 F2	ug/Kg	☼	432	34 - 104	82	20
Nitrobenzene	38	U * F1 F2	920	6990	* F1 F2	ug/Kg	☼	759	30 - 100	41	20
N-Nitrosodi-n-propylamine	11	U F1	920	5880	F1	ug/Kg	☼	639	33 - 100	13	20
N-Nitrosodiphenylamine	43	U * F1	920	4380	* F1	ug/Kg	☼	476	32 - 100	12	20
Phenanthrene	15	U * F1 F2	920	799	* F2	ug/Kg	☼	87	33 - 100	22	20
Pyrene	9.3	U F2	920	357	F2	ug/Kg	☼	39	32 - 100	61	21
Carbazole	8.5	U * F1 F2	920	2540	* F1 F2	ug/Kg	☼	276	34 - 100	71	20
Acetophenone	38	U F1 F2	920	2150	F1 F2	ug/Kg	☼	234	31 - 100	45	20
Atrazine	45	U * F1 F2	920	1600	* F1 F2	ug/Kg	☼	174	30 - 130	74	20
Benzaldehyde	69	U * F1 F2	920	1260	F1 F2	ug/Kg	☼	137	30 - 130	24	20
1,1'-Biphenyl	41	U * F1 F2	920	3530	* F1 F2	ug/Kg	☼	383	32 - 100	84	24
Caprolactam	350	U * F1	920	350	U * F1	ug/Kg	☼	0	37 - 103	NC	20
4-Chloro-3-methylphenol	42	U * F1 F2	920	9900	* F1 F2	ug/Kg	☼	1077	37 - 100	63	20
2-Chlorophenol	38	U F1 F2	920	3030	F1 F2	ug/Kg	☼	330	31 - 100	82	20
2-Methylphenol	32	U F1 F2	920	2590	F1 F2	ug/Kg	☼	282	33 - 100	91	20
Methylphenol, 3 & 4	45	U F1 F2	920	2350	F1 F2	ug/Kg	☼	256	33 - 100	109	20
2,4-Dichlorophenol	9.2	U * F1 F2	920	9850	* F1 F2	ug/Kg	☼	1071	34 - 100	70	20
2,4-Dimethylphenol	72	U * F1 F2	920	13900	* F1 F2	ug/Kg	☼	1516	34 - 100	33	20
2,4-Dinitrophenol	550	U * F1 F2	1840	1340	J * F2	ug/Kg	☼	73	30 - 100	54	23
4,6-Dinitro-2-methylphenol	180	U * F1 F2	1840	1210	J * F2	ug/Kg	☼	66	36 - 100	76	20
2-Nitrophenol	51	U * F1 F2	920	7110	* F1 F2	ug/Kg	☼	773	33 - 100	23	22
4-Nitrophenol	170	U * F1 F2	1840	51300	E * F1 F2	ug/Kg	☼	2787	23 - 138	57	20
Pentachlorophenol	41	U * F1 F2	1840	4300	* F1 F2	ug/Kg	☼	234	24 - 106	83	20
Phenol	11	U F1 F2	920	3420	F1 F2	ug/Kg	☼	372	34 - 100	78	20
2,4,5-Trichlorophenol	49	U * F1	920	4940	* F1	ug/Kg	☼	537	34 - 103	12	22
2,4,6-Trichlorophenol	69	U * F1 F2	920	3690	* F1 F2	ug/Kg	☼	402	34 - 103	46	25

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
2-Fluorobiphenyl	*127*	**X*	*38 - 103*
2-Fluorophenol (Surr)	*409*	*X*	*34 - 103*
2,4,6-Tribromophenol (Surr)	*208*	**X*	*20 - 113*
Nitrobenzene-d5 (Surr)	*918*	**X*	*41 - 108*

Method: 8270D LL - Semivolatile Organic Compounds by GC/MS - Low Level (Continued)

Lab Sample ID: 180-54234-3 MSD
Matrix: Solid
Analysis Batch: 174781

Client Sample ID: MORRIS SLUDGE
Prep Type: Total/NA
Prep Batch: 174740

Surrogate	MSD %Recovery	MSD Qualifier	Limits
Phenol-d5 (Surr)	347	X	35 - 103
Terphenyl-d14 (Surr)	43		28 - 109

QC Association Summary

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

GC/MS VOA

Analysis Batch: 174682

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-54234-2	MORRIS EFFLUENT	Total/NA	Water	8260C	
180-54234-2 - DL	MORRIS EFFLUENT	Total/NA	Water	8260C	
180-54234-4	TRIB BLANK	Total/NA	Water	8260C	
LCS 180-174682/15	Lab Control Sample	Total/NA	Water	8260C	
MB 180-174682/7	Method Blank	Total/NA	Water	8260C	

Analysis Batch: 174794

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-54234-3	MORRIS SLUDGE	Total/NA	Solid	8260C	174800
LCS 180-174800/2-A	Lab Control Sample	Total/NA	Solid	8260C	174800
LCSD 180-174800/3-A	Lab Control Sample Dup	Total/NA	Solid	8260C	174800
MB 180-174800/1-A	Method Blank	Total/NA	Solid	8260C	174800

Prep Batch: 174800

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-54234-3	MORRIS SLUDGE	Total/NA	Solid	5030C	
LCS 180-174800/2-A	Lab Control Sample	Total/NA	Solid	5030C	
LCSD 180-174800/3-A	Lab Control Sample Dup	Total/NA	Solid	5030C	
MB 180-174800/1-A	Method Blank	Total/NA	Solid	5030C	

Analysis Batch: 174823

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-54234-1	MORRIS INFLUENT	Total/NA	Water	8260C	
LCS 180-174823/5	Lab Control Sample	Total/NA	Water	8260C	
LCSD 180-174823/6	Lab Control Sample Dup	Total/NA	Water	8260C	
MB 180-174823/8	Method Blank	Total/NA	Water	8260C	

GC/MS Semi VOA

Prep Batch: 174719

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-54234-1	MORRIS INFLUENT	Total/NA	Water	3520C	
180-54234-2	MORRIS EFFLUENT	Total/NA	Water	3520C	
LCS 180-174719/2-A	Lab Control Sample	Total/NA	Water	3520C	
LCSD 180-174719/3-A	Lab Control Sample Dup	Total/NA	Water	3520C	
MB 180-174719/1-A	Method Blank	Total/NA	Water	3520C	

Prep Batch: 174740

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-54234-3	MORRIS SLUDGE	Total/NA	Solid	3541	
180-54234-3 MS	MORRIS SLUDGE	Total/NA	Solid	3541	
180-54234-3 MSD	MORRIS SLUDGE	Total/NA	Solid	3541	
LCS 180-174740/2-A	Lab Control Sample	Total/NA	Solid	3541	
MB 180-174740/1-A	Method Blank	Total/NA	Solid	3541	

Analysis Batch: 174781

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-54234-3	MORRIS SLUDGE	Total/NA	Solid	8270D LL	174740
180-54234-3 MS	MORRIS SLUDGE	Total/NA	Solid	8270D LL	174740
180-54234-3 MSD	MORRIS SLUDGE	Total/NA	Solid	8270D LL	174740

QC Association Summary

Client: Shalewater Solutions, LLC
Project/Site: HEP Shalewater Solutions

TestAmerica Job ID: 180-54234-1

GC/MS Semi VOA (Continued)

Analysis Batch: 174781 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 180-174740/2-A	Lab Control Sample	Total/NA	Solid	8270D LL	174740
MB 180-174740/1-A	Method Blank	Total/NA	Solid	8270D LL	174740

Analysis Batch: 174783

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-54234-1	MORRIS INFLUENT	Total/NA	Water	8270D LL	174719
180-54234-2	MORRIS EFFLUENT	Total/NA	Water	8270D LL	174719

Analysis Batch: 174922

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 180-174719/2-A	Lab Control Sample	Total/NA	Water	8270D LL	174719
LCSD 180-174719/3-A	Lab Control Sample Dup	Total/NA	Water	8270D LL	174719
MB 180-174719/1-A	Method Blank	Total/NA	Water	8270D LL	174719

General Chemistry

Analysis Batch: 174728

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
180-54234-3	MORRIS SLUDGE	Total/NA	Solid	2540G	

RELIANCE LABORATORIES, INC. - CHAIN OF CUSTODY RECORD

☐ 2044 MEADOWBROOK ROAD
POST OFFICE BOX 4657
BRIDGEPORT, WV 26330
TEL. (304) 842-5285 • FAX (304) 842-5351
E-MAIL reliancelabs@wvdsl.net
INTERNET www.RelianceLabs.net

☐ RIDGEFIELD BUSINESS CENTER
25 CRIMSON CIRCLE
MARTINSBURG, WV 25403
TEL. (304) 596-2084 • FAX (304) 596-2086

RUSH TAT 48 HR

*CLIENT NAME Hillstone Environmental (Formerly Stakewater Solutions)

*ADDRESS

CUSTOMER #

*TEL.# 724 289 7475 FAX #

*SAMPLER (S) Ryan Hall

E-MAIL rhall@shalewater.com

SHEET NO. ____ OF ____

LABORATORY #	*DATE	*TIME	COMP.	GRAB	MATRIX W, DW, S, O, M	TEMP. ≤ 4°C Yes No	*# OF CONTAIN.	HN03	H2S04	HCL	NaOH	BAC-T	NO PRES.		8260 TCL	8270 TCL							*PROJECT/REMARKS
Morris Inf	4/27	1630	X		W		4			X			X		X	X							
Morris Eff.	4/27	1630	X		W		4			X			X		X	X							
Morris Sludge	4/27	1630	X		S		1								X	X							
Trip Blank					W		1			X					X								

180-54234 Chain of Custody

SAMPLES DO_____ DO NOT_____ MEET USEPA GUIDELINES FOR HOLDING TIMES
SAMPLES DO_____ DO NOT_____ MEET USEPA GUIDELINES FOR CHEMICAL PRESERVATIVES
SAMPLES DO_____ DO NOT_____ MEET USEPA GUIDELINES FOR SAMPLE CONTAINERS
SAMPLES ARE_____ ARE NOT_____ FOR REGULATORY COMPLIANCE PURPOSES

*RELINQUISHED BY:		*DATE/TIME	*RECEIVED BY:
PRINT:	DATE: 4/28/2016	4/28/16	PRINT: Eric Kubat
SIGN: Ryan Hall	TIME: 2030	0600	SIGN:
*RELINQUISHED BY:		*DATE/TIME	*RECEIVED BY:
PRINT:	DATE:		PRINT:
SIGN:	TIME:		SIGN:
*RELINQUISHED BY:		*DATE/TIME	*RECEIVED BY:
PRINT:	DATE:		PRINT:
SIGN:	TIME:		SIGN:
*COURIER:	DATE:	*DATE/TIME	*RECEIVED BY:
TRACKING#:	TIME:		PRINT:
			SIGN:

REMARKS:

PWS#

WEATHER/TEMPERATURE:

☒ ***RUSH STATUS*** (INITIAL ACCEPTANCE _____)

*** ADDITIONAL LABORATORY FEES MAY APPLY***

EXTENT OF LIABILITY

SHOULD RELIANCE LABORATORIES, INC. BE AT FAULT AND ANY DISPUTE ARISE REGARDING ANALYTICAL DATA GENERATED BY THE LABORATORY, THE EXTENT OF THE LIABILITY TO RELIANCE WILL BE A DUPLICATE ANALYSIS OF THAT SAMPLE (PROVIDING ADEQUATE SAMPLE REMAINS) OR A REFUND OF THE ANALYTICAL FEE. IN NO EVENT WILL RELIANCE LABORATORIES BE LIABLE FOR DAMAGES INCLUDING BUT NOT LIMITED TO DIRECT, INDIRECT OR CONSEQUENTIAL DAMAGES ARISING FROM SUCH DISPUTE.

NOTE: TYPICAL SAMPLE TURN AROUND FOR ROUTINE SAMPLES IS 5 TO 10 WORKING DAYS. THIS IN NOT A GUARANTEE THAT SAMPLES WILL BE COMPLETED IN THIS TIME FRAME, HOWEVER. NON-ROUTINE SAMPLES MAY REQUIRE ADDITIONAL TIME.

*TO BE COMPLETED BY CLIENT

ORIGINAL CHAIN OF CUSTODY DOCUMENT MUST BE EXECUTED IN INK

WHITE - LABORATORY YELLOW - CLIENT

Login Sample Receipt Checklist

Client: Shalewater Solutions, LLC

Job Number: 180-54234-1

Login Number: 54234
List Number: 1
Creator: Kovitch, Christina M

List Source: TestAmerica Pittsburgh

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
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 <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ATTACHMENT G

Certificates of Conformity

	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY **2012 MODEL YEAR** **CERTIFICATE OF CONFORMITY** **WITH THE CLEAN AIR ACT OF 1990**	**OFFICE OF TRANSPORTATION** **AND AIR QUALITY** **ANN ARBOR, MICHIGAN 48105**

Certificate Issued To: **Deere & Company** (U.S. Manufacturer or Importer) **Certificate Number: CJDXL04.5130-005**	**Effective Date:** **08/05/2011** **Expiration Date:** **12/31/2012**	**Karl J. Simon, Director** **Compliance and Innovative Strategies Division**	**Issue Date:** **08/05/2011** **Revision Date:** **N/A**

Model Year: 2012 **Manufacturer Type:** Original Engine Manufacturer **Engine Family:** CJDXL04.5130	**Mobile/Stationary Indicator:** Both **Emissions Power Category:** 37<=kW<56 **Fuel Type:** Diesel **After Treatment Devices:** No After Treatment Devices Installed **Non-after Treatment Devices:** Engine Design Modification, Non-standard Non-After Treatment Device Installed

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Parts 60 and 1039, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Parts 60 and 1039 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Parts 60 and 1039 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Parts 60 and 1039.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Parts 60 and 1039. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Parts 60 and 1039.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

California Environmental Protection Agency Air Resources Board	JOHN DEERE POWER SYSTEMS	EXECUTIVE ORDER U-R-004-0475 New Off-Road Compression-Ignition Engines

Pursuant to the authority vested in the Air Resources Board by Sections 43013, 43018, 43101, 43102, 43104 and 43105 of the Health and Safety Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-02-003;

IT IS ORDERED AND RESOLVED: That the following compression-ignition engines and emission control systems produced by the manufacturer are certified as described below for use in off-road equipment. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY	DISPLACEMENT (liters)	FUEL TYPE	USEFUL LIFE (hours)
2013	DJDXL02.4074	2.4	Diesel	5000

SPECIAL FEATURES & EMISSION CONTROL SYSTEMS	TYPICAL EQUIPMENT APPLICATION
Direct Diesel Injection, Turbocharger, Smoke Puff Limiter	Loaders, Tractor, Pump, Compressor, Generator Set

The engine models and codes are attached.

The following are the exhaust certification standards (STD), or family emission limit(s) (FEL) as applicable, and certification levels (CERT) for hydrocarbon (HC), oxides of nitrogen (NOx), or non-methane hydrocarbon plus oxides of nitrogen (NMHC+NOx), carbon monoxide (CO), and particulate matter (PM) in grams per kilowatt-hour (g/kw-hr), and the opacity-of-smoke certification standards and certification levels in percent (%) during acceleration (Accel), lugging (Lug), and the peak value from either mode (Peak) for this engine family (Title 13, California Code of Regulations, (13 CCR) Section 2423):

RATED POWER CLASS	EMISSION STANDARD CATEGORY		EXHAUST (g/kw-hr)					OPACITY (%)		
			NMHC	NOx	NMHC+NOx	CO	PM	ACCEL	LUG	PEAK
19 ≤ kW < 37	Tier 4 Final	STD	N/A	N/A	4.7	5.5	0.03	20	15	50
		FEL	--	--	7.5	--	0.30	--	--	--
		CERT	--	--	6.6	2.7	0.30	1	2	2

BE IT FURTHER RESOLVED: That the family emission limit(s) (FEL) is an emission level declared by the manufacturer for use in any averaging, banking and trading program and in lieu of an emission standard for certification. It serves as the applicable emission standard for determining compliance of any engine within this engine family under 13 CCR Sections 2423 and 2427.

BE IT FURTHER RESOLVED: That for the listed engine models, the manufacturer has submitted the information and materials to demonstrate certification compliance with 13 CCR Section 2424 (emission control labels), and 13 CCR Sections 2425 and 2426 (emission control system warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations.

This Executive Order is only granted to the engine family and model-year listed above. Engines in this family that are produced for any other model-year are not covered by this Executive Order.

Executed at El Monte, California on this 28 day of December 2012.

Annette Hebert, Chief
Mobile Source Operations Division

12-17-2012

EO#: U-R-004-0475

Attachment: Page 1 of 1

Engine Model Summary Form

Manufacturer: John Deere Power Systems
Engine category: Nonroad CI
EPA Engine Family: DJDXL02.4074
Mfr Family Name: 250TB
Process Code: New Submission

1. Engine code	2. Engine Model	3. kW@RPM (SAE Gross)	4. Fuel Rate: mm/stroke@peak kW (for diesel only)	5. Fuel Rate: (kg/hr)@peak kW (for diesels only)	6. Torque (Nm) @RPM (SEA Gross)	7. Fuel Rate: mm/stroke@peak torque	8. Fuel Rate: (kW/hr)@peak torque	9. Emission Control Device Per SAE J1930
4024TF281C	4024T	36.0@2800	33.0@2800	9.65@2800	173@1680	40.5@1680	6.94@1680	EM SPL DFI TC
4024TT012	4024T	36.0@2400	34.2@2400	8.37@2400	189@1440	43.2@1440	6.35@1440	EM SPL DFI TC
4024TF281B	4024T	36.0@1500	48.9@1500	8.9[illegible]@1500				EM SPL DFI TC
4024TF270E	4024T	36.0@2400	37.6@2400	9.2@2400	198.5@1440	47.7@1440	7.01@1440	EM SPL DFI TC
4024TF281A	4024T	36.0@2800	33.6@2800	9.65@2800	173@1680	40.5@1680	6.94@1680	EM SPL DFI TC

California Environmental Protection Agency AIR RESOURCES BOARD	ISUZU MOTORS LIMITED	EXECUTIVE ORDER U-R-006-0361 New Off-Road Compression-Ignition Engines

Pursuant to the authority vested in the Air Resources Board by Sections 43013, 43018, 43101, 43102, 43104 and 43105 of the Health and Safety Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-02-003;

IT IS ORDERED AND RESOLVED: That the following compression-ignition engines and emission control systems produced by the manufacturer are certified as described below for use in off-road equipment. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY	DISPLACEMENT (liters)	FUEL TYPE	USEFUL LIFE (hours)
2012	CSZXL02.2VNB	2.2	Diesel	5,000

SPECIAL FEATURES & EMISSION CONTROL SYSTEMS	TYPICAL EQUIPMENT APPLICATION
Mechanical Direct Injection	Generator Set

The engine models and codes are attached.

The following are the exhaust certification standards (STD) and certification levels (CERT) for hydrocarbon (HC), oxides of nitrogen (NOx), or non-methane hydrocarbon plus oxides of nitrogen (NMHC+NOx), carbon monoxide (CO), and particulate matter (PM) in grams per kilowatt-hour (g/kW-hr), and the opacity-of-smoke certification standards and certification levels in percent (%) during acceleration (Accel), lugging (Lug), and the peak value from either mode (Peak) for this engine family (Title 13, California Code of Regulations, (13 CCR) Section 2423):

RATED POWER CLASS	EMISSION STANDARD CATEGORY		EXHAUST (g/kW-hr)					OPACITY (%)		
			HC	NOx	NMHC+NOx	CO	PM	ACCEL	LUG	PEAK
19 ≤ kW < 37	Tier 4 - Interim	STD	N/A	N/A	7.5	5.5	0.30	N/A	N/A	N/A
		CERT	--	--	6.6	2.0	0.25	--	--	--

BE IT FURTHER RESOLVED: That for the listed engine models, the manufacturer has submitted the information and materials to demonstrate certification compliance with 13 CCR Section 2424 (emission control labels), and 13 CCR Sections 2425 and 2426 (emission control system warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations.

This Executive Order is only granted to the engine family and model-year listed above. Engines in this family that are produced for any other model-year are not covered by this Executive Order.

Executed at El Monte, California on this 1 day of September 2011.

Annette Hebert, Chief
Mobile Source Operations Division

CARB EO. U-R-006- 0361
DATE: 8/30/11

ATTACHMENT

Engine Model Summary Template

Engine Family	1.Engine Code	2.Engine Model	3.BHP@RPM (SAE Gross)	4.Fuel Rate: mm/stroke @ peak HP (for diesel only)	5.Fuel Rate: (lbs/hr) @ peak HP (for diesels only)	6.Torque @ RPM (SEA Gross)	7.Fuel Rate: mm/stroke@peak torque	8.Fuel Rate: (lbs/hr)@peak torque	9.Emission Control Device Per SAE J1930
CSZXL02.2VNB	4LE2NCDFA -01	BV-4LE2	34.3@1800	34.1@1800	13.7@1800	-	-	-	EM, DFI
CSZXL02.2VNB	4LE2NCVFA -01	BV-4LE2	34.3@1800	34.1@1800	13.7@1800	-	-	-	EM, DFI

	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY **2013 MODEL YEAR** **CERTIFICATE OF CONFORMITY** **WITH THE CLEAN AIR ACT OF 1990**	**OFFICE OF TRANSPORTATION** **AND AIR QUALITY** **ANN ARBOR, MICHIGAN 48105**

Certificate Issued To: Deere & Company (U.S. Manufacturer or Importer) **Certificate Number: DJDXL02.4074-023**	**Effective Date:** **12/20/2012** **Expiration Date:** **12/31/2013**	**Byron J. Bunker, Division Director** **Compliance Division**	**Issue Date:** **12/20/2012** **Revision Date:** **N/A**

Model Year: 2013 **Manufacturer Type:** Original Engine Manufacturer **Engine Family:** DJDXL02.4074	**Mobile/Stationary Indicator:** Both **Emissions Power Category:** 19<=kW<37 **Fuel Type:** Diesel **After Treatment Devices:** No After Treatment Devices Installed **Non-after Treatment Devices:** Engine Design Modification, Non-standard Non-After Treatment Device Installed, Smoke Puff Limiter **FELs:** NOx+NMHC 7.5 g/kW-hr, PM 0.30 g/kW-hr

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Parts 60 and 1039, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Parts 60 and 1039 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Parts 60 and 1039 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Parts 60 and 1039.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Parts 60 and 1039. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Parts 60 and 1039.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

This certificate of conformity is conditional upon compliance of said manufacturer with the averaging, banking and trading provisions of 40 CFR Part 1039, Subpart H. Failure to comply with these provisions may render this certificate void *ab initio*.

California Environmental Protection Agency AIR RESOURCES BOARD	JOHN DEERE POWER SYSTEMS	EXECUTIVE ORDER U-R-004-0444 New Off-Road Compression-Ignition Engines

Pursuant to the authority vested in the Air Resources Board by Sections 43013, 43018, 43101, 43102, 43104 and 43105 of the Health and Safety Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-02-003;

IT IS ORDERED AND RESOLVED: That the following compression-ignition engines and emission control systems produced by the manufacturer are certified as described below for use in off-road equipment. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY	DISPLACEMENT (liters)	FUEL TYPE	USEFUL LIFE (hours)
2012	CJDXL04.5130	4.5	Diesel	8000

SPECIAL FEATURES & EMISSION CONTROL SYSTEMS	TYPICAL EQUIPMENT APPLICATION
Direct Diesel Injection, Turbocharger	Pump, Compressor, Generator Set, Other Industrial Equipment

The engine models and codes are attached.

The following are the exhaust certification standards (STD), or family emission limit(s) (FEL) as applicable, and certification levels (CERT) for hydrocarbon (HC), oxides of nitrogen (NOx), or non-methane hydrocarbon plus oxides of nitrogen (NMHC+NOx), carbon monoxide (CO), and particulate matter (PM) in grams per kilowatt-hour (g/kw-hr), and the opacity-of-smoke certification standards and certification levels in percent (%) during acceleration (Accel), lugging (Lug), and the peak value from either mode (Peak) for this engine family (Title 13, California Code of Regulations, (13 CCR) Section 2423):

RATED POWER CLASS	EMISSION STANDARD CATEGORY		EXHAUST (g/kw-hr)					OPACITY (%)		
			HC	NOx	NMHC+NOx	CO	PM	ACCEL	LUG	PEAK
37 ≤ kW < 56	Tier 4 Interim	STD	N/A	N/A	4.7	5.0	0.30	20	15	50
		CERT	--	--	4.6	1.2	0.29	2	1	4

BE IT FURTHER RESOLVED: That for the listed engine models, the manufacturer has submitted the information and materials to demonstrate certification compliance with 13 CCR Section 2424 (emission control labels), and 13 CCR Sections 2425 and 2426 (emission control system warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations.

This Executive Order is only granted to the engine family and model-year listed above. Engines in this family that are produced for any other model-year are not covered by this Executive Order.

Executed at El Monte, California on this 20 day of September 2011.

Annette Hebert, Chief
Mobile Source Operations Division

8-11-2011 CUM: U-R-UD4-0777 Attachment: page 1 of 1

Engine Model Summary Form

Manufacturer: John Deere Power Systems
Engine category: Nonroad CI
EPA Engine Family: CJDXL04.6130
Mfr Family Name: 350TAC
Process Code: Correction

1. Engine code	2. Engine Model	3. kW@RPM (SAE Gross)	4. Fuel Rate: mm/stroke@peak kW (for diesel only)	5. Fuel Rate: (kg/hr)@peak kW (for diesels only)	6. Torque (Nm) @RPM (SEA Gross)	7. Fuel Rate: mm/stroke@peak torque	8. Fuel Rate: (kg/hr)@peak torque	9. Emission Control Device Per SAE J1930
4045TF290A	4045T	55.0@2400	59.7@2400	14.61@2400	288@1700	66.4@1700	11.51@1700	EM DFI TC
4045TF290B	4045T	55.0@1800	73@1800	13.4@1800				EM DFI TC
4045TF290C	4045T	55.0@2350	59.2@2350	14.19@2350				EM DFI TC
4045TF290D	4045T	55.0@2100	63@2100	13.49@2100				EM DFI TC
4045TF290E	4045T	48.0@1760	64.1@1760	11.51@1760				EM DFI TC
4045TF290F	4045T	36.0@2350	39.8@2350	9.54@2350				EM DFI TC
4045TF290G	4045T	36.0@2100	41.3@2100	8.85@2100				EM DFI TC
4045TF290H	4045T	36.0@1760	48.1@1760	8.63@1760				EM DFI TC