

Air Sampling and Analysis Plan

Version: 2.0

Effective Date: 8/29/14

Incident:	Petroleum pipeline release/Double Oak Mountain
Location:	Pelham, Alabama
Client:	Plantation Pipeline Company
Version History:	Version 1.0, 8/24/14; Version 1.1, 8/24/14; Version 2.0, 8/29/14

CTEH Project-Specific Action Levels

This release may potentially include the following petroleum mixtures: unleaded gasoline, reformulated gasoline with up to 10% ethanol and diesel fuel no. 2. The following petroleum mixtures/chemicals were determined to have the greatest potential for human health impacts based on the relative levels in air of volatile organics emitted from gasoline and diesel fuel no. 2, together with published information regarding health-based worker exposure guidelines.

Plan/Assignment: **STAGING AREA**

Objective: Report air levels before they reach those requiring respiratory protection; assess need for engineering control and respirator use

Analyte	Action Level	Basis	Action to be Taken
VOC/Gasoline	50 ppm ⁽¹⁾ to 150 ppm	One-half the TLV-TWA (Exxon) to one-half the ACGIH TLV for gasoline (rationale: VOCs are an indicator of possible benzene exposure between 0.5 and 2.5 ppm)	At sustained levels of VOCs between 50 ppm and 150 ppm for up to 15 minutes, safely egress work area and immediately inform Incident Command; perform benzene readings; use engineering and administrative controls, respirators, or other means to decrease worker exposures to VOCs and benzene according to actions taken for benzene readings below.
	≥ 150 ppm ⁽²⁾	One-half the ACGIH TLV-TWA for gasoline (rationale: VOCs are an indicator of possible benzene exposure at or above 2.5 ppm)	Immediately but safely leave work area and inform Incident Command of readings; perform benzene readings; once VOCs are less than 50 ppm and benzene readings less than 0.5 ppm or workers don air purifying respirators, work may continue in the area. Persons wearing air purifying respirators should egress the work area at benzene readings of ≥ 25 ppm
VOC/Diesel fuel no. 2	11 ppm ⁽³⁾	TLV-TWA (ACGIH) - Reading sustained for 15 minutes	Immediately report readings to project manager who will inform Incident Command evaluate work practices and need for engineering control/respirator use
Benzene	0.5 – 2.5 ppm	OSHA PEL Action level – Readings sustained for 15 minutes (STEL is 2.5 ppm)	Don Air Purifying Respirator or Evacuate Area, immediately report readings to project manager who will inform Incident Command

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(1)The MultiRAE and AreaRAE reading 50 ppm action level for gasoline will read 50 ppm VOC (50 ppm/correction factor of 1) on these instruments; the first alarm on a MultiRAE will sound at 50 ppm

(2)The MultiRAE and AreaRAE reading 150 ppm action level for gasoline will read 150 ppm VOC (150 ppm/correction factor of 1) on these instruments; the second, more urgent audible alarm on a MultiRAE will sound at 50 ppm

(3)The UltraRAE and ppbRAE respond slowly to diesel fuel; the 11 ppm action level for diesel fuel no. 2 will read 16 ppm VOC (11 ppm/correction factor of 0.7) on these instruments

Plan/Assignment: **CLEANUP/EXCAVATION ZONES**

Objective: Report air levels before they reach levels requiring upgraded respiratory protection

Analyte	Action Level	Basis	Action to be Taken
VOC/Gasoline	50 ppm ⁽¹⁾ to 150 ppm	One-half the TLV-TWA (Exxon) to one-half the ACGIH TLV for gasoline (rationale: VOCs as an indicator of possible benzene exposure between 0.5 and 2.5 ppm)	At sustained levels of VOCs between 50 ppm and 150 ppm for up to 15 minutes, safely egress work area and immediately inform Incident Command; perform benzene readings; use engineering and administrative controls, respirators, or other means to decrease worker exposures to VOCs and benzene according to actions taken for benzene readings below.
	≥ 150 ppm ⁽²⁾	One-half the ACGIH TLV-TWA for gasoline (rationale: VOCs as an indicator of possible benzene exposure at or above 2.5 ppm)	Immediately but safely leave work area and inform Incident Command of readings; perform benzene readings; once VOCs are less than 50 ppm and benzene readings less than 0.5 ppm or workers don air purifying respirators, work may continue in the area. Persons wearing air purifying respirators should egress the work area at benzene readings of ≥ 25 ppm
VOC/Diesel fuel no. 2	11 ppm ⁽³⁾	TLV-TWA (ACGIH) - Reading sustained for 15 minutes	Immediately report readings to project manager who will inform Incident Command evaluate work practices and need for engineering control/respirator use
Benzene	0.5 – 2.5 ppm	OSHA PEL Action level – Readings sustained for 15 minutes (STEL is 2.5 ppm)	Don Air Purifying Respirator or Evacuate Area, immediately report readings to project manager who will inform Incident Command

(1)The MultiRAE and AreaRAE reading 50 ppm action level for gasoline will read 50 ppm VOC (50 ppm/correction factor of 1) on these instruments; the first alarm on a MultiRAE will sound at 50 ppm

(2)The MultiRAE and AreaRAE reading 150 ppm action level for gasoline will read 150 ppm VOC (150 ppm/correction factor of 1) on these instruments; the second, more urgent audible alarm on a MultiRAE will sound at 50 ppm

(3)The UltraRAE and ppbRAE respond slowly to diesel fuel; the 11 ppm action level for diesel fuel no. 2 will read 16 ppm VOC (11 ppm/correction factor of 0.7) on these instruments

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Plan/Assignment: **COMMUNITY**

Objective: Report levels that minimize nuisance odor levels in the community

Analyte	Action Level	Basis	Action to be Taken
VOC/Gasoline	1 ppm	Upper bound of typical background reading; reading sustained for 15 minutes	Immediately report readings to project manager who will inform Incident Command
VOC/Diesel fuel no. 2	1 ppm	Upper bound of typical background reading; reading sustained for 15 minutes	Immediately report readings to project manager who will inform Incident Command
Benzene	Detection	Instrument detection limit.	Immediately report readings to project manager who will inform Incident Command

Plan: **All – FLAMMABILITY**

Objective: Report areas where flammability is most likely

Analyte	Instrument Reading	Corrected Value	Correction Factor	Basis	Action to be Taken
LEL	4.7 %	10 %	2.1 for gasoline LEL	10% LEL	Egress and Notify Site Management
VOCs	1,444 ppm	1,300 ppm	0.9 for gasoline PID	10% LEL as VOC	Egress and Notify Site Management

Methods/Resource Types

Chemical	Instrument	Detection Limit	Media/Tube#/Lamp	Notes	Correction Factor
VOC/ Gasoline	MultiRAE	0.1 ppm	PID 10.6 eV lamp		1
	AreaRAE	0.1 ppm	PID 10.6 eV lamp		1
	Colorimetric	5 ppm	Gastec 101L	Range: 30 to 1,000 Volume: 200 ml	1
VOC/Diesel fuel no. 2	UltraRAE	0.05 ppm	PID 10.6 eV lamp	MultiRAE and AreaRAE do not respond to diesel fuel; if diesel fuel odor is noticed or hydrocarbon odors are apparent but there is no response by the AreaRAE or MultiRAE, use the UltraRAE or ppbRAE. Detection of VOC readings using these instruments may be evidence of diesel fuel; apply the action level for diesel fuel (11 ppm divided by 0.7 = 16 ppm VOC reading on these instruments) in the instance where diesel fuel no. 2 is the suspected hydrocarbon mixture present.	0.7
	ppbRAE	0.001 ppm (1 ppb)	PID 10.6 eV lamp		
Benzene	UltraRAE	0.05 ppm	PID 9.8 eV lamp	Change SEP tube frequently (Benz. Cal Gas)	NA
	MultiRAE	0.1 ppm	PID 10.6 eV lamp		0.53
	AreaRAE	0.1 ppm	PID 10.6 eV lamp		0.53
	Colorimetric	0.05 ppm	Gastec tube #121L	Measuring range: 0.1 to 10 Volume: 500 ml	1



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Analytical Methods				
Analyte	Media/Can	Method	Detection Limit	Target compounds
Benzene, Ethylbenzene, Toluene, Xylenes, Hexane, plus semi-quantitative analysis of Naphthalene	3M 3520 Badge	Modified NIOSH 1500/1501	Compare to appropriate health based exposure limit	Benzene, Toluene, Ethylbenzene, Xylene, Hexane plus semi-quantitative analysis of Naphthalene

General Information on Procedures (Assessment Techniques) Used

Procedure	Description
AreaRAE Network	An AreaRAE network may be established with AreaRAEs equipped with photoionization detectors and LEL sensors will be positioned at established locations around the work zone. The AreaRAEs will be telemetering instantaneous data at 15-second intervals to a computer console. The data will be visible in real-time at the computer console and will be monitored 24 hours per day by CTEH personnel.
Hand-held Survey	CTEH staff members will utilize handheld instruments (e.g. MultiRAE Plus; ppbRAE, UltraRAE, Gastec colorimetric detector tubes, etc.) to measure airborne chemical concentrations. CTEH will use these hand-held instruments primarily to measure the breathing zone. Additionally, measurements can be made at grade level, as well as in elevated workspaces, as indicated by chemical properties or site conditions. CTEH will also use these techniques to verify detections observed by the AreaRAE network.
Analytical sampling	Analytical sampling can be used to validate the fixed station and hand-held data monitoring data, or to provide data beyond the scope of the real-time instruments. Personal analytical air samples (3M 3520 organic vapor badges) will be placed in the breathing space of representative workers to monitor personal exposures to selected petroleum mixture constituents and sent to an off-site laboratory for chemical analysis.



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Sampling Areas

Sampling Area	Description
Staging Area	The general area around the incident location where workers are actively or sporadically participating in remediation activities.
Cleanup/ Excavation Zone	The spill area where the pipeline is being uncovered by excavation or where product removal/soil excavation activities are being conducted. Possibly requiring a level of personal protection above that required in the staging area.
Other	During the course of the remediation, some additional areas may be established which require a unique set of action levels or sampling (e.g. decontamination zones, commercial zones, etc.)

Quality Assurance/Quality Control Procedures

Method	Procedure
Real-time	- Real time instruments will be calibrated in excess of the manufacturer's recommendations. - At a minimum whenever indicated by site conditions or instrument readings. - Co-located sampling for analytical analysis will be conducted, if necessary, to assess accuracy and precision in the field. - Lot numbers and expiration dates will be recorded with use of Gastec colorimetric tubes.
Analytical	- Chain of custody documents will be completed for each sample. - Level IV data validation may be performed on the first sample group analyzed. - Level II data validation may be performed on 20% of all samples. - Level IV data validation may be performed on 10% of all samples.
Other	

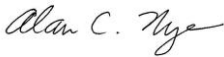
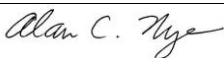
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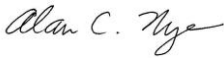
Change from version 1.0 to 1.1

- In the section titled:
 - “Incident” identified as “Petroleum pipeline release/Double Oak Mountain”
 - “Client”-changed name to correctly reference “Plantation Pipeline Company”
 - “Plan/Assignment: STAGING AREA” under “Action to be Taken”- noted that readings above action level should be immediately reported to the project manager who will then inform Incident Command
 - “Plan/Assignment: CLEANUP/EXCAVATION ZONES” under “Action to be Taken”- noted that readings above action level should be immediately reported to the project manager who will then inform Incident Command
 - Added “Plan/Assignment: COMMUNITY” air monitoring and air sampling section
 - Added “Analytical Methods” section Revised “Analytical sampling” section under “General Information on Procedures (Assessment Techniques) Used” to include community air sampling and the possible use of mini-cans and 3M 3520 organic vapor badges as sampling media for community air samples

"	Name/Position	Signature	Date Signed
1.0 Prepared By:	Alan Nye, Ph.D. Principal toxicologist		8/24/14
1.1 Version Revised By:	Alan Nye, Ph.D. toxicologist		8/24/14

Change from version 1.1 to 2.0

- In the section titled:
 - “Plan/Assignment: STAGING AREA” for “VOC/Gasoline” under “Action Levels”, “Basis” and “Action to be Taken”- changed action levels for VOCs based on consultation with Eric Hamm, Safety Officer
 - “Plan/Assignment: CLEANUP/EXCAVATION ZONES” for “VOC/Gasoline” under “Action Levels”, “Basis” and “Action to be Taken”- changed action levels for VOCs based on consultation with Eric Hamm, Safety Officer
 - Modified “Analytical Methods” section Revised “Analytical sampling” section under Analyte “VOCs” – mini-cans were not used to sample VOCs in the community and community sampling is no longer necessary; this sampling method removed from SAP; “Community” air monitoring guidance is retained to address possible public concerns as they arise
 - Modified “Analytical Methods” section Revised “Analytical sampling” section under “General Information on Procedures (Assessment Techniques) Used” to remove discussion of community air sampling; community air sampling no longer required because occupied structures uphill and well away from remediation areas
 - Modified “Analytical Methods” section Revised “Sampling Areas” – “Community” analytical sampling removed to reflect no further need for community monitoring based on remoteness of the public from remediation locations.

"	Name/Position	Signature	Date Signed
2.0 Version Revised By:	Alan Nye, Ph.D. toxicologist		8/29/14