CTEH

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Port Neches TPC Plant Fire

Port Neches, TX

Preliminary Air Sampling and Analysis Plan

(SAP)

Version 1.0

Prepared on behalf of:

TPC Group

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Air Monitoring and Sampling Strategy

CTEH® is focusing on the mixtures, chemicals, and indicators of flammability chosen below because they are among the most important and readily monitored hazards of light end hydrocarbons mixtures (including raffinate, 1,3-butadiene, butene) and associated combustion products. Monitoring and sampling for some chemicals or associated indicators may be conducted less frequently or even discontinued as initial air monitoring and sampling results indicate that these chemicals and indicators do not pose a health concern.

The strategy is to utilize three broadly-defined monitoring plans: 1) Worker Monitoring; 2) Community Assessment; and 3) Site Assessment. Worker Monitoring will generally take place in the presence of workers performing/supporting mitigation and remediation operations. The readings will generally be taken at a height consistent with that of the sampler's breathing zone and in close proximity to workers without interfering or obstructing their work tasks. Community Assessment may take place in those residential and commercial locations immediately surrounding the incident site, not necessarily currently occupied by members of the community. Unlike Worker Monitoring and Community Assessment, Site Assessment does not necessarily represent ambient air monitoring near breathing zone level. Site Assessment may involve a variety of different monitoring tasks intended to provide information that may help to delineate the nature and extent of the release (e.g. fence line monitoring, worst case determination, container head space, ground level, etc.).
Free-roaming handheld real-time air monitoring may be conducted in a variety of areas based on levels of activity, proximity to the release/source area, and site conditions.

Discrete air samples may be collected in all monitoring areas and sent to an off-site laboratory for chemical analysis. These analytical air sampling techniques may be used to provide air quality data beyond the scope of real-time instruments. When necessary, discrete air samples may be collected on individual workers (personal sampling) to provide exposure data over the course of a work shift for more direct comparison to occupational exposure values.

CTEH® Site-Specific Action Levels

CTEH site-specific action levels may be employed in all air monitoring plans to provide information for corrective action to limit potential exposures. These values do not replace occupational or community exposure standards or guidelines, but are intended to represent a concentration limit that triggers a course of action to better address worker and public safety. Action level exceedances will be communicated to Site Management and the CTEH Project Technical Director by the CTEH Project Manager (PM). Work practices may be assessed and then altered if necessary. Site-Specific action levels are not utilized for Site Characterization monitoring.

Plan 1: Worker Monitoring
Analytes and Parameters

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

Analyte	Action Level*	Action to be Taken	Basis	Instrument	Detection Limit	Notes	Correction Factor
Total VOCs** (as 1,3-butadiene)	0.5 ppm 5 min	Confirm reading with secondary instrument specific to 1,3-butadiene/benzene.	OSHA PEL Action Level of 0.5 ppm	MultiRAE PID	0.1 ppm	Measuring Range: 0 – 5,000 ppm	0.6 (10.6 eV Lamp)
1,3-butadiene	0.5 ppm 5 min	Exit Area or don air purifying respirator; report reading to PM. PM will report readings to site management and additional site controls may be implemented.	OSHA PEL Action Level of 0.5 ppm	Drager X-pid 9000/9500	0.07 ppm	LOQ Range: 0.2-25 ppm	NA
				UltraRAE PID	0.1 ppm	UltraRAE - Change SEP tube frequently	NA
				Gastec #174LL	0.1 ppm	Range: 0.5-5 ppm (vol. variable)	See insert.
1,3-butadiene	5 ppm 5 min	Exit Area or don air purifying respirator; report reading to PM. PM will report readings to site management and additional site controls may be implemented	OSHA -STEL (5 ppm)	Instruments as above	--	--	--
Butane	500 ppm 5 min	Monitor for oxygen deficiency and verify sustained level	½ ACGIH TLV STEL for aliphatic hydrocarbons $C_1 – C_4$	MultiRAE PID	0.1 ppm	Measuring Range: 0 – 5,000 ppm	67 (10.6 eV Lamp)
				Gastec tube #104	5 ppm	Measuring Range: 25 - 1,400 ppm Volume: Var.	See Tube Insert
Benzene	0.5 ppm 5 min	Exit Area or don air purifying respirator; report readings to PM	OSHA PEL Action level/ACGIH TLV-TWA	Drager X-pid	0.02 ppm	Measuring Range: 0.02-25 ppm	NA
				UltraRAE PID	0.025 ppm	UltraRAE-Change SEP tube frequently	NA
				Gastec tube #121L	0.05	Range: 0.1-65 ppm Volume: Variable	See insert.
Benzene	5 ppm Sustained	Exit Area or don air purifying respirator; move upwind; report readings to PM	OSHA STEL	Drager X-pid	0.02 ppm	Measuring Range: 0.02-25 ppm	NA
				UltraRAE PID	0.025 ppm	UltraRAE-Change SEP tube frequently	NA
				Gastec tube #121L	0.05	Range: 0.1-65 ppm Volume: Variable	See insert.

** Note that additional analytes are detectible on the MultiRAE PID with the following correction factors: benzene (0.47), butadiene (0.6); 1-butene (0.9); butane (67); isobutane (2.1); isobutylene (1.0); 4-vinylcyclohexane (0.56); dicyclopentadiene (0.47); tert-butyl methyl ether ((0.9); isopentane (8.2); ethylbenzene (0.47); xylene (0.42).

Combustion By-Products: Analytes and Parameters*

Analyte	Action Level	Action to be Taken	Basis	Instrument	Detection Limit	Notes	Correction Factor
Particulate Matter ($PM_{2.5}$ or PM_{10})**	351 µg/m^3 5 min	Report reading to PM	Wildfire Smoke Guidelines for 1 hr avg. upper-bound breakpoint for unhealthy AQI	SidePak AM510	0.001 mg/m^3	PM2.5 impactor – 50% cut-off at 2.5 micron PM10 impactor – 50% cut-off at 10 micron	NA
$PM_{2.5}$ or PM_{10}	200 µg/m^3 8 hrs	Report reading to PM	See above - 8 hr guideline	SidePak AM510	0.001 mg/m^3	See above	NA
Carbon monoxide (CO)	25 ppm 5 min	Report reading to PM	ACGIH® TLV – Reading sustained for 5 minutes	MultiRAE Sensor	1 ppm	Range: 0 – 500 ppm	NA
				Gastec tube #1LC	0.5 ppm	Range: 1 – 30 ppm Volume: 100 mL	1
Carbon Dioxide (CO_2)	5,000 ppm 5 min	Report reading to PM	ACGIH® TLV – Reading sustained for 5 minutes	MultiRAE Sensor	100 ppm	Range: 0 – 50,000 ppm	NA
				Gastec tube #2LC	20 ppm	Range: 100 – 2,000 ppm Volume: Var.	See insert
				Gastec tube #2LL	30 ppm	Range: 300 – 5,000 ppm Volume: Var.	See insert
Nitrogen dioxide (NO_2)	0.2 ppm 5 min	Report reading to PM	ACGIH TLV – Reading sustained for 5 minutes	MultiRAE PID	1 ppm	Range: 1 – 5,000 ppm	16
				MultiRAE Sensor	0.1 ppm	Range: 0 – 20 ppm	NA
				Gastec tube #9L	0.1 ppm	Range: 0.5 – 125 ppm Volume: Var.	Var.

*Monitoring for combustion products will be conducted if a fire is reported during CTEH air monitoring. **$PM_{2.5}$ is especially prone to interference from high humidity, in cases of high humidity, PM_{10} impactors may be used which are not as sensitive to humidity. In general, correction factors may be used to adjust PM readings for humidity. Monitoring for combustion products may be discontinued when the fire is extinguished.

Flammability*								
Analyte	**Action Level**	**Corrected Value**	**Action to be Taken**	**Basis**	**Instrument**	**Detection Limit**	**Notes**	**Correction Factor**
%LEL	1 % 1 min	1.8 % ~2.0%	Notify PM, Facilitate communication with site contact.	Detectible LEL	MultiRAE Sensor AreaRAE Sensor	1 %	Measuring range: 1 – 100%	1.8
%LEL	5 % 1 min	10 %	Exit area and Notify PM	10% of LEL	MultiRAE Sensor AreaRAE Sensor	1 %	Measuring range: 1 – 100%	1.8

* LEL Action Levels based on LEL Sensor Correction Factor for 1-3 Butadiene (1.8) rounded to 2 as conservative estimate.

Plan 2: Community Monitoring

Analytes and Parameters

Objective: Report air levels before they reach those causing nuisance or health issues

Analyte	Action Level*	Action to be Taken	Basis	Instrument	Detection Limit	Notes	Correction Factor
Total VOCs**	0.5 ppm 5 min	Report reading to PM; Collect a 1,3-butadiene specific reading with secondary instrument.	Preliminary UC Action Level	MultiRAE PID	0.1 ppm	Measuring Range: 0 – 5,000 ppm	0.6 (10.6 eV Lamp)
Total VOCs	5.0 ppm Sustained	Report reading to PM; Collect a 1,3-butadiene specific reading; notify TCEQ/IC	UC Action Level	MultiRAE PID	0.1 ppm	Measuring Range: 0 – 5,000 ppm	0.6 (10.6 eV Lamp)
1,3-butadiene	Any Detect	Report reading to PM; verify with secondary instrument.	Inform PM/PTD of potential off-site issues	Drager X-pid 9000/9500	0.07 ppm	LOQ Range: 0.2-25 ppm	NA
				UltraRAE PID	0.1 ppm	UltraRAE - Change SEP tube frequently	NA
1,3-butadiene	0.5 ppm 5 min	Report reading to PM/PTD; report reading to Incident/unified Command.	Inform PM/PTD/UC of potential off-site issues	Gastec #174LL	0.1 ppm	Range: 0.5-5 ppm (vol. variable)	See insert.
Benzene	0.5 ppm 5 min	Report reading to PM/PTD; report reading to Incident/Unified Command	Inform PM/PTD/UC of potential off-site issues	Drager X-pid	0.02 ppm	Measuring Range: 0.02-25 ppm	NA
				UltraRAE PID	0.025 ppm	UltraRAE-Change SEP tube frequently	NA
				Gastec tube #121L	0.05	Range: 0.1-65 ppm Volume: Variable	See insert.

Analyte	Action Level*	Action to be Taken	Basis	Instrument	Detection Limit	Notes	Correction Factor
Butane	Any Detect	Sample as requested; Report reading to PM	Inform PM/PTD of potential off-site issues	MultiRAE PID	0.1 ppm	Measuring Range: 0 – 5,000 ppm	67 (10.6 eV Lamp)
				Gastec tube #104	5 ppm	Measuring Range: 25 - 1,400 ppm Volume: Var.	See Tube Insert

** Note that additional analytes are detectible on the MultiRAE PID with the following correction factors: benzene (0.47), butadiene (0.6); 1-butene (0.9); butane (67); isobutane (2.1); isobutylene (1.0); 4-vinylcyclohexane (0.56); dicyclopentadiene (0.47); tert-butyl methyl ether ((0.9); isopentane (8.2); ethylbenzene (0.47); xylene (0.42).

Combustion By-Products: Analytes and Parameters*

Analyte	Action Level	Action to be Taken	Basis	Instrument	Detection Limit	Notes	Correction Factor
Particulate Matter ($PM_{2.5}$ or PM_{10})**	138 µg/m^3 5 min	Report reading to PM	Wildfire Smoke Guidelines for 1 hr. avg. upper-bound breakpoint for unhealthy for sensitive groups AQI	SidePak AM510	0.001 mg/m^3	PM2.5 impactor – 50% cut-off at 2.5 micron PM10 impactor – 50% cut-off at 10 micron	NA
$PM_{2.5}$ or PM_{10}	79 µg/m^3 8 hrs	Report reading to PM	See above - 8 hr guideline	SidePak AM510	0.001 mg/m^3	See above	NA
Carbon monoxide	25 ppm 5 min	Report reading to PM	Inform PM/PTD of potential off-site issues	MultiRAE Sensor	1 ppm	Range: 0 – 500 ppm	NA
				Gastec tube #1LC	0.5 ppm	Range: 1 – 30 ppm Volume: 100 mL	1
Carbon Dioxide	5,000 ppm 5 min	Report reading to PM	Inform PM/PTD of potential off-site issues. 1/6 of PAC-1 value of 30,000 ppm.	MultiRAE Sensor	100 ppm	Range: 0 – 50,000 ppm	NA
				Gastec tube #2LC	20 ppm	Range: 100 – 2,000 ppm Volume: Var.	See insert
				Gastec tube #2LL	30 ppm	Range: 300 – 5,000 ppm Volume: Var.	See insert
Nitrogen dioxide	0.2 ppm 5 min	Report reading to PM	Inform PM/PTD of potential off-site issues. >1/2 of AEGL-1 Value of 0.5 ppm.	MultiRAE PID	1 ppm	Range: 1 – 5,000 ppm	16
				MultiRAE Sensor	0.1 ppm	Range: 0 – 20 ppm	NA
				Gastec tube #9L	0.1 ppm	Range: 0.5 – 125 ppm Volume: Var.	Var.

*Monitoring for combustion products will be conducted if a fire is reported during CTEH air monitoring. **$PM_{2.5}$ is especially prone to interference from high humidity, in cases of high humidity, PM_{10} impactors may be used which are not as sensitive to humidity. In general, correction factors may be used to adjust PM readings for humidity. Monitoring for combustion products may be discontinued when the fire is extinguished.

Flammability*								
Analyte	**Action Level**	**Corrected Value**	**Action to be Taken**	**Basis**	**Instrument**	**Detection Limit**	**Notes**	**Correction Factor**
%LEL	1 % 1 min	1.8 % ~2.0%	Notify PM, Facilitate communication with site contact.	Detectible LEL	MultiRAE Sensor AreaRAE Sensor	1 %	Measuring range: 1 – 100%	1.8
%LEL	5 % 1 min	10 %	Exit area and Notify PM	10% of LEL	MultiRAE Sensor AreaRAE Sensor	1 %	Measuring range: 1 – 100%	1.8

* LEL Action Levels based on LEL Sensor Correction Factor for 1-3 Butadiene (1.8) rounded to 2 as conservative estimate.

Plan 3: Site Assessment

Objective: Characterize nature and extent of release.

Analyte	Action Level*	Action to be Taken	Basis	Instrument	Detection Limit	Notes	Correction Factor
Total VOCs (as 1,3-butadiene)	NA	Report reading to PM	NA	MultiRAE PID	0.1 ppm	Measuring Range: 0 – 5,000 ppm	0.6 (10.6 eV Lamp)
1,3-butadiene	NA	Report reading to PM	NA	Drager X-pid 9000/9500	0.02 ppm	Range: 0.02-25 ppm	NA
				UltraRAE PID	0.1 ppm	UltraRAE - Change SEP tube frequently	NA
				Gastec #174LL	0.1 ppm	Range: 0.5-5 ppm (vol. variable)	See insert.
Butane	NA	Report reading to PM	NA	MultiRAE PID	0.1 ppm	Measuring Range: 0 – 5,000 ppm	67 (10.6 eV Lamp)
				Gastec tube #104	5 ppm	Measuring Range: 25 - 1,400 ppm Volume: Var.	See Tube Insert
Benzene	NA	Report reading to PM	NA	Drager X-pid	0.02 ppm	Measuring Range: 0.02-25 ppm	NA
				UltraRAE PID	0.025 ppm	UltraRAE-Change SEP tube frequently	NA
				Gastec tube #121L	0.05	Range: 0.1-65 ppm Volume: Variable	See insert.
LEL	5%	Exit area and notify PM	10% LEL	MultiRAE Sensor	1%	Measuring Range: 1-100%	Correction factor of 2.0

Potential Analytical Methods			
Analyte	**Media/Can**	**Method**	**Notes**
VOCs (butane/butadiene)	MiniCans	EPA TO-15	
1,3-Butadiene	3M 3520 Badge or Assay 566	Modified NIOSH 1500/1501	
Benzene	3M 3520 Badge or Assay 566	Modified NIOSH 1500/1501	
Asbestos*	PCM/TEM-Asbestos 25 mm cellulose cassette	NIOSH method 7400	

*In the event of potential disruption of asbestos containing materials due to the explosion; analytical sampling may be conducted for airborne asbestos.
NIOSH method 7400.(134) In this method, fibers are collected on a 25 mm cellulose ester filter using a personal sampling pump attached to a filter cassette with a conductive cowl. The method recommends sampling air at a flow rate of 0.5 L / min or greater. The sampling time and flow rate can be adjusted to achieve a target sampled fiber density of 100 to 1300 fibers/mm2 of filter surface area. Following air sampling, the filters are removed and treated with ether acetone or glycerol triacetate in order to make the filter transparent. Fibers are then quantified using phase contrast microscopy (PCM).

General Information on Procedures (Assessment Techniques) Used

Procedure	Description
Real-Time Handheld Survey	CTEH staff members may utilize handheld instruments (e.g. MultiRAE Plus; Drager PID, Gastec colorimetric detector tubes, etc.) to measure airborne chemical concentrations. CTEH will use these handheld instruments primarily to monitor the ambient air quality at breathing zone level. Additionally, measurements may be made at grade level, as well as in elevated workspaces, as indicated by chemical properties or site conditions.
Analytical sampling	Analytical sampling may be used to validate the fixed and handheld real-time monitoring data, or to provide data beyond the scope of the real-time instruments. Analytical samples may be collected as whole air samples in evacuated canisters or on specific collection media, and sent to an off-site laboratory for further chemical analysis.
Particulate Monitoring Network	A network of data-logging particulate monitors may be set up and positioned around the Community.

Quality Assurance/Quality Control Procedures

Method	Procedure
Real-Time	• Real-time instruments may 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 may be conducted, if necessary, to assess accuracy and precision in the field.

Method	Procedure
	• Lot numbers and expiration dates may be recorded with use of Gastec colorimetric tubes.
Analytical	• Chain of custody documents may 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.
Reporting	• Daily data summaries may be provided for informational purposes using data that have not undergone complete QA/QC. • Comprehensive reports of real-time and/or analytical data may be generated following QA/QC and may be delivered 60 days following receipt of validated results, if applicable.

Glossary

Term	Definition
Sustained	Instrument reading above the action level continuously for the listed time period.
Excursion Limit	Whenever a reading exceeds an ACGIH® TLV by 5 times (if the chemical does not have a STEL- or Ceiling-based action level), exit the area and notify the PM
Breathing zone	The area within an approximate 10-inch radius of an individual's nose and mouth.
Ambient Air	That portion of the atmosphere (indoor or outdoor) to which workers and the general public have access.

Change from version 1.0 to 1.1

- *In the section titled:*

	Name/Organization	Signature	Date Signed
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Change from version 1.1 to 1.2			
• *In the section titled:*			
	Name/Organization	Signature	Date Signed
Prepared by:			
Review by:			
Approved by:			
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