



CENTER FOR TOXICOLOGY
AND ENVIRONMENTAL HEALTH, LLC

Worker Exposure Assessment Plan

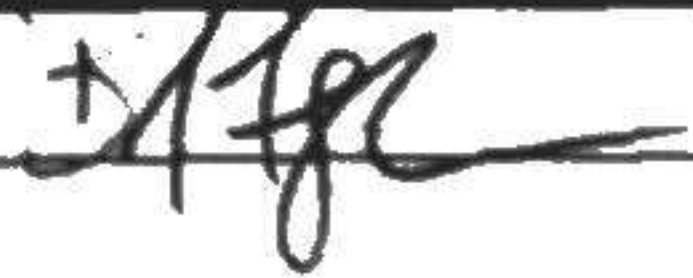
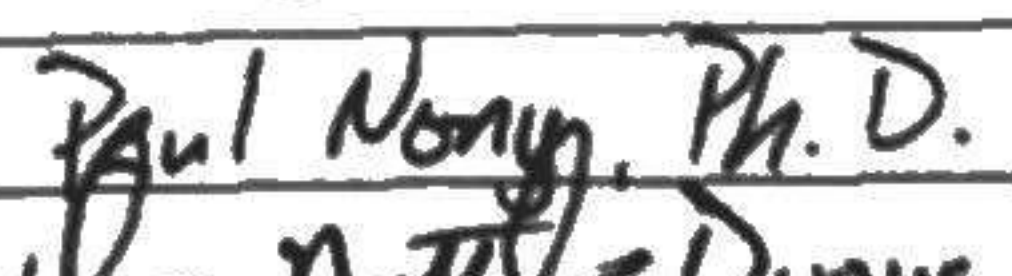
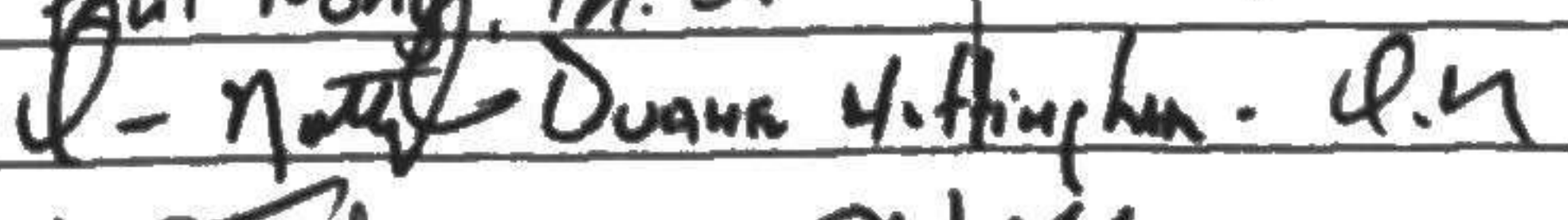
Version: 1.0 Effective Date: 9/18/2014

Incident:	Stevens Facility Release – Crude Oil
Location:	Pachuta, MS
Client:	Plains All American
Version History:	1.0

Addendum to the Sampling and Analysis Plan

This Worker Exposure Assessment Plan is an addendum pursuant to the CTEH® Air Sampling and Monitoring Work plan, titled: "CTEH Air Monitoring and Sampling Plan - PAA - Stevens Facility Release v1.1".

The objective of this Worker Exposure Assessment Plan is to provide guidance for the collection of worker exposure samples for response and remediation workers. The samples are collected from the breathing zone to represent the full-shift exposure over the duration of the work activity.

	Name/Position	Signature	Date Signed
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1 Basic Characterization of Operations

This section is a basic characterization of the response work operations and remediation activities intending to describe: work tasks, work environments, potential chemical hazards, and similar exposure groups (SEGs). The work operations data was collected from site observations, work area surveys, and operational briefings at incident command.

CTEH® field staff are providing real-time air monitoring and analytical air sampling designed to reduce worker exposure to potential inhalation hazards associated with airborne constituents of crude oil during the response and remediation activities. In addition to real-time air monitoring, CTEH® field staff will focus exposure sampling on workers performing the following general tasks:

1. Machine Cleanup Technicians
2. Manual Cleanup Technicians
3. Environmental Technicians

To measure the field staff's exposure to the target analytes, personal breathing zone samples will be deployed on a representative number of staff and will be collected during the worst 8-hour portion of his/her full shift. If workers are engaged in extended shifts, consecutive sampling may be used where appropriate to measure the full-shift exposure beyond 8 hours.

Each shift, CTEH® will evaluate the number of workers and their assigned tasks to determine how many from each similar exposure group should be sampled. Generally, CTEH® will target 10% of the moderate and maximum risk exposure groups. This may not be possible due to missing site information with regard to total worker numbers. In this case, CTEH® will identify a representative number of workers from the Maximum Risk Worker category for sample collection. Listed below in **Table 2** are SEGs that have been identified for exposure sampling:



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Table 2 – Similar Exposure Groups

SEG	Description
Environmental Field Specialists	<i>Workers collecting environmental and occupational air, soil, and/or water samples at remediation sites. Continuous presence at remediation work sites, with infrequent short-duration handling of potentially contaminated material.</i>
	Tasks: <ul style="list-style-type: none">• Environmental Sampling-Air• Environmental Sampling-Water
Machine Cleanup Technicians	<i>Workers responsible for handling crude oil, impacted soil or other materials using heavy machinery with frequent, moderate-to-long duration work among or near potentially contaminated material.</i>
	Tasks: <ul style="list-style-type: none">• Impact soil excavation• Dike or containment construction• Infrastructure Construction near Remediation Sites
Manual Cleanup Technicians	<i>Workers responsible for handling crude oil, impacted soil, and soiled cleanup materials using manual methods with frequent, moderate-to-long duration work among or near potentially contaminated material.</i>
	Tasks: <ul style="list-style-type: none">• Boom/Sorbent Deployment• Vac Operations• Boom/Sorbent Decontamination• Handling/Disposal of Soiled Sorbent Materials• Decontamination/Removal of Impacted Earthen Materials

2 Identification of Potential Occupational Exposures

Crude oil has been released as a result of the overfill of a tanker truck. The workers exposure assessment plan provides guidance for the chemical constituents of crude, which may include, but is not limited to the analytes listed in Table 3 with their corresponding occupational exposure limits.

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Table 3 – Occupational Exposure Standards and Guidelines

	PEL-TWA ^a	PEL-STEL ^b (ppm)	PEL-Ceiling ^c (ppm)	TLV-TWA ^d (ppm)	TLV-STEL ^e (ppm)
Benzene	1 ppm	5 ppm	NE	0.5 ppm	2.5 ppm
Toluene	200 ppm	NE	300 ppm; 500 ppm*	20 ppm	NE
Ethyl Benzene	100 ppm	NE	NE	20 ppm	125 ppm
Xylene	100 ppm	NE	NE	100 ppm	150 ppm
n-Hexane	500 ppm	--	--	50 ppm	--

* 10 minute peak per 8 hr. shift.

NE = Not Established

- OSHA PEL-TWA = The permissible concentration in air of a substance that shall not be exceeded in an 8-hour work shift or a 40-hour work week (OSHA 29 CFR: 1910.1028).
- OSHA PEL-STEL = The time-weighted average exposure that should not be exceeded for any 15-minute period (OSHA 29 CFR: 1910.1028).
- PEL-Ceiling = OSHA PEL-Ceiling = The exposure limit that shall at no time be exceeded. If instantaneous monitoring is not feasible, then the ceiling shall be assessed as a 15-minute time-weighted average (TWA) exposure, which shall not be exceeded at any time during the working day.
- ACGIH TLV-TWA = The Threshold Limit Value-TWA is the concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect (ACGIH, 2014).
- ACGIH TLV-STEL = The STEL exposure limit is a 15 minute time weighted exposure that should not be exceeded at any time during a work day. (ACGIH, 2014).

3 Sampling Methods

Worker exposure to benzene, toluene, ethylbenzene, m-,p- xylenes (collectively referred to as BTEX) and n-hexane will be evaluated using a 3M® 3520 organic vapor monitoring (OVM) badge placed in the worker's breathing zone. These OVM badges will be sent to an American Industrial Hygiene Association-accredited laboratory and analyzed using a gas chromatography flame ionization detector (GC/FID) in accordance with the National Institute for Occupational Safety and Health (NIOSH) air sampling method 1500/1501 (**Appendix A**). The OVM badge is a passive dosimeter, composed of a permeation membrane and activated charcoal sorbent media, which collects air samples at a flow rate controlled by the process of diffusion. **Table 4** displays descriptive characteristics for the OVM badges with respect to the sampled compounds.



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Table 4 – Organic Vapor Monitor Badge Description

Chemical	Collection Media	Sample Duration	Laboratory LOQ
Benzene	3M [®] 3520	720 min	2 µg
Toluene	3M [®] 3520	720 min	5 µg
Ethyl Benzene	3M [®] 3520	720 min	5 µg
Xylene	3M [®] 3520	720 min	15 µg
n-Hexane	3M [®] 3520	720 min	5 µg

Samples will be collected over the worst 8-hour period of the workday. The sample results will be compared to the ACGIH TLV-TWA and OSHA PEL-TWA occupational exposure limits.

4 Exposure Limit Exceedance

In accordance with the benzene substance-specific standard (1910.1028), a regulated area shall be established for areas with personnel samples or measurements from direct-read real-time instrumentation resulting in a sustained exceedance of the OSHA Action Level of 0.5 ppm benzene.

Site control shall be established to prevent un-protected workers from entering the designated areas. Access to any regulated area will be limited to workers with appropriate respiratory protection, if required at the time. Workers with respiratory protection must meet the criteria documented in 29 CFR 1910.134, and discussed herein:

- Must have medical clearance to don the designated respiratory protection for the regulated area,
- Must have been trained on proper use of the selected respiratory protection,
- Must have been fit-tested resulting in a satisfactory fit for the respirator being used within 1 year, and
- Must be trained on the maintenance and storage of the respiratory being used.

5 Quality Control

With each sample delivery group, one field blank sample will be submitted to the laboratory. The results of the quality control testing can be found along with laboratory reports supplied by Galson Laboratories as part of the post-analysis deliverable package.



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Appendix A

NIOSH Method 1500/1501