Gulf Science Data

Work Plan and/or Related Documents

Personal Breathing Zone Samples for Industrial Hygiene Program

Study Reference No. 2001.2

Appendices containing Health, Safety, and Environment (HSE) Plans and Simultaneous Operations (SIMOPS) Plans, and material safety data sheets (MSDSs) have not been included since these documents do not provide substantive technical context for sample collection and analysis.

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GoM Drilling, Completions and Interventions - MC252

Mississippi Canyon 252 On-Shore/Near Shore IH Monitoring Strategy MC 252 Well Incident

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Mississippi Canyon 252 Incident

MOBILE LOCATION

Please write in BLUE ink only

Name of Plan:	On-Shore Near Shore IH Monitoring Strategy
Section:	Planning Section
Submitted By: (Name, Signature & Date)	[redacted]
Reviewed by Planning Chief/ Deputy: (Name, Signature & Date)	

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Agency/ Team/ Name: (Name, Signature & Date)	[redacted]
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Mississippi Canyon 252
On-Shore/Near Shore IH Monitoring Strategy
MC 252 Well Incident

Prepared For:

MC 252 Incident Command - Safety Officer

Prepared By:

[redacted]

May 23, 2010

Table of Contents

1 Introduction and Purpose

On April 20, 2010, the Transocean Limited Platform, located approximately 55 miles offshore from Houma, LA, experienced a significant explosion and fire. The fire was proven inextinguishable and burned until the platform submerged into the Gulf of Mexico on April 23, 2010. As a result of the MC 252 incident, a supply of crude oil has continued to vent from the damaged well. Mitigation and remediation efforts have been organized in anticipation of crude oil impact to shoreline throughout the Gulf Coast.

This work plan specifically addresses on-shore and near-shore industrial hygiene monitoring. The on-shore monitoring will be conducted in addition to the existing on-shore community monitoring that is currently taking place. (Community monitoring example is found in Attachment 1.) These activities include;

- Real-time monitoring (and communication of results), and representative personal exposure monitoring during decontamination activities (including beach clean up, commercial/private vessel decontamination, and wildlife decontamination)
- Real-time monitoring (and communication of results) and representative personal exposure monitoring on near-shore vessels including Vessels of Opportunity (VOOs) skimming operations and boom placement/maintenance.
- Real-time monitoring (and communication of results) in response to community odor complaints
- Toxicology and other industrial hygiene support related to shoreline clean-up work activities.

2 General Monitoring Strategy

Four "tactical IH strike teams," one assigned to each state (Alabama, Florida, Mississippi, and Louisiana), will be positioned near the beach, staged and ready to go wherever oil makes landfall within the state they are assigned. Each team will be composed of 1 CIH and 3-5 technicians, and will be equipped to perform representative personal monitoring and real-time monitoring with direct reading instruments during various decontamination activities (e.g. beach clean-up including tar ball retrieval, vessel decontamination, booming decontamination, wildlife decontamination, boom repair and configuration) and community odor response monitoring. Sampling scope may grow as new activities are identified.

Beginning May 21, additional IH monitoring support was provided for Louisiana to supplement the existing monitoring personnel, as area crew numbers have increased significantly as beach remediation efforts have intensified in response to additional oil coming onshore. The additional personnel were pulled from the existing strike teams in FL and AL,. and will be back-filled with additional personnel as needed.

Regarding monitoring equipment, each team will be equipped with the capability to conduct personal monitoring for benzene, toluene, xylenes, and total hydrocarbons (e.g 3M 3500 OVM's), and area monitoring for VOCs, benzene, CO, and LEL (e.g. 4 PID's capable of simultaneously monitoring for VOCs, CO and LEL, plus 4 benzene PID's). See Attachment 1 at the end of this document for the current organization chart for the strike teams.

The priority of these tactical teams is to collect information including real-time monitoring from direct reading instruments and representative personal exposure monitoring data of decontamination activities (e.g. beach clean-up, vessel decon, booming decon, wildlife decontamination). This data will be critical in determining whether or not adjustments to personal protective equipment (e.g. respiratory protection) are necessary. Those performing decontamination activities would be expected to experience the highest potential exposures. Correspondingly, these results of worker exposure, coupled with ongoing community monitoring will allow us to make judgments about potential community exposures. The CIH from each team should be available to respond to community odor complaints when free from oversight of personal monitoring activities associated with decontamination work. Towards that end, when interfacing with the community, the industrial hygienist can use Attachment 2 (Public Health Information Statement) and Attachment 3 (Weathered Crude Oil MSDS) to assist in communication. The Weathered Crude Oil MSDS is being translated into Spanish and Vietnamese versions to better facilitate communications with local area residents.

Regarding personal monitoring details, the number of samples required to assess "representative exposures" for a given decontamination activity is left to the discretion of the CIH. However, OVM badge placement on at least 10% of the workforce should be considered the goal (e.g. for a beach clean-up crew of 100, the goal would be to sample at least 10 of its members.) OVM badges should be analyzed for benzene, toluene, xylenes, and total hydrocarbons. When professional judgment dictates broader sampling or analyses, the CIH shall consult with the BP Industrial Hygiene Lead.

3 Occupational Standards and Guidelines

The Occupational Safety and Health Administration (OSHA) establishes workplace standards to protect the safety and health of workers. The American Conference of Governmental Industrial Hygienists (ACGIH) and National Institute for Occupational Safety and Health (NIOSH) have also established exposure guidelines to protect workers from hazards on the job. Table 3.2 lists the OSHA, ACGIH, and NIOSH values for carbon monoxide, benzene, toluene, and xylene. When applicable, sampling data results will be compared to health- and risk-based ambient air and exposure guidelines such as Minimal Risk Levels from the Agency for Toxic Substances and Disease Registry, Acute Exposure Guideline Levels from the EPA, Emergency Response Planning Guidelines from the American Industrial Hygiene Association, and Temporary Emergency Exposure Limits from the US Department of Energy.

Table 3-2 Occupational Exposure Standards and Guidelines

Compounds	OSHA PEL-TWA[a] (ppm)	OSHA PEL-STEL[b] (ppm)	OSHA PEL-C[c] (ppm)	ACGIH TLV-TWA[d] (ppm)	ACGIH TLV-STEL (ppm)
Benzene	1	5	–	0.5	2.5
Toluene	200	–	300	20	–
p-Xylene	100	–	–	100	150
Carbon monoxide	25	35	200	25	–
Hydrogen sulfide (H_2S	20		50 (10 min. once only)	10	15

NE= Not Established

a. *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, 1989).*

b. *OSHA PEL-STEL = The time-weighted average exposure that should not be exceeded for any 15-minute period (OSHA, 1989).*

c. *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. (OSHA, 1989).*

d. *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, 2006).*

4 Site Action Levels

Site action levels have been established for the chemicals of interest.

Table 4-1. Site Action Levels for Chemicals of Interest

Compounds	Action Level*	Description of Action
Benzene	<0.5 ppm	No action required.
	≥0.5 ppm	Confirm with a duplicate sample. Benzene levels will be communicated to site officials and workers will be notified to move away from the area.
	0.5-5.0 PPM	If work plans indicate that benzene levels will not dissipate in a short amount of time, personnel who are fully trained in 24 HAZWOPER and have completed all requirements of the respiratory protection program may don half-mask respirators and continue work.
	≥5.0 PPM	Workers must leave area.
Carbon Monoxide	< 10 ppm	No action required
	10 ppm	Confirm with duplicate sample. CO levels will be communicated to site officials
	> 15 ppm	Confirm with duplicate sample. Workers will be notified and moved away from areas of elevated concentrations.
Toluene	< 50 ppm	No action required.
	50 ppm	Confirm with a duplicate sample. Toluene levels will be communicated to site officials.
	> 100ppm	Confirm with a duplicate sample. Workers will be notified and moved away from areas of elevated concentrations. If work plans indicate that xylene levels will not dissipate in a short amount of time, personnel who are fully trained in 24 HAZWOPER and have completed all requirements of the respiratory protection program may don half-mask respirators and continue work
Xylene	< 50 ppm	No action required.
	50 ppm	Confirm with a duplicate sample. Xylene levels will be communicated to site officials..
	100 ppm	Confirm with a duplicate sample. Workers will be notified and moved away from areas of elevated concentrations. If work plans indicate that xylene levels will not dissipate in a short amount of time, personnel who are fully trained in 24 HAZWOPER and have completed all requirements of the respiratory protection program may don half-mask respirators and continue work

Compounds	Action Level*	Description of Action
VOCs	< 25 ppm	No action required.
	25 ppm	VOC levels will be communicated to site officials
	> 50 ppm	Confirm with duplicate sample. Workers will be notified and moved away from areas of elevated concentrations. If work plans indicate that VOC levels will not dissipate in a short amount of time, personnel who are fully trained in 24 HAZWOPER and have completed all requirements of the respiratory protection program may don half-mask respirators and continue work.
LEL	1 %	Notify BP site safety officials of detected combustibles. Use PID and chemical specific monitoring capability to identify the source of combustible gas.
	10%	Confirm with duplicate sample. Nearby hot work will be stopped. Workers will be notified and moved away from areas of elevated concentrations.

* Action levels are based on sustained concentrations for each analyte.

5 Real-Time Monitoring with Direct Reading Instruments

Real-time air monitoring will be performed during shoreline clean-up operations.

The term "real–time" refers to direct reading instruments that allow nearly instantaneous determinations of a chemical concentration in air. Real-time measurements provide immediate information for worker and community exposure scenarios and, with the use of appropriate site safety measures, help prevent overexposures. Real-time measurements are not directly comparable to OSHA or ACGIH 8-hour TWA values or to community exposure standards or guidelines. Instantaneous real-time samples do not necessarily represent conditions experienced throughout the workday and can substantially underestimate or overestimate exposures potentially experienced by workers. Direct reading instruments perform sampling and analyses within the instrument and concentration readings can usually be obtained immediately. These instruments have fast response times and can follow rapid changes in concentration.

Real-time monitoring will be conducted using the Rae Systems MultiRAE Plus with photo ionization detectors (PID) which are equipped with 10.6 eV lamps. Additionally, the MultiRAE plus PID will be equipped with CO and LEL electrochemical sensors.

Table 5.1 Summary of Real-time Instrument Detection Limits

Instrument	Analyte	Energy Lamp (eV)	Detection Limit
MulitRAE PID	VOCs	10.6	0.1 ppm*
MulitRAE PID	Benzene	10.6	0.5 ppm**
RAE systems CO Sensor	CO	NA*	1.0 ppm
RAE systems LEL Sensor	LEL	NA	1%

*NA = Not Applicable

* The PID detection limit is for VOCs. For specific compounds, the detection limit will require adjustment based on the compounds published correction factor.

**The correction factor for benzene is 0.53. Therefore, if 100% of the 0.1 ppm limit of detection reading was attributable to benzene, then the L.O.D. for benzene would be 0.53 ppm for the MultiRAE PID.

5.1 Photo Ionization Detectors

MultiRAE PIDs are used to measure airborne concentrations of volatile organic compounds (VOCs). Photo ionization is a nondestructive technique that is somewhat specific through selection of ultra-violet (UV) lamps of varying energies. PIDs use high energy UV light from a lamp housed within the detector to provide energy needed for ionizing VOCs. Ions are collected in an ionization chamber with accelerating and collecting electrodes designed to measure current. Current produced during VOC ionization is proportional to VOC concentrations.

PIDs are not specific for any chemical. The presence of atmospheric humidity and other VOCs may be problematic while using the detectors. PIDs often need to account for background readings and need to be coupled with other real-time instruments. The 10.6 eV PID lamp will be used to monitor for the primary chemicals of interest. To record measurements that most accurately reflect specific contaminant's concentrations in air, a correction factor may be applied to VOC concentrations as measured by the RAE systems PID in the MultiRAE PID. For example, the correction factor applied to benzene with the 10.6 eV lamp is 0.53.

5.2 Real-Time Air Monitoring Locations

Airborne contaminants generated by crude oil will be measured at various locations throughout the work sites. Air monitoring will be focused in the work areas near shorelines impacted by crude oil. Air sampling personnel will be designated to the work area during work activities. CTEH will survey the worksite and downwind regions using real-time and analytical sampling methods. Real time air monitoring and analytical air sampling may be performed at the following locations:

- Shoreline clean-up worksites,
- Wildlife clean-up worksites,
- at varying locations targeting fugitive vapor emissions from crude oil,
- along the perimeter of the shoreline clean-up worksite,
- at selected locations that will address potential on-site receptors, accounting for possible changes in wind-direction,
- at selected locations that will address potential on-site receptors in regards to workers.
- On Vessels of Opportunity (VOOs) involved in skimming operations and boom work.

6 Air Sampling

6.1 Definitions

- The term "real–time air monitoring" generally refers to using handheld, portable direct reading instruments that rapidly detect and display the airborne concentration of a chemical.
- The term "analytical air sampling" refers to air sampling methods that involve collection of air samples over a specified period, followed by analysis at a laboratory. The results of these samples represent the average airborne concentration for the sample period. These methods typically involve passing a known volume of air through a collection medium (e.g. charcoal sample tube or filter cassette) that efficiently traps and retains the compound until it can be analyzed by the laboratory. By knowing the volume of air collected and the quantity of chemical absorbed onto the collection medium, the average air concentration can be calculated. The initial personal air sampling will be conducted for VOCs via the use of passive diffusion badges. The organic hydrocarbon analytes of concern are toluene, xylene, benzene, and ethyl benzene.

6.2 Air Sampling Procedure

Analytical air sampling may be conducted for the purpose of collecting personal samples to evaluate potential exposure to constituents of crude oil. When applicable, sampling will be conducted and analyzed for various constituents of crude oil, specifically benzene, toluene, and xylenes. Monitoring will be responsive to onsite activities and may require additional personnel to sample.

A similar exposure group (SEG) analysis will be conducted to determine the number of samples that will be collected to best represent the various job tasks conducted at the shoreline clean-up areas. SEGs are groups of workers and quantity of workers having the same general exposure profile because of the similarities & frequency of the tasks they perform, the materials/processes in which they work, & the similarity of the way they perform the tasks. The observational approach to determining SEGs will be utilized. The major processes and work operations will be defined and correlated with the potential exposure to crude oil based on proximity to impacted areas. The following steps will be taken to maintain the pre-established SEGs.

1. Observer workers to determine the work tasks they perform as the default approach to defining SEGs
2. Assess exposures for observed work groups broken into SEGs
3. Identify critical SEGs for which the consequences of misclassification are very severe due to potential exposures.
4. Use exposure monitoring results & statistical analysis to check & refine critical SEGs

All samples will be held according to method/laboratory requirements and will be shipped to an AIHA accredited laboratory for subsequent analysis. Analytical air sampling methods for volatile organic compounds are summarized in Table 6.1 and copies of the method are available in Appendix B.

Table 6.1 Summary of Analytical Air Sampling Methods

Analyte	Analytical Method	Sample Media	*Flow Rate (mL/min)*	*Max Volume*
Volatile Organic Compounds	NIOSH 1500/1501	100mg / 50 mg charcoal tube	200	96L
Volatile Organic Compounds	EPA TO15+TICs	1 Liter Mini-Can	-	1L
Organic Vapor	EPA Method No. 7	3M 3520 OVM Passive Dosimeter	NA	NA

7 Equipment and Data Management

- All analytical air samples will be sent to Galson Laboratories, an AIHA Accredited Laboratory located in East Syracuse, N.Y. Bureau Veritas, located in Michigan and also an AIHA accredited laboratory, is the back-up laboratory.
- A request for complete data packages will be made to the laboratory for all samples analyzed.
- Chain of Custody forms will be completed for all physical samples collected.
- The data packets will be reviewed and the data will undergo a data validation process.
- All real-time instruments will be calibrated according to the manufacturer recommendations or as determined necessary by CTEH personnel.
- Calibration logs will be completed daily.
- Real-time readings will be documented. Handwritten notes, handheld PDA, or the use of data logging capabilities of the instrument are all acceptable means of documentation.
- Real-time data will be entered onsite and drafts made available upon request.

8 Project Organization

CTEH will be responsible for the following:

- Air monitoring
- Toxicology support
- Quality Assurance/Quality Control
- Data evaluation
- Reporting

The BP Industrial Hygienist will be responsible for providing support and direction for the CTEH Strike Teams. This will occur through continual interaction with the CTEH Strike Team Director and a daily teleconference with the Strike Team Leaders to discuss daily air monitoring issues and resource needs and deployment. In addition, a separate daily conference call occurs with the BP Industrial Hygiene Team to coordinate activities, manage data gathering & communications, and share best practices.

The BP Industrial Hygienist will also be responsible for interfacing with applicable outside organizations, including Coast Guard personnel, EPA, OSHA, State Public Health Agencies, the FDA, ATSDR, CDC, and any other organizations interested in BP Industrial Hygiene data, knowledge, and practices.

The BP Industrial Hygiene Lead and the CTEH employees report up through the Mobile Safety Organization, in the Planning Section within the Mobile Alabama MS-252 Incident Command Center.

9 Equipment Decontamination

If required, equipment will be decontaminated by the decontamination group where all entries and exits occur. The decontamination will be with damp cloths as the equipment cannot be submerged under water.

10 Field Documentation

During the project, the team members will maintain various field books, reports, electronic database, and logs. Each of the components of the field documentation is described below.

10.1 Calibration and Maintenance of Field Instruments

The calibration and maintenance of field equipment and instrumentation will be in accordance with each manufacturer's specifications or applicable test/method specifications, and shall be documented in the Calibration Logs or Site Safety and Health Logbooks.

10.2 Sample Labels and Chain of Custody (COC)

All sample labels used on sample containers will include, at a minimum, a sample identification code, the date of the sample, and the analyte. Each sample will be identified on a chain of custody record. The analytical sample numbering system will include site name, date, analyte, and identification code unique to each sample.

11 Packaging and Shipping

Packaging and shipping of samples will vary depending upon sample media, contaminant concentration, preservation technique, and sample container. The person packaging the samples is responsible to ensure that the sample packaging is in suitable condition for shipping.

12 Attachments Description

The attachments are supplemental forms supporting this Industrial Hygiene Air Monitoring Strategy. Since users of this plan may be reading from a printed document, the attachments listed below are provided in their entirety at the end of this document

- **Attachment 1**: IH Tactical Strike Team Organization (May 23, 2010)
- **Attachment 2**: Community response air monitoring example
- **Attachment 3**: Crude Oil MSDS
- **Attachment 4**: Weathered Crude MSDS
- **Attachment 5**: Public Health Information for Crude Oil Spill

13 References

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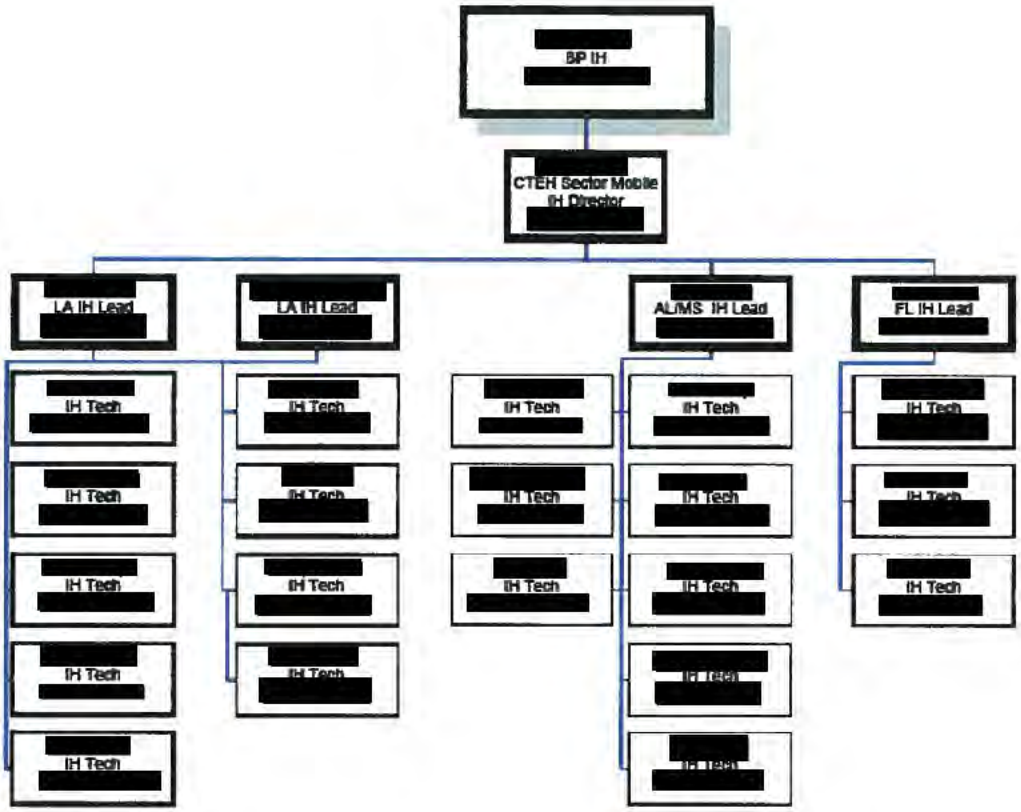
14. Attachments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Summary of CTEH's Air Monitoring Activities for the Community In Response to the MC 252 Oil Spill

Daily Summary for May 23, 2010

Air monitoring was conducted between New Iberia, LA and Apalachee Bay, FL to address public concern for crude oil vapors. The results of air monitoring for May 22, 2010 18:00 – May 23, 18:00 are shown in Tables 1 and 2 below and the locations where monitoring was conducted are shown in the map below (Figure 1).

Table 1 Summary of Air Monitoring in Residential and Commercial Areas Along the Gulf Coast

Crude Oil Chemicals of Interest	Number of Measurements	Average Concentration (ppm)	Maximum Concentration (ppm)
Volatile Organic Chemicals including benzene (VOCs)	589	0	0
Hydrogen sulfide	592	0	0
Sulfur dioxide	486	0	0
Benzene*	52	0	0
Total	1719		

*Benzene measured with detector tubes

Table 2

Particulates	Number of Measurements	Average Concentration (mg/m^3)	Maximum Concentration (mg/m^3)
Particulate Matter (PM10)*	62	0.054	1.36
Particulate Matter (PM2.5)*	509	0.022	0.17
Total	571		

*PM10 – is particulate matter less than 10 microns

*PM2.5 – is particulate matter less than 2.5 microns

Air monitoring results show that crude oil vapors were not detected throughout residential and commercial areas between New Iberia, LA and Apalachee Bay. Particulate levels show that concentrations were in range with baseline readings and were below levels of concern. Testing teams trained in odors also noted the presence or absence of crude oil vapors (Figure 2). Oil odors were not detected between New Iberia, LA and Apalachee, FL.

Figure 1 Map Showing Where Air Monitoring is Being Conducted Throughout the Gulf Coast States

Figure 2 – Odor Investigation Results

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Note – blue dot means no odor detected, orange dot indicates that crude oil odors were detected.

CTEH

Material Safety Data Sheet

Title of Document:	Mississippi Canyon 252 On-Shore/Near Shore IH Monitoring Strategy MC 252 Well Incident	**Document Number:**	2200-T2-DO-PN-4003
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