Deep water Horizon Workers Potentially Exposed to Benzene

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Abstract

The tragic accident of the Deep water Horizon oil platform occurred on April 20th 2010, where eleven workers lost their life in this accident. (BP, 2013). The Industrial hygienist Tom Jones will interpret the samples taken during the initial stages of the response. The paper will discuss the any possible exposure that the cleanup crew was exposed during cleanup operations. By far this was one of the largest oil spill cleanup in history that left a spill covering about 600 miles of ocean, and almost the same area of sea shore line. We will analyze data collected from two groups the laborers and the Hazardous Materials workers. There are lessons that can be learned from such large incident.

Introduction

The BP tragedy has created a larger need for broader occupational and safety rules. In fact the company started monitoring health and environmental impacts in Louisiana and in parts of Florida where the tragedy had the most impact. BP is committed to ensure that the residents and the cleanup the health and safety crew is not affected. According to the BP website, more than 30,000 first responders and cleanup workers participated with the cleanup efforts. Under Federal guidance, BP conducted more than 15,000 air samples that were taken and analyzed for on-shore community air quality observation, with over 499,000 analytical results reported. Additionally, more than 874,000 community air quality observation monitoring readings were reported. For worker protection, more than 319,000 air monitoring readings were reported (BP, 2013). In spite of all this there are many residents that have complained about odors, headaches, and other health related symptoms. Any large company must maintain a good relation between the communities, and state and federal authorities.

Discussion

Benzene is used in many industrial applications, example include gasoline, detergents, pesticides, plastics, paints, pharmaceutical explosives, waxes, inks, extraction of oils from seeds and nuts; rubber and in some printing applications. Benzene is a carcinogenic and known to be a Human Carcinogen (CDC, 2011). Therefore, workers exposed to benzene could develop chronic illnesses and develop several health issues. Exposure to benzene with ethanol (e.g., alcoholic beverages) can increase benzene toxicity in humans. Neurological symptoms of inhalation exposure to benzene include drowsiness, dizziness, headaches, and unconsciousness in humans. Ingestion of large amounts of benzene may result in vomiting, dizziness, and convulsions in humans (CDC, 2011). Benzene is found in emissions from burning coal and oil operations, motor vehicle exhaust, and evaporation from gasoline service stations. These sources contribute to higher levels of benzene in the ambient air (ibid). Research has shown benzene to be a carcinogen (cancer causing). With exposures from less than 5 years to more than 30 years, individuals have developed, and died from, leukemia. Long-term exposure may affect bone marrow and blood production. Short-term exposure to high levels of benzene can cause drowsiness, dizziness, unconsciousness, and death. (Steinberg Law Firm PC, 2013). When a person breaths-in vapors or mists, Benzene is easily absorbed into the bloodstream and therefore this would be a major concern for the cleaning up crew. OSHA permissible exposure level for benzene is 1 ppm. For regulatory purposes National Institute of Occupation Safety and Health (NIOSH) recommends that fore regulatory purposes benzene is0 considered carcinogenic in man. (NIOSH, 1979). NIOSH recommended that occupational exposure be controlled so that the worker will not be exposed to benzene in additional of 1 ppm in air as determined by a 2 hour air collected at 1 liter per minute. OSHA PEL is 5 ppm. NIOSH Specify that 100 ppm for 8 hour average TWA of 100 ppm, an acceptable ceiling for 25 ppm and 50 ppm for

maximum duration of 10 minutes as an acceptable. (CDC, 2005). Clean up workers must meet these

exposures standards in order to avoid toxic exposures form the oil spill. An estimated 42,000 gallons

(1000 barrels) were leaking from the well each day into the Gulf of Mexico. Within a week this

estimate was revised by the government to 210,000 gallons (5,000 barrels) a day. (Lisa Suatoni's,

2010). In all one must have to admit this was a large spill, however the BP spill was small in

comparison, to the Exxon Valdes that happened on March 28th 1989, when the tanker Valdez struck

Bligh Reef in Prince William Sound, Alaska, spilling more than 11 million gallons of crude oil. The

spill was the largest in U.S. history and tested the abilities of local, national, and industrial

organizations to prepare for, and respond to, a disaster of such magnitude. (Environmental Protection

Agency, 2014). After such incident the Congress passed the Oil Spill Pollution Act of 1990 that

require the US Coast Guard to impose tougher regulations on oil tank vessels, and oil tank owners

and operators. (Environmental Protection Agency 2014).

Tom Jones, is the ACME Industrial Specialist, has selected a partial amount of data to use

for interpretation the selected group selected, is made up of laborers (Beach Cleanup), Laborers

(Other), and hazardous materials removal workers all part of the 5th, 8th streets cleanup crew.

Table 1 illustrates the number or personnel involved and tested for Benzene exposure. One

important aspect is the date was consistent with other parts similar to the area chosen for

interpretation. Sites from Florida, Mississippi and Louisiana all show almost the same results. The

samples selected are analyzed for benzene exposures, out of 27 entries we chose 8 samples. The

TWA is 240 minutes.   Crew was constantly briefed to report any unusual working conditions such

as unusual smell or odor, headaches, fatigues or any other unusual body aches. All of this was must

be reported immediately. Table 1 below represent the data chosen for further analysis.

TABLE 1

Site Name	Sampling Date	Employee Occupation	Situation Encountered	Analyte	Samp Alt Id	Lab- Number	Total-Time	Result (Total)	ReportingLi
3 Mile Rd Beach Access	04-Jul-2010	Laborers (Beach Cleanup)	NULL	Benzene	0041830	D82459	106	ND	.36 ppm
3 Mile Rd Beach Access	04-Jul-2010	Laborers (Beach Cleanup)	NULL	Benzene	0041830	D82459	106	ND	.36 ppm
5th Street Decon	19-Aug-2010	Laborers (Other)	Automated system using "simple green" sprayed on algae boom swept for barnacles.	Benzene	0156292	D85622	122	ND	.31 ppm
5th Street Decon	19-Aug-2010	Laborers (Other)	NULL	Benzene	0156237	D85621	236	ND	.16 ppm
5th Street Decon	30-Aug-2010	Decon	NULL	Benzene	0350633	D86793	420	ND	
5th Street Decon	30-Aug-2010	Decon Boom	NULL	Benzene	0350651	D86790	420	ND	
5th Street Decon	30-Aug-2010	Decon	NULL	Benzene	0350679	D86791	420	ND	
5th Street Decon	30-Aug-2010	Decon	NULL	Benzene	0350698	D86794	420	ND	
5th Street Decon	30-Aug-2010	Decon	NULL	Benzene	0350717	D86795	420	ND	
5th Street Decon	30-Aug-2010	Decon	NULL	Benzene	0350738	D86792	420	ND	
8th Street Decon	05-Jul-2010	Hazardous Materials Removal Workers	Employees are pressure washing hard boom. The boom is laid out on a long pallet pressure washed on both sides	Benzene	0348797	D82127	241	ND	.16 ppm
8th Street Decon	05-Jul-2010	Hazardous Materials Removal Workers	Employees are pressure washing harb boom. The boom is laid out, pressure washed and folded. Clean boom is	Benzene	0348811	D82126	240	ND	.16 ppm
8th Street Decon	05-Jul-2010	Hazardous Materials Removal Workers	NULL	Benzene	0348778	D82128	253	ND	.15 ppm
8th Street Decon	15-Jul-2010	Hazardous Materials Removal Workers	Night time	Benzene	0043930	D83248	270	ND	.14 ppm
8th Street Decon	15-Jul-2010	Hazardous Materials Removal Workers	Nighttime	Benzene	0043897	D83252	240	ND	.16 ppm
8th Street Decon	15-Jul-2010	Hazardous Materials Removal Workers	Nighttime	Benzene	0043911	D83251	240	ND	.16 ppm
8th Street Decon	15-Jul-2010	Hazardous Materials Removal Workers	Nighttime	Benzene	0043953	D83249	270	ND	.14 ppm
8th Street Decon	29-Jul-2010	Laborers (Other)	Employee cleaning boom caontaining weathered oil.	Benzene	0055819	D85138	165	ND	.23 ppm
8th Street Decon	29-Jul-2010	Equipment Operators:	Employee working near the boom decon area	Benzene	0349447	D85136	175	ND	.22 ppm
8th Street Decon	29-Jul-2010	Laborers (Other)	Employees cleaning the booms.	Benzene	0349423	D85140	165	ND	.23 ppm
8th Street Decon	29-Jul-2010	Laborers (Other)	Employees cleaning the booms.	Benzene	0349468	D85137	185	ND	.21 ppm
8th Street Decon	31-Aug-2010	not specified	NULL	Benzene	0350772	D86783	NULL	ND	
8th Street Decon	31-Aug-2010	Decon	NULL	Benzene	0350793	D86785	420	ND	
8th Street Decon	31-Aug-2010	Decon	NULL	Benzene	0350819	D86784	420	ND	
8th Street Decon	31-Aug-2010	Decon	NULL	Benzene	0350835	D86788	420	ND	
8th Street Decon	31-Aug-2010	Decon	NULL	Benzene	0350857	D86787	420	ND	
8th Street Decon	31-Aug-2010	Decon	NULL	Benzene	0350874	D86786	420	ND	

Reference from https://www.osha.gov/oilspills/index_sampling.html, (2010).

Table 2, represents the eight samples chosen for the analysis of the cleanup effort. Air Samples were

taken within 48 hours, from the initial spill. We collected air samples using two types of equipment,

the first equipment is a Photo Ionization Detector PID that detects VOC's with a Serial number of

XRE3454489. The other equipment are two passive sampler serial numbers FXVB 675-005/ FXVB-

002. The Passive Sampler was used had a range of 4 hour at 0.05 L/min for charcoal tube tubes

using Method 7. The eight samples collected represent specific type range of working events in the

off-shore remediation operations; work events s in the near-shore remediation operations and; the

work events in the on-shore remediation operations. The eight samples chosen are listed in Table 2

below. Workers worked upwind to prevent any possible contaminated dispersion.

T ABLE 2

Sample Alt Id	Lab- Number	Total-Time	Result (Total)	Reporting Limit
0156237	D85621	236	ND	.16 ppm
0348797	D82127	241	ND	.16 ppm
0348811	D82126	240	ND	.16 ppm
0348778	D82128	253	ND	.15 ppm
0043930	D83248	270	ND	.14 ppm
0043897	D83252	240	ND	.16 ppm
0043911	D83251	240	ND	.16 ppm
0043953	D83249	270	ND	.14 ppm

 Reference https://www.osha.gov/oilspills/index_sampling.html, (2010).

Personnel have been briefed on their work during early meeting. The Field supervisor briefs the team

that there might still be possibility of exposure of Benzene and other hazardous chemicals. All

personnel have donned the appropriate PPE. OSHA standard from the 1 ppm 8-hour TWA and 5

ppm STEL of the benzene as required under 40 CFR at 1910.1028. Ethylene benzene, Toluene, and

Xylene, are present and these chemicals evaporates in air within 24 to 48 hours into the ocean water before reaching shore. (CDC, 2010). Table 3 Benzene Statistics /Analysis

Table 1 Benzene Statistics /Analysis

| Sample data	Descriptive statistics	
0.016	Number of samples (n)	8
0.016	Maximum (max)	0.016
0.016	Minimum (min)	0.014
0.015	Range	0.002
0.014	Mean	0.015
0.016	Median	0.016
0.016	Standard deviation (s)	0.001
0.014	Geometric mean	0.015
	Geometric standard deviation	1.063
	Percent above OEL	0.0%
	Test for distribution fit	
	W-test of log-transformed data	0.692
	Lognormal (α = 0.05) ?	No
	W-test of data	0.693
	Normal (α = 0.05) ?	No
	Lognormal parametric statistics	
	Estimated Arithmetic Mean - AM est	0.015
	LCL1,95% - Land's "Exact"	0.015
	UCL1,95% - Land's "Exact"	0.016
	95th Percentile	0.017
	UTL95%,95%	0.019
	Percent above OEL	0.0%
	LCL1,95% %>OEL	<0.1
	UCL1,95% %>OEL	<0.052
	Normal parametric statistics	
	Mean	0.015
	LCL1,95% - t statistics	0.015
	UCL1,95% - t statistics	0.016
	95th Percentile - Z	0.017
	UTL95%,95%	0.02
	Percent above OEL	0.00

From the statistical chart above one can notice that benzene levels is not a major concern for the workers because the exposure levels is Zero of the OEL, The 95th percentile is 0.017which is below the 1ppm. Samples taken averaged from 236 minutes to a high of 270 minutes. Acclamation and controlling heat exhaustion was also a concern for Management. Crew took 15 minutes break intervals every couple of hours to prevent heat exhaustion. Clean up crew members drank a plenty of water and spend the time in a controlled temperature building.

A Few studies from previous oil spill disasters showed that common reported acute...symptoms were due to irritant effects on mucus membranes, upper airway, and the skin. (CDC, 2010). Several samples have been elevated from different sites in various parts from the beach area, to the local streets. Looking at different samples, collected, none of the samples are above the TWA limit.
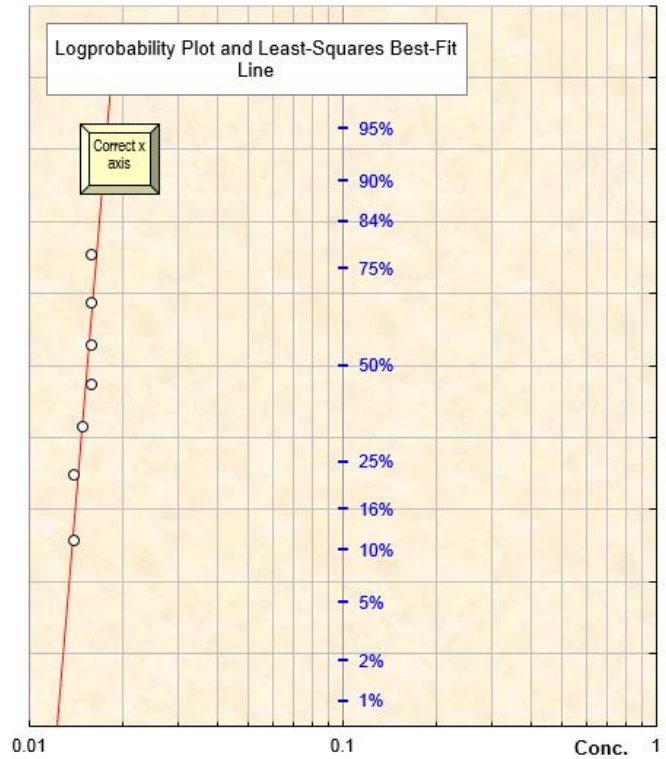
Graph 1
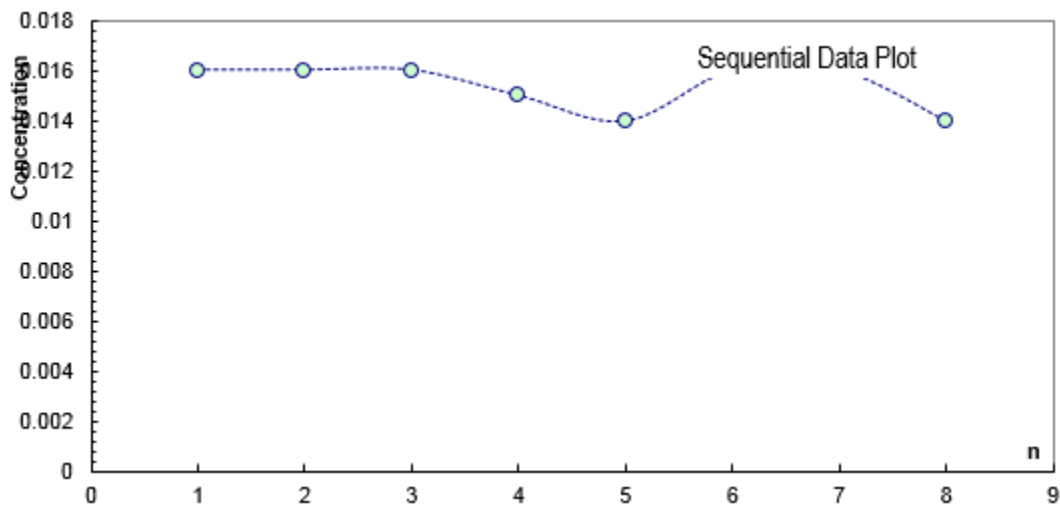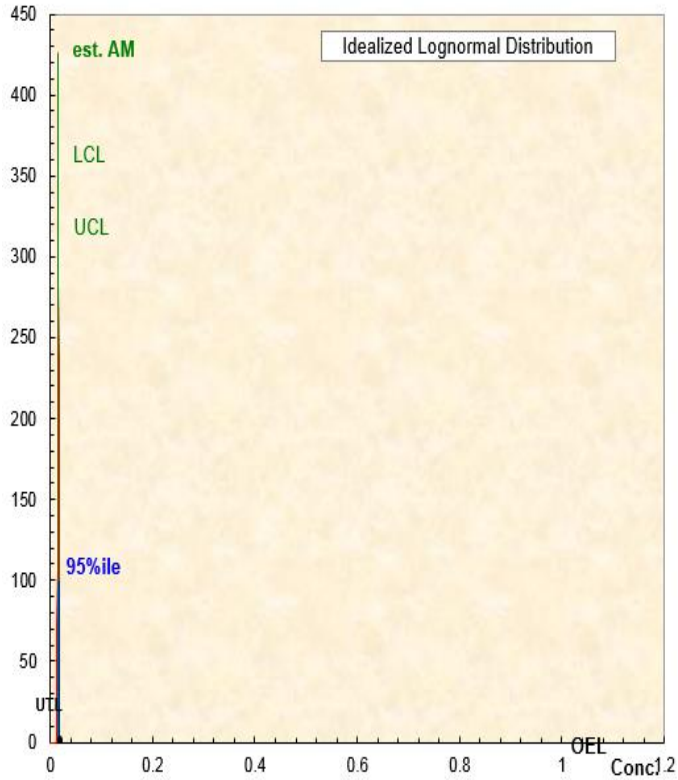
Graph 2   Graph 3

The results from all the sampling clearly indicate that the eight samples taken are under the 95th

percentile of the OEL, infect Benzene was below the standard STEL Rule. Which is 5 ppm. The

exposure category for these workers is Zero, because the levels are low enough that workers would

be exposed to any benzene exposure. Since these workers were the first responders, air samples

collected would result in a high number of benzene exposure. The average eight samples averaged

about of 0.153 per hour. Exposures levels were reduced significantly for workers due to the distance

of the initial explosion, assuming most of the benzene and other chemicals was consumed by fire.

Conclusion

The results and data collected under this scenario does not predict the human toxic exposure on data collected on people and communities. Benzene evaporates quickly but not all chemicals evaporates immediately. The analysis describe under this study clearly illustrate that benzene was below 1 ppm, and also below the Short exposure Limit (STEL). It's also important to now that in this particular incident BP had the resources to conduct all these necessary air sampling to ensure the workers and communities.

In this scenario cleanup workers has not been exposed to any potential exposure, although the concern for workers developing long term exposure, was still possible. The workers also ensure not only that the samples were collected, but ensure that working away upwind from the initial incident away from any dispersion.   Although there was a significant delay for the initial response time, there is still the potential of airborne particulates from "oil burns" when it is contacted with chemical dispersant during the cleanup operation.

Tom Jones was certain that taken all precautions would result in positive results, that all workers were not exposed to high benzene exposure. He removed any doubt and all guidelines of safety have been followed.

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