NIOSH’s Health Hazard Evaluations for the Deepwater Horizon Response

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Washington, D.C.
NIOSH Activities

• Rostering: **55,512**
  – Staging 16,206; Training 39,306
  – BP employees, contractors, federal and state employees, volunteers

• Technical Guidance

• Health Surveillance

• Health Hazard Evaluations (HHEs)
Objectives for Presentation

• How to find the NIOSH data?
• Summary of health surveillance data
• Describe NIOSH data from HHEs
Where to find the data?

http://www.data.gov/restorethegulf/datasites
Where to find the data?

http://www.cdc.gov/niosh/topics/oilspillresponse/
Where to find the data?
http://www.cdc.gov/niosh/topics/oilspillresponse/
NIOSH Analysis of BP Injury and Illness Data

**Total injury/illness by week, April 23 - July 27, 2010**

**Average Number of Workers per Week, April 23 - July 27, 2010**
Injury Reporting

Most common Events leading to injury; First Aid vs OSHA recordable, April 23 - July 27, 2010

- Caught in or compressed by objects: First Aid - 26, OSHA - 4
- Dermal exposure to caustic substances: First Aid - 7, OSHA - 2
- Rubbed or abraded by friction: First Aid - 4, OSHA - 1
- Struck against object or equipment: First Aid - 91, OSHA - 4
- Automobile incident: First Aid - 81, OSHA - 50
- Water vehicle incident: First Aid - 97, OSHA - 21
- Struck by moving object: First Aid - 120, OSHA - 18
- Overexertion: First Aid - 171, OSHA - 20
- Animal bites or stings: First Aid - 152, OSHA - 50
Illness Reporting

Most common illnesses by nature of illness; First Aid vs OSHA recordable, April 23 - July 27, 2010

- Cardiovascular: 15 First Aid cases, 13 OSHA recordable cases
- General Symptoms: 36 First Aid cases, 6 OSHA recordable cases
- Dermatologic: 75 First Aid cases, 3 OSHA recordable cases
- Gastrointestinal: 113 First Aid cases, 9 OSHA recordable cases
- Headache/Dizziness: 126 First Aid cases, 9 OSHA recordable cases
- Multiple Symptoms: 148 First Aid cases, 23 OSHA recordable cases
- Heat Stress & Heat effects: 171 First Aid cases, 21 OSHA recordable cases
Health Hazard Evaluations (HHE)

• Study of a workplace: 42 CFR 85
• To determine if workers exposed to hazardous materials or harmful conditions;
• Requests from an employer, employees, or a union official;
• Requests from Federal, State or Local officials for technical assistance
Where to find the data?

http://www.cdc.gov/niosh/topics/oilspillresponse/
NIOSH Health Hazard Evaluations

1. Water dispersant
2. In-situ burn
3. Oil skimming
4. Vessels of opportunity
5. Wildlife cleaning
6. Off-shore response workers
7. Shore cleaning
8. Equipment and Boat Repair and Decontamination and Waste Handling
For these and other NIOSH health hazard evaluations, results may not reflect conditions on a continual basis.

NIOSH announces the availability of a spreadsheet containing quantitative industrial hygiene sampling data available to date from its health hazard evaluation of the Deepwater Horizon Response. When available for release, data from additional evaluations will be added to the downloadable file.

The spreadsheet is available to view or to download by right clicking (Option clicking on Macintosh™ systems).

NIOSH Sampling Data BP Response [Microsoft Excel 2007 - 142kb] Updated Oct 27
NIOSH Sampling Data BP Response [Microsoft Excel 2003 - 430kb] Updated Oct 27

The data are discussed in the HHE interim reports available from the links below.

Interim Report 8: Health Hazard Evaluation of Deepwater Horizon Response Workers [PDF - 2203 KB]
HETA 20100129
October 26, 2010
Summary of Interim Report #8 [PDF - 810 KB]

Interim Report 7: Health Hazard Evaluation of Deepwater Horizon Response Workers [PDF - 1163 KB]
HETA 20100115
October 14, 2010
Summary of Interim Report #7 [PDF - 746 KB]

Interim Report 6: Health Hazard Evaluation of Deepwater Horizon Response Workers [PDF - 298 KB]
HETA 20100115
September 16, 2010
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<th>description</th>
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<td>2010-0115</td>
<td>Skimming operations (water)</td>
<td>6/15/2010</td>
<td>Queen Bee</td>
<td>Inside galley by phone</td>
<td>GA</td>
<td>Toluene</td>
<td>479</td>
<td>94.6</td>
<td>0.0034</td>
<td>ppm</td>
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<tr>
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<td>6/15/2010</td>
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<td>On skimmer console</td>
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<td>Toluene</td>
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<td>Opening tank hatch</td>
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<td>Outside-entrance to galley</td>
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Department of Health and Human Services
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

CDC
NIOSH
Qualifiers

- **n = Below Limit of Detection (1580)**
- **t = Below Limit of Quantitation (221)**
- **b = Breakthrough (11)**
  - Dipropylene glycol and propylene glycol
- **m = Matrix interference (2)**
  - Acetone
- **d = Results from a dilution (6)**
  - Ethanol, hexane, heptane, nonane, octane
Example: Limits of Detection

• Example 1:
  – Analytical Limit of Detection = 1 microgram
  – Sample Volume = 0.8 cubic meters
  – Sample LOD = 1.25 micrograms/cubic meter

• Example 2:
  – Analytical Limit of Detection = 1 microgram
  – Sample Volume = 0.4 cubic meters
  – Sample LOD = 2.5 micrograms/cubic meter
Each sample identifies its NIOSH analytical method and HHE report Web address.

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<thead>
<tr>
<th>sample_time</th>
<th>sample_volume</th>
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<th>units</th>
<th>qualifier</th>
<th>method</th>
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<td>NMAM 1403 with modifications</td>
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</tr>
</tbody>
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Department of Health and Human Services
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health
Compounds Monitored

• Quantitatively looked for a total of 111 analytes
  – 92 analytes were characterized on general area air samples
  – 42 analytes were characterized on personal breathing zone air samples
## Air Sampling Results

<table>
<thead>
<tr>
<th>Activity</th>
<th>Personal Breathing Zone</th>
<th>General Area</th>
<th>Total Samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Booming</td>
<td>46</td>
<td>150</td>
<td>196</td>
</tr>
<tr>
<td>Decontamination</td>
<td>249</td>
<td>12</td>
<td>261</td>
</tr>
<tr>
<td>Dispersant application</td>
<td>123</td>
<td>856</td>
<td>979</td>
</tr>
<tr>
<td>In-situ burning</td>
<td>59</td>
<td>575</td>
<td>634</td>
</tr>
<tr>
<td>Skimming</td>
<td>81</td>
<td>100</td>
<td>181</td>
</tr>
<tr>
<td>Work at the source</td>
<td>282</td>
<td>44</td>
<td>326</td>
</tr>
</tbody>
</table>
Air Sampling Results

• 2,577 air sample points were collected
  – 840 (33%) were personal breathing zone air sample points
  – 1,737 (67%) were general air sample points
• Personal breathing zone was conducted on 69 individuals on 15 vessels and at 2 ports
  – Only 1 (0.1%) of the 840 personal breathing zone sample points exceeded any occupational exposure limit
On-Shore Exposure Monitoring

- 261 sampling points -- Personal breathing zone sampling was conducted on 24 individuals
- 154 of the 261 (59%) samples were non-detect
- 25 of the 107 (23%) detectable samples were less than the minimum quantifiable concentration
  - Although detectable, samples less than the minimum quantifiable concentration have more uncertainty associated with their result than samples above the minimum quantifiable concentration
- None of the individuals’ chemical exposures exceeded any occupational exposure limit
- In addition to chemical exposures, we evaluated noise exposures at one of the two sites
  - Noise exposure calculations estimated that individuals performing pressure washing or working near the pressure washers are likely to have exposures that exceed the NIOSH REL
Off-Shore Exposure Monitoring

- 2,316 sampling points; Personal breathing zone sampling was conducted on 45 individuals
- 1,426 of the 2,316 (62%) samples were non-detect
- 196 of the 890 (22%) detectable samples were less than the minimum quantifiable concentration
- 1 individual’s exposure to carbon monoxide exceeded the NIOSH ceiling REL of 200 parts per million
  - This exposure occurred at an in-situ burn site while the gasoline-powered igniter boat was idling, suggesting that the exposure was a result of engine exhaust rather than from burning surface oil)
# Personal Breathing Zone Samples > ND

<table>
<thead>
<tr>
<th>Compound</th>
<th>OSHA PEL</th>
<th>Lowest OEL* (Country)</th>
<th>Maximum Personal Breathing Zone Sample Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-Butoxyethanol</td>
<td>50 ppm</td>
<td>2 ppm (France)</td>
<td>0.28 ppm</td>
</tr>
<tr>
<td>Anthracene</td>
<td>N/A†</td>
<td>N/A</td>
<td>0.0029 mg/m³</td>
</tr>
<tr>
<td>Benzene</td>
<td>1 ppm</td>
<td>0.1 ppm (US)</td>
<td>0.0059 ppm</td>
</tr>
<tr>
<td><strong>Carbon monoxide (ceiling)</strong></td>
<td>N/A</td>
<td>200 ppm (US)</td>
<td>220 ppm</td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>50 ppm</td>
<td>20 ppm (EU)</td>
<td>3 ppm</td>
</tr>
<tr>
<td>Chrysene</td>
<td>N/A</td>
<td>N/A</td>
<td>0.011 mg/m³</td>
</tr>
<tr>
<td>Dipropylene glycol butyl ether</td>
<td>N/A</td>
<td>N/A</td>
<td>0.063 ppm</td>
</tr>
<tr>
<td>Ethyl benzene</td>
<td>100 ppm</td>
<td>20 ppm (France)</td>
<td>0.0086 ppm</td>
</tr>
<tr>
<td>Fluoranthracene</td>
<td>N/A</td>
<td>N/A</td>
<td>0.00014 mg/m³</td>
</tr>
<tr>
<td>Fluorene</td>
<td>N/A</td>
<td>N/A</td>
<td>0.001 mg/m³‡</td>
</tr>
<tr>
<td>Limonene</td>
<td>N/A</td>
<td>20 ppm (Germany &amp; Switzerland)</td>
<td>0.085 ppm</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>10 ppm</td>
<td>10 ppm (all reported)</td>
<td>0.11 ppm</td>
</tr>
<tr>
<td>Phenanthrene</td>
<td>N/A</td>
<td>N/A</td>
<td>0.012 mg/m³</td>
</tr>
<tr>
<td>Propylene glycol</td>
<td>N/A</td>
<td>N/A</td>
<td>0.17 mg/m³</td>
</tr>
<tr>
<td>Pyrene</td>
<td>N/A</td>
<td>N/A</td>
<td>0.0041 mg/m³</td>
</tr>
<tr>
<td>Toluene</td>
<td>200 ppm</td>
<td>20 ppm (Japan)</td>
<td>0.074 ppm</td>
</tr>
<tr>
<td>Total hydrocarbons</td>
<td>N/A</td>
<td>N/A</td>
<td>9.1 mg/m³</td>
</tr>
<tr>
<td>Total PAHs</td>
<td>N/A</td>
<td>N/A</td>
<td>0.020 mg/m³</td>
</tr>
<tr>
<td>Total particulates</td>
<td>15 mg/m³</td>
<td>10 mg/m³ (Canada)</td>
<td>0.18 mg/m³</td>
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<tr>
<td>Xylene</td>
<td>100 ppm</td>
<td>25 ppm (Denmark)</td>
<td>0.046 ppm</td>
</tr>
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*Lowest OEL listed in the German Institute for Occupational Safety and Health database of international OELs (available at [www.dguv.de/bgia/en/gestis/limit_values/index.jsp](http://www.dguv.de/bgia/en/gestis/limit_values/index.jsp) updated August 2010)

†N/A = not applicable

‡Concentration is between the minimum detectable concentration and the minimum quantifiable concentration
Questions?