

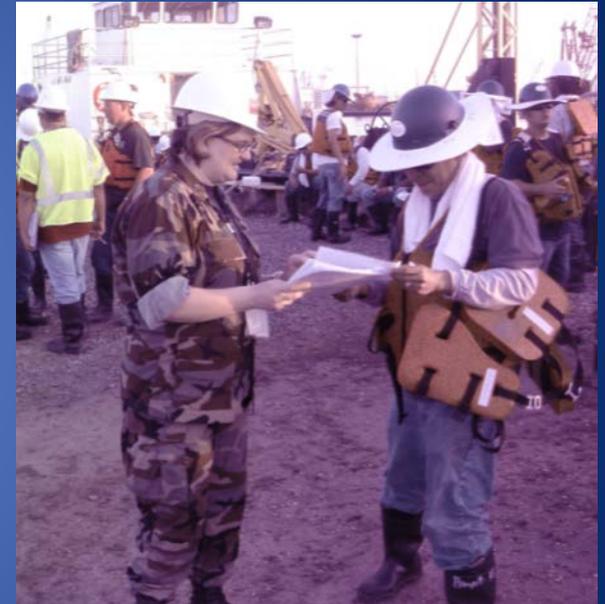
NIOSH's Health Hazard Evaluations for the Deepwater Horizon Response

Frank Hearl, P.E.

National Institute for Occupational Safety and Health
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)



Technical Guidance

<http://www.cdc.gov/niosh/topics/oilspillresponse/protecting/default.html>

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A-Z Index for All CDC Topics

Workplace Safety & Health Topics

Workplace Safety and Health Topics

- Deepwater Horizon Response
- Interim Guidance for Protecting Deepwater Horizon Response Workers and Volunteers**
- Medical Pre-Placement Evaluation
- Chemical Exposure Assessment
- Tips for Deepwater Horizon Response Workers
- Respiratory Protection Recommendations
- Summary of Potential Hazards
- Key Safety and Health Topics

[NIOSH](#) > [Workplace Safety and Health Topics](#) > [Deepwater Horizon Response](#)

DEEPWATER HORIZON RESPONSE



Interim Guidance for Protecting Deepwater Horizon Response Workers and Volunteers

07/26/2010

National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services and Occupational Safety and Health Administration, U.S. Department of Labor

Recommendations contained in the Interim Guidance will be updated as more information about exposures is collected and assessed in relationship to the incidence and prevalence of symptoms, illnesses and injuries.

The recommendations provided in this Interim Guidance focus on issues specific to the Deepwater Horizon Response and do not address issues common to all disaster response work activities. For more information on general disaster response, consult the NIOSH Emergency Response Topic Page at <http://www.cdc.gov/niosh/topics/emergency.html>.

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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>

The screenshot shows a data.gov page titled "DATA" with a search bar at the top right. The main content area is divided into several sections:

- Top Left (Red Box):** CDC logo and text: "Centers for Disease Control and Prevention". Below this is a section for "2010 Gulf of Mexico Oil Spill" with the sub-heading "Response Worker Health and Safety Resources (NIOSH)".
- Top Right:** "WHAT'S NEW (UPDATED)" section with a search bar and a "SEARCH" button.
- Middle Right:** FDA logo and text: "Food and Drug Administration". Below this is a section for "Gulf of Mexico Oil Spill Update" with sub-headings "Reopening of Closed Waters" and "Information & Seafood Testing Data by State".
- Bottom Left:** NASA logo and text: "National Aeronautics and Space Administration". Below this is a section for "NASA Imagery of Oil Spill" with sub-headings "MODIS Rapid Response System" and "AVIRIS Aids in Gulf Oil Spill Response".
- Bottom Center:** NOAA logo and text: "National Oceanic and Atmospheric Administration". Below this is a section for "Software and Data Sets" with sub-headings "Surface Oil Maps", "Digital Coast", "Deepwater Horizon Data Index", and "Deepwater Horizon Information Resources".
- Bottom Right (Red Box):** CDC logo and text: "Centers for Disease Control and Prevention". Below this is a section for "2010 Gulf of Mexico Oil Spill" with the sub-heading "Response Worker Health and Safety Resources (NIOSH)".
- Bottom Left (Partial):** Department of the Interior logo and text: "Department of the Interior". Below this is a section for "NPS Oil Spill Response".

Where to find the data?

<http://www.cdc.gov/niosh/topics/oilspillresponse/>

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Workplace Safety & Health Topics

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 - Protecting Workers and Volunteers Responding On-Shore to Hurricanes

[NIOSH > Workplace Safety and Health Topics](#)

DEEPWATER HORIZON RESPONSE Gulf of Mexico Oil Cleanup

Updates

- [NIOSH Ongoing Health Hazard Evaluation: Deepwater Horizon Response](#) **Updated October 27**
- [Voluntary Roster of Deepwater Horizon Response Workers](#) **Updated October 14**

NIOSH Efforts to Protect Oil Cleanup Workers

NIOSH is protecting oil cleanup workers with the following ongoing efforts:

- Partnering with the Occupational Safety and Health Administration (OSHA) and National Institute of Environmental Health Sciences (NIEHS) to provide other federal and state partners, BP, and workers with guidance and educational materials for protecting response workers.
- Conducting [health hazard evaluations](#) and surveillance of reported illnesses among workers involved in the Gulf response.
- Developing a [voluntary roster of workers](#) to obtain a record of



On This Page

- [NIOSH Efforts to Protect Oil](#)

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Contact Us:

- Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health (NIOSH)
- 800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 24 Hours/Every Day
cdcinfo@cdc.gov

Where to find the data?

<http://www.cdc.gov/niosh/topics/oilspillresponse/>

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 - Protecting Workers and Volunteers Responding On-Shore to Hurricanes
 - Reducing Exposures while Working with Dispersants
 - Traumatic Incident Stress: Response Workers and Volunteers
 - Health Hazard Evaluation: Deepwater Horizon Response
 - Voluntary Roster of

NIOSH > Workplace Safety and Health Topics

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DEEPWATER HORIZON GULF OF MEXICO OIL SPILL RESPONSE

Updates

- NIOSH OSHA
- Voluntary

NIOSH Efforts

NIOSH is protecting workers through the following efforts:

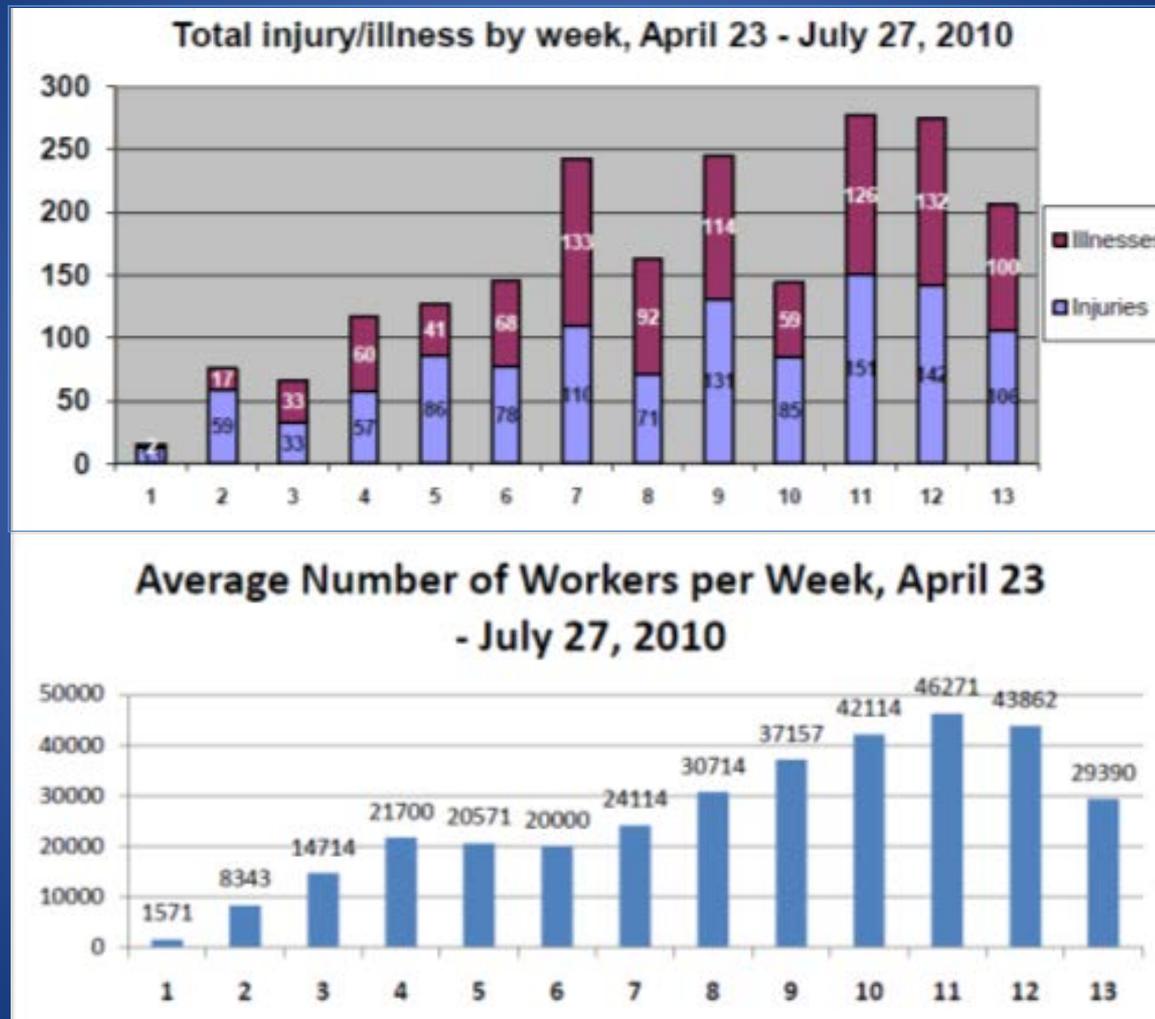
- Partnering with the Occupational Safety and Health Administration (OSHA) and National Institute of Environmental Health Sciences (NIEHS) to provide other federal and state partners, BP, and workers with guidance and educational materials for protecting response workers.
- Conducting health hazard evaluations and surveillance of reported illnesses among workers involved in the Gulf response.
- Developing a voluntary roster of workers to obtain a record of those who have participated and a mechanism to contact them about possible work-related symptoms of illness or injury, as needed.
- Analyzing injury and illness data provided to NIOSH by BP safety officials to increase awareness of the risks associated with Gulf oil response work.

Control and Prevention
National Institute for Occupational Safety and Health (NIOSH)
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 24 Hours/Every Day
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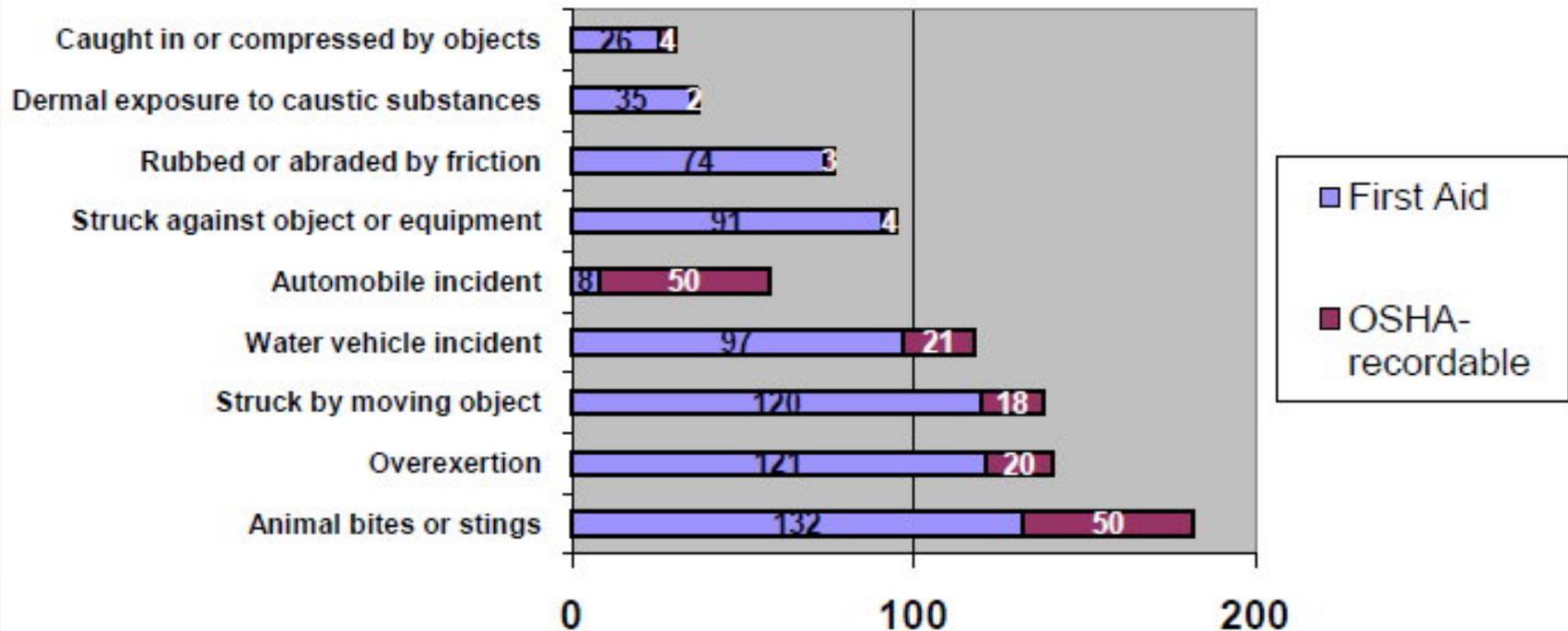
- NIOSH Efforts to Protect Oil Cleanup Workers
- NIOSH/OSHA Deepwater Horizon Guidance
- NIOSH Guidance
- Other NIOSH Resources
- Hazard Information
- Other Government Resources

NIOSH Analysis of BP Injury and Illness Data



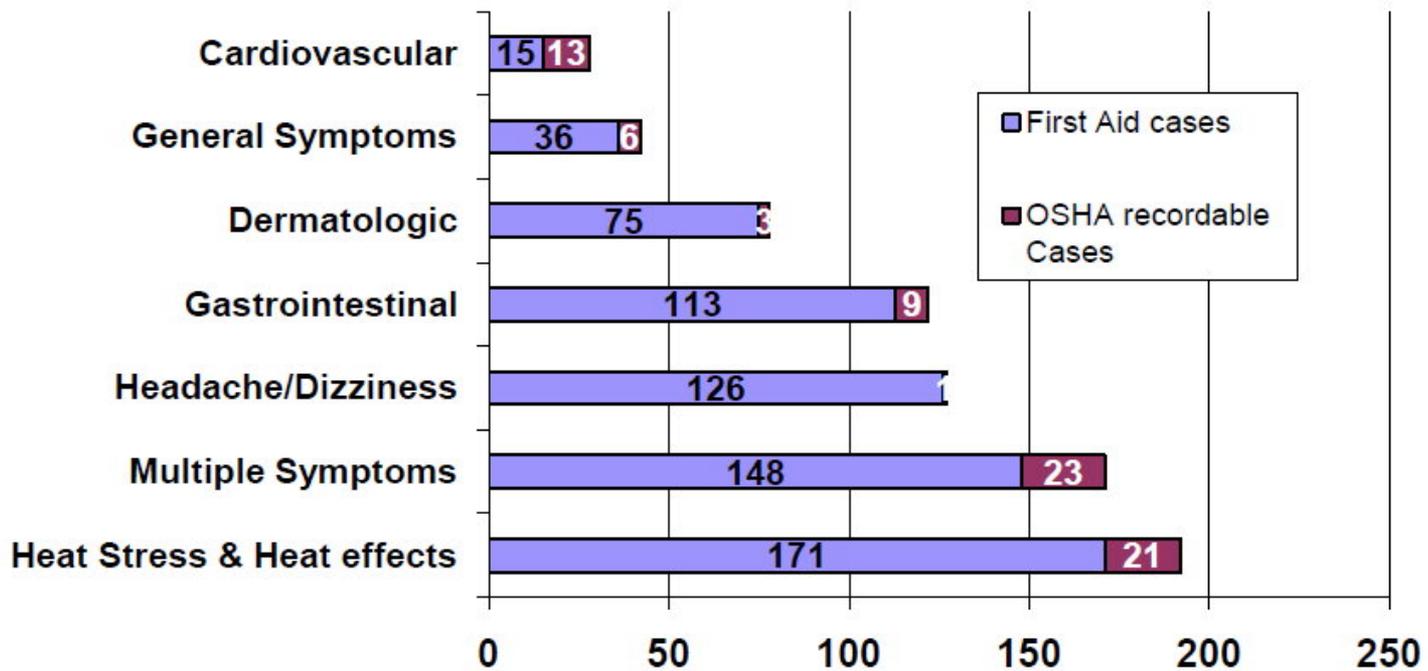
Injury Reporting

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



Illness Reporting

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



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/>

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DEEPWATER HORIZON RESPONSE Gulf of Mexico Oil Cleanup

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- Developing a voluntary roster of workers to obtain a record of those who have participated and a mechanism to contact them about possible work-related symptoms of illness or injury, as needed.
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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



HHE Data

Topics
Issues and
...
...

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

October 13, 2010

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	primary_key	hete_number	work_operation	date	location	description	type	worker	analyte	sample_time	sample_volume	concentration	units	qualifier
340	339	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Toluene	479	94.6	0.0034	ppm	
341	340	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	On skimmer console	GA		Toluene	534	107	0.001	ppm	n
342	341	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	On skimmer console	GA		Xylenes	761	148	0.0023	ppm	t
343	342	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Opening tank hatch	GA		Xylenes	3	0.592	0.2	ppm	n
344	343	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Outside-entrance to galley	GA		Xylenes	664	133	0.014	ppm	
345	344	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Xylenes	479	94.6	0.029	ppm	
346	345	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Xylenes	479	94.6	0.029	ppm	t
347	346	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Xylenes	479	94.6	0.029	ppm	n
348	347	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Xylenes	479	94.6	0.029	ppm	n
349	348	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Toluene	479	94.6	0.0034	ppm	
350	349	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Toluene	534	107	0.001	ppm	n
351	350	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Toluene	534	107	0.001	ppm	n
352	351	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Xylenes	761	148	0.0023	ppm	t
353	352	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Xylenes	761	148	0.0023	ppm	t
354	353	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Xylenes	3	0.592	0.2	ppm	n
355	354	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Xylenes	3	0.592	0.2	ppm	n
356	355	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Xylenes	664	133	0.014	ppm	
357	356	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Xylenes	664	133	0.014	ppm	n
358	357	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Xylenes	479	94.6	0.029	ppm	n
359	358	2010-0115	Skimming operations (water)	6/15/2010	Queen Bee	Inside galley by phone	GA		Xylenes	479	94.6	0.029	ppm	n
360	359	2010-0115	Skimming operations (water)	6/16/2010	Queen Bee	Skimmer Operator	PBZ	31	Xylenes	408	81.9	0.022	ppm	
361	360	2010-0115	Skimming operations (water)	6/16/2010	Queen Bee	Skimmer Operator	PBZ	32	Benzene	464	93.6	0.001	ppm	n
362	361	2010-0115	Skimming operations (water)	6/16/2010	Queen Bee	Skimmer Operator	PBZ	32	Ethyl benzene	464	93.6	0.0039	ppm	
363	362	2010-0115	Skimming operations (water)	6/16/2010	Queen Bee	Skimmer Operator	PBZ	32	Limonene	464	93.6	0.016	ppm	
364	363	2010-0115	Skimming operations (water)	6/16/2010	Queen Bee	Skimmer Operator	PBZ	32	Naphthalene	464	93.6	0.0008	ppm	n
365	364	2010-0115	Skimming operations (water)	6/16/2010	Queen Bee	Skimmer Operator	PBZ	32	Total hydrocarbons	464	93.6	2.2	mg/m3	
366	365	2010-0115	Skimming operations (water)	6/16/2010	Queen Bee	Skimmer Operator	PBZ	32	Toluene	464	93.6	0.0013	ppm	t
367	366	2010-0115	Skimming operations (water)	6/16/2010	Queen Bee	Skimmer Operator	PBZ	32	Xylenes	464	93.6	0.025	ppm	
368	367	2010-0115	Skimming operations (water)	6/16/2010	Queen Bee	Skimmer Operator	PBZ	33	Benzene soluble fraction	463	920	0.2	mg/m3	n
369	368	2010-0115	Skimming operations (water)	6/16/2010	Queen Bee	Skimmer Operator	PBZ	34	Benzene	468	91.9	0.001	ppm	n
370	369	2010-0115	Skimming operations (water)	6/16/2010	Queen Bee	Skimmer Operator	PBZ	34	Ethyl benzene	468	91.9	0.0052	ppm	
371	370	2010-0115	Skimming operations (water)	6/16/2010	Queen Bee	Skimmer Operator	PBZ	34	Limonene	468	91.9	0.044	ppm	
372	371	2010-0115	Skimming operations (water)	6/16/2010	Queen Bee	Skimmer Operator	PBZ	34	Naphthalene	468	91.9	0.0021	ppm	t
373	372	2010-0115	Skimming operations (water)	6/16/2010	Queen Bee	Skimmer Operator	PBZ	34	Total hydrocarbons	468	91.9	2.6	mg/m3	



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

J	K	L	M	N	O	P	Q
sample_time	sample_volume	concentration	units	qualifier	method	comments	corresponding_report
343	68.6	0.0015	ppm	t	NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_3.pdf
356	71.2	0.0014	ppm	t	NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_3.pdf
296	58.9	0.0022	ppm	t	NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_3.pdf
298	58.9	0.0049	ppm	t	NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_3.pdf
295	58.8	0.0021	ppm	t	NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_3.pdf
304	61	0.0033	ppm		NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_3.pdf
276	54.3	0.0021	ppm	t	NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_3.pdf
304	61.1	0.0007	ppm	n	NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_4.pdf
445							report_4.pdf
460							report_4.pdf
450							report_4.pdf
461							report_4.pdf
470							report_4.pdf
183							report_4.pdf
591							report_4.pdf
694							report_4.pdf
759							report_4.pdf
357							report_4.pdf
306							report_4.pdf
751	74.9	0.0026	ppm		NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_4.pdf
224	22.5	0.0021	ppm	t	NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_4.pdf
245	24.5	0.048	ppm		NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_8.pdf
216	21.5	0.16	ppm		NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_8.pdf
490	49	0.072	ppm		NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_8.pdf
505	51.8	0.068	ppm		NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_8.pdf
558	56.3	0.11	ppm		NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_8.pdf
543	54.2	0.076	ppm		NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_8.pdf
545	54.1	0.057	ppm	t	NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_8.pdf
50	10	0.0043	ppm	t	NMAM 1403 with modifications		http://www.cdc.gov/niosh/hhe/pdfs/interim_report_1.pdf



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

	Personal Breathing Zone	General Area	Total Samples
Booming	46	150	196
Decontamination	249	12	261
Dispersant application	123	856	979
In-situ burning	59	575	634
Skimming	81	100	181
Work at the source	282	44	326

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

Compound	OSHA PEL	Lowest OEL* (Country)	Maximum Personal Breathing Zone Sample Point
2-Butoxyethanol	50 ppm	2 ppm (France)	0.28 ppm ←
Anthracene	N/A†	N/A	0.0029 mg/m ³
Benzene	1 ppm	0.1 ppm (US)	0.0059 ppm
→ Carbon monoxide (ceiling)	N/A	200 ppm (US)	220 ppm
Carbon monoxide	50 ppm	20 ppm (EU)	3 ppm
Chrysene	N/A	N/A	0.011 mg/m ³
Dipropylene glycol butyl ether	N/A	N/A	0.063 ppm
Ethyl benzene	100 ppm	20 ppm (France)	0.0086 ppm
Fluoranthracene	N/A	N/A	0.00014 mg/m ³
Fluorene	N/A	N/A	0.001 mg/m ³ ‡
Limonene	N/A	20 ppm (Germany & Switzerland)	0.085 ppm
Naphthalene	10 ppm	10 ppm (all reported)	0.11 ppm
Phenanthrene	N/A	N/A	0.012 mg/m ³
Propylene glycol	N/A	N/A	0.17 mg/m ³
Pyrene	N/A	N/A	0.0041 mg/m ³
Toluene	200 ppm	20 ppm (Japan)	0.074 ppm
Total hydrocarbons	N/A	N/A	9.1 mg/m ³
Total PAHs	N/A	N/A	0.020 mg/m ³
Total particulates	15 mg/m ³	10 mg/m ³ (Canada)	0.18 mg/m ³
Xylene	100 ppm	25 ppm (Denmark)	0.046 ppm

*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 updated August 2010)

†N/A = not applicable

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

Questions?

