NOAA Fisheries
Analytical Response to the Gulf Oil Spill

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Tuesday April 20, 2010: Deepwater Horizon explodes and begins a massive oil spill

Analytical procedures initiated for testing Gulf of Mexico seafood
NOAA Goal – Safe Seafood

Goal of 2010 Response:

To ensure public safety and consumer confidence in Gulf of Mexico seafood while re-opening the closed area in federal waters as expeditiously as possible.
DWH Seafood Safety Concerns

- **Polycyclic Aromatic Hydrocarbons (PAH)**
  - FDA has established levels of concern for PAHs in seafood
  - PAH’s in seafood detected by sensory and chemical evaluations

- **Dispersants (Corexit®)**
  - Used for breaking up oil slicks
  - Low human toxicity
  - Do not accumulate in seafood
  - Break down rapidly and become highly dispersed in Gulf waters

- **Mercury / Arsenic**
  - Very small components of crude oil -- in the PPB range
Protecting the Public from DWH-Contaminated Seafood: A Three-Pronged Approach

1. Precautionary Closures
   - Closure of fishing and shellfish harvesting areas that have been or are likely to be exposed to DWH oil
   - Monitor fish caught just outside closed areas
   - Enforcement - NOAA, USCG, states

2. Strict Re-opening Protocol
   - No oil
   - Seafood testing – Chemical and Sensory

3. Surveillance
   - Air / on-water monitoring
   - 3 Post-opening seafood samplings
   - Dockside and seafood processing facilities monitoring
   - Long-term seafood and environmental monitoring
NOAA Seafood Sampling Sites
Chemical Testing

- Chemical analysis detects deleterious components of oil (PAHs) and dispersants that are of concern for human health.

- All the samples tested in federal waters were well below the FDA’s level of concern, routinely 100 to 1000 times below that level.
## FDA PAH Levels of Concern

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Levels of Concern (PPM)</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>13 g/day (Shrimp and Crabs)</td>
<td>12 g/day (Oysters)</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>123</td>
<td>133</td>
</tr>
<tr>
<td>Fluorene</td>
<td>246</td>
<td>267</td>
</tr>
<tr>
<td>Anthracene/ Phenanthrene</td>
<td>1846</td>
<td>2000</td>
</tr>
<tr>
<td>Pyrene</td>
<td>185</td>
<td>200</td>
</tr>
<tr>
<td>Fluoranthene</td>
<td>246</td>
<td>267</td>
</tr>
<tr>
<td>Chrysene</td>
<td>132</td>
<td>143</td>
</tr>
<tr>
<td>Benzo(k)fluoranthene</td>
<td>13.2</td>
<td>14.3</td>
</tr>
<tr>
<td>Benzo(b)fluoranthene</td>
<td>1.32</td>
<td>1.43</td>
</tr>
<tr>
<td>Benz(a)anthracene</td>
<td>1.32</td>
<td>1.43</td>
</tr>
<tr>
<td>Indeno(1,2,3-cd)pyrene</td>
<td>1.32</td>
<td>1.43</td>
</tr>
<tr>
<td>Dibenz(a,h)anthracene</td>
<td>0.132</td>
<td>0.143</td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>0.132</td>
<td>0.143</td>
</tr>
</tbody>
</table>

LOC includes alkylated homologues, for example C-1, C-2, C-3, C-4 napthalenes, fluorenes, anthracenes, fluoranthenes, pyrenes and chrysenes. Alkylated homologues are assumed to have similar toxicities to the parent compounds.

Cancer criteria are based on a one-in-a-one hundred thousand increase in the lifetime (78 yr) upper bound cancer risk adjusted to account for exposures which are expected to last 5 years (78/5 yr).
Naphthalene Levels in Seafood Collected in Re-opening Federal Waters

- Fish: 123,000 (ng/g)
- Shrimp: 32,700 (ng/g)
Anthracene + Phenanthrene Levels in Seafood Collected in Re-opening Federal Waters
Benzo[a]pyrene Levels in Seafood Collected in Re-opening Federal Waters

Benzo[a]pyrene (ng/g)

- 132 (ng/g)
- 35 (ng/g)

Fish Below LOD
PAHs in “Reopening” Gulf Seafood

PAHs (ppb) in Reopening Seafood Samples

- 1988 fish samples
- 406 shrimp samples
- 12/9/2010

- Fish Below LOD
- Shrimp Below LOD
- Fish
- Shrimp
- Shrimp Action Limit
- Fish Action Limit

Data points:
- 1,846,000
- 123,000
- 132,000
- 135,000
- 185,000
- 246,000
- 246,000
- 490,000
- 13,200
- 32,700
- 35,000
- 49,000
- 65,300
- 65,300
- 3,500
- 1,320
- 1,320
- 1,320
- 350
- 350
- 350
- 132
- 132
- 35
- 35
- 0.1
- 1
- 10
- 100
- 1000
- 10000
- 100000
- 1000000
- 10000000

GDP* analytes that pose a cancer risk:
- BAP*
- DBA*
- BAA*
- BBF*
- IDP*
- BKF*
- NPH
- CHR*
- PYR
- FLU
- FLA
- ANTPHN
What About Dispersants?

Concern regarding concentrations applied and the widespread use of dispersants in the aftermath of the Deepwater Horizon incident.
Dispersants in Gulf Seafood

Dioctyl Sodium Sulfosuccinate (µg/g)

- Fish Below LOD
- Shrimp Below LOD

[Diagram showing the concentration of Dioctyl Sodium Sulfosuccinate in Gulf seafood samples, with data points indicating the levels below the limit of detection (LOD).]
DWH/BP Oil Spill: Federal Fisheries Closure and Other Information

- Website: fisheries.noaa.gov/region/southeast
- Call 1-888-INFO-FDA with questions or concerns about seafood or to report any seafood you have purchased that you suspect of being contaminated with oil.