Seafood Safety in the Wake of the Deepwater Horizon Oil Spill

- ***What are the benefits of consuming Gulf of Mexico seafood?***

The health benefits of seafood are well documented. Seafood contains long chain omega-3 fatty acids which are critical to heart, eye, brain and immune system health. Pregnant women should be especially interested in consuming seafood because omega-3 fatty acids aid in fetal brain development.

Cetin, I and B. Koletzko. 2008. Long-chain Ω-3 fatty acid supply in pregnancy and lactation. Current Opinion in Clinical Nutrition and Metabolic Care. 11: 297-302.

- ***What is the Federal and State authority for safety of seafood?***

The National Marine Fisheries Service (NMFS) advises on the safety of harvesting from waters that may have been contaminated by harmful substances; the U.S. Food and Drug Administration (FDA) has authority over the edible portions of seafood and seafood products after harvest; and the Environmental Protection Agency (EPA) has an advisory role regarding the environment from which seafood is harvested, under the Toxic Substances Control Act (TOSCA). State regulations typically mirror the FDA requirements and states often have an MOU (memorandum of understanding) with the FDA to conduct inspections on behalf of the federal agency.

- ***What is the basis of determining if seafood from an oil affected area is safe?***

NMFS has published protocols for monitoring seafood, and the FDA has honored this in the event of seafood harvests from oil impacted areas. First, there is a precautionary closure of fishing grounds in the area of the spill. With wave motion, if there is a sheen of oil on the water further away from the spill site, that area and a large safety buffer is closed to all seafood harvesting. FDA maintains and updates tolerance limits for suggested seafood consumption rates based upon identified compounds of concern. These are usually hydrocarbons that may contaminate water, soil, groundwater and aquatic life and contain contaminants of concern (COC) such as aliphatics, aromatics and asphaltics. Most often, these are called PAHs or polycyclic aromatic hydrocarbons (also polynuclear aromatic hydrocarbons). Consumption of PAHs represents the greatest health hazard in seafood contaminated from an oil spill.

Yender, R, J Michel, and C Lord. 2002. Managing Seafood Safety after an Oil Spill. Seattle: Hazardous Materials Response Division, Office of Response and Restoration, National Oceanic and Atmospheric Administration. 72 pp.

- ***How does this determination of PAHs provide safety in seafood?***

The levels of concern of the PAHs are calculated to provide for health protection and include a large margin of safety. This calculation determines the very low levels of PAHs that would have to be contained in seafood products and eaten every day over a lifetime to cause a health risk.

Bolger, M and C Carrington. 1999. Hazard and risk assessment of crude oil in subsistence seafood samples from Prince William Sound: lessons learned from the Exxon Valdez. In L. Jay Field et al. (eds.). Evaluating and communicating subsistence seafood safety in a cross-cultural context: Lessons learned from the Exxon Valdez oil spill. Pensacola Society of Environmental Toxicology and Chemistry. pp. 195-204.

ICF-Clements Associates. 1988. Comparative potency approach for estimating the cancer risk associated with exposure to mixtures of polycyclic aromatic hydrocarbons. Interim final report EPA 68/02/4403. Fairfax, Virginia. U.S. Environmental Protection Agency.

Nisbet, ICT and PK LaGoy. 1992. Toxic Equivalency Factors (TEFs) for polycyclic aromatic hydrocarbons (PAHs). Regulatory Toxicology and Pharmacology 16:290-300.

U.S. Environmental Protection Agency (USEPA). 2000a. Guidance for assessing chemical contaminant data for use in fish advisories, Volume 1: Fish sampling and analysis, Third Edition. EPA 823/B/00/007. Washington, D.C.: Office of Science and Technology, U.S. Environmental Protection Agency.

U.S. Environmental Protection Agency (USEPA). 2000b. Guidance for assessing chemical contaminant data for use in fish advisories, Volume 2: Risk assessment and fish consumption limits, Third Edition. EPA 823/B/00/008. Washington, D.C.: Office of Science and Technology, U.S. Environmental Protection Agency.

- ***Are PAHs a part of our lives?***

Yes. PAHs are part of refined oil products as well as crude oil. For example, these volatile compounds are released when filling one's car or lawnmower with gasoline or diesel fuel. The PAHs are also added to food by grilling and smoking.

Kazerouni, N, Sinha, R, Hsu, C-E, Greenburg, A and N Rothman. 2001. Analysis of 200 food items of benzo[a]pyrene and estimation of its intake in an epidemiologic study. Food and Chemical Toxicology. 39: 423-436.

Phillips, DH. 1999. Polycyclic aromatic hydrocarbons in the diet. Mutation Research. 443: 139-47.

- ***Can seafood really be smelled to detect petrochemical contamination?***

Absolutely. Field screeners are trained and able to detect 10 ppm petrochemical contaminants which are indicative of the presence of PAHs. Any seafood that smells of petrochemical contamination would be rejected. This is the first defense in identifying oil contaminated seafood and preventing it from entering the marketplace. Professional "sniffers" are able to detect to 1 ppm. As a matter of reference, 10 ppm of PAHs is equivalent to one drop in one gallon of water.

Davis, HK, Moffatt, CF and NJ Shepherd. 2002. Experimental Tainting of Marine Fish by Three Chemically Dispersed Petroleum Products, with Comparisons to the *Braer* Oil Spill. Spill Science & Technology Bulletin. 7: 257-278.

Mearns, A.J. 1995. Elements to be considered in assessing the effectiveness and effects of shoreline countermeasures. Spill Science & Technology Bulletin 2: 5-10.

Ogata M, Miyake Y, Fujisawa K, Ogura T and M Aramaki. 1986-1987. Oily smell and oil components in fish flesh reared in seawater containing heavy oil. Oil and Chemical Pollution. 3: 329-341.

- ***Is smelling the seafood the only testing conducted?***

No. If the seafood passes the field smell test, samples are then sent for odor and taste testing by a panel of trained inspectors. If the seafood passes smell and taste tests, samples are subjected to sophisticated laboratory tests for PAHs.

Ogata M, Miyake Y, Fujisawa K, Ogura T and M Aramaki. 1986-1987. Oily smell and oil components in fish flesh reared in seawater containing heavy oil. Oil and Chemical Pollution. 3: 329-341.

http://www.fda.gov/Food/ucm217598.htm

Yender, R, J Michel, and C Lord. 2002. Managing Seafood Safety after an Oil Spill. Seattle: Hazardous Materials Response Division, Office of Response and Restoration, National Oceanic and Atmospheric Administration. 72 pp.

- ***How many samples have been analyzed?***

By the end of 2010, more than 2,000 seafood samples were evaluated by Federal and State agencies. None of the samples tested contained levels of COCs approaching levels for concern. The regulatory agencies have continued a higher rate of testing because of an abundance of caution.

http://new.dhh.louisiana.gov/assets/docs/SurveillanceReports/SeafoodSurveillance/SeafoodUpdate_2_07_11.pdf

- ***How is seafood harvesting areas re-opened?***

If and once a specific area of water was determined to have an absence of oil, and seafood samples were tested and determined to be free or below levels of concern of PAHs, then this area would be opened to fishing.

http://www.fda.gov/Food/ucm217598.htm

- ***Is there assurance that seafood has been harvested from open waters?***

Those who first receive seafood from fishing boats must document that it was harvested from waters opened by the NMFS (Federal waters) and the Louisiana Department of Wildlife and Fisheries (State waters). This assurance of harvest from open waters must be documented in the processor's HACCP plan.

http://www.fda.gov/Food/FoodSafety/HazardAnalysisCriticalControlPointsHACCP/SeafoodHACCP/ucm215430.htm

- ***What are dispersants?***

Dispersants contain surface active agents, or surfactants, that prevent the oil from forming oil-in-water emulsions, which are much harder to breakdown by natural weathering and degradation. Dispersants are commonly used in everyday living and are used in shampoo, liquid body wash, dish detergent, laundry detergents, liquid cosmetics and household cleaners. Dawn™ dishwashing liquid (containing dispersants) is the most common cleaner used to de-foul and clean birds and other animals contaminated during an oil spill.

http://www.itopf.com/spill-response/clean-up-and-response/dispersants/

- ***Why were dispersants used?***

Dispersants were used to reduce oil slicks into dispersed droplets; the increased surface area greatly speeds biodegradation.

http://www.dec.state.ak.us/spar/perp/star/23dispersants.pdf

http://www.itopf.com/spill-response/clean-up-and-response/dispersants/

- ***Will dispersants contaminate the seafood in the Gulf?***

It is unlikely. The dispersants have a short half-life and quickly biodegrade. Furthermore, the typical ratio of dispersant to oil is 1 part dispersant to 20 parts oil.

http://www.dec.state.ak.us/spar/perp/star/23dispersants.pdf

- ***How do health officials determine a safe level of dispersants used?***

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) restricts dispersant use. Dispersants must be on a national list of approved substances which is maintained by the EPA.

http://www.epa.gov/osweroe1/content/ncp/product_schedule.htm

- ***How long will the oil from the Deepwater Horizon spill be seen in the Gulf?***

This depends on a number of factors. Oil is a biogenic product resulting from the decomposition of organic matter over millions of years. It is ubiquitous, or present everywhere, and naturally occurring in coastal regions of the world. Naturally occurring microorganisms (primarily bacteria) exist in areas where oil seepage exists. The exact type will vary depending upon the depth (and therefore temperature) of the water column. Bacteria consume the oil as food and discharge water and carbon dioxide as waste products over a period of weeks to months, depending upon the temperature. The growth of the bacteria and decomposition of the oil takes place far more quickly in warm, coastal waters versus deeper, colder waters.

Atlas, RM. 1995. Petrochemical biodegradation and oil spill remediation. Marine Pollution Bulletin. 31: 178-182.

Spies, RB, Rice, SD, Wolfe, DA, and BA Wright. 1996. The effects of the Exxon Valdez oil spill on the Alaskan coastal environment. Proceedings of the Exxon Valdez Oil Spill Symposium. American Fisheries Society Symposium. Vol. 18: pp. 1-16.

- ***Will oil from the spill continue to surface?***

Ninety percent or more of the oil will have degraded through evaporation, weathering or by bacteria. It is the inert portion (less than 10 percent) that is more resistant to biodegradation and will be seen for months, and 1 to 3 percent will be seen for several years.

Atlas, RM. 1995. Petrochemical biodegradation and oil spill remediation. Marine Pollution Bulletin 31: 178-182.

Spies, RB, Rice, SD, Wolfe, DA, and BA Wright. 1996. The effects of the Exxon Valdez oil spill on the Alaskan coastal environment. Proceedings of the Exxon Valdez Oil Spill Symposium. American Fisheries Society Symposium. Vol. 18: pp. 1-16.