



Contaminated Discharges from Offshore Oil and Gas Operations

Offshore oil and gas operations produce a number of waste streams that can contaminate waters and bottom sediments around offshore platforms. These waste streams include produced water, ballast water, displacement water, deck drainage, drilling muds, drilling cuttings, produced sand, cement residue, blow-out preventer fluid, sanitary and domestic wastes, gas and oil processing wastes, slop oil, cooling water, and desalination brine. Amongst these, drilling muds and produced water pose the greatest potential threats to aquatic environments.¹ Both are released in extremely large amounts from offshore platforms.²

Produced and formation waters have been shown to contain oil, inorganic salts, and technological chemicals, and trace metals. Discharges in both produced water and drilling muds and cuttings can include heavy metals (mercury, cadmium, zinc, chromium, copper, and others) biocides, corrosion and scale inhibitors, detergents, emulsifiers, and oxygen adsorbents- all potentially toxic to aquatic organisms.

Studies have shown that drilling discharges caused changes in rates of respiration and heart contraction of salmon fry at 2-15mg/l for 1-2 minutes and also found reduced survival at 5mg/l for 10-30 days for cod and flounder. Other studies found synthetic drilling muds caused disturbances of physiological functions and behavior responses at 15-40mg/l for 2-5 minutes for cod fry, flounder, and salmon.³

Environmental studies by MMS in the Gulf of Mexico showed that zones around oil platforms had sediments with higher levels of contaminants and toxicity, reduced levels of abundance, species diversity, genetic diversity, and reproductive success.⁴ Heavy metals such as mercury were amongst the contaminants found in the area's sediments and were also found in elevated levels in the tissues of fish and shrimp near the platforms. Other studies funded by MMS showed drilling discharges in the Gulf of Mexico caused widespread, long-term, sublethal effects on planktonic organisms such as amphipods and copepods, which are key food sources for salmon and other types of fish, as well as whales, and seals.⁵ This raises concern over the bioaccumulation of contaminants in species important for subsistence and commercial fisheries in the Bristol Bay region.

The discharge of drill cuttings onto the seabed has also been shown to alter the seafloor structure and could potentially physically smother juvenile and larval forms of crab.⁶

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¹ Patin, Stanislav (1999). *Environmental Impact of the Offshore Oil and Gas Industry*. East Northport, NY: EcoMonitor Publishing.

² Many proponents of developing Bristol Bay assert that zero discharge is the effluent standard for drilling muds and produced waters. While this may be true outside of Alaska, the federal government has not imposed this standard for oil and gas development in Cook Inlet. It therefore cannot assume that this would be the standard for development of Bristol Bay.

³ Patin (1999).

⁴ Montagna, P. GOOMEX: Experimental Design and What The Data Mean. *Minerals Management Service Website*. Accessed June 22, 2005 at: http://www.mms.gov/eppd/scicom/sc_mercury/goomex_presentation.htm

⁵ Peterson et al. (1996) Ecological consequences of environmental perturbations associated with offshore hydrocarbon production: a perspective on long-term exposures in the Gulf of Mexico. *Canadian Journal of Fisheries and Aquatic Sciences* 53, pp. 2367-2654.

⁶ Patin (1999).