

Exposure to Oil Mist and Oil Vapour During Offshore Drilling in Norway, 1979–2004

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Objectives: To describe personal exposure to airborne hydrocarbon contaminants (oil mist and oil vapour) from 1979 to 2004 in the mud-handling areas of offshore drilling facilities operating on the Norwegian continental shelf when drilling with oil-based muds.

Methods: Qualitative and quantitative information was gathered during visits to companies involved in offshore oil and gas production in Norway. Monitoring reports on oil mist and oil vapour exposure covered 37 drilling facilities. Exposure data were analysed using descriptive statistics and by constructing linear mixed-effects models.

Results: Samples had been taken during the use of three generations of hydrocarbon base oils, namely diesel oils (1979–1984), low-aromatic mineral oils (1985–1997) and non-aromatic mineral oils (1998–2004). Sampling done before 1984 showed high exposure to diesel vapour (arithmetic mean, AM = 1217 mg m⁻³). When low-aromatic mineral oils were used, the exposure to oil mist and oil vapour was 4.3 and 36 mg m⁻³, and the respective AMs for non-aromatic mineral oils were reduced to 0.54 and 16 mg m⁻³. Downward time trends were indicated for both oil mist (6% per year) and oil vapour (8% per year) when the year of monitoring was introduced as a fixed effect in a linear mixed-effects model analysis. Rig type, technical control measures and mud temperature significantly determined exposure to oil mist. Rig type, type of base oil, viscosity of the base oil, work area, mud temperature and season significantly determined exposure to oil vapour. Major decreases in variability were found for the between-rig components.

Conclusions: Exposure to oil mist and oil vapour declined over time in the mud-handling areas of offshore drilling facilities. Exposure levels were associated with rig type, mud temperature, technical control measures, base oil, viscosity of the base oil, work area and season.

Keywords: exposure • offshore • oil drilling • oil mist • oil vapour