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INTERIM FINAL ASSESSMENT OF ENVIRONMENTAL FATE AND EFFECTS OF DISCHARGES FROM OFFSHORE OIL AND GAS OPERATIONS

by

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Lignosulfonates--

Lignosulfonates, by-products of the pulp and paper industry, are considered the best all-purpose deflocculants for water-based drilling fluids, and serve to maintain the mud in a fluid state. Water is not generally used to thin barite-containing muds because this practice increases the total fluid volume, reducing barite concentration and increasing the barite required to achieve a necessary density; therefore, chemical deflocculants are used.

Ferrochrome lignosulfonates are the most widely used deflocculants. They perform over a wide alkaline pH range, are resistant to common mud contaminants, are temperature stable to approximately 177°C (350°F), and will function in high soluble salt concentrations. Chromium can represent up to three percent by weight of ferrochrome lignosulfonate; the mud aqueous fraction of used seawater ferrochrome lignosulfonate drilling fluid contains approximately 1 ppm chromium. Most of this chromium is in the less toxic trivalent form. Moreover, most of the chromium is bound to clay particles, further limiting its bioavailability and toxicity (McCulloch et al., 1980).

Lignites--

Lignites are used as deflocculants, like lignosulfonates, but are substantially less soluble in seawater. Lignite products are used to thin freshwater muds, reduce drilling fluid loss to the formation, and aid in the control of mud gelation at elevated temperatures.

Other Additives--

Other basic drilling fluid components, such as lime [$Ca(OH)_2$], caustic soda (NaOH), and carbonate/bicarbonate, are used to control drilling fluid pH. Drilling fluid pH, which typically ranges from 9.0 to 10.5, affects the dispersibility of clays, solubility of various chemicals, corrosion of