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Scientific Advisory Committee Summary
"Accumulation of Polycyclic Aromatic Hydrocarbons
by *Neocalanus* Copepods in Port Valdez, Alaska"

Empty tankers bound for Port Valdez carry seawater ballast in crude oil tanks to maintain vessel stability during transit. At the Port Valdez Alyeska Marine Terminal, tankers transfer their oily ballast water into the Ballast Water Treatment Facility (BWTF) where the oil-water mixture is treated to remove much of the oil prior to discharging the ballast water into the port. The treatment process, consisting of physical separation and biodegradation stages, does not remove all the crude oil from the water. Some of the mixture's constituents, including polycyclic aromatic hydrocarbons (PAH), enter the port waters. The treatment plant discharges on average 9,000,000 gallons of ballast water per day into Port Valdez. The PAH, a component of crude oil, typically remains dissolved in seawater for a relatively long time. This study looked for their presence in an important copepod.

The purpose of this study was to identify the presence of hydrocarbons, presumably originating from the BWTF, in the water column and in marine organisms. The goals of the study were: 1) measure PAH concentration and composition in a planktonic copepod, *Neocalanus plumchrus*; 2) compare PAH composition in this copepod to composition of Alaska North Slope crude oil and other known signals; and 3) describe the probable extent of PAH biologically available to this copepod in Port Valdez as a result of tanker and diffuser activity. *N. plumchrus* is an important food source for many larger animals such as salmon. This copepod produces high quantities of fats and oils, which accumulate hydrocarbons from seawater. These 'bioaccumulated' hydrocarbons are concentrated to levels much higher than usually found in seawater, typically a thousand times or more. Sea water samples were also examined for hydrocarbons.

In April 2004, both PAH and another hydrocarbon component, alkanes, consistent with effluent from the ballast water treatment facility were detected in *N. plumchrus* in Port Valdez. These PAH concentrations were small (about 1 µg /g dry weight on average) and concentrations in the water were below the method detection limits (the total was less than 0.02 µg/L). Previous studies indicate that about 10µg/L PAH can be toxic to copepods. Hydrocarbon concentrations were highest in the eastern and central part of Port Valdez, the general area of effluent discharge, and least in the vicinity of a reference site in western Prince William Sound. Furthermore, the PAH composition in copepods matched Alaska North Slope crude oil best where concentrations were highest and did not match Alaska North Slope crude oil at sampling sites away from the treatment plant. Spatial distribution and hydrocarbon composition suggest that hydrocarbons from the diffuser contribute to elevated concentrations observed in *N. plumchrus* tissue in Port Valdez. Although Alaska North Slope oil-based hydrocarbons are present in the water of Port Valdez and accumulate in this copepod, they appear to be too low to trigger decreased survival and other viability measurements. The contractor's conclusion that releases of treated ballast water into Port Valdez are not harming this copepod species could be changed sometime in the future as more information becomes available concerning the potential multigenerational effects of chronic oil exposure to copepods and their predators.