

SUBTIDAL STUDY NUMBER 3A

Study Title: Bioavailability and Transport of Hydrocarbons

Lead Agency: NOAA

Cooperating Agency: ADEC

PROJECT JUSTIFICATION

The goal of the NOAA component of project Subtidal Study #3 is to document petroleum hydrocarbon loading in near shore waters impacted by the Exxon Valdez oil spill. In 1989, hydrocarbon loading was monitored by direct sampling of seawater in Prince William Sound and in 1989, 1990, and 1991 by deployment of hydrocarbon-free mussels along the oil spill trajectory for exposure periods of 1 to several months.

In 1989, chemical analysis of the seawater samples showed the presence of aromatic hydrocarbons of petroleum origin. Total aromatic hydrocarbon concentrations ranged up to about 8 µg/l (ppb) at the most heavily contaminated sites 8 days after the spill, but after 6 weeks declined to below detection limits. Although higher than concentrations reported by Exxon, these concentrations were still lower than those known to cause detectable adverse effects on biological marine resources following relatively short-term exposures.

Caged mussels are sensitive indicators of oil in seawater, because they effectively contact large volumes of seawater, and selectively filter and ingest organic particulates. In 1989, both aromatic and aliphatic hydrocarbons of petroleum origin were detected in tissue of caged mussels at concentrations ranging up to 100 µg/g wet tissue (ppm), and were detected at all stations and depths inside Prince William Sound along the spill trajectory.

Outside Prince William Sound, hydrocarbon concentrations were generally low and highly variable among replicates. However, mussels exposed at Tonsina Bay and Chignik showed moderate levels of contamination. Oil contamination levels in the caged mussels declined after May 1989 and approached control levels by Fall 1989. In 1990, oil contamination levels that were significantly above control levels were low and sporadic.

These results from the caged mussels indicate that biologically available hydrocarbons from the Exxon Valdez oil spill were generally pervasive in the upper water column along the spill trajectory inside Prince William Sound during the summer of 1989.

This biological availability may result from association of petroleum hydrocarbons with particulate organic material in the

water column that can be ingested by larval herring and juvenile salmon, thus providing a mechanism for the adverse effects observed in these fish (see Fish/Shellfish studies).

The Alaska Department of Environmental Conservation component of project Subtidal Study #3 involved the deployment of sediment traps at selected locations within Prince William Sound. Results indicate that petroleum hydrocarbons associated with near-shore sediments or organic particulates can migrate to greater depths. In 1991, caged mussels were deployed with the sediment traps to determine the biological availability of trapped hydrocarbons. These results will help to evaluate additional injury to biological resources caused by these migrating hydrocarbons.

The analysis and interpretation of these results will be completed and a final report produced in 1992.

	BUDGET (\$K)
Salaries	\$ 32.1
Travel	2.2
Contracts	0.0
Supplies	0.0
Equipment	0.0
Subtotal	<u>\$ 34.3</u>
General Administration	4.8
Total	<u>\$ 39.1</u>