Attached #1

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About 2000 words

UNDERSTANDING ALYESKA:

THE OIL INDUSTRY AND ALASKANS

by Riki Ott

In the designated deep water anchorage just off Knowles Head in Prince William Sound, two oil tankers swing on the hook as they await a pilot boat to escort them up Valdez Arm through the Narrows and into Port Valdez to the Alyeska oil terminal. The Alyeska terminal is the southern-most point of the trans-Alaska pipeline system. The terminal clings to the steep sides of snow-covered mountains on the south shore of the deep water fijord across from the town of Valdez.

Both tankers ride high in the water exposing much of their red hulls, enormous rudders and bulbous bows, normally all below the waterline. The tankers come north nearly empty and hungry for the Prudhoe Bay crude oil at Alyeska. They look tippy, riding so high out of the water but they have both tanked down with just enough seawater–approximately 30% of their total volume–to make them stable for the trip north. When they reach the terminal, they pump off this ballast water and take on the black gold which is then transported south to refineries Outside.

Over 20 percent of the United States' domestic oil comes from the North Slope and the Alyeska terminal is a busy place with a constant stream of tankers arriving, light and high, and leaving, low and squatty. Besides being an oil terminal, Alyeska is a ballast water treatment facility, the largest in the United States, because the seawater which tankers bring north becomes contaminated with residual oil as it sloshes around in tanker holds and this oil must be removed before the ballast water can be discharged into the receiving waters of Port Valdez.

This ballast water treatment facility has been operating for ten years. During this time, Alyeska has routinely discharged **petroleum hydrocarbons** (the compounds found in crude oil) into the water under a discharge permit authorized by the U.S. Environmental Protection Agency and monitored by the Alaska Department of Environmental Conservation (ADEC).

While Alyeska scientists steadfastly maintain there are no pollution problems in Port Valdez resulting from these routine discharges, independent National Marine Fisheries Service and NOAA scientists report that the total hydrocarbon concentration in Port Valdez sediments and blue mussels, an indicator organism, is near the low end for chronically polluted marine environments in North America. Who is the public to believe?

To understand the extent of these environmental problems, one must first understand how the Alyeska facility was designed to operate (Figure 1). Oil comes down the pipeline under pressure and, before it is loaded onto tankers, the oil is sent **crude oil storage tanks** where the oil is allowed to "off-gas." (When the pressure on the oil is released, the oil "fizzes" like opening a can of Coke.) The poisonous crude oil gases or vapors collect in the tops of the cone-shaped crude oil storage tanks. These vapors (similar to what you smell when you fill your car up with gasoline) are drawn by a centralized compressor system to incinerators where the hydrocarbons in the vapors are destroyed by burning them at high temperatures (1400 degrees F). This process is called the **vapor recovery system** (Fig. 1).

The oil is now ready to be loaded onto tankers but before the tankers can onload oil, they must offload **ballast water**. Tankers pump their contaminated seawater ballast into **ballast water holding tanks** (Fig. 1) which store ballast water until it can be properly treated. This system allows tankers to offload their ballast water quickly so they can onload oil.

Ballast water then flows into **impound basins** (Fig. 1) where, in theory, bacteria physically eat or degrade the hydrocarbons, removing these compounds from the water. The treated ballast water is discharged as **effluent** directly into the receiving waters of Port Valdez. Again in theory, the effluent now meets the state's water quality standards.

The Alyeska ballast water treatment facility was designed as a model plant but problems arose when actual plant construction and operation veered away from the blueprint models. Originally the plant was designed in three phases; each phase increased the physical size of the plant as the volume of oil coming down the pipeline increased (Table 1).

Table 1.

Phase	Oil Flow Rate	# Ballast Water Storage Tanks	# Crude Oil Storage Tanks	# Incinerators
1	about 0.6 mbd	3	14	3
2	1.2-1.5 mbd	3	22	3
3	over 2.0 mbd	5	32	5

Today, however, the plant is the exact same size as when it was built in 1977 despite over a two fold increase in pipeline throughput. Alyeska is currently operating in Phase III oil production (over 2.2 million barrels per day) with only a little over Phase I plant capacity: 3 ballast water storage tanks, 18 crude oil holding tanks and 3 incinerators.

Because the Alyeska facility is overloaded, neither the ballast water treatment system nor the vapor recovery system can keep up with the oil flow. The result is that large quantities of hydrocarbons are entering the water and air in Port Valdez daily during standard plant operations.

The vapor recovery system is both overloaded and badly in need of major repairs. Five of the seven compressors do not work because of corrosion (Prudhoe Bay crude oil contains a high percentage of sulfur compounds which are very corrosive) and the remaining two compressors are not enough to drive the entire vapor recovery system. To cut expenses, miles of pipeline for the vapor recovery system were built with mild steel instead of stainless and this pipeline is corroding badly throughout its length. The incinerators have trouble maintaining the high temperatures necessary to properly combust the crude oil vapors: between 1980 and 1987, inclusive, the incinerators were operating properly 6% of the time.

To compound the problems with the vapor recovery system, since early 1987 large volumes of natural gas liquids (NGLs) have been routinely injected into the pipeline when it was discovered that addition of NGLs substantially increase oil flow by reducing friction. NGLs contain a high proportion of "light ends" (highly volatile hydrocarbons) and therefore cause a much greater degree of off-gasing than crude oil alone. Additional incinerators are necessary to handle the additional vapors from the NGLs; yet Alyeska officials have made no plans to increase the size of the vapor recovery system to compensate for the additional vapors from NGLs.

To avoid stressing the rapidly weakening vapor recovery system, crude oil is loaded directly onto the tankers from the pipeline. The oil off-gases in the tanker holds releasing tons of noxious hydrocarbon vapors untreated into the air daily.

The ballast water treatment system simply does not work. Bacteria need both time and warm temperatures to properly degrade hydrocarbons: with the present system, they have neither. Because of the shortage of ballast water holding tanks, the ballast water must be rushed through the impound basins to prevent slow-downs in tanker traffic and oil flow. The bacteria are not very active in cold water. Because of the cold temperatures and rapid flow, the bacteria do not have time to eat the hydrocarbons. The resulting effluent contains high levels of hydrocarbons.

The DEC has granted Alyeska a **mixing zone** which is a volume of water in which toxic compounds in effluent mix with surrounding seawater and are diluted so that the state's water quality standards will be met at the mixing zone boundaries. However, the DEC criteria specifically state that there shall be NO MIXING ZONE ALLOWED for compounds which accumulate in the sediment or are carcinogenic. The effluent from Alyeska contains compounds which are both known **carcinogens** and powerful **mutagens** (compounds which change DNA in ways which can be passed on to offspring). The heavier weight hydrocarbons found in sludge are also known to accumulate readily in sediment.

As a result of both the standard operating procedures at Alyeska and the presence of a mixing zone, high levels of hydrocarbons in the sediment have been reported by independent scientists. But hydrocarbons are extremely mobile compounds; that is they are readily taken up by organisms and passed throughout the foodweb (see accompanying insert). Scientists have documented the following pathway for flatfish: 1) hydrocarbons settle out of the water column and collect in the sediment; 2) "bugs" (small invertebrates) pick up the hydrocarbons from the sediment while feeding; 3) flatfish pick up the hydrocarbons from the bugs while feeding; 4) the hydrocarbons are broken down in the liver (which is where poisons are sent for detoxification); 5) the resulting break-down products or **metabolites** are themselves toxic; and 6) these metabolites cause cancer in the flatfish. A similar pathway of uptake and accumulation of hydrocarbons has been demonstrated for chinook salmon.

The types of compounds that Alyeska is discharging can cause long-term environmental damage by reducing the reproductive potential of fish and other aquatic organisms. The waters of Port Valdez lie within Area E and

are part of a rich fishery which in 1987 yielded over $70 million worth of salmon and herring product. Halibut, tanner crab and shrimp are also harvested commercially and for subsistence within Port Valdez. Clams are taken for personal use as well as salmon by sports fishermen. The local communities of Cordova, Valdez and Whittier are directly affected by their fishing interests in Area E.

But the implications of the environmental problems in Port Valdez affect all Alaskans, not just the communities in Prince William Sound because the eight oil companies that, as a consortium, own and operate Alyeska are the same eight oil companies that work the North Slope oil fields and want to open the Arctic National Wilderness Refuge (ANWR) for oil development. If Alyeska is an example of how these oil companies operate "in an environmentally sound manner," what are they doing in more remote wilderness areas with even less supervision than they have at Alyeska?

In its ten years of operation, the trans-Alaska pipeline system has paid for itself over three times. The money exists and the technology exists to operate a ballast water treatment facility with minimal environmental impact. (Other oil industries both in the Lower 48 and other countries operate oil terminals with carbon filter systems with off-gas capture.)

The oil companies responsible for Alyeska need to upgrade the plant and include a state-of-the-art ballast water treatment system. Construction and maintenance work need not cost jobs on the North Slope; rather such work could employ local Alaskans. Surely it costs less, both financially and in terms of worker safety, to continually maintain and upgrade a system rather than to operate or rebuild a completely run-down system.

Other countries also use independent technical review boards composed of representatives from regulatory agencies, the oil industry, scientists, other affected commercial or recreational industries, environmentalists, and the general public to oversee and monitor operations. Perhaps we should establish such a group for monitoring Alyeska and the North Slope operations: can we really believe that <u>one</u> DEC employee <u>working part-time</u> in Valdez is enough to supervise an oil industry which supplies over 20% of the United State's domestic oil?

In light of the oil industry's practices at Alyeska, Alaskans should carefully consider the decision to open ANWR for further oil development. At a time when a single sockeye salmon is worth more than a barrel of oil, we must weigh the long-term benefits from our renewable resources against

the costs of our nonrenewable resources. Perhaps it is time to insist that we want oil AND A CLEAN ENVIRONMENT.

The author has a Masters in oil pollution and a Ph.D. in sediment pollution. She is a gillnet fisherman in Area E and a member of the Board of Cordova District Fishermen United and United Fishermen of Alaska

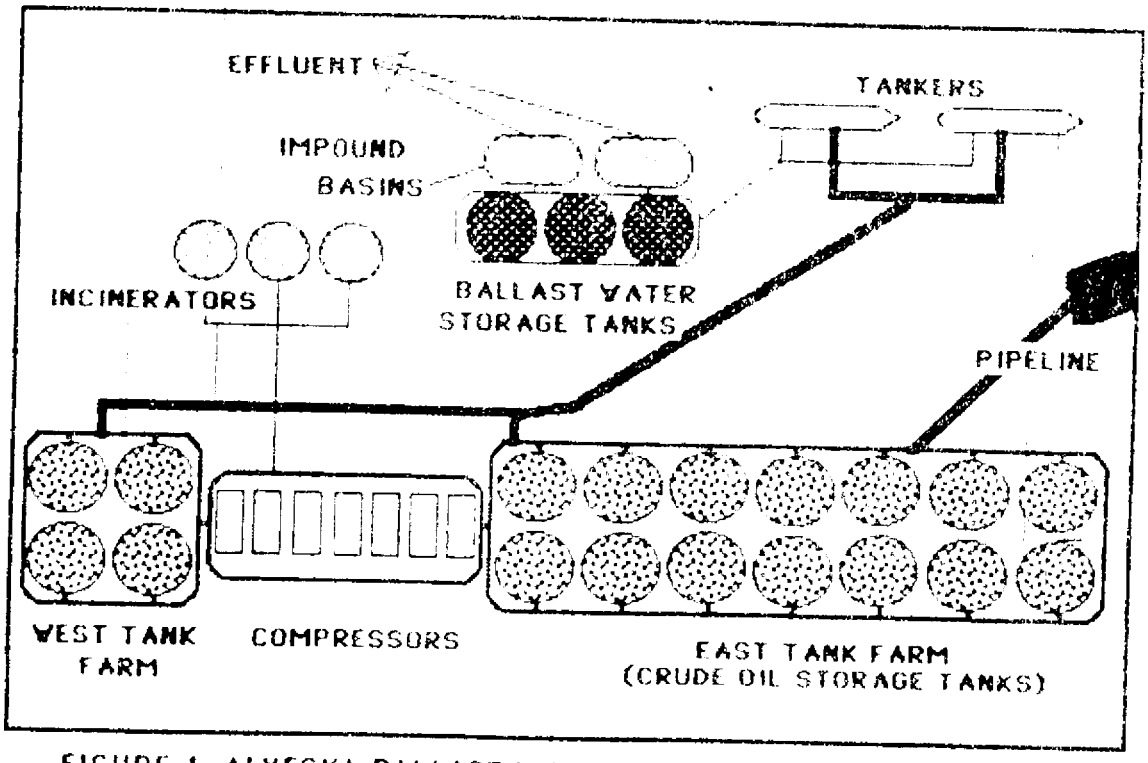

FIGURE 1. ALYESKA BALLAST WATER TREATMENT FACILITY