Discharge of Waste into Arctic Waters

Myth- Zero discharge is standard for other sensitive areas, why not Alaska OCS?

<u>Reality:</u>

• The term "zero discharge" can be easily misinterpreted by stakeholders in relation to Oil and Gas operations in Norway. It was believed that drilling in Norway was being undertaken with zero discharge when in fact a more appropriate definition of the practice in Norway would be zero "harmful" discharge. There is one exception, the Barents Sea.



- Shell meets the very high standard of zero 'harmful' discharge.
- Even the Barents Sea (part of the Arctic ocean, north of Norway and Russia), there is 'zero volume' discharge for mud and cuttings, for sections of the hole after a riser has been installed, but that <u>does not</u> include the top-hole section of the well.
- Even in countries that claim zero discharge, they do not practice zero discharge 100% of the time. In most cases, some waste streams are discharged, under dispensation, including the top-hole sections of drill muds and cuttings.
- Transport of drill cuttings to maintain zero discharge will have an overall negative effect on the environment and subsistence hunting by increasing air pollution and solid waste generation and management. It will also increase energy consumption (for boats, cranes, trucks and earth-moving equipment at waste disposal sites)--The increase in marine traffic could have an impact on subsistence hunting.

Myth- Shell can discharge up to 18,000 barrels per day.

<u>Reality:</u>

- Shell anticipates discharging less than 10,000 barrels (bbls) in total for each well section in our drilling season. NPDS permit allows 18,000 BPD (barrels per day). Our actual daily discharge will be about 1% of permitted volumes (less than 200 BPD).
- The reason why Shell has a larger daily discharge rate than is expected to be used, is because the discharge permit is a 'General Permit' (issued by US EPA), which covers all operators in the area
- Release of various discharges is allowed by EPA under the National Pollutant Discharge Elimination System (NPDES) permits. This includes sewage wastes from Arctic municipalities like the NSB. There are various other discharges allowed in other Arctic regions.

Myth- Shell will be discharging waste directly to the sea.

<u>Reality:</u>

• Shell will be testing all waste on the rig prior to discharge, and the discharge of the waste will be in strict compliance with regulations in place.

Myth- Shell will be discharging raw sewage into the paths of bowhead whales.

<u>Reality:</u>

- Shell will not be dumping wastes in "the paths" of bowheads during the hunt. There would be no impact on the bowhead whale hunt as drilling in the Beaufort in 2010, as planned, will start and end before the bowhead whale hunt.
- All sewage streams will be treated prior to being discharged, to a similar or better standard than that



required of the communities of the North Slope.

Myth- Over time, accumulations of muds and cuttings will damage the seafloor and local ecosystem (creating <u>"dead zones")</u>.

<u>Reality:</u>

• Due to a variety of natural processes, areas where mud and cuttings have been discharged recover fairly quickly, it is often difficult to determine where they are several years after discharges have ceased. There are no documented instances of these areas becoming "dead zones."

Myth- Shell will be discharging toxic chemicals into the Arctic water.

<u>Reality:</u>

- The water-based muds that Shell plan to use in the Beaufort Sea are composed of materials that are chemically inert in the environment, including water, barite, salt, and bentonite clay.
- Studies conducted throughout the world's oceans for over 30 years have shown that water based drilling muds are essentially non-toxic, and that the effect on marine life is slight to none.



- Based on the weight of evidence from laboratory and field studies around the world and in the Arctic, it is the conclusion of government experts, scientists and the North Slope Borough (NSB) Science Advisory Committee that water-based mud and cuttings generated by our exploratory drilling activities <u>will not</u> negatively impact the environment, marine mammals or local communities
- Our modeling shows that all cuttings will settle out quickly and will have no more effect on water quality than Spring runoff from rivers into the Beaufort in terms of organic matter, peat, oil from surface seeps, and turbidity. So, it is very doubtful that the whale hunt would be affected by mud and cuttings. If it is, the plume area is so small (compared to the total area available for the migration) as to be statistically insignificant
- The only effects that have been measurable have been to bottom communities living within 100-200 meters of the discharging structure. These seafloor effects usually disappear within a few years after the discharge has ceased. Upon revisiting prior wells drilled in the Alaska Arctic, there is no indication of a negative impact.

Myth- Technology has not improved.

<u>Reality:</u>

- The important aspect of this recent post-exploration study was that it used the latest, state of the art analytical techniques, which allow the detection of different chemical elements to extremely low concentrations.
- Shell was one of the first companies to use environmentally friendly synthetic fluids to drill its deepwater wells. Shell was the first oil & gas operator that was granted a discharge permit in the environmentally sensitive Eastern Gulf of Mexico (Florida & Alabama), due to a large extent to its pro-active approach to waste minimization technology and Best Management Practices.
- Industry has made significant improvements in discharging drilling fluid Industry has developed more environmentally sensitive drilling methods to move away from use of oil-based fluids during drilling.

Myth- Shell has not considered onshore disposal as an option.

<u>Reality:</u>

• Shell believes shipping mud and cuttings for onshore disposal would have a greater overall environmental impact than discharging on site. Onshore disposal of waste would result in increased vessel traffic, therefore would lead to additional noise, waste, air emissions, water use and human exposure to the elements.



Discharge of Waste into Arctic Waters (2)

Myth- temperature of the waste being discharged into the Arctic will affect ecosystems.

<u>Reality:</u>

Shell has previously provided the North Slope Borough with information on thermal plumes (model runs). The actual temperature difference between the heated water that may be discharged into the Beaufort Sea and the ambient seawater is only about 1.4 centigrade. This is quickly reduced back to the background temperatures within meters of the discharge. By the time the plume gets 1000m away from the rig in 4 hours, the temperature has dropped from a 1.4 deg C increase to 0.038 deg C increase. That is a very small temperature difference regardless of ambient water temperature at the drill site. That's also about the distance of the anchor marker buoys away from the drilling rig.

Myth- Whales avoid sewage discharge and they will be deflected away.

Our sewage is treated aboard the ship and chlorinated to kill bacteria such that it meets or exceeds municipal waste water standards in compliance with USCG regulations. We do not discharge raw sewage to the sea; the Coast Guard inspects our treating facility before certifying the drillship to work in the Arctic. If the black water gathering and treating facilities aboard the ship are not in top condition, it cannot proceed into the Chukchi or Beaufort Seas, much less anchor and drill there.

Myth- The mud and cuttings discharged affects a wide area from the rig

By the time the plume is 6000 feet from the drill site, the concentration of Total Dissolved Solids (the material in the mud that doesn't drop to the seafloor in the first 200m) has dissipated to less than 1 mg/kg (about 1 ppm). This is getting to the concentration where it is probably undetectable by any of the senses of most mammals.

