FACT SHEET
ALL ABOUT OIL

WHAT IS OIL?

Oil is a general term used to describe a wide variety of natural substances of plant, animal or mineral origin.

Crude oils and their refined petroleum products consist largely of hydrocarbons (chemicals composed of hydrogen and carbon) in various molecular arrangements.

They may also contain varying levels of other substances such as oxygen, sulphur, nitrogen and metals such as iron, nickel and chromium.

Oils from different geographical areas have their own unique properties and each type of oil has characteristics that influence its behaviour when spilled.

Accurate identification and an understanding of these characteristics helps the response team determine the likely behaviour of the oil, the effect that it may have on the environment and the most effective response method.

Properties of oils commonly spilled in New Zealand

	Type			
Property & Description	**GASOLINE**	**DIESEL**	**HEAVY FUEL OIL**	**LUBE OIL**
VISCOSITY The measure of the flow of resistance. The lower the viscosity-the easier it will flow and spread over the surface	*LOW*	*LOW*	*HIGH*	*MOD-HIGH*
SURFACE TENSION The resistance to spreading over another liquid. Low-tension material will spread more easily.	*LOW*	*MOD*	*MOD*	*MOD*
VOLATILITY The tendency to evaporate. High volatility materials will evaporate more easily but combined with a low flash point present an explosion hazard.	*HIGH*	*LOW*	*VERY LOW*	*VERY LOW*
SOLUBILITY The tendency for all or part of oil to dissolve in water. The soluble component of oil may be harmful to aquatic organisms.	*VERY LOW*	*VERY LOW*	*VERY LOW*	*VERY LOW*
SPECIFIC GRAVITY A measure of an oil's density. High density material may sink and smother organisms on seabed.	*LOW*	*LOW*	*HIGH*	*MOD*
EMULSIBILITY The tendency to form stable masses suspended in water. High emulsiblity spreads oil throughout water column, extending contamination affecting free- swimming species.	*VERY LOW*	*LOW*	*HIGH*	*HIGH*

Flammability How likely a product is to catch fire when its vapours are exposed to an ignition source.	*VERY HIGH*	*MOD*	LOW	*VERY LOW*

WHAT DOES OIL LOOK LIKE?

Oil spills look different depending on the type of oil spilled and the length of time spent in the water. Common features include:

Black oil

A black or very dark brown layer of oil. Oil tends to quickly spread out over the water surface to a thickness of about 0.1 millimetre. However, from the air, it is impossible to tell how thick a black oil layer is.

Sheen

A sheen is a very thin layer of oil. Depending on thickness, sheens range in colour from dull brown for the thickest sheens to rainbows, greys, silvers, and near-transparency in the case of the thinnest sheens.

Mousse

An emulsified mixture of water in oil. Mousse can range in colour from dark brown to nearly red or tan, and typically has a thickened or pudding-like consistency compared with fresh oil.

Pancakes

Isolated, roughly circular patches of oil ranging in size from a few feet across to hundreds of meters in diameter.

Streamers

A narrow line of oil, mousse, or sheen on the water surface, surrounded on both sides by clean water. Streamers result from the combined effects of wind, currents, and/or natural convergence zones. Often, heavier concentrations of mousse or sheen will be present in the centre of a streamer, with progressively lighter sheen along the edges. Streamers are also often called "fingers" or "ribbons."

Tarballs

Weathered oil that has formed pliable balls or patches that float on the water. Tarballs can range in diameter from a few millimetres to half a metre. Depending on how weathered, or hardened, the outer layer of the tarball is, sheen may be present.

Windrows

Streaks of oil that line up in the direction of the wind.

OIL AND ITS BEHAVIOUR

Natural processes are always at work in the marine environment. The actions of winds, waves, and currents (called *Weathering*) causes spilled oil to break down and become distributed throughout the water.

A range of natural processes can occur depending on the type and nature of the oil:

Dispersion
Dispersion involves the oil becoming broken down into small droplets, which are then distributed throughout the water column by the movement of water.
The presence of oil in these small droplets makes them available to micro-organisms such as bacteria and fungi in the water, which assist in the breakdown of the oil to harmless products.

These droplets may also result in the creation of a secondary slick or thin film on the surface of the water.

Evaporation
Evaporation occurs when the lighter substances within the oil mixture become vapours and leave the surface of the water. This process leaves behind the heavier components of the oil, which may undergo further weathering or may sink to the bottom of the ocean floor.

Oxidation
Oxidation occurs when oil contacts the water, and oxygen combines with the oil to produce water-soluble compounds. This process affects oil slicks mostly around their edges. Thick slicks may only partially oxidize, forming tar balls. These may linger in the environment and collect in the sediments of slow moving streams or lakes or wash up on shorelines long after a spill.

Biodegradation
Biodegradation occurs when micro-organisms such as bacteria and fungi feed on oil. A wide range of micro-organisms is required for a significant reduction of the oil. Nutrients such as nitrogen and phosphorus are sometimes added to the water to encourage the micro-organisms to grow and reproduce.

Emulsification
Emulsions consist of a mixture of small droplets of oil and water. Emulsions are formed by wave action, and can greatly hamper weathering and cleanup processes by increasing the volume of oil. Two types of emulsions exist: water-in-oil and oil-in-water.

IDENTIFYING THE OIL
Finding out the type and characteristics of the oil spilled is one of the earliest tasks undertaken by the response team.

Proper classification and an understanding of the chemical and physical properties of the spilled oil helps determine the hazard to personnel and wildlife, the effects that may be observed on adjacent shorelines or estuaries and the form a response should take.

The response team must understand the amount and composition of the oil they are dealing with to establish how it will react to the various clean up options.
One of the important challenges for any response team is to predict where and how fast the oil may move.
Visual information is gathered on the oil slick, usually from the air, along with detailed local information on tides, currents and weather forecasts.

STORAGE AND DISPOSAL

Once an oil spill has been contained or when the shoreline clean up is underway, the recovered oil, oily debris and contaminated beach material has to be properly disposed of. The recycling and disposal options selected for oily waste will depend upon the types and volume of waste generated from the response operation, storage, treatment and disposal technology available, environmental law and the cost of each option.
All waste must be disposed of in an environmentally sensitive manner in accordance with the Resource Management Act 1991.

The oil industry in New Zealand has formed the Used Oil Recovery Group (UORG) to provide for nationwide responsible collection and management of used oil. The UORG comprises: BP Oil NZ Ltd, Shell NZ Ltd, Castrol NZ Ltd, Caltex Oil (NZ) Ltd, Milburn NZ Ltd, the Ministry for the Environment and the Ministry of Economic Development.