



Diagram of Dome Petroleum's planned Arctic Production and Loading Atoll.

Island year round—it would be in the upper reaches of Zone 6.

Since the regulations were adopted, some extraordinary ships have been built and more are on the way.

The Canadian icebreakers *John A. Macdonald* and *Laurier*, approximately Class IV, may operate in Zone 1 from August 15 to September 15.

Dome Petroleum's experimental icebreaker *Kigoriak* has a basically straight-sided hull, with a spoon-shaped bow. The bow has a "reamer" which breaks ice at least six feet wider than the hull. This and beveled sides at the stern make it easier to turn.

The motor vessel *Arctic* was commissioned in June, 1978, and is Class II. It is the world's first ice-breaking (as distinguished from ice-strengthened) cargo ship. It is able to cut through two feet of level, first year ice at a speed of four to five knots. It has a double-skinned bow, three times stronger than the bows on ice-strengthened ships that operate on the St. Lawrence and in the Baltic Sea.

The *Arctic* has an airbubble system, similar to one developed in Finland, which eases it through the ice. The air bubbling along the ship's sides keeps loose ice in motion, acting as a lubricant to reduce friction.

The ship has a controllable pitch propeller enclosed in a duct, which both protects the blades from ice and directs the thrust toward the stern. This is a great advantage when the ship is moving through the ice at slow speeds.

The *Arctic* has a capacity of 28,000 tons and is 688 feet long, about the size of a Great Lakes freighter. It has extended the Arctic shipping season from three months to five. It can move bulk cargo, such as ore concentrates, from the high Arctic to any port in the world. It was built at Port Weller Drydocks in the Niagara Peninsula. Canarctic Shipping Ltd., a federal government agency, owns 51 per cent of it, and three private companies, Canada Steamship Lines, Federal Commerce and Navigation, and Upper Lake Shipping, each own 16½ per cent. It cost \$40 million.

The *Arctic* is the first of a planned line. If ice-breaking oil tankers and liquefied natural gas carriers are found to be environmentally safe, they will probably be at work within eight years.

On the Way

Three more unprecedented ships—an icebreaker, a supply ship and an Arctic dredge—are due in 1983.

They will be guided by REMSCAN—remote sensing communications systems—which will relay information on weather and ice received from satellites, aircraft and shipboard radar.

Dome Petroleum's Arctic dredge will be capable of moving about 11 million cubic metres of fill in a year and of storing 25,000 cubic metres of sand inside its hull. It will meet at least Class IV ice-breaking standards and will dredge year round to depths of 250 feet.

Dome also has a design for an Arctic tanker with a double-skinned hull. Oil would be carried only in the inner section. The hull could be subdivided and would have twin propellers and twin rudders to give it increased maneuverability.

Production Follows

In the Arctic, production systems must be more elaborate than in the North Atlantic—they must be able to resist the inevitable ice.

Artificial drilling islands can be enlarged and permanent facilities set up. Other systems can be anchored in the sea.

In Cook Inlet, for example, there is already a steel jacketed platform, supported by four columns, rising sixty feet above the sea's surface. It is anchored to the floor by steel pilings driven 350 feet below the mud line. There is no cross-bracing since such braces would add to the stresses by impeding ice movement.

A variety of production systems for the future



The Arctic.