

## The way you lived and died

	Australia	Canada	France	Federal German Republic	Italy	Japan	Netherlands	Sweden	UK	US
Population (millions)	13.1	22.1	52.2	62.0	54.9	108.4	13.4	8.1	56.0	210.4
Crude birth rate (per thousand)	18.9	15.7	16.4	10.3	16.1	19.3	14.5	13.5	13.9	14.9
GDP per capita (\$)	4,900	5,410	4,900	5,610	2,510	3,760	4,410	6,140	3,100	6,170
Death of infants in 1st year per thousand live births	16.7	16.8	12.9	20.4	25.7	11.7	11.6	9.6	17.5	17.6
Percentage of relevant age group in higher education	28	50	30	16	28	24	20	31	21	44
Grams of animal protein per inhabitant per day	71	66	68	58	45	31	56	58	56	75
Total primary energy requirements in tons of oil equivalent per capita	4.6	8.2	3.5	4.7	2.6	3.2	6.0	4.7	4.3	9.1
Telephones per thousand inhabitants	340	499	199	268	206	315	299	576	314	628

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## North to Alaska

from Angela Croome

THE development of large nearshore oil deposits in the North is likely to rationalise the use of shipping in both the American and Soviet Arctic. Since the Americans have so far made no commitment to an Arctic shipping fleet and the projected Alaskan pipeline's cost has now escalated beyond all bounds there is now a good argument for reconsidering freighting under the ice in cargo submarines. Once a fleet of cargo subs had been built the system would appear to be cheaper as well as safer than available alternatives.

The capacity to navigate the polar sea passages across North America and the Soviet Union is not properly used by either nation. The technology for bringing cargo out through the North West passage throughout the year was effectively proved in 1970 with the successful voyage of the supertanker *Manhattan*, but no use has yet been made of this solution. On the other hand, freight is regularly brought out through the Soviet "Northern Sea Route", and plans are in hand to expand the navigation despite the growth of alternative and less arduous land routes.

A North West passage to the Pacific was first attempted as long ago as the reign of Elizabeth I, and the search for it preoccupied many explorers and claimed the lives of not a few. It was in the course of the search for the ill-fated Franklin expedition last century that the route was found though it was not until 1944 that a ship actually got through. The setting up

and supply in the 1950s of the Canadian DEW-line (of defence radars) across northern Canada brought more traffic to the NW sea-route than ever before or since. Fifty ships and 15,000 people were being moved around the Canadian margin of the Arctic Ocean at one time but always escorted by ice-breakers. It had been suggested early on that the NW passage would be more easily negotiated under the ice by submarine. An attempt was made by a First World War US submarine, the *Nautilus*, in 1931 but she got no further than half a hull's length beneath the ice. Nuclear submarines with their much longer submergence times simplified the task and in 1954 the US *Sea Dragon* negotiated the passage entirely beneath the ice. The obvious development now was for cargo-carrying submarines to bring out freight from the Canadian Arctic but there were no bulk products to bring at the time. The situation changed with the proving of oil in Prudhoe Bay, Alaska in 1968, and various alternative transport methods were considered. Ice-strengthened giant tankers which could operate independently of ice-breakers were an attractive possibility and in 1970 an experiment was hastily put together to test the feasibility of this idea. The largest tanker ever built in the United States, the *Manhattan*, jointly commissioned for the job at \$40 million by three oil companies including BP was sliced up and the parts distributed among the shipyards of the North East US for ice-strengthening. (This was partly for speed and partly because no single shipyard could handle such a large ship 307 m long with a 45 m beam.)

Dr Charles Swithinbank now head of the Geology department of the British Antarctic Survey who accompanied the USS *Manhattan* as a member of the glaciological team on its pioneering voyage to Prudhoe Bay in 1970 recently discussed the "modern North West Passage" at a polar symposium at the National Maritime Museum, Greenwich. The object of the experiment was to establish how large a horsepower would be required to drive a 250,000-ton tanker through the ice, and so the *Manhattan* was in fact an over-powered half-scale experiment. The glaciologists made detailed measurements of the ice all along the route which was deliberately chosen to run through the toughest ice—which a normal voyage would avoid. *Manhattan's* passage was triumphantly successful; she had no difficulty in breaking through the thickest ice and regularly preceded her icebreaker escort and a great deal of valuable glaciological and bathymetric data were collected. The conclusion was that it would be feasible for supertankers to service the Prudhoe Bay oil-wells 12 months a year.

Nevertheless analyses at the time indicated that bringing the oil out by pipeline would be cheaper, although in the event 800 miles of pipeline have been deteriorating in store at Valdez for several years, and the pipeline cost has escalated to an estimated \$5,000 million. The actual cost of transporting a barrel of oil from Prudhoe by submarine cargo-ship was estimated as marginally cheaper in 1970 at 90 cents a barrel, but of course there was no such fleet available.

An almost opposite situation characterises the North East Passage—the