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Extracted from personal papers of Bernt Balchen, 11 October 1967 to 29 October 1970; 168.7053-178, in USAF collection, AFHRA; all pages

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RETURN TO

AFSHRC
MAXWELL AFB AL 36112

SMC

GENERAL DYNAMICS

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ISMC

RETURN TO
AFSHRC
MAXWELL AFB AL 36112

68-70563-178
67/10/11 —
70/10/24

INTEROFFICE COMMUNICATION

Date: October 11, 1967

To: E. H. Heinemann

From: Bernt Balchen

Subject: Warm-Up of the Arctic Regions

The melting of the ice in the Arctic Ocean is progressing a little ahead of schedule, as predicted by Professors Ahlman, Sverdrup, Petterssen and Liljequist. Their predictions were: By 1980-85 the Arctic Ocean will be free or nearly free of ice during the summertime and allow commercial shipping to use these lanes between Europe and the Far East.

At my conference at Upsala with Professor Liljequist, he confirmed this.

Professor Liljequist stated that during the last ten years the temperature over the Arctic has been a little higher than anticipated, so some shortening on reaching the navigable status of the Arctic Ocean can be expected. They are going to bring their data up to current status.

In the last 26 years -- I started my work in the Arctic for the U. S. Air Force in 1941 -- Thule opened up for resupply by sea from about the middle of August to mid-September. Today, in 1967, Thule is open from about July 1 and until November. Just one proof of the truth of this forecast.

The tremendous sources of iron ore and other metals and oils in the Arctic will then be available for full exploitation by conventional equipment for mining and transportation during a short summer season.

The preliminary figures that I have are as follows: 2.2 billion barrels of oil in the Arctic Archipelago, 3-5 billion metric tons of iron ore in Labrador, Baffin Island, Ellesmere Island. I expect to have these numbers confirmed shortly.

During the rest of the year there is a real requirement for special cold weather equipment such as:

- Icebreakers of various sizes
- Icebreaking barges
- Oil drilling rigs for operations in ice-clogged waters during the cold part of the year
- Mining, excavating and transportation equipment designed for cold weather operations
- Housing and communication equipment for these environments

Bernt Balchen

Bernt Balchen

BB/jms
Enc.

1007720

GENERAL DYNAMICS

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INTEROFFICE
COMMUNICATION

Date: October 23, 1967

To: E. H. Heinemann

From: Bernt Balchen

Subject: Warm-Up of the Arctic Regions

The melting of the ice in the Arctic Ocean is progressing a little ahead of schedule, as predicted by Professors Ahlman, Sverdrup, Petterssen and Liljequist. Their predictions were: By 1980-85 the Arctic Ocean will be free or nearly free of ice during the summertime and allow commercial shipping to use these lanes between Europe and the Far East.

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The tremendous sources of iron ore and other metals and oils in the Arctic will then be available for full exploitation by conventional equipment for mining and transportation during a short summer season.

The preliminary figures that I have are as follows: 33 billion barrels of oil in the Arctic Archipelago, 130 billion metric tons of iron ore in Labrador, Baffin Island, Ellesmere Island. These figures are an excerpt from a speech by Arthur Laing, Minister of Northern Affairs, on September 27, 1966.

During the rest of the year there is a real requirement for special cold weather equipment such as:

Icebreakers of various sizes

Icebreaking barges

Oil drilling rigs for operations in ice-clogged waters during the cold part of the year

Mining, excavating and transportation equipment designed for cold weather operations

Housing and communication equipment for these environments

Bernt Balchen

BB/jms

Bernt Balchen

GENERAL DYNAMICS

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File

INTEROFFICE COMMUNICATION

Date: December 5, 1967

To: E. H. Heinemann

From: Bernt Balchen

Subject: Warm-Up of the Arctic Regions

The melting of the ice in the Arctic Ocean is progressing a little ahead of schedule, as predicted by Professors Ahlman, Sverdrup, Petterssen and Liljequist. Their predictions were: By 1980-85 the Arctic Ocean will be free or nearly free of ice during the summertime and allow commercial shipping to use these lanes between Europe and the Far East.

At my conference at Upsala with Professor Liljequist, he confirmed this.

Recent U. S., Canadian, European and Soviet scientific work and forecasts on the vast subject of the heat budget for the Arctic Ocean appears to be leading to conclusions that, if confirmed, must become a matter of great concern to the Northern Hemisphere. The indication is that the Arctic Ocean ice cover is vulnerable, and that if it were to vanish, it would not form again. The central argument is that the thin (some 12 feet) floating pack ice could melt away within a very short time (a few years to a few decades). The climatic changes, for the middle latitudes, would be of greatest consequences to the Northern Hemisphere owing to the northward shifting of the storm paths with their precipitation patterns. The central United States will have very dry winters; very heavy snowfalls can be expected in Northern Canada. Europe will be similarly affected.

The albedo of 60% to 80% limits the absorption of incoming radiation; it acts as an effective inhibitor of heat exchange between the overlying atmosphere and the underlying water. Heat budget calculations give rise to the belief that a reduction of summer albedo of the pack ice from 70% to 60% would melt it in 8 to 10 years; a reduction to 50% would do so in 2 to 3 years. A summer air temperature increase of 10° would melt the ice in no more than 2 years and an increase of 5° would do the job in a few decades.

In the last 26 years -- I started my work in the Arctic for the U. S. Air Force in 1941 -- Thule opened up for resupply by sea from about the middle of August to mid-September. Today, in 1967, Thule is open from about July 1 and until November. Just one proof of the truth of this forecast.

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Bernt Balchen

BB/jms

GENERAL DYNAMICS

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INTEROFFICE
COMMUNICATION

Date: July 24, 1968

To: E. H. Heinemann

From: Bernt Balchen

Subject: Warm-Up of the Arctic Regions

The melting of the ice in the Arctic Ocean is progressing a little ahead of schedule, as predicted by Professors Ahlman, Sverdrup, Petterssen and Liljequist. Their predictions were: By 1980-85 the Arctic Ocean will be free or nearly free of ice during the summertime and allow commercial shipping to use these lanes between Europe and the Far East.

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E. H. Heinemann July 24, 1968

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The tremendous sources of iron ore and other metals and oils in the Arctic will then be available for full exploitation by conventional equipment for all year round mining and exploitation and conventional transportation during the summer season.

The preliminary figures that I have are as follows: 50 billion barrels of oil, 33 billion of which are in the Arctic Archipelago; 750 million metric tons of iron ore in Labrador, Baffin Island, Ellesmere Island, and Alaska. These figures are excerpts from a speech by Arthur Laing, Minister of Northern Affairs, and from assessments made during discussions at long range polar planning committees.

Bernt Balchen

Bernt Balchen

BB/jms

Warm-Up of the Arctic Regions

The melting of the ice in the Arctic Ocean is progressing a little ahead of schedule, as predicted by Professors Ahlman, Sverdrup, Petterssen and Liljequist. Their predictions were: By 1980-85 the Arctic Ocean will be free or nearly free of ice during the summertime and allow commercial shipping to use these lanes between Europe and the Far East.

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Bernt Balchen

Bernt Balchen
July, 1968

Observed Ice Conditions on Flight
from Thule AFB to Point Barrow
July 4, 1968

Ice Conditions

Thule to East Side Devon Island

Slush ice with large open basins of water. Lancaster Sound open to Cape York on Brodeur Peninsula and to Bear Bay in James Sound.

Devon Island to West Side Banks Island

Solid ice cover, long cracks, large melt pools, whole ice surface is water logged and cored. Estimated albedo is 50%. Fast deteriorating surface.

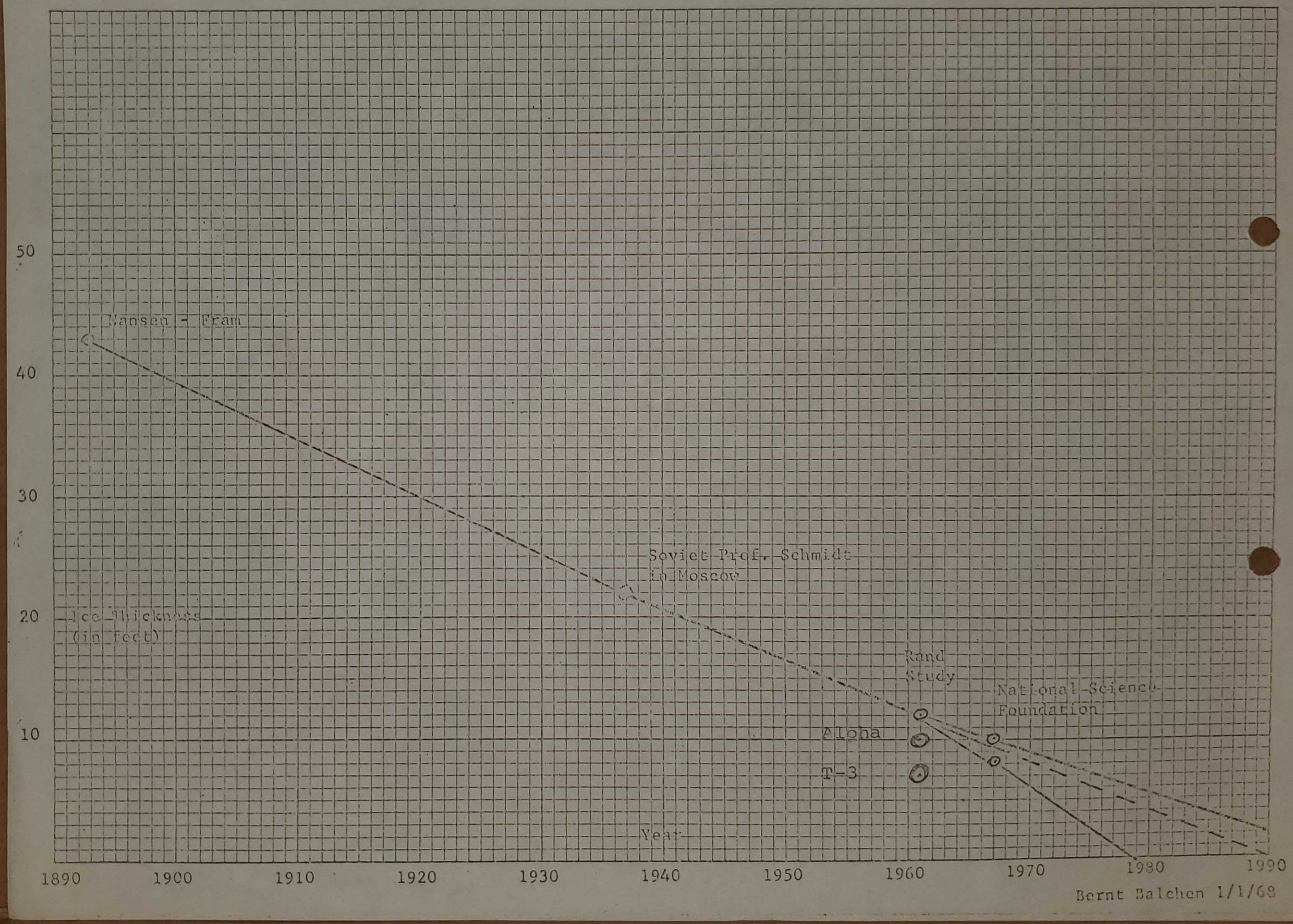
Banks Island to Point Barrow

Large open leads running East-West. Some of them 10-12 miles wide and up to 100 miles long. Ice is thin with numerous melt pools and water logged with slush open patterns over most of surface. This type of ice will, when pushed by wind, open up larger section of the Arctic. With a southerly wind it could leave an open passageway all along the Beaufort Sea coastline. It is a situation which I have never seen nor heard or read of having happened before.

Looked at, in connection with the large flush out of ice between Spitzbergen and Greenland in March, it can lead to thinking of the opening up of the Arctic Ocean for the first time in the very near future -- the next couple of years.

Bernt Balchen

Bernt Balchen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Bernt Balchen 1/1/68

GENERAL DYNAMICS

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GENERAL DYNAMICS
Quincy Division
97 East Howard Street, Quincy, Massachusetts 02169

ROBERT L. STERNBERG

Chief, Advanced Study Group Area 617 - 471-4200, Ext. 3280

Date: November 2, 1967

To: Distribution

From: E. D. Lundell

Subject: U. S. Coast Guard Icebreaker Program

Bernt Balchen and I met with key Coast Guard officers Wednesday, 1 November. Their current program is as follows...

1. Complete preliminary design and issue an RFP for contract design on 1 June 1968.

2. Award contract for contract design in October 1968. (They are investigating the possibility of awarding the contract design responsibility to a shipbuilder, rather than to a Naval architect, such as Gibbs & Cox).

3. Contract design complete 1 July 1969.

4. Construction RFP - 1 August 1969 (90 day response, one month review).

5. Construction award - December 1969.

The Coast Guard is presently performing a study designed to support a multi-ship program. They have a selling job to do within Coast Guard and to their superiors in the Department of Transportation. Col. Balchen briefed the study group, headed by Cdr. Keith Shumacher, for about two hours. They were extremely interested in the facts that he presented. We agreed to furnish further data and will keep in close touch with the development of their study and the selling campaign that is required.

E D Lundell

E. D. Lundell
Washington Office

Distribution: Bernt Balchen, NYO
E. H. Heinemann, NYO
E. J. LeFevre, W.O.
T. J. Kelley, Quincy
Don Kidder, E.B.

GENERAL DYNAMICS
Electric Boat Division

MEMORANDUM

TO: Distribution

DATE December 9, 1968

FROM: G. Kee

FILE NO.: 400/68/GK/12

RECD. S. O. PERRY DEC 10 1968

SUBJECT: Submarine Supertanker Study

REFERENCE:

Enclosure: (1) Description of Study
(2) Preliminary Ship Characteristics

This study is being undertaken, in coordination with the New York office, on a very condensed schedule, to see if a nuclear-powered submarine supertanker can be economically competitive with surface shipping and pipelines in delivering crude oil from northern Alaska to the eastern sea coast of the U.S. We believe there is a very good chance that such will prove to be the case, because of the submarine's ability to operate freely under sea ice. However, the time is very limited: we must get our foot in the door by next January to forestall probable commitments by the major oil companies to surface shipping and pipelines. The potential value of this new business might be more than 30 nuclear-powered submarine supertankers of 200,000 dwt each.

Enclosures (1) and (2) were put together as interim guidelines to ensure that all participants in this study understand its scope and thrust, and that we get the program off to as fast a start as possible. OWO 400-specialty-7054860 is chargeable. Please treat all aspects of this work as company private. The potential stakes for this division have never been higher. We intend to win.

G. Kee, Manager
Systems Economic Analysis
Advanced Program Development

RWJ:eph

Enclosures (2)

Distribution:
R. Butera
F. DeHaan
E. DeLaura
J. Haskell
R. Jones
A. Kalley
D. Lawrence
R. Lewis
G. McAndrew
J. Mead
L. Mowell
R. Nejes
N. Rabe

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Enclosure (1)

SUBMARINE SUPERTANKER STUDY

Objective:

Define the characteristics of a nuclear-powered submarine supertanker of about 200,000 dwt, suitable for operation under the polar pack ice on the route from the North Slope of Alaska to Philadelphia. A preliminary design will be prepared in sufficient depth to demonstrate general feasibility, and to provide a basis for estimating system costs. The aim is to arrive at a submarine system that can be competitive with pipelines and surface ships via the long warm water route, or with surface supertanker and icebreaker convoys via the Arctic route. No military submarine systems or equipment will be installed that are not essential to safe commercial service in peacetime. The size of the ship's company will be minimal. Ship speed will be in the range of competitive surface tankers of comparable tonnage. Ship costs will be based on large block procurement and commercial shipyard (nonmilitary) standards.

Trade Route:

The basic trade route under consideration is the transportation of crude oil from Prudhoe Bay, Alaska, through the Northwest Passage and the Davis Straits to Philadelphia. Transhipment to surface shipping at some ice-free intermediate point such as Godthaab, Greenland may be considered in the economic analyses, if advantageous. The submarine will load and unload on the surface. Both operations must be completed within a period that will ensure ship turnaround in not more than 24 hours. It is assumed that an ice-free terminal area will be provided in which the submarine will surface to load crude oil. The crude oil will have a density of 54 cu ft/long ton. The loading station will furnish means of heating the oil in cold weather, if required to facilitate loading. It is assumed that the submarine will return to Alaska in ballast. However, the possibility on the backhaul of carrying partial cargoes of refined petroleum products; coal, iron ore, or other dense minerals and concentrates; bulk grain; and general cargo will be considered. It is assumed the mineral cargoes may be carried in water.

End Product:

The outcome of the initial study will be a report consisting of:

- A preliminary design of a nuclear-powered submarine supertanker, including sketches, weight and displacement estimates, structural calculations, and design of a shipboard crude-oil handling system.

- A design description of the above with a precis of the nuclear propulsion system. Because of the very short period allowed for this design, quick decisions will have to be made and a number of alternative options may be left unexplored. It is anticipated that recommendations for further design studies will be made.

- A discussion of the design implications of carrying partial cargoes other than crude oil on the return trip to Prudhoe Bay.

- An examination of alternate potential trade routes for a nuclear-powered submarine merchantman in the Arctic.

- A discussion of the producibility of the nuclear submarine supertanker designed.

- Ship acquisition costs for the submarine designed.

- System cost analysis of the submarine supertanker versus a surface system on the Prudhoe to Philadelphia route, and other routes if attractive.

Schedule:	Responsible	Due Date
Submarine Supertanker Design	L. V. Mowell	20 Dec 68
Naval Architecture	N. E. Rabe	
Drawings	F. de Haan	
Weights	D. Lawrence	
Structures	R. Butera	
Cargo Handling	J. Haskell	
Design Description (Draft)	R. W. Jones	20 Dec 68
(Revision)	N. E. Rabe	27 Dec 68
Discussion of Alternate Cargoes (Availability)	R. W. Jones	20 Dec 68
(Design Implications)	N. E. Rabe	27 Dec 68
Alternate Trade Routes	R. W. Jones	20 Dec 68
	J. H. Mead	20 Dec 68
Submarine Supertanker Producibility	A. Kalley	20 Dec 68
Cost Analyses	G. Kee	27 Dec 68
	R. F. Nejes	
	G. McAndrew	
	E. de Laura	
	J. H. Mead	
Final Editing and Publication	R. W. Jones	2 Jan 69
	R. S. Lewis	

Preliminary documentation will be furnished Mr. S. O. Perry, N.Y. office, as it is completed.

Enclosure (2)

SUBMARINE SUPERTANKER
PRELIMINARY CHARACTERISTICS

Dimensions overall	1000 x 120 x 80 ft
Cargo deadweight	about 200,000 long tons
Displacement	
Full-load surfaced	
Light surfaced	
Submerged	280,000 long tons
Draft, full load	70 ft
light	
Speed, surfaced	
submerged	15-16 knots
Shaft horsepower	60,000 (30,000 per shaft)
Operating depth	
Normal	100-400 ft
Maximum	1000 ft
Collapse	1500 ft
Pressure hull material	HY80 steel
Outer hull material	HTS
Complement	less than 40
Reactor plant	Combustion Engineering's Unified Modular Plant, compact 80 Mw (t) PWR
Reactor shielding	cargo or water and distance to the extent feasible
Propulsion	Steam turbines, geared drive
Navigation, under ice	sonar beacons on seabed (no SINS)
on surface	standard surface ship

Auxiliary propulsion	none (no diesel, no main battery; twin reactors and independent machinery plants provide redundancy)
Periscopes	none (closed circuit TV ensures safe surfacing)
Distilling plant	none

GENERAL DYNAMICS

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INTEROFFICE COMMUNICATION

Date: January 22, 1968

To: E. H. Heinemann

From: Bernt Balchen

Subject: Norwegian Defense Industries

Norwegian Defense Industries consists of the following main divisions:

Kongsberg Vaapenfabrik	Ordnance, fire controls computers, Essig. Autocon, rockets, tool manufacturing.
Raufoss Ammunisjonsfabrik	All types of ammunitions - military and sports, explosives.
Horten Naval Dockyard	Surface vessels up to 60,000 tons, naval and commercial subsurface vessels, torpedoes.
Horten Naval Aircraft Factory	Aircraft and engine overhaul. Manufacture of aircraft components.
Noratom	Communication, electronics, avionics and electronic components.
F.F.I.	(Research and Development) Weapons systems, nucleonics, radar, communications.

These industries are under the management of a Defense Industries Board.

Chairman:	J. Chr. Hauge	Reporting directly to the Prime Minister and the Norwegian Cabinet.
Members:	B. J. Hurlen	Director of Kongsberg and Raufoss.
	M. Langballe	Director, Horten Naval Dockyard and Aircraft Factory.
	F. Meyer	Director, Noratom.
	Dr. F. Lied	Director, F.F.I.

Mr. Hauge has repeatedly expressed the desire to enter into a general working agreement with General Dynamics and Norwegian Defense Industries, an association which should have great beneficial potential in the development of capabilities in both military and commercial hardware.

Norwegian Defense Industries are used to working after U. S. drawings conforming to U. S. military specifications and tolerances.

Mr. Hauge was scheduled for a meeting with General Dynamics management in September, 1967. This was cancelled by us as it conflicted with the Paris Air Show. He is waiting to hear further from us.

Bernt Balchen

Bernt Balchen

BB/jms

BID RESULTS FOR GUIDED MISSILE FRIGATES

Naval Ship Systems Command on Tuesday (Aug. 1) opened bids for conversion, modernization of weapons systems, and repair and overhaul of 6 guided missile frigates (DLG 17, 18, 20, 21, 22 and 24. Following is recapitulation of bids showing unit and total prices received:

	BATH	BETHLEHEM	G.D.-QUINCY	TODD
Lot #1 (6 ships)				
1967 Unit	$6,408,660	$8,013,802	$11,220,834	$9,348,678
1968 Unit	6,408,660	8,013,805	11,220,834	9,348,678
TOTAL	38,451,960	48,082,815	67,325,004	56,092,068
Lot #2 (3 ships)				
Unit	6,640,340	8,113,923	12,566,000	9,356,224
TOTAL	19,921,020	24,340,769	37,698,000	28,068,672
Lot #3 (3 ships)				
1967 Unit	6,634,150	8,096,422	12,692,334	9,731,444
1968 Unit	6,634,150	8,096,422	12,692,334	9,731,442
TOTAL	19,902,450	24,289,266	38,077,002	29,194,332
Lot #4 (4 ships)				
1967-8 Unit	6,503,780	7,958,360	12,250,250	9,426,107
TOTAL	26,015,120	31,833,440	49,001,000	37,704,429
Lot #5 (2 ships)				
Unit	6,842,500	8,228,666	13,547,500	9,856,326
TOTAL	13,685,000	16,457,332	27,095,000	19,712,651
Lot #6 (2 ships)				
Unit	6,743,240	8,333,666	13,251,000	9,452,391
TOTAL	13,486,480	16,667,332	26,502,000	18,904,781
Lot #7 (2 ships)				
1967-8 Unit	7,411,590	8,228,660	13,816,000	9,856,326
TOTAL	14,823,180	16,457,320	27,632,000	19,712,651
Plan Work	2,012,500	1,864,000	6,209,000	2,140,000
Subcontract	None	90%/Henry	None	75%/Rosenblatt
Weight Control	132,380	85,000	450,000	50,000

TO PROBE GREAT LAKES MARITIME PROBLEMS

On Friday (Aug. 4), Senate Subcommittee on Merchant Marine & Fisheries will hold hearings on Great Lakes Maritime problems. Senator E. L. Bartlett (D-Alaska) will preside as Chairman.

Slated to testify are: Senator William Proxmire (D-Wis.), C. R. Christianson, Vice President of Christy Corp., at Sturgeon Bay, Wis.; and representatives of Lake Carriers' Assn., Great Lakes Shipowners Assn., Port Authority of Toledo, and Michigan Department of Commerce.

LOW-COST, MULTI-PURPOSE SHIP DESIGN UNVEILED

Design of multi-purpose cargo vessel "which can be built speedily and economically on a mass-production basis by domestic shipyards" was revealed today by James J. Henry - one of nation's leading naval architects. Intended as low-cost replacement for aging dry cargo fleet, design calls for 530-ft.-long, automated, 20-knot vessel of 16,500 deadweight tons.

Henry said vessel would be suitable for all types of cargoes including containers, break-bulk, grain, ore or any combination of these. Four of five holds would be served by twin hatches, and heavy lift gear would be provided between No. 3 & No. 4 holds.

Naval architect said that if ordered in lots of 16, they could be built for about $9 million each. He recommended that 48 ship program be undertaken - sponsored either by government or private industry - and stressed that this should be in addition to subsidized lines' ship replacement programs.

GO-AHEAD GIVEN TO NEW JERSEY ACTIVATION

On Tuesday (Aug. 1), Defense Department announced that battleship NEW JERSEY would be reactivated for Vietnam service. Reactivation work, which DOD said will be performed on "austere basis," will be carried out by Philadelphia Naval Shipyard. It is estimated that cost of work will approximate $27 million and require 9 to 10 months to complete. Ship has been "mothballed" since 1957.

Modernization work will be confined chiefly to updating of battleship's electronic equipment. Mission of vessel will be to bring North Vietnam targets under fire of her 16-inch guns. Ship was similarly deployed during Korean War.

Weekly Bulletin

PBUILDERS COUNCIL OF AMERICA • 1730 K ST., N.W. • WASHINGTON, D. C. 20006 • TEL. 338-7722

Thursday, August 3, 1967 - No. 31

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HOOD CALLS FOR SPECIAL COMMISSION TO BREAK DEADLOCK

Testifying Tuesday (Aug. 1) before House Merchant Marine and Fisheries Committee, Council President Hood called for creation of Commission on American Shipbuilding to break maritime policy deadlock over Transportation Secretary Boyd's foreign building proposal. He also urged that a domestic shipbuilding program encompassing at least 30 ships per year be initiated in FY'69.

These were among recommendations made by Hood while testifying in support of legislation which would establish independent Federal Maritime Administration. While endorsing pending legislation, Council President stressed that independent agency, to function effectively and correct nation's maritime deficiencies, must be backed up by "a clear national purpose with supporting policies, people and plans."

But, main thrust of Hood's remarks dealt with Secretary Boyd's build abroad proposal and latter's refusal to develop any maritime policy or program because of strong Congressional and industry opposition to his controversial recommendation. Said Hood:

"To avoid doing nothing, which is implicit in an all or nothing at all approach, we suggest that the controversy as to foreign shipbuilding be referred to a Commission on American Shipbuilding to be composed of Congressional, Government, public, shipyard, component manufacturers, shipping and labor representatives for resolution. Such a Commission might well determine (1) the level of shipbuilding activity needed to support the national interests of the United States, (2) the present and necessary future capabilities of the U. S. shipyard industry to meet that level, and (3) whether or not any restructuring of the industry might be necessary to meet that level.

"Prior to the submission of a report and recommendations by any such Commission, we urge that the program for constructing at least 30 vessels per year in U. S. shipyards, as advocated by the Secretary of Transportation, be instituted with Fiscal Year 1969. We gather from testimony thus far that budgetary support for such a level of domestic

construction has already been endorsed by the Executive Agencies involved."

Page Groton, Director of Boilermakers Iron Shipbuilders International Marine Council, also appeared before Committee on Aug. 1. He urged that Congress formally reject Secretary Boyd's build abroad proposal by issuing a joint resolution expressing its opposition to building of U.S. flag vessels abroad and also urging an immediate start on an expanded shipbuilding program in American yards. Union official also cited figures which show that if 10 U.S. ships per year were built in foreign yards, U.S. shipyard industry would lose $200 million and 16 million man-hours of employment annually. Additionally, he said allied marine supply firms would lose $100 million and 11.2 million man-hours of work.

NAVY BIDS POSTPONED

Bids which were to have been opened by Navy Aug. 1 covering construction of nuclear-powered guided missile frigate (DLGN-36) have been rescheduled to Aug. 28.

Navy also has announced postponement of construction bids on 2 medium survey ships (T-AGS-33 & 34) from Aug. 8 to Aug. 22. British yards have been invited to bid.

PROCUREMENT OF ICEBREAKERS FROM FINLAND DISCUSSED

Over past several months, it is understood discussions have been taking place between U.S. and Finnish government representatives concerning possible construction of two conventional icebreakers in Finnish shipyard for U.S. Coast Guard.

Though UPI dispatch on July 25 reported "there is little prospect at present that the United States will buy icebreakers from Finland," U.S. Dept. of State is said to not oppose in principle such procurement.

With Coast Guard now located in Dept. of Transportation, whose Cabinet official is actively pushing for construction of U.S. merchant ships in foreign yards, it is important to note that PL 90-37, covering FY '68 authorizations for Coast Guard vessel procurements includes this language: "none of the vessels authorized herein shall be procured from other than shipyards and facilities within the United States." Provision resulted from amendment by Congressman Frank T. Bow (R-Ohio) which was adopted by House on Apr. 12 without dissent. From long-range standpoint, foreign built icebreakers could not be procured without specific authorizing legislation from Congress.

All of this underscores prevailing view that, in last analysis, Congress will decide whether or not ships are to be built abroad.

SHIPBUILDERS BULLETINS

S. O. Perry
G. W. Keach
W. G. Lashbrook
R. A. Cutter
~~T. W. Dunn~~

Return to: TIC

ERAL DYNAMICS CORPORATION

DA

TO:

SUBJEC

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was law clerk to the
rfin, Judge of the United
ppeals for the First Circuit.

Mr. Bennett was graduated from the City College of New York with a B.A. degree, and obtained his J.D. degree from the New York University Law School. He served there as Research and Administrative Assistant to the Institute of Judicial Administration, Inc., and was a member of the Board of Student Editors of the Annual Survey of American Law.

He is admitted to the Bars of the District of Columbia and the State of New York.

Roger Ekins

GENERAL DYNAMICS CORPORATION

DATE: May 9, 1968

TO: All Employes

SUBJECT: Personnel Announcement 68-4

Mr. Gus J. Bennett has recently joined the Chief Counsel's staff as Assistant Counsel.

Prior to joining General Dynamics, he was an attorney in the office of the General Counsel of Continental Oil Company. Mr. Bennett was appointed to the honors program of the Securities and Exchange Commission, Washington, D. C., upon graduation from law school. He served first as a trial attorney with the Division of Trading and Markets, and later as a staff member of the Commission's Office of the General Counsel. He also was law clerk to the Honorable Frank M. Coffin, Judge of the United States Court of Appeals for the First Circuit.

Mr. Bennett was graduated from the City College of New York with a B.A. degree, and obtained his J.D. degree from the New York University Law School. He served there as Research and Administrative Assistant to the Institute of Judicial Administration, Inc., and was a member of the Board of Student Editors of the Annual Survey of American Law.

He is admitted to the Bars of the District of Columbia and the State of New York.

Roger Ekins

GE
Elec
Easter

GENERAL DYNAMICS
Electric Boat Division

To: Mr. John C. Franklin Date: 6/21/68

From: J. L. HELM

Enclosed is a letter to Bernt Balchen requesting his advice and suggestions relative to the possible use of an icebreaker in support of a fleet of ore carriers operating out of Baffin Island.

cc: Mr. Bernt Balchen

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GENERAL DYNAMICS
Electric Boat Division
Eastern Point Road, Groton, Connecticut 06340 • 203 446-5960

BERNT BALCHEN JUN 26 1968

June 20, 1968

Mr. Bernt Balchen
General Dynamics
One Rockefeller Plaza
New York, N. Y. 10020

Reference: (a) Your paper entitled Warm-up of the Arctic Regions
(b) Your paper entitled Position Paper - USCG Icebreakers

Dear Mr. Balchen:

Mr. John Franklin forwarded references (a) and (b) to us.

In connection with USCG icebreakers, we are giving this active consideration in Marketing. The Electric Boat division charter has been broadened this year to include nuclear powered surface ships. Nuclear powered icebreakers fit well with this.

With regard to reference (a) in which you describe a melting of the Arctic ice, we would be very interested in your opinion regarding the feasibility of keeping a channel open into Baffin Island throughout a major part of the year.

As you may know, there is a large deposit of rich iron ore on Baffin Island. There has been much interest in it over the past two years. The problems of getting the ore out were brought to Mr. Franklin's and my attention by Mr. A. M. Wilson, Executive Vice President of Utah Construction and Mining Company, when we called on him April 26, 1968. At that time we were looking for undersea opportunities related to mining and were intrigued by the possibility of bringing this ore out under the ice.

Since meeting with Mr. Wilson, the work done at Electric Boat when this deposit was first discovered has been reviewed. It was concluded then that the cost of submerged transport was too great to make exploitation of the deposit in this way economically attractive.

Your memos suggest the thought that a large powerful nuclear icebreaker working in conjunction with a fleet of conventional ore carriers might keep a Baffin Island ore port open and serviced year around. Your reference (a) findings suggest that the job of keeping this port open might gradually become easier as time passes. The incremental cost of building a large nuclear icebreaker over the total cost of constructing a fleet of ore carriers suitable for moving out this ore body would not have the severe impact on the economics that nuclear underwater propulsion had in our earlier studies.

Could you review this question and give us your opinion concerning the practicality of using a large icebreaker in this way. Enclosed for your information are some data developed at Electric Boat in 1965 concerning the nature and extent of the ice in Baffin Bay and Davis Strait. In addition, we have some data here published by the Geological Survey of Canada, which indicates that Baffin Bay in the summer has 20-90% ice cover.

A recent development in icebreaking that interests us very much here is the Canadian development of a bow shape that breaks the ice and throws it up on either side like a snowplow. This development was tested as a floating device pushed by a tugboat in Lake Erie last winter. It was reported in the Maritime Reporter that the device was effective and efficient. A tugboat pushing it was able to accomplish an icebreaking job equivalent to that performed by one of the large government icebreakers with much greater power. The concept of turning the ice up on either side like a plow minimizes the danger of large chunks of ice damaging propellers. We would appreciate your thoughts on this.

If it is feasible to keep a Baffin Island port open, we can probably work cooperatively with someone like Utah Construction and Mining to develop a valid economic analysis of the potential for moving this ore. If feasible economics can be demonstrated, it could represent a very interesting opportunity for applying our technological capabilities.

If you have any further questions, you can contact me at Electric Boat (phone number (203) 446-3784).

Very truly yours,

J. L. Helm

J. L. Helm

JLH:jeg

encls.

Arctic - Cozy

"Arctic" file

GENERAL DYNAMICS

One Rockefeller Plaza, New York, New York 10020 • 212-Circle 5-5000

INTEROFFICE COMMUNICATION

Date: August 5, 1968

To: John C. Franklin

From: John P. McCann, M.D.

Subject:

I had a most interesting talk with Dr. Assur of the U.S. Army Terrestial Science Center, Hanover, New Hampshire (603) 643-3200. He feels that whatever warming is taking place is more prominent over the Scandinavian and Russian passages. The Northwest passage, per se, has been getting colder over the past 8-10 years. He does feel, however, that this area will be subject to more and more commerce. The advances, however, will come mainly from technological developments rather than real climatic changes. These will be in the form of better ice breakers, better forecasting of ice behavior and possibly environmental control. In the latter, he indicates that thought has been given to spreading a dark material on the ice thus promoting heat absorption and melting.

As a local source in New York City, he suggests that a Dr. Fields of the Explorers Club and the Geographical Society is quite knowledgeable. The best single source document is a Rand Corporation publication edited by a Col. Joseph Fletcher. He is quite sure Dr. Fields has a copy of this document which, by the way, is unclassified.

John

GENERAL DYNAMICS
New York Corporate Office

Date: 3/10/69

To: Col. Balchen

From: Rosemary La Rocca

Attached is a rather sketchy outline of the notes I took this morning.

Not sure of some of those Scandinavian names.

Rosemary

onths before our arrival in shipping companies had taken tankers in Norway.

conference with one of the - Mr. Berggraf, who confirmed

at one, possibly two, berths with improvements during the

with Fred Olsen, who owns five of the largest shipyards in Norway, they confirmed the previous statements. They were interested in being kept informed on future requirements for U.S.

Ice Conditions in the Arctic

Bernt Balchen had several conferences with the Norwegian Polar Institute about the Arctic Ocean ice problems.

Managing Director, Mr. G. Gjertsen, made the following account of what had happened in the area between Spitsbergen and Greenland.

During the latter part of February, and during the rest of the Spring and Summer, continuing into the freeze-up in latter part of September, the following had taken place: A large out-flush of heavy polar ice had occurred. Forma while it blocked the North Coast of Iceland and made it extremely difficult to get to Jan Mayen, Bear Island and Spitsbergen during the whole season. Bernt Balchen informed about what had taken place over on the Coast of Alaska, this was news to them and of great importance. Their estimate of the amount of polar ice, which had flushed out of the Arctic, must have been at least 40-50% of the area covered by the polar pack ice.

December 12, 1968

S. O. Perry

Col. B. Balchen

TANKERS

MHV informed us that about 1½ months before our arrival in Norway (October 28th) a rush of shipping companies had taken all berths available for large tankers in Norway.

After our visit to MHV, we had a conference with one of the large ship broker firms in Oslo - Mr. Berggraf, who confirmed MHV statements.

Mr. Berggraf stated, however, that one, possibly two, berths might be available in 1970; and with improvements during the next 3-4 years.

Bernt Balchen had a conference with Fred Olsen, who owns five of the largest shipyards in Norway, they confirmed the previous statements. They were interested in being kept informed on future requirements for U.S.

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The solution to this problem must be found along the coast of Siberia. This they had no way obtaining.

They had, however, found that the Laptev Sea had practically open water during the Summer of 1967.

They were interested in obtaining closer liasson with the American agencies in the U.S. and Canada.

Bertt Balchen made a search of Norwegian libraries about the thickness of the polar pack ice. Nothing outside what we already have, came up.

Some oil drilling is going on at the present in Spitsbergen. No oil has been located yet.

ENCL. B

GENERAL DYNAMICS

One Rockefeller Plaza, New York, New York 10020 • 212-Circle 5-5000

File

INTEROFFICE COMMUNICATION

Date: March 27, 1969

To: S. O. Perry

cc: J. Franklin
E. H. Heinemann

From: B. Balchen

Subject: ICEBREAKERS

Horten, Norway - March 18, 1969

Discussion on prices and possible way of delivery and informal prices on Icebreakers.

Present: Fredrik Borchensius - Managing Director MHV
Michael Langballe - Chairman of Board MHV

The MHV will quote an informal price of $19M on the MOSKVA class Icebreaker built along the Wartsila specifications. MHV received a letter recently from Landtman of Wartsila stating that they are trying to sell one Icebreaker to the U.S. Coast Guard. If they do not succeed, they would like to work through MHV as agreed upon before.

Professor Jansson from the University of Helsinki will be coming over to Horten sometime the latter part of April or the beginning of May to discuss this. MHV will inform GD on this, and would then like to be current on the Icebreaker status.

For vessels of this size, 15,000 tons, there are ample facilities in Scandinavia for their construction and relatively short deliveries.

Bernt Balchen

Encl. A.

April 18, 1969

E. H. Heinemann

B. Balchen

Icebreakers for Moran Towing Company

On the 17th of this month I had a meeting with John Bull, President of the Moran Towing Company, at his office 17 Battery Place, New York. We discussed the possibility of acquiring three Moskva Class heavy Icebreakers for icebreaking and towing services in the Arctic Ocean from the north shores of Alaska and the Canadian Archipelago through the Lancaster Sound into the Atlantic Ocean.

We had several times before discussed this as a project worthwhile exploring, and at this meeting it was possible to come down to what was desired of information from Horten Naval Dock Yard for an operational cost analysis of such a project. It was agreed upon that I should obtain as close as possible the price of such vessels:

(1) Delivered in New York

(2) Crew Size

(3) Operational Cost and Consumptions of POL, etc.

(4) A Set of Drawings of this Model

On further discussion of the specifications, it was indicated that the towing winches will be sufficient for the time being and not influence the price too much.

Moran Towing would be interested, after my return, to enter into an agreement with GD to be discussed in detail later on.

It was obvious that we should also obtain a similar working agreement with Horten Naval Dock Yard. I will ask the Director there to give me a proposal for such an outline; and hope that Don Kidder, who will meet me in Oslo, and I can arrive at a workable solution on this project.

BB:rcg
cc:E. L. Ball, Jr.

KNUT RASMUSSEN

Notes on Arctic Situation -- B. Balchen -- 3/10/69

- Thule had open water in 1942 from the middle of August to about the middle of September (two to three weeks). Kurt K told me that in 1910, there were years they could not get in. In 1951, when the Air Force built Thule, we had open water from the first of July until the first of October (3 months). In 1968, Thule was opened from the first of June until the middle of November.

- In 1941, when I came to BW 8, the codfish (temperate water fish) were just south of the mouth of the ~~shore~~ FJORD where BW8 was built. Today, according to information from the GREENLAND Administration, the codfish are at Hall Basin, north latitude 82.

- Ice Conditions - 1968.
Open water 250 miles north of Pt. Barrow (Dr. Max Brewer). Open water all along the Queen Elizabeth Islands also confirmed by Mr. MacKenzie of Standard Oil.

Also in 1968, there was flushed out ~~all~~ LARGE AMOUNTS OF polar pack ice (through the Greenland Sea), north coast of Iceland in February. (Director of Civil Aviation, Iceland). This condition has never before been observed in history, and Iceland has kept ~~this ice under surveillance~~ METEOROLOGICAL RECORDS since 1820.

WAS COMPLETELY BLOCKED BY POLAR PACK ICE

This condition was discussed in Oslo by Bernt Balchen with the executives of the Norwegian Polar Institute. They claim that they have never before in the history of the Polar Institute, ~~been blocked by~~ SEEN SUCH such heavy ice in the Greenland Sea.

-The significance of this is that a large ~~fraction~~ PORTION of the Polar ice PACK pack has been flushed out into the North Atlantic (estimated at 40%).

-At the briefing for Alan ~~Byrd~~ BOYD, Secretary of Transportation, after the meeting in Easton in 1967, Dr. Quam stated that the influx of superfluous heat into the Arctic Ocean has made ~~this~~ ITS ice surface at a very critical stage.

-From 1967, for the first time to the knowledge of the Polar Institute, the Laptev Sea was open to the 80th parallel during the summer.

-This area has not been photographed by satellites and should be. This information would be very useful and of great military importance.

The last three winters have been particularly mild as reported by Max Brewer. Only one-year old Ice is forming along the Alaska Coast as compared to pack ice of average age of five years.

-Commander Robertson of the Royal Canadian Navy said that ~~we~~ THEY will keep the Northwest passage open all year-round.

GENERAL DYNAMICS
New York Corporate Office

Date: 5/15/69

To: Mr. Perry

From: Rosemary La Rocca

These are the rough notes I took down today on surface vessels in the arctic. Am not sure of some of those Scandinavian names.

RM

RECD. S. O. PERRY MAY 16 1969

Oil compan: ... rth America in the Pruc ... eat deal of interest i: ... have joined together t: ... try to prove the capabi: ... rthwest passage. ... oken into four sectic ... e East coast. It is prese ... panied by one Canadian a:

GD has stu: ... or the purpose of transpo: ... st Coast. At the present, t: ... Indications are that surfac ... oing west through the northwe ... er tugs.

While it is obviously desirable to the oil companies to operate in either direction 12 months out of the year, it is quite possible that adding storage tankers in the Eastern areas would permit operation well into the winter and to start replenishment again in the spring as one of the alternatives. With such an arrangement, ships could be kept busy making western deliveries during the period they could not travel east. There are, of course, many other possibilities including pipe lines, some of which certainly are to be installed as the central Canadian oil fields currently under development develop further.

In all likelihood, all different methods will be seriously considered and tried. Present indications are that the order of development will be pipe line, tanker, submarine.

Oil companies on the northern continental slope of North America in the Prudo Bay and adjacent areas, have caused a great deal of interest in the shipping industry. _____companies have joined together to strengthen the tanker Manhattan hull, to try to prove the capability of a surface vessel to traverse the northwest passage. To meet the summer schedule, it has been broken into four sections and is being rebuilt by four yards on the East coast. It is presently scheduled to start North during July, accompanied by one Canadian and one U.S. icebreaker.

GD has studied both surface and sub-surface vessels for the purpose of transporting oil from the northern slope to the East Coast. At the present, there are rather strong arguments for both. Indications are that surface tankers can be operated all-year round going west through the northwest passage with the assistance of icebreaker tugs.

While it is obviously desirable to the oil companies to operate in either direction 12 months out of the year, it is quite possible that adding storage tankers in the Eastern areas would permit operation well into the winter and to start replenishment again in the spring as one of the alternatives. With such an arrangement, ships could be kept busy making western deliveries during the period they could not travel east. There are, of course, many other possibilities including pipe lines, some of which certainly are to be installed as the central Canadian oil fields currently under development develop further.

In all likelihood, all different methods will be seriously considered and tried. Present indications are that the order of development will be pipe line, tanker, submarine.

In any event, it appears that there is a great need to lengthen the navigable season in the Prudo Bay area by means of icebreaker tugs, to assist tankers, supply ships, or carriers and to tow marine type platforms and rigs in and out of the area.

The Moran towing ?? people ~~xxx~~ of New York City have indicated a great interest in acquiring tugs for this purpose and are interested in operating in that area.

Since no one builds icebreaker tugs in the U.S. and the expertise is largely in Scandinavian countries, there is a possibility of an arrangement where GD would act as agent for commission in the purchase and possible outfitting of tugs built in the Horten shipyard in Norway under Ver____ in Sweden. Tugs are exempt from our Jones Act (1937?) and therefore, are not required to be built in the U.S.

It is understood that three tugs are desired for initial operation with considerably larger numbers having been considered by the oil companies after oil ~~sales~~ wells are brought into production.

The purpose of the PDO is to consider the possibilities of the following:-

1) An arrangement where GD would be an agent for Horten in the U. S. for the sale, outfitting, and delivery of an initial small quantity of ships.

2) Based upon the success of (1), GD would through its Quincy Division, build under Horten license.

General Dynamics International,
Corporation,
23, Rue de la [illegible]i,

BRUSSELS 4,
Belgium

C O P Y

April, 29th, 1969

Our Ref.
Ma/kg-A

Att.: Mr. Donald E. Kidder

We acknowledge discussions held previously between Mr. Bernt Balchen and ourselves and discussions 26th - 27th April 1969 regarding possibilities of designing and constructing a polar type icebreaker for use in arctic ocean. The Horten yard is prepared to make preliminary studies and investigations to make it possible to continue discussions and negotiations which might lead to a business agreement between your company and A/S Horton Verft.

To do this preliminary studies the confirmation of the following is needed:

1. That until further A/S Horten Verft has the exclusive right to handle the project on behalf of the interests of General Dynamics and the Moran Company.

2. That A/S Horten Verft has your consent to take any assistance and advise from other experts, consultants or other companies to an extent which is found practicable.

3. That an amount of US $ 200.000 would be put to our disposal for the preliminary investigations in the period mentioned below.

Provided your immediate approval of these conditions, A/S Horten Verft will within November 1st, 1969 provide the following preliminary information necessary for further discussions and negotiations:

1. A set of project drawings of polar type ice breaker.
2. Broad Outline Specification.
3. Estimates of operational costs.
4. Estimated price, construction schedule.

A/S Horten Verft must take the usual reservations regarding possible other contracts of projects, which might be entered into before this deal is settled. Furthermore, A/S Horten Verft take reservations that co-operation with other experts will be possible.

We thank you very much for an interesting co-operation up to now and hope that this first practical step into the project will be successful for all parties.

Yours faithfully
A/S HORTEN VERFT

May 22, 1969

E. H. Heinemann

Col. B. Balchen

Icebreakers/Towing Utility Craft

In accordance with your instructions, I am hereby forwarding to you a concentrate on the status of the Polar Icebreakers and a copy of the letter to Mr. D. E. Kidder, General Dynamics Corporation, Brussels from Horten Verft outlining a preliminary proposal for an agreement between Horten Verft and General Dynamics.

Also enclosed is a booklet describing the Polar Type Icebreakers, Moskva and Leningrad.

/s/ Bernt Balchen

BB:rw

Encs. (3)

Presentation by Mr. Berndt Balchen - January 26, 1970
General Dynamics / Quincy Shipbuilding Division

Attendees:

M. E. Turnbaugh (Bill)	Director of Engineering
J. H. Robinson (Jim)	Mgr., Advanced Engineering
C. R. Walker Jr. (Chuck)	Program Manager
John Randall	Director/Planning
J. R. Salzer (Dick)	Project Leader/Submarine Tankers
R. H. Seacord (Dick)	Master Planner
A. N. Donkin (Al)	Chief Naval Architect
Tony Morse	Marketing
Spencer Reitz	Proposal Leader/Advanced Engineering
Dr. Rolf Glasfeld	" " "
E. Jordan	Advanced Engineering
George Wadleigh	Advanced Engineering
Jack Dallinger	Manager Design Engineering with MTurnbaugh (Not in attendance)

GENERAL DYNAMICS
Quincy Division

MEMORANDUM

Date January 28, 1970

TO: L. Bergeson

FROM: Col. Bernt Balchen

FILE NO.:

SUBJECT: Humble/Manhattan Presentation 1/27/70 to Propeller Club Boston

REFERENCE Captain Steward, Captain Graham and John Bennett

Facts - True

Ice thickness between 6-8 feet average pressure ridges can be negotiated by Manhattan - varying in height - 10-20 feet.

Ship got repeatedly closed in by lead pressing on sides. Had to be broken loose by icebreakers (Capt. Steward claims that on the new and larger ships, with full reversible pitch propeller, this can be avoided - in my opinion this closure of lead will be much more severe).

Captain Graham and Bennett stated that it is planned to build 20-250,000 ton super tankers for this operation (this agrees with previous figures which I have gotten).

Captain Steward stated that they would expect to operate around 7 knots and down to 4 knots in difficult waters.

False

Captain Graham and Bennett claimed that the Manhattan had not sustained any damage whatsoever. This does not agree with other reports by Dr. Azur and Wittman.

The assessment of surface ice and it's penetrability was misleading.

That these super tankers can operate between the North Slope through the Beauford sea pack ice fields and Lancaster Sound regions all year around without ice-breaker assistance is another absurd statement.

Scandinavia

The parameters which we worked out for a preliminary cost analysis at Horten, Norway, will give us the type of icebreakers needed for these operations. They are inside the frame of what S. Perry and I arrived at before and agrees on the Coast Guard's postulated requirements.

Bernt Balchen

Enclosure

Col. Bernt Balchen

DO NOT FILE UNLESS NECESSARY — ORIGINATOR HAS REFERENCE COPY

Q 442

GENERAL DYNAMICS

One Rockefeller Plaza, New York, New York 10020 • 212-Circle 5-5000

INTEROFFICE
COMMUNICATION

Date: January 30, 1970

To: L. Bergeson

From: S. O. Perry

Subject: Arctic Oil Transportation Economics

Following your phone call yesterday, I have re-examined the economics of transporting Arctic oil by escorting conventional jumbo tankers using new construction polar icebreakers. This assumes foreign built icebreakers at $25 million with reduced crew for commercial operations. Three icebreakers escorting one tanker is assumed to provide a wide enough path for the beam of the tanker. Convoying more than one tanker is considered risky due to poor maneuverability of the tanker and rapid closing of the broken lead under any wind conditions.

I derive a cost of about $1.73 a barrell for total sea transportation costs. I checked with George Kee at Electric Boat, and he currently estimates about $1.00 per barrell for transportation by tanker submarine of 170,000 DWT capacity. At 250,000 DWT the cost would run 70 cents a barrell. Humble currently estimates 70 cents a barrell for transportation by ice-breaking tanker travelling autonomously. The cost factors we have used are consistant with those used by Humble. Their estimate of 70 cents a bbl. would correspond to an $80 million dollar ship making an average of 9 kts. through the ice portion of the voyage.

Both George Kee and I feel that a transportation cost of $1.73 a barrell to the East Coast is out of the running, and that the oil companies have other options that are more economical. However, this does not deny that there is a definite need for polar icebreakers in support of Arctic operations in roles other than in the prime system for cargo transport. Who will eventually purchase them and on what basis is what we need to determine before making any substantial commitments.

I hope this is of some use to you; and if I can be of further assistance, please don't hesitate to call.

SOP

SOP:rg
Enclosures
cc: B Balcken ✓

OIL TRANSPORT - NORTH SLOPE ALASKA TO PHILADELPHIA

Mission: Assume polar icebreaker escort for conventional 250,000 DWT tankers from Godthaab Greenland to North Slope Alaska on continuous cycle 355 days/year. Tankers proceed from Godthaab to Philadelphia unescorted. Speed in ice is 7 kts, in open water 16 kts.

Icebreaker:

	$M/yr
Crew - 75 @ 30K	2.25
Ins, repair, OH, etc	1.00
Capital $25M x .14	3.50
Fuel - 94 tons/day @ 23.30 x 355	.78
	$ 7.53 M/yr.

North Slope to Godthaab - 2431 mi @ 7 kts.

= 14.5 days/ow
= 12 trips/year

250,000 tons x 7 bbls/ton x 12 = 21 million bbls/year
Cost/bbl = $.36 per icebreaker
For 3 icebreakers = $1.08/bbl.

Tanker:

	$M/yr
Crew 32 @ 25K	.80
Insurance, etc.	.77
Capital $45M @ .14	6.30
Fuel 135 @ 14.20 x 333	.64
	$ 8.51 M/yr.

Godthaab to Philadelphia - 3204 mi @ 16 kts.

= 16.7 + 2 port = 18.7 days rt.
18.7 + 29 = 47.7

7.5 cycles/yr @ 250,000 x 7 = 13,024 M bbl/yr
= $.65/bbl

Total transportation costs = $1.73/bbl.

GENERAL DYNAMICS

Corporate Public Relations Department

BB

NEWS SUMMARY

FRIDAY, OCTOBER 23, 1970

Directors of General Dynamics elected David S. Lewis chairman and chief executive officer. Roger Lewis, who had been chairman and president since 1962, will continue as president and as a director. David Lewis has been president and chief operating officer of McDonnell Douglas Corp. (Dow Jones, October 21, New York Times and others, October 22)

President Nixon's approval of a new U.S. maritime program in which 300 merchant ships will be built over the next 10 years has been warmly greeted by New England shipbuilders. Lloyd Bergeson, vice president of General Dynamics and general manager of the Quincy Shipbuilding Division, termed the program "a great opportunity for the shipbuilding industry. It's the first time since World War II there's been any indication that the Government will have a consistent policy relative to building and maintaining a strong merchant marine." (United Press International, October 22)

The Computer Output Microfilm (COM) industry is expected to grow 20 to 25 percent a year for the next decade, says Donald A. Mitchell, the chief operating officer of COM's pioneering and biggest producer, Stromberg DatagraphiX, Inc., a subsidiary of General Dynamics. Big computers spew out mountains of data, and COM, the next link in the information processing chain, has some unusual potentialities for future use. DatagraphiX has produced 70 percent of the installed COM recorders for business. (Chicago Tribune, October 18)

Stromberg DatagraphiX is counting pennies -- customers' pennies. This fall the General Dynamics subsidiary introduced a lower-priced Computer Output Microfilm (COM) recorder system and now is expected to announce a COM fiche reader priced under $175. Competitors in the low-price viewer market have done everything but "break into the plant to see how it's done." (Datamation, November 1)

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This summary is presented as a service to personnel of General Dynamics to call attention to material appearing in the press that may relate to company activities · Every attempt is made to condense reports of events, or opinion, currently appearing in the press in such a way as to reflect the tone of the original material · Nevertheless, the appearance of an item here in no way reflects an endorsement by General Dynamics of the accuracy of the news report nor a concurrence with the opinion · Original clippings are available from the public relations department.

GENERAL DYNAMICS

Corporate Public Relations Department

NEWS SUMMARY

THURSDAY, OCTOBER 29, 1970

General Dynamics still is convinced that the use of nuclear-powered submarine tankers to transport Alaska oil through the Northwest Passage would be economically competitive with either pipelines or surface icebreaker-tankers. Humble Oil and Refining Co., which sponsored the voyage of the Manhattan, said that use of icebreaker-tankers would be commercially feasible, but that it is suspending all studies of such a marine system in favor of pipelines. Cost studies for Humble on the pipeline systems currently are under way. Cost surveys by General Dynamics last year indicated that a fleet of submarine tankers could beat the pipeline price for oil delivered to the Northeast. (Journal of Commerce, October 27)

The Air Force said that further inspection and testing of its F-111 fleet will not be necessary as a result of an accident in which one of the bomber versions crashed at Fort Worth, Tex. The Air Force said the landing crash did not result from "in-flight structural failure. The accident board's investigation did not uncover any malfunction which would necessitate any new inspections or testing of the F-111 fleet." (United Press International, October 27)

General Dynamics' Convair Aerospace Division has developed a large, erectable ground antenna for Goddard Space Flight Center in support of the Applications Technology Satellite program. NASA recently accepted the 15-foot diameter self-erecting antenna. It will be put into use in South American countries for communications experiments and later for television reception from satellites. (Aerospace Daily, October 23)

Aircraft workers at Canadair Limited, a Montreal subsidiary of General Dynamics, voted to accept a new contract offer, averting a strike that had been set. The contract was ratified by members of the United Automobile, Aerospace and Agricultural Workers of America by an 82 percent majority. The 18-month contract gives pay raises of 25 cents an hour for the first 12 months and 15 cents an hour for the remaining six. (Wall Street Journal, October 27)

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Researchers have been striving for some time to perfect the magneto-acoustic memory -- a kind of delay-line memory in which an ultrasonic pulse propagating down a metal line writes bits onto the line or reads them. This approach holds promise of giving the same performance that cores give at 10 times less cost. A new version developed by General Dynamics is said to overcome the limitations that have stymied previous developments of this type memory. (Electronic Design, October 11)

A surface-launched air missile is being investigated by the Navy as a quick-reaction, basically off-the-shelf answer to the threat of Soviet cruise missiles. The concept envisions use of ship-launched, modified General Dynamics Standard Arm missiles against cruise missile launch platforms. They could be fired from existing launchers and commanded by modified Terrier Tartar surface-to-air missile fire control systems. (Aviation Week & Space Technology, October 26)

Stromberg DatagraphiX computer output microfilm system which maintains 190 million records for the Social Security Administration is featured on the cover of the October issue of Office magazine. An article describes the system and outlines advantages including speed, space saving, ability to update material, labor cost reduction and ease of information retrieval.

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