APPENDIX B

PRINCE RUPERT LETTER REPORT

April 20, 1983

CITY OF PRINCE RUPERT

424 WEST 3rd AVENUE
PRINCE RUPERT, B.C
V8J 1L7

INCORPORATED MARCH 10, 1910

PHONE: (604) 627-1781

FILE NO. 99-24
03-18

April 20, 1983

Cynthia Hawksworth
Director, Strategic Planning
Ministry of Municipal Affairs
747 Fort Street
Victoria, B.C.
V8W 3E1

Dear Ms. Hawksworth:

We understand that the Energy Project Co-ordinating Committee will shortly be making a recommendation to the Minister of Energy, Mines and Petroleum Resources as to the need to refer Dome Petroleum's application for a Certificate of Public Convenience and Necessity for the Grassy Point L.N.G. Plant to the British Columbia Utilities Commission for public hearings.

We have reviewed information provided to us todate and request that full public hearings take place with respect to this application.

The attached material outlines the City's major concerns with regard to site access.

City Council has previously requested that public hearings be held and received assurance from the Hon. Stephen Rogers that public hearings will take place.

Thank you for bringing this matter to the appropriate Committee's attention.

Yours truly,

G. M. Howie
City Administrator

GMH/cd

Encl:

cc: Peter Ostergaard, Planning Branch
Ministry of Municipal Affairs

The City of Prince Rupert strongly objects to the proposed routing of the access road, the hydro transmission line and the gas pipeline for the Western L.N.G. Project.

The City requests that the Energy Project Co-ordinating Committee require Public Hearings on these aspects of the project in line with the assurance given the City by the Hon. Stephen Rogers in correspondence of November 13th, 1981, (Copy Attached). Also, Dome Petroleum Ltd. should be required to pay to the City the full costs for representation at the hearings as well as the costs for the necessary integrated studies which properly evaluate alternative routes, City concerns and mitigative measures for all proposed utility corridors.

The City's objections to the proposed routing stem from three major areas of concern, summarized as:

1. The City feels that the studies prepared to date are inadequate in terms of outlining the issues and implications of the proposals. In addition, some studies do not seem to have been prepared or else they have not been made available to the City. The studies that have been presented lack sufficient examination and mitigation of local issues. More specifically, they do not examine the issue of alternative routes.

2. The City feels that the routes proposed are unsuitable in relation to the concerns and the needs of the City. There are immediate adverse impacts to the City in the routes proposed; these impacts are not obvious in the routes advocated by the City. Furthermore, there are no benefits to the residents of Prince Rupert associated with the proposed routes that could not be realized through other routes but, there are additional benefits in other routes that can not be realized through the proposed routes.

3. The City feels that the long term implications of the proposed routes have not been properly addressed. Apart from the adverse impacts associated with the construction phase of these routes, the City will be subjected to continuing risks associated with the existence, maintenance and possible increasing use of these routes. These risks represent eventual costs to the City; costs the City would not normally encounter.

The City's concern with respect to the adequacy of the studies available can be best outlined as follows:

1.1 All studies submitted by the proponents and reviewed by the City are premised on certain preconceptions regarding routing; i.e.

'an all-weather, all-land road for Dome, the location of the proposed pipeline'. These preconceptions have obviously eliminated any objective analyzes of the 'Best Overall Routes'.

For Example:

1. "In particular, the planned access road and pipeline will affect the degree of environmental impact in some areas of the corridor where these facilities are adjacent to the transmission line." (P 1-1)

2. "The study corridors are confined to the area of Tuck Inlet." (P 1-3)

3. "B.C. Hydro provided twelve major route options" (P 2-1)

4. "The proposed location of the road and pipeline are shown on Fig. 2-2." (P 2-3)

5. "If the road were located elsewhere, Denise Inlet - Woodworth Lake segment would be preferred since the pipeline and its access road would be located through this area." (P 6-3)(1)

1.2 In a typical Environmental Assessment Report, alternative routes should be considered and discussed in detail. It has been known for a long time that a number of possible routes connecting Prince Rupert and Port Simpson have been advocated and discussed. However, Dome's preference for an all-land, all-weather road to meet its own requirements has precluded the serious examination of any other routes. "Dome Petroleum's request is for an all-weather, all-land connection. This reduces the number of available alternatives to routes following the Tsimpsean Peninsula East and North of Prince Rupert Harbour and Tuck Inlet." (P.3. Dome Road Study Report).

1.3 Since there has been no examination of alternative routes, it is obvious that there has been no serious cost/benefit analysis of the route advocated by the city or any other route for that matter. Dome itself has indicated that earlier preliminary costs on the various road locations indicated only minor cost differences. It seems that the only benefits considered to date accrue exclusively to Dome, in spite of the fact that they have been advised by their consultants that they can minimize adverse impacts to land use and settlement by "Designing rights-of-way for use by others." (P 4-6. Transmission Line Assessment).

(1) All references are to "Environmental Description and Assessment of the proposed Rupert-Grassy Point Transmission Line" prepared by Tera Environmental Consultants.

1.4 The analysis of alternatives within an Assessment Report should be structured in a manner which will permit comparison of environmental benefit or damage. The Transmission Line Assessment Report does not structure its findings in such a manner, in fact, a lot of cross referencing is required, and in reading the report one is never certain if he has synthesized all the factors adequately.

1.5 It appears that many of the impacts identified in the Transmission Line Report have been downplayed somewhat because it was 'given' that the location of the pipe line and road were fixed. Therefore it was assumed the impacts would take place in any event, thus they would not be initiated or seriously compounded by the Transmission Line.

1.6 To the best knowledge of the City, there has been no public report regarding the proposed location of the gas pipeline. This pipeline follows a drainage corridor of the Woodworth Lake System which has a high sensitivity to construction and which has a potential for serious impacts on the City's water system. This corridor seems to be being given consideration by Hydro simply because the pipeline will be located there. This corridor should not be considered for any right-of-way.

1.7 The bridge and road reports prepared for Dome address only issues such as cost, geotechnical considerations, air and marine traffic and scheduling. The Reports do not address the issues of land use or land traffic as they exist on Kaien Island or as they are envisioned in City Plans.

1.8 The fact that the Consultants for the road state that "the scope of further geotechnical investigations may be widened by the application of stringent slope hazard safety criteria should the roadway be freely and widely utilized by the public" leaves the City in an apprehensive state regarding safety considerations in locating the road. This concern is only reinforced when the aspect of future intensification of this road's use is considered, as will be discussed later.

1.9 It is felt that none of the reports presented to date have addressed the real implications of the proposed corridor or the reasons why it should be accepted notwithstanding the limitations of the effects or impacts. The City feels that this should be described in detail. The only explanation the City has been given is that 'it is Dome's road, Dome's money and Dome's preferred route'. This is not satisfactory.

. . . 4

1.10 In general, the City feels that more co-ordination should be applied in examining the right-of-way needs for all facilities in relation to the needs of the City and the region. This sentiment appears to be echoed by the Consultants for the Transmission Line Corridor who finish their impact report by saying "Consequently, a study should be considered that evaluates all linear facilities on common basis and suggests mitigation for all facilities." (P. 7-1)

With respect to the suitability of the routes proposed, apart from the adverse impacts identified by the Consultants for the Transmission Line, the City wants to make it clear that it finds it difficult to accept any route which passes through its Watershed Reserve. This is especially true when there is no evidence demonstrating why this is 'necessary'. The following will outline the City's concern with respect to its Watershed Reserve as well as other general concerns the City has with respect to the immediate impacts of the proposed routes:

2.1 All the routes proposed encroach on the City's Watershed Reserve. This is acknowledged by the proponents but the actual impacts of such encroachments have been downplayed because it appears that the Consultants do not recognize that Shawatlan Lake plays a major role in the City's water system. Shawatlan Lake must be treated with the same importance as Woodworth Lake.

2.2 Any right-of-way in the vicinity of the City's Watershed should be discouraged because of the increased opportunities it would provide in terms of unauthorized access to the water supply. It is readily recognized that rights-of-way provide such access and open up areas for recreational and other uses. "In general, any new access to the areas would be beneficial in terms of improving recreation opportunities." (P. 3-132. Transmission Line Report). It is the truth of this statement which causes concern insofar as the water supply is involved.

2.3 Referencing the B.C. Ministry of Environment Guidelines for Watershed Management of Crown Lands, "To maintain a high quality environment within watersheds needed for present and/or future community water supplies is a responsibility none can deny." (P.23)

Prince Rupert's watershed is very productive on a per capita basis according to figures provided by the Ministry of Environment. The City's Watershed serves approximately 1,636 persons per square mile of Watershed. Provincially, the average per capita productivity of the three classes of watershed identified by the Ministry are:

Class I - 655 persons per square mile
Class II - 143 persons per square mile
Class III - 44 persons per square mile

Because of its size (9.9 square miles), Prince Rupert's Watershed has been tentatively designated as a Class II Watershed; one in which the"practicality of curtailing activities is problematic." However, the Ministry also recognizes that this type of designation is somewhat arbitrary as it is based on size only. The Ministry's publication states that "Because of isolation and lack of complicating existing activities, certain watersheds which are over the six (6) square mile limit can readily be administered within the Category I requirements and should therefore be nominated as Class I watersheds" (P. 3); designated for maximum protective measures. This is reiterated on Page 8, "There are those watersheds which, due to their smallness of size and relatively little general public activity within the area can be set aside for rigid control."

Along with isolation and level of general public activity, the Ministry recognizes that "achievement in control would be a function of land ownership and watershed size." (P. 15) In view of the Ministry's own criteria, Prince Rupert's Watershed should be a prime candidate for Class I designation - rigid control, maximum protective measures, for it possesses the following characteristics:

1. It is not overly large in relation to the area served.
2. It is very productive on a per capita basis.
3. It is presently very isolated.
4. It has no other existing land uses within it or public access to it which could conflict with its primarly function.
5. It is almost completely City and Crown owned.

The City is in a very favourable position with respect to the current status of its Watershed. To jeopardize that position unnecessarily is to entertain dire consequences.

2.4 The only reference to the City's Watershed in the Dome Road Report is "It should be noted that although the road alignment is encroaching in the Watershed Reserve, it does not actually violate the catchment area of Woodworth Lake, which supplies water to the City of Prince Rupert." (P. 3) This is small consolation to the City for as mentioned earlier the function of Shawatlan Lake is not recognized and the route discussed necessitates providing access very close to Shawatlan Lake. As well, the gas pipeline is proposed to follow a highly sensitive triburary entering Woodworth

Lake prior to cutting across the Shawatlan River which flows between our two water supplies.

The Ministry of Environment's own guidelines will be violated by the proposed corridors:

1. "As a general rule, rights-of-way, easements and such required for the construction and maintenance of power transmission lines, pipelines, highways and the like, should attempt to by-pass community watersheds." (P. 36)

2. "Highway rights-of-way are not so amenable to guideline controls as powerlines, since a highway in the final analysis, as part of the public domain, becomes subject to daily use by the people at large. It is for this reason that public highways should not intrude upon watersheds insofar as it is possible to avoid." (P. 38)

3. "Rights-of-way, easements, powerlines, roads, pipelines, etc. should be restricted to those cases where no suitable or reasonable alternative exists and where no water quality deterioration will occur." (P. 40)

As indicated earlier, no real effort has been expended to determine if suitable alternatives exist.

2.5 The City is cognizant of its responsibility to prevent water quality deterioration. Again, quoting the Ministry's guidelines, "In law, the onus to deliver high quality water to the consumer rests with the water purveyor." (P. 8) The proposed encroachments on Prince Rupert's watershed represents only the beginning of a host of potential threats to our water supply through the simple process of exposing the area. Once these corridors are in place, they present an opportunity for all types of activities to apply pressure in the area. Indeed, it is believed that interest in these previously inaccessible lands is already on the rise through applications for use of Crown Lands. Many of these pressures or impacts may not be felt for years but nevertheless the threat will be constantly there. Yet, the agents responsible for creating these pressures will not even be affected by any adverse impact; they will not be relying on the City's water supply, they will not reside within the City's boundaries. There can be no doubt that the routes preferred by the proponents establish precedents which are likely to have significant future environmental effects through the provision of access to the Shawatlans - Woodworth Lake area.

2.6 Apart from the threat to the City's Watershed, the corridors proposed pose several other potential problems. The city feels that the Denise Inlet - Woodworth Lake corridor should be discounted altogether because of its forestry, terrain, wildlife, vegetation and water resource constraints and a total lack of argument why such a route is necessary.

Morse Basin East is not preferred by the Consultants primarily, it appears, because of the high visual impact in the southern half of the corridor in relation to the views from Yellowhead 16 and the importance of said views on the impressions of visitors. The City however, is also concerned about the crossing of the estuary and mouth of the Shawatlan River in terms of its major significance for sockeye salmon and its importance as a Chinook spawning Area; its importance as a deer winter habitat and waterfowl breeding, wintering and stop-over area; and, its richness in heritage sites (At least 8 known sites). This route also exposes more of our Watershed, more seriously than any other route.

The Morse Basis West corridor, the route recommended by the Consultants, pre-empts the potential use of land south of the B.C.D.C. Industrial Park, threatening to divide the property into east and west sections and serving to reinforce the historical separation between the public and the waterfront because of the location of industrial facilities. Yet, this route is advocated with full knowledge that the City may be forced out of necessity to develop this area for residential purposes; "The proposed transmission line could potentially conflict with current and future land uses at five locations." (P. 5-4) This route is also advocated in spite of the visual sensitivity of this corridor, the sensitive vegetation communities and the expected impacts on known heritage sites.

It appears that a crossing at Fern Passage has been ruled out, due to conflicts with marine and air traffic. However, a crossing at Butze Rapids probably combines the worst elements of both the Morse Basin East and Morse Basin West routes in terms of short-sighted foreclosure of future options by narrowing the range of beneficial uses of the little land available to the City while posing long term risks to health or property at the same time. As well, there has been a commitment on the part of B.C.D.C. to dedicate land at Butze Rapids for the only waterfront park within the Municipal Boundaries and the proponents would like to partially fill the rapids; one of our only publicized natural features.

2.7 The proposed corridors all eventually encounter Laurier Cove, an area of high environmental sensitivity in many respects. "No alternative to this segment exits" and "severe problems would be faced since geotechnical difficulties and limited space would not easily accommodate the three utilities." (P. S-4) Though the likely impacts in the area will not directly affect the City, its residents, or its future options they are the result of an irreversible commitment of land and access that does have serious long term implications to the City. Should the City's concerns be resolved by a favourable assessment of an alternative route the unavoidable problems of Laurier Cove would not likely be encountered.

2.8 The City, in reviewing proposed corridors, looks not only for potential damages but for potential benefits as well. Aside from whatever benefits many accrue as a result of the location of the L.N.G. facility at Grassy Point, the City can see no benefits to the citizens of Prince Rupert as a result of the facilities corridors as proposed. The Consultants to the Transmission line recognize that a crossing at Fern Passage or Butze Rapids Road "would probably not open up any new land for residential development because of the Watershed restrictions and soil constraints on the mainland side of Morse Basin." (P. S-3) Yet the need for additional land by the City is recognized in their report, "Prince Rupert has little land remaining for new residential construction." (P. 3-91)

The route which the City would have preferred to see examined in detail would satisfy the basic requirement of accessing Port Simpson while improving the Island's existing ferry service to Digby Island and the airport, improving access to Metlakatla and opening up land for recreational and residential land use on the north side of the Harbour. All of this could be accomplished without jeopardizing the City's watersupply, pre-empting the use of valuable land on Kaien Island or negotiating the highly sensitive Laurier Cove area; at no known extra cost. The City feels that not considering this alternative objectively is a great disservice to the Sub-Region.

The last, and perhaps the most threatening, though difficult to grasp, aspect of the proposed routes is the long term implications of such an irreversible commitment. These are the most difficult impacts to quantify but it is safe to say that they will not be felt by the owners of the L.N.G. Project and that they have not been given adequate consideration in the review process to date.

3.1 It would be naive for anyone to believe that the Western L.N.G. Project will be the only development encouraged to locate in the Grassy Point area. With a surplus of land, good port facilities and an L.N.G. Plant, the area will likely be exploited for marine oriented bulk material facilities. Within this context, the application of 'lower standards' for road and bridge construction and the present determination of impacts are surely shortsighted since they meet only Dome's needs and assess only the impact of the L.N.G. development. The volume of traffic on the road could increase substantially and with this comes an increase in exposure of the Watershed, an increase in dependency on the road, an increase in erosion, an increase in maintenance costs and a decrease in control of access. Since the support services for the L.N.G. Project will likely be available for the development of future industrial sites it is exceedingly important that responsibilities and risks are clearly understood and that the routes chosen reflect the best interests of the entire region.

3.2 The City also feels that once one encroachment is permitted in the Watershed Reserve, pressures for others are inevitable, particularly when the area is accessible. As noted earlier, interest in land and resources on the mainland side has already increased. With the introduction of a road, hydro and natural gas to an area with an existing water supply it is only a matter of time before the wrong pressure in the right places causes the area to be developed, especially when previously unavailable opportunities are provided, compounded by a lack of land for developments other than industry on Kaien Island. If, or when, the City succumbs to the pressures to permit developments, it is not too difficult to envision the calls for improved services such as a wider bridge, a better road, etc; all in an area that should have never been exposed to development in the first place. With the introduction of each new activity the probability of increased costs to protect our water supply or to provide additional treatment increases as well. It is easy to say that this can be prevented through rigid control but if rigid control can be exercised it should be exercised now, unless it can be proven that these encroachments are absolutely necessary.

In summary, Dome Petroleum is concerned about the security of the 'road link'. The City of Prince Rupert however, is concerned about the security of its 'water supply' for which no known alternatives exist. The City also wants to avoid disrupting the integrity and continuity of existing developments and does not want to pre-empt the use of the little land left for development on Kaien Island. Since the road and other right-of-ways are necessary, they should be located and constructed in such a

manner that they resolve as many outstanding problems as possible, provide opportunities to benefit as many interests as possible while creating no new problems.

Surely this approach warrants consideration.

Province of
British Columbia

OFFICE OF THE MINISTER

Ministry of the
Environment

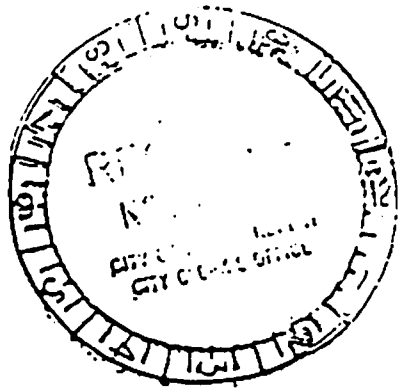
Parliament Buildings
Victoria
British Columbia
V8V 1X4

8

30/11/8

November 13, 1981.

M.O. 9951



Mr. Ed Hausner,
Administrative Assistant,
City of Prince Rupert,
424 - West 3rd Avenue,
Prince Rupert, British Columbia.
V8J 1L7

Dear Mr. Hausner:

Thank you for your letter of September 25, 1981 regarding petrochemical and liquified natural gas projects proposed for the north coast area.

In common with all other energy project proposals in the Province, these projects will be assessed according to the Energy Project Review process. By introducing the Utilities Commission Act, the Government of British Columbia has established this process for the review and certification of major energy projects, including the removal of energy resources from the Province.

In closing, please find enclosed a copy of the document entitled Energy Project Review - Guide to Agencies. You will note that legislation requirements and the associated review procedures for assessing energy projects are outlined. Regulatory and technical agencies within the Ministry of Environment are involved in the inter-ministry review of all proposed projects. In addition, you may be assured that public hearings will be held as outlined under the Utilities Commission Act.

I appreciate receiving your concerns, and wish to thank you again for writing to me about these.

Yours truly,

Stephen Rogers,
Minister of Environment.

Enclosure

Province of
British Columbia

Ministry of
Municipal Affairs

Fourth Floor
1011 Fourth Avenue
Prince George
British Columbia
V2L 3H9

YOUR FILE

OUR FILE 170.2.3

April 15, 1983

Mr. Gordon Howie
City of Prince Rupert
424 West 3rd Avenue
Prince Rupert, B.C.
V8J 1L7

Dear Mr. Howie:

Dome Petroleum Ltd. filed their Energy Project Certificate Application for the Western LNG in March. A copy is enclosed for your review. Hearings will be held by the National Energy Board on Dome's application for a Certificate of Public Convenience and Necessity; in addition, a decision will be made by the Minister of Energy, Mines and Petroleum Resources on whether or not to refer the application to the British Columbia Utilities Commission for public hearing. The public involvement process in Energy Project Review is described in the accompanying Information Bulletin.

Please send your comments to Cynthia Hawksworth, Director, Strategic Planning, Ministry of Municipal Affairs, 747 Fort Street, Victoria, B.C. V8W 3E1, as soon as possible and certainly no later than month's end. I would appreciate receiving a copy of your correspondence.

Yours sincerely,

Peter Ostergaard

Peter Ostergaard
Senior Planning Co-ordinator
Northern Region
Planning Branch

PO/slc
encls.

INFORMATION BULLETIN

PUBLIC INVOLVEMENT IN THE ENERGY PROJECT REVIEW PROCESS

November 5, 1982

Public Involvement in the Energy Project Review Process

Introduction

The Energy Project Review Process established pursuant to the Utilities Commission Act (1980), provides for a comprehensive and integrated review of major energy project proposals in British Columbia. The Ministry of Energy, Mines and Petroleum Resources has published the "Guide to the Energy Project Review Process" which outlines in detail how energy project proposals will be assessed in the province. For a full description of the process, those interested should consult the Guide. Public involvement occurs at the three major stages in the review of a particular project:

1. Pre-Application Stage
2. Application and Hearing Stage
3. Implementation and Monitoring Stage.

Public consultation will take on a different form in each of these stages consistent with the purpose of that phase of the process. Opportunities for involvement in the process are outlined below.

1. Pre-Application

In the pre-application phase, the applicant gathers information necessary to fulfill the requirements for an Energy Project Certificate application specified in B.C. Regulation 388/80.

The Regulation requires an application to contain "a description of the applicant's public information and consultation program."

The consultation program should provide early and ongoing dialogue between the proponent and public groups and individuals. The purpose of this dialogue is two-fold: firstly, so that the proponent can make information available to the public and government; and secondly, so that the public can give information to the proponent regarding the affected area and alert the proponent to community attitudes, issues and concerns that should be taken into account in project planning.

Initial public involvement, therefore, is largely based on information sharing between the proponent and the public. Responsibility for this information sharing rests with the proponent and may take many forms such as: open houses, information meetings, workshops, newsletters, etc. If this process begins at an early stage, an applicant will be able to undertake project planning with more awareness of local concerns. The public should be informed of and have an opportunity to review the proposed project as well as to make their concerns known to the proponent and to government.

The first document to be submitted by a proponent in the Energy Project Review Process is a Prospectus. This report outlines the project and the planning program. The results of this early consultation are to be described in the subsequent document, the Preliminary Planning Report. Here, the applicant reports on public responses to initial consultations and outlines what further consultations are planned. The proponent should, where appropriate, obtain public

input on the alternative locations for the project. Once the feasible alternative(s) and the major impacts have been generally evaluated, the proponent is advised to initiate meetings or workshops with local government authorities, local interest groups and the general public prior to preparation of an application. In the Application for an Energy Project Certificate, the applicant reports on the overall results of their public consultation program, including a description of:

1. information disseminated through public notice, meetings, workshops, and other consultation;
2. public responses to the notices, meetings, workshops, etc.;
3. major issues and concerns identified; and
4. the potential resolution of issues and concerns.

2. Application and Hearing

Once a formal application for an Energy Project Certificate is received by government, a decision

will be made by the Minister on whether or not to refer the application to the British Columbia Utilities Commission for public hearing.

If Commission hearings are held, the Commission will decide on format and location and public notice in local newspapers. In most cases, any member of the public or public group may register as an "intervenor" at the hearings and make verbal and/or written submissions to the Commission's panel. These hearings are normally conducted under judicial procedures and, thus, an intervenor's testimony is subject to cross-examination by the Commission, the applicant, or other intervenors. The Commission may also decide to hold informal, community hearings, where cross-examination is not permitted.

The Commission is empowered under Section 133 of the Utilities Commission Act, to award costs incidental to a proceeding and this may, at their discretion, be awarded to assist intervenors for participation in the hearings. Once a hearing is announced, those requesting assistance may make application to the Commission. Questions regarding the format, timing, or location of the hearings and preparation for intervention should be

directed to:

The Secretary,
British Columbia Utilities Commission,
21st Floor, 1177 W. Hastings Street,
Vancouver, B.C. V6E 2L7 (604) 689-1831

In the preparation of its report to Cabinet, the Commission's panel considers all evidence presented during the hearings. The Commission may recommend that a certificate be either refused or granted and, if granted, they may recommend terms and conditions for construction and operation of the project.

3. Implementation and Monitoring

Where construction is authorized by an Energy Project Certificate, the implementation of terms and conditions may be required. The ongoing inspection of construction and operation is the responsibility of the developer, with appropriate supervision by government agencies. In addition, environmental, social, and economic changes resulting from a project may be monitored. Where required, appropriate program responses to manage these impacts will be established.

The specific organization necessary to carry out project supervision and monitoring will be tailored to meet the specific needs of each project.

Local advisory committees could be recommended to assist in the process of managing project impacts. Such committees or other informed ways can be used to identify local issues and concerns as they arise and to advise appropriate government agencies on the ways and means of reducing negative impacts and enhancing positive impact.

Further information on the Energy Project Review Process may be obtained from the Project Analysis Branch, Ministry of Energy, Mines and Petroleum Resources, 525 Superior Street, Victoria, British Columbia, V8V 1T7, (604) 387-5231.

November 5, 1982

DOME PETROLEUM LIMITED

BOX 200
CALGARY, ALBERTA, CANADA
T2P 2H8

(403) 260-5100

December 21, 1981

Captain C. Burrill
Canadian Coast Guard
Western Region
P.O. Box 10060, Pacific Centre
700 West Georgia Street
9th Floor
VANCOUVER, British Columbia
V7Y 1E1

Dear Sir:

Re: Dome Petroleum Limited
Western LNG Project
TERMPOL Submission

Enclosed are twenty-five(25) copies of the TERMPOL Submission as prepared by Dome and its consultants.

We believe that this document, together with the "Environmental Setting and Assessment for Liquefied Natural Gas Terminal, Grassy Point, Port Simpson Bay, Northern British Columbia" and the "Risk Analysis - Western LNG Project" to be filed shortly, will represent the amended TERMPOL Submission discussed in Paragraph 1.9 of the TERMPOL Code dated February 22, 1977 as supplemented by the LNG/LPG Supplement dated September 1980.

The other two documents referred to above should be in your possession before year end.

We trust that once you have received this material, the TERMPOL Coordinating Committee will be in a position to compile its assessment of this Project.

Yours very truly,

J.R. van der Linden,
Project Manager.

R.A.F. Evelein,
TERMPOL Coordinator.

RAFE:fhs

Enclosures

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

GLOSSARY

This Glossary in intended for those not familiar with the terminology used in this Submission.

Avifauna	Birds of a given region considered as a whole.
Bathymetric Line	Pertaining to contour depth of oceans, seas, or other large bodies of water.
Beam	Greatest width of a vessel.
Bearing	Direction of an object from the observer and may be stated in terms of true or magnetic compass values.
Beaufort Scale	A scale of wind forces described by name and range of velocity and classified from force 0 to force 12. The scale is shown at the end of this Glossary.
Benthic Biota	Aggregate of animal and plant organisms being in or at the bottom of a body or region of water.
Boil-off	Vapour produced from the vapourization of liquid natural gas cargo.
Bollard	A heavy single or double post set into the edge of a wharf, pier or on the deck of a ship to which mooring or lines of a ship may be made fast.
Bollard Pull	Maximum towing force capable of being exerted by a tug.
Booming Ground	An area where floating timber is collected, rafted by chains or cable and stored.
Bow Thruster	An impeller installed in the bow of a vessel which is activated during berthing operations producing a lateral thrust.

GLOSSARY (continued)

Bunkering	The operation of loading fuel aboard a vessel.
Cable Length	A nautical unit of measurement equal to 1/10 of a nautical mile or 0.185 km.
CCG	Canadian Coast Guard.
Chart Datum	Lowest Normal Tide
Cool Down	The operation of pre-cooling cargo tanks or piping prior to initiating LNG cargo transfer, done by spraying of liquefied gas cargo at a controlled rate.
Course	Direction of movement to be followed for a vessel from one place to another.
Cryogenic	Refers to applications of physics that deal with very low temperatures (i.e., below -100°C).
Deadweight Tonnage	Carrying capacity of a vessel by weight in tonnes.
Displacement Tonnage	Actual weight of water in tonnes which a vessel displaces when floating at any given draft.
Dolphin	A group of piles driven close together and bound into a single structure or a structure of a similar type used for docking or mooring.
Doppler Sonar	A device which measures a vessel's speed over ground, using the apparent change in frequency of a sound wave, resulting from relative motion of the reflection source and the receiver.
Draft or Draught	Depth of under-water body of a ship at a given level of immersion.
ETA	Estimated Time of Arrival.
ETD	Estimated Time of Departure.

Echo Sounder	A sonar instrument used to measure depths under water.
Fetch	The open water distance over which wind can act in generating waves.
Flaked	A line arranged in layers so that it will run clear.
Freeboard	The vertical distance from the waterline to the vessel's main deck.
Gyro Compass	A navigational compass containing a gyroscope rotor that registers the direction of true north along the surface of the earth.
Heading	Direction in which a vessel's bow points at any given time.
IMCO	Intergovernmental Maritime Consultative Organization, a United Nations Agency to establish international maritime standards.
Inert Gas	A non-flammable gas.
International Shore Connection	Standard international flange to permit interconnection of fire water systems between a vessel and shore facilities.
Length on the Waterline (l.w.l.)	Length of vessel measured along the plane where the surface of the water touches the hull when the vessel carries her design load.
Length Overall (l.o.a.)	Length of vessel measured from the fore part of the bow to the after part of the stern.
LNGC	Liquid Natural Gas Carrier.
Loran C	An electronic position fixing method used for navigation, requiring shore based transmitters and a shipboard receiver, capable of an accuracy of $\pm$ 0.25 mile (nautical). Area of coverage is usually limited to 600 miles offshore.

GLOSSARY (continued)

Lower Flammable Limit	The lower limit of a range in which a natural gas/air mixture will ignite. (Natural gas, when mixed with air in a range of 5% to 15% by volume, will ignite. The Lower Flammable Limit is 5%)
Miles	Nautical miles in all sections of the Submission except in Section 4.0 where miles are statute.
Moss Rosenberg System	Proprietary LNG containment and installation system using spherical tanks.
Omega	Navigational system using eight stations to provide global electronic navigation whereby a fix is made by detecting the phase difference between very low frequency radio waves transmitted. The Omega receiver provides longitude and latitude position.
Person-in-charge	Individual who has the total responsibility for the conduct of the operation.
Pier	Structure which projects out from the shoreline, to which vessels are tied.
Pilot	A person licensed to advise a vessel's Master to navigate ships through coastal waters, or into or out of a harbour.
PPI	Plan Position Indicator (radar scope)
Purge	To rid a containment system of flammable gases by displacement with inert gases.
Racon	Radar beacons which respond electronically to ship board radar interrogation to indicate location and identity for navigational purposes.
R.D.F. Beacon	A special purpose radio transmitter used to provide bearing direction information to a shipboard radio direction finder.

GLOSSARY (continued)

Satellite - Satnav	A term to denote the Navy Navigation Satellite System (Transit) which provides accurate navigational fixes.
Shackle (length)	A nautical unit of measurement equal to 15 fathoms or 27.4 metres.
Side-Scan Sonar	Sonar device which can detect water depths at variable angles including vertical readings.
Snatch Loads	Sudden pull of weight on a line.
Sonar	A method for detecting and locating objects submerged in water by means of the sound waves they reflect or produce.
Storing	To take on board provisions and supplies.
Strain Gauge	Force measuring device.
Tail or Peunant	Extensions to a mooring line which provides elasticity in securing lines.
Towing Wire Pennant	Wire tail of a combination wire and nylon tow line.
Transducer	An electronic signal emitting and receiving device.
Transponder	A radio or radar transceiver, used in radar beacons, that automatically transmits a reply promptly on reception of a certain signal.
VHF Radio Telephone	Very high frequency two-way telephone with a line-of-sight reception of about 25 miles.
Wharf	Structure generally parallel to the shore.
Wharf Superintendant	Terminal employee directly responsible for operation of wharf facilities, including mooring of vessels.

BEAUFORT SCALE

Wind Force (Beaufort)	Limit of (knots)	Descriptive Term	Probable Mean Height of Wave (Open Sea) (feet)*	(metres)
0	1	Calm	0	0
1	1-3	Light Air	0	0
2	4-6	Light Breeze	0.5	0.15
3	7-10	Gentle Breeze	2.0	0.61
4	11-16	Moderate Breeze	3.5	1.07
5	17-21	Fresh Breeze	6.0	1.83
6	22-27	Strong Breeze	9.5	2.90
7	28-33	Moderate Gale	13.5	4.11
8	34-40	Fresh Gale	18.0	5.49
9	41-47	Strong Gale	23.0	7.01
10	48-55	Whole Gale	29.0	8.84
11	56-63	Storm	37.0	11.28
12	64-71	Hurricane	over 45.0	over 13.72

* In open sea

PREFACE

For more than two years, Dome, on behalf of itself and others, have been working towards implementation of the Western Liquefied Natural Gas Project. This Project involves the construction in British Columbia of LNG Terminal facilities for the liquefaction of natural gas from British Columbia and Alberta for export to overseas markets. Dome is in the process of obtaining all necessary Provincial and Federal regulatory approvals with a view of having these facilities in operation in the fourth quarter of 1985.

The Submission has been prepared by Dome Petroleum Limited with the assistance of the following specialized consultants.

- ARESCO Ltd.
- Beak Consultants Ltd.
- Columbia Pacific Resources Group Ltd.
- Ecology and Environment, Inc.
- Environmental Sciences Limited.
- Golder Associates.
- Paul Johnson Associates, Inc.
- Swan Wooster Engineering Co., Ltd.
- Tera Environmental Consultants Ltd.
- Captain G.A. Veres Associates Limited.

Communications with respect to this Submission should be addressed to:

Mr. Jerry van der Linden
or
Mr. Rein Evelein
Dome Petroleum Limited
P.O. Box 200
Calgary, Alberta T2P 2H8

SUMMARY

Dome, on behalf of itself and others, proposes to transport liquefied natural gas from Canada to Japan pursuant to long-term contracts which Dome has entered into with five Japanese utility companies.

This Project will involve moving gas by pipeline from Alberta and British Columbia to an LNG Terminal to be constructed at Grassy Point in Port Simpson bay (approximately 30 km north of Prince Rupert) on the British Columbia coast. The Terminal facilities will liquefy and store 13.6 million cubic metres (480 million cubic feet) average per day of natural gas and it is proposed that five 125,000 cubic metre LNG carriers will be constructed to carry the LNG from Grassy Point to Japan. Some of the carriers will be constructed in Canada.

As part of the Canadian regulatory approval process, it is necessary to obtain the approval of the Government of Canada for the marine components of this Project. Specific approval is needed for the wharf at Grassy Point, as well as the operations relating to the arrivals and departures of the LNG carriers in Canadian waters.

In 1977, the Ministry of Transport brought into existence the "TERMPOL Code"; a policy of the Government which requires proponents of projects such as the Western LNG Project to provide an overall assessment of the impact that such a project would have from a marine perspective. The TERMPOL assessment will serve as the framework for obtaining specific approvals under the Navigable Waters Protection Act and the Fisheries Act.

This document encompasses preliminary information given to the TERMPOL Committee in mid-1981 as well as responses to requests for supplementary information respecting the Project from the TERMPOL Committee.

Dome has commissioned extensive studies respecting environmental impact and has also retained highly qualified experts to advice on the question of risk. This document will be supplemented by two other documents which are near completion, namely the "Environmental Setting and Assessment for Liquefied Natural Gas Terminal, Grassy Point, Port Simpson Bay, Northern British Columbia" as well as a "Risk Analysis - Western LNG Project" as prepared by Dome and its consultants in those fields.

The approach to the questions of environmental and risk has been intentionally analyzed on a "pessimistic" basis. It is the view of Dome and its consultants that the long term effect of this Project on the environment will be minimal and further that the risk of a serious accident or casualty occurring is minimal.

This Summary identifies the more important subjects addressed in this Submission:

Route Alternatives

Six route alternates within the British Columbia coastal waters have been evaluated to provide the Master of the LNG carrier maximum flexibility in the selection of an optimum route to accommodate the following factors:

- A more southerly route from Japan across the Pacific to avoid large north Pacific storms.

- The boarding of a Pilot in other areas, (presently, Pilots are boarded at Triple Island pilot boarding station in the Prince Rupert area).
- The avoidance of a particular route where fishing vessel concentrations are high.
- The avoidance of a particular route when and where the weather conditions are bad.

Ship Particulars

The LNG carriers to be used in this Project will be of the Moss Rosenberg design. Specifics, pertaining to the vessel particulars, are included in the Submission.

Navigational Aids

The LNG carrier will be equipped with the latest navigational equipment and will utilize the existing Loran C network, satellite navigation, Omega and numerous other electronic equipment coupled with existing and new shoreboard navaids. Improvements in navaids are outlined in the Submission, of which the majority are in the Dixon Entrance area. The Canadian Coast Guard have advised that active plans are in existance to establish a Level III Vessel Traffic Management (VTM) system in 1983-84 covering Dixon Entrance and the approaches to Prince Rupert to be supplemented with radar surveillance (Level IV) as traffic increases.

Marine Traffic Densities

Projections of vessel traffic along the route alter-

natives have been forecast for the years 1985 and 1990. The LNG carrier will make approximately 60 round trips per year which represents about 4% of the projected 1985 traffic. By way of comparison of the 1980 Prince Rupert traffic with traffic in other world ports, it was found that traffic in the Prince Rupert area is:

- 1.6% of the Dover Strait summer traffic.
- 3.8% of the Malacca Strait traffic in 1974-75.
- 4.7% of the traffic in the approaches to Vancouver in 1975-76.

Fishing Vessel Operations

Although difficult to predict, the numbers of fishing vessels at any time that will be encountered by the LNG carrier vary significantly during different months of the year. An encounter with a fishing vessel is most likely to occur with a vessel crossing the LNG carrier when moving from one fishing area to another or when a packer or fishing vessel is on its way to deliver fish.

The potential for an encounter has been or can be reduced by:

- Selecting course heading of the various routes to avoid known fishing areas.
- Selecting an alternate route to avoid large concentrations of fishing vessels along one particular route.
- Installing the latest "state of the art" navigational equipment on the LNG carrier.
- Continued communications between the carrier and the Prince Rupert VTM Centre and local fisheries offices to update local fishing vessel activities.
- The ability of fishing vessels equipped with radar to detect the LNG carrier's position.
- The fact that the LNG carrier fleet will be dedicated to this Project and the high standard crews who will become familiar with the local waters.
- Upgrading of navaids in the Prince Rupert area which will add to overall marine safety.

Transit Time

The total time for the LNG carrier to transit from the eastern end of Dixon Entrance or the southern part of the Hecate Strait to the Terminal is between 8-15 hours.

When in full operation, an LNG carrier will arrive in Port Simpson bay every six days. It would take 36 to 48 hours for each carrier to transit the British Columbia coastal waters, be loaded with LNG and return to sea. The carrier operations in Port Simpson bay will be assisted by four large dedicated tugs.

Emergency Anchorage Areas

A ship requiring an emergency anchorage will utilize one of the following areas depending on prevailing weather and sea conditions.

- McIntyre Bay.
- Browning Entrance (northwest of Larsen Island).
- An area east of Burnaby Island and north of Howay Island.
- An area east of Stephens and Prescott Island as well as north of Porcher Island.
- An area southeast of Kinahan Islands.
- An area east of Dundas Island and northwest of Whitesand Island.

Port Simpson Bay Shipping Operational Safety

Port Simpson bay, where the Terminal is to be located, is spacious, well sheltered and eminently suitable for large vessels. The village of Port Simpson (which has a population of about 1000) is located on the south side of the bay, approximately 2.8 km (1.5 miles) from the Terminal location.

Only one LNG carrier will be allowed in Port Simpson bay at any time during normal operations even though, potentially, three carriers could be placed in the bay (one at berth and one at each of the two designated anchorage areas in the bay). The decision to allow only one carrier in the bay is based on:

- the unlikely possibility of a collision between a carrier loading at the wharf and a sister ship proceeding to anchor causing a spill,

- the requirement that a carrier wishing to leave the berth would require one and possibly both anchorages to be vacant,
- the possibility that a carrier at berth may wish to go to anchor in sudden adverse weather conditions.

Berthing Strategy

Various strategies relating to the berthing/unberthing of the LNG carrier in the predominent wind regimes expected at the Terminal are given in the Submission. In order to obtain an accurate assessment of these operations, Dome is making arrangements for simulation studies to include:

- the dynamic forces acting upon the design-ship in various weather conditions,
- the analysis and evaluation of tug horsepower requirements,
- berthing and unberthing manoeuvres in all kinds and combinations of weather,
- conditions under which the design-ship will vacate the berth in an emergency.

Operations and Contingency Plan

The TERMPOL Code requires development of a comprehensive Operation and Contingency Plan. Dome's consultants have prepared an Operations Plan as well as an outline for the Contingency Plan.

Prior to start-up, the Contingency Plan will be finalized in consultation with TERMPOL together with any changes or revisions to the Operations Plan.

1.0 PROJECT DESCRIPTION

1.1 Western LNG Project

Dome Petroleum Limited and other energy companies have been working towards implementation of a Western Liquefied Natural Gas ("LNG") Project involving the construction of an LNG Terminal in British Columbia.

The participants in the Project are:

Dome Petroleum Limited,
NIC Resources Inc.,
NOVA, An Alberta Corporation,
TransCanada PipeLines.

Canada, at this time, has surplus natural gas from existing producing areas substantially in excess of those volumes required to supply the Canadian domestic market demand and the licenced exports. It would be of significant benefit to Canada to develop new markets, such as Japan, for Canadian gas, particularly in view of the large additional volumes of gas which will be available from the Beaufort Sea and the Arctic Islands in the near future.

Dome has proposed a project to liquefy 13.6 million cubic metres (480 million cubic feet) average per day of natural gas from existing producing areas in Western Canada. The gas would be converted into LNG for export to Japan with initial deliveries beginning in late 1985, building up rapidly to 7.0 million cubic metres of LNG per year in 1990, subject to Government approvals.

Dome and NIC Resources Inc., who will be the purchasers of the LNG from the Terminal, have investigated jointly the feasibility of exporting the LNG to Japan. Five Japanese buyers, Chubu Electric Power Co. Inc., Toho Gas Co., Ltd., Osaka Gas Co., Ltd., Kyushu Electric Power Co., Inc. and Chugoku Electric Power Co., Inc. have indicated an interest in the furtherance of this Project by way of signing a Sales Contract to purchase LNG.

The gas for the Project will move through existing and new gas pipeline facilities to a west coast port site. Extensive studies of many locations have been completed. The preferred site is Grassy Point in Port Simpson bay, Northern British Columbia. The gas will be liquefied and stored on site prior to being loaded on LNG carriers for export to markets.

The Western LNG Project will consist of:

1) The pipeline facilities to connect existing and proposed gas transmission facilities to Grassy Point. It is expected that the pipeline will be constructed and owned by Westcoast Transmission Company Limited. The pipeline will run from northeastern British Columbia to the Terminal site.

2) A cryogenic liquefaction facility located at the Terminal capable of liquefying 13.6 million cubic metres per day of natural gas at pipeline conditions. The gas will be liquefied by cooling it to approximately -160°C (-260°F).

3) Four 80,000 cubic metres (500,000 barrels) cryogenic storage tanks located at the Terminal with loading pumps capable of loading 125 000 cubic metres of LNG in 12 hours.

4) A loading wharf located at the Terminal designed to accommodate a 125 000 cubic metre capacity LNG carrier.

5) Five 125 000 cubic metre capacity LNG carriers.

Figure 1.1 shows the location of the pipeline and liquefaction facilities.

The investment required to build the pipeline facilities, the liquefaction and storage facilities, wharf and loading facilities and the carriers is of the order of $3 billion.

Direct benefits realized from the Western LNG Project are:

- 22,000 man years of direct employment over 3 1/2 years for construction.

- 92 permanent jobs in the operation of the plant and marine terminal.

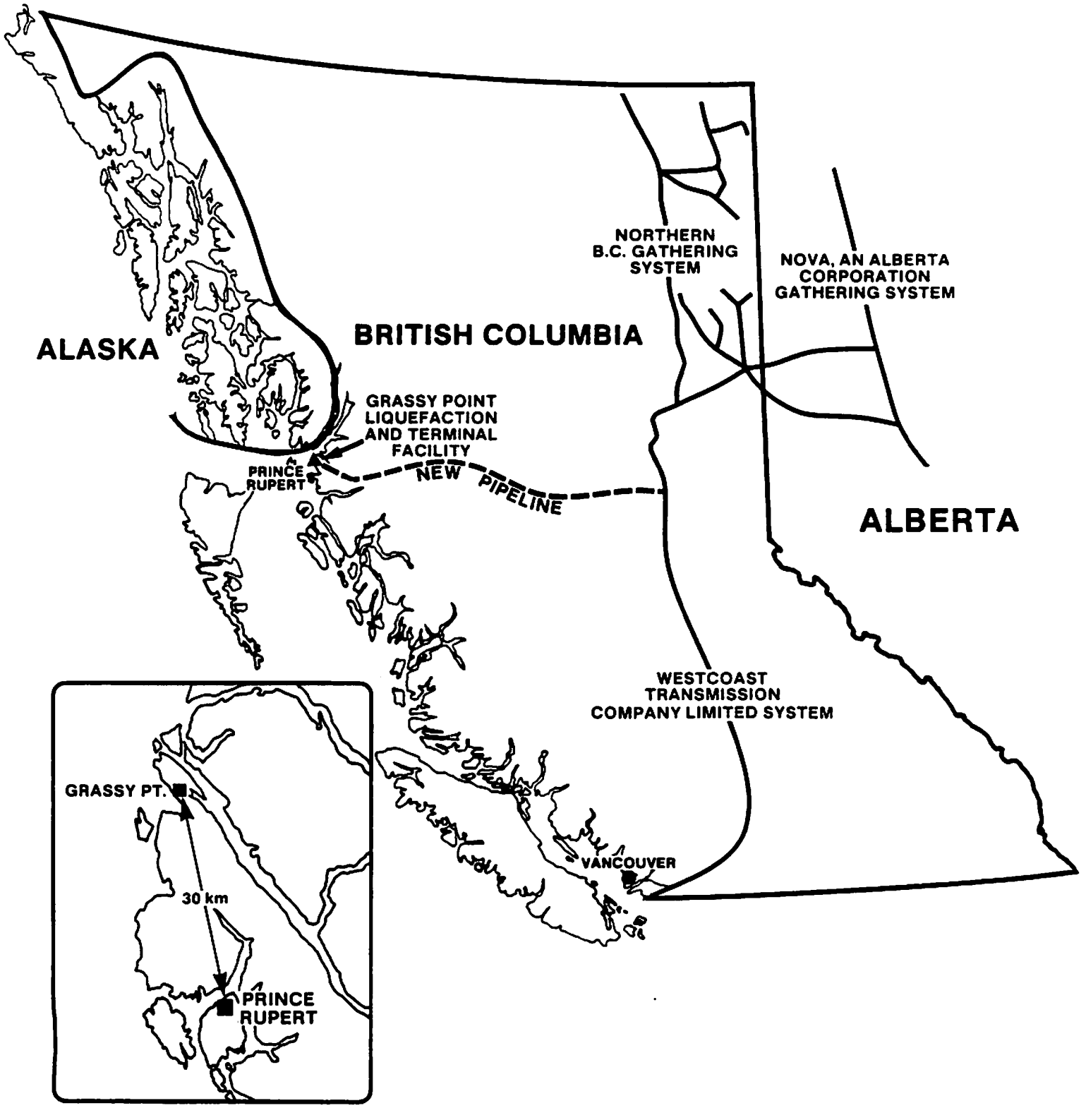
- Additional permanent jobs in offsite services and transportation.

- Training and employment opportunities for local residents.

- An all-weather road from the site to Prince Rupert.

- Additional benefit to the British Columbia and Alberta governments through a steady new market of surplus British Columbia and Alberta gas, thus stimulating growth in British Columbia's and Alberta's oil and gas exploration.

FIGURE 1-1
WESTERN LNG PROJECT



1.2 CANADIAN SHIPYARD

A primary objective of the Western LNG Project is to insure that substantial industrial benefit accrues to Canada. One of the key items to be included in the LNG sale to the Japanese utility companies is the requirement that there be at least 50% Canadian content in the shipping component of the Project.

Dome Petroleum is proposing to achieve this requirement through ship construction in a new Canadian shipyard facility owned and operated by Dome.

The plan, is to establish in Canada a world scale shipyard capable of building conventional LNG carriers and Arctic Class LNG and crude oil carriers. The design for the shipyard will call on existing shipbuilding expertise developed in the major shipbuilding centres of the world. To this end, Dome Petroleum has entered into a memorandum of understanding with Kawasaki Heavy Industries Ltd. ("Kawasaki") for acquiring Japanese shipbuilding technology. With this agreement, Dome will be able to implement in the new yard the most advanced technology in the shipbuilding world for quality control systems. The new yard will utilize extensive automation and highly computerized systems. Key personnel, Canadian engineers, technicians and skilled craftsmen would obtain on-the-job training and experience in Japan.

The five LNG carriers for the Western LNG Project would be scheduled as follows. The first vessel will be built in Japan by Kawasaki Heavy Industries. The remaining vessels will be built in two stages. The hull will be constructed in Canada and then towed to Japan where the spherical tanks will be constructed and

installed by Kawasaki. Joint arrangements are now being developed for the construction of the remaining ships.

It is, at present, planned that at least two of the five carriers will be Canadian registered. As Canadian crews become available, they will be used on the Canadian registered carriers to the greatest extent possible and will be specially trained in ship handling and LNG operations.

2.0 STUDIES AND SURVEYS

2.1 SITE SELECTION SURVEY

The Grassy Point site was chosen as the preferred Port site for the Western LNG Project from amongst a list of some 26 sites on the British Columbia mainland and Vancouver Island coast. This list was compiled in order to consider all sites which might be feasible.

Preliminary review of these sites by Dome engineering and environmental staff was followed by more detailed review by consultants. Separate reports have been prepared by Swan Wooster Engineering Co. Ltd., addressing the engineering factors in site selection and Tera Environmental Consultants Ltd., addressing environmental concerns.

The following is a list of factors which influenced the site selection process:

a) Port site approaches and shipping channels;
b) Offshore foundation conditions for wharf construction;
c) Plant site foundation conditions;
d) Plant access by road, pipeline and power;
e) Land use and ownership at the prospective site and in the surrounding area;
f) Environmental considerations in relation to both renewable and non-renewable resources;
g) Consideration for public safety;

h) Capability of local infrastructure to handle both operating and construction personnel or to be expanded to required levels;

i) Overall projected cost.

While it is impossible to project development without some impact on the environment, it is the firm belief of the applicant that the development of an LNG plant and port at Grassy Point will represent minimum impact. Grassy Point is the optimum site for this Project.

2.2 APPROACH CHARACTERISTICS AND NAVIGABILITY ANALYSIS

This analysis deals with the marine transportation system of LNG cargoes, with an LNG Terminal being sited in the vicinity of Grassy Point, Port Simpson.

The three major components of the analysis are:

(a) Area - Dixon Entrance
- Hecate Strait
- Chatham Sound

(b) Marine traffic network - dealing with navigation matters, ship safety and meteorological factors, viz:

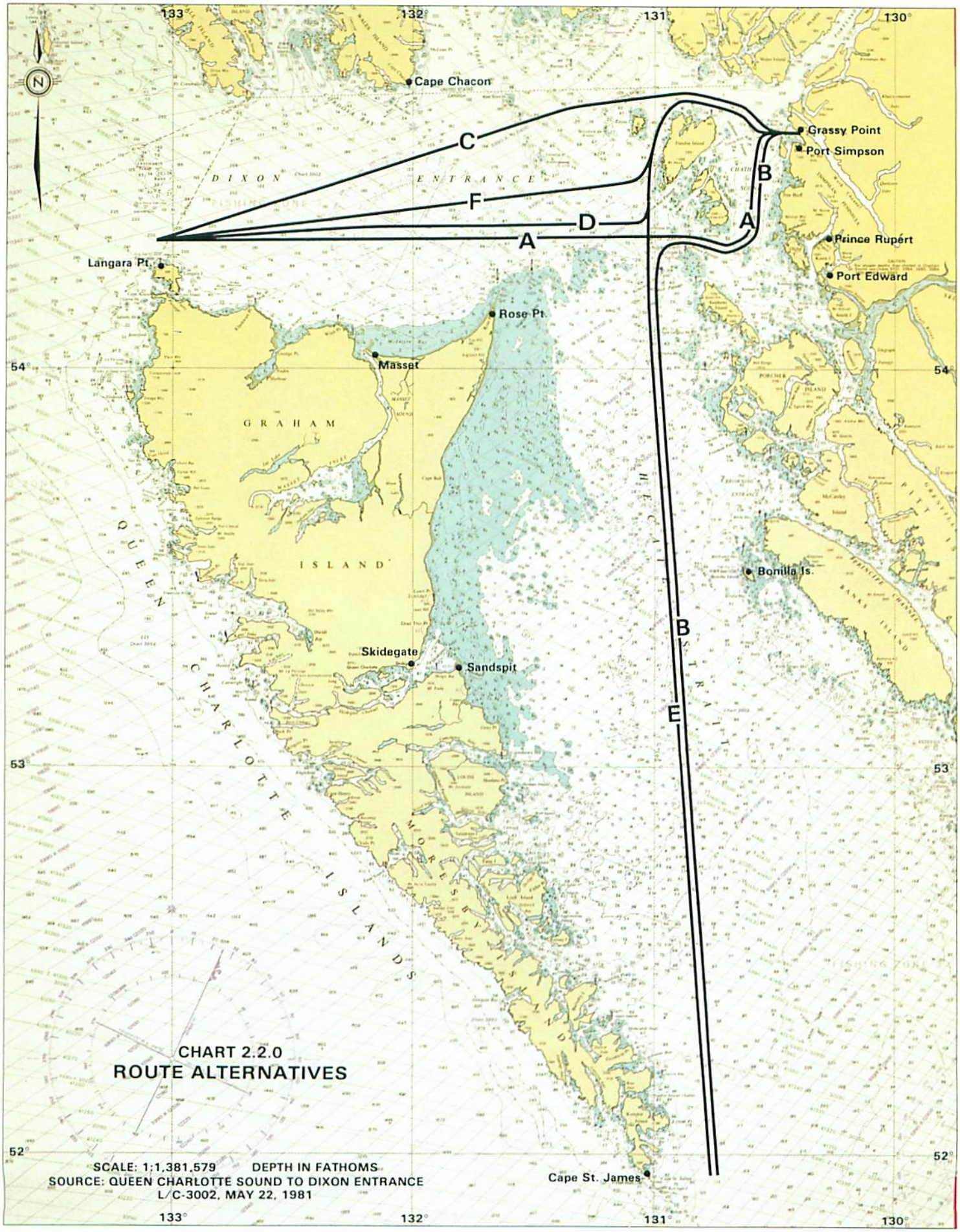
- evaluation of safe navigation requirements
- determination of safest routes
- projection of marine traffic densities and of the ensuing constraints.

(c) Transit time and delay assessment

2.2.1 Route Alternatives Evaluated

The routes analysed are shown in Chart 2.2.0 and described below. Chart 2.2.0 shows the routes in stylized form. Exact routing and headings are described further in this Section.

(A) Dixon Entrance to Triple Island Pilot Boarding Station, across Brown Passage to Chatham Sound, thence north into Port Simpson via Inskip Passage.


133°
132°
131°
130°
N
Cape Chacon
Grassy Point
Port Simpson
DIXON ENTRANCE
C
F
D
A
B
A
Prince Rupert
Port Edward
Langara Pt.
Rose Pt.
Masset
54°
54
GRAHAM ISLAND
QUEEN CHARLOTTE ISLANDS
HECATE STRAIT
Bonilla Is.
Skidegate
Sandspit
B
E
53°
53
MORESBY ISLAND
CHART 2.2.0
ROUTE ALTERNATIVES
52°
52
SCALE: 1:1,381,579 DEPTH IN FATHOMS
SOURCE: QUEEN CHARLOTTE SOUND TO DIXON ENTRANCE
L/C-3002, MAY 22, 1981
Cape St. James
133°
132°
131°
130°

(B) Hecate Strait to Triple Island Pilot Boarding Station, across Brown Passage to Chatham Sound, thence north into Port Simpson via Inskip Passage.

(C) Dixon Entrance direct between the West Devil Rock and Celestial Reef to the north coast of Dundas Island, into Chatham Sound and to Port Simpson via Inskip Passage.

(D) Dixon Entrance to Triple Island Pilot Boarding Station, then north through Caamano Passage rounding the north coast of Dundas Island, into Chatham Sound and to Port Simpson via Inskip Passage.

(E) Hecate Strait to Triple Island Pilot Boarding Station, then north through Caamano Passage, rounding the north coast of Dundas Island, into Chatham Sound and to Port Simpson via Inskip Passage.

(F) Dixon Entrance to and through Caamano Passage, then north of Dundas Island, into Chatham Sound and to Port Simpson via Inskip Passage.

Discussion of Route Alternates

The routes have been selected to provide the Master of the LNG carrier maximum flexibility in the selection of an optimum route.

Normally, the LNG carrier will leave Japan going north following the Great Circle Route and will enter British Columbia waters via Dixon Entrance.

Large north Pacific depressions (storms) may require the LNG carrier to adopt a more southerly route from Japan thus the Master may wish to approach the British Columbia coast via Hecate Strait. It is estimated that this may occur 20% of the time. Routes B or E would be used.

At present, Pilots board ocean going vessels in the vicinity of Triple Island and routes A, B, D and E allow for this. Routes C and F are more direct routes to the terminal but would require the Pilots to board in the area north or west of Dundas Island.

The question of establishing a satellite pilot station north of Dundas Island has been discussed with the Pacific Pilotage Authority ("PPA") who have expressed their willingness to consider the matter. PPA have pointed out that establishing such a satellite pilot station would necessitate stationing an additional pilot boat at Prince Rupert. A second pilot boat could also service a pilot boarding station at Browning Entrance for those design-ships that select the Hecate Strait approach route.

The feasibility of helicopter-boarding of Pilots is also understood to be under active consideration by the PPA and the British Columbia Coast Pilots. Helicopter boarding of Pilots is used extensively in some ports (e.g. Rotterdam) particularly with VLCCs which have a large, clear foredeck.

Although no design or structural problems are foreseen in erecting a heli-pad aft of the deckhouse of the design-ship, Dome has serious reservations about the safety aspects of helicopter-boarding arrangements on a LNG carrier. The helicopter landing and take off manoeuvres could be affected by the updraft of the

ship's funnel discharge in close proximity. It is pertinent to observe that, as far as is known, no LNG carrier has adopted this method of boarding Pilots. Clearly the matter requires further consideration. Appendix I describes the helicopter pilot boarding procedure used at Rotterdam. (This is included for illustrative purposes and would not be used on LNG carriers.)

Route C, although approximately 9 km (5 miles) shorter than Route F, is considered unsafe because of the unmarked West Devil Rock, East Devil Rock, McCullock Rock and the shallows surrounding them. An extensive new network of navaids would be required if this route is used.

Fishing occurs at different times of the year in some areas of the selected routes, namely, Chatham Sound, north of Dundas Island, and in some sections of Dixon Entrance and Hecate Strait. The course headings of each route have been selected to avoid known fishing grounds to the maximum possible extent. For example, routes B and E, through Hecate Strait stay clear of the grounds on the east shore off the Queen Charlotte Islands.

In some cases, seasonal fishing areas can be avoided by selecting an alternate route. For example, herring fishing occurs in March throughout Chatham Sound however, the Master of the ship may choose routes C, D, E or F (north of Dundas Island) and avoid, almost entirely the Chatham Sound area. In all cases, the Master of the LNG carrier will want to stay clear of congested areas and will reduce speed or make course corrections to avoid extensive fishing activity or cross traffic.

Weather conditions vary along the selected routes. Northerly gales are experienced in the area north of Dundas

Island. The Master of the carrier may choose either routes A or B (through Chatham Sound) to avoid this area or to maintain a wind head-on condition.

In the discussion that follows, courses, etc., are considered for the in-bound passage to Port Simpson. It is assumed that out-bound tracks will be identical on a reverse course with allowances for separation of traffic. The courses laid out and shown on Charts 2.2.2 to 2.2.11 are intended for guidance only. Course adjustments, as deemed necessary in the judgement of the Master, may be made, as dictated by circumstances (navigational safety, weather, fishing activity, etc.).

2.2.2 Route Descriptions

Each of the six routes have been broken down into common links numbering 1 through 11 as shown in Chart 2.2.1. The links are described in Table 2.2.1 and the link composition for each route is illustrated in Table 2.2.2. Each link is discussed in detail in the following sections.

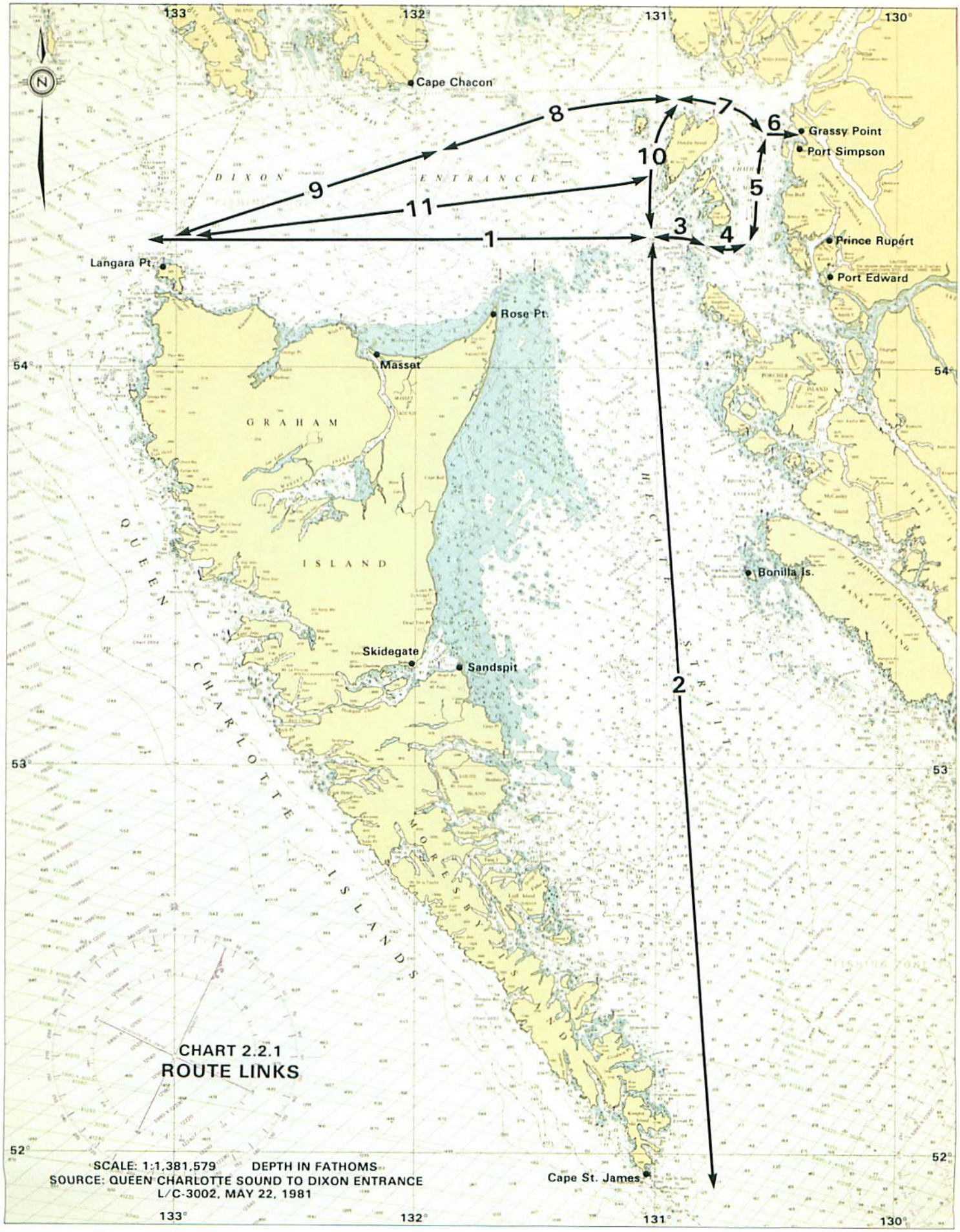


CHART 2.2.1
ROUTE LINKS

SCALE: 1:1,381,579 DEPTH IN FATHOMS
SOURCE: QUEEN CHARLOTTE SOUND TO DIXON ENTRANCE
L/C-3002, MAY 22, 1981

TABLE 2.2.1

ROUTE LINK DESCRIPTION

Link Number	Link Name	Description
1	Dixon Entrance South	Langara Island to Triple Island
2	Hecate Strait	Cape St. James to Triple Island
3	Triple Island	Triple Island Pilot Boarding Area
4	Brown Passage	Brown Passage
5	Chatham Sound	Chatham Sound Northern Part
6	Inskip Passage	Inskip Passage to Off Berth
7	Main Passage/North of Dundas	North of Dundas Island and across Chatham Sound
8	Dixon Entrance-NE	Dixon Entrance to a point between Devils Rocks and Celestial Reef
9	Dixon Entrance-ENE	Dixon Entrance towards ENE
10	Caamano Passage	Triple Island to Caamano Passage
11	Langara to Caamano	Dixon Entrance to Caamano Passage

TABLE 2.2.2

ROUTE DESCRIPTIONS

Route	Description	Link Numbers
A	Dixon Entrance, Brown Passage, Chatham Sound	1, 3, 4, 5, and 6
B	Hecate Strait, Brown Passage, Chatham Sound	2, 3, 4, 5, and 6
C	Dixon Entrance, Main Passage	9, 8, 7, and 6
D	Dixon Entrance, Triple Island, Caamano Passage, Main Passage	1, 3, 10, 7, and 6
E	Hecate Strait, Caamano Passage, Main Passage	2, 3, 10, 7, and 6
F	Langara Island, Caamano Passage, Main Passage	11, 10*, 7 and 6

* Shortened version of Link 10.

2.2.2.1 Dixon Entrance South (Routes A & D, Link No. 1 Chart 2.2.2)

Dixon Entrance is extensively used by deep sea shipping, being the northernmost seaward approach from the Pacific Ocean to the inside waters of British Columbia[1]. It is entered between the Queen Charlotte Islands on the south and Dall and Prince of Wales Islands on the north; and extends from Langara Island in the west to Dundas Island in the east, a distance of approximately 140 km (75 miles) and with an average width in excess of 55 km (30 miles).

Dixon Entrance is a deep waterway. Learmonth Bank lies in the fairway at the west entrance. This bank is approximately 9 km (5 miles) wide in an east/west direction and 22 km (12 miles) long in a northwest/southeast direction with uneven depths, the least being 36.5 m (20 fathoms). No navigational hazard to the design-ship is expected, although heavy tide rips are reported around the bank which would make it desirable to avoid the bank, when a heavy swell is running.

Open to the westerly Pacific swell, seas and wind, Dixon Entrance is also subject, during the winter months, to northerly gales which funnel down Portland Inlet. Tidal streams are most pronounced north of Langara Island, and may attain a speed of 2.5 knots, running east/west.

---

(1) Routes selected and discussed in this submission are safe or can be made safe with proper shipboard equipment and improvements in shore based navaids. The submission aims to recognize and realistically assess navigation within British Columbia waters. (See also Section 2.4).

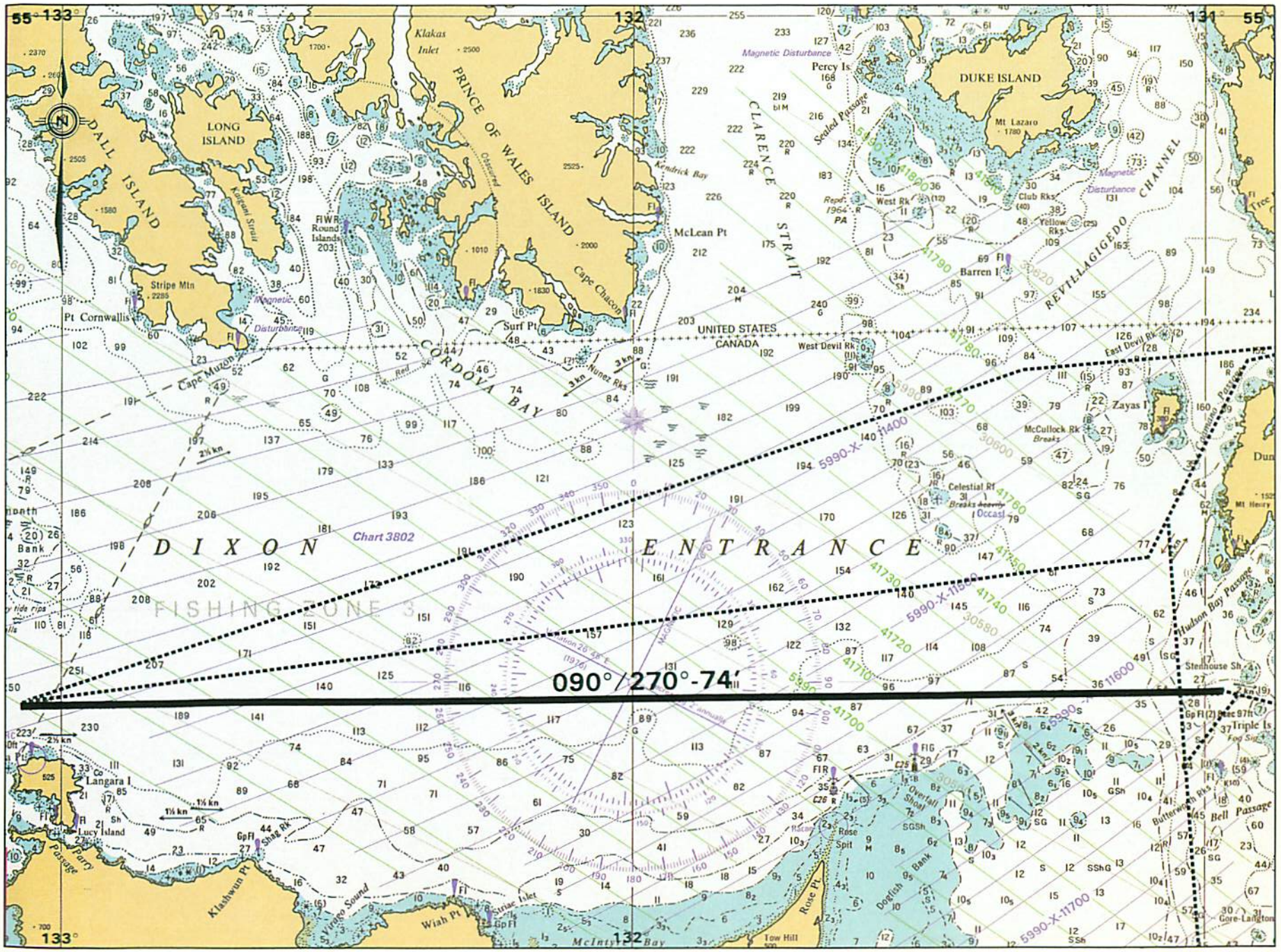


CHART 2.2.2

DIXON ENTRANCE SOUTH (LINK No. 1 - ROUTE A & D)

SCALE: 1:617,600 DEPTH IN FATHOMS

SOURCE: C.H.S. CHART L/C-3002; FEB. 29, 1980

CORRECTED THROUGH NOTICES TO MARINERS JUNE 26, 1981

Reduced visibility [less than 3.7 km (2 miles)] is reported to occur at approximately 6% of the time at Langara Island, due to advection fog in summer and/or steam fog in the winter. Reduced visibility, due to precipitation, accounts for about 9% of all hourly observations(1).

Making a landfall from the west is assisted by the 35 km (19 mile) range Langara Point light and a 111 km (60 mile) range RDF Beacon. From Langara to the pilot station off Triple Island, a vessel's true course would be of 090°, with a 137 km (74 mile) steaming distance. The rocky coastal terrain offers good radar targets for position fixing, in thick weather, at the beginning of the passage but the land becomes more difficult to identify around the low lying McIntyre Bay and Rose Point areas (eastern part of the north shore of Graham Island). See 2.4 for discussion on use of ship born electronic navaids in coastal waters.

Overfall Shoals, extending some 30 km (16 miles) in an east-northeast direction from Rose Spit, represents a grounding hazard for a vessel uncertain of its position, as it approaches Triple Island. Rose Spit is fitted with a Racon Transponder which will identify itself on the PPI of a high sensitivity 3 cm radar set, at up to 22 km (12 miles) distance. Two buoys, marking

(1) Source - D.W. Phillips, Atmospheric Environment Service, Meteorological Application Branch: "A Marine Climatology of the Approaches to Kitimat, British Columbia, September 1977". The conditions described are also stated to be applicable to Hecate Strait.

the northern edges of Rose Spit and Overfall Shoals are the only other navaids in the area(1).

The east-northeast tip of Overfall Shoals, with minimum depth of about 10.9 m (6 fathoms), represents a hazard to all deep-sea shipping. During flood periods the tidal stream is southeasterly (into Hecate Strait) in this area where shipping has to reduce its speed on approaching the Pilot Station. Manifestly, improvements in navigational aids are desirable to ensure that the northern limits of the shoal are unmistakeably identified.

The average traffic density in Dixon Entrance is light/moderate. In 1978 it averaged 4.8 vessel movements per day(2).

NOTE: When discussing traffic densities and vessel movements in this submission, all vessels, except fishing vessels and pleasure craft, are understood to be included. Specifically:

- Cargo ships (including container and bulk carriers, oil or chemical tankers, specialized carriers, etc., both deepsea and coastal).
- Ferries and cruise ships.
- Tug/barge and tug/tow (log-boom) units.
- Naval and/or government owned vessels.
- Miscellaneous vessels.

---

(1) Both these buoys - the Rose Spit buoy and the Overfall Shoal bellbuoy are of the largest type (9 1/2') used on the West Coast. They are reported difficult to observe even at close range and to be often out of position. It is understood that CCG is considering replacement of these buoys with larger units and their repositioning, particularly the Rose Spit buoy, where a higher intensity light also appears desirable.

(2) See Section 2.5 for detailed discussion of Marine Traffic Densities.

2.2.2.2 Hecate Strait (Route B, Link No. 2 - Chart 2.2.3)

It is anticipated that the LNG carriers will follow a "weather-routed, optimum-time-on-passage" track. It is therefore probable that occasionally adverse weather conditions emanating from the Gulf of Alaska (the Aleutian Low) would make it preferable to approach the Triple Island Pilot Boarding Area from the south, via Hecate Strait.

Approaching Cape St. James from the Pacific, an LNG carrier would determine its position by means of electronic navigational aids (Satellite/Omega and Loran C) until radar fixes from the steep west coast shoreline of Moresby Island become possible. A 31 km (17 miles) lighthouse and a continuous operation radio beacon are situated on Cape St. James [the latter having a range of 185 km (100 miles)].

Vessels rounding Cape St. James must keep well clear of Gray Rock [with less than 1.8 m (6 ft.) of water over it]. To do so is recommended also because the Pacific swell from the west is apt to turn into a steep ground swell near the Cape. A distance-off from the lighthouse, of 22.2 km (12 miles), will clear the vessel, with adequate safety margin, from Gray Rock.

After clearing Gray Rock, the course of 356° (true) will bring the LNG carrier, over a steaming distance of approximately 257 km (139 miles), to a point about 2.8 km (1.5 miles) west of Butterworth Rocks, at the northern end of Hecate Strait, from where the vessel will manoeuvre herself into position off Triple Island Pilot Boarding Station.

An alternative route through Hecate Strait would be selected if the design-ship would board the Pilot at Browning Entrance. In such case the ship would wish to close Bonilla Island, on a true course of 007°, for a distance of approximately 183.5 km (88 miles). After boarding the Pilot, a course of 342° (true), over a 54.6 km (29 miles) steaming distance, would bring the ship to a point where Grenville Rock bears due east, 7.4 km (4 miles) distant. From Grenville Rock the course mentioned in the previous paragraph would be followed.

The additional steaming distance for this route alternative is negligible (3.7 km - 2 miles). It has the advantage of obviating the need to board the Pilot in the Triple Island area and is particularly attractive if the design-ship intends to proceed to Port Simpson bay via Caamano Passage.

No navigational problems, or hazards, should be encountered during the passage through Hecate Strait. Although of varying depths (generally decreasing on the northbound passage), the minimum depth over the track indicated above will be 32.9 m (18 fathoms).

Tidal stream velocities are moderate [1.9 - 3.7 km/hr (1 - 2 knots)], although flood tides in August can reach 4.6 - 5.6 km/hr (2.5-3 knots).

Hecate Strait is more than 157 km (85 miles) wide at its south entrance, whilst at the northern entrance it narrows to about 55 km (30 miles) between Rose Point and Stephens Island. This latter width, however, includes the shallows of Overfall Shoals. The width of the deep passage between the eastern end of Overfall Shoals and Butterworth Rocks is about 7.4 km (4 miles).

The 1978 marine traffic density averaged 4.7 vessel movements per day.

Considerable number of fishing vessels, however, are active in certain parts of the year in the Hecate Strait area. Such fishing activity takes place in the shallower waters along the east coast off Graham and Moresby Islands and in the Inside Passage water-way, off the western shore of the British Columbia Mainland. The route above described runs clear of these fishing areas, but fishing vessel cross-traffic from the east to the west shore of Hecate Strait (and vice versa) must be allowed for.

2.2.2.3 Triple Island (Routes A, B, D and E, Link No. 3, Chart 2.2.4)

The flood tide sets towards Triple Island. Several rocks, with shallow depths, are to be found in the vicinity of Triple Island, therefore, a large ship should keep at a distance of 3.7 km (2 miles). Apart from the lighthouse, a fog signal and a radio beacon are in operation on Triple Island.

Occasionally, Pilots encounter difficulties in boarding ships during adverse sea and weather conditions. In such circumstances the Pilot on the Pilot boat acts as guide and leads the ships into calmer waters (nearer to Lucy Island) where the Pilot will board. It is reported that this procedure, which would represent no deviation or undue delay for a ship bound for Port Simpson bay, has to be adopted about 20-24 times a year (based on current traffic densities), particularly during periods of southeasterly gales.

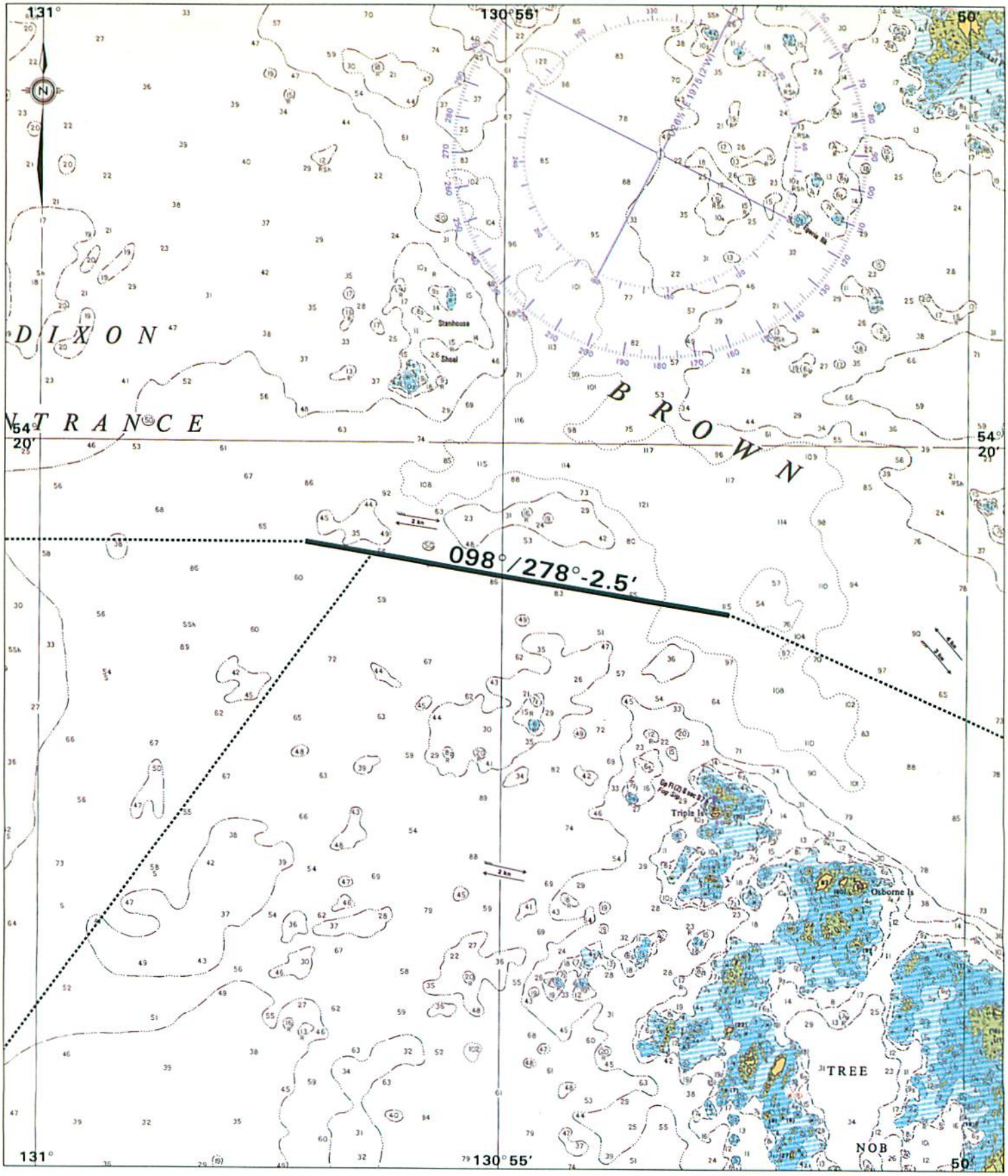


CHART 2.2.4

TRIPLE ISLANDS PILOT STATION AREA (LINK No. 3 - ROUTES A, B, D & E)

SCALE: 1:59,700 DEPTH IN FATHOMS

SOURCE: C.H.S. CHART 3989; AUG. 24, 1981

CORRECTED THROUGH NOTICES TO MARINERS MARCH 20, 1981

It has been mentioned earlier that, apart from westerlies, strong northerlies can blow through Portland Inlet, which can affect the Triple Island area. There are occasions, therefore, when a Pilot simply cannot board and at such times a vessel will have to remain at sea until the weather moderates(1).

The 1978 traffic density in the Triple Island Pilot Station area was 6 vessel movements per day (average).

2.2.2.4 Brown Passage (Routes A and B, Link No. 4, Chart 2.2.5)

With the Pilot on board, the vessel would enter Brown Passage, steering for Lucy Islands lighthouse. Such course would bring the ship safely through the narrowest [3.7 km (2 miles) wide] part of the passage, between Osborne Islands in the south and Hanmer Rocks to the north.

Tidal streams, at 2-4 knots, run diagonally across this passage with the flood setting in southeast direction and the ebb in a northwest direction and they have to be allowed for in selecting the routes.

---

(1) The question has been raised as to the exact sea and weather conditions wherein the Pilot could not board. This Submission does not attempt to describe (or prescribe) matters which should be left to the judgement of the Master and the Pilot. Clearly, there will be communication, by VHF radio, between the design-ship, Vessel Traffic Management and the pilot station, so the Master will know in advance if weather conditions are deemed too severe for the Pilot to attempt boarding. In such cases, no doubt the Master will prefer to heave to or steam around slowly outside Dixon Entrance, where he has more sea-room.

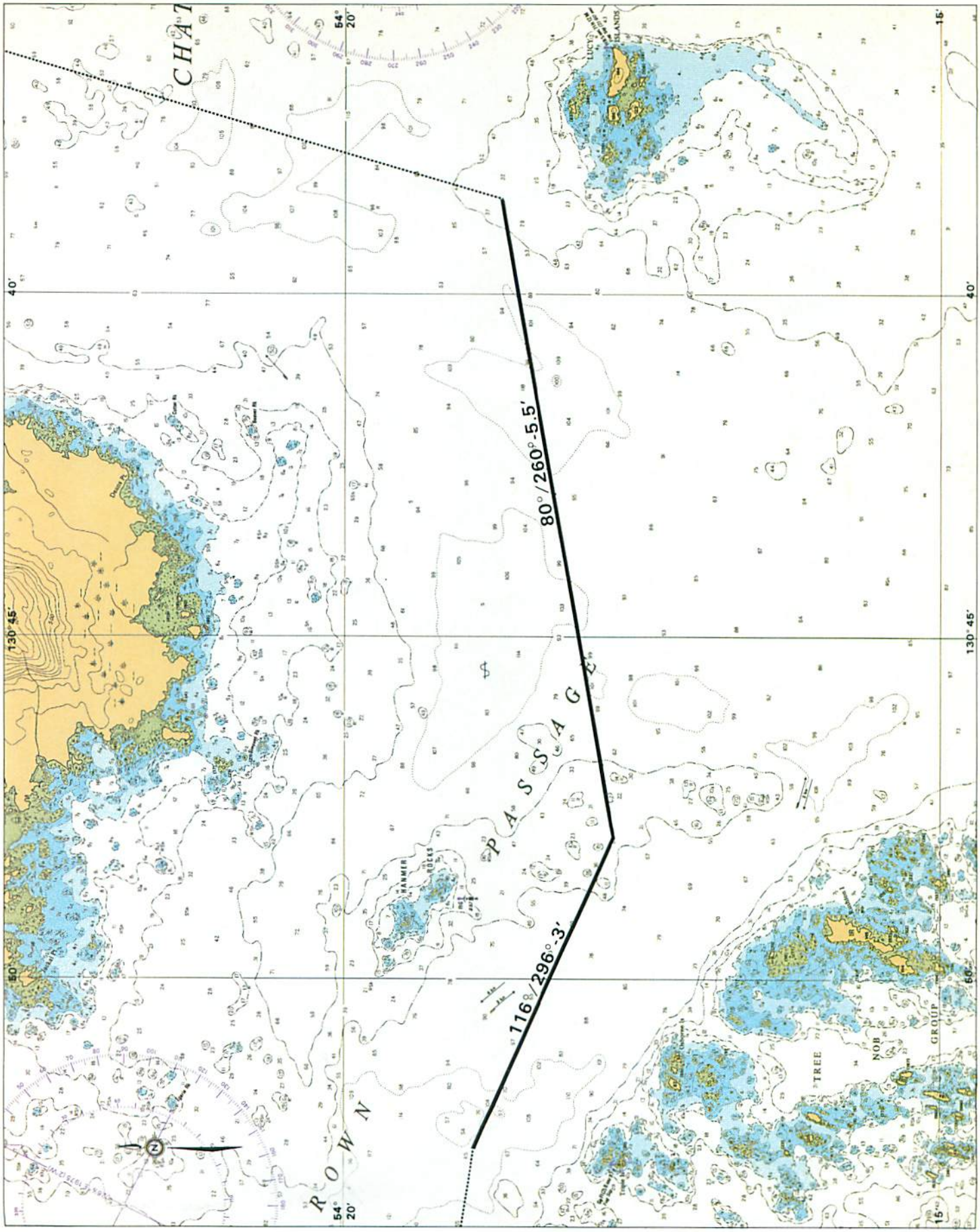


CHART 2.2.5

BROWN PASSAGE (LINK No. 4 - ROUTES A & B)

SCALE: 1 80,000 DEPTH IN FATHOMS

SOURCE: C.H.S. CHART 3989; AUG. 24, 1979

CORRECTED THROUGH NOTICES TO MARINERS MARCH 20, 1981

Navigation is presently assisted by the 22 km (12 miles) range Lucy Islands lighthouse (and foghorn) and the Hanmer Rocks light/whistle buoy equipped with radar reflector. Melville Island, to the north of the passage, with a maximum elevation of 408 m (1340 ft.) would also offer a good radar target.

Northbound ships through Chatham Sound will alter course when Hanmer Rocks light buoy bears 335°, about 2.3 km (1.3 miles) distant; steer 080° until Lucy Islands lighthouse is on a bearing of 129°. Thence a course of 015° will square the ship for entering Chatham Sound. The total steaming distance through Brown Passage is approximately 15.7 km (8.5 miles).

Although some waters as shallow as 15.4 m (8.4 fathoms) are encountered when transiting Brown Passage(1), the minimum water depth on the route described is shown on Canadian Hydrographic Chart No. 3989 to be 20.1 m (11 fathoms) which is an adequate and safe depth for the design-ships.

The average traffic density through Brown Passage in 1978 was 5.1 movements per day. Because of the strong tidal streams, there is no significant fishing activity in the passage itself, but part of the Prince Rupert based fishing fleet uses Brown Passage for transiting to the fishing grounds in Dixon Entrance and off the east coast of Graham Island.

---

(1) 16.5 and 18.3 m (9 and 10 fathom) patches south of Hanmer Rocks, and 15.4 m (8.4 fathom) patch to the south of the course indicated. These depths would not present a problem to the design-ships, except perhaps under conditions of very heavy (resonance) pitching when speed adjustment would be required. The alternate to Brown Passage would be Camaano Passage. See Section 5.7.

2.2.2.5 Chatham Sound (Routes A and B, Link No. 5, Chart 2.2.6)

A 31 km (17 miles) passage from a point approximately 3.7 km (2 miles) north of Lucy Islands, on a true course of 015°, will bring the LNG carrier off the Inskip Passage entrance of Port Simpson bay.

The northern part of Chatham Sound, with a width of 12.9 km (7 miles) at the southern end and 20.3 km (11 miles) at the northern end, is contained between the Tsimpsean Peninsula and adjacent islands on the eastern side; Dundas and Melville Islands, as well as the islands lying between them, on the western side. On the north it leads to Portland Inlet and the inner passages to Ketchikan and other Alaskan points. It is a deepwater passage with water depths ranging from 54.9 m (30 fathoms)(1) and generally deepening at its northern end, to water depths reaching 274 m (150 fathoms) in the centre of the Sound at the latitude of Inskip Passage into Port Simpson bay.

The islands, laying to the west of the Sound, shelter it from Pacific swells. Tidal streams do not exceed 1 knot, and in the northern part of the Sound, they run parallel to the main channel.

The radio beacon located on the west coast of Digby Island [some 3.7 km (2 miles) away from Prince Rupert Airport] and the 24 km (13 miles) range lighthouse on Green Island (with fog

---

(1) Except for one 13.4 m (44 ft.) deep shoal (Moore Shoal), approximately 185 m (1 cable) in diameter, which lies 1.8 km (1 mile) to the east of track shown on Chart 2.2.6. A navigational mark should be placed on this shoal.

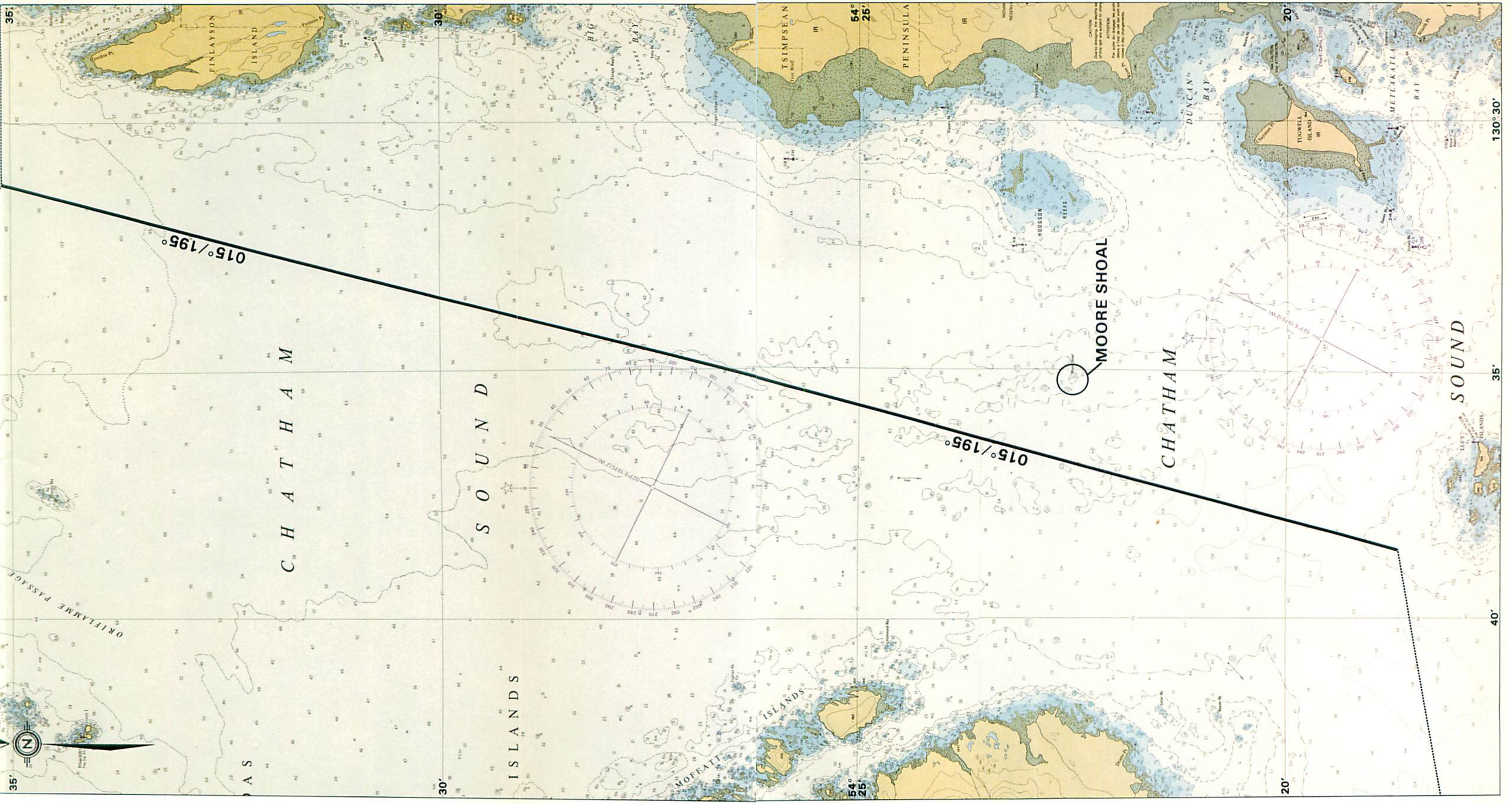


CHART 2.2.6

CHATHAM SOUND (LINK No. 5 - ROUTES A & B)

SCALE: 1:75,500 DEPTH IN FATHOMS

SOURCE: C.H.S. CHARTS 3989 & 3991; AUG. 24, 1981 & MAY 11, 1979

CORRECTED THROUGH NOTICES TO MARINERS JULY 10, 1981 & MARCH 20, 1981