

NORTH YUKON PORT WORKSHOP

WHITEHORSE, YUKON

November 20 & 21, 1984

Chairman: A. E. Ganske
Facilitator: B. Chambers
Recorder: J. Nickel

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A. Workshop Purpose, Objectives and Process

The purpose of the workshop was to provide a forum for government agencies to exchange information regarding port development on the Yukon north coast. The workshop was not a government screening and does not replace the COPE screening and review process. However, it is hoped that the outcome of this workshop will assist the participating government departments in their preparations for the COPE process. It should be recognized that the individuals involved in the workshop did not present governmental or departmental positions to this forum. They participated as resources specialists with knowledge and experience useful to an open discussion.

The objectives of the workshop were to discuss siting criteria for a port on the Yukon north coast; to identify broad principles of port development; and to focus on issues related to port development, goals to be achieved in dealing with these issues, and means of achieving these goals. The objectives were intended to elicit discussion applicable to port proposals in general rather than any one proposal.

The workshop was structured to provide maximum opportunity for participants to learn and put forward ideas. The workshop began with introductory remarks followed by presentations on the history of key events affecting the north coast, user requirements identified in development proposals and various resource systems which may have an influence on or be affected by port development. Following the presentations the whole group was involved in a discussion of siting considerations for a port. The participants were then broken into work groups to discuss broad principles of port development. The principles which resulted represent some considerations in the establishment of a port and are presented in Part C(2).

On the second day of the workshop the results of the previous work group discussions were reviewed and then the same work groups met to identify issues related to port development. The lists which resulted are presented in Part C(3). To focus further discussion a list of major issues which had been identified was prepared. This list was then used by the work groups to identify the resource management goal that should be achieved in dealing with the major issues and methods by which the goal might be achieved.

During the course of the workshop several concerns were expressed about the assumptions, constraints, purpose, and products

of the workshop. The concerns and resulting discussion are summarized as follows:

1. The context of the workshop contained the assumption that there will be one multi-user port on the Yukon north coast. Several individuals felt that this assumption was improper. They stated that no decision had been made, that only port potential had been identified and that an alternative siting study might show some other area to be more suitable. In response to these concerns it was noted that the points were valid but proposals were before government which may soon lead a north coast development decision. This situation has led to a need to discuss Yukon north coast development in advance of alternative siting studies. It was agreed that the workshop should proceed anticipating that development might occur should an area of the Yukon north coast be identified as suitable for port development and should a port be required.
2. Concerns involving the purpose and product of the workshop included the feeling that participation in the workshop might be viewed as departmental sanction for the development proceeding, that some use may be made of the product other than information exchange, that statements by individuals should not be taken to represent departmental policy and that, given the workshop time constraints and lack of representation by other groups, the product of the workshop should not be viewed as comprehensive. In response to these concerns it was agreed that statements by individuals did not represent departmental policy, that no departmental sanction is implied through participation in a technical information exchange, that minutes of the meeting would be distributed to participants who would use them as they saw fit, and that the product of the workshop was by no means comprehensive.
3. It was noted that infrastructure and other developments related to port development, specifically an access road from the Dempster Highway, should be considered as part of the port development for the purpose of this workshop. Other opinions held that some associated developments, such as a road, could be considered separately. It was decided that the work groups should discuss this during the issues discussion.

B. Summary of Presentations

1. Historical Overview (Bob Friesen)

The presentation highlighted events and decisions affecting the Yukon north coast over the past decade. A summary of the presentation is provided in Appendix 2.

2. User Requirements (Bruce Chambers)

Mr. Chambers reviewed the development proposals which have been raised to date including those of Gulf, Esso, Kiewit, Dome, ^{and} LGL/~~and~~ Monenco. It was mentioned that a 60 to 70 square kilometer development zone has been suggested to accommodate development needs overall. Approximately 200 to 250 hectares (640 acres) would accommodate the forecasted land area requirements of shore-base facilities (bulk storage, airport, offices, warehousing, 1,000 person camp, etc.) should Beaufort oil production proceed. A synopsis of company comments is contained in Appendix 3.

One participant questioned how long a causeway at the King Point site would have to be to reach the 20 meter depth point. Mr. Chambers noted that the Dome proposal identified 2,200 meters as the necessary length of such a causeway.

3. Bathymetry (Marg Crombie)

Ms. Crombie presented a 1:50,000 airphoto mosaic base map and bathymetric overlay taken from 1:100,000 scale bathymetry maps. Discussion points included:

- The oil industry has indicated they require a medium to deep draft port. This would entail 12 to 14 meter depth and a 15 meter wide channel for manoeuvring;
- Kiewit's needs might be satisfied by about 8 meters depth for side dumping ships; *and/or sounding*
- The existing bathymetry information shows that greater information detail is required before design work is done. (Kiewit have done some drilling off King Point but this data has not yet been forwarded to government.)

4. Coastal Processes (Don Forbes)

Mr. Forbes outlined the general principles of coastal processes (inputs, system parameters, outputs) then focussed on processes specific to the Yukon north coast:

Since has apparently suggested some changes

Sediment Inputs

- The general sources of sediment are river transport, shore erosion and sea bed erosion.
- In the Beaufort 97% of sediments originate from the Mackenzie River. However, along the Yukon coast in the vicinity of King Point the major sediment source is cliff erosion.
- The thickness of the mobile sea bed in the Beaufort may be from 1 to 4 meters.

System Parameters

- The system parameters which influence coastal processes include morphology (topography, bathymetry), materials (textures, geotechnical character), mean sea level, variance in sea level (tides, surges, storm waves) and ice.
- The King Point area is adjacent to the Mackenzie Trough which is filling with Mackenzie River silt.
- The Coastal types found along the north coast include:
 - cliffs of ice-bonded unconsolidated sediment.
 - drowned valleys.
 - barriers and lagoons.
- Mean sea level has risen over the past 12 to 13 years. It appears to still be rising but a predictive statistical base does not exist.
- Driftwood evidence suggests that the maximum storm surge along the Yukon coast is 2 meters above mean sea level. Kay Point and King Point barrier beaches would be completely inundated during such a maximum storm surge.
- Deep water waves propagate predominantly from the northwest. Artificial islands in the Beaufort migrate to the south and southeast as a result. Longshore sediment transport from cliff erosion is predominantly from west to east along the Kay to King Point shore.
- Cliffs along the coast are ice rich and unstable and erode due to:
 - surface wash and gullying
 - ground ice slumps (retrogressive thaw failure)
 - thermo-erosion (block failures)

- Any structures built along the Kay to King Point shore will have to deal with thaw failure and cliff erosion, with net longshore sediment transport toward the south-east, and with significant sea ice forces.
- At King Point there has been a reactivation of the retrogressive failure thaw cycle.
- Detailed coastal zone stability mapping has been based on study of coastal failures and beach accumulations using
 1. photogrammetric measurement of coastal erosion rates based on aerial photographs for 1952 and 1970;
 2. examination of aerial photographs extending over the period 1944-76;
 3. field observations from 1972 to 1984.

Sediment Sinks

- Sediment transport should be considered when planning vessel passage and barriers.
- Sediments from cliff erosion move in a southeasterly direction down to coast.
- A breakwater at angles to the coast would impede sediment transport along the coast.

5. Surficial Geology (Steve Morison)

Mr. Morison presented a basic surficial geology map for the King Point area derived from Rampton's work (Bulletin 317, GSC). Four major surficial types exist in the quarry to coast area as follows:

i) Lacustrine

- associated with polygonal ground, ice wedge, high organic content, poorly drained fine sediments (unsuited to development, subsidence in stripped areas)

ii) Moraine

- 5 to 20% stoniness, upper 3 meters debris flow, massive ice, wedges not evident through polygonal ground (poor to fair for development)

iii) Glaciofluvial

- poorly sorted gravel with ice content, ice wedges

present where overlain by organics, apparent minimal volume, generally stable except where covered by fine grain organics and fine grain sediments (fair to good for development).

iv) Fluvial

- coarse grain gravel and fine grain flood deposits with ice wedges, polygonal ground, high organic content, poorly drained, high percentage of fine alluvium (unsuitable to fair for development, fine alluvium subject to subsidence).

It should be noted that the development suitability rating is an indicator of the magnitude of development limitation and associated costs.

Surficial materials which have been subject to modifying processes are key limitations to development in the area (i.e. accumulation of organics, development of ice wedges and massive ice). These modified materials can be 9 to 10 meters deep.

Detailed geotechnical drilling is necessary before problems and suitability for development can be determined.

6. Waterfowl (Tom Barry)

Mr. Barry's presentation used snow geese to illustrate waterfowl use patterns in the area:

- Banks Island normally has about 95% of the population during the nesting period. The north slope is a fall staging area for snow geese. During the fall the young are still weak and must gain approximately one pound in body weight from the end of August to late September or early October in the north slope area before migrating south.
- Use in the King Point area shifts each year primarily governed by snow cover. If the Alaska side is snow-covered they will come to clear areas on the Yukon side.
- Last year only the tops of cliffs were clear of snow during the early part of the staging period so that is the area the snow geese used until the snow cleared. They then moved into the Deep Creek, Babbage R., Canoe Creek and Spring R. areas.
- Overgrazing can occur with 40,000 or more birds in an area and the population may have to shift location as a result.

- The Deep Creek Valley (along the coast from Shingle Point to past King Point) is a heavily used staging area. From 30,000 to 120,000 geese used this area last year. The total population was over 400,000 last year and has been as high as 500,000.
- Snow geese eat berries if available and may use the area around the proposed Kiewit quarry. The area between the quarry and King Point is a major area of concern. In August and September of 1983 from 5,000 to 10,000 geese were located around the quarry site during exploratory drilling.
- Alaska white-fronted geese and coastal migrating brant may also use the north slope. Brant utilize the coastal area (Phillips Bay).

7. Caribou (Don Russell)

- There are 135,000 to 150,000 animals in the Porcupine Caribou herd.
- Cows migrate north 2 to 3 weeks ahead of the bulls and the north slope is a major calving area. Caribou generally migrate north on the east side of the Old Crow Flats in the pre-calving period but can utilize the west side as well. The bulls then fan out for calving around the first part of June moving north following vegetation and forming larger and larger groups. The cows are already in the coastal area at this time. Calving occurs in the early part of June. The post-calving movement period occurs from June 20 to 30 with thousands moving along the coastal area toward Alaska. By early July aggregations can reach 90,000 animals. They are usually in the foothills during this time. By the end of July the aggregations disperse into small groups of 1 to 100 animals with movement in all directions (westward along the northern edge of the flats and some dispersing into the Richardson Mountains). Migration south usually occurs around mid-September.
- Present level of traffic on the Dempster does not appear to have had an impact but do not know what higher levels may do.
- New access is a concern due to hunting.
- A range use study conducted over the past 12 years shows most calving occurs west of the Babbage River. During dispersal there is some proximity to the King Point area but only on two occasions in the 12-year period has wintering occurred close to the port site.

- Port development alone should have minimal affect on Caribou but access (road, noise) is a major concern, particularly road access from the Dempster Highway.

8. Fish (Bill Bond)

- The migratory movements of 5 coregonids have been studied:
 - broad whitefish
 - lake whitefish
 - arctic cisco
 - least cisco
 - inconnu
- All 5 species spawn in the autumn in the Mackenzie River or major tributaries. They return to the delta or estuary in late October to early November after spawning to overwinter. Spawning migration commences in early summer and continues through the summer dependent on species.
- These 5 species are anadromous but have a freshwater dependence. In the coastal waters they stay near the shoreline in waters up to 5 meters in depth probably because these waters are less saline. Waters along the coast are less saline due to the inflow of river water and opposing direction of ocean currents. Fish may also stay near the coast as a guide or because these waters are warmer.
- Juvenile broad whitefish migrate to the freshwater lakes of the Tuktoyaktuk peninsula and may spend up to 4 years there before going back to coastal waters. Most broad whitefish move east of the Mackenzie River probably because in winter there can be up to 6 meters of fresh water eastward down the peninsula to MacKinley Bay and migration can occur without encountering salt water.
- Lake whitefish do not travel far along the coast. They might be quite salinity sensitive judging from their limited coastal distribution.
- Both cisco species move farther east and west than whitefish but still keep within 1/2 kilometer of shore.
- Arctic cisco may move over long distances. The commercial fishery in the Colville River Delta, Alaska, may utilize arctic cisco that originated in the Mackenzie River.
- The specific location of major feeding areas along the coast for cisco are not known.

- The factors which may influence cisco movement and migration (e.g. temperature, salinity) are not well understood. Inconnu may only migrate as far east as Tuktoyaktuk and as far west as Shingle Point.
- A causeway may alter salinity and temperature gradients. This may act as a barrier to fish movement or delay fish movement. The duration and effects of a delay are not known.
- At Prudo Bay, Arco built a long causeway with breaches a long way out. The breaches silted up. Some movement of fish around the causeway has been observed. However, the data available regarding the effect of causeways on migration is sparse. Present understanding suggests that breaches close to shore may be more advisable considering the fact that migration occurs close to shore. Such breaches should be large enough to prevent the creation of steep temperature and salinity gradients across the structure
- Arctic char population found in the Malcolm, Firth and Babbage Rivers probably behave similarly to the coregonids but there is little information as to their migratory patterns.
- DFO had hoped to conduct coastal migration studies starting in the summer of 1985 but this will depend on the availability of NOGAP funding.

9. Marine Mammals (Tom Strong)

Mr. Strong noted that ringseal populations are not a hunting target and are not a major concern in port development. However, increased ship traffic may be a concern, particularly during the spring pupping season. His discussion centered on Bowhead and Beluga whales as follows:

- Both whale species spend time off Banks Island on the east side of the Mackenzie Delta.
- Bowhead whales concentrate off King Point in the fall before heading west. They probably don't come in to shore under 5 meters depth and their movements are quite erratic from year to year. Many immature bowheads have been found along the trench and they may lay in shallow areas. The overall information base is poor and this does not allow proper analysis of cause and effect relationships.
- Beluga whales migrate north from Shingle Point. The Beluga hunt is east of Shingle Point but not much hunting has

occurred lately. Examination of historical hunting patterns appears to show whale movements follow the silting up of an area. The initial estimate of Beluga whale populations was 1,500 to 2,000. A more recent estimate puts the population at 11,500 but it may be as low as 7,000.

- The effect of increased ship traffic and noise is not known. Whales may presently be tolerating the stress and not adapting. There is no comparable delta environment in the area that the whales frequent.
- DFO have an ongoing program to examine Beluga whale populations in an area east to Mackinley Bay, west to Hershel Island and up to 20 miles offshore over the next 3 years (photographic surveys for distribution and abundance). They are also collecting harvest statistics.

10. Climate (Neil Parker)

Mr. Parker provided an overview of climate in the coastal area and discussed some implications for port development.

- Offshore climate can be divided into three types:

Summer - open water with fog and 15 to 20% visibility less than one kilometer, less fog on shore (Maritime).

Fall - A transition period (September and October) with storms from the North Pacific and west with intense events, snow flurries, low cloud (potential effect on navigation)

Winter - cold with high pressure, ice crystals and ice fog (Continental).

- Dewline station data from Komakuk Beach and Shingle Point for the period 1961-71 shows winds are from the west northwest and east southeast year around. There is also a strong frequency of southwest wind in the winter originating in the Blow River area due to the influence of the Blow River valley.
- It is quite likely that King Point also receives a strong frequency of southwest winds due to the proximity of the Babbage River and a runway may have to be oriented along a southwest axis.

- Peak rainfall in a 24-hour period at Shingle Point was 33.5 mm and occurred in August.
- During storm surges water piles up to the right of the wind flow due to frictional drag so the coast receives it.
- The highest reported storm surge was in September 1970 at Tent Island at the mouth of the Mackenzie River. A surge of 3.6 meters was recorded (visual observation) but this height may have been due to basin amplification. Such a storm may have been a 1:100 year event. The highest reported storm surges at Shingle Point are from 1.2 to 1.5 meters.
- Shorefast ice goes out to about the 20 meter depth. Transition ice is present between the shorefast ice and the wind-driven polar pack.
- The greatest danger to offshore facilities are portions of ice islands from the polar pack which get caught in the gyre and can end up on the coast.

C. Workshop Results

1. Port Siting Considerations

The initial purpose of this part of the workshop was to develop criteria for port site selection and, if possible, use those criteria to select the optimum port site. During discussion it soon became apparent that physical constraints were the primary location determinates rather than environmental impact potential. Further, as industry was not present at the workshop, the flexibility in proponent plans and future needs could not be determined. This meant that absolute criteria and an optimum site could not be selected in this forum. However, general siting considerations were discussed as follows:

- Water depth requirements are a major siting factor. Present shipping needs can be met with a 12 to 15 meter (medium) draft port. A deep draft port (20 meters) has been identified as necessary in the second phase of the Dome proposal but there is doubt as to the certainty of this need. A deep draft port provides an opportunity to dock tankers and large supply loads of fuel but smaller shipments can be used, the 20 meter depth contour reduces the length of potentially suitable coast in comparison to a 15 meter draft without channel dredging by approximately 1 kilometer at the east end of the trough adjacent to King Point, and a causeway to the 20 meter depth is considerably longer than one to the 15 meter depth assuming no dredging.
- In determining the depth of a potential port site, negative storm surges of up to 1 meter should be considered.
- Wave, current and tide information should exist for any potential port site prior to design. If the data doesn't exist it should be collected.
- A deep port could be located offshore.
- Protection from ice is another main location factor. Gulf requires this and has it at Herschel Island but would not have it at King Point at present. Protection from ice exists in the King Point lagoons and the unnamed flooded valley to the east of King Point. Protection from ice may require seasonal operation (as Kiewit has proposed) or construction of expensive structures.
- An ice protected area needs much less ship manoeuvring room. Danger from multi-year ice makes a ship's captain want adequate water for escape passage. A supply ship may require hundreds of feet and a tanker may require miles.

- King Point lagoons have advantages and disadvantages as a potential harbour. Ships could be located there for winter and allowed to freeze in for ice protection but the cove is only 12 meters deep so it would only be useful for barges as dredging is probably too expensive. Use of the lagoon as a harbour may provide containment for any oil spills within but would require continuous dredging and is only about one square kilometer in area. With ships docked and allowing for ship's wash there may be little room in the lagoon. It may be better to dredge passage into the lagoon than to maintain a causeway suitable for fish passage (breaches of adequate size and ongoing sediment removal) and live with the risk of ice damage.
- If a causeway is built at an angle to the shore sediment will build up in a southeast direction due to longshore transport. The actual pattern of silt movement will have to be modelled to show more precisely how the sediment accumulates.
- Coastal process constraints on development and changes due to development are also major siting concerns. These include:
 - geotechnical stability of the shore for construction
 - cliff erosion
 - longshore transport rates

Improper design or construction practises on shore can lead to enhanced cliff erosion as well as terrain impact on shore. Cliff erosion leads to recession of the shoreline and to increased sediment transport. Increased sediment transport may lead to increased maintenance costs for dredging. Structures located outside of existing shore barriers can lead to cliff erosion due to wave reflection and hence shoreline recession and increased sediment transport.

- Except for isolated small sites back from the shore, the whole coast from Kay Point to Sabine Point is poor geotechnically and the cliffs are unstable. A geotechnically suitable site might be found but none are presently known and the probability of finding such a site is low.
- Net longshore sediment transport can be minimized by moving toward Kay Point from King Point but none of the terrain is geotechnically better and it may be worse. Better geotechnical surveys are required to say.

- From a geotechnical point of view Stokes Point may be a better site than King Point.
- Cliffs should be avoided. The Barrier Beaches at King Point and the unnamed drowned valley east of King Point are the only sites available where cliff erosion problems can be avoided.
- The beach area within the King Point lagoon has good gravel but is subject to storm surges and will be ice rich (design would have to deal with this).
- To assess geotechnical problems at a development site the area must be drilled. You should avoid any fine grain sediment areas with frozen organics on top. It is possible to build on unsuitable ground but the cost is much greater.
- The dynamic nature of the coast seems to be the main factor in selection of a port site. Proposals to date do not appear to have adequately dealt with these issues and may have been based on more traditional engineering that does not recognize the unique constraints of this area.
- Other site considerations include ship safety concerns and port facility needs. Fog, space for vessel passage, manoeuvrability are all aspects of ship safety. Winds have a bearing on airport siting and runway alignment.
- Bill Field raised an idea for port design at King Point that might minimize or eliminate the major concerns that have been raised. Instead of building a causeway perpendicular to the coast he suggests building it parallel to the lagoon barrier along the shore with vessel passage through it to a harbour inside the lagoon area. Material would have to be dredged from the interior of the lagoon but it could be used to build a platform for shorebase facilities that would not be subject to the geotechnical stability problems of existing land surfaces. Such a harbour would not aggravate cliff erosion and shoreline recession because wave reflections would follow the natural pattern. Also, the causeway would not be as subject to sediment accumulation, would not interfere with fish passage, would be less prone to damage from ice, would provide a containment area for oil spills within the harbour, and would increase the area presently available in the lagoon.

2. Development Principles - Some Ideas

Workshop participants were divided into work groups and asked to discuss the principles that might guide port development. Due to the lack of representation by industry and other affected parties and in view of the short time available to the work groups, the principles which resulted should not be considered complete or comprehensive. Indeed, some of the work groups interpreted the task differently and some of the principles conflict. However, the ideas raise some useful points for discussion. The points raised by the work groups are listed on the four pages that follow.

In preparing the group lists it became apparent that some principles were common to several work groups. These common points are listed below:

1. A port should only be built in response to a proven need.
2. Ship safety is an important need from both economic and environmental points of view.
3. Shared use of port facilities should be ensured. A single use facility should be permitted only on the condition that other reasonable user needs not be prejudiced in the foreseeable future.
4. Government should encourage and facilitate engineering integrity and good design.
5. An overall conceptual development plan for the foreseeable future should be prepared for government approval to ensure incremental development does not occur and allow impact assessment.

PRINCIPLES OF PORT DEVELOPMENT - Some Ideas

Work Group #1

1. Harbour facilities should be safe.
2. There should be a viable market (longer than two - five years) before development proceeds.
3. Benefits should exist for the local, regional and national levels.
4. Appropriate mitigative measures should be developed (especially for impacted communities).
5. There should be balanced development.
6. There should be native/local involvement.
7. Factors to consider include:
 - Land Claims Settlements
 - Caribou Management Board
 - National Park
 - Land Use Planning process
 - Maximize use of limited area
 - Wildlife management program
 - Offshore habitat management/marine stocks
 - Ship traffic control
8. There should be one port (if one is developed) and it should be multi-user.
9. Regulatory framework (Land Use Planning, COPE screening & review) should be put in place prior to development.
10. DIAND should appoint a project manager to co-ordinate all government department activities (eg. RAMP).
11. Should develop a government technical position.

PRINCIPLES OF PORT DEVELOPMENT - Some Ideas

Work Group #2

Sea Related Aspects

1. Shipping safety is an important concern (navigation aids, bathymetry, etc.).
2. The port should be multi-user.
3. The port should have impartial fair management.
4. Port users should have equitable entry and fair cost-sharing of existing facilities and improvements.

Land Related Aspects

5. Land facilities should be multi-user (could have separate camps, etc. but only one joint-use airport).
6. Access should be restricted (no hunting, etc. from access road). Effects of human presence should be confined as much as possible.
7. Users must comply with a conceptual development plan developed for the foreseeable future (say five years) and approved by government. Government should give industry some indication of what it wants.
8. A minimum area of land should be used.

Aspects Common to Sea and Land Development

9. Buildings, etc. should be compatible with terrain/climate.
10. Social/Environmental impacts in construction and operation should be:
 - avoided if possible
 - mitigated if they cannot be avoided
 - compensated if they cannot be avoided or mitigated
11. Land and marine use should be consistent with the COPE Agreement and native land use patterns.
12. Monitoring programs should be set up with feedback into the operation of the monitoring program.
13. Development cannot be planned without consideration of associated infrastructure impacts.
14. Consideration should be given to the social and environmental aspects of community development.

Note: Work Group #2 approached the task under the assumption that a port development had already been approved. They considered how a port should be developed rather than under what conditions approval should be sought.

PRINCIPLES OF PORT DEVELOPMENT - Some Ideas

Work Group #3

1. The port must be needed.
2. The type of facility, design and timing should be feasible to all private and public users.
3. The public should have access to the airstrip.
4. To provide for conservation and protection of Caribou and Snowgeese a precondition of development should be:
 - Porcupine Caribou Management Plan in place and an International Agreement.
 - Management Plan for Snowgeese
5. Develop in best/optimum location for all concerned.
6. Ship safety cannot be compromised by cost or in site selection, planning or design.
7. Expandable - Phase I development must not limit or constrain future expansion.
8. A one-port concept should not be adopted as rigid policy as different types of ports may be needed. Multiple use should be encouraged when and where feasible.
9. There should be shared use of facilities such as the airstrip.
10. Proponents should demonstrate credibility (i.e. understanding of environment and engineering/design).
11. The development should be a camp rather than a community (i.e. no formal institutions like schools, etc). Other models should be examined (Tuktoyaktuk, Polaris, etc.) to determine the problems and benefits.
12. Each subsequent increment or layer of development should be analyzed and investigated.

ISSUES

Work Group #4

1. Caribou
 - aircraft flight patterns
 - haul road (traffic description, noise, dust, hunting)
 - explosives at quarry
2. Moose
3. Bears (grizzly, polar)
4. Muskox
5. Snowgoose staging and other waterfowl
6. Marine mammals (Beluga and Bowhead Whales)
 - hunting
 - ship noise
 - ice
7. Fisheries
 - migration description (barriers, water chemistry)
8. Waste Management
 - waste water
 - solid and hazardous wastes
9. Road design
 - drainage
 - erosion control
 - stream crossings
10. Off road vehicle activity
11. Dredging
 - maintenance costs
 - dumping
 - longshore transport
12. Coastal Processes
 - enhanced erosion due to structures and construction procedures
 - profile adjustment due to structures
13. Archaeology
14. Spills
 - oil
 - other
15. Adequacy of baseline data
 - physical environment (waves, climate, currents, sediment transport rates, coastal erosion rates, shorezone geotechnical properties)
 - ice conditions/ice flows
 - visibility
 - winds
 - overall geotechnical information
 - bear population levels and denning sites
 - fish and aquatic organisms (migration)
 - marine water quality

16. Systems understanding (long-term research needs)

- coastal circulation
- nearshore wave and ice regime
- marine ecosystem

MAIN ISSUES

- impact of causeway on coastal zone processes and fish migration
- ship safety/spill potential
- hunting pressure on caribou
- disruption to snow geese, bears and whales
- data deficiencies
- long term research needs
- incremental development

4. Resource Management Goals and Methods

Work groups were given the list of major issues included in Part C(3) and asked to identify the resource management goal that should be achieved in dealing with the issue and alternative means of achieving the goal.

In some instances different goals were developed by different work groups and one work group had one goal for all issues, to minimize or eliminate impacts. The results of this work are summarized below:

1. (a) Fish - Migration

- ISSUE - disruption to coastal fish migration
- GOALS - no measureable negative impact
- METHODS - improve data base to accurately define the problem
 - seek good engineering and environmental design (barrier)
 - terms and condition of permits (water quality)
 - no oil discharge
 - spill contingency plan (oil and toxic materials)
 - examine alternative causeway designs
 - design the causeway to permit migration
 - inventory and monitor
 - examine breakwater orientation, length, materials, construction timing and breaches

(b) Fish - Fishing Pressure

- ISSUE - increased fishing pressure
- GOALS - no measurable negative impact
 - minimize disturbance and maintain viable populations
 - optimize harvest relative to fish stock capability
- METHODS - regulate fishing through restrictions/quotas
 - regulate as legislation allows
 - acquire adequate knowledge of population levels and dynamics; forecast demand; and implement controls

2. Bowhead Whales - Shipping Disruption

- ISSUE - impact to Bowhead Whales due to shipping activity
- GOALS - reduce impact/minimize impact
 - minimize disturbance and ensure viable populations
- METHODS - consider routes, schedules, adequacy of information base
 - address data gaps in bowhead biology (distribution and abundance)
 - avoid sensitive areas

3. Bowhead Whales - Hunting Pressure

- ISSUE - impact to Bowhead whale population due to hunting pressure
- GOALS - prevent hunting
- no Canadian Bowhead hunt until population could sustain such
- METHODS - deal with data gaps in Bowhead biology (reproductive biology, distribution and abundance, effects of noise and disturbance)
- continue present ban

4. Bears - Human Activity

- ISSUE - impact to bears due to human activity
- GOALS - maintain natural populations/minimize interactions
- maintain bear populations at viable levels
- minimize impact
- METHODS - regulate harvest (need good harvest information and monitoring)
- solid waste management
- control camp personnel (feeding)
- problem bear policy
- monitor and restrict shipping in terms of time and location (polar bears)
- man/bear interaction awareness program

5. Caribou - Hunting

- ISSUE - impact to caribou populations from hunting (particularly associated with a road)
- GOALS - reduce impact
- maintain integrity of present habitat and demography
- minimize impact
- METHODS - Caribou Management Agreement and Board (traditional user impact)
- regulate hunting through permits
- policy of no firearms
- manage traffic on roads
- assess impact of a road
- control land activities during sensitive times of year
- monitor and collect harvest data to feed back into management plan
- monitor haul road impacts and be prepared to institute mitigative measures

6. Waterfowl - Aircraft Disturbance and Hunting

- ISSUE - Impact to waterfowl due to aircraft disturbance and increased hunting pressure
- GOALS - establish a harvest that is consistent with Canadian waterfowl plan
- minimize impact
- METHODS - impose restrictions on flight paths, ceilings, aircraft traffic (timing)
- consider location and alignment of the runway (approach over water)
- restrict flight during critical times
- restrict access
- restrict hunting
- obtain good harvest data and monitor
- establish harvest zones
- establish an aircraft avoidance plan (over water turnout, flight routes)

7. Shoreline Stability

- ISSUE - impacts on shoreline stability associated with alterations to current/wave patterns
- GOALS - minimize negative man-made impacts
- maintain shoreline stability
- minimize disturbance
- METHODS - address through appropriate cost effective engineering design
- chose the best site and design (alternative)
- surface/geotechnical investigations of soil properties, moisture content, etc.
- maintain thermal regime by not disturbing surface or insulating
- avoid high hazard lands
- design conservatively (use experience from other northern regions)
- keep use areas as small as possible (eg. all terrain vehicles)
- geotechnical on and offshore properties should be understood

8. Terrain Disturbance

- ISSUE - terrain disturbance associated with port development
- GOALS - minimize negative impact
- minimize disturbance
- METHODS - as in 7. above
- analysis of surficial features
- design criteria to be suited to materials, slope, exposure, use
- minimize land area used
- apply sound engineering design based on site specific information

9. Marine Systems - Ship Safety and Oil Spills

- ISSUE - impacts to marine systems due to oil spills (ship safety)
- GOALS - minimize risk and impact of oil spills
- METHODS - develop and implement an oil transfer, storage and handling plan
- develop a spill contingency plan
 - abide by existing standards
 - obtain company commitment and training
 - regulate through appropriate legislation

10. Inadequate Data Base

- ISSUE - risk and uncertainty associated with inadequate resource data base
- GOALS - minimize risk and uncertainty
- METHODS - augment data base as required by making resources (\$ and PYs) available through special preparedness type programs (ESRF, NOGAP)
- collect more information in areas of particular need (fish, whales, construction materials, ice protection/scour, physiology of geese, population estimates for Porcupine Caribou)
 - employ conservative design
 - monitor and regulate

11. Incremental Development

- ISSUE - impacts associated with incremental development
- GOALS - manage impacts associated with incremental development
- minimize impacts
- METHODS - classify activities into stages (eg. exploration, development) and do not go from one stage to another without thorough review and assessment
- employ on-going monitoring
 - review potential for incremental activities in a planning process

12. Socio-Economic Aspects

- ISSUE - social and economic issues (hunting, camp vs town, native use patterns, etc.)
- GOALS - maximize positive impacts and minimize negative impacts
- METHODS - identify needs, opportunities and risks
- prepare action plan and allocate resources

13. Cumulative Impacts

- ISSUE - multiple or additive stress factors may result in impact
- GOAL - minimize or eliminate the impact
- METHODS - the work groups did not deal with this issue

14. Impact of the Environment on the Project

- ISSUE - constraints on the project due to environmental factors (effect of ice movement on the causeway, effect of climate on the airstrip, etc.)
- GOAL - to minimize the adverse effects of the environment on the project
- METHODS - where possible, design offshore/onshore facilities to account for meteorological, ice climatological, and geotechnical conditions (eg. frequency of low cloud and fog result in long, low aircraft approaches; local wind patterns result in hazardous flying conditions if runways are not properly aligned; intrusions of multi-year ice and possibly portions of ice islands into offshore structures; positive and negative store surges; control of oil spills in ice infested waters; effects of waves on offshore structures).

APPENDIX I

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APPENDIX II

CHRONOLOGY - NORTH COAST EVENTS

1973-1979	King Point identified as suitable for port development
1974	Canadian Arctic Gas Pipeline proposal across N. Yukon
1977	Justice Berger report - no development - park
1978	O.I.C. withdrawing N. Yukon from disposal
1978	COPE A.I.P. - park
July 1982	Gulf proposal for Stokes Point
Aug/March 1983	Facilities Siting Study
March 1983	Formal Gulf application
June 1983	Kiewit proposal for King Point area
July 21, 1983	North Slope Project Review Group formed
July 27	Formal Kiewit application
Aug/Sept. 1983	RERC commences screening
Nov. 7, 1983	Munro rejects Gulf/Kiewit proposals
March 1984	Gulf land use permit rejected
July 1984	Kiewit land use permit withdrawn
July 1984	Kiewit submits new permit application
July 1984	COPE Settlement Act proclaimed
July 1984	BEARP report

HISTORICAL OVERVIEW

Those of you familiar with the recent history of the North Yukon will be aware of many omissions in this overview, however, in the interest of brevity I've attempted to highlight only key events and major decisions.

Turning firstly to previous studies of port potential in the Beaufort, many studies point to the Babbage Bight as being the most likely candidate area.

The U.S. Department of Commerce concluded in 1973 that the "best candidate site for a very-deep water terminal.....is Babbage Bight (King Point)".

Also in 1973 the Department of Public Works concluded "conditions on the land in Babbage Bight and in the sea, with the exception of submarine permafrost, are considered ideal for a deep-water terminal".

In 1977 ACND the DIAND Advisory Committee on Northern Development recognized King Point among other sites as having attributes suitable for a moderate draft port facility.

In 1979 Dome Petroleum identified King Point and Wise Bay as likely deep water port locations. Of King Point they said:

"Subject to some dredging and breakwater development, King point offers the best potential for a deep draft harbour and supporting shorebase facilities".

These however were merely studies of the potential of the north Yukon for port-facilities. The controversy surrounding development in the north Yukon dates back to 1974 when Canadian Arctic Gas Pipelines Ltd. applied for permission to transport gas across the north Yukon from Prudhoe Bay and south on the MacKenzie route to southern consumers. The project you will recall was referred to Mr. Justice Berger.

In his report dated April 1977 Justice Berger said:

"The region should not be open to any other future proposal to transport energy across it, or to oil and gas exploration and development in general....I therefore urge the Government of Canada to reserve the Northern Yukon as a wilderness park...."

In June of 1977 the National Energy Board denied the application of Canadian Arctic Gas to build that pipeline across the Yukon North Slope.

In July 1978, an Order in Council made pursuant to the Territorial Lands Act withdrew the North Yukon from disposal. In making the announcement the Minister said it was to allow Government to determine how much of the area

should be dedicated to a national wilderness park and to other conservation purposes.

In October 1978 an agreement in principle was reached between the Government of Canada and the Committee for Original Peoples Entitlement which included a commitment to establish a national wilderness park in the north Yukon of some 5,000 square miles.

In 1980 the Yukon Government published its "North Yukon Resource Management Model" as a vehicle for balancing wildlife conservation and environmental protection with industrial development.

Turning now to more recent events, on July 12, 1982 Gulf Canada Resources Inc. submitted to DIAND for approval in principle a proposal for the development of an exploration base at Stokes Point. This was to be a temporary medium to deep draft base to serve their Beaufort Sea Drilling System. Gulf indicated it hoped for approval by March 1, 1983 so the base could be operational in 1984.

In response the Department, in conjunction with the Interdepartmental Environmental Review Committee, initiated a study "to help Government make a decision on Gulf's need for a support base on the Beaufort Coast." The study generally referred to as the Facility Siting Study was an overview using existing information and was not intended to be "a comprehensive coastal facilities planning study."

"A facility profile was developed as a basis for systematically evaluating a number of potential sites. The profile was made up of four major elements: location; access; harbour and channel; and land." The distance of 250 kilometres was used as a workable maximum from the assumed centre of Beaufort operations to an acceptable site. From previous studies, including those I referred to earlier, the following potential sites were selected for evaluation:

1. "Floating Base", Herschel Island
2. Pauline Cove, Herschel Island, Y.T.
3. Roland Bay, Y.T.
4. Stokes Point, Y.T.
5. King Point, Y.T.
6. McKinley Bay, Y.T.
7. Tuktoyaktuk, N.W.T.
8. Clapperton Island, N.W.T.
9. Wise Bay, N.W.T.
10. Letty Harbour, N.W.T.

Of the ten sites examined Pauline Cove, Tuktoyaktuk, Clapperton Island, Wise Bay and Letty Harbour were not considered to meet the requirements of the profile, either due to draft limitations, distance from the centre of operations, or a restricted developable area. The floating base, though a feasible temporary solution, did not meet the criteria of a shore-based facility. Roland Bay was considered inferior to Stokes Point and hence the report concluded that Stokes Point and hence the report concluded that Stokes Point, King Point and McKinley Bay were all feasible and that "if in the long term deeper draft vessels come into use in Mackenzie Bay and a new support base is required, King Point offers the more suitable location".

The foregoing report was released in late March 1983. The release was accompanied by a round of community consultation. Some two weeks earlier, March 11, 1983, Gulf submitted their application for the construction and operation of the Stokes Point facility. This application initiated a protracted series of meetings and consultations focussing on Stokes Point. The King Point dimension to the development controversy was added three months later.

In June 1983 Peter Kiewit Sons. Co. Ltd. a contracting firm based in Downsview, Ontario met with DIAND officials to outline their proposal for a quarry and load out facility in the vicinity of King Point for the export of rock to the American Beaufort.

On July 27, 1983 DIAND formally accepted the Kiewit land use permit application for the development of a large sandstone deposit located 15 miles east of the Babbage River and nine miles inland near King Point. Over a 30-year operating period, Kiewit plans to develop a quarry to produce up to three million tons of various types of rock products a year. Kiewit has staked nine quarry lease blocks and applied to the Minister for quarry leases on these areas. Their proposal includes an all-weather haul road, load-out facilities on the coast, some form of protection from the marine environment during the open water season, an airstrip, and camp facilities. The rock would be used as construction material to reduce or replace the volume of sand and gravel required to construct exploration and production islands for oil and gas drilling in the American Beaufort.

On July 21, six days before receiving the official Kiewit application, the Minister of DIAND announced the formation of the North Slope Project Review Group to prepare and submit to the Minister of Indian and Northern Affairs and the Government of Yukon recommendations concerning the establishment and suitable location of shore and harbour facilities on the North Slope of Yukon with particular reference to:

- a) Gulf Canada's proposed development of a temporary hydrocarbon exploration support base at Stokes Point;
- b) Kiewits...proposed development of a sandstone quarry, haul road and port in the area between King Point and Shingle Point; and

c) Any representations made by communities in the areas affected.

North Slope Project Review Group was chaired by a DIAND official and included representatives from the Yukon Government, COPE, and CYI. The NSPRG held a series of meetings in Whitehorse from September 26 - October 14.

Following receipt and acceptance of the Peter Kiewit Sons land use permit application and quarry lease applications, the project was also referred to the Regional Environmental Review Committee for screening. RERC is an intergovernmental and interdepartmental screening group formed in 1981 to advise DIAND.

In late August and early September RERC in collaboration with the Arctic Waters Advisory Committee drafted guidelines for the preparation of an Initial Environmental Evaluation by the proponent.

In late October following this screening the Chairman of RERC expressed the view that the project not be referred for formal public review, that the project could be managed and added that there are areas where further study or information is required before terms and conditions could be developed for the management of the project.

On October 17 the NSPRG reported to the Minister that no consensus had been reached. The Minister requested the group reconvene and attempt to narrow their differences by October 31.

The North Slope Project Review Group never did reach a consensus but submitted a series of recommendations. COPE and CYI rejected arguments of need for short term development but suggested King Point would be a likely candidate for future port development. The Yukon Government indicated both projects were viable and should be supported subject to appropriate environmental and socio-economic terms.

On November 7, 1983 based on this, the advice of the Regional Environmental Review Committee the Minister announced his rejection of both the Gulf and Kiewit proposals.

In making this announcement, the Minister said:

"I have decided against allowing these projects to proceed for the time being, because we have been unable to reach consensus on a comprehensive package governing both conservation and development activities. Furthermore, we are now too close to agreements on land claims to jeopardize the substantial progress that has been made."

The comprehensive package the Minister referred to included progress on outstanding land claims with CYI and COPE; consensus on the boundaries for a proposed national park; creation of a Porcupine caribou management board;

implementation of land use planning; substantive agreement on where to focus industrial activities so as to minimize environmental disturbances; and the verification of potential economic benefits.

In respect of the number of potential ports, the Minister said:

"Furthermore, it is my view, supported by the Project Review Group, that one port — most likely located at King Point — is a more desirable site."

After November 7 both projects went into limbo. Gulf concentrated on making their "floating base" work and in March 1984 DIAND rejected their application for the land use permit.

Kiewit continued to work toward their goal of establishing a quarry operation in the King Point area. In July 1984 just prior to the expiration of the one year period provided for a review of projects under Section 25(1)(c) of the TLUR, Kiewit withdrew their application. A few days later they reapplied for the same purpose.

That application is still before us.

I would like to turn briefly to three further events which have some bearing on this historical review.

On July 25, 1984 the COPE Settlement Act was proclaimed after a speedy passage through Parliament. Among other things the Act through Section 11 of the COPE Agreement established a new environmental screening and review process in the Western Arctic Settlement Region, which includes the north Yukon. An Environmental Impact Screening Committee and an Environmental Impact Review Board are now being established to satisfy the provisions of the COPE Act.

The Kiewit proposal will in all likelihood be the first proposal to enter this process.

The COPE Settlement Act also had the effect of amending the National Parks Act and created a new park in the north west corner of Yukon bounded roughly on the south by the watershed separating the Porcupine River system from those waters flowing to the Beaufort Sea, on the east by the right shore of the Babbage River and on the west by the international boundary. The park includes Stokes Point.

And finally in July the Beaufort Environmental Assessment and Review Panel made a series of 86 recommendations among which were:

-no port or supply base be permitted west of Kay Point;

-only one deep-draft port be permitted on the Beaufort Sea coast unless offshore production areas are so far apart that two separate deep-draft ports become necessary;

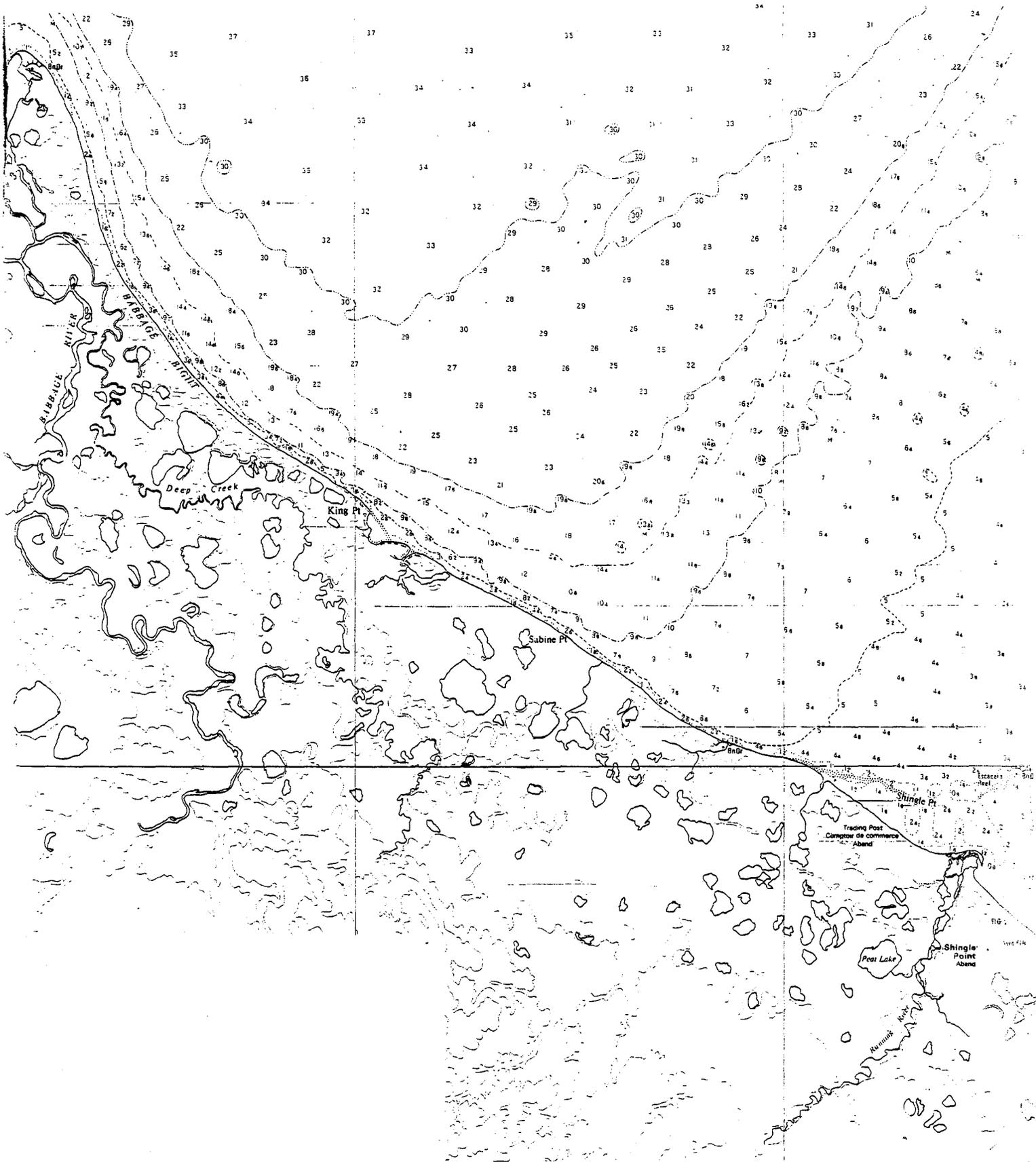
-multi-user ports be encouraged so that the proliferation of facilities is minimized.

APPENDIX 3

Oil Company Perspective

Prior to the workshop, Dome, Gulf and Esso Resources were contacted to determine if the 1982 EIS still reflected the current thought of the companies regarding possible port development on the Yukon North Coast. For the most part, the EIS was still effective, but each company qualified their position by stating that if a commercially productive oil field in the western Beaufort were identified changes could occur to how the company (ies) would proceed with production. It was concluded that all three companies could be accommodated at King Point (as well as other small suppliers) but that exposure to the Beaufort was a concern. All three companies said that the first company to establish itself should not do so (in terms of physical siting) to the exclusion of others. Furthermore, common facilities (wharves, sewage treatment, water supply, solid waste management) would be beneficial. There was no consensus whether a single agency/company should be responsible for the design/development/management of a harbour; however, all major users should be involved in the deliberations leading to a conceptual design. None of the companies indicated an interest in the Kiewit product and two company representatives felt that Kiewit required considerably greater work on details (market demand, site limitations, etc.) before it should be seriously considered.

APPENDIX 4 - MAP OF COASTAL AREA



PRINCIPLES OF PORT DEVELOPMENT - Some Ideas

Work Group #4

1. Only build a port in response to a proven need.
2. Provisions of the COPE Agreement should be respected throughout the process.
3. Government planning and review processes should not be compromised by unreasonable industry imposed time limits. Government should not impose unreasonable delays in planning and approvals.
4. An assessment of other potential port areas should be done before detailed study in one area (shorezone plan).
5. The port location should be chosen on the basis of minimum overall environmental impact compatible with industry operational requirements (eg. ship safety).
6. A single user port facility should be permitted only on condition that other users not be excluded in future. Abandonment requirements might also be imposed.
7. The long range use of the port (infrastructure and associated impacts) should be considered in the planning process.
8. The planning process should:
 - not jeopardize engineering integrity of structures (eg. by site selection limitations).
 - require adequate information and satisfactory demonstration of engineering integrity.
 - encourage good design.
9. The development should maximize socio-economic benefits to the north and ensure northern participation.

3. Issues

Each work group was asked to identify the issues associated with port development. The list of issues developed by each work group is presented in the following pages. Key issues have been identified in some cases.

To assist in focusing further discussion of goals to be achieved and means of dealing with the major issues, a summary list of major issues was prepared as follows:

1. Fish - Disruption to the Coastal Migration of fish species (barriers, alterations to water quality)
- Increased Fishing Pressure
2. Impact to Bowhead Whale populations due to shipping activity.
3. Impact to Bowhead Whale populations due to hunting pressure.
4. Impact to bears due to human activity.
5. Impact to caribou populations from hunting (particularly associated with a road).
6. Impact to waterfowl due to aircraft disturbance and increased hunting pressure.
7. Impact on shoreline stability associated with alterations to current/wave patterns.
8. Terrain disturbance associated with port development and associated works.
9. Impacts to marine systems due to oil spills (ship safety).
10. Risk and uncertainty associated with inadequate resource base data.
11. Impacts associated with incremental development.
12. Social and economic issues
(Hunting, camp vs. town, Native use patterns, etc.)
13. Cumulative Impacts
14. Constraints on the project due to environmental factors
(eg. the effect of ice movement on causeways and the effect of micro-climate on an airstrip).

ISSUES - WORK GROUP #1

RESOURCES	Ship Traffic	Port Construction	Site Facilities	Port Operation	Air Traffic	Land Access	Industrial Development	Recrea- tional/ Tourism	Parks (2)	Subsistence Use
Marine										
Fish	X	X	X	X		X	X	X	X	X
Mammals										
- Whales	X	X					X	X	X	X
- Seals	X	X					X	X	X	X
- Polar bears	X		X	X			X	X	X	X
Micro organisms		X		X						
Waterfowl	X	?		X	X	X	X	X	X	X
Wildlife										
Caribou		X	X		X	X	X	X	X	X
Furbearers			X		X	X		X	X	X
Grizzly			X		X	X	X	X	X	X
Migratory Birds		M	X		X	X	X	X	X	X
Raptors			X			X	X	X	X	
Land Resources										
Aesthetic			X		?	X	X	X	X	
Vegetation			X			X	X	X		
Habitat		X		X		X	X			
Granular Resources			X			X	X		X	
Water Resources										
Freshwater										
- quantity			X	X			X			
- quality			X	X		X	X			
- sources			X			X	X			
Salt water										
- quality	X	X	X	X			X			
Human										
Delta	X	X	X	X	X	X	X	X	X	X
Yukon	X	X	X	X	X	X	X	X	X	X
South	X	X	X	X	X	X	X	X	?	
Archeology		?	?			X	?	?		

X = impact
 ? = unknown
 M = minor

ISSUES

Work Group #2

Marine Environment Activity

- sewage disposal (localized)
- solid waste disposal
- industrial effluent (localized)
- atmospheric emissions (birds, foxes, bears)
- lights
- breakwaters/wharves (sediment transport)
- human presence (fishing, hunting, disturbance)
- ice breaking (mammals, birds)
- vessel presence and underwater sound (mammals, fish)
- airborne noise (seals, birds, whales, bears, foxes)
- dredging (all resource systems)
- oil spills (all resource systems)
- cumulative impact (all resource systems)

Terrestrial Environment Activity

- human presence (all terrestrial resource systems)
- air emissions (flora and fauna)
- sewage disposal (all resources)
- solid waste disposal (all resources)
- artificial illumination (bears, birds, foxes, wolves)
- aircraft disturbance (all resources)
- airborne noise from vehicles, operations and blasting (all)
- roads and associated vehicle traffic (all resources)
- presence of artificial structures (all)
- oil spills (all)
- industrial effluent (fish, birds)
- cumulative impacts (all)

Environmental Constraints on Man/Facility

- ice (vessels, pipeline, wharves, etc.)
- climate (everything/everybody)
- storm surges (vessels, wharves, etc.)
- coastal processes (facility siting, design, operation)
- fish and wildlife movement/habitat (siting, operation)

ISSUES

Work Group #3

Issues have been classified as "A" and "B" to reflect the level of concern.

1. Bowhead Whale Impact (A) and Beluga Whale Impact (B)
 - hunting pressure
 - habitat loss through ship movement/dredging/
disturbance to food sources/general increase in industrial activity
2. Fishery (B)
 - impede movement (near shore)
 - increased fishing pressure
3. Grizzly Bears (A)
 - increased harvest
 - man/bear interaction
4. Waterfowl
 - increased hunting pressure (A)
 - disturbance due to increased industrial activity (B)
5. Caribou
 - increased hunting pressure due to access (A)
 - local avoidance due to industrial activity (B)
6. Social Issues (A)
 - shanty town
7. Terrain disturbance associated with port development (A)
8. Data base (overriding concern)
9. Shipping- large scale - (A); limited season - (B)
 - pollution
 - noise
 - ship track crossing problems on ice
10. Seals (B)
 - disturbance to haul out (ice breaking)
11. Ship Safety - pollution (A)
12. Increased ability to do resource study and management (side effects)