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Review of Tuktoyaktuk
Harbour as a Base for
Offshore Oil & Gas
Exploration and Development

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Review of Tuktoyaktuk Harbour as a Base for Offshore Oil & Gas
Exploration and Development

Prepared for:
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Calgary, Alberta

Prepared by:
KAVIK-AXYS Inc.
Inuvik, Northwest Territories
and
Calgary, Alberta

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Executive Summary

During the 1970s through to the 1990s, the oil and gas industry completed a number of seismic and exploratory drilling programs throughout the Canadian and Alaskan Beaufort Sea, as well as in several areas of the Canadian High Arctic. Interest in oil and gas activity in the region has returned over the last several years and if circumstances warrant (e.g., the Mackenzie Gas Project proceeds, commodity prices rise, etc) there will likely be renewed interest in further exploration and developing proven oil and gas reserves in the Beaufort Sea. Tuktoyaktuk and its harbour have been the primary marine base supporting activity to date and would be expected to play a significant role in future oil and gas activity in the region.

While other locations along the Beaufort coast provide some advantages over the harbour in Tuktoyaktuk (e.g., access for deeper draft vessels) the existing infrastructure and presence of local services could result in Tuktoyaktuk again playing a significant role as a marine base for the oil and gas industry. In preparation for the potential for Tuktoyaktuk Harbour to support increased oil and gas activity in the region, the Environmental Studies Research Fund (ESRF) retained KAVIK-AXYS (KAVIK) to review issues and concerns with past, current and future harbour use and to recommend priorities for further action to address these issues and to assist with future planning. This report presents the results of the study.

Following the initial start-up meeting with the ESRF Technical Advisory Group, KAVIK undertook the following activities to complete the study:

- literature review
- interviews with people knowledgeable about past and present oil and gas related activity in Tuktoyaktuk Harbour
- community workshop and public meeting to gather, discuss and develop action items for the issues surrounding future use of the harbour by the oil and gas industry
- reporting

Results of the workshop, literature review and interviews identified both positive and negative social and environmental issues related to past exploration activities. Interviewees and workshop participants expressed general support for future activity but want to avoid the situations that led to negative effects in the past. Participants acknowledged that they now have more control over development than was the case during the previous exploration period.

Lessons learned from past industry activities include:

- Both the community and industry need some certainty with respect to how the harbour will be operated.
- Communication between the community and industry was a key factor for successful identification and resolution of issues. The involvement of the HTC is important to continue as a focus for environmental and safety issues. In addition, the use of a community advisory committee was also successful.
- Activities occurred without adequate municipal infrastructure to support them (e.g., water, sewage, landfill), which put stress on local and regional resources. Activities need to be anticipated and planned so the community's infrastructure and services are not compromised and industry has the infrastructure and services it requires. Generally, industry found that the government and the community could not move fast enough for the speed at which industry was progressing (e.g., make decisions, put infrastructure and programs in place).

Review of Tuktoyaktuk Harbour as a Base for Offshore Oil & Gas Exploration and Development

- Past dredging (whether it was industry related or resupply related) affected fish habitat changing where and how people fished. There was little or no consultation with community members resulting in a lack of understanding and knowledge of the dredging activities that took place and the potential effects on people's lives.
- Industry did not take full advantage of willing and able northern workers and contractors. However, most companies now have policies in place for local businesses and employment.
- In the early 1980s, Dome made their base camp available during the winter for training (Tuk Tech). Programs such as education upgrading, sports programs, first aid, basic welding and pipefitting, housecleaning, sports, and general supportive activities and counselling were available. Tuk Tech was spearheaded by Dome/Canmar with the full support of the other oil and gas companies and governments and was considered a great success.

Issues and concerns with past and future activity were discussed during the workshop. In general community residents and leaders participating in the workshop identified that they support the use of Tuktoyaktuk Harbour as a base for oil and gas activities and want to benefit from future oil and gas exploration and development activities.

Sommaire

Durant les années 1980 et jusqu'à dans les années 1990, l'industrie pétrolière et gazière a mené plusieurs programmes de prospection sismique et de forage de recherche dans les zones canadienne et alaskiennes de la mer de Beaufort et dans plusieurs secteurs du haut Arctique canadien. On note ces dernières années un regain de l'intérêt porté aux ressources pétrolières et gazières de la région et, si la conjoncture le permet (par exemple si le projet gazier Mackenzie va de l'avant, le prix des produits de base augmente, etc.), on assistera vraisemblablement à une reprise des travaux de prospection et à un développement des réserves prouvées de pétrole et de gaz dans la mer de Beaufort. Tuktoyaktuk et son port ont été jusqu'à ce jour la principale base maritime des projets de prospection et on estime qu'ils continueront à jouer un rôle de premier plan dans les futurs travaux que mènera l'industrie gazière et pétrolière dans la région.

Certes, d'autres installations le long de la côte de la mer de Beaufort jouissent de certains avantages par rapport à Tuktoyaktuk (par exemple la possibilité d'accueillir des navires à plus fort tirant), mais Tuktoyaktuk pourrait malgré tout continuer à servir d'importante base maritime pour l'industrie gazière et pétrolière grâce à ses infrastructures et à ses services déjà en place. Dans le but de préparer le port de Tuktoyaktuk à desservir adéquatement les activités gazières et pétrolières dans la région, le Fonds pour l'étude de l'environnement (FEE) a demandé à KAVIK-AXYS (KAVIK) d'étudier les difficultés et les enjeux passés, présents et à venir des installations portuaires et de cerner les mesures qui doivent être prises en priorité pour les résoudre et planifier l'avenir. Ce rapport présente les résultats de cette étude.

Après la première rencontre avec le groupe de conseillers techniques du FEE, KAVIK a mené les activités suivantes pour son étude :

- Analyse de la documentation;
- Entrevues avec les personnes qui sont au courant des activités gazières et pétrolières passées et présentes dans le port de Tuktoyaktuk;
- Atelier communautaire et rencontre publique pour recueillir, débattre et élaborer des mesures de résolution des enjeux que pose la future utilisation du port par l'industrie pétrolière et gazière;
- Présentation d'un rapport.

L'atelier, les entrevues et l'analyse de la documentation ont permis de dégager des enjeux environnementaux et sociaux à la fois positifs et négatifs concernant les activités antérieures de prospection. Les personnes interrogées et les participants à l'atelier appuient une reprise des activités, mais veulent éviter les situations qui dans le passé ont eu des répercussions négatives. Les participants reconnaissent qu'ils ont désormais un contrôle accru sur le développement, contrairement à la précédente période de prospection.

Entre autres leçons retenues des activités industrielles précédentes :

- La collectivité et l'industrie veulent certaines garanties sur le futur mode d'exploitation du port.
- La communication entre la collectivité et l'industrie a été l'un des principaux facteurs de réussite dans la détermination et la résolution des enjeux. La participation du Comité des chasseurs et des trappeurs (CCT) est importante dans la résolution des problèmes liés à l'environnement et à la sécurité. L'engagement du comité consultatif communautaire a également été profitable.
- Les infrastructures municipales (aqueduc, égouts, site d'enfouissement) ne pouvaient soutenir les activités si bien que les ressources locales et régionales s'en sont ressenties. Il faudra prévoir et planifier les activités pour éviter toute pression sur l'infrastructure et les services de la collectivité et veiller à ce que ces derniers répondent aux besoins de l'industrie. En règle générale, l'industrie

estime que le gouvernement et la collectivité ne soutenaient pas son rythme (par exemple dans les prises de décision, l'aménagement des infrastructures et l'adoption de programmes).

- Les opérations de dragage antérieures (pour les besoins de l'industrie ou du ravitaillement) ont eu des répercussions sur l'habitat des poissons et modifié les sites et les modes de pêche. On n'a que peu ou pas consulté les membres de la collectivité, d'où un manque de compréhension et de connaissances des activités de dragage effectuées et les effets potentiels sur la vie des gens.
- L'industrie n'a pas pleinement mis à profit les travailleurs et les entrepreneurs du Nord disposés à travailler. Mais les compagnies ont depuis adopté des politiques d'embauche des entreprises et des travailleurs locaux.
- Au début des années 1980, Dome a permis l'utilisation de son camp de base pour de la formation pendant l'hiver (Tuk Tech). On y trouvait des programmes de sport et d'enseignement scolaire, des cours de premiers soins, de soudage élémentaire, de tuyauteur et d'entretien ainsi que des activités d'aide générale et des services de counseling. Tuk Tech, piloté par Dome/Canmar, jouissant de l'appui des autres compagnies gazières et pétrolières et du gouvernement, a été une réelle réussite.

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1 Introduction

1.1 Study Background

During the 1970s through to the 1990s, the oil and gas industry completed a number of seismic and exploratory drilling programs throughout the Canadian and Alaskan Beaufort Sea, as well as in several areas of the Canadian High Arctic. Interest in oil and gas activity in the region has returned over the last several years and if circumstances warrant (e.g., the Mackenzie Gas Project proceeds, commodity prices rise, etc.) there will likely be renewed interest in further exploration and developing proven oil and gas reserves in the Beaufort Sea. Tuktoyaktuk and its harbour have been the primary marine base supporting activity to date and would be expected to play a significant role in future oil and gas activity in the region. The community of Tuktoyaktuk is located on the Tuktoyaktuk Peninsula on the south-eastern shore of the Beaufort Sea (Figure 1).

In addition to the oil and gas industry, the harbour in Tuktoyaktuk serves as a base for local and regional community resupply and is utilized by local residents for subsistence harvesting activities. The potential for Tuktoyaktuk to become a marine gateway to the Western Arctic and oil sands region of Alberta is currently being promoted by the Arctic Module Inland Transportation (AMIT) group, possibly resulting in increased activity in the harbour. Also, if the proposed all-weather road between Inuvik and Tuktoyaktuk proceeds, changes could occur in how Tuktoyaktuk Harbour is utilized. While other locations along the Beaufort coast provide some advantages over the harbour in Tuktoyaktuk (e.g., access for deeper draft vessels) the existing infrastructure and presence of local services could result in Tuktoyaktuk again playing a significant role as a marine base for the oil and gas industry. In preparation for the potential for Tuktoyaktuk Harbour to support increased oil and gas activity in the region, the Environmental Studies Research Fund (ESRF) retained KAVIK-AXYS (KAVIK) to review issues and concerns with past, current and future harbour use and to recommend priorities for further action to address these issues and to assist with future planning. This report presents the results of the study.

1.2 Purpose

Specifically, the goal of the study is to help the community of Tuktoyaktuk, government and industry to begin to prepare for anticipated increased use of the harbour to support oil and gas activity in the region. To achieve this goal, KAVIK undertook the following tasks:

- review of available documentation related to past, present and future harbour use and surrounding areas
- consultation with government, industry and local residents to identify biophysical and socio-economic issues and concerns related to past and present use of the harbour and potential solutions to address such concerns in the future
- delivery of a workshop in Tuktoyaktuk involving community, Inuvialuit organization, industry and government representatives to review identified issues and concerns and identify actions to resolve remaining issues
- preparation of a report to communicate the results of the studies and assist the parties in planning for the future

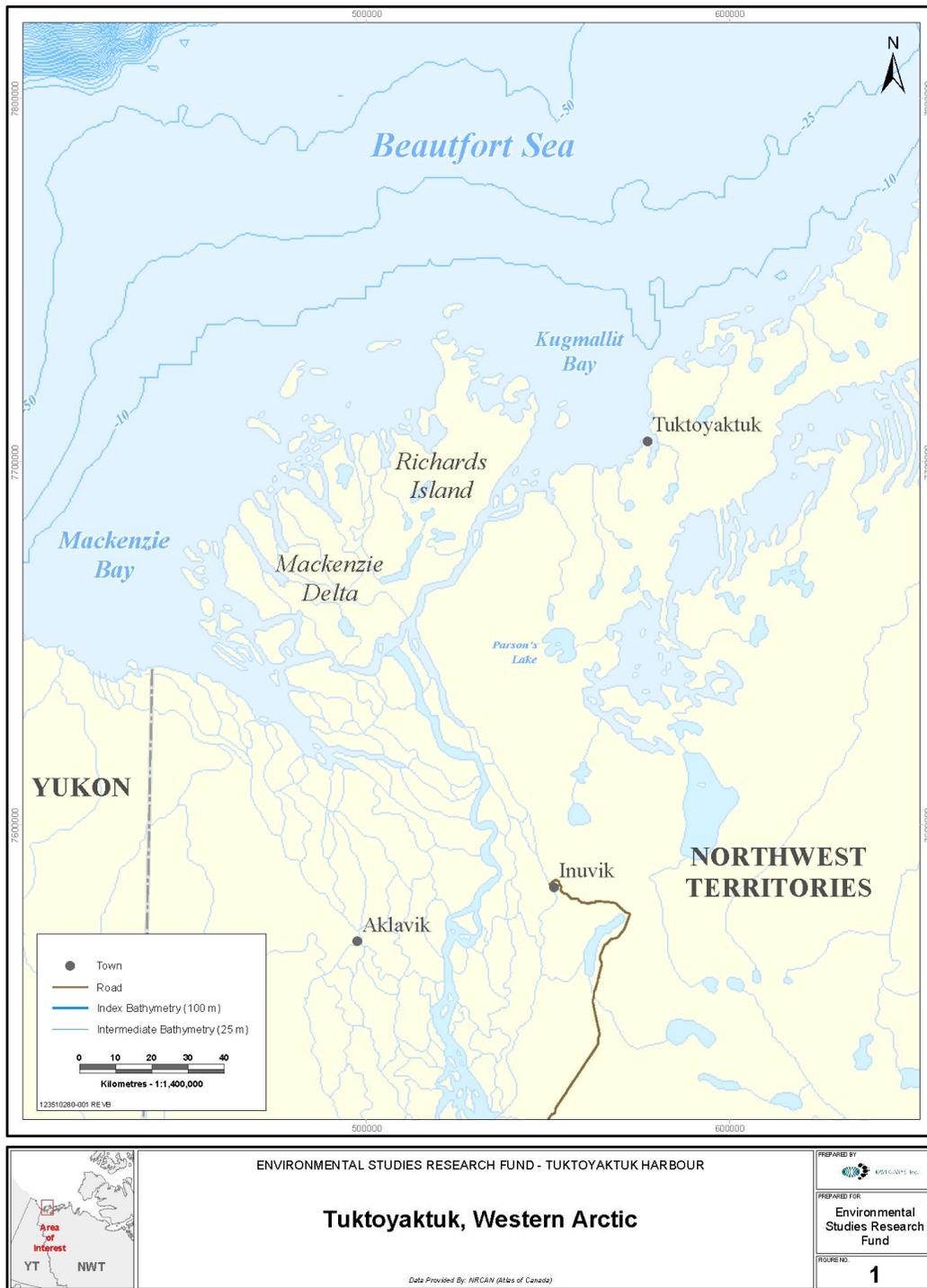


Figure 1 Tuktoyaktuk, Western Arctic

1.3 Methods/Activities

On behalf of the ESRF, a project specific Technical Advisory Group (TAG) consisting of industry, government and community representatives was established to supervise the work and provide guidance to KAVIK. Following the initial start-up meeting with the TAG, KAVIK undertook the following activities to complete the study

1.3.1 Literature Review

Identification of relevant documentation involved a number of activities including database searches, review of bibliographies, review of agency records and consultation with knowledgeable persons.

Literature under the following categories was searched:

- Tuktoyaktuk Harbour
- Beaufort Sea
- Oil and Gas exploration in northern Canada
- Arctic Shipping

Databases searched included:

- Arctic Science and Technology Science Information System (ASTIS) held by the Arctic Institute of North America
- Department of Fisheries and Oceans, online catalogue WAVES
- Natural Resources Canada bibliographic database Geoscan

In addition to the database search, several recent bibliographies and compendiums related to petroleum hydrocarbon exploration and development in the Beaufort Sea and northern Canada were reviewed for relevant references. Libraries in Yellowknife and Inuvik were also searched for references. Finally, persons interviewed were requested to identify references that may be relevant to the current study.

While the literature search identified a number of potentially relevant sources, many of the references could not be located. A summary of those documents which were reviewed are presented in Appendix A.

1.3.2 Interviews

The project team interviewed a number of people knowledgeable about past and present oil and gas related activity in Tuktoyaktuk Harbour. A draft list of parties to be interviewed was provided to the TAG for review and comment. It is recognized that the draft list was not complete, nor were all on the list available or able to be interviewed, but those interviewed did represent a cross-section of expertise, past and present, with respect to the use of Tuktoyaktuk Harbour. Parties interviewed included representatives from the oil and gas industry, marine transport industry, federal and territorial governments, Inuvialuit organizations and local residents. A list of the parties interviewed and the interview protocol is contained in Appendix B. Interviewees were provided assurance that their comments would not be attributed directly to them. Issues and themes resulting from the interviews do, however, appear in Section 4 of this report.

1.3.3 Workshop

Central to the study was a community workshop held in Tuktoyaktuk on February 9 and 10, 2010. Originally scheduled for November 2009, the workshop was postponed as a result of insufficient accommodations for participants.

The intent of the workshop was to bring together community, government and industry representatives to review the findings of the literature review and interviews, confirm which issues and concerns identified during the literature review and interview stage remain valid, identify any new issues and concerns regarding future use of the harbour and identify actions that should be undertaken to prepare for future industry use of the harbour.

Prior to the workshop, issues and concerns identified during the literature review and interviews were organized into seven key issues. A summary of each issue was presented to the workshop participants, discussed and refined. Although not all items were appropriate to each issue discussed, in general, the discussion revolved around the following points related to each issue:

- relevance
- additional background information and context
- specific concerns
- lessons learned from previous exploration activities
- opportunities
- recommendations

The workshop commenced with a number of presentations summarizing the results of the literature search and interviews as well as providing potential development scenarios which could affect Tuktoyaktuk Harbour in the future. These presentations provided an opportunity for open discussion about the issues and possible actions. The workshop report, including the participant list and agenda, is included in Appendix C.

A public meeting in Tuktoyaktuk was held at Kitty Hall on the evening of the first day of the workshop. A summary of the presentations from the workshop was delivered and the floor opened for questions. A report of the public meeting is also presented in Appendix C.

1.3.4 Reporting

This report represents a summary of the information collected during the literature review, interviews and the workshop.

1.4 Report Organization

In keeping with the intent of the study, the report focuses on a presentation of issues and concerns related to the oil and gas industry's use of Tuktoyaktuk Harbour. Following this introductory section, a summary of past and forecast harbour use is presented. A brief overview of relevant issues identified during the literature review is also presented. Issues raised and lessons learned from past activity are then discussed. The appendices contain a summary of the documents reviewed, a list of the parties interviewed and the report of the workshop.

2 Use of Tuktoyaktuk and other Regional Harbours by the Oil and Gas Industry

2.1 History of Tuktoyaktuk and the Harbour

The community of Tuktoyaktuk is the northernmost community on the mainland of the Northwest Territories (NWT). It is located on a peninsula extending into Kugmallit Bay on the Beaufort Sea, east of the Mackenzie River Delta. Tuktoyaktuk's 929 residents are predominantly Inuvialuit (Bureau of Statistics 2010). Local employment and business opportunities are mainly provided by government and the oil and gas industry. Traditional harvesting remains an important economic and cultural activity.

The Inuvialuit have lived in the area for thousands of years; however, it was the establishment of the Hudson Bay Company Store in the 1920's and the Roman Catholic Mission in the 1930's that resulted in the permanent settlement at Tuktoyaktuk. During these times schooners were popular for transporting people and supplies throughout the region. During the 1950's the Distant Early Warning (DEW) Line was constructed in Tuktoyaktuk and other locations along the Arctic Coast. The harbour became an important staging area for the shipment of goods from the Mackenzie River system to communities and DEW line sites along the coast. Tuktoyaktuk Harbour continues to be an important support base for the marine resupply of communities in the NWT and western Nunavut with the Northern Transportation Company Limited (NTCL) maintaining a regional operations base in the harbour.

The harbour at Tuktoyaktuk (Figure 2) is located on the Tuktoyaktuk Peninsula on the eastern side of Kugmallit Bay (approximately 69° N and 133° W) and east of the Mackenzie River Delta. The entrance of the harbour is protected by a long, narrow and flat island which is subjected to strong erosional pressures, accounting for a loss of approximately 2 m of shoreline a year (Solomon, workshop presentation). Water is exchanged between Kugmallit Bay and the harbour through two channels on either side of Tuktoyaktuk Island. Tuktoyaktuk Harbour is roughly 6.5 km long with a width of up to 1.8 km (Bond 1982). There are two basins in the harbour, a south and north basin separated by a narrows of approximately 0.6 km in width. Both basins have depths greater than 20 m, however, the depths in the approaches to the harbour are only 4 m, which limits the types of vessels that can access the harbour. Depths can be further reduced by strong southerly winds. Water in the harbour is strongly affected by the outflow of the Mackenzie River. Three creeks (Freshwater, Mayogiak and Reindeer) of importance to a number of whitefish species drain into the harbour. Tuktoyaktuk Harbour experiences a semidiurnal tide with a normal range of approximately 0.4 m (Bond 1982). Freeze-up can occur between September and October with break-up generally occurring in June.

2.2 Oil and Gas Exploration Activity in the Mackenzie Delta Beaufort Sea

Oil and gas exploration began in the onshore Mackenzie Delta in the 1960s. By the early 1970s exploration extended to the shallow near shore areas of the Beaufort Sea. Over 140 wells were drilled in the Canadian and American Beaufort Sea between 1970 and the early 1990s (Timko and Frederking 2009). Drilling initially occurred from artificial islands constructed from material dredged from the ocean floor or trucked over the ice from quarries on land. Drill ships were first used in 1976, allowing for drilling to occur in deeper waters. Drill ships typically operated during the ice-free season of late June to November. In the early 1980s mobile drilling structures or caissons were introduced, allowing for an extended drilling season. A variety of caisson structures (Kulluk, Tarsuit, SDC, Molipaq, etc) were used by

the different operators in the Beaufort Sea. Supporting the various drilling platforms were a variety of aircraft and vessels, including dredges, resupply vessels, icebreakers, fuel tankers, maintenance facilities and fixed and rotary wing aircraft. During the 1986 drilling season there were 39 vessels and 11 aircraft supporting the various drilling operations in the Beaufort Sea (Norton 1987). During the winter, vessels either overwintered in local harbours or transited out of the region.

2.3 Use of Tuktoyaktuk Harbour by Industry

Initially Inuvik was the primary support location for both onshore and near shore exploration activity. Eventually as exploration moved further offshore to deeper waters, Tuktoyaktuk became the primary support base. Between 1970 and 1982 several oil and gas companies and marine transportation companies established support facilities in the harbour (Figure 3).

Imperial Oil developed its facility on the east side of the harbour away from the community. It originally included a camp, office complex, storage facilities, bulk fuel storage, airstrip and 2 docks. The facility has since been removed; however, Imperial retains a lease for the site.

Canadian Marine Drilling (Canmar), a subsidiary of Dome Petroleum, established its base on the west side of the harbour directly opposite that of Imperial Oil's camp. The facilities remain largely intact and include a camp, office complex, storage facilities, maintenance shops, bulk fuel storage and a dock. The facilities are now owned by Horizon North Logistics (Horizon). Horizon also acquired Arctic Transportation Limited's shore base, located immediately south of the former Beadrill base.

Beadrill (Gulf Canada Resources Beaufort Sea drilling subsidiary) established its base on the west side of the harbour. Consisting of docks, accommodation, fuel and bulk storage facilities, the site is now owned by the Tuktoyaktuk Community Corporation (TCC) and operated by E. Gruben's Transport Limited (Gruben's). Gruben's also owns a smaller facility adjacent to the TCC facility.

The Northern Transportation Company Limited (NTCL), a marine transportation with a long history of providing community and industry transport service, operates its transshipment base to the northeast of the Horizon facility. Originally including a camp complex, the base currently now houses an office complex, storage facilities, maintenance shops and a dock.

Several other marine facilities were also established on the west side of the harbour to support industry activity and marine navigation. The establishment of the bases and the average of four to eight wells drilled each year resulted in an unprecedented level of activity in the harbour and support facilities such as the community airport.

2.4 Other Harbours and Support Bases

While Tuktoyaktuk was the primary support base for offshore exploration, the shallow draft of the approaches and harbour entrance prevented access by deeper draft drill ships and support vessels. As a result, industry required other locations where deeper draft vessels, requiring 10 - 20 m water depths, could undergo maintenance or overwinter. A number of locations in the Canadian Beaufort Sea were utilized for this purpose (Figure 4).

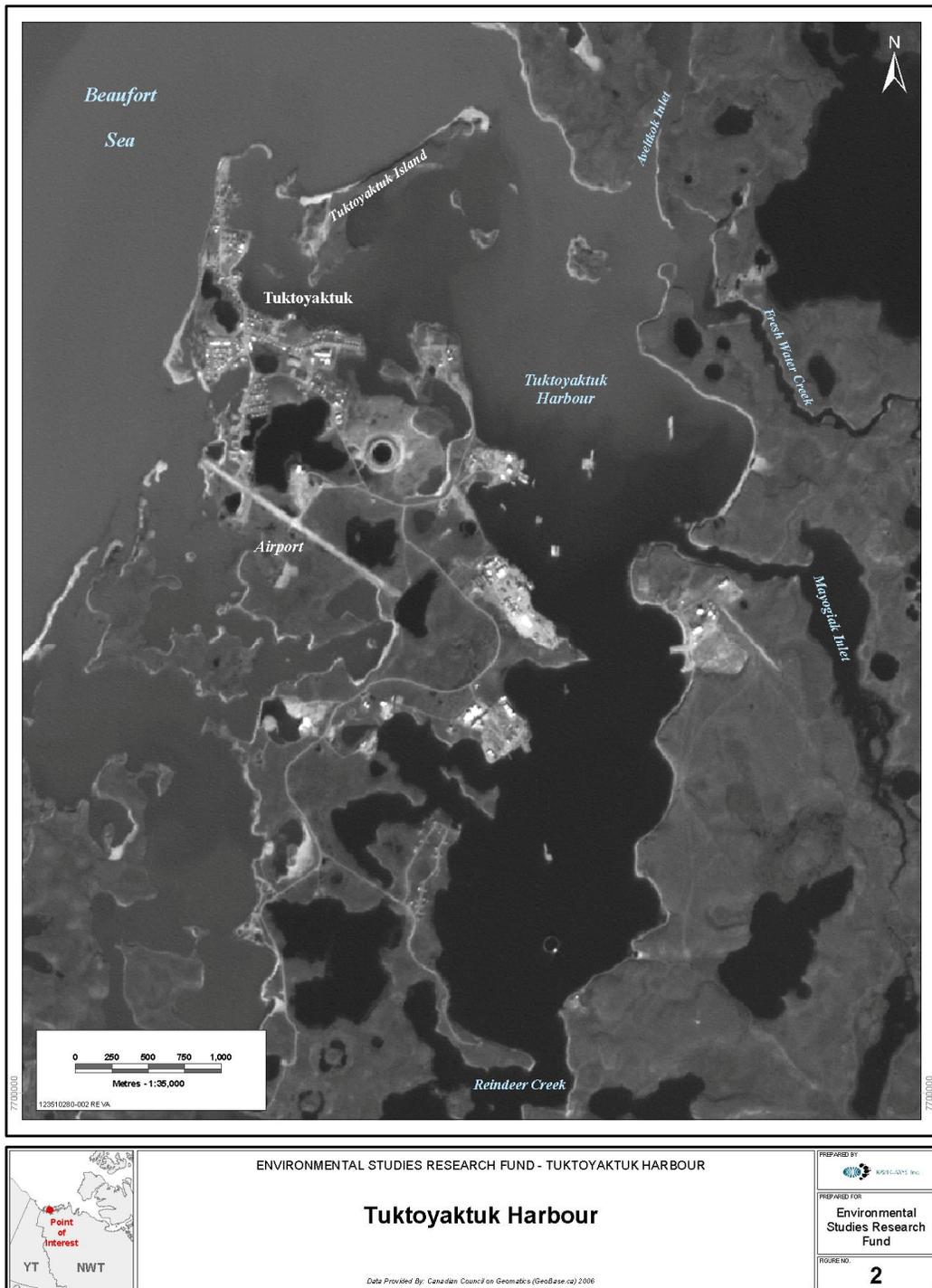


Figure 2 Tuktoyaktuk Harbour

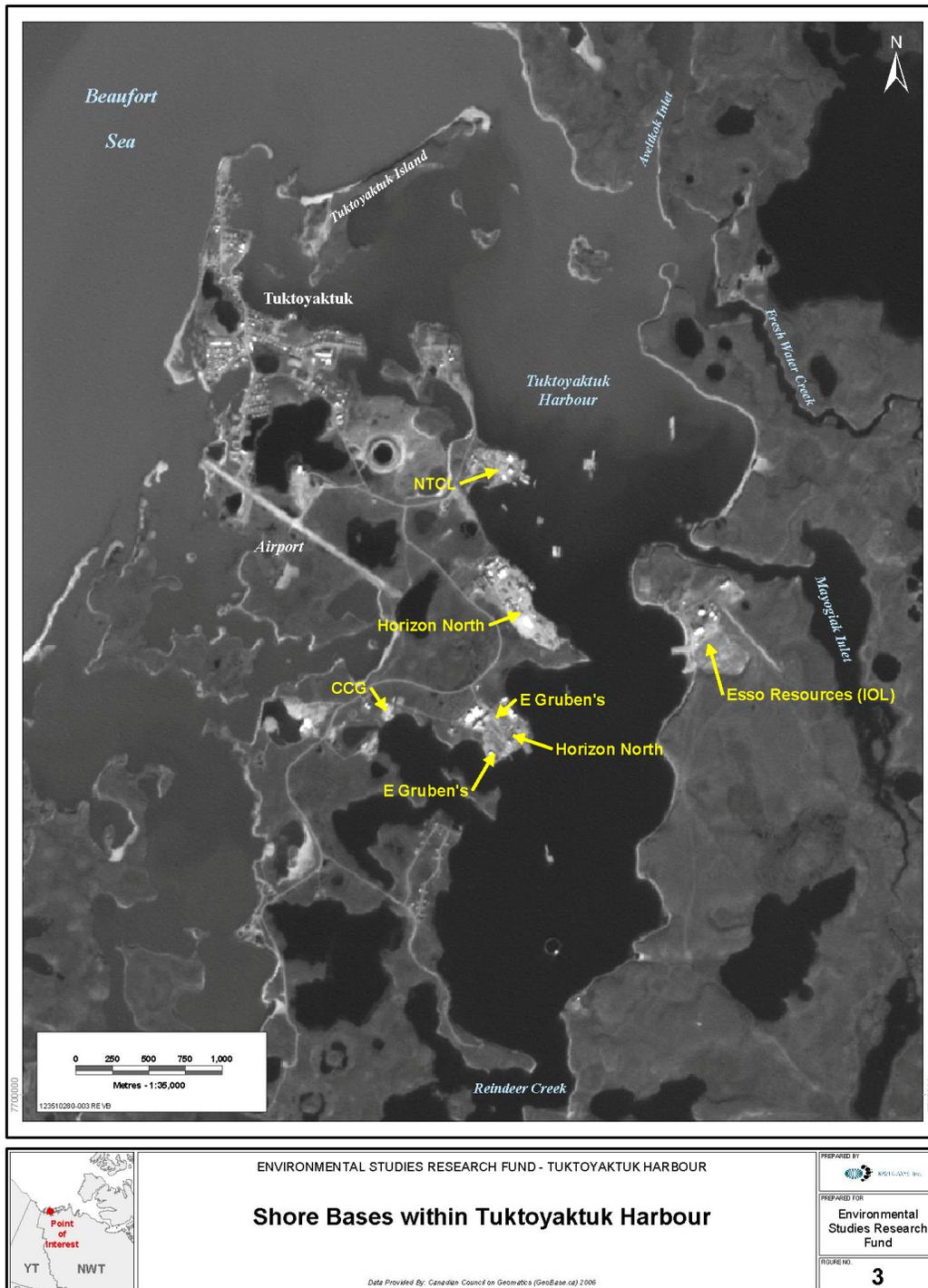


Figure 3 Shore Bases within Tuktoyaktuk Harbour

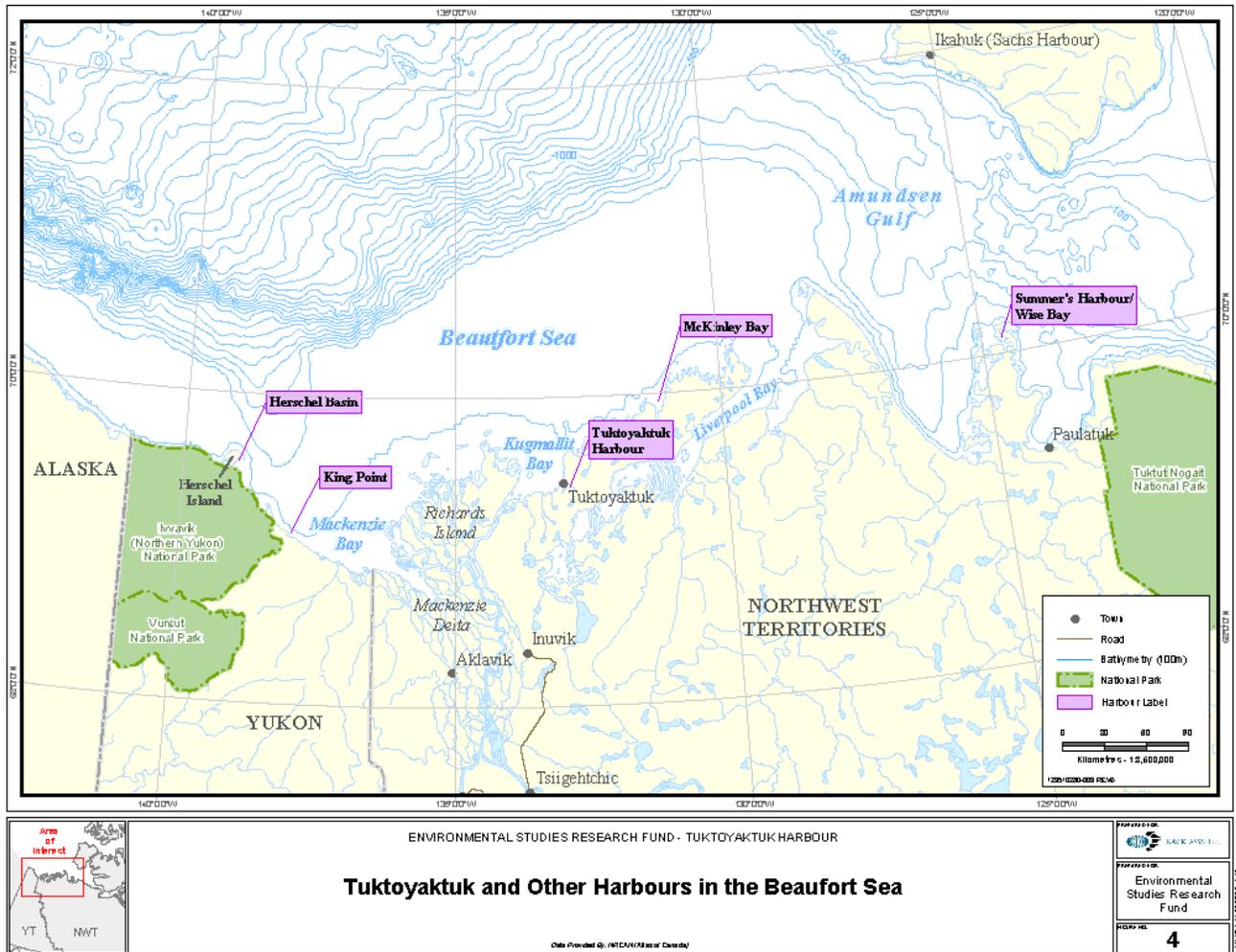


Figure 4 Tuktoyaktuk and Other Harbours in the Beaufort Sea

Herschel Basin

Herschel Basin is immediately east of Herschel Island. The maximum depth of the basin is approximately 30 m allowing deeper draft vessels to anchor there. Beaudrill used Herschel Basin to anchor and overwinter several vessels. Currently there is only one caisson, the Tarsuit, stored at Thetis Bay, Herschel Island.

McKinley Bay

McKinley Bay is located east of Tuktoyaktuk. The bay provides a good protected harbour and has close access to deep water; however the approaches are limited to approximately 9 m depth. The McKinley Bay mooring basin and its approach were first dredged in 1978 and maintenance dredging occurred into the 1980s, which allowed Canmar to overwinter its drill and supply ships there. Dredge spoil was used to create an island which was then used as a storage platform. A camp and runway were also built. The

drilling platform *Kulluk* is stored at McKinley Bay; however, all infrastructure has since been removed. The McKinley Bay coastline is a dynamic environment with ongoing erosion and sedimentation. The artificial island built in the 1980s has moved about 40 m shoreward. McKinley Bay is deeper than Tuktoyaktuk Harbour and can be used (and has been used) to overwinter drill and supply ships. When the *Kulluk* was taken out and put back into McKinley Bay in 2007, it was noted that not much infill occurred in the areas dredged 30 years earlier.

Summers Harbour and Wise Bay

Summers Harbour and Wise Bay are natural deep water harbours, both located in the vicinity of Cape Parry, east of Tuktoyaktuk and McKinley Bay. The harbour and approaches are deep; therefore no dredging is required. Both harbours have been used to overwinter ships. The closest community to Summers Harbour and Wise Bay is Paulatuk. There is no infrastructure such as a camp or docks at either harbour location.

King Point

King Point, west of Tuktoyaktuk was investigated in the 1980s for its potential as a deep water port; however, development did not proceed at this site.

Wareships and offshore facilities

Bulk fuel carriers and mobile drydocks were used to support offshore drilling operations in the past. Some vessels were too large to enter Tuktoyaktuk Harbour and operated either at the drilling locations or in deeper water harbours such as McKinley Bay. Two of the mobile dry docks were located in Tuktoyaktuk Harbour. Wareships, which would hold the supplies typically stored at a shore base and therefore bypass the need for resupply from Tuktoyaktuk, could be used as a future means of supporting offshore drilling in the Beaufort Sea.

2.5 Future Scenarios and Potential Harbour Use

During the interviews conducted for this report, the potential future uses of Tuktoyaktuk Harbour identified by industry were:

- as a staging area during construction of the Parsons Lake development
- as part of the Mackenzie Gas Project, potential use of the harbour as an overwintering location for a dredge if the Kittigazuit S bends require dredging and if it takes more than one season
- as a support base for offshore drilling projects associated with recent exploration licence agreements

Although the oil and gas industry has expressed interest in Beaufort Sea exploration, no firm commitments were expressed with respect to their future use of Tuktoyaktuk Harbour. In addition, not all companies with an interest in the Canadian Beaufort were available to be interviewed. While industry may not be in a position to make firm commitments on the use of Tuktoyaktuk Harbour, there is opinion that Tuktoyaktuk Harbour would be utilized to some degree if oil and gas exploration continues and expands into production. The proximity of Tuktoyaktuk to the Mackenzie River Delta and existing leases, its existing infrastructure and experienced workforce, along with the lack of infrastructure at other coastal locations within the Canadian Beaufort Sea provides Tuktoyaktuk Harbour with good opportunities to provide services to the oil and gas industry in the future. Potential harbour uses could include:

- housing, maintenance and storage facilities for oil and gas activities both offshore and onshore

- base for offshore resupply of materials and fuel by support vessels
- transfer site for supplies delivered via the offshore destined for land operations such as production facilities or pipelines
- transfer point for workers coming from other communities or the south to offshore platforms or ships
- small vessel repair or use of floating dry dock
- overwintering site for shallow draft vessels and barges
- oil spill response base

Existing use of the harbour by NTCL and CCG would also be expected to continue and possibly increase. Further and prolonged oil and gas activity would likely spur on other uses of the harbour as a base for research and research vessels. Additionally, a proposal to ship materials from the offshore up the Mackenzie River to the oilsands region may result in additional activity in or near the harbour. The construction of the Inuvik to Tuktoyaktuk highway may also provide new opportunities for the harbour as well. Freight currently bound for Tuktoyaktuk by marine transport during open water could now arrive year round by road and on a more frequent schedule. The harbour would continue to act as a transshipment location for offshore activity and coastal communities; however, the all-weather road would provide improved service to Tuktoyaktuk. Additionally, the presence of the all-weather road may make shipments from the offshore to Tuktoyaktuk and points south more attractive. The all-weather road may also have a negative effect on the amount of freight transported by barge through Tuktoyaktuk Harbour. An all-weather road would permit year round trucking of goods to and from the community of Tuktoyaktuk, some of which might otherwise have been transported by barge.

3 Literature Review

The literature review concentrated on items relevant to past and future use of Tuktoyaktuk Harbour. The review contributed to the identification of biophysical and socio-economic changes and issues of concern and contributed to the recommendations made in this report.

Substantial information exists related to the Canadian Beaufort Sea, however, there is less information available that explicitly documents issues and concerns related to either the past use of the harbour or its potential future use. Additionally, many of the documents identified in searches could not be physically located. Recognizing this situation, it was understood that the project interviews and results of the workshop would be the primary sources of information to be used to identify concerns and provide recommendations.

A summary of the relevant findings from each document reviewed is contained in Appendix A. In general, the documents reviewed identified the following related to past use of the harbour by the oil and gas industry:

- The shallow approaches and entrance to Tuktoyaktuk Harbour limit the vessels that can access the harbour. Dredging has been undertaken on several occasions and additional dredging to accommodate deeper draught vessels has been identified by industry and marine operators as a potential need. The amount of dredging required, if any, is unknown at this time as there are numerous potential exploration and development scenarios which may evolve.
- While there are potential deep draft harbours in the Canadian Beaufort Sea, the presence of infrastructure at Tuktoyaktuk makes it attractive for future use.
- Other potential uses of the harbour such as a tourism base or by the military, which may be accompanied by additional infrastructure, would increase cumulative effects and potentially limit harbour development and use by the oil and gas industry.
- Past industry activity in the region and harbour affected community wellness, availability of granular resources, community infrastructure and planning.
- There was a need for a harbour management authority to manage activity in the harbour to meet all parties' needs and concerns.
- Potential environmental effects from industry use of the harbour could result from: waste and waste water disposal, air emissions, artificial illumination, icebreaking, underwater noise and dredging.
- Increased use of the harbour should provide local employment, training and contracting opportunities and will also likely result in effects on the environment, traditional harvesting, the social and cultural environment and community infrastructure.

4 Key Issues and Concerns

Issues of concern have been identified through a combination of the literature review, interviews and the results of the workshop held in Tuktoyaktuk on February 11-12, 2010,

The following sub-sections present the key environmental and socio-economic issues and concerns identified and provide the pertinent information related to the past, present and possible future use of Tuktoyaktuk Harbour as a base for offshore oil and gas activity.

4.1 Community Concerns

During the previous exploration activities in the 1970s and 1980s, social changes accompanied changes in the community's economy (MacEachern et al., 1983). Many of the concerns raised by people during the 1970s and 1980s are still being raised as concerns (e.g., during the MGP hearings and during the workshop). Although concerns still exist, it was acknowledged there will be differences between how development occurred in the past and how it would happen now. People are confident that the community has more control over how development will occur and though people still have concerns about the effects of development, there is a sense that any effects will be better managed by this community control.

In general, community interviewees and workshop participants are supportive of the development of Tuktoyaktuk Harbour. People feel that they have a history with and understanding of the oil and gas industry. If the harbour is developed, it will provide an opportunity for people in Tuktoyaktuk to be able to live where they work. There is a general belief that if the Harbour is utilized by industry, local and regional businesses would benefit and employment levels would improve. People also feel that harbour development and the construction of an all-weather road between Tuktoyaktuk and Inuvik are complementary and would benefit the community as well.

During the 1970s and 1980s, some community-based management structures were established that were successful at identifying and resolving community concerns. These include joint HTC/industry meetings and a community advisory committee which met every three months to raise and resolve issues.

Many of the community concerns identified overlap with or are complementary to the remaining key issues identified in this report. The concerns identified include:

- Industry did not understand the stress placed on local workers due to camp work schedules.
Although working a 12-hour day may be acceptable for people who are in a camp and who are away from their family (e.g., southern workers), it is very hard for people in the community. It results in difficulties such as child care availability and expense, and other family issues. During the 1970s and 1980s, part-time positions were not common and job sharing was not an option. Industry needs to consider greater flexibility for people who are hired locally. Issues related to hours of work and rotations should be discussed and resolved between the community and industry.
- Strain on local resources and infrastructure.
In the 1970s and 1980s, there was an increase in Tuktoyaktuk's population. In addition to natural population growth, former residents and people from elsewhere in the region moved to Tuktoyaktuk looking for employment. This strained local services such as education, health care and water and sewer services.

- Poor understanding of employment opportunities by local residents.
Before further development occurs, people in the community want to understand job availability and training opportunities. Ideally there should be a location in town where people can access this information.
- Lack of locally-based employees at supervisory and management levels.
When an individual responsible for resolving an issue is at a great distance from the problem, it can take a long time for resolution to occur. For this reason, industry managers should be based in Tuktoyaktuk.
- Unwanted activities between community residents and non-local people.
Unwanted activities were not fully explained but did include alcohol and drug-related problems. Although the oil and gas industry had policies to keep their camp activities separate from those of the community, it appears that these policies were not fully successful in preventing conflicts with the community from occurring. Ancillary (e.g., logistics) companies that established themselves in Tuktoyaktuk during the 1970s and 1980s and whose employees lived within the community, may have compounded negative effects on the community from unwanted activities. Options such as controlling access to the camp, improving and enforcing alcohol and illegal drug policies and the number of people in camps were discussed as some possible ways to control unwanted activities within the community.
- A lack of cultural awareness by those coming to Tuktoyaktuk from the south.
During the 1970s and 1980s, many people from the south came to Tuktoyaktuk who did not understand the differences in lifestyle between themselves and local residents. A cultural immersion course for people from the south would have been helpful and should be established by industry for any future activities.
- Youth leaving school to obtain industry jobs.
In the 1970s and 1980s, many youth did not stay in school because they could obtain high paying jobs with industries. Although industry did hire students for summer employment, no part-time positions were available. Industry needs to develop and implement policies that dissuade youth from quitting school to take jobs.
- Community businesses and individuals must benefit from harbour development.
Long- term harbour development benefits are necessary for both local businesses and individuals.
- Safety and costs associated with industrial use of community infrastructure.
The use of community infrastructure by industry might result in increased safety issues and costs within the community. Safety issues include increased road traffic which could result in additional vehicle or vehicle/pedestrian accidents and safety issues associated with icebreaking in the harbour. The use of community infrastructure such as roads and water or waste facilities may result in increased maintenance costs for community infrastructure.
- The development of the harbour should include a long-lasting, positive legacy.
- Addition of other community services would be beneficial.
The addition of other community services such as banking would be beneficial to the community. During previous activities, a bank was opened but later closed when industry left.

4.2 Harbour Management

In the 1970s and 1980s, there was no formal harbour management structure or port authority for the harbour. ESSO Resources, Dome Petroleum, Gulf and the vessel operators provided their own management services in addition to their developed infrastructure (e.g., camps, docks, fuel facilities), often in cooperation with each other.

To help manage harbour and shore base activities, each company had a shore captain. The shore captains regularly communicated with each other to help maintain safe operating conditions in the harbour (e.g., related to mooring, transits in the harbour). In addition, a community advisory committee was established which consisted of representatives from the Hamlet, HTC and industry. This committee would meet approximately every three months to address harbour-related concerns, including safety concerns.

Industry has indicated that for future activities, they would no longer consider providing their own infrastructure or harbour management structure, but would rely on locally provided turn-key facilities and services. In preparation for currently proposed exploration activities, industry now consults with a wide range of local and regional bodies and organizations regarding the use of Tuktoyaktuk Harbour. From a single-use perspective (i.e., one project), industry indicated that this works well. However, should activity levels in the harbour increase, there could be stress placed on these bodies. It was found that during the previous exploration activities, local and regional bodies were unable to react quickly enough (e.g., make rapid decisions) to address industry requests and their additional needs (MacEachern et al., 1985; interview comments). A formal harbour management structure could provide a useful and efficient service to help focus and manage industry's use of the harbour. A formal harbour management structure could also provide a structure to manage other harbour related activities and provide a mechanism for community input into harbour activities.

Between the early 1980s and 1990s, a number of reports were commissioned by the GNWT and the Hamlet related to harbour land use and facility planning, as well as the establishment of a harbour management structure. These include:

- Tuktoyaktuk Harbour Masterplan: Final Report, 1980. Acres Consulting Services. Completed on behalf of Town Planning and Lands, Government of the NWT.
- Tuktoyaktuk Harbour East Shore Land Use Plan, 1987. UMA Engineering Ltd. Completed on behalf of Municipal and Community Affairs, Government of the NWT.
- Feasibility Study to Resolve the Tuktoyaktuk and McKinley Bay Harbour Authority Issue, 1988. Canada Research Institute and Sypher-Mueller International Inc. Completed on behalf of the Hamlet of Tuktoyaktuk.
- Hamlet of Tuktoyaktuk Harbour Authority Study, 1991. David Nairne and Associates Ltd. and Sypher-Mueller International Inc. Completed on behalf of the Hamlet of Tuktoyaktuk.
- Brief in Support of the Establishment of the Tuktoyaktuk Harbour Authority, 1992. David Nairne and Associates Ltd., Northern Oil and Gas Action Program.

Since these reports were developed, no formal initiatives to establish a management mechanism for Tuktoyaktuk Harbour have occurred.

During the interviews and in the workshop, industry and the community identified the need for harbour management which would allow the community to have a say in harbour use, as well as provide a degree of certainty for industry with respect to the facility availability and operating conditions. Community members want harbour management considerations to include both community use and industry needs. Although community members want some control over the use of the harbour, they do not want to hamper the community's use of the harbour or make it difficult for industry to use. It was also thought that

a well managed harbour would have a positive synergy with all-weather road development and the development of other non-renewable resources in the region.

According to Transport Canada's comments at the workshop, there is no existing regulatory mechanism for Tuktoyaktuk Harbour to obtain federal port authority status. Although a federal port authority cannot be obtained, other management options should be explored. People did feel that the level of management at the harbour should consider the level of activity expected. People were interested in exploring how communities manage small fishing-related harbours in other parts of Canada. With respect to Transport Canada's responsibilities, they noted that ships must operate by Transport Canada regulations and speed limits in the harbour can be set by regulation by Transport Canada.

During the workshop, some community members indicated that the development of a Harbour Management Plan that considers land use is premature to consider at this time, because the mechanisms for community planning and planning on Inuvialuit lands are well established. It is thought that there is enough land available for oil and gas exploration activities, however, there would likely need to be further land use considerations for oil and gas development and production activities. People expect that the land-based supporting harbour activity would be incorporated into land use plans completed by the Hamlet and Inuvialuit Land Administration (ILA).

Workshop participants felt that a cooperative harbour management committee or board, which would include industry and community representatives, could be established. This committee could help identify the extent of the harbour operations that the community would want to address/manage, and this could include, but not necessarily be limited to:

- assess docking priorities
- identify mooring locations
- identify restricted areas
- navigational aids
- safety
- fuel
- foreign ship requirements (bilge water, garbage, slop oil)
- potential for introduction of invasive species from ballast water
- people from cruise ships and tourist adventurers travelling in private yachts
- maintenance process and issues

4.3 Icebreaking

The potential for icebreaking as a result of an extended shipping season emerged as a substantial concern during the interviews and at the workshop. Tuktoyaktuk Harbour is used by residents for fishing and for cross-ice travel to access hunting and trapping areas. Previously, it was also used to travel to preferred drinking water sources. When icebreaking occurs, there is a risk of people falling into open water and/or having to travel over very rough ice. This is a safety concern and an imposition on people with respect to both the additional time it takes to access hunting and fishing areas and the additional costs incurred to travel farther.

Discussions during the workshop and interviews identified that during the 1970s and 1980s, icebreaking occurred regularly in the harbour, often into December. There was reportedly minimal consultation with the community with respect to the icebreaking and its potential effects.

Industry representatives at the workshop acknowledged that regular (i.e., every year) late season access to the harbour after the ice has formed will be required. Discussions at the workshop identified that freeze-up is occurring later than it has in the past. Scientific models also predict a later freeze up. Even with a later freeze up, icebreaking in the harbour may still be required to extend the shipping season (Solomon pers. com).

In the recent past, cooperation between industry and the HTC to resolve issues and identify mitigation strategies has worked on a case-by-case basis. Recently (2007), industry and the HTC worked out mitigation measures related to icebreaking activities in the harbour, although at the workshop it was noted that from the community perspective, icebreaking was considered only because the community barge resupply that season was not yet completed and icebreaking would facilitate the resupply. The mitigation measures implemented include:

- house-to-house notification to community residents
- daily public announcements on radio
- 24-hour monitoring of the harbour when icebreaking occurred to ensure people did not unknowingly interact with ship's tracks
- a local contractor was hired to smooth out the tracks at key locations to make snowmobile passage easier

Other options for mitigating the effects of icebreaking were discussed, such as setting a firm end-of-season date for harbour activities. It was acknowledged that this option is likely not workable because freeze-up dates change from year to year. Some community members supported the continuation of industry requests for icebreaking on a case-by-case basis. Industry representatives indicated that industry would likely want to know that icebreaking activities could occur for multiple years in advance, i.e., determine mitigation measures and community notification procedures that could apply as standard operating conditions. However, community residents reiterated that industry must recognize the substantial safety concerns, increased costs and inconvenience that icebreaking activities cause.

4.4 Dredging

During the 1970s and 1980s, shallow draft support vessels would move people and supplies from Tuktoyaktuk to the various drilling platforms in the offshore. These support vessels and dredges could and often did overwinter in the harbour. However, at the end of the season the drill ships, and other deep draft vessels either had to exit the region or overwinter in deeper harbours such as McKinley Bay, Herschel Basin and Summers Harbour.

In the past, dredging occurred throughout the Beaufort Sea to support offshore exploration, including in Tuktoyaktuk Harbour and its approaches. In the 1980s, the channel into Tuktoyaktuk Harbour was widened and deepened. Dredging in the harbour was conducted in support of municipal needs such as for the construction of the community water reservoir or to fill in low lying areas to facilitate construction in these areas. The most recent dredging was undertaken by Public Works Canada in the early 1990s when the Kitti S-bends and areas around the docks in Tuktoyaktuk were dredged to facilitate community resupply. Bathymetric surveys have identified marks on the seabed in the approach channel to Tuktoyaktuk that are interpreted as being formed by vessels and presumed to be propeller wash scour.

To enable deep draft vessels to enter the harbour, both the approach and portions of the harbour would require dredging. For the purpose of this report deep draft refers to vessels with a draft of 10 - 20 m. It has been estimated that up to about 25 km of the approach would need to be dredged, resulting in large volumes of sediment requiring disposal.

Management options would have to be assessed on how to dispose of dredged spoil (sediment). These options would require consideration of a number of factors including, ecological considerations such as how the habitat is being used, timing of the disposal, the type of spoil for disposal, its compatibility for other uses, whether contaminants are present and at what levels and other factors depending on the area. The disposal options available may have positive or negative effects on the use of the harbour. Positive effects could include the use of spoil for infrastructure purposes while negative effects may be temporary in nature, restricting some activities during the period of disposal or longer term where options may be prohibitive to dredging the desired areas.

Dredging and its potential effects are a concern to community residents. Some environmental and social concerns on the effects of dredging raised during the workshop include: effects on fish and mammals, effects on fishing, redistribution of contaminants, if present, within the sediments and how dredging would affect people's use of the harbour. In addition, the following was noted about the harbour dredging that occurred in the 1980s:

- herring (Arctic cisco) was affected during and after the dredging activities; the herring have now returned
- the locations of Pacific herring (blue herring) spawning beds have not been mapped within the harbour and could be affected by dredging
- there was not much consultation before this dredging activity
- dredging can be beneficial to the community (e.g., use of the material to construct the reservoir)

From a technological perspective, people felt that dredging methods and technology may now be advanced enough to address the environmental concerns of dredging in the harbour. For instance, it was noted that there are new technologies that can treat dredge material before disposal, possibly alleviating concerns related to contaminated dredge material and water quality. Therefore potential dredging should be considered in the context of modern dredging practices rather than past experience only.

There were a number of questions raised with respect to dredging. For instance, people questioned that should dredging of the approach channel and entrance to the harbour occur, it is not known how long the channels would require maintenance dredging and the extent of this dredging.

The shoreline protection of Tuktoyaktuk Island was identified as a priority by people who attended the workshop and is linked to the discussion about Climate Adaptation and Shoreline Protection. Tuktoyaktuk Island provides protection for the inner harbour and if it erodes away or is breached, there would be less protection of the harbour during storm surges and normal wave action, especially with rising sea levels. The option of using dredge spoil for protecting the land was discussed. However, questions were also raised about the possibility that dredging might also increase the rate of erosion.

4.5 Shoreline Protection and Adaptation to Climate Change

The shoreline protection of Tuktoyaktuk Island was identified as a priority by people who attended the workshop. Tuktoyaktuk is a dynamic environment with a history of shoreline erosion. Shoreline protection activities within the community date back to the 1970s. Tuktoyaktuk Island provides protection for the inner harbour from severe wave action. Given the current rates of erosion, it is probable that the island will be eroded to a low barrier island along much of its length in 30 – 50 years. If the island erodes away or is breached, there is the potential for greater negative effects such as erosion of the inner harbour coastline or damage to infrastructure during storm surges or normal wave action, especially with rising sea levels. An increase in the open water season and fetch will likely increase Tuktoyaktuk's exposure to storms and their associated waves.

During the workshop, a number of questions related to climate change and shoreline protection were raised, including:

- will climate change alter ice flow dynamics because of a change in ice cover?
- will climate change affect/eliminate multi-year ice?
- will there be a greater fetch as a result of decreased ice, changing the swell, storm surges and wave dynamics?
- what implications does the presence of ice (ground ice) have for harbour development?
- what does it mean for long-term harbour development if Tuktoyaktuk Island is breached or disappears?

It was noted that flooding due to storm surges occurs in Tuktoyaktuk about every 10 years (Solomon pers. com.). These events can flood community infrastructure (e.g., the road to the airport, the landfill). If there are rising sea levels, increased fetch and an increased number of large storms occurring, a greater frequency of flooding can also be expected (Solomon pers. com.).

The presence of ground ice can provide challenges to the development of new or upgrading of existing infrastructure. The community of Tuktoyaktuk is largely underlain by solid ice with only limited sediment content, as compared to permafrost which is largely frozen ground with some ice content. If exposed, the ice can be subject to rapid melting and erosion causing situations such as slumping and ponding, potentially leading to the instability or loss of infrastructure. Infrastructure has successfully been constructed in Tuktoyaktuk in the past. New improved technology and design to mitigate against damage to ice and permafrost now exists which should allow for construction of most harbour infrastructure if the protection of ice and permafrost are included in the early design stage of that infrastructure. The breaching of Tuktoyaktuk Island at the entrance to Tuktoyaktuk Harbour would likely affect water, wave and sediment movement within the harbour. Tuktoyaktuk Island provides protection for much of the inner harbour of Tuktoyaktuk. The breaching or disappearance of the island would leave the inner harbour exposed to increased and more severe wave action and storm surges. Increased wave action could lead to increased shoreline erosion within the harbour, which potentially could lead to infrastructure damage. Reduced protection of the inner harbour by Tuktoyaktuk Island may also affect the safety of smaller vessels during large storm events. Modelling of the effects related to the breaching of Tuktoyaktuk Harbour would be valuable in evaluating the longer-term potential of Tuktoyaktuk Harbour as a working harbour and/or allow for mitigation to be developed to prevent increased wave and storm surge severity, which would allow for the continued safe use of the harbour.

4.6 Infrastructure

Infrastructure-related concerns and issues are associated with people's concerns about industry's potential use of municipal infrastructure and industry's need for upgraded or additional harbour specific infrastructure.

4.6.1 Municipal Infrastructure

It is expected that increased harbour activity will result in increased industry use of some municipal infrastructure (e.g., airport, roads, water, power, sewage). People are concerned that industrial use of community infrastructure might affect community resident's safety (e.g., additional vehicles on roads), and increased maintenance and capital requirements and costs (e.g., as a result of industry's use of roads and or the possible need for enhanced airport facilities and services). There were also concerns that industrial users might be given priority over community residents because industrial users pay a higher price for services, e.g., water supply.

During the 1970s and 1980s, industry used municipal infrastructure (e.g., water supply, sewage disposal, landfill, airstrip, roads); infrastructure and municipal services were affected by both industry's demands and community growth (MacEachern et al. 1983). Domestic waste was deposited in the local lagoon and industrial wastes were commingled with domestic waste in the municipal landfill (Red Sky Enterprises 2009).

Currently, many municipal facilities are either operating at their maximum capacity or nearing the end of their lifespan. The Hamlet is pursuing the development of a new solid waste facility and considering a new location for the sewage lagoon.

There are concerns that increased industrial activity could overload the airport. Current airside capacity is limited. It was noted that industry may need to consider an industry specific air terminal building to accommodate crew changes as occurred during the previous exploration period. Some local people interviewed felt that there was already a shortage of air travel capacity between Inuvik and Tuktoyaktuk during the tourist season and are concerned that industry might overload the available capacity. In addition, the need to extend the runway length to accommodate industry's requirements was raised. Aircraft such as 737s and Hercules C-130 cargo planes can land, but other large cargo aircraft cannot land due to the airstrip length (1527 m).

Kudlik Lake, located on the east side of Tuktoyaktuk Harbour, is the community water supply. Water is pumped from Kudlik Lake through a pipeline to the water reservoir in town. The water pipeline lies on the bed of the harbour and is anchored with cement blocks. In 2006, a survey of a portion of the harbour determined that the concrete blocks have moved at least two times, likely putting a kink in the water line. There also is evidence that a ship or barge anchor dragged across the water line. Subsequently, a new water line was installed by the GNWT.

During the Mackenzie Gas Project hearings, Tuktoyaktuk Hamlet representatives identified that industry must address infrastructure impacts arising from its operation and help solve problems to which they contribute (Hamlet of Tuktoyaktuk 2006, 2007).

4.6.2 Harbour Infrastructure

During the 1970s and 1980s, industry developed and owned their own infrastructure and generally operated in a self-contained manner. Much of the equipment used in the 1970s and 1980s (e.g., marine fleet facilities, cranes, dry dock infrastructure) was removed, not maintained, or required upgrading to meet current needs.

While there is a need to upgrade existing infrastructure, participants at the workshop felt there were sufficient shore base facilities to meet the needs of the oil and gas industry at the low to moderate levels of activity currently being experienced or expected in the area. However, if oil and gas activity were to intensify, the harbour would need upgrades and additional infrastructure to meet industry's needs (e.g., dock upgrades/repairs, larger crane to offload ships, dredging). It was noted that if Tuktoyaktuk Harbour is not improved to provide services that industry needs, industry might use other locations to support their operations. This could reduce the economic benefits for Tuktoyaktuk and the region. For example, large warships could be brought into the Beaufort Sea which may be able to provide all or most support services to the offshore oil and gas activities and require little shore base support.

Industry also indicated that a broad range of services and infrastructure need to be provided including (but not limited to): fresh water, fuel, fuel storage, storage and laydown areas, maintenance and repair facilities, security, camp facilities and camp support services, waste disposal facilities, anchoring locations and vessel manoeuvring areas. Industry understands that costs will need to be recovered should further development and upgrading occur to the harbour and its facilities.

Should oil and gas activities move into an operational phase, there is likely some infrastructure, e.g., mechanisms to address ship bilge water and different types of hazardous waste, that only industry would require and that industry should address on its own.

4.7 Environmental Management

During the workshop, the need for an environmental management plan, which could cover a wide range of biophysical and land use issues, emerged as an important element that would need to be addressed should industrial activity levels in the harbour increase. Three aspects of environmental management were discussed: the development of an environmental baseline of the harbour including a description of how the land and water are used, the development of oil spill response capability and waste management.

4.7.1 Environmental Baseline and Land and Water Use Description of the Harbour

Tuktoyaktuk Harbour is used for fishing, camping and for travel. During the open water season, people fish in the harbour and travel by boat to coastal camps. During winter, people travel across the harbour ice to caribou harvesting areas. People at the workshop expressed concern that there is no comprehensive document that describes the current environmental quality of the harbour or the way the land and water are used. People are concerned that an increase in development would negatively affect the environmental quality of the harbour and that there is currently insufficient and outdated baseline data from which to determine if changes occur.

Although not mentioned in the workshop or during interviews, the re-installation of a tide gauge in Tuktoyaktuk Harbour would be valuable. In addition to the tide gauge, the development of real-time oceanographic modelling and prediction of waves and currents would enhance ship safety, infrastructure planning for offshore and shore base sites and potentially allow for improved information for making decisions for entering or leaving Tuktoyaktuk or other harbours in the area.

4.7.2 Oil Spills

Potential oil spills in the harbour and their effects are a prevalent concern. During the 1970s and 1980s, there was spill response equipment stored in Tuktoyaktuk. Local people were trained in oil spill response and periodic training exercises were conducted. The Beaufort Sea Oil Spill Response Cooperative, which was capable of responding to spills that were large in volume, extended in duration or affecting a sensitive area, was set up during the 1970s and 1980s by Imperial, Gulf and Dome. This cooperative is no longer in place nor is there an equivalent capability in the region. Some oil spill equipment is stored at the Canadian Coast Guard facility in Tuktoyaktuk Harbour; however, it was reported to be capable of responding to spills up to only 1000 litres in volume.

The ESRF has funded a project to examine oil spill knowledge in the Arctic.

4.7.3 Waste Management

During the 1970s and 1980s, industry with the exception of Esso Resources, which was located across the harbour from the town site, used municipal waste facilities. Currently these facilities are at or near their capacity, and a new facility is required. People are concerned that hazardous waste could be placed in the local landfill and contaminants potentially released into the harbour (TCC interview). In addition, people identified that there is abandoned waste from industry (e.g., a caisson, barrels) remaining in the community.

5 Lessons Learned

Results of the workshop, literature review and interviews have identified both positive and negative social and environmental issues related to past exploration activities. Interviewees and workshop participants expressed general support for future activity but want to avoid the situations that led to negative effects in the past. Participants acknowledged that they now have more control over development than was the case during the previous exploration period.

Lessons learned from past industry activities include:

- Both the community and industry need some certainty with respect to how the harbour will be operated.
- Communication between the community and industry was a key factor for successful identification and resolution of issues. The involvement of the HTC is important to continue as a focus for environmental and safety issues. In addition, the use of a community advisory committee was also successful.
- Activities occurred without adequate municipal infrastructure to support them (e.g., water, sewage, landfill), which put stress on local and regional resources. Activities need to be anticipated and planned so the community's infrastructure and services are not compromised and industry has the infrastructure and services it requires. Generally, industry found that the government and the community could not move fast enough for the speed at which industry was progressing (e.g., make decisions, put infrastructure and programs in place).
- Past dredging (whether it was industry related or resupply related) affected fish habitat changing where and how people fished. There was little or no consultation with community members, resulting in a lack of understanding and knowledge of the dredging activities that took place and the potential effects on people's lives.
- Industry did not take full advantage of willing and able northern workers and contractors. However, most companies now have policies in place for local businesses and employment.
- In the early 1980s, Dome made their base camp available during the winter for training (Tuk Tech). Programs such as education upgrading, sports programs, first aid, basic welding and pipefitting, housecleaning, sports, and general supportive activities and counselling were available. Tuk Tech was spearheaded by Dome/Canmar with the full support of the other oil and gas companies and governments and was considered a great success.

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- Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 53 Hearing Held at Kitti Hall, Tuktoyaktuk, NT September 11, 2006. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html.
- Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 98 Hearing Held at Kitti Hall, Tuktoyaktuk, NT June 20, 2007. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html.
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Appendix A Document Review Summary

A.1 Reference

Title of Report, Study or Initiative:

Western Arctic Moderate Draft Harbour Study

Location:

Hershel Island - Pauline Cove, King Point, Tuft Point, Mason Bay, Warren Point, Atkinson Point, McKinley Bay, Liverpool Bay, Wood Bay, Police Point, Letty Harbour, Sachs Harbour, Paulatuk, Tuktoyaktuk, Pearce Point

Type:

Advisory Committee on Northern Development – Transportation Committee Steering Group on Marine Transport.

Bibliographic Citation(s) Reviewed:

1. Western Arctic Moderate Draft Harbour Study Report, February 1977

Website URL(s):

1. Accessed from GNWT-Department of Environment and Natural Resources Library, Yellowknife N.T.:
<http://207.67.203.75/G92011Staff/OPAC/Index.asp>

Name of Reviewer: Peter Lennie-Misgeld

A.2 Description

Summary:

This report outlines a study by the Advisory Committee on Northern Development (ACND) that investigated the requirements for and cost to establish moderate (20 feet) draft facilities in the Western Arctic.

Canadian Marine Drilling Limited (CANMAR) conducted oil and gas exploration in the Beaufort in the summer of 1976, using three drill ships, five support vessels and one base vessel. In 1975, CANMAR requested that the Federal Government dredge the approach channel into Tuktoyaktuk Harbour to accommodate the fleet of vessels. The Government rejected the request.

The study examines sixteen possible locations between Hershel Island and Paulatuk on the following criteria: operational acceptability, hydrography, meteorology, ice regime, infrastructure, environmental impact and costs.

The study made the following observations and conclusions about Tuktoyaktuk Harbour:

- The Department of Public Works estimated that the cost to dredge the approach channel to the harbour would be 40 million dollars
- Large groups of Beluga whales live and breed in the harbour area and are harvested by local residents
- Large populations of fish are found in the area

- The harbour could be expanded to limit the scope of port development to one location and preserve other sensitive marine areas
- Dredging of the channel into the harbour would require continuous maintenance to maintain the channel causing continuous environmental disruption and high costs

The study made the following conclusions:

- Port development would be very expensive to only suit the needs of one operator (CANMAR was the only oil and gas company exploring at that time);
- A port could not be constructed in time to be used during the current exploration program
- If a port were developed, it could be obsolete within five years if exploration did not continue or if drilling operations shifted to a different location that could not be serviced by the port
- The value of the port would depend on the discovery of petroleum resources within the region of the port or justification for continued exploration
- Government investment in the port would be a non-recoverable cost if the exploration program failed and ceased
- Cost savings to drillship supply operations as a result of dredging are insignificant compared to dredging costs
- Offshore ice regime prevents increasing the length of drill season by choice of a particular port site
- Environmental data is incomplete
- Sites other than Tuktoyaktuk could provide adequate harbours at a much lower cost
- Although other sites than Tuktoyaktuk offer better shelter and lower marine costs, its geographic position at the mouth of the Mackenzie River and its available infrastructure make Tuktoyaktuk an attractive candidate
- It was recommended that Government take no action to develop a moderate draft harbour at that time, but that the situation be monitored so if more oil and gas activity occurs, Government may want to reconsider harbour development

A.3 Reference

Title of Report, Study or Initiative:

A Study of the Technical Aspects of Deep Draft Shipping to the Western Arctic

Location:

Western Arctic Region of NWT and Nunavut

Type:

Study, Department of Transportation, GNWT

Bibliographic Citation(s) Reviewed:

1. D.F. Dickins Associates Ltd., 1998. "A Study of the Technical Aspects of Deep Draft Shipping to the Western Arctic" Prepared for the Department of Transportation, Government of the Northwest Territories

Website URL(s):

1. xxx

Name of Reviewer: Nick Lawson

A.4 Description

Summary:

The study examined the technical feasibility of supplying the Western Arctic coastal communities with dry cargo and fuel by deep sea vessels

Approaches:

Notes that deep draft ship would have to anchor outside of the harbor (20 miles) in an exposed area. Cargo would have to be lightered to a vessel capable of navigating 4m draft into harbor. Inshore water levels not generally affected by tide but can be reduced severely by offshore winds. With these limitations, resupply of Tuk Harbour is not recommended for resupply by deep draft vessels and further work was not pursued in this study.

A.5 Reference

Title of Report, Study or Initiative:

Hydrocarbon Development in the Beaufort Sea - Mackenzie Delta Region

Location:

Beaufort Sea - Mackenzie Delta Region

Type:

Environmental Impact Statement

Bibliographic Citation(s) Reviewed:

1. Environmental Impact Statement for Hydrocarbon Development in the Beaufort Sea - Mackenzie Delta Region, Volume 4 Biological and Physical Effects. Prepared by Dome Petroleum Ltd., Esso Resources Canada Limited and Gulf Canada Resources Inc.

Website URL(s):

1. Accessed from GNWT-Department of Environment and Natural Resources Library, Yellowknife N.T.:
<http://207.67.203.75/G92011Staff/OPAC/Index.asp>

Name of Reviewer: Peter Lennie-Misgeld

A.6 Description

Summary:

The environmental impact statement (EIS) was submitted in 1982 to the Environmental Assessment Review Panel in support of the proposed Beaufort Sea - Mackenzie Delta hydrocarbon development. The majority of development proposed was planned for offshore operations in the Beaufort Sea, and the EIS discusses use of the Tuktoyaktuk Harbour to support offshore operations. The Northern Transportation Company Limited (NTCL) and Arctic Transportation Limited (ATL) were the two main contractors for provision of shipping services to offshore operations with ATL basing its operations out of the Tuktoyaktuk Harbour. In 1981, a four year construction program began with the installation of a 200-metre wharf and construction of warehouses and other associated facilities.

The EIS notes that the harbour had an entrance draft of 4.3 metres, which limits vessels to a draft of about 4 metres, but that future expansion of the harbour could accommodate bigger vessels through dredging of the entrance channel. Use of the harbour is generally confined to June through December.

At this phase of development in the Beaufort Sea - Mackenzie Delta region, the harbour was an important base for all exploration drilling in the Beaufort Sea and was considered to continue this function through oil and gas industry expansion of harbour facilities and infrastructure. The airstrip was also expanded to accommodate jet aircraft and Tuktoyaktuk acted as the main transfer centre for all incoming and outgoing personnel. Other sites along the Beaufort Sea coastline (McKinley Bay, Yukon North Slope) were also considered and evaluated for their suitability as ports or shore base facilities.

The EIS evaluates biological and physical impacts that may occur from development of shore base activities at Tuktoyaktuk. Potential impacts from harbour activities include impacts associated with solid and sewage waste, waste water discharges, air emissions, artificial illumination, dredging, icebreaking and underwater sound. Impacts were deemed minor or negligible with the exception of dredging, which was considered to cause moderate effects to fish and invertebrate communities.

A.7 Reference

Title of Report, Study or Initiative:

Hydrocarbon Development in the Beaufort Sea - Mackenzie Delta Region, Volume 5 Socio-Economic effects

Location:

Beaufort Sea - Mackenzie Delta Region

Type:

Environmental Impact Statement

Bibliographic Citation(s) Reviewed:

1. Environmental Impact Statement for Hydrocarbon Development in the Beaufort Sea - Mackenzie Delta Region , Volume 5 Socio-Economic effects. Prepared by Dome Petroleum Ltd., Esso Resources Canada Limited and Gulf Canada Resources Inc.

Website URL(s):

1. Accessed from GNWT-Department of Environment and Natural Resources Library, Yellowknife N.T.:
<http://207.67.203.75/G92011Staff/OPAC/Index.asp>

Name of Reviewer: Peter Lennie-Misgeld

A.8 Description

Summary:

The environmental impact statement (EIS) was submitted in 1982 to the Environmental Assessment Review Panel in support of the proposed Beaufort Sea - Mackenzie Delta hydrocarbon development. The majority of development proposed was planned for offshore operations in the Beaufort Sea, and the EIS discusses the social and economic impacts of hydrocarbon development in the region.

At the time of the EIS, Dome and the other oil and gas companies generated a significant amount of business activity from 1976 onwards. It is noted that the Tuktoyaktuk business section was rudimentary and had experienced a recent decline pending a decision on the Arctic Gas Pipeline Proposal. Increased economic activity by Dome and other companies resulted in an increase in local businesses as residents became involved in business opportunities.

The EIS also outlines the social and economic impacts associated with oil and gas development in the Beaufort Sea - Mackenzie Delta region.

A.9 Reference

Title of Report, Study or Initiative:

1979/80 Improvement to Tuktoyaktuk Entrance and the Development of a Supplementary Harbour at McKinley Bay.

Location:

Tuktoyaktuk

Type:

Consultant report

Bibliographic Citation(s) Reviewed:

1. 1979/80 Improvement to Tuktoyaktuk Entrance and the Development of a Supplementary Harbour at McKinley Bay. Prepared by ESL Environmental Sciences, Calgary, Alberta. June 1979.

Website URL(s):

1. Accessed from GNWT-Department of Environment and Natural Resources Library, Yellowknife N.T.:
<http://207.67.203.75/G92011Staff/OPAC/Index.asp>

Name of Reviewer: Peter Lennie-Misgeld

A.10 Description

Summary:

This report consists of two parts:

- Part 1- Improvement to Tuktoyaktuk Entrance and the Development of a Supplementary Harbour at McKinley Bay.
- Part 2 – Discussion of Pertinent Dredging Related Environmental Studies recently undertaken in the South Beaufort Sea.

PART 1

This section outlines proposed improvements to improve the capability of the existing harbour at Tuktoyaktuk and to establish a deep draft harbour at McKinley Bay in support of oil and gas drilling operations in the Beaufort Sea. During 1979/80, the harbour at Tuktoyaktuk was the major base for oil and gas operations, with Canadian Marine Drilling establishing its northern operating base out of the harbour. Limitations of harbour became evident shortly after oil and gas operations began with the shallow entrance, preventing overwintering of drilling ships. Supply operations were also affected as ships could not be fully loaded due to the shallow draft of the harbour. During 1979/80, drill ships overwintered in Pauline Cove and at Summers Harbour near Cape Parry and supply operations continued out of Tuktoyaktuk Harbour but with decreased efficiency.

Requests were made to the Federal Government to provide assistance to improve the entrance but requests were denied. It was proposed that a channel 100 metres wide, 18 kilometers long and 6 metres deep be dredged to improve access into Tuktoyaktuk Harbour. This would allow supply ships to operate under full load capability and would also allow drill ships to overwinter in the harbour. In addition, this would provide long-term sustainability to the long-term economic base of the community.

The report also notes that even if dredging operations were conducted to deepen and widen the entrance to the harbour, large icebreakers would still not be able to use the harbour. It also notes that it does not seem feasible to dredge the Tuktoyaktuk entrance channel to greater depths as maintenance requirements would be excessive. To accommodate large ships or icebreakers, a deep draft facility would have to be established near Tuktoyaktuk with McKinley Bay providing the closest proximity to drill sites and deep draft conditions.

The proposed dredging operation was discussed at a Tuktoyaktuk council meeting in June of 1979. The main concern expressed was that the base of operations would be moved to McKinley Bay if the harbour was not dredged and improved.

PART 2

This section reviews reports associated with dredging activities in the South Beaufort Sea and identifies environmental impacts, including:

- In shallow water where ice freezes to the bottom, dredged areas are deeper and can result in thicker ice which causes delayed ice-break up in the spring.
- Large scale deep excavations near shore can cause changes to wave refraction processes which can result in shoreline erosion and/or deposition changes.
- Dredging can cause significant increases in suspended materials, turbidity downstream of the dredge. These effects are most pronounced outside of the sediment laden waters from the Mackenzie River

where plumes of up to 5 km have been observed from suction dredges operation outside of Kugmallit Bay.

- Traffic and sounds associated with dredging activities can disturb whales and also potentially affect harvesting activities in estuaries where dredging may occur.
- Fisheries impacts associated with dredging activities included: loss of food sources, alterations in migratory patterns, loss of habitat and physical presence of artificial islands.
- Benthos and invertebrate communities are destroyed by dredging as bottom sediments are excavated, violently mixed and transported to a spoiling area for deposition.

A.11 Reference

Title of Report, Study or Initiative:

The Impact of Beaufort Sea Exploration Activities on GNWT Programs, Service, Facilities and Staff, the Inuvik Region's Experience with Tuktoyaktuk, 1976-1983

Location:

Inuvik Region

Type:

Presentation to Beaufort Sea Environmental Assessment Review Panel, November 1983

Bibliographic Citation(s) Reviewed:

1. MacEachern, J. 1983. The Impact of Beaufort Sea Exploration Activities on GNWT Programs, Services, Facilities and Staff: the Inuvik region's Experience with Tuktoyaktuk, 1976-1983." GNWT.

Website URL(s):

1. xxx

Name of Reviewer: Nick Lawson

A.12 Description

Summary:

The study reports on the GNWT's observations/actions with Tuktoyaktuk resulting from oil and gas industry activity. Focuses primarily on socio- economic and business issues.

Approaches:

Not a great deal of information directly related to "harbour use" exists. This approach instead focuses on industry activity in general and the larger types of concerns – community wellness, access to granular resources, community planning, etc. It was reported that "The daily process of moving personnel into and out of the Tuktoyaktuk area and supplying the shore bases and offshore activities results in heavy use of both the airport and the harbor by industry and its associated service companies." There are notes that water supply, sewage disposal and solid waste disposal have been "heavily impacted by industry

demands and community growth". Council planning has been hampered by uncertainty with industry long-term plans. Relocation of airport suggested as a means to reduce noise and dust in the community.

A.13 Reference

Title of Report, Study or Initiative:

Brief in Support of the Establishment of the Tuktoyaktuk Harbour Authority

Location:

Tuktoyaktuk

Type:

Consultant report

Bibliographic Citation(s) Reviewed:

1. Brief in Support of the Establishment of the Tuktoyaktuk Harbour Authority, Northern Oil and Gas Action Program (NOGAP), Prepared by David Nairne and Associates Ltd, March 1992.

Website URL(s):

1. Accessed from GNWT-Department of Environment and Natural Resources Library, Yellowknife N.T.: <http://207.67.203.75/G92011Staff/OPAC/Index.asp>

Name of Reviewer: Peter Lennie-Misgeld

A.14 Description

Summary:

The Brief in Support of the Establishment of the Tuktoyaktuk Harbour Authority was funded by NOGAP to assist the Hamlet of Tuktoyaktuk to promote the establishment of a Tuktoyaktuk Harbour Authority. The Hamlet had identified control of the harbour as a priority in the Hamlet's Official Community Plan in 1984, and wanted to secure a role in the management and development of the harbour. The brief provides recommendations that were considered as the Terms of Reference towards drafting the required legislation towards the establishment of the Tuktoyaktuk Harbour Authority. The report considered the following issues:

- Proposed Harbour Authority objectives
- Rationale for establishment
- Fed and Territorial legislative considerations
- Required authority and mandate
- Organizational structure of the proposed Harbour Authority
- Outline of administrative responsibilities and functions

- Highlight of financial considerations with a framework Business plan with Revenues and Tariffs
- Outline of operations considerations

The report notes that three other reports served as the basis for preparation of the Brief:

- *Tuktoyaktuk Community Plan*, June 1984, Prepared in association with the Hamlet Council, GNWT with the assistance of Ferguson, Simek, Clark Ltd., and Karl Stevens and associates.
- *Feasibility Study to Resolve the Tuktoyaktuk and McKinley Bay Harbour Authority Issue*, April 1988, prepared by Canada Research Institute and Sypher: Mueller International Inc. for the Hamlet of Tuktoyaktuk.
- *Hamlet of Tuktoyaktuk Harbour Authority Study*, September 1991, prepared by David Nairne and Associates Ltd and Sypher: Mueller International Inc. for the Hamlet of Tuktoyaktuk.

The *Hamlet of Tuktoyaktuk Harbour Authority Study* outlined the following stakeholder issues and concerns:

Community Concerns

- ship traffic through the ice after freeze-up
- snowmobile access through the harbour ice roads
- shoreline access for traditional pursuits
- water quality
- fish habitat
- lack of a harbour inspection and monitoring program
- lack of a conflict resolution mechanism

Commercial/Industry Concerns

- operations require an unrestricted shipping season
- do not support the establishment of another regulatory level
- do not support paying fees without receiving a service
- do support bringing economic benefits to the community
- insist on giving top priority to resolving community concerns

GNWT Concerns

- Focus on providing coordination and facilities for the local community
- Support for coordinated development and management of the harbour

Federal Government Concerns

- Noted that inspections, monitoring and enforcement or existing mandates are inadequate
- An uncoordinated approach amongst government agencies having jurisdiction and activities with the harbour
- Limited communication with the community

Other concerns were noted in the Port Policy for the Canadian Arctic Coast Report and included:

- Water quality concerns relating to harbour operations
- Safety considerations relating to harbour movement conflicts
- Shore erosion and loss of community shorelines from wake and dredging activities
- Shoreland land use conflicts

Approaches/Issues:

Establishment of a harbour authority would provide a formalized process for strong communications between stakeholders and would help to utilize the harbour as a strategic resource for development with the Hamlet. The authority would also form a partnership between the community, industry, government and could be used to access funding and capital investment dollars. The Brief also outlines the jurisdiction, organizational structure and financial considerations for the general Terms of Reference to establish the authority. The Brief recommends that a Board of Directors be established and a Harbour Management Plan be developed. No additional information was found to indicate if any additional work to establish the authority was completed.

A.15 Reference

Title of Report, Study or Initiative:

Arctic Industrial Activities Compilation, Volume 1: Beaufort Sea: Marine Dredging Operations 1959-1982

Location:

Beaufort Sea

Type:

Study, DFO

Bibliographic Citation(s) Reviewed:

1. Taylor, D.A., M.G. Read, B.D. Smiley, and G.S. Floyd. 1985. "Arctic Industrial Activities Compilation Volume 1, Beaufort Sea; marine Dredging Activities 1959 to 1982. Canadian Data Report of Hydrography and Ocean Sciences No: 32. Department of Fisheries and Oceans

Website URL(s):

1. xxx

Name of Reviewer: Nick Lawson

A.16 Description

Summary:

- Notes up until 1978/9 Dome/Canmar overwintered their drill ships at temporary anchorages at Pauline Cover (Herschel) and Wise Bay (Parry Peninsula)

- Dredging occurred in 1979, 1981 and 1982 at McKinley Bay to dredge access channel and vessel mooring basin
- In 1980 , 350,000 m3 of substrate dredged by dome/Canmar from approach channel at Tuk Harbour
- In 1981 and 1982 Esso dredged over 250,000 m3 of material in Tuk Harbour for a land reclamation project
- In 1969 PWGSC Started a maintenance dredging project in Tuk Harbour for navigational safety
- In 1979, the GNWT used 80,000 m3 of material for landfill purposes. In 1981, 750,000m3 of dredged material was used to construct the community reservoir
- In 1981, ATL Dredged 250,000m3 of material for dock construction and fill operations in the harbor
- At present, Tuk Harbour serves as the primary support and services centre for offshore exploration in the Beaufort region, McKinley bay serves as a winter anchorage and forward supply point for early and late season drilling activities
- Annual dredging will also be necessary to maintain safe navigable waters in McKinley bay and Tuk Harbour

A.17 Reference

Title of Report, Study or Initiative:

Start Your Engines Transportation Show, Hay River, September 2008. Summary of Discussion: Tuk port pushed at transport show.

Location: (e.g., Tuk or specify where in surrounding area).

Tuktoyaktuk and the Mackenzie River

Type:

Newspaper article.

Bibliographic Citation(s) Reviewed:

1. Dehcho Blog. <http://www.dehcho.com/blog/?p=65>. Guy Quenneville, Northern News Services. Tuk port pushed at transport show. September 15, 2009. Accessed July 27, 2009.

Website URL(s):

1. <http://www.dehcho.com/blog/?p=65>

Name of Reviewer: Leslie Green

A.18 Description

Summary:

This is an article about the bi-annual Start Your Engines Transportation Logistics Show, held in Hay River September 2008. Jim Guthrie, general manager of Kulluk Arctic Services identified that Tuktoyaktuk Harbour is being left out of the infrastructure discussions and funding that the GNWT are promoting.

Without funding the port for improvements, the community of Tuktoyaktuk and NTCL will not realize benefits when offshore drilling occurs. One concern is that companies will build their own ships because Tuktoyaktuk Harbour is too shallow to accommodate large icebreaking ships.

Approaches/Issues:

Issues:

- Tuktoyaktuk Harbour is the weak link in the transportation chain from the south to the Beaufort Sea. It is too shallow to accommodate large ships. Development (dredging) is needed to make the harbour viable.
- Concern that NWT companies will not reap benefits if oil and gas industry builds their own ships to bring supplies to offshore locations.
- GNWT does not have the funding for Tuktoyaktuk Harbour. Will need federal support.

Relevance:

Direct discussions of the Tuktoyaktuk Harbour: identification of limitations, physical and financial, and concerns people have if Tuktoyaktuk Harbour is not further developed.

A.19 Reference

Title of Report, Study or Initiative:

Environmental Assessment for the Mackenzie Gas Project - Public Hearing Phase held by the Joint Review Panel.

Location:

Tuktoyaktuk

Type:

Hamlet of Tuktoyaktuk: Written Submissions to and transcripts of the Joint Review Panel for the Environmental Impact Assessment of the Mackenzie Gas Project.

Bibliographic Citation(s) Reviewed:

1. Hamlet of Tuktoyaktuk. 2006. Submission of the Hamlet Council to the Joint Panel Examining the Mackenzie Gas Project, Tuktoyaktuk, NT, September 11, 2006. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/Upload/Interveners/Tuktoyaktuk%20-%20Hamlet%20of/060825_Ham_of_Tuk_wrsub_Sept15_CH.pdf.
2. Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 53 Hearing Held at Kitti Hall, Tuktoyaktuk, NT September 11, 2006. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html
3. Hamlet of Tuktoyaktuk. 2007. Submission to the Joint Review Panel, June 20, 2007. Retrieved August 11 2009 from: http://www.ngps.nt.ca/Upload/Interveners/Tuktoyaktuk%20-%20Hamlet%20of/070612_Tuk%20Hamlet%20Submission%20Comm%20Hearing.pdf.
4. Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 98 Hearing Held at Kitti Hall, Tuktoyaktuk, NT June 20, 2007. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html

Website URL(s):

1. http://www.ngps.nt.ca/Upload/Intervenors/Tuktoyaktuk%20-%20Hamlet%20of/060825_Ham_of_Tuk_wrsub_Sept15_CH.pdf
2. http://www.ngps.nt.ca/transcripts_e.html
3. http://www.ngps.nt.ca/Upload/Intervenors/Tuktoyaktuk%20-%20Hamlet%20of/070612_Tuk%20Hamlet%20Submission%20Comm%20Hearing.pdf.
4. http://www.ngps.nt.ca/transcripts_e.html

Name of Reviewer: Leslie Green

A.20 Description

Summary: *(one paragraph max. describing what the initiative is and relevance to Tuktoyaktuk Harbour).*

At the time of this review (August 2009), the Joint Review Panel for the Mackenzie Gas Project had not completed its final recommendations. The information presented consists of concerns and recommendations identified during the public hearing phase.

These documents present the Hamlet's vision for the use of Tuktoyaktuk Harbour and concerns related to industrial development.

- The development of Tuktoyaktuk Harbour is a vision of the community and linked to the development of an all-weather access road to Tuktoyaktuk.
- Harbour development will bring impacts on the community. Industry must be responsible for these impacts, e.g., issues related to in-migration, use of community infrastructure.

Hamlet Vision: To promote an all-weather road to Tuktoyaktuk that would, in turn, see the Tuktoyaktuk Harbour become a full service, deep-water port that would provide increased access into and out of the NWT.

Approaches:

In general, the Hamlet supports the Mackenzie Gas Project. Recommendations and issues relevant to Tuktoyaktuk Harbour

Concerns:

- Health and social services impacts identified as a result of increased labour income, travel to work sites away from home, family stresses and in-migration to community. The Hamlet is not confident that the GNWT can address additional requirements in Tuktoyaktuk. The health centre is already experiencing shortened hours of operation.
- Hamlet budget continually reduced affecting council's ability to address concerns related to development.
- Industry must address the social and community infrastructure impacts arising from its operation, e.g., in-migration, need for day care, increased demand on recreational facilities (for both recreational activities and for meetings that would be held to discuss development proposals). Industry must help to resolve issues to which they contribute.

- Industry must provide long-distance learning opportunities at camps, so young people who have not completed schooling can keep up with their schooling.
- Industry must use community infrastructure (e.g., airport) rather than building its own infrastructure.

Relevance:

This submission identifies the vision for the community which includes Tuktoyaktuk Harbour as well as concerns about how oil and gas development affects the community.

A.21 Reference

Title of Report, Study or Initiative:

Environmental Assessment for the Mackenzie Gas Project - Public Hearing Phase held by the Joint Review Panel.

Location:

Tuktoyaktuk, Parsons Lake, Niglintgak, Taglu, the Kittigazuit S bends and the waters surrounding Tuktoyaktuk.

Type:

Proponent's (IVORL [Imperial], ConocoPhillips, Shell) Project Plans: Written Submissions to and transcripts of the Joint Review Panel for the Environmental Impact Assessment of the Mackenzie Gas Project.

Bibliographic Citation(s) Reviewed:

1. IOVRL. 2006. Mackenzie Gas Project Presentation by IOVR – Topic 5: Marine Environment, Marine Habitat and Marine Mammals and Birds, Tuktoyaktuk, September 13 and 14, 2006. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/Upload/Proponent/Imperial%20Oil%20Resources%20Ventures%20Limited/2006_08_24_IORVL_Presentation_Topic_5_Marine_Environment_Sep13-14_06.pdf
2. Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 53 Hearing Held at Kitti Hall, Tuktoyaktuk, NT September 11, 2006. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html
3. Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 54 Hearing Held at Kitti Hall, Tuktoyaktuk, NT September 13, 2006. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html

Website URL(s):

1. http://www.ngps.nt.ca/Upload/Proponent/Imperial%20Oil%20Resources%20Ventures%20Limited/2006_08_24_IORVL_Presentation_Topic_5_Marine_Environment_Sep13-14_06.pdf
2. http://www.ngps.nt.ca/transcripts_e.html
3. http://www.ngps.nt.ca/transcripts_e.html

Name of Reviewer: Leslie Green

A.22 Description

Summary: *(one paragraph max. describing what the initiative is and relevance to Tuktoyaktuk Harbour).*

At the time this review (August 2009), the Joint Review Panel for the Mackenzie Gas Project had not completed its final recommendations. Information presented contains concerns and recommendations identified during the public hearing phase.

These transcripts presents proposed plans related to the Mackenzie Gas Project in the Tuktoyaktuk area, including the use of Tuktoyaktuk Harbour and dredging of the Kittigazuit S bends, the regulations governing the activities, a summary of the potential environmental effects and proposed mitigation measures. A summary of concerns from Tuktoyaktuk Harbour during the project consultation are summarized.

Volume 54 provides greater detail regarding dredging of the Kittigazuit S bends, marine transport routes and technical questioning from government interveners and the Joint Fisheries Management Committee.

Description of the project:

- Marine activities are regulated by: Fisheries Joint Management Committee, Canadian Coast Guard, Transport Canada, Environment Canada and Fisheries and Oceans Canada.
- Niglintgak (Shell): Transport of Shell's gas conditioning facility from offshore to the Niglintgak site will require the dredging of the Kittigazuit S bends, (about 6 km). Staging activity options include the Herschel basin, offshore Tuktoyaktuk or in Tuktoyaktuk Harbour. Alternative routes were investigated and people in Tuktoyaktuk were consulted. Previous dredging was most recently done by Public Works Canada in 1990 and 1991 for the NTCL barge transport to communities. Bathymetry was performed on the S bends in 2004 and 2005. The channel shape did not change much over these two years. Consultation with the community identified a "back door route" which is used to navigate around the S-Bends during bad weather. To reduce dredging, alternative routes were examined (Shallow Bay and Kittigazuit Bay).
- Parsons Lake (ConocoPhillips): Equipment modules to be transported by ship to Tuktoyaktuk Harbour. One alternative for facility module transport to Parsons Lake involves the potential use of ocean barges around Point Barrow Alaska into the Beaufort Sea to a staging area in Tuktoyaktuk, then using a winter road to Parsons Lake. Existing commercial shipping lanes and routing into Tuktoyaktuk Harbour would be used. Depending on the depth of the harbour approach, they will either be taken directly to the harbour using 400 series barges. If the harbour is not deep enough and to avoid dredging Tuktoyaktuk Harbour, an alternative method of transferring the equipment onto smaller river barges and towed into harbour is being considered. Bathymetry would be completed just before transit. Modules would then be taken from Tuktoyaktuk to Parsons Lake by winter road. The community of Tuktoyaktuk would like Conoco to develop the all-weather road as an alternative means to access Parsons Lake and as an alternative to the proposed airstrip. Conoco identifies this as beyond the project's (Parsons Lake) need as well as the great uncertainty with respect to when an Inuvik-Tuktoyaktuk all-weather road would be constructed.
- Taglu (Imperial): For Taglu, three to four equipment modules, set on purpose-built barges, will be delivered to their location one year before start-up. A single heavy-lift vessel will transport the modules to a staging site at either Herschel Island or offshore from Tuktoyaktuk where there is sufficient water depth. The modules, on purpose-built barges, will be floated off the HLV and individually transported to Taglu using a wet-tow system via the East Channel route using East, Middle and Harry Channels.

- Potential effects: Introduction of foreign biota (ballast water); aesthetics; changes in water quality due to potential oil spills; dredging could displace fish, marine mammals and birds; sensory disturbance; community barges and harvesting activities could be disrupted.
- Potential mitigation: monitoring for marine mammals during transit; regulatory requirements met regarding bilge water; emergency response plans in place in case of spill; dredging limited to a 6-week window and will occur after beluga harvest; dredging will occur in a previously dredged channel; reduction of dredge volumes through design changes and consultation used to determine dredge spoil locations.

Summary of concerns heard from Tuktoyaktuk during consultation regarding marine shipping activities, dredging and the general project:

- Culture
 - Construction and operations activities should be sensitive to areas of cultural and environmental importance. Sites of cultural, spiritual and traditional importance might be affected.
 - Traditional knowledge needs to be used in planning the project.
 - Project activities could affect traditional culture, including language and harvesting.
 - Workers will need cross-cultural awareness training
- Wildlife, Wildlife Harvesting
 - Wildlife, birds, fish and their habitat must be protected
 - The project should use existing disturbed areas instead of clearing new areas, when possible.
 - Barges and dredging in the Beaufort Sea could harm or displace fish, marine mammals, and birds affecting harvesting. Any dredging activities need to wait until after harvesting is complete.
 - Activities or noise and light from operations might affect marine mammals and birds.
 - An airstrip at Parsons Lake could disturb wildlife and disrupt hunting.
 - Water quality could be degraded as a result of the release to the marine environment of foreign biota from contaminated ballast water of the ocean-going vessels, the discharge of dirty, untreated bilge water or fuel spills from ships.
 - Spills during construction and leaks during operations might affect the water, fish, vegetation, and animals. The quality of country foods as a result of poor waste management, spills, and emissions.
 - Wildlife harvesters should be compensated for impacts from the project.
 - Monitoring should be done before, during, and after construction for the life of the project.
 - Monitors are required and they should be local and knowledgeable.
- Community
 - Noise and light must be minimized as this will affect people (and wildlife).
 - The project may result in a boom-and-bust economic cycle.
 - People from outside the community and region may come to Tuktoyaktuk looking for work. Additional people and increased demand for services as a result of the project activities could disrupt community access to services such as health and social services.
 - Family wellness could be disrupted. Increased disposable income could lead to increased substance abuse and family violence.

- Workers' access to the community and the community's access to workers could cause adverse social impacts. In general, people do not want camp-based workers coming into communities.
- Community Infrastructure
 - Industry might deplete gravel sources available for the community. Gravel is already a scarce resource for the community.
 - Project activities could affect the safety, maintenance and community use of winter roads, airstrips and barge landings.
 - Transportation to and from Tuktoyaktuk should be improved.
- Education, Training, Business
 - Local people will need to be trained and educated for jobs with the project
 - Local people should be employed. Unions might create barriers to employment.
 - Businesses will need to build capacity to qualify for contracts with the project. Local businesses should have priority for certain types of work.
 - The project might result in people leaving community jobs for higher paid jobs with the project. This might increase the demand for labour and increase labour costs.
- Tourism
 - Visitors to coastal parks could be affected by the site of industrial activities in the near shore areas resulting in a negative visitor experience.

Relevance:

These transcripts identify community concerns related to industrial activity in the Tuktoyaktuk area and the limitations of using Tuktoyaktuk Harbour (need for dredging) and how companies are looking for alternatives to dredging the harbour and channels (e.g., using smaller vessels, looking for alternative routes to destinations).consultation for the project.

A.23 Reference

Title of Report, Study or Initiative:

Environmental Assessment for the Mackenzie Gas Project - Public Hearing Phase held by the Joint Review Panel.

Location:

Tuktoyaktuk and waters surrounding Tuktoyaktuk.

Type:

Tuktoyaktuk community members (W. Nasogaluak, F. Wolki, E. Pertschy, M. Ovayuak, V. Teddy, Y. Kisoun-Camsell, R. Lundrigan, R. Gruben, D. Pokiak, R. Pokiak, S. Keevik, M. and R. Gruben, E. Pokiak, J. Pokiak, E. Dillon, L. Dillon, P. Gruben, T. Steen, J. Pokiak, R. Pokiak, H. Masogaluak, E. Cockney): Written Submissions to and transcripts of the Joint Review Panel for the Environmental Impact Assessment of the Mackenzie Gas Project to the MGP Joint Review Panel.

Bibliographic Citation(s) Reviewed:

1. Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 53 Hearing Held at Kitti Hall, Tuktoyaktuk, NT September 11, 2006. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html
2. Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 56 Hearing Held at Kitti Hall, Tuktoyaktuk, NT September 15, 2006. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html
3. Gruben, Roger. 2006. Presentation by Roger Gruben [to the] Joint Review Panel. Tuktoyaktuk, NT, Sept. 15.06. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/Upload/Other%20Hearing%20Participants/2006_09_15_GrubenRoger_Pres_Tuk_CH.pdf
4. Pokiak, Randal Boogie. n.d. JRP Submission Summary. Summary of presentation to the Joint Review Panel for the Mackenzie Gas Project Public Hearings held in Tuktoyaktuk September 15, 2005. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/Upload/Intervenors/Pokiak%20-%20Randal%20-%20citizen/060915_PokiakR_wrsup_sum.pdf.
5. Pokiak, Randal Boogie. n.d. JRP Intervener Submission to the JRP. Summary of presentation to the Joint Review Panel for the Mackenzie Gas Project Public Hearings held in Tuktoyaktuk September 15, 2005. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/Upload/Intervenors/Pokiak%20-%20Randal%20-%20citizen/060906_PokiakR_wrsup_Tuk_Sept15GH.pdf
6. Pokiak, Randall Boogie. 2007. Intervener Recommendations for the JRP for November 2007. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/Upload/Intervenors/Pokiak%20-%20Randal%20-%20citizen/Randal%20Boogie%20Pokiak_Recommendations.pdf.
7. Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 98 Hearing Held at Kitti Hall, Tuktoyaktuk, NT June 20, 2007. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html

Website URL(s):

1. http://www.ngps.nt.ca/transcripts_e.html
2. http://www.ngps.nt.ca/transcripts_e.html
3. http://www.ngps.nt.ca/Upload/Other%20Hearing%20Participants/2006_09_15_GrubenRoger_Pres_Tuk_CH.pdf
4. http://www.ngps.nt.ca/Upload/Intervenors/Pokiak%20-%20Randal%20-%20citizen/060915_PokiakR_wrsup_sum.pdf.
5. http://www.ngps.nt.ca/Upload/Intervenors/Pokiak%20-%20Randal%20-%20citizen/060906_PokiakR_wrsup_Tuk_Sept15GH.pdf
6. http://www.ngps.nt.ca/Upload/Intervenors/Pokiak%20-%20Randal%20-%20citizen/Randal%20Boogie%20Pokiak_Recommendations.pdf.
7. http://www.ngps.nt.ca/transcripts_e.html

Name of Reviewer: Leslie Green

A.24 Description

Summary:

At the time of this review (August 2009), the Joint Review Panel for the Mackenzie Gas Project had not completed its final recommendations. The information presented consists of the concerns and recommendations identified during the public hearing phase.

These transcripts and written submissions present the issues and concern from community residents regarding the Mackenzie Gas Project

Approaches/Issues:

Summary of issues:

- Any development that occurs should improve the lives of the Inuvialuit. Businesses must be given the opportunity to work and the proponents must assist businesses to become qualified.
- People of Tuktoyaktuk must benefit from development that occurs related to oil and gas. Oil and gas companies and governments will gain substantial revenue and Tuktoyaktuk should benefit as well. This is because people from Tuktoyaktuk will feel the effects of the development more than other communities (e.g., because of the use of the harbour, anchor fields are near the community, marine transit in areas where the community harvests).
- The prime contractor must be instructed to use small, local businesses. Targets should be set and annual reports developed to detail how these targets were achieved and to provide recommendations for improvement. Some of the camps should be built locally. All listed Inuvialuit businesses are not being contacted when industry works in the Inuvialuit Settlement Region.
- Need to have firm numbers of job requirements and training needs. People in the Inuvialuit Settlement Region must be trained for jobs well in advance of the project. On-the-job training might be necessary, even though it might cost more. Youth must be provided jobs. Current training initiatives are inadequate. Annual reports of industry achievements with respect to training and jobs should be required.
- Shift work and subsistence hunting are not complementary. Although people do not mind shift work and work rotations (2 and 2, 3 and 1), during some seasons (e.g., spring) set work rotations do not allow for enough time off for traditional pursuits. This needs to be worked out between companies and the community.
- Do not know the impacts of dredging. Need to have more studies before dredging occurs and need to use traditional knowledge when determining baseline and effects.
- Previous development changed wildlife patterns and people now have to go farther to hunt. Companies cannot compensate harvesters for the long-term loss of wildlife.
- Want to know the details of any compensation package (for Aboriginal groups and individual citizens) should a disaster occur. Compensation needs to address loss of opportunity for revenue, as well as loss of food on the table. Costs associated with needing to go farther to harvest, increase in gas prices should be considered. A suggestion of a royalty for harvesters was made.
- Concern over length of time development would occur and that it might not fit in with how people traditionally use the land. Industry does not give enough time for people to respond to projects, meaning a short notice period. More time needed.
- If the Parsons Lake development goes forward, then Tuktoyaktuk will be the centre for development. This will result in noise, activities and people will have to go even further for hunting.
- Concern that global warming will affect the project.

- Concern that work camps near Tuktoyaktuk and in the Inuvialuit Settlement Region will affect the community.
- Industrial use of gravel will take the resource away from community needs. Need to look at how all the gravel will be hauled over winter roads in a short time period.
- Industrial development will result in year-round activities (e.g., aircraft, boats) as opposed to the limited seasonal activities that currently occurring. This would affect people and wildlife.
- Need to use existing disturbed areas as much as possible. Need to use existing infrastructure (e.g., existing work camp in Tuktoyaktuk, Tuktoyaktuk airport [rather than a new one at Parsons Lake] and need to construct new infrastructure to service communities and development (i.e., build the Tuktoyaktuk-Inuvik All Weather Road).
- There will be social impacts on the community and additional needs for social workers, educational facilities, and so forth. Industry should contribute to the physical and monetary resources needed to keep on top of these needs.
- Cross cultural training is needed for workers coming from the south, industry employees (including management) and government.
- The Inuvialuit harvesters depend on marine life found in the oceans. Prior to any approval, fully equipped emergency response depots are needed along the Beaufort coastline.
- A cumulative effects monitoring system is needed.

Relevance:

Identifies community concern related to development.

A.25 Reference

Title of Report, Study or Initiative:

Environmental Assessment for the Mackenzie Gas Project - Public Hearing Phase held by the Joint Review Panel.

Location:

Marine waters surrounding Tuktoyaktuk.

Type:

Fisheries and Oceans Canada (Marine Mammals): Written Submission to and transcripts of the Joint Review Panel for the Environmental Impact Assessment of the Mackenzie Gas Project.

Bibliographic Citation(s) Reviewed:

1. Fisheries and Oceans Canada. 2006. Presentation: MGP Marine Environment, Marine Habitat and Marine Mammals, JRP Technical Hearing, September 13-14, 2006, Tuktoyaktuk, NT. Retrieved August 12 from: [http://www.ngps.nt.ca/Upload/Intervenors/Fisheries%20and%20Oceans%20Canada%20\(DFO\)/DFO_Marine_mammals_and_dredging_Presentation.pdf](http://www.ngps.nt.ca/Upload/Intervenors/Fisheries%20and%20Oceans%20Canada%20(DFO)/DFO_Marine_mammals_and_dredging_Presentation.pdf).
2. Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 55 Hearing Held at Kitti Hall, Tuktoyaktuk, NT September 14, 2006. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html

Website URL(s):

1. [http://www.ngps.nt.ca/Upload/Interveners/Fisheries%20and%20Oceans%20Canada%20\(DFO\)/DFO_Marine_mammals_and_dredging_Presentation.pdf](http://www.ngps.nt.ca/Upload/Interveners/Fisheries%20and%20Oceans%20Canada%20(DFO)/DFO_Marine_mammals_and_dredging_Presentation.pdf)
2. http://www.ngps.nt.ca/transcripts_e.html

Name of Reviewer: Leslie Green

A.26 Description

Summary:

At the time this review (August 2009), the Joint Review Panel for the Mackenzie Gas Project had not completed its final recommendations. The information presented consists of the concerns and recommendations identified during the public hearing phase.

This description provides a summary of the marine mammal component presented by DFO.

DFO confirmed that in addition to Environment Canada Disposal at Sea permits, *Fisheries Act* authorizations would be needed for dredging. DFO also indicated that advanced aerial survey for marine mammals should be undertaken before industrial activity takes place.

Approaches/Issues:

Concerns:

- Need information on timing of activities, ship routes and underwater noise associated with project activities.
- Vessel encounters with Bowhead whales is possible if vessels transit through feeding areas.
- There is potential for accidental spills.
- There is possibility of ship strikes with marine mammals if proper mitigation is not implemented.
- Need greater information on temporal overlap of beluga whales with project activities (e.g., dredging, barge transport).

Recommendations:

- Monitoring:
 - sediments along the gas conditioning route
 - water quality in Kittigazuit Bay during dredging
 - marine mammals with an observer program (including advanced aerial surveys) agreed by DFO and co-management organizations and use local people
 - monitoring at all dredge sites
- Proponents need to provide additional detail on dredge volumes, dredge disposal, methods.
- Twenty-year beluga harvest data needs to be presented.
- Dredging should occur quickly, i.e., over one season rather than two seasons.
- Dredging should occur after beluga harvest is completed, and beluga harvest is not always complete by August 15.

- Community notification prior to vessel transit and clear means of communication should be established.
- The possibility of winter dredging should be explored.
- Existing community supply routes should be followed.

Relevance:

Provides issues associated with and recommendations related to marine shipping and channel maintenance.

A.27 Reference

Title of Report, Study or Initiative:

Environmental Assessment for the Mackenzie Gas Project - Public Hearing Phase held by the Joint Review Panel.

Location:

Marine waters surrounding Tuktoyaktuk.

Type:

Environment Canada (Disposal at Sea): Written Submissions to and transcripts of the Joint Review Panel for the Environmental Impact Assessment of the Mackenzie Gas Project

Bibliographic Citation(s) Reviewed:

1. Environment Canada. 2006. Presentation - Topic 5: Disposal at Sea. Environment Canada's Submission to MGP Marine Environment, Marine Habitat and Marine Mammals, JRP Technical Hearing, September 13-14, 2006, Tuktoyaktuk, NT. Retrieved August 12 from: http://www.ngps.nt.ca/Upload/Intervenors/Environment%20Canada/Environment_Canada_Presentation-Topic_5_Disposal_at_Sea_Tuk_Sept13-14.pdf
2. Environment Canada. 2006. Written Submission - Disposal at Sea: Mackenzie Gas Project Environmental Assessment Review Written Submission. Joint Review Panel Technical Hearing, Theme 2: Physical Environment – Land, Water and Air. Topic 5: Marine Environment, Marine Habitat and Marine Mammals and Birds (September 13-15, 2006). August 24, 2006. Retrieved August 12, 2009 from: http://www.ngps.nt.ca/Upload/Intervenors/Environment%20Canada/Environment_Canada_Submission_Topical_5-Ocean_Disposal_Tuk_Sept13-14.pdf
3. Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 55 Hearing Held at Kitti Hall, Tuktoyaktuk, NT September 14, 2006. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html

Website URL(s):

1. [http://www.ngps.nt.ca/Upload/Intervenors/Fisheries%20and%20Oceans%20Canada%20\(DFO\)/DFO_Marine_mammals_and_dredging_Presentation.pdf](http://www.ngps.nt.ca/Upload/Intervenors/Fisheries%20and%20Oceans%20Canada%20(DFO)/DFO_Marine_mammals_and_dredging_Presentation.pdf)
2. http://www.ngps.nt.ca/Upload/Intervenors/Environment%20Canada/Environment_Canada_Submission_Topical_5-Ocean_Disposal_Tuk_Sept13-14.pdf

3. http://www.ngps.nt.ca/transcripts_e.html

Name of Reviewer: Leslie Green

A.28 Description

Summary:

At the time of this review (August 2009), the Joint Review Panel for the Mackenzie Gas Project had not completed its final recommendations. The information presented consists of the concerns and recommendations identified during the public hearing phase.

These documents provide a summary of the disposal at sea component presented by Environment Canada.

- **Regulatory Requirements:** Disposal of waste and other matter at sea in Canada is regulated by Environment Canada pursuant to the *Canadian Environmental Protection Act, 1999*, known as CEPA under Part 7, Division 3 and its regulations as possible: *Disposal at Sea Regulations, Regulations Respecting Applications for Permits for Disposal at Sea*.
- **Information Requirements:** Will include such things as: final disposal location, including information such as bathymetry, sediment transport, salinity, current flows, sediment sampling plans and chemical analyses for both the dredge location and disposal site, and method of disposal and equipment to be used.
- **Potential Mitigation Measures:** Could include: timing restrictions to protect marine resources at sensitive periods; use of certain equipment or methods to reduce impacts, for example, silt curtains; avoiding locating a disposal site on or near sensitive areas.
- **Monitoring:** Follow-up monitoring will be required to confirm the assumptions made at the time of permit issuance.

Approaches/Issues:

- **Conclusions:** Environment Canada concluded (although detailed information supporting a disposal at sea proposal was still required), based on that potential adverse environmental impacts from disposal of dredge sediments should be minimal as long as the proponent follows the regulatory approval process, complies with CEPA Part 7, and all its disposal at sea regulations; and if a permit is granted, complies with the terms and conditions of the permit and implements the required mitigation measures.

Relevance:

Provides a regulatory summary of Disposal at Sea permits, which are associated with dredging in a marine environment.

A.29 Reference

Title of Report, Study or Initiative:

Environmental Assessment for the Mackenzie Gas Project - Public Hearing Phase held by the Joint Review Panel.

Location:

Marine waters surrounding Tuktoyaktuk.

Type:

Environment Canada (Marine Mammals and Birds): Written Submission to and transcripts of the Joint Review Panel for the Environmental Impact Assessment of the Mackenzie Gas Project.

Bibliographic Citation(s) Reviewed:

1. Environment Canada. 2006. Presentation - Topic 5: Marine Mammals and Birds. Environment Canada's Presentation to MGP Marine Environment, Marine Habitat and Marine Mammals, JRP Technical Hearing, September 13-14, 2006, Tuktoyaktuk, NT. Retrieved August 12 from: http://www.ngps.nt.ca/Upload/Intervenors/Environment%20Canada/Environment_Canada_Presentation-Topic_5_Polar_Bears_Marine_Birds_Tuk_Sept13-14.pdf
2. Environment Canada. 2006. Polar Bears and Marine Birds Written Submission - Mackenzie Gas Project Environmental Assessment Review Written Submission. Joint Review Panel Technical Hearing, Theme 2: Physical Environment – Land, Water and Air. Topic 5: Marine Environment, Marine Habitat and Marine Mammals and Birds (September 13-15, 2006). August 24, 2006. Retrieved August 12, 2009 from: http://www.ngps.nt.ca/Upload/Intervenors/Environment%20Canada/Environment_Canada_Presentation-Topic_5_Polar_Bears_Marine_Birds_Tuk_Sept13-14.pdf
3. Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 55 Hearing Held at Kitti Hall, Tuktoyaktuk, NT September 14, 2006. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html

Website URL(s):

1. http://www.ngps.nt.ca/Upload/Intervenors/Environment%20Canada/Environment_Canada_Presentation-Topic_5_Polar_Bears_Marine_Birds_Tuk_Sept13-14.pdf
2. http://www.ngps.nt.ca/Upload/Intervenors/Environment%20Canada/Environment_Canada_Presentation-Topic_5_Polar_Bears_Marine_Birds_Tuk_Sept13-14.pdf
3. http://www.ngps.nt.ca/transcripts_e.html

Name of Reviewer: Leslie Green

A.30 Description

Summary:

At the time of this review (August 2009), the Joint Review Panel for the Mackenzie Gas Project had not completed its final recommendations. The information presented consists of the concerns and recommendations identified during the public hearing phase.

This description provides a summary of the Marine Mammal and Birds component presented by Environment Canada.

- Regulatory:
 - EC is the lead agency for protection of the environment in the national interest. Wildlife, particularly highly-mobile migratory birds and wide-ranging polar bears, must be managed on

multiple scales. Local and regional conservation issues and initiatives must be considered within both national and international contexts. Marine Birds are protected and managed through the *Migratory Birds Convention*, *Migratory Birds Convention Act (1994)*, *Migratory Birds Regulations* and *Migratory Bird Sanctuary Regulations*. International Polar Bear research and management is guided by the international *Agreement on the Conservation of Polar Bears and Their Habitat*. Canada is a signatory to this agreement.

- Concerns:
 - Induced development will have greater impacts than specific developments on their own and governments, industry and the Inuvialuit should prepare for it.
 - Polar bears live throughout the ice-covered waters of the circumpolar Arctic. In addition, there are key offshore marine bird habitat areas in the Beaufort Sea. Open water areas in the southeastern Beaufort Sea are critically important to birds during spring migration.
- Potential effects:
 - Increased risk of human-bear conflict.
 - Disturbance to maternity dens.
 - Disturbance of key polar bear feeding areas.
 - Increased risk of hydrocarbon spills affecting birds and marine mammals.
 - Loss of key offshore and coastal habitat due to development activity within in them.
 - Disturbance due to human activity (dredging, port development, creation of staging areas) could impact nesting, moulting and fall staging birds.
 - Risk of introduction of aquatic alien species.
 - Potential adverse effects on Inuvialuit hunting.

Approaches/Issues:

- Recommendations:
 - Protection of key polar bear and bird habitat required. Mitigation measures to reduce potential impact on polar bears must be identified and implemented. Must include avoidance of human-bear encounters and identification of material dens and their avoidance. Monitoring must also take place.
 - Polar bear and marine birds must have special consideration in the Marine Spill and Response Plan.
 - Must proactively manage potential impacts of induced development, including:
 - protection of key marine and coastal habitat used by polar bears (denning and key feeding areas) and marine birds (critical feeding, nesting, and moulting areas);
 - adequate measures to prevent hydrocarbon spills in key areas used by polar bears and concentrations of birds;
 - adequate measures to prevent the introduction of aquatic invasive alien species;
 - monitoring and ongoing assessment of the effects of development activities on polar bears and marine birds; and
 - consideration of the interactions of development activities with other factors such as Inuvialuit hunting and long-term climate change.

Relevance:

Provides a summary of Environment Canada regulatory responsibilities, concerns related to potential industrial activity and potential effects on marine mammals and birds in the Beaufort Sea. Specifically looks at induced development and their potential impacts.

A.31 Reference

Title of Report, Study or Initiative:

Environmental Assessment for the Mackenzie Gas Project - Public Hearing Phase held by the Joint Review Panel.

Location:

Tuktoyaktuk and surrounding waters.

Type:

Tuktoyaktuk Community Corporation: Written Submission to and transcripts of the Joint Review Panel for the Environmental Impact Assessment of the Mackenzie Gas Project.

Bibliographic Citation(s) Reviewed:

1. Tuktoyaktuk Community Corporation. 2006 Summary of the Views and Concern of Tuktoyaktuk: A Submission Prepared by the Tuktoyaktuk Community Corporation to the Joint Panel Examining the Mackenzie Gas Project, September 11, 2006. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/Upload/Other%20Hearing%20Participants/2006_08_28_Tuktoyaktuk%20CC%20JRP%20Submission.pdf
2. Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 56 Hearing Held at Kitti Hall, Tuktoyaktuk, NT September 15, 2006. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html

Website URL(s):

1. http://www.ngps.nt.ca/Upload/Other%20Hearing%20Participants/2006_08_28_Tuktoyaktuk%20CC%20JRP%20Submission.pdf
2. http://www.ngps.nt.ca/transcripts_e.html

Name of Reviewer: Leslie Green

A.32 Description

Summary:

At the time of this review (August 2009), the Joint Review Panel for the Mackenzie Gas Project had not completed its final recommendations. The information presented consists of the concerns and recommendations identified during the public hearing phase.

The Tuktoyaktuk Community Corporation attended consultations associated with the MGP and decided to present Tuktoyaktuk-specific views on the MGP. Tuktoyaktuk has considerable experience with oil and

gas and believes that the community will bear greater impact from development than other communities in the Inuvialuit Settlement Region. The people from Tuktoyaktuk

Approaches/Issues:

A summary of the issues and concerns presented:

- General Views
 - Communication between proponent and the community is essential. An effective method of communicating specific project details is needed.
 - Concerns raised and suggestions made by residents are not incorporated into project plans. Proponents need to seriously address concerns that are raised.
- The Environment and Wildlife
 - Airstrip at Parsons Lake: Concern that development cuts across caribou migration plans and that noise will add stress to wildlife and local residents.
 - Dredging: People understand that to benefit from development, dredging of the channel would be required. People have noticed changes in fish habitat in Tuktoyaktuk Channel. Biologists must rely more on the traditional knowledge available from hunters and fishers and need to work with people of Tuktoyaktuk to better understand what changes are underway among the fish and fish habitat and what is being caused by actions such as dredging of the channel.
 - Debris from Past and Future Projects: Industry must be responsible to clean up their waste. The development around Tuktoyaktuk Harbour in the past 30 years is still visible from the roads. To address past problems, a fund must be established to clean up shorelines and beaches.
- Education
 - People want to go beyond their traditional role of supplying manual labour.
 - Student Awareness: Young people need to be shown that there is a career in the oil and gas sector and other related industries.
 - Improved Education: Industry must support improved education in the community.
 - Scholarships: Industry must develop a scholarship fund.
 - Vocational Training: Industry must support targeted vocational education and training in the trades in the community.
- Mental and Physical Health
 - Cultural Awareness Programs: Need to be provided to people coming from the south.
 - Recreation: People from camps will make their way into the community and these interactions need to be made as positive as possible. Industry must assist in improving the existing recreational facilities.
- Developing the Local Economy
 - Economic Plan: Need a precise plan of how people from Tuktoyaktuk will benefit from the project.
 - Long-Term Economic Vision: Tuktoyaktuk looks beyond one project. Industry must respect Tuktoyaktuk's long-term vision.
 - Opportunity for Local Contractors: Local people must benefit economically from development.

- Corporate Presence in Tuktoyaktuk: Businesses must set up a corporate presence in Tuktoyaktuk.
- Inuvik-Tuktoyaktuk All Weather Road: Government and industry must find ways to build this.

Relevance:

Provides a summary of community expectations with respect to development and identifies that, although concerning, dredging of Tuktoyaktuk Harbour is an accepted consequence of long-term economic development.

A.33 Reference

Title of Report, Study or Initiative:

Environmental Assessment for the Mackenzie Gas Project - Public Hearing Phase held by the Joint Review Panel.

Location:

Tuktoyaktuk, Kittigazuit S bends, surrounding waters.

Type:

Shell Canada (dredging plans and potential effects): Written Submissions to and transcripts of the Joint Review Panel for the Environmental Impact Assessment of the Mackenzie Gas Project.

Bibliographic Citation(s) Reviewed:

1. Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 63 Hearing Held at the Midnight Sun Recreation Complex, Inuvik, NT October 26, 2006. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html
2. AMEC Americas Limited. 2007. Kittigazuit S-Bends Fish and Fish Habitat Study: August 22 – 25, 2006. Prepared for Shell Canada Limited, January 2007. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/Upload/Proponent/Shell%20Canada%20Limited/070105_Shell_J-U-141_Attach_Kittigazuit_S-BendsFish.pdf.
3. IOVRL. 2006. Response to JRP Intervener Request for Information Round 5, IR 5.04: Kittigazuit Dredging Information. Prepared by Shell Canada Limited. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/Upload/Proponent/Imperial%20Oil%20Resources%20Ventures%20Limited/060901_IORVL_resp_EC_R5_IRs_resp.pdf

Website URL(s):

1. http://www.ngps.nt.ca/transcripts_e.html
2. http://www.ngps.nt.ca/Upload/Proponent/Shell%20Canada%20Limited/070105_Shell_J-U-141_Attach_Kittigazuit_S-BendsFish.pdf
3. http://www.ngps.nt.ca/Upload/Proponent/Imperial%20Oil%20Resources%20Ventures%20Limited/060901_IORVL_resp_EC_R5_IRs_resp.pdf.

Name of Reviewer: Leslie Green

A.34 Description

Summary:

At the time of this review (August 2009), the Joint Review Panel for the Mackenzie Gas Project had not completed its final recommendations. The information presented consists of the concerns and recommendations identified during the public hearing phase.

The transcript and IR responses provide background discussion and detail on the dredging in the Kittigazuit S bends and the potential effects on fish, fish habitat and water quality, including information on consultation, field programs (sediment, water quality and fish), dredging considerations, bathymetric work.

Approaches/Issues:

- **Details:** Final details on dredging in the S bends had not yet been completed. Options for dredge methods and disposal locations as well as information on the Shallow Bay alternative are presented (IOVRL. 2006).
- **Conclusions:** The results of the studies of the fish community (AMEC 2007) generally agree with previous studies in the region in terms of the species present and their relative abundances. Dredging in the S-Bends in late August will miss the major spawning migrations, although some species, such as inconnu and broad whitefish, might be encountered undergoing a transitional migration from summer feeding to overwintering habitats. Based on fish movements reported by local fishers and observations made during this study, most of these fish are expected to traverse Kittigazuit Bay by travelling along its shorelines, and are not expected to be present in significant numbers in the area where dredging is proposed to occur. Resident (non-migratory) species of fish, such as Arctic flounder, northern pike, and spoonhead sculpin, will be present throughout Kittigazuit Bay during the proposed dredging. The results of this study suggest that these species are unlikely to be present in large concentrations within the area of dredging and spoil disposal, and are likely to be more abundant along the margins of Kittigazuit Bay. Effects of dredging on these species are expected to be low.

Relevance:

Information on dredging.

A.35 Reference

Title of Report, Study or Initiative:

Environmental Assessment for the Mackenzie Gas Project - Public Hearing Phase: Hamlet of Tuktoyaktuk, Topic 5: Marine Environment, Marine Habitat and Marine Mammals and Birds.

Location:

Tuktoyaktuk

Type:

IVORL (socio-cultural considerations): Transcripts of the Joint Review Panel for the Environmental Impact Assessment of the Mackenzie Gas Project.

Bibliographic Citation(s) Reviewed:

1. Joint Review Panel for the Mackenzie Gas Project. 2006. Volume 80 AMENDED. Hearing Held at the Midnight Sun Recreational Complex, Inuvik, NT February 12, 2007. Retrieved August 11, 2009 from: http://www.ngps.nt.ca/transcripts_e.html

Website URL(s):

1. http://www.ngps.nt.ca/transcripts_e.html

Name of Reviewer: Leslie Green

A.36 Description

Summary:

At the time of this review (August 2009), the Joint Review Panel for the Mackenzie Gas Project had not completed its final recommendations. The information presented consists of the concerns and recommendations identified during the public hearing phase.

A summary of the socio-cultural component of the MGP EIS is presented. While no specific discussions on Tuktoyaktuk Harbour occur, the experiences of Tuktoyaktuk with respect to oil and gas activity are discussed. The transcripts mainly concern technical aspects of the socio-cultural component of the EIS.

Relevance:

Provides a discussion of background (historical) information on Tuktoyaktuk's experience with oil and gas activities, its relevance to current initiatives and some resulting positive and negative (socio-economic) effects.

Appendix B Interview List

ESRF “Review of Tuktoyaktuk Harbour as a base to Support Offshore Oil and Gas Activity in the Beaufort Sea

INTERVIEW LIST

Name	Affiliation
Evan Birchard	Imperial Oil Resources
Deon Bridge, Emily Borsy, Barry Jacobson, John Fraser	Inuvialuit Lands Administration
Terry Camsell	Independent Marine Consultant
Pietro deBastiani, Jim Stevens	Department of Transportation, GNWT
Wayne Greenall	Former Industry consultant, GNWT and INAC Official
Chucky Gruben, Robert Gruben	Tuktoyaktuk Community Corporation
Lennie Amohok	
Jim Guthrie	Horizon North Logistics
Bob Henderson	ConocoPhillips
Kim Johnson	Shell Canada
Johnny Lennie	Department of Industry, Tourism and Investment, GNWT
George McCormick	Indian and Northern Affairs
Russell Newmark	E. Gruben’s Transport Limited
Debbi Raddi	Hamlet of Tuktoyaktuk
Ben Selligman	Shell Canada
Steve Solomon	Natural Resources Canada
Cody Teff	Shell Exploration and Production
John Vandenberge	Department of Public Works and Services, GNWT
Paul Voudrack	Department of Environment, GNWT, formerly HTA Tuktoyaktuk

Appendix C Workshop Report

C.1 Introduction

A workshop to discuss the increased use of Tuktoyaktuk Harbour as a base for offshore oil and gas exploration and development was held in Tuktoyaktuk on February 10 - 11, 2010.

The purpose of the workshop was to:

- identify and review biophysical, socio-economic and safety issues and concerns raised by the community related to the past, current and future use of Tuktoyaktuk Harbour by the oil and gas industry
- identify and recommend actions that could be taken to begin to address the outstanding issues and concerns identified during the workshop

Representatives of community organizations, the Hamlet, Inuvialuit co-management groups, territorial and federal government departments with regulatory responsibilities and/or interest in the use of the harbour, and industry were invited. A full list of attendees is provided in Attachment C.1.

The workshop was facilitated by KAVIK-Axys. Background presentations which provided an overview of the past uses of the harbour, a summary of the interviews conducted in advance of the workshop and possible scenarios for future oil and gas development in the region were provided. Craig Miller of Transport Canada delivered a presentation about federal legislation governing activities in the harbour. A presentation on coastal erosion prepared by Steve Solomon of Natural Resources Canada was delivered by KAVIK Axys. Attachment C.2 provides the workshop agenda.

Mayor Mervin Gruben and the Tuktoyaktuk Hamlet Council also provided a short background explaining the importance of the use of the harbour to the community of Tuktoyaktuk as well as the importance of developing the harbour. In addition, a presentation that provided initial thoughts for an alternative to substantial dredging of the approach channel which also would still provide benefit to the community was presented by Horizon North and John Waring Dredging Consultant.

The workshop participants remained in one group and identified issues related to the use of Tuktoyaktuk Harbour. As a group, each issue was discussed, concerns about the issue were identified, information was provided on how this issue was, or in some cases was not addressed during the previous exploration activity. Finally, suggestions and recommendations were offered. A record of the discussion was summarized on flip charts.

A public session was also held in Kitti Hall during the evening of February 10. A summary of the presentations was given, and attendees were provided the opportunity to ask questions and voice their opinions. The results of the public session are incorporated into this report.

This report summarizes the issues identified during the workshop and, for each issue, presents:

- background information
- a summary of concerns identified or the discussion that took place
- a list of recommendations (if any were made) that could be taken to begin to address the outstanding issues and concerns
- conclusions and overall recommendations

C.2 Workshop Results

During the Tuktoyaktuk Harbour workshop, seven major issues were identified related to the use of the harbour for oil and gas activities. These are: icebreaking, dredging, community concerns (general), infrastructure, harbour management, climate adaptation and shoreline protection and environmental management.

C.2.1 Icebreaking

C.2.1.1 Background

- During previous exploration activities, there were substantial concerns about the icebreaking and the safety of people crossing the harbour. It was reported that in the past, industry compensated the HTC for the inconvenience related to the icebreaking activities.
- Discussions and cooperation between the HTC and industry recently led to the successful completion of the icebreaking activities in the harbour (2008). It was noted that there was consultation, notice of activity to community and monitoring during the event.
- One reason that icebreaking was allowed to occur in the harbour in 2008 was because NTCL still had to get into the community to deliver goods.

C.2.1.2 Concerns/Discussion

- When icebreaking occurs to allow late season transits of the harbour, there is a risk of people falling into the water and/or having to travel over very rough ice. In addition, people have to avoid the ship tracks and travel farther to go hunting. This is an imposition on people with respect to both time and the costs to travel further.
- Cooperation between industry and HTC has worked in the past on a case-by-case scenario.
- The mitigation measures associated with the recent icebreaking activities in the harbour include:
 - Notification of activity to residents by: house-to-house, daily CBC broadcasts.
 - 24 hour monitoring of harbour during periods of access to ensure people did not unknowingly interact with ship's tracks.
 - Tracks smoothed out at key locations to make travel easier.
- Compensation and insurance coverage for harvesters was discussed.
 - With respect to insurance coverage, industry cannot be negligent, and harvesters need to consider their own safety and be careful when they are travelling.
- Setting a date for harbour activities was discussed:
 - Could a date be set that states: no activity after a certain date?
 - Difficult to do because freeze-up dates change year-to-year.
 - Community could consider industry requests for icebreaking on a case-by-case basis, as has been done in the past.
 - Having industry apply on a case-by-case basis may be daunting to them, as it is likely there will be more companies operating and it is likely every year industry will want to conduct late season operations. Industry needs certainty whether they can use the harbour longer for multiple years.
 - Industry must take into account the community needs to cross the harbour and the extra costs when people have to go the long way around for hunting.

C.2.1.3 Potential Opportunities/Resolution/Recommendations

- Consultation and communication between HTC and industry is instrumental to successful icebreaking activities.
- Could establish a multiple year protocol for icebreaking activities that is acceptable to the community and industry.

C.2.2 Dredging

C.2.2.1 Background

- Dredging of the access channel, near the mouth of the harbour and around docking facilities will be required to secure the long-term use of Tuktoyaktuk Harbour. Dredging would likely not be contemplated within the harbour, but only for the approaches to the harbour. Some maintenance dredging around docks would likely be required (Horizon North) and would likely be clamshell dredging from the dock.
- There is a difference between how dredging occurred in the 1970s and 1980s, and how it occurs now. There are substantial differences in the type of vessels used, how dredging is conducted and ways to manage the effects of dredging.
- Dredging at the docks would require an Authorization by DFO under the Fisheries Act regarding fish and fish habitat. Maintenance dredging thereafter if conducted within 5 years of the initial dredging would not require an Authorization by DFO. Maintenance dredging after five years from the initial dredging would require a DFO Authorization under the Fisheries Act. In 1976, a fish study was done and saw no change in fish outside Tuktoyaktuk Harbour before and after dredging.
- This topic is linked to Climate Adaptation and Shoreline Protection (Section C.2.5).

C.2.2.2 Concerns/Discussion

- A number of environmental and social concerns were raised including effects of dredging on fish, mammals, water quality and how people use the harbour.
- Can dredging affect the rate of erosion? This topic is related to climate change and adaptation.
- The shoreline protection of Tuktoyaktuk Island is a priority for people. Tuktoyaktuk Island provides protection for the inner harbour and if it erodes away or is breached there would be less protection of the harbour during storm surges and normal wave action. Need to consider dredging as an option for protecting land. Tuktoyaktuk Island is Inuvialuit private land.
- The following was noted about the harbour dredging that occurred in the 1980s:
 - herring was affected during and after the dredging activities; the herring have now returned
 - there was not much consultation before this dredging activity
 - dredging can be beneficial to the community (e.g., use of the material to construct the reservoir)
- Sediment contaminates and water quality related to dredging activities was discussed. It was noted that there are new technologies that can treat dredge material before disposal.
- People made the following observations:
 - people know and see the effects of activities that occur in the harbour and the region
 - change in bottom affects herring

- there is a concern that the government does not provide all the information that they collect
- dredging of the channel would affect marine mammals
- Need to determine how much dredging and where it would likely be required. This would affect:
 - size of dredge vessel
 - cost of operations
 - how material would be disposed and where
 - induced effects (such as changes to the bottom leading to other changes)
 - HADD

C.2.2.3 Potential Opportunities/Resolution/Recommendations

- Invite Steve Solomon, NRCan, to Tuktoyaktuk to speak about the erosion issues related to Tuktoyaktuk Island (linked to a recommendation in Section C.2.5 Adaptation to Climate and Shoreline Protection).
- Need to explore the link between dredging and the opportunities to use the dredge material for community use (e.g., protection of Tuktoyaktuk Island, create new lands for building upon). This is linked to Section C.2.5 Adaptation to Climate and Shoreline Protection.
- Educate people on the new dredging technology.
- Educate people on the possible effects of dredging and methods that can be used to mitigate and minimize the effects. People's knowledge of how dredging affect fish and wildlife must be incorporated into this.
- Horizon North (Jim Guthrie) and Dredging Consultant John Waring will compile information on current dredging techniques and provide it to the community.
- DFO will research existing information related to dredging and the effects of dredging.
- Need to record the local knowledge of the previous effects of dredging.

C.2.3 Community Concerns

C.2.3.1 Background

- The community, businesses and individuals must benefit from harbour development. Long-term benefits are necessary.
- During the previous exploration activities, there was communication between industry and the community through various community organizations (e.g., HTC) or committees that were established as a result of the exploration (e.g., community advisory committee).

C.2.3.2 Concerns/Discussion

- The development of the harbour should include a long-lasting, positive legacy.
- A former drilling caisson is still in the harbour and people cannot get owners to remove it. This is an example of a long-lasting legacy that is not positive.
- Industry needs to establish locally-based people at the working and management levels. When an individual responsible for resolving an issue is at a great distance from the problem, it can take a long time to get things resolved. For this reason, industry managers should be based in Tuktoyaktuk.

- A discussion of camps occurred:
 - during previous exploration activities, there were unwanted activities associated with camp personnel. Ideas such as controlling access to the camp, limiting its physical size, as well as the number of people in a camp were discussed
 - issues related to waste and waste management, use of local roads and airstrip are linked to community infrastructure
 - drug and alcohol policies must be implemented in camps
- During previous exploration activities, some things were done right such as:
 - a joint HTC/industry meeting was held every three months to raise and resolve issues
 - a community advisory committee was established. This advisory committee brought up community concerns and how to address them.
- The community will need to understand job availability, training opportunities, and ideally there should be a location in town where people can obtain this information. This was an issue raised during the previous exploration activities, but was never adequately resolved to the community's satisfaction.
- During previous exploration activities, many people from the south came to Tuktoyaktuk. A cultural immersion course for these people would have been helpful and should be established by industry for any future activities.
- During previous activities, industry did not understand the stress that was placed on local workers. Although working a 12-hour day may be acceptable for people who are in a camp and who are away from their family (e.g., southern workers), it is very hard for people in the community. It raises difficulties such as child care, and other family issues such as issues related to children missing their parents. There were no part-time positions available. Greater flexibility with local hires is needed and these issues should be discussed and resolved between the community and industry.
- During previous exploration, people found that youth did not stay in school because they could obtain high paying jobs with industry. Industry did hire students for summer employment, but did not have any part-time positions available. There needs to be company policies that dissuade youth from quitting school to take jobs.
- More services, such as banking, will be needed in the community. During previous activities, a bank was opened but closed when industry left.
- The community wants to benefit from increased usage of the harbour and wants to participate in the decision making process when it comes to development of the harbour.
- Industry needs to be prepared to leave a positive and lasting legacy.

C.2.3.3 Potential Opportunities/Resolution/Recommendations

- A community advisory council is a good vehicle to help address community concerns with industry.
- The HTC must also remain a focus for identifying and resolving issues.
- With respect to hours of work, rotations, child care and so forth, look at other areas with resource development (e.g., Nunavut) and see how industry and communities have resolved this issue.

C.2.4 Harbour Management

C.2.4.1 Background

- Based on interviews and discussions at the workshop, industry and the community believe that some form of harbour management is necessary. Harbour management would allow community members to have some say in how the harbour is used, as well as providing some certainty for industry with respect to the facilities available.
- During the previous exploration activities, each company had a shore captain who would regularly communicate with each other to help maintain safe operating conditions in the harbour. An advisory committee was also established consisting of representatives from Tuktoyaktuk Hamlet, HTC and industry. This committee would meet approximately every three months to address concerns which may have arisen over use of the harbour.

C.2.4.2 Concerns/Discussion

- The management structure chosen should reflect the level of activity expected, and the management structure needs to be flexible. Based on the presentation given by Transport Canada, there is no opportunity for Tuktoyaktuk Harbour to have federal port authority status.
- There is not a lot of comparison between how things happened in the past and how they would happen now. Today, the community has more control over how development occurs.
- Planning for Tuktoyaktuk Harbour should occur in two phases:
 - Stage 1: Planning
 - Needs to involve the HTC, Hamlet, TCC, Industry, ILA, federal and territorial governments
 - Stage 2: Implementation
 - Would involve HTC, Hamlet, TCC, Industry and ILA
- During the 1970s and 1980s, there was an Industry/Community committee (HTC) established that met every three months. This was a successful way to bring industry and the community together, and addressed mainly safety issues.
- Establishing and maintaining channel navigability was discussed. Transport Canada identified that they do not have the responsibility to maintain navigability.
- CCG sets buoys.
- Ships must operate by Transport Canada regulations.
- Speed limits in the harbour can be set by regulation by Transport Canada after consultation.
- When making regulations/rules for Tuktoyaktuk Harbour, people do not want to hamper community use of the harbour or make industry use of the harbour difficult.
- Development of a Harbour Management Plan is premature to consider at this time. The mechanisms for community planning and planning for Inuvialuit lands are well established. The land base that would support harbour activity needs to be incorporated into any land use plans. It is thought that there is enough land available for oil and gas exploration activities; however there would likely need to be further land use considerations for oil and gas development and production activities. The harbour land area must be planned and managed by the Hamlet and ILA. Due to access logistics, Hamlet land should be developed before private land. However, it was noted that the Hamlet currently has no space for additional docks.

- A cooperative harbour management committee or board, which could include industry and community representatives, could be established. The appropriate players would need to be chosen and a funding method would have to be established. This committee could help identify the extent of the harbour operations that the community would want to address/manage, and this could include (not an exhaustive list):
 - assess docking priorities
 - identify mooring locations
 - identify restricted areas
 - navigational aids
 - safety
 - fuel
 - foreign ship requirements (bilge water, garbage, slop oil)
 - people from cruise ships and tourist adventurers travelling in private yachts
 - maintenance process and issues
- There are many regulatory facets to the further development of the harbour, including land (INAC, ILA, Hamlet), infrastructure, transits, harbour sea floor (INAC), waterlots (INAC).
- Marine facilities (permitting, etc.) would be the responsibility of: ILA; INAC; Transport Canada; DFO; and the Hamlet.
- Harbour management considerations must include how the community uses the harbour as well as how industry needs to use it.
- Harbour development and management would have a positive synergy with all weather road development and the development of other non-renewable resources in the region.

C.2.4.3 Potential Opportunities/Resolution/Recommendations

- Conduct a Regulatory Roadmap exercise, which would identify:
 - regulations applicable to harbour use and the responsibility of parties responsible for the regulations
 - determination of whose responsibility it is to maintain navigability into the channel
 - guidelines for setting up a harbour management process for Tuktoyaktuk
- Research models of cooperative harbour management for possible applicability to the management of Tuktoyaktuk Harbour.
- Funding for a locally based individual to conduct the regulatory roadmap exercise and research related to cooperative models of harbour development needs to be established.

C.2.5 Climate Adaptation and Shoreline Protection

C.2.5.1 Background

- This topic is linked to dredging.

C.2.5.2 Concerns/Discussion

- A number of concerns were raised including:
 - will climate change alter ice flow dynamics because of a change in ice cover?
 - will climate change affect/eliminate multi-year ice?
 - will there be a greater fetch as a result of decreased ice, changing the swell, storm surges and wave dynamics?
 - what about the presence of ice (ground ice) and implications for harbour development?
 - what does it mean for long-term harbour development if Tuktoyaktuk Island is breached or disappears?
 - would the shipping season be increased?
- Use of the dredge material for erosion control is an option. There are technologies that should be examined.
- Need to also look at other options for erosion control (options that do not require the use of dredged material).

C.2.5.3 Potential Opportunities/Resolution/Recommendations

- Invite Steve Solomon, NRCan, to Tuktoyaktuk to speak about the erosion issues related to Tuktoyaktuk Island (linked to a recommendation in Section C.2.2 Dredging).

C.2.6 Infrastructure

C.2.6.1 Background

- Increased activity in the harbour will likely result in the use some of the municipal infrastructure (airport, roads, water, power, sewage).
- During the past exploration activities, industry did use hamlet infrastructure and this did put stress on the infrastructure. Some wastes were commingled in the municipal landfill.
- Tuktoyaktuk Hamlet is developing a five and 25 year plan that is attempting to address expanding infrastructure.

C.2.6.2 Concerns/Discussion

- Municipal facilities are at maximum now; currently the Hamlet is pursuing the development of new solid waste facility.
- There will likely be some specific new non-municipal related infrastructure that will be required, such as mechanisms to address ship bilge water and different types of (hazardous) waste. Municipal infrastructure would also need to be developed such as larger schools and larger medical facilities.
- Municipal airport only has CARS; there is currently limited airside space; the ATB is small and industry may need to consider an industry-specific terminal (this has been done in the past).

- There should likely be some industry-specific infrastructure that industry must address on its own (e.g., water, waste) and should be addressed early such as in the exploration phase. Production operations are a long-term activity potentially involving more staff and resources. The existing community infrastructure would likely not be able to handle waste and water requirements during the production phase. The level of activity expected should guide the type of industrial infrastructure required.
- A local service industry would likely support secondary needs such as storage and warehouses.

C.2.6.3 Potential Opportunities/Resolution/Recommendations

- Infrastructure planning should be considered part of community planning initiatives (capital planning and land use planning). Industry will have to address infrastructure requirements during exploration.

C.2.7 Environmental Management

An environmental management plan would be needed for the harbour. This plan could cover a wide range of biophysical as well as land use issues. This section provides a summary of discussions held related to oil spills, environmental/social baseline of the harbour and waste management.

C.2.7.1 Oil Spills

Background

- There is a model for an approach to cooperative management structures (Husky Lake).
- During the previous exploration activities, there was spill response equipment stored locally and local people were trained.
- During the previous activity, a Spill Cooperative was established and it was managed by a private company in Aklavik. There was an agreement between industry and the community on oil spill response but the community did not own the equipment.
- Currently, oil spill equipment is stored at CCG and the spill response capacity is adequate up to only 1000 litres of oil.

Concerns/Discussion

- An oil spill response plan and development of local capacity is required.
- Spill response will need community input.
- Refuelling offshore – who is responsible to manage (Transport Canada) and who monitors it?
- The NEB requires industry to have the appropriate spill response equipment.
- Currently there is an ESRF project which is examining oil spill knowledge in the Arctic. This is to be completed in 2010.

Potential Opportunities/Resolution/Recommendations

- Potential to build local expertise in oil spill clean-up.

C.2.7.2 Environmental/Social Baseline of the Harbour

Background

- The harbour is used for obtaining food (e.g., fish), for camping, and for travel. During the open water season, people travel by boat to coastal camps and for sealing. During winter when the harbour is frozen, the harbour is used as a shortcut to harvesting areas (e.g., caribou).

Concerns/Discussion

- A baseline environmental management plan could be developed. This baseline information could include:
 - fish stock inventory, spawning and creek access locations
 - water and sediment quality
 - location of fish camps and nets
- A results-based management system could be used for the fish and fish habitat.
- Any baseline information must record where and how people use the water and how they travel on the ice and water.
- Old barges should be checked for possible leaks.

Potential Opportunities/Resolution/Recommendations

- Community and ILA planning should include harbour use.
- Information about the environmental status of the harbour should be communicated to the community.
- Environmental monitoring in the harbour should be undertaken.

C.2.7.3 Waste Management

Background

- In some cases during the previous activity in the harbour, local facilities were used. Currently, the local facilities are at their maximum capacity.
- During the previous activity, camps had their own sewage treatment system.
- Some ships overwintered in the harbour. In the spring, sewage was pumped out of the ships and presumably taken to the local sewage lagoon.
- Some solid waste was sent to the local land fill, hazardous wastes were transported south.

Concerns/Discussion

- Because the local facilities are at their maximum, would need to develop a plan on where waste would go. Hazardous waste is a concern.

Potential Opportunities/Resolution/Recommendations

- Examine opportunities for burning slop oil.
- Examine methods address disposal of bilge water.
- Identify lands for waste disposal use.

C.3 Conclusions and Recommendations

The following conclusions and recommendations resulted from the issues raised during the literature review and interviews and discussion at the community workshop. While future oil and gas activity is unknown, these recommendations are presented to benefit future planning exercises for Tuktoyaktuk Harbour and the region.

C.3.1 Community Concerns

Community residents and leaders have identified that they support the use of Tuktoyaktuk Harbour as a base for oil and gas activities and want to benefit from future oil and gas exploration and development activities. It is also thought that harbour development and effective management would have a positive synergy with the development of an all-weather road between Tuktoyaktuk and Inuvik, and development of other non-renewable resources in the region.

However, it was also noted that the exploration activities in the 1970s and 1980s resulted in some negative effects that should not be repeated. The concerns identified by the community are wide-ranging and include potential effects on the social fabric of the community, municipal infrastructure and people's safety.

Recommendation

- (a) The development of a community social plan which identifies priorities and potential social issues facing the community if further harbour development occurs. The plan could identify how these priorities and issues could be alleviated or enhanced. As part of this plan, other jurisdictions and communities that have faced similar development pressures could be contacted to determine how industry and communities have resolved issues.
- (b) As part of the harbour management structure, consider establishing a community component such as a community advisory panel, which could further identify and help resolve concerns raised by community members.

C.3.2 Harbour Management and Land Use Planning

C.3.2.1 Harbour Management

Some form of harbour management is necessary to provide the certainty needed for the community to know that their interests are being considered and addressed, as well as providing the certainty needed for industry that the required infrastructure and services will be available. The type of harbour management structure that would be appropriate and the potential regulatory requirements are not yet understood.

Recommendations

- (a) Conduct a regulatory analysis exercise, which would:
- identify the acts and regulations applicable to harbour development and management
 - confirm responsibility for maintaining navigability in the approach channel and harbour
 - review previous Tuktoyaktuk Harbour Authority reports and proposals and determine their applicability to the development of a management structure
 - research models of cooperative harbour management for possible applicability to the management of Tuktoyaktuk Harbour
 - identify a suggested approach for establishing a harbour management structure and process for Tuktoyaktuk Harbour
 - identify funding options for the recommended structure
- (b) Funding for a locally based individual to participate in the regulatory exercise and research related to cooperative models of harbour development needs to be established.

C.3.2.2 Land Use Planning

Hamlet representatives feel that there is enough industrial land available to support exploration activities, but perhaps not enough land to support the production phase. Land ownership and management rests with the Hamlet (on the west side of the harbour) and the ILA (on the east side of the harbour and Tuktoyaktuk Island). Community and ILA land ownership and management does not include the seabed of Tuktoyaktuk Harbour which is under federal authority. Although there does not appear to be a desire for a formal harbour management plan to be developed at this time, planning discussions with the Hamlet and the ILA focusing on the long-term use of the harbour should occur to understand and plan for industrial land requirements and availability for short-term and long-term activities.

Recommendation

- (a) Industry and the community should collaborate to develop realistic development scenarios for oil and gas exploration and operation, and identify what each scenario could require in context of industrial land in Tuktoyaktuk. This would help to identify if there is a sufficient industrial land base for the short and long term. Establishing development scenarios would also assist in determining appropriate harbour management structures and infrastructure needs.

C.3.3 Icebreaking

It is recognized that should Tuktoyaktuk Harbour be used as a base for future oil and gas exploration and production activities, icebreaking in the harbour will need to occur to extend the navigation season. Although the community and industry agree that mitigation measures can be put into place to ensure that icebreaking activities occur without jeopardizing the safety of community residents, agreement within the community or between the community and industry with respect to icebreaking has not yet been reached, i.e., by addressing each icebreaking request on a case-by-case basis or by establishing a multi-year protocol for icebreaking activities that is acceptable to the community and industry.

Recommendation

- (a) The community, in consultation with industry, should establish an icebreaking protocol that is not based on a case-by-case industry request and which would not unreasonably disrupt community

activities or place people in danger. This will help ensure Tuktoyaktuk benefits from future exploration and development as well as allow industry to know with some certainty the conditions under which icebreaking could occur in the harbour.

C.3.4 Dredging

The results of the interviews and workshop indicated that to improve the harbour and make it more amenable as a base for offshore oil and gas exploration and production, some dredging is required. Current restrictions along the approach and entrance to the harbour limit the harbour to vessels with a draft less than 4 m. Dredging would allow vessels with a deeper draft to utilize the harbour rather than other locations in the region.

Concerns were expressed with respect to how previous dredging occurred and the resulting environmental and social effects. There is a lack of understanding of current dredging technologies and options for disposal of the dredge spoil. Dredging has been linked to opportunities for shoreline protection and adaptation to climate change.

Recommendations

- (a) Record the local knowledge of the previous effects of dredging and identify potential induced effects of dredging (such as changes to the seabed leading to other changes) so these can be considered in any future dredging plans.
- (b) Provide information to people on current dredging technologies, potential effects of dredging and methods that can be used to mitigate and minimize these effects.
- (c) Identify and assess disposal options for dredged material.
- (c) Based upon the potential development scenarios, identify the likely extent of dredging that is desired and explore uses for beneficial uses of the spoil material (e.g., shoreline protection) and measures to mitigate environmental effects.

C.3.5 Shoreline Protection and Adaptation to Climate Change

The coastline of Tuktoyaktuk is a dynamic environment with erosion and sediment deposition occurring regularly. Threats to community infrastructure and homes due to coastal erosion, has resulted in numerous actions to protect the shoreline from erosion since the 1970s. Protecting the shoreline from erosion continues to be a priority for the community and is an important concern for industry. Further erosion, particularly at Tuktoyaktuk Island, could have implications on harbour activity.

Recommendation

- (a) Examine the long-term implications for harbour development if the shoreline is breached and identify potential measures to mitigate erosion and resulting effects.
- (b) Explore the opportunities to use dredge spoil for community use (e.g., protection of Tuktoyaktuk Island, create new lands for construction).

C.3.6 Infrastructure

Current municipal and harbour infrastructure are not likely sufficient to address the needs of oil and gas operations in the long-term. Important harbour infrastructure has been removed and no upgrading has

occurred since the late 1980s. Some municipal infrastructure is near the end of its lifecycle and other infrastructure may need upgrading to accommodate industrial needs.

Recommendations

- (a) Based on potential development scenarios, forecast the harbour-related facilities and municipal infrastructure that will likely be required for the short term and long term.
- (b) Conduct an inventory of existing harbour and municipal infrastructure and identify upgrading or new facilities that could be required.
- (c) Identify which facilities and infrastructure that will be provided by industry and that which will be provided by government.

C.3.7 Environmental Management

An increase in industrial activities in Tuktoyaktuk Harbour has the potential to cause environmental and social effects. There is a lack of environmental and baseline data for the harbour. A better understanding of baseline condition would allow for improved environmental management and evaluation of potential effects from activity.

Recommendations

Environmental Management Plan

- (a) Develop a baseline of the existing state of the harbour which includes, but is not limited to:
 - fish stock inventory, spawning and creek access locations
 - water and sediment quality (also include harbour approaches where dredging may occur)
 - location of fish camps and nets
 - common on-ice and water travel paths taken by residents
 - location of the municipal water line
 - recommendations for environmental monitoring (e.g., water quality)

Oil Spill Response

During the 1970s and 1980s, substantial effort was expended in oil spill clean-up expertise locally and in the region; however, the capacity has since been reduced.

Recommendation

- (b) The community should review the results of the current ESRF project which is examining oil spill knowledge in the Arctic and determine a method of proceeding with respect to the need for oil spill training in the community.

Waste Management

Current municipal waste management facilities are unlikely to meet the long-term needs of industrial activities in the harbour. The Hamlet is currently planning to establish a new land fill, and is considering a new sewage lagoon.

Recommendations

- (c) In concert with the capital and land use planning exercises, and in consultation with industry, the Hamlet should consider waste management facility planning which would identify waste streams, volumes and sources that would be accepted in municipal facilities and the conditions under which they would be accepted.
- (d) Industry and the community should collaborate to determine the waste management facilities that do not currently exist that might be required by industry (e.g., disposal of bilge water). The level of activity expected should guide the identification of the waste management systems potentially required.

Attachment C1 Workshop Participants

ESRF – Review of Oil and Gas Industry Use of Tuktoyaktuk Harbour

Workshop Attendees – February 10-11, 2010

Name	Affiliation
Dave Kerr	ESRF
Lyn Huntley	BP Exploration
John Waring	Boskalis/Horizon North
Willie Moore	Horizon North Logistics
David Wasylciw	Department of Transportation (GNWT)
Lorie Fyfe	Municipal and Community Affairs (GNWT)
Barry Jacobson	Tuktoyaktuk Hunters and Trappers Committee
Deon Bridge	Inuvialuit Lands Administration
Wendy Smith	Imperial Oil
Todd Paget	Environment and Natural Resources (GNWT)
Stephen Charlie	Environment and Natural Resources (GNWT)
Julia Cockney	Elders Committee
James Pokiak	Tuktoyaktuk Hunters and Trappers Committee
Ernest Pokiak	Tuktoyaktuk Hunters and Trappers Committee
Robert Gruben	Tuktoyaktuk Community Corporation
Russell Newmark	E Gruben's Transport
Fred Wolki	Tuktoyaktuk Elder's Committee
Chuck Gruben	Tuktoyaktuk Community Corporation
Conrad Baetz	Indian and Northern Affairs Canada
Merven Gruben	Hamlet of Tuktoyaktuk
Bob German	Horizon North Logistics
Jim Guthrie	Horizon North Logistics/Shell Exploration
Lennie Emaghok	Tuktoyaktuk Community Corporation
Billy Emaghok	Hamlet of Tuktoyaktuk
Jean Gruben	Hamlet of Tuktoyaktuk
Lucy Cockney	Tuktoyaktuk Elders Committee
Max Kotokak	Fisheries Joint Management Committee
Craig Miller	Transport Canada
Donna Bernhardt	Constituency Assistant, MLA Jackie Jacobson
Kevin Bill	Fisheries and Oceans Canada
Amanda Joynt	Fisheries and Oceans Canada
Vernon Amos	Kavik AXYS
Nick Lawson	Kavik AXYS
Doug Chipertzak	Kavik AXYS
Leslie Green	Kavik AXYS

Attachment C2 Workshop Agenda

ESRF Workshop – Tuktoyaktuk Harbour as a Base for Offshore Oil and Gas Exploration and Development - February 10-11, 2010, Tuktoyaktuk

AGENDA

Wednesday February 10

- 9:00 a.m. Introductions
- 9:30 Presentations - Past Use of Harbour by Industry, Future Activity Scenarios, Lessons learned
- 10:30 Break
- 10:45 Presentations - Hamlet of Tuktoyaktuk
- 11:15 Presentation – Transport Canada – Regulations, Harbour Management
- 11:30 Presentation – Natural Resources Canada - Coastal Stability and Tuktoyaktuk Harbour
- 12:00 Lunch Break
- 1:30 p.m. Harbour issues identification and refinement by full group
- 3:00 Break
- 3:15 Breakout groups – issues analysis
- 4:15 Daily Wrap-up
- 7- 9 p.m. Public Session – short Presentation by KAVIK followed by opportunity for public to raise issues and concerns.

Thursday February 11

- 9:00 a.m. Introductions/ updates
- 9:30 Breakout group sessions continued
- 10:30 Break
- 10:45 Breakout group sessions continued
- 12:00 Lunch Break
- 1:30 p.m. Reporting by breakout groups, discussion with full group
- 3:00 Break
- 3:30 Confirm results, action items, next steps, etc
- 4:30 Adjournment

