Environmental Stewardship Branch
6 Bruce Street
Mount Pearl NF A1N 4T3

February 13, 2009 File No.: 4194-10

Ms. Kim Coady
Canada Newfoundland and Labrador Offshore Petroleum Board
Fifth Floor, TD Place
140 Water Street
St. John's, NF A1C 6H6

Dear Ms. Coady:

RE: Hibernia Drill Centres Construction and Operations Program EAS 2008-203B
EA Report, Offshore NL

As requested in your letter of December 18, 2008, Environment Canada has reviewed the EA Report for the Hibernia Drill Centres Construction and Operations Program. From the information provided it is understood that the proponent intends

The following EC comments stem from the department's mandate under the *Migratory Birds Convention Act* (MBCA) Section 36 of the *Fisheries Act* and the *Canadian Environmental Protection Act* (CEPA). Pertinent EC expertise, and related comments, also originates with the *Canadian Wildlife Act,* and the *Species at Risk Act* as well as *Department of the Environment Act.*

Project Description

The project description does not include the required description of the installation, operation maintenance, modification, decommissioning and abandonment of subsea flowlines/umbilicals and associated equipment. The analysis of accidents and malfunctions should include incidents related to this equipment.

The project description does not include the required description of dredge spoils disposal.

Section 2.1.1: Is it likely that boulders could be encountered that are too large for the suction dredge to handle? If so, there should be a contingency plan and possible inclusion in the disposal at sea permit.

Physical Environment

3.1 Climate

In many respects the description of the climate including winds and waves and climate variability was very well done. However, the data sources used to develop the wind and wave climate were less complete than required to ensure a full understanding of the climatology, especially of the extremes.

The report makes insufficient use of the more than 10 year nearly continuous record of meteorological and wave measurements from platforms in the Northern Grand Banks, contained in industry archives, and in a more limited set in government archives (Fisheries and Oceans, for wave measurements) or university archives (ICOADS: International Comprehensive Ocean Atmosphere Dataset). There is no analysis of freezing spray and icing accumulation, even though it is noted as a hazard in Section 9 Effects of the Environment on the Project.

3.1.4 Wind Climatology

The wind analysis by Oceans Ltd (2008), referenced in this Screening Report, primarily uses modelled winds from the MSC50 dataset. For measurements, it uses the 10 minute mean winds reported every 3 hours in ship format (referred to as Hibernia MANMAR in Table 3.3 and Table 3.4), and the 3-hourly reports from ships and platforms in the area as archived in ICOADS. It does not use or reference industry archives of hourly measurements of sustained and gust wind speeds measured for use in helicopter operations, which would be of great value for this study. QuikScat satellite-sensed winds, calibrated to the 10-m level, are another important data source that is not used in this report although it has been used to a limited extent by Oceans Ltd in other studies. These would be of value in assessing and validating other sources of wind information in extreme storms.

As noted in the report, the collection of wind observations in ICOADS is inhomogeneous, coming from ships and platforms with different observing methods and measurement heights. However no attempt was made to homogenize the winds through adjusting to a standard height, using available information about anemometer heights from platforms in the area, and the quality control method was overly simplistic and restrictive. ICOADS includes trimming flags which indicate the degree to which the observed value exceeds the monthly climatological mean for the area. The analysis used a trimming flag of 3 which excludes valid extreme winds from extreme storms, including extreme winds reported by the Hibernia platform. This is apparent in Table 3.4 of monthly maximum wind speeds which has 49.4 m/s (MANMAR) in February and 38.1 m/s (ICOADS), even though ICOADS includes the Hibernia MANMAR observations. A more extreme case occurred in September 1, 1999, when Hibernia reported a 60 m/s wind in association with an extra-tropical cyclone that developed from Hurricane Cindy. This is in ICOADS, yet is not given in Table 3.4.

Comments on the scoping document indicated that platform winds from various anemometer heights need to be adjusted to a standard level, using accepted methods in industry and the scientific community (e.g. see ICOADS Release 2 documentation). In response to that, the report states that “methods to reduce wind speeds from anemometer level to 10 m have proven ineffective due to atmospheric stability issues”. This claim is repeated in Section 3.1.6.1 on Wind Extremes. Height adjustment models do have more uncertainty in stable marine boundary conditions. However neutral to unstable conditions, which are better modelled, are fairly prevalent between the months of September to February (as shown by Figure 3.1: monthly mean air temperatures are about 1° less than sea surface temperatures in those months). One method that assumes neutral stability is the logarithmic profile developed for Norwegian platforms in the North Sea and implemented in World Meteorological Organization-supported TurboWin software. More sophisticated methods, that use air and sea temperature observations to account for atmospheric stability, are also widely used, and could be used for the offshore platforms. Wind measured at 139 m at Hibernia would be reduced by a factor 0.77 to adjust to 10 m using the TurboWin formula, in neutral conditions. It may be more appropriate for the purposes of this study to adjust all winds to a difference reference level such a typical helideck level for a particular platform, than 10 m. Using the factor of 0.77 would reduce the extreme wind of 49.4 m/s to 38.0 m/s at 10 m (74 kt). This is still greater than the 30.2 m/s in the MSC50 dataset (32.0 m/s after adjusting from a maximum one-hour mean to a 10 minute mean). This discrepancy is large enough to indicate the importance of using measurements to supplement modelled winds, where sufficient measurements exist.

3.1.5 Wave Climatology

This section relies entirely on the MSC50 hindcast data set for significant wave height, even though, as noted in Section 3.1.6.2 on Wave Extremes, there is a near continuous waverider data set extending back to early 1999. It is recommended that these be analyzed and presented in this section also.

3.1.6 Wind and Wave Extremes

The extremal wave analysis was performed using the long-term MSC50 dataset. It is generally less desirable to perform an extremal analysis on a 10 year dataset. However, it may be worth considering, in addition to the long-term analysis, an extremal analysis of the available wind and wave measurements, given the intrinsic value of measurements, and considering the occurrence of some recent extreme events and the possibility of climate trends.

3.1.6.1 Wind Extremes

As noted above, platform measurements of extreme wind speeds in extreme storms of the past decade were not adjusted to a standard reference level. The discrepancy between MSC50 extremal analysis (10 to 100 year return period) winds and recent, stronger, extreme measurements from a 10 year dataset is not discussed or resolved. Reference to Quikscat satellite-sensed wind images in particular storms may be helpful.

Various standard adjustment factors from a 1979 reference were used to adjust extremal analysis results from one-hour mean values to shorter interval sustained winds of 10 minutes and 1 minute. Results could be compared to one or two minute sustained wind datasets collected in support of helicopter operations at the platforms. Given the existence of continuous measurements of one to 10 minute sustained winds and gusts in extreme storms in this location, these measurements could be used to validate or improve on the standard adjustment factors.

3.1.6.2 Wave Extremes

The report notes that recent extreme wave measurements are such that if more occurrences of events of those magnitudes are observed, the calculated statistics would begin to increase. In particular, the highest waverider measurement of 14.7 m in the 10 year dataset exceeds the 10 year return period value by 2 m, and is close to the 100 year return period value of 14.5 m. Estimates made using the measured wave dataset may help to develop understanding of how the statistics might change.

3.1.8 Climate Variability

The analysis of the North Atlantic Oscillation index for winter and summer is interesting. It is recommended that a similar seasonal analysis be performed for the long-term and relatively homogeneous MSC50 wind and wave dataset.

Section 3.3 Sea Ice and Icebergs

The mean annual number of icebergs within the ice monitoring zone around the Hibernia platform is 54 based on the past 26 years of data and 45 icebergs per year since the GBS was installed in 1997. However, there are large seasonal variations in the numbers of icebergs each year. There have been several years where no icebergs were recorded within the ice monitoring zone. On average, 1 in every 4 years are iceberg free (P. Rudkin, pers. comm*.).* *From 2004-2008, the* *average date on which icebergs first drifted south of 49N was March 4, and the average date on which icebergs permanently retreated back north of 49N was August 10. Southerly berg extents ranged from 41.3N in 2008 to 48N in 2006. Easterly berg extents reached as far as 41W in 2004, but only reached 47W in 2005. (See table in Appendix A.)*

Pack ice incursions into the ice monitoring zone around Hibernia have been recorded in two years (2003 and 2008) since the installation of the Platform (P. Rudkin, pers. comm.). *According to the CIS weekly ice charts, unusually large incursions occurred in 1973, 1990+1991, and 2008. These extreme events appear to be spaced roughly 18-19 years apart. Time series of Total Accumulated Ice Coverage (TAC) for the Grand Banks area (see Figure 1 Appendix A) show that the years with large incursions correlate with years of high average ice coverage in the region. Years with large TACs generally also have large iceberg numbers because sea ice protects icebergs from melt/erosion as they drift southwards. Also, the same winds/currents that drive the sea ice into the Grand Banks area also drive the icebergs into the GB area.*

Icebergs can have drafts larger than 150 m in off-shelf areas, but while in on-shelf areas, icebergs drafts are restricted to 20 to 100 m because of water depth. For water depths less than 100 m the mean iceberg mass was 125,000 tonnes (LGL 2008b). Iceberg drift speeds in the area show a correlation with sub-surface currents. Iceberg drift speeds measured from various drilling operations on the Grand Banks show speeds ranging from 0 to 1.3m/s, with a mean drift speed equal to 0.3 m/s (LGL 2008b). *Ice islands (very large, flat, tabular ice bergs) sometimes reach the Grand Banks. In summer 2008, such an ice island broke off the Petermann Glacier in northwest Greenland and drifted south into Baffin Bay, where it was tagged with a beacon. At the time it was tagged, it was ~8km long, 20 km^2, had a draft of 50-55m, and massed 1 billion tonnes. It passed Cape Dyer at the southern end of Baffin Island on January 29, 2009, at which time it measured 5km long and 13.75 km^2 (see Figure 2 Appendix A). This ice island may reach the Grand Banks in the summer 2009 season.*

Section 3.3.1 2008 Ice Season

In 2008, the pack ice reached the White Rose oil field on the 1st of April and remained until April 26th. The pack consisted of 20% - 80% ice cover of thin, *medium and thick* first-year ice with thickness up to 150 cm. (FYI: ice > 120 cm is termed “thick” first-year ice.)

The iceberg distribution over the 2008 season was *extensive*. The first iceberg of the 2008 season was tracked on March 22, 2008 and the last iceberg was tracked on April 28??, 2008. The ice season was officially closed on June 27^{th}??, 2008. During that time, 82 icebergs were tracked, of those, 28 required management operations. *(**Check your dates: CIS logs show IIP’s last day of the season was **July 15**, 2008. Also, CIS iceberg charts indicate extensive iceberg sightings in the area until ~July 12, 2008).*

Section 3.3.2 Recent Past Ice Seasons

The pack ice cover over the 2004/05 season was light, although not as light as the 2003/04 season *(see Figure 1 Appendix A)*. The maximum southerly extent of the pack occurred on March 14th, which is typical of the maximum extent of pack ice over the past thirty years. The pack ice was 51 miles northwest of Hibernia and consisted of only 40 percent ice cover. The 2005 *IIP iceberg* season opened February 28th as the pack encroached on the top of the Banks and closed with the last iceberg being dropped from the tracking system 07 April 2005. Over those 38 days a total of 1 iceberg was tracked, its course did not require any management operations.

In 2006, the *IIP iceberg* season did not officially open, as no ice (of any form) crossed south of 48° N. While this is an unusual situation, it is not without equal. The 1966 ice season also saw no ice recorded south of 48N and again in 1999 and 2005 only one iceberg was recorded below 48N. Based on the icebergs recorded, the 2006 iceberg season equals the lightest year on record and active ice management operations were not required. *The reason for the low iceberg numbers in 2005 and especially in 2006 is that during the winter unusual periods of prolonged easterly winds drove the icebergs onto the Labrador coast, where they became grounded. Because of this, the majority of the bergs could no longer drift southwards towards the Grand Banks.*

The pack ice cover *during* the 2007 season was typical when compared to previous years. The maximum southerly extent of the pack was reached on March 14th when it was 82 miles northwest of Hibernia and consisting of 50 percent ice cover. The iceberg distribution over the 2007 season was moderate. The *IIP* season was opened on the 23rd of February and closed July 27, 2007. Over the course of the 155 day season, a total of 11 icebergs were tracked, of those, 7 required management operations. The most common management operation (82%) was either an iceberg net or a single vessel tow. The water cannon was used *for* two operations during this season, which is equivalent to 12% of the total operations. Ice management operations were successful with no downtime related to ice.

Air Emissions

There are no major concerns from an air quality point of view. The emission estimates for the diesel engines provided in Table 2.6 on page 29 appear reasonable and the document also provides flaring estimates for GHGs during well tests. However, in addition to the GHGs, it would be useful to provide an estimate of CAC emissions from flaring and well testing, recognizing that these estimates would have greater range of uncertainty associated with them. The proponent mentions that GHGs are reported to the CNLOPB as per the OWTG. The OWTG also require reporting of VOC emissions to the CNLOPB so these should also be estimated.

Migratory Birds

Section 4.4 Marine Birds
There are two spelling mistakes in this section. Please correct the spelling of Glaucous Gull and Wilson's Storm-Petrel.

Table 4.7 Foraging Strategy and Prey of Seabirds in the Study Area
Hydrobaridae should be replaced with Hydrobatidae.

The time with head under water is listed as brief for all species, with no frame of reference. The term brief should be quantified.

The maximum depth for Northern Gannets is listed in the table as 10m, however, this should be changed to 22m. Reference:

Garthe, S., S. Benvenuti and W.A. Montevecchi. 2000. Pursuit plunging by northern gannets (*Sula bassana)* feeding on capelin (*Mallotus villosus*). Proc. R. Soc. Lond. 267: 1717-1722.

Section 4.4.2 Seasonal Abundance
Leach's Storm-Petrel's Latin name is incorrect. It should be replaced with *Oceanodroma leucorhoa.*

The statement that gull species may occur in the winter months is correct, but they are more common at other times of the year (See Figure 4.18).

A reference should be provided for the statement that Puffins winter mostly south of the project area. The exact wintering area for NL breeding Puffins is poorly known.

On page 113, it is indicated that the project area is beyond the range of most Northern Gannets. This is unsupported and should be rewritten. Just because a species is not common does not mean that the project area is beyond their range. For example, Northern Gannets from NL have been tracked to Africa and back (Fifield and Montevecchi, unpub.).

On page 116, it is stated that concentrations of Alcids are contracted to the northern Grand Banks and coastal areas during the summer, however a lack of survey data makes this statement unsupported. This statement should be rewritten. The same sentence goes on to say that there are large aggregations near the southwest shoal of the Grand Banks during the fall and winter, however survey data shows that in the winter the largest concentrations are on the northeast Grand Banks. This should also be changed.

This paragraph also states that Atlantic Puffins are not likely to occur during the winter months. However, from survey data, Puffins appear to be widely distributed in small numbers across the northern Grand Banks at that time.

On page 118, in the last sentence of the second paragraph, Witless Bay Island should be replaced with Witless Bay Islands.

The last paragraph on page 118 states that the project area is well beyond the foraging range of breeding birds in the breeding season. This is not true and should be rewritten. For example, Leach's Storm-Petrel and Northern Gannet foraging ranges likely overlap the project area as they have been reported feeding greater than 200 km from the nest.
(Sources: Birds of North America online, and Garthe, S., W.A. Montevecchi, G. Chapdelaine, J.F. Rail, A. Head. 2007. Contrasting foraging tactics by northern Gannets (*Sula bassana*) breeding in different oceanographic domains with different prey fields. Mar Biol 151: 687-694.)

Table 4.8 Predicted Monthly Abundances
There are several spelling mistakes in the table. The following scientific names should be changed: Greater Shearwater should be *Puffinus gravis*, Sooty Shearwater should be *Puffinus griseus*, and South Polar Skua should be *Stercorarius maccormicki.* The common name for Lesser Blk-backed Gull should be Lesser Black-backed Gull.

Section 6.5 Marine Birds
Hydrobaridae is spelled wrong. The correct spelling is Hydrobatidae. Also, the italics on Phalaropodinae need to be checked.

Section 6.5.3.2 Lights and Flares
This section states that the greatest period of risk of attraction to offshore lights is in September. However, this is unfounded speculation with no data for support. Survey maps show large numbers of seabirds in summer on the Grand Banks that are potentially attracted as well. It should also be noted that while some Procellariids including Storm-Petrels sometimes forage at night, they are not limited to this mode as this section suggests.

In several places the hyphen is missing in Storm-Petrel.

Section 6.5.3.4 Noise

On page 200, the word measurable should be replaced with significant.

Section 6.5.3.5 Vessel and Aircraft Traffic
The statements that marine birds on the Grand Banks are habituated to vessel activity and energy expended during these events (following vessels for extended periods) would be minimal and have no physiological effect on the birds are unfounded unreferenced speculation and should be rewritten.

Section 6.5.6.5 Vessel and Air Traffic
Although birds are mobile, the important point is that birds are attracted to vessels and may subsequently come into contact with oil or grease from machinery.

Table 6.6 Summary of EA for Marine Birds
The geographic extent of presence of structures and lights is listed as <1km, but birds can likely see and be attracted to lights from a much greater distance. This number should be increased.

Section 6.6.6.4 Effects Assessment for Marine Birds Species at Risk
CWS is concerned with the interaction between drilling waste and any run-off from drill rigs or associated vessels and the Ivory Gull. Toxin accumulation in Ivory Gulls is a possible factor in their dramatic decline over the past 20 years. It is not clear from this brief write-up what sort of toxins may be introduced into the surrounding environment (especially what may be brought up from the ocean floor), and therefore it is difficult to assess the possible impacts. This factor in the decline of Ivory Gulls should be discussed in this section.

Section 7.2.5 Marine Birds - Cumulative Effects
The sentence listing potential effects should also include interaction with harmful substances after stranding on a vessel.

The statements that the project is located far enough from other offshore structures to avoid cumulative effects with respect to attraction to lighting are unsubstantiated. CWS offshore bird observers report that they can see Hibernia's flares from other offshore projects, and birds may be able to do so as well. The cumulative effect of attraction of lighting should be discussed further.

Cumulative Effects

The cumulative effect of subsequent glory hole excavations and spoil disposals should be considered along with the use of either one or several disposal sites.

Accidental Events

Contrary to the scoping document the discussion of accidents and malfunctions is limited to Hibernia crude and to a limited extend diesel. There is no reference to drilling fluids, drilling muds, and chemicals and does not consider the effects of these materials on all VECs.

The assessment of accidental effects should include the effect of the unintentional disposal of dredge material on route to the intended disposal site.

Effects of the Environment on the Project

9.0 Effects of the Environment on the Project

Despite the intent stated in the Scoping Document to describe the effects of the environment on different platform types, this section is very short and general. There were no specifics about typical limiting environmental conditions for each platform type, including dredging and disposal activities or the frequency of occurrence of such thresholds by season.

I trust that this information will be of assistance in your review of this assessment. If you wish to discuss these comments or have further questions, please do not hesitate to contact me at your convenience.

Yours truly,

Original Signed by Glenn Troke

Glenn Troke
Environmental Assessment Coordinator
Environmental Protection Operations Directorate
ESB/NL

Attachment

cc G. Worthman
S. Zwicker

Appendix A

Canadian Ice Service Figures

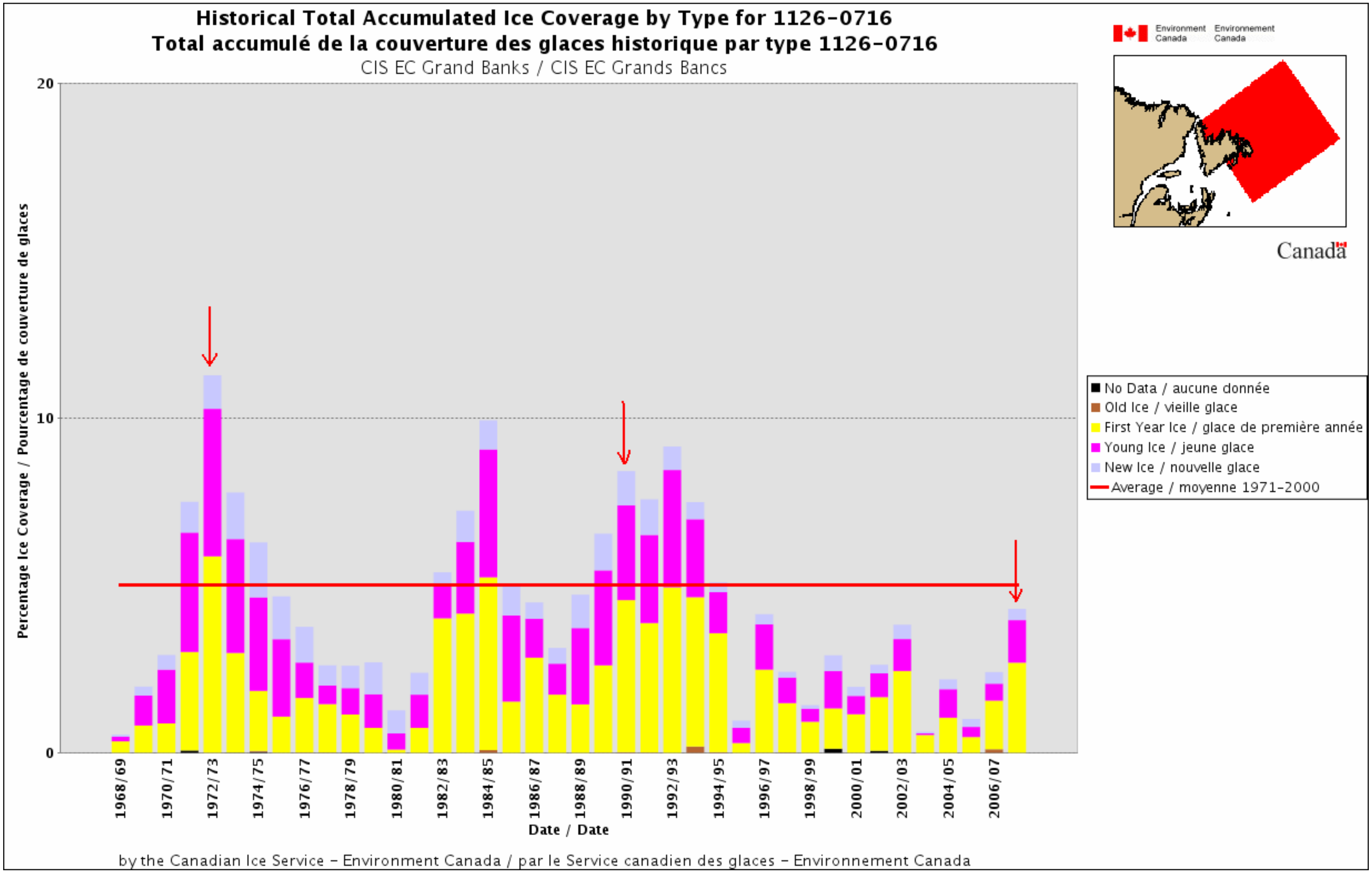
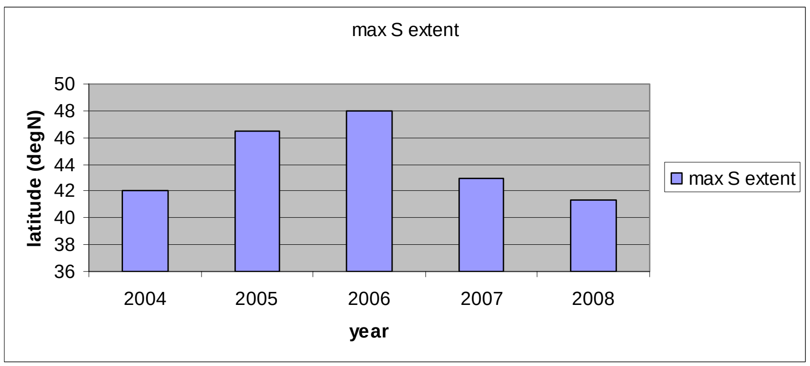


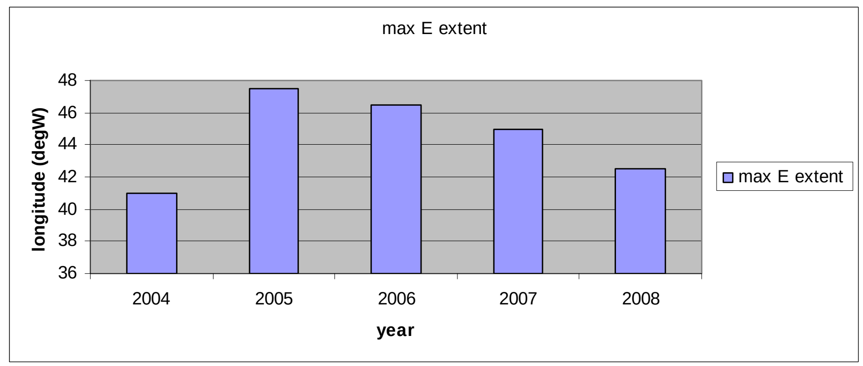
Figure 1. Years with large ice incursions into the study area are shown with arrows.

Figure 2. The Petermann ice island can be tracked using the sailwx.info ship tracker. The beacon # is 47557.

5-year Iceberg Statistics
based on daily CIS Iceberg charts 2004-2008

year	date icebergs first crossed S of 49N	max S extent latitude (degN)	max S extent date	max E extent longitude (degW)	max E extent date	date iceberg limit perm. retreated N of 49N
2004	Mar-18	42	various times Jun 25 - Jul 26	41	jun 30 - Jul 03	Aug-12
2005	Feb-15	46.5	Apr 24-25	47.5	Mar30-Apr07, May 2-14	Jun-03
2006	Mar 29, Aug 5	48	May 30, Aug 9-12	46.5	aug 8-10	May 31, Aug 13
2007	Mar-02	43	Jul 8-13	45	Jun27-Jul17	Sep-04
2008	Feb-09	41.3	May 29 - Jun 13	42.5	May 16-17	Aug-12





**Note that the higher bars mean less-far-south and less-far-east, while the lowest bars represent the most extreme-south and most-extreme east extents.