

## APPENDIX B

### POTENTIAL OFFSHORE ENTITLEMENTS OF NOVA SCOTIA AND NEWFOUNDLAND

#### A. Introduction

1. This Appendix describes the methodology used in calculating the maximum potential offshore area entitlements of Nova Scotia and Newfoundland under the definitions provided in the *Accord Acts*.<sup>1</sup> The calculations of those entitlements<sup>2</sup> are applied in Part IV to determine the relevant area of overlapping potential entitlements, and are further applied in Part V to assess the proportionality of the delimitation line as provisionally drawn.

#### B. Article 76 Of The 1982 *Law Of The Sea Convention*

2. As shown in Parts III and IV, the combined effect of the *Accord* legislation and the *Oceans Act*<sup>3</sup> means that the outer limits of the separate provincial entitlements to offshore areas must be defined according to the approach set out in Article 76 of the 1982 *United Nations Convention on the Law of the Sea (hereinafter "LOS 1982")*.<sup>4</sup> The relevant parts of Article 76 provide as follow:

1. The continental shelf of a coastal State comprises the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance.

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<sup>1</sup> Annexes 1 and 2: *Accord Acts*, s. 2.

<sup>2</sup> See Figures 34 and 35.

<sup>3</sup> Annex 113: S.C. 1996, c. 31, s. 17.

<sup>4</sup> Annex 186: December 10, 1982, UN Doc. A/Conf. 62/122 (entered into force November 16, 1994).

2. The continental shelf of a coastal State shall not extend beyond the limits provided for in paragraphs 4 to 6.
3. The continental margin comprises the submerged prolongation of the land mass of the coastal State, and consists of the sea-bed and subsoil of the shelf, the slope and the rise. It does not include the deep ocean floor with its oceanic ridges or the subsoil thereof.
4. (a) For the purposes of this Convention, the coastal State shall establish the outer edge of the continental margin wherever the margin extends beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured, by either:
  - (i) a line delineated in accordance with paragraph 7 by reference to the outermost fixed points at each of which the thickness of sedimentary rocks is at least 1 per cent of the shortest distance from such point to the foot of the continental slope; or
  - (ii) a line delineated in accordance with paragraph 7 by reference to fixed points not more than 60 nautical miles from the foot of the continental slope.(b) In the absence of evidence to the contrary, the foot of the continental slope shall be determined as the point of maximum change in the gradient at its base.
5. The fixed points comprising the line of the outer limits of the continental shelf on the sea-bed, drawn in accordance with paragraph 4 (a)(i) and (ii), either shall not exceed 350 nautical miles from the baselines from which the breadth of the territorial sea is measured or shall not exceed 100 nautical miles from the 2,500 metre isobath, which is a line connecting the depth of 2,500 metres.
6. Notwithstanding the provisions of paragraph 5, on submarine ridges, the outer limit of the continental shelf shall not exceed 350 nautical miles from the baselines from which the breadth of the territorial sea is measured. This paragraph does not apply to submarine elevations that are natural components of the continental margin, such as its plateaux, rises, caps, banks and spurs.
7. The coastal State shall delineate the outer limits of its continental shelf, where that shelf extends beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured, by straight lines not

exceeding 60 nautical miles in length, connecting fixed points, defined by coordinates of latitude and longitude.

3. This provision both defines the juridical shelf and establishes a methodology for establishing the outer limits of a coastal State's claim. The continental shelf is defined as extending to the outer edge of the continental margin, which is itself defined as consisting of the "sea-bed and subsoil of the shelf, the slope and the rise", but excluding "the deep ocean floor with its oceanic ridges".
4. The methodology for defining the limits of a potential claim to the shelf is somewhat more complex. First, in cases where the outer edge of the margin is less than 200 nautical miles from the baselines, a minimum shelf entitlement of 200 nautical miles applies. This definition is not applicable in this arbitration, because the shelf throughout the relevant area is broader than 200 nautical miles.<sup>5</sup>
5. Where the potential claim extends to the so-called "broad shelf," Article 76 provides two alternative formulae for the determination of the potential outer limits of a State's claim (either or both of which can be used in a single claim to maximize the area). It also stipulates two outer constraints or limits on the potential claim as determined by the formulae.

i. **Outer Limit Formulae**

6. The coastal State may determine the potential outer edge of its continental margin by applying either or both of two methods, to its maximum advantage:
  - a line drawn by reference to the outermost points where the sediment thickness is at least 1 per cent of the distance of that line from the foot of the slope (Article 76(4)(a)(i)); or

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<sup>5</sup> There are some areas off Labrador where the 200 nautical mile limit is engaged, but as is shown in Part IV, these are not part of the area of immediate relevance in terms of overlapping entitlements.

- a line drawn 60 nautical miles from the foot of the slope, the foot of the slope being defined, in the absence of evidence to the contrary, as the point of maximum change in the gradient at its base (Article 76 (4)(a)(ii) and (4)(b)).
7. The effect of these two formulae is shown in schematic form in **Figure B-1**.<sup>6</sup> (the foot of slope plus 60 nautical miles) and **B-2** (the one percent sediment thickness formula). The implementation of the two formulae leads to the determination of a single “outer envelope” of the two lines as combined.

ii. **Outer Limit Constraints**

8. Having applied these two formulae to determine the maximum potential extent of the seaward entitlement, the coastal State must then apply either of the two constraints imposed by Article 76 on the maximum seaward extent of the entitlement produced by the two formulae (again, to its maximum advantage):
- the claim cannot exceed 350 nautical miles from the baselines from which the territorial sea is measured (Article 76(5)); or
  - the claim cannot extend beyond 100 nautical miles from the 2500 metre isobath (Article 76(5)).<sup>7</sup>
9. The effect of these two constraints is shown in schematic form in **Figures B-3** (the 350 nautical miles) and **B-4** (the 2500 metre isobath plus 100 nautical miles constraint). The implementation of the two constraints leads to a single “outer envelope” of the two lines as combined.

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<sup>6</sup> **Figures B-1 to B-4:** Schematics Depicting the Methodology Applied in the Determination of the Outer Limit of the Continental Shelf.

<sup>7</sup> On submarine ridges, the outer limit of the continental shelf cannot exceed 350 nautical miles from the baselines from which the territorial sea is measured (Article 76(6)). This provision is not applicable in this case.

iii. **Application of the Formulae and Constraints**

10. Assuming a situation where the 200 nautical mile minimum is not an issue, such as in this arbitration, and where there are no submarine ridges, the following summarizes the basic process to be followed in determining the outer limit under Article 76:

a) Application of the Formulae

11. First, determine the maximum potential claim, in the absence of constraints, as follows:

- determine the location of the foot of the continental slope;
- draw a line 60 nautical miles offshore from the foot of the slope;
- determine the line where the sediment thickness is 1 per cent of the distance of the line to the foot of the slope;
- combine the two lines to determine an “outer envelope” line, so that the maximum potential entitlement is delineated (*i.e.*, a line which shows the maximum combined effect of both methods).

b) Application of the Constraints

12. Next, determine the outer limit constraints imposed under the two specified methods:

- determine the 2500 metre isobath;

- draw a line 100 nautical miles offshore from that isobath;
- draw a line 350 nautical miles from the baselines from which the territorial sea is measured;
- combine the two lines to determine an “outer envelope”, arriving at one line providing for the maximum allowable extension under either method.

c) Application of the Constraints to the Potential Entitlement

13. Finally, apply the line determined by the constraints to the maximum potential claim. The result will be a line that extends to one of the following limits:

- where the potential entitlement as determined by the formulae line falls short of the line determined by the constraints, that will be the maximum extent of the entitlement; or
- where the potential claim would extend beyond the line determined by the constraints, the constraints line will be the outer limit.

### **C. Application Of The Method To Nova Scotia And Newfoundland**

14. This section applies the process and methodology described above to the definition of the outer limits of the entitlements of Newfoundland and Nova Scotia under the *Accord Acts*.<sup>8</sup> The technical work is represented in several

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<sup>8</sup> The methodology employed is consistent with that recommended by the Commission on the Limits of the Continental Shelf (CLCS), in their Technical Guidelines. Annex 209: United Nations Convention on the Law of the Sea, Commission on the Limits of the Continental Shelf, 5<sup>th</sup> session, CLCS/11, “Scientific and Technical Guidelines of the Commission on the Limits of the Continental Shelf” (13 May 1999).

Figures, and was calculated using the best available data.<sup>9</sup> Although the current state of information is such that no outer limit determination can yet be absolute, the level of confidence is such that any potential inaccuracy would not affect the overall magnitude of the overlapping entitlements.

**i. Newfoundland's Potential Entitlement**

15. The following paragraphs and Figures B-5 to B-8 reproduce the steps undertaken to determine the outer limit of Newfoundland's potential entitlement.
16. Figure B-5<sup>10</sup> shows: i) the foot of the continental slope;<sup>11</sup> ii) the line where the sediment thickness is 1 per cent of the distance of the line to the foot of the slope;<sup>12</sup> iii) the line 60 nautical miles from the foot of the slope; and iv) the combined effect of the sediment thickness and 60 nautical mile lines.

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<sup>9</sup> The data sets used in this work are described below, and further information can be provided if required.

<sup>10</sup> Figure B-5: The Construction of the Formulae Line for the Determination of the Outer Limit of the Offshore Area of Newfoundland.

<sup>11</sup> The foot of the continental slope was determined by defining the maximum change of the gradient of the continental slope at its base. Individual bathymetric profiles were analysed separately in order to locate the position of the maximum change in the gradient, as shown in the figures. The tracks along which bathymetric data were analysed (shown as the "hatched lines") are spaced so as to conform to the nautical mile segment requirements of Article 76 (7). The bathymetric data is a hybrid set formed by the combination of hydrographic sonar soundings available in the public-domain marine geophysical trackline database assembled by the International Hydrographic Office Center for Digital Bathymetry in Colorado, USA, and the 2 minute by 2 minute measured and predicted bathymetric model grid by the National Oceanic and Atmospheric Administration (NOAA) and the Scripps Institute of Oceanography (SIO). The IHO database is described and included in *Marine Geophysical Trackline Data Worldwide*. (CD-ROM Set, Version 4.0 with data assimilated through October, 1998 Data Announcement 98-MGG-04, World Data Center for Marine Geology & Geophysics, Boulder, Colorado). The measured and predicted model is described in Annex 210: W.H.F. Smith and D. T. Sandwell, "Global seafloor topography from satellite altimetry and ship depth soundings" *Science*, v. 277, p. 1957-1962 (26 September 1997).

<sup>12</sup> Sediment thickness was obtained from a model determined from existing seismic information and other geophysical data describing properties of the continental crust. The model is described in Annex 211: G. Laske and G. Masters, "A Global Digital Map of Sediment Thickness" *EOS Transactions of the American Geophysical Union (AGU)*, 78, F483, (1997).

17. **Figure B-6**<sup>13</sup> shows: i) the 2500 metre isobath line;<sup>14</sup> ii) the line 100 nautical miles beyond the 2500 metre isobath; iii) the line 350 nautical miles from the baselines; and iv) the combined effect of the two constraints.
18. **Figure B-7**<sup>15</sup> shows: i) the combined effect of the two formulae from **Figure B-5**; ii) the combined effect of the two constraints from **Figure B-6**; and iii) the line resulting from the application of the constraints to the potential claims. This final line, which is reproduced in full size in **Figure B-8**<sup>16</sup>, represents the maximum potential entitlement of Newfoundland to an offshore area under the *Accord* legislation.

ii. Nova Scotia's Potential Entitlement

19. **Figures B-9** through **B-11**<sup>17</sup> show the application of the same criteria and methodology to Nova Scotia, with the resulting potential maximum claim shown in **Figure B-12**.<sup>18</sup>

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<sup>13</sup> **Figure B-6:** The Construction of the Constraints for Newfoundland's Potential Offshore Areas Entitlement.

<sup>14</sup> The isobath is drawn from the bathymetric data sets referred to *supra*, note 11.

<sup>15</sup> **Figure B-7:** The Determination of Newfoundland's Maximum Potential Offshore Area Entitlement.

<sup>16</sup> **Figure B-8:** The Outer Limit of Newfoundland's Offshore Area Entitlement.

<sup>17</sup> **Figure B-9:** The Construction of the Formulae Line for the Determination of the Outer Limit of the Offshore Area of Nova Scotia; **Figure B-10:** The Construction of the Constraints for Nova Scotia's Potential Offshore Areas Entitlement; **Figure B-11:** The Determination of Nova Scotia's Maximum Potential Offshore Area Entitlement.

<sup>18</sup> **Figure B-12:** The Outer Limit of Nova Scotia's Offshore Area Entitlement.