1982 UNITED NATIONS CONVENTION ON THE LAW OF THE SEA
BEFORE AN ARBITRAL TRIBUNAL ESTABLISHED UNDER ANNEX VII

IN THE DISPUTE CONCERNING
THE MOX PLANT, INTERNATIONAL MOVEMENTS OF
RADIOACTIVE MATERIALS, AND THE PROTECTION OF THE
MARINE ENVIRONMENT OF THE IRISH SEA

IRELAND v. UNITED KINGDOM

MEMORIAL OF IRELAND

VOLUME I

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CONTENTS

LIST OF COLOUR PLATES IN VOLUME I

All maps and figures are for illustrative purposes
and are shown for the purposes of the present proceedings only

PART I:

THE FACTUAL AND HISTORICAL BACKGROUND

CHAPTER 1

INTRODUCTION

1.1. This Memorial is submitted pursuant to the Rules adopted by the Arbitral Tribunal fixing 26 July 2002 as the date by which Ireland is to submit its Memorial in this arbitration. The Memorial addresses all factual and legal matters relating to Ireland's claim as set out in its Amended Statement of Claim of 21 January 2002.[1]

1.2. On 3 October 2001 the Government of the United Kingdom adopted a Decision[2] that the Mixed Oxide fuel plant at Sellafield ("the MOX plant") was "justified", that its benefits outweighed its costs. The October 2001 Decision opened the way for the commissioning and operation of the MOX plant. The Decision was taken notwithstanding the following facts, none of which are in dispute. The Irish Sea is a semi-enclosed sea. It is already amongst the most radioactively polluted seas in the world. The MOX plant itself will cause further radioactive wastes to be discharged directly and indirectly into the Irish Sea. The operation of the MOX plant will result in even larger amounts of new and additional discharges of radioactive wastes to be discharged directly and indirectly into the Irish Sea from the THORP reprocessing plant, which will reprocess spent nuclear fuel into plutonium oxides for use in the manufacture of MOX fuel. The operation of the MOX plant will also lead to a significant increase in international transports of radioactive substances through the Irish Sea, in close proximity to Ireland. And the operation of the MOX plant will cause significant new and additional volumes of radioactive wastes to be stored at the Sellafield site.

1.3. This case is not a dispute over science. It is in essence a dispute over the failure of the United Kingdom to fulfil three categories of legal obligation under UNCLOS:

> (1) The obligation to carry out a proper assessment of the likely impact of the MOX development upon the marine environment of the Irish Sea before authorising that development. Ireland considers that the United Kingdom has violated Article 206 of UNCLOS by not having caused to have been prepared a proper environmental impact assessment which assessed all the environmental consequences of the authorisation of the MOX plant. The environmental consequences of the MOX plant itself were inadequately assessed, and there has never been an assessment of the environmental consequences of the THORP plant, the additional waste to be stored at Sellafield, and the international transports of radioactive materials associated with the authorization of the MOX plant, including security-related issues.
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> (2) The obligation to co-operate with Ireland, as co-riparian of the semi-enclosed Irish Sea, in taking the steps necessary to protect and preserve the marine

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1 See Order No 1, Annex VII Tribunal, 2 July 2002, vol 3(1), Annex 6. See also Ireland's Amended Statement of Claim, 21 January 2002 and the explanatory note on the Amended Statement, vol 3(1), Annexes 1 & 2.

2 Vol 3(2), Annex 92.

environment of that sea. Ireland considers that the United Kingdom has violated Article 123 and 197 UNCLOS, in particular by having failed to provide Ireland with adequate information of the environmental consequences arising from the MOX project, including in respect of security issues. It has failed to engage properly in consultations with Ireland, and to take into account Ireland's rights and interests, when deciding whether and how to proceed with the implementation of the MOX project. It has not co-operated with Ireland in the development of strategies for coping with the pollution and the risk of pollution arising from the MOX project.

(3) The obligation placed directly upon the United Kingdom itself to take all the steps necessary to protect and preserve the marine environment of the Irish Sea. Ireland considers that the United Kingdom has violated various provisions of UNCLOS, including in relation to environmental impact assessment and co-operation with Ireland. The provisions violated include Articles 192, 193, 194, 207, 211, 212, 213, 217 and 222, as well as obligations to apply a precautionary approach and make use of "best available technologies" and "best environmental practices". In particular, the United Kingdom has failed to take all measures necessary to prevent, reduce and control pollution of the Irish Sea, to avoid causing pollution to Ireland and its environment, and to ensure that pollution from the MOX plant "does not spread beyond the areas" where it exercises sovereign rights. The United Kingdom has also failed to take the measures designed to minimize "to the fullest extent possible" the release of radioactive substances arising from the authorisation of the MOX plant (including from vessels), and to adopt or implement international rules and standards to prevent, reduce and control pollution of the Irish Sea arising from the authorisation of the MOX plant.

1.4. This Memorial comprises this Volume and 4 volumes of appendices and annexes. This *Volume 1* is divided into 3 Parts. **Part 1** addresses the factual and historical background of the dispute. Chapter 1 addresses geographical issues, the state of the Irish Sea, the Sellafield site and Ireland's general concerns. Chapter 2 addresses the MOX plant itself, including the manufacturing process, the transports, the economics, and the regulatory background. Chapter 3 identifies the environmental implications of the authorisation of the MOX plant, including from the MOX and THORP plants, international transports and waste storage issues. Chapter 4 summarises the history of the dispute, from the authorisation of the THORP plant through to the justification of the MOX plant, and subsequent developments. **Part 2** addresses the law, in relation to both jurisdiction and the merits. Chapter 5 addresses the jurisdiction of the Annex VII Tribunal. Chapter 6 deals with the law to be applied by the Annex VII Tribunal. Chapter 7 is concerned with environmental impact assessment. Chapter 8 deals with Co-operation. Chapter 9 deals with pollution. The Memorial concludes with **Part 3**: Chapter 10 indicates the role of the Tribunal and restates the relief sought by Ireland. *Volume 2* comprises a set of appendices, namely independent reports (opinions of experts and scientific reports) which have been commissioned by Ireland for the purposes of these proceedings, *Volume 3,* made up of three parts, contains general annexes, and *Volume 4* comprises the whole of the Environmental Report prepared in 2000 for a non-commercial United States MOX facility. In *Volume 1* a number of paragraphs (and certain annexes) relating to material, which may be considered by one or both States to be subject to a possible requirement of confidentiality on grounds of security, have been blacked out. They are included in a confidential folder provided to the Tribunal as *Volume 5*.

1.5. This Chapter is divided into four sections.

- **Section A** sets out the introductory factual background, describing in brief the geographical context of the dispute. It describes the physical qualities of the Irish Sea (including oceanography and bathymetry), and identifies those of its principal features which are unique and which are particularly relevant to this case, in particular the propensity to retain radionuclides which are discharged into it;
- **Section B** explains the importance of the Irish Sea for Ireland, in terms of its ecological, recreational and economic functions. This Section also describes the quality of the Irish Sea, which has been significantly diminished by the radioactive pollution that result from the nuclear activities carried out at the Sellafield site by the United Kingdom since the 1950s;
- **Section C** describes the Sellafield site and the historical and ongoing nuclear activities carried out there. In particular it sets out Ireland's concerns with regard to the MOX plant and its implications for the continued and extended operation of the THORP nuclear reprocessing plant. It also briefly describes the other related activities in Sellafield, including facilities for clean up, storage and disposal of radioactive wastes on site;
- **Section D** summarises the history of concerns in Ireland regarding the operation of the new MOX plant and its implications for the continued and extended operation of the THORP plant, as well as for the Sellafield site as a whole. These concerns have been voiced by the Government of Ireland and many of its citizens. Ireland's concerns are shared by many third states in the North East Atlantic region, as well as states which are located in proximity to the transport routes by which MOX and other radioactive material is transported to and from the Sellafield site in relation to the MOX plant.

This Chapter therefore sets the scene, explaining the reasons for Ireland's longstanding, continuing and growing concerns about the impact on the Irish Sea of nuclear activities at Sellafield. The authorisation of the MOX plant – with all that it implies for the extension of other activities at Sellafield – signals a further intensification of nuclear activities at the Sellafield site, including an extension of the life of the THORP plant and the generation of additional quantities of radioactive wastes. As the later parts of this Memorial will show, the authorisation of the MOX plant is difficult to reconcile with the United Kingdom's obligations under the 1982 UN Convention on the Law of the Sea ("UNCLOS"), including the related subsequent commitments which the United Kingdom undertook in 1992 not to allow or promote activities of this kind in or near the marine environment, and the even more specific commitments undertaken in 1998 to significantly and progressively reduce discharges of radioactive substances into the marine environment and to reduce concentrations of radionuclides in the Irish Sea to "close to zero" by 2020.

A. GEOGRAPHY AND OCEANOGRAPHY

1.6. Ireland is situated in the north west of Europe between 51.5° and 55.5° north latitude and between 5.5° and 10.5° west longitude. Ireland's land area covers 70,282 square kilometres, and consists of Munster, Leinster, Connacht and three counties of Ulster. It has a population of 3,840,000 with a density of 171 per square mile. Along the Irish coastline, southwards from Northern Ireland, lie around fifty significant communities, including Ireland's capital Dublin. These cities, towns and villages, comprise a regular coastal population of some 1.5 million people and increases significantly during holiday periods. See **Plates 1 and 2** which set out a general location map and a map of the Irish Sea region.

1.7. The Irish Sea lies to the east coast of Ireland. It is a relatively small, semi-enclosed sea[3] which is a part of the North-west European continental shelf located approximately between latitudes 52^0 and 55^0 N and longitudes 3^0 and 6^0 W. It is situated within Region III of the waters covered by the 1992 Convention on the Protection of the Marine Environment of the North East Atlantic (1992 OSPAR Convention).[4] **Plate 5** sets out the Region III area covered by the 1992 OSPAR Convention. It has a water surface area of approximately 47,000km^2 and over 4,000km of coastline. West of about 4.5^0W the sea bottom forms a deep channel 300km in length and 30-50km in width, with a minimum depth of 80m and a maximum depth of over 275m.[5] It is connected to the Atlantic Ocean by narrow entrances in the north and south through the North Channel and the St. George's Channel. The total volume of the Irish Sea is about 2,400 km. Approximately 80% of this volume lies in the region to the west of the Isle of Man.

1.8. The pattern of water circulation in the Irish Sea is closely related to the semi-enclosed character of the sea, and is highly seasonal in nature. During the summer period, the solar heating together with the density driven currents create a stable gyre to the west of the Isle of Man. The effect of the gyre is caused by warmer water circulating about a dome of colder denser water, creating the closed circulation feature. The density fronts around the dome are strong and prevent complete mixing of water. This in turn reduces the effective amount of water for dilution within the Irish Sea and tends to cause elevated levels of radionuclides to be drawn towards the vicinity of the western Irish Sea gyre. This increases the likelihood of retaining, for many years in that area, radionuclides from Sellafield in both solute and sediment form.[6] Figures of the effects of the gyre as well as illustrations of tidal lines of the Irish Sea are set out in a Report on the Oceanography of the Irish Sea.[7]

1.9. This gyre was unknown during the planning stages of the original plants at the Sellafield site; and has only recently become known and better understood.[8] The gyre was not considered when the decision to construct the MOX plant was taken. Without adequately understanding important processes such as the gyre, it is impossible to accurately predict the impacts of radioactive discharges on the Irish Sea. Recent studies indicate that our understanding of the Irish Sea water circulation is incomplete. This has

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3 See Chapter 8, para 8.1.

4 The 1992 OSPAR Convention, vol 3(1), Annex 74.

5 A Review of the Oceanography of the Irish Sea, Michael Hartnett, vol 2, Appendix 7.

6 *Ibid*, p 375 *et seq.*

7 *Ibid*, p 383 *et seq*.

8 *Ibid*, p 376 *et seq*.

potentially serious implications for the management of hazardous discharges such as radionuclides.[9]

1.10. The water circulation in the Irish Sea is highly dependent on tidal action. Within the OSPAR region, the Irish Sea is quite unusual in that tides enter it from two directions. This reduces flushing, and consequently, the dilution of pollutants. In other words, once radionuclides are discharged into the Irish Sea, they tend to stay there. Many of the radionuclides discharged from Sellafield end up in the sediments at the bottom of the Irish Sea. The major features of sediment distribution in the Irish Sea largely mirror the distribution of tidal current speeds with gravels where the currents are strongest, and muds where they are weakest.[10] According to the Hartnett Report there are three significant mud patches in the Irish Sea.[11] These mud patches contain many of the radionuclides including significant quantities of plutonium.[12]

1.11. According to the Report of Professor Salbu, radionuclides in the Irish Sea are inhomogeneously distributed in the sediments.[13] Localised areas with activity concentrations significantly higher than the surroundings (hot spots) are situated close to the Cumbrian coast (Sellafield mudpatch) and an area between Isle of Man and the east coast of Ireland. These hot spots represent major potential sources to radioactive contamination in the future, especially if exposed to heavy storm events increasing the water erosion.[14] About 60 % of total discharged plutonium and about 5 % of discharged caesium are contained in subtidal sediments, and radioactive particles are still present in the Sellafield mudpatch. Remobilisation of actinides – Plutonium (Pu-239, 240) and Caesium (Cs-137) from sediments in the eastern Irish Sea is evident, and transport via the North Channel to the North Sea as well as to the western Irish Sea takes place. The Salbu Report also states that contaminated sediments in the Irish Sea will continue to act as a diffuse source for at least the coming century.[15]

1.12. With regard to radionuclides in seawater, the Salbu Report indicates that the activity concentration of mobile radionuclides in seawater varies according to the discharges. About 1% of the Irish Sea inventory for plutonium is contained in seawater.[16] The rest is in the sediments of the Irish Sea, or unaccounted for.

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9 *Ibid*.

10 *Ibid*, p 379.

11 *Ibid*.

12 *Ibid*.

13 Radionuclides discharged into the Irish Sea: sources, distributions and long-term ecosystem behaviour, Professor Brit Salbu, vol 2, Appendix 2, p 122 *et seq*.

14 *Ibid*, p 126 *et seq*.

15 *Ibid*, p 113..

16 *Ibid*, p 127.

B. THE IRISH SEA AND ITS IMPORTANCE TO IRELAND

1.13. The impact of radionuclides in the Irish Sea is significant, given the importance of the Irish Sea for Ireland. It is exploited for fishing, transport, recreation, gravel extraction, renewable energy and other uses. The impact on the marine environment of discharges from Sellafield is – or could be – felt on the quality of the waters and on marine life. Lobsters and seaweeds, in particular, are known to contain radioisotopes arising from Sellafield operations.[17] The radioactivity arising from Sellafield has the potential to contaminate beaches, and may have an impact on the tourist trade (including recreational fishing and water sports), on fisheries and on marine wildlife. Although there has been some research on the impacts of radionuclides (including at low-levels) on human health, their impacts on wildlife have not been assessed.[18]

1.14. Ireland has a special concern for its marine environment, not least since a significant proportion of its economy relates to fishing activities in the Irish Sea, some of which take place in close proximity to the Sellafield site and the areas in which international movements of plutonium and other radioactive substances are to occur.[19] There are several Irish fishing ports along the Irish Sea. The main ports are at Clogherhead and Howth. **Plate 10** sets out the east coast fishing ports of Ireland.

1.15. The formal boundary for fishery control purposes is the median line between Ireland and the United Kingdom. Both States claimed a 200-mile exclusive fishing zone in 1977. **Plate 12** sets out the maritime zones. See also **Plate 8** which sets out the Search and Rescue zones of responsibility and **Plate 9** sets out the Irish pollution response zone.

1.16. The Connolly Report sets out the importance of the fisheries industry to Ireland's economy. It confirms the importance to Ireland of maintaining the quality of the Irish Sea. In 1998, an estimated 42,600 tonnes of fish species (including shellfisheries) were landed from commercial fishing operations the Irish Sea. These had an estimated landed value of €72 million. These figures exclude aquaculture production. The main commercial fisheries operating in the Irish Sea are the mixed fisheries for cod, whiting, haddock, plaice, sole, herring and *Nephrops* (Dublin Bay Prawn).[20] In 1998, 29,574 tonnes were landed by all international vessels, with an estimated value of €60 million. There are smaller inshore fisheries for whelk, scallops, queens and ray species and in 1998, 13,000 tonnes of these species were landed by all international vessels with an estimated value of €12 million.[21]

1.17. The main countries involved in the fisheries are Ireland and the UK, with Belgium and France also participating. The Irish trawl fleet targets *Nephrops* and mixed fisheries for cod, whiting haddock, plaice and sole, mainly in the northwestern Irish Sea. **Plate 11** sets out the foreign fishing rights in the 6 to 12 mile zone. It confirms Irelands extensive geographic interest in the waters and the interests of several third states.

1.18. Tourism also makes an important contribution to Ireland's economy. A considerable portion of that tourism is related to the Irish Sea. Foreign exchange earnings from tourism amount to approximately £3 billion per annum, domestic tourism earnings of

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17 The OSPAR Quality Status Report 2000 for the North-East Atlantic, (QSR 2000),Para 6.6. Artificial radioactivity from Sellafield can be detected in almost all flora and fauna from the Irish Sea.

18 QSR 2000, Para 5.3.13 *et seq*.

19 Irish Sea Fisheries – Dr. Paul Connolly, vol 2, Appendix 1.

20 *Ibid*, p 19.

21 *Ibid*.

over £1 billion and sustaining close to 150,000 in employment. In recent years the Irish tourism industry has developed in maturity and importance in the Irish economy. A significant factor for this increase has been its pristine environment and landscapes which are well known and widely appreciated. More recently visitors have also travelled to Ireland to avail themselves of the wide range of sporting and recreational facilities including sailing, scuba diving and fishing. **Plate 7** is a map of designated bathing areas and marine sports areas on the east coast of the Irish Sea.

RADIOACTIVITY IN THE IRISH SEA

1.19. Today, the Irish Sea is one of the most radioactively polluted seas in the world. According to the OSPAR Quality Status Report 2000 there is an estimated 200 kgs of plutonium in the Irish Sea.[22] This has largely resulted from the fact that routine (planned) and accidental discharges of artificial radionuclides into the Irish Sea from Sellafield have occurred since the early 1950s. These discharges increased significantly in the 1970s, resulting in severe pollution that directly affects Ireland, including its waters. The United Kingdom's Secretary of State for Trade and Industry recently stated in the House of Commons that:

> 'In the earlier years of the nuclear programme, the standards of environmental care and regard for long-term safety were not as stringent as those we apply today. Only limited and often superficial records of what the facilities contained were kept. Indeed, the clean-up challenges involved were not recognised as such until well into the 1980s.'[23]

1.20. There have been many independent scientific assessments of the state of the Irish Sea. As described below they have concluded that as a result of radioactive pollution from Sellafield, the Irish Sea is amongst the most radioactively polluted seas in the world.[24]

1.21. For the purposes of these proceedings Ireland has commissioned an independent report from Dr Hartmut Nies, on Artificial Radioactivity in the Marine Environment.[25] The Nies Report identifies four main sources of artificial radioactivity in the European marine environment of which the most significant are discharges from European nuclear reprocessing plants primarily at Sellafield and La Hague, and the former dumping of radioactive wastes at sea. The Report compares the radioactive pollution of various seas, and with regard to the Irish Sea states that the main radioactive pollution of Sellafield derived radionuclides is found on the eastern part of the Irish Sea. The Report notes also that the influence of the discharges from Sellafield are obvious in the western and southern

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22 QSR 2000, Para 4.9.3. See also vol 3(3), Annex 105. Earlier, in 1985, the United Kingdom's Environment Committee, of the House of Commons noted that as a result of the "discharge of huge volumes of low level liquid waste from the Sellafield pipeline" at least "1/4 of a tonne of plutonium has been deposited in the Irish Sea which has become the most radioactive sea in the world." According to the minutes, the plutonium and americium in the Irish Sea was found to be at least 15 times the North Atlantic fallout levels: First Report from the Environment Committee, Session 1985-86, Radioactive Waste, House of Commons.

23 House of Commons Hansard Debates for 28 Nov 2001, col. 990 *et seq*, vol 3(2), Annex 93.

24 See Ireland's letter in response to questions from the ITLOS and its Annex 1, 21 November 2001, vol 3(1), Annex 42, p 183 at 186, 187.

25 Artificial Radioactivity in the Marine Environment – Burden of Various Seas Regions -Hartmut Nies, vol 2, Appendix 4.

part of the Irish Sea, because the levels are significantly above the expected levels of Atlantic surface water.[26]

1.22. The Nies Report states that sediments conserve historical discharge deposition over long periods and therefore the levels in the seabed reflect a completely different situation than the sea water. In this respect the sediments in the eastern part of the Irish Sea can be considered to contain the highest levels of artificial radioactivity in any of the world's oceans.[27]

1.23. In its conclusions, the Nies Report states *inter alia* that the discharges from reprocessing plants at La Hague and Sellafield have dominated the levels of radionuclides in northern European Seas and the discharges from Sellafield have generally been significantly higher than those from La Hague.[28]

OSPAR REPORTS

1.24. In 2000, the OSPAR Commission (established under the 1992 OSPAR Convention) prepared its first Quality Status Report for the whole North-East Atlantic (the "QSR 2000").[29] In its overall assessment of radioactive substances, the Report states that:

> "Nuclear weapons testing, the dumping of wastes in deep water, the foundering of a nuclear submarine, accidents during transportation and discharges from coastal installations have all added to the radionuclides present in the marine environment. The majority of these inputs have been drastically reduced. Remaining inputs are largely due to ongoing releases from nuclear-fuel reprocessing plants. The greatest threats in the future are accidents in the civilian and military nuclear sectors. Releases from dumpsites are considered to pose negligible radiological risk to man, although it is difficult to draw firm conclusions about environmental impacts.
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> The question of radioactive contamination, particularly that arising from the Cap la Hague and Sellafield nuclear-fuel reprocessing plants, is a matter of public concern. This stems from the higher levels of radioactivity discharged in the past and from recent increases in the discharge of certain less radiologically significant radionuclides, particularly technetium-99. There are now more sophisticated detection systems and there have been substantial net reductions in the levels of some more harmful radionuclides over the last decade. Low concentrations of some man-made radionuclides are found in seaweeds, shellfish and wildlife far from the sources. Impacts of radionuclides on wildlife have not been assessed. There are no internationally agreed standards for the assessment of the impact of man-made radionuclides on wildlife."[30]

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26 *Ibid*, p 184.

27 *Ibid*, p 188.

28 *Ibid*, p 187.

29 The OSPAR Report sets out details of the Geography; Hydrography and Climate; Human Activities; Chemistry; Biology and an overall assessment of the entire region covered by it. This is followed by specific reports on each of the 5 OSPAR Regions. The Report is available at http://www.ospar.org/eng/html/welcome.html.

30 QSR 2000, Para 6.6 (emphasis added).

1.25. The 2000 OSPAR Quality Status Report discusses the effectiveness of existing measures including the 1998 OSPAR Strategy with regard to Radioactive Substances.[31] That Strategy sets out, *inter alia*, the objective of "prevent[ing] pollution of the maritime area from ionising radiation through progressive and substantial reductions of discharges, emissions and losses of radioactive substances, with the ultimate aim of concentrations in the environment near background values for naturally occurring radioactive substances and close to zero for artificial radioactive substances." It sets a time frame of "ensur[ing] that discharges, emissions and losses of radioactive substances are reduced to levels where the additional concentrations in the marine environment above historic levels, resulting from such discharges, emissions and losses, are close to zero by 2020".

1.26. The OSPAR Quality Status Report 2000 for the North-East Atlantic makes several relevant observations. It confirms the presence of radionuclides in measurable and significant quantities. On seawater, it states *inter alia* that:

> "Traces of man-made radionuclides are found with a decreasing gradient with increasing distance from the reprocessing facility. The level of caesium-137 ranges from approximately 500 Bq/m^3 in the vicinity of the outlets of reprocessing plants down to 2 Bq/m^3 in the open ocean. The trend has been steadily downward in the Irish Sea since 1988, however the signal is still present in the Irish Sea and as far afield as the Norwegian west coast and in the Arctic. At Sellafield, releases of the actinides and ruthenium have decreased, but there were consequential increases of the less radiologically significant technetium-99 in 1994 and 1995 and the level of technetium-99 in the Irish Sea close to Sellafield outfalls were approximately 350 Bq/m^3. This has resulted in the rapid spread and detection of technetium-99 in the North Sea and along the Norwegian west coast at very low concentrations."[32]

1.27. On the issue of sediments, the OSPAR Quality Status Report concludes:

> "Concentrations of artificial and natural radionuclides in sediments are in generally low except near outlets from the reprocessing industry and from phosphate fertiliser production. […] The accumulation of sediments in both sub-tidal and inter-tidal areas of the Irish Sea act as a long-term sink for plutonium and other long-lived particle reactive elements. These sediments contain substantial amounts of artificial radionuclides, particularly caesium, plutonium and americium, the redistribution of which is now being observed in the Irish Sea. Sub-tidal sediments contain the highest proportion of the estimated inventory of plutonium in the Irish Sea *(*c. 200 kg in the total sediment of the area). It is however the inter-tidal sediment that is more critical in terms of human contact".[33]

1.28. On human exposure it states *inter alia* that:

> "With regard to individual exposure from artificial radionuclides, generally caesium-137 has by far the greatest significance. […] For areas in the proximity of discharges, other radionuclides such as technetium-99, plutonium-239,

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31 The 1998 OSPAR Strategy with regard to Radioactive Substances, vol 3(1), Annex 75. See also Chapter 9, para 9.50.

32 QSR 2000, Para 4.9.2.

33 QSR 2000, Para 4.9.3.

plutonium-240 and americium-241 may be a more significant contribution to the doses to the local critical group."[34]

1.29. In relation to the ecological impacts of radioactivity it is apparent that there exists very great uncertainty, since this matter has been the subject of very little study. As the 2000 OSPAR QSR Report states:

> "the interest in the behaviour of radionuclides in the marine environment has, until now, been driven by the objective of protecting human health from ionising radiation through the food chain. While the system of human radiological protection has been well developed through the adoption of internationally recognised guidelines and standards, there are currently no internationally accepted radiological criteria for the protection of marine flora and fauna. The assumption has been that man is the most radiosensitive organism and that if man is adequately protected, then other living things are also likely to be sufficiently protected. The International Commission on Radiological Protection states that: 'the standard of environmental control needed to protect man to the degree currently thought desirable will ensure that other species are not put at risk. Occasionally, individual members of non-human species might be harmed, but not to the extent of endangering whole species or creating imbalance between species' (ICRP, 1991)."[35]

1.30. More recently, however, there has been an increased recognition of the potential harmful impacts of radiological releases on the environment itself, as opposed to the consequential impacts on human health.[36] In 1994 the OSPAR Convention parties agreed that more emphasis should be put on assessing biological and ecological effects in the marine environment (including the vulnerability of marine organisms and communities) arising from existing and foreseen future discharges of radioactive substances (PARCOM Decision 94/8). There is now a growing recognition that protection of the environment merits attention in its own right. The International Atomic Energy Agency acknowledges that:

> "there is a growing need to examine methods to explicitly address the protection of the environment from radiation. The concept of sustainable development places environmental protection on an equal footing with human protection, on the basis that it is necessary first to protect the environment in order to protect human populations." (IAEA, 1999).[37]

The 1998 OSPAR Strategy with Regard to Radioactive Substances reflects the shift in the approach, concerned as it primarily is with reducing concentrations of radionuclides in the marine environment and hence protecting the marine environment itself; the issue of doses to man are no longer the primary consideration. The Strategy requires the OSPAR Commission to undertake the development of environmental quality criteria for protection of the marine environment from adverse effects of radioactive substances and to report on progress by 2003.[38] Notwithstanding these developments, the United Kingdom has – in

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34 QSR 2000, Para 4.9.5.

35 QSR 2000, Para 5.3.13 *et seq* (emphasis added).

36 For this view, as expressed by the UK's National Radiological Protection Board, see Chapter 9, para 9.66.

37 Cf. QSR 2000, Para 5.3.13 *et seq*.

38 *Ibid*.

Irelands view – authorised the MOX plant without proper – if any – consideration of the ecological impacts of discharges from the MOX, THORP and other plants at Sellafield which will arise as a result of the MOX authorisation.

1.31. In addition to the main OSPAR QSR Report, in 2000 the OSPAR Commission prepared five regional Quality Status Reports. The western part of the United Kingdom, (including Northern Ireland) and Ireland and the Irish Sea lie within OSPAR Region III. The QSR 2000 for Region III confirms that over the last 40 years inputs of artificial radionuclides have been dominated by discharges from the nuclear reprocessing at Sellafield.[39] In analysing trends in discharges from Sellafield, this Report notes that:

- Discharges of various radionuclides have increased as a result of the starting of reprocessing at THORP;
- The subtidal sediments of the Irish Sea contain substantial amounts (ten to hundreds of kilograms) of artificial radionuclides, particularly caesium, plutonium and americium, and that the estimated total quantity of plutonium in sediments is about 200 Kg; and
- As the concentrations in the sediments slowly accumulate, they act as a long-term sink for plutonium and other long-lived and particle reactive radionuclides.[40]

1.32. With respect to levels of radionuclides in biota, the OSPAR QSR Report confirms the presence of radionuclides in biota (including seaweed, fish and shellfish) in areas of Irish sovereignty and over which Ireland exercises sovereign rights and recognises that their presence results from discharges at Sellafield. It also indicates uncertainty as to trends in levels of concentrations, including recent increases in concentrations of certain levels of radionuclides. The OSPAR Report states:

> "Concentrations of caesium-137 in bladder wrack [a seaweed] diminish with increasing distance from Sellafield and have fallen in response to reductions in the discharge. On the east coast of Ireland they decreased by approximately 20% per annum during the period 1983 to 1986, and although the downward trend continues, it is now less pronounced. […]Concentrations of technetium-99 in seaweeds and the edible tissues of lobsters rose rapidly in response to increased discharges after 1994. As with caesium, the concentrations decrease with increasing distance from Sellafield. Monitoring of seaweeds around Ireland during 1997 showed concentrations of technetium-99 at sites on the east coast to be almost 30 times higher than the pre 1994 level. […]In general, the concentrations of plutonium and americium are higher in shellfish than in fish. The most recent monitoring shows that their concentrations in fish and shellfish from routinely monitored sites in the Irish Sea are relatively stable."[41]

1.33. In its Overall Assessment, the OSPAR Report further recognises and confirms, "the radioactive contamination, particularly that arising from the Sellafield nuclear fuel

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39 The OSPAR Quality Status Report 2000: Region III – Celtic Seas, (Extracts), Paras 4.8 *et seq*, vol 3(2), Annex 85.

40 *Ibid*, para 4.8.6.

41 *Ibid*, para 4.8.7.

reprocessing plant, is a matter of concern to the public."[42] None of these conclusions or statements appear to have been challenged by the United Kingdom. A further point of note in the Quality Status Report for Region III is the confirmation that there are a number of important subjects in relation to which "… [our] understanding is relatively poor." This includes information on the passage of ships carrying cargoes of hazardous material, and the difficulty of establishing trends in contaminant concentrations.[43] In its conclusions, the OSPAR Region III Report recognises that the west coast of Ireland is relatively unimpacted by the contamination arising from within the region, indicating (in comparative terms) the degree of impact on the east coast of Ireland which is closest to Sellafield.[44]

OTHER REPORTS

1.34. Other reports confirm the impact of radionuclide discharges from Sellafield on the Irish Sea. One recent report is the Report on "Possible Toxic Effects from the Nuclear Reprocessing Plants at Sellafield (UK) and Cap de La Hague (France)" which was commissioned by the European Parliament's Directory General for Research, under the auspices of its Panel on Scientific and Technological Office Assessment (STOA) ("2001 STOA Report").[45] It was prepared by 10 independent experts and published by the European Parliament in November 2001. The General Conclusions set out in the Executive Summary include:

- "Marine discharges at Sellafield have led to significant concentrations of radionuclides in foodstuffs, sediments and biota";
- "The deposition of plutonium within 20km of Sellafield attributable to aerial emissions has been estimated at 16-280 GBq (billion becquerels), that is two or three times the plutonium fallout from all atmospheric nuclear weapons testing";
- "It has been estimated that over 40,000 TBq (trillion becquerels) of caesium-137, 113,000 TBq of beta emitters and 1600 TBq of alpha emitters have been discharged into the Irish Sea since the inception of reprocessing at Sellafield" (which means that "between 250 and 500 kilograms of plutonium from Sellafield is now absorbed on sediments on the bed of the Irish Sea");
- "In the UK, about 90% of nuclide emissions and discharges from the UK nuclear programme result from reprocessing activities" (at Sellafield).[46]

According to the 2001 STOA Report, the reprocessing of spent nuclear fuel at Sellafield and at La Hague results in the largest man-made release of radioactivity into the environment anywhere in the world.

1.35. Some of the conclusions of the STOA Report have been challenged, including by the United Kingdom.[47] Ireland notes in this respect that in March 2002 the EC

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42 QSR 2000, para 6.6.

43 *Ibid*, para 6.3.

44 supra n 38, p 63. See also **Plate 14** which shows the differences in the levels of radionuclide concentrations between the east and west coast of Ireland.

45 Possible Toxic Effects from the Nuclear Reprocessing Plants at Sellafield (UK) and Cap de La Hague (France), WISE-Paris, August 2001, vol 3(3), Annex 105.

46 *Ibid*, p 140-149.

Commissioner for the Environment told the European Parliament Assembly that the analysis of the discharge data of the Report was "consistent" with the data collected by the Commission.[48]

CONCLUSIONS

1.36. The Reports and studies identified above confirm that nuclear reprocessing at Sellafield generates large quantities of radioactive waste. A significant part of this radioactive waste is deliberately discharged, either directly or indirectly into the Irish Sea. These discharges have led to significant concentrations of radionuclides in the waters, sediments and biota of the Irish Sea. As described in Chapters 6 and 9, as a consequence of increased concern about the current situation the United Kingdom, Ireland and other parties to the OSPAR Convention undertook commitments to significantly and progressively reduce discharges of radionuclides and to reduce concentrations in the Irish Sea to "close to zero" by 2020.[49]

1.37. The presence of nuclear activities at Sellafield, including in particular the storage of large quantities of radioactive waste, also gives rise to a significant risk of unplanned releases of radioactive materials, whether in a liquid or aerial form, which would pose a significant threat to the Irish Sea. Ireland considers that the current state of knowledge makes it difficult to prepare accurate evaluations of risk arising from such storage. Nevertheless, it is clear that the consequences for human health and the terrestrial and marine environment of an accidental atmospheric or other release from the high-level radioactive waste tanks at Sellafield would be far greater than the consequences of the Chernobyl accident in April 1986. Concerns about accidental releases are further compounded by renewed concerns about terrorist attacks on the Sellafield site or on international transports associated with transports to and from the Sellafield site, including the MOX plant. This aspect is addressed in more detail in Chapter 8.

1.38. In conclusion, the present situation with respect to radioactive contamination of the Irish Sea may be summarised as follows:

- the Irish Sea has become significantly polluted by radionuclides;
- such pollution arises principally as a result of activities at Sellafield which commenced in the 1950's, which have been authorised by the United Kingdom;
- this pollution has caused the Irish Sea to be considered as the most radioactively-contaminated semi-enclosed sea in the world;
- such pollution has an impact on living resources and marine life, marine activities, and could have an impact on human health;

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47 See for example the Verbatim Record of the proceedings of ITLOS, 20 November 2001, 9.30 a.m,,p 5, line 46 *et seq*, where the Attorney General of the UK stated *inter alia*:

"It is a report, apparently leaked to the press, that has been widely criticised as unscientific. It has led, according to those reports, the Chairman of the very Committee, STOA, to say that the behaviour of WISE has not been "in line with the long standing tradition of STOA which always endeavoured to associate its work with the highest scientific and ethical standards".

48 See vol 3(3), Annex 115.

49 See Chapter 9, paras 9.42-51 *et seq*.

- whilst discharges of radioactive substances from the Sellafield site have generally decreased since the 1970's the discharge of some radionuclides, including from the THORP plant, have increased in the mid-1990's;
- the impact of radioactive pollution on the marine environment has not been well-studied and is therefore generally unknown;
- there is recognised concern about the radioactive pollution of the Irish Sea, as a result of which States have undertaken to significantly and progressively reduce discharges of radioactive substances with the object of reducing concentrations of artificial radionuclides in the Irish Sea to "close to zero" by 2020.

C. THE SELLAFIELD SITE (MOX, THORP AND RELATED FACILITIES)

1.39. It is against this background that the Sellafield site assumes a central importance. Sellafield is a 480-acre nuclear site located in Cumbria, in the North West of England. It is in very close proximity to the Irish Sea. The Sellafield site is approximately 112 miles from the Irish coast at its closest point (at Clogher Head). See **Plate 3** for the location of Sellafield in the United Kingdom and **Plate 4** for an aerial photograph of the Sellafield site.

1.40. Sellafield was a former Royal Ordnance factory site where work on the plutonium production piles (i.e. reactors) for defence purposes began in September 1947. At that time the site was called Windscale, after the bluff overlooking the River Calder on the seaward side of the site. The first plutonium production pile began to operate in October 1950. Pile No.2 commenced operation in June 1951. In January 1952 the first irradiated fuel rods were taken out of the piles and fed into a reprocessing plant.[50] This marked the commencement of nuclear reprocessing at Sellafield, and the resulting direct discharges of radioactive substances into the Irish Sea from Sellafield, by way of pipeline and aerial emissions.[51] This was not the only source of radioactive pollution of the Irish Sea; between the late 1940s and 1982 much of Britain's low-level radioactive waste was disposed of in the English Channel and Atlantic Ocean.

1.41. The two plutonium piles did not operate for long. In October 1957, seven years after it was built, Pile No. 1 caught fire and caused a plume of radiation. It is still not known precisely what caused the fire, which went on for two days: the fire is generally assumed to have been caused by heating due to the release of Wigner energy into the graphite. It was the first major accident in the history of nuclear power, and remains amongst the most significant (with Chernobyl and Three Mile Island). No one was evacuated or told to stay indoors during the 1957 Sellafield (Windscale) fire, and there was little restriction or safety instruction of any kind, beyond a somewhat belated decision to destroy locally produced milk after it was found to be contaminated. The effects of radiation from released radioisotopes and the degree of contamination are still not known

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50 For a brief history of the Sellafield site and its activities see Harold Bolter, Inside Sellafield, Quartet Books, 1996.

51 "Reprocessing" involves a chemical separation process by which plutonium and uranium are separated from fission products. It is described more fully in Liquid and Aerial Discharges from the Sellafield Mixed Oxide Plant, Dr. Frank Barnaby, vol 2, Appendix 8.

with any degree of certainty. Hence the impact on human health and the environment – in the United Kingdom and Ireland – remains unknown as the whole incident was covered up and little information made publicly available (The best estimate is that the accident gave a collective dose of 2,000 man-sieverts, producing about 100 fatal cancers).[52] Moreover, the authorities in the United Kingdom are still not certain of the total amount of radioactivity that was released during the fire. Over the years the estimates have varied between some 800 MBq and 2 GBq. The 1957 Windscale fire was a very serious event by any normal standards of industrial safety.[53]

1.42. The Windscale fire did not deter the United Kingdom from pressing ahead with the development of civil nuclear power. In October 1956 Britain's first commercial power reactor, Calder Hall on the Sellafield site, started generating electricity. It was fuelled by natural uranium metal encased in cladding made from magnesium oxide (and therefore referred to as a "Magnox" plant). Calder Hall was intended primarily to produce plutonium for the weapons programme and remains Britain's longest operating nuclear power plant. In June 2002 BNFL announced that the Plant will close in March 2003.[54]

1.43. Over the next twenty years after 1956, nine further Magnox type reactor plants, 14 Advanced Gas Cooled Reactors (AGRs) and one Pressurised Water Reactor (PWR) were built in the United Kingdom. Planning for a small prototype AGR fuelled by using enriched uranium began within a year of the opening of Calder Hall. Sellafield was once again chosen as the site where the new reactor was to be tested. The Windscale AGR (WAGR) began to supply electricity to the national grid in 1963. It was shut down in 1982.

1.44. In the 1970's responsibility for nuclear weapons passed from the United Kingdom Atomic Energy Authority (UKAEA) to the Ministry of Defence, leaving UKAEA to focus on the civilian nuclear industry. At this time, British Nuclear Fuels Limited (BNFL) was formed by the United Kingdom to take responsibility for nuclear fuel manufacture and for the management of spent nuclear fuel and wastes. BNFL reprocesses both British spent nuclear fuel and spent fuel from overseas. The activities carried out by BNFL at the Sellafield site can be broadly divided into three categories:

- **Operational activities:** including reprocessing of spent nuclear fuel in the Magnox and Thermal Oxide Reprocessing Plant (THORP) plants, the operation of the Calder Hall nuclear power station and MOX manufacture and
- **Waste management** and clean-up activities: including the management of historical accumulations of radioactive wastes and the clean up and decommissioning of plants that have ceased operation. In this regard it is important to mention the United Kingdom's recent White Paper on "Managing the Nuclear Legacy", which sets out the United Kingdom's latest

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52 For a critical account of the way the fire was handled by the Sellafield management see Harold Bolter, Inside Sellafield, Quartet Books, 1996, pp39–46.

53 As recently as 2001, the Pile was still undergoing decommissioning. In November 2001, the decommissioning had to be halted after an Inspector of the Nuclear Installations Inspectorate (NII) expressed "growing concerns" about the ability to manage the decommissioning of the Pile. See vol 3(3), Annex 116, p 358. The NII is responsible for regulating the nuclear radiological and industrial safety of Nuclear Installations in the United Kingdom, and is a responsible to the Health and Safety Executive (HSE) which is the statutory body responsible for the enforcement of work related health and safety law and the licensing authority for Nuclear Installations.

54 At that time Reactor 1 was already closed for routine maintenance while Reactors 2,3 and 4 had been shut down following a safety related incident at Chapelcross, which is of similar design. Reactor 1 has since gone back into operation. It is believed that the other three reactors will remain closed.

strategy for clean up ("the 2002 White Paper"). Its other implications are spelt out in detail in the following chapters.[55] See also paragraph 1.62 below.

- **Transport activities,** including the transport of spent nuclear fuel to Sellafield for reprocessing and the transport of MOX and high-level wastes back to countries of origin.

Each of these categories raises concerns for Ireland and are relevant to the dispute.

OPERATIONAL ACTIVITIES

1.45. Like the first nuclear power reactor, the first reprocessing plant in the United Kingdom was built at Sellafield for defence purposes, to produce plutonium for use in British nuclear weapons. A military reprocessing plant came into operation in 1952. This plant was shut down after 12 years and replaced by a new Magnox plant in 1964, designed to reprocess civil, as well as military, nuclear fuel. It was also built at Sellafield.

1.46. In 1969 another reprocessing plant – the Head End plant was completed. The Head End plant, which reprocessed oxide fuel, operated for only four years, reprocessing some 90 tonnes of spent oxide fuel. It was shut down in September 1973 after a release of radioactivity into the operating area of the plant contaminated about thirty-five workers. As a result, BNFL was left with some 350 tonnes of overseas fuel, which it was contractually committed to reprocess.

1.47. Notwithstanding the closure of the Head End plant, BNFL was determined to continue to reprocess oxide fuel, which it considered likely to be a profitable activity. The original plan to build a Thermal Oxide Reprocessing Plant (THORP) emerged in the mid-1970s. Initially there were plans to build two plants, one dedicated to reprocessing British fuel and one for overseas fuel. However, by 1975 a single THORP plant was envisaged.

1.48. In June 1976, BNFL applied to the Cumbria County Council for planning permission to build the THORP plant. In November the Council referred the matter to the Department of the Environment. In December 1976, BNFL was accused of covering up a leak of radioactive water from an old concrete silo (B38) at the Sellafield site. As a result, BNFL had to resubmit its THORP application, which it did in March 1977. A Public Inquiry was opened in June 1977. The Windscale Inquiry (as it has been called) lasted 100 days and closed in November 1977. The Inquiry inspector recommended approval for the construction of THORP in January 1978. THORP was not then subject to any environmental impact assessment, and it has not since been subject to any environmental impact assessment.[56] It was the subject of an Opinion from the European Commission as required by Article 37 of EURATOM.[57] But this Opinion was concerned only with impacts on human health and not impacts on the marine environment. Moreover, the data presented to the European Commission has not been made available to Ireland.

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55 See Managing the Nuclear Legacy, United Kingdom, July 2002, vol 3(2), Annex 94. The White Paper sets out *inter alia* the role of the new Liabilities Management Authority (LMA), its relationship with the government and its implications for BNFL. It also details the funding arrangements and the regulatory framework and radioactive waste management.

56 See Chapter 7, para 7.62 *et seq*. See also the Review of BNFL's Environmental Statement for the Sellafield MOX Plant, Mr. William Sheate, vol 2, Appendix 6.

57 EURATOM Commission Opinion on THORP, 30 April 1992, vol 3(3), Annex 122.

1.49. Over the next decade, during the course of the design and construction programme for THORP, there were substantial changes to the terms in which THORP had been described at the Windscale Inquiry and subsequently built, costed and marketed. For example, THORP's capacity was initially to be utilised by domestic and overseas reprocessing on a fifty-fifty basis. This balance was significantly eroded, with overseas fuel now accounting for 70% of the loading of the plant. Other parameters had also changed since the initial approval. Despite construction being almost completed in September 1992, commissioning was delayed as a further economic reappraisal of the THORP project was carried out.[58]

1.50. THORP finally began operating in 1994, reprocessing spent nuclear fuel elements and separating plutonium and uranium from fission products. THORP has not, however, lived up to its operational or economic expectations. It is now running two years late, as a result of which costs have increased significantly.[59] Moreover, the market for reprocessing of spent nuclear fuel has been significantly smaller than was expected, as result of which THORP is thought to have received no new reprocessing contracts since 1997.[60] Furthermore, its contracts with British Energy (the main UK based generator of nuclear energy) have turned out to be far more expensive than the alternative of long-term storage, and British Energy has stated that it would prefer to terminate all its reprocessing contracts with THORP.[61] The general expectation is that on its own THORP would obtain no new contracts and would close down in or around 2010, once its existing contractual obligations were completed.[62] It is against this background that the MOX plant assumes particular significance, since all the plutonium dioxide which is to be used at the MOX plant has either already been reprocessed or will be produced through reprocessing spent nuclear fuel at the THORP plant.[63]

1.51. The new MOX plant at Sellafield is premised on the assumption that any overseas customers (from Japan, Germany, Switzerland, Sweden and The Netherlands) who sent or will send their spent reactor fuel to THORP for reprocessing may want the separated plutonium from the spent fuel to be returned to them in the form of MOX. And it is expected that all contracts for the production of MOX fuel will also include a commitment to reprocess the spent fuel through the THORP plant.[64] In this way BNFL hopes that the MOX plant will increase the operational life of the THORP plant beyond its existing

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58 Interestingly, Harold Bolter, the longest serving Director of BNFL states in his book that "[I]n summary many of the assumptions fed by BNFL into the Whitehall appraisal of THORP have turned out to be wrong, making the whole exercise something of a charade." Harold Bolter, *Inside Sellafield*, Quartet Books, 1996, p 70 *et seq* at p 87.

59 See Report on Commercial Confidentiality and the SMP Plant, Mr. G. Mackerron, vol 2, Appendix 10.

60 *Ibid*, para 1.3.25.

61 See the second Mackerron Report, vol 2, Appendix 11, at p 528.

62 See Report on Commercial Confidentiality and the SMP Plant, Mr. G. Mackerron, vol 2, Appendix 10 and Dr. Barnaby's Report, vol 2, Appendix 8. See also the Radioactive Waste Management Advisory Committee's [RWMAC] Advice, vol 3(2), Annex 98, p 518 which states:

> "The lifetime of THORP reprocessing is dictated by BNFL's ability to win commercial contrast for reprocessing […]. RWMAC's analysis suggest that THORP's currently contracted work could be completed by 2010."

63 See Report on Commercial Confidentiality and the SMP Plant, Mr. G. Mackerron, vol 2, Appendix 10 also Liquid and Aerial Discharges from the Sellafield Mixed Oxide Plant, Dr. Frank Barnaby, vol 2, Appendix 8.

64 *Ibid*.

contracts. This is explicitly recognised in BNFL's economic case for the the MOX plant.[65] This explains why Ireland considers that the MOX and THORP plants – and their impacts on the environment – are properly to be treated in an integral way and as part of a single project. The environmental impacts of the THORP plant are an integral part of the consequences of the authorisation of the MOX plant. The THORP plant's environmental impacts are described in Chapter 3.

1.52. Along with reprocessing spent nuclear fuel, the production of Mixed Oxide Fuel (MOX) at Sellafield began over 30 years ago, originally (and mainly) for the Prototype Fast Reactor at Dounreay. In 1993 a fuel fabrication facility – known as the MOX Demonstration Facility (MDF) – began producing MOX fuel for Light Water Reactors.[66] MDF was a pilot (demonstration) plant, with a nominal production capacity of up to 8 tonnes of MOX fuel per year. It was shut down in 1999 and will not produce MOX fuel for use in reactors. It was MOX fuel produced at the MDF that that gave rise to the falsification scandal in 1999.[67]

RADIOACTIVE WASTE MANAGEMENT

1.53. The nuclear activities at Sellafield from the 1950s have given rise to a very large and growing stockpile of nuclear waste. The United Kingdom's policy on long term and secure storage and disposal of intermediate- and high-level nuclear waste remains unresolved, and is growing more acute each year.[68] The most significant discharges come from BNFL's spent fuel element storage ponds and the reprocessing plants, which handle the United Kingdom's irradiated Magnox fuel, spent fuel from the AGRs and the PWR and spent fuel from overseas. National Low-level solid waste, whether military or civil, is stored at Drigg, a waste repository operated by BNFL, down the coast from Sellafield. Civil intermediate level solid waste is largely stored at Sellafield awaiting a decision on a national storage facility. Both civil and military high level solid waste is generally moved to Sellafield for temporary storage. There are major problems with the long-term storage and disposal of intermediate and high-level waste. Since this waste is highly dangerous and very long-lived, any storage or permanent disposal facility has to be very secure and safe over a long period.

1.54. High Level Waste (HLW) is a heat generating waste, that has accumulated at Sellafield since the early 1950's, primarily from the reprocessing of "spent nuclear fuel." The temperature in HLWs may rise significantly, so this factor has to be considered when designing storage and disposal facilities. Intermediate Level Wastes (ILW) arise mainly from the reprocessing of spent nuclear fuel and from general operations and maintenance of radioactive plants. Low Level Wastes (LLW) arise principally as lightly contaminated miscellaneous scrap.

1.55. The developing problem of solid radioactive waste disposal was first highlighted by the 1976 Report of the Royal Commission on Environmental Pollution, which advised

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65 See vol 3(3), Annex 104, p 85.

66 For an account of how Mixed Oxide Fuel is manufactured see Chapter 2.See also Liquid and Aerial Discharges from the Sellafield Mixed Oxide Plant, Dr. Frank Barnaby, vol 2, Appendix 8, p 402.

67 See chapter 2, paras 2. 78 *et seq.*

68 Disposal in the context of solid waste means the emplacement of waste without intent to retrieve at a later date. Retrieval maybe possible, but if that is intended it amounts to storage. Disposal also includes the release of airborne and liquid wastes into the environment.

against expanding nuclear power until a safe method had been found to contain radioactive wastes. The Commission called for research on the solidification of High Level Waste (HLW). Fifteen years later, in 1991, this resulted in the setting up of the Windscale Vitrification Plant at Sellafield.[69] The Report also recommended research into the disposal of solidified HLW. Following the Commission's advice, responsibility for dealing with radioactive waste was transferred from the Department of Energy to the Department of the Environment.

1.56. Before the disposal of operational and stored liquid wastes, they are treated at the Enhanced Actinide Removal Plant (EARP). Chemical treatment and ultra-filtration at the Plant remove alpha activity and some beta activity and the treated effluent is discharged to sea. Similarly, the Site Ion Exchange Effluent Plant (SIXEP), set up in the mid 1980's, also treats liquid wastes. An ion-exchange method is used to remove mainly caesium-137 and strontium-90 following which the liquid effluents are discharged in to the sea. The Segregated Effluent Treatment Plant (SETP) deals only with low active liquid wastes from THORP and B-205 before discharging them into the sea. Improving the efficiency of these plants could reduce the levels of radioactivity in discharges.

1.57. In 1982, the United Kingdom established United Kingdom Nirex Ltd. ("UK Nirex") to provide radioactive waste disposal services for Low Level Waste (LLW) and Intermediate Level Waste (ILW). In 1989, Nirex was asked to investigate a deep waste repository for all types of LLW and ILW. In 1989, UK Nirex decided to focus on sites at Sellafield and Dounreay. However in 1994 Nirex was denied planning permission by the local authority for an underground laboratory to investigate the suitability of a potential deep disposal site at Sellafield, next to the Irish Sea. In 1997, following a Planning Inquiry at which Ireland made submissions, this decision was upheld in a Report of a Planning Inspector and by decision of the (then) UK Secretary of State for the Environment.[70] The decision to refuse permission was based *inter alia* on the fact that the environmental impact assessment prepared by UK Nirex was inadequate, that alternative options (and sites) had not been properly explored, and on the potential impacts of the project on the marine environment of the Irish Sea, having regard to the requirements of the precautionary principle and the recognition of Ireland's legitimate interests.[71] It was also based on the conclusion that the proposed laboratory was so closely connected to the Deep Waste Repository itself that the two formed a single project. The UK Nirex proposal therefore bears a striking similarity to the issues raised by the MOX plant.[72]

1.58. Following the collapse of the proposal by UK Nirex, a House of Lords Select Committee on Science and Technology investigated the management of nuclear waste. The Committee reported in March 1999: its main recommendation was that the United Kingdom should "seek to build public consensus before attempting to implement its chosen policy".[73] In response the United Kingdom government stated that it would publish a "detailed and wide-ranging consultation paper" in 2000. In September 2001, the United Kingdom government published its consultation paper on "Managing Radioactive Waste

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69 In this plant liquid waste is mixed with molten glass and allowed to cool inside a stainless steel container, forming a solid block. This process is called vitrification.

70 Extracts of the Inspector's Report and a discussion regarding the Decision appear in *Ibid.*

71 See also the United Kingdom's decision letter regarding Nirex, 17 March 1997, vol 3(3), Annex 118.

72 See Sheate Report, vol 2, Appendix 6.

73 See http://www.parliament.the-stationery-office.co.uk/pa/ld199697/ldinfo/ld16sctk/ld16sctk.htm.

Safely" which aimed to start a nationwide debate on how to manage solid radioactive waste.[74]

1.59. Ireland believes that currently the HAST (radioactive waste storage) tanks at Sellafield contain almost 1600 cubic metres of extremely dangerous liquid high-level waste. In addition Ireland believes that the ILW is not stored in "safe passive form". The United Kingdom Government's Radioactive Waste Management Advisory Committee (RWMAC) has called this "unsatisfactory".[75]

1.60. It is not in dispute that the authorisation of the MOX plant will generate further – and very significant – quantities of solid, aerial and liquid wastes, both from the MOX and THORP plants. These will have to be added to the existing and growing stockpile at Sellafield. These consequences have not been the subject of any environmental impact assessment.[76]

TRANSPORT ACTIVITIES

1.61. Besides the operational and waste management activities carried out by BNFL at Sellafield, the company is also responsible for transporting radioactive material. Nuclear materials have in the past entered and left the United Kingdom by sea, air and land. As no nuclear reactors in the United Kingdom currently use MOX fuel, any MOX fuel produced at the MOX Plant will have to be exported. There will thus be an increasing traffic in nuclear materials by sea, air and land. Ireland understands that a significant number (if not all) of the dispatches by sea will be through the Irish Sea. Pacific Nuclear Transport Ltd. (PNTL), a subsidiary of BNFL operates ships capable of carrying all categories of nuclear material. However, the United Kingdom has refused to provide Ireland with any information on such transports.[77]

TRANSFER OF MOX AND THORP FROM BNFL TO THE NEW LIABILITIES MANAGEMENT AUTHORITY

1.62. All the liabilities and assets at Sellafield including the MOX and THORP plants, are about to be transferred from BNFL back into full public ownership. In July 2002, the United Kingdom published a White Paper on "Managing the Nuclear Legacy."[78] Its stated aim is the management of the nuclear waste legacy. Earlier, in November 2001, the Secretary of State for Trade and Industry, United Kingdom had announced the setting up of a new Liabilities Management Authority (LMA).[79] The White Paper sets out the role of the LMA which is to be responsible to the United Kingdom Government with a specific remit to "ensure the nuclear legacy is cleaned up safely, securely, cost effectively and in ways which protect the environment for the benefit of current and future generations." Chapters 3 and 4 of the White Paper detail the role of the LMA and its operations and

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74 See Chapter 3 and 9 below.

75 RWMAC Submissions, 27 June 2002, vol 3(2), Annex 100. See also Chapters 3 and 9.

76 See Sheate Report, vol 2, Appendix 6 and Review of BNFL's Environmental Statement for the Sellafield MOX Plant, vol 2, Appendix 6.

77 On the issue of transports of nuclear materials through the Irish Sea, see Chapter 8.

78 See vol 3(2), Annex 94.

79 House of Commons Hansard Debates for 28 Nov 2001, col. 990 *et seq* at vol 3(2), Annex 93.

Chapter 5 deals with the implications on BNFL. The White Paper recognises that the clean up cost will be in excess of £40 Billion and will take "scores of years."[80]

1.63. The LMA is to take over the financial and legal responsibility for various nuclear sites including Sellafield. It is to be established by statute as a non-departmental public body. The statute will also set out its functions and duties. The creation of the LMA has major implications for BNFL, and will involve a significant restructuring of the company. The LMA will take on financial and legal responsibility for the Sellafield site, all the assets and associated liabilities, which include THORP and the MOX plant, as well as nuclear wastes and materials at the site. With regard to THORP and the new MOX plant, the White Paper states that any new contracts involving the THORP and MOX plants will require the prior approval of the Secretary of State. The Paper states that any new proposal will not only be looked at in the circumstances of the specific case, but also in the light of the Bergen Declaration.[81] The White Paper states that approval for new contracts would only be given if the contracts were consistent with the clean up plans for Sellafield, and were expected to make a positive return to the United Kingdom tax-payer after allowing for certain costs including any additional clean up cost and consistent with the United Kingdom's environmental objectives and international obligations.[82] The White Paper recognises the importance of waste management as well as the fact that current uncertainties about future policy requirements need to be resolved.[83]

D. THE GENERAL CONCERNS OF THE IRISH PEOPLE, THE IRISH GOVERNMENT AND THIRD GOVERNMENTS

1.64. Ireland has been concerned about nuclear activities at Sellafield since they began in the late 1940's. Ireland's concern has been acute since the Windscale fire in 1957. Ireland has consistently protested against all radioactive discharges, against the use of the Sellafield site for nuclear activities, and against the use of the Irish Sea as a depositary for the United Kingdom's nuclear waste. As a neighbouring coastal State, Ireland is deeply concerned at the radioactive pollution of its waters, including those over which it exercises sovereign rights. Ireland's concerns are shared by many of the coastal States in the region.

1.65. The United Kingdom Government has in the past recognised that Ireland has a "legitimate interest" in the activities carried out at Sellafield, in particular because of the potential impacts of radioactive emissions from the Sellafield facility into the Irish Sea. In 1997, following the planning inquiry relating to the proposal by UK Nirex, the United Kingdom declined to authorise an application by UK Nirex to construct an experimental deep waste repository for the storage of nuclear waste under the Irish Sea. In taking that decision, the then Secretary of State, stated that he:

> "notes and agrees with the [Planning Inspector's conclusions (IR 3C.18 to 3C.23) regarding the concerns of the Irish Government …. and agrees that the people of Ireland have a legitimate interest in any proposal for a repository for radioactive

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80 See also the 2002 White Paper, vol 3(2), Annex 94, Figure 2, p 297.

81 The Bergen Ministerial Declaration, March 2002, at vol 3(2), Annex 86 *inter alia* encourages North Sea states to evaluate the options for spent fuel management after current reprocessing contracts come to an end.

82 See the 2002 White Paper, Chapter 5, vol 3(2), Annex 94.

83 *Ibid*, Chapter 7.

> waste near the Irish Sea coast. He is acutely aware of the Government's obligations to other states which are set out in various international obligations in respect of the sea and the environment more generally."[84]

1.66. Ireland participated in the Windscale Inquiry regarding THORP in 1977. Similarly in relation to the MOX plant Ireland has been a consultee in all five public consultations held by the United Kingdom. It has made its concerns about the MOX plant known since 1994.[85]

1.67. The Irish people have also voiced their views, independent of their Government's actions. In April 2002, 93% of all Irish households took part in a postal campaign against the Sellafield site. In a campaign organised by civil society 1.2 million of Ireland's 1.3 million households sent post cards to Prime Minister Tony Blair and to the chairman of BNFL calling for Sellafield to be shut down. These were delivered on 26 April 2002.[86]

1.68. The concerns of Ireland are shared by other coastal States, who also feel the impact of discharges from Sellafield, on the marine environment. In March 2002, at the Bergen Summit on pollution of the North Sea, the press reported that the Government of Norway was seeking legal advice on how to stop BNFL discharging radioactive waste into the sea from the Sellafield site. The UK Environmental Minister promised to listen to complaints about Sellafield, saying: "I am aware that there are genuine and very real concerns in this country."[87] Earlier, in October 2001, the five member States of the Nordic Council (Norway, Sweden, Denmark, Finland and Iceland) called on the United Kingdom to stop radioactive pollution from Sellafield. Norway and other States called on the United Kingdom to halt all radioactive discharges from Sellafield and close the THORP reprocessing plant. Norway has called for emissions from BNFL's reprocessing facilities to be processed inland and not to be discharged into the Irish Sea;[88] and the Norwegian Minister of the Environment wrote to the United Kingdom counterpart expressing strong regret with regard to the United Kingdom's decision that the commissioning of the MOX plant was justified, stating that:

> "the new MOX plant will strengthen the commercial basis for reprocessing activities at Sellafield and most likely expand the volume and prolong the life span of these activities as well as the discharges and risks they entail. There will also inevitably be more shipments of MOX-fuel which represent a significant environmental and safety risk."[89]

1.69. In addition to these neighbouring States, other States which lie along the routes used to transport radioactive materials to and from the United Kingdom, have also protested vigorously against this transportation. This aspect is dealt with in more detail in Chapter 2.

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84 See the United Kingdom's decision letter regarding Nirex, 17 March 1997, vol 3(3), Annex 118.

85 For particulars of Ireland's participation in the public consultations regarding the justification of the MOX plant see Chapter 4.

86 On 1 May 2002, the Prime Minister was asked in Parliament if he could confirm that he had "received the largest amount of correspondence [1 Million cards] from individuals on one subject that any Prime Minister has ever received, …from citizens across Ireland." See House of Commons Hansard Debates, 1 May 2002 (pt 2) at www.parliament.the-stationery-office.co.uk/cgi-bin/htm_hl?DB=ukparl&STEM.

87 See vol 3(3), Annex 116, p 359. See also extracts from the Bergen Ministerial Declaration, March 2002, 3(2), Annex 86.

88 See vol 3(3), Annex 112.

89 Letters from Norway dated 12 August 2001 and 18 October 2001, vol 3(3), Annexes 113 & 114.

1.70. Ireland's concerns, and those of other States, have become all the more acute as a result of the events of 11 September 2001. The Prime Minister of the United Kingdom has recognized these renewed concerns when he stated in Parliament, on 14 September 2001, that for terrorist groups:

> "[T]he limits are only practical and technical. We know, that they would, if they could, go further and use chemical, biological, or even nuclear weapons of mass destruction. We know, also, that there are groups or people, occasionally states, who will trade the technology and capability of such weapons. It is time that this trade was exposed, disrupted, and stamped out. We have been warned by the events of 11 September, and we should act on the warning."

1.71. However, within three weeks of these events the MOX plant was authorised by the United Kingdom Government, on 3 October 2001.

CHAPTER 2

THE MOX PLANT

2.1. In the early 1990's BNFL sought authorisation for the construction at the Sellafield site of a new MOX plant for the commercial manufacture of nuclear fuel from a mixture of uranium and plutonium dioxides. The plutonium dioxide was to be produced at the THORP plant. After planning authorisation was granted in 1994, construction of the MOX plant was completed in 1996. However, it took a further five years before the United Kingdom was able to take the decision on 3 October 2001, which paved the way for its authorisation and operation. In that period five Public Consultations were held and a scandal concerning the faulty production of MOX fuel at the MOX Demonstration Facility (MDF) caused Japan to review its use of the MOX fuel.

2.2. This Chapter is divided into 5 sections. **Section A** outlines the nuclear fuel cycle and explains the processes whereby MOX fuel is manufactured, including related activities associated with its manufacture. **Section B** summarises the details – insofar as they are known – as to the international shipments of radioactive materials to and from the United Kingdom which are associated with the MOX plant, and which pass through the Irish Sea. **Section C** describes economic aspects of the MOX plant, and the international market for MOX fuel, such as it is. **Section D** describes the ownership of the site, which is to be transferred shortly from BNFL to a new Liabilities Management Authority. This Section also touches upon BNFL's record of compliance with the regulatory safeguards which apply to the Sellafield site. Finally, **Section E** describes the regulatory process and the decision-making procedure leading to the decision of 3 October 2001.

A. THE MANUFACTURE OF MOX FUEL, AND RELATED ACTIVITIES

2.3. The manufacture of MOX fuel, the consequent increase in activity at the Thermal Oxide Reprocessing Plant (THORP) and the pressures on existing waste storage facilities, involve significant risks for the Irish Sea. The manufacture of MOX fuel will inevitably lead to discharges of radioactive substances into the marine environment, including planned liquid discharges into the Irish Sea and releases into the atmosphere which will reach the Irish Sea. These, in turn, will add to the existing concentration of radioactive isotopes in the Irish Sea, in a manner which Ireland considers to be incompatible with the United Kingdom's international legal obligations. MOX manufacture is also vulnerable to accidents, and the MOX plant can only serve to increase the attractiveness of Sellafield as a target for terrorist attack.

2.4. The production of MOX fuel at Sellafield involves two material stages. Both have significant implications for the marine environment of the Irish Sea. In the first stage spent nuclear fuel is reprocessed at THORP. The spent fuel is separated into uranium, plutonium

and fission products. In the second stage the separated plutonium dioxide and uranium are used to manufacture mixed oxide fuel (MOX) at the new MOX plant at Sellafield.

2.5. The production of MOX fuel is graphically depicted at **Plate 13**.

THE NUCLEAR FUEL CYCLE

2.6. Nuclear power rectors, used to generate electricity, are normally fuelled with uranium, a naturally occurring element.[1] After uranium has been used in a reactor to produce electricity it is known as "spent fuel". Spent fuel may be stored and eventually permanently disposed of in a geological repository. Alternatively, spent fuel may undergo a further series of steps including temporary storage, reprocessing, and recycling before eventual disposal as waste in a geological repository. These steps collectively make up the "nuclear fuel cycle".

2.7. Several hundred fuel assemblies make up the core of a nuclear reactor. For a reactor with an output of 1,000 megawatts of electricity, the core would contain about 75 tonnes of low-enriched uranium. In the reactor core the uranium-235 isotope fissions (or splits), producing heat in a continuous process called a fission chain reaction. Some of the uranium-238 in the reactor core is turned into plutonium and about half of this is also fissioned, providing about one third of the reactor's energy output.

2.8. Fission is the process of splitting the nucleus of a heavy atom (such as uranium and plutonium) into two or more parts. When the atom is bombarded with neutrons and the nucleus splits apart, it produces fission products – essentially two or more unstable (radioactive) atoms. A number of neutrons (which may go on to split apart other nuclei, thus setting up a chain reaction) and a great deal of energy in the form of radiation. The radioactive decay of the radioactive fission products produces heat.

2.9. As in any electricity generating station, the heat is used to produce steam to drive a turbine and an electric generator. To maintain efficient nuclear reactor performance, about one-third of the spent fuel is removed every year or so, to be replaced with fresh fuel.

2.10. Spent fuel assemblies taken from the reactor core are highly radioactive and give off large amounts of heat. They are therefore stored in special ponds which are usually located at the reactor site, to allow both their heat and radioactivity to decrease. The water in the ponds serves the dual purpose of acting as a barrier against radiation and dispersing the heat from the spent fuel.

2.11. Spent nuclear fuel still contains approximately 96% of its original uranium; about 3% of spent nuclear fuel comprises waste products and the remaining 1% is plutonium produced while the fuel was in the reactor and not "burned" then. The separated plutonium can be blended with, for example, natural uranium to produce a mixed oxide (MOX) fuel, in a MOX fuel fabrication plant like the Sellafield MOX plant.

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1 To prepare uranium for use in a nuclear reactor it must be processed through a number of steps: mining and milling, conversion, enrichment and fuel fabrication. The vast majority of all nuclear power reactors in operation in the world use "enriched" uranium fuel in which the content of the uranium-235 isotope has been raised from the natural level of 0.7% to about 3.5% or slightly more. The enrichment process removes 85% of the U-238 (the other uranium isotope in natural uranium).

2.12. The highly radioactive fission products can be stored in liquid form and subsequently solidified. This is done by calcining it (heating it strongly) to produce a dry powder which is incorporated into borosilicate (Pyrex) glass to immobilise the waste. The glass is then poured into stainless steel canisters, a process referred to as vitrification.

2.13. The final disposal of vitrified high-level wastes, or the final disposal of spent fuel which has not been reprocessed, has not yet taken place. It is generally assumed that it will be buried in stable rock structures deep underground in geological formations such as granite, volcanic tuff, salt or shale.

STEP 1: REPROCESSING OF SPENT NUCLEAR FUEL

2.14. As stated above, plutonium, which is ultimately used to manufacture MOX fuel, comes from reprocessing "spent" nuclear fuel – fuel which has already been irradiated in the core of a nuclear reactor. The MOX process is therefore closely connected with spent fuel reprocessing. A MOX plant requires a reprocessing plant to supply it with raw materials. In the case of Sellafield, the spent fuel is first brought to THORP where it is reprocessed and the product of the THORP process (i.e. the plutonium dioxide) is then transferred to the adjoining MOX plant. The reprocessing activity itself produces significant amounts of radioactive wastes which are discharged into the Irish sea.[2]

2.15. All commercial reprocessing plants (in the UK, France, Russia, India and Japan) use a chemical process known as PUREX. This involves cutting spent fuel elements into small lengths and dissolving them in tanks of hot concentrated nitric acid. On the Sellafield site this takes place at the THORP plant. The pieces of the stainless steel canisters which had enclosed the oxide fuel elements (called waste hulls), which are removed during the cutting process, are encapsulated in cement and then stored at Sellafield (as intermediate level radioactive waste).

2.16. The uranium and plutonium dissolved in the nitric acid are then separated by solvent extraction steps. Three streams of liquid emerge from the reprocessing plant – solutions of uranium nitrate, plutonium nitrate, and fission products. The liquid containing the fission products is highly radioactive and generates a large amount of heat by way of radioactive decay processes. At Sellafield these liquids are contained in 21 stainless steel Highly Active (Waste) Storage Tanks (HAST tanks). This high-level radioactive waste would boil if the tanks were not continuously cooled. This high-level liquid waste is vitrified. Cylinders of vitrified waste are stored at Sellafield until they can be returned to the owners of the spent fuel, who will then decide how it is to be stored.[3]

2.17. Only a small amount – about 10% – of all spent reactor fuels are subject to reprocessing. The remainder is stored until it can be permanently disposed of in a geological repository. The United Kingdom has no permanent storage facility. A proposal to explore the construction of one near the Irish Sea was rejected by the United Kingdom.[4] The United States is planning to build such a repository at Yucca Mountain.

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2 See Chapter 3, para 3.27 *et seq*.

3 Vol 3(3), Annex 116. See also Chapter 3, para 3.8 and Chapter 8, para 8.192 *et seq*.

4 See Chapter 1, para 1.57.

THE THORP REPROCESSING PLANT

2.18. THORP started operating in 1994. It reprocesses foreign spent fuel and British spent fuel originating from reactors operated by British Energy (Advanced Gas-Cooled Reactors and one Pressurised Water Reactor). Most of the foreign fuel comes from Japan; the rest comes from Germany, Switzerland, Sweden, and the Netherlands.

2.19. Apart from the Advanced Gas-Cooled Reactors (AGRs),[5] these reactors are light-water reactors (LWRs). Both types are originally fuelled with uranium-dioxide fuel, covered in stainless steel cladding. Reactors such as Magnox reactors are fuelled with metal uranium fuel, clad in magnesium alloy. At Sellafield Magnox fuel is currently reprocessed in another reprocessing plant, called B-205.[6] The B 205 plant is not at present a part of this dispute between Ireland and the United Kingdom.

2.20. The THORP plant at Sellafield has reprocessed spent oxide fuel since 1994. In the Fiscal Year 2001-2002 BNFL expects to reprocess 735 tonnes of Heavy Metal (tHM).[7] This gives a total of 3,899 tHM reprocessed in THORP during its eight years of operation, an average annual throughput of 487 tHM per year. On average, the output of THORP has fallen far short of the annual capacity of more than 900 tHM originally envisaged as practical. The full design throughput of the plant is 1,200 tHM and according to BNFL, it could reach 1,000 tHM. However, THORP has never reached this throughput and is unlikely ever to do so.

2.21. The THORP reprocessing contracts so far negotiated by BNFL amount to a total of about 6,600 tonnes of heavy metal (tHM).[8] These contracts are called "baseload contracts." THORP's initial baseload period was ten years, and it was originally due to be completed on 31 March 2004. However, significant delays have slowed down the operation of THORP, so this volume is expected to keep THORP running until 2007 or later.[9] BNFL is actively trying to obtain new contracts to keep THORP running after this date. However, BNFL has obtained no new contracts for THORP since 1997.[10] It is considered highly unlikely that THORP will attract any more contracts, at least without the MOX plant being brought into operation.[11]

2.22. About two-thirds of the baseload contracts are from overseas customers. Five overseas customers – Japan, Germany, Switzerland, Sweden and the Netherlands – account for about 4,432 tHM of the baseload contracts. Two countries, Japan and Germany, together account for about 86% of the overseas baseload contracts. Most of the remaining

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5 Chapter 1, para 1.43.

6 Since 1965, the B-205 plant has reprocessed about 27,000 tonnes of spent Magnox fuel. About 3,500 tonnes of LWR spent fuel have been reprocessed at THORP. According to current plans, B-205 will shut down by 2012.

7 In its first Fiscal Year (FY) 1994 – 95 THORP reprocessed 65 tHM; in FY 95-96, it reprocessed 208 tHM; in FY 96-97, 408 tHM; in FY 97-98, 781 tHM; in FY 98-99, 461 tHM;in FY 99-00, 879 tHM; and in FY 00-01, 362 tHM. See Liquid and Aerial Discharges from the Sellafield Mixed Oxide Plant, Dr. Frank Barnaby, vol 2, Appendix 8.

8 See Dr. Barnaby's Report, vol 2, Appendix 8, paras 2.3, 2.4.

9 *Ibid*, para 2.4.

10 See Report on Commercial Confidentiality and the SMP Plant, Mr. G. Mackerron, vol 2, Appendix 10, para 1.3.25.

11 *Ibid*, para 1.3.27-1.3.29.

one-third of the baseload contracts, more than 2,000 tHM, is contracted by British Energy[12]

2.23. BNFL has negotiated two post-baseload contracts with British Energy and Germany. Without additional contracts THORP will cease to operate in the period 2007-2010. This factor is the key to understanding the rationale behind the proposal for the MOX plant. Without MOX it is unlikely that THORP would obtain any new contracts. If there were no reprocessing contracts, then once the already separated plutonium at Sellafield was made into MOX fuel, the MOX plant would have no reason to exist.[13]

2.24. The reprocessing at THORP results in the production of radioactive wastes in solid, liquid and gaseous forms.[14] A significant proportion of these wastes are discharged directly or indirectly into the Irish Sea or into the atmosphere.[15] Therefore THORP has and continues to contribute materially to the radioactive pollution of the Irish Sea.[16]

2.25. The MOX plant is dependent upon the plutonium dioxide produced at the THORP plant as a feedstock. BNFL hopes that the operation of the MOX plant will extend the life of the THORP plant. In this way the authorisation of the MOX plant leads directly to an increase in activity at the THORP plant, and to significantly greater increases of radioactive discharges into the Irish Sea.

2.26. The Report of Gordon MacKerron ('the MacKerron Report') explains in great detail that MOX production is an expensive alternative to the storage of spent nuclear fuel, rather than an economically competitive alternative fuel. The MacKerron Report also explains the link between the MOX plant and the THORP plant.[17]

STEP 2: THE MANUFACTURE OF MOX FUEL

2.27. The product of the THORP reprocessing activity produces the feedstock for the manufacture of MOX fuel. The manufacturing process for MOX fuel is relatively straightforward. Mixed Oxide (MOX) nuclear-reactor fuel is made from a mixture of depleted uranium dioxide (UO_2) and plutonium dioxide (PuO_2). It typically contains 3% to 10% plutonium-239 (Pu-239), the remainder being depleted uranium (U-238). The radioactivity in PuO_2 makes it a highly toxic material. If a person inhales into the lungs less than 100 micrograms of PuO_2 (which is too small a quantity to be visible to the human eye), it is highly probable that they will develop lung cancer. If a few milligrams are ingested there is a high probability of developing liver or bone cancer.

2.28. The MOX plant at Sellafield is a commercial MOX production plant, with a nominal capacity of 120 tonnes of heavy metal per year (tHM/y). Its only stated rationale is the commercial production of MOX fuel, unlike the United States MOX production facility which is non-commercial and is solely intended to reduce its plutonium stockpile. As described in Chapter 1, the MOX plant will, in the United Kingdom Government's own assessment, never recoup the costs of its construction.

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12 See Barnaby Report, vol 2, Appendix 8, para 2.4.

13 See the Mackerron Reports, vol 2, Appendices 10 and 11.

14 See Chapter 3, also Barnaby Report, vol 2, Appendix 8, part 3.

15 *Ibid*.

16 *Ibid*.

17 See Mr MacKerron's Report, Executive Summary and Section 1.1, vol 2, Appendix 10.

2.29. The MOX plant is designed to manufacture fuel for Light-Water Reactors, both Pressurised Water Reactors and Boiling-Water Reactors. To manufacture MOX fuel at the plant, uranium dioxide and plutonium dioxide will be mixed – by grinding, milling and blending – to produce a micronised, granulated powder.[18] During these processes a dry lubricant (zinc stereate) and a conditioner (an agent to control porosity) are added. The granulated powder is then milled, pressed and sintered in an atmosphere of argon-hydrogen. This, in turn, produces a sintered fused matrix of ceramic dioxide. This sintered MOX is in the form of cylindrical pellets. Conveyors transfer the pellets to the grinding and inspection stations where they should be precisely ground to the dimensions (diameter and length) specified by the customer. Suitable pellets are put into a pellet store until they are required for the production of fuel rods for a reactor. Unsuitable pellets are re-milled and the powder put through the process again. Pellets are stored on the Sellafield site until they are required for the production of reactor fuel rods.[19] This involves placing the MOX pellets in a zirconium alloy sheath, which is purged with helium. This forms a sealed fuel rod of about two to three meters long.[20]

2.30. The fuel rods are inserted into the reactor core as an assembly; the rods are held in geometric (square) arrays by lightweight spacers to form fuel assemblies for a Pressurised Water Reactor or a Boiling-Water Reactor. A typical MOX fuel assembly consists of a square array of rods: each rod contains about 300 MOX pellets. For a Pressurised Water Reactor the array is typically 17 by 17 rods; for a Boiling-Water Reactor it is 8 by 8 rods. The customers for MOX require that the pellets are soluble in a pure nitric acid solution so that spent MOX fuel rods can be reprocessed.

2.31. The specified properties of MOX pellets produced by BNFL are: density, 10.45 grams per cubic centimetre (g/cc); the green pellet density is more than 6 g/cc; the average grain size is 7.4 microns, with a standard deviation of 0.54 micron. A typical MOX pellet for a Pressurised Water Reactor is 1.0 centimetres in length and 1.0 centimetres in diameter, and weighs 8.2 grams. A Boiling Water Reactor pellet is typically 1.03 centimetres long and 1.04 centimetres in diameter and weighs 9.15 grams.[21]

2.32. In summary, the Sellafield MOX Plant consists of two separate lines. Each line contains an attritor mill (fed by uranium and plutonium dioxide dispensers), a blender, a second attritor mill, a spheroidiser, a pellet hopper, a pellet press, sintering furnaces, and a grinder. After grinding, the pellets go to the sintered pellet store. Zinc stearate and a conditioner are added to the blender and the spheroidiser. Unsuitable pellets, after passing through a pellet crusher, as well as arisings from the grinder, can be recycled through the line. Most of the operations at the MOX plant up to the loading of filled fuel rods into fuel magazines and assemblies are carried out in "glove boxes". The MOX Plant is mainly a remotely operated (automated) plant relying extensively on a software-based system for control of the process. The plant is operated from a control room provided with equipment

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18 The technology used by BNFL to produce MOX is known as the Short Binderless Route (SBR) process; it is a dry powder process developed by BNFL from its experience in developing and fabricating MOX fuel for fast breeder reactors. Other European MOX producers use a different process, called Micronized Master Blend (MIMAS).

19 See Dr. Barnaby's Report, vol 2, Appendix 8.

20 The fuel rod, purged with helium, is subjected to a helium leak test, monitored for loose and fixed contamination, tested for rogue pellets, checked for overall length and geometry, X-rayed, inspected for surface finish, loaded into a magazine and stored until required for the production of a fuel assembly.

21 *Ibid*.

to control the production and inspection stages of the pellets, and to monitor and control the environment of the plant.

2.33. The operation of the MOX process involves particular risks which distinguish it from other fuels:

- The MOX plant is an automated plant relying extensively on an untried software-based system for control of the process;
- The production process involves the use of an advanced powder technology. Experience in other powder processing industries indicates that processes which are dependent on powder technology are not very reliable, since small changes in conditions can affect the powder and result in poor mixing or powder jams;
- Problems associated with powder technologies are exacerbated when, as in the MOX process, small batches need to be produced to variable formulations;
- Lapses in the quality of inspections carried out by BNFL may have extremely serious safety implications and may have consequences which are time consuming and costly to rectify. In relation to Japan, it is still not clear that the loss of customer confidence caused by the Data Falsification Incident (see para. 2.78 below) will be possible to rectify at all.
- Although MOX ceramic melts at a temperature of about 1800 degrees Centigrade, surface oxidation occurs at the much lower temperature of about 250 degrees Centigrade if the fuel is exposed to air; at relatively low temperatures MOX pellets give off breathable particles after relatively short exposure periods.

2.34. The MOX manufacturing process also involves the production of radioactive wastes in solid, liquid and gaseous forms. Chapter 3 sets out the details of the planned discharges from the MOX plant.[22]

2.35. Ireland is concerned to know whether appropriate safety standards are being applied in the MOX plant, and whether these have been properly budgeted for. Ireland, however, has no information on this issue, since the United Kingdom has declined to make information available to Ireland. This is the subject of the separate proceedings initiated under the 1992 OSPAR Convention.

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22 See Dr. Barnaby's Report, vol 2, Appendix 8.

B. INTERNATIONAL SHIPMENTS OF RADIOACTIVE MATERIALS THROUGH THE IRISH SEA

2.36. As stated above, the spent fuel which is reprocessed at THORP has been sourced from the United Kingdom and overseas. Reprocessing spent fuel from overseas has, in the past, involved shipments through the Irish Sea. If BNFL were to secure any additional reprocessing contracts from overseas, these would result in additional transports of spent nuclear fuel through the Irish Sea. Ireland is concerned to know whether appropriate safety standards have been and continue to be applied and properly budgeted for in relation to the transports through the Irish Sea. Ireland, however, has no information on this issue since the United Kingdom has declined to make information as to the total number and frequency of transports, and their routes available to Ireland.[23]

2.37. Once spent nuclear fuel has been reprocessed at THORP for overseas customers, and the separated plutonium has been used to manufacture MOX fuel at the Sellafield plant, the MOX fuel will be returned to the overseas customer. This will result in the transport of MOX fuel from the United Kingdom to the overseas customer, resulting in additional shipments through the Irish Sea. In addition, Ireland understands that there will also be transports of the radioactive high-level wastes that result from the reprocessing, through the Irish Sea.

TRANSPORTS OF SPENT FUEL INTO THE UNITED KINGDOM

2.38. The spent nuclear fuel elements which are ultimately to be converted into MOX fuel are intended to come from sources both within and outside the United Kingdom. This requires the transportation of large quantities of hazardous radioactive materials in close proximity to Irelands territory and waters.

2.39. Since the 1970s several thousands tonnes of spent nuclear fuel have been shipped to Sellafield by overseas customers. These shipments take place on dedicated civil (i.e., non-military) freighters. Shipments to the United Kingdom have passed and will continue (if permitted) to pass through the Irish Sea in close proximity to Ireland. Although the United Kingdom states that most of the spent fuel that will be used to manufacture MOX is already at Sellafield, as of March 2002, some of the overseas spent fuel remained to be delivered to THORP under the baseload contracts. Future shipments of spent fuel will, therefore, come from Europe (from Germany, Switzerland and the Netherlands) to Sellafield, almost certainly via Barrow. These shipments will go through the Irish Sea.

TRANSPORT OF MOX FUEL FROM THE UNITED KINGDOM

2.40. No nuclear power stations in the United Kingdom currently use MOX fuel. This means that all MOX fuel produced at Sellafield will have to be transported abroad by sea. The transportation of the MOX fuel prepared at Sellafield to Japan and possibly to other States is also expected to take place largely on dedicated civil (i.e. non-military) freighters. The potential routes are set out in the map at **Plate 6**.

2.41. The three possible routes for transport to and from Japan involve travel (i) via the Cape of Good Hope and the southwest Pacific, (ii) via Cape Horn and (iii) through the

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23 See Chapter 8, paras 8.238-274.

Caribbean Sea and via the Panama Canal. Each shipment will pass close to Ireland. If the MOX plant proceeds to plan, then about 45 tonnes of plutonium reprocessed from previously contracted Japanese spent nuclear fuel could be incorporated into MOX fuel assemblies. Forty-five tonnes of plutonium could produce 900 tonnes of MOX fuel or 1800 typical LWR assemblies.[24] Assuming that all the Japanese plutonium is returned to Japan in the form of MOX fuel, Ireland estimates that that alone will involve a minimum of 60 shipments, if fully loaded, and many more if partly loaded.

TRANSPORT OF MOX FUEL TO THE UNITED KINGDOM

2.42. In 1999, MOX fuel assemblies manufactured at the Sellafield MDF were transported by sea to Japan. The total amount of plutonium in the assemblies was approximately 255 kgs. Subsequently it was revealed that the specifications of the MOX pellets that had been sent to Japan had been falsified (See paras 2.78 below). The existence of this tainted MOX fuel was first disclosed to the public in 1999. After lengthy discussions, Japan refused final delivery of the tainted fuel thus necessitating its transport back to the United Kingdom. One of the five conditions to allow BNFL to restart its MOX supplies to Japan was the return of this tainted MOX fuel to the United Kingdom.[25] BNFL agreed to this demand in July 2000. BNFL also agreed to bear the transport costs for the return of the tainted fuel and pay compensation of about £40 Million.[26] BNFL stated that the transport costs were expected to amount to "several million pounds." The total cost of the episode amounts to £113 million (i.e. more than half of the "profit" which the United Kingdom government expects the MOX plant to make over the course of its life, not taking into account the £470 million construction costs). This tainted fuel is currently (on 26 July 2002) en route from Japan to the United Kingdom, and is the subject of a distinct claim by Ireland of non-cooperation.[27]

OPPOSITION TO THE TRANSPORT OF RADIOACTIVE MATERIALS BY SEA

2.43. Besides Ireland, several other States have already entered strong protests about the shipment of radioactive materials through waters over which they exercise sovereign rights, or over the high seas. States have protested individually and through regional groupings.

2.44. States in Latin America, led by Argentina and Chile, have declared their strong opposition to the use of the Cape Horn route and have insisted that the ships do not enter their exclusive economic zone(EEZ).[28]

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24 See Dr. Barnaby's Report, vol 2, Appendix 8.

25 The ADL Report suggests, on the basis of extensive but unidentified interviews with Japanese parties, that there will be no BNFL MOX deliveries to Japan until five conditions have been met, and in any case not until late 2004 (ADL Report, page 15). The ADL Report also accepts that "the [falsification] incident has severely disrupted the Kansai MOX programme." (Appendix, page 7), vol 3(2), Annex 97.

26 See the Memorandum of the US Nuclear Regulatory Committee, 6 September 2001 and its attachment 2, Nuclear Fuel, 20 August 2001, vol 3(3), Annex 119. See also Articles regarding BNFL's finances, vol 3(3), Annex 117.

27 See Chapter 8, paras 8.256-266.

28 See statements of protest by states situated in proximity to transport routes, vol 3(3), Annex 109

2.45. Countries in the south-west Pacific, led by New Zealand, have done the same in relation to the Cape of Good Hope and the Pacific routes.[29] However, as the Caribbean/Panama Canal route is the swiftest and cheapest, the Caribbean is considered especially suitable as a route. The use of this route has also attracted widespread governmental protest from states in the region.

2.46. In March 1999, Heads of Government of the Caribbean Community (CARICOM) expressed their strong opposition to the increasing frequency and volume of the hazardous material being shipped, in spite of the repeated protests by States in and bordering on the Caribbean Sea, and appealed to the Governments of France, Japan and the United Kingdom to desist from such transports along this route.[30]

2.47. States in other parts of the world have also taken steps to address movements of radioactive shipments in and around their waters. These include expressions of concern and protest notes, and the banning of shipments through territorial waters and EEZs. In 1995, a number of States banned BNFL's *Pacific Pintail* from their EEZs.[31] Similarly, in 1997, a number of states banned BNFL's *Pacific Teal* from entering their EEZs.[32] The Governments of Argentina, Brazil, Chile and Uruguay issued a joint declaration stating their serious concerns with the risks of the transport of radioactive waste shipments in the region, their intention to adopt, in waters under their jurisdiction, measures recognized under international law in defence of the health of their populations and the marine environment, and the need to reinforce, in international bodies, the regulation of the transport of nuclear waste and spent nuclear fuel.[33] South Africa stated its opposition to the *Pacific Teal* entering its EEZ.[34] New Zealand issued formal statements seeking Japanese assurances that the vessel would not pass through New Zealand's EEZ.

2.48. The Ministers for Foreign Affairs of the Rio Group, meeting in Santiago, Chile, on 27 March 2001, formally expressed their concern about the transit of radioactive materials and wastes along routes near their coasts, or along navigable watercourses of member countries, in view of the risks of damage involved and the harmful effects for the health of coastal populations and for the ecosystems of the marine and Antarctic environment. Those concerns, which were transmitted to the United Nations on 4 September 2001, related *inter alia* to security measures applicable to the transport of radioactive material and hazardous wastes, the need for guarantees on the non-pollution of the marine environment and the exchange of information on the routes selected, the need to communicate contingency plans in case of accidents, the provision of commitments to recover materials in the event of spills (or loss of materials through sinking or other causes) and to decontaminate affected areas, and establish mechanisms for liability in the event of damage.[35]

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29 *Ibid*.

30 *Ibid*.

31 In 1995 Brazil, Chile and Argentina and Kiribati banned BNFL's *Pacific Pintai*l from their EEZs (Reuters wire story, March 22, 1995). Fiji sent a diplomatic note to Japan to ensure the ship was kept out of its territorial waters.

32 Portugal and Malaysia banned the Pacific Teal from its waters (Reuters report, 15 July 1997). (Joint Declaration about Radioactive Waste Transport, 17 January 1997).

33 Joint Declaration about Radioactive Waste Transport, 17 January 1997.

34 Press Statement by Deputy Minister P. R. Mokaba, 31 January 1997.

35 Note verbale dated 4 September 2001 from Chile to the UN, vol 3(3), Annex 109.

2.49. The shipment of faulty MOX that is en route from Japan to the United Kingdom (at the time of writing) has raised objections from at least 37 States,[36] including Ireland, which is also concerned as to the compatibility of the transport with the undertaking given by the United Kingdom to the International Tribunal for the Law of the Sea in November 2001. This is dealt with in further detail in Chapter8.

VESSELS USED FOR TRANSPORTATION

2.50. Spent nuclear fuel, vitrified waste and MOX are transported to and from the UK in five vessels flagged in the United Kingdom. Their registered owner is Pacific Nuclear Transport Ltd (PNTL), which is jointly owned by BNFL, Cogema and ORG, which represent the Japanese nuclear utilities. The PNTL fleet is designated "Pacific Class". Shipments of used, and subsequently reprocessed, nuclear fuel between Europe (UK and France) and Japan commenced in 1969. The United Kingdom states that these shipments have always conformed to IAEA transport regulations (in respect of the packaging of the materials being shipped). However, there were no international standards applied to the type of ships employed in this trade until 1993. Available information suggests that the UK registered Pacific Class PNTL fleet consists of the following vessels:

- **Pacific Swan,** built in 1979 (United Kingdom)
- **Pacific Crane,** built in 1980 (United Kingdom)
- **Pacific Teal,** built in 1982 (United Kingdom)
- **Pacific Sandpiper,** built in 1985 (United Kingdom)
- **Pacific Pintail,** built in 1987 (Japan)[37]

2.51. Despite the fact that these vessels were designed and built well before the introduction of the 1993 Irradiated Nuclear Fuel (INF) Code, it is claimed that the PNTL fleet has always operated to INF Code standards and that extra equipment has been added in line with technological developments and operating experience to maintain high standards of operational safety.[38] The 1993 INF Code stipulates most of the features designed by the PNTL designers in the late 1970s, but there is no evidence that any major modification of the PNTL vessels has occurred since they were completed. One conclusion that may be drawn is that the IMO standard is not as "stringent" as the United Kingdom claims.

2.52. Each ship is about 104 metres long, with a beam of about 16 metres and a dead weight tonnage of about 3800 tonnes, and is powered by two 1,900 horsepower diesel engines. Each can carry a maximum of 17 spent fuel casks (type TN12) or 14 waste casks (type TN28VT).[39]

2.53. Most other vessels which carry hazardous materials are fully double hulled. The Pacific fleet of PNTL, however, is double hulled only around the cargo area. The fore and

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36 See articles regarding the return of the MOX shipment from Japan, vol 3(3), Annex 110.

37 A Review of Aspects of the Marine Transport of Radioactive Materials: Report, Tim Deere Jones, vol 3(3), Annex 106.

38 *Ibid*.

39 *Ibid*.

aft sections have only a single skin. This means that the PNTL fleet is more vulnerable in accidents than most hazardous cargo carriers.

2.54. MOX fuel transported from Barrow to Japan will be carried on the *Pacific Teal* and the *Pacific Pintail*; these merchant vessels are armed with machine guns. They were used to carry the consignment of MOX, produced in the MDF to Japan from Barrow in 1999; this is the only shipment of MOX so far made from Sellafield to Japan. As mentioned above, it is currently en route from Japan to Sellafield.

2.55. The *Pacific Sandpiper* and *Pacific Swan* are used to carry high-level waste from Europe to Japan. The *Pacific Crane* has not been approved for the transport of high-level waste. It is mainly used to carry highly-enriched uranium research reactor fuel. BNFL also operates the *Atlantic Osprey,* formerly called the *Arneb*, a roll on-roll off vessel built in 1986. The *Atlantic Osprey* is an INF Class 2 ship. It will carry MOX fuel from Barrow to Europe. All the ships in the Pacific Fleet and the *Atlantic Osprey* can carry any type of INF.

2.56. The effect of an accident, involving the loss of some or all of the cargo in and around Ireland, could seriously contaminate the ocean and probably also the land with highly radioactive materials. This could have devastating effects on fisheries and on human health and the environment and contributes to Ireland's serious concern about these activities, particularly in the context of a semi-enclosed sea.[40]

C. MOX ECONOMICS – ITS MARKET AND COMPETITION

2.57. The MOX plant cost £470 million to construct.[41]

2.58. The Decision of the United Kingdom to proceed to the authorisation of the MOX plant was based on an independent report (the ADL Report[42]) which concluded that its best estimate was that the MOX plant would make between £199 million and £216 million "profit" over its life.[43] However, this figure excluded the capital costs. Accordingly the United Kingdom has authorised the operation of the MOX plant on the basis that it will never recoup the costs of its construction.

2.59. Moreover, the PA Report states that the costs of transport have been excluded from this assessment. In its Counter-Memorial in the arbitration proceedings under Article 9 of the 1992 OSPAR Convention the United Kingdom has stated that the PA and ADL Reports do not contain information on the costs of meeting safety standards, and it is unclear whether these have been taken into account.[44]

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40 The International Atomic Energy Agency has stated that "if a large irradiated fuel package were to be lost on the continental shelf, some large exposures could result". Chairman's Report, IAEA, 4-6 November 1996.

41 The ADL Report, vol 3(2), Annex 97, pp 506, 508.

42 *Ibid*.

43 *Ibid*, p 478.

44 Counter Memorial of the United Kingdom in the context of the OSPAR Arbitration, para 1.16, footnote 9.

2.60. Further, in June 2002 BNFL made public the fact that the incident involving the falsified Japanese MOX fuel would cost it £113 million, including compensation to Japanese customers.[45]

2.61. It is apparent that the MOX plant will never be profitable, in any commercial sense.[46]

2.62. It is also apparent that the construction and operation of the MOX plant is inextricably connected to the future of the THORP plant. The MOX plant is inextricably bound up with nuclear reprocessing, both economically and physically.[47]

2.63. It is against this background that the merits of the significant environmental consequences of the authorisation of the MOX plant fall to be considered.

D. OWNERSHIP AND MANAGEMENT OF THE SELLAFIELD SITE: BNFL AND THE PROPOSED LIABILITIES MANAGEMENT AUTHORITY.

2.64. British Nuclear Fuels plc ("BNFL") is responsible for most of the activities carried out at the Sellafield site and is engaged in a range of commercial nuclear activities, including the reprocessing of spent nuclear power reactor fuels and the production of MOX fuel. It has existed in its present form since its incorporation in 1971, when it was created out of the United Kingdom Atomic Energy Authority. It took over the Authority's activities, property, rights, obligations and liabilities.[48] BNFL subsequently became a separate company, intended to operate on a fully commercial basis, although the United Kingdom's Secretary of State for Trade and Industry and the Treasury Solicitor hold all the shares in the company. All "profits" from BNFL therefore go to the United Kingdom. This suggests that the MOX plant should be treated as a normal commercial activity. However it is to be noted that in its most recent accounts – for 2001- BNFL revealed negative profits (i.e. an annual loss) of £2.3 Billion.[49]

2.65. The United Kingdom Government has now recognised that the MOX and THORP plants are not normal commercial activity. They are recognised to be liabilities (rather than assets) and are to be brought back into public ownership.

THE MOX PLANT AND THE LMA

2.66. Since BNFL is a public limited company it has the same corporate structure and is subject to the same rules as any other commercial enterprise. It has the same duties to its shareholders, and the same objective of maximizing profit. However, the unusual feature

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45 See para 2.80 below.

46 The French Government has been advised by a report prepared in 2000 (the Charpin Report) that MOX fuel is expensive and unprofitable. See the MacKerron Report, vol 2, Appendix 10, para 1.2.2.

47 The Report of PA Consulting, (June 1999 public domain version), vol 3(2), Annex 96, p 460.

48 It was incorporated in England under the Companies Acts 1948 to 1967, now repealed and replaced by the Companies Act 1985.

49 See reports of BNFL's financial condition, vol 3(3), at Annex 117.

of BNFL is that it has only one shareholder, the Government. The identity of the shareholder(s) would make no difference in certain contexts, for example a straightforward contractual dispute. However, for the purposes of this case, the identity of the shareholder is highly significant. In this case BNFL's commercial interests are in reality the commercial interests of the United Kingdom.

2.67. On 28 November 2001, the Secretary of State for Trade and Industry (Ms Patricia Hewitt) announced to the House of Commons the creation of a new body, the Liabilities Management Authority (LMA), which was expected to commence activities in 2002.[50] The LMA will take into public ownership the Sellafield site, including the THORP and MOX plants. The Secretary of State set out the Government's view on *inter alia* the THORP and MOX plants. She stated that they were to be regarded as liabilities which must be managed, rather than as assets. It is apparent that the financial position of BNFL contributed to the decision to remove the company from ownership and control of, *inter alia*, the Sellafield site: the Secretary of State told the House that "BNFL's chairman informed me today that the company's board has concluded that its long-term liabilities are now estimated to exceed its assets."[51]

2.68. In view of the financial position of BNFL, and the huge amount of radioactivity on numerous contaminated nuclear sites requiring remedial work, the LMA has been given the task of "systematically and progressively reducing the hazard posed by legacy [nuclear] facilities and wastes. It will have a specific remit to develop an overall UK strategy for decommissioning and clean-up."[52] A detailed explanation of the structure of the LMA was not given. However, it is clear that the LMA will be a governmental body, and not a commercial entity:

> 'I therefore propose to set up a Liabilities Management Authority responsible for the Government's interest in the discharge of public sector nuclear liabilities, both BNFL's and the [United Kingdom Atomic Energy Authority's]…
>
> [T]o enable the LMA to exercise its role across the whole public sector civil nuclear liabilities portfolio, the Government now propose to take on responsibility for most of BNFL's nuclear liabilities and the associated assets. The most significant of those will be the Sellafield and Magnox sites.'[53]

2.69. It is now clear that once the LMA is operational, and the MOX and THORP plants are transferred to it, the MOX plant will be owned and run by the United Kingdom Government. The 2002 White Paper states that the LMA is to own the sites and assets operated by BNFL and the UKAEA. It is apparent that the plants will not be run on a commercial basis, as the White Paper states that any potential future contracts for MOX and THORP will be entered into only if the United Kingdom Government is satisfied that they will contribute to the overriding and primary need to clean up the site.[54]

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50 House of Commons, Hansard Debates for 28 Nov 2001, Cols. 990 to 995, vol 3(2), at Annex 93.

51 *Ibid*.

52 *Ibid*, column 991.

53 *Ibid*, columns 991-992.

54 The 2002 White Paper, July 2002, vol 3(2), Annex 94.

BNFL'S COMPLIANCE RECORD

2.70. Along with a poor financial record, BNFL has a far from satisfactory record of safety and regulatory compliance at the Sellafield site, with numerous examples of violations of regulatory authorisations. These continue up to the present, and are a significant and continuing concern for Ireland. The examples which follow are not exhaustive.

2.71. The 1957 Windscale fire caused a major release of radioactivity into the environment, although its extent remains unknown. Its consequences continue to be felt, however.[55] As recently as November 2001, a report in the British press indicated that there are continuing adverse consequences of the 1957 accident at Windscale (Sellafield), with the Nuclear Installations Inspectorate reportedly halting the decommissioning of the Windscale reactor which caught fire in 1957 after an Inspector "lost confidence in the Atomic Energy Authority's ability to carry it out safely and legally".[56]

2.72. Another incident involving the release of radioactivity into the operating area of the plant resulted in the closure of the Head End Plant in September 1973. This release of radioactivity contaminated about thirty-five workers.[57]

2.73. Since the management of the Sellafield site passed to BNFL in 1971, its record of compliance with regulatory requirements is not considered by Ireland to be entirely satisfactory. During the authorisation process for THORP, in December 1976, BNFL was accused of covering up a leak of radioactive water from an old concrete silo – B38 – containing magnesium oxide cladding removed from spent Magnox fuel before it was reprocessed. Magnox cladding has to be kept under water because of the danger of spontaneous combustion. As a result of this, about a 100 gallons of radioactive water seeped into the ground.[58]

2.74. Three years later, in March 1979, an additional source of ground contamination was discovered, this time from building B701, one of more than 600 buildings at the site. This leak consisted of far more radioactive material than that released from B38. In July 1980, the United Kingdom's Health and Safety Executive established that ground contamination had occurred from radioactive acids over a period of 8 years.[59]

2.75. Following this incident, the United Kingdom's Nuclear Installations Inspectorate (NII) conducted a comprehensive evaluation of safety at the site. This took nearly two years to complete. The NII made fifteen detailed recommendations for improvements, which took BNFL several years to complete. According to the NII, by the early 1970s Sellafield's safety had deteriorated to an unsatisfactory level, a situation which "should not have been allowed to develop, nor should it be permitted to occur again."[60] Earlier at the THORP Inquiry it had been revealed that between 1950, when reprocessing started, and

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55 Chapter 1, para 1.41.

56 See articles regarding nuclear waste management in the United Kingdom, vol 3(3), Annex 116.

57 Harold Bolter, Inside Sellafield, Quartet Books, 1996, pp 64.

58 Harold Bolter, Inside Sellafield, Quartet Books, 1996, p 71.

59 *Ibid*, p 94.

60 *Ibid*, p 95.

1976, there had been 177 incidents at Sellafield which were sufficiently serious to warrant a formal investigation.[61]

2.76. Another significant accident came to be known as the 1983 "Beach incident", an event which effectively closed local beaches for six months. Apparently, in November 1983 an estimated 4,500 curies of radioactive liquid, including solvent and particulate matter, was discharged into the Irish Sea. Subsequently the public was told that low levels of contamination had been identified on the beach in the immediate vicinity of Sellafield. The United Kingdom Government subsequently advised the public not to use a twenty-five mile stretch of local beaches. BNFL was prosecuted over this incident, and in July 1985, after a seven-week trial, BNFL was found guilty on three charges.[62]

2.77. Besides incidents involving the release of less radioactive contaminants, BNFL has also had accidents involving plutonium. It is reported that in February 1986 a release of plutonium was detected within the main reprocessing plant. Apparently an amount had also been released into the atmosphere. Other incidents are reported to have occurred in 1990 and 1992. After the 1992 incident, it was several months before the NII allowed Sellafield to commence reprocessing.[63]

2.78. More recently there have been specific concerns relating to the manufacture of MOX fuel itself. In September 1999 reports emerged concerning the "falsification" of quality control data for MOX fuel destined for a Japanese customer. Specifically, allegations were made that certain data relating to MOX fuel production at the Sellafield MDF plant had been falsified.[64] The matter was investigated by the NII, of the Health and Safety Executive. It produced a report which was highly critical of the running of the MDF plant, stating that:

> "It is clear that various individuals were engaged in falsification of important records but a systematic failure allowed it to happen. It has not been possible to establish the motive for this falsification, but the poor ergonomic design of this part of the plant and the tedium of the job [measuring MOX pellets] seem to have been contributory factors. The lack of adequate supervision has provided the opportunity."

2.79. The Report concluded:

> "The events at MDF which have been revealed in the course of this investigation could not have occurred had there been a proper safety culture within this plant. It is clear that some process workers falsified records of the diameter of fuel pellets taken for QA sampling. One example of falsification has been found dating back to 1996. There can be no excuse for process workers not following procedures and deliberately falsifying records to avoid doing a tedious task. These people need to be identified and disciplined. However, the management on the plant

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61 *Ibid*, p 97.

62 *Ibid*, p 105.

63 *Ibid*, pp 135-167.

64 Employees within BNFL's quality control process had bypassed elaborate checks on the dimensions of fuel pellets by using data sheets from previous samples – leading to some lots being passed as safe when the pellets had not actually been measured.

allowed this to happen, and since it had been going on for over three years, must share responsibility."[65] (emphasis added)

2.80. The NII Report – published just over two years ago – concluded that before the MDF was allowed to restart, BNFL would need to address all the recommendations made by the Inspectorate.[66] By 3 October 2001, when the Decision on "justification" was taken, not all the NII recommendations appeared to have been met. As a result of the adverse publicity surrounding the data falsification scandal, the authorisation process of the MOX plant was slowed down, and in effect delayed by almost two years. The incident cost BNFL £113 million. The falsification incident also eroded Japanese confidence in MOX fuel from Sellafield, who insisted upon the return of all the fuel to Sellafield. Shortly after the incident it was reported the Japanese Government had suspended imports of MOX fuel from BNFL.[67] At the time of writing, this tainted fuel is en route to the United Kingdom.

2.81. In February 2000, the HSE published three reports. The first report dealt with the falsification scandal described above. A second report set out the findings of an inspection team over the control and supervision of BNFL's operations at Sellafield.[68] The Inspection was requested by the NII following a series of events at Sellafield where the "cause was seen to be weakness in control and supervision." The weaknesses found showed that there had been a deterioration in safety performance at the site. The Report stated that "there [was] a lack of a high quality safety management system"; "insufficient resources to implement even the existing safety management system" and that there was a "lack of an effective independent inspection, auditing and review system within BNFL." The HSE team made a list of 28 recommendations which required implementation to fully meet the standards that were expected of a nuclear site licensee.[69]

2.82. The third report pertained to the safety of the storage of Highly Active Liquid [stored in the HAST tanks] at the Sellafield site. The NII made further recommendations to BNFL to ensure that it would meet the requirements to control and reduce risks.[70]

2.83. Beyond concerns over the "safety culture" at BNFL, Ireland also has a long-standing and growing concern in relation to dangers posed by the ever increasing volume of liquid high level waste (HLW) in the HAST tanks at Sellafield. In October 2001 the press reported that BNFL had closed both its reprocessing plants at Sellafield, since it could not reduce the production of liquid high-level radioactive waste (HLW) sufficiently

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65 Health and Safety Executive, Nuclear Installations Inspectorate, *An investigation into the falsification of pellet diameter data in the MOX demonstration facility at the BNFL Sellafield site and the effect of this on the safety of MOX fuel in use*, Report released 18 February 2000. (Extracts), vol 3(2), Annex 101.

66 These included assurances that the deficiencies found in the quality checking process were rectified, that the management of the plant was improved and plant operators were either replaced or retrained to bring the safety culture in the plant up to the standard NII required for a nuclear installation. *Ibid.*

67 The ADL Report suggests, on the basis of extensive but unidentified interviews with Japanese parties, that there will be no BNFL MOX deliveries to Japan until five conditions have been met, and in any case not until late 2004 (ADL Report, page 15). The ADL Report also accepts that "the [falsification] incident has severely disrupted the Kansai MOX programme." (Appendix, page 7), vol 3(2), Annex 97.

68 All the Reports are available at the website of the Nuclear Safety Directorate of the HSE at www.hse.gov.uk/nsd (last accessed on 17 July 2002).

69 HSE Team inspection of the control and supervision of operations at BNFL's Sellafield site. Report available at http://www.hse.gov.uk/nsd/nsdhome.htm.

70 See vol 3(3), Annex 116.

to meet regulators' requirements.[71] In fact it is reported that the NII has warned BNFL that neither the structural integrity of the tanks nor the building containing them could be guaranteed beyond 10 years and that the tanks "must be emptied as soon as possible." The press has also reported that BNFL has already put up a steel building around the tanks – in case they collapse completely and lead to a "catastrophic failure."[72]

2.84. The Health and Safety Executives website lists all enforcement notices issued by it since April 2001. The website states that since then BNFL has been issued 5 notices; 8 notice breaches; 2 prosecution cases and 5 prosecution breaches.[73] Within the past 18 months, the notices have related to *inter alia* inadequate monitoring of levels of ionising radiation,[74] inadequate control or containment of nuclear materials,[75] inadequate arrangements for decommissioning of plants, ponds and facilities,[76] and inadequate control of radioactive waste.[77] This is the background against which Ireland's concerns as to the further intensification of nuclear activity at Sellafield is to be assessed.

E. REGULATORY BACKGROUND AND THE DECISION-MAKING PROCESS

2.85. The construction, authorisation and operation of the MOX plant has been subject to various United Kingdom domestic regulatory procedures. To a certain extent these are based on the United Kingdom's international obligations, including European Community law. Particulars regarding these international obligations are set out in detail in the following chapters. However, it is apparent that the authorization of the MOX plant has taken no account of requirements arising under the 1982 Convention, and relatedly under the 1992 OSPAR Convention.[78]

2.86. For the purposes of this case, the construction and operation of the MOX plant was subject to the following steps.

> **First**, the developer (BNFL) had to apply for planning permission to build the MOX Plant. This application was to be accompanied by Environmental Statement prepared by BNFL.
>
> **Second**, the United Kingdom authorities had to be satisfied that the MOX plant would meet applicable environmental requirements, including in relation to the authorisation of discharge levels into the Irish Sea.

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71 See vol 3(3), Annex 116. BNFL has been instructed to reduce the amount of liquid stored in the tanks from the current 1500m^3 to a beffer volume of 150m^3 by 2015. this reflects the concerns about both the integrity of the tanks and the practice of maintaining large volumes of high level liquid waste above ground instead of vitrification.

72 *Ibid*.

73 See www.hse.gov.uk, HSE Enforcement Notices Area, (last accessed 12 July 2002).

74 Notice N170002575, served on 25 June 2001.

75 Notice N180002595, served on 5 July 2001.

76 Notice N180002627, served on 20 July 2001.

77 Notice N180002860, served on 6 February 2002.

78 See Chapters 7, 8, and 9.

Third, the United Kingdom authorities had to be satisfied that the MOX plant was "justified", in accordance with the provisions of EC Directive 96/29/EURATOM which replaced Directive 80/836/EURATOM with effect from 13 May 2000, that is to say the benefits of the project exceeded its costs.

PLANNING PERMISSION AND THE 1993 ENVIRONMENTAL STATEMENT

2.87. In 1993, BNFL applied for permission from the planning authority local to Sellafield (Copeland Borough Council) to build the MOX Plant. As part of its obligations under the *Town and Country Planning (Assessment of Environmental Effects) Regulations 1988*, BNFL was required to produce a Statement to identify, describe and assess the likely significant effects that might result from the construction, operation and eventual decommissioning of the MOX Plant.[79] As set out in Chapter 7, it is Ireland's position that the Environmental Statement was wholly inadequate and did not meet the United Kingdom's requirements governing environmental assessment. Ireland first made known its views to the United Kingdom to that effect as early as 1994.[80] Consent for the construction of the MOX Plant was nevertheless given by the local planning authority on 23 February 1994. Construction was completed in September 1996.

THE JUSTIFICATION PROCESS AND THE DISCHARGE AUTHORISATIONS

2.88. In November 1996, BNFL applied to the United Kingdom Environment Agency for variations to the gaseous and liquid discharge authorisations granted under the *Radioactive Substances Act 1993* for the Sellafield site. These included the following authorisations:

- authorisation for *uranium* processing, to test the operation of the MOX plant;
- authorisation for *plutonium* processing at the MOX plant, and
- authorisation for *full operation* of the plant.

2.89. Although closely related, these three stages are treated separately under the relevant domestic law in the United Kingdom. At the time, the Environment Agency when considering an application under the Radioactive Substances Act 1993, was under a legal obligation to consider the "justification" of an activity giving rise to a new practice giving rise to ionising radiation under the terms of the then applicable *EURATOM Directives* (*Directives 80/836 and 84/467*).[81]

2.90. The process of "justification" requires a consideration of whether the benefits of the practice outweigh the detriments. The requirement is based upon the recommendations of the International Commission on Radiological Protection (ICRP). Paragraph 112 of ICRP Publication 60 provides *inter alia*:

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79 The 1993 Environmental Statement, vol 3(3), Annex 103.

80 See vol 3(1), Annex 8.

81 Directive 96/29/EURATOM replaced Directive 80/836/EURATOM with effect from 13 May 2000. Article 6 of Directive 96/269 also imposes the duty to justify:

> "(1) Member States shall ensure that all new classes or types of practice resulting in exposure to ionising radiation are justified in advance of being adopted by their economic, social or other benefits in relation to the health detriment they may cause." (Emphasis added)

> "No practice involving exposures to radiation should be adopted unless it produces sufficient benefit to the exposed individuals or to society to offset the radiation detriment it causes. (*The justification of a practice*)"

As the manufacture of MOX fuel was an activity resulting in exposure to ionising radiation, the Environment Agency was under a duty to consider whether it was justified in accordance with *EURATOM* provisions. Accordingly, the Agency requested BNFL to provide information specifically relating to the MOX Plant in a separate application, which was done by BNFL in January 1997. BNFL had to demonstrate that the MOX plant would not release unacceptable levels of radioactive discharges *inter alia* into the marine environment.

2.91. No assessment of discharges, and no justification, were required in respect of shipments of radioactive materials bound for Sellafield, or for shipments of MOX fuel or radioactive wastes out of the United Kingdom. As far as Ireland is aware, these shipments have never been subject to any environmental impact assessment requirement, and their impacts on the environment have never been assessed. Nor was any requirement imposed by the United Kingdom authorities in respect of the consequences of the operation of the MOX plant for the operation of the THORP plant, and for the resulting discharges from the THORP plant.

2.92. Indeed, as noted above, the THORP plant has never been the subject of an environmental impact assessment.[82]

2.93. The justification process involving the MOX plant has comprised five public consultations and the commissioning of two independent reports on the economic case for the MOX plant. The first public consultation conducted by the Environment Agency was concluded in April 1997. In response to concerns about insufficient information about the Plant, PA Consulting Group was commissioned to produce a report. The PA report was released to the public in December 1997 and formed the basis for a second consultation which concluded in March 1998.[83]

2.94. In October 1998, the Environment Agency issued a *Proposed Decision* to the effect that the plutonium commissioning and full operation of the MOX Plant was "justified".[84] With regard to the radiological impact of the MOX Plant, it stated that:

> "The Agency is satisfied that the gaseous, liquid and solid wastes arising from the operation of the MOX plant can be disposed of within the constraints of the existing Sellafield authorisations under [the Radioactive Substances Act 1993]" [85]

The "existing Sellafield authorisations" were granted before 1998. Those authorisation took no account of the United Kingdom's obligations under the 1982 Convention or the commitments made by the United Kingdom in 1998 in the context of its obligations under the 1992 OSPAR Convention. In other words, the environmental standards applied to the

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82 See Chapter 7 and the Sheate Report, vol 2, Appendix 6.

83 See Chapter 4, paras 4.10 *et seq*.

84 Proposed Decision on the Justification for the Plutonium Commissioning and Full Operation of the Mixed Oxide Fuel Plant, October 1998, vol 3(2), Annex 95. The Environment Agency issued three proposed decisions affecting the MOX Plant at this stage: (i) approving the variations to the liquid and gaseous discharge authorisations for the Sellafield site, (ii) finding that the uranium commissioning of the MOX Plant was justified, (iii) finding that the plutonium commissioning of the MOX Plant was justified

85 *Ibid*, para 3.1.

MOX plant were outdated. It is a central part of Ireland's case that this approach is inconsistent with the requirements of the 1982 Convention.[86]

2.95. The conclusion by the Environment Agency that the MOX plant could be operated within the existing discharge authorisations for the Sellafield site was approved by the relevant Secretaries of State in June 1999.[87] Although the Secretaries were provisionally of the view that, on balance, plutonium commissioning and full operation of the MOX Plant was justified, they considered that further consultation should be carried out. Hence a third round of public consultation took place in June 1999.

2.96. The data falsification incident which was uncovered in September 1999 interrupted this process. In the light of this incident, and its potential impact on Japan as a MOX customer, BNFL submitted a revised economic case for the MOX Plant in January 2001, and a new consultation document was published in March 2001. In April 2001, another report was commissioned from Arthur D. Little to evaluate BNFL's revised economic case. (ADL Report). The report was made public in July 2001 and a final round of public consultation, based on this, ended in August 2001.[88]

2.97. The public domain versions of both the PA Report and the ADL Report were heavily censored, and most of the material financial and quantitative information was removed. Ireland made submissions in each consultation round, and on each occasion asked to be provided with a complete copy of the relevant report. Its requests were refused. These refusals rise to a dispute under Article 9 of the OSPAR Convention, which is presently the subject of arbitration proceedings. (see Chapter 4, para 4.10 *et seq*).

THE DECISION OF 3 OCTOBER 2001

2.98. On 3 October 2001, the United Kingdom Secretary of State for Environment, Food and Rural Affairs and Secretary of State for Health decided that the manufacture of MOX fuel was "justified" in accordance with the requirements of Article 6(1) of *Directive 96/29/EURATOM*.[89] (The October 2001 Decision). The effect of the Decision is to allow the MOX plant to proceed to operation, and to allow new and additional radioactive discharges to enter the Irish Sea from the MOX and THORP plants.

2.99. The October 2001 Decision is 25 pages long. Four pages are devoted to the background; five pages to the process of justification and six to the events and consultations since 1996. The Decision addresses the environmental issues in three pages; safety and security issues are given 1 ½ pages, and economic issues and other relevant issues are given 4 pages. The Decision concludes by stating "the manufacture of MOX fuel is justified in accordance with the requirements of Article 6(1) of Directive 96/29 EURATOM".

2.100. In the section entitled "Environmental Issues" the Secretaries rely on the earlier discharge authorisations of the Environment Agency. They state that "the Agency is currently carrying out a general review of all discharges from the Sellafield site that there

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86 See Chapters 7 and 9.

87 The October 2001 Decision, paragraph 5, vol 3(2), Annex 92.

88 The Public Domain 2001 ADL Report, vol 3(2), Annex 97.

89 The October 2001 Decision, vol 3(2), Annex 92.

is an ongoing consultation which proposes a reduction in the total discharge limits for the site."

2.101. On the issue of waste arising from the MOX plant the Decision states that the Government had recently published a consultation on a long-term strategy for managing radioactive waste. (See Chapter 3). It states that the "government is satisfied that radioactive waste can be safely stored for many years in conditions tightly regulated by the HSE and the Agency."

2.102. The section entitled "Safety and security issues" states that "The Office for Civil Nuclear Security ("OCNS") which regulates security within the civil nuclear industry is satisfied that the security arrangements to be applied by BNFL will provide effective security once the [MOX plant] starts to operate. The OCNS has taken into account the terrorist attacks [in the USA] and continues to be satisfied that this is still the case. The operation of the [MOX Plant] does not materially affect the availability of potential targets for hijacked aircraft. The [MOX Plant] is one of many plants within a large industrial site and has no special features that would single it out from others on the Sellafield site."[90]

2.103. As regards BNFL's transportation of nuclear fuel (spent fuel, separated plutonium and MOX fuel), the Decision states only that it complies with all United Kingdom and international regulatory requirements.[91]

2.104. Annex 1 to the *Decision* summarizes the main issues raised by "interested organisations and individuals and the Secretaries views on these issues.

1. Environmental issues (Annex 1 to the *Decision*, paragraphs 6-14).
2. Health and safety issues (Annex 1 to the *Decision*, paragraphs 15-20).
3. Implications for plutonium and uranium (Annex 1 to the *Decision*, paragraphs 21-24).
4. Security issues (Annex 1 to the *Decision*, paragraphs 25-28).
5. Transportation issues (Annex 1 to the *Decision*, paragraphs 29-33).
6. Wider nuclear issues (Annex 1 to the *Decision*, paragraphs 34-36).
7. Local issues (Annex 1 to the *Decision*, paragraphs 37-40).
8. Economic issues and those related to the AD Little assessment (Annex 1 to the *Decision*, paragraphs 41-53 and 54-62).
9. Trust issues (Annex 1 to the *Decision*, paragraphs 63-65).
10. International and other issues (Annex 1 to the *Decision*, paragraphs 66-69).
11. Issues relating to the decision making process (Annex 1 to the *Decision*, paragraphs 70-80).

2.105. The final paragraph to Annex 1 to the Decision concludes:

> "Ministers view the requirement of justification as a very serious issue and as a result have taken the necessary time to collect all the relevant information, have sought the views of interested organisations and individuals on several occasions

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90 *Ibid*, para 68.

91 *Ibid*, para 69.

> and have considered all the relevant factors carefully before reaching a final decision".[92]

2.106. The 2001 Decision makes no mention of Ireland, or the Irish Sea, or of Ireland's submissions or interests.

2.107. The 2001 Decision makes no mention of UNCLOS, or any of the international instruments upon which Ireland relies in these proceedings.

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92 *Ibid*, Annex 1, para 80.

CHAPTER 3

ENVIRONMENTAL IMPLICATIONS OF THE MOX AUTHORISATION

INTRODUCTION

3.1. This case is not a dispute over science. It is in essence a dispute over the failure of the United Kingdom to fulfil three categories of legal obligation under the UNCLOS: (i) the obligation to carry out a proper assessment of the likely impact of the MOX development upon the marine environment of the Irish Sea before authorising that development; (ii) the obligation to co-operate with Ireland, as co-riparian of the semi-enclosed Irish Sea, in taking the steps necessary to protect and preserve the marine environment of that sea; and (iii) the obligation placed directly upon the United Kingdom itself to take all the steps necessary to protect and preserve the marine environment of the Irish Sea. Those matters are addressed in chapters 7, 8 and 9 of this Memorial. Nonetheless, some knowledge of the scientific background is necessary in order to appreciate the environmental significance of the MOX development. This chapter outlines that scientific background. A fuller explanation is given in the Reports commissioned by Ireland for these proceedings, in particular the Reports by Professor Salbu,[1] Dr Mothersill,[2] Dr Nies,[3] Professor Liber[4] and Dr Barnaby,[5] and other studies, documents and materials to which reference is made in this chapter.

3.2. In considering the environmental consequences of the MOX development it is necessary to consider the MOX project as a whole, asking the question: what environmental consequences would not occur if the MOX plant had not been authorised and did not operate? Those are the environmental consequences that are caused by the MOX project. They are the environmental consequences which should have been assessed in the 1993 MOX Environmental Statement, but which were not.[6] They are the environmental consequences which should have been the subject of co-operation with Ireland, but which were not.[7] And they are the environmental consequences which the United Kingdom should have taken all measures necessary to prevent, but which it did not.[8]

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1 Radionuclides Discharged into the Irish Sea: Sources, Distributions and Long-Term Ecosystem Behaviour, vol 2, Appendix 2.

2 Opinion on Low Dose Effects of Radiation, vol 2, Appendix 3.

3 Artificial Radioactivity in the Marine Environment: Burden of Various Sea Regions, vol 2, Appendix 4.

4 Genetic Risks from Low Doses of Ionising radiation, vol 2, Appendix 5.

5 Liquid and Aerial Discharges from the Sellafield MOX Plant and THORP, vol 2, Appendix 8.

6 See Chapter 7.

7 See Chapter 8.

8 See Chapter 9.

3.3. This chapter, which summarizes the main points to be found in the technical appendices to this Memorial, begins by explaining the projected increase in pollution from the Sellafield site, and identifying the contribution to that increase that is attributable to the MOX project (**Section A**). It then explains how those discharges reach the Irish Sea, the effects of radiation, and the effects that the resulting contamination has upon marine life and upon humans (**Section B**). Finally, it explains that the discharges are avoidable using existing know-how and technology, which have not been deployed at Sellafield (**Section C**).

A. POLLUTION ARISING AS A RESULT OF THE AUTHORISATION OF THE MOX PLANT

(1) THE MOX PLANT AND THORP ARE INEXTRICABLY LINKED

3.4. The MOX plant is not designed to function in isolation. It has a specific role within the broader Sellafield operation and is intended to function in conjunction with other Sellafield facilities. The links between the MOX and THORP plants have already been noted in Chapters 1[9] and 2,[10] and are explained in more detail in Appendix 8.

3.5. The operation of the MOX plant has direct and immediate consequences for the THORP plant. In Chapter 2 it was shown that the operations of the MOX plant and the THORP plant are inextricably intertwined.[11] This is also clearly visible from the flow-chart reproduced as **Plate 13** at the end of this volume. The plutonium dioxide that will provide the feedstock for the manufacture of MOX fuel at the MOX plant is produced at the THORP reprocessing facility. The MOX plant physically adjoins the THORP plant. The uranium dioxide, the other component of MOX, could come from any of three sources: (a) natural uranium dioxide; (b) depleted uranium dioxide from another nuclear facility; (c) reprocessed uranium dioxide from THORP. The choice is made by the customer. Currently, the plan appears to be mainly to use naturally occurring uranium dioxide.

3.6. Without supplies of plutonium arising from new contracts from the THORP plant, the MOX plant would cease to have any role once the existing stock at Sellafield has been fabricated into MOX. Without the MOX plant to process its end products, the THORP plant is very unlikely to attract new contracts. This is recognised by the United Kingdom Government. As the ADL Report commissioned by the United Kingdom Government clearly states:

> "Interviews with customers also confirmed that there would be little point for them to sign further [THORP] reprocessing contracts with BNFL if [the MOX plant] did not proceed."[12]

3.7. Reprocessing at the THORP plant produces very large quantities of radioactive wastes. During the course of reprocessing at THORP, spent nuclear fuel is separated into

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9 Chapter 1, para 1.51.

10 Chapter 2, paras 2.25, 2.62.

11 Chapter 2, paras 2.4-2.35.

12 Arthur D. Little, Assessment of BNFL's Business Case for the Sellafield MOX Plant, July 2001, vol 3(2), Annex 97, p 505.

(a) uranium, (b) plutonium, and (c) fission products. The fission products are essentially waste by-products of the nuclear fuel. They are radioactive and, along with other radioactive waste such as worn-out and irradiated plant components, they must be stored and disposed of safely.

3.8. THORP produces high-level liquid wastes (HLW). These are hot solutions of highly radioactive fission products in nitric acid that require constant cooling in order to prevent them from boiling. Those high level wastes are stored in the highly-active waste storage tanks – the HASTs – in building B-215 pending vitrification and permanent storage of that waste.[13]

3.9. THORP also produces lower level liquid wastes (LLW). Before the liquid wastes from THORP containing low levels of radioactivity are discharged to the sea from THORP and the storage ponds they are treated in the Segregated Effluent Treatment Plant (SETP). The Enhanced Actinide Removal Plant (EARP) chemically treats liquid wastes, including those from THORP, to remove certain radioisotopes called actinides which emit alpha particles.[14] The treated liquid is then discharged to the sea. The Site Ion Exchange Plant (SIXEP) uses an ion-exchange system to remove some radioisotopes, particularly caesium-137 and strontium-90, from liquid wastes before they are discharged into the sea.

3.10. Some of the fission products and plutonium, americium and uranium and other radioisotopes are discharged into the marine environment in liquid form, others are released into the atmosphere, and yet others are removed for storage as waste. The main radioisotopes discharged in liquid form into the sea from THORP are: tritium, carbon-14, and cobalt-60; the fission products ruthenium-106, iodine-129, and caesium-137; and plutonium 241. The main radioactive isotopes discharged in gaseous form into the atmosphere from THORP are tritium and the fission product krypton-85. The MOX plant itself discharges radioactive liquids into the sea and radioactive gases into the air.

3.11. The bulk of the radioactivity discharged by the operation of the THORP plant arises from four of its constituent facilities: (1) the THORP Receipt and Storage facilities (building B-560,), including (2) the ponds in which the spent fuel is stored before reprocessing (buildings B-27 and B-310 at Sellafield), and which are open to the atmosphere; (3) the THORP reprocessing plant, including the Head End, in which the spent fuel is dissolved and put into the chemical separation plant (B-570); and (4) the Waste Encapsulation Plant in which the stainless steel cans containing the fuel element are encapsulated into cement after being removed from the fuel elements (building B-368).[15] This can be seen from the Flow Chart at **Plate 13**.

3.12. Aerial discharges from THORP are discharged to the atmosphere through a stack attached to the THORP reprocessing plant (B-570). The stack serves the THORP Head End and Chemical Separation Plant (B-570) and the THORP Receipt and Storage facility (B-560) as well as the Sellafield MOX Plant (B-572).[16]

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13 See chapter 2, para 2.16.

14 Alpha radiation consists of heavy particles (helium nuclei) which, because they collide with other particles, rapidly lose their energy, and accordingly have very limited penetrative ability over distances of the order of a millimetre (they are unable to penetrate the skin). They are particularly dangerous if inhaled or swallowed.

15 Environment Agency, Radioactive Substances Act 1993, Explanatory Document, Appendices And Annexes, Appendix 6, 30 July 2001.

16 *Ibid*.

(2) THE OVERALL AMOUNTS OF THE DISCHARGES FROM SELLAFIELD

3.13. The amounts of radioactivity discharged in the past from Sellafield in liquid and aerial forms are shown in the tables, taken from Appendix 8 (tables 4 and 5). The figures are for 2000,[17] which appears to be a typical year.

Table 1: Liquid Discharges from Sellafield to the Irish Sea

Radio-isotope	2000 Actual Discharge (TBq/year)	Notional Full Throughput Discharges (TBq/year)
H-3	2,300	11,000
C-14	4.6	16
Co-60	1.2	3.8
Sr-90	20	36
Zr/Nb-95	0.19	2.0
Tc-99	44	64
Ru-106	2.7	26
I-129	0.47	1.2
Cs-134	0.23	1.1
Cs-137	6.9	18
Ce-144	0.55	1.8
Np-237	0.03	?
Pu-alpha	0.11	0.26
Pu-241	3.2	5.9
Am-241	0.03	0.12

17 Vol 2, Appendix 8, p 410.

Table 2: Air Emissions from Sellafield

Radio isotope	2000 actual discharge (Gq/year)	Notional full Throughput discharges (GBq/year)
H-3	220,000	550,000
C-14	2,900	2,500
S-35	120	170
Ar-41	2,500,000	2,800,000
Co-60	0.033	0.15
Kr-85	74,000,000	300,000,000
Sr-90	0.054	0.17
Ru-106	1.1	22
Sb-125	0.18	0.5
I-129	25	50
I-131	2.7	1.4
Cs-137	0.57	0.72
Pu-alpha	0.044	0.11
Pu-241	0.27	0.96
Am-241	0.043	0.085

3.14. The figures in the two preceding tables demonstrate that there will be a clear increase in the contamination of the Irish Sea by adding significantly to the radioactive material that is discharged into it by the facilities at the Sellafield site. The middle column in each table sets out the actual discharges from the entire Sellafield site in 2000. The figures in the right-hand columns represent the discharges from the entire Sellafield site that would occur if the THORP plant were run at full capacity (as BNFL hope to do) and plant B-205 (the Magnox reprocessor) were also to run at full capacity. Even excluding tritium (H-3), which is officially regarded as radiologically insignificant (but recently has been considered to be of greater radiological significance),[18] this would represent a near-threefold increase in liquid emissions from the Sellafield site into the Irish Sea, and a greater increase in atmospheric emissions.

3.15. The present case is not concerned with the operation of the Magnox reprocessor as such: it is concerned only with the impact of the MOX project. The impact specifically attributable to that project is accordingly considered more closely in the following section.

18 See Harrison, J D, Khursheed, A and Lambert, B.E. Uncertainties in dose coefficients for intakes of tritiated water and organically bound forms of tritium by members of the public, Radiation Protection Dosimetry, **98**, 299, (2002).

(3) The Effects of the MOX Development on the Amounts of the Discharges from Sellafield

3.16. If the United Kingdom had decided not to proceed to the authorisation of the MOX plant, there would be:

a. no planned or unplanned liquid or aerial discharges from the MOX plant itself;

b. no other radioactive wastes from the MOX plant;

c. no planned or unplanned liquid or aerial discharges from the THORP plant arising from the reprocessing of spent nuclear fuel for the purposes of producing plutonium for the MOX plant;

d. no other wastes produced from such reprocessing by the THORP plant;

e. no planned or unplanned liquid or aerial discharges or other wastes arising from the EARP and other associated waste treatment plants as a result of treatment of THORP wastes arising from (c) and (d) above;

f. no planned or unplanned liquid or aerial discharges or other waste arising from the storage of radioactive wastes arising from (c) and (d) above;

g. no planned or unplanned liquid or aerial discharges or other wastes arising from vitrification of THORP wastes arising from (c) and (d) above;

h. no transports through the Irish Sea of spent nuclear fuel or other radioactive substances destined for the MOX plant, either directly or indirectly via reprocessing through the THORP plant; and

i. no transports through the Irish Sea of MOX fuel for delivery to customers.

3.17. A proper appraisal of the environmental effects of the authorisation of the MOX plant must, therefore, assess all of those factors. Each of them involves either planned releases of radioactive material, or an increased risk of unplanned releases of radioactive material, attributable to the consequences of the authorisation of the MOX plant.

Planned Discharges of Radioactive Isotopes from MOX Production

3.18. The detailed explanation of the planned discharges arising from the MOX project appears in Appendix 8.

3.19. The MOX manufacturing process involves the production of radioactive wastes in solid, liquid and gaseous forms. A significant proportion of these liquid and gaseous wastes will be discharged directly into the Irish Sea, or enter that sea via the atmosphere. The information relating to the planned discharges of radioactive substances directly from the MOX plant is limited and incomplete.

3.20. Until 3 October 2001 what was known to Ireland about the discharges from the MOX plant itself was drawn principally from BNFL's 1993 Environmental Statement.[19] This confirmed that the MOX plant will produce "various solid radioactive wastes, principally in the form of plutonium contaminated material" comprising process waste and maintenance waste, in an annual amount of "about 120" cubic metres.[20] The 1993 Environmental Statement does not state what precisely this waste will be, or where precisely it will go for treatment or storage. The Environmental Statement provides merely that:

> "[I]t is intended to route all [plutonium contaminated waste] to the proposed new Water Treatment Complex (WTC) where it will be compacted to originally half its original volume before being prepared for ultimate disposal in a manner consistent with the Company's and the UK's strategy for the disposal of intermediate level waste."[21]

3.21. The 1993 Environmental Statement confirmed also that the MOX plant will produce liquid radioactive effluents, and that:

> "effluent arising from floor washings and fuel assembly wash will be about 107 m^3/yr; this will be discharged, via THORP, to existing site facilities. The arisings will be conditioned as necessary to make them suitable, after monitoring, for discharge to sea."

This confirms that radioactive wastes will be discharged directly into the Irish Sea. It does not indicate the types or quantities of radioactivity of the radionuclides associated with this waste.

3.22. The 1993 Statement further confirms that the MOX plant "will have the potential for different levels of radioactive contamination and airborne activity".[22] It states that some of the categories of ventilation extracted from the plant will be discharged into the atmosphere, and that they will have a radioactive content.[23]

3.23. The United Kingdom's October 2001 Decision, authorising the commissioning of the MOX plant, confirms this. It states that "the aerial and liquid discharges and the solid wastes arising from the operation of this practice at the SMP can be managed within the constraints of the existing Sellafield discharge authorisations."[24] The 2001 Decision gives no indication that any regard was had, or any account taken, of any legal requirements except the United Kingdom's "existing Sellafield discharge authorisations". Those authorisations had been granted in 1996.

3.24. In the absence of complete information it is difficult for Ireland to challenge in any way the material provided in the 1993 Environmental Statement concerning discharges from the MOX plant. The United Kingdom has consistently refused to provide Ireland with any further information, including details such as the capacity and likely output of MOX

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19 The 1993 Environmental Statement is at vol 3(3), Annex 103. For a review of that Environmental Statement, see vol 2, Appendix 6, and Chapter 7.

20 *Ibid*, para 4.34-35 (vol 3(3), pp 29-30).

21 On the inadequacies of the Statement see Chapter 7, paras 7.62 *et seq*.

22 Supra. note 22, at para 7.34-35.

23 *Ibid*, para 7.41.

24 The October 2001 Decision, para 60 (emphasis added), vol 3(2), Annex 92.

fuel, and the relevant period of operation of the MOX plant. Ireland has obtained independent advice on estimates of likely liquid and aerial discharges from the MOX plant.

3.25. The figures relating to estimated discharges from the MOX plant at the Sellafield site are set out in Table 3 and Table 4 below, which are taken from Appendix 8 (Tables 11 and 12, at p. 413).

Table 3: Annual liquid discharges from the SMP plant

Radioisotope	Discharge (GBq/year)	Liquid discharge from THORP (GBq/year)
Plutonium-241	0.0113	4000
Other plutonium	0.533	700
Americium-241	0.000102	300

Table 4: Annual aerial discharges from the SMP plant

Radioisotope	Discharge (GBq/year)	Liquid discharge from THORP (GBq/year)
Plutonium-241	0.0566	6.8
Other plutonium	0.0268	0.272
Americium-241	0.000512	0.197

3.26. In the context of the MOX authorisation process the United Kingdom has provided no information at all as to the environmental consequences which will arise as result of the engagement of the THORP plant in support of the MOX plant. There has never been an environmental impact assessment of the THORP plant. In the absence of any information provided by the United Kingdom, Ireland is left to estimate what the consequences of the THORP plant will be, in particular as concerns radioactive discharges.

Planned Discharges of Radioactive Isotopes
from THORP and Other Associated Facilities

3.27. In addition to the discharges from the MOX plant itself, one must take into account the discharges that would emanate from the THORP plant and the facilities (EARP, etc) associated with it.

3.28. Those discharges represent a significant part of the liquid discharges of radioactivity from the Sellafield site. For instance, the THORP plant on full throughput would account for about 70% of caesium-137, about 70% of tritium, about 40% of iodine-129, about 30% of carbon-14, and about 30% of strontium-90 emitted from Sellafield as a whole.[25]

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25 See vol 2, Appendix 8, p 415. See also Environment Council, *BNFL National Stakeholder Dialogue, Plutonium Working Group Report*, 10 November 2000.

3.29. The aerial discharges present a similar picture. The THORP plant on full throughput would account for about 90% of krypton-85, nearly 100% of iodine-129, about 30% of carbon-14 and about 10% of tritium emitted from Sellafield as a whole.[26]

Consequences for Liquid and Aerial Discharges
From Sellafield for Three Different Operational Scenarios

3.30. This section identifies that part of the planned pollution from Sellafield that is attributable to the MOX project. They do so by considering the estimated discharges that would result in three alternative scenarios, in each of which the MOX project is wholly or partly removed from the calculation. The detailed account of these scenarios appears in Annex 8. The three scenarios are:

> Scenario 1: If the MOX Plant does not operate and the THORP Plant closes down
>
> Scenario 2: If the MOX Plant operates and THORP reprocesses the base load of 7,000 tonnes of heavy metal of spent fuel at full capacity and then closes down between 2007 and 2010
>
> Scenario 3: If the MOX Plant operates normally and THORP continues to reprocess spent fuel at full capacity for one further contract period of ten years and then closes down in about 2018

Scenario 1: Consequences for Liquid and Aerial Discharges from Sellafield if the MOX Plant Does Not Operate and the THORP Plant Closes Down

3.31. If the MOX plant were not to operate, the economic justification for the continued operation of the THORP plant would disappear, and the contributions of the liquid and aerial discharges from the THORP plant to the total liquid and aerial discharges from Sellafield would eventually become zero.

3.32. On the basis of the data available to Ireland, it is reasonable to estimate that if the MOX plant and THORP ceased to operate, there would be a dramatic reduction in the amount of radioactive emissions compared with the scenario in which the MOX project is fully implemented:[27]

- the amount of tritium in the liquid discharges for Sellafield would be about 30% of the amount if the MOX project is fully implemented;
- the amount of carbon-14 in the liquid discharges would be about 70%;
- the amount of cobalt-60 in the liquid discharges would be reduced to almost zero;
- the amount of strontium-90 in the liquid discharges would be about 70%;
- the amount of iodine-129 in the liquid discharges would be about 60%;
- the amount of caesium-137 in the liquid discharges would be 30%;
- the amounts of plutonium-241 and americium-241 in the liquid discharges would be reduced to close to zero.

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26 Vol 2, Appendix 8, p 415.

27 *Ibid*, p 414.

- the amount of tritium in the aerial discharges from Sellafield would be about 90%;
- the amount of carbon-14 would be about 70%;
- the amount of krypton-85 would be about 10%; and
- the amount of iodine-129 would be close to zero.

Scenario 2: Consequences for Liquid and Aerial Discharges from Sellafield if the MOX Plant Operates and THORP Reprocesses the Base Load of 7,000 Tonnes of Heavy Metal of Spent Fuel At Full Capacity and then Closes Down Between 2007 And 2010

3.33. As at March 2002, about 2,500 tonnes of heavy metal (tHM) out of the 7000 tHM of baseload contracts have still to be reprocessed in THORP.[28] The past performance of the THORP plant suggests that an average future annual throughput of about 650 tHM per year could reasonably be expected, even though BNFL is aiming to reprocess about 1,000 tHM per year.[29]

3.34. The contribution made by the MOX and THORP plants to emissions from Sellafield were described earlier. Those reductions would, on this scenario, arise in approximately 5 years' time.

Scenario 3: Consequences for Liquid and Aerial Discharges from Sellafield if the MOX Plant Operates Normally and THORP Continues To Reprocess Spent Fuel At Full Capacity for One Further Contract Period of Ten Years and Then Closes Down in about 2018

3.35. BNFL hope that it will be able to negotiate further contracts which will enable it to operate THORP for at least one more contract period of ten years. Their ambition is to secure further reprocessing contracts (perhaps another 7,000 tHM or so of spent fuel). The authorisation of the MOX plant is expected to improve prospects of further contracts for THORP. Without MOX there would most likely be no more contracts.

3.36. Current contracts will keep THORP operational until between 2007 and 2010, the end point depending on how effectively THORP works from now onwards. If another 7,000 tHM are reprocessed, beyond the period 2007-2010, the discharges from Sellafield would continue, augmented by the emissions from the MOX and THORP plants, at the higher rate for a further decade. That period might be further extended, if more contracts could be secured and the plants remained operational.

3.37. As a result of further reprocessing requirements associated with the production of MOX fuel, the total amount of radioactivity discharged to the sea, over the time it takes to reprocess the additional 7,000 tHM, would be about 170 TBq (excluding tritium) and about 45,170 TBq (including tritium).

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28 See Chapter 2, para 2.20.

29 It can be noted that the highest throughput since THORP opened in 1994 was 879 tHM. The remaining 2,500 tHM (to complete the 7,000 tHM baseload) are likely to be reprocessed by about 2007. Some say that it will take until 2010.

Unplanned Discharges from MOX, THORP and Associated Facilities, and Other Factors That Could Affect Discharges from Sellafield

3.38. There is an evident risk that unplanned discharges may occur. This could be the result of operational failure, or natural phenomena such as earthquakes, or deliberate action such as sabotage or terrorist attack.[30] The Sellafield site has been the subject of numerous operational failures in the past.[31]

3.39. The problem of potential terrorist attacks upon the Sellafield site is discussed in Chapter 8.

3.40. Discharges into the Irish Sea could also result from unplanned discharges from transport activities attached with the authorisation of the MOX plant. As stated earlier, the operation of the MOX Plant and the THORP reprocessing plant involves the transport of radioactive material by sea.[32] It involves the transport of spent fuel from foreign reactors to THORP for reprocessing and the transport of vitrified high level waste back to its countries of origin. If the MOX plant operates, it will involve the transport of MOX fuel back to the States which own the plutonium used to make the MOX. This could involve many shipments containing unknown amounts of radioactive materials. At the time of writing, the United Kingdom has still not given any indication of the probable number of such shipments. All the voyages start or end in the Irish Sea.

3.41. The proposed shipments themselves have not been subject to any environmental impact assessment. As is explained in chapters 7 and 8, the shipments give rise to two sets of problems. One concerns the risk of an accident at sea, leading to the loss of the nuclear cargo. The cargo is carried on specially constructed ships in specially designed flask, built in each case to conform to international standards. The standards applicable to the flasks, however, appear to have been conceived in the context of land-based accidents. It is unclear whether they are adequate for the particular characteristics of accidents at sea.[33] The ship construction and equipment standards are also thought by some to be inadequate,[34] the older ships having been constructed around twenty years ago and having undergone no major rebuild since then.

3.42. The second set of circumstances concerns the risk of terrorist attack on the ships. That, too, is addressed in chapter 8.[35]

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30 For a detailed consideration of the possibility of terrorist attacks, see Confidential Annex.

31 See Chapter 2, para 2.70 *et seq*.

32 See Chapter 2 para 2.36 *et seq*.

33 See Chapter 8. See also Deere Jones Report, vol 3(3), Annex 106; and McLoughlin Report, vol 2, Appendix 12, p 556.

34 McLoughlin Report, vol 2, Appendix 12, p 556. See also Deere Jones Report, vol 3(3), Annex 106, p 278. See also Information paper submitted to the special consultative meeting of the IMO by BNFL, Cogema and FPC, 1996, page 10.

35 Para 8.206.

B. RADIATION PATHWAYS FROM THE MOX PLANT AND ASSOCIATED FACILITIES AND SHIPMENTS, AND IMPACTS UPON HUMANS AND THE ENVIRONMENT

(1) RADIATION PATHWAYS

3.43. There are various pathways by which radioactive emissions from the MOX plant and associated facilities and shipments may reach the Irish Sea.

3.44. Planned liquid discharges from the Sellafield site are piped into the Irish Sea, via a holding tank from which they are released when the oceanographical conditions are appropiate.

3.45. Unplanned liquid discharges may occur through spillages on the site, as a result of accident or sabotage. Liquid discharges may also result incidentally from other actions. For example, in the case of an accident, water sprayed on to fires in certain areas may itself become radioactive, or wash out radioactive particles. That water may reach the Irish Sea by being ducted through a rainwater or other drainage system, or by running off the ground directly into the sea or into the River Calder (which runs through the site) and thence into the sea, or by seeping into the ground and thence into the River Calder or the Sea.

3.46. Atmospheric discharges are taken up into the atmosphere. They may be bought down to earth as particles, or in rain-water, or absorbed directly into river- or sea-water.

3.47. Particles of solid wastes may be washed into the sea with liquid effluents. Any solid material discharged into the atmosphere may also be washed into the sea by precipitation. Solid wastes may also enter the sea as a result of an incident involving one of the transport ships.

3.48. Some radioactive particles tend naturally to stay in suspension in sea water. That is why some radioisotopes discharged into the Irish Sea are washed out by sea currents and find their way to the coasts of Norway. Other particles, such as plutonium, sink to the seabed. These particles naturally tend to remain in the Irish Sea, where they are particularly concentrated in certain mud patches in the western sector. It is thought that one of the major causes of occasional increases in concentrations of certain radionuclides in the water in the Irish Sea is the remobilisation into the water column of particles that had previously sunk into the sediment. As Dr Nies states:

> "The highest levels and inventories of various long-lived radionuclides such as Cs-137, Pu-238, 239, 240, and Am-241 in sediments can be found in fine grained sediments in the eastern part of the Irish Sea. These radionuclides can be measured down to more that 40 cm depth. This contamination is now the main source of radionuclides in seawater due to remobilisation into the water phase."[36]

3.49. Radioactivity in seawater finds its way ashore in three main ways. Some is blown ashore in sea spray. Some dries out on coastal beaches and mud-flats, and is then blown inland as dried particles on the wind. Some comes ashore by being taken up into the food chain. Contaminated objects could also carry radioactivity ashore.

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36 See Nies Report, vol 2, Appendix 4, p 188.

(2) The Effects of Discharges into the Irish Sea

3.50. The projected discharges from the Sellafield site will deliberately add to the existing contamination of the Irish Sea. They will, for example, increase the estimated 200–250kg of plutonium that has been disposed of in the Irish Sea over recent decades. That contamination is in itself a major cause of concern. It plainly amounts to a degradation of the marine environment. In fact, the Irish Sea is one of the most highly polluted sea areas in the world.[37] As Professor Salbu states:

> "The Irish Sea is the most contaminated marine ecosystem in the world. The estimated sea inventory of plutonium-isotopes and the estimated total transport of plutonium-isotopes via the North Channel amount to about 70% of the total discharges. Thus, about 30% per cent of the estimated total discharges of plutonium are unaccounted for. About 90% of plutonium in the Irish Sea is contained in the sediments."[38]

3.51. That degradation is irreversible in the human scale. The half-life of the plutonium – (that of plutonium-239 is approximately 24,400 years— and the relative immobility of particles deposited in the semi-enclosed waters of the Irish Sea is such that the much the greater part of the radioactivity that is already there, and of that which is currently being added to the sea, will remain there way beyond any foreseeable future. The consequences of this in the unforeseeable future are necessarily themselves unforeseeable.

3.52. The fact that consequences are unforeseeable or unknown does not mean that they can be ignored. It is self-evident that radiation is hazardous, that radioactive contamination of the seas is a problem that cannot be brushed aside, and that there are considerable uncertainties as to its effects on humans and the environment. It must be addressed. That is the point of the precautionary principle, as is explained in chapter 9.[39] But there is already clearly foreseeable, and demonstrable, harm resulting from the contamination of the waters; and that clearly demands some response.

3.53. There are two distinct categories of threats to life resulting from the degradation of the marine environment of the Irish Sea that may be distinguished. First, there is the effect of the radioactivity upon the marine life of the Irish Sea; and secondly, there is the effect of the radioactivity upon humans.

Effects upon Marine Life

3.54. As far as the effects upon the marine life are concerned, the overall levels of radioactivity in the seawater of the Irish Sea itself, taken as a whole, do not appear to be yet so harmful that an average consumption of fish caught in the Irish Sea exposes the consumer to dangerous levels of radiation. That is not, however, an appropriate or intelligent way of approaching the question of the extent of the degradation of the marine environment and the consequences for marine life.

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37 See Salbu Report, vol 2, Appendix 2, p 113.

38 *Ibid*.

39 Chapter 9, paras 9.79-9.86.

3.55. The effects of radiation on non-human biota are less well studied than the effects on human health. There is clear evidence that some species are affected more than others.[40]

3.56. This is partly a matter of oceanography. Concentrations of contaminants vary across the Irish Sea.[41] For instance, there is evidence that the Irish Sea gyre traps radioactive contaminants in the breeding grounds of the commercially-important *Nephrops*. It is also partly a matter of biology. For example, mussels and winkles tend to accumulate transuranic elements to a greater extent than fish and crustaceans, probably because of their filter-feeding habit.[42] Technetium (largely from the Sellafield B-205 plant), reaches very high levels in seaweed and in lobster tail muscle and mussels and oysters.[43]

3.57. There is considerable uncertainty and lack of knowledge concerning the effects of low-dose radiation on marine life. It may have seriously harmful effects, as recent studies of the effects of low-does radiation on humans indicate.[44]

Effects on Humans

3.58. While some population groups, such as fishermen and sailors, are particularly exposed to the radioactive contaminants in the Irish Sea because of their physical proximity to them, the population as a whole receives its exposure largely from consuming fish caught in the sea, and from inhaling or ingesting wind-borne particles blows from sea-spray or drying beaches and mud-flats.[45]

3.59. The levels of radioactivity in fish caught in the Irish Sea are, in general, not so high that at present they fall above the levels that are officially regarded as representing a serious risks to human health. Nor are the levels of radioactivity resulting from wind-spray and airborne particles from drying mud-flats.

3.60. There are, however, serious and increasing concerns about the effects of low-dose radiation, and also concerns that clusters of cases of, for example, leukaemia may have some connection with radioactive emissions from the Sellafield plant. These concerns are explained below.[46]

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40 See Salbu Report, vol 2, Appendix 2, p 129.

41 See Nies Report, vol 2, Appendix 4, p 184.

42 See Salbu Report, vol 2, Appendix 2, p 129.

43 *Ibid*, p 132.

44 See below, paras 3.58-60.

45 See Salbu Report, vol 2, Appendix 2, especially at p 129.

46 See Heather O. Dickensen and Louise Parker, *Leukaemia and Non-Hodgkin's Lymphoma in Children of Male Sellafield Radiation Workers,* International Journal of Cancer, **99**, 437-444, (2002).

(3) THE EFFECTS OF RADIATION

3.61. Radiation causes damage to human health in a number of ways. Radiation carries energy which when it passes through the human body, heats it up and may damage it. Radiation may also have effects at the cellular level. Some radioisotopes may be absorbed by organic material, such as DNA, and the radiation from them may damage the DNA and produce a genetic effect. This can cause genetic mutations or cancer.[47]

3.62. It should be emphasised that there is no such thing as a safe dose of radiation. There is some evidence that the decrease in harmful effects on human health as the radiation doses decreases does not continue at very low doses of radiation. In other words, very low doses of radiation may produce significantly more harmful effects than a straightforward extrapolation from the effects at high doses (which is the basis upon which current determinations of "safe" doses of radiation are made) would suggest.[48]

3.63. The question is controversial, but there are suggestions that exposure to low-levels of radiation may cause oxidative stress in cells, which predisposes them to sustain mutations that arise randomly. These effects are not readily evident from research that has concentrated on the effects of radiation on individuals, rather than at the cellular level. This is an area of particular concern to Ireland, given the high level of uncertainty.[49] As Professor Liber states:

> "I think that the genetic risk from very low dose radiation exposure could be considerably higher that previously estimated."[50]

Others suggest that radiation-induced genomic instability may be an important effect, arising when radioisotopes like plutonium or tritium are taken up by DNA and when they decay damage the DNA molecule. This damage may cause mutations which show up, not in the next generation but several generations later.

3.64. The uncertainties concerning the effects of low dose radiation are one of the main areas of scientific controversy in the field of radiology. The present trend is, however, towards a downward revision of the limits of radiation dose to which people should be exposed, particularly for vulnerable groups such as children. For example, in 1999 the World Health Organization published new guidelines on reference levels on radiation doses for different population groups. The levels regarded as acceptable for the most sensitive group (neonates, infants, children, adolescents to 18 years and pregnant and lactating women) was reduced from 100 milliGray (mGy) avertable dose to the thyroid to 10 mGy, i.e., a reduction by a factor of 10. This reflects a growing understanding as to the effects of exposure to low-levels of radiation. As Dr Mothersill states:

> "[…] in the last ten to fifteen years it has become apparent that low doses of radiation can cause subtle effects in cells surviving the dose, which may not become apparent for many, many cell generations."[51]

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47 See Mothersill Report, vol 2, Appendix 3; and Liber Report, vol 2, Appendix 5.

48 Liber Report, vol 2, Appendix 5, p 3; Mothersill Report, vol 2, Appendix 3.

49 *Ibid*.

50 Vol 2, Appendix 5, p 191.

51 Vol 2, Appendix 3, p 161.

3.65. The fear of radiation imposes its own costs. It affects demand for a wide range of goods and services, from fish and fishing to tourism.

3.66. While much attention is focused upon *doses* of radiation (and that is what the United Kingdom relies upon almost exclusively), the approach reflects only one aspect of the environmental impact of radioactive pollution. An area may become very heavily and irreversibly, polluted by radioactivity; but if the reference population is distant from it or visit it only rarely, doses to individuals may be low. The lowness of the dose may conceal the practical destruction of a natural resource.

C. USE OF ABATEMENT TECHNOLOGIES

3.67. Liquid and aerial discharges are considerably higher than is necessary, given the know-how and technology at present available. These are not being fully utilised, apparently because of the cost. The estimated discharges from the planned MOX fabrication facility at Savannah River in the United States show that MOX can be produced with emissions that are practically zero.

3.68. There are available technologies (known as abatement technologies), the use of which by BNFL could significantly reduce and/or eliminate the liquid and aerial discharges of radioisotopes from THORP (and of B-205, the Magnox plant).

3.69. In relation to the THORP plant, the question of abatement technologies has been addressed by the United Kingdom's Radioactive Waste Management Advisory Committee in its Advice to UK Ministers on the Radioactive Waste Implications of Reprocessing, provided in November 2000. The Executive Summary concludes:

> "[I]n terms of seeking to reduce the activity of discharges, the situation is somewhat more complex. Again, it is difficult to see how any significantly extended reprocessing programme could be compliant with the Government's proposed OSPAR objectives unless substantial advances in abatement technology can be achieved."[52]

3.70. Notwithstanding this advice, within a year the United Kingdom decided in its Decision of 3 October 2001 to proceed to the authorisation of the MOX plant, and the consequential extended reprocessing activity at THORP plants. In reaching that Decision no consideration appears to have been given to the use of abatement technologies, or other retentive technologies.[53]

3.71. In April 2002 the Royal Society, in its submissions to the United Kingdom Government on "Managing Radioactive Waste Safely", provided the following advice:

> "The problem of disposal of existing radioactive waste is serious and urgent […].
>
> Changes are essential […].
>
> The ever more stringent targets imposed under the North Atlantic (OSPAR) Convention makes passivisation increasingly difficult and expensive.

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52 Vol 3(2), Annex 98, p 522.

53 See Chapter 9.

> During the last 50 years the nuclear industry has assumed that passivisation of nuclear waste is a simple matter of engineering, based on straightforward scientific principles. It also seems to have been assumed that such solutions could be implemented rapidly while nuclear waste was being produced. The industry therefore seems to have regarded treatment of waste as of secondary importance, and to have focused its efforts on countering what it saw as unfounded hostile public opinion and on economic concerns. […]
>
> We conclude:
>
> - Changes in waste management are essential regardless of whether a new generation of nuclear power stations generates fresh volumes of wastes;
> - Industry and government have placed insufficient emphasis on continued technical developments as a basis for improved waste management […];
> - The current waste management regime falls short of that which could be achieved through the use of currently available technologies;
> - In this interim period, BATNEEC (best available technologies not entailing excessive cost) should be adopted;"[54]

3.72. The United Kingdom's Radioactive Waste Management Advisory Committee and The Royal Society recognise the importance of alternative technologies, and their availability. The Report of Dr Frank Barnaby indicates a range of technologies which are available to reduce liquid discharges and aerial emissions from THORP.[55]

3.73. These are described in Appendix 8 and at Chapter 9.[56] The application of abatement technologies could significantly reduce discharges of *inter alia* carbon-14, ruthenium-106, strontium-90, tritium, krypton and plutonium/americium and improving the effectiveness of the EARP plant would improve significantly the removal of caesium-137 and strontium-90 from discharges.

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54 Vol 3(2), Annex, 99, pp 524-5.

55 Vol 2, Appendix 8, pp 418 *et seq*.

56 At paras 9.120 and 9.165.

CHAPTER 4

THE DISPUTE

4.1. The UNCLOS dispute between Ireland and the United Kingdom crystallized in October 2001 with the Decision by the United Kingdom to recognise that the MOX plant was "justified" and to proceed to authorise its commissioning and operation. The roots of the dispute, however, go back much further. Its history includes the circumstances under which the United Kingdom permitted the THORP plant to operate without ever having been subject to an environmental assessment, and the manifest inadequacies of the environment statement prepared in relation to the MOX plant, in 1993. Indeed, the 1993 MOX environmental statement is at the heart of this dispute. It failed properly to address the environmental consequences of the MOX plant. It failed altogether to address the environmental consequences of the extension of the operating life of the THORP plant. It failed to address the question of international transports, and the implications of further waste streams for the Sellafield site.

4.2. Subsequently, in the period 1997-2001, the United Kingdom engaged in a process of "justification" of the MOX plant which was not transparent and failed to take account of Ireland's concerns, including requests for further information. The United Kingdom decided that the MOX plant was economically "justified" and would make some £200 million profit over its life, but in so doing excluded the £470 million capital costs of constructing the plant. The United Kingdom also refused to provide Ireland with information as to which costs had been included and excluded in the process of justification, including costs relating to environmental and safety standards. This failure to co-operate provoked Ireland into initiating proceedings under the 1992 OSPAR Convention to obtain access to information.

4.3. When the United Kingdom authorised the operation of the MOX plant, in October 2001, it did so on the basis of a discharge regime which had been authorised for the Sellafield site as a whole in 1998. That discharge regime did not take into account the environmental standards reflected in *inter alia* the 1982 UNCLOS or the 1998 Sintra Ministerial Declaration.

4.4. Finally, the MOX plant was authorised three weeks after the events of 11 September 2001. This raised serious concerns on the part of Ireland as to the adequacy of safety and security arrangements, both in relation to the MOX plant on the Sellafield site itself and the international transports associated with the authorisation of the MOX plant.

4.5. The dispute therefore concerns serious procedural violations of UNCLOS by the United Kingdom, which have engendered violations of the substantive requirements of UNCLOS. The second part of the Memorial addresses the procedural violations relating to environmental impact assessment (Chapter 7) and non-cooperation with Ireland (Chapter 8), and then the substantive violations relating to the failure by the United Kingdom to take adequate steps to prevent pollution of the Irish Sea (Chapter 9). This Chapter describes chronologically, the background to the dispute and its crystallization in October 2001, as well as subsequent developments.

A. THE THORP PLANT

4.6. As set out above, the THORP plant was initially authorised by the United Kingdom in the early 1990s.[1] It has never been subject to an environmental impact assessment.[2] It forms part of the present dispute because the authorisation of the MOX plant increases the operation and extends the life of the THORP plant, but without considering its environmental impacts.

B. THE MOX ENVIRONMENTAL STATEMENT: 1993

4.7. On 28 July 1993 Ireland wrote to the United Kingdom authorities seeking details of the plans for the proposed MOX plant, and called for a full environment impact assessment to be undertaken in accordance with the relevant legal requirements.[3] In October 1993, the United Kingdom Department of the Environment informed Ireland that BNFL had confirmed that it would, in fact, be preparing an Environmental Statement in accordance with the Town and Country Planning (Assessment of Environment Effects) Regulations 1988.[4] On 19 October 1993 BNFL gave notice that a planning permission application had been made to Copeland Borough Council. In support of its Planning Application, BNFL submitted an Environmental Statement.[5] The content of the 1993 MOX Environmental Statement is set out in Chapter 7.[6]

4.8. In July 1994 Ireland made submissions to the Copeland Borough Council. Ireland made several observations about the Environmental Statement, which it noted was "remarkably concise for a project of this nature."[7] Ireland identified a series of material omissions in the information supplied by BNFL in the Statement, which it considered to be inadequate. Ireland's environmental concerns, as expressed to the United Kingdom in 1994, are fully described in Chapter 7.[8] Ireland's expressed concerns also extended to the economic case for the MOX plant and the security implications of the plant, as well as its interdependence with nuclear reprocessing at the THORP plant. Ireland stated that

> "because [the MOX plant] assumes the availability of some facilities at THORP, […] its environmental effects and consideration of any benefits should also form part of the wider THORP Public Inquiry."

Ireland stressed that, during the THORP Public Consultation process, BNFL had stated that the economic benefits of operating THORP could be enhanced by, *inter alia*, the "inclusion of the economic benefits of projects conditional on THORP going ahead e.g.

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1 Chapter 1, para 1.47.

2 Chapter 7, para 7.62 *et seq*; See also the Review of BNFL's Environmental Statement for the Sellafield MOX Plant, Mr. William Sheate, vol 2, Appendix 6.

3 Cited from Ireland's submissions to the Copeland Borough Council on the proposed Sellafield Mixed Oxide Plant, vol 3(1), Annex 8.

4 In the UK, these regulations implement EC Community Directive 85/337/EEC on the assessment of certain public and private projects on the environment.

5 BNFL's 1993 Environmental Statement is set out at vol 3(3), Annex 103.

6 Chapter 7, paras7.33 *et seq.*

7 Ireland's submissions to the Copeland Borough Council on the proposed Sellafield Mixed Oxide Plant are set out at vol 3(1), Annex 8.

8 Chapter 7, para7.50 *et seq*.

MOX fuel manufacture". Notwithstanding Ireland's concerns the local authority granted planning approval and construction of the MOX plant commenced.

C. THE DISCHARGE AUTHORISATIONS

4.9. In authorising the MOX plant the United Kingdom has relied on discharge authorisation for the Sellafield site as a whole. These authorisations were granted prior to the 1998 proposed decision of the Environment Agency.[9] The 1998 discharge authorisations were set at a level that took no account of the United Kingdom's substantive obligations under the 1982 UNCLOS. These UNCLOS obligations require the following standards to be applied: (1) a standard of necessity to prevent, control and reduce pollution (having regard to the needs of the receiving environment); (2) a standard requiring minimization of releases to the fullest extent possible (having regard to available technologies and practices); and (3) a standard requiring implementation of international rules and standards (having regard to international norms). In meeting its obligations, the United Kingdom is thereby required to have regard to the quality of the Irish Sea, to all available technologies and practices, and to applicable and relevant international norms. By basing its discharge authorisation on levels set in 1998 the United Kingdom failed to have regard to its obligations under UNCLOS. This is addressed in Chapter 9.[10]

D. "JUSTIFICATION" AND THE OSPAR DISPUTE: 1997-2001

4.10. The United Kingdom held five rounds of public consultations before reaching the Decision of 3 October 2001 on the "justification" of the MOX plant. The consultation were based around two independent reports – the PA Report and the ADL Report. However, the two reports were heavily censored on alleged grounds of "commercial confidentiality", making it impossible for the reader to assess on an objective basis whether the conclusions in the Reports were objectively justifiable and reasonable, whether the costs of environmental protection had been adequately taken into account, and whether the proposed MOX facility was economically "justified". Indeed, this now appears to be accepted by the United Kingdom: one of the United Kingdom's expert witnesses in the OSPAR arbitration proceedings, Mr Wadsworth states that:

> "In the case of BNFL the information classed as commercially confidential principally relates to the inputs into the financial model supporting the economic case for the MOX plant together with the related outputs."

Dr Gordon Mackerron (Ireland's expert witness in those proceedings) points out that this is–

> "an admission that without the information sought, the economic case for the SMP cannot be assessed […] This goes contrary to Article 6 of the Directive 80/836/EURATOM and Article 6 of Directive 96/269."[11]

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9 The Environmental Agency's Proposed Decision 1998, vol 3(2), Annex 95

10 See paras 9.75-169.

11 See the Second Mackerron Report, vol 2, Appendix 11, paras 1.1 *et seq*; see also the United Kingdom Counter-Memorial, Appendix B, para B.1.1.

Ireland, who has a material interest in the environmental consequences of the SMP, is unable to assess, without the information sought, whether there ever was an economic justification to the SMP. The statement by David Wadsworth confirms this."

THE CONSULTATION PROCESS

4.11. From February to April 1997, the United Kingdom Environment Agency held a first public consultation on the "justification" of the proposed MOX plant. During the course of the consultation concerns were raised *inter alia* about the lack of information made available to the public on the case for the proposed MOX plant. The United Kingdom decided to obtain an independent opinion as to BNFL's economic case for the proposed MOX plant. The Environment Agency appointed a private company – PA Consulting Group ("PA") – to carry out an independent assessment of the economic justification of the MOX plant and to prepare a report on the basis of which the public consultation could be carried out. Ireland took part in the first round of public consultation.[12]

4.12. In December 1997, the United Kingdom published a "public domain" version of the PA Report, which excluded certain material on alleged grounds of "commercial confidentiality".[13] This Public Domain PA Report formed the basis of a second public consultation held from January to March 1998. Around 100 responses were received to the second consultation, including a response from Ireland, again requesting a full copy of the PA Report.[14]

4.13. In October 1998, following the second public consultation, the Environment Agency concluded that plutonium commissioning, full operation and decommissioning of the proposed MOX plant was "justified" and proposed draft decisions on *inter alia* the justification of the proposed MOX plant. The draft Agency decision was forwarded to the UK Secretary of State for the Environment, Transport and the Regions and the UK Minister of Agriculture, Fisheries and Food ("the UK Ministers").[15]

4.14. In June 1999, the UK Ministers reached a preliminary decision that the evidence indicated that the proposed MOX plant was economically justified. However, the Ministers considered that the amount of information which had been excluded from the 1997 Public Domain Report was more than strictly necessary. They decided to publish a fuller version (the 1999 Public Domain version), which was to be the basis of a further consultation.

4.15. This revised report was the basis for a third public consultation from July to August 1999.[16] The 1999 Public Domain version was similar to the 1997 version, save that the former included in place of the data removed on grounds of "commercial confidentiality" a description of its nature and an explanation as to why it had been removed. Ireland made a

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12 Ireland's submission to the United Kingdom in the first public consultation dated 4 April 1997, vol 3(1), Annex 9.

13 PA Consulting Group, *Final Report – Assessment of the BNFL's Economic Case for the Sellafield MOX Plant*, Version Released December 1997.

14 Ireland's submission to the United Kingdom in the second public consultation dated 16 March 1998, vol 3(1), Annex 11.

15 The Environmental Agency's Proposed Decision 1998, vol 3(2), Annex 95.

16 PA Consulting Group Report (version released June 1999), vol 3(2), Annex 96.

further submission on 30 July 1999, once again asking for a full copy of the PA Report.[17] It was not provided.

4.16. The PA Report concluded that the MOX plant will make a profit over the life of the plant. In reaching this conclusion, however, the PA Report took no account of sunk capital costs.[18]

4.17. The 1999 Public Domain Version of the PA Report is heavily censored. It omits *inter alia* all numerical information relating to assumptions as to production capacity and costs, sales volumes and prices, contractual commitments, price and decommissioning costs, start-up date, plant maintenance down time, fixed costs, level of manning, operational costs, and the quantity of fuel already on site. Ireland is also concerned by the removal of information relating to the number of transports that will arise as a result of the authorisation of the MOX plant, and how the costs of these transports (including the costs of protective measures to be taken by the Irish Government, if any) are to be assessed and integrated into the overall economic analysis. The resultant gaps in the information make it impossible for a reader of the 1999 Public Domain PA Report to assess whether the PA Report's conclusions are objectively justifiable and reasonable, whether the MOX plant should be authorised to operate, and whether discharges into the Irish Sea and further international transports of radioactive materials in and around the Irish Sea should be permitted as "justified". The excised information also makes it impossible for Ireland to assess whether, *inter alia*, the costs of security and safety measures and insurance against the consequences of accidents have been fully taken into account.

4.18. It appears that these costs may not have been taken into account. Ireland was surprised – and concerned – to read in the United Kingdom's OSPAR Counter-Memorial that

> "the PA and ADL Reports do not contain information on the costs of meeting safety standards. This is apparent from the texts of those Reports, which identify the nature of any information excised".[19]

In fact, it is not apparent from the ADL or PA Reports that safety costs have been treated in this way. The United Kingdom's statement in the Counter-Memorial is ambiguous, and suggests that safety costs may not have been taken into account <u>at all</u> in the exercise of "justifying" the MOX plant. Ireland would welcome clarification, as those safety standards – and their costs – are material to the protection of the marine environment of the Irish Sea. Their exclusion would therefore be a matter of considerable concern, particularly since it has already been acknowledged by the United Kingdom that transport costs were excluded.

4.19. In September 1999 reports surfaced about the falsification of safety checks at the MOX Demonstration Facility (see Chapter 2, paras 2.78 *et seq*). This resulted in a further delay (of nearly two years) in the authorisation of the MOX plant. BNFL has recently confirmed that the costs of the MOX falsification scandal are £113 million.[20]

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17 Ireland's submission in the third public consultation dated 30 July 1999, vol 3(1), Annex 16.

18 It states that: "As the costs of building the plant are already sunk, [the Reference and Base] cases examine only the further costs and revenue streams that would arise from commissioning and operating the SMP or withdrawing from the MOX fuel fabrication business", vol 3(2), Annex 96, para 1.1.
It is now accepted that capital costs of construction are £470 million, according to the latest ADL Report, vol 3(2), Annex 97.

19 United Kingdom Counter-Memorial, para 1.16 at footnote 9.

20 See Articles regarding BNFL's finances, vol 3(3), Annex 117.

4.20. In March 2001, following the data falsification scandal and concerns relating to the size of the international market in MOX fuel, the United Kingdom initiated a fourth public consultation on the justification of the MOX plant. The consultation was based on the 1999 Public Domain PA Report and two new documents prepared by BNFL (on the economic case for MOX).[21] Once again, Ireland requested a complete and uncensored copy of the PA Report to enable it to make a meaningful contribution to the consultation.[22] This was refused.[23]

4.21. In view of the United Kingdom's repeated refusal to provide the information requested Ireland commenced arbitration proceedings on 15 June 2001 against the United Kingdom under Article 9 of the OSPAR Convention.[24] The proceedings sought to obtain a complete copy of the PA Report in order to obtain full information on *inter alia* production volumes, international transportation and environmental costs. Ireland considers that without this information it is not able to assess whether the authorisation and operation of the MOX plant is compatible with the United Kingdom's international obligations.

4.22. In the meantime, the United Kingdom decided to commission a new report on the "justification" of the MOX plant – from Arthur D. Little (ADL), another private company – and to carry out a further public consultation. The ADL Report was submitted to the United Kingdom on 15 June 2001.[25] On 27 July 2001 the United Kingdom Department for the Environment, Food and Rural Affairs and the United Kingdom Department of Health initiated a fifth public consultation on justification. Ireland made another set of submission to the fifth public consultation. Subsequently, in order to be able to make a meaningful contribution, Ireland requested a full copy of the public domain version of the Report.[26] This too was refused.

4.23. As with the PA Report, the ADL Report deals with the justification of the MOX facility. It too ignores all capital and related costs of constructing the proposed plant, which it estimates to be in the region of £470 million.[27] Nevertheless it concludes that the proposed plant will produce a "net economic benefit" over its life of between £199 million and £216 million.[28] In reaching this conclusion, however, the ADL Report takes no account of sunk capital costs (£470 million).[29] It is accepted by the United Kingdom that the plant will never recoup its capital costs. Not only will the plant therefore contribute to added pollution of the Irish Sea (as described in Chapter 3), it will also lose the company (or the British taxpayer) more than £250 million. Putting it another way, BNFL (or the British taxpayer) are paying more than £250 million for the benefit of being able to discharge radioactive waste from the MOX and THORP plants into the Irish Sea.

4.24. Like the PA Report, the basis upon which the ADL Report reaches its conclusion cannot be assessed objectively, because the public domain version of the ADL Report omits, among other information: total projected MOX production capacity; prices; total

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21 BNFL's business case for the MOX plant, vol 3(3), Annex 104.

22 Letter of Ireland dated 22 May 2001 at vol 3(1), Annex 27.

23 United Kingdom's letter dated 5 September 2001, vol 3(1), Annex 31.

24 See Statement of Claim, vol 3(1), Annex 72.

25 The 2001 Public Domain ADL Report is at vol 3(2), Annex 97.

26 Ireland's letter dated 7 August 2001, vol 3(1), Annex 29.

27 Vol 3(2), Annex 97, para 5.2.

28 *Ibid*, Executive Summary.

29 Supra note 18.

MOX volumes; all information as to the identity of customers, the status of contracts with them, and the volume contracted for; operating costs; transport revenues and costs; transport information; and any details of the projected life span of the MOX facility.

4.25. In June 2001 (with a reminder in August 2001) Ireland asked the United Kingdom to confirm that it would not authorise the operation of the MOX plant pending the conclusion of the OSPAR arbitration proceedings.[30] On 13 September 2001 – some three months after the request – the United Kingdom declined to provide such a confirmation.[31]

THE JUSTIFICATION DECISION OF 3 OCTOBER 2001

4.26. On 3 October 2001 the United Kingdom adopted its decision on the justification of the MOX plant.[32] That decision relied on the ADL Report. The United Kingdom decided that the MOX plant was economically justified, that the benefits from the plant outweighed the detriments to health, the environment and otherwise. The decision briefly considers the environmental impact of the MOX plant, concluding that:

> "Therefore, the Secretaries of State consider that the radiological detriments which would arise in association with the manufacture of MOX fuel from plutonium separated in THORP and belonging to foreign customers would be very small and that any effects on wildlife would be negligible. They also consider that the aerial and liquid discharges and the solid wastes arising from the operation of this practice at the SMP can be managed within the constraints of the existing Sellafield discharge authorisations.
>
> The Secretaries of State are satisfied that the manufacture of MOX fuel can be carried out within discharge limits which will effectively protect human health, the safety of the food chain and the environment generally. They are satisfied that regulatory measures can be taken to ensure that the SMP operates safely and within such discharge limits."[33]

The Decision makes no reference to any other environmental consequences associated with the authorisation of the MOX plant, in particular the extension of the life of the THORP plant, or the implications for the management of radioactive wastes at Sellafield.

IRELAND'S EFFORTS TO OBTAIN INFORMATION

4.27. Since 1997 Ireland has unsuccessfully sought to obtain complete copies of the PA Report and, since July 2001, the ADL Report. Ireland has sought the information because it is concerned about the impact of MOX on the environment, particularly from the intensification of activities at THORP. Ireland also wishes to ensure that the justification process is taken in a transparent manner, allowing proper public scrutiny of the economic justification, or otherwise, of the MOX plant, given the potential effect on the marine environment of the Irish Sea. Ireland is also concerned to ensure that all relevant costs (including in particular environmental costs) have been taken into account.

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30 Ireland's letters dated 15 June 2001 and 7 August 2001, vol 3(1), Annex 28 & 29.

31 United Kingdom's letter dated 13 September 2001, vol 3(1), Annex 32.

32 Decision of the United Kingdom dated 3 October 2001, authorising the MOX plant, vol 3(2), Annex 92.

33 *Ibid*, paras 60 and 61.

4.28. In its submissions in April 1997, Ireland again expressed its opposition to the extension of nuclear activities at Sellafield. It set out the links between reprocessing at THORP and the MOX plant. It stated *inter alia* that:

> "the justification now being put forward for using plutonium and producing MOX fuel is to create the rationale for continued reprocessing at Sellafield. BNFL is now promoting MOX use as the solution to the continuing oversupply of plutonium, to which its own operations daily contribute. The bulk of the plutonium for the MOX plant is likely to come from the fuel reprocessed from the UK Magnox reactors at Sellafield and from the new THORP plant."

Ireland's Department of Public Enterprise stated that it was opposed to the commissioning of the MOX Plant on the grounds that it would extend the life of the nuclear reprocessing industry. This view is shared by others, including Norway.[34] The submission also expressed the Department's concerns about the additional radioactive marine discharges from Sellafield into the Irish Sea arising from MOX production. It then set out specific observations on *inter alia* the consultation process; the transport of weapons-grade plutonium to Sellafield; waste management strategy; and the implications of the MOX plant for the economic, environmental, and safety case at Sellafield as a whole.[35]

4.29. In March 1998, in the context of the second public consultation, Ireland made specific comments on the economic case for the MOX plant. Ireland also protested at the omission of data from the PA Report:

> "The report does not release information on cost and price data and on plant process and performance. As a consequence, many of the assertions made in the report are unverifiable and BNFL's economic case is not open to public review."[36]

In its conclusions, the Department of Public Enterprise stated that it believed that the PA Report had failed to fulfil the purpose of this further consultation, namely, to provide in the public domain sufficient commercial information to justify the commissioning and operation of the plant.

4.30. On 30 July 1999, in the context of the third public consultation, Ireland requested that the United Kingdom provide it with "an unedited and full copy of the [1999 Public Domain] PA Report".[37] Ireland also submitted that the information upon which the United Kingdom was basing its decision did not provide a proper basis for determining whether the proposed MOX plant was justifiable, the information which had been provided did not indicate that the proposed MOX plant was economically viable, and that the proposed MOX plant (and international transports of plutonium related thereto) raised other issues of European and international law. It received no response to that request, and no explanation as to the failure to respond or to provide the information. As no response was forthcoming, a reminder was sent on 18 November 1999.[38]

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34 See Chapter 1, para 1.68.

35 Ireland's submission to the United Kingdom dated 4 April 1997, in the context of the first public consultation, vol 3(1), Annex 9.

36 Ireland's submission to the United Kingdom dated 16 March 1998, in the context of the second public consultation, vol 3(1), Annex 11.

37 Ireland's submission to the United Kingdom dated 30 July 1999, in the context of the third public consultation, vol 3(1), Annex 16.

38 Ireland's letter dated 18 November 1999, vol 3(1), Annex 18.

4.31. By its letter of 17 December 1999, the United Kingdom refused to make available the expurgated version of the PA Report on the grounds of commercial confidentiality.[39]

4.32. In a letter dated 25 May 2000, Ireland's Department of Public Enterprise wrote to the United Kingdom Department of the Environment, Transport and the Regions explaining that it had been advised by external counsel that there was no justification in law for the refusal of the United Kingdom to provide Ireland with the information it had requested, namely "the information deleted from the PA Report".[40] The letter went on to state that the refusal "is inconsistent with the United Kingdom's obligations *inter alia* under Directive 90/313/EC (on freedom of access to information on the environment) and the 1992 OSPAR Convention, which entered into force for Ireland and the United Kingdom on 25 March 1998." The letter reiterated a request for information relating *inter alia* to production and sales volumes, start dates and transports that were omitted from the PA report.

4.33. No immediate written response was received from the United Kingdom to that request. The dispute was discussed bilaterally and at the meeting of the OSPAR Commission in June 2000. The dispute was not resolved.

4.34. By letter dated 27 October 2000 (i.e. more than six months after Ireland's request in its letter of 25 May 2000) the United Kingdom responded with a refusal to make available to Ireland the information requested pursuant to Article 9 of the OSPAR Convention. The United Kingdom letter stated:

> "[T]he UK Government does not wish to prejudice the commercial interests of an enterprise by disclosing commercially confidential information. We note the views set out in your 25 May letter, but nevertheless believe that disclosure of the information which you have sought would cause such harm."[41]

4.35. On 9 February 2001, the Irish Minister of State wrote to the UK Minister of the Environment reiterating the request for information. His letter stated:

> "In conclusion, it now appears that a dispute exists between Ireland and the United Kingdom as to the interpretation and application of Article 9 of the OSPAR Convention. Once again I invite your Government to disclose the information requested in the letter of 25 May, or alternatively to propose appropriate means for resolving our differences. In the absence of information or an early resolution of our differences my Government reserves its right to invoke the procedures envisaged by Article 32 of the Convention."[42]

4.36. On 15 May 2001, officials from Ireland's Nuclear Safety Division of the Department of Public Enterprise met in London with officials of the UK Department of the Environment, Transport and the Regions. The meeting had been requested to inform the United Kingdom that Ireland was preparing an application under Article 32 of the OSPAR Convention, that the matter was being put formally to Government, and that a continuing refusal by the United Kingdom would result in the initiation of Article 32 proceedings.

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39 United Kingdom's letter of 17 December 1999, vol 3(1), Annex 19.

40 Ireland's letter dated 25 May 2000, vol 3(1), Annex 23.

41 Letter of the United Kingdom dated 27 October 2000, vol 3(1), Annex 24.

42 Ireland's letter dated 9 February 2001, vol 3(1), Annex 25.

4.37. On 21 May 2001 the United Kingdom Minister of State responded to the letter from the Irish Minister of State dated 9 February 2001, apologising for the delay. No information was provided, but the Minister expressed the hope that he would be able to provide a substantive reply "shortly".[43] No substantive reply was received until 13 September 2001, nearly six months after the request.[44] That reply provided no reasons beyond a general assertion of confidentiality (see paragraph 4.43 below).

4.38. Also in May 2001, in the context of the fourth public consultation, Ireland requested once again an unexpurgated copy of the 1999 Public Domain PA Report. In his letter of 22 May 2001 the Irish Minster of State wrote:

> "It is the view of the Irish Government that the information contained in the Consultation Papers and the absence of critical information relating to primary economic factors including critical data relating to other cost factors such as transportation and security, makes it impossible for the reader to assess the justification of the [MOX plant] as is required under the [Directive 96/29/EURATOM]. […]
>
> The Irish Government in its submissions in regard to the previous Consultation Rounds sought the unedited and full copy of the PA Consulting Report. In the absence of this information from the Consultation Papers, which is critical to assessing the justification of the SMP, the Irish Government is reserving its right to pursue legal measures for the release of the information."[45]

No response was received until 5 September 2001.[46] (See para 4.42 below.)

4.39. As stated above, on 15 June 2001 Ireland initiated proceedings against the United Kingdom under the 1992 OSPAR Convention.[47] On that day, the United Kingdom published the public domain version of the ADL Report, the Report that was the basis for the decision of 3 October 2001. Ireland subsequently amended its Statement of Claim to include the ADL Report.[48] The arbitration is ongoing, and a hearing is expected to take place in October 2002, under the auspices of the Permanent Court of Arbitration in The Hague.

4.40. On 7 August 2001, in the context of the fifth public consultation, Ireland requested an unedited copy of the ADL Report:

> "Due to the omission of economic data from the public domain versions of both the PA and ADL reports it is not possible for us to make an independent analysis of the economic justification of the proposed plant. It is our opinion that the omissions cannot be justified on the grounds of commercial confidentiality.
>
> In this context I would be very grateful if your Department could pass on to my Department a copy of the full version of the ADL report. In the event that a copy of the full report is not provided Ireland reserves the right to amend and extend its

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43 Letter of the United Kingdom dated 17 May 2001 at vol 3(1), Annex 26.

44 Letter of the United Kingdom dated 13 September 2001, vol 3(1), Annex 33.

45 Letter of Ireland dated 22 May 2001, vol 3(1), Annex 27.

46 Letter of the United Kingdom dated 5 September 2001, vol 3(1), Annex 31.

47 Supra, para 4.21.

48 Ireland's Amended Statement of Claims and Grounds which accompanied the Request, vol 3(1), Annex 72.

> application in the OSPAR arbitration filed on 15 June last to include the information omitted from the ADL report."[49]

4.41. Ireland also requested the United Kingdom not to authorise the proposed MOX plant pending the outcome of the OSPAR arbitration proceedings.[50] The United Kingdom declined to give an undertaking not to authorise the MOX plant.

4.42. By its letter dated 5 September 2001, the United Kingdom explained the basis for the refusal to accede to Ireland's request for information. This constituted the most "substantive" response to Ireland's request. The letter said *inter alia*:

> "[M]y authorities do not accept that the information excised from the public version of the ADL Report is information falling within the scope of Article 9(2) of the OSPAR Convention. […]
>
> [E]xcisions have been made on the grounds that publication of that information would cause unreasonable damage to the commercial operations of [BNFL] or to the economic case for the Sellafield MOX plant itself."[51]

4.43. By letter dated 13 September 2001, Mr. Michael Wood, Legal Adviser at the Foreign and Commonwealth Office set out the United Kingdom's position in greater detail.[52]

4.44. On 3 October 2001 the United Kingdom decided that the MOX plant was economically justified, paving the way for its commissioning and operation (see paras 4.26 above). The 2001 Decision relies heavily on the environmental statement provided by BNFL (in 1993) and the 1998 Discharge Authorisations.

UNCLOS

4.45. Ireland first raised its specific concerns with regard to the UNCLOS in its submission of 30 July 1999.[53] Subsequently, in its letter of 23 December 1999, Ireland again set out in detail its concerns about the MOX plant by reference to clearly identified provisions of the UNCLOS.[54] In both these communications Ireland expressly reserved its rights under the UNCLOS. The United Kingdom did not respond at all to the first letter, and merely acknowledged receipt (three months later) of the second letter. Since 1999 the United Kingdom has had ample time to address Ireland's concerns, both generally and specifically in relation to the UNCLOS. But instead it has chosen to ignore them.

4.46. At a meeting held in London on 5 October 2001, Ireland notified the United Kingdom that, following the 3 October 2001 decision "justifying" the MOX plant, it considered the United Kingdom to have acted in violation of various provisions of the UNCLOS, as well as various other international instruments binding upon the United

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49 Ireland's submission to the United Kingdom dated 7 August 2001, in the context of the fifth public consultation, vol 3(1), Annex 29.

50 Letter of Ireland dated 27 August 2001, vol 3(1), Annex 30.

51 Letter of the United Kingdom dated 5 September 2001, vol 3(1), Annex 31.

52 Letter of the United Kingdom dated 13 September 2001, vol 3(1), Annex 33.

53 Ireland's submission to the United Kingdom dated July 1999, in the context of the third public consultation, vol 3(1), Annex 16.

54 Ireland's letter dated 23 December 1999, vol 3(1), Annex 20.

Kingdom. At that meeting Ireland informed the United Kingdom that it considered that a dispute existed between them in relation *inter alia* to the interpretation and application of various provisions of the UNCLOS.

4.47. By letter dated 16 October 2001 Ireland reiterated its view that with the authorisation of the MOX plant on 3 October 2001 a dispute or disputes had arisen with the United Kingdom under UNCLOS and other international instruments binding upon the United Kingdom.[55] The letter stated:

> "Ireland considers that the United Kingdom is in breach of its obligation to protect and preserve the marine environment and has failed to take all measures necessary to ensure that activities under its jurisdiction are so conducted as not to cause damage by pollution to Ireland (as required by Articles 192 to 194 [UNCLOS])."

The letter went on to identify various provisions of UNCLOS that Ireland considered had been violated by the United Kingdom. The letter also stated:

> "These international obligations become all the more significant in light of the terrorist attacks occurring in the United States on 11 September 2001. Ireland considers that it is imperative, in view of these attacks and renewed threats by terrorist groups, that further precautionary measures need to be taken to protect nuclear installations such as the MOX plant from attacks of this kind, as well as the proposed international transports by sea of radioactive materials to and from the MOX plant. Ireland is deeply concerned that possible terrorist attacks on the MOX plant and on sea transportations of radioactive material pose a very serious threat to Ireland and to its marine environment."

4.48. In that letter Ireland invited the United Kingdom "to suspend with immediate effect the authorisation of the MOX plant, and to take the necessary steps to halt with immediate effect all transportations of radioactive material in and around the Irish Sea to and from the MOX plant." Ireland also reserved its right to institute proceedings before appropriate international courts or tribunals without further notice. Ireland indicated its availability to proceed to an exchange of views as envisaged by Article 283 of the UNCLOS, notwithstanding the fact that the United Kingdom "appears strongly committed to the authorisation and early operation of the MOX plant".

4.49. The United Kingdom responded by letter dated 18 October 2001 from the Secretary of State at the UK Department for Environment, Food and Rural Affairs (DEFRA).[56] The United Kingdom did not respond to Ireland's request that the authorisation of the MOX plant be suspended with immediate effect, merely noting that the United Kingdom "Environment Agency has concluded that the radiological detriments associated with the manufacturing of MOX fuel would be very small and that any effects on wildlife would be negligible". Once again the United Kingdom did not address the question of international movements of radioactive materials, including plutonium, associated with the MOX plant, or the increased threat of terrorist acts following events of 11 September 2001 and subsequently, or any of the points made by Ireland in relation to the specific provisions of UNCLOS identified in its letter of 16 October. The United Kingdom response simply stated that "[T]he UK is anxious to exchange views on the points you raise in your letter as soon as possible. In order to do so meaningfully we need

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55 Letter from Ireland to the United Kingdom dated 16 October 2001, vol 3(1), Annex 34.

56 Letter of the United Kingdom dated 18 October 2001, vol 3(1), Annex 35.

to understand why the Irish Government considers the UK to be in breach of the provisions and principles identified in your letter."

4.50. On 23 October 2001, the Irish Taoiseach received a letter from the United Kingdom Prime Minister indicating that the United Kingdom was intending to proceed with the MOX plant.

4.51. By letter dated 23 October 2001, Ireland stated that it considered that no useful purpose could be served by any exchange of views unless the United Kingdom indicated a willingness to suspend authorisation or operation of the MOX plant.[57] By letter dated 24 October 2001 the United Kingdom declined to indicate any willingness to suspend authorisation or prevent operation of the MOX plant pending the resolution of the dispute with Ireland.[58] With that letter it became clear that the dispute could not be settled by exchange of views and negotiations.

4.52. Accordingly, by letter dated 25 October 2001 Ireland notified the United Kingdom that a situation of urgency now existed (given the imminence of the commissioning of the MOX plant) that views had been exchanged between the parties, and that it reserved its right to initiate UNCLOS proceedings without further notice.[59] That evening Ireland initiated UNCLOS arbitration proceedings against the United Kingdom, alleging violations of a number of Articles of the Convention.

4.53. By letter dated 30 October 2001 Ireland asked the Secretary of State at the UK Department for Environment, Food and Rural Affairs (DEFRA) when the MOX plant was likely to be authorised and operational.[60] No response was received. A reminder was sent on 6 November 2001.[61]

4.54. Before the United Kingdom responded, Ireland learned (not from the United Kingdom government) that BNFL planned to take "irreversible steps" to commence operations on or around 23 November 2001. This information was communicated by BNFL's lawyers in the context of legal proceedings in the High Court in London (in which Ireland was not involved), by letter dated 17 October 2001.[62] That letter stated:

> "Following the decision of the Secretaries of State on 3 October 2001, BNFL commenced with the consent of the [Nuclear Installations Inspectorate], the initial stages of plutonium commissioning, which it expects to complete on or around 15 November 2001. These involve the transfer of sealed plutonium containing materials into SMP in order to calibrate radiation monitoring equipment and test shielding. These initial stages are part of a commissioning programme which will lead to the opening of a plutonium can scheduled to take place on or around 23 November 2001, allowing plutonium to be fed into the process as a prerequisite to the manufacture of MOX fuel. The cost and complexities involved in reversing the commissioning of SMP will be very significantly increased once the plutonium can has been opened and plutonium introduced into the plant process.

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57 Letter from Ireland to the United Kingdom dated 23 October 2001, vol 3(1), Annex 36.

58 Letter from the United Kingdom dated 24 October 2001, vol 3(1), Annex 37.

59 Letter from Ireland to the United Kingdom dated 25 October 2001, vol 3(1), Annex 38.

60 Letter from Ireland to the United Kingdom dated 30 October 2001, vol 3(1), Annex 39.

61 Letter from Ireland to the United Kingdom dated 6 November 2001 at vol 3(1), Annex 40.

62 Letter dated 17 October from BNFL's lawyers regarding the operation of the plant, vol 3(3), Annex 120.

> It is of vital commercial importance to BNFL that the completion of the commissioning programme for SMP and the commencement of active operations is not delayed and it is BNFL's firm intention to proceed with the programme outlined above."

4.55. On 6 November 2001 Ireland learned that the date of 23 November 2001 had been pushed back to 20 December 2001.[63]

4.56. On 15 November 2001, Ireland received a letter from the UK Secretary of State. The letter stated *inter alia* that the United Kingdom was unable to give an undertaking to delay the commissioning of the MOX plant.[64]

4.57. Ireland understands that the commissioning of the plant occurred on 20 December 2001.

PROCEEDINGS BEFORE THE INTERNATIONAL TRIBUNAL FOR THE LAW OF THE SEA AND THE ORDER OF TRIBUNAL DATED 3 DECEMBER 2001

4.58. As indicated above, on 25 October 2001 Ireland instituted these arbitration proceedings against the United Kingdom, pursuant to Article 287 of UNCLOS. The written notification was accompanied by a Statement of Ireland's claim and the grounds upon which it is based in accordance with Annex VII, Article 1 of UNCLOS (together referred to as the Statement of Claim). This was amended on 21 January 2002, and the amendment approved by the Annex VII Tribunal by its Order dated 2 July 2002.[65]

4.59. Ireland also stated that if, within 14 days of the institution of the Annex VII arbitration proceedings, the United Kingdom declined to take the measures requested by Ireland (to suspend the authorisation of the MOX plant and to stop international movements of radioactive materials associated with the MOX plant), Ireland would submit a request for Provisional Measures to the International Tribunal for the Law of The Sea ("ITLOS") pursuant to Article 290(5) of UNCLOS. The United Kingdom did not take the measures requested. On 9 November 2001 Ireland submitted a Request for Provisional Measures along with its Statement of Case (together referred to as the Request for Provisional Measures) to ITLOS, pending the constitution of this Arbitral Tribunal constituted under UNCLOS, Annex VII ("the Annex VII tribunal"). The United Kingdom filed its written response on 15 November 2001, and by Order dated 13 November 2001, the President of ITLOS fixed dates for the hearing of the request.[66]

4.60. Hearings were held on 19 and 20 November 2001 in Hamburg. The written pleadings and a verbatim record of these proceedings are available at the ITLOS web site.

4.61. On 3 December 2001 ITLOS adopted its Order. It unanimously prescribed the following provisional measures:

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63 Letter dated 5 November 2001 in the United Kingdom judicial proceedings, vol 3(3), Annex 121.

64 Letter dated 15 November 2001 from the United Kingdom, vol 3(1), Annex 41.

65 UNCLOS Annex VII Arbitral Tribunal Order No.1, 2 July 2002, vol 3(1), Annex 6.

66 ITLOS, Order 2001/5 of 13 November 2001.

"Ireland and the United Kingdom shall co-operate and shall, for this purpose, enter into consultations forthwith in order to:

(a) exchange further information with regard to possible consequences for the Irish Sea arising out of the commissioning of the MOX plant;

(b) monitor risks or the effects of the operation of the MOX plant for the Irish Sea;

(c) devise, as appropriate, measures to prevent pollution of the marine environment which might result from the operation of the MOX plant."[67]

4.62. ITLOS also decided that each party was required to submit not later than 17 December 2001 an initial report "upon the steps it has taken or proposes to take in order to ensure prompt compliance with the measures prescribed."[68]

DEVELOPMENTS SUBSEQUENT TO THE ITLOS ORDER

4.63. In compliance with the Order of 3 December 2001, and with a view to initiating the co-operation and consultation which ITLOS prescribed in its Order, Ireland invited the United Kingdom to attend a meeting in Dublin with a view to establishing the parameters for consultation between the parties.[69] The letter also stated that Ireland considered that the commissioning of the plant, and the consequential intensification of the use of the THORP plant, prior to the fulfilment of the obligation of co-operation ordered by the International Tribunal could aggravate and extend the dispute between the parties.

4.64. Ireland annexed to its letter a list of questions concerning the nature and implications of the MOX project for the Irish Sea. The letter was premised on that part of the ITLOS Order which stated that "[…] in the view of the Tribunal, prudence and caution require that Ireland and the United Kingdom co-operate in exchanging information concerning risks or effects of the operation of the MOX plant and in devising ways to deal with them, as appropriate" (para. 84). Many of the questions had previously been posed by Ireland, but Ireland had not received responses from the United Kingdom. Ireland hoped that the meeting might provide an opportunity for an initial exchange of views on aspects of the consequences of the commissioning of the MOX plant, in particular in relation to the exchange of further information, on monitoring of risks or effects, and on devising measures to prevent pollution of the marine environment.

4.65. By its letter of 7 December 2001, the United Kingdom agreed to attend the meeting. With regard to the questions asked by Ireland, the letter stated "that many of [the questions] relate to matters outside the scope of the dispute submitted by Ireland to the Annex VII tribunal."[70]

4.66. On 11 December 2001 a meeting was held between the parties in Dublin. During the course of the meeting it became clear that the parties interpreted the provisional measures prescribed by the ITLOS in different ways.[71]

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67 Order of the ITLOS of 3 December 2001, vol 3(1), Annex 3

68 See vol 3(1), Annex 5.

69 Letter from Ireland to the United Kingdom dated 5 December 2001, vol 3(1), Annex 44.

70 Letter from the United Kingdom in response dated 7 December 2001, vol3(1), Annex 45

71 Minutes of the meeting held on the 11 December 2001, vol 3(1), Annex 4.

4.67. On 17 December 2001 both parties submitted their Reports to the ITLOS on the steps taken or proposed to be taken to ensure prompt compliance with the measures prescribed in the Tribunal's Order of 3 December 2001.[72]

4.68. Since the meeting on 11 December 2001, correspondence between the parties has focused on a number of issues, and two in particular: (1) information requested by Ireland, and (2) the transportation of radioactive materials to and from Sellafield in the light of the United Kingdom' assurances to the ITLOS.

EXCHANGE OF INFORMATION BETWEEN THE PARTIES

4.69. As stated above, Ireland's letter of 5 December 2001 was accompanied by a list of 55 questions regarding various aspects of the MOX plant. Ireland requested early answers to the same. While stating that it considered many of the matters addressed to fall outside the scope of the Provisional Measures Order, the United Kingdom's letter in reply stated that it would respond as quickly as it could. Ireland was disappointed that no answers were forthcoming at the meeting of the parties on 11 December 2001.

4.70. On 17 December 2001, Ireland received responses to 16 of Ireland's 55 questions. This was followed by a second batch of answers on 1 February 2002, and a third and final batch of responses was received from the United Kingdom on 21 March 2002.[73] By letter dated 22 March 2002 Ireland reserved its position as to the adequacy of the United Kingdom's responses to the questions.[74]

4.71. Ireland also sought clarification with regard to Question 35 which stated "What special measures have been taken to ensure the safe passage of [ships carrying radioactive material] to and from their destinations?" in the light of Article 4 and Annex 1 (Section 2(b)) of the 1980 Convention on the Physical Protection of Nuclear Materials. This provision requires the United Kingdom to ensure that transportation of the nuclear materials takes place "under constant surveillance by escorts and under conditions which assure close communication with appropriate response forces". This clarification was sought, as the Answer provided by the United Kingdom made no reference to such "escorts".[75] Ireland was concerned to know if transports from Japan and Germany were "under constant surveillance by escorts".

4.72. The United Kingdom's response dated 11 April 2002 merely stated that "all transports of nuclear materials undertaken by the United Kingdom are carried out in full compliance with the [1980] Convention."[76] It did not provide any further details.

4.73. Reference is made to the 55 questions as to the answers provided by the United Kingdom as appropriate in this Memorial.

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72 Report of Ireland to the ITLOS dated 17 December 2001, vol 3(1), Annex 5.

73 Letters from the United Kingdom dated 17 December 2001, 1 February 2002 and 21 March 2002 with responses to Ireland's 55 questions, vol 3(1), Annexes 46, 47 and 57.

74 Ireland's letter to the United Kingdom dated 22 March 2002, vol 3(1), Annex 58.

75 *Ibid*.

76 Letter from the United Kingdom dated 11 April 2002, vol 3(1), Annex 60.

TRANSPORTATION OF RADIOACTIVE MATERIALS TO AND FROM SELLAFIELD IN THE LIGHT OF THE UNITED KINGDOM'S ASSURANCES TO THE ITLOS AND IRELAND

4.74. During the course of the ITLOS hearings, and in response to the Tribunal's question as to the extent to which the commissioning of the MOX plant would increase the transport by sea of radioactive materials to and from Sellafield, Counsel for the United Kingdom made *inter alia* the following undertaking:

> "[…] Before summer 2002 (at the earliest) there will be no additional marine transports of radioactive material either to or from Sellafield as a result of the commissioning of the MOX plant. I shall revert to that subject in a moment in order to avoid any possibility of misunderstanding over the use of terms."[77]

He went on to state:

> "You have also heard a certain amount about the falsification of data incident at the MOX demonstration facility. It is a matter of public knowledge that the MOX fuel, which was the subject of that incident, is to be returned. It will not be returned to the MOX plant but to a storage pool. It is presently not anticipated that this will be returned until some time late next year. It is a matter for agreement with the Japanese authorities, among others.
>
> There will be no export of MOX fuel from the plant until summer 2002. There is to be no import to the THORP plant of spent nuclear fuel for conversion to the MOX plant within that period either. Indeed, the lead times for contracts of this kind are such that it is not likely to be anywhere near within that period.
>
> I have been asked by my Irish friends to be more precise in the use of these terms. I have deliberately spoken of "summer" rather than giving a fixed date because all of this is anticipation, although in some cases rather confident anticipation, of arrangements yet to be made but I have been told this afternoon that if one were to read the word October" for "summer" that would give acceptable greater precision."[78]

4.75. The ITLOS noted and placed on record these undertakings regarding marine transports of radioactive material either to or from Sellafield. Its Order notes:

> "78. *Considering* that, at the public sitting held on 20 November 2001, the United Kingdom has stated that "there will be no additional marine transports of radioactive material either to or from Sellafield as a result of the commissioning of the MOX plant";
>
> 79. *Considering* that at the same sitting the United Kingdom stated further that "there will be no export of MOX fuel from the plant until summer 2002" and that "there is to be no import to the THORP plant of spent nuclear fuel pursuant to contracts for conversion to the MOX plant within that period either" and clarified that the word "summer" should be read as "October";"

4.76. Against this background, in February 2002 Ireland learnt that a German nuclear power utility (Gemeinschaftskraftwerk Neckarwestheim (GKN)), had announced its intention to make five shipments of spent fuel to Sellafield in 2002. The information was

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77 See ITLOS, 20 November 2001, 3:00PM, Verbatim Record, P. 21, lines 40 *et seq*.

78 *Ibid*, p 26, lines 22 *et seq*.

not provided by the United Kingdom Government. It was reported that this spent nuclear fuel was to be reprocessed at the THORP plant, that the first such shipment was to take place in early February, and that further shipments were expected to be made in mid-March, mid-May and July. Ireland also learnt that licences had been issued by the German authorities in relation to the transportation of this nuclear waste from Neckarwestheim to Sellafield, according to a provisional timetable envisaging that three transports would occur before "mid-2002".

4.77. At about this time, Ireland also learnt that a new German Nuclear Law adopted by the German Bundestag in December 2001 had been adopted by the Plenary Session of the German Bundesrat at its meeting on 1 February 2002. Ireland's understanding is that the new Law provides, in effect, that shipments of spent nuclear fuel transported to the United Kingdom for reprocessing cannot return to Germany in the form of plutonium. It therefore appeared to Ireland that, in order to comply with the new German Nuclear Law and the policy of the German Federal Government, the spent nuclear fuel which was being shipped from GKN to Sellafield – scheduled to begin in February 2002 – were intended to be transformed into MOX Fuel at the MOX plant, and then returned to Germany. In this way the transportations are transports associated with the authorisation of the MOX Plant, in the sense that they could not have occurred if the MOX plant had not been authorised. This raised concerns about the undertaking which the United Kingdom had given to ITLOS.

4.78. Accordingly, Ireland addressed a letter dated 1 February 2002 to the United Kingdom.[79] The letter set out Ireland's understanding of the German Law and, in light of the United Kingdom's undertaking at the ITLOS, asked the United Kingdom to confirm (1) that nuclear materials which were scheduled to be transported from the German nuclear plant to Sellafield in February 2002, March 2002, May 2002 and July 2002 would not be transformed into MOX fuel following their reprocessing at the THORP plant and (2) that the United Kingdom would ensure that, if there existed any intention or understanding that these nuclear materials were to be transformed into MOX fuel, their shipments to Sellafield would be delayed until after October 2002, in accordance with the United Kingdom's undertaking to the ITLOS. The letter also asked the United Kingdom to provide, pursuant to the obligation to co-operate, complete information on all expected shipments of nuclear materials to Sellafield for reprocessing at the THORP plant (including country of origin and expected date of arrival) in order that Ireland may be satisfied that such materials are not to be transformed into MOX fuel.

4.79. The United Kingdom's response of 6 February 2002 provided none of the assurances Ireland sought with regard to the German shipments. Nor did it provide any information about future shipments of nuclear materials to Sellafield for reprocessing at the THORP plant, or any other information about the scheduling of transports, their routes, timing and security arrangements. In fact the letter stated that:

> "[f]or obvious security reasons, and in accordance with the terms of the International Convention on the Physical Protection of Nuclear Materials, the [UK] Government does not make public detailed information about the timing of transports of nuclear materials".[80]

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79 Ireland's letter dated 1 February 2002, vol 3(1), Annex 48.

80 Letter from the United Kingdom dated 6 February 2002, vol 3(1), Annex 49.

4.80. In Ireland's opinion this constituted a further example of the United Kingdom's failure to co-operate. Ireland was particularly surprised to be characterised as part of the "wider public".

4.81. By a letter dated 27 March 2002, Ireland invited the United Kingdom to confirm that the transportations of nuclear materials from Germany and from Japan were taking place in accordance with the provisions of the 1980 Convention on the Physical Protection of Nuclear Materials. This *inter alia* provided that such transports are to be "under constant surveillance by escorts and under conditions which assure close communication with appropriate response forces."[81] Ireland requested full details regarding any proposed escorts for the transport under appropriate conditions of confidentiality.

4.82. At about this time (late March 2002), Ireland also learned that the shipment of the Japanese MOX fuel which was the subject of the data falsification scandal (Chapter 2, paras 2.78 *et seq*) was scheduled to take place in the early summer of 2002, apparently before October 2002, which was the date specified by the United Kingdom in its undertaking to ITLOS. Ireland's letter also addressed this issue. It reminded the United Kingdom of its assurances to both the ITLOS and Ireland. Ireland requested the United Kingdom to *inter alia* confirm that the transportation of the said MOX fuel from Japan to Sellafield would not occur before "late" 2002 or October 2002. It also asked the United Kingdom about its plans for the subsequent use of this fuel.[82]

4.83. The United Kingdom replied by letter of 19 April 2002.[83] With regard to the timing of the transportation of the tainted Japanese MOX fuel to the United Kingdom, the letter confirmed that the tainted MOX fuel was to be returned before October 2002. With regard to the use to which the tainted fuel would be put, the letter stated that "On arrival, the [tainted MOX fuel from Japan] will be placed in a storage pond at Sellafield". The United Kingdom offered to discuss confidentially with Ireland information relating to the number of transports of MOX fuel.

4.84. By its letter dated 9 May 2002, Ireland responded to the United Kingdom's letters dated 11 April 2002 and 19 April 2002.[84] With regard to the United Kingdom's letter of 11 April 2002 regarding security arrangements for the transportation of nuclear materials, Ireland stated that it considered the United Kingdom's response inadequate and indicative of the United Kingdom's continuing reluctance to co-operate with Ireland.

4.85. On the issue of the transport and the subsequent use of the tainted Japanese MOX fuel, Ireland drew the United Kingdom's attention to certain documents of the relevant US and EURATOM authorities.[85] These documents indicated that the US and EURATOM authorities (and presumably therefore the United Kingdom authorities) had knowledge (as early as September 2001) that the tainted Japanese MOX fuel was to be transferred from Japan to the United Kingdom "in the course of April through December 2002". Ireland also requested a specific assurance that the tainted fuel would not arrive within British or Irish waters before October 2002.

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81 Ireland's letter dated 27 March 2002, vol 3(1), Annex 59.

82 *Ibid*.

83 United Kingdom's letter dated 19 April 2002, vol 3(1), Annex 61.

84 Ireland's letter dated 9 May 2002, vol 3(1), Annex 62.

85 See the Memorandum from Janice Dunn Lee, Office of International Programs, US Nuclear Regulatory Commission, to the Nuclear Regulatory Commissioners, 6 September 2001 with enclosures,vol 3(3), Annex 119.

4.86. On the issue of the subsequent use to which the tainted Japanese MOX fuel would be put, Ireland referred to the same US documents, which indicated that the fuel from Japan would not remain in "a storage pool" but would be returned to Japan as "fresh" MOX fuel.[86] This appeared to be inconsistent with the information provided in the United Kingdom's letter of 19 April 2002. It also appeared to differ from the content of the United Kingdom's undertakings before ITLOS.[87] Ireland's letter pointed out that the only facility at Sellafield which is operational and capable of transforming the recovered plutonium into "fresh MOX assemblies" is the MOX plant.

4.87. The EU and US documents also refer to the existence of a "Security Plan" for transport of the tainted fuel back to the United Kingdom. Ireland, pursuant to the ITLOS Order on co-operation, requested an opportunity to examine, on a confidential basis, this "Security Plan" relating to the international transports of the tainted Japanese MOX fuel Ireland hoped to assess its implications for Ireland's own safety and security plans. Ireland's letter asked the United Kingdom whether any existing plans had been reviewed and amended in light of events on 11 September 2001. The letter also noted that Ireland's requests for information from the United Kingdom, including clarification of undertakings and practices, remained outstanding.

4.88. On 17 May 2002, Ireland received three letters from the United Kingdom. The first pertained to the transport of the tainted fuel from Japan to the United Kingdom.[88] The letter did not address a number of the specific issues which Ireland had raised in its earlier letter. The United Kingdom's letter did, however, confirm that the tainted MOX fuel would arrive in the United Kingdom before October 2002.

4.89. A second letter of the same date related to the subsequent use of the tainted fuel on its return to the United Kingdom from Japan.[89] The letter stated that "BNFL has yet to finalise precise plans for the management of the fuel." It did not, however, address the question of the apparent differences between the statement made by the United Kingdom to the ITLOS and the information to be found *inter alia* in correspondence between the European Commission and the US Department of Energy, to the effect that the tainted MOX fuel will be processed in the MOX plant after storage.

4.90. The third letter of 17 May 2002 pertained to the estimated annual number of MOX fuel transports.[90] The United Kingdom stated that it was willing to supply the estimated number of such transports, provided that Ireland undertook to respect the confidentiality of the information. The letter also invited Ireland to a meeting to exchange views on this matter.

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86 *Ibid*, Enclosure 1, letter from Ms Trisha Dedik to Mr Ronald Hauber states:

> "Upon its return to British Nuclear Fuels, the material will be stored in an approved facility pending recovery of the plutonium contained in the unirradiated fuel assemblies. The recovered plutonium will be returned to Japan in the form of fresh MOX fuel assemblies."

The same formulation is to be found in the enclosure 1B, letter from Mr J. Santos Bento (European Commission) to the US Department of Energy, dating back to 20 July 2001.

87 Mr Plender's statement to the ITLOS, that the tainted MOX fuel from Japan "will not be returned to the MOX plant but to a storage pool" (Verbatim Record, ITLOS/PV.01/09).

88 United Kingdom's letter dated 17 May 2002, vol 3(1), Annex 64.

89 United Kingdom's letter dated 17 May 2002, vol 3(1), Annex 65.

90 United Kingdom's letter dated 17 May 2002, vol 3(1), Annex 63.

4.91. By its letter of 20 June 2002 Ireland responded to the United Kingdom's letters of the 17 May 2002 and accepted the invitation to attend in a meeting on 25 June 2002. The letter stressed that Ireland required the requested information on the shipping and transport of nuclear materials in order to make adequate emergency and security preparations for the protection of the Irish Sea. The letter set out an agenda, explaining some of Ireland's main concerns in respect of access to information on and coordination of preparations for shipments of nuclear materials. This included details of the estimated number of transports to and from Sellafield; conditions under which such transports were to take place, (having regard to the potential environmental impacts of such transports and the requirements of the 1980 Convention on the Physical Protection of Nuclear Material); particulars regarding emergency response equipment, personnel and measures to be taken in respect of shipboard emergency planning; the communication of emergency plans; prior notification and exchange of information on routes for shipments; and mechanisms for the exchange of regular information on the location of ships in transit within 200 miles of the Irish coast. Ireland also wished to discuss with the United Kingdom assurances of non-contamination of the marine environment, commitments to recover radioactive material in the event that ships carrying such materials are involved in an accident or incident and effective liability mechanisms currently in place and or planned.[91]

4.92. Ireland's letter also raised the issue of extending beyond October 2002, the United Kingdom's undertakings in relation to the operation of the MOX plant and of shipments to it. Ireland stated that it would prefer to reach an agreement with the United Kingdom on such an extension, rather than seek any Order from the Tribunal. In this regard Ireland stated that this issue could also be discussed at the meeting on the 25 June 2002 so as to ensure that any Order that the Tribunal might give in terms of paragraph 5 of the Statement of Claim was not defeated by any action taken by the United Kingdom prior to the date of such an Order.

4.93. With regard to the United Kingdom's request that that Ireland maintain strict confidentiality over certain information imparted by the United Kingdom, Ireland stated that in relation to security-related matters its interests coincided with those of the United Kingdom, and that any information that the United Kingdom supplied would be covered under one or more of the areas covered by Section 24 of the Irish Freedom Of Information Act 1997. In respect of commercial confidentiality issues, the letter stated that Ireland was not a competitor or a customer of BNFL and had no commercial interest in any information and had no interest in passing any such information on to customers or competitors of BNFL.

4.94. Ireland's letter indicated that its intention in coming to a meeting with the United Kingdom was to exchange views and information which would enable Ireland, and the United Kingdom, to make practical arrangements and develop co-ordinated contingency plans in advance of the arrival of shipments of nuclear materials including the MOX shipments from Japan.

4.95. Finally, the letter noted that the United Kingdom's letters of 17 May 2002 did not adequately address Ireland's concerns in relation to the proposed shipment of MOX fuel from Japan to the United Kingdom.

4.96. At the meeting on the 25 June 2002, the parties held discussions on how, in addition to employing the safeguards with the Annex VII Tribunal's rules, Ireland might

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91 Ireland's letter dated 20 June 2002, vol 3(1), Annex 66.

protect the asserted confidentiality of the information under consideration. No agreement was, or has subsequently, been reached.

4.97. On 1 July 2002, the United Kingdom Environment Agency adopted a decision on the application of the Transfrontier Shipment of Radioactive Waste Regulations 1993, to the proposed return of the tainted MOX fuel from Japan.[92] This stated that the MOX fuel in question could not be treated as waste because it was to be used to make MOX fuel. By its letter of 3 July 2002, Ireland expressed its surprise at this decision, in the light of the United Kingdom's undertaking at ITLOS, and the earlier correspondence stating that the MOX fuel was to be put in storage. Ireland requested information about the various options identified with regard to the recovery of the materials.[93]

4.98. In response, the United Kingdom stated that the information supplied by BNFL to the Environmental Agency about options for managing the fuel upon its return to the United Kingdom was "commercially sensitive" and solely for the purpose of the Environmental Agency's assessment.[94]

4.99. By letter of 15 July 2002, Ireland noted the United Kingdom's remarks about the Environmental Agency's decision, and reserved its position.

4.100. Ireland's second letter of 15 July 2002 referred to the United Kingdom's offer to disclose to Ireland, in confidence, information on the estimated number of shipments of MOX fuel.[95] Ireland considers this information essential to make its own emergency and security preparations and to help ensure that the Irish Sea was subject to the greatest possible protection from further pollution from radioactive sources. The letter stated that as Ireland had not yet seen the information, it was not in a position to agree to the confidential or commercially sensitive nature of the information.[96] Ireland reserved its position in this regard.[97]

4.101. The letter stated that Ireland, having carefully considered the matter, was unable to agree to the suggestion that it should give prior sight of its pleadings (or a portion of its pleadings) to the United Kingdom. Instead, Ireland suggested that the better course of action would be to put that portion of the argument and the specific information in question into a separate pleading document which would itself be treated as confidential and would continue to be treated as such by both parties and the Tribunal throughout and after the hearing, or until such time as the Tribunal had determined that the material was not subject to confidentiality requirements. Ireland confirmed that it had put in place administrative machinery which would ensure that the circulation of the said information would be restricted to the minimum.

4.102. Ireland's letter of 16 July 2002 concerned the United Kingdom's undertaking to the ITLOS that there would be no transports associated with the MOX plant before October 2002. Ireland invited asked the United Kingdom to indicate its position regarding the adoption of a voluntary assurance (in the terms of paragraphs 78 and 79 of the ITLOS

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92 See the Decision of the EA on the application of the Transfrontier Shipment of Radioactive Waste Regulations 1993, July 2002, vol 3(2), Annex 102.

93 Ireland's letter to the United Kingdom dated 3 July 2002, vol 3(1), Annex 67.

94 United Kingdom's letter dated 5 July 2002, vol 3(1), Annex 68.

95 This matter was also discussed at the meeting between the parties in London on 25 June 2002

96 Ireland's letter dated 15 July 2002, vol 3(1), Annex 70.

97 *Ibid*.

Order) to extend its undertaking beyond the October 2002 date, until the Annex VII Tribunal had given its Award. Ireland indicated that in the spirit of co-operation in accordance with the ITLOS Order, and in the interest of both parties it would be preferable to reach a common understanding rather than making any formal applications to the Annex VII Tribunal.[98]

98 Ireland's letter dated 16 July 2002, vol 3(1), Annex 71.