"BRENT SPAR" ABANDONMENT: AN OVERVIEW

INTRODUCTION

The "Brent Spar" is a cylindrical buoy, moored by six anchor chains with a height of 140m and a maximum diameter of 29m. It is therefore a fixed installation for the purposes of regulation. The installation was used for oil storage and subsequent transfer to tankers prior to decommissioning in 1991. Up to the point at which the Brent System pipeline was commissioned in 1978, the "Brent Spar" was the sole route for the export of crude oil from the Brent Field in the UK sector. The installation was operated by Shell UK Exploration and Production. Operational error caused two of the six tanks to rupture in 1977. These were not brought back into use. The operators have commissioned a report from consultants Rudall Blanchard Associates Limited entitled "Brent Spar Abandonment BPEO" published in 1994 (DOCUMENT 1) where BPEO stands for Best Practicable Environmental Option. This document identified two options as feasible:

1) Refloating the structure horizontally followed by dismantling

2) Deep water disposal

It is planned, therefore, to tow the structure to one of three deepwater sites west of Scotland and sink it using explosive charges. The possibilities of vertical dismantling and *in situ* disposal were ruled out together with a continued maintenance programme and a refurbishment option. Other analyses of the problem, published by Greenpeace under the title "No Grounds for Dumping" argue that dismantling is a financially sound and is the most acceptable environmental option (DOCUMENT 4). DOCUMENT 1 finally identifies deep water disposal as the BPEO after consideration of cost, engineering complexity and worker safety aspects of the operation. Deep water disposal is the lowest cost option. A further document, by the same consultants entitled "Brent Spar Abandonment Impact Hypothesis" (DOCUMENT 2) was also published in 1994. It is implied that this has been prepared using the "1991 Oslo Commission Guidelines for the Disposal of Offshore Installations at Sea." The guidelines have been drafted with the provisions of UNCLOS (1982) and the 1958 Geneva Convention in mind and have been adopted on a trial basis only. In addition, a document has been produced by the University of Aberdeen entitled "Removal and Disposal of the Brent Spar: A Safety and Environmental Assessment of the Options" which synthesises earlier assessment work carried out by University personnel on the subject, commissioned by Shell UK Exploration and Production (DOCUMENT 3). Broadly, this reiterates the findings of the other two documents and has largely drawn on the same body of reference material and, lacking in apparent independent analysis, adds very little to the findings of these reports. The general premise of these reports is that deep sea disposal represents the least environmentally damaging option, but this must be set against the fact that this will be the largest structure abandoned to date (there are five previous small scale examples) (DOCUMENT 3 Page 14) and that a further 418 fixed structures will approach the end of their working lives in the foreseeable future.

This overview examines the proposed dumping operation proposed in the "Impact Hypothesis" document in the context of the guidelines, drawing on information to be found in the other documents and highlighting areas of concern.

OSLO COMMISSION GUIDELINES AND ARTICLES

a) Assumed Requirements

i) Hazardous or noxious materials- metals and organics

The Oslo Commission Guidelines assumes that abandonment plans prepared by the industry and national authority includes *inter alia* the removal of all hazardous or noxious materials e.g. PCBs, biocides, toxic chemicals, hydrocarbons and corrosion inhibitors. In the case of the "Brent Spar" this is demonstrably not the case. Although it is intended to reenter the structure this will only remove "accessible" hazardous materials for onshore disposal (DOCUMENT 2, Section 4.2). This will leave a considerable quantity of hazardous materials aboard as shown in the table below.

Additionally, the actual content of structural steel alone amounts to 6,700 tonnes and the structure contains 6,800 tonnes of haematite concrete ballast. The steel is the least commercially valuable of the metals on board yet in scrap value is likely to raise at least 400,000 pounds sterling. Copper and aluminium scrap values are high, while the 1000 tonnes of machinery could have values as spares and replacement parts. This financial aspect, although a small offset against abandonment costs is not considered in either of the financial breakdowns presented. (Document 1 Section 9). It is not clear how these relative costings have been devised which show that horizontal dismantling will cost 45.9 million sterling as against a deep water dumping option cost of 11.7 million. There is certainly a need to subject these costings to an independent audit and examine the individual components of costs. In particular, this needs to be compared to the costs of the original equipment, the value of the commodity handled and the revenue generated during its lifetime. These highly important figures are not given in any of the documents.

SUBSTANCE	SOURCE	QUANTITY
Mercury	Sacrificial anodes, sludge, light fittings	0.3kg
Cadmium	Sacrificial anode, sludge, batteries	16.4kg
Copper	Wiring, switchgear, sludge	13500 kg
Lead	Batteries, sludge	9.5kg
Zinc	Sacrificial anodes, in paint	13,800 kg
Nickel	Batteries, sludge	7.4kg
Petroleum Persistent oils	Hydrocarbons, sludge, storage tanks, pipes	100t

Radioactive material (includes 100t sludge)	sludge, scale in pipework	130t

Information: Table 2, DOCUMENT 3.

The estimates include a residual amount of PCBs in the transformer fluids, but not the transformer fluids themselves which are likely to be persistent silicone based oils. In addition, there is an unknown quantity of persistent synthetic materials in the form of plastics and cable insulation. This will include plastic additives in the form of plasticisers and fire retardants which are both subject to leaching from cable coatings. Substances such as chloro-paraffins and brominated organic compounds which are used as lubricants, although organohalogens and therefore "Regulated Substances" under the terms of the Oslo and Paris Conventions and the London Convention. Other organohalogens may be present in grease type lubricants on machinery

These figures are all estimates and are highly uncertain. For example, the quantity of PCBs does not appear to have been confirmed by analysis. In addition, the levels of metals and petroleum hydrocarbons in the oily sludge have been estimated from only two samples (DOCUMENT 3, Page 1) while the composition of the 48000 cubic metres of seawater present in the storage tanks is not accurately known (DOCUMENT 1 Section 3.3.3). The assumption is made that some toxic chemicals present in the tank contents were removed during the decommissioning operation, for example the 45001 of Glyoxal added in 1991 and its reaction products. No evidence of this is presented. The presence of biocides has not apparently been monitored.

ii) Radioactivity

The radioactivity is present in both the sludge and in the scale on the inside of the pipework. Its total quantity is estimated at around 12 GBq (12 thousand million Bq) divided between the sludge and the scale. The sludge has a lower activity than the scale. It has arisen as a result of the co-precipitation of natural radionuclides with barium sulphate present in oil well- produced water. Precise determinations have only been carried out on the radioactive content of the sludge (Document 2 Section 3.2.9) and the activity of the scale has been done by extrapolation from operations on other rigs.

OVERVIEW

1) The "Brent Spar" contains a substantial inventory of materials which are regulated under the terms of the Oslo Convention. There is a clear breach of the guidelines published by the Commission relating to the disposal of offshore structures. Moreover, there appears to be a clear violation of Article 5(2) of Annex 3 of the Oslo Convention (DOCUMENT 4 Page 21).

2) The estimates of the quantities of Regulated Substances appear to highly uncertain, based on very limited spot sampling carried

out in 1991. The inventory of radioactivity is based on operational experience at other installations not upon empirical measurement.

4) The inventory is incomplete and does not consider such chemicals as fire retardants, solid lubricants or plasticisers which are subject to leaching and which are Regulated Substances under the terms of the Oslo Convention.

ii) Stability of dumped materials

A second requirement of the guidelines is "the provision of satisfactory evidence on the stability of the materials when deposited". No empirical evidence is presented on this aspect (DOCUMENT 2 Section 6.3) although it is estimated that the structure will remain substantially intact for around 4,000 years although the sacrificial anodes will be exhausted after only 15 years. In addition, it is projected that the contained materials are likely to be released only slowly, but this is dependent upon the structure reaching the ocean floor intact after dumping (DOCUMENT 2 Section 6.1.2; 6.2.1). Although the probability of this is estimated as high, (DOCUMENT 2 Section 6.1.2), no precise figures are given. This is a point of considerable significance in relation to the likely manner of release of the contained toxic substances. In addition, it can be argued that if Regulated Substances are likely to be discharged under any circumstances, then the structure is not stable.

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1) The structure cannot be regarded as stable.

DISPOSAL OF RADIOACTIVE MATERIALS

This is a highly important aspect of the proposed "Brent Spar" deep sea dumping option. Document 3, Page 24 notes that the scale is likely to attract regulation both under the UK Radioactive Substances Act (1960 & 1993) and under Radioactive Substances (Phosphatic Substances, Rare Earths Etc.,) Exemption (Scotland) Order 1962 and therefore qualifies as low level radioactive waste. It is further argued that the provisions of the Oslo Convention and London Convention since both exclude the disposal of wastes derived from the normal operations of offshore oil platforms. The London Convention, to which the UK is a signatory, imposed a ban on the dumping of low level radioactive waste in 1992.

Although apparently ambiguous, this exemption applies only to active operational installations. Decommissioning renders an installation dysfunctional i.e. incapable of the normal operations for which it was emplaced. Accordingly, wastes existing after this point cannot be regarded as a product of normal operations.

Further, in Document 2 Section 8.5.2 it is implied that the International Atomic Energy Authority (IAEA) is working to define

radioactive wastes for the purposes of regulation under the London Convention. This advisory work is ongoing and has not been included. To infer, as this document does that on these grounds the doses likely to arise in the human populations are so small as to justify exclusion from the terms of the convention is misleading and incorrect. The IAEA definitions constitute no more than suggestions which have been made to the body of the LC through the Scientific and Technical Working Group and have no basis, as yet, in International Law. Hence, any proposed dumping of this material would preempt discussions at the Convention.

The various documents also contain some specious statements concerning the scale of the radioactive contamination present. Document 3 Page 21 asserts that the total radioactivity is the same as is present in the granite buildings of Union Street Aberdeen. Such statements are not scientific.

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2) The dumping of the radioactive contaminants present on the Brent Spar in the scale would breach UK domestic law governing the handling of low level radioactive waste.

3) The assertion that this waste is excluded from the provision of the Oslo and London Conventions is not credible or accurate.

ECOLOGICAL IMPACTS

The general thesis held in Documents 1, 2 & 3 is that ecological impacts will be minimal based on the assumption that the structure will reach the seabed intact. Unfortunately, this assumption is not backed up by any probabilistic assessment. More importantly, the documents do not present any baseline data for the proposed dumpsites, relying upon general, early, references to describe deep sea conditions (Document 2 Section 5.3). The biology of deepwaters appears to be very poorly understood, and the authors appear to have little expert knowledge of this aspect. Highly simplistic assertions based upon the limited information (e.g. Document 3: 61-65) are made concerning the biology of potential dumpsites, yet it is acknowledged (Page 60) that very little is known about these deep water environments.

It is conspicuous, however, that potential impacts have been assessed on the basis of the known responses of shallow water organisms (Document 2 Section 7). No evidence is presented concerning the actual effects upon the deep water ecosystem. Toxicological data cannot be reliably extrapolated from shallow to deep water systems. Hence, the impact scenarios presented in Document 2 Section 7 are mere speculation on the part of the authors. The report is particularly weak in discussing the global significance of deep water environments. Similarly, even with detailed baseline information concerning the physical environment of deep water sites, the behaviour of toxic chemicals will be impossible to predict.

OVERVIEW

1) Insufficient information exists to properly assess the ecological impacts of a deep water dumping operation.

2) There is no certainty that the contaminant release scenarios are accurate.