



Department of Trade and Industry

**Strategic Environmental Assessment of the
Mature Areas of the Offshore North Sea
SEA 2**

SEA 2 Post Public Consultation Report

January 2002

CONTENTS

1	Introduction.....	2
1.1	Background.....	2
1.2	Overview of the consultation process.....	2
1.3	Purpose of this document	2
2	Habitats-directive.org.....	3
2.1	Introduction.....	3
2.2	Web hits and pages/document reviewed statistics.....	3
3	Consultation issues.....	6
3.1	Consultation input received	6
3.2	Consultation issues with DTI responses and clarifications	6
3.2.1	Comments on the SEA initiative	6
3.2.2	Comments on document structure etc	6
3.2.3	SEA process	6
3.2.4	Non-technical summary.....	7
3.2.5	Issues raised on Section 3 Regulatory Context	8
3.2.6	Issues raised on Section 4 Activities	8
3.2.7	Issues raised on Section 5 Physical and Chemical Environment	9
3.2.8	Issues raised on Section 6 Ecology	10
3.2.9	Issues raised on Section 7 Potential Offshore Conservation Sites.....	11
3.2.10	Issues raised on Section 8 Existing Human Activity	12
3.2.11	Issues raised on Section 10 Consideration of the Effects of Licensing ..	13
3.2.12	Issues raised on Section 11 Conclusions.....	17

Technical Appendix – Cumulative and Synergistic Effects

1 INTRODUCTION

1.1 Background

The European Commission Directive on the assessment of the effects of certain plans and programmes on the environment (2001/42/EC, the Strategic Environmental Assessment Directive) was adopted in June 2001 and implementation by Member States is required by 2004. The Department of Trade and Industry has adopted a proactive attitude towards this Directive and in 1999 commenced the use of Strategic Environmental Assessment (SEA) as a planning tool prior to the 19th Round of offshore licensing. It is planned to use SEA before all future Licensing Rounds for hydrocarbon exploration and production on the UK Continental Shelf (UKCS). In order to prioritise and expedite the process, the UKCS has been sub-divided into eight areas. In 2001 the SEA process focussed on the mature oil and gas provinces of the North Sea, an area referred to as SEA 2, prior to a 20th Licensing Round. The DTI initiated the SEA 2 process in January 2001. Shortly thereafter the SEA Steering Group was set up, whose role is to provide independent expert advice to the DTI.

1.2 Overview of the consultation process

In keeping with Government policy on enhancing access to public documents, and to make the SEA process transparent, a number of mechanisms were established to facilitate public consultation:

- Stakeholder Dialogue Workshop Session during scoping
- A consultation web site was designed and went public on 21 April 2001 (<http://www.habitats-directive.org>). The website is intended as a “one stop shop” for information (and feedback) on all aspects of the SEA process. The environmental implications of further licensing in the SEA 2 area were assessed and a public consultation document was placed on the web site on 12 September 2001.
- In addition, the SEA 2 documentation could be requested in hard copy or on CD. The public consultation on SEA 2 lasted for 90 days and a range of responses were received via the website, e-mail and letter. These responses are all available on the SEA website.

1.3 Purpose of this document

This document summarises the comments received during the 90 day public consultation period following issue of the SEA 2 Consultation Document, and provides factual and technical clarifications together with DTI responses regarding policy, regulatory and other controls, and future plans where appropriate.

2 HABITATS-DIRECTIVE.ORG

2.1 Introduction

Visitors to the www.habitats-directive.org website were encouraged to register, which allowed news from the site to be mailed to them.

The site was designed to be user friendly and in a series of sections, each of which is accessible from the navigation bar.

All documents were placed on the site in pdf format for downloading and in addition the Consultation Document was converted for viewing on the web. To aid navigation through a many paged document, the section content list indicated the current viewing location. A search facility was also included.

A comments facility was provided, where users could comment on individual sections within the Consultation Document, on the technical reports, or on the SEA process in general. Respondees were asked to elect whether they wished to publish their comments on the site so other visitors could view their input.

In addition to the web based documents the site included an ordering facility for the documents in paper form or CD. A number of requests for both were received.

2.2 Web hits and pages/document reviewed statistics

To allow the relative success of the website as a vehicle for public consultation on the SEA, the number of visits to the site and individual reports and pages accessed was recorded. A summary of these statistics is provided in the series of histograms below.

Figure 1 – Number of views of individual web pages

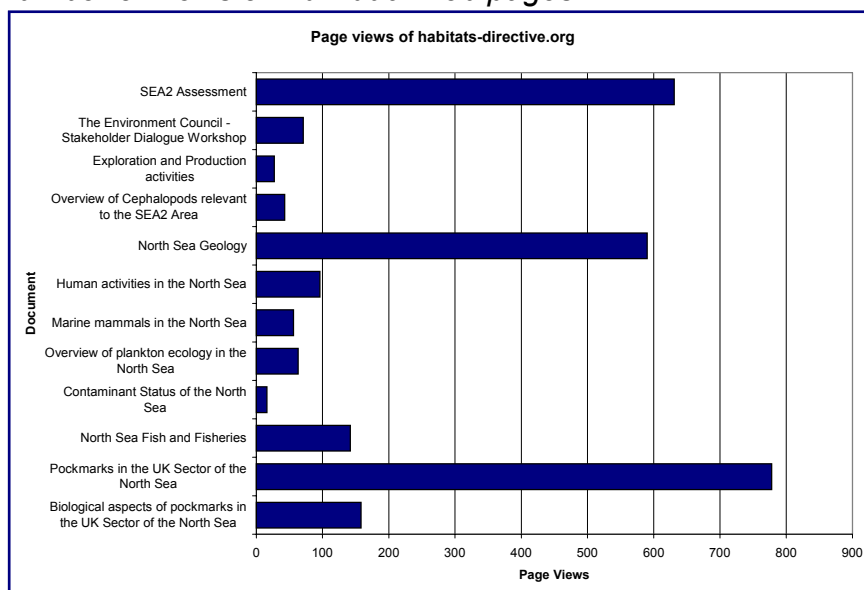


Figure 2 – Number of pages requested per week over the SEA 2 consultation period

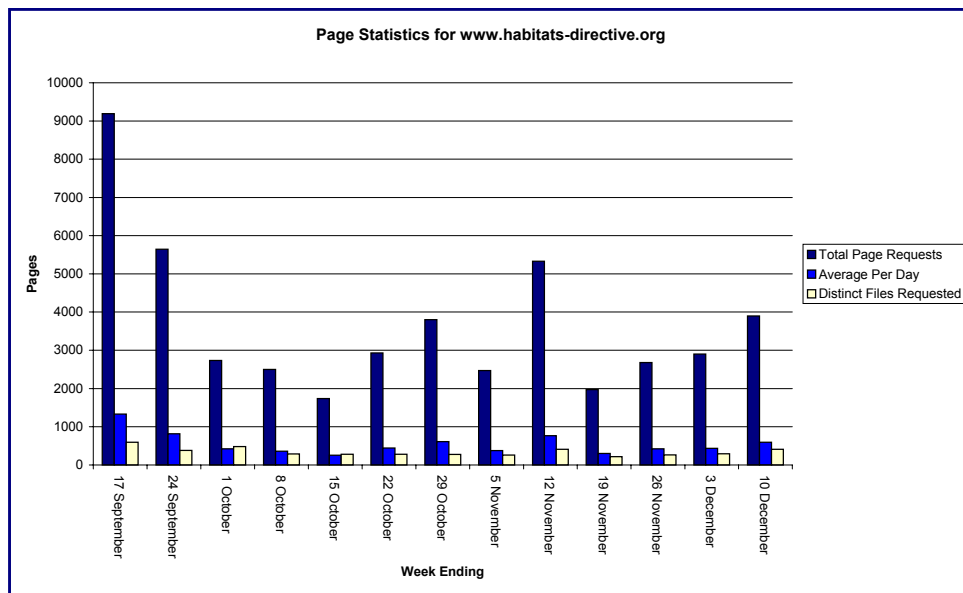


Figure 3 – Breakdown of by origin of hosts of page requests during SEA 2 consultation

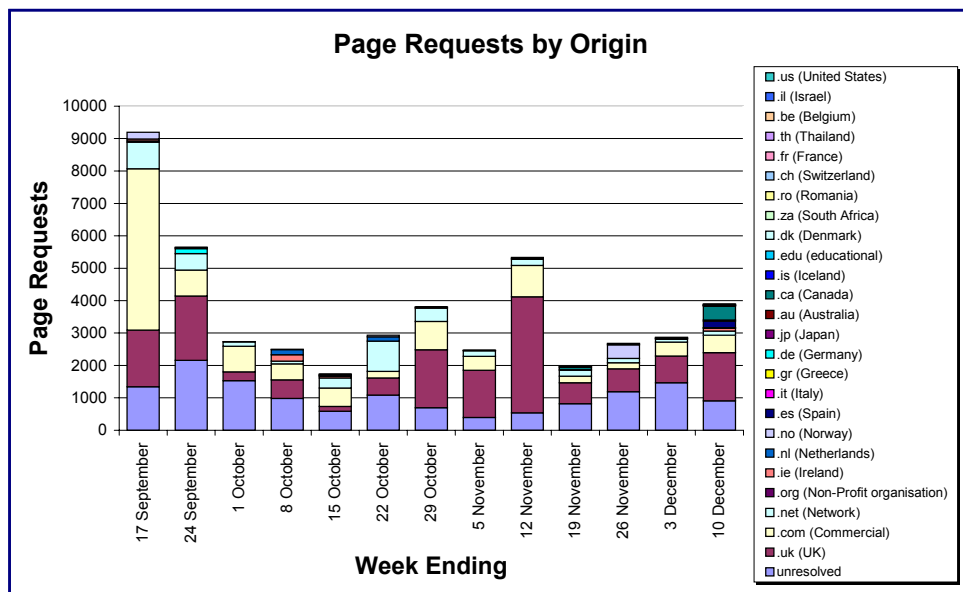
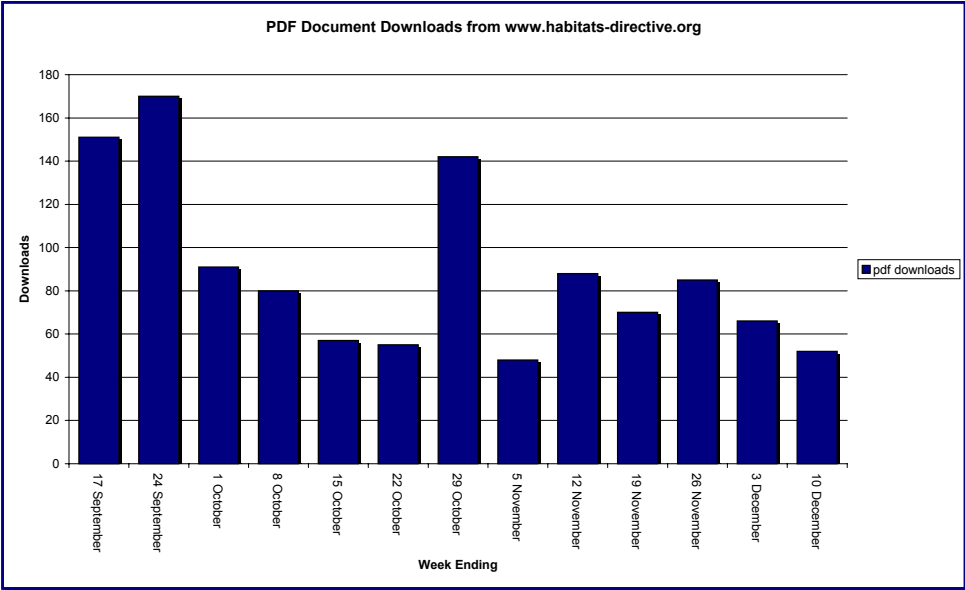


Figure 4 – Number of pdfs downloaded per week over the SEA 2 consultation period



3 CONSULTATION ISSUES

3.1 Consultation input received

Responses were received via the SEA website and as e-mailed or hard copy correspondence to the DTI. The DTI continued to accept comments after the end of the formal consultation period. Feedback relevant to the SEA 2 public consultation was received from:

- Joint Nature Conservation Committee (JNCC)
- Royal Society for the Protection of Birds (RSPB)
- Worldwide Fund for Nature (WWF)
- Scottish Environment Protection Agency (SEPA)
- Marine Conservation Society (MCS)

For ease of reader access, consultee comments have been summarised and grouped in Section 3.2 (by subject/SEA 2 Consultation Document Section), together with clarifications and DTI responses which are given in italicised text following each comment. Full texts of consultee comments are available on the SEA website.

3.2 Consultation issues with DTI responses and clarifications

3.2.1 Comments on the SEA initiative

- a. Positive response to DTI SEA initiative (RSPB).
- b. Positive response to SEA initiative and involvement in steering group (JNCC and Statutory UK Nature Conservation Agencies).
- c. Positive response to DTI SEA initiative (WWF).
- d. Positive response to DTI SEA initiative (MCS)

3.2.2 Comments on document structure etc

- a. SEA Consultation Document more user friendly than first DTI SEA (RSPB)
- b. Positive response to web based consultation (JNCC and Statutory UK Nature Conservation Agencies).
- c. Structural comment suggesting restricting section 6 to description of baseline ecology (RSPB). *The comment is noted for the future DTI SEAs.*

3.2.3 SEA process

- a. Scoping – The stakeholder dialogue report was useful but not readily accessible to non-participants and a summary report of issues raised was suggested. (RSPB). *The stakeholder dialogue meeting was organised by the Environment Council, an independent charity, and their report is on the SEA website (as supporting document SD_001). The Environment Council normally produces “verbatim” reports to avoid the issue of impartiality regarding ranking of individual inputs to a session. The RSPB suggestion will be considered by the DTI and the SEA steering group for future SEAs.*

- b. Scoping – The preparation and circulation of an SEA scoping report documenting proposed scenarios, potential impacts, and approach to the assessment prior to beginning the main body of work on an SEA was suggested as a way to ensure concerns are addressed and consensus of approach (RSPB). *The preparation of a scoping report prior to SEA 3 had been discussed and agreed by the SEA steering group and if successful this practice would be adopted for subsequent SEAs.*
- c. Background reports – The expert reports document the environment but do not comment on impacts (RSPB). *Expert reports were intended to provide a basis for the SEA assessment by drawing together the current understanding of selected topics. The SEA assessment team used this understanding in consideration and assessment of the implications of each scenario. There is an issue with varying levels of understanding of the sources and range of effects from oil and gas activities among the contributing experts. It is proposed that for future SEAs, a contributor workshop will be included as part of the assessment process to promote transparency of input from commissioned single subject experts.*
- d. Decision making - SEA should be used to inform licensing decisions and when published, licensing decisions should be accompanied by reasons for the decisions including how environmental information has been taken into account (RSPB). *It is planned that the licence round announcement will include a narrative on the role that SEA and consultation has played in informing decisions. The licensing announcement will also indicate key environmental sensitivities and gaps in information with a request to operators to include in their applications their proposals for addressing these (including where appropriate by cooperative work). Block award announcements will be accompanied by summary information on the DTI's evaluation of the successful applications (as was done for the 19th Round announced in May 2001).*
- e. To enable unforeseen adverse effects and enable appropriate remedial action to be taken, the DTI is urged to implement monitoring measures for SEA 2 (RSPB).
- f. Consultation regarding Transboundary effects - MCS believes that the 20th licensing round will have a significant effect on the North Sea and thus under the SEA Directive Member States bordering the North Sea will need the opportunity to review the SEA 2 before the plan can be adopted (MCS). *At the start of the consultation period, the DTI sent copies of the SEA 2 CD (which includes the Consultation Document and underpinning studies) to all the Heads of Delegations to OSPAR. Thus all the states bordering the North Sea, including non EU members such as Norway, have been included. The DTI will consider all feedback received in decisions relating to the 20th licensing round.*

3.2.4 Non-technical summary

- a. Page vi. Contamination section. Since synthetic and mineral based muds may be used after consultation with UK government departments, the section could be misinterpreted as suggesting the only source of contaminants is produced water discharges (RSPB). *This section describes existing environmental conditions in SEA 2 areas. While the DTI may approve the use of synthetic and mineral based muds for offshore drilling, current controls precludes the discharge to sea of resultant cuttings (which are either reinjected into the rock or shipped to shore for treatment). Thus the statement that “the main source of contaminants from oil industry activities is produced water from existing activities in the SEA 2 areas” is correct.*
- b. Pages vi-x. Some of the results of the assessment are very short and would benefit from some brief additional text to explain key assessment issues further e.g. why seismic noise is unlikely to cause physical damage or significant behavioural disturbance to marine mammals (RSPB). *The level of detail necessary in the non-technical summary was carefully considered, and it was decided on balance, that a relatively concise*

summary would increase the accessibility of the SEA. As the topics are explored further in the body of the document, this comment is noted for future SEAs.

- c. Page x. A short explanation of the reasons for the wider policy objectives conclusions should be given (RSPB). *As response 3.2.4b above, this comment is noted for future SEAs.*

3.2.5 Issues raised on Section 3 Regulatory Context

- a. Onshore legislation should also be cited in Control of Operations listing (SEPA). *The list in SEA section 3.3 addressed the main offshore legislation and onshore legislation which applied directly to offshore operations. Significant new onshore development was not predicted to result from the licensing of SEA 2 areas and hence a detailed listing of onshore regulations was not included. We note the comment regarding the legislation relevant to the control of development and operation of onshore supporting infrastructure. These are extensive and include the onshore planning regime with associated requirements for environmental assessment and public consultation, Integrated Pollution Prevention and Control authorisations (and variation process) etc.*
- b. Waste carriers are required to register not license (SEPA). *Agreed.*
- c. Special Waste Regulations due to be revised in 2002 (SEPA). *Noted.*

3.2.6 Issues raised on Section 4 Activities

- a. What is envisaged in scenario 4 requires more explanation (RSPB). *The process of licensing offshore areas for oil and gas exploration and production is explained in a DTI brochure available from www.og.dti.gov.uk/upstream/licensing (cited in SEA 2 section 3.2) and the activities that could follow from licensing are detailed in SEA 2 supporting document SD_002 (cited in SEA 2 section 4.4). Some 220 blocks are indicated in section 4.3 as potentially available for licensing. It should be emphasised that the number actually licensed depends on a range of factors. These include the number of blocks offered for licensing by the DTI (which is informed inter alia by advice provided by the DTI's statutory advisers and other government departments, and the SEA document and results of public consultation), the number of blocks applied for by companies and the results of the DTI's evaluation of the applications for blocks. The scenarios developed in section 4.3 are indicative only and reflect the DTI's expectations of likely applications and levels of subsequent exploration and production activity.*
- b. Greater emphasis should be placed on the comparison of effects of alternative scenarios including how and why these differ from those of scenario 4 (RSPB). *Section 4.2 outlines four activity alternatives which ranged from option 1 not to offer any blocks for licensing to option 4, to proceed to offer all available blocks in the SEA 2 area. For option 4, activity scenarios were developed to provide indications of likely maximum levels of exploration and production activity for use in the assessment of environmental and socio-economic implications. These alternatives and scenarios were discussed and used as a basis for the assessment workshop with the SEA steering group and for the consideration of the effects of the alternatives in section 11.1.1. The actual numbers of blocks likely to be offered for licensing and subsequently applied for is uncertain (see 3.2.6a above). The logic behind the approach taken for SEA 2 was that the scale of environmental impacts would be greatest in option 4 and that if these were assessed to be tolerable (with available controls and mitigations) then those of the other options would be lesser and thus also tolerable. Socio-economic effects were judged to be greatest for option 1 and 4 (negative and positive respectively).*
- c. The reasons why the 4 alternatives chosen were used or what other alternatives exist are poorly developed (SEPA). *The alternatives selected for assessment were discussed and agreed by the SEA Steering Group. Given the geological constraints on*

the nature and potential location of hydrocarbon resources, it is difficult to envisage what other alternatives could validly be developed. The issue of wider energy policy for the UK was deemed to be outside to scope of SEA 2 (see section 1.3).

- d. The analysis of the environmental and socio-economic outcomes of the alternatives are weakly presented, have they been effectively analysed? (SEPA). *The environmental and socio-economic assessment are documented in SEA 2 sections 10 and 11.1.1 and an underpinning socio-economic assessment, conducted by the University of Aberdeen, is available on the SEA website. See also responses 3.2.6a, b and c.*

3.2.7 Issues raised on Section 5 Physical and Chemical Environment

- a. Section 5.3.2. Climatic conditions should be considered as part of the scope of the SEA. (WWF). *This section of the SEA deals with regional meteorological conditions and variability. If the comment relates to sources and effects of climate change and policy, these are dealt with through other fora e.g. Energy Policy Review, Kyoto Protocol implementation, OSPAR etc. Climate change processes are complex and driven by natural and latterly by anthropogenic factors. Over the last 9000 years parts of the environment of the SEA 2 area have undergone dramatic changes as a result of naturally induced changes to climate e.g. the Dogger Bank has changed from a terrestrial to a marine habitat. Natural fluctuation and trends in baseline conditions have therefore been factored, where possible, in the SEA.*
- b. Circulation – Hydrographic fronts are associated with high productivity and have the possible impacts of offshore discharges been considered sufficiently? (WWF). *Productivity associated with fronts is noted in SEA 2 section 5.4.2, and in relation to seabird distribution on the Flamborough Front in section 6.7.4. The potential effects of marine discharges are considered in section 10.4.4 and further developed in relation to potential cumulative and synergistic effects (see technical appendix). Overall, it was concluded that, in view of the dispersive conditions in the North Sea, environmental effects of discharges would be limited to the immediate vicinity of the discharge point. The influence of fronts on widescale dispersion and circulation of offshore discharges is regarded as very unlikely to be significant.*
- c. Circulation – Understanding of long term variability remains the subject of long term studies. Potentially need more consideration to effects of climate forced changes and resulting patterns of impacts from oil and gas (WWF). *The 2000 North Sea Quality Status report cites work by International Panel on Climate Change predicting significant changes in surface air temperature, mean sea level, precipitation and storm frequency in the North-east Atlantic by 2100. It is further possible that major climate system changes and changes to the global thermohaline circulation could substantially influence physical and biological characteristics of the SEA 2 area. However, these predictions remain speculative and it is unlikely that climate forcing of North Sea circulation will produce significant changes in the predicted environmental effects of licensing over the likely timescale of development (20-30 year duration).*
- d. Section 5.5.3.3. The age (>5 years old) and nature (direct toxicity) of data, little consideration given to cumulative and synergistic effects of chemicals in particular and no mention of hormone mimicking properties (WWF). *SEA 2 section 5.5.3.3 was intended as a summary of existing conditions in the study area and was derived from the report commissioned from CEFAS (TR_004). As stated in section 5.5.3.3, ecological effects of chemicals discharged with produced water and drilling wastes are considered in section 10. See also response 3.2.11k.*

3.2.8 Issues raised on Section 6 Ecology

- a. Seabird vulnerability – The SEA notes the age of data, gaps in coverage and the potential for ecological change to have occurred. In the light of this, updating the seabird data and filling gaps should be a priority. This will be particularly pertinent once offshore SPA criteria are published (RSPB). The shortcomings of the data set potentially calls into question conclusions with regard to seabird vulnerability and represents a significant short-coming in the SEA. A precautionary approach should be applied to further development until an up to date and complete data set is available for seabird vulnerability in and adjacent to SEA 2 areas (WWF). *Identification of data gaps is a key part of SEA. The SEA is explicit about the information gaps and recommends that they be filled in due course. However, the gaps in coverage are small in scale and evidence from breeding colonies surrounding the North Sea suggest there have not been major changes in species composition over the last 20 years. A precautionary approach with regard to seabirds is taken in the licensing process with the DTI receiving advice from the JNCC. Similarly, in the consenting of offshore activities, the JNCC is a key consultee and the opportunity for wider advice is provided through the public consultation process for SEAs and Environmental Statements.*
- b. Section 7.2.5. It is of concern that appropriate assessments of offshore SPAs would be made by the DTI after receiving advice from the JNCC which would be based on a data set that is incomplete and potentially out of date (WWF). *See response 3.2.8a above.*
- c. Note the Countryside and Rights of Way Act 2000 updates Wildlife and Countryside Act (RSPB). *Noted, but the amendment of the Wildlife and Countryside Act applies only to territorial waters and hence is not one of the controls on SEA 2 area activities.*
- d. Section 6.8.2 – The SEA notes the importance of parts of the North Sea for harbour porpoises. Offshore areas may potentially be included in SACs for this species and this should be reflected in the decision making process (WWF). *The importance of the North Sea for various marine mammals is noted in SEA 2 section 6.8.2 and detailed in supporting document TR_006, including the present status of conservation frameworks. It is recognised that SACs beyond territorial waters may be established for marine mammals and this fact is reflected in the decision making processes which apply to offshore oil and gas activities. Specifically, the DTI receives advice from the statutory conservation bodies regarding licensing rounds, the Offshore Petroleum Activities (Conservation of Habitats) Regulations, 2001 places obligations on the Secretary of State and companies regarding potential conservation sites and features, which are reflected in present activity consenting and would include appropriate assessments if offshore SACs or SPAs are established.*
- e. Section 6.8.4 of the SEA states “current mitigation methods in relation to seismic survey activity are probably generally effective in preventing physical damage”. The use of word probably suggests uncertainty in assessment, and there appears to be no scientific data to back up this statement in general (WWF). *The qualifier “probably” was cited directly from the commissioned SMRU report (TR_006), and reflects the difficulty in producing statistically robust data demonstrating the effectiveness of guidelines. This difficulty is due to observational difficulties, small sample sizes (associated with low population densities), experimental design limitations (associated with lack of relevant control, i.e. with and without mitigation measures) and ethical constraints on direct experimentation. While there is some uncertainty in the assessment, there is a lack of evidence for effects on marine mammals from “unregulated” seismic, and the guidelines applied to the UKCS are essentially precautionary. The major concern on mitigation efficiency relates to incomplete implementation of the guidelines by industry, in particular data reporting, which DTI and JNCC have taken steps to improve.*
- f. Section 6.8.4.2 makes no direct mention of effects of potential endocrine related impacts of contaminants on marine mammals, including those released from E&P activity (WWF). *Endocrine disruptor (ED) effects were not identified by the commissioned SMRU report*

(TR_006) as an area of concern. While the theoretical possibility of ED effects on cetaceans and pinnipeds exists, e.g. possibly through biomagnification of ED compounds, the incremental sources represented by forecast 20th Round-related activity was assessed as negligible. Chemicals with ED properties have been phased out under Offshore Chemical Notification Scheme guidelines and the Offshore Chemicals (Pollution Prevention and Control) Regulations 2001 which have implemented PARCOM recommendation 92/8 regarding the phase-out of such materials. The potential risk associated with ED compounds present in formation water, and discharged in produced water, is noted in SEA 2 section 10.4.4.2, (see also response 3.2.11k below).

- g. The records of marine reptiles detailed in section 6.6.2 should be updated using C. Pierpoint (2000) "Bycatch of marine turtles in UK and Irish waters" JNCC Report No 310 (MCS). The Pierpoint reference provides the most recent summary of UK and Irish strandings and sightings information. However, having reviewed the report and in particular Figures 3 and 4, the patterns of occurrence given in SEA 2 section 6.6.2 are not changed and hence the basis of the SEA assessment is regarded as sound.

3.2.9 Issues raised on Section 7 Potential Offshore Conservation Sites

- a. Recommend that no activities that might affect the large pockmarks in Block 15/25 be permitted, pending resolution as to whether or not the structures in these pockmarks are relevant for protection under the Habitats Directive (JNCC). Recommend a precautionary approach is taken to the three pockmarks in Block 15/25 and that the remaining portion of this block should not be licensed until further investigations have been made of these features. In addition, as there is biological interest in actively seeping pockmarks without cemented sediment features, precautionary measures are recommended until further data is available on such features (RSPB). Since pockmark features are covered by the Habitats and Species Directive, it may be prudent to afford particular attention to the conservation value and possible vulnerability of those in Block 15/12 (meaning 15/25?) (WWF). *Noted. The three large pockmarks in block 15/25 have been comparatively well sampled and investigated, and there is believed to be sufficient information on which to base considerations regarding possible SAC status. Given the range of activity controls available to the DTI (see also response 3.2.8e) and mitigation techniques available to companies, in theory the remaining portion of block 15/25 could be licensed without jeopardising the conservation interest of the features. The same considerations apply to other pockmarks both in licensed and potentially licensed areas on the UKCS.*
- b. Recommend that no activities which might affect the sandbanks in Blocks 43/13, 43/14, 43/15, 43/18, 43/19, 43/20, 44/11, 44/12, 44/13, 44/14, 44/16, 44/17, 44/18, 47/14, 48/13, 48/15, 48/18, 48/22, 48/23, 49/12 and 49/13 be permitted, pending resolution as to the choice of candidate sites for protection under the Habitats Directive (JNCC). *Noted. Given the range of activity controls available to the DTI (see also response 3.2.8e) and mitigation techniques available to companies, in theory the above blocks could be licensed without jeopardising the conservation interest of the features.*
- c. Figure 5.6. Majority of sandbanks have a single survey transect, has an assumption been made that they are uniform (geology & ecology) along their length and on what basis? (WWF). *Several of the sandbanks had more than one transect along their length. The survey aim was to characterise the range of sandbanks present with a view to informing SAC considerations. The survey strategy was circulated to the steering group for comment prior to execution.*
- d. Pockmarks (Figure 5.7) – Given the limited amount of work to date on the relationship between pockmark distribution and biodiversity could further work be considered necessary? (WWF). *There had been comparatively limited study of pockmarks which*

was one of the catalysts for the DTI 2001 survey of these features. Further work may be viewed as desirable to elucidate particular aspects but sufficient information has been collected to inform SAC and SEA 2 area licensing considerations.

- e. The seeping pockmark structures identified to date should be considered for designation as SACs as a matter of urgency (WWF). *Noted, and the DTI, JNCC and DEFRA are actively considering this issue.*
- f. Further work should be considered to identify if other examples of pockmarks should be considered for designation within the SEA 2 area (WWF). *The pockmarks selected for investigation during the DTI 2001 survey as part of the SEA were selected on British Geological Survey advice as to which were largest and most likely to be seeping. In addition, other sources of information (academic and oil industry surveys) were used to select features to be investigated. The seabed throughout the Fladen/Witch Ground area of the central North Sea is characterised by pockmarks, typically shallow, ovoid depressions which occur at densities of between 10-40/km². Only a proportion of such features are required to be designated as SACs, although the conservation interest of these features is drawn to the attention of companies by the DTI and JNCC during consultation over activities requiring consent. The present level of understanding of pockmarks in the SEA 2 area is regarded as adequate to inform licensing decisions.*
- g. Section 7.2.4. The SEA considered that in the event of Special Protection Areas (SPAs) being designated, existing regulatory controls over exploration and production activities would be adequate. WWF comment that the process of project specific assessments will not adequately consider cumulative and synergistic effects especially as many existing installations will not have been subject to a formal EIA process. This, in conjunction with gaps in the database of seabird vulnerability, is cited as an "apparent significant inadequacy in the SEA process" (WWF). *Statutory EIAs are required to consider cumulative and synergistic effects, albeit in a local context. More significantly, if an activity could affect an SPA (or SAC) then an appropriate assessment would be required which would consider cumulative and synergistic effects.*

3.2.10 Issues raised on Section 8 Existing Human Activity

- a. The poor state of demersal fish stocks was not detailed in Demersal Fisheries subsection although it is stated under Fisheries Management (JNCC). *Noted.*
- b. Sandeel fishery not discussed here (JNCC). *Sandeel ecology is summarised in SEA 2 section 6.5.3. The fishery is explicitly discussed in Sections 3.2.11, 4.1.5 and 4.2.3 of the CEFAS report (TR_003). In summary, sandeel are taken by trawlers using fine-meshed gears. The majority of landings come from the central North Sea, with fleets from Denmark and Norway accounting for ~95% of the international landings from the North Sea in 1999. International landings data by ICES rectangle show that fishing for sandeel takes place mainly during the summer months, especially throughout May, June and July, and is focused on the Dogger Bank, on the Wee Bankie off Scotland, and in the central North Sea (Fig. 4.1.5.1). The spatial distribution of the catch during 1999 changed slightly from the pattern observed during the previous five years, and over the past 15 years there has been a trend towards an increased proportion of the total catch coming from the Dogger and Viking Banks (within the SEA 2 area). Norway pout are of great importance to European industrial fisheries, and are the focus a large Danish and Norwegian trawl fishery that targets pout for fishmeal products. These fisheries also employ small-meshed bottom trawls or pair trawls with fishing throughout the year, with landings peaking from April/May to October.*
- c. Other stock management areas not marked (on Figure?) (JNCC) (SEA Figure 8.3 includes under the heading of "various" the Cod closed area, Plaice box and Norwegian Zone Closure, the sandeel seasonally closed areas are also indicated.

3.2.11 Issues raised on Section 10 Consideration of the Effects of Licensing

- a. The basis and responsibility for the assessment needs to be more clearly stated. The tables in section 10 are useful but need to state who made assessments and on which basis (RSPB). *The assessments were made by the consultant assessment team (Hartley Anderson Ltd.), which comprised expert scientists specialising in the consideration of industrial impact on the environment, in particular oil and gas activities in the marine environment. The three principal scientists have combined experience in this field of over 50 years. In addition, as part of the SEA 2 assessment process, the SEA steering group participated in an assessment workshop to agree potentially significant interactions which could arise from licensing SEA 2 areas.*
- b. Potential incremental and cumulative effects are downplayed. Small increments to existing/historic effects may exceed a threshold and could lead to potentially severe consequences. This issue should be explored more fully for each impact type. Cumulative effects have not been considered in enough detail (RSPB). MCS agrees with the definition of cumulative effect used in SEA 2 section 10.5 but requests that SEA 2 should assess cumulative effects on the whole area or a particular biotope (e.g. of physical damage from E&P activities on pockmarks). MCS is also concerned that the 20th licensing round is being assessed as not significant in comparison to ongoing oil and gas exploration, and that SEA 2 should include cumulative effects of existing, past and future activities and synergistic effects from activities such as fisheries and aggregate extraction (MCS). *Detailed consideration of incremental, cumulative and synergistic effects is given in the Technical Appendix to this document. Cumulative effects are considered to include incremental effects (i.e. effects from E&P activities resulting from the proposed 20th Round licensing, which have potential to act additively with those from other oil and gas activity), together with potential effects of E&P activities which act additively or in combination with those of other human activities (past, present and future). In addition to the "overlapping footprint" scenario, the effects of multiple sources are considered to be cumulative if they clearly act on a single receptor or resource (for example a fish stock or seabird population), or if transient effects are produced sequentially. The conclusion of these assessments is that, with the present and impending controls on these activities, the effects of 20th licensing round activities will not be significant.*
- c. Spatial information about impacts - Combined sensitivity and potential impact maps are needed to enable an overall picture of constraints and impacts to be gained and help identify any blocks that should not under present circumstances be offered for licensing (RSPB). *It was recognised at an early stage in the SEA 2 process that spatial representation of data (i.e. figures) would be an important element of transparency in presenting the assessment findings. Considerable effort was therefore expended on scoping and preparing the Consultation Document figures. However since the nature of a licensing round is that companies may bid for any of the blocks on offer, a precautionary assumption was used in the assessment i.e. that activities might be expected to occur in any block within the SEA 2 area. With present controls, the scale of individual impact footprints (with the exception of oil spills) are too small to represent on the same maps as SEA 2 areas or even individual blocks (the average size of a North Sea block is 250km²). In view of these constraints, it is therefore not practical to pinpoint individual activity footprints and overlay them on the sensitivity maps. Environmental sensitivities in individual blocks or groups of blocks are considered in the ecological description provided in section 6, for example seabird vulnerability is illustrated in figures 6.7 and 6.8. While a number of SEA 2 blocks have year round seabird vulnerability to oil spills, this does not preclude their consideration for licensing. To inform such a decision, the likely or known reservoir hydrocarbons, mandated and optional mitigation measures, spill response measures etc require to be considered.*

- d. For offshore SPAs, the selection criteria have yet to be published and until offshore SACs and SPAs have been designated, the effects of licensing can not be fully explored. The assessments do not take full account of this problem, which is viewed as a very serious omission (RSPB). *The RSPB perspective is noted. However, designation of SACs and SPAs is not viewed as a sine qua non. SEA 2 section 7 states: "The Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001, came into force on 31 May 2001, and implement with respect to UKCS offshore oil and gas activities, the European Council Directive on the conservation of natural habitats and of wild fauna and flora, and the European Council Directive on the conservation of wild birds". That offshore SACs and SPAs had not yet been designated was fully recognised by the SEA steering group and assessment team and was one of the catalysts for the DTI 2001 survey. The survey targeted shallow sandbanks and pockmarks so that a basis of comparative information would be available for licensing considerations (and also to contribute to the process of SAC selection). The designation of SACs and SPAs does not preclude activities in an area - rather it requires that the effects of such activities be thoroughly considered through an appropriate assessment before consent(s) can be granted. The SEA assessments documented in section 10 considered the potential effects of activities that could follow licensing, including effects on potential statutory conservation sites. The assessment concluded that in the event of offshore SACs and SPAs being designated in the SEA 2 area, project-specific assessment and permitting procedures available to the DTI under existing legislation, including The Offshore Petroleum Activities (Conservation of Habitats) Regulations 2001, provided adequate control over exploration and production activities (including management of oil spill risks).*
- e. Marine discharges section 10.4.4.8 and elsewhere. After attendance at the UKOOA Drill Cuttings Workshop in November 2001, concern that the SEA advocates the rapid and wide dispersal of drill cuttings as the least damaging ecologically (RSPB). *This comment appears to be based on a misconception of current regulations and offshore practice. Both SEA 2 and the UKOOA Drill Cuttings Initiative have made a clear distinction between previously discharged cuttings containing oil-based mud, and future discharges of water-based mud. Discharge to sea of cuttings generated by drilling with organic phase drill fluids (including oil and synthetic based fluids) is effectively prohibited by current regulations. The rapid and wide dispersion referred to in SEA 2 relates to the behaviour of water based mud drilled cuttings when discharged near sea surface. The mud and cuttings are not cohesive and tend not to form cuttings piles. There is a general consensus that discharge and dispersion of water based mud cuttings results in limited environmental effect (see section 10.4.4.5).*
- f. Conservation sites for marine mammals – EU Directive calls for identification for SACs for bottlenose dolphins, harbour porpoises, grey seals and common seals if various conditions are met. JNCC is presently undertaking a process of identification of sites in offshore areas. They indicate sites in the SEA 2 area are unlikely for bottlenose dolphins, grey seals and common seals based on numbers present. If offshore sites are designated for marine mammal species then an appropriate assessment would be needed prior to activity consenting (JNCC). *Noted. The JNCC comments on fisheries bycatch mortality of harbour porpoises are noted.*
- g. The latest version of the seismic guidelines are published by JNCC and do not require acoustic survey for cetaceans although they are recommended for certain areas and may be used elsewhere (JNCC). *This is accepted.*
- h. Physical effects on potential conservation sites in particular sandbanks not explicitly stated although the proposed mitigation are endorsed (JNCC). *Noted. Mitigation measures will include detailed rig site and pipeline route surveys, which together with consultation with JNCC and other advisers (through statutory procedures) will ensure that habitats and communities of conservation importance are identified. This would*

allow appropriate rig locations and pipeline routes to be selected to minimise disturbance.

- i. The JNCC agree with the analyses of seabird vulnerability in section 10.4.7.4 and have made recommendations on special control of certain activities in areas of highest seabird vulnerability. These recommendations form part of the JNCC formal response to licensing round, and will be used when considering individual EIAs (JNCC). *Noted.*
- j. The SEA conclusion in section 10.4.1.6 that “it is considered unlikely that physical damage or significant behavioural disturbance of marine mammals will result...” is questioned because individual EIAs will be unlikely to be able to address cumulative and synergistic effects resulting from multiple projects (WWF). *The DTI will specifically raise the issue in scoping Environmental Statements and in consultation prior to submission of PON 14 applications & considered in the assessment of ESs and PON 14 submissions.*
- k. Section 10.4.4.4. Given some of the uncertainties regarding the composition of produced water (e.g. endocrine disrupting components) and cumulative and synergistic effects, a precautionary approach should be adopted to further development in the SEA 2 area (WWF). Dispersion of chemicals from produced water discharges could result in cumulative and synergistic effects in combination with those from existing produced water discharges (WWF). *The SEA explicitly recognised gaps in understanding of effects of some components of produced waters. However, the conclusions reached on the potential effects of activities which could result from SEA 2 licensing are regarded as sound on the basis of available scientific evidence. The conclusions were based on recent OSPAR decisions regarding produced water quality standards, the presumption against discharge of produced water for new developments, and the removal of chemicals with endocrine disrupting properties from the list of chemicals approved for use offshore. The DTI (and others including OSPAR) monitors developments in understanding of the effects of offshore oil and gas activities including produced water discharges, and introduces additional control measures as necessary.*
- l. Section 10.4.7.4 No consideration that spill vulnerability indices may be inaccurate as a result of ecological changes over time (WWF). *No explicit consideration of the likelihood that was made that oil spill vulnerability indices may be inaccurate as a result of ecological changes over time, although SEA 2 noted that seabird distribution data should be updated on an ongoing basis. However, seabird vulnerability was noted to be associated (in part) with proximity of breeding colonies. Species composition and numbers of birds at colonies are monitored on a more regular basis than offshore seabird distribution, and have not changed significantly over the last 20 years. Inter-annual variability in hydrographic conditions, including front positions, may be expected to influence offshore seabird distribution, and is referenced in SEA 2 (see sections 5.4 and 6.7). However, at the scale of resolution used in oil spill trajectory and risk assessment, it is unlikely that changes in seabird distributions will significantly alter the assessment findings.*
- m. Mitigation measures should be given greater emphasis especially regarding wastes returned to shore for disposal (SEPA). *Under Annex 1 of the SEA Directive the Environmental Reports should present mitigation measures to offset significant adverse effects – the SEA did this and wastes returned to shore were not assessed as posing risks of significant adverse effects.*
- n. Consideration of potential onshore development arising from licensing is desirable, together with assessment of associated significant environmental effects (SEPA). *This was done for oil and gas reception, processing and distribution infrastructure. Section 10.7 concluded that existing infrastructure was adequate to handle new production which may result from discoveries in the SEA 2 area. The challenges presented by onshore cuttings treatment and disposal were outlined in section 10.4.6, together with the observation that these would be significantly eased by transfer between installations for reinjection.*

- o. The level of analysis of the treatment and onshore disposal of oil based drill muds and cuttings is questioned along with the SEA conclusion that the onshore issues associated with these wastes are not considered to represent significant environmental effects (SEPA). *The subject was considered in the SEA in the context of numerous important uncertainties, in particular the number of wells in which oil based mud would be used, the UK countries of landing and treatment of these wastes, and the volume of wastes reinjected into geological formations. In addition, the ability to transfer mud and cuttings between installations for disposal has been the subject of OSPAR discussion and studies to identify Best Available Techniques and Best Environmental Practice (BAT/BEP). Assuming inter-installation transfer is permitted as expected, this will result in a major reduction in volumes of drilling wastes returned to shore for disposal.*
- p. Atmospheric emissions – Clarification of the regulatory authority for local air quality at offshore facilities (SEPA). *The DTI is the regulator for the Offshore Combustion Installations (Prevention and Control of Pollution) Regulations 2001 and also administers flare consents granted under the Petroleum Act 1998. Workplace air quality issues are the remit of the Health and Safety Executive.*
- q. Spills trajectory and consequences – Use of dispersants cannot be relied upon (and may not be desirable) in all circumstances (SEPA) *(Agreed. SEA 2 states that “foreseeable oil spills... could be managed using chemical dispersion, subject to the agreement of conservation and fisheries agencies”. In practice, factors including oil type, weather conditions and environmental sensitivities would be included in the decision-process for selecting response(s) to an individual oil spill. However, chemical dispersion has been, and remains the most likely intervention for oil spills on the UKCS. Oil spill contingency arrangements were considered in more detail in SEA 1, from which the following is taken “Recent legislative developments (The Merchant Shipping (Oil Pollution Preparedness, Response and Co-operation) Regulations 1998) have strengthened regulatory control over oil spill risk assessment and response arrangements. Consequently, specific consideration of oil spill prevention and response provisions would be required of operators before exploration wells or production activities were undertaken in the possible licence area. Offshore oil spill response measures are normally structured as Tier 1 (locally available, sufficient for small spills), Tier 2 (available within a short period, usually defined in terms of beaching times, to deal with moderate sized spills) and Tier 3 (to deal with major spills). At present, Tier 1 oil spill response arrangements are primarily based on the provision of dispersant on standby vessels. Proposed changes to personnel recovery and evacuation methods (i.e. replacement of standby vessels by helicopters), if applied in the possible licence area, would necessitate alternative Tier 1 response provision”.*
- r. The potential for Scottish SPAs to be affected by oil spills is given little reference (SEPA). *Immediately following the reference to Bempton Cliffs SPA (p170), SEA 2 notes the proximity of the northern SEA 2 area to major seabird colonies on the east coast of Shetland, which along with designated sites along the Moray coast are elsewhere (Table 9.1) noted as SPA and Ramsar sites. SEA 2 section 10.4.7.4 and Figure 10.2 provide distances and deterministic time to beach for both Unst and Rattray Head (Outer Moray Firth)*
- s. Spill mitigation is not referenced (SEPA). *Disagree. See response 3.2.11q.*
- t. Potential effects of transport, storage and processing of chemicals required for offshore purposes are not referenced (SEPA). *Offshore chemical use and spillage are considered – see SEA 2 sections 10.4.4, 10.4.8 and supporting document SD_002. Chemicals for use offshore undergo onshore processing, transport and storage at supplier facilities and oil and gas supply bases. At all stages spill hazards exist representing contamination risks to air, land and water (in addition to health and safety considerations). Risk prevention, control and reporting are required by legislation and a wide range of physical and management measures are employed. In view of the minor nature of additional chemical usage associated with the activity scenarios developed for*

licensing of parts of the SEA 2 area, detailed description of onshore activity control was not seen as warranted.

- u. The cumulative effect of gas releases combine to create air quality problems (SEPA). *Agreed and these are controlled, see response 3.2.11p.*
- v. MCS believes that the proposed activities will have a potential significant effect on Bottlenose dolphins in the central North Sea, associated with the potential cumulative and synergistic effects of acoustic disturbance (from a wide range of sources), contamination from toxic discharges and potential for direct mortality resulting from oil spills, decommissioning explosives or from collisions with shipping. Also concerned about similar effects on other marine mammals in the North Sea (MCS). *Sections 6.8.4 and 10.4.1.3 of SEA 2 gave detailed consideration to potential risks and effects on marine mammals, based on expert advice provided by SMRU and with additional input from JNCC and other SEA steering group members via the assessment workshop. Overall, it is considered unlikely that significant behavioural disturbance or any direct mortality would result from the activity scenarios associated with the proposed licensing. See also responses 3.2.8f & g.*

3.2.12 Issues raised on Section 11 Conclusions

- a. More information on the relative proportion of direct vs indirect and location of employment that would flow from SEA 2 licensing (RSPB). *These details are provided in the underpinning socio-economic assessment, conducted by the University of Aberdeen, and available on the SEA website. A summary was included in SEA 2 section 11.1.1, which noted under the high oil and gas price scenario, the peak number of additional UK jobs was around 9000 occurring in 2009 of which some 10% (858) were direct. These jobs were related to the areas of licensing (as in the scenarios) with 3756, 2762 and 2500 jobs predicted for the SNS, CNS and NNS areas respectively. The locations of the jobs is assumed to be throughout the UK, reflecting the geographical spread of contractors and subcontractors to the oil industry and the home bases of offshore workers.*
- b. Insight into train of thought underlying the conclusion on wider policy objectives (RSPB). *The conclusions on wider policy objectives was based on an assessment of whether activities of the scale anticipated in the scenarios as likely to follow from 20th Round licensing were significant in a regional or national context. Given the scale of existing oil and gas activities within the SEA 2 areas, in all cases no significant influence of wider policy objectives or commitments were envisaged. See also response 3.2.11d.*
- c. Consideration of withholding blocks with significant features not yet designated as SPAs or SACs e.g. the remainder of Block 15/25 (RSPB). MCS requests that no licences should be given for blocks which include pockmarks or sandbanks which could be designated as offshore conservation sites, until the conservation status of these features is determined by the statutory nature conservation agencies (MCS). *The DTI is giving consideration to whether parts some blocks should be excluded from the 20th licensing round on the basis of environmental and/or other grounds or whether alternative approaches to the protection of features may be appropriate. This consideration is based on the available existing (and imminent) controls on activities, advice received, and the conclusions of the SEA. See also responses 3.2.9a, b, f and g.*
- d. The RSPB agrees with all the recommendations and would expect to see significant work on all these targets being met (RSPB). *The DTI is considering the recommendations contained within the SEA, if and how they are going to be implemented (and tracked) and which organisations should be involved.*
- e. The possibility of stopping activities or revoking a licence in the event of designation of an SAC/SPA not explored (RSPB). *The designation of an SAC/SPA does not preclude development in an area but would trigger appropriate assessments as part of the activity*

- consenting process. It is noted that all major offshore oil and gas activities require the preparation of Environmental Statements for use in public consultation.
- f. In view of the information gaps and need to apply a precautionary approach, WWF disagrees with overall conclusion of the SEA regarding the offer of blocks in a 20th licensing round (WWF). *The DTI needs to find a balance between the feedback received from different consultees regarding what constitutes a precautionary approach (e.g. JNCC and WWF). Designation of SAC/SPA does not preclude development in an area. However, offshore conservation issues are explicitly recognised in the decision making processes which apply to offshore oil and gas activities. In particular, the Offshore Petroleum Activities (Conservation of Habitats) Regulations, 2001 places obligations on the Secretary of State and companies regarding potential conservation sites and features, which are reflected in present activity consenting and would include appropriate assessments if offshore SACs or SPAs are established.*
 - g. The SEA lists a number of gaps in understanding and in the light of these WWF believes that the SEA conclusion of no significant impact resulting from further oil and gas development is placed into question. More work is needed before impacts can be adequately be quantified. Therefore recommends a precautionary approach, with either no blocks or very limited numbers offered for licensing (WWF). *Agree a precautionary approach is needed and this is advocated in the SEA. A precautionary approach is factored into the licensing process and subsequently implemented through the consenting processes including appropriate assessments where developments could affect SACs or SPAs. The precautionary approach spectrum extends from “no proof of harm done” to “no proof of no harm done”. In practical terms, a precautionary approach is somewhere between and recognises that in no environment is there 100% certainty. The DTI believes that there is sufficient understanding of cumulative, synergistic and incremental effects for conclusions to be reached in the SEA. Nevertheless, the DTI SEA process aims to continue to improve the basis of understanding to enhance the quality of environmental management decisions taken and environmental protection afforded.*
 - h. Need to analyse the increases in projected discharges and emissions in terms of significance of impact (SEPA). *This is done in section 10 of the SEA.*
 - i. The context in which individual waste management licence decisions are made is not considered (SEPA). *Believe this level of consideration is outside the scope of a Strategic Environmental Assessment.*
 - j. The Scottish Coastal Forum is working on a Scottish Coastal Strategy which will provide in some form an integrated approach to managing the pressures on the Scottish coast (SEPA). *The DTI is aware of this initiative although not directly represented on the group.*
 - k. MCS considers that further research is needed on the distribution of marine mammals and the cumulative and synergistic effects of all activities in the North Sea on these creatures (MCS). *SEA 2 section 11.2 noted the distribution of marine mammals as a significant gap in understanding, together with sound propagation in the sea and the effects of noise on marine mammals; and section 11.3 recommended funding and coordination of resources to address these. The DTI is committed to participation in improving the information base of environmental understanding of the UKCS and the effects of industrial activities, contributing to a sound basis for regulatory control decisions.*
 - l. The alternatives matrix presented in SEA 2 section 11.1 is not consistent or correct, and in particular that the alternative of not offering any blocks would clearly be of significant environmental benefit, (although of negative socio-economic impact). MCS therefore accepts that some oil and gas licensing will continue until the UK government, industry and public are prepared to make the change over from polluting energy production to clean, renewable energy production (MCS). *The summary matrix given in section 11.1.1 is a simplification of the complex assessment of potential effects presented in*

SEA 2. Alternative 1 (the “do nothing” scenario) is considered to be of no significant environmental benefit or impact over the status quo. Following detailed consideration of potential environmental effects, acting individually and cumulatively, it was concluded that partial or staggered licensing offered some benefits over alternative 4 (licensing of all nominated blocks), for example through exclusion of fishing activity from localised areas, although these benefits were limited in view of the minor scale and consequence of predicted effects associated with full licensing.

- m. To proceed with the licensing programme as proposed would have “potential significant environmental effects” rather than the “minor environmental effects” concluded in the SEA (MCS). *SEA 2 presents a detailed consideration of potential environmental effects, acting individually and cumulatively, on the basis of which no overriding reasons were identified for not licensing blocks within the SEA 2 areas. Based on present understanding and the range of controls available, the DTI regards these conclusions as sound but is considering the consultation feedback received as part of the decision making process for the 20th licensing round.*
- n. It is recommended that the DTI adopt the second alternative identified for the 20th Round, i.e. to restrict the area licensed by offering only a proportion of the blocks nominated partial licensing, in order to remove environmental impacts in the most sensitive blocks (such as those that may be proposed as SACs) while limited socio-economic disadvantage (MCS). *The SEA 2 Consultation Document concluded that the minor scale and consequence of predicted effects associated with full licensing did not represent a basis for restricting blocks to be offered for licensing within the SEA 2 areas. In addition, through the Offshore Petroleum Activities (Conservation of Habitats) Regulations, 2001, offshore conservation issues are explicitly recognised in the decision making processes which apply to offshore oil and gas activities. The DTI is considering the consultation feedback received as part of the decision making process for the 20th licensing round.*
- o. MCS calls for the UK government to undertake an ecological and economic assessment of all activities in UK waters. In the absence of this, the full impact of all the activities of UK plc on regional seas such as the North Sea needs to be fully assessed (MCS). *The DTI is committed to a comprehensive SEA process covering E&P activities across the entire UKCS, which will address cumulative and synergistic effects with those of other human activities including recreational and industrial uses of the marine environment. Complementing this are the Government’s soon to be published Marine Stewardship reports and a range of other sectoral and regional initiatives (including in relation to aggregate extraction and offshore wind energy production). The UK Government is an active participant in programmes which address environmental issues affecting the North Sea and north-east Atlantic, for example through OSPAR. The 1993 and 2000 OSPAR Quality Status Reviews comprise an integrated assessment of the impact of anthropogenic activities in these areas, including those of the UK.*

TECHNICAL APPENDIX – CUMULATIVE & SYNERGISTIC EFFECTS

Introduction

It is a requirement of the SEA Directive that effects considered should include secondary, cumulative, synergistic, short, medium and long-term permanent and temporary, positive and negative effects (see Consultation Document section 3.1). ANNEX II of the SEA Directive sets out the criteria for determining the likely significance of effects, having regard, in particular, to:

- the probability, duration, frequency and reversibility of the effects
- the cumulative nature of the effects

Following consultation on the SEA 2 Consultation Document, this Technical Appendix has been produced to clarify the approach used to assessment of cumulative effects within the SEA. There are two parts to this:

Part A:

- definition and explanation of incremental, cumulative and synergistic effects
- review of the relationship between SEA and project-specific EIA, in terms of assessment and mitigation of cumulative effects
- clarification of the SEA process, and the method by which potential cumulative effects were identified and assessed; and recommendations developed for appropriate mitigation and monitoring

Part B:

- review of individual cumulative effects issues arising from the proposed licensing and associated E&P activities.

Part A

Incremental, cumulative and synergistic effects

As noted above, the SEA Directive requires *inter alia* that cumulative and synergistic effects should be considered. Guidance notes on individual project EIA under the Offshore Petroleum Production and Pipe-lines (Assessment of Environmental Effects) Regulations 1999 also state that “Any cumulative effects of the proposed development should be addressed, both quantitatively and qualitatively”. However, neither of the above specifies the definition of cumulative or synergistic effect.

Stakeholder consultation has confirmed the importance of cumulative effects within the overall SEA process, and formal response to the SEA 2 Consultation Document has included concerns over “incremental effect” – “the possibility that small incremental effects may exceed a threshold and lead to potentially severe consequences” (RSPB, 13 December 2001).

Cumulative Effects Assessment (CEA) is also a specific requirement of the Environmental Impact Assessment process for major projects in several other countries, including the U.S. and Canada. The U.S. Council on Environmental Quality has provided useful guidelines Considering Cumulative Effects Under the National Environmental Policy Act available at <http://ceq.eh.doe.gov/nepa/ccenepa>

Incremental effects have been considered within the SEA process as effects from 20th Round licensing E&P activities, which have the potential to act additively with those from other oil and gas activity, including:

- forecast activity in newly licensed areas,
- new exploration and production activities in existing licensed areas,
- existing production activities
- forecast decommissioning activities
- “legacy” effects of previous E&P activities, post-decommissioning (e.g. unrecovered debris and cuttings material)

Cumulative effects are considered in a broader context, to be potential effects of E&P activities which act additively or in combination with those of other human activities (past, present and future), notably:

- fishing
- shipping, including crude oil transport
- military activities, including exercises (principally in relation to noise)

Those cumulative effects associated with the interaction of E&P activities resulting from the proposed 20th Round licensing, with other anthropogenic effects, were included in the scope of SEA 2.

Cumulative effects may also result from the combination of all three sources: i.e. E&P activities resulting from the proposed 20th Round licensing, existing E&P activities and other anthropogenic effects.

Synergistic effects – synergy occurs where the joint effect of two or more processes is greater than the sum of individual effects – in this context, synergistic effects may result from physiological interactions (for example, through inhibition of immune response systems) or through the interaction of different physiological and ecological processes (for example through a combination of contaminant toxicity and habitat disturbance).

To some extent, all potential sources of effect (i.e. disturbance, emissions and discharges) resulting from oil and gas activity within a mature province such as the North Sea are cumulative, in so far as they are incremental to previously existing sources (although the net trend of overall source level may be a reduction, due to improved environmental management and/or declining production levels). Sources were quantified, based on predicted activity scenarios, and placed in the context of existing activities so far as possible throughout the assessment in the Consultation Document.

However, effects are considered incremental, cumulative or synergistic only if:

- the physical or contamination “footprint” of a particular project overlaps with that of adjacent activities
- the effects of multiple sources clearly act on a single receptor or resource (for example a fish stock or seabird population)
- if transient effects are produced sequentially.

Concerns over incremental and cumulative effects are generally based on models of environmental response which incorporate threshold effects concentrations (e.g. in relation to toxicity), and by implication, environmental “carrying capacity” (i.e. the ability of a habitat or population to accommodate effects up to a certain point, beyond which significant catastrophic effects occur). Both concepts are used in empirical modelling, although scientific understanding of the processes involved is, in general, not well developed.

There are also known mechanisms for cumulative and synergistic effects of multiple “stresses” (which may include natural sources) on physiological and ecological function, for example respiratory stress and heavy metal toxicity in fish and Crustacea may act synergistically. However, even where potential sources appear to be relatively similar – for example, hydrocarbon inputs from operational discharges and accidental spills – there is little substantive basis for quantitative prediction of synergistic effect. Equally, there is little evidence to support generalised assumptions that synergistic effects will result from combined discharges of contaminants below individual No Observed Effect Concentrations (NOEC).

Strategic and project-specific Environmental Assessment

The relationship between Strategic Environmental Assessment and project-specific Environmental Assessment (or EIA) has also been the subject of much discussion. Assessment and management of cumulative effects is commonly accepted to be the fundamental weakness of project-specific EA – NEPA guidelines cite Odum’s (1982) succinct description of environmental degradation from cumulative effects as “the tyranny of small decisions”.

Equally, however, it is inappropriate for Strategic Environmental Assessment to result in prohibition of activities with substantial socio-economic benefits, where adequate regulatory control is available at a project-specific level, and SEA does not identify significant risk of incremental or cumulative effects. For example, SEA 2 concluded that available mitigation measures and regulatory controls, together with implementation of a monitoring programme, were sufficient to prevent cumulative effects of seismic noise on marine mammals, and chemical discharges in produced water.

It should also be recognised that the context to SEA 2 is one of greatly increased environmental regulatory control over the oil and gas industry, including the implementation of new legislation, and substantially improved environmental management and reporting. Major sources of environmental effects associated with past oil and gas operations, such as the marine discharge of mineral and synthetic oil based muds and large-scale flaring emissions have been eliminated or substantially reduced. The Offshore Combustion

Installations (Prevention and Control of Pollution) Regulations, 2001 extend Integrated Pollution Prevention and Control to offshore combustion plant OSPAR recommendation 2000/1 for the Management of Produced Water from Offshore Installations has been in force since 29th June 2001 and provides for reduction in the overall quantities of oil discharged in produced water, and a lowering of individual discharge concentrations, together with a presumption against the discharge to sea of produced water from new developments. New regulations will, during 2002, implement a Harmonised Mandatory Control System for the control the use and discharge of offshore chemicals.

There have also been a number of industry initiatives, such as the recently published UKOOA "Striking a Balance" document, representing the UK offshore oil and gas industry's strategy for its contribution to sustainable development (2001).

As a general principle, therefore, SEA 2 has aimed to identify potential sources of incremental and cumulative effects, and recommend mitigation through a combination of "policy-level" management (for example that produced water should be re-injected where possible) and project-specific controls. SEA 2 did not identify any potential cumulative issues which justify alternatives to the licensing of the proposed blocks, but did recommend an integrated and comprehensive programme of monitoring to enable adaptive management at a project-specific level.

In conclusion, the challenge for SEA is to balance a precautionary approach to environmental protection and conservation of natural resources from incremental and cumulative effects, with legitimate objectives for economic and social benefits. The difficulty of this task in view of scientific uncertainty is reflected by the U.S. Council on Environmental Quality, who conclude:

"The continuing challenge of cumulative effects analysis is to focus on important issues, recognizing that a better decision, rather than a perfect cumulative effects analysis, is the goal...."

SEA 2 Process – identification and evaluation of incremental, cumulative and synergistic effects

The approach adopted for SEA 2 reflects guidance from a range of sources within the UK, EU and internationally. Guidelines on the range of techniques for assessing cumulative impacts (and indirect impacts & impact interactions) has been prepared on behalf of the EU by Hyder (1999) although this was primarily targeted at Environmental Impacts Assessments and Integrated Pollution Prevention and Control. The adopted approach has also reflected best practice in other countries and industries, including Cumulative Effects Assessment under the U.S. National Environmental Policy Act (NEPA) and Canadian Environmental Assessment Act; and is based on available past experience of oil and gas exploration and production in the North Sea, the Gulf of Mexico and elsewhere (including SEA 1).

The adopted assessment process is set out in Section 10.2 of the SEA 2 Consultation Document, and was an iterative process involving:

- a defined scoping stage with structured stakeholder dialogue
- identification of information gaps and review of proposed commissioned work to address data requirements

- commissioned studies and surveys
- expert Assessment Workshop to identify issues and review the available information base

Table 10.1 of the Consultation Document lists cumulative effects interactions considered within SEA 2. Those potentially significant effects considered to be incremental, cumulative or synergistic are discussed in further detail below.

Part B

Review of Individual Cumulative Effects Issues Arising from the Proposed Licensing and Associated E&P Activities

UNDERWATER NOISE

Seismic noise was considered to have minor or moderate direct effects on plankton, pelagic and benthic invertebrates or seabirds, but potentially significant effects on marine mammals (Section 10.4.1.3). The number of projected seismic surveys is low reflecting that the majority of SEA 2 areas have already been extensively surveyed using seismic.

Although the range of seismic noise propagation makes incremental exposure to noise from sequential surveys in 20th Round acreage and noise from seismic surveys in previously-licensed areas possible, the extent of this is dependent on exploration activity level, operational and timing factors and is impossible to predict. Although it is likely (Section 4.3) that individual block surveys will be combined, the total duration of seismic associated with SEA 2 areas will be limited (50-180 days on each area, assuming 10 day survey duration). Offshore, marine mammals are not generally confined to localised areas (e.g. Figure 6.12 grey seal trackplot) and it is unlikely that individuals would be exposed to the full duration of a survey. No marine mammal species are known to follow regular migration pathways in the North Sea, which could be “blocked” by cumulative seismic disturbance.

However, simultaneous seismic surveys cause acoustic interference and are therefore managed on a cooperative basis (“timeshared”). This has the effect of substantially mitigating the probability of a single receptor receiving disturbance from two or more sources concurrently, but can increase the duration of continuous disturbance.

Incremental and cumulative effects from broadband impulse noise could potentially occur through exposure to seismic noise and other sources, for example pile driving during construction activities and military sonars, however the probability and scale of exposure is considered to be low in SEA 2 areas. Similarly, incremental and cumulative effects of continuous noise from drilling, production, shipping and military activities are not considered to represent a significant risk to marine mammals.

Potential effects of E&P activities in the SEA 2 areas, in terms of acoustic disturbance, were considered by SMRU in a commissioned report, concluding that current mitigation methods for seismic are “probably generally effective” in preventing physical damage, but that decommissioning activities involving explosive cutting may involve some risk. The incremental contribution of 20th Round-related activity to this risk will be negligible.

Incremental Simultaneous and sequential surveys in 20th Round and previously licensed areas. Seismic and operational noise (e.g. drilling, thruster and pipeline manifold noise).

Cumulative Seismic survey noise and broadband impulse noise, for example military sonars; and continuous sources e.g. shipping

Synergistic None known

Overall, the likelihood of incremental noise effects from seismic surveys will depend on the timing and location of seismic, but is considered to be low both in terms of simultaneous surveys, and also in terms of sequential surveys affecting the same receptors (marine mammals). There is no evidence that substantial E&P activity in the North Sea to date has resulted in direct mortality or acute trauma to marine mammals.

PHYSICAL DAMAGE TO BIOTOPES

Potential sources of physical disturbance to the seabed, and damage to biotopes, were identified as rig and laybarge anchoring, wellheads and templates, jacket footings, pipelay activities including trenching, rock-dumping and jack-up rig spud cans; of these, rig anchoring and pipelay accounted for most spatial extent.

The total area with potential to be directly affected by 20th Round-related activities was estimated (Section 10.4.2.2) as 93,000m², approximately one part in eight million of the total North Sea area.

Given the forecast exploration and production scenarios for SEA 2 areas, it is likely that there would be considerable spatial separation between disturbance “footprints”, and a low probability of incremental overlap of affected areas.

Existing control and mitigation measures are provided through the Offshore Petroleum Production and Pipe-lines (Assessment of Environmental Effects) Regulations, 1999 or (in the vicinity of an SAC) from The Offshore Petroleum Activities (Conservation of Habitats) Regulations, 2001. The required consenting procedure for specific projects ensures that biotopes of particular conservation or ecological value are identified and provided appropriate protection.

As noted in Section 10.4.2.1, cumulative effects of physical damage to the benthos are overwhelmingly dominated by the effects of trawling, with a predicted increment due to 20th Round-related activity of approximately one part in 217,000. There have been no recent estimates of total areal extent of disturbance due to existing oil and gas activity. However, the total area of undisturbed seabed is unlikely to exceed that protected from fishing through established exclusion zones (~0.25% of the total area of the North Sea, Section 10.4.3.2), so the overall cumulative effect of oil and gas developments may be positive in terms of physical disturbance.

Other sources of physical damage to seabed habitats and communities include gravel and aggregate extraction, vessel anchoring, dredge spoil disposal and natural processes associated with sediment mobilisation through wave action, tidal and surge currents, and (in the case of pockmarks) fluid release. In the southern North Sea, it is evident (e.g. from the low persistence of physical scar features, and from studies of sandbank structure) that natural storm events are the major influence on biotope stability.

Incremental Physical footprint incremental to existing oil and gas activity – increment of one eight-millionth of North Sea area

Cumulative Cumulative effects dominated by trawling. Overall effect of oil and gas development likely to be positive, through fishing exclusion.

Synergistic None known

Recovery of affected seabed through sediment mobility, and faunal recovery and re-colonisation, is expected to be rapid where the source of effects is transient (e.g. anchoring); less than five years in most cases.

Mitigation measures, principally the identification and avoidance of habitats and populations of particular sensitivity, will be implemented through established project assessment and planning controls.

It is therefore concluded that the potential incremental and cumulative effects of physical disturbance are not likely to be significant. Synergistic effects associated with physical disturbance have not been identified.

PHYSICAL PRESENCE

The physical presence of offshore infrastructure required for exploration and production can have significant direct effects on other users of the affected areas (notably the fishing industry), in terms of:

- Loss of access due to exclusion zones and obstructions (wellheads and pipelines)
- Safety risks associated with “snagging” of fishing gear to obstructions.

In the early 1980's, it was estimated that the loss of fishing area in the North Sea caused by these zones was ~0.25% of the total area of the North Sea (Section 10.4.3.2). The incremental effect of forecast Scenarios identified for exploration and development of SEA 2 licence areas amounts to 31 exclusion zones (although not all would be concurrent), an increment of ~0.5% of existing excluded area.

Similarly, DTI (2001) lists a UKCS total of 10,640 km of pipeline (all diameters), of which the SEA 2 forecast increment of 30km (infield and export pipelines) represents ~0.3%.

It may also be noted that the forecast exclusion areas are spatially separated, with no overlap in “footprint”, and likely to be offset by decommissioning and removal of existing infrastructure (although at present, it is unclear whether exclusion zones around large steel jacket and concrete gravity platforms will be removed, especially where cuttings piles may be left in place to degrade and disperse naturally).

The extent of existing cumulative effects of physical structures (primarily wrecks) on fishing is difficult to assess quantitatively, since charting of wrecks is incomplete (Section 8.4.7) and although fastening may be a risk to trawling in the vicinity of structures, they may nevertheless be targeted, or fished by alternative methods (also true of pipelines). However, records from the UK Hydrographic Office reveal 1157 confirmed wrecks and 151 items of non-wreck debris (lost cargoes, anchors, cables, large boulders) within the SEA 2 area, the majority in the central and southern areas. In this context, the maximum cumulative increase of 31 locations associated with 20th Round development is not significant.

Synergistic effects associated with the physical presence of infrastructure were not identified.

Incremental Small increment to existing exclusion zones and obstructions

Cumulative Exclusion and fastening risks are cumulative to those resulting from natural obstructions, shipwrecks and other debris. Extent of cumulative effect associated with 20th Round is negligible.

Synergistic None known

MARINE DISCHARGES

SEA 2 identified certain marine discharges from E&P operations as potential sources of significant environmental effect. These related primarily to produced water (dispersed and dissolved contaminants with effects principally on water quality, plankton and pelagic organisms) and drilling discharges (particulate contaminants with effects principally on benthos).

Due to the offshore location of SEA 2 areas, particularly the central and northern areas where significant quantities of produced water could be generated, incremental effects with existing oil and gas developments are more likely than cumulative effects with riverine and coastal inputs.

Produced Water

The latest reported total produced water discharge from UKCS oil production was 244 million tonnes in 2000, with an average oil in water content of 21.5 mg/kg (DTI 2001), compared to a forecast peak annual production from developments in newly licensed SEA 2 blocks of around 6 million tonnes of water, containing 132 tonnes of oil. The predicted increment is therefore 2.4% of current total North Sea produced water discharges. It is not possible to accurately predict reservoir fluid composition for potential 20th Round discoveries, and therefore incremental discharges of hydrocarbons, metals and organic constituents must be assumed to increase on a pro rata basis. However, it should also be noted that through OSPAR, the UK is committed to a 15% reduction in total discharged volume of oil in produced water by 2006 and there is a presumption against discharge from new developments. Future technology, including downhole separation and improved reservoir management, may also substantially reduce produced water discharges in comparison to previous oilfield practice. It is therefore likely that the predicted increment in produced water discharges is a substantial over-estimate.

Chemical composition is strongly field-dependent, with generally little correlation between the oil-in-water content (which is used as the standard for environmental regulation) and the aromatic and trace organic content (principally responsible for toxicity). Studies of acute and chronic toxicity of produced water in Norway (OLF 1998) concluded that Polycyclic Aromatic Hydrocarbons (PAH) and alkylated phenols were the major contributors, with potential immunotoxic, carcinogenic and teratogenic effects in the former, and possible oestrogenic effects in the latter case. Recent studies in Norway have raised concerns over the possible endocrine disruption effects of alkylated phenols in produced water on fish and also whether these compounds could affect key detoxification systems responsible for metabolising xenochemicals. These Norwegian studies have yet to be published but when available their implications for UKCS activities will be considered.

The fate and effects of produced water discharges were reviewed by the SEA 2 assessment document, which concluded that the environmental effects of produced water discharges are limited primarily by dispersion, to below No Observed Effect Concentrations (NOECs).

Although synergistic interactions between individual components, particularly PAHs, specific process chemicals (particularly those which are surface-active, including demulsifiers), and other organic components are possible, and require further investigation, “whole effluent” exposure studies are considered a more relevant approach to assessing environmental risk of discharges. In general, studies of “whole” produced water effects at environmentally relevant concentrations have not demonstrated significant toxicity or other physiological effect (including endocrine disruption). There are also no known indications that incremental or cumulative effects of produced water discharges have or will exceed threshold concentrations for significant environmental effect, or exceed environmental “carrying capacity”.

Produced water discharges are, and will continue to be dominated by previous oil developments in the central and northern North Sea. Key concerns over produced water discharges relate to potential incremental and cumulative effects of oil and possible biological effects of residual process chemicals. To a very large extent, these will be mitigated by a presumption against consenting of new discharges, in favour of Produced Water Re-Injection (PWRI). This control can be effectively implemented through existing legislative mechanisms.

Drilling discharges

Cuttings discharges from forecast drilling activity in SEA 2 areas was predicted to total around 50,000 tonnes (~25,000m³), assuming the use and discharge of water-based muds. As context, ALTRA (1996) estimated that around 695,726m³ of cuttings had been discharged from development drilling in the central and northern North Sea UKCS; whereas later estimates (UKOOA 2001), including Norwegian installations, estimated accumulation in cuttings piles of approximately 787,500m³ in the central North Sea and about 503,218m³ in the northern North Sea (with no significant accumulations of cuttings in the southern North Sea).

Considerable data has been gathered from the North Sea and other production areas, indicating that physical disturbance is the dominant mechanism of ecological disturbance where water-based mud and cuttings are discharged. Water based muds are of low inherent toxicity (see Ray *et al.* 1989, ERTSL 2001) and toxicological studies of the major individual constituents have reported limited or no effects (eg Tagatz and Tobia 1978, Starczak *et al.* 1992). However, Canadian studies (Cranford and Gordon 1992, Cranford *et al.* 1999) have found in experimental studies that used water based mud and its major constituents, bentonite and barite caused effects on the growth, reproductive success and survival of sea scallops, which were attributed in part to chronic toxicity. An expanded discussion of this is given in section 10.4.4.5 of the SEA 2 Consultation Document.

Discharges of WBM cuttings in the SEA 2 areas of the North Sea have been shown to disperse rapidly and to have minimal ecological effects. Dispersion mechanisms could, in theory, lead to localised accumulation in relation to topographic features (the bottoms of pockmark and sandbank crests, in the central and southern North Sea respectively) although on the basis of previous drilling with OBM and WBM, resulting contamination is considered very unlikely to be detectable and to have negligible incremental or cumulative ecological effect. Periodic re-suspension of seabed sediments due to wave and tidal currents occurs throughout the North Sea (with reduced frequency in deeper water), and any contamination associated with WBM cuttings will be dispersed over a period of a few years.

Incremental Produced water – incremental contribution of PW is dependent on extent of PWRI (NB presumption against new PW discharges) and forecast increase in PW volume from existing fields. PW composition is dependent on reservoir chemistry, and production

chemical management. PW plumes must ultimately commingle to produce a widescale dispersion following residual circulation patterns of the North Sea. However, available evidence indicates that NOECs (with reference to toxicity and other biological effect) are reached in close proximity to discharge point, and it is unlikely that the “effects zones” of individual discharges will overlap.

Drilling discharges – discharges of oil-based drilling fluids are prohibited, and incremental addition to existing OBM cuttings piles (161,500 tonnes of oil in the North Sea) will not occur.

WBM drilling discharges generally disperse widely and significant accumulations do not occur (Section 10.5.4). It is therefore possible that discharge footprints will overlap, although the ecological effects will be undetectable. Potential “sinks” include pockmarks in the CNS, and sandbank crest accretion zones in the SNS. Both features will be subject to periodic (frequency dependent on water depth) remobilisation of sediments due to storm events.

Cumulative Principal cumulative sources of major contaminants, including hydrocarbons and metals, are riverine and atmospheric inputs. Cumulative sources of particulate contaminants include dredge spoil disposal and coastal discharges, although these are negligible in the context of natural suspended particulate loads.

Synergistic Synergistic effects of chemical contaminants in PW and drilling discharges are frequently postulated (e.g. NGO comments to SEA 2 Consultation Document), although substantive data is almost entirely lacking.

In general, studies of “whole” PW effects at environmentally relevant concentrations have not demonstrated significant toxicity or other physiological effect (including endocrine disruption). Although synergistic effects of individual components, particularly PAHs, specific process chemicals including demulsifiers, and other organic components are possible, the balance of evidence to date indicates that significant environmental effects do not occur.

Toxicological studies of WBM drilling fluid components, whole mud systems and WBM cuttings indicate low toxicity and synergistic effects are considered unlikely.

ATMOSPHERIC EMISSIONS

Atmospheric emissions from offshore oil and gas exploration and production activities may contribute to reduction of local air quality. Greenhouse and acid gas emissions effectively contribute to a mixed regional or global “pool” and can therefore be considered cumulative.

It should be noted that implications of the ultimate use of oil and gas production from UKCS the with regard to greenhouse gas emissions and UK commitments under the Kyoto Protocol, were not considered here since these are subjects for a different appraisal forum.

The major sources of emissions to atmosphere are internal combustion for power generation by installations, terminals, vessels and aircraft, flaring for pressure relief and gas disposal, cold venting and fugitive emissions. Flaring from existing UKCS installations has been substantially reduced relative to past levels, largely through continuing development of export infrastructure and markets, together with gas cycling and reinjection technologies. New developments will generally flare in substantial quantities only for pressure relief, with “zero routine flaring” now considered a realistic design target for new developments. Other than start-up flaring, subsea tie-back developments, which are predicted to account for the majority of production from proposed licence areas (SEA 2 Section 4.3), will generally have little effect on host platform flaring.

Assuming that incremental combustion emissions (excluding flaring) can be estimated on a pro rata basis from production forecasts, and using 2000 production as a baseline (DTI 2001), both oil and net gas production, and therefore emissions, are forecast to increase (13.4% and 1.8% respectively) with peak production predicted to occur in 2002. Production, and therefore emissions, in newly licensed blocks are forecast to peak in 2009 (oil) and 2010 (gas), with production rates of both oil and gas equivalent to 2.4% of 2000 production. In view of the high atmospheric dispersion associated with offshore locations, incremental and cumulative environmental effects of atmospheric emissions on the scale forecast above, are not expected to be significant on a local (and hence a wider) scale.

No synergistic effects associated with the atmospheric emissions were identified.

Incremental Incremental emissions resulting from internal combustion for power generation by installations, terminals, vessels and aircraft, flaring for pressure relief and gas disposal, cold venting fugitive emissions

Cumulative Greenhouse and acid gas emissions effectively contribute to a mixed regional or global "pool" and can therefore considered to be cumulative. However, on a global scale, cumulative effects of emissions resulting from SEA 2 developments will be negligible in comparison to the influence of onshore sources.

Local environmental effects of atmospheric emissions are not expected to be significant, in view of the high atmospheric dispersion associated with offshore locations.

Synergistic None known

WASTES TO LAND

The SEA 2 Consultation Document concluded that the air quality and land use implications of onshore disposal of mud and cuttings were potentially significant, although the effects associated with other returned wastes (predominantly scrap metal, plastics and paper with a limited quantity of Special Wastes comprising waste oils, paints etc.) were minor with effective management and existing legislative controls. The environmental effects of managing drilling wastes returned onshore include atmospheric emissions, since treatment processes including solvent extraction and thermal desorption are generally energy-intensive; and landfill requirements since, to date, UK contractors have not found a large-scale viable use for "clean" cuttings and material is being stored pending long-term disposal.

The incremental requirement for onshore disposal of drilling wastes depends on the requirement for use of OBM (cuttings from which cannot be discharged) and the technical and economic feasibility of alternative disposal, particularly re-injection. The quantity of OBM cuttings generated from individual wells is usually minimised so far as possible, with typical quantities of the order of a few hundred tonnes per well, giving a total quantity associated with exploration, appraisal and development wells in SEA 2 licence areas of ca. 12,500 tonnes (at a maximum rate of around 2,500 tonnes/year). As context, assuming an equivalent quantity of 250 tonnes OBM per well, the maximum number of UKCS development wells forecast by DTI over the period 2002-2010 corresponds to 65,000 tonnes of OBM cuttings (to which cuttings resulting from exploration and appraisal wells would be added).

In a review of options for the treatment and disposal of OBM cuttings recovered from existing cuttings piles, ERM (2001) reviewed current treatment and storage facilities for returned cuttings in Scotland, totalling 265,000 and 33,000 tonnes/year respectively (with excess

treatment capacity of 6,400-32,000 tonnes/year). However, this report identified only two existing landfill sites in Scotland accepting cuttings (Stoney Hill, near Peterhead licensed for 20,000 tonnes/year untreated cuttings and Lerwick, currently licensed for 10,000 tonnes/year treated cuttings but planning new site possibly >50,000 tonnes/year). It is likely that cuttings material from central and northern SEA 2 areas (forecast 38 wells) would be handled through Lerwick, Peterhead and Aberdeen with material from the southern SEA 2 area (forecast 12 wells) transported through Great Yarmouth. Consideration of the quantities reviewed above suggests that incremental throughput resulting from 20th Round-related activity would comprise approximately 1% of treatment capacity and 10% of landfill capacity.

Incremental Incremental return of general oilfield wastes insignificant; incremental return of drilling wastes corresponding to approx. 1% of current treatment capacity and 10% of landfill capacity

Cumulative Not quantified

Synergistic None known

OIL SPILLS

Oil spill scenarios and predicted frequency are assessed in Section 10.4.7 of the SEA 2 Consultation Document, based on historic data and activity scenarios for 20th Round-related exploration and development.

Overall, it was concluded that incremental risk of oil spills associated with exploration and development in the SEA 2 area is low, particularly in the southern area where production will almost certainly involve gas. In the event of a spill of persistent oil, and in the absence of an effective response, there are possible effects of coastal oiling around much of the North Sea coastline. Offshore seabirds are also vulnerable, particularly in late summer and autumn. However, a considerable amount of risk assessment work has been carried out for previous exploration and production activities in the area, and understanding of the likely incremental risk is well-developed. Established risk-reduction and mitigation measures, including operational timing, and spill response contingency measures have been developed which will minimise incremental risks.

In terms of cumulative risk, there is little doubt that due to scale and consequence, the major risk of significant oil spills is associated with tanker transport of crude oil, and refined products. Although some control and response measures have been implemented, for example following the Donaldson enquiry into the Braer incident, the residual risk remains relatively high (in comparison to other oil spill sources including E&P). SEA 2 areas are located close to major terminal and refinery centres, including Sullom Voe, Flotta, Immingham and Rotterdam. In 1997, 374 million tonnes of crude oil were either imported or exported to north-west Europe (QSR 2000), the majority of which will pass through or in close proximity to SEA 2 areas. To date, there have been no major tanker spills within or close to SEA 2 areas, although other shipping activity can also result in significant pollution incidents. For example, in 1998 the cargo vessel Pallas ran aground and spilled 250 m³ of oil in the Wadden Sea, resulting in 16,000 dead seabirds (QSR 2000).

Other cumulative sources of anthropogenic hydrocarbon input to the North Sea (e.g. QSR 2000, Cordah 2001) include rivers and land run-off (combined 16,000-76,000 tonnes/year), coastal sewage/sewage sludge (1000-10,000 tonnes/year), dredge spoils (2000-10,000 tonnes/year), operational shipping discharges (1000-5000 tonnes/year) and atmospheric deposition (7000-15,000 tonnes/year). Although cumulative hydrocarbon inputs are often summed for comparative purposes, it is important to note that the environmental effects and fate of individual oil types and sources may be very different (see SEA 2 Section 10.4.7.3).

Simple comparison of cumulative inputs may therefore be misleading, in terms of effects assessment. Nevertheless, it can be observed that the majority of oil spills most likely to result from E&P operations will make an insignificant contribution to overall North Sea inputs.

It is also reasonable to observe that overall, although the acute effects of oil spills can clearly be severe at a local scale, the cumulative effects of around a century of oil spills from shipping to the North Sea – and thirty years of oil and gas development – do not appear to have resulted in wide-scale or chronic ecological effects. It is therefore concluded that the limited incremental effects of 20th Round-related activity, assuming that effective risk management practices continue to be implemented, will be minimal.

Incremental Hydrocarbons from oil spills will be incremental to produced water discharges and other (minor) offshore E&P sources; however, it is considered very unlikely that oil spill footprints will overlap given the predicted spill frequency associated with SEA 2 activities.

Cumulative Cumulative sources of hydrocarbons to the North Sea are reviewed in Section 5.5. Accidental spills represent a minor contribution to overall North Sea inputs.

Synergistic None known

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