



GUIDELINES TO THE PROTOCOL CONCERNING MARINE POLLUTION
RESULTING FROM EXPLORATION AND EXPLOITATION OF THE
CONTINENTAL SHELF

**GUIDELINES ON REQUIREMENTS FOR THE
CONDUCT OF ENVIRONMENTAL IMPACT SURVEYS
AND THE PRODUCTION OF ENVIRONMENTAL
IMPACT STATEMENTS**

Guidelines on Requirements for the Conduct of Environmental Impact Survey and the Production of Environmental Impact System

INTRODUCTORY NOTE

1. The Protocol concerning Marine Pollution resulting from Exploration and exploitation of the continental shelf provides in Article III that:

“Each contracting state shall ensure that in the protocol Area under its Jurisdiction any offshore operation shall be conducted under a licence, which may be granted subject to such conditions for the protection of the marine environment and coastal areas as the competent state Authority sees fit to impose. The Competent State Authority shall require the operator to comply with relevant laws and regulations issued under the authority of the state, and shall have the power to have the power to take such measures as are necessary to enforce compliance therewith”.

Furthermore, Article IV 1 (a) of the protocol provides that:

“Each Contracting states shall take measures to ensure the following:

- (a) Before licensing any offshore operation which could cause significant risks of pollution in the Protocol Area or any adjacent coastal area, the competent state Authority shall call for submission of an assessment of the potential environmental effects thereof. No such operation shall commence until a statement of those effects has been submitted, and no licence shall be granted until the competent state Authority is satisfied that the operation will entail no unacceptable risk of such damage in the Protocol Area or any adjacent coastal area”.

The Competent State Authority of the Contracting State is to have regard to Article IV, 1 (b), in deciding to call for an environmental impact statement and in determining its scope.

2. Definitions

The following is a list of definitions of words used in the text.

“Environmental Impact Assessment Office” means the office, department or technical unit which oversees the Environmental Impact Assessment (EIA) process. It may be an independent office or may be subordinate to, or subject to directives given by the competent state Authority.

“Protocol” means Protocol concerning Marine Pollution resulting from Exploration and Exploitation of the Continental shelf, signed in Kuwait on 29 March, 1989.

“Significant” means in relation to an adverse effect of such severity that the competent State Authority would consider it reasonable for the person threatened to take action to prevent it.

“Environment Impact Assessment” is a decision making-tool involving:

- Assessment of the effects of a proposed action on the environment.
- Comparing various alternatives by which a desired objective may be realized and seeking to identify the one which represents the best combination of economic and environmental costs and benefits.
- Prediction of changes in environmental quality which would result from the proposed action.
- Weighing out the environmental effects on a common basis with economic costs and benefits.

“Person” means any natural person, corporation, association, partnership, trustee, guardian, executor, administrator and a judiciary or representative of any kind.

PART A : FUNCTIONS OF THE AUTHORITIES

1. Competent State Authority:

The functions of that Authority relating to environmental impact assessment should include the following:

- (a) Receipt of initial application for a license.
- (b) Referral to the EIA Office.
- (c) Calling for an independent survey of the marine environment to be carried out and an environmental impact statement to be submitted as required by the EIA office.
- (d) Final decision on the grant of a license, and on any conditions to which the license is to be subject.
- (e) Prepare a summary of the potential environmental effects, as referred to in an environmental impact statement, in accordance with Article IV 1(c) of the Protocol.

2. Environmental Impact Assessment Office

The functions of the EIA Office should be as follows:

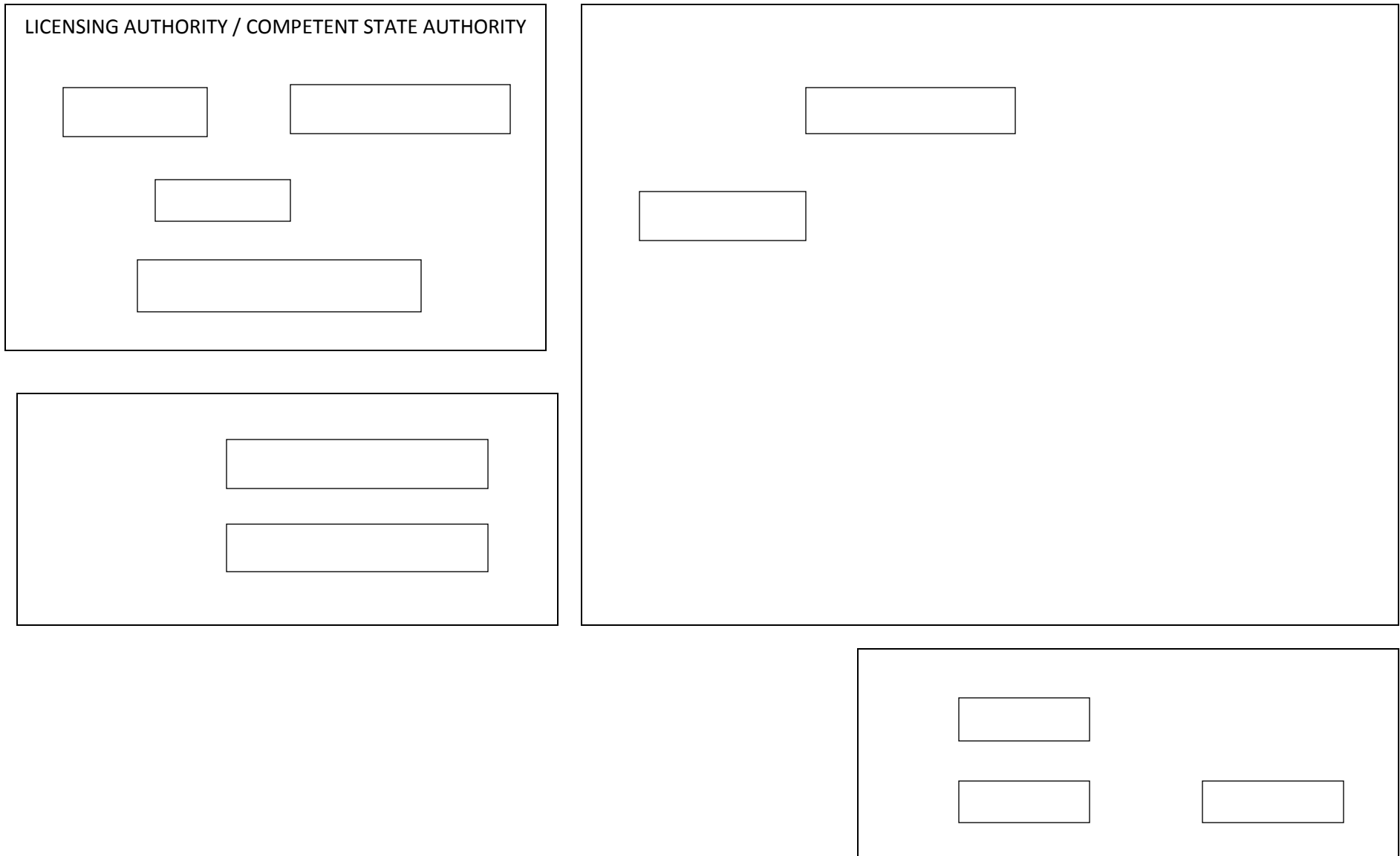
- (a) To ensure that the application for a license referred to it by the Competent State Authority, contains all the details necessary to determine whether or not an assessment will be required. To obtain from the applicant any further information this may be needed for that purpose.

(See Flow chart for licensing and Environmental Impact Assessment (EIA) Process, on next page).





FLOW CHART FOR LICENSING AND EIA PROCESS



- (b) To review or carryout any preliminary assessment necessary to determine whether or not an environmental impact assessment must be made and an Environmental Impact Statement (EIS) submitted and to make that determination or to make a recommendation thereon to the Licensing Authority.
- (c) To recommend calling a survey of the Marine Environment and the aquatic life therein whereon it does not call for an environmental impact assessment.
- (d) To determine the scope of any assessment that must be made, on the basis of the initial application or the preliminary assessment.
- (e) To recommend or approve the appointment of the person or persons to carry out the assessment or survey and agree to the terms of reference. The EIA office may also publish a list of approved bodies / contractors capable of carrying out the assessments.
- (f) To examine the draft EIS, and to require any further work to be done as necessary.
- (g) To approve the Environmental Impact Statement when complete and satisfactory.
- (h) To send to the Competent State Authority the EIS referred to it together with its recommendations concerning approval, refusing or conditions.

Note: The Competent State Authority is to ensure that applicants are informed as soon as possible about environmentally sensitive areas.

PART B: PROCEDURE

1. The Application

1.1 The following information is required in the initial application:

- (a) Name of operator or proposed operator; and name, address and telephone number of person to contact.
- (b) Type of operation proposed, with full details.
- (c) Date proposed for commencement of operations.
- (d) Estimate of period of operations.
- (e) Types and number of equipment proposed for preventing and controlling pollution during construction and operations.
- (f) Description of the measures envisaged to prevent and reduce and where possible offset any significant adverse effects on the environment.

1.2 The EIA office should require any additional information as it may need for its preliminary assessment.

1.3 No application need be submitted for any of the following:

- (a) Offshore operations for which sanction had been given and contracts entered into force before the Protocol became binding upon the Contracting State.
- (b) Offshore operations for which a license has already been granted.

2. Decision on whether or not to Require an Environmental Impact Assessment

The decision on whether or not to require an environmental impact assessment to be made, and a statement thereon to be submitted, should lie with the EIA Office. For that purpose, the offshore operations are divided as follows:

Class I

Operations for which as EIA and EIS will normally be required at the discretion of the EIA Office. None of them, however, will require a survey and assessment if it falls within the scope of an existing license. Such operations include but are not limited to:

- (a) Construction of a permanently manned offshore structure.
- (b) Development of an offshore producing oil field.
- (c) Installation of major offshore pipelines.
- (d) Construction of large production platforms.
- (e) Construction of any offshore oils storage facility.
- (f) Construction of any tanker loading facility.
- (g) Any significant dredging project , and
- (h) Exploratory drilling in new areas.

Class II

Operations for which an environmental impact assessment and survey will not normally be required:

- (a) All work of maintenance and repair whether or not it falls within the scope of an existing license such as, corrosion protection of

pipelines, except where new substance are to be used, or new types of sacrificial anodes are to be fitted, desludging of gas and oil separating plant and plant well work-overs .

- (b) Any other operation which does not involve a discharge of waste into the marine environment, or a risk of such discharge.

As an aide to the EIA office in determining whether or not to require an EIA, the criteria described in Part C has been developed.

3. Preliminary Environmental Impact Assessment

3.1 Preliminary environmental impact assessments will need to be made for two purposes :

- (a) To decide whether or not to require an impact assessment and statement, taking into account the presumptions for class I and class II operations.
- (b) To determine the scope of any marine survey and environmental impact assessment which must be carried out.

3.2 The preliminary assessment will normally involve the following :

- (a) Examination of known data on existing environmental conditions in areas which could be affected.

Examination of the known hydrological, oceanographic and meteorological conditions, as relevant, of those areas.

Examination of the known ecology of those areas.

- (b) Examination of the literature and records on the potential environmental impact of that type of operation.

- (c) Any further field work which may be necessary for a properly informed decision.

Such further field work may have to be done before a decision can be reached with any confidence. It may be done by the staff of the EIA Office, other persons or institutions under contract with the office. In any event, the cost of conducting the preliminary assessment may be charged to the applicant.

- d) Consultation with the operator on measures envisaged to prevent, reduce and where possible offset any significant adverse effects on the marine environment.

3.3 The factors to be taken into account in reaching a decision whether or not to require an impact assessment and statement could be as follows:

- (a) Whether or not the operation, with all its cumulative effects from commencement to completion, and the rate of environmental recovery after completion, will cause any significant pollution of the marine environment or adjacent coastal areas, or will cause any significant interference with lawful fishing or other lawful uses of the sea.

Full weight should be given to any permanent or long term effects which could be suffered by established commercial interests, or local traditional activities.

- (b) The probable mitigating effects of any environmental control practices offered by the applicant or available to him.
- (c) The availability of alternative sites or alternative methods of operation.

- 3.4 The procedure to be followed, and the criteria to be applied, are set out on part C , section 1 below . There is further guidance on assessing the effects on plants and animals in Annex 2 .

4. Terms of Reference for the Assessment

- 4.1 If the EIA offices recommends that an assessment will be required , it will need to draft the terms of reference .
The principal purpose of doing so will be to determine the scope of the survey and assessment.
- 4.2 Those terms will always require the consideration of the following :
except that where any item is unnecessary considering the objective of the survey as set out in (K) below, it may be struck out by the office .
- (a) Name of the operator.
 - (b) Specification of the project. This will include :
 - i) A description of the work to be done, and the procedure by which it will be done.
 - ii) Types of plant and equipment to be used, with sizes and capacities where relevant.
 - iii) Substances to be discharged, or which may be released into the marine environment.
 - iv) Any alternative kinds of procedures, plant, equipment or substances which may be used.
 - v) Kinds of pre-discharge treatment to be used , and a description of any other anti-pollution procedures and equipment .

- vi) Any blasting, trenching or drilling which may be necessary.
- vii) Duration of the project.
- (c) Geographical boundaries of the area in which operations are to be conducted. Locations of any plant or equipment which will be in continuous or regular use. Alternative locations.
- (d) Facilities for product storage.
- (e) Proposals for the transport of the product to shore, including any alternative arrangements.
- (f) Frequencies and routes of any regular vessel movements.
- (g) Need for any routine inspection and maintenance, and any foreseeable work of repair or replacement, which could have an effect on the marine environment or cause interference with lawful fishing, navigation, or any other lawful use of the sea.
- (h) Type of training given to the persons working on the proposed operations.
- (i) Any planned or foreseeable extension of the project work, e.g. drilling of satellite wells, provision of offshore storage or loading facilities.
- (j) Plans for removal of any plant or equipment, and any reclamation, restoration or clearing of the site after cessation of operations.
- (k) Objectives of the survey.

- 4.3 The terms may then require that the survey covers, as appropriate, any or all of the following (Further guidance on (a) and (g) is given in Annex 2 to this guideline):
- (a) Description of the existing ecological state of the area which might be affected by the project. The description required may be limited to specified orders, families or species of fauna or flora, or to specified kinds of habitat.
 - (b) Assessment of the foreseeable direct and indirect short-term and long-term effects that the operations might have on:
 - (i) The fauna and flora of the area , or any specified range of fauna.
 - (ii) Habitats, or any particular type of habitat, in the area
 - (iii) The ecological balance of the area.
 - (c) Assessment of any effects on water quality,taking into account the uses to which the water might be put, e.g. desalination.
 - (d) Particular attention may be directed to any rare or endangered species, to any organisms on which others are dependent, e.g. plankton, or to any spawning or breeding grounds.
 - (e) Effects on any particular environmental features which may merit attention, e.g. effects of sedimentation.
 - (f) Assessment of any effects the operations might have on other legitimate uses of the sea, effects on commercial fisheries, need for the rerouting of maritime traffic, increased hazards to navigation.
 - (g) Assessment of any other socio-economic effects the changes noted might have, e.g. on marine sporting activities or tourist attractions.

- (h) Description of proposed methods to eliminate or reduce any of the adverse effects noted above.

Description of alternative methods of operating which might be used.

- (i) Contingency measures which may have to be taken in an emergency.

4.4 The terms may also require any or all of the following:

- (a) Obligation to consider alternatives :
 - i) Alternative locations for plant or equipment. The criteria for assessing the impact proposed activities on the marine flora and fauna is presented in Annex 2;
 - ii) Alternative substances which may be used, e.g. alternative chemicals or drilling fluids;
 - iii) Alternative production procedures;
 - iv) Alternative methods of transport of the product to shore;
 - v) Alternative kinds of plant or equipment which might be used;
 - vi) Alternativemeans of environmental protection.

The alternative may or may not be specified by the EIA Office.

- (b) Description of any new techniques which might significantly affect the marine environment or uses of the sea.
- (c) Consultation with particular persons or organizations specified by the EIA Office.

4.5 The terms of reference will thus delineate the scope of the survey to be conducted, and the assessments to be made. This part of the Guidelines, however, simply indicates the matters which may be included in the survey and subsequent statement.

5. Environmental Impact Statement

- 5.1 The statement should be in a language which can be understood by a non-scientist.
- 5.2 The statement should be as short as reasonably possible, consistent with complete coverage of all matters referred to in the terms of reference. Other documents may be incorporated by reference.

Where there is relevant information which cannot be obtained without unreasonable expense and effort, this should be noted.

- 5.3 Each statement should contain an accurate summary of the findings. The summary should not normally be more than 12 pages long.

The summary should include the following:

- (a) Name of the applicant.
- (b) Brief specification of the project, with reference to all parts of the operation capable of generating pollution, and the polluting substances involved.
- (c) Boundaries of the area in which the operations are to be conducted, and any alternative site considered.
- (d) Brief description of the ecology of the area which might be affected, with references to any sensitive areas, and any rare or endangered species of plant or animal.
- (e) Assessments of any potential adverse effects on the environment, and any potential commercial and socio-economic effects, whether direct or indirect. This should be a major part of the summary.
- (f) Measures proposed to limit adverse effects.
- (g) Any alternatives considered under 4.4 above.
- (h) Place and times at which the full statement can be seen.

5.4 Attention is drawn to Article IV 1 (c) of the Protocol.

6. Persons or Body Chosen to carry out the Environmental Impact Assessment and to write the Statement

6.1 The persons or body chosen to carry out the survey and write the statement should be approved by the EIA Office.

The EIA Office may prepare a list of qualified persons and bodies for conducting the survey and writing the statement for selection.

Part C : CRITERIA

1. Criteria on whether or not to require an Environmental Impact Assessment

1.1 The first step to be taken by the Competent State Authority in the procedure set out in Part B, is a recommendation by the EIA Office on whether or not to require the submission of an environmental impact statement. In making that recommendation it is of first importance for the office to take into account every possibility of significant adverse environmental impact. As an aid, a chart can be used in that process is set out in Annex 1.

1.2 The chart shows in the left hand vertical column the components of any project for which a license may be sought and along the top row the possible direct and indirect effects which may have to be taken into account. The lists are not necessarily exhaustive, and new items may be added in the light of new applications and further experience in environmental and consequential effects.

1.3 Before using the chart, the EIA office is advised to check the license application to ensure that it covers:

(a) All parts of the project, including ancillary and associated developments and work to be done in establishing the project, e.g.

transport services or disturbance of the sea-bed, or pre-commissioning work on a pipeline.

- (b) Foreseeable future extensions of the project and associated developments.

All those matters should be taken into account in the initial assessment, otherwise there may be piecemeal approvals for developments with cumulative effects, which would not have been approved if presented as a whole.

- 1.4 All operations listed in the vertical column which fall within the scope of the application should first be underlined or otherwise indicated. Each should then be checked against the effects listed at the top of the chart and the possibility of an adverse effect indicated by a diagonal line from top right to bottomleft of the rectangle made by the intersection of the appropriate row and column. (A diagonal line from top left to bottom right may be used at a later stage for beneficial effects). Within the rectangle may be placed a number as a reference to a footnote on the potential effects eg.

- 1.5 On the basis of the information thus indicated, a decision is to be made. The decision should be to call for an environmental impact assessment if the completed chart shows that there is a chance, real as distinct from theoretical, that the possible consequences of carrying out the project would include any of the following:
 - (a) Significant adverse effect on any established:
 - i) Commercial interest;
 - ii) Scientific interest;
 - iii) Recreational activity;
 - iv) Social or cultural activity.

- (b) Extinction or significant impairment of any species of plant or animal.
 - (c) Significant effect on any submarine area designated and maintained by a public authority as a marine park or otherwise protected area.
 - (d) Significant geophysical or ecological effect on any area of the sea-bed or coastal terrain.
 - (e) Significant adverse effect on any amenity.
 - (f) Significant adverse effect on public health.
 - (g) Significant increase in the cost of maintaining any existing public service, or the creation of a need for a new public service.
 - (h) Significant, but only temporary, development of any coastal area. (“boom – bust” effect).
 - (i) Any other adverse effect of such significance that the EIA office considers that a call for an environmental impact assessment is justified.
 - (j) Benefits expected to the local environment from the operation.
- 1.6 When all entries are made on the chart, it will contain more information than will be needed for the decision whether or not to call for an impact assessment.
- (a) However, the EIA Office should take into consideration that an adverse effect on an area such as a fish breeding ground may affect fish stocks elsewhere.
 - (b) There may be additional information, particularly in footnotes to the chart, which are not needed for making the decision, but

which may be useful in preparing the terms of reference for any assessment required (See 2).

- 1.7 In deciding whether or not there is likely to be a significant adverse effect on marine organisms, particular attention should be given to the effect from the following substances and classes of substances:

Biocides

Oxygen scavengers

Corrosion inhibitors

Discharges of suspended solids

Demulsifiers

Dispersants

2. Criteria for Terms of Reference for an Environmental Impact Assessment

- 2.1 The items which should, and may be, included in the terms of reference are listed in B 4.2 and 4.3 above. If the recommendation of the EIA Office is to require an impact assessment, what must be included in that assessment should be determined in accordance with the preliminary findings indicated on the completed chart.
- 2.2 In assessing the probable effects of the project, the criteria set out in Annex II should be applied by the assessor, except where he can show that particular circumstances justify the use of different criteria.
- 2.3 The criteria shown in Annex II for assessing the effects on plants and animals are not necessarily complete. It must be noted that toxicity can be expressed only in relation to particular species, and may even be different for sub-species found in other waters, or for the same animals in different circumstances, e.g. colder waters.

As experience and knowledge progresses on the use of chemicals in offshore operations, more data will become available. Annex 2 can therefore be updated intermittently in conjunction with the Guidelines on the Use of

Chemicals in Offshore Operations, which are also issued by the Organization.

The same applies in principle to other criteria. As experience and knowledge increases, Annex 2 will be revised. It will therefore be necessary to ensure that the most recent edition of it is used.

- 2.4 The persons conducting the survey should be required to produce a report which would at least reveal any significant impacts beyond the jurisdiction of the licensing State, and the extent of impacts in terms of the following:
- (a) Adverse effect on any commercial interest in terms of :
 - i) estimate of the losses to be suffered;
 - ii) estimate of the period of time for which the commercial enterprise would not be viable.
 - (b) Adverse effect on any scientific interest, in terms an estimate of the period of time when scientific progress would be inhibited.
 - (c) Adverse effect on any recreational activity, in terms of an estimate of the numbers of persons who would be denied that activity, and the period of time during which it would be denied to them.
 - (d) Adverse effect on any social or cultural activity, in terms of an estimate of the number of people who would be affected, and the period of time for which they would be affected.
 - (e) Extinction of any species of plant or animal.
 - (f) Adverse effect on any submarine area designated and maintained by a public authority as a marine park or otherwise protected area, in terms of the extent to which:
 - i) habitat would be affected;

- ii) plants or animals living in the area would be affected including any inducement of animals to leave the area;
 - iii) further development of the park or protected area would be inhibited, and an estimate of the period of time of that effect.
- (g) Alteration of any area of sea-bed or coastal terrain to the extent that it would be classified differently in geophysical or ecological terms. An estimate of the duration of such change.
- (h) Adverse effect on local amenity by reason of:
 - i) visual intrusion.
 - ii) noise or vibrations.
 - iii) discharge to water or the atmosphere.
- (i) Adverse effect on public health in terms of extent and severity.
- (j) Estimate of any additional cost in maintaining a public service.
- (k) Temporary development of a coastal area in terms of :
 - i) increase in population of nationals in the area;
 - ii) estimate of period during which the increased population of nationals will be maintained;
 - iii) estimate of the extent of any sites of industrial dereliction remaining after completion of the project and cessation of all operations thereunder.
- (l) Assessment in appropriate terms of any other significant adverse effect.
- (m) Benefits expected to the local environment from the operation.

ANNEX 1

MATRIX

Left Hand Column

Explosives used;

- In seismic operations;
- In laying pipelines.

Drilling of:

- Exploratory well;
- Appraisal well;
- Production well;
- Secondary recovery well;
- Diversion of existing well.

Disposal of:

- Drill cuttings;
- Waste drilling fluids;

Oily waste waters:

- Production water;
- Displacement water;
- Offshore processing
- Drainage;
- Machinery space
- Drainage;
- Oily sludge from separators.

Other disposals:

- Sewage;
- Garbage;

The use of the chemicals which may enter the marine environment.

Use of sacrificial anodes:

- Of anti-corrosion Coatings;
- Of impressed current System;
- Of electrical shockers for Cooling water intake.

Pipeline:

- Laying;
- Pre-commissioning work;
- Maintenance.

Installation of:

- Production platform;
- Gas and oil separation Platform;
- Control platform for satellite wells;
- Subsea completion

Suspended well head:

- Suspension of operations;
- Presence of well head;
- Presence of marker buoy.

Mooring and loading points:

- Installation of new Loading buoy;
- Presence of loading buoy;
- Accident due to maritime perils: Oil spillages.

Other offshore storage facilities:

- submarine storage tanks;
- floating storage vessels.

Well work-over – the risks involved.

Works of maintenance, repair and replacement.

Onshore developments:

- Loading berths;
- Tank farms;
- LPG storage vessels;
- Gas/oil separators;
- Pumping stations;
- Construction and maintenance yards.

Other operations.

Top Row

Direct Effects

Consequential Effects

National income.

Employment.

Development of expertise:

- Scientific knowledge;
- Technical knowledge;

Effects on installations of:

- Geological faults;
- Seismic activity:
- taunamic generation:
- Erosion:
- Sedimentation:
- Seafloor settling after withdrawal of ground waters.

Modification of sea bed and coastal terrain:

- Surface cover;
- Reefs;
- Corals;
- Lagoons;
- Mangroves;
- Tidal flats;
- Salt marshes.

Risks of fire, explosion and leakage from:

- Oil storage tanks;

LPG storage vessels.

Ballast water discharges from tankers transporting the product to shore.

Effects on water:

- Temperature;
- Salinity:
- pH;
- Suspended solids;
- Dissolved oxygen;
- Oil content;
- Faecal coliform;
- Movement of water;
- Frequency of interchange ;
- Other forms of water pollution;
- Radioactive substances discharge.

Accumulation of discharged substances:

- Oils;
- Faecal coliform;
- Other substances.

Effects on:

- Desalination of water;
- Benthic organisms;
- Demersal fish;
- Pelagic fish;
- Migratory aquatic species
- Dugongs;
- Turtles, including
- Breeding sites;
- Other macro species;
- Plankton;

- Composition of the aquatic community with particular reference to critical habitats;
- Submerged plant species;
- Coastal terrestrial species. e.g. dune species;
- salt marshes;

Food chains
Mangroves.

Commercial fishing, including the exploitations of shell fisheries.

Sport fishing:
Clamming and crabbing;
Coastal fishing;
Deep sea fishing.

Water sports:
Swimming;
Boating;
Water skiing;
Wind surfing;
Scuba diving;
Other water sports.

Effects on:

Habitats, including
Beneficial
Effects and formation of new habitats;
Spawning and breeding grounds;
Nursery areas;
Marine parks;
Historic sites, including
Sites of wrecks;
Recreation areas.

Effects on aquatic species:

Benthic species;
Demersal fish;
Pelagic fish;
Migratory species
Dugongs, seabirds and
Turtles, including
Breeding sites;

Other macro species;
Plankton;
Composition of aquatic
Communities.

Aesthetic effects:

Overall visual amenity;
Coastal amenity;
Submarine amenity.

Effects of emissions to the atmosphere:

Hydrocarbons;
Nitrogen oxides;
Sulphur oxides;
Carbon monoxide;
Losses from “floating roof” tanks

NOTE: Some effects may be noted under more than one heading. “Double counting” of such effects must be avoided. This can best be done by cross reference in footnotes.

ANNEX 2

CRITERIA FOR ASSESSING THE EFFECTS ON FLORA AND FAUNA

1. Carrying out the Initial Survey and making the Assessment

Paragraph B 4.3 (a) of these guidelines requires the person carrying out the survey to describe the existing ecological state of the area which might be affected by the project. That will be followed by an assessment of the possible effects on the biota of the area. Some guidance is given on the possible extent of the survey, and making of that assessment below.

2. Marine Life

2.1 For the purpose of assessing the possible effects on marine life, the survey should include, so far as they may relate to matters within the terms of reference:

- (a) the abundance and distribution of benthic, demersal and pelagic species.
- (b) identification of organisms of commercial and scientific interests.
- (c) presence of breeding grounds and other sensitive habitats.
- (d) seasonal variations in distribution and numbers.
- (e) the normal chemical and physical characteristics of the water and other elements of their environment.
- (f) seasonal changes in physical and chemical characteristics of sea water.

2.2 The surveyor should give details of any discharges likely to be made into the environment. They should include assessments of the total weight or volume

of the discharge, as appropriate, assessment of the dispersion and final concentrations in the waters of the area. Where a discharge contains suspended solids, particle size and the species which may be affected, are important factors to be considered. Special and separate attention should be given to sensitive areas.

- 2.3 Assessment should then be made of the potential effects on the biota of the area. Special attention should be given to species which are rare or particularly sensitive, and to the need for more detailed information on their ecology and sensitivity to particular substances than for others. Any possible effects to the reproductive capacity of organisms should also be considered.

If there are commercial fisheries, including shell fisheries, within the area, an estimate should be made of any likely loss of yield or income.

For marine parks the estimate should be in terms of species and numbers affected. For areas of high amenity, there should be an explanation of the features or characteristics affected, and if possible an estimate of any likely fall in the number of visitors and any consequent financial loss.

- 2.4 The assessment should be made on the basis of toxicity tests, which should be carried out, if feasible, on local species and varieties. Such tests will normally be 96 hour LC₅₀ tests. For some discharge, however, where the toxic constituent is a highly persistent substance present in very small quantities, e.g. mercury, longer term tests will be needed, where 96 hour LC₅₀ tests on certain substances have been carried out by an authority recognized by the EIA Office, the results may be used towards the assessment of the potential toxic effects of such substances.
- 2.5 Where toxic substances are likely to get into the tissues of any particular species, and especially where they are likely to get into the food chain, the possible effects on all marine organisms and humans should be assessed.
- 2.6 Separate consideration should be given to possible effects within the jurisdiction of other States.

- 2.7 Discretion will have to be used in requiring some of the above tests to be carried out. Account will have to be taken of the time and expense involved, and the probable value of the results.

Local academic and research institutes could be involved in the research, and in the long term a greater body of knowledge of the local biota and its responses to pollution built up.

It must be emphasized, however, that it would be unfair to impose on a particular applicant the delay and cost involved if the main purpose was to build up knowledge for future occasions. The applicant must be asked to bear no more in cost and delay than is strictly necessary to assess the impact of his proposed project.

3. Birds

- 3.1 In assessing the possible effects on bird life, the following must be considered:

- (a) The possibility of migratory routes through the area.
- (b) Food and food chains
- (c) The possibility of interference with roosting, e.g. on marshes, dunes and floating vegetation.
- (d) Reproductive capacity:
 - behavior changes;
 - viability of eggs;
 - toxin loading in eggs as well as in young and adults.

- 3.2 For these purposes, the person carrying out the survey should be required to consult one or more local expert ornithologists.