**ENVIRONMENTAL PROTECTION AGENCY**

# BATNEEC GUIDANCE NOTE

***Class 9.2***

## *CRUDE PETROLEUM HANDLING AND STORAGE*

(Draft 3)

# 1. INTRODUCTION

This Guidance Note is one of a series issued by the Environmental Protection Agency and is designed to provide guidance to those applying for integrated pollution control licences under the EPA Act. It should also be read in conjunction with *Application Guidance Notes*, available under separate cover.

It should be noted at the outset, that noise is not included within the scope of this work and guidance on this parameter has been issued separately.

This Guidance Note is comprised of seven main sections and an appendix. Following this introduction, Section 2 contains a general note on the interpretation of BATNEEC. The industrial activity covered by the terms of this note is given in Section 3. In Section 4, the technologies to control emissions are tabulated and in Section 5 the specific emission limit values (ELVs) are given. Section 6 contains comments on compliance monitoring requirements, while the principal references are given in Section 7.

The Appendix gives the main sources of emissions, and the principal releases from such sources.

All applicants for Integrated Pollution Control licences, in the sector covered by this note, should carefully examine the information laid down in this Guidance Note, and should use this information to assist in the making of a satisfactory application for an Integrated Pollution Control licence to the Agency. It should be clearly understood that achieving the emission limit values does not, by itself, meet the overall requirements in relation to I.P.C. In addition to meeting such values the applicant will also be required to demonstrate that waste minimisation is a priority objective and to put in place particular abatement measures to reduce overall mass emissions and pollutant load where this is necessary to protect the ambient environment.

The technologies and the associated emission limit values (ELVs) identified in this Guidance Note are, at the time of writing, regarded as representing BATNEEC for new activities. BATNEEC is not a static quality and will change as technologies, environmental factors and costs alter with the passage of time. The Agency may amend or update the guidance contained in this note should such amendments seem appropriate. The information contained in this Guidance Note is intended to be used only as a tool to assist in determining the BATNEEC for an operation in this sector and should not be taken to be a definitive authority on the BATNEEC for this sector**.** This Note should not be considered as a legal document**.**

# 2. INTERPRETATION OF BATNEEC

BATNEEC means '*the best available technology not entailing excessive costs'*. The technology in question should be **Best** at preventing pollution and **Available** in the sense that it is procurable by any person. **Technology** itself is taken as the techniques and the use of the techniques, including training and maintenance etc.
**NEEC** addresses the balance between environmental benefit and financial expense.

The objective of the Best Available Technology Not Entailing Excessive Costs (BATNEEC) Guidelines is to provide a list of technologies which will be used by the EPA to determine BATNEEC for a scheduled activity. The BATNEEC identified in this Guidance Note is used as a basis for setting emission limit values. It is intended to update these guidelines as required in order to incorporate technological advances as they occur.

In the identification of BATNEEC, emphasis is placed on pollution prevention techniques, including cleaner technologies and waste minimisation, rather than end-of-pipe treatment.

Technologies identified in the BATNEEC guidelines are considered to be the current best practice for the purposes of setting emission limit values. These technologies are representative of a wide range of currently employed technologies appropriate to particular circumstances. However, the guidance issued in this note in respect of the use of any technology, technique or standard does not preclude the use of any other similar techniques which may achieve the same emission. The entire range would not necessarily be appropriate in specific cases. The specific choice depends on a wide range of circumstances but the crucial factor is that the selected regime achieves BATNEEC. In applying BATNEEC, Environmental Quality Objectives (EQOs) must be respected where set. Measures such as in-plant changes, raw material substitution, process recycling and improved material handling and storage practices, may also be employed to effect reductions in emissions. As well as providing for the installation of equipment and the operation of procedures for the reduction of possible emissions, BATNEEC will also necessitate the adoption of an on-going programme of environmental management and control, which will focus on continuing improvements aimed at prevention, elimination and/or progressive reduction of emissions.

As described in the EPA Act of 1992, BATNEEC will be used to prevent, eliminate or, where that is not practicable, limit, abate, or reduce an emission from an activity which is listed in the first schedule to the Act. The use of BATNEEC is construed in the Act to mean the provision and proper maintenance, operation, use and supervision of facilities which are the most suitable for the purposes.

In determining BATNEEC for an activity, regard shall be had to :

- the current state of technical knowledge;
- the requirements of environmental protection;

- the application of measures for these purposes, which do not entail excessive costs, having regard to the risk of significant environmental pollution which, in the opinion of the agency, exists.

For existing facilities, additional regard shall be had to :

- the nature, extent and effect of the emission concerned;

- the nature and age of the existing facilities connected with the activity and the period during which the facilities are likely to be used or to continue in operation, and

- the costs which would be incurred in improving or replacing these existing facilities in relation to the economic situation of activities of the class concerned.

The technologies and the associated emission limit values (ELVs) identified in this Guidance Note are regarded as representing BATNEEC. It is generally envisaged that these emission limit values will gradually be extended to existing facilities. However the specific licence requirements and associated time frames will be identified when the licence is processed. Additional and more stringent requirements may be specified on a site-specific basis.
Where an operator of an existing facility predicts that it will be difficult to meet the emission limit value within the specified time-frame, he will be required to satisfy the Agency as to the reasons why the requirements cannot be met. The applicant will be required to submit an environmental management plan which will give consideration to the following, in order of priority:

- waste reduction/source elimination;
- waste recovery;
- proposed and alternative treatment technologies and predicted performance data;
- proposed and alternative waste disposal options.

This management plan must propose a revised time-frame for the achievement of emission limit values as set out in this Guidance Note.

The BATNEEC guidelines are not the sole basis on which licence emission limit values are to be set, since information from other sources will also be considered; including site-specific environmental and technical data, plant financial data and other relevant information.

# 3. SECTOR COVERED BY THIS GUIDANCE NOTE

This Guidance Note covers SECTOR 9.2 of the activities specified in the First Schedule to the EPA Act, 1992. These are:

***9.2. The handling or storage of crude petroleum.***

Note: Sea transport aspects are considered outside the scope of this Note, as are the transfer of oil between ship and shore.

# 4. CONTROL TECHNOLOGIES

## 4.1 INTRODUCTION

As explained in Section 2, this Guidance Note identifies BATNEEC, but obviously does so in the absence of site-specific information. Accordingly, it represents the requirements expected of any new activity covered by the Note, but does not exclude additional requirements which may form part of the granting of a licence for a specific site.

The approach to be used in selecting BATNEEC is based on the following hierarchy:

- Process design / redesign changes to **eliminate** discharges and wastes that might pose environmental problems.

- **Substitution** of materials by environmentally less harmful ones (e.g. purchase of crude oils which are easier to handle etc.).

- Inventory control, to demonstrate waste **minimisation** by means of process control, inventory control and end-of-pipe technologies etc.

The existing or possible measures for reducing and controlling emissions are described in this section. These range from relatively simple containment measures to sophisticated recovery and end-of-pipe technologies and include:

(i) Load Minimisation
(ii) Containment
(iii) Recovery/recycle
(iv) Emission reduction
(v) Waste treatment & disposal.

The technical feasibility of the measures listed below has been demonstrated by various sources. Used singly or in combination the measures represent BATNEEC solutions when implemented in the appropriate circumstances. The circumstances depend on scale, nature of the crude oil handled, etc. A summary of the treatments for various emissions is given at the end of the section. (Preventative maintenance and emergency response plans are important factors in the operation of any major storage facility. These will be matters to be addressed at the time of licensing).

Note that where flammable/explosive vapours or dusts are handled, safety procedures (acceptable to HSA) should be adopted and nothing in this note should be construed as advice to the contrary.

## 4.2 TECHNOLOGIES FOR LOAD MINIMISATION:

(No priority ranking is intended, and the appropriate selection in a particular case will depend on the specifics of the process concerned and of the plant location)

- Prompt clean-up of minor spillages.
- Transfer operations to be carried out so as to minimise vapour (incl. sulphur compounds) releases by e.g. bottom filling or closed loop systems.
- Minimisation of residue settlement in storage tanks by e.g. jet mixers
- Drain design on floating roof tanks to avoid hydrocarbon contamination of rain water.
- Separation of storm water and other effluents of different origin in order to permit appropriate treatment options.
- Floating roof tanks to be landed as infrequently as possible to avoid unnecessary vapour releases.
- Inventory control.
- Leak detection systems under storage tanks.
- Use of high pressure water cleaning rather than detergents or chemicals.

## 4.3 CONTAINMENT OF EMISSIONS:

- Enclosed sewer systems for transfer of contaminated water from tanks to separation facilities.
- Vent collection and ducting from tank farms to central abatement systems.
- Transfer pipelines and associated valves, flanges, pumps etc. to be suitably constructed to avoid leakages.
- Overground pipelines and transfer lines.
- Bunding of facility.
- Overfilling protection on bulk storage tanks.
- Use of floating roof tanks with double seals (or fixed roof tanks with internal floating decks) for storage of oils with a vapour pressure greater than 14 kPa (at the maximum storage temperature).
- Enclosed oil/water separators to be used to prevent vapour emissions.

## 4.4 TECHNOLOGIES FOR RECOVERY AND RECYCLE:

(No priority ranking is intended, and the appropriate selection in a particular case will depend on the specifics of the process concerned and on site constraints).

- Reuse of recovered oil from separators.
- Reuse of ballast water (return to ship).

**4.5 TECHNOLOGIES FOR TREATING EMISSIONS TO AIR:**

Air emissions are dealt with by minimisation and containment. No specific end-of-pipe technologies are discussed.

**4.6 TECHNOLOGIES FOR TREATING WATER EMISSIONS:**

(No priority ranking is intended, and the appropriate selection in a particular case will depend on the specifics of the process concerned and on site constraints). (Symbols refer to Table 4.1).

- Separators (e.g. tilted plate separators) (F1).

**4.7 TECHNOLOGIES FOR THE TREATMENT AND DISPOSAL OF WASTES:**

(No priority ranking is intended, and the appropriate selection in a particular case will depend on the specifics of the process concerned and on site constraints).

- Incineration (Incinerator emissions are the subject of a separate note).
- Engineered landfill.

**Table 4.1 Summary of Technologies for Treating Water Emission (Symbols refer to Section 4.6)**

| Technology | Emissions |
|---|---|
| F1 | Hydrocarbons |

# 5. EMISSION LIMIT VALUES

## 5.1. REFERENCE CONDITIONS - EMISSIONS TO WATER

The limit values for discharges to water are based on 24 hour flow proportional composite samples taken over a representative production period.

## 5.2. RELEASES TO WATER

All releases to waters are subject to a licence from the Agency. However any discharge to sewer will require the consent of the sanitary authority. BATNEEC to minimise the release of substances will generally include minimisation at source and either specific treatment of contaminated waste streams to remove particular substances or co-treatment of combined effluent streams or both. The Emission Limit Values for effluent discharges to waters are set out in Table 5.1.

**Table 5.1 - Emission Limit Values for Discharges to Water***
(These values apply prior to any dilution with e.g. uncontaminated stormwaters or cooling waters)

| Constituent Group or Parameter | Limit Value | Notes |
|---|---|---|
| pH | 6 - 9 | 3 |
| BOD (mg/l) | 25 | 3 |
| Suspended Solids (mg/l) | 30 | 3 |
| Number of Toxicity Units | 5 | 1,3 |
| Mineral Oil (mg/l) Separators | 40 | 3 |
| EC. List 1 | As per 76/464/EC and amendments | |
| Fish Tainting | No Tainting | 2 |
| Phenols (mg/l) | 1 | 3 |

* All values refer to daily averages, except where otherwise stated to the contrary, and except for pH which refers to continuous values.

**Note:** Non-reusable sea-water ballast should be discharged to sea/lower estuary in compliance with the above standards.

**Notes for Table 5.1**

1. The toxicity of the effluent shall be determined on an appropriate aquatic species. The number of Toxicity Units (TU) = 100/96 hr LC50 in percentage vol/vol. so that higher TU values reflect greater levels of toxicity. For each TU at least 20 dilutions of the effluent volume must be available in the receiving system.

2. No substance shall be discharged in a manner which, or at a concentration which, following initial dilution causes tainting of fish or shellfish, interferes with normal patterns of fish migration or which accumulates in sediments or biological issues to the detriment of fish, wildlife or their predators.

3. Consent conditions for these parameters for discharge to municipal treatment plants can be established with the Licensing Authority, and different values may apply.

# 6. COMPLIANCE MONITORING

The methods proposed for monitoring the emissions from this sector are set out below.

## 6.1 WASTE WATER DISCHARGES:

1. Establish existing conditions prior to start-up, of key emission constituents and salient flora and fauna.

2. Daily monitoring of flow and volume. Monitoring of other relevant parameters as deemed by the Agency taking account of the nature, magnitude and variability of the emission, and the reliability of the control technologies.

3. The potential for the treated effluent to have taining and toxic effects should be assessed and if necessary measured by established labortatory techniques.

## 6.2 SOLID WASTE MONITORING:

1. The recording in a register of the types, quantities, date and manner of disposal of all wastes.

2. Leachate testing of sludges and other material, as appropriate, being sent for landfilling.

3. Annual waste minimisation report showing efforts made to reduce specific consumption together with material balance and fate of all waste materials.

# 7. PRINCIPLE REFERENCES

## 7.1 U.K. H.M.I.P. Chief Inspector's Guidance to Inspectors

7.1.1 Industry Sector Guidance Note IPR 1/15
**(**Petroleum Processes - Crude Oil Refineries).

## 7.2 E.C.

7.1.2 Techno-economic study on the reduction measures, based on best available technology, of water discharges and waste generation from refineries. (Contract B91/B4-3041/8148, January 1993)

# APPENDIX 1

## SOURCES AND EMISSIONS

### 1. INTRODUCTION:

In this section, the major sources of emissions to air and water are identified, as are the principal sources of waste from the sector. It should be borne in mind that the identified list of sources is not all encompassing, nor will every plant falling within an individual sector have every one of the emissions which are associated with the sector as a whole.

Emissions are considered under two headings: fugitive and unscheduled emissions, and specific process emissions. Some of the latter are considered to have little potential environmental significance (and hence no emission limit value) and these are designated as minor (m). However, obviously there could be specific sites where these designations may not be correct. Such emissions must then be examined on a one-off basis.

### 2. SOURCES OF EMISSION TO AIR:

#### 2.1 Fugitive Emissions and Unscheduled emissions.

- Vapour losses during storage, filling and emptying of bulk tanks.
- Release of VOCs and odorous compounds from open tanks etc. in waste water treatment plants (WWTP).
- Leakages from flanges, pumps, seals, valve glands etc.
- Vapour losses from spillages and from disposal of hydrocarbon contaminated sludges from storage tanks.
- Bursting disks and relief valve discharges.

## 3. SOURCES OF EMISSIONS TO WATER : (SYMBOLS REFER TO TABLE A1)

### 3.1 Spills and Diffuse Sources etc.

- Contaminated stormwaters (E1).
- Storage tank leaks (E1).
- Pipework leaks (E1).
- Spillages (E1).
- Bund Drains (E1).
- Leakages from flanges, pumps, seals, valve glands etc. (E1).

### 3.2 Specific Effluents

- Tank cleaning (E1).
- Ballast water (E2).
- Laboratory effluent (m).

## 4. SOURCES OF WASTE: (SYMBOLS REFER TO TABLE A2).

- Sludges from storage tanks (W1).
- Sludges from oil/water separation systems (W2).
- Contaminated equipment and protective clothing (W3).
- Spillage clean-up (W4).

## 5. RELEASES

The substances most likely to be present in the release to the environment and of principal concern in the processes covered by this note are given below. A licence applicant should identify and quantify all environmentally significant emissions (including heat discharges) from the process.

**Table A1 - Summary of Sources and Emissions to Water**
**(Symbols refer to Section 3 in Appendix)**

| Source | Emission |
|---|---|
| E1 | Hydrocarbons |
| E2 | Hydrocarbons<br>Organisms (minor)<br>Sea Water (normally) |

**Table A2 - Summary of Other Releases**
**(Symbols refer to Section 4 in Appendix)**

| Source | Emission |
|---|---|
| W1 | Hydrocarbons<br>Rust<br>Grit<br>Water |
| W2 | Hydrocarbons |
| W3 | Paper, cloth, plastics, metals etc.<br>Hydrocarbons |
| W4 | Hydrocarbons<br>Water<br>Natural and synthetic oil<br>Absorbents |