Advisory guidelines for the environmental impact statement on expansion of the ESSO refinery with a hydrocracker

24 January 1992

384-43E

CIP-DATA KONINKLIJKE BIBLIOTHEEK, DEN HAAG

Advisory

Advisory guidelines for the environmental impact statement on expansion of the ESSO refinery with a hydrocracker / [Commission for Environmental Impact Assessment ; adapt. by S.A.A. Morel ; transl. from the Dutch]. - Utrecht : Commission for Environmental Impact Assessment
Transl. of: Advies voor richtlijnen voor de inhoud van het milieu-effectrapport Uitbreiding ESSO Raffinaderij met Hydrocracker. - Utrecht : Commissie voor de Milieu-Effectrapportage, 1992.
ISBN 90-5237-760-X
Subject headings: environmental impact statement ; ESSO Netherlands / oil refineries.

CONTENTS

SUMMARY OF THE ADVICE

This advice of the Commission for EIA contains recommendations for the contents of the environmental impact statement (EIS) for a hydrocracker installation in the Esso refinery near Rotterdam.

Problem definition and objectives (chapter 2)
The formulation of the objectives should concentrate on the industrial processing in the hydrocracker. In addition objectives related to the raw material (quantities and qualities of crude to be processed) and products (quality and use of products) have to be considered.
The EIS must give insight into the (commercial) considerations that led to the choice to build a hydrocracker.

Proposed activity and alternatives (chapter 4)
Parts of the proposed activity are the construction and exploitation of the hydrocracker, the consequences for the present installations and other activities linked to the hydrocracker.
In the opinion of the Commission, the zero alternative is not realistic. The EIS must however examine, to what extent really feasible implementation alternatives exist for parts of the proposed activity. Elements for the 'alternative most favourable to the environment' (AMF) can be derived from a comparison of the expected environmental impacts of the proposed activity with those of the elaborated implementation alternatives. The AMF must focus on 'best technical means'.
The following configurations of the refinery must be described in the EIS, as basic elements for the discussion concerning environmental impacts of the autonomous development, the proposed activity and its alternatives:

- the present refinery;
- the total refinery after fitting in the proposed activity;
- the total refinery with alternatives (among which the AMF) for parts of the proposed activity.

In particular these elements of the proposed activity and the alternatives have to be described that may cause environmental impacts. The emphasis should be on the exploitation stage of the installations, paying attention to the proposed monitoring and control programme.

Current state of the environment / autonomous development (chapter 5)
In describing the current environmental situation data on emissions, risk and security aspects of the present configuration of the refinery as well as data on the present (background) environmental quality in the region (partly caused by the emissions of the refinery but also by other sources) should be used.
The information concerning the autonomous development of the environment is important for providing insight in the contribution of the refinery (with and without modifications) to the expected future environmental quality in the region.

Environmental impacts (chapter 6)
It is of importance to describe the environmental impacts not only in the processing stage but also in the stages of the raw materials and the products. The environmental impacts in the processing stage (in the hydrocracker) must be described in detail and, if possible, quantitatively. With respect to the stages of raw materials and products a general qualitative description will be sufficient. The descriptions must be focused on air quality (including stench), water quality, soil quality, noise levels, removal and processing of solid waste matter as well as health, risk and safety aspects for people.
The configurations of the refinery rendered in the section 'proposed activity and alternatives' should be the basis for the description of environmental impacts, resulting in 'overall pictures' of:

- the present refinery: description of the current situation and the autonomous development of the environment;
- the total refinery after fitting in the proposed activity: description of the environmental impacts of the proposed activity;
- the total refinery with alternatives for elements of the proposed activity: description of the environmental impacts of implementation alternatives and AMF.

Comparison of alternatives (chapter 7)
Through mutual comparison of the 'overall pictures' mentioned before, the EIS should express the 'environmental profit' of the proposed activity. To what extent can it be considered as 'best option' and to what extent does the proposed activity satisfy the (future) governmental policy?

Gaps in information, post project analysis (chapters 8 and 9)
The gaps in knowledge and information established in the EIS can be considered as subjects for further study. They must therefore be part of an evaluation programme to be issued by the competent authority when granting the necessary licences.

1. INTRODUCTION

Esso Nederland B.V. intends to improve on the structure and efficiency of the current refinery near Rotterdam for reasons of strengthening the competitive position and diminishing adverse impacts on the environment (in the first place by the production of low-sulphureous diesel oil). The proposed activity comprises:

- the building of a hydrocracker installation for the catalytic conversion (while adding hydrogen gas) of a high-sulphureous heavy gas oil fraction into lighter low-sulphureous products, with a capacity of 220 tons/hour.

The EIA obligation is coupled to the procedure for license granting by the Minister of Transport, Public Works and Water Management and the executive board of the province of South Holland.

In drafting the advice the Commission considered the written comments of the public, received through the competent authority.

2. DEFINITION OF PROBLEMS AND OBJECTIVES

Environmental Protection Act, section 7.10, subsection 1, sub a:
An EIS shall contain at least: *" a description of the purpose of the proposed activity".*

Problems and objectives of the proposed initiative must be clearly elucidated in the EIS. This concerns in the first place the processing of gas oil in the hydrocracker. In addition problems and objectives as regards the stages of raw materials (qualities eligible for processing and required quantities of crude oil) and products (quality and use of products) have to be considered.
The EIS must provide insight into the (commercial) considerations which resulted in the choice to build a hydrocracker. The EIS must pay attention to alternatives for the hydrocracker of which the feasibility has been proven on the scale desired by Esso. A comparison of the hydrocracker and the alternatives must show to what extent the hydrocracker can be considered as 'the best possible alternative', taking into account the objective of the initiative.

With respect to environmental problems the objective of the proposed activity must be elucidated in view of the objectives of the environmental policy.

Due to the long life span the proposed installations may have, it is recommended to discuss objectives up to the year 2000 as well as objectives for the distant further.

3. DECISION-MAKING PROCESS

Environmental Protection Act, section 7.10, subsection 1, sub c:
An EIS shall contain at least: *"an indication of the decisions in the preparation of which the environmental impact statement is to be drawn up, and a review of the decisions previously taken by government bodies relating to the proposed activity and the alternatives described".*

The EIS must indicate the decisions for which the EIS is to be compiled, the status of those decisions, the decision-making process to be followed and the corresponding time table.

The EIS must list and explain the governmental decisions and policy intentions which influence or impose restrictions on the decision for which the EIS is to be drawn up.
Reviewing criteria for the activity and the alternatives such as environmental standards must be mentioned.

4. PROPOSED ACTIVITY AND ALTERNATIVES

Environmental Protection Act, section 7.10, subsection 1, sub b:
An EIS shall contain at least: *"a description of the proposed activity and the manner in which it will be carried out, and of the alternatives which should reasonably be taken into consideration".*

Environmental Protection Act, section 7.10, subsection 3:
"The alternatives to be described in accordance with subsection one, under b, shall in any case include the alternative which makes use of the best means available for protecting the environment".

4.1 General

The following configurations of the refinery have to be outlined as basic elements for the description of the current state of the environment and of the environmental impacts of the proposed activity and the alternatives:

- the configuration of the present refinery (see section 4.2);
- the proposed activity (see section 4.2);
- the configuration of the refinery after fitting in the proposed activity (see section 4.2);
- the configuration of the refinery with implementation alternatives for the proposed activity (including the alternative most favourable to the environment) (see section 4.3).

4.2 Proposed activity

The construction and processing of the hydrocracker, the present installations that consequently will be used more intensively, and other activities connected with the hydrocracker are, in the opinion of the Commission, part of the proposed activity.

The hydrocracker will consist of:
- two reactors;
- two step fluid/gas separation installation;
- furnace;
- flare installation;
- hydrogen compressor.

The existing installations that will be affected are:
- fractionation tower;
- gas purification/sulphur recovery installation;
- acid water stripper.

Other activities connected with the hydrocracker are:
- obtaining hydrogen from third parties because of the larger demand of hydrogen;
- the regular supply of catalyst;
- the regular removal of residues (sulphur and exhausted catalyst);
- transportation of raw materials and products of the hydrocracker.

The definition of the proposed activity should emphasize on the exploitation stage of the installations to be built, including the hydrocracker. Also the mitigating measures must be described. The hydrocracker will convert high-sulphureous vacuum gas oil into low-sulphureous lighter products such as:
- naphtha, which is processed into products such as petrol;
- hydrocarbon fractions which, after being mixed with other products, are suited as amongst others kerosene and diesel oil;
- heavy gas oil that is exported to France for an Esso steamcracker.

Input-output balance sheets of the proposed activity and the alternatives must be compiled, based on the maximal capacity of the refinery. In addition a description of the quantities and composition of raw materials (including any pollution) for the hydrocracker ('light vacuum gas oil' and 'gofinate') is important, as well as a characterisation of the quantities and the qualities of the refinery products before and during the operational stage of the hydrocracker. The amounts, the composition and the processing of residues (exhausted catalyst and sulphur) must also be part of the description of the input-output balance sheets.
The spectre of eligible types of crude oil to be adopted in the hydrocracker must be described in the EIS, in particular with respect to the sulphur content and the expected amounts per type of crude oil.
With respect to the hydrogen supply the EIS must indicate:
- the supply capacity;
- the route and the manner of transportation.

Because the production cannot be stopped during construction , it is important to indicate in the EIS which measures will be taken to prevent or minimize emissions or risks in the construction stage.

4.3 Alternatives

4.3.1 Zero alternative

In the opinion of the Commission the zero alternative is not realistic. It is, however, important and also legally compulsory to describe a reference situation (see chapter 5).

4.3.2 Implementation alternatives

By removing sulphur from fossil fuel the net SO_2 emission after combustion of the products will decrease. Because the use of refinery fuel will increase with approx. 5% of the current fuel use, it is certain that the SO_2 emission will rise with 2% as a result of the proposed activity. The EIS must indicate how in the scope of current policy a decrease of the SO_2 emissions of the total refinery complex can be reached. For the other combustion products one may expect an increase in the emissions to an extent strongly determined by the combustion technology to be applied and the effectivity of mitigating measures. In particular it is important to indicate how the increase of emissions can be minimized, and how decreasing emissions can be reduced even further.

In this scope the Commission draws the attention to the hydrogen necessary for the process. The notification of intent states that hydrogen will be obtained elsewhere. For the production of hydrogen energy is required, which will lead to emissions. Although the hydrogen production is not Esso's responsibility, it is recommended to roughly indicate in the EIS the nature and quantities of these emissions, the immissions and the resulting environmental impacts. The EIS should also report how Esso intends to limit the import of hydrogen by adopting a process with a high efficiency. What are the possibilities to produce (a part of) the demanded amount of hydrogen in the hydrogen plant that is present at the location and is this environmentally favourable?

In addition to alternatives for the hydrocracker, the EIS must describe alternatives as regards mitigating measures to prevent or decrease environmental impacts, in particular the control of gas, catalyst and water. The EIS should consider to what extent application of process-integrated technology is possible. It must also give insight in technological possibilities expected in the near future. In this scope, attention must be paid to the facilities fitted prevent and combat calamities, also in view of possible direct discharge of purified waste water into the surface water. Can those facilities be considered as 'best technical means'?

Special attention has to be paid to residues and ways to prevent or limit their amount. The EIS must also consider alternative processing possibilities for released residues, in particular catalyst and sulphur. How can the amounts of

residues to be removed to processing companies be minimised in order to reduce emissions of those companies?

4.3.3 Alternative most favourable to the environment

The proposed activity consists partly of the construction of several installations or expanding the capacity of present installations (see section 4.2.1). There are alternatives for many elements of the proposed activity. Elements of the proposed activity and possible alternatives may be part of the alternative most favourable to the environment. The selection process for this alternative should finally result in the configuration with the lowest emissions and safety risks for the surroundings.
In the alternative most favourable to the environment the 'best technical means' must be adopted, for instance with respect to attaining efficient use of energy and preventing or limiting residues.

In the alternative most favourable to the environment attention must be paid to the following aspects:

- minimizing the CO_2 emission by more efficient energy use;
- optimal environmental effectivity for the exhaust gas treatment installation. In the design of this installation only environmental and safety considerations may play a role. One could think of considerations concerning reliability, use of energy, new emissions, shifts of emissions towards other environmental compartments, waste matter production etc.;
- as previous experience has shown, acid waste water can cause considerable stench. The alternative most favourable to the environment must include the best technical means to achieve a stench-free operation. The EIS must go into measures to prevent stench. Not only the process design should be considered but also back-up systems according to the 'best technical means', to obtain far-reaching nitrogen removal from the waste water (nitrification, denitrification). Since it may concern direct discharge of purified waste water into the surface water, the EIS must pay attention to facilities in the scope of possible calamities and to the implementation of these facilities in an internal environmental care system;
- maximal prevention of residues and a further processing of residues by methods as favourable as possible to the environment (if possible re-use);
- with respect to risk and safety one must look at elements of intrinsic safety (pressure, temperature, volume flows, hold-up of pipes and components and the like) besides additional facilities to the installations (for instance fast-acting shut off valves in H_2S-pipes);
- a set-up of installations that enables the implementation of future adoptions to prevent or limit environmental impacts in an economic and technically responsible manner.

5. CURRENT STATE OF THE ENVIRONMENT AND AUTONOMOUS DEVELOPMENT

Environmental Protection Act, section 7.10, subsection 1, sub d:
An EIS shall contain at least: *"a description of the current state of the environment in so far as the proposed activity or the described alternatives may affect it, and the expected developments in the said environment in the event that neither the said activity nor the alternatives are undertaken".*

5.1 Study Area

The study area consists of the location and the contiguous areas that might be influenced by the activity or the accompanying infrastructure in an environmental/hygienic, (geo)hydrological and ecological respect.
The size of this sphere of influence, and hence of the study area can differ, depending on the environmental aspect considered.
The main residential areas must be included in the study area.

5.2 Current state of the environment

The current situation of the environment must be described in the EIS as reference for comparing the expected environmental impacts of the proposed activity and its alternatives. In describing the current situation of the environment on the one hand data concerning the emissions and risk and safety aspects of the current configuration of the refinery and on the other hand data from the current (background) environmental quality in the region, must be used.

Only those aspects of the current environmental situation in the study area that are significant to the prediction of the environmental impacts of the proposed activity and the alternatives must be described in the EIS. With respect to the refinery and the (background) environmental quality in the region in particular the following aspects deserve attention:

* **air quality** (including stench)

Important compounds for primary pollution are:
- carbon monoxide;
- sulphur dioxide;
- nitrogen oxides (NO and NO_2);
- volatile hydrocarbons (such as benzene);
- black smoke, including heavy metals;
- polycyclic aromatic hydrocarbons;
- stench (H_2S, NH_3, amines, mercaptans, and others);
- carbon dioxide.

An important compound for secondary pollution is ozone.

* **water quality**

Apart from the quality of the surface water as such in the study area (see 6.2), the EIS should describe the quality of subaquatic soils. This quality must be expressed by methods that show the compounds that will probably be discharged in higher quantities as a result of the initiative.
Examples can be:
- phenol;
- oil;
- heavy metals (including arsenic);
- hydrocarbons;
- nitrogen (nitrate, nitrite and Kj-N);
- mercaptans.

In addition to the compounds mentioned, attention must be paid to quality characteristics such as:
- volatile organic chlorocarbons;
- extractable organic chlorocarbons;
- phenol index;
- polycyclic aromatic hydrocarbons: Borneff's 6;
- monocyclic aromatic hydrocarbons: benzene, toluene, ethyl benzene and xylene;
- biological oxygen demand;
- chemical oxygen demand;
- temperature;
- acidity.

* **soil quality, including groundwater quality**

* **noise** levels in relation to the presence of industry (shipping) traffic, railroad noise and aviation

* presence of **residential buildings** (in connection with risk, safety and health aspects)

* presence of **industries** sensitive to emissions (as well as agriculture and horticulture)

* presence of significant terrestrial and aquatic **organisms/communities** (vegetation, flora and fauna)

* the presence of **water-extraction areas**

5.3 Autonomous development of the environment

The EIS must outline the development of the environment in the region in the next years, in case neither the proposed activity nor one of the alternatives will be executed. In view of the uncertainty of such predictions, the Commission

has the opinion that an indication of the expected environmental quality in the year 2000 will suffice. If possible quantitative predictions can be given.
In predicting the autonomous development with respect to air, water and soil quality a method may be chosen that is based on the development of emissions of primary pollution (see 5.2) and the immissions of the primary and secondary pollution over the last ten years. These data facilitate realistic extrapolations for the emissions and the immissions of primary pollution for the next ten years. Any uncertainties must be identified.
The environmental quality in the region is influenced not only by the Esso refinery. Other sources – within and outside the region – play an important role, too. In predicting the autonomous development of these sources the achievement of the policy objectives established for instance the national environmental policy must be supposed.
Attention must also be paid to the expected establishment or demolition of (potentially large) pollution sources in the region.

6. IMPACTS ON THE ENVIRONMENT

Environmental Protection Act, section 7.10, subsection 1, sub e:
An EIS shall contain at least: *"a description of the effects which the proposed activity or the described alternatives may have on the environment, and an explanation of the manner in which the said effects have been determined and described".*

6.1 Environmental impacts - general

As a result of the proposed activity and the alternatives (positive and negative) environmental impacts will arise both in the processing stage (conversion of heavy gas oil in the hydrocracker), and in the stage of the raw material supply and the product stage (use of products). Environmental impacts in all these three stages must be described. For the stages of raw materials and products overall and qualitative descriptions will do. The environmental impacts in the processing stage must be rendered detailed and quantitatively if possible.

Both positive and negative impacts must be described. The description of negative impacts must be focused on irreversible effects.

Special attention must be paid to the possibility that environmental impacts of one stage are shifted to another (for instance preventing emissions of the refinery causing them occur in the product stage (cars)). The same applies to the shifting of problems from one environmental compartment to another (replacing an emission into the air by an emission into the water) or from one environmental problem to the other environmental problem (for instance solving a stench problem which causes a waste problem). Possible shifts must clearly be visualized.

Not only the expected emissions but also the impacts on immission contours and the impacts of immissions on the biotic and abiotic environment must be

indicated. In addition, environmental impacts have to be described that will arise as a result of emissions during testing, cleansing and maintenance.

If possible the expected consequences for the environment must be considered in their mutual coherence (accumulation, synergism).

The description of these environmental data must conclude in 'overall pictures' of the environmental impacts in the study area (see also section 4.1):

- the present refinery (description of the current situation and the autonomous development of the environment, see section 5);
- the total refinery after fitting in the proposed activity (description of the environmental impacts of the proposed activity);
- the total refinery with alternatives for the proposed activity (description of the environmental impacts of implementation alternatives and the alternative most favourable to the environment).

By mutual comparison of these 'overall pictures' the 'environmental profit' of the proposed activity must be illustrated. To what extent can the preferred alternative be considered 'best technical means' and to what extent does it comply with the (future) government policy?
The total pictures can be filled in with the help of the specific questions about environmental impacts in section 6.2.

6.2 Environmental impacts - specific questions

6.2.1 **Impacts on air quality**

As far as the primary pollution is concerned (see section 5.2) the future emissions must be estimated, preferably on the basis of emission data from installations already operational elsewhere and on the basis of the estimated leakage losses of the installations.

Special attention must be paid to what will happen in extreme meteorological circumstances, such as the occurrence of inversion and photochemical reactions (including impacts on air quality).

How will the geographic concentration profiles of the following compounds change:

- CO, (average per hour);
- SO_2 and black smoke (daily averages);
- polycyclic aromatic hydrocarbons and benzene (annual averages);
- stench (average per hour);
- NO_2 (average per hour);
- O_3 (average per hour);
- H_2S (average per hour).

The EIS must indicate whether any dioxins might be formed.

6.2.2 Impacts on water quality

- What is the expected composition of the waste water flows of the new installations, to what extent is purification in the current waste water purification installation possible?
- If a common water purification technique will be used for the waste water flows of the hydrocracker and the other waste water flows: what interactions can occur between the various flows to be discharged and what may be the resulting environmental impacts?
- To what extent will cooling water be discharged, what temperature increase can occur in the receiving surface water and what impact will this have on the environment?

6.2.3 Impacts on soil quality (including groundwater)

- What is the chance of soil and groundwater pollution occurring on the industrial site itself as a result of leakage losses and what environmental impacts can arise?
- How will possible undesired emissions towards soil, land (and surface) water quality be monitored and intercepted?
- See section 6.2.1 regarding soil and groundwater pollution as a result of deposition of air pollution.
- Will the installations use any groundwater?

6.2.4 Impacts on noise levels

- What is the sound power level of those acoustic sources in the new installations that are significant for immisions. When will they be active (which hours of the day, periods of the week)? Which processing conditions have been assumed for predicting these data and what is the average period per year that these occur?
  It must also be indicated how these values have been determined.
- What is the sound power level of the significant acoustic sources during starting, switching off, test running, maintenance activities and under abnormal industrial circumstances? The expected frequency and time of such periods must be stated.
- Can the new installations cause an increase in frequency or a change in duration of for instance flaring periods?
- What will the noise levels be outside the site, caused under representative processing conditions? Where will the 50 dB(A)-24 hours value (zoning) contour be?
- Show the L_{eq} level per assessment period on relevant points outside the boundaries of the site and indicate the contribution of various sources on the site. What will traffic and other (industrial) activities on these spots possibly contribute?

6.2.5 Solid waste

Which solid waste matters will be generated during the processing in the hydrocracker and related installations and how are these emitted or removed and processed (see also section 4.2)? The most important environmental impacts of the waste disposal (such as the disposal of exhausted catalyst and sulphur) must be clearly described in the EIS. If third parties take care of the processing the environmental impacts must be discussed qualitatively, if possible.

6.2.6 Risk and safety

A risk analysis must enable answering the following questions:

- Which possible incidents such as operating faults, failure of instruments, breaking of pipes and of the largest connection on a barrel etc. might cause danger outside the location? What are the chances these accidents may occur? List the impacts and chance-limiting measures that have been or will be taken. What is the group risk and individual risk of the proposed activities?

Special attention must be paid to the accidents with the most serious impacts on the environment.

- What impacts on traffic safety both on the road and on the water may occur as a result of the supply and removal of raw and auxiliary materials, products and residues.

In considering these questions the fact has to be taken into account that the new installations will be part of a larger system by functional links.
A clear distinction is necessary between the various possible impacts, such as gas explosions, intoxications, serious stench, serious air pollution, etc.

With respect to the alternative most favourable to the environment, based on the safest design:

- What are the accidents with the most serious impacts on the environment? List the impacts.
- What are the chances of these accidents happening?

6.3 Prediction methods and models

The following questions must be answered in the EIS:
Which methods and models have been used for predicting impacts and why? What is the reliability of these methods and models? What is the accuracy and reliability of the input data? How do the uncertainties and inaccuracies in the methods and input data affect the accuracy and reliability of the output (predictions)? In case of uncertainty about the occurrence and size of any impact at least the worst conceivable situation for the environment is to be mentioned.

7. COMPARISON OF THE ALTERNATIVES

Environmental Protection Act, section 7.10, subsection 1, sub f:
An EIS shall contain at least: *"a comparison of the expected developments in the environment, as described under d, with the described effects of the proposed activity on the environment and with the described effects on the environment of each of the alternatives considered".*

In the EIS, environmental impacts of alternatives must be mutually compared. Impacts must also be discussed in view of the current situation of the environment (including autonomous development). A preferential order of the alternatives per environmental aspect must be compiled. The EIS must show to what extent each of the alternatives is expected to comply with the objective of the activity and with the current environmental policy (environmental standards etc). This comparison must be the basis for a final designation of the preferred alternative.
According to the Environmental Protection Act it is not obligatory to describe costs aspects in the EIS. However, a section with respect to the financial effectiveness of alternatives can play a useful role in the EIS.
A sensitivity analysis must be executed with respect to the assessment criteria used.

8. GAPS IN INFORMATION

Environmental Protection Act, section 7.10, subsection 1, sub g:
An EIS shall contain at least: *"a review of the omissions in the description referred to under d and e, due to lack of the necessary information".*

The EIS must state which of the required data cannot be delivered, which uncertainties remain and why. The significance of these gaps in information for the decision-making process must be indicated.

9. POST PROJECT ANALYSIS

Environmental Protection Act, section 7.39:
"The competent authority that has taken a decision, in the preparation of which an environmental impact statement was drawn up, shall investigate the effects of the activity concerned on the environment, either during or after its completion".

The competent authority should draw up an evaluation programme in order to compare the predicted impacts with the actually occurring impact. Firstly, the programme must identify whether the actual environmental impacts are more positive or more serious than predicted and whether supplemental measures must be taken. Secondly, it must be investigated whether the gaps in knowledge and information mentioned in the EIS can meanwhile be filled in.
A draft of a post project evaluation programme can be part of the EIS.

10. EIS STYLE AND PRESENTATION

The EIS must contain a summary that is separately readable. It must be comprehensible for the public at large. The summary must correctly reflect the main issues of the EIS. Special attention must be paid to the presentation (in a map) of the initiative and the most important alternatives, as well as to the overview of the comparison of the alternatives.

For the remaining presentation the following is recommended:

- to keep the EIS concise;
- to give the maps a well readable topographical basis and to provide it with clear legends and topographical names;
- to clearly account for the important choices in drafting the EIS;
- to account for possible deviations from the guidelines;
- to record background information (as baseline for conclusions, predictions and choices) not in the EIS itself, but to include it in appendices;
- to include in the EIS an explanatory list of terms, a list of abbreviations used and a literature list.

ANNEX

Outline of the EIA procedure on expansion of the Esso refinery with a hydrocracker

Outline of the EIA procedure on expansion of the Esso refinery with a hydrocracker

Introduction

The ESSO refinery intends to build a so called 'Hydrocracker' for the conversion of high-sulphureous gas oil fractions into lighter low-sulphureous products like diesel oil and kerosine. It concerned the expansion of the existing refinery near Rotterdam. The EIA started in 1991.

Advice on specific guidelines

The advice can be characterised by two major aspects.
Firstly the new installation had to be implemented in an existing refinery. The main question was how to match the new and the already existing installations regarding technology, capacity, and mitigating measures, in order to reach a minimum increase and if possible even a reduction of negative environmental impacts.
Secondly the activity had to be regarded as part of a product chain, existing of a *raw material stage* (amounts and qualities of crude oil to be processed), a *processing stage* (the hydrocracking process) and a *product stage* (quantities and qualities of products). Though the EIS should focus on quantifying environmental impacts in the processing stage, attention should also be payed to the raw material and product stages at least on a qualitative level. In this way the 'environmental benefits' in all stages of the activity could be elucidated, not only on the site of the refinery but also on a wider scale related to the use of the products. The province acting as competent authority for licensing accepted the advice of the Commission and established the guidelines in 1992.

Alternatives

In this situation only few alternatives were reasonable. Therefore, it was recommended to restrict the EIS to the description of environmental impacts of the proposed and the existing installations, where necessary with supplemental mitigating measures. Not the comparison of alternatives for the proposed installation but the investigation of environmental advantages and disadvantages of the refinery with and without the new installation should be the main purpose of the EIA.

The alternatives to be elaborated were:

- configuration of the present refinery;
- configuration of the refinery including the new installation;
- configuration of the refinery including the new installation and supplemental mitigating measures (if possible).

EIS

All relevant guidelines were covered in the EIS. The EIS showed the environmental impacts of the new installation to be negligible in comparison to the impacts of the total refinery. Moreover, due to the significant reduction of the sulphur content of products of the new installation, the diffuse sulphur pollution was expected to decrease with circa 40,000 tonnes yearly.

Review advice

The review by the EIA-Commission resulted in a positive review advice. There were hardly any critical remarks by the public. It was felt that the insight in the total product chain given in the EIS contributed to the support of the public for this new installation. The EIS showed reductions in diffuse acidifying emissions, an important topic for both the national environmental policy and for NGOs.

Decision

The licenses were granted in June 1993.