



Environmental Protection Authority

Guidance for the Assessment of Environmental Factors

(in accordance with the
Environmental Protection
Act 1986)

Assessment of Odour Impacts from New Proposals

No. 47

March 2002

Western Australia



FOREWORD

The Environmental Protection Authority (EPA) is an independent statutory authority and is the key provider of independent environmental advice to Government.

The EPA's objectives are to protect the environment and to prevent, control and abate pollution. The EPA aims to achieve some of this through the development of environmental protection Guidance Statements for the environmental impact assessment (EIA) of proposals.

This document is one in a series being issued by the EPA to assist proponents, consultants and the public generally to gain additional information about the EPA's thinking in relation to aspects of the EIA process. The series provides the basis for EPA's evaluation of, and advice on, development proposals subject to EIA. The Guidance Statements are one part of assisting proponents in achieving an environmentally acceptable proposal. Consistent with the notion of continuous environmental improvement and adaptive environmental management, the EPA expects proponents to take all reasonable and practicable measures to protect the environment and to view the requirements of this Guidance as representing the minimum necessary process required to achieve an appropriate level of environmental protection.

This Guidance will be used by the EPA during the assessment of new proposals which have the potential for odour impacts which are incompatible with surrounding land uses. It also applies to the expansion of existing facilities and proposals for land developments and schemes which may result in odour sensitive land use occurring close to existing odour sources.

This Guidance Statement has the status of "**Final**" which means that it has been reviewed by stakeholders and the public. The EPA has signed off on the Guidance Statement and published it, although it will be reviewed in two years.

I am pleased to release this document which now supersedes the draft version.



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ENVIRONMENTAL PROTECTION AUTHORITY

March 2002

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Guidance Statement No. 47

Guidance Statement for Assessment of Odour Impacts from new proposals

Key Words: odour, odour measurement, odour assessment, dynamic olfactometry, separation distances, odour criteria

1 PURPOSE

- 1.1** Guidance Statements generally are developed by the EPA to provide advice to proponents, and the public generally, about the minimum requirements for environmental management which the EPA would expect to be met when the Authority considers a proposal during the assessment process. The generic process is set out in Appendix 1.

This Guidance Statement is termed “Final”, and thus the EPA expects that proponents will give full attention to the information provided when they submit proposals for assessment.

- 1.2** This Guidance Statement specifically addresses the assessment of odour impacts due to proposed new potentially odorous facilities and expansion of existing odorous facilities, and the determination of appropriate separation distances for proposed new developments near existing odour sources. The Guidance provides information which the EPA will consider when assessing proposals where odour impact is a relevant environmental factor in an assessment. It takes into account:

- (a) protection of the environment as defined by the *Environmental Protection Act 1986 (WA)* with a focus on public amenity; and
- (b) the factor of odour measurement and industry assessment (in the widest possible sense) where odour sensitive land uses are involved or proposed for development.

- 1.3** This is a Guidance Statement and proponents are encouraged to consider their proposals in light of the guidance given. A proponent wishing to deviate from the minimum level of performance set out in this Guidance Statement would be expected to put a well-researched and clear justification to the EPA arguing the need for that deviation.

NOTE: This Guidance Statement is intended to guide proponents in providing information to the EPA for environmental impact assessment (both formal or informal) for new proposals or expansions of existing odorous facilities. It is not designed to apply to currently operating facilities. The criteria in this Guidance Statement are intended to indicate whether odour impacts from a new proposal are likely to be acceptable in terms of their impact on amenity. **The criteria are NOT to be used as automatic rejection criteria by decision making authorities but are used to identify whether sufficient information has been provided.**

2 THE ISSUE

The Department of Environmental Protection (DEP) has consistently recorded odour as the cause of about one-third¹ of all public complaints received. Most odour complaints against industry have centred around animal products processing activities.

The objective of this Guidance Statement is to ensure that public amenity and welfare is protected by providing assessment guidance and criteria for new facilities with potentially odorous emissions, expansion of existing facilities and new odour sensitive proposals adjacent to existing odour sources.

The EPA expects that proponents of projects with odorous emissions will incorporate best practice odour management to minimise and manage the emissions of odour and their potential impacts. Similarly, the EPA expects the proponents of odour sensitive projects (such as housing developments) to fully consider the impacts of existing odour sources when designing their proposals.

In 1994 the EPA endorsed the development of an odour guideline based on quantitative odour assessment. Proponents have been advised that odour assessment should be performed using dynamic olfactometry as of that time.

In 1994, the DEP adopted an interim position with respect to odours from new developments based on the then Queensland Department of Environment and Heritage (draft) "Policy for Odours from New Developments" until such time as an odour policy was developed for Western Australia.

The EPA recognised the importance of maintaining appropriate separation distances between odour sources and odour sensitive land uses within Draft Guidance Statement No. 3 on Industrial - Residential Buffer Areas (EPA 1997). Draft Guidance Statement No. 3 recommends generic separation distances, which should be adopted unless more scientific studies are undertaken by a proponent (if justified).

This Guidance Statement provides criteria which will assist the EPA to determine whether odour impacts from, or on, a new proposal are likely to be acceptable in terms of their impact on amenity for sensitive land uses.

¹ Data for 1/7/94 to 30/6/97, primary complaint, head office database.

A number of other states, including New South Wales, Victoria and Queensland are developing guidelines to assist them in assessing new proposals. Proposed criteria vary significantly in form and stringency, indicating that odour management is very much in the developmental stage throughout Australia. Comparison with other states is not straight-forward, however it may be noted by way of example that the criteria which have been used in Victoria for some time are at least 4 times more stringent than those in this Guidance Statement. The EPA believes the proposed criteria offer a balance between the needs of industry and land development and the protection of amenity.

As is the case for other air pollutants, odour impacts can be estimated by source sampling, modelling and comparison with appropriate criteria. Guidelines for sampling and modelling methodology, entitled *Odour Methodology Guideline* (DEP, 2002), have been developed by the DEP and should be read in conjunction with this Guidance Statement.

The criteria set in this Guidance Statement are applicable to new proposals and expansions of existing facilities only. The criteria are not intended to be applied to the following situations:

- investigation of complaints of odour from existing facilities;
- setting of licence conditions;
- buffer definition studies where surrounding land is not yet zoned for urban use;
- assessing odour during contaminated site remediation;
- determination of odour emission rates before and after a plant upgrade in order to quantify emission reduction;
- odour emissions from tall stacks, surface-based point sources and line sources (please refer to DEP guideline for further information on these sources).

Odour intensity is expressed in terms of perceived strength of an odour, as outlined in Table 1. Like odour threshold determination, assessment of odour intensity is undertaken in the laboratory by odour panels and dynamic olfactometry equipment.

Table 1: Odour Intensity Categories.

Odour Strength	Intensity Level
Extremely strong	6
Very strong	5
Strong	4
Distinct	3
Weak	2
Very weak	1
Not perceptible	0

The methodology used to determine odour intensity and concentration must follow the procedures and standards set out in the DEP's guidelines (DEP, 2002) in order to be meaningfully compared with the EPA's odour criteria.

3 THE GUIDANCE

3.1 Guidance on odour as a relevant environmental factor

This Guidance Statement (No. 47) recommends criteria which will assist the EPA in determining whether odour impacts from a new proposal or expansion are likely to be acceptable in terms of their impact on amenity. The DEP has prepared guidelines for the methodology for determining reasonable worst case odour impact predictions which should be used to assess odour (DEP, 2002).

It should be noted that where odour is not the only environmental factor for which a separation distance is required, then appropriate assessment must be undertaken for each factor.

It is also important to recognise that the emission of an odour does not readily indicate whether or not the emission will have significant impacts on human health. However, an odour is an indication that an emission exists which may need investigation. This Guidance Statement concentrates on the impacts of odour on amenity, while determination of health and ecological impacts is a separate and very important part of the impact assessment process, which is beyond the scope of this document.

When assessing new proposals or expansions with the potential to cause odour impacts on existing sensitive land uses (see definition on page 18), or when assessing new developments near existing odour sources, the EPA will use the following process which is also summarised schematically in Figure 1. The numbers shown in brackets in Figure 1 are references to the numbered text below. Odour assessment and modelling must be in accordance with DEP Guidelines for methodology (DEP, 2002).

- i)** If generic buffer distances are met (as set out in EPA Guidance Statement No 3 or in appropriate Codes of Practice or Statements of Planning Policy developed by the WA Planning Commission) and the proposed facility is designed for “best practice” emission control (DEP, 1996 and DEP 1998), then no further assessment of odour is required. Proposals for sensitive land use developments near existing odour sources will also need to make some assessment of the level of management in place at the nearby source.
- ii)** If a generic separation distance is not met, the proponent needs to undertake an odour impact study in accordance with one or both of the procedures in ii(a) and ii(b) below. By way of explanation the procedure in ii(a) is a conservative but relatively simple screening procedure, providing the proponent with a “green light” without the necessity to undertake further studies. The more detailed odour assessment required in procedure ii(b) is less conservative and would be used by the EPA to decide if odour impacts are likely.

ii (a) Conduct computer modelling, using either a measurement or reliable estimate of odour emission rate (in odour units per second, OU/s) in order to demonstrate that the ambient odour concentration does not exceed the following two-part criterion at existing or proposed sensitive premises (this is a “green light” criterion which provides confidence that nuisance impacts are unlikely):

A) 2 OU/m³ 3 minute average, 99.5th percentile

AND

B) 4 OU/m³ 3 minute average, 99.9th percentile

Part B will generally be met if Part A is met, but is nevertheless required to accommodate sources which emit odour for only a fraction of the hours in a year.

If the above two part criterion is met, no further assessment of odour is needed.

ii(b) For proposals which do not meet the screening (“greenlight”) criterion in ii(a) above, proponents may undertake an odour intensity study to provide greater certainty about the odour impact of the proposal. This greater certainty allows a less conservative criterion to be used. The purpose of the odour intensity study is to determine the relationship between odour concentration and odour intensity, and specifically to determine the odour concentration equivalent to the intensity level of “distinct”. The calculations of intensity-concentration relationship must be reported as outlined in the DEP guideline (DEP, 2002). As with ii(a) above, the proponent should conduct computer modelling, using a measurement of odour emission rate (OU/s) and should compare the results to the following criterion at existing or proposed sensitive premises:

- odour concentration equivalent to an intensity level of “distinct”, averaged over 3 minutes, 99.5th percentile.

For sources that are intermittent in nature, and emit odour for only a fraction of the hours of the year, proponents should advise of these emissions to allow development of a criterion which is applicable for that source. By way of indication, the criterion would be likely to retain an intensity of “distinct” averaged over 3 minutes, but with a higher percentile to reflect the degree of intermittency. Such an approach would give a level of protection against the highest events in the year from intermittent sources similar to that given by the above criterion for continuous emissions.

If the above criterion is met, no further assessment of odour is needed.

NOTE:

- In the case of poultry farms the EPA will assume that the odour concentration of 7 OU corresponds to a “distinct” odour intensity rating.
- The above criterion for acceptability applies only to sources which may be classified as “volume sources” (eg poultry sheds), “large area sources” (eg effluent treatment ponds) or “strongly wake-affected plumes”. The DEP will advise the EPA in cases where it is not clear whether a particular source fits into one of these classes.

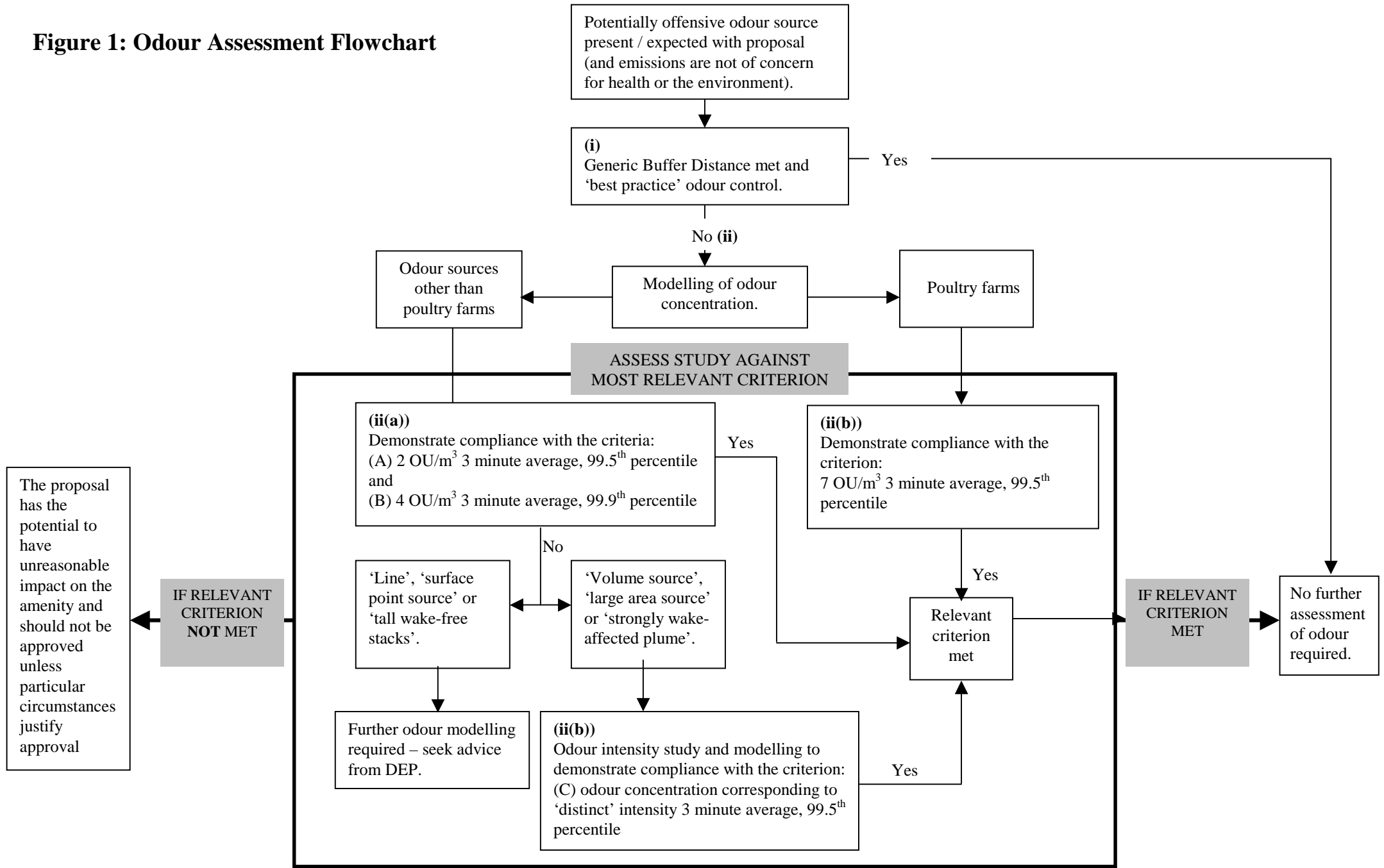
For other source types such as “line”, “surface point source”, “tall wake-free stack”, etc, a modelling study which adequately considers the ratios of peak to mean concentration fluctuations must be undertaken. Appropriate criteria for these sources are expected to be developed in the future. The DEP will be developing modelling methodology and criteria for peak to mean assessment as resources permit.

If the above criteria are met then the EPA considers that odour levels are unlikely to have an unreasonable effect on amenity. However if criterion ii(b) is not met, the proposal has potential to have an unreasonable impact on the amenity and should not be approved unless particular circumstances justify approval, such as:

- Surrounding landuses are relatively insensitive to odour impacts (eg other rural activities with their own rural odours); or
- Management measures are being taken to control odours to a greater extent than standard practice.

The criteria are not intended to be used as ‘limits’ which define a level of unreasonable odour. As such their direct use for odour management may be inappropriate. The EPA intends these criteria to apply only to new proposals (for facilities, expansions and odour sensitive developments) and not to assessment and management of odour from existing premises or contaminated sites. DEP guidelines on odour methodology and management should be followed, and advice should be sought for individual cases.

Figure 1: Odour Assessment Flowchart



Odour Assessment of New Industry and Facilities

Where the EPA is of the opinion that a project involves a significant probability of odour impacts or if an assessment of environmental management practices and appropriate generic separation distances indicates that further assessment is required, a quantitative odour assessment will need to be undertaken at an early stage of the EIA process. The odour assessment should be undertaken to the EPA's satisfaction by a competent and reputable analyst accepted by the EPA, in accordance with guidelines developed by the DEP, at the proponent's expense. This process requires the analyst to satisfy the EPA that the assessment was done objectively and independently.

Under some circumstances considered justified by the EPA, the EPA could request separate verification of the odour impact assessment, at the proponent's expense. This is especially so if there is an affiliation between the odour assessor and the proponent.

In conjunction with the quantitative odour assessment, the EPA expects the proponent to recognise and address the public's perceptions and concerns associated with the emitted odours as part of the proponent's environmental management plan. Community consultation in the decision making process is important in the management of odour.

Developments Near Existing Odour Sources

The EPA acknowledges that if the generic distances in draft EPA Guidance No 3 (EPA 1997) (to which the Statement of Planning Policy No 4 (WAPC, 1997) refers) are applied, significant amounts of land are potentially unable to be developed for odour sensitive land-uses (although development of non-sensitive land uses may be permissible) potentially resulting in concerns by the land owners. The EPA also recognises that if odour sensitive land-uses are permitted in the vicinity of established odour sources, conflicts may occur.

It is the EPA's opinion that proponents of sensitive land-use developments near existing odour sources should demonstrate that there will not be unacceptable odour impacts on the proposed development. This may require greater separation distances around older existing facilities than are required for new facilities, such that the same odour impact is achieved at the development (as measured by odour concentration). This will provide consistent protection of public amenity from odours over the long-term, and meet public expectations when purchasing or using land or facilities within the new development. This position maintains the current treatment of proposed developments by the EPA.

Scheme amendments presented to the EPA for assessment will require some consideration of likely odour issues where rezoning results in sensitive land use zones close to (or including) existing odorous premises. Full odour assessment as outlined in this Guidance would not be required to be undertaken for existing odour sources at the time of scheme assessment but existing odour sources should be identified at this time. The EPA would expect the scheme to include provision for how odour issues will be dealt with as proposals for sensitive land uses near existing odour sources are received and would expect a level of conservatism to be incorporated into the scheme.

If scheme amendments allocate areas for industrial development, it is unlikely that sufficient detail will be known on industry types to undertake meaningful odour assessment. As such, the EPA would expect that the planning of such areas recognised the potential for some industry types to have odour impacts, and incorporated this into the design of the area.

It is desirable that the development proponent and the odour source owner reach an appropriate arrangement to conduct the required odour study.

Expansion of Existing Odour Sources

If an existing facility wishes to expand but does not itself comply with the odour criteria for new sources then the EPA would expect, as a minimum requirement, that predicted odour concentrations at sensitive land uses would not increase (ie there would be no deterioration of current amenity values).

Alternatively if the odour emissions from the existing facility do comply with the odour criteria for new sources, the expansion should be carried out such that compliance with the criteria is maintained.

As with new facilities, best practice emission control would be expected for the expansion program.

Cumulative Impacts

Where cumulative impacts may lead to unacceptable odour impacts on existing odour sensitive land-uses the EPA may recommend against the development proposal. Alternatively higher levels of odour control may be required.

Proponents should consider the likelihood of cumulative or interactive impacts with other odour sources when selecting a plant site and also for determining the acceptability of their proposal. Where cumulative impacts are likely, the proponent should demonstrate an added degree of conservatism in their approach, to minimise the likelihood of restrictive conditions being set on the project based on poor estimates of odour impacts. For example, in an area with other existing significant

odour sources, a proponent should strive for best practice odour management and to do better than the “distinct” odour intensity criterion, or where practical, consider other sites for location of the new facility.

3.2 Guidance for Achieving Desired Outcomes

i) Measures

In order for the EPA to apply the above criteria, sampling, analysis and modelling must be in accordance with DEP guidelines (DEP, 2002). The guidelines recommend sampling and analysis of odour using dynamic olfactometry consistent with the Dutch Standard NVN 2820 (NVN, 1995), the draft CEN standard (CEN, 1996) or Australian Standard 4323.3 (AS/NZS, 2001).

ii) Best Practice

The EPA’s position on odour management is that where odour impacts associated with the development of new industrial facilities (taken in the widest possible sense) are likely, the new facility should be designed using best practicable engineering design and operated using best environmental practice management systems.

Further guidance on best practice environmental management is available from the DEP (DEP, 1996 and DEP, 1998).

iii) Odour Minimisation

In addition to industry best practice, there is a corporate responsibility that wherever possible, odour impacts should be reduced to as low as reasonably practicable. This means that as an input in their decision making for proposals, proponents should consider alternative sites, technologies or management systems which may reduce or eliminate odour impacts on sensitive land uses.

iv) Public Expectation

The community expects that industry will ensure that odours will not impact unreasonably on their amenity. In documenting and designing a facility or land development the proponent should inform the community as to why the proposed site was chosen in favour of some alternative site, why certain technologies were chosen, what checks and procedures (including emergency procedures) are in place to minimise odour impacts and what potential health impacts may be associated with the project (especially with odour emissions).

v) Management Objectives

The overall objectives in the management of odorous industries/facilities are to:

- minimise odour emissions and their impacts;
- ensure that the odorous industries/facilities meet acceptable criteria for individual exposures and that land use compatibility in relation to separation distances is established in the planning process;
- ensure the industry continues to operate in such a manner that the odour emissions are managed within acceptable levels; and
- apply principles of risk management, given the current poor understanding of odours and potential health effects.

The objectives for development of sensitive land uses near existing odour sources are to:

- minimise likely frequency and duration of odour impacts on residents through appropriate subdivision setbacks and design;
- consider staged development of areas where odour impacts are uncertain or temporary, with future stages not implemented until anticipated odour reductions are achieved; and
- consider working with the operators of odorous facilities to assist them to reduce existing odours.

vi) Complaints Verification/Ground Truthing

Where a proposal relates to odour from an existing facility, the EPA expects submissions to include information on complaint verification and/or ground truthing of existing odour impacts. This should be undertaken to confirm whether modelling of the existing odour sources is in the right “ball park” prior to extrapolating the modelling to new odour sources.

Guidelines for ground truthing are included in the DEP guideline for methodology and management.

Complaint verification and management response to odours should be built into ongoing odour management plans for odorous facilities.

4 APPLICATION

4.1 Area

This Guidance Statement applies to all applications for new, or expansions of existing, odorous or potentially odorous facilities (taken in the widest sense) and the development of odour sensitive land-uses near existing odorous or potentially odorous facilities (taken in the widest sense) throughout the State of Western Australia.

4.2 Duration and Review

The duration of this Guidance Statement is initially for two years to allow for review of developments in the field of odour science, assessment and management and of whether the criteria can be easily applied to most situations.

5 RESPONSIBILITIES

5.1 Environmental Protection Authority Responsibilities

The EPA will apply this Guidance Statement during the assessment of proposals under Part IV of the *Environmental Protection Act 1986* where odour may lead to incompatible land uses.

5.2 Proponent Responsibilities

Where proponents demonstrate to the EPA that the requirements of this Guidance Statement are incorporated into proposals, in a manner which ensures that they are enforced and audited, the assessment of such proposals is likely to be assisted.

6 DEFINITIONS AND ABBREVIATIONS

CEN	Comité Européen de Normalisation.
DEP	Department of Environmental Protection.
Dynamic Olfactometer	A dynamic olfactometer delivers a flow of mixtures of odorous and neutral gas with known dilution factors in a common outlet. (CEN 1995)

Dynamic Olfactometry	Olfactometry using a dynamic olfactometer. (CEN 1995)
EIA	Environmental impact assessment.
EPA	Environmental Protection Authority.
Industry	Industry is used in the widest possible sense to include industry and infrastructure. As a guide, industry should be taken to include (but not limited to) the following categories from the State Industrial Buffer Policy (WAPC 1997): <ul style="list-style-type: none">• Extractive industry;• General industry;• Hazardous industry;• Light industry;• Noxious industry;• Resource processing industry;• Infrastructure.
Odorant	A substance which stimulates a human olfactory system so that an odour is perceived. (CEN 1995)
Odour Intensity	The relative perceived psychological strength of an odour above its threshold. (EPA 1999)
Odour Threshold	The concentration of odour necessary for detection by a certain percentage of the population, normally 50%. This concentration is defined as 1 odour unit. (Ministry for the Environment (New Zealand) 1995)
Odour Unit	The amount of odorant(s) that, when evaporated into 1 cubic metre of neutral gas at standard conditions, elicits a physiological response from a panel (detection threshold) equivalent to that elicited by one Reference Odour Mass (ROM), evaporated in one cubic metre of neutral gas at standard conditions.
Olfactometry	The measurement of the response of human assessors to olfactory stimuli. (CEN 1995)
OU	Odour unit.
Reference Odour Mass (ROM)	The accepted reference value for the odour unit, equal to a defined mass of a certified reference material. One ROM is equivalent to 132 µg n-butanol (CAS 71-36-3) which evaporated in 1 cubic metre of neutral gas at standard conditions produces a concentration of 40 ppb (µmol/mol).
Sensitive Land Uses	Land uses considered “sensitive” include residences, hospitals, hotels, caravan parks, schools, aged care facilities, child care facilities, shopping centres, play grounds, recreational centres etc. (EPA 1997)
WAPC	Western Australian Planning Commission.

7 LIMITATIONS

This Guidance Statement has been prepared by the Environmental Protection Authority to assist proponents and the public. While it represents the contemporary views of the Environmental Protection Authority, each proposal which comes before the Environmental Protection Authority for environmental impact assessment will be judged on its merits. Proponents wishing to deviate from the Guidance provided in this document should provide robust justification for the proposed departure.

8 REFERENCES

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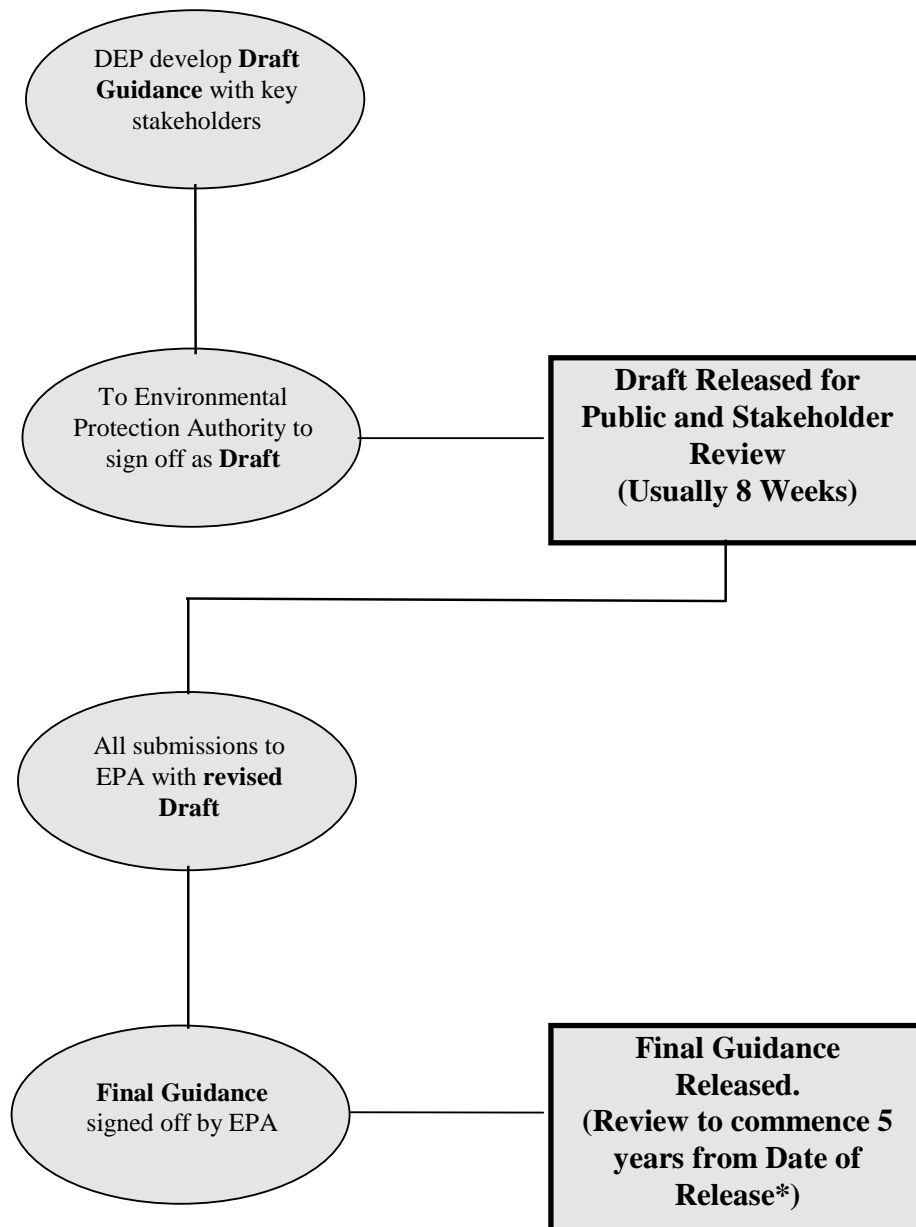
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Index	Final Guidance	March 2002
Status	Signed-off by the EPA.	
Citation	This document can be cited as the Guidance Statement for Assessment of Odour Impacts for New Proposals.	
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Appendix 1

Generic Flow Diagram for the Guidance Statement Process



* Guidance may be reviewed earlier if circumstances require it.