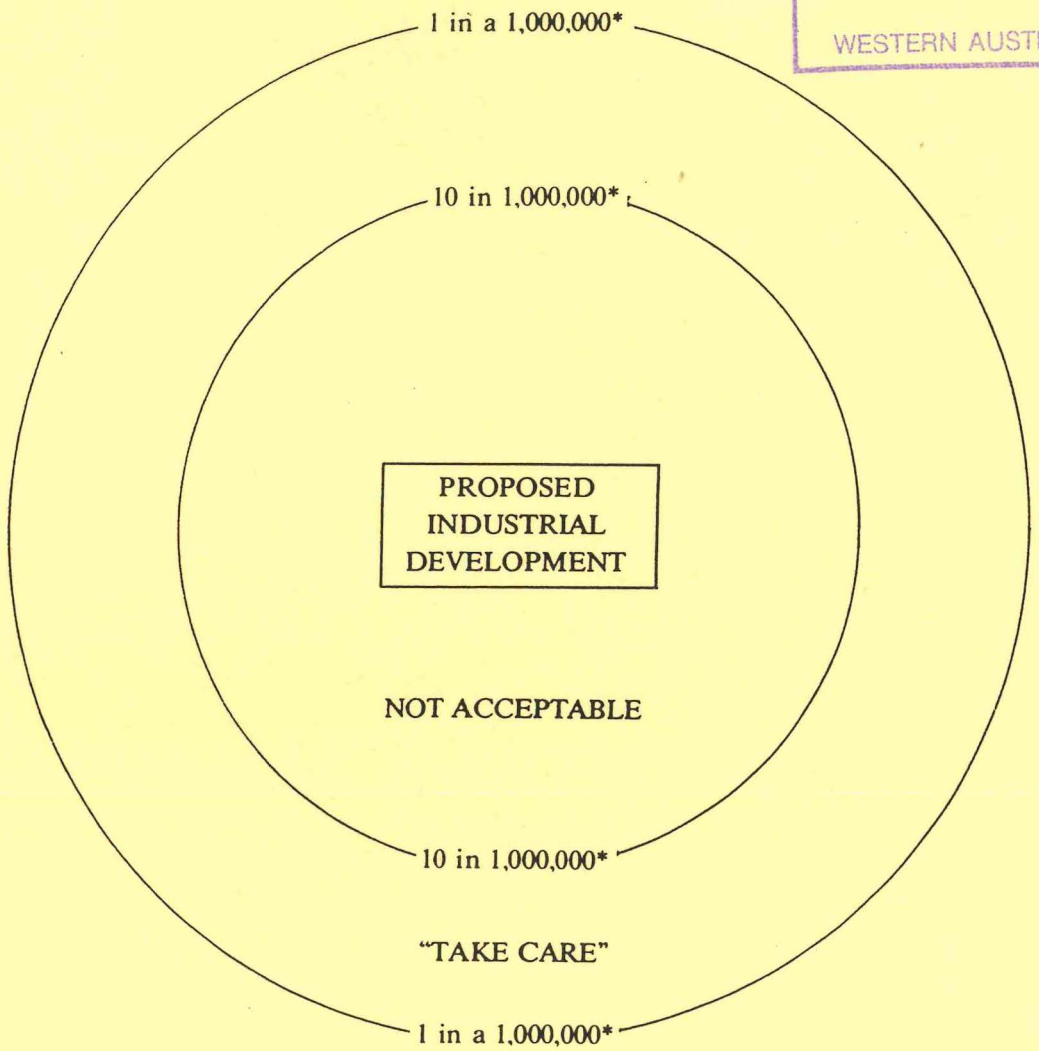
ENVIRONMENTAL PROTECTION AUTHORITY GUIDELINES

RISKS AND HAZARDS OF INDUSTRIAL DEVELOPMENTS ON RESIDENTIAL AREAS IN WESTERN AUSTRALIA



* LEVEL OF RISK FROM PROPOSED INDUSTRIAL DEVELOPMENT TO RESIDENTIAL AREAS, IN UNITS OF FATALITIES PER YEAR.

EPA BULLETIN 278.

Environmental Protection Authority
Western Planner
Bulletin 278 May 1987

ENVIRONMENTAL PROTECTION AUTHORITY GUIDELINES

RISKS AND HAZARDS OF INDUSTRIAL DEVELOPMENTS ON RESIDENTIAL AREAS IN WESTERN AUSTRALIA

* LEVEL OF RISK FROM PROPOSED INDUSTRIAL DEVELOPMENT TO RESIDENTIAL AREAS, IN UNITS OF FATALITIES PER YEAR.

EPA BULLETIN 278.

Environmental Protection Authority
Western Planner
Bulletin 278 May 1987

ENVIRONMENTAL PROTECTION AUTHORITY STATEMENT ON THE EVALUATION OF THE RISKS AND HAZARDS OF INDUSTRIAL DEVELOPMENTS ON RESIDENTIAL AREAS IN WESTERN AUSTRALIA

INTRODUCTION

The Environmental Protection Authority has required environmental impact assessment for a number of new industrial projects recently, and more may be submitted in the near future. In addition to conventional environmental issues, many of these industries have risk and hazard factors associated with them. The Authority believes that the quantitative assessment of risk to the community is an important part of the evaluation of such proposals. Historical records show that industrial accidents occur, and that technical safeguards have their limitations. However, with proper planning, review and control during the plant design, commissioning and operational stages these risks and hazards can, in most cases, be minimised, managed and made acceptable in the sense that they can be reduced to a level that the community is prepared to tolerate.

In this statement, the term 'hazard' is used to describe a set of conditions that could lead to a harmful accident. 'Risk' is defined in terms of both the likelihood of a hazard, and the consequences of that hazard.

In November 1986 the Environmental Protection Authority prepared for public comment a draft statement on the evaluation of risks and hazards of industrial developments on residential areas in Western Australia.

A total of 39 submissions were received from individuals and various organisations including interstate and overseas groups. An analysis of these submissions is given at the Appendix. In revising this Statement the Authority has taken into account the comments received.

REQUIREMENTS AND APPROACH TO BE ADOPTED FOR EVALUATION OF RISKS AND HAZARDS

The Authority will adopt the following approach to the evaluation of risks and hazards for new industrial developments of a potentially hazardous nature:

1. Where the Authority is of the opinion that a project involves a significant element of risk it will require a quantitative risk assessment at an early stage of the environmental impact assessment process.The need for such an assessment will be determined on a case by case basis.

2. The quantitative risk assessment should be undertaken and certified to the Authority's satisfaction by a competent, reputable and objective analyst, approved by the Authority, and at the proponent's expense. This process requires the risk analyst to certify to the Authority that the assessment was done independently.

   In most circumstances the Authority would not seek or undertake a separate verification of the independent risk assessment but could do so if it considered exceptional circumstances so justified.

3. The scope and extent of the assessment will vary from project to project, and the Authority will provide specific advice to each proponent. However, in general, assessment will include an identification of all relevant hazards, a quantification of their consequences and the likelihood of their occurrence, and estimations of outdoor risk levels. The assessment is to address specifically proposed safeguards and their effectiveness in reducing and managing risk.

4. The Authority may require the proponent to make public all or part of the assessment, as part of the environmental impact assessment documentation. Key findings of the risk assessment will be required to be published in the document describing the proposal submitted to EPA.

5. NEW INDUSTRIAL INSTALLATIONS

The following are proposed by the Authority, as a guide for the assessment of the fatality risk acceptability of new industrial installations:

5.1 The Authority has taken note of how decisions on risks are taken in other parts of the world. In the light of that knowledge the Authority will classify decisions into three categories. These are as follows:

- A small level of risk which is acceptable to the Environmental Protection Authority;

- A high level of risk which is unacceptable to the Authority and which warrants rejection; and

- A middle level of risk, which subject to further evaluation and appropriate actions may be considered to be acceptable to the Authority.

5.2 An individual risk level in residential zones of less than 1 in a million a year is so small as to be acceptable to the Environmental Protection Authority.

5.3 An individual risk level in residential zones exceeding 10 in a million a year is so high as to be unacceptable to the Environmental Protection Authority.

5.4 Where the preliminary risk level in residential zones has been calculated to be in the range 1 in a million to 10 in a million a year, the Authority will call for further evaluation of the risks associated with the project. The Authority may then be prepared to recommend that the project be acceptable subject to certain planning and technical requirements.

A major technical requirement will be the commissioning of a Hazard and Operability Study at an appropriate stage or stages of the project. Such a study is an effective technique for discovering potential hazards and operating difficulties at the design stage. Significant reductions of hazards, and in the number of problems encountered in operation, as a result of such studies are possible. The Hazard and Operability Study should be undertaken by the proponent with a qualified person, approved by the Authority, who will be required to certify to the Authority that the study was

carried out in a proper manner. This study should explore all feasible ways of reducing hazards. The proponent may be required to update the risk analysis, and make the results public.

6. CUMULATIVE RISK IMPACTS

Where a number of hazardous industries or activities exist in a region, it is appropriate for a cumulative risk and hazard analysis for existing and proposed developments in the region to be undertaken before assessing new developments in the region. No extra risk would be acceptable where the cumulative risk of existing industry, combined with the assessed risk of the proposed new industry, exceeds the risk levels proposed for new industry (item 5).

7. EXISTING INDUSTRY

The Authority is aware that some existing industry and industrial areas may give rise to risk levels to residential zones which exceed the guidelines in this statement. In such cases, a programme shall be agreed between the relevant agencies and the industry in order to reduce the impact of major risk generators. This may entail recommendations for action by either the industry or government, or both. The Authority believes that the long-term targets for individual risk level in residential zones for existing industry should be the same as those proposed for new industry (item 5).

APPENDIX

The Environmental Protection Authority statement on the evaluation of risks and hazards of industrial developments on residential areas was released to the public on 14 November 1986 for a nine week review period which ended on 16 January 1987.

A total of 39 submissions were received from individuals and various organisations from WA, interstate and overseas.

This appendix contains a summary of the issues and concerns raised in the submissions and the responses by the EPA to those issues and concerns.

The numbering of points in this Appendix corresponds with that in the Statement.

INTRODUCTION

A number of comments were made on the meteorite illustration of hazards and risks.

One submission said that a more realistic illustration is a low risk potentially harmful lightning strike on a person or industrial installation. It was suggested that this could be used in addition to or in place of the meteorite example.

One submission said that the meteorite example was not relevant as the random nature of a meteorite hitting a populated area has no relevance to the deliberate siting of an industry in a specific area.

One submission pointed out that the meteorite example corresponds to external causes and said that another example could have been included to show risk generated by industrial processes.

Another submission said that the meteorite example was not appropriate as the risk level of this incident is very low. The submission indicated that a better example would be a flood or a bushfire.

EPA RESPONSE

The example of the meteorite was meant to illustrate the difference between hazards and risks. Remarks in the submissions indicate that the example used was not clear. Consequently examples have been omitted from the revised version of the Statement.

POINT 1

A number of submissions expressed the view that the case by case approach to determining whether a project will require a quantitative risk assessment is too arbitrary. Some submissions suggested the development of guidelines as to what constitutes a hazardous process. A few referred to approaches overseas mentioning for example that UK and Europe legislation specifically defines what constitutes a hazardous process or storage. It was recommended that there should be guidelines obliging notification of hazardous processes. One submission raised the question of how a significant element of risk would be defined at an early stage. A submission suggested that the UK Notifiable Installations Handling Hazardous Substances Regulations (NIHHS, 1982) and the "Control of Industrial Major Accident Hazards" (CIMAH, 1985) could help in determining which industrial installations should require full or partial risk assessment.

EPA RESPONSE

The EPA has decided to utilise a case-by-case approach in determining whether a project requires a quantitative risk assessment. The EPA wishes to maintain a maximum of flexibility (with regard to projects assessed) in the early stages of its experience in the risk assessment area. As the EPA gains experience, it may decide to issue guidelines on which types of projects will require assessment.

POINT 2

One submission referred to the word 'certified' and said that if this has a legal connotation, it should be defined. The submission saw it desirable that every consultant should be prepared to write a statement verifying his independence in carrying out a quantitative risk assessment study.

Submissions questioned use of the word 'qualified' as they pointed out that there are no recognized or specialist qualifications in the field of risk analysis.

Use of the term 'independent' was also of concern. It was seen as questionable that an outside consultant funded by and relying on information from the proponent would necessarily be any more independent than an in-house centre of expertise.

Submissions mentioned that there were few consultants involved in risk analysis and indicated that most large chemical companies have the expertise to provide objective risk assessment. It was recommended that the statement should be amended to promote the development and use of in-house expertise.

Suggested descriptions for the risk analyst were the words 'competent, reputable and objective', and 'competent' rather than 'qualified and reputable'.

It was recommended that there should be scope for a second opinion to be available to the EPA and local authority in determining the level of risk of a proposal.

A submission questioned whether the EPA would appoint staff who could assess risk analyst reports and advise the EPA on whether and how to design further investigation. One submission said that the EPA should have some capability to undertake separate verification.

One submission said that all estimates of risk should be independently assessed.

EPA RESPONSE

'Certified' means that the consultant undertaking the quantitative risk assessment shall provide a certificate to the Authority attesting to the independence of the analysis. 'Independence' is taken to mean that the analyst is able to stake his integrity and reputation on the independence of his analysis. (It is also in the consultant's interest to maintain this independence.) The Authority is aware that there are relatively few specialists in the risk assessment field. and believes that the provision of a 'certificate' for each risk assessment will allow the analyst to declare his independence.

The Statement will be modified to read 'competent. reputable and objective.'

The EPA recognises the need at times. in exceptional circumstances. for a second opinion. This second opinion may be made available to third parties if the EPA so decides.

The EPA believes that its proposed procedures preclude the need for second assessments of risks for all proposals.

The EPA is in the process of having some staff trained in various aspects of risk assessment.

POINT 3

One submission commented that if the Authority is to provide specific advice to each proponent on scope and extent of the assessment, there is no need for an independent analyst approved by the Authority to carry out the assessment.

Submissions questioned whether the risk estimates should be limited to outdoor levels only. It was indicated that this would exclude an allowance for lessening of consequences arising from being indoors. It was recommended hat the term 'outdoor' be deleted.

Clarification of the last sentence was requested in relation to who would propose safeguards to be evaluated and of what type.

EPA RESPONSE

For EPA to provide advice to proponents on the scope and extent of assessment cannot be equated to an analyst carrying out a full assessment. Moreover, the Authority will not duplicate work that is properly in the province of the risk analyst.

The Authority believes that it should be conservative in assessing risks, and for this reason, it will use 'outdoor' risks in its assessments. The use of 'indoor' risk levels involves yet another set of assumptions, which, moreover, are likely to differ markedly from assumptions used in overseas countries, where most risk assessment models have been developed.

The safeguards which are to be assessed are those proposed by the project proponent.

POINT 4

A range of views were expressed in relation to publication of the quantitative risk assessment.

A number of submissions expressed reservations about the proposed approach to make full assessment results public. The main concern was that commercial and technical information which is confidential to the proponent could be released. It was mentioned that making all documentation public could be breaching patent or trade secrecy arrangements.

Some submissions supported the approach to make all or part of the quantitative risk assessment public. A submission said that the local authority should be provided with the whole of the assessment documentation.

Submissions favoured that key findings of the risk assessment should be published by way of a summary in the Environmental Impact Statement.

One submission mentioned that disclosure of risk analysis to the public is no longer used by some authorities. It indicated that the quality of the assessment has improved as a result of this approach.

EPA RESPONSE

The Authority has a policy of making its reports publicly available insofar as it is reasonable to do so.

To this end, EPA believes that risk assessment reports should be made public, but confidential data and information required for the development of the assessment should not. This is normal EPA practice.

Key findings of the risk assessment will be required by EPA to be published in the document describing the proposal.

POINT 5

It was mentioned that the standard risk acceptability in residential zones for new plants set at 1 in a million per year (10^{-6}) with an upper limit of 10 in a million per year (10^{-5}) is a very high standard which exceeds the accepted overseas standards with the exception of the Netherlands.

One submission saw the one in a million per year limit of negligible risk as a reasonable value if applied to the final design stage. Some submissions commented that the acceptable level of one in a million per year for residential zones is extremely low. One submission said that a level of five in a million for new plants is more appropriate. Another submission said that a level of one in ten thousand (10^{-4}) is a more realistic value in the light of fatalities due to road accidents, ill health and due to nature such as being struck by lightning.

Some submissions expressed that the difference of one order of magnitude between acceptable and unacceptable risk levels was too narrow. It was mentioned that the band of uncertainty within any assessment would probably exceed this range and it would be theoretically possible for a project to appear both acceptable and unaccepable simultaneously.

A few submissions said that the statement should be worded more flexibly with regard to risk levels so that the EPA is not bound by these limits. It was recommended that they should be used as a guide rather than as a standard since input data can at times be questionable.

Some submissions said that any standard set should be judged against the accuracy available from the data/methodology used.

Some submissions said that the Authority should justify its selection of the level of risk figures.

It was mentioned that where there is a middle level of risk and further action is required, the action should require the endorsement of the local authority and should also apply in an updating of the risk analysis.

One submission was opposed to the proposed unacceptable risk level of 10^{-5} per year. The figure was seen as unnecessarily severe. The submission mentioned that it infers a precision in the technique which is not justifiable. A submission recommended the adoption of an individual risk level of 10^{-3} as unacceptable, and that an individual risk level between

10^{-6} and 10^{-3} per annum should be assessed with consideration of the benefits of the industrial development, costs of reducing the potential hazard and the likelihood and consequence of any catastrophic event.

EPA RESPONSE

The upper limit of potential acceptability of risk (10 in a million per year) does not conflict with other standards. For example, Victoria has a lower upper limit. The United Kingdom has issued guidelines, rather than standards. The Authority believes that the level set is appropriate given overseas experience and the concerns about risks in the Western Australian community.

Direct comparison of this upper limit for potential acceptability with risks due to other sources should be addressed in a public education programme (see below).

The Authority has been cognisant of experience elsewhere in setting 1 in a million per year as the level for acceptability.

Where a middle level of risk occurs, and further evaluation and appropriate actions are required, the re-evaluation is to be included in any required up-date of the risk assessment. The re-evaluation will address both 'hardware' (cf HAZOP, below) and 'software' (management of operations and emergency response plans). Endorsements by other agencies will be at the discretion of EPA, as usually a number of bodies need to be involved.

Risk assessment techniques have been refined sufficiently in recent years to such an extent that risk analysts are now able to obtain results which have uncertainties much less than an order of magnitude.

The Authority believes that the best possible approach to risk assessment is one with set values, rather than guiding values. It is incumbent on proponents to ensure that the input information is as accurate as possible.

HAZARD AND OPERABILITY (HAZOP) STUDY

Inaccuracy was noted in this section.

It was mentioned that HAZOPs may be carried out at various stages of a design and not just at the detailed design stage as implied by the Statement.

Submissions indicated that the HAZOP study identified potential hazards and/ or operating problems and that the statement 'This study should explore all feasible ways of reducing risks', is incorrect as it is not within the definition of a HAZOP.

One submission commented in relation to the certification mechanism. It suggested that the section should indicate that the EPA wishes to ensure that the HAZOP findings are of a high quality and useful in reducing/ eliminating hazard rather than the certification of the study being carried out in a proper manner.

One submission said that it was not understood why the HAZOP may be carried out by the proponent, but the risk assessment may not.

It was recommended that the HAZOP should be carried out for all chemical projects, not just those exceeding 10^{-6} per year.

EPA RESPONSE

The Authority recognises that Hazard and Operability (HAZOP) studies may be carried out at various stages of the project, and that it is a study designed to reduce hazards rather than risks. It should be recognised that in reducing hazards, the overall level of risk is thereby reduced.

The HAZOP should be carried out by the proponent, who has the detailed knowledge of plant design, and of the particular components to be used in the construction of the facility.

Whilst some large companies have 'in-house' expertise in risk assessment, the EPA believes that the risk assessment phase should be undertaken by an outside consultant, who must certify his independence (see point 2). The risk assessment process should take into account the recommendations of any (in-house) HAZOP study.

The Authority believes that ideally all chemical projects should have a HAZOP study carried out on them. If, however, a proposal meets the 1 in a million per year criterion for acceptability, then any such study should be at the proponent's own volition.

POINT 6

Submissions raised the question of who would conduct the cumulative risk and hazard analysis. If carried out by a proponent of new industry, there was the problem of obtaining information from existing industry especially if it were a competitor.

Some suggested that the EPA should be responsible for the analysis.

One submission saw problems with the situation of reconsidering all parameters relative to established industries when integrating new development. It suggested a preventive approach for heavy industrial areas where the safety and emergency plans for each facility take those neighbouring ones into consideration so that a combination of procedures is possible.

Submissions said that if a proposed development's assessed risk combined with the assessed cumulative risk of existing industry, exceeded acceptable levels of risk, this could discourage competition and prevent further developments. It was envisaged that the result would be uneconomic development of small scattered industrial units.

One submission said that the statement should indicate clearly the upper band of non-acceptance for cumulative risk.

One submission expressed the opinion that cumulative risk impacts, whether new activities are proposed or not, should be given high priority.

EPA RESPONSE

Cumulative risk and hazard studies are important for industrial areas. The WA Government is currently financing a cumulative risk study of the Kwinana

area. Confidentiality requirements necessitate a government agency (Department of Resources Development) being responsible for the study.

It is essential that where industries are situated together, that safety an emergency response plans for each facility take into account those of neighbouring facilities, in order to assume maximum protection for all the industries and the public.

Where the level of risk of a new proposal, combined with risks from existing industry, combine to preclude the new proposal, there is a need to reduce the overall level of risk. This reinforces the need for a regional approach to risk assessment, safe operational management of facilities, and emergency response procedures.

POINT 7

Submissions suggested that for existing industry, the standard for risk should be on order of magnitude higher (as is general practice overseas) than for new installations.

Some submissions were of the opinion that it is not feasible that risk levels for existing industry could in the long term be similar to new industry.

One submission advised that care should be taken when attempting to reduce risk levels from existing industry as strict rules may lead to closure of industry rather than a gradual phasing out of high risk plants.

A submission commented on part of the statement which indicates that the Authority is aware that some existing industry and industrial areas may give rise to risk levels to residential zones which exceed the guidelines. The submission said that if this is not based on empirical studies carried out by the Authority, then the statement needs to indicate that there is a possibility that some existing industrial areas may exceed the guidelines for acceptable risk levels.

One submission expressed the view that individual risk level proposed for new industrial developments should be implemented immediately for existing industries rather than regarded as a long term target.

Submissions said that the EPA statement should be more emphatic with requirements for existing industry.

EPA RESPONSE

The EPA recognises the situation in which existing industry finds itself, given that most of these facilities were built over a decade ago. Consequently, it has established objectives for these industries, which will not involve closure due to fast-track implementation of the standards.

The statement that 'some existing industry and industrial areas may give rise to risk levels to residential zones which exceed the guidelines ...' does not require empirical evidence to sustain it.

OTHER

WA APPROACH

One submission had the view that the WA approach to risk assessment may result in different standards or regulations from those adopted by other states. It mentioned that it would be more appropriate for the safety of both industry and the public, to develop national standards or regulations for risk assessment.

EPA RESPONSE

The EPA believes that standards for risk assessment should be similar throughout Australia, but with sufficient flexibility to ensure that each state may take its own circumstances into account. The differing industrial histories and profiles of each state have resulted in different approaches to risk assessment. It is essential that Western Australia proposes standards which are relevant to its own circumstances.

EXTENT OF RISK ASSESSMENT

Several submissions mentioned that the statement did not refer to risks to workers in the industrial plant, a neighbouring workforce, or the public in adjacent recreational areas. They said that the requirements should be comprehensive enough to cover all parties at risk.

A few submissions pointed out that the form of risk to be assessed is that of death and situations such as injury, damage to public property, environmental risks (eg to flora and fauna) and loss of property value: were not taken into account. It was suggested that there should be a broadening of approach in the statement.

It was recommended that the statement should be expanded to include risk to zones other than residential eg recreational, rural zones.

EPA RESPONSE

The EPA has issued this Statement in respect of impacts on individuals in residential areas. The impacts of risks from industrial plants on other groups of people (eg workforce), other land uses (eg recreational), or societal risk have been considered by the EPA in the development of the Statement. The EPA believes, however, that more experience in risk assessment, in various agencies, is required before statements can be issued on these aspects of risk assessment. In all cases, the EPA believes that more experience in risk assessment is required, and in some cases, other agencies have carriage of those issues within their range of responsibilities.

SOCIETAL RISK

A few submissions suggested the inclusion of societal risk criteria which examines a proposal in terms of the likelihood of occurrence of an accident that would cause a given number of deaths.

Among the reasons given for this approach were that government is concerned with major events that can hurt many people rather than individual fatalities and societal risk is impersonal where no one is specifically identified.

EPA RESPONSE

See 'Extent of Risk Assessment'.

PUBLIC EDUCATION

A few submissions said that the risk assessments are based on very technical methodology and would be difficult for the public to understand. A suggestion was made that if the EPA is to make the assessments public it would be useful to provide suitable explanatory risk comparisons.

EPA RESPONSE

The EPA believes that more effort is required in educating the public about industry, including the associated benefits and risks.

HAZARD ANALYSIS APPROACH

Some submissions commented that the approach of hazard analysis as presented in the statement appeared to be based completely on an assessment of the hardware features with no mention of the software features ie management controls of operating procedures, maintenance procedures, management and supervisory procedures etc.

EPA RESPONSE

Hazard analysis by definition is an analysis of hazards, which are created by equipment and design. HAZOP is a procedure by which hazards can be eliminated, or reduced and minimised. Operational and management procedures are designed to minimised those risks due to the hazards which remain.

TRADITIONAL TECHNIQUES

One submission commented that the statement does not cover problems of conflict between the guidance given by traditional techniques used to improve community safety and prevent loss of industrial assets (ie engineering standards, codes of practice, government regulations, keeping of comparative statistics) and that given by quantitative risk assessment.

EPA RESPONSE

The Authority does not see any conflict between the requirements of 'traditional management' techniques (eg engineering standards) and risk assessment. The two approaches are seen to be complementary, in that quantitative risk assessment can indicate where standards need to be improved in order to obtain maximum reductions in hazards and risks.

BUFFER ZONES

Submissions recommended that the statement should refer to the requirements of adjacent land use planning, and adequate buffer zones related to risk levels.

EPA RESPONSE

The question of appropriate buffer zones around industrial facilities is most important. The EPA does not wish to be prescriptive about buffer zones (either with regard to their size, or the land use(s) within them), but will treat each case on its merits.

OPPOSITION TO TECHNIQUES IN STATEMENT

One submission indicated that standard engineering techniques for assessing risks and guarding against the types of failures that could result in significant hazards are more appropriate than techniques indicated in the statement. It mentioned that the Australian record of engineering practice in producing industrial developments with acceptable hazard levels is regarded as excellent.

EPA RESPONSE

See 'Traditional Techniques'.

OPPOSITION TO INDUSTRIAL DEVELOPMENTS IN RESIDENTIAL AREAS

Some submissions expressed the view that any industry of a hazardous or risky nature, no matter how small, should not be established in a residential area.

EPA RESPONSE

The EPA believes that there should be appropriate separation of industrial and residential activities.

CONCEPT OF RISKS AND HAZARDS

A few submissions said that any activity involving a potential public risk should be analysed. For example dams, airports, transport of hazardous goods by road.

EPA RESPONSE

Many activities involve potential risk to the public. Major activities, such as those suggested, could be the subject of risk assessment by EPA in the future.

EMERGENCY SERVICES

One submission commented that the statement does not provide an opportunity for emergency services to be involved in the decision making process which determines whether an industry presents an acceptable risk to the community. It said that involvement of emergency services would allow early detection of inadequacies in staffing, training and equipment required to respond to an accident event and which would allow an improved response capability or influence the decision not to locate the plant at the site.

A number of submissions recommended that the statement should mention that industrial developments should have adequate emergency plans and should co-operate with each other and existing emergency services to set up effective community plans for times of emergency.

EPA RESPONSE

The EPA believes that appropriate emergency response plans are most important in ameliorating the effects of hazards and risks on industry and the community. Emergency response measures are seen to be complementary to the risk assessment process.

SENSITIVITY ANALYSIS

Two submissions recommended that the statement should indicate that a sensitivity analysis be undertaken in all cases (ie analysis of the effects of varying the assumptions made in a risk assessment) as this would make the risk assessment more useful to decision makers and aid public acceptance.

EPA RESPONSE

The EPA believes that sensitivity analysis may be a valuable tool, in certain cases, and would encourage its use in appropriate circumstances.

ASSESSMENT TOOL

A number of submissions were concerned that the hazard and risk assessment would be used as the sole judge of whether a project should be continued or not. Several commented that it was a tool based on assumptions and could produce risk values with some considerable error factors.

EPA RESPONSE

The EPA believes that quantitative risk assessment is just one of a range of assessment methods, all of which contribute to the decision-making process.

BENEFICIAL STATEMENT

Several submissions commended the statement as a well developed approach to evaluating risks associated with industrial developments.

MODIFICATIONS TO STATEMENT

A number of submissions suggested inclusions and modifications to the wording of the statement.

SUBMISSIONS

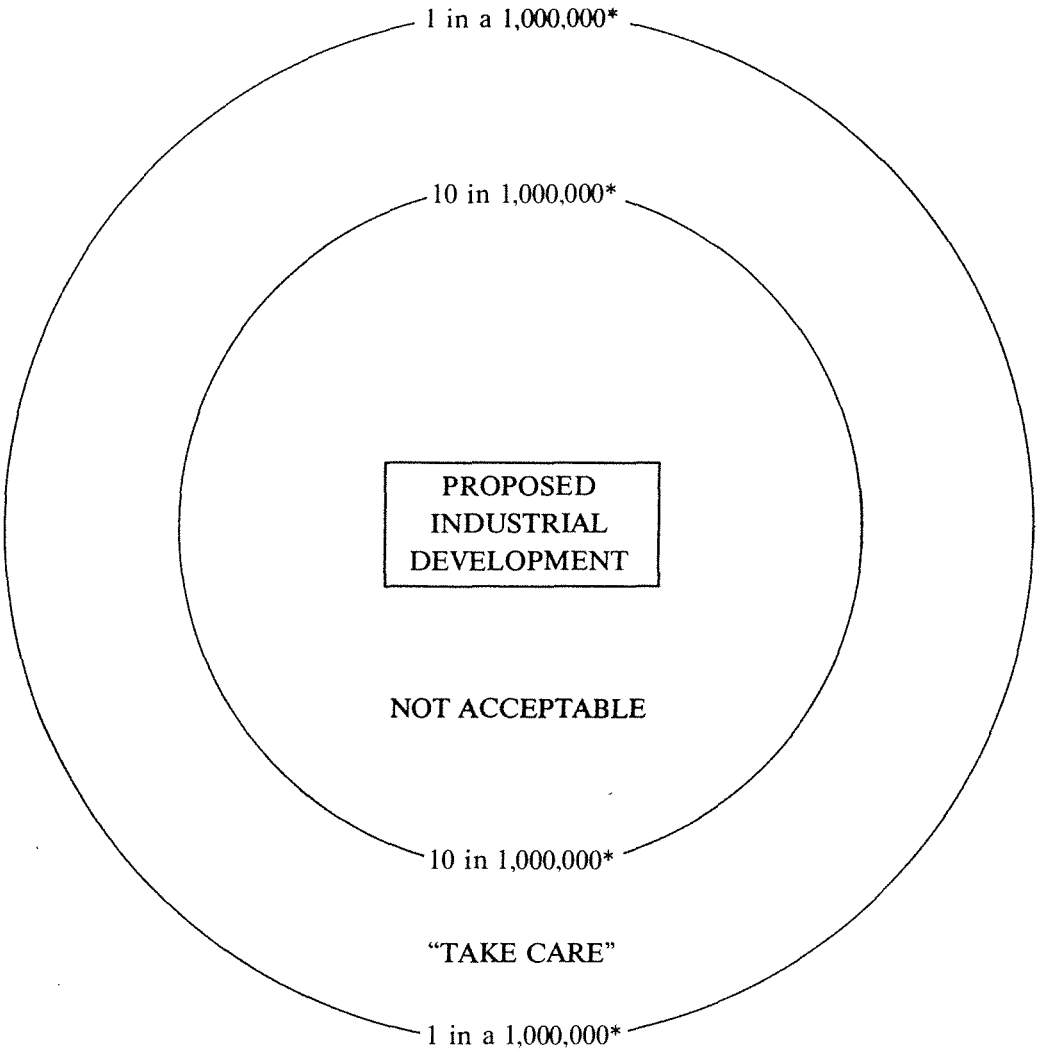
The Agricultural & Veterinary Chemicals Association of Australia Ltd
Technica Ltd, London
BP (Kwinana) Proprietary Ltd
SCM Chemicals Ltd
D J Glenister
Conservation Council of WA Inc
Bureau Veritas
Submission with 18 names
K Wheatley
M Stewart
Lloyd's Register Safety Technology, London
ICI Australia Operations Pty Ltd
Dr D J Griffiths
The Federated Miscellaneous Workers' Union of Australia, Hospital, Service and Miscellaneous, WA Branch
Department of Civil Engineering, University of Western Australia
E S Hammond
F W Shier
J R and B McCracken Consulting Services
School of Mathematical and Physical Sciences, Murdoch University
Shire of Rockingham
M H Johansen
M Anderson
Department of Chemical Engineering, University of Sydney
City of Cockburn
Worksafe Australia
P Skitmore
The Chamber of Mines of Western Australia (Incorporated)
Town of Kwinana
Confederation of Western Australian Industry
Cremer and Warner Ltd, London
City of Fremantle
Australian Chemical Industry Council
Department of Occupational Health, Safety and Welfare of WA
State Planning Commission
Health Department of Western Australia
Water Authority of Western Australia
Western Australian State Emergency Service
Department of Environment and Planning, South Australia
Department of the Environment, Tasmania

278

ENVIRONMENTAL PROTECTION AUTHORITY
BP HOUSE,
1 MOUNT STREET, PERTH, WESTERN AUSTRALIA 6000

ENVIRONMENTAL PROTECTION AUTHORITY GUIDELINES

RISKS AND HAZARDS OF INDUSTRIAL DEVELOPMENTS ON RESIDENTIAL AREAS IN WESTERN AUSTRALIA



* LEVEL OF RISK FROM PROPOSED INDUSTRIAL DEVELOPMENT TO RESIDENTIAL AREAS. IN UNITS OF FATALITIES PER YEAR.

EPA BULLETIN 278.

ENVIRONMENTAL PROTECTION AUTHORITY STATEMENT ON THE EVALUATION OF THE RISKS AND HAZARDS OF INDUSTRIAL DEVELOPMENTS ON RESIDENTIAL AREAS IN WESTERN AUSTRALIA

INTRODUCTION

The Environmental Protection Authority has required environmental impact assessment for a number of new industrial projects recently, and more may be submitted in the near future. In addition to conventional environmental issues, many of these industries have risk and hazard factors associated with them. The Authority believes that the quantitative assessment of risk to the community is an important part of the evaluation of such proposals. Historical records show that industrial accidents occur, and that technical safeguards have their limitations. However, with proper planning, review and control during the plant design, commissioning and operational stages these risks and hazards can, in most cases, be minimised, managed and made acceptable in the sense that they can be reduced to a level that the community is prepared to tolerate.

In this statement, the term 'hazard' is used to describe a set of conditions that could lead to a harmful accident. 'Risk' is defined in terms of both the likelihood of a hazard, and the consequences of that hazard.

In November 1986 the Environmental Protection Authority prepared for public comment a draft statement on the evaluation of risks and hazards of industrial developments on residential areas in Western Australia.

A total of 39 submissions were received from individuals and various organisations including interstate and overseas groups. An analysis of these submissions is given at the Appendix. In revising this Statement the Authority has taken into account the comments received.

REQUIREMENTS AND APPROACH TO BE ADOPTED FOR EVALUATION OF RISKS AND HAZARDS

The Authority will adopt the following approach to the evaluation of risks and hazards for new industrial developments of a potentially hazardous nature:

1. Where the Authority is of the opinion that a project involves a significant element of risk it will require a quantitative risk assessment at an early stage of the environmental impact assessment process.The need for such an assessment will be determined on a case by case basis.

2. The quantitative risk assessment should be undertaken and certified to the Authority's satisfaction by a competent, reputable and objective analyst, approved by the Authority, and at the proponent's expense. This process requires the risk analyst to certify to the Authority that the assessment was done independently.

   In most circumstances the Authority would not seek or undertake a separate verification of the independent risk assessment but could do so if it considered exceptional circumstances so justified.

3. The scope and extent of the assessment will vary from project to project, and the Authority will provide specific advice to each proponent. However, in general, assessment will include an identification of all relevant hazards, a quantification of their consequences and the likelihood of their occurrence, and estimations of outdoor risk levels. The assessment is to address specifically proposed safeguards and their effectiveness in reducing and managing risk.

4. The Authority may require the proponent to make public all or part of the assessment, as part of the environmental impact assessment documentation. Key findings of the risk assessment will be required to be published in the document describing the proposal submitted to EPA.

5. NEW INDUSTRIAL INSTALLATIONS

The following are proposed by the Authority, as a guide for the assessment of the fatality risk acceptability of new industrial installations:

5.1 The Authority has taken note of how decisions on risks are taken in other parts of the world. In the light of that knowledge the Authority will classify decisions into three categories. These are as follows:

- A small level of risk which is acceptable to the Environmental Protection Authority;

- A high level of risk which is unacceptable to the Authority and which warrants rejection; and

- A middle level of risk, which subject to further evaluation and appropriate actions may be considered to be acceptable to the Authority.

5.2 An individual risk level in residential zones of less than 1 in a million a year is so small as to be acceptable to the Environmental Protection Authority.

5.3 An individual risk level in residential zones exceeding 10 in a million a year is so high as to be unacceptable to the Environmental Protection Authority.

5.4 Where the preliminary risk level in residential zones has been calculated to be in the range 1 in a million to 10 in a million a year, the Authority will call for further evaluation of the risks associated with the project. The Authority may then be prepared to recommend that the project be acceptable subject to certain planning and technical requirements.

A major technical requirement will be the commissioning of a Hazard and Operability Study at an appropriate stage or stages of the project. Such a study is an effective technique for discovering potential hazards and operating difficulties at the design stage. Significant reductions of hazards, and in the number of problems encountered in operation, as a result of such studies are possible. The Hazard and Operability Study should be undertaken by the proponent with a qualified person, approved by the Authority, who will be required to certify to the Authority that the study was

carried out in a proper manner. This study should explore all feasible ways of reducing hazards. The proponent may be required to update the risk analysis, and make the results public.

6. CUMULATIVE RISK IMPACTS

Where a number of hazardous industries or activities exist in a region, it is appropriate for a cumulative risk and hazard analysis for existing and proposed developments in the region to be undertaken before assessing new developments in the region. No extra risk would be acceptable where the cumulative risk of existing industry, combined with the assessed risk of the proposed new industry, exceeds the risk levels proposed for new industry (item 5).

7. EXISTING INDUSTRY

The Authority is aware that some existing industry and industrial areas may give rise to risk levels to residential zones which exceed the guidelines in this statement. In such cases, a programme shall be agreed between the relevant agencies and the industry in order to reduce the impact of major risk generators. This may entail recommendations for action by either the industry or government, or both. The Authority believes that the long-term targets for individual risk level in residential zones for existing industry should be the same as those proposed for new industry (item 5).