Criteria for the assessment of risk from industry

Environmental Protection Authority Guidelines

Environmental Protection Authority
Perth, Western Australia
Bulletin 611
February, 1992

Criteria for the assessment of risk from industry

Environmental Protection Authority Guidelines

Environmental Protection Authority
Perth, Western Australia
Bulletin 611
February, 1992

ISSN 1030-0120
ISBN 0 7309 4739 4

1. Introduction

Risk assessment is now used extensively both in Australia and overseas as a factor in government decision making on the acceptability of new major hazardous industrial developments. The results of risk assessments for hazardous industries also have been used for land use safety planning around both proposed and existing hazardous industrial areas.

In May, 1987 the Environmental Protection Authority published details of its requirements for the evaluation of risks and hazards (EPA Bulletin 278 "Risks and hazards of industrial developments on residential areas in Western Australia", May, 1987). Bulletin 278 has been the reference document in Western Australia for assessing the acceptability of risks imposed on the community through new hazardous industry. Experience since that time has demonstrated that the criterion adopted has received broad support across the community and has worked well in practice.

The essential features of the risk criteria before the review were:

- The Environmental Protection Authority will require a risk assessment for projects which may have a significant level of risk;
- The Environmental Protection Authority will provide advice on the required scope and extent of the risk assessment;
- The analyst undertaking the risk assessment, at the proponent's expense, must be professionally acceptable to the Environmental Protection Authority, and the analyst must certify the risk assessment;
- The Environmental Protection Authority may require the proponent to make public all or part of the risk assessment as part of the environmental impact assessment documentation;
- The Environmental Protection Authority will use the following guidelines for the assessment of the acceptability of fatality risk from new installations:
    - an individual risk level in residential zones of less than one in a million a year is so small as to be acceptable
    - an individual risk level in residential zones exceeding ten in a million a year is so high as to be unacceptable
    - where the preliminary risk level in residential zones has been calculated to be in the range one in a million to ten in a million a year, further evaluation of the risks will be required
- A hazard and operability study (HAZOP) will be required at an appropriate stage of the project;
- Where several hazardous industries or activities exist in a region and it is likely that the cumulative risk to individuals approaches one in a million it is appropriate for a cumulative risk and hazard analysis to be undertaken before assessing new developments in the region; and
- Long term targets for individual risk level in residential zones for existing industry should be the same as those proposed for new industry.

2. Review of the guidelines

In 1990, the Environmental Protection Authority decided to review and extend the existing guidelines. As part of the review the Authority published the document "Review of the guidelines for risk assessment in Western Australia — information to assess public input to the Environmental Protection Authority (December 1990)". The document examined the issues of individual risk, societal risk, injury risk, ecosystem risk and whether the risk criteria for existing industries should be different to those for new industries.

Community consultation was undertaken and international, interstate and intrastate submissions were received from government agencies, companies, industrial groups, consulting firms, community groups and individuals.

The Environmental Protection Authority has reviewed the submissions and the approach to risk assessment being taken in Australia and internationally. The outcomes of the review by the Authority are detailed below.

3. Requirements and approach to be adopted for evaluation of risks and hazards

The review supported the community's acceptance of several of the key elements of the Environmental Protection Authority's Bulletin 278 "Risks and hazards of industrial developments on residential areas in Western Australia", May, 1987. These elements are repeated with modifications resulting from the review together with additional requirements.

1. Requirement for a risk assessment

Where the Environmental Protection Authority believes that a project involves a significant element of risk to the public it will require a preliminary quantitative risk assessment as part of the environmental impact assessment process. The need for such an assessment will be determined on a case-by-case basis.

2. Approval of risk analyst

The quantitative risk assessment should be certified to the Environmental Protection Authority's satisfaction by a competent, reputable and objective analyst approved by the Environmental Protection Authority and at the proponent's expense.

3. Scope and extent of risk assessment

The scope and extent of the assessment will vary from project to project, and the Environmental Protection 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. Publication of risk assessment

The Environmental Protection 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 the Environmental Protection Authority.

5. New industrial installations

The following are now the Environmental Protection Authority's criteria for the assessment of the fatality risk acceptability of <u>new</u> industrial installations.

Individual fatality risk

(a) *A risk level in residential zones of one in a million per year or less, is so small as to be acceptable to the Environmental Protection Authority.*

(b) *A risk level in "sensitive developments", such as hospitals, schools, child care facilities and aged care housing developments of between one half and one in a million per year is so small as to be acceptable to the Environmental Protection Authority.*

(c) *Risk levels from industrial facilities should not exceed a target of fifty in a million per year at the site boundary for each individual industry, and the cumulative risk level imposed upon an industry should not exceed a target of one hundred in a million per year.*

(d) *A risk level for any non-industrial activity located in buffer zones between industrial facilities and residential zones of ten in a million per year or lower, is so small as to be acceptable to the Environmental Protection Authority.*

6. Cumulative risk impacts

Where several hazardous industries or activities exist in a region and it is likely that the cumulative risk to individuals approaches the risk criteria given in item 5, 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 assessed risk of the proposed new industry, exceeds the risk levels proposed for new industry (item 5).

7. Societal risk

There are two components to societal risk. Firstly, the number of people exposed to levels of risk is important. Secondly, society is more averse to incidents which involve multiple fatalities or injuries than to the same number of deaths or injuries occurring through a large number of smaller incidents.

Elements of a societal risk study can be used to help formulate emergency management plans for a hazardous industry or an industrial estate. Societal risk also may help in long term planning for areas around hazardous industries, particularly to control population densities in those areas.

Societal risk may help identify incidents which have the greatest impact on the potential for loss of life and for which priority should be given for implementing risk reduction measures.

The Environmental Protection Authority may require that a societal risk study be undertaken as part of the risk assessment of new proposals. Population groups to be considered in such a study include those associated with the hazardous industry, neighbouring industries, commercial activities, schools, hospitals and residential areas.

The Environmental Protection Authority's experience with societal risk indicates that more research is needed before societal risk is addressed through the establishment of criteria. The Authority will use a qualitative approach in its assessment of societal risk levels. The approach will be based on the merits of each proposal, rather than on specifically set numerical values.

8. Environmental and injury risk

The Environmental Protection Authority considers that more experience is needed before environmental and injury risk criteria are established.

9. Avoiding avoidable risks

There is a public expectation and a corporate responsibility that where possible, regardless of calculated risk levels and criteria, "avoidable risks should be avoided". This means that a proposed hazardous installation, and for development in the impact area of an existing hazardous installation, developers should consider alternative sites or alternative technologies which may reduce or eliminate risks. The same principle applies to existing hazardous industries.

10. Intermittent high risk operations

The risks from a hazardous industry are normally presented as annual frequencies, that is, as the likelihood of unwanted consequences occurring within a year. If the risks were presented as daily frequencies there would be times when the risks are either higher or lower than the annual average daily value.

Several industrial operations increase the risk levels above the average value (including those of plant start-up or shut-down and for the import or export of hazardous substances). No separate criteria have been established for risks associated with these intermittent hazardous operations.

The principle of "avoiding avoidable risks" should be used during these operations. This principle encompasses actions including additional safety management through equipment and people and considerations of increased emergency preparedness and timing of the operation to minimise the impact of an incident.

11. Existing industry

The specific risk criteria and qualitative risk considerations detailed in this paper apply to proposed hazardous industrial developments and need to be considered by planning authorities for proposed land use development around existing hazardous industry.

Some existing hazardous industries have been established or land use developments have occurred at a time before there was a full recognition of the hazards associated with the industries, or before there were methods available to quantify the associated risks. Additionally, acceptable risk criteria may change in the future with development of safer technologies or with changes in community expectations.

These past and possible future changes may result in land uses being subject to risks in particular areas which are greater than those considered acceptable. Where such land uses are identified a programme should be developed to alter the land use or reduce the risks so that the current criteria can be met.