

# **Risk criteria — on-site risk generation for sensitive developments**

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**Modifications to sensitive development  
criterion - on-site risk**

**Environmental Protection Authority  
Perth, Western Australia  
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#### THE PURPOSE OF THIS REPORT

This report outlines the recent modification to the Environmental Protection Authority's criterion for the assessment of risk to sensitive developments from industry.

This bulletin is not a report under Part IV of the Environmental Protection Act, 1986, and there are no provisions for appeals against the Authority's views expressed within this report.

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# 1. Introduction

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). In 1990, the Authority decided to review and extend those guidelines. That review resulted in the publication of Bulletin 611 "Criteria for the assessment of risk from industry". The resultant risk criteria (reproduced at Appendix 2 in this Bulletin) provide guidelines which are used for assessing the acceptability of risks imposed upon surrounding land uses by hazardous industry. The 1990 review 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. Although the many facets of the different types of risks, ie injury, societal etc are constantly under scrutiny the EPA has to date only established criteria for fatality risk.

The EPA has adopted a fatality risk level of one in a million per year as the upper limit for acceptability of risk from industry to residential areas. This criterion assumes that residents will be outdoors at their homes, exposed to the risk 24 hours a day and continuously day after day for the whole year, and do nothing to avoid being harmed. The risk levels calculated are therefore deliberately conservative. It is desirable when examining land uses to account for variations in people's vulnerability to hazardous effects, duration of exposure to risk at any particular location by any one individual, and the ability to take evasive action. People in hospitals, children at school or old aged people are generally more vulnerable to hazardous effects than the average population. In view of this the EPA established a risk criterion specifically for sensitive developments.

## 2. Sensitive development criterion

The EPA criteria for the assessment of risk from industry (Bulletin 611) defines the level of acceptable risk for sensitive developments as follows:

*A risk level for "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.*

This criterion was established primarily to ensure that unacceptable levels of risk are not imposed upon sensitive developments from external risk generators. A literal reading of the criterion does not address the issue of risk generators within the boundary of a sensitive development. Due to the nature of dangerous goods in general (and LPG in particular) it is understood that it is impracticable to reduce the level of risk from such facilities to below 1 in a million per year immediately adjacent to the storage facility itself. It is not the intent of the EPA risk criteria to prohibit those dangerous goods facilities which may be appropriate for the operation of the sensitive development eg LPG for heating for hospitals and schools etc.

With reference to meeting EPA risk criteria, it appears that there is a need to further define sensitive development in terms of their components. Schools, hospitals and aged care centres contain various facilities, ie classrooms, canteens and playgrounds in the case of schools, wards, carparks and maintenance facilities in the case of hospitals for example. The EPA criteria can be seen as an issue which centres around the application of site boundaries. It may be appropriate to differentiate between hospital ward, workshop and park boundaries within the same development. For the purpose of on-site hazardous facilities it is not appropriate to include for example carparks and maintenance workshops as sensitive developments particularly when compared with hospital wards which require the greatest amount of protection in terms of risk afforded by the sensitive development criterion. An appropriate method of defining sensitive development facilities is in terms of occupancy of the sensitive population (ie patients at hospitals, students at schools and residents of aged care centres).

Once the populations considered at risk and their location(s) are defined, from the sensitive development perspective, then the EPA criterion can be applied.

**The principle of avoiding avoidable risks should be pursued in all cases.**

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.

### 3. Modified criterion

Proposal where risk generator is **on** grounds of sensitive development:

- Areas continuously occupied (for examples of occupancy see appendix 1) by sensitive populations should be afforded the maximum protection defined for sensitive developments ( $0.5 \times 10^{-6}$ ). These areas refer to hospital wards in hospitals, classrooms, hallways and recreational areas in schools and accommodation areas, dining rooms and recreational areas in aged care centres.
- Areas intermittently occupied by sensitive populations do not require the same level of protection. However these areas should, where possible, be afforded the maximum protection defined for sensitive developments ( $0.5 \times 10^{-6}$ ). Where such protection is not possible a risk of up to  $1 \times 10^{-6}$  may be accepted provided all reasonable efforts are taken to protect the sensitive population (ie ALARP/AAR). Such approval would only be granted if the proposal had given appropriate consideration to **societal risk**. These areas include garden areas, carparks and some recreational areas in sensitive developments as outlined in Appendix 1.
- The public risk criteria are not relevant to areas solely occupied by staff working at sensitive developments and infrequently occupied by sensitive populations. These areas are suitably addressed by the existing Occupational requirements and any other regulations which may be applicable (AS 1596 in the case of LPG).

Proposal where risk generator is **not** on grounds of sensitive development.

The existing criteria will apply, that is:

*A risk level for "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.*

For the purpose of the sensitive development criterion:

**Continual** applies to occupation of an area for most of the time; and  
**Intermittent** applies to occupation of an area for some of the time on a regular basis.

The EPA also expect that all practicable steps should be taken to reduce risk in any proposal. Measures which may be incorporated to reduce the level of risk include:

- emergency response plans;
- improved ESD systems;
- improved ignition source control;
- safety management systems; and
- water deluge systems.

## 4. Epilogue

The above extension to the sensitive development criterion has been made to facilitate the installation of hazardous operations within sensitive developments. It is anticipated that only those proposals which provide benefit to the 'occupiers' of the sensitive development will be assessed under the modified criterion. Those proposals which do not provide some benefit to those whom the risk is imposed will be required to comply with the existing risk level of 0.5 in a million at the boundary (or anywhere within) of the sensitive development.

Although the EPA risk criteria refers to individual fatality risk only, it may however, 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. The Authority anticipates that with the continuing competing pressures for land uses within the environs of industrial areas that criteria for societal risk could ultimately be established.

# **Appendix 1**

**Examples relating to occupancy of areas at sensitive developments**



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• Continual occupancy	hospitals	wards, medical suites, operating theatres etc
	schools	classrooms, halls, playgrounds etc
	aged care centres	residences, dining rooms, recreational areas etc
• Intermittent occupancy	hospitals	garden areas, carparks etc
	schools	lawns, recreational areas, carparks etc
	aged care centres	carparks

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## **Appendix 2**

### **Individual fatality risk criteria**

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