

THE TOLERABILITY OF RISK – MISUNDERSTOOD, MISAPPLIED OR MISSED ALTOGETHER?

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Abstract

It is argued that the tolerability of risk (TOR) concept as often used in New Zealand is rooted in low probability, high consequence risks of the nuclear power industry that may bear little relevance to general industry in NZ, let alone our societal risks and natural hazards. It is argued that the TOR concept has often been misunderstood, misapplied or missed altogether to the detriment of duty-holders, the courts and the public in New Zealand and that there is a need for research into risk evaluation criteria and the TOR concept in the NZ context.

This paper outlines a proposal for a research project that will attempt to develop TOR criteria relevant to the context of New Zealand in the early 21st century and applicable to a range of work and non-work risks as well as voluntary and involuntary exposures to risks.

NZ legislation

Contrary to some opinions, duties in the Health and Safety in Employment Act 1992 (HSIEA) are not absolute. The Act uses the “all practicable steps” test to determine whether a duty has been discharged. This test incorporates the “reasonably practicable” test from UK statute and common law. Together, these tests require the duty-holder to consider the level of harm that might occur and the likelihood of such harm and then scale the precautions accordingly *before* harm occurs.

The reasonably practicable test effectively requires the duty-holder to consider how much harm may be acceptable; the greater the level of foreseeable harm the greater the precautions to be applied. We therefore have a risk-based hazard management system.

Risk assessments

The HSIEA and supporting documents give little or no guidance on carrying out a risk assessment but the joint standard AS/NZS 4360: 2004 *Risk Management* and the associated guidelines HB 436 *Risk Management Guidelines* do provide such guidance.

The term “risk” is defined in AS/NZS 4360 as:

“the chance of something happening that will have an impact upon objectives.

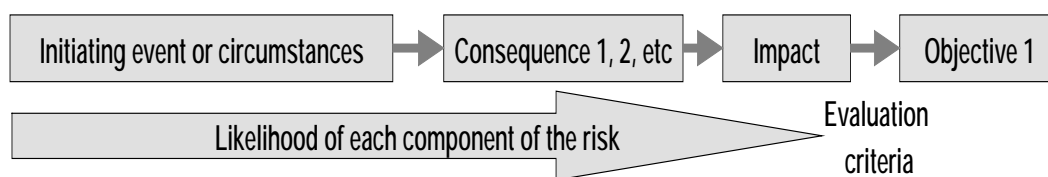
Notes

A risk is often specified in terms of an event or circumstances and the consequences that may flow from it.

Risk is measured in terms of a combination of the consequences of an event and their likelihood.

Risk may have a positive or negative impact.”

Dissecting this definition shows that a full risk analysis must consider:



AS/NZS 4360 requires that such a risk assessment be preceded by the development of a context statement that must include criteria for the evaluation of risks. The ALARP concept contributed to text on risk evaluation criteria in HB 436 but the guidelines do not suggest such criteria.

Guidance on evaluation criteria and TOR

Guidance on the level of harm that may be tolerable is set out in several UK Health and Safety Executive guidance documents (HSE, 1992, 2001) and planning guidance in New South Wales (NSW Department of Planning, 2002) but no comparable guidance has been published in New Zealand. This has led many risk and health and safety practitioners to use the UK guidance for occupational and societal risks and risks due to natural hazards. None of the risk assessments seen has included a context statement justifying use of the UK TOR criteria.

The origins of the NSW guidance are in the UK guidance which are, in turn, derived from the nuclear power industry – specifically (if we go back far enough) the escape of iodine 131 from UK nuclear power stations (Farmer, 1967) and US power station risks (Okrent, 1981). They led to the “dagger diagram” or ALARP diagram in Figure 1.

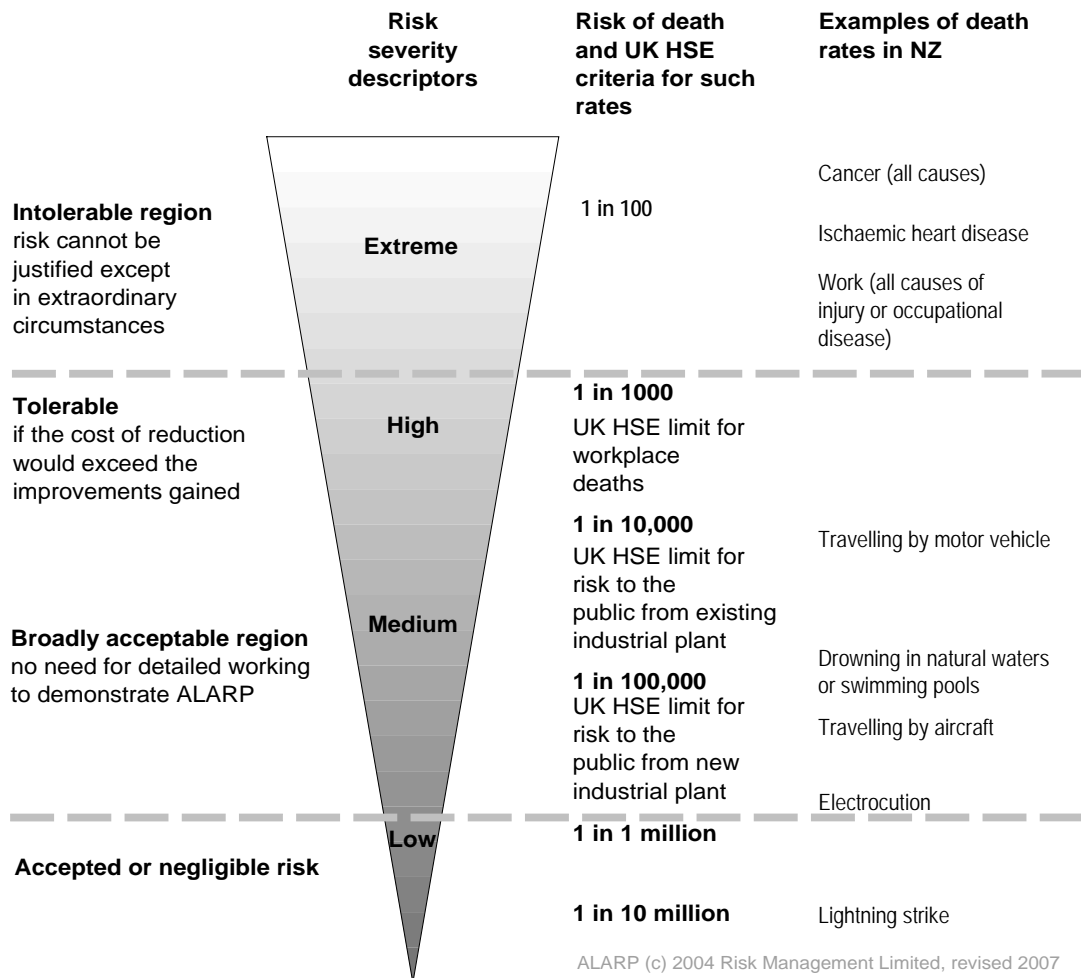
Thus, the origins of the TOR concept in the nuclear power industry are rooted in very low probability, high consequence risks that may bear little relevance to general industry in New Zealand, let alone our natural hazards. The UK guidance may have been tempered by some 30 years of experience but the origins remain clear and beg questions for NZ in the 21st century including the following.

- Can we equate occupational health risks in NZ with radiation risks due to nuclear power stations?
- Can we equate the life-safety risks due to living on the coast, exposed to a tsunami, with those from living near to a nuclear power station?
- Similarly, can we equate the risk of death due to a lahar with risks from a nuclear power station?

The implied equivalence of such risks is embedded in a number of NZ reports. For example the GNS report on tsunami risk (Berryman, 2005) explicitly uses UK-derived “standards” that have never been tested or researched in NZ. Similarly, work on hazardous substances in relation to civil defence and planning has used the UK criteria, apparently without asking if New Zealanders accept or reject such threats to their lives and communities – or, indeed, if understand the criteria.

Do the public, regulators and courts accept and understand the implications of the combination of “all practicable steps” and “reasonably practicable” and the suggested levels of tolerability and acceptance shown in Figure 1? If we map some common causes of death against the ALARP diagram (right-hand column in Figure 1) we seem as a society to accept higher levels of risk (especially workplace risk) than the UK (Driscoll *et al.*, 2004).

Figure 1. The ALARP diagram



Discussion

If the origins and meaning of the UK TOR criteria are unknown to the majority of duty-holders, practitioners and regulators in NZ can we really say that are correct for NZ in 2008?

As risk and safety practitioners, we may think we can advise stakeholders that a chance of death of 10^{-6} is acceptable (as per the UK criteria) but some stakeholders might consider that level unacceptably high while others argue that the expense in achieving such a high standard is not warranted.

If we consider the “social amplification of risk” concept we find that matters become even murkier (Sheehy *et al.*, 2002). Risk evaluation criteria seem increasingly to be established on the front page of newspapers with little account taken of the foreseeability or controllability of risks and the cost of their control. How do we in NZ compare voluntary and involuntary risk in NZ and what influence does our voluntary risk tolerance have on workplace involuntary risk tolerance?

In the 15 years since the original HSE guidance was published risk aversion seems to have increased in our society yet no research has been found showing what level of risk people actually will accept in the UK (let alone NZ) and under what

circumstances. This absence of locally researched risk evaluation criteria sometimes results in ill-informed risk assessments.

Thus, the TOR concept seems to have been misunderstood, misapplied or missed altogether to the detriment of duty-holders, the courts and the public in New Zealand. There is a need for research into the TOR concept in the NZ context.

Outline of proposed research

Such research will include:

Context of risk in NZ (man-made and natural hazards; work and non-work hazards; historical, historical and future likelihood; etc).

Detailed literature review of risk criteria used in NZ, Australia and comparable countries and the origins of the criteria.

High-level risk assessment of risks in NZ (occupational, transport, residential, etc) to compare and contrast what seems to be acceptable under different circumstances.

Development of draft criteria for a NZ TOR framework that can be proposed for planning, regulatory and enforcement purposes by duty-holders, regulatory agencies and the courts.

Conclusions

There is a need for TOR criteria developed in and for NZ in the 21st century that take account of our history and current social acceptance of risks.

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