

Was ist negligible/broadly acceptable risk ?

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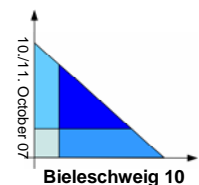
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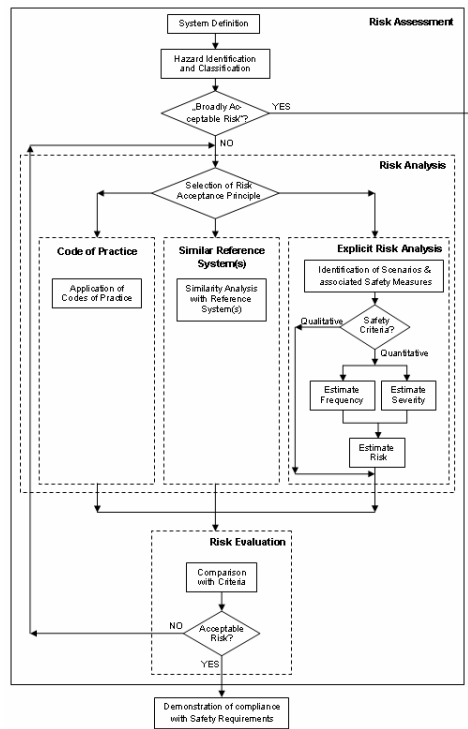
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Layout

- Introduction: The European Risk Assessment Framework
- Negligible risk: associated problems
- Options for negligible risk
- Conclusion

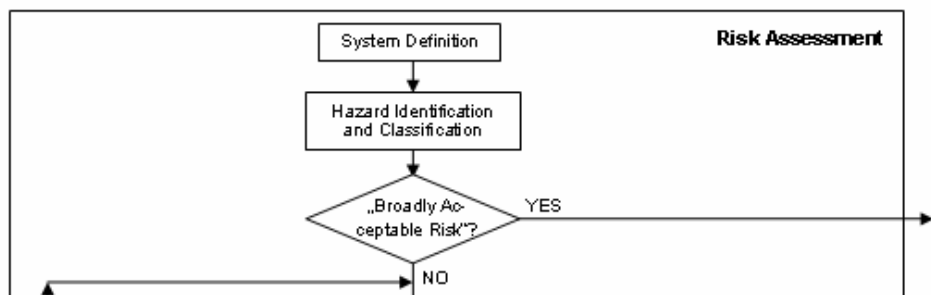
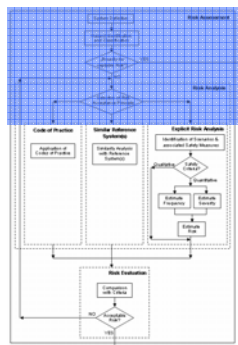


The European Risk Assessment Framework

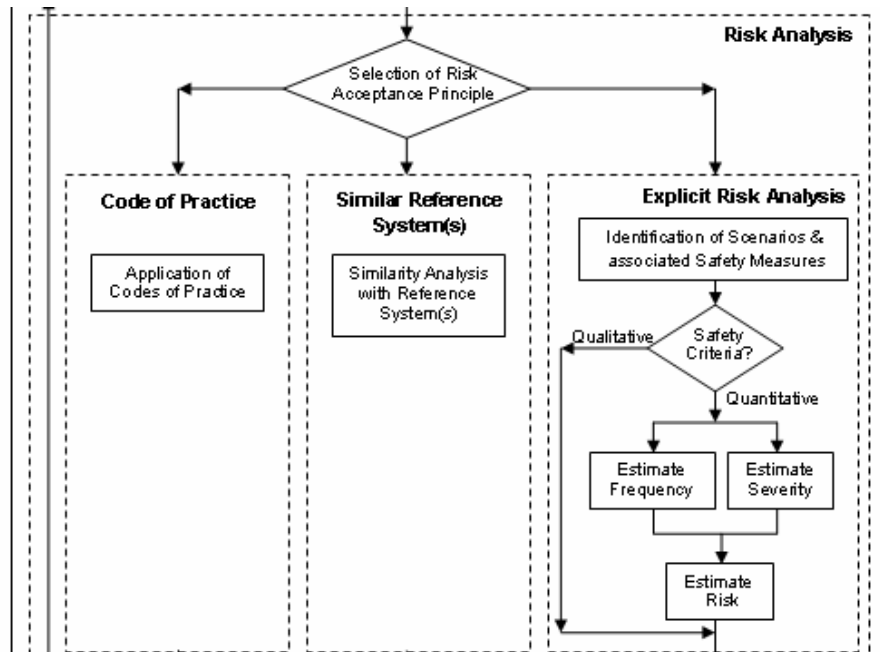
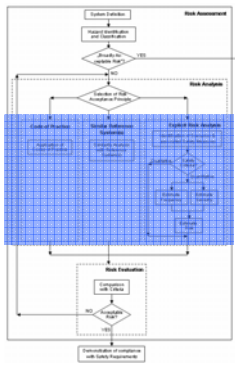


ERA Risk Assessment Framework

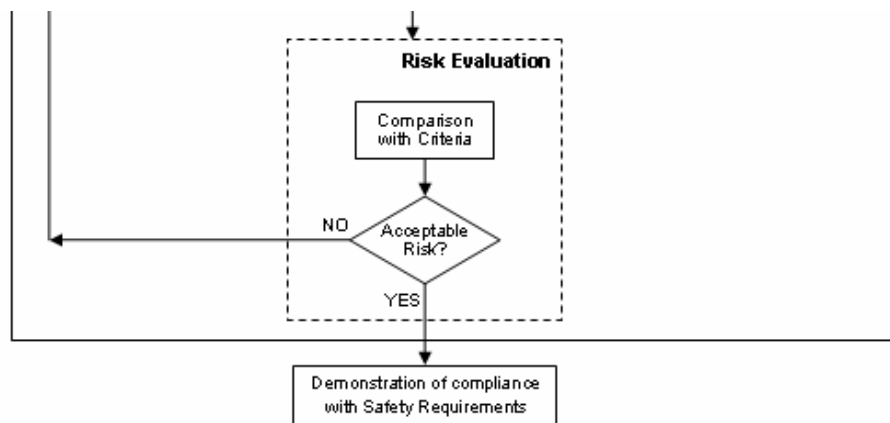
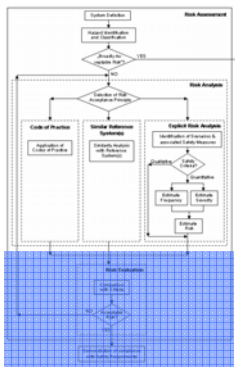
System Definition & Hazard Identification

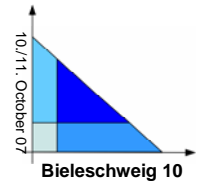


Risk Analysis

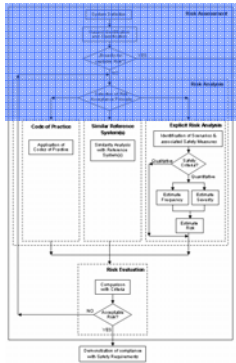


Risk Evaluation





Negligible Risk

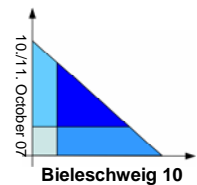


Article 7, §2 and 3 of the ERA recommendation:

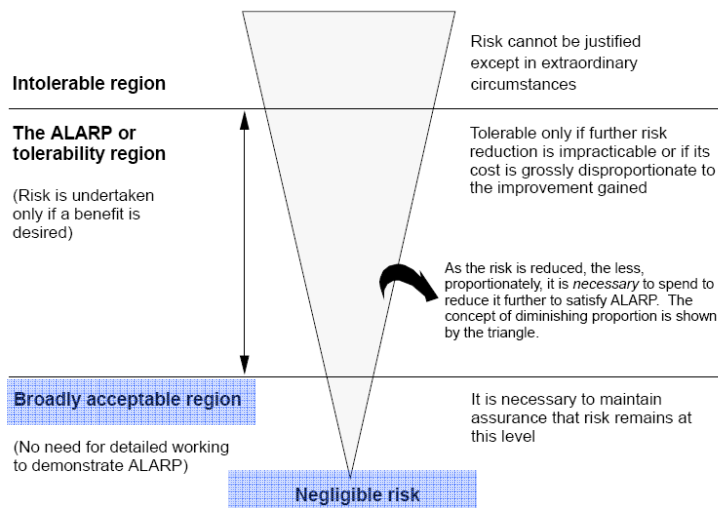
- *To focus the Risk Assessment efforts upon the most important risks, the hazards shall be classified according to the expected risk that they are associated with. Based on expert’s judgment, hazards associated with a broadly acceptable risk need not be analyzed further but shall be recorded in the hazard log and their classification justified in order to allow independent assessment by the assessment body.*
- *As a criterion, risks resulting from hazards may be classified as broadly acceptable when the expected loss is so small that it is not reasonable to implement any counter safety measure.*



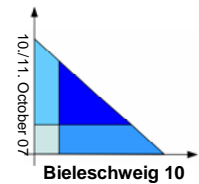
Associated Problems (I)



Based on expert’s judgment, hazards associated with a broadly acceptable risk



Associated Problems (II)



“As a criterion, risks resulting from hazards may be classified as broadly acceptable when *the expected loss is so small...*”

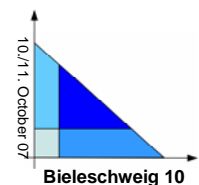
Risk is combination of probability/frequency and severity!

“Based on expert’s judgment,...”

“As a criterion, risks resulting from hazards may be classified as broadly acceptable when the expected loss is so small that it is *not reasonable to implement any counter safety measure* „



Approaches on negligible risk



Probabilistic safety analysis for power plants gives a criterion for “*negligible initiating events*”:

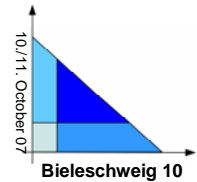
If the sum of initiating events that causes damage to the core is below 20% of the total frequency of the core damage and a single initiating event is below 10% of the core damage, then a detailed analysis of accident sequences is not necessary. (...two orders of magnitude... often mentioned in other documents)

Swiss “*statutory order of hazardous incidents*” of chemical industry:

Companies write short report. As long as the severity is estimated to be lower than a given threshold, no detailed risk analysis has to be carried out.



Options for negligible risk

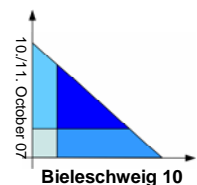


- Definition
- Qualitative or quantitative value: Setting thresholds
- Application level
- Level of confidence
- Risk aversion



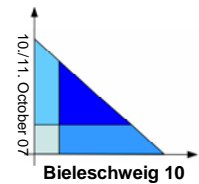
Options for negligible risk

Definition



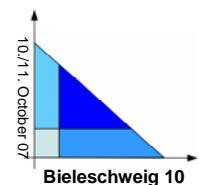
- terms *negligible* as well as *broadly acceptable risk* are used within ALARP model; might lead to misunderstanding.
- the term *acceptable risk* is usually associated with a risk acceptance criterion.
- acceptable risk (set according to society principles) versus negligible risk (set to reduce the work load for the risk analysis; help to focus on hazards with significant risk impact → the qualitative and quantitative limits of hazard classification methods as well as the limits of industrial failure rate verification have to be taken into account).
- a new term is necessary e.g. *insignificant risk*





Application level

- system level for which the hazard classification is carried out (hazard level) versus system level for which negligible risk is defined (decision level)
- in order to compare a risk arising from a hazard to the negligible risk threshold, both have to be determined on the same system level → otherwise chances for misuse!
- decision level has not been defined in the ERA risk management process
- defining a decision level has to take political and technical aspects into account



Qualitative and/or quantitative ?

Quantitative: a risk value, given with all the necessary information e. g. units, reference groups and reference points

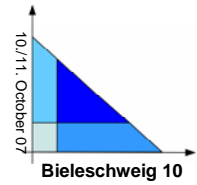
Qualitative: a verbal description of a risk level; could be an absolute or comparative threshold

"...when the expected loss is so small that it is not reasonable to implement any counter safety measures". [ERA]

Combination:

an example for a qualitative, comparative criterion with quantitative aspects.
"Clearly a negligible risk should be much lower than the maximum tolerable risk for a given class of hazard. We therefore propose defining a hazard as 'negligible' if its associated risk is at least two orders of magnitude smaller than the maximum tolerable risk for this class of hazard." [Braband]



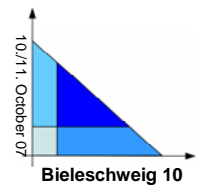
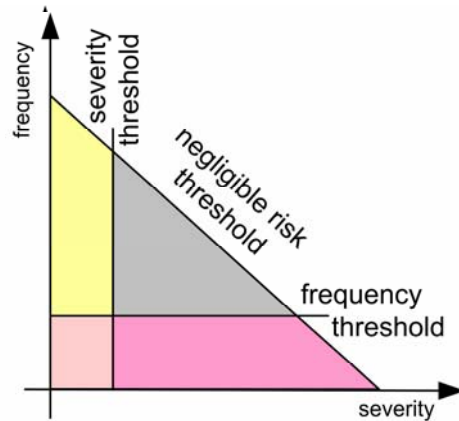


Setting Thresholds

Risk is combination of frequency and severity.

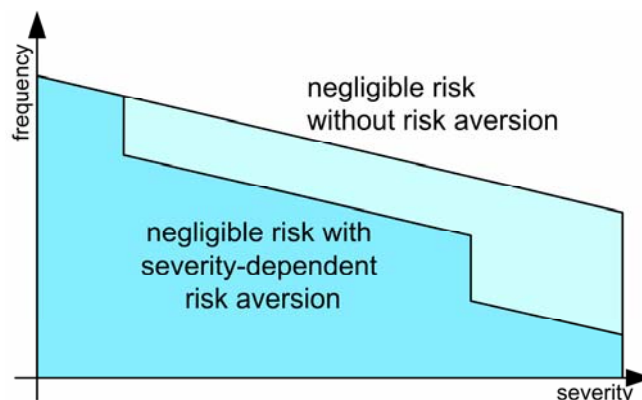
Three options for negligible risk thresholds

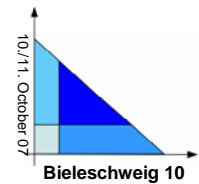
- Frequency threshold (value)
- Severity threshold (value)
- Risk threshold (value/diagram)
- SFR threshold (2-out-of-3; value/diagram)
- Frequency-severity threshold (value)



Risk Aversion

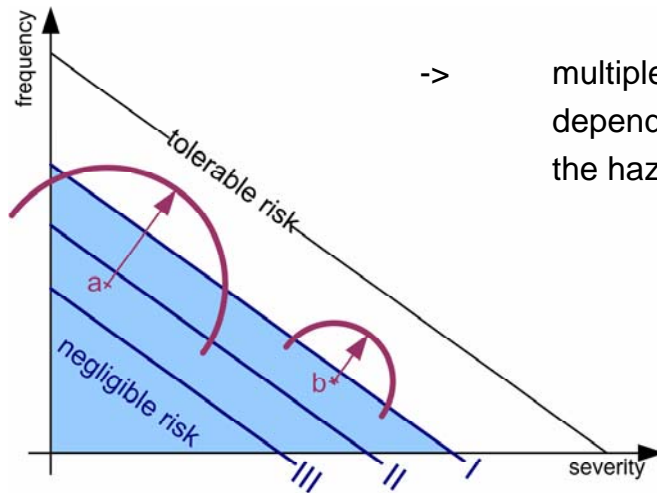
Using *risk aversion*, negligible risk thresholds are lessened according to the (catastrophic) severity of an accident.





Level of confidence

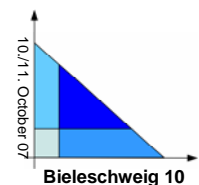
Rising the negligible risk threshold for those hazard classifications with high confidence due to reliable data



-> multiple negligible risk thresholds depending on the *confidence levels* of the hazard classification method



Proposals



- In addition to a **risk threshold**, severity and frequency thresholds should be given.
- The aspect of **risk aversion** might be taken into account when setting a negligible risk threshold.
- Negligible risk thresholds should be defined according to estimated **confidence levels** of hazard classification method.

Thank you very much for your attention.

