

Applying A Risk Model to UXO Contamination

*Comparison of a portfolio of 105
properties cleared by a NGO vs the
predictive results of the model*

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Two ways of managing UXO contamination in one area

■ Hazard Management

- Is there contamination?

Clear the area, until contamination is under a specified threshold

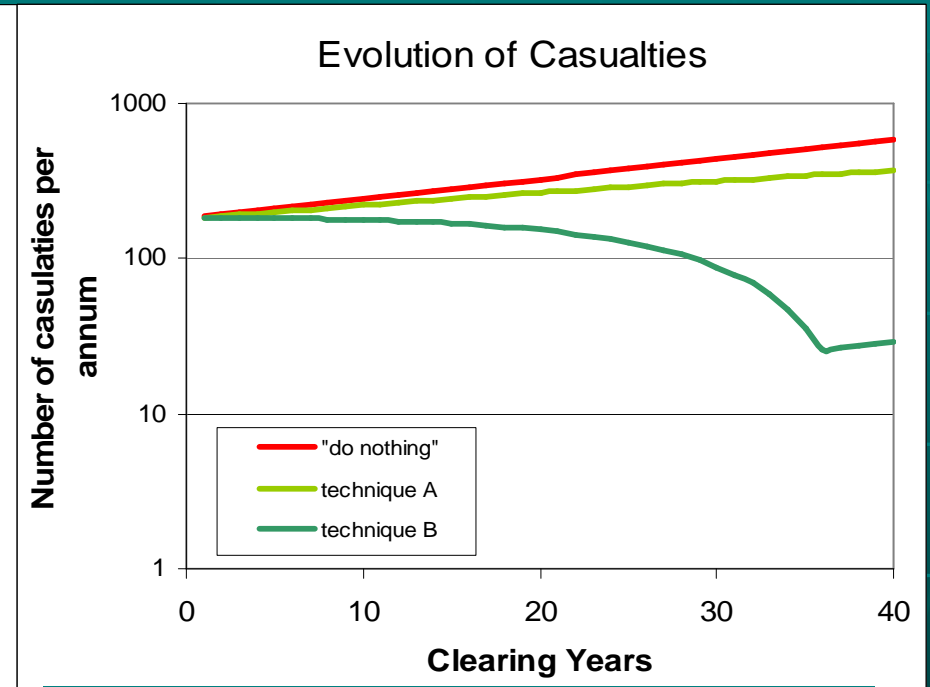
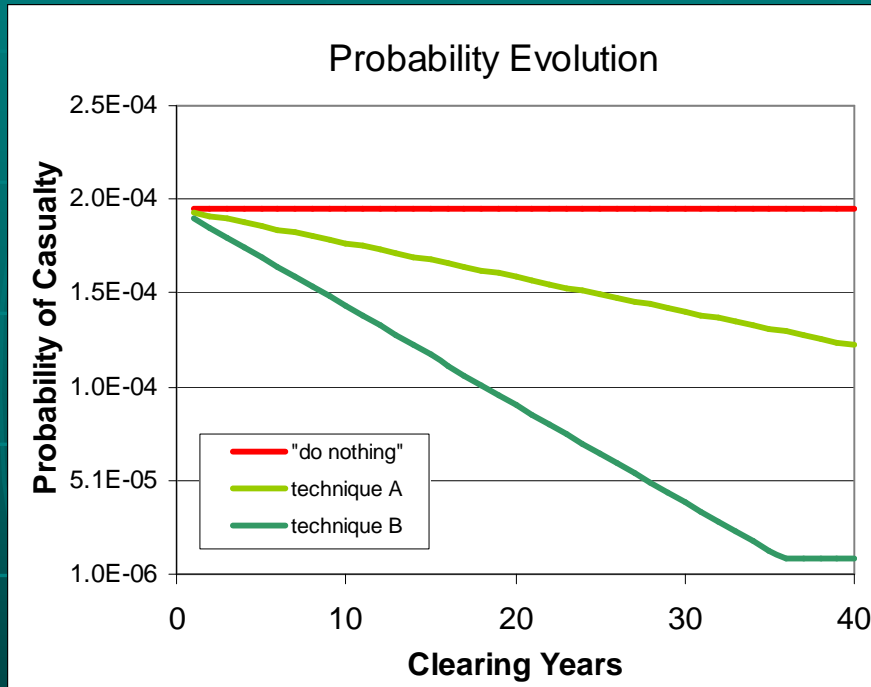
■ Risk Management

- Is there contamination?
- What type predominantly?
- How susceptible to detonation?
- How many people can it kill/maim/impact?

Clear the area if risk is intolerable, until it is tolerable

Working slowly at very high standards, with poor prioritization of tasks actually kills and maims people instead of saving them. Proper risk management provides sustainable solutions and saves more lives.

Comparing 3 Alternatives: do nothing, decontaminate with very high standards (technique A), decontaminate faster and cheaper (technique B).



Diminishing probability of casualty using different technique in a province (growing rate 3 per cent and reliability of 95 per cent for Technique B)

Diminishing casualties using faster and cheaper demining technique in a province (growing rate 3 per cent and reliability of 95 per cent for Technique B)

Thus a model to enhance prioritization and proper decision making is fundamental to increase the life saving effectiveness of Mines/UXO action.

- *The model should use all possible easily available information*
- *The model has to be probabilistic in nature to cope with information uncertainties*
- *The model has to allow internationally accepted benchmarks comparisons*
- *The model should be simple to use, avoid biases and allow clear, transparent decisions to be made and justified.*

The Model Includes Hazard Identification and Risk Assessment

Only a few questions with pre-formatted replies, leading to subjective probabilities in the background generate a risk evaluation which is compared to a "traffic light" action advice by the model: **clear**, **sample**, **cancel**.

Field questions	
QUESTION 1 a) did you see/hear of UXO presence on site? b) If "heard of" by whom? c) If "yes" or "heard of" what type of UXO; If "no" what type of suspected UXO? d) How far is the item from the village?	No strangers, rumors General Purpose Bombs 1,5km to 2km
QUESTION 2 a) Was there ever an accident on site? b) If "heard of" by whom? c) If "yes" or "heard of" what type of UXO; If "no" what type of suspected UXO?	No strangers, rumors Cluster Bombs hospital
QUESTION 3 What's the past land use? (NB: carefully reply to this question if sampling is performed)	
Office questions	
QUESTION 4 Bombing data indicate targets in a 2km radius from site? (NB: requires judgement based on bombing maps (dot analysis only))	Yes
QUESTION 5 a) Was the bombing heavy? b) If "yes" or "heard of" what type of UXO; If "no" what type of suspected UXO?	Yes General Purpose Bombs

Your site risk vs action program

Site Risk

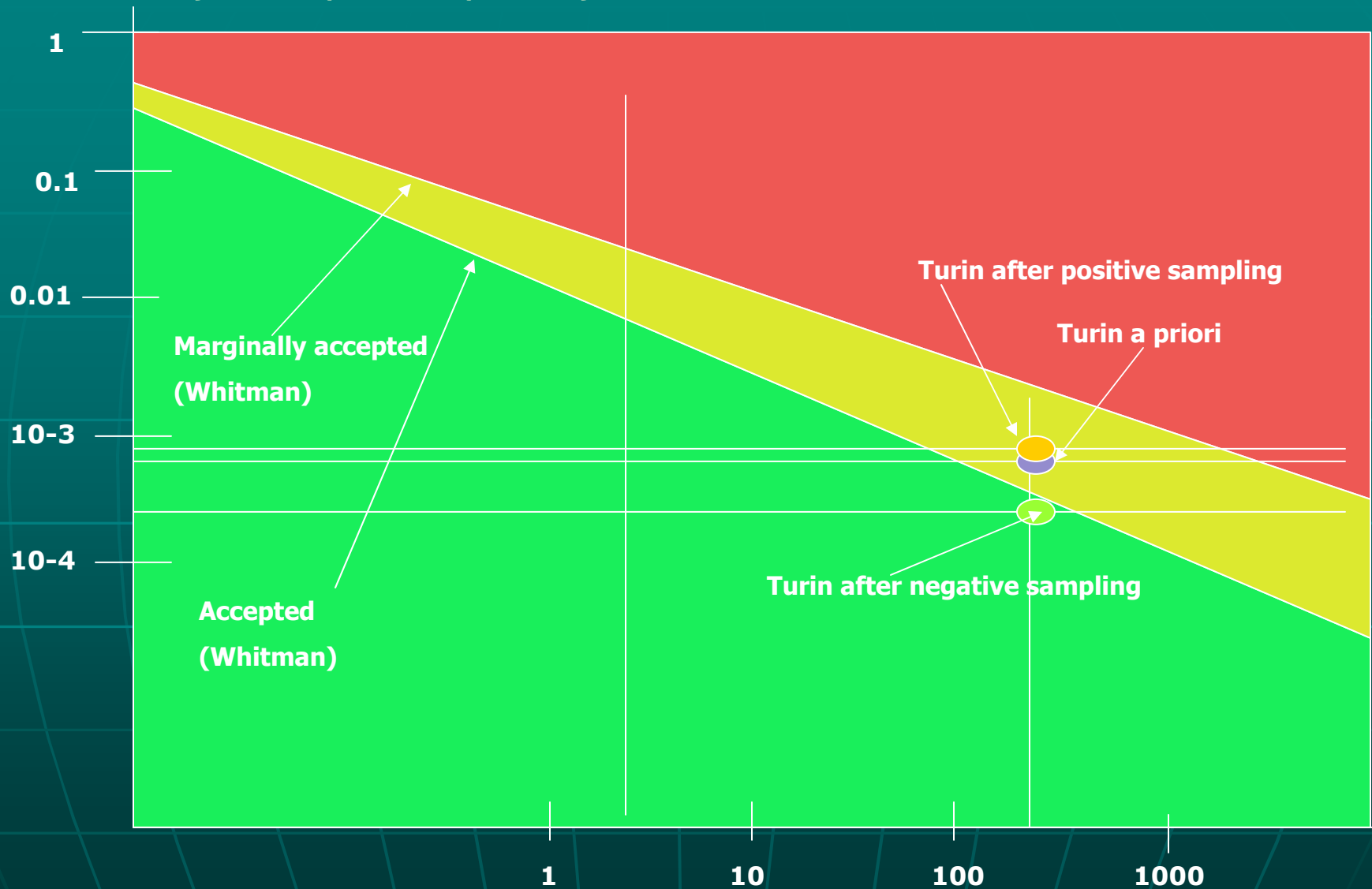
Expresses the likelihood of UXO(s) potentially on site detonating, combined with a numeric estimate of potential victims.

The plot to the left proposes action programmes as a function of the site risk

*NE: small risks may not be visible
NE: if your result is very near to an action program limit judgement should be used to come to a final decision.*

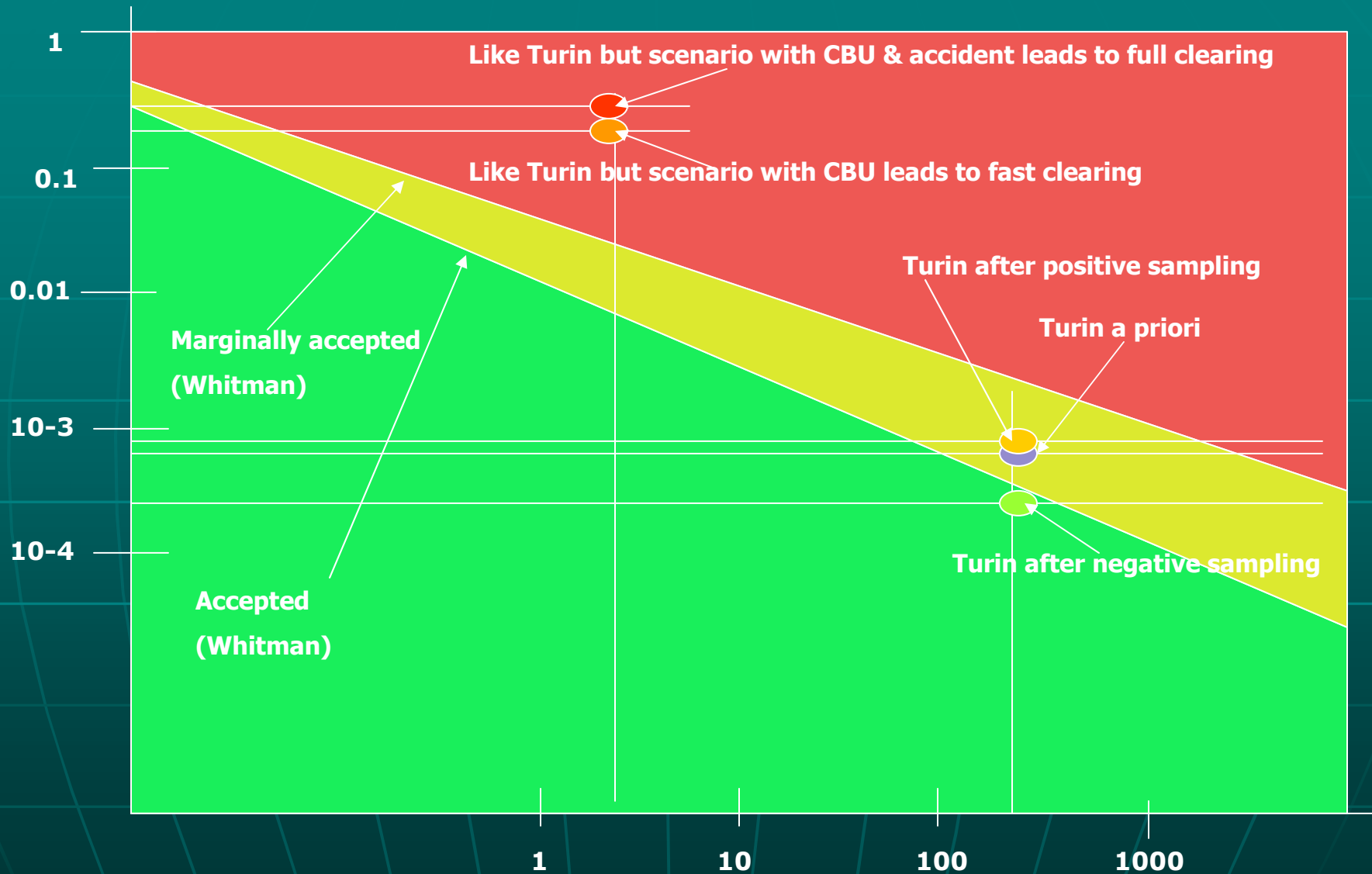
Risk Assessment Hazard Identification

The model was initially calibrated for UXO contaminated cities in Europe, using internationally developed acceptability criteria



Potential Victims of an Accident

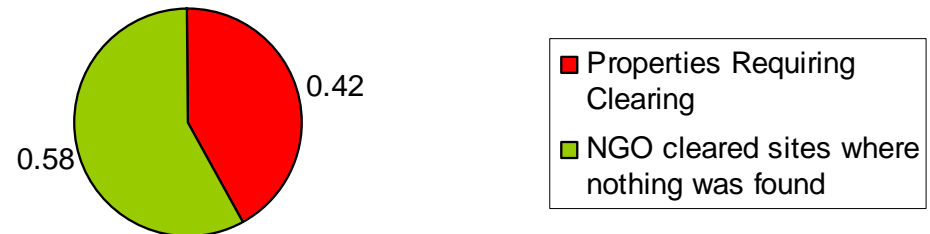
Cluster bombs were used for a second round of calibration of the model using a fictitious city as a background



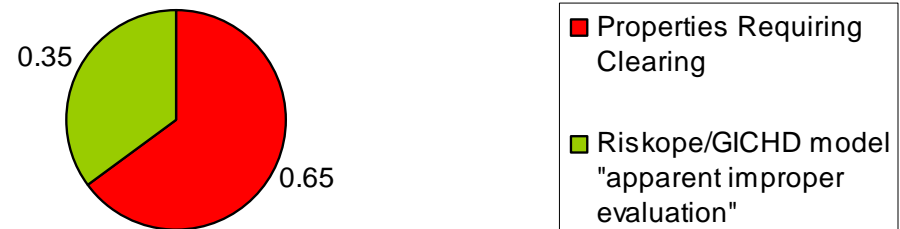
Potential Victims of an Accident

Finally the model was delivered to a NGO who used it in parallel to current practices to develop the necessary basis for a further possible calibration

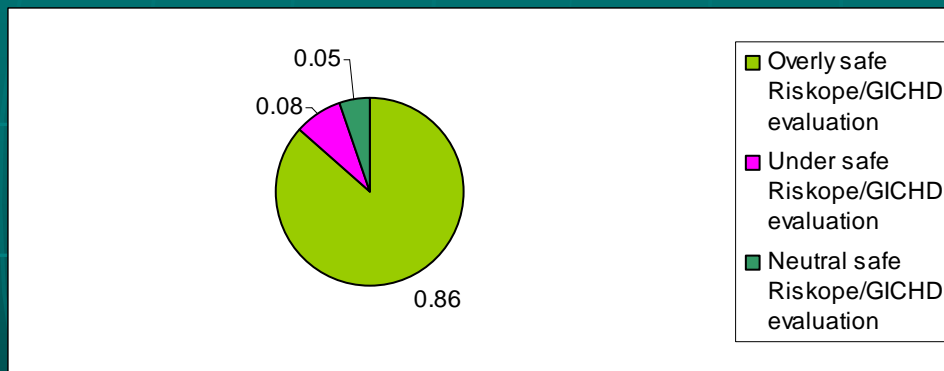
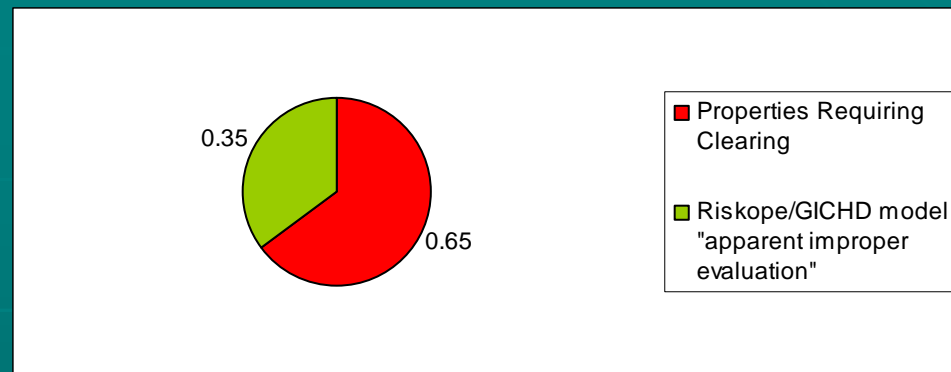
NGO practice: over half of the properties receiving clearing have no contamination!



Model test: 40% less mistakes, thus resources would be better allocated!

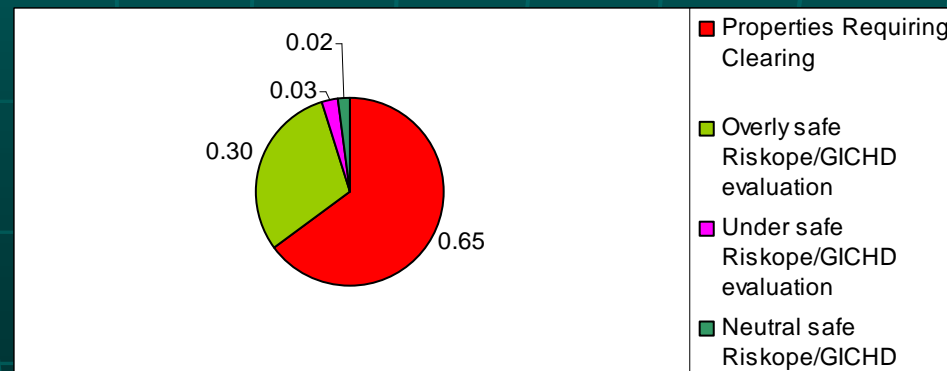


Model error analysis: 35% of "apparent improper evaluations"

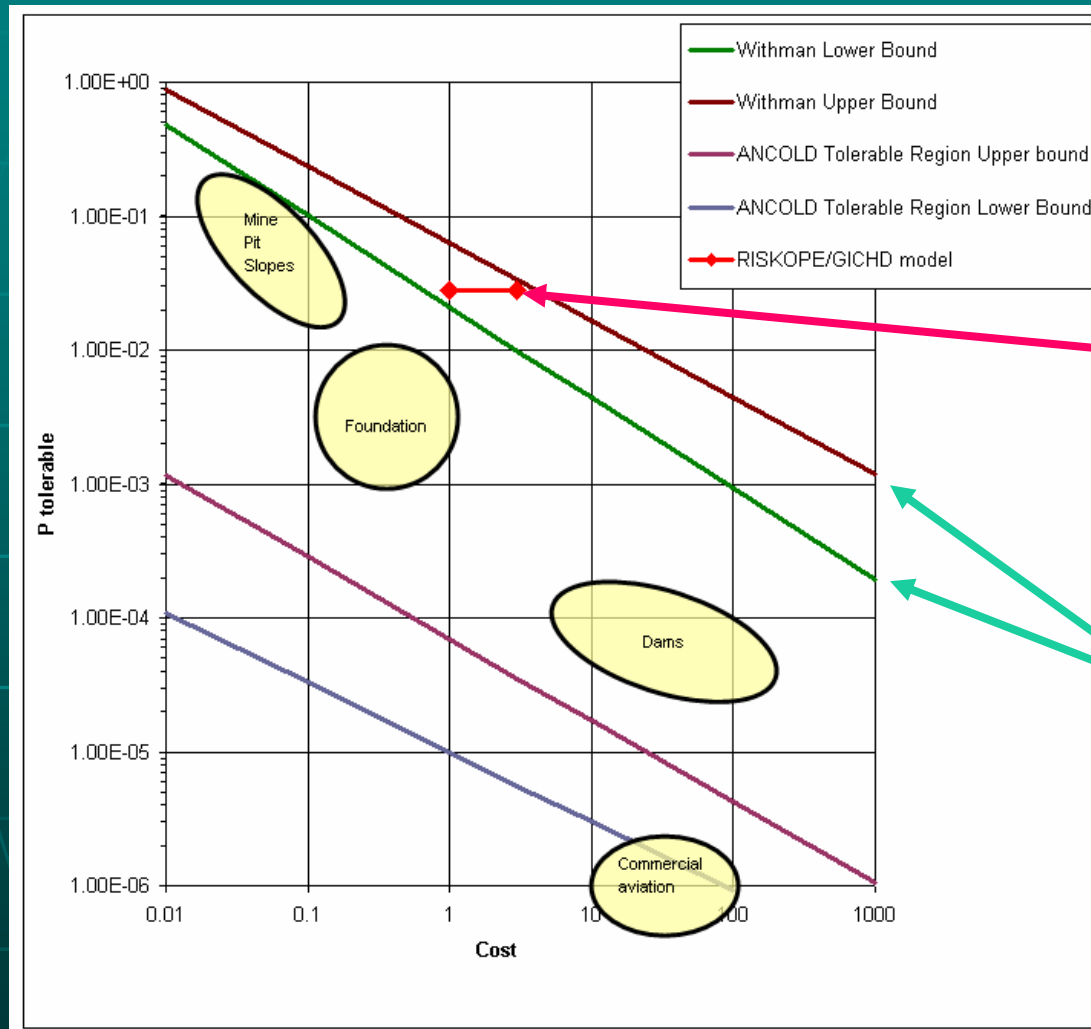


Most of the "apparent improper evaluations" (86%) are overly conservative, 5% neutral, 8% represent a residual risk

Looking at the results globally, the model "leaves behind" only 2.8% chances of an accident with BLU26



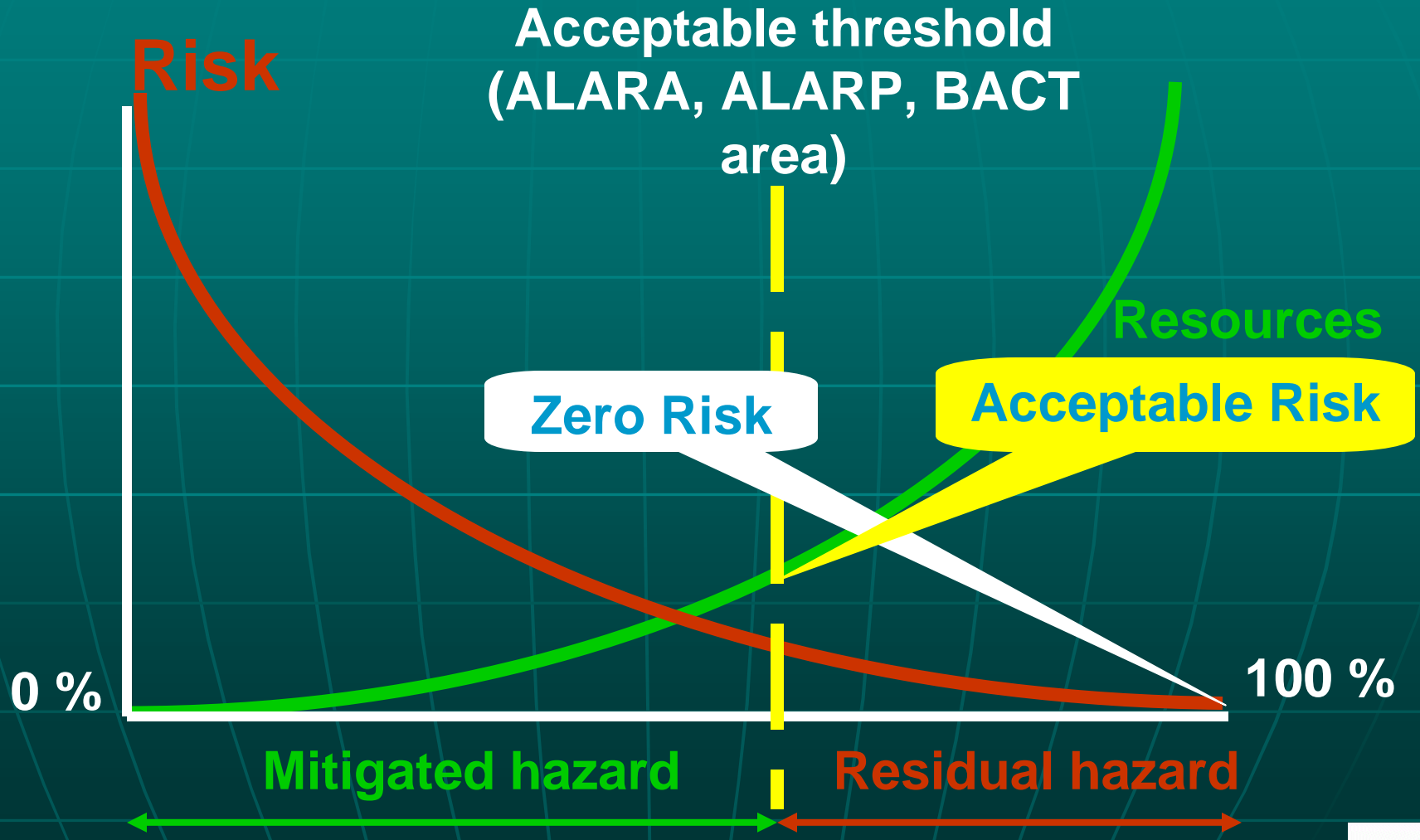
It is now possible to use the 2.8% probability of a BLU26 accident (which has the potential to generate 1-3 casualties) to see if the residual risk is socially acceptable (using the same acceptability criteria used for calibrating the model)



Residual Risk: 1-3 victims with a probability of 2.8%

Acceptable when compared to internationally recognized societal criteria

A government could either use the societal risk acceptability curves, or develop an acceptable threshold of risk mitigation (ALARA, ALARP, BACT, other?) to set a limit to the costs of mitigation vs effectiveness of risk mitigation.



Results of Applying the Model

Enhanced Strategic planning and prioritization

Better Sequencing of tasking so that impact is reduced in stages that are more equitable than current practices

Enhanced Resources Allocation