

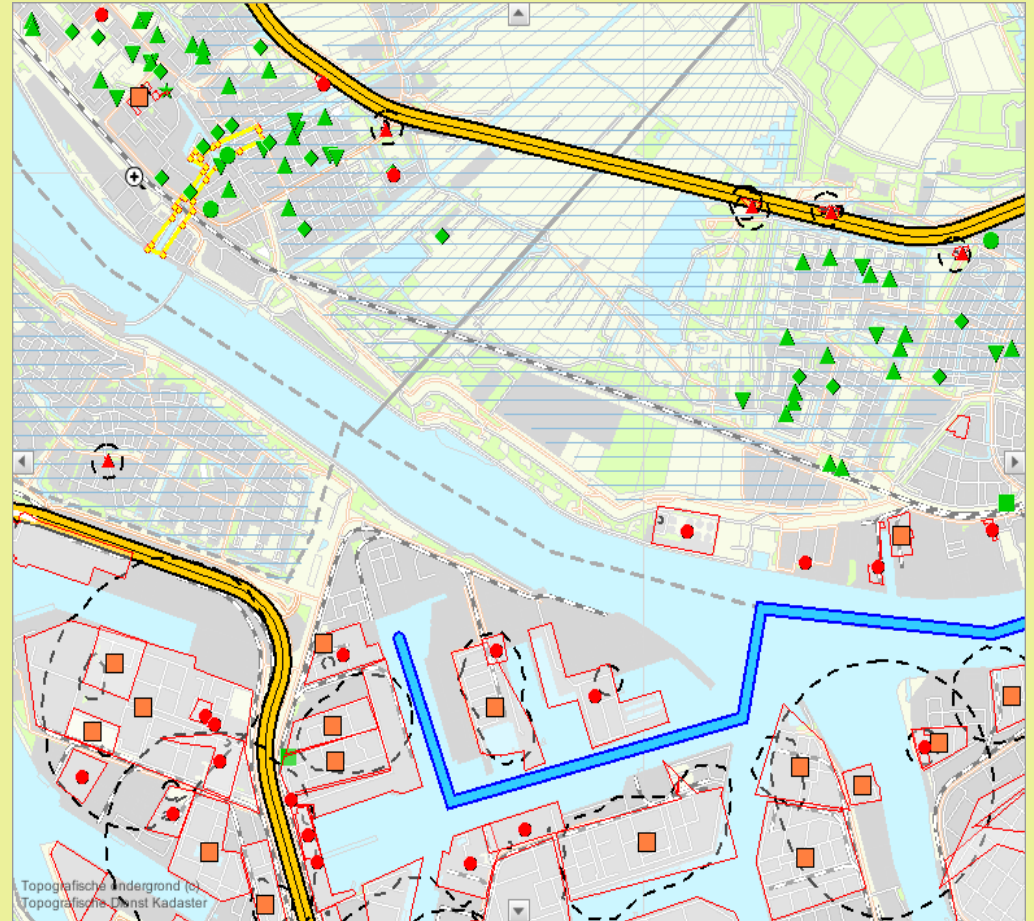


Paul Uijt de Haag, Leendert Gooijer, Peter Frijns
**QRA for land use decisions –
Need for unification and the validity**



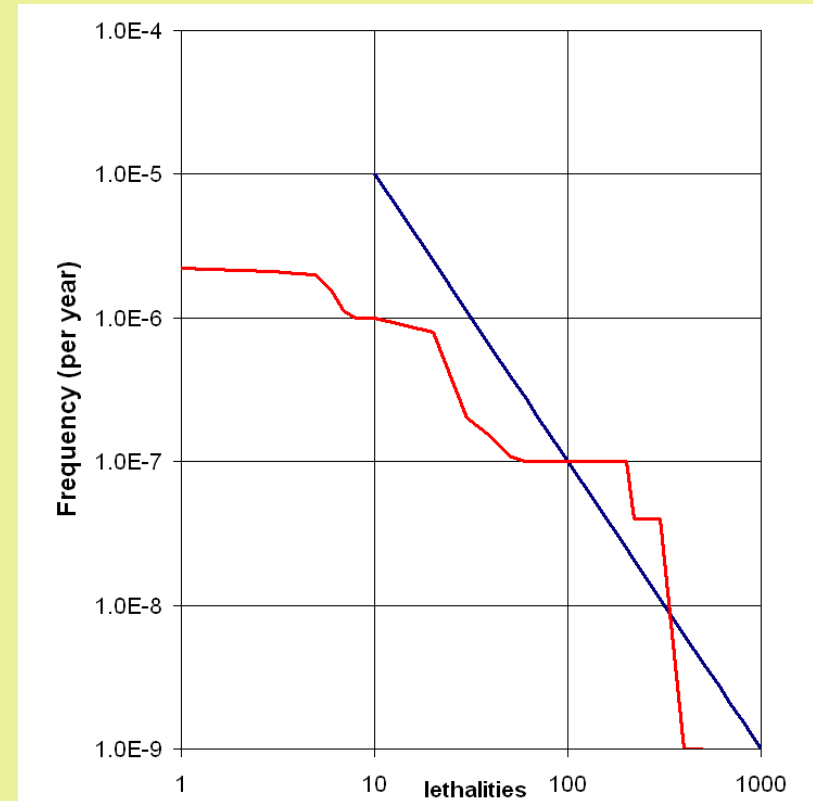
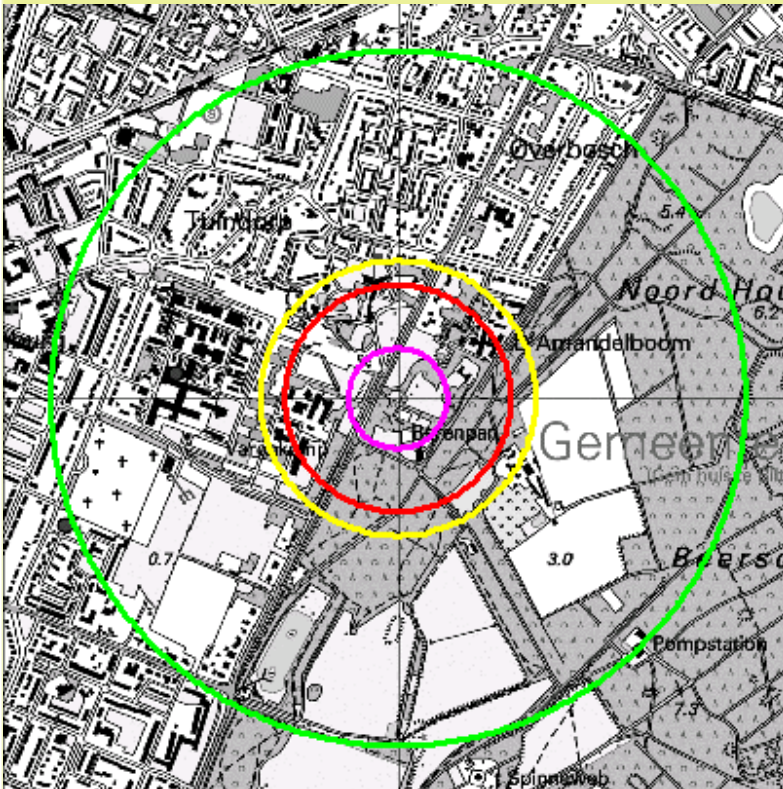
Land use planning in the Netherlands

- Land use planning for dangerous substances based on quantified risk calculations
- Risk criteria are established in legislation



Risk criteria

Location based Risk and Societal Risk

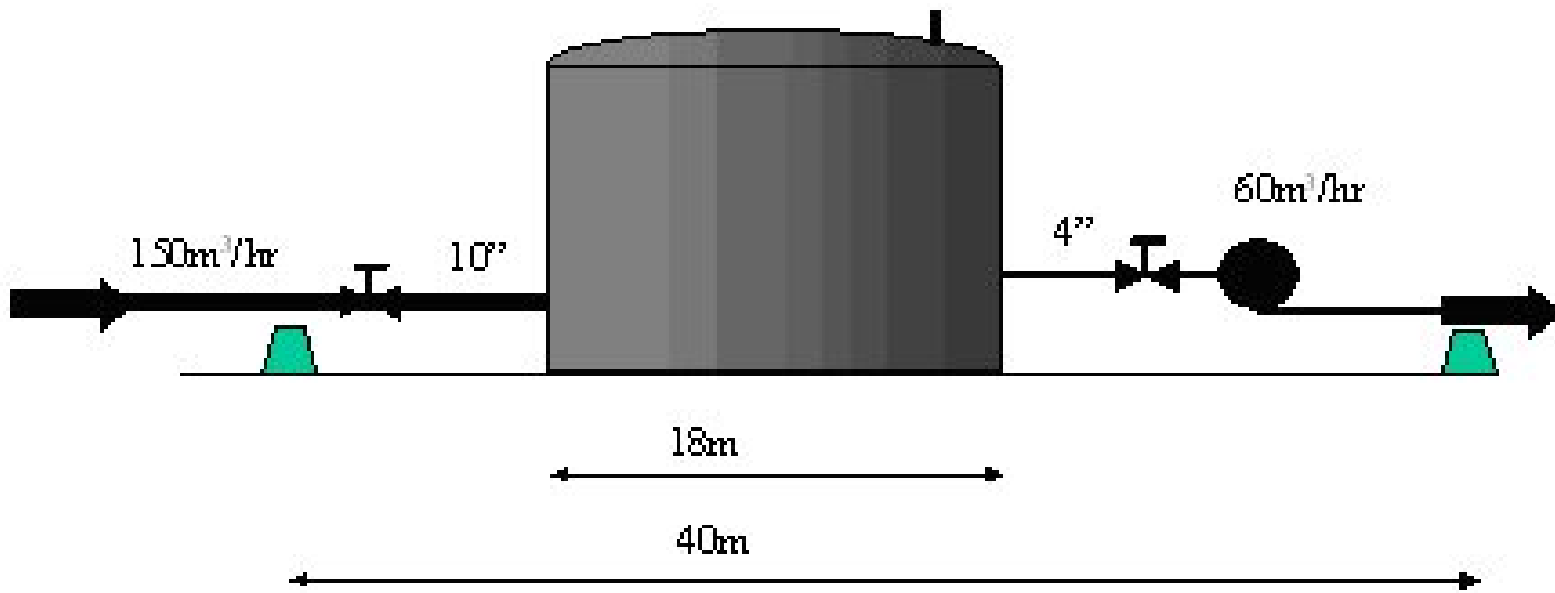


Basis for QRA calculations

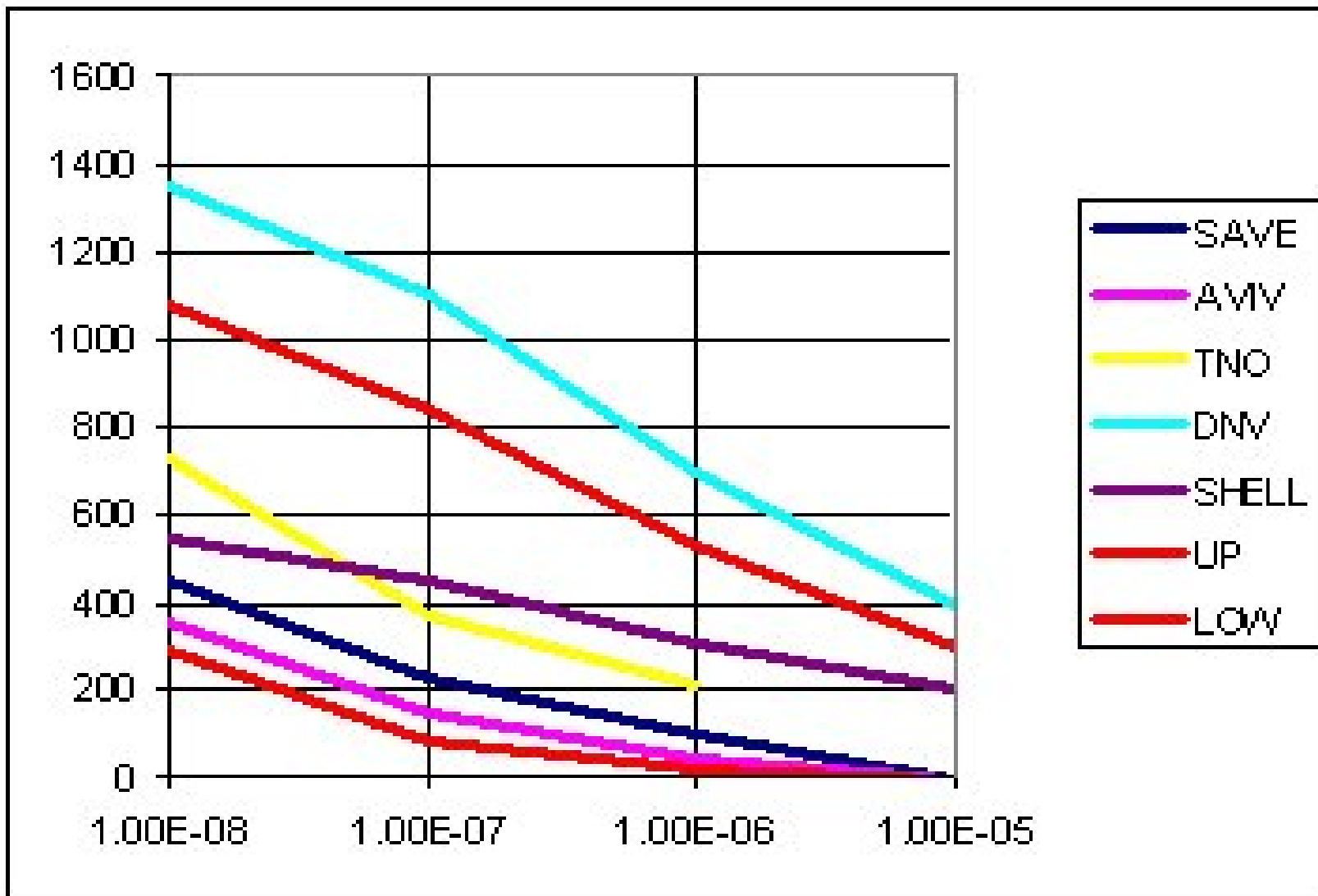
- Guidelines
- computer models
- Benchmark ...



BRAM - Benchmark Risk Models



Results benchmark



Conclusion of the benchmark

- Differences in model results are too large
 - Results are not transparent
 - Results are not verifiable
-
- Conclusion:
 - QRA method was not clear enough for land use planning

Solution

- Fixed 'risk' distances for 'standard' situations
 - LPG filling stations
 - Ammonia refrigerators
 - warehouses

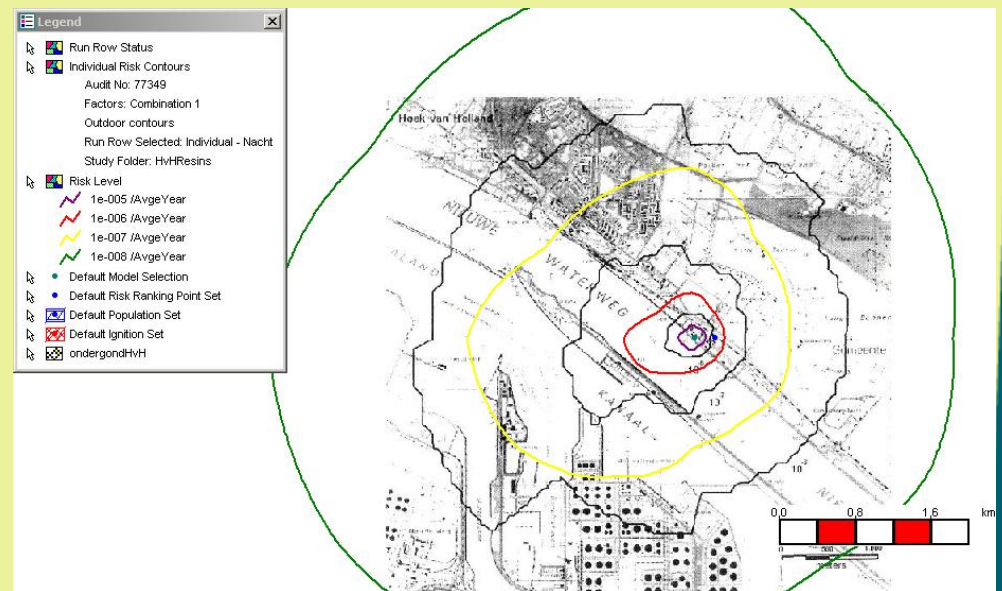
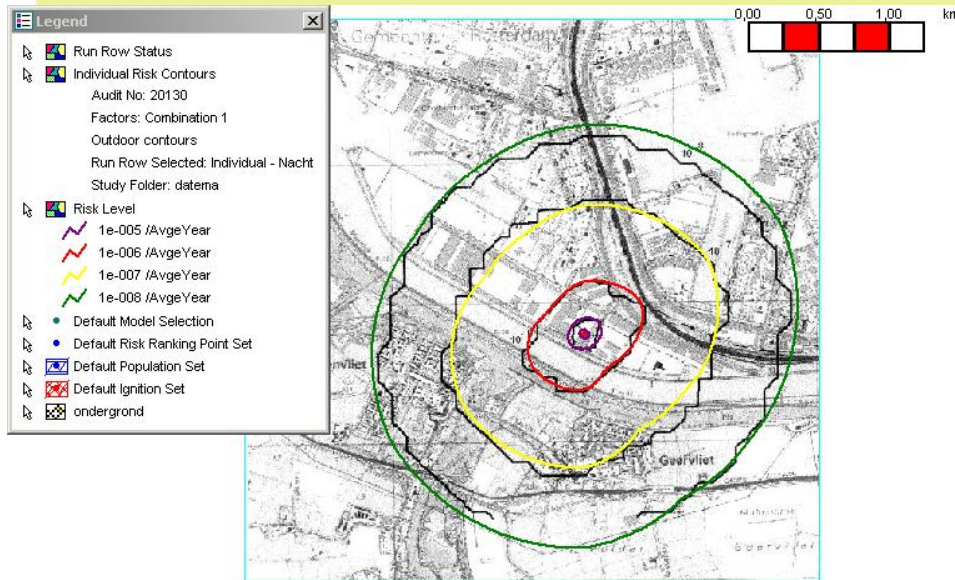
- One software model prescribed – SAFETI-NL

Solution

- Guideline more tight
 - Fixed failure frequencies
 - Prescribed model input
 - Fixed dose-response functions
- Stringent procedure for deviations

Advantages

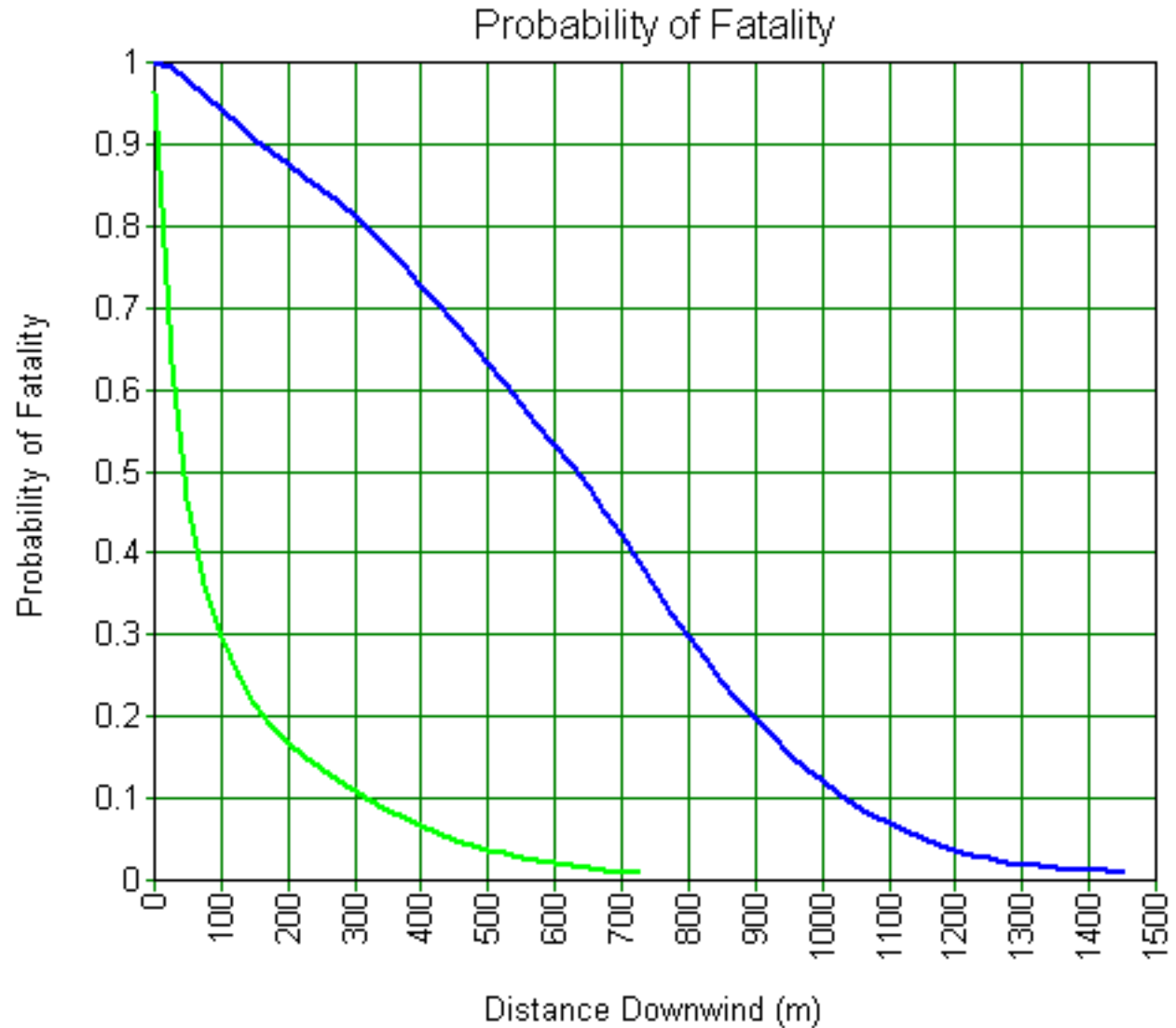
- Results are transparent
- Differences are traceable to input



Balance between transparency ↔ reality

Study Folder: TV release
Run Row: Individual
Audit No: 5394
Weather: D 5 m/s
Material: CARBON
MONOXIDE
Models/Cases

— CO vat: Outdoor
— CO vat TV: Outdoor



How valid is the QRA

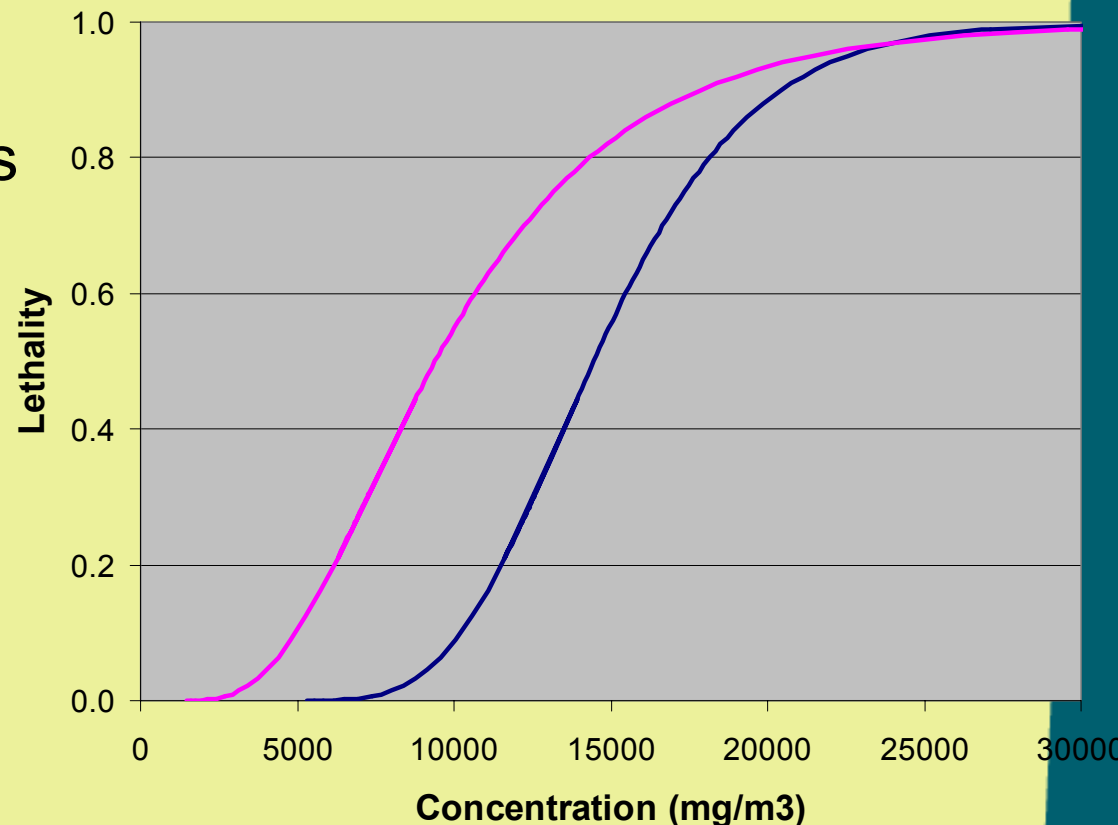
- 'QRA' is now standardized
- Useful instrument for land use planning
- Link between actual risk and QRA weaker
 - Risk reducing measures difficult to evaluate
 - Strict procedure for model changes

QRA for land use planning - comparison

- QRA looks similar in different countries, but

- Large differences exist in
 - standard failure frequencies
 - end point
 - dose-response

- Results similar



Conclusions

1. QRA for land use planning is a compromise between reality and transparency
2. QRA differs between countries
3. QRA is an integrated method and is directly linked to legislation
4. QRA is (only) useful for its purpose

Conclusions

5. Challenge to include risk reducing measures in a transparent QRA method