Health and Safety
Executive

HSE

Pipelines Risk Assessment and LUP in HSE

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HID CI5G

HSE involvement in LUP

- Extends back to the early 1970s
- Flixborough (1974) and Seveso (1976)
- Advisory Committee on Major Hazards
- Planning Legislation and HSE as a Statutory Consultee
- Advice given through PADHI

Legislation

HSE	LPAs
Notification of Installations Handling Hazardous Substances Regulations 1982	Planning (Hazardous Substances) Act 1990
COMAH	Planning (Hazardous Substances) Regulations 1992
Pipeline Safety Regulations 1996	General Development Procedure Order 1995 (GDPO)

Developments on Land Use Planning

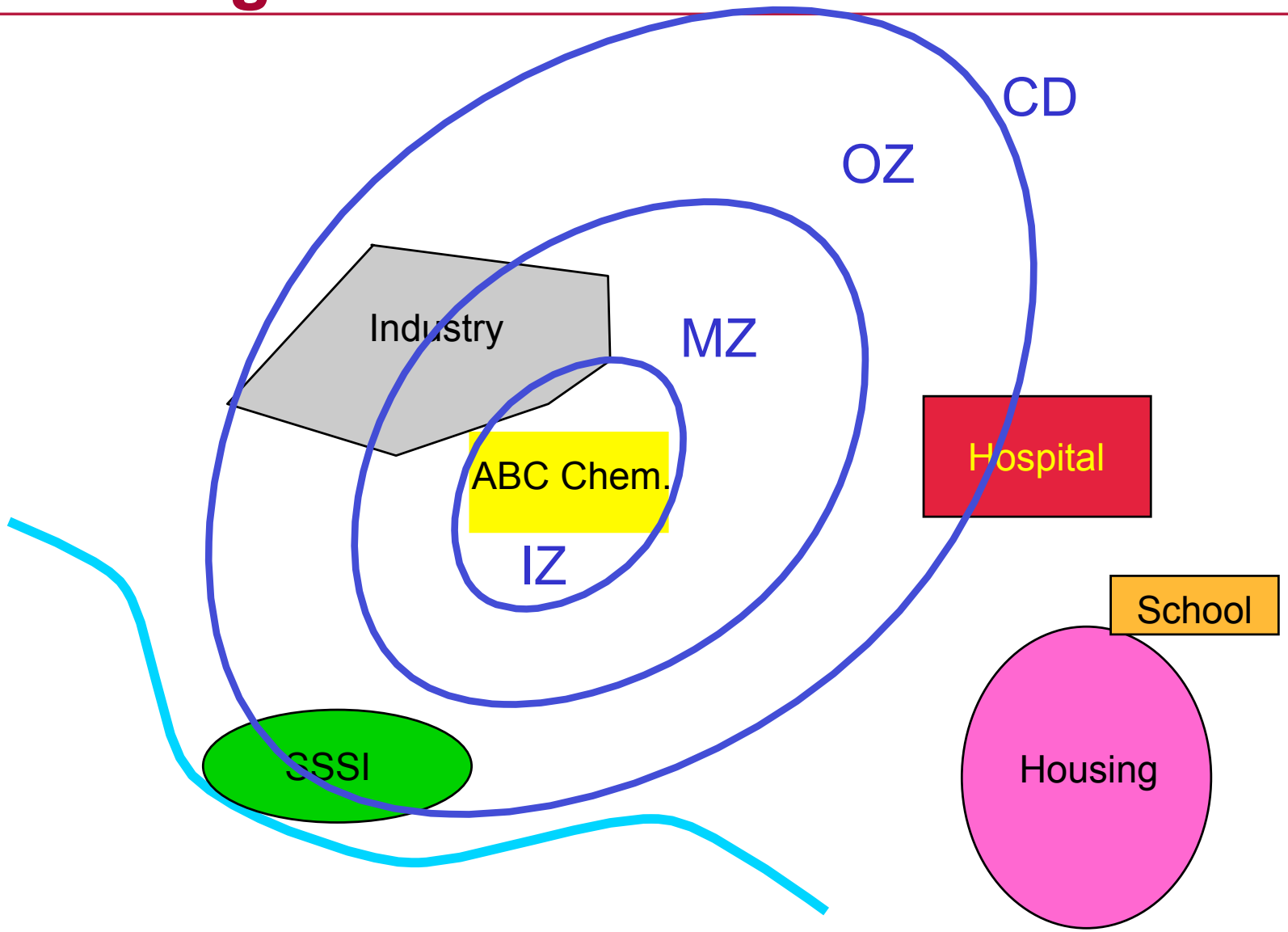
Current system

- HSE's role is two fold but both advisory -
  - setting consultation distances
  - advising on proposed developments in vicinity of hazardous installations

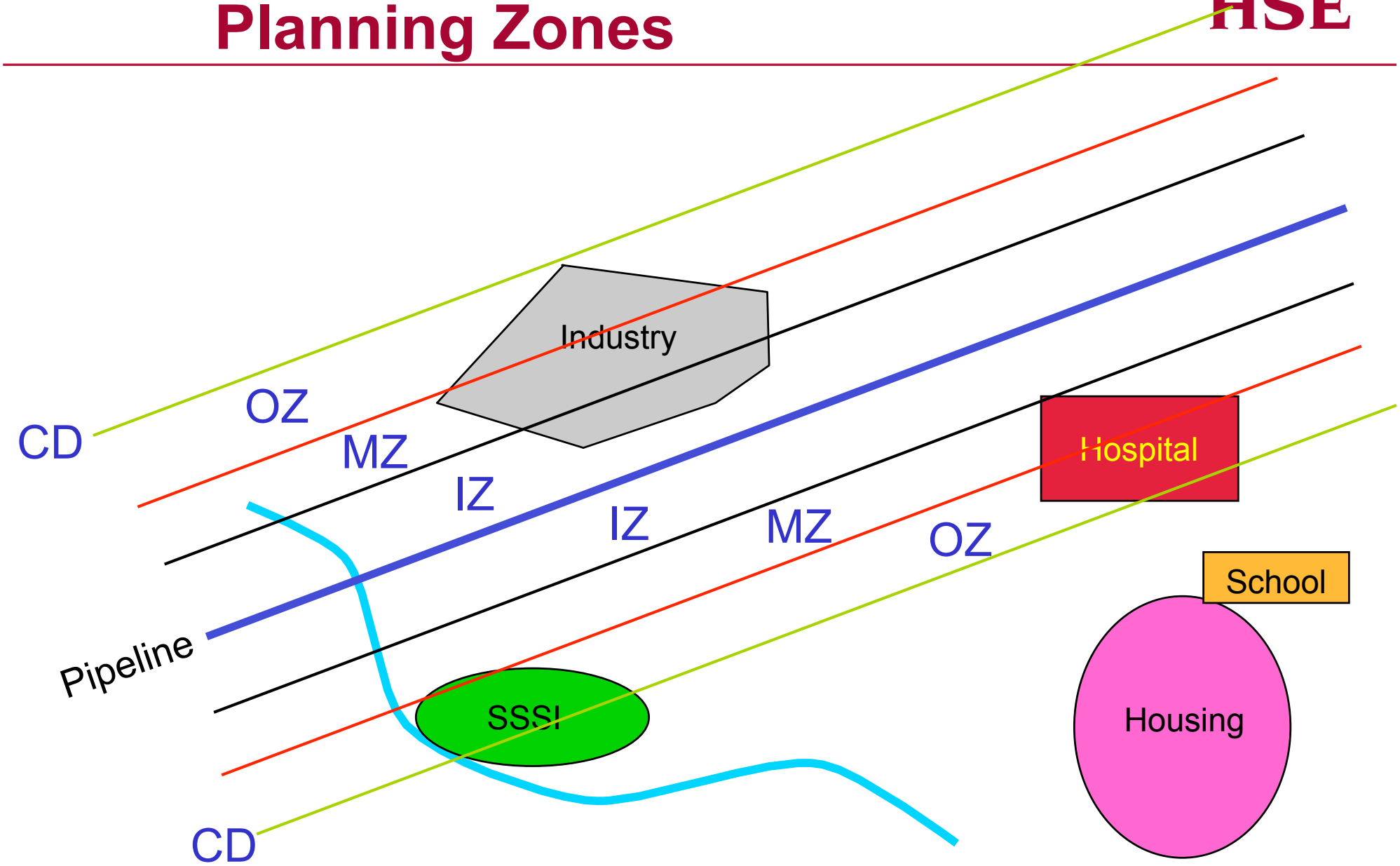
Land Use Planning

- Zones define areas of particular concern
- Consultation Zone is limit of HSE interest
- Within CD there are:
    - Inner Zone (10 cpm)
    - Middle Zone (1 cpm)
    - Outer Zone (0.3 cpm)
- Chances per million (cpm) per year of receiving a Dangerous Dose
- Consequence based zones (mainly for flammables)

Planning Zones



Planning Zones



Societal risk – cross-Gov't work

- HSE LUP advice largely based on individual risk - cumulative affect of developments is not considered
- Population levels/density around sites can increase over time
- Cross-government Task Group
- Not a new concept

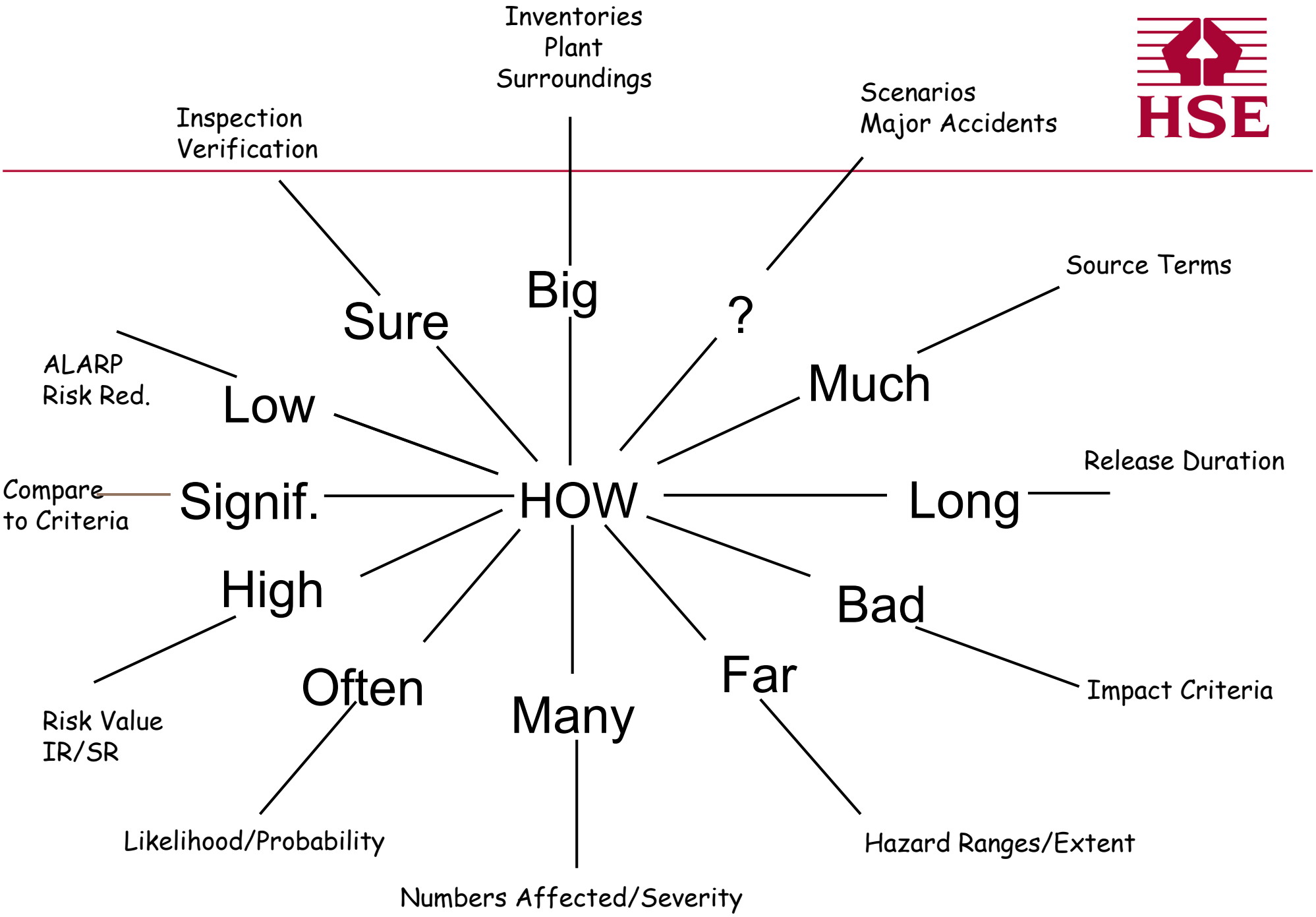
Risk Assessment

- Risk from steady state operation of pipeline
- (Not construction, etc.)

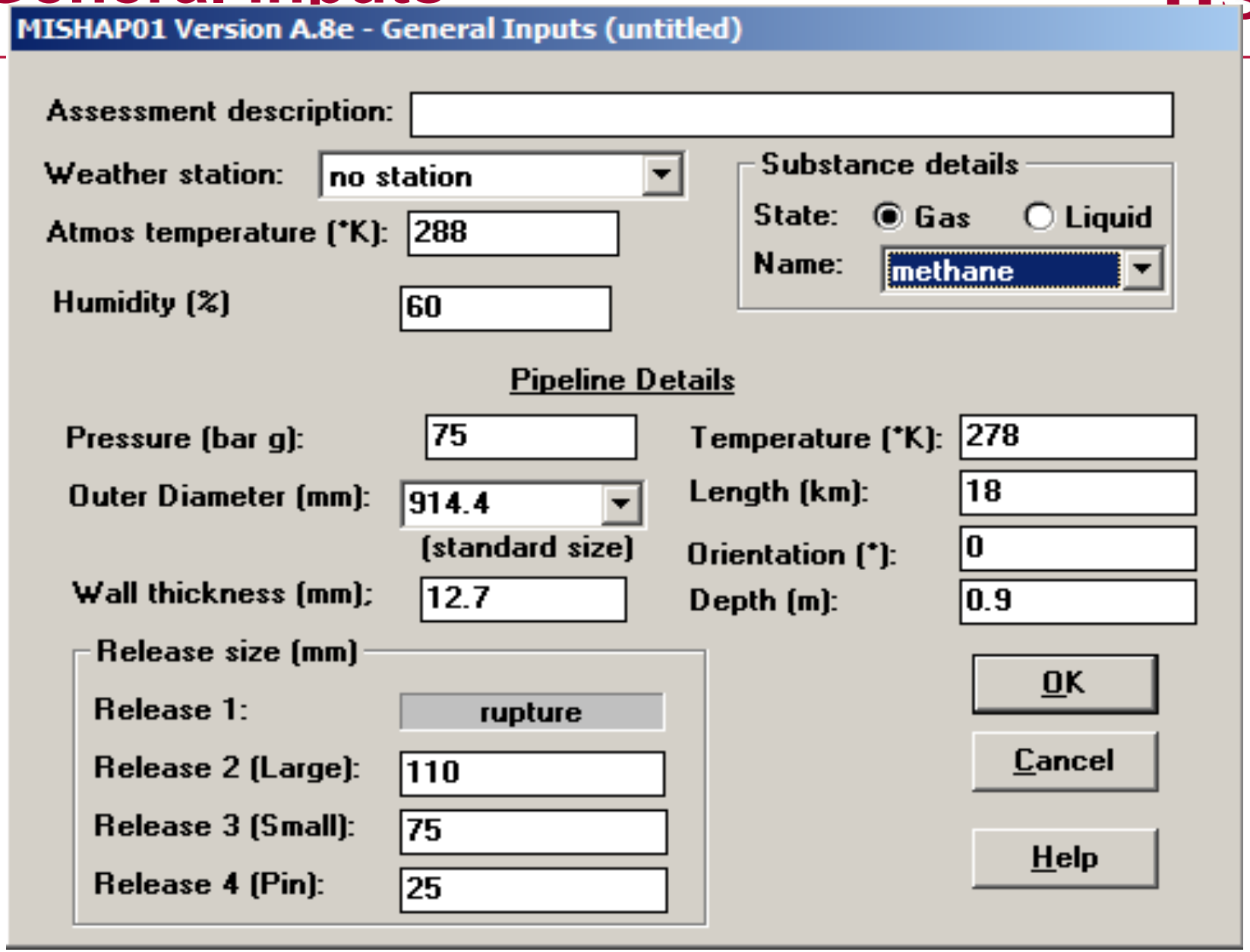
Pipeline Risk Assessment Process

HSE

- Inputs to MISHAP
- Event likelihood
- Consequence calculations
- Risk outputs


HSE
Inventories
Plant
Surroundings
Inspection
Verification
Scenarios
Major Accidents
Sure
Big
?
Source Terms
ALARP
Risk Red.
Low
Much
Release Duration
Compare
to Criteria
Signif.
HOW
Long
High
Bad
Risk Value
IR/SR
Often
Many
Far
Impact Criteria
Likelihood/Probability
Numbers Affected/Severity
Hazard Ranges/Extent

General inputs



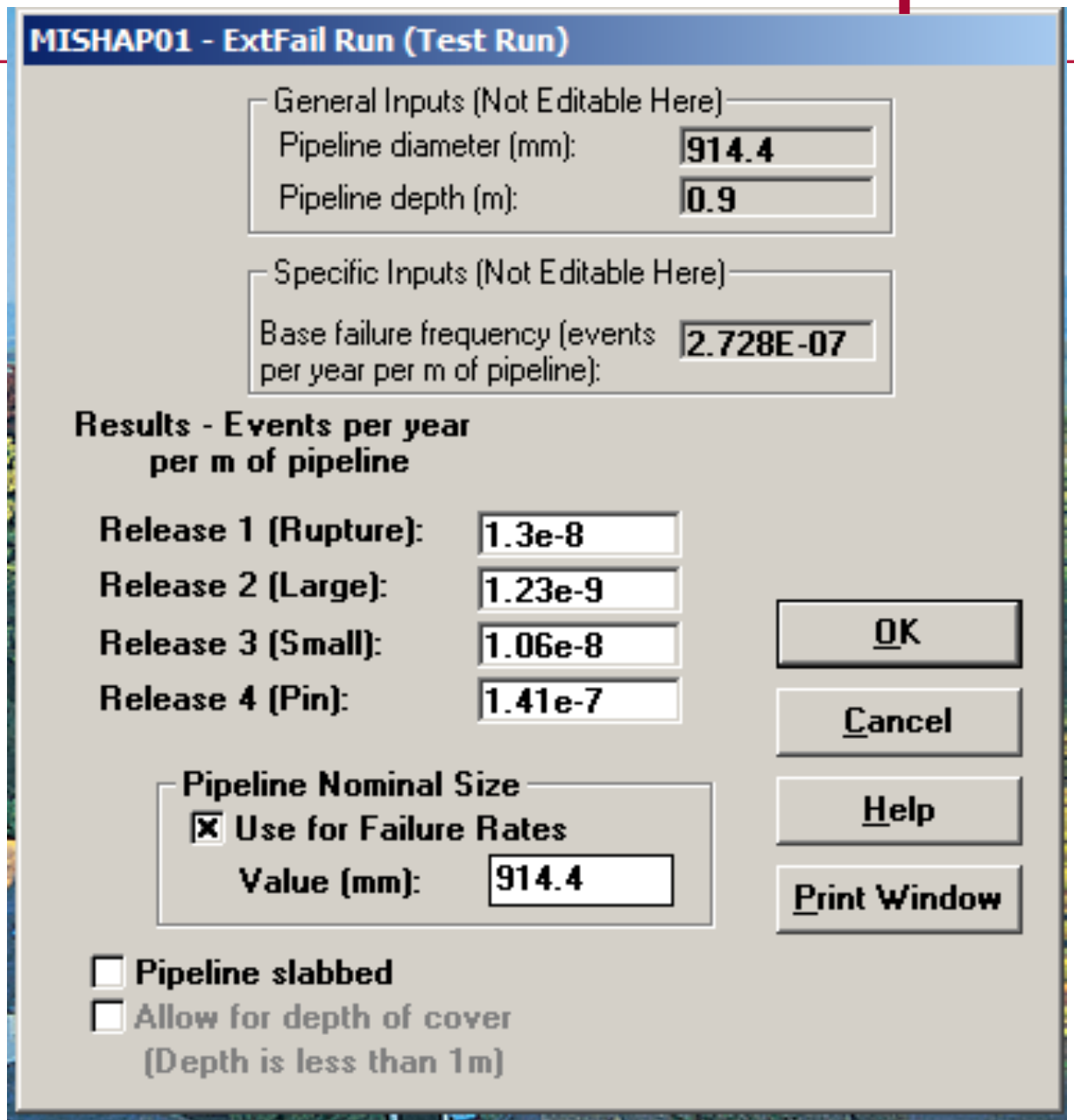
Event likelihood –Failure frequency

- Third Party Activity
  - Predictive model
  - Based on structural reliability
  - Uses BG damage data
  - Validated and verified against operational data
  - Similar to model used by Advantica

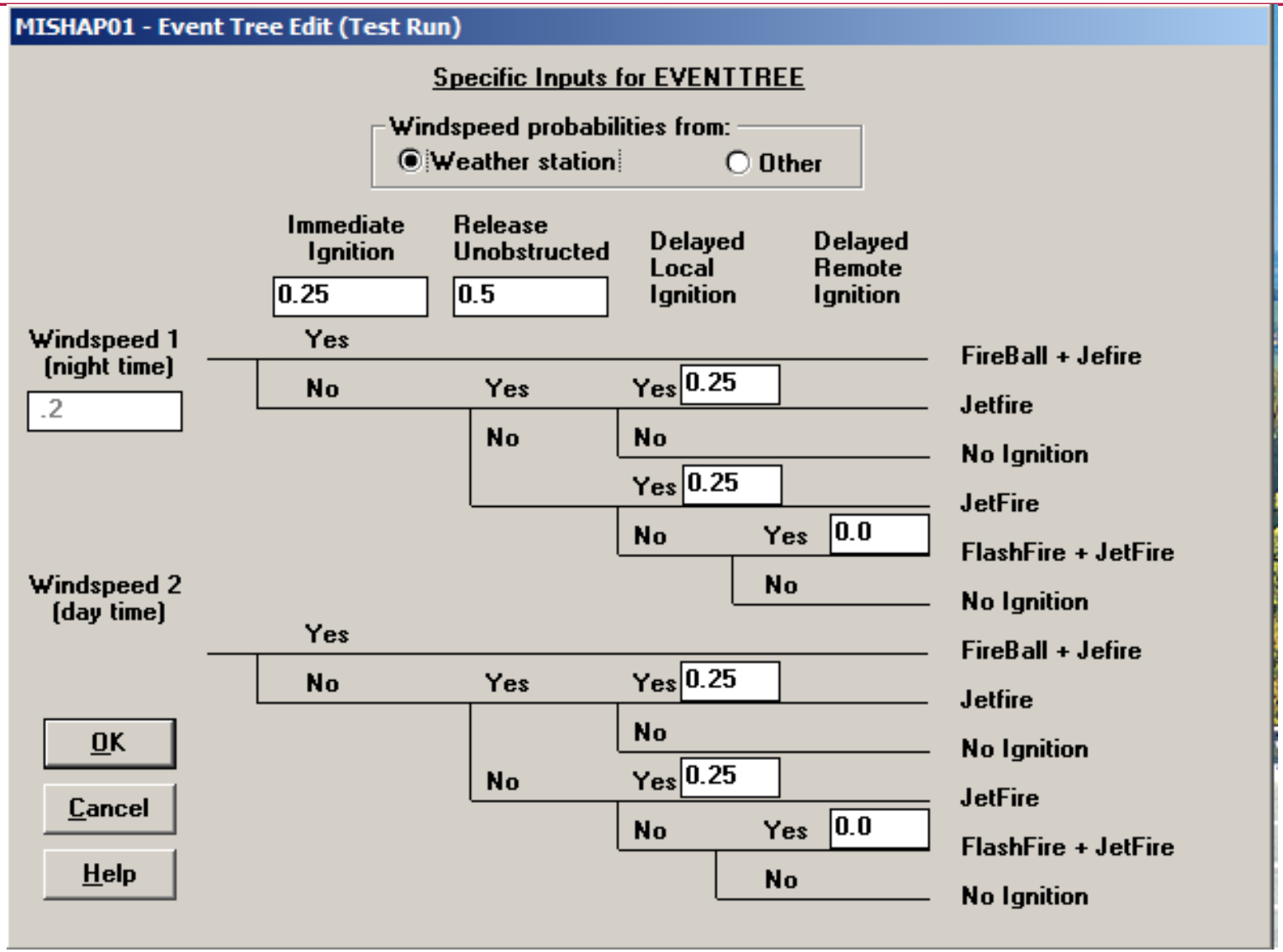
Event likelihood –Failure frequency

- Other failure modes
  - Mechanical, corrosion, natural causes and other
  - Previously based on EGIG data
  - Now based on UKOPA data
  - Main difference are in “mechanical” and “natural causes”

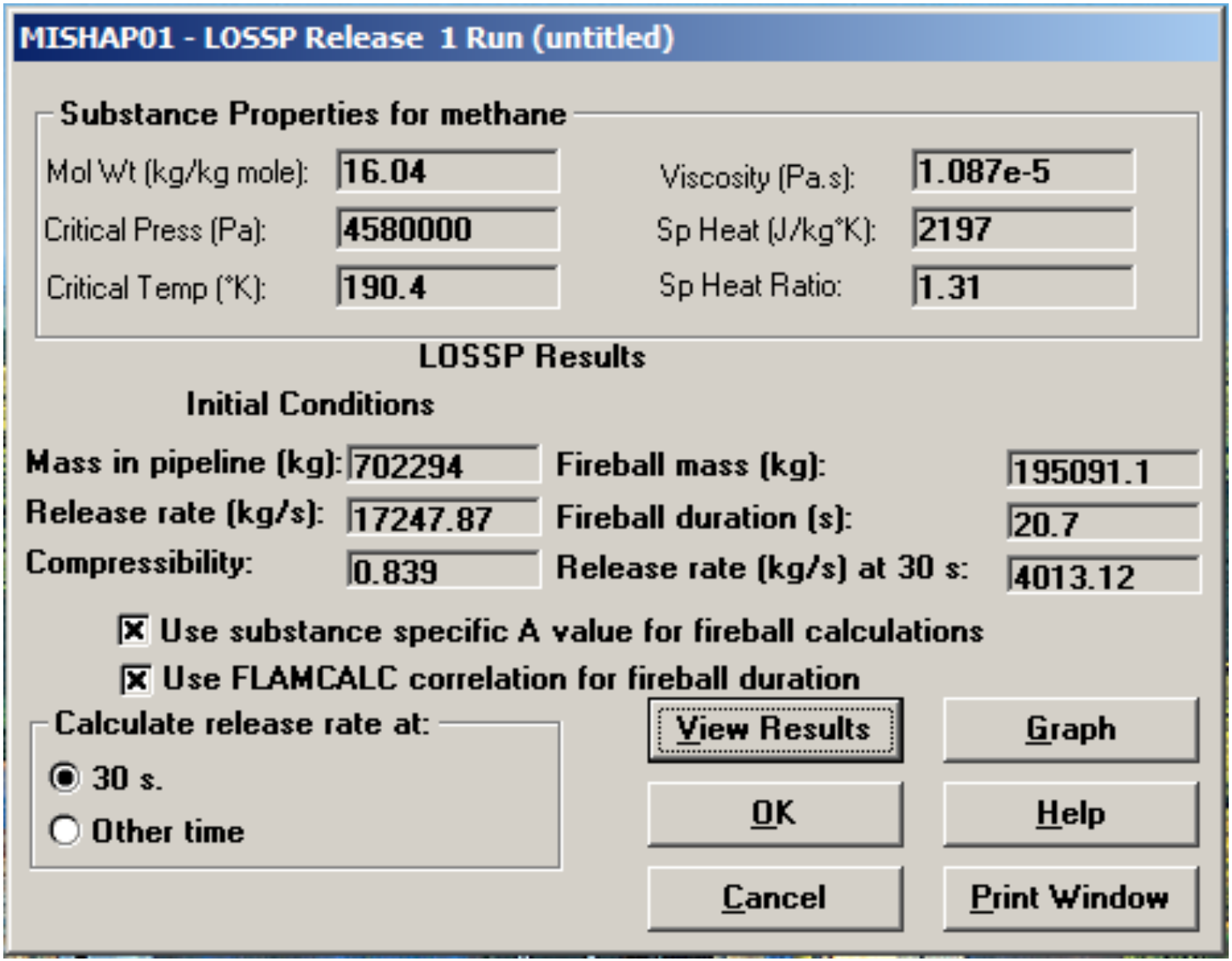
Event likelihood –Failure frequency



Event likelihood –Event probability



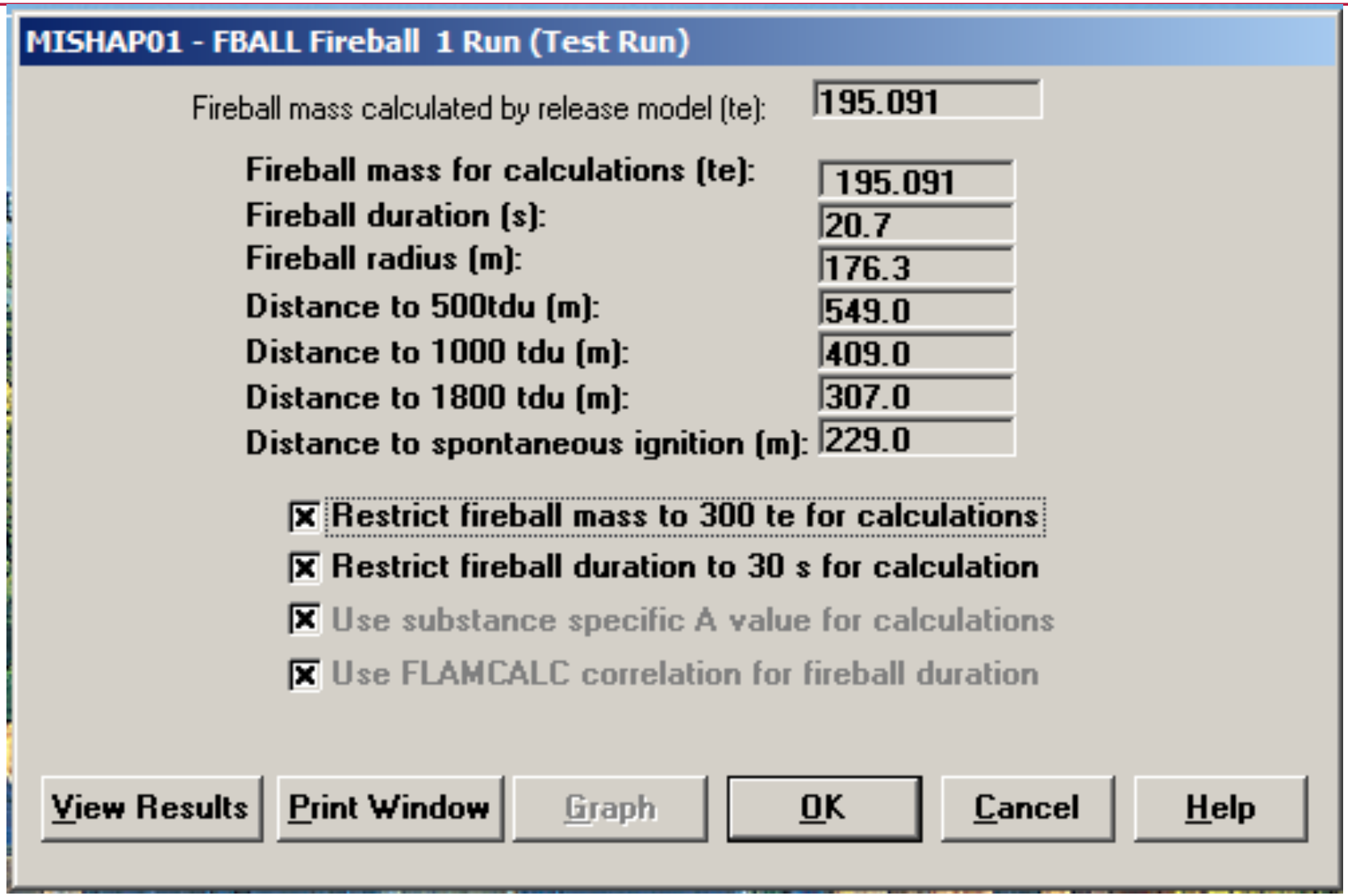
Consequences – release rates



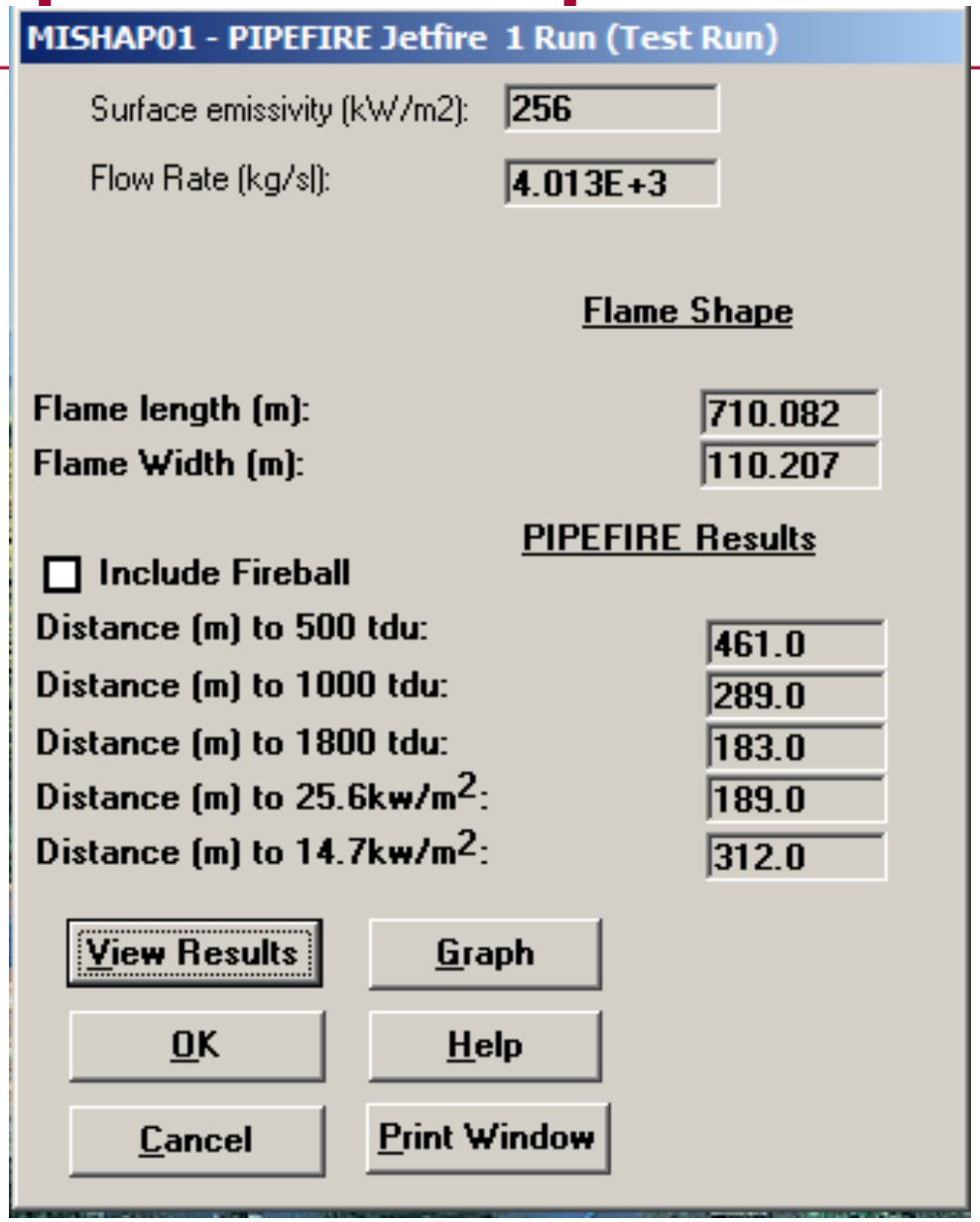
Consequences – impact models

- Fireball – FLAMCALC
- Jetfire – PIPEFIRE
- Flashfire – not used for natural gas
- Models have been compared to experimental and incident data (RR036, CRR294/2000)

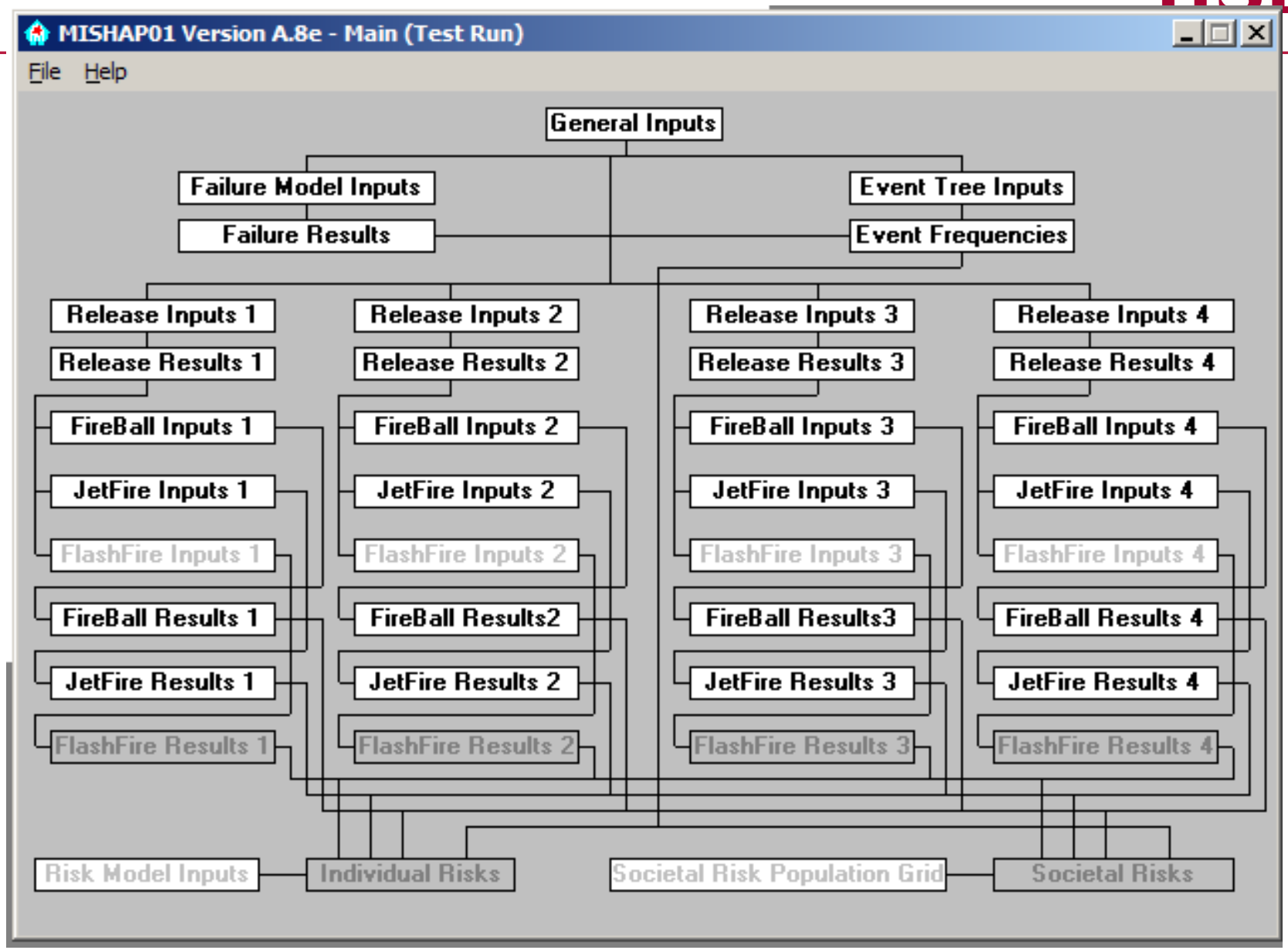
Consequences – impact models



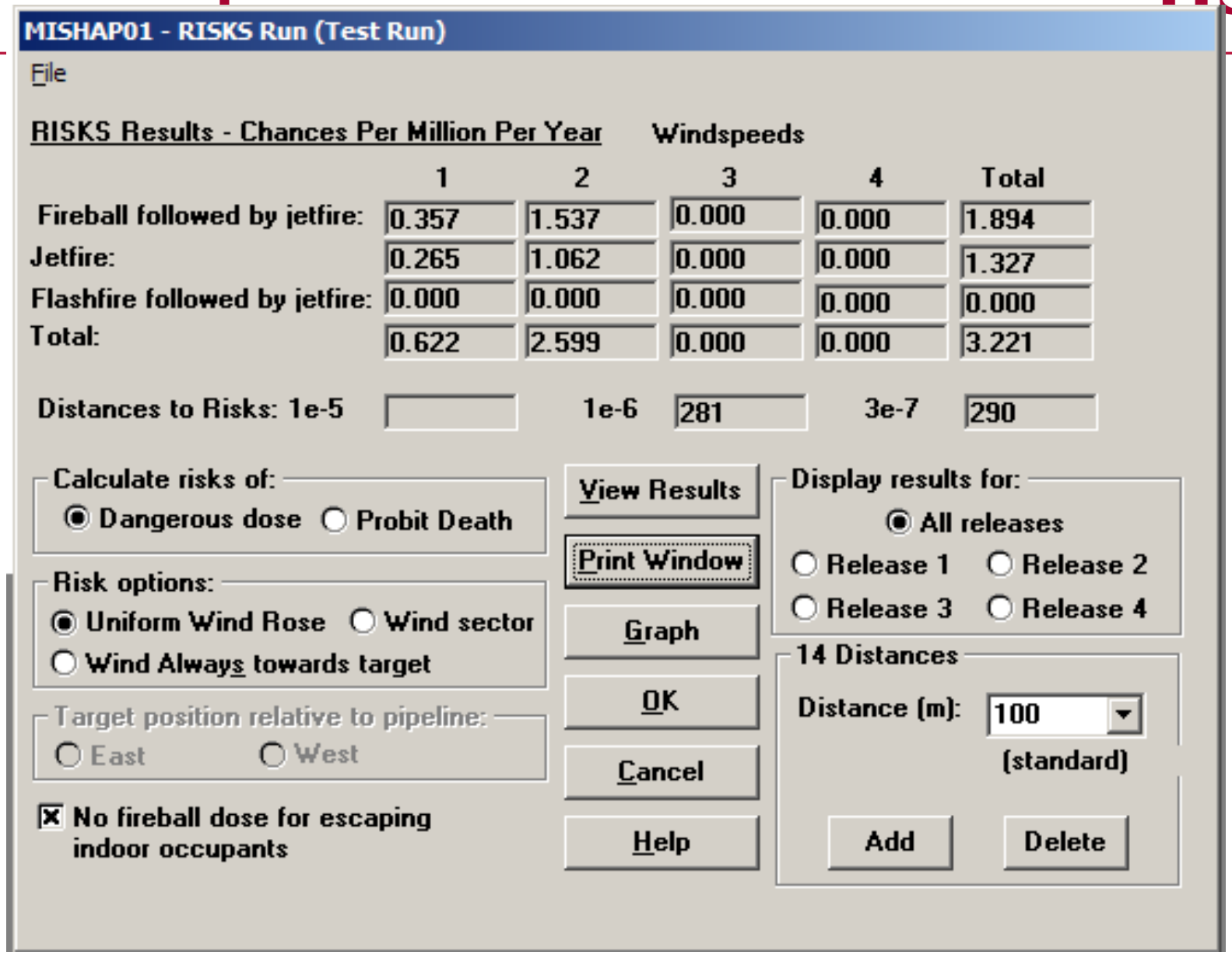
Consequences – impact model



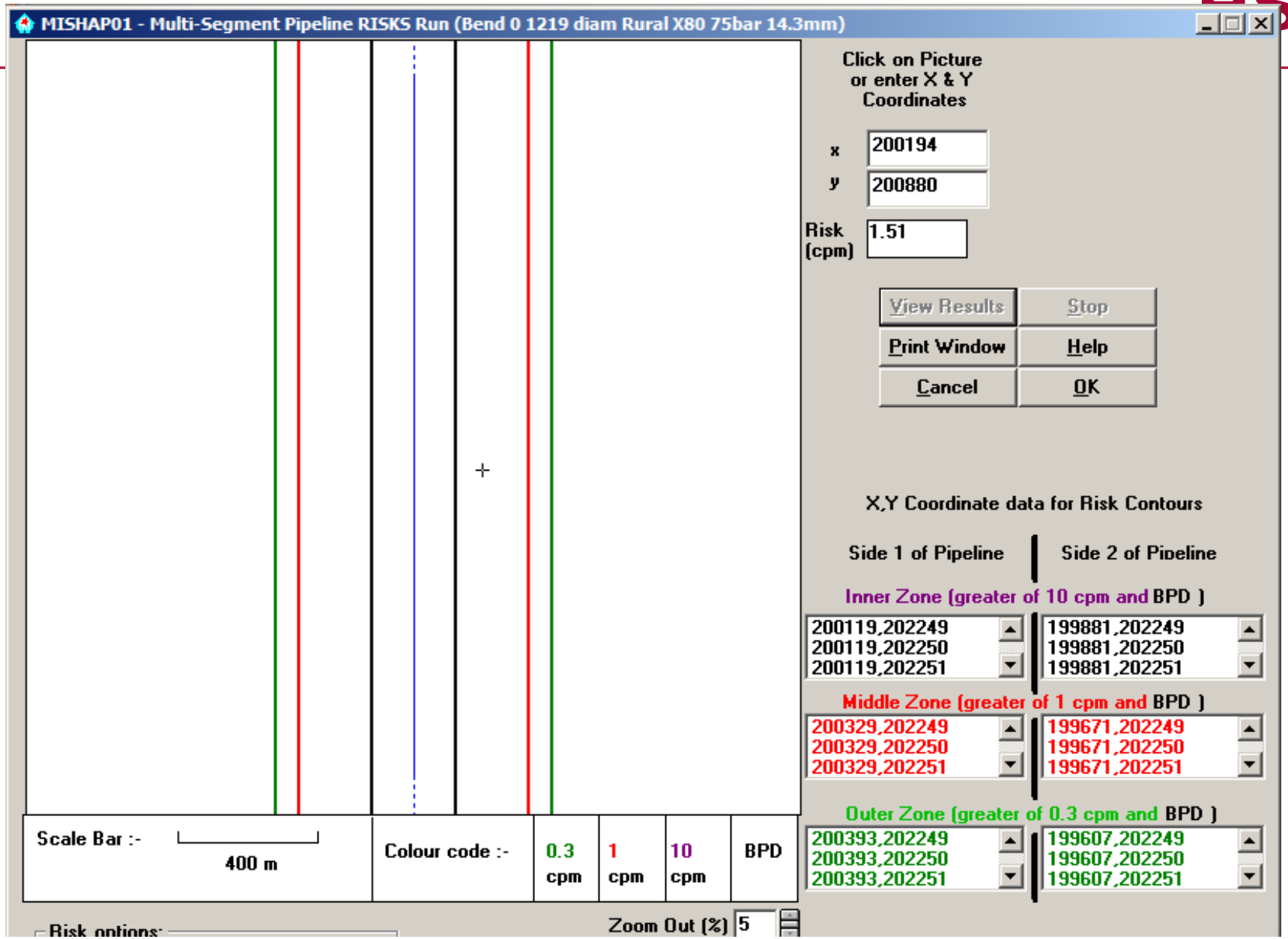
MISHAP structure



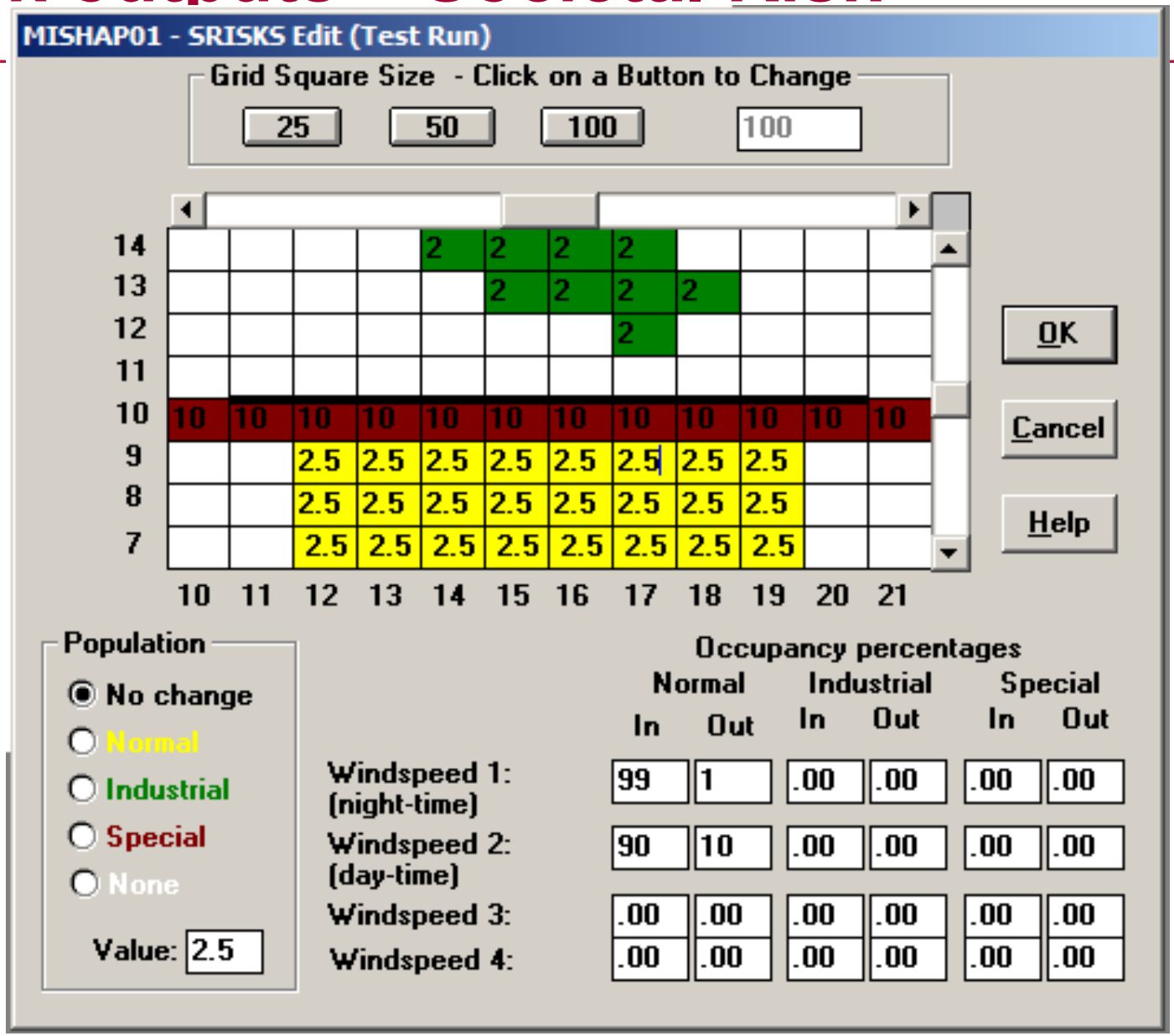
Risk outputs – Individual Risk



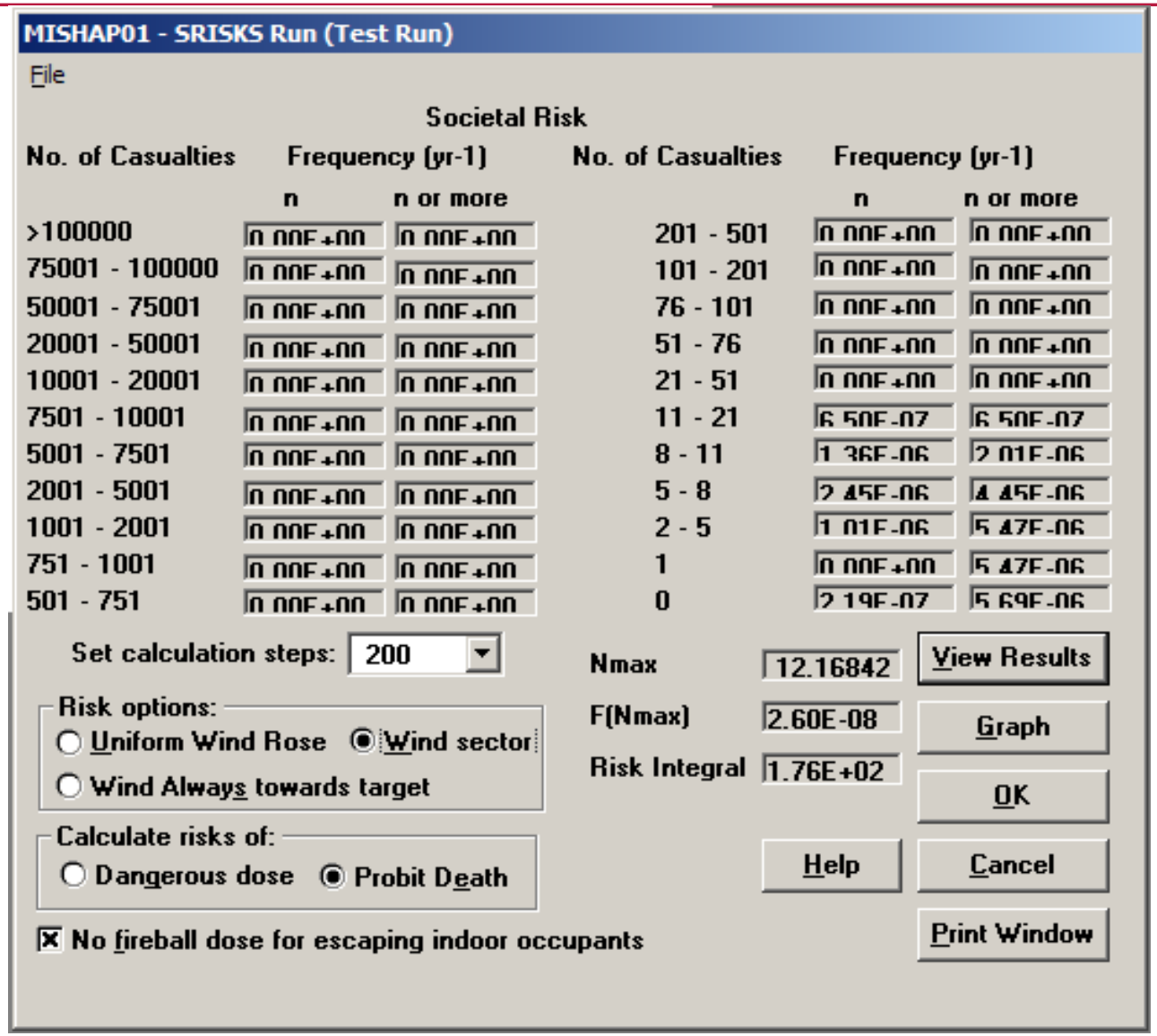
Risk outputs – Individual Risk



Risk outputs – Societal Risk



Risk outputs – Societal Risk



Other substances

- Propane
- Ethylene
- Hydrogen
- Crude Oil
- Ethane
- VCM
- Gasoline (PIPERS)
- Ammonia (Toxic PRAM)

Health and Safety Executive

PADHI

HSE

Planning
Advice for
Developments near
Hazardous
Installations

Introduction

PADHI (**P**lanning **A**dvice for **D**evelopments near **H**azardous **I**nstallations) is the name of the procedure used to give a response and advice on consultations involving land use planning proposals.

PADHI+ is the software used by Planning Authorities to generate the advice themselves.

Extranet contains maps of fixed site LUP zones and LUP distances for pipelines.

Why PADHI ?

- Use specialist resource for assessing Seveso reports
- Fundamental review of HSE role in land use planning
  - Recommended advice codified and an IT tool provided to planners to generate HSE advice themselves.

PADHI - Basic System

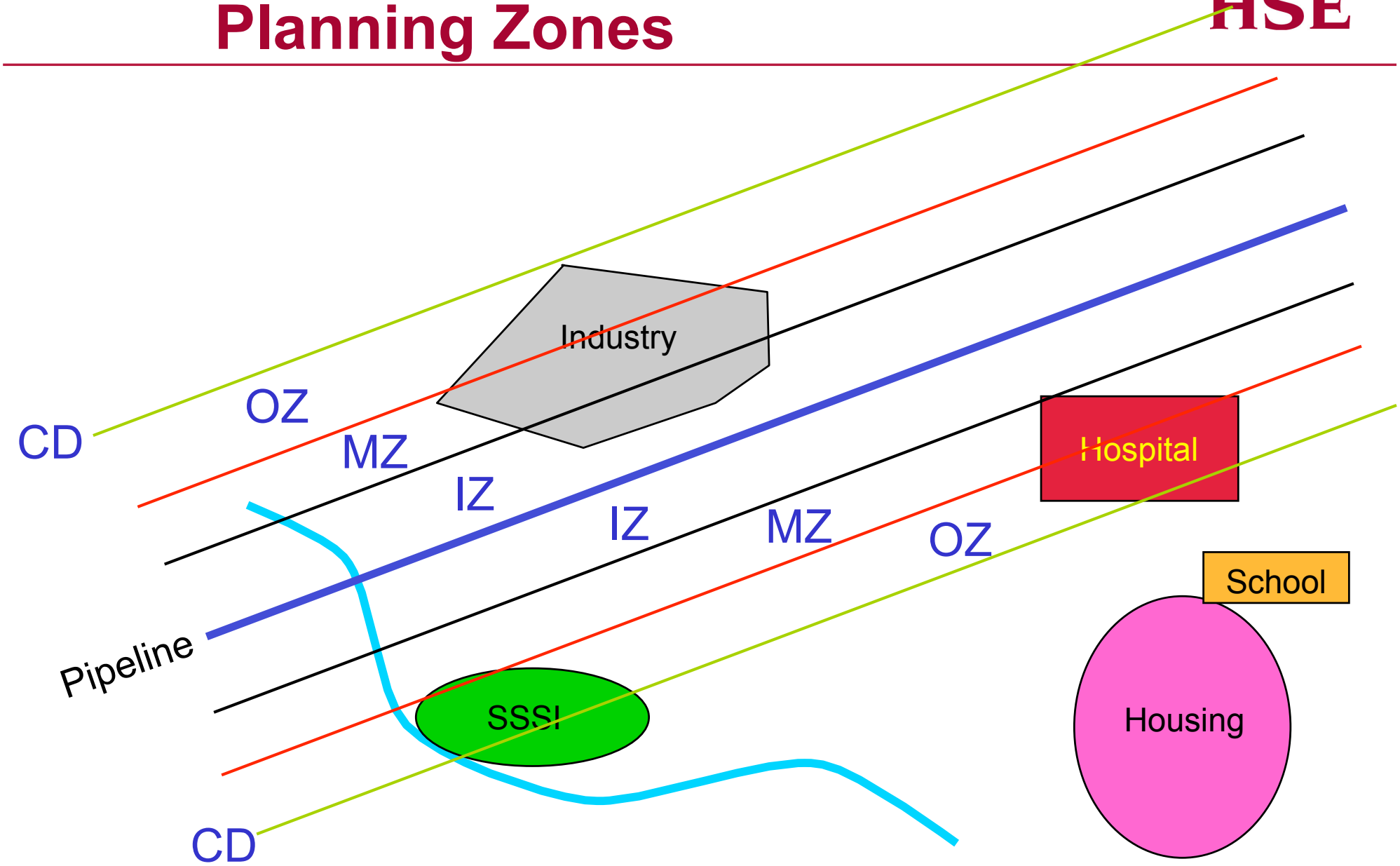
2 inputs to decision matrix:

- Where the development is
  -
- What it is
  -

Generate either:

- ‘Advise Against’ – (**AA**)
- ‘Don’t Advise Against’ – (**DAA**)

Planning Zones



Sensitivity Levels

- SL 1 – people at work, parking
- SL 2 – use by the general public
- SL 3 – use by vulnerable people
- SL 4 – very large and sensitive developments

www.hse.gov.uk/landuseplanning

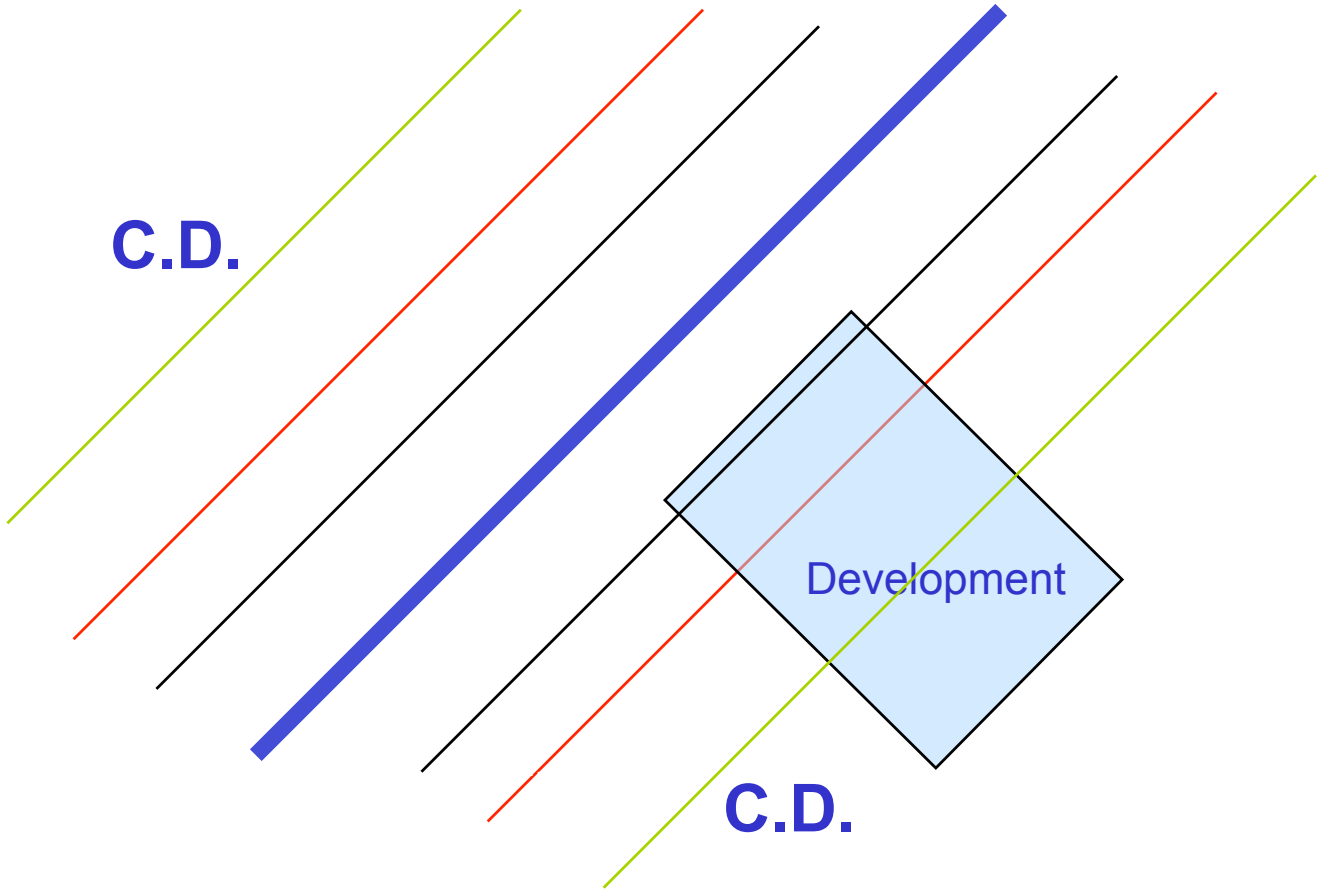
Decision Matrix

Sensitivity **L**evel	Development in **I**nner **Z**one	Development in **M**iddle **Z**one	Development in **O**uter **Z**one
1	DAA	DAA	DAA
2	**AA**	DAA	DAA
3	**AA**	**AA**	DAA
4	**AA**	**AA**	**AA**

Rules

- Rules for:
  - Zone boundaries being straddled
  - More than one hazard
  - More than one land use
  - Extension to existing development facility

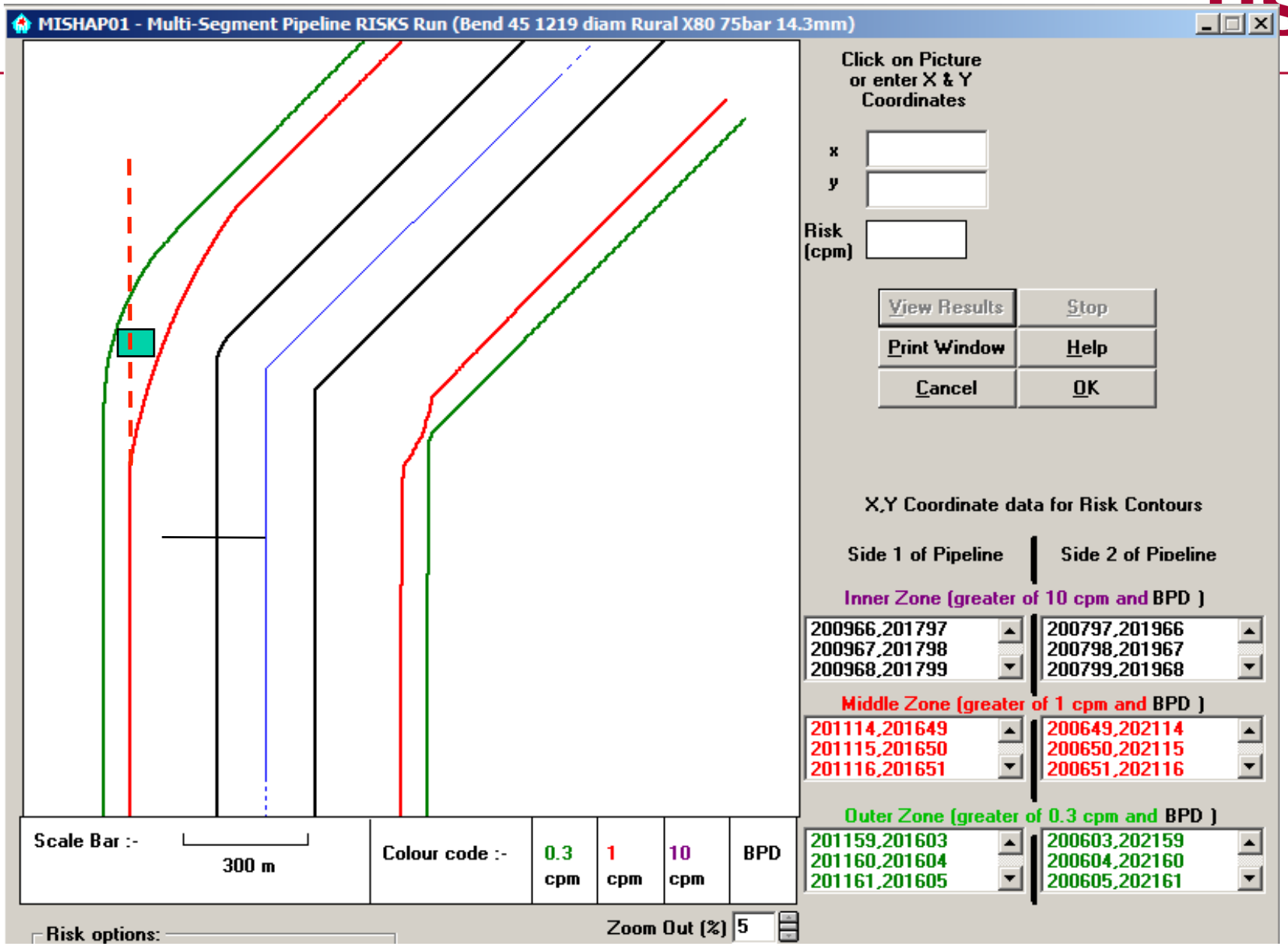
‘Straddling’

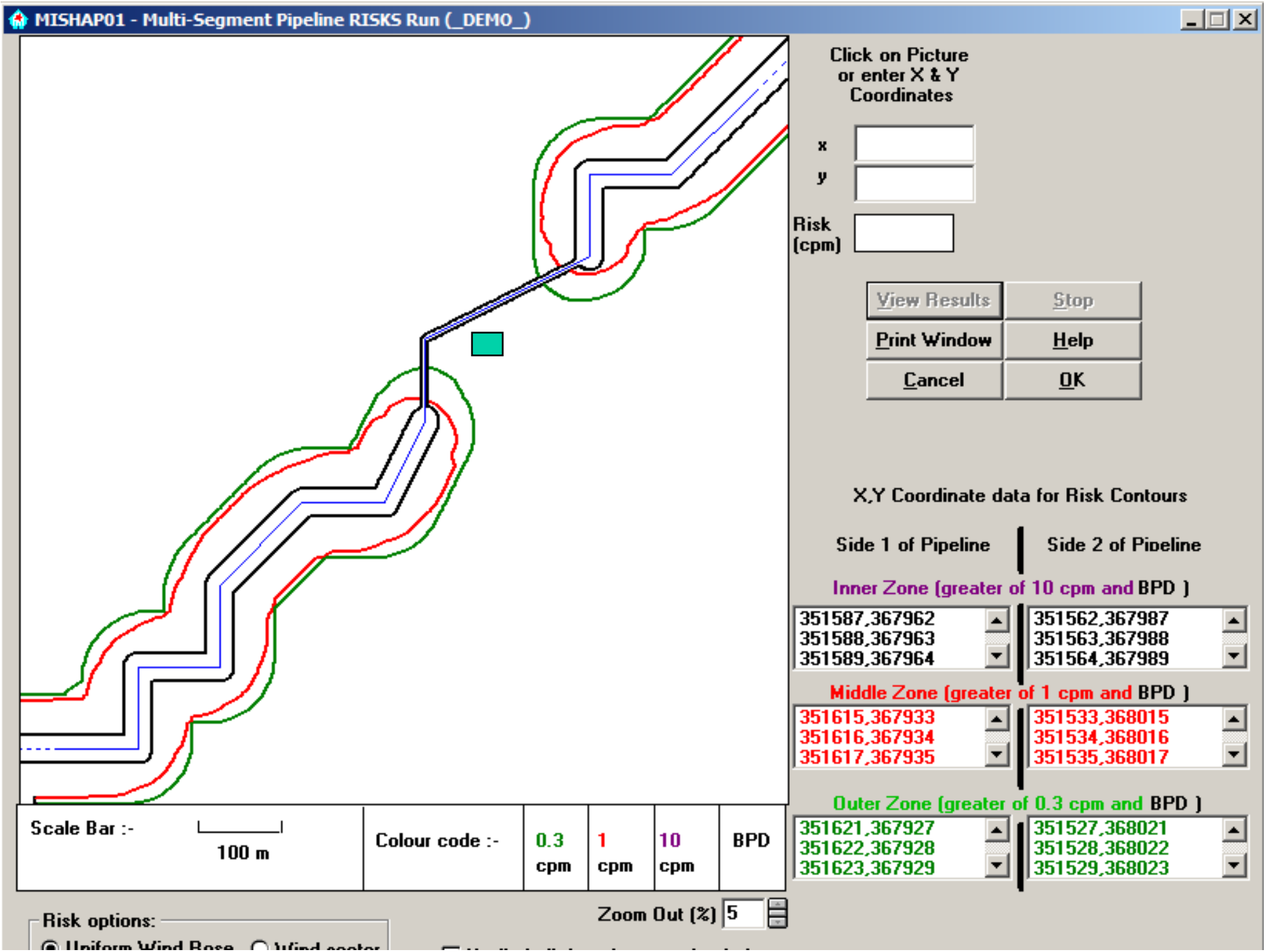


‘Multiple major hazards’

- More than 1 installation or pipeline
  - Must consider all
  - PADHI decision for each
  - Any AA decision dominates

Second Bite Cases




MISHAP01 - Multi-Segment Pipeline RISKS Run (_DEMO_)
Click on Picture or enter X & Y Coordinates
x
y
Risk (cpm)
View Results
Stop
Print Window
Help
Cancel
OK
X,Y Coordinate data for Risk Contours
Side 1 of Pipeline
Side 2 of Pipeline
Inner Zone (greater of 10 cpm and BPD)
351587,367962
351588,367963
351589,367964
351562,367987
351563,367988
351564,367989
Middle Zone (greater of 1 cpm and BPD)
351615,367933
351616,367934
351617,367935
351533,368015
351534,368016
351535,368017
Outer Zone (greater of 0.3 cpm and BPD)
351621,367927
351622,367928
351623,367929
351527,368021
351528,368022
351529,368023
Scale Bar :-
100 m
Colour code :-
0.3 cpm
1 cpm
10 cpm
BPD
Zoom Out (%)
5
Risk options: