



Control and Instrumentation

HSE/HSL LOPA Study

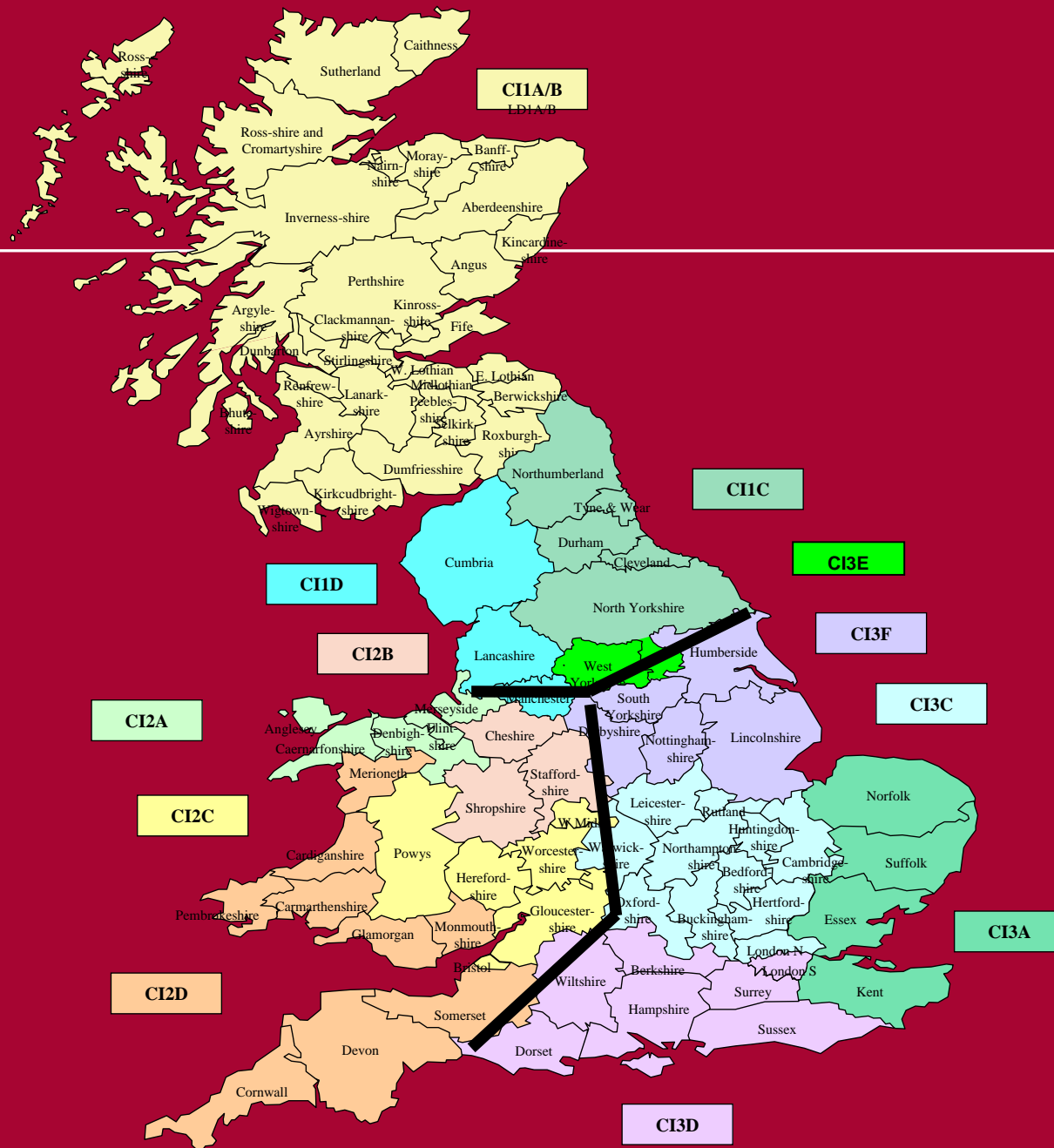
John Brazendale

C&I Team Leader

Chemical Industries Division

Outline of Talk

- HSE and C&I team
- Background to study
- Study findings
- Study Recommendations
- Conclusions



C&I team

- 9 specialist C&I Inspectors in various locations
- Glasgow, Newcastle, Sheffield
- Bootle, Manchester, Stoke,
- Northampton, Cardiff

C&I Inspections in future?

- Grouped Tank Depots
 - Esso, Chevron, BP, ...etc
- Nominated C&I Inspector for central contact
- Local C&I inspector will still visit local Depots

LOPA study - background

- Buncefield BSTG and MIIB recommendations
- Industry used (in main) LOPA to determine SIL for overfill prevention
- C&I team started to look at LOPAs
- Questions/Queries
- Commissioned HSL to review 15 LOPAs
- Note that HSL make independent opinions/conclusions

LOPA Study –Good Points

- Everyone committed to doing it and resource obtained
- Some HAZIDs and HAZOPs used as well to identify IEs
- Some carried out specific Human Error (HEART) analyses

LOPA Study –Good Points

- In main good identification of PLs (although issue of independence)
- Some appreciation of dependencies
- Some detailed modelling involving mini event and fault trees
- Many sites looking to improve even if results from LOPA marginal

LOPA study -Findings

- Data (inc Human error)
- Modelling Protection layers
- Conditional Modifiers
- ToR /ALARP
- Method

Data

- Generic data used from IEC 61511 or general databases
- Little justification as to why appropriate to the specific site/equipment
- Similar issues for human error rates –often very optimistic
- Some studies used HEART and other task-specific methods
- Not clear in some cases where IEs came from

Protection layers

- Issues around modelling failure of ATG and operator response to alarms
- Can ATG be both an IE and a PL?
- Modelling of human error and independence of PLs when same operator responding to alarms from both ATG and independent trip
- Independence of PLs not demonstrated in some cases
- Some PLs not complete – e.g. didn't consider valve

Conditional Modifiers

- Some very low values claimed e.g. 0.08 for prob of ignition for petrol
- General concern that values chosen for CMs too low and not substantiated
- No explanation given as to how would be maintained in future e.g. occupancy

ToR/Alarp

- Risk Targets not justified or (in our view) appropriate
- All hazards target used for single hazard
- ALARP not always considered.
- Societal risk as a factor (even if qualitatively) not often considered

Method

- Some miscalculations of PFD
- Some double counting
- Very few sensitivity studies
(can be very helpful)
- Supporting documentation sparse on occasions

Way Forward

- Industry and HSE needs to revise guidance based on experience of this LOPA exercise
- Industry (suppliers, operators , system integrators) and HSE needs to share experience and work together to generate better failure, reliability and incident/IE data .
- MIIB Recommendation

Conclusions

- Current LOPA studies need improving and both HSE and Industry have part to play
- We want a high reliability overfill protection.
- Risk/LOPA/ SIL studies are about tailoring to the site-specific situation so we achieve high reliability overfill protection - ***appropriate to a particular site***
- Are we improving the overfill protection provided?
- Thank You
- Any questions?