

MODULE 1

Conceptual clarity and science applied to understanding risk – course introduction

- Accident causation theory and its history
- Recognising accident causation ideas in safety management systems
- Scientist's views on accident causation theory
- The qualities of models and theories arising from application of the scientific method
- Illuminating the differences

MODULE 2

Structured registers of Risks in engineered systems in the rail industry

- The origins of the scientific understanding
- How damage and loss happens 1
- How damage and loss happens 2
- Categorising and cataloguing risks in engineered systems – a structured approach to risk registers
- Risks in the rail industry

MODULE 3

How damage happens – the foundation of risk analysis

- Understanding the sequential structure of the damage or loss process
- Understanding the basis and use of Fault Tree Analysis and its difference from 'cause analysis'
- Understanding the basis and use of Event (Outcome) Analysis and its difference from 'cause analysis' and its difference from 'cause analysis'
- Awareness of how these two forms of analysis combine to model the process leading to damage/loss and its uncertainty (hence risk)

MODULE 4

Real number estimates of risk

- Understanding the parameters that determine risk and the risk diagram
- Understanding risk using real numbers
- Understanding the practical value of this in cost benefit analysis of proposed control measures

MODULE 5

Quantified Risk Analysis (QRA)

- The ability to decide on the measure of exposure that suits the overall function of the system
- Understanding the difference between and the meaning of frequency and probability
- The ability to determine appropriate values of equipment failure probability
- Understanding how Outcome pathway probabilities can be synthesised
- The ability to estimate risk through QRA

MODULE 6

Control over risk

- Recognising risk controls in the Energy Damage Model
- Recognising risk controls in the Time Sequence Model
- Understanding of both 'Class A' and 'Class B' controls
- Understanding of the effect of risk controls on the risk diagram

MODULE 7

Evaluating risk control possibilities

- Understanding the social and legal context of risk
- Understanding that proposed risk control measures can be evaluated in the context of practical, social and moral obligations
- Understanding of the criteria for 'Must Do, Should Do and Could Do' controls
- Understanding cost benefit analysis in the context of risk

MODULE 8

System design evaluation in EN50126

- Evaluation in the context of the EN50126 process for risk assessment
- Translation or comparison of terms and concepts used in EN50126, part 1
- Translation or comparison of terms and concepts used in EN50126, part 2
- Summary of the engineering risk assessment process