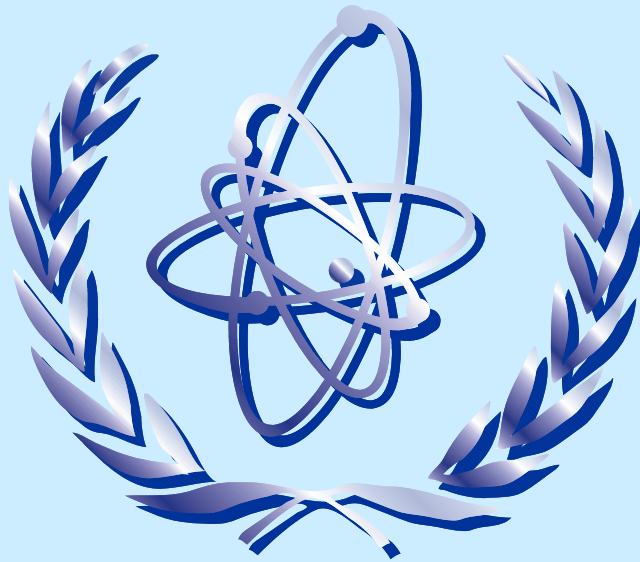


Basic Level 1. PSA course for analysts



Key elements of the documentation for the IE definition, success criteria determination and event sequence modelling



Key elements of the documentation for the IE definition, success criteria determination and event sequence modelling

Content

- **Introduction: Why?**
- **Key elements of the task procedure(s)**
- **Key elements of the task analysis file(s)**



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Introduction: Why?

BECAUSE THE ANALYSIS NEEDS TO BE:

→ TRACEABLE

→ REPRODUCIBLE

→ VERIFIABLE



Key elements of the documentation for the IE definition, success criteria determination and event sequence modelling

Key Elements of the Task Procedure(s)

Key Elements of the Task Procedure(s)

- **Interface between this(these) task(s) and the human reliability, system modelling and data analysis tasks. Definition of the information to be exchanged**
- **Guidance for preparation of the Task Analysis File(s)**



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Key Elements of the Task Procedure(s)

IE Definition

- **Processes to be used in the identification and definition of initiating events**
- **Source documents to be used**
- **Way in which consequential initiating events are to be developed**
- **Process for grouping initiating events**



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Key Elements of the Task Procedure(s)

Success Criteria Determination

- Sources to be used for the derivation of success criteria
- Thermal hydraulic codes to be used for derivation of plant specific criteria
- Definition of the sequence end states for success/failure (cladding temperature, containment temperature and pressure, etc..)
- Specific acceptance criteria for the performance of equipment during the course of an accident sequence



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Key Elements of the Task Procedure(s)

Event Sequence Modelling

- **General assumptions relating to all event tree development**
- **Sequence end states**
- **Level at which the event tree headings are to be defined (function, system, train)**
- **Requirements for the development of Event Sequence Diagrams**
- **Interface between Level 1 and Level 2**



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Key Elements of the Task Analysis File(s)

General

- **Information exchanged between this(these) task(s) and other PSA tasks**
- **List of all the references used, including version number and date**



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Key Elements of the Task Analysis File(s)

IE Definition

- **A data base of abnormal events and incidents which could lead or have led (in similar plants) to disruption of plant normal operation**
- **Events based on previous experience from similar plants**
- **A record of all failure modes and effects analyses (FMEA) to identify initiating events, capturing all significant assumptions**



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Key Elements of the Task Analysis File(s)

IE Definition (Cont.)

- **Fault trees and human reliability analyses used to derive initiating events (interface with system analysis and human reliability task)**
- **Derivation of consequential initiating events or cross reference to the document(s) in which they are developed**
- **An assessment of the applicability of initiating events to each plant operating mode**



Key elements of the documentation for the IE definition, success criteria determination and event sequence modelling

Key Elements of the Task Analysis File(s)

IE Definition (Cont.)

- **Initiating events within the plant which occur as the result of internal or external hazards**
- **Derivation of the grouping criteria and the mapping to derive the final initiating event groups**
- **Provision of clear definitions of the initiating event groups to the data task for the quantification of initiating event frequencies (interface with data analysis task)**



Key elements of the documentation for the IE definition, success criteria determination and event sequence modelling

Key Elements of the Task Analysis File(s)

Success Criteria Determination

- **Definition of the safety functions and the systems which can perform each of the functions**
- **Rationale for the use of success criteria for the various initiating event groups from sources other than plant specific analysis**



Key elements of the documentation for the IE definition, success criteria determination and event sequence modelling

Key Elements of the Task Analysis File(s)

Success Criteria Determination (Cont.)

- **Thermal hydraulic analyses performed to demonstrate that a given system response will prevent the safety limit being exceeded, and those performed to develop timing for operator actions**
- **Relationship between the defined safety functions and the event tree headings and functions**



Key elements of the documentation for the IE definition, success criteria determination and event sequence modelling

Key Elements of the Task Analysis File(s)

Event Sequence Modelling

- **Description of the evolution of the sequence of events following the representative initiator from each group**
- **If Event Sequence Diagrams are developed, the trip parameters challenged to cause the scram, the signals/channels challenged to initiate various safety functions, and the operators intervention in the course of the sequence, either as the result of system failures, or in response to changes in plant state**



Key elements of the documentation for the IE definition, success criteria determination and event sequence modelling

Key Elements of the Task Analysis File(s)

Event Sequence Modelling (Cont.)

- **Description of each heading in the event tree, and its relationship to a system (or systems) fault tree, human failure event, or other event. (This will include a functional fault tree, top logic or other link to the system models as applicable)**
- **The treatment of dependencies explicitly and implicitly included in the accident sequences**



Key elements of the documentation for the IE definition, success criteria determination and event sequence modelling

Key Elements of the Task Analysis File(s)

Event Sequence Modelling (Cont.)

- **Reference to all relevant operational and emergency procedures used in the development of the individual sequences in the event trees. This information will also be used in the evaluation of the operator response modelling and quantification**
- **Boundary conditions for each function. These include such things as the impact of the function failure on other functions, environmental and other impacts of initiating events, or dependency on the success or failure of preceding functions**



Key elements of the documentation for the IE definition, success criteria determination and event sequence modelling

Key Elements of the Task Analysis File(s)

Event Sequence Modelling (Cont.)

- **The mission time for each function and the justification for each time**
- **Description of the development of any basic events used to replace an integrated time dependent function (such as the failure of diesel generators to run combined with non recovery of off-site power)**



Key elements of the documentation for the IE definition, success criteria determination and event sequence modelling

Key Elements of the Task Analysis File(s)

Event Sequence Modelling (Cont.)

- All event tree drawings and core damage events (for example vessel rupture), together with an identification of the end state for each sequence. In the case of a level 1 study this may be simply core damage, while in the case of a Level 1+ or Level 2 study this may be the plant damage state which the sequence is grouped into
- All the functional fault tree models (models developed to link the event tree headings with the system fault trees)



Key elements of the documentation for the IE definition, success criteria determination and event sequence modelling

Key Elements of the Task Analysis File(s)

Event Sequence Modelling (Cont.)

- In the case of a Level 1+ or Level 2 study, the analysis file should include the sequence grouping criteria for the plant damage states
- The development of consequential initiators within event trees and transfer of sequences as initiators in other event trees