Major Incident Control Measures – Ensuring Effectiveness

TECHNICALLY SUPERIOR
RISK MANAGEMENT

Sam Grayson
Risk Engineer
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R4Risk

L14, 222 Kings Way (PO Box 5023)
South Melbourne VIC 3205

P: (03) 9268 9700
F: (03) 8678 0650

E: solutions@r4risk.com.au
www.r4risk.com.au

Overview

- Introduction
- Control Measure Identification and Selection
- Control Measure Adequacy Assessment
- Demonstration of risks reduced ‘so far as is reasonably practicable’ (SFAIRP)

Safety Case Development

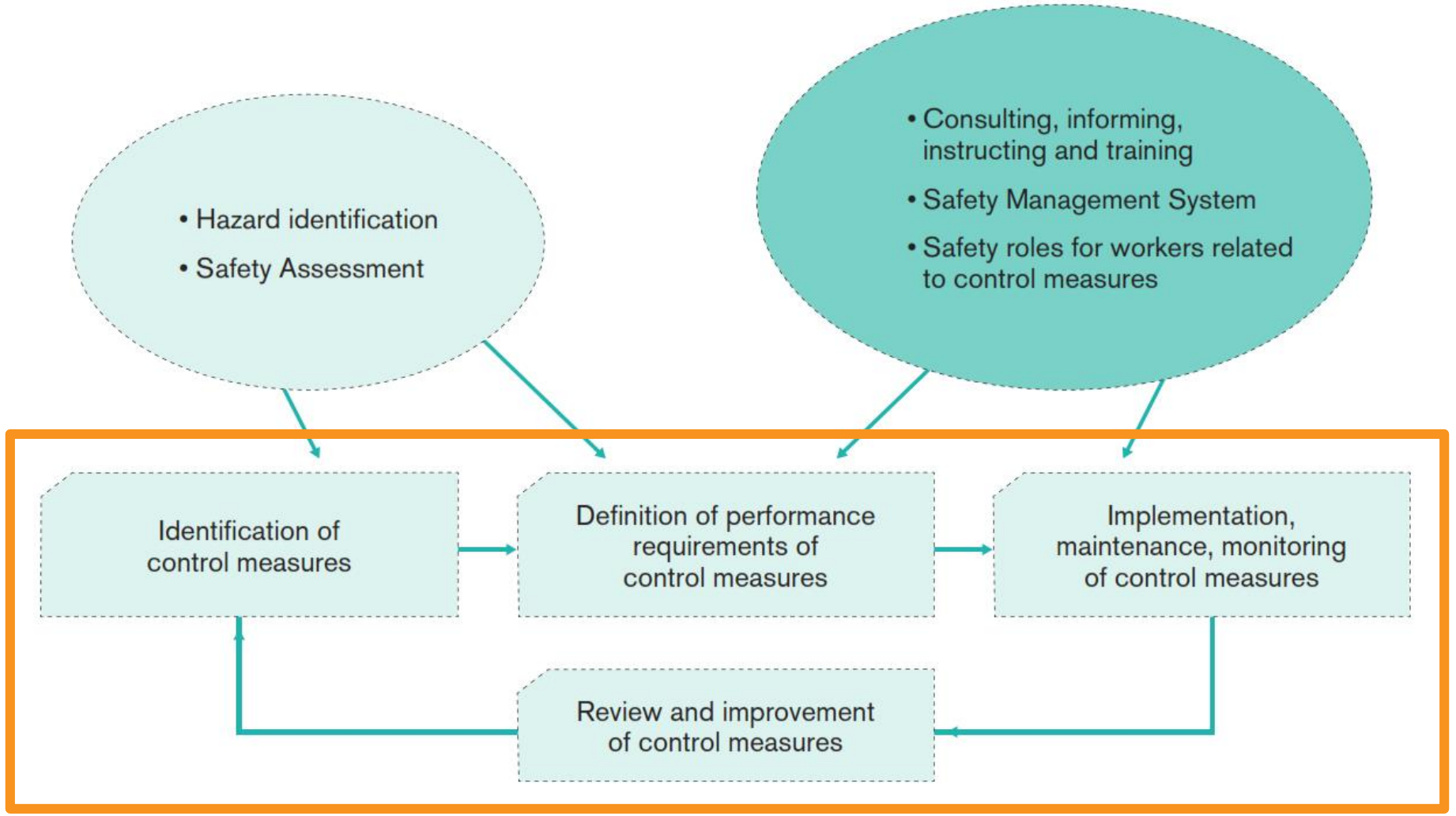
- Most larger process facilities are categorised as ‘Major Hazard Facilities’ (MHFs)
- MHFs are required to develop a Safety Case every five years
- The Safety Case process must identify major incident hazards and control measures that prevent or mitigate the consequences of the hazard
- The site must be able to demonstrate that risks have been reduced SFAIRP

Control Measure Identification and Assessment

- Control measure identification and assessment is integral to the Safety Case process

- Appropriate control measures must be identified for each major incident hazard and an assessment made as to their adequacy

Control Measure Identification and Assessment

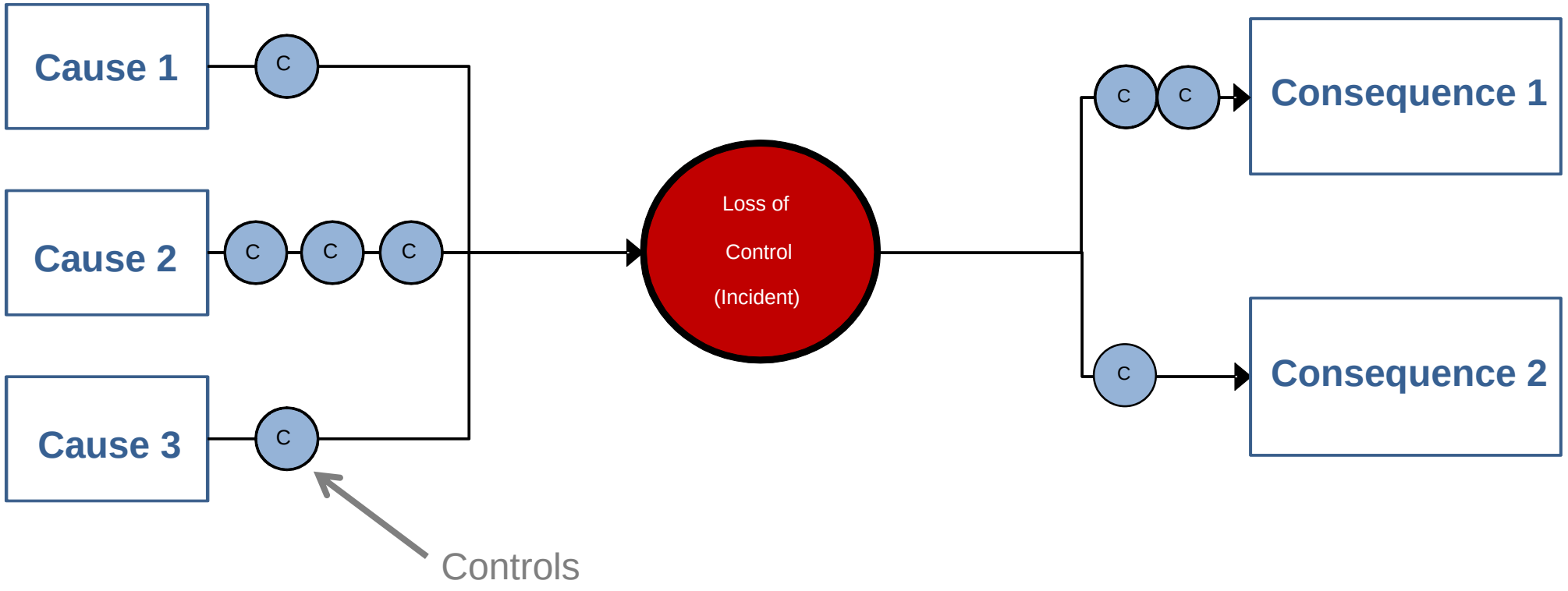


Ref.: Worksafe Victoria, Major Hazard Facility Guidance Note

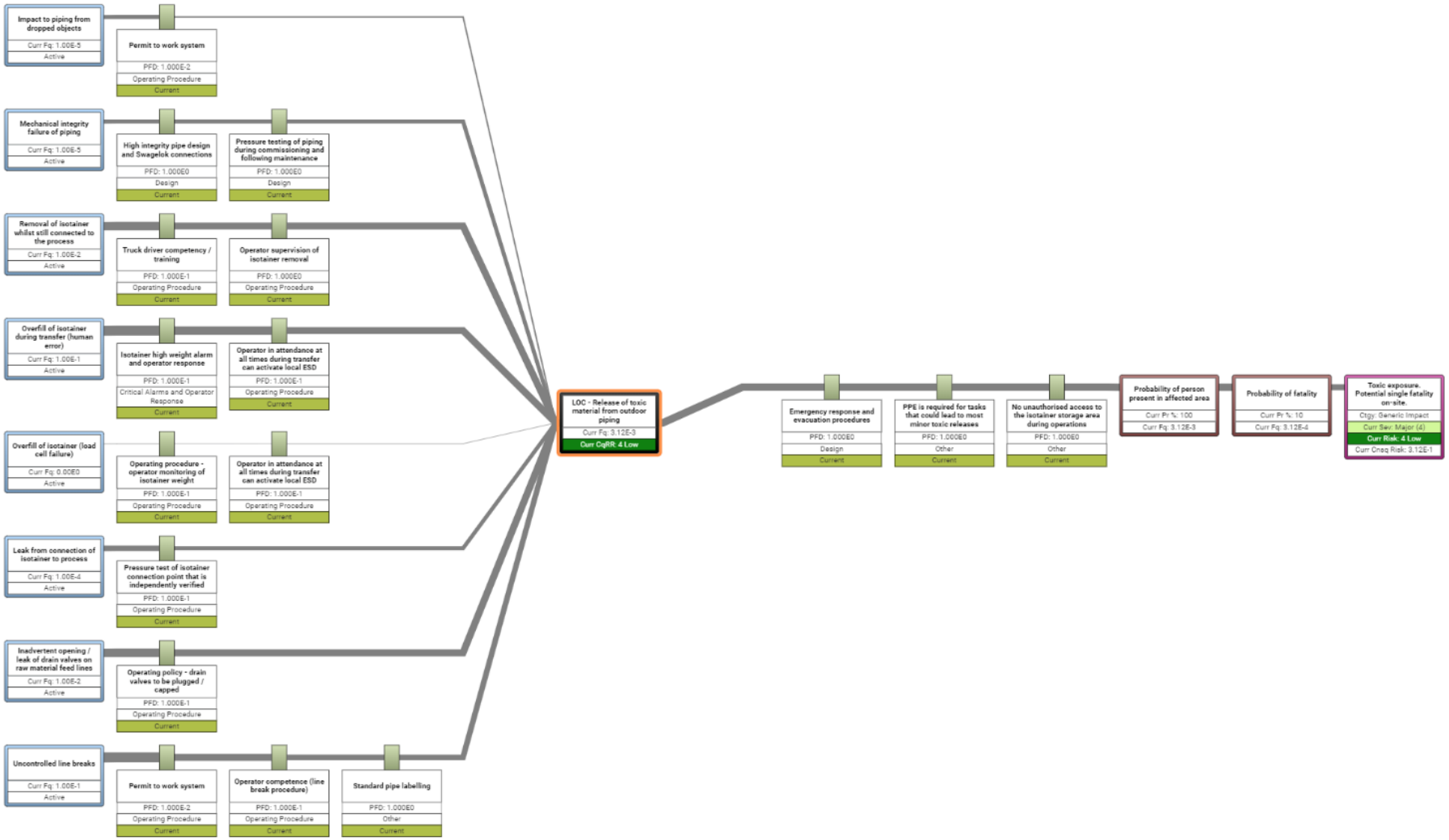
Control Measure Identification and Assessment

- Bow tie diagrams are useful tools to review a suite of control measures
- Gaps and unsuitable control measures can readily be identified

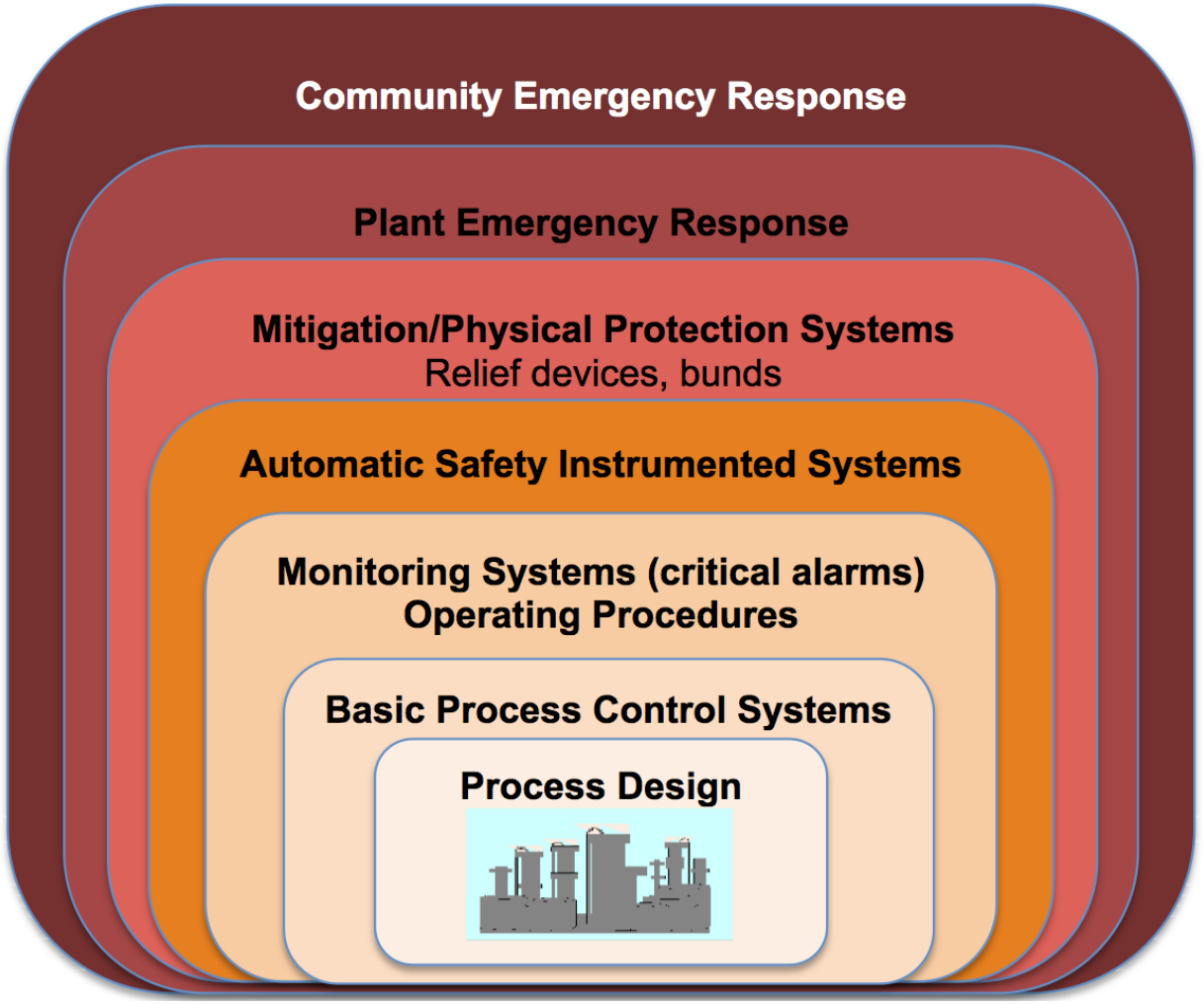
Bow Tie Diagram



Bow Tie Diagram



Control Measure Identification



Control Measure Identification

- Engineering Controls
  - Basic control systems, safety interlocks, relief systems, etc.
  - Managed by periodic maintenance and proof testing
- Administrative Controls
  - Response to alarms, operating procedures, LOTO systems, emergency response procedures etc.
  - Supported by documentation, training and auditing of compliance

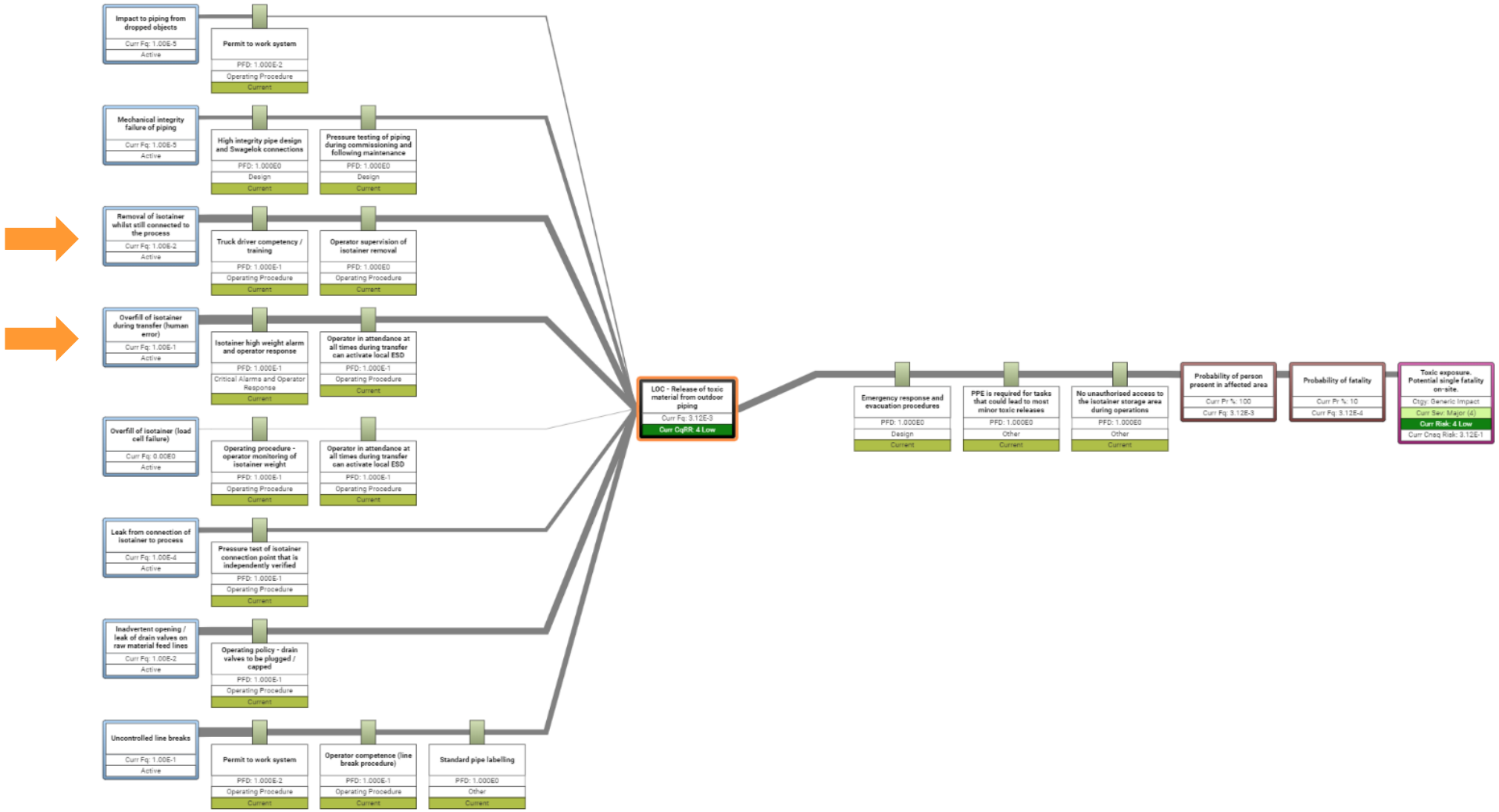
Control Measure Characteristics

- Five characteristics of good controls:
  - Independence
  - Effectiveness
  - Auditability
  - Access security
  - Management of change

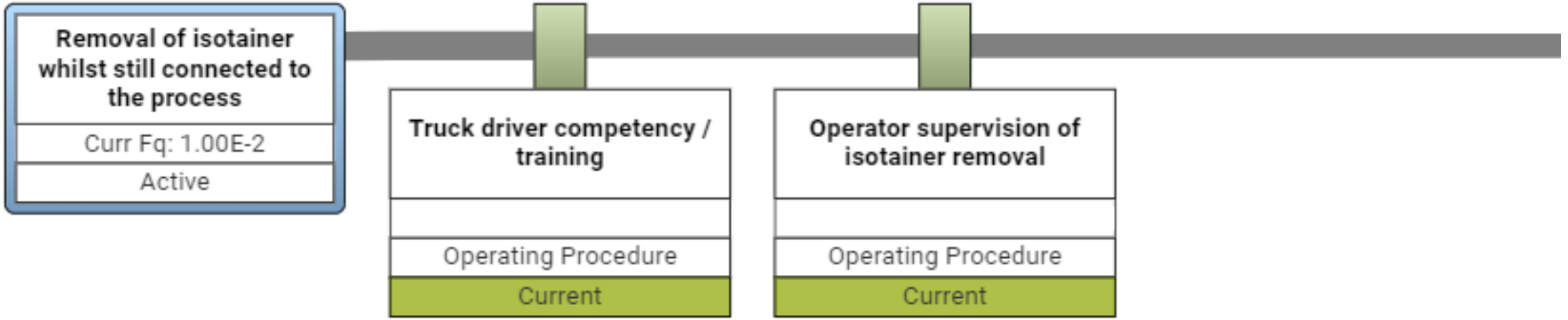
Control Measure Characteristics

- Independence
  - Will the control function separately from other controls?
  - Is the control independent of the initiating event?
  - Need to consider potential common-mode failures

Bow Tie Analysis

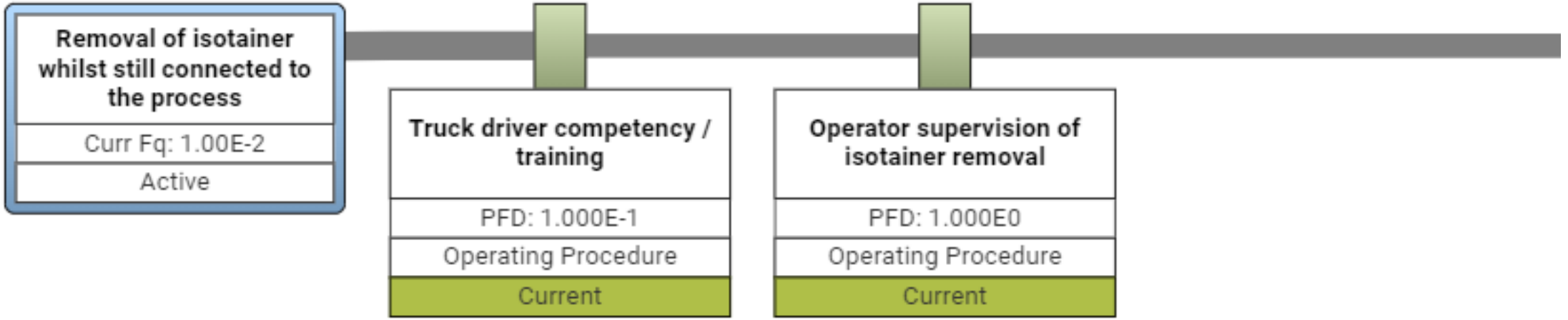


Checking Independence



- Cause is result of failure of control ‘Operator supervision of isotainer removal’
- No risk reduction credit can be assigned to this control

Checking Independence



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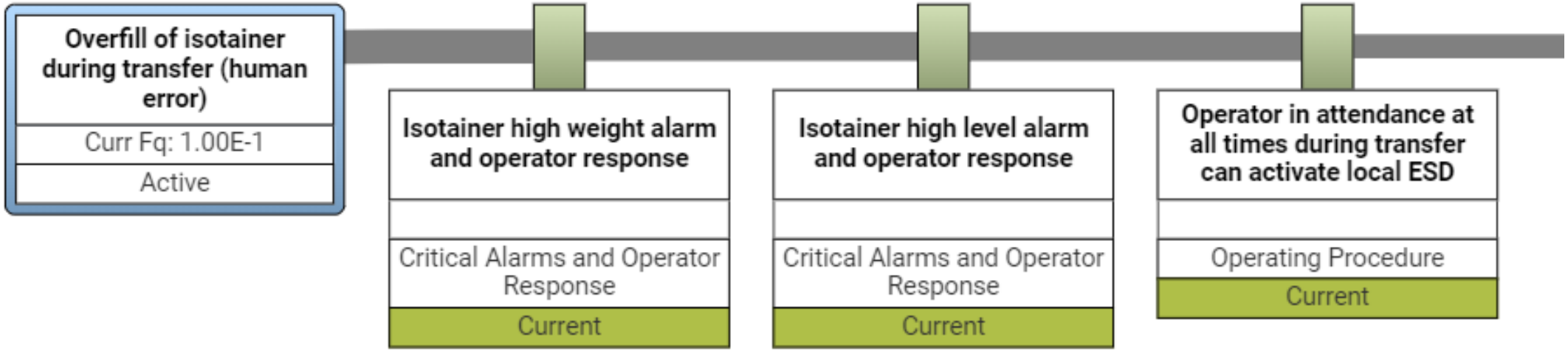
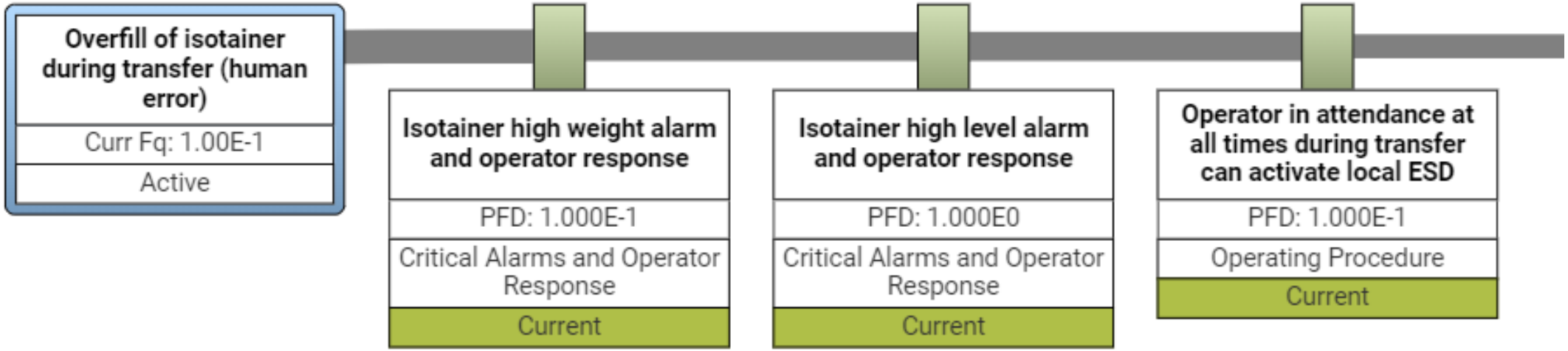


- The high weight alarm and high level alarm utilise the same logic solver and require action from the same operator

- Risk reduction credit can only be assigned to one of these controls

Checking Independence



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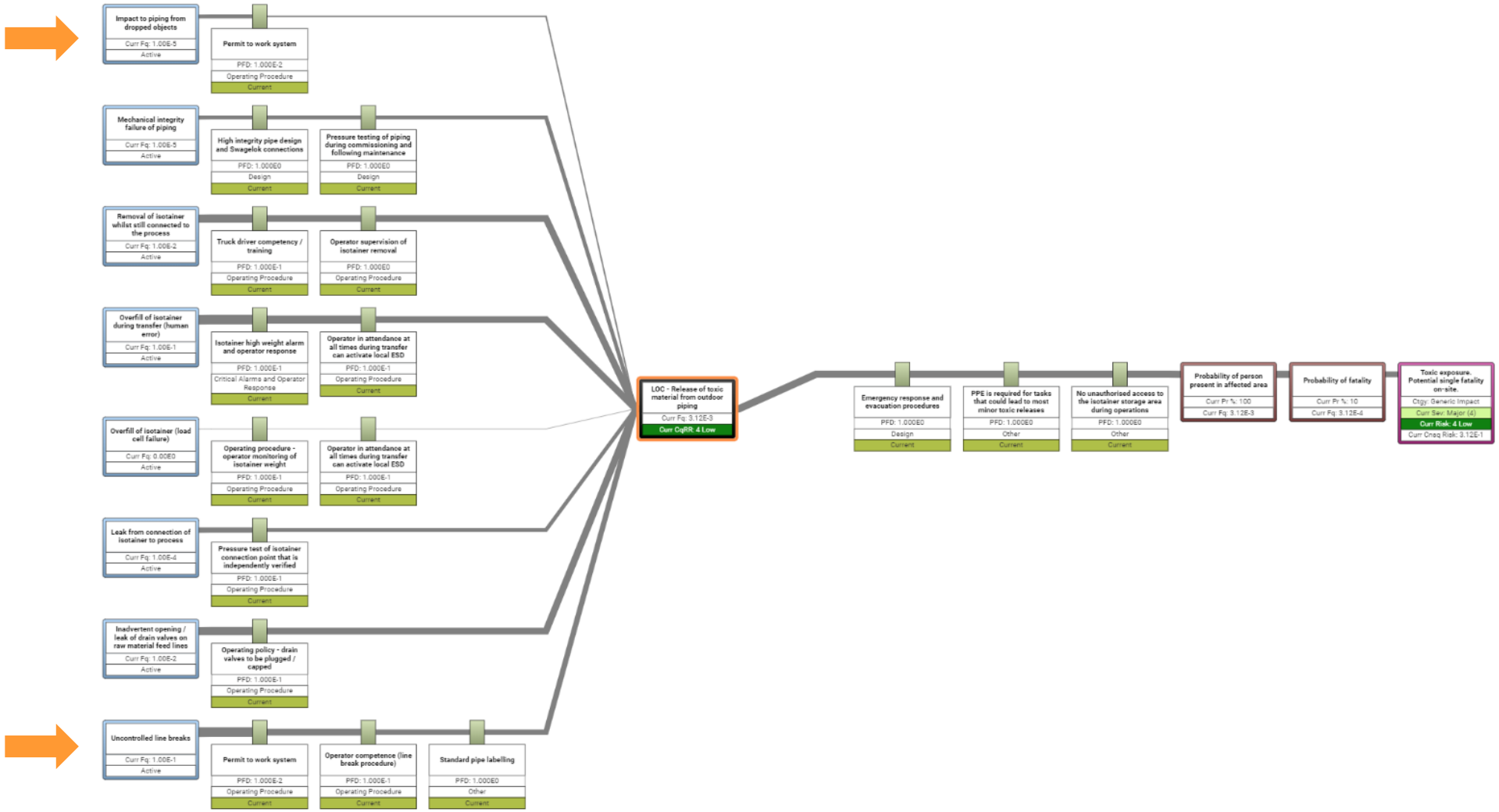
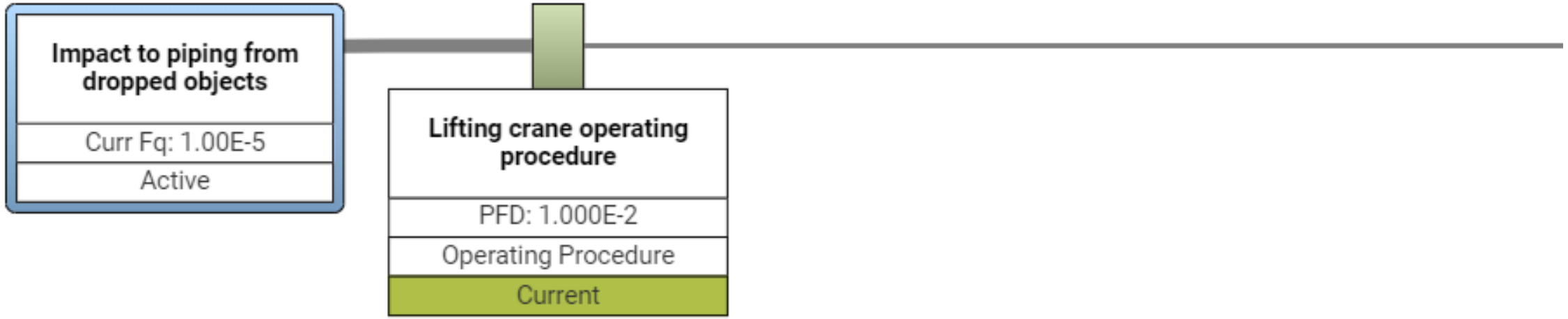
Control Measure Characteristics

- Effectiveness
  - Encompasses functionality, integrity and reliability
  - Will the action of the control directly prevent or mitigate the incident?
  - Will the control function as required on demand?
  - Will the control be able to act sufficiently in a short enough period of time to be effective (i.e. prevent escalation of the hazard)?

Bow Tie Analysis

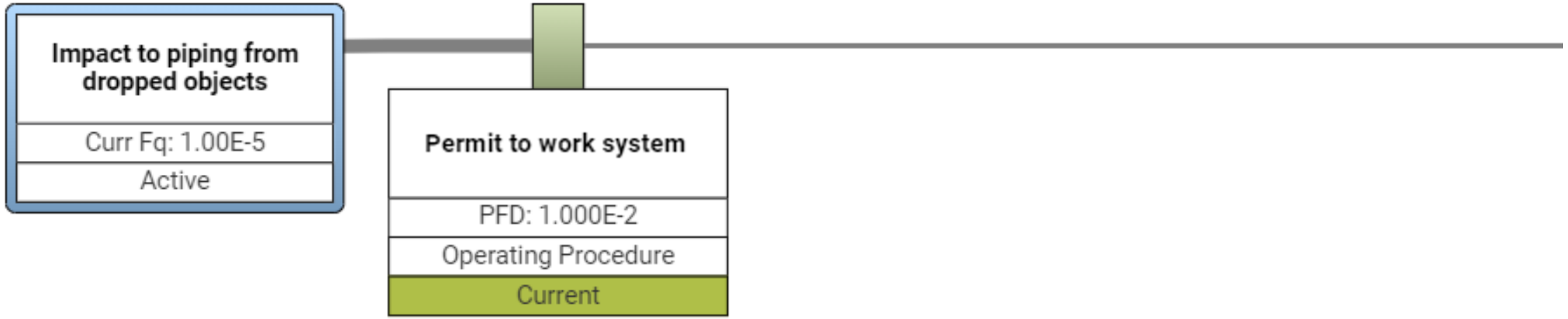


Checking Effectiveness



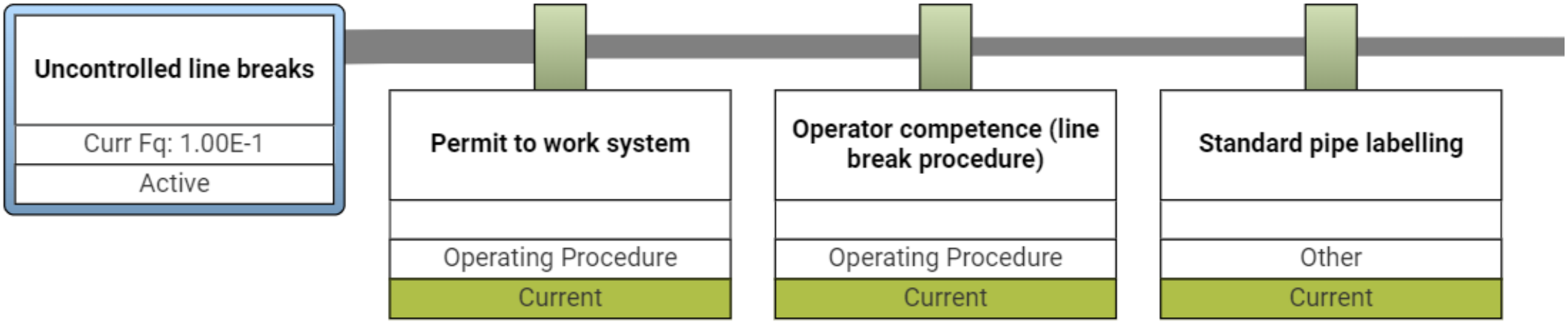
- An operating procedure, supported by training and competency assessments, is typically assigned no more than one order of magnitude risk reduction

Checking Effectiveness



- A well-functioning Permit to Work system is a high-integrity operating procedure that can achieve a greater level of risk reduction than a regular operating procedure

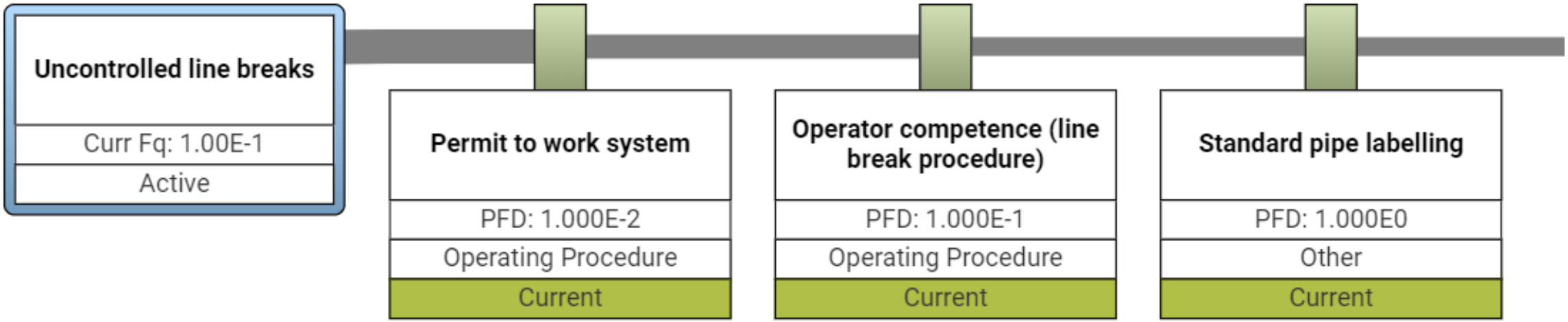
Checking Effectiveness



- ‘Standard pipe labelling’ is not an effective control measure to prevent uncontrolled line breaks

- No risk reduction credit should be assigned to this control

Checking Effectiveness



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Control Measure Characteristics

- Auditability
  - Is the control of a type that enables its performance / function to be verified?
  - Is the performance of the control measure actually being monitored / audited?
  - Are the results of the monitoring / auditing being reviewed?
  - Do the results show that the control is meeting its required reliability?

Control Measure Characteristics

- Access security
  - Is the control secure from tampering or unauthorised changes?
  - Examples include:
    - Authorised access to BPCS set points and alarms
    - Physical locks and car seals

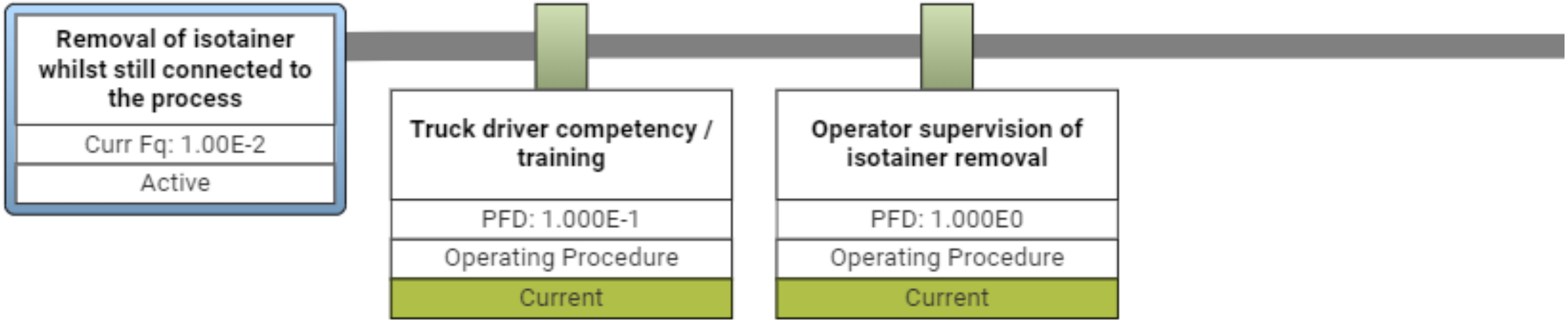
Control Measure Characteristics

- Management of change (MOC)
  - A formal process for reviewing, approving and documenting changes
  - MOC covers risk of changes to procedures, materials, equipment, processes etc.
  - Control measures listed in the Safety Case must be considered in the MOC process

Control Measure Adequacy Assessment

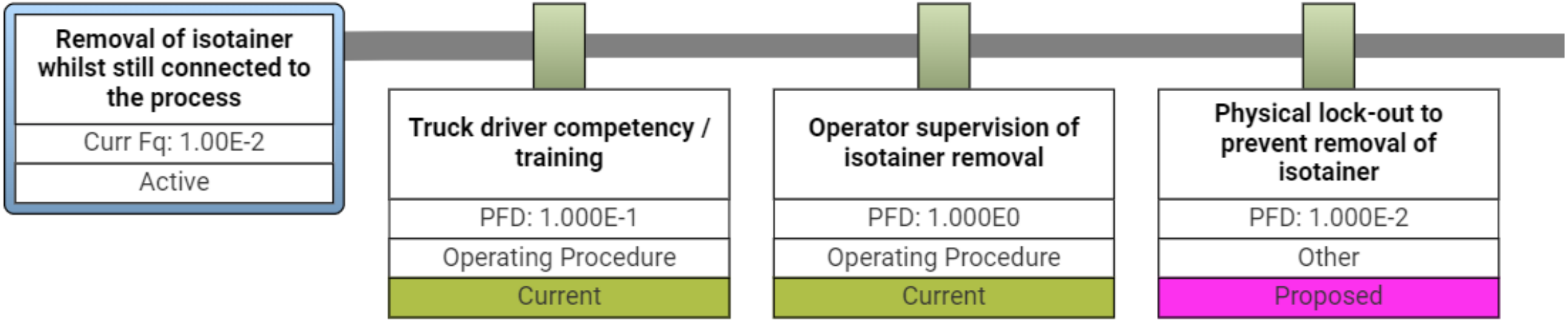
- Are there other control measures that aren’t in place that could reduce the risk further?
- Could you replace some of the existing control measures with better ones?

Additional Control Measures



- Potential to put in place additional control measures
- Some control measures can be both simple and high-integrity

Additional Control Measures



- Potential to put in place additional control measures
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Demonstration of SFAIRP

- Need to be able to show the regulator that a rigorous approach was followed in selecting appropriate control measures
- When rejecting control measures, sound justification is required
- Cost-benefit analysis is one tool that can be used to support this justification

Summary

- Where possible, have different types of control measures in place
- Ensure controls are independent, effective and auditable
- Follow a rigorous approach to ensure that risks are reduced SFAIRP

Thank you

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