



Using TapRoot®



to Evaluate Common Causes, Extent
of Condition, & Extent of Cause

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Overview / Objectives

- Definitions
 - Extent of Condition
 - Extent of Cause
 - Common Cause
- Extent of Condition
 - Discussion
 - Exercise using TapRoot
- Extent of Cause
 - Discussion
 - Exercise using TapRoot
- Common Cause
 - Discussion
 - Exercise using TapRoot
- Wrap up

Extent of Condition - Defined

- The assessment of the vulnerability of the condition existing elsewhere in the station / work location. The condition being the issue stated in the problem statement.
- NRC 95003 Inspection Manual
 - Extent of Condition is defined as the extent to which the actual condition exists with other plant processes, equipment, or human performance.
- IEEE Recommended Practice – (Draft)
 - Extent of Condition - The extent to which the same condition exists with other processes, equipment, computer software, or human performance.

Extent of Cause - Defined

- NRC 95003 Inspection Manual
 - Extent of Cause is defined as the extent to which the root causes of an identified problem have impacted other plant processes, equipment, or human performance.
- IEEE Recommended Practice (Draft)
 - Extent of Cause - The extent to which the root cause(s) of the event have impacted other processes, equipment, software, or human performance

Common Cause - Defined

- NRC 95003 Inspection Manual
 - Common Cause is defined as multiple failures (i.e., two or more) of plant equipment or processes attributable to a shared cause.
- IEEE Recommended Practice (Draft)
 - **Common Cause Analysis** - An analysis associated with a situation where a number of like or similar **Events** have occurred. Often involves using the results of tracking and Trending data to determine or better define conditions of interest. Is most effective when use on a proactive bases to prevent future significant Events. Should be used in cases where there are repetitive failures.

Cause Definition

These are examples of Root Causes or clustered groups of root causes

- Inadequate procedures
- Not enforcing policies
- Erroneous reference material
- Inadequate corrective actions
- OE not incorporated
- Communication errors

Waterbox Example

A mechanic was told to open the manway on “D” waterbox on the main condenser. He went and opened “B” waterbox, only stopping when he heard a loud sucking sound and saw water flowing by. He hastily refastened the manway and reported the incident. One of the root causes was failure to use repeat-backs and the phonetic alphabet.

Waterbox Example (cont.)

- The generic implications (more termites) appeared when the Condition Report database was queried for communication errors. 15 additional instances were discovered involving miscommunication.
- These incidents were shared among Maintenance, Engineering and Security.
- There were no incidents from Operations.

Extent of Condition – The Discussion

- How does it fit into the investigation
- Purpose of the ‘mental exercise’
- How to begin – State the condition to be explored!
- How far do you go – bounding the analysis
- Document – Document – Document

Extent of Condition – The Discussion

Does the same condition that proved consequential in this instance currently exist in

- other plant equipment
- other processes
- human performance

Extent of Condition – The Example

- The problem statement is – Plant tripped as a result of an Electro Hydraulic Control Circuit Board Failure.
 - The extent of condition is where else in the plant is there a vulnerability of another circuit board failure.
- Using TapRoot in the analysis

Extent of Cause – The Discussion

Have the Root Causes of this event also affected

- the performance of other individuals or groups,
- the quality of other programs or procedures,
- the reliability of other types of equipment?

Extent of Cause – The Discussion

- These can be found by searching Condition Reports and Operational Experience database
- In the Waterbox example, the Extent of Cause was communication errors.

Common Cause

- Common cause exists when there is a weakness in a system that has or may cause the same failure in a like system.

Common Cause Example

- Three couplings have failed.
- Failure was due to inadequate heat treatment.
(Common Cause)
 - All couplings of that batch may fail.
 - Because of this potential Common Cause failure, preparations should be made to either proactively replace the couplings or to prepare for the results of their failure.
 - The course of action taken depends on the consequences of failure.

Extent – The Exercise

- The governor of one of three Emergency Diesel Generator fails because the applied lubricant has become sticky. What are my concerns for Common Cause failure?
 - The governors for the other two EDGs (Extent of Condition)
 - Other applications of this lubricant (Extent of Condition)
 - Was this the specified lubricant? If so why the failure? If not, why was it used? (Extent of Cause)

Termite Analogy

- One inadequate policy enforcement – one termite
- Extent of Condition - Look for other areas of vulnerability – more termites
- Other policy enforcement issues – Look for CRs documenting the results of inadequate enforcement – termite damage
- Extent of Cause/Common Cause - Inadequate policy enforcement – Termite nest

In Closing....

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