Root Cause Analysis

Carolinas Air Pollution Control Association

Presentation by:

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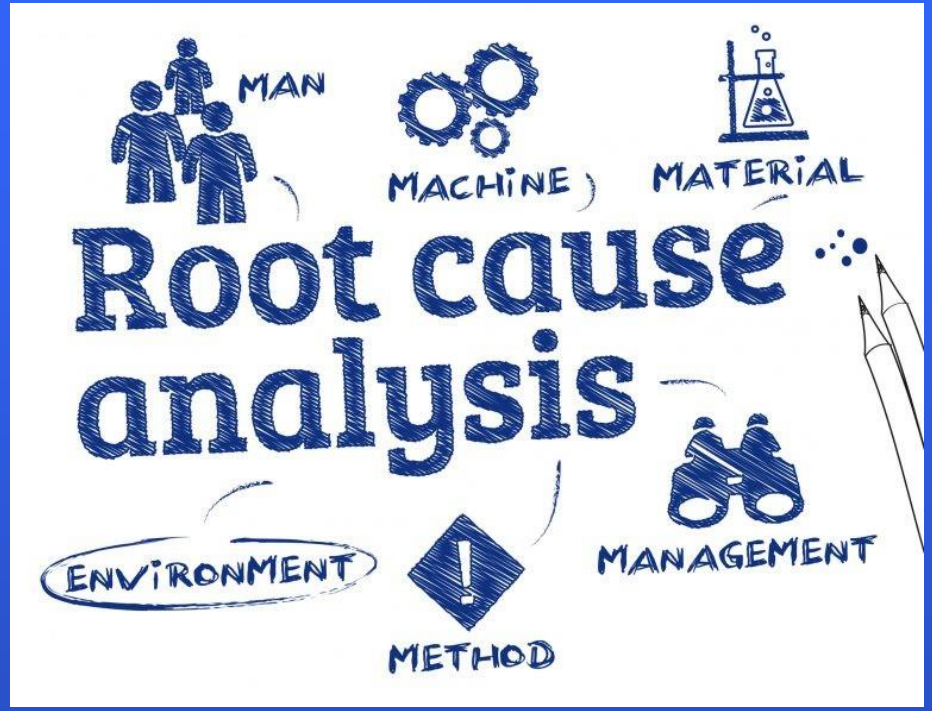
Agenda

- Process Steps
- RCA - Methods and Techniques
- Causative and Contributing Factors
- Prevention



Root Cause Analysis

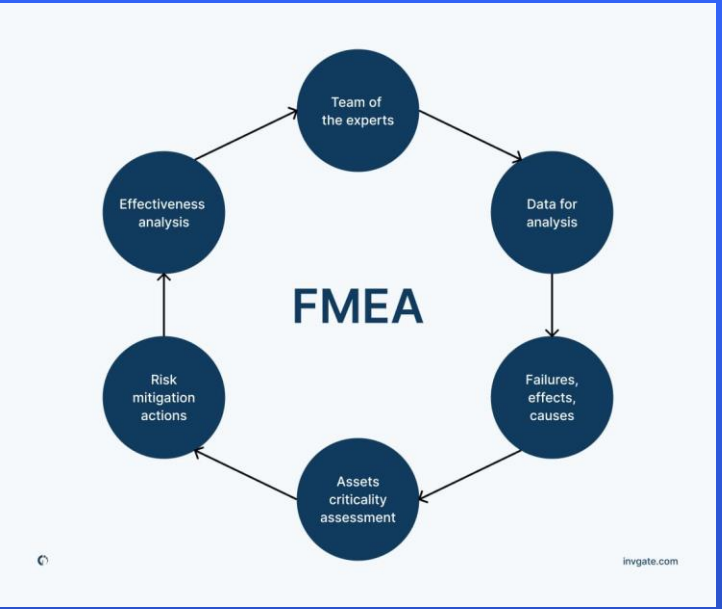
Process:

- **Problem Identification:** Clearly define the environmental spill incident.
- **Data Collection:** Gather evidence and data in real-time from the incident scene using incident investigation techniques.
- **Causal Factor Determination:** Identify all the direct and contributing factors leading to the spill.
- **Significant Factor Identification:** Pinpoint the most critical and contributing factors.
- **Prevention:** Implement corrective actions and develop measurement systems to track their effectiveness through verification.

Root Cause Analysis

Common Methods and Techniques

- 5 Why's
- Fishbone Diagram
- Tap Root
- Fault Tree Analysis (FTA)
- Failure Mode and Effects Analysis (FMEA)



Root Cause Analysis

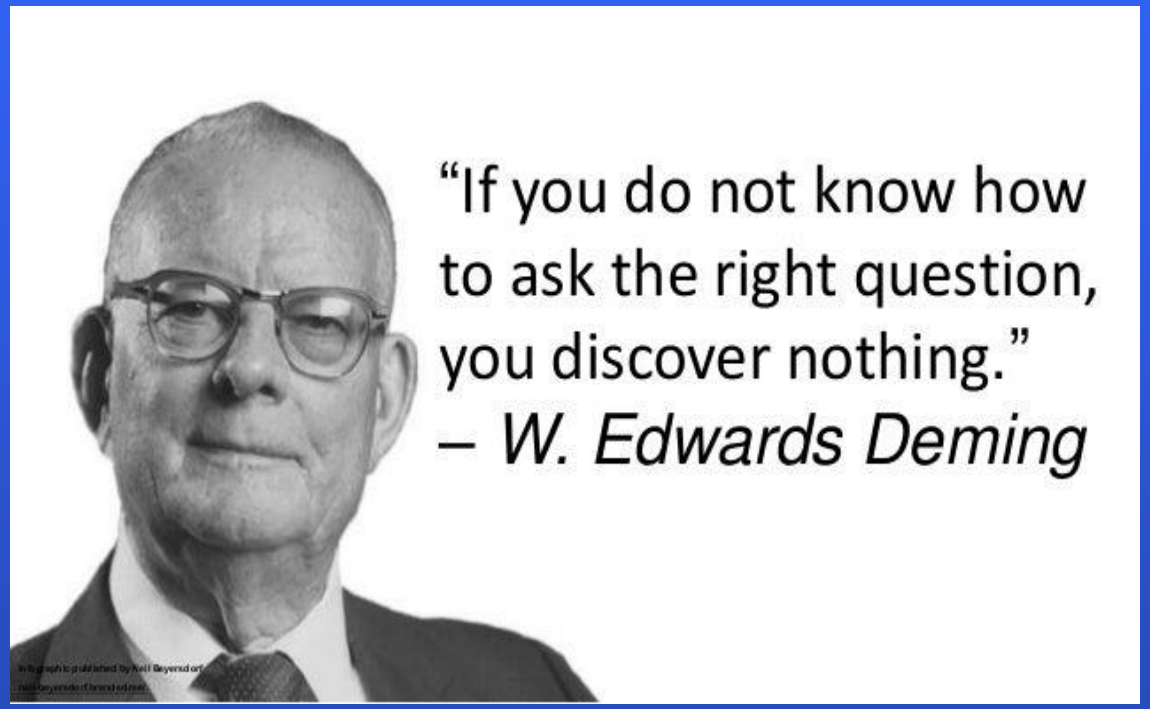
Causative and Contributing Factors

- **Perception of RISK – What is acceptable?**

Root Cause Analysis

Causative and Contributing Factors

- Human Error:
- Equipment Reliability:
- Management Systems:
- Culture/Behavior:
- Environment/Conditions:



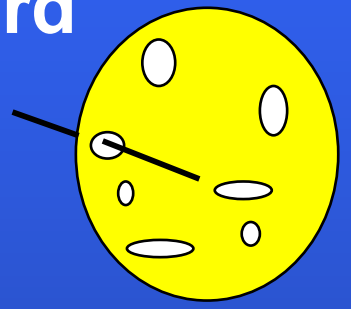
Root Cause Analysis

Causative and Contributing Factors - Alignment

Human Error:

- People make mistakes?
- Blame game
- Symptom not the source

Risk/Hazard



Root Cause Analysis

Causative and Contributing Factors

Human Factor

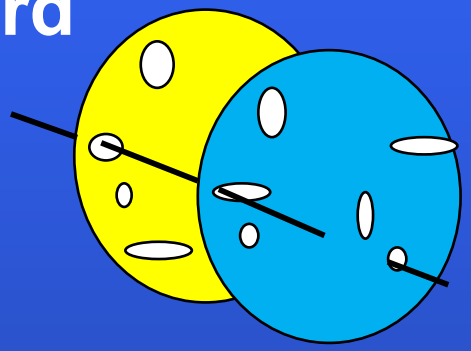
- The investigation concluded that ditching in the Hudson was the most viable option, as simulations showed attempting to reach an airport resulted in a crash.

Root Cause Analysis

Causative and Contributing Factors - Alignment

- **Human Error:**
- **Equipment Reliability:**
  - **Pump Failed**
  - **Seals leaking**
  - **Lack of maintenance**
  - **Used beyond capacity**

Risk/Hazard



"Quality comes not from inspection, but from improvement of the production process."

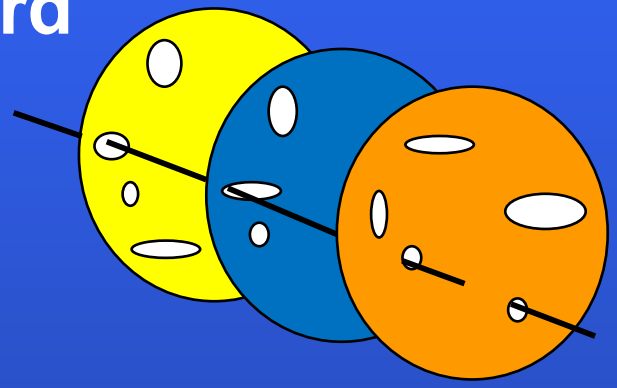
- **Deming believed that quality should be built into the process**
- **rather than relying on inspection to catch defects.**

Root Cause Analysis

Causative and Contributing Factors - Alignment

- Human Error:
- Equipment Reliability:
- Management Systems:
  - Accountability or Inadequate resources
  - Training ???
  - Missing controls or MOC not in place
  - Corrective Actions never verified

Risk/Hazard



"A bad system will beat a good person every time."

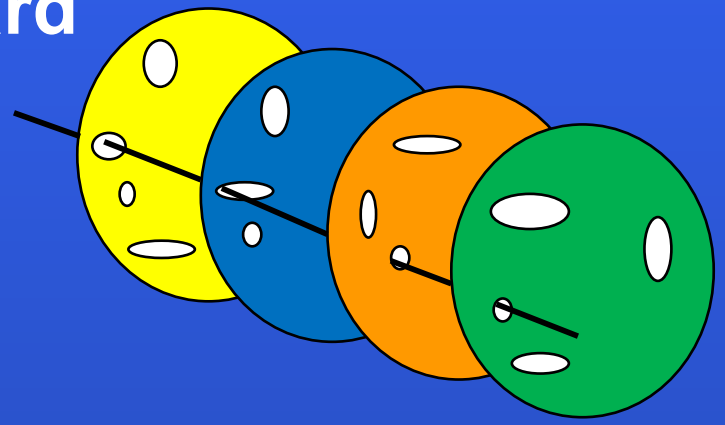
- Reflects the idea that even the best employees cannot succeed in a poorly designed system.

Root Cause Analysis

Causative and Contributing Factors - Alignment

- Human Error:
- Equipment Reliability:
- Management Systems:
- Culture/Behavior:
  - Procedures not followed
  - Employee shortcuts
  - Management cut program and reduced expenditures

Risk/Hazard



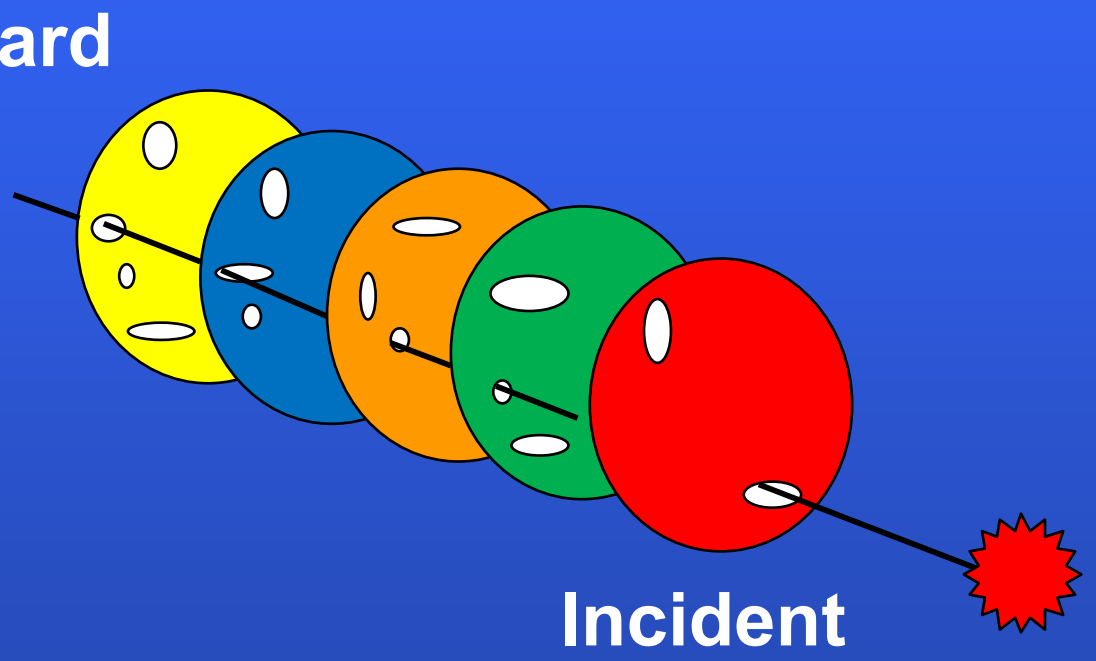
"The worker is not the problem. The problem is at the top!"

- Management practices often contribute to organizational issues.

Root Cause Analysis

Causative and Contributing Factors – Alignment

- Human Error:
- Equipment Reliability:
- Management Systems:
- Culture/Behavior:
- Environment/Conditions:
  - Weather
  - Working area



Root Cause Analysis

Causative and Contributing Factors – Alignment

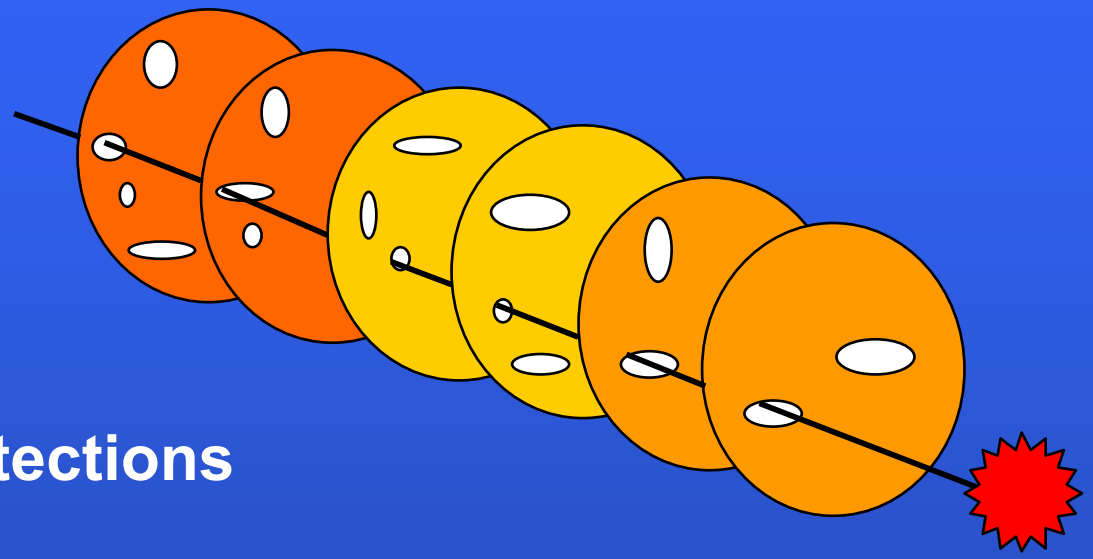
- Human Error
- Equipment Reliability
- Management Systems
- **Culture/Behavior**
- Environment/Conditions

Root Cause Analysis

Why Do We Have Incidents?

Alignment of:

1. Hazards or lack of recognition
2. Working conditions
3. Lack of controls, safeguards and protections missing
4. Lack of management systems
5. Training not effective or not provided
6. Unsafe Acts/Behavior



Root Cause Analysis

Working Conditions

- Cramped work area

Transferring Corrosive Chemicals

Management Systems

- Inadequate training
- No written procedures

Human Behaviors

- Hurrying to finish task
- Skipping steps

Multiple Safeguards and Protections missing

Spill and Eye Injury!

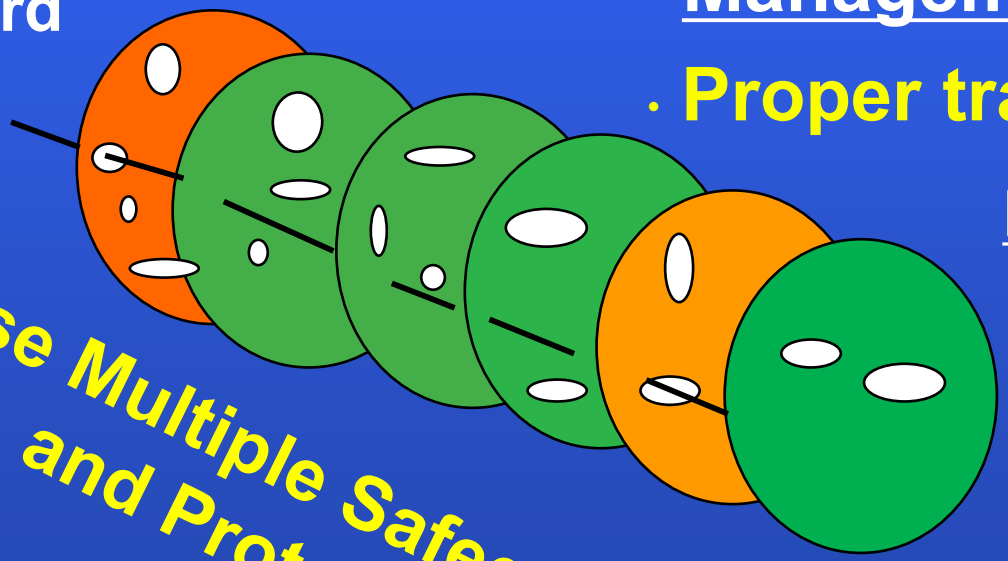
Root Cause Analysis

Prevention - Implement Obstacles to Incident Alignment

Recognize Hazard

Working Conditions

- Change or Modify



Management Systems

- Proper training and procedures

Human Behaviors

- Follow safe work practices
- Wear PPE

Use Multiple Safeguards and Protections

Root Cause Analysis

Tools and Methods of Prevention

- **Equipment Reliability**
  - Preventive Maintenance Program
  - Quality program
  - Pre-Startup reviews and MOC

Root Cause Analysis

Tools and Methods of Prevention

- Training
  - Focus on hazard recognition and acknowledgement
  - Proper procedures
  - Reinforce or change behavior
  - Defined objectives of the training

Root Cause Analysis

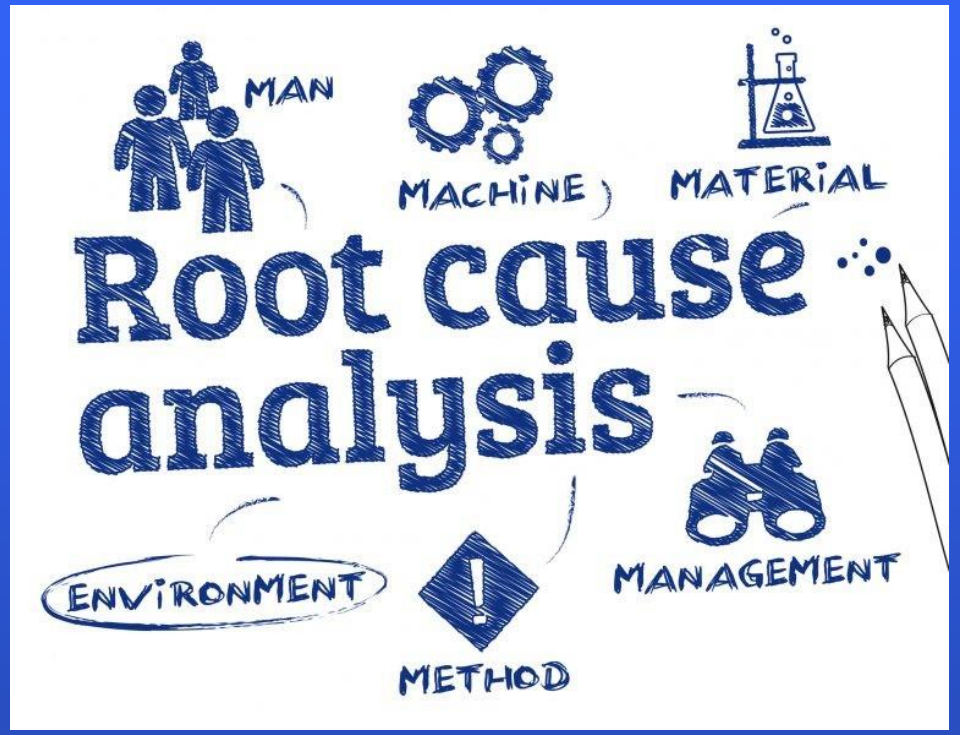
Prevention:

- Corrective Actions Implemented and Verified
- Management of Change
- Messaging/Lessons learned

Root Cause Analysis

Summary:

- Process Steps
- RCA - Methods and Techniques
- Causative Factors
- Prevention



Thanks!

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