

# Quick Reference Guide for Initial RCA Data Collection Efforts

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## Assessing the Initial Failure Scene

1. Safely secure the failure scene
2. Take lots of pictures from many different angles to 'freeze' the failure scene for future review
3. Take clear, hi-resolution close-ups of failed areas
4. Take pictures up & downstream of failure
  - a. Sight glasses
  - b. Piping
  - c. Valve positions
  - d. Structure, base, etc.
  - e. Couplings
  - f. Safety guards
  - g. Take video of failure event area to further preserve the scene
5. Map out the event scene as needed via use of a simple hand drawn sketch
6. Interview key people who were present as the event unfolded, to retain direct observations
7. Identify where each person was during the event, on your sketch
8. Create a rough timeline of known facts at the time
9. Leave instructions with area leadership about what parts you want & where to stage them
10. Plan the next step with leadership related to RCA team formation and timeline

## Collecting The 5P's (Parts, Position, People, Paper & Paradigms)

1. Devise data collection strategy using 5-P's
  - a. **PARTS INFORMATION –**
    - i. 'Bag & Tag' all relevant parts (anything tangible')
      1. Bearings
      2. Gears
      3. Shafts
      4. Gaskets
      5. Fans
      6. Motors
      7. Conveyors
      8. Conveyor Rollers
      9. PLC's
      10. Lube Samples
      11. Product Samples
      12. Air Samples
      13. Water Samples
      14. Hydraulic Samples
      15. Belts
      16. Couplings
    - ii. Do not introduce foreign markings into collected parts

b. **POSITIONAL INFORMATION -**

- i. Note physical location of incident
- ii. Note physical location of involved personnel
  - 1. Note where involved personnel were at time of failure as opposed to where they were supposed to be
- iii. Location of parts after the failure (did they separate from the equipment)
- iv. Observe wear patterns on failed parts for metallurgical review
- v. Note observed control panel readings (if applicable)
- vi. Record last calibration time of involved instrumentation
- vii. Note time of incident & any past similar incidents
  - 1. Note shift on which failure occurred
  - 2. Note if during event occurred during start up or shut down
  - 3. Note if event occurred near scheduled meals (e.g. - breaks, lunch, etc.)
- viii. Note environmental conditions
  - 1. High humidity?
  - 2. Unusual ambient temperatures?
  - 3. Excessive rain/drought?
  - 4. Inadequate lighting?
  - 5. Excessive dust environment?
- ix. Notice the progression of any spills (e.g. – diameter, rate, currents, etc.)
- x. Location of anomalies in piping related failures
  - 1. Straight runs or bends?
  - 2. At the flange, welds or body of the pipe?
  - 3. ID or OD failure?
- xi. Note directional position of any cracks (e.g. vertical, horizontal, diagonal, etc.)
- xii. Compare failed components to like non-failed components and note differences
- xiii. Observe and note positions of wear and failure patterns (e.g. – erosion, corrosion, fatigue, overload) on the failed component(s)
- xiv. Inspect for misalignment of relevant equipment
- xv. Note whether equipment was on/off, open/closed, etc.

c. **PEOPLE INFORMATION-**

i. **Interview Overview**

1. WHAT did you see, hear, feel, smell, etc.? [Sense]
2. WHEN did you see, hear, feel, smell, etc.? [Sense]
3. WHERE did you see, hear, feel, smell, etc.? [Sense]
4. WHO did you see, hear?
5. WHY, in your opinion, did this happen?
6. WHAT could have prevented this from happening?

ii. **Who to Interview?**

1. The people directly involved (most fearful of discipline)
2. The people involved but not present at the time the incident unfolded (stakeholder)
3. Internal subject matter experts (non stakeholder)
4. External subject matter experts (non stakeholder)

iii. **Interview Preparation**

1. Why is the evidence/data being gathered?
2. What type of information do we expect to get from the interview?
3. Has the event happened before?
4. Are there any known outside pressures that could be a factor in the responses received (i.e. – time, political, regulatory, etc.)?
5. Are there any circumstances that are likely to make the interviewee's hostile or reluctant to speak freely (i.e. – union barriers, toxic work environment, etc.)?
6. Plan and write questions down ahead of time, relevant to failure
7. Review ahead of time, procedures, drawings and other documents that were or should have been used during the event
8. One-on-one interviews are most effective, but sometimes diverse group interviews spark synergistic discussions
9. Interview should consist of a lead-in statement, a questioning phase, and a conclusion
10. Construct a preliminary timeline (from first-pass data collection)
11. Develop a list of interviewees
12. Schedule appointments for interviews with appropriate leadership to keep them posted on the progress of the RCA

iv. **The Interview**

1. State the purpose of the interview and inform the interviewee the information will only be used to solve the event and not to punish anyone for honest mistakes (only make this statement if you can back it up!)
2. Pick a non-threatening place to conduct the interview
3. Know each interviewee's name
  - a. **WORK AS IMAGINED (WAI)**
    - i. How long have they been doing their job?
    - ii. Do they like their job?
    - iii. Was what happened covered in their training?

- iv. What procedure was used the day of the incident?
  - v. What was the lighting like during the event?
  - vi. Were they physically & mentally able to perform task that day?
  - vii. Any medical restrictions they may have had at the time?
- b. WORK AS DONE (WAD)**
- i. Any internal problems that may have caused a distraction?
  - ii. When did you first notice there was something wrong?
  - iii. What happened that made you notice the problem?
  - iv. What did you do when you noticed the change?
  - v. What did you expect to happen when you made the adjustment? Why?
  - vi. When this adjustment didn't give you the expected outcome, what did you think you should do next?
  - vii. What made you think this?
  - viii. What did you think you should do next?
  - ix. Would you say this is a common 'practice'?
  - x. What typically prevents you from doing your job properly?
  - xi. Was anyone working with you as the problem unfolded?
  - xii. Where were they during this time?
  - xiii. Did you communicate with them as the problem unfolded?
  - xiv. What was said, by whom and when?

- d. **PAPER INFORMATION** - Determine what kinds of paper documents are available
- i. Applicable Policies/Procedures
  - ii. Maintenance Histories
  - iii. Shift Logs
  - iv. DCS Information/Data Dumps/Production Data
  - v. Purchasing Information
  - vi. OEM Design Specs/ P& ID Modifications
  - vii. Inspection Results
  - viii. Lab Test Results
  - ix. Consecutive Hours Worked by Personnel Involved
  - x. Training History
  - xi. HR Records
  - xii. Past RCAs on Same/Similar Issue(s)
  - xiii. Failures from Other Sites with Same Equipment in Same Service
  - xiv. Interview Debrief Notes
  - xv. Warehouse/Stores Information
  - xvi. Applicable Financials
  - xvii. Evidence of New Technology/ Automation
- e. **PARADIGM INFORMATION** - Note general themes that come through when talking to people. Samples only:
- i. "They say safety is #1, but when it comes down to production on the floor, cost is really #1!"
  - ii. "Nuisance alarms are expected to be bypassed...we do it all the time."
  - iii. "Practice makes permanent, not perfect (OJT)."
  - iv. "Stores doesn't want us to return the parts...it is too much trouble."
  - v. "It is old equipment, that is why it is failing."
  - vi. "We are understaffed."
  - vii. "They were inexperienced."
  - viii. "I don't have time to do it right!"