

Root-Cause Analysis

The purpose of this article is to provide some practical insight into satisfying the DOD requirement to determine the cause, not just the symptom, of deficiencies identified by your internal audit program (IEP). We find this to be a recurring problem that commonly results in a finding in the area of internal audits under operations management or maintenance quality assurance. We hope that by providing some examples of RCA processes that consistently pass inspection, listing some cause analysis resources, and providing one example of an effective RCA tool, we will reduce the number of DOD findings associated with this important requirement.

Q&S Requirement Concerning RCA:

Federal Register 32 CFR 861.4 (DOD Air Transportation Quality and Safety Requirements (Q&S)) lists the following as a required feature of an IEP process:

An internal quality audit program or other method capable of identifying in-house deficiencies ... has been implemented. Audit results are analyzed in order to determine the cause, not just the symptom, of any deficiency.

RCA Processes that Satisfy the Intent of the Q&S:

There are a wide range of processes that have satisfied the DOD's intent for cause analysis. These processes run the gamut from complex and expensive to simple and free. These processes come in three basic forms: 1) Commercially purchased programs, 2) In-house programs that specifically identify the root cause, and 3) In-house programs that informally identify root cause.

1. Commercially Purchased Programs: Formally trained analysts using purchased software, spreadsheets, and scientific methods look at facts, identify problems, and find the most basic or root cause of a deficiency.

2. In-house Specific Process (most commonly observed): An in-house developed tracking form specifically requires root cause be determined during the resolution process. The format obviously varies from company to company, but we typically see the following information:

- A. Discrepancy: Restatement of deficiency noted during the self inspection
- B. Root Cause: Most basic cause of the deficiency is identified and documented
- C. Resolution Plan: Plan to fix or resolve the deficiency is documented
- D. Follow-up Inspection: Re-evaluation of area to validate effectiveness of the fix

3. In-house Informal Process: Here root cause or the process to find the root cause is not specifically broken out and identified as such with each finding. Rather, the write-up informally identifies the cause in the resolution plan or corrective action. The root-cause identification process is usually spelled out in a manual or set of directions. A

drawback to this process is that it is difficult to determine if root cause identification was done, failure of personnel to go through the process, and commonly results in a finding for inconsistent compliance, and the potential for the finding to reoccur.

In the end, the RCA process does not need to be complicated, it just needs to exist, be documented in a manner that our evaluators can determine it is being conducted, and accurately identify the cause of each deficiency.

RCA Resources:

There are countless articles, books, and programs available to help you design and implement an RCA process tailored to the operations of your company. The examples we are about to provide are just examples of root-cause analysis information available. We do not endorse any particular product to carriers in their effort to meet DOD Quality and Safety Requirements. We highly encourage you to conduct your own research to find models that fit your particular operation and company culture.

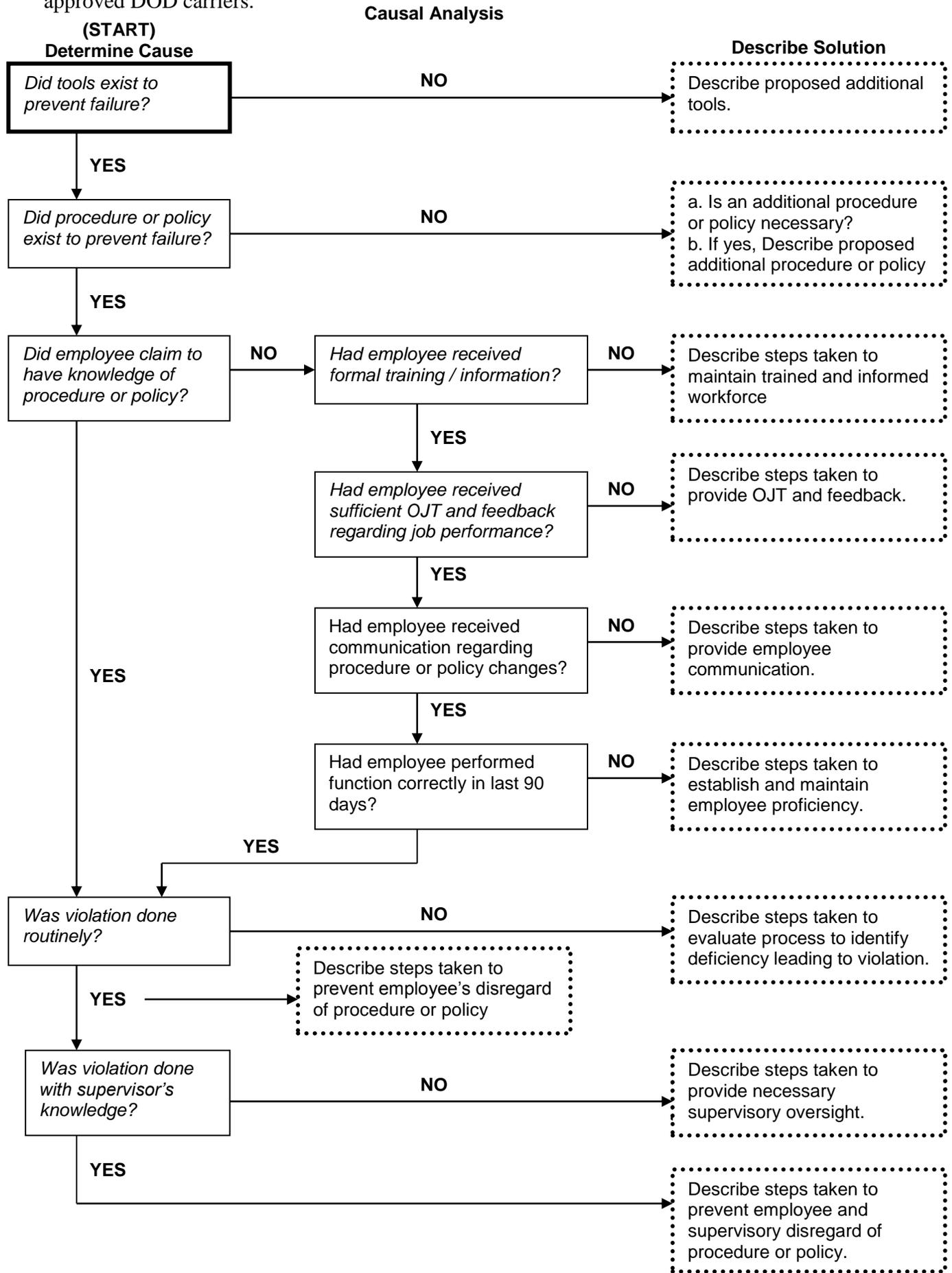
1. A prime example is the Wikipedia article on labeled Root Cause Analysis. This article offers a basic understanding of the methodologies and their applicable uses. It further expands the different schools or defined approaches to RCA.

- A. Safety-based RCA arose from the fields of accident analysis and occupational safety and health.
- B. Production-based RCA has roots in the field of quality control for industrial manufacturing.
- C. Process-based RCA, a follow-on to production-based RCA, broadens the scope of RCA to include business processes.
- D. Failure-based RCA originates in the practice of failure analysis as employed in engineering and maintenance.
- E. Systems-based RCA has emerged as an amalgam of the preceding schools, incorporating elements from other fields such as change management, risk management and systems analysis.

2. Another article titled, *Root-Cause Analysis For Beginners*, by James J. Rooney and Lee N. Vanden Houvol and located at <http://asq.org/quality-progress/2004/07/quality-tools/root-cause-analysis-for-beginners.html> identified the following qualities as essential for an RCA process:

- A. Root-cause analysis helps identify what, how, and why something happened, thus preventing recurrence.
- B. Root causes are underlying, are reasonably identifiable, can be controlled by management, and allow for generation of recommendations.
- C. The process involves data collection, cause charting, root cause identification, recommendation generation, and recommendation implementation.

Following is one example of an RCA flow chart that is being used effectively at several approved DOD carriers.



Recent findings concerning RCA Processes:

As we visit carriers, we are seeing a lack of RCA being accomplished to ensure adequate closure of problem areas or findings from internal audits. To ensure items are properly addressed, closed, and won't come back, an RCA program is essential. A recent Department of Defense (DOD) audit highlighted how a simple RCA could have eliminated a system-wide problem at a certain carrier.

1. During a line station audit one of our evaluators identified a problem with the carrier's shelf-life program. The company's manual stated certain adhesives would have a 12-month shelf life from the time they were received. It was the receiving inspector's responsibility to determine the expiration date and affix the shelf-life sticker during the receiving process. This procedure was not being adhered to, and since the line-station being audited was also the carrier's main stores, shelf-life items were being shipped to all the other maintenance stations with unknown expiration dates.
2. The carrier had identified the lack of stickers itself during a line-station audit two months prior to the DOD audit. The fix to the problem was to send the adhesives back to the main stores and have replacements sent. If they would have looked at the shelf-life identification process then, to find out why the sticker-less tubes were there in first place, (RCA) the problem could have been averted. Not only did carrier have an embarrassing DOD finding to answer, it had to initiate an audit of all its parts locations to flush out the questionable shelf-life items; an unnecessary and potentially costly endeavor.

RCA is not just a DOD requirement, it's a smart business decision that can save you money, time and more importantly, has the ability to save lives. A band-aid fix will get you through today, but it won't eliminate the possibility of the problem coming back tomorrow.