

Attachment A

Recommended Format for a Root Cause Analysis Report

It is recommended that the Root Cause Analysis Report (RCAR) include the following information content and the format.

The report should be complete (including providing the information that was originally provided in the OTMA request application), and must contain all relevant facts related to the failure of the tank, structure, or appurtenance, and the details of the investigation and analyses performed to evaluate the principal and secondary cause of the failure of the equipment. The RCAR should be organized as indicated below.

1 Reference materials and numbers

The RCAR pages should be numbered on each page (“page # X of Y pages”). The FRA approval number and the report date must be indicated on each page of the report.

2 Description of the incident (What happened?)

Provide in this section a detailed account of the circumstances leading to the request for a one time movement approval (OTMA). This should be an elaboration (where possible) of the information provided in the “Descriptive” section of the original application for an OTMA.

3 Background:

Indicate the circumstances of failure of the equipment, how the defect was identified or discovered and provide any other information related to loss of containment, etc. In other words, please expand the brief summary information provided in the original application sections on “Descriptions” and “Explanations.”

Include in this section such data as (i) the last qualification date of the failed part, (ii) the product that was in the tank car at the time of failure, (iii) whether the part has been in the same product service or had been exposed to multiple products, (iv) the date of last inspection of the properly working part, (v) Fix of the problem implemented “on site,” if any, and (vi) any other relevant information.

4 Actions taken subsequent to the receipt of OTMA

a. Description of the failure and failed equipment:

- Provide a description of the equipment that failed and the functions they serve.
- Include information on model number (if applicable), drawing of the equipment, specifications for the components of the equipment (if a valve provide the characteristics of the spring, unloaded length, spring constant, temperature sensitivity, modulus of elasticity of the spring material, etc.) and any other information of relevance.
- Include in the RCAR close up color (preferred) photographs, video clips and other illustrative methods to show the failed components and damage to other parts of the appurtenance. Identify the

failed or damaged equipment with appropriate reference (such as part numbers) on an original drawing.

b. **Findings from the field or the shop**

- Identify the instruments used or other methodology used in the field or in the shop to investigate the failure.
- Include in the RCAR close up color (preferred) photographs, video clips and other illustrative methods to show the failed components and damage to other parts of the appurtenance. Identify the failed or damaged equipment with appropriate reference (such as part numbers) on the original drawing.

5 Discussion of the causes

- Provide details of the findings in the field or shop observations of the equipment in question.
- Specify how the assessment of the cause of failure was performed.
- Discuss possible failure mechanisms and their causes which would result in the observed failure and/or the damage.
- Elaborate the causes with justifications based on any one or combination of (i) published literature citations, (ii) past data, (iii) lab scale tests performed by your organization, (iv) physical and/or mathematical modeling results, (v) full scale tests, and (vi) physically justifiable and defensible conjecture.

6 Conclusions

- Provide the conclusions from your study
- Justify each conclusion based on facts and evaluations performed

7 Proposed corrective actions

- Indicate the corrective actions that will be initiated, if any.
- Provide a time line for implementation of the corrective actions
- Discuss how the corrective action will prevent reoccurrence.
- If no corrective actions are to be taken, provide justification.

8 Submission of the report

- Sign and date the report submitted to FRA

Federal Railroad Administration
RRS-12, Mail Stop 25, 3rd Floor West
1200 New Jersey Avenue, SE
Washington, DC 20590
Fax: (202) 493-6309
HMASSIST@dot.gov

- Indicate whether you are submitting the report on behalf, and as an agent, of the grantee to fulfill the OTMA requirement.