

Case History #2: Eastman Chemical Company

Kingsport, TN

UNDESIRABLE EVENT: Customer Complaints

UNDESIRABLE EVENT SUMMARY: Five (5) similar customer complaints were received concerning green pellets mixed with clear pellets. Complaints were received from more than one customer, but not all rail cars of product received a complaint.

The silos (Figure 11.1) and conveying systems were checked prior to their initial use for the clear product. They were also cleaned and inspected after each customer complaint. Each time, one or more potential sources of green contamination was found and corrected.

After the fifth complaint, a team was put together to discover and eliminate the Root Cause of the contamination.



Figure 11.1: Product Silo with Blend Tubes

Sub-System	Event	Mode	Frequency	Impact/ Occurrence*	Total Annual Loss
Customer Service	Customer Complaints	Green Pellets Mixed with Clear Pellets	5 Railcars in 7 months (190,000 #/ Railcar)	\$17,100	\$85,500

Table 11.1: Line Item from Modified FMEA

IDENTIFIED ROOT CAUSES :

Physical Roots -

One of the silo blend tubes was damaged causing green pellets to be held in place and released intermittently.

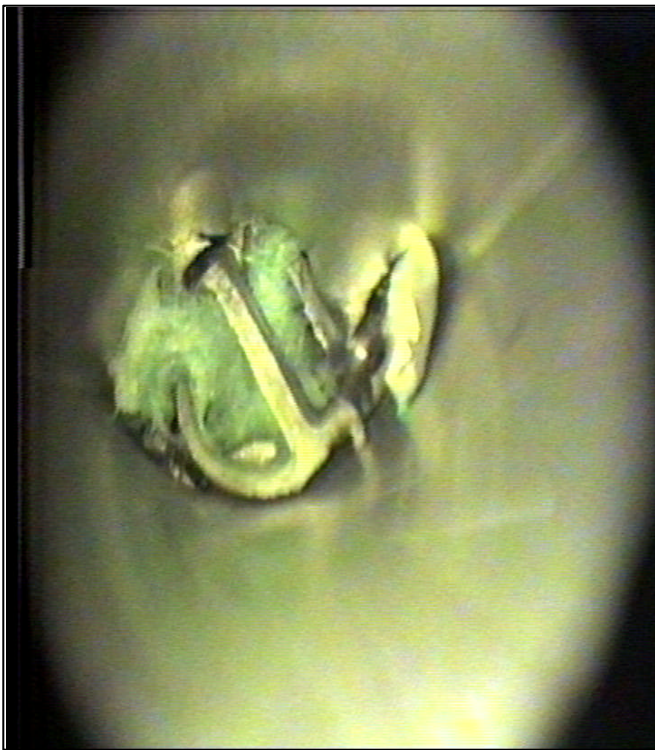


Figure 11.2: Plugged Blend Tubes

Human Roots -

Poor Repair Process was Used in the Past to Patch the Broken Blend Tube.

Inadequate Cleaning

Inadequate Inspection of Silo

Latent Roots -

Blend Tube/Support Design Allowed Fatigue Failure

Cleaning and Inspection Process Inadequate and Poorly Documented

IMPLEMENTED CORRECTIVE ACTIONS:

1. Damaged Blend Tube was Thoroughly Cleaned
2. Cleaning/Inspection Procedures Developed and Documented
3. Blend Tube Repair Procedure Developed and Documented
4. Communicate New Procedures to Operations and Maintenance Personnel
5. Conveying System/ Silo Product Changeover Check Sheet Developed and Deployed
6. An Improved Blend Tube Design is Used in New Silos

EFFECT ON BOTTOM-LINE:

TRACKING METRICS:

Number of Customer Complaints Concerning Green Pellets

BOTTOM-LINE RESULTS

Have Experienced Zero Customer Complaints Since Root Cause was Found and Countermeasures Implemented.

Conservative Estimates Report the Damaged Blend Tube Held Enough Green Pellets to Contaminate Five (5) More Railcars of Clear Product.

$$(5 \text{ Railcars}) \times (190,000 \text{ lbs./Railcar}) \times (\$0.09/\text{lb.}) = \$85,500$$

CORRECTIVE ACTION TIME FRAMES

From First Complaint to Correction was Seven (7) Months

RCA Team Found and Corrected Root Causes in Seven (7) Days

RCA TEAM STATISTICS:

Start Date: July 14, 1998

End Date: July 21, 1998

Estimated Cost to Conduct RCA: \$2,700 **Estimated Returns from RCA:** \$85,500

Return on Investment: ~3200%

RCA TEAM ACKNOWLEDGEMENTS:

Principal Analyst: Kevin Bellamy

Title: Reliability Engineer

Company: Eastman Chemical Company

Department: Reliability Technology

Site: Kingsport, TN

Core RCA Team Members:

Leslie White

Lee Norell

Keith Bennett

Michael Lambert

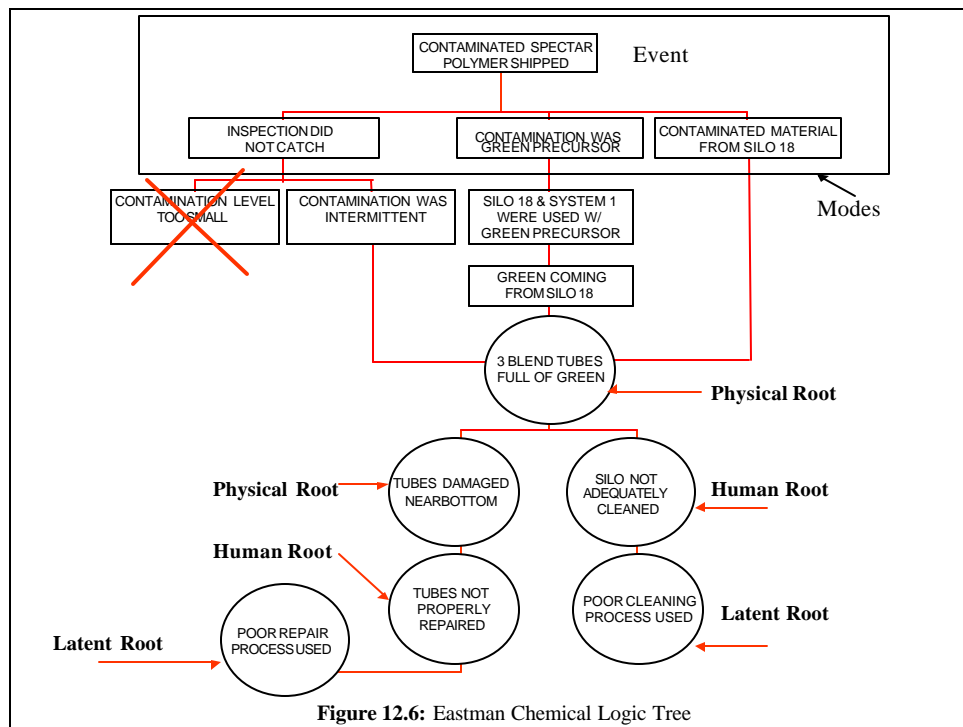


Figure 12.6: Eastman Chemical Logic Tree

Figure 11.3: Eastman Chemical Logic Tree