

## Case History #2: Eastman Chemical Company

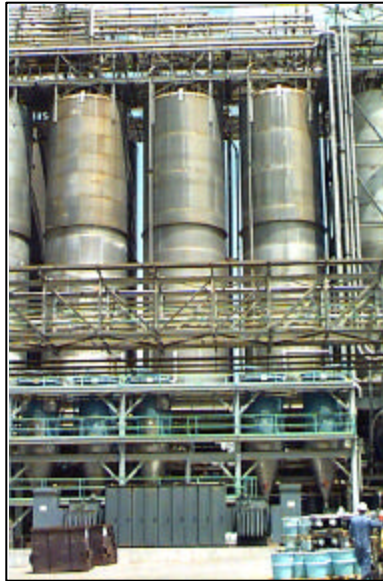
Kingsport, TN

### 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

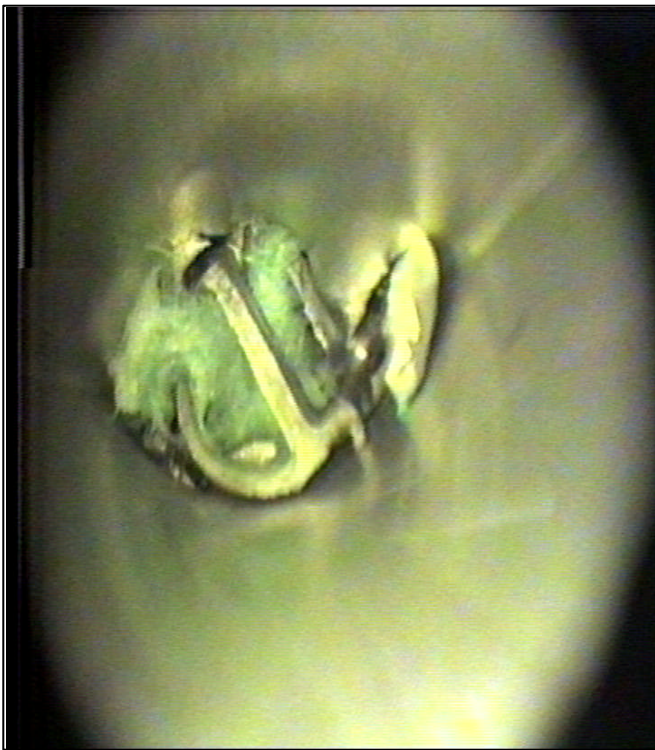
Sub-System	Event	Mode	Frequency	Impact/ Occurrence*	Total Annual Loss
Customer Service	Customer Complaints	Green Pellets Mixed with Clear Pellets	5 Railcars in 7 months (190,000 #/ Railcar)	\$17,100	\$85,500

**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

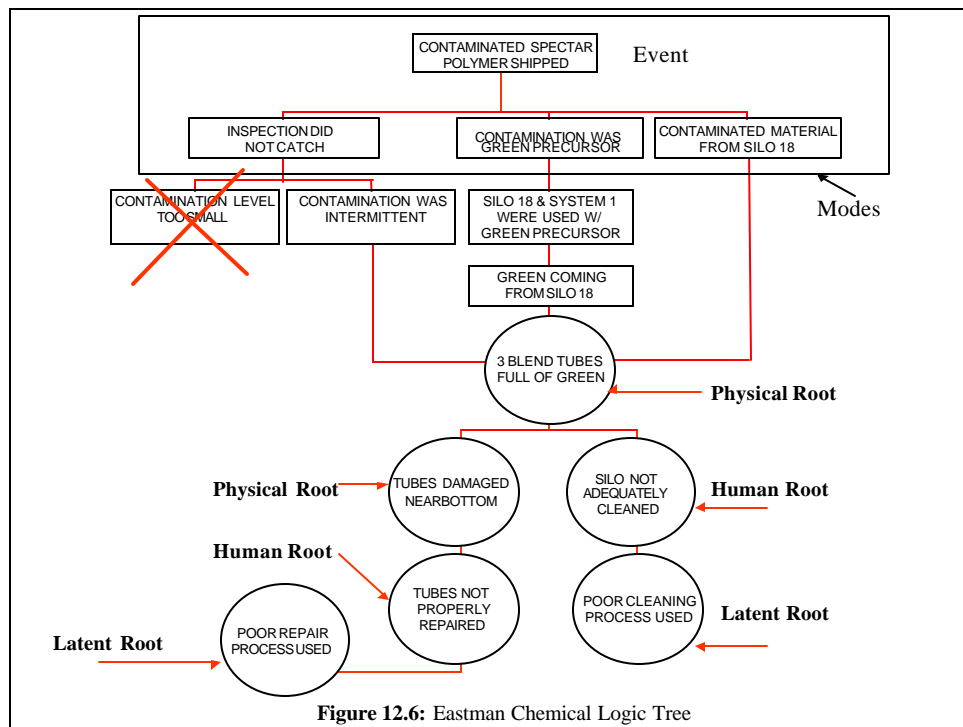


Figure 12.6: Eastman Chemical Logic Tree

Figure 11.3: Eastman Chemical Logic Tree