Root Cause Analysis (RCA) Report

Introduction

This Root Cause Analysis (RCA) report is generated by an AI reasoning agent based on past information from companies' SHE databases and considering information from training data sources. The document should only be used as guidance to generate the final RCA report.

Accident/ Incident Investigation Report

Prepared by: Safety AI Agent

Potential Root Causes Based on Historical Learnings

- **Static Charge Accumulation**: Static charge buildup in PVC pipes.
- **Friction at the Impeller**: Friction at the impeller of the blower.
- **Missing Earthing and Bonding**: Lack of proper earthing and bonding.
- **Use of PVC Pipes**: Non-conductive PVC pipes prone to static charge buildup.

Additional Potential Causes

- **Dust Accumulation and Ignition**: Explosive dust mixtures and hot spots.
- **Improper Maintenance**: Inadequate cleaning schedules.
- **Environmental Factors**: High ambient temperatures or humidity changes.
- **Equipment Malfunction**: Malfunction in the dust collector blower.
- **Design Issues**: Poor design of the dust collection system.
- **Ignition Sources in the Area**: External sources such as exposed electrical components.
- **Material Properties**: Flammability of SAP materials.

Recommendations for Additional Investigations

- **Material Testing**: Conduct tests on SAP.
- **Environmental Monitoring**: Install sensors to monitor temperature, humidity, and dust concentration.
- **Design Review**: Review the overall design of the dust collection system.
- **Inspection of Adjacent Equipment**: Ensure other nearby equipment isn’t contributing sparks or heat.
- **Historical Data Review**: Analyze historical incidents in similar factories.

Lessons from Similar Incidents Globally

- **Imperial Sugar Refinery Explosion (2008)**: Dust explosion from sugar dust accumulation.
- **Metalworking Plants**: Dust fires and explosions due to insufficient earthing and bonding.
- **Woodworking and Paper Mills**: Emphasis on the need for antistatic materials and grounding.

Proposed Preventive Measures

- **Material Replacement**: Replace PVC pipes with conductive or antistatic materials.
- **Improved Maintenance**: Implement stricter cleaning and maintenance schedules.
- **Fire Detection and Suppression**: Install advanced fire detection systems.
- **Continuous Monitoring**: Use real-time sensors for detecting static charge.
- **Training and Awareness**: Conduct regular training sessions for staff.
- **Third-Party Audit**: Engage external experts to audit the dust collection system design.

Knowledge database:

SHE DB

📌 Industrial Incident Databases – IChemE Lessons Learned, OSHA Root Cause Analysis Reports, NCBI Safety Studies
📌 Global SHE Best Practices – European Process Safety Centre (EPSC), Roche SHE Guidelines, ISO 45001 Framework
📌 Academic & Regulatory Research – BMJ Quality & Safety Reports, NCBI Environmental Health & Safety Management
📌 Industry-Specific Case Studies – Historical data on process safety failures, near-miss reporting, and preventive maintenance analytics