Presented by:

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Overview

- High profile structural failures raised MSHA concerns
- Issues identified in MSHA investigations
- Inspection strategy utilized by Agency
  - Enforcement Framework
  - Technical Support
- Regulations cited by MSHA
- Case Study
- Best Practices for mine operators moving forward
Worker Trapped In Collapsed Silo
Presumed Dead

'Corroded' Parts One Reason Silo
Collapsed: Federal Report

Citation issued against quarry operator
Steady Rise in MSHA’s Focus on Structural Issues after 2012

• Concerns initiated by investigation of Florida silo collapse
  ➢ Defects in the original construction of the silo roof.
  ➢ Ineffective material welds, delaminated beam pockets; vibration fatigue.

• Agency skepticism about third party engineering analysis, absent extensive internal structural analysis.
Silo Roof Failure
Agency Fear of a Larger Issue

- Agency concern that these types of issues might exist at other aging facilities.

- Initial focus on cement plant silos expanded to broader range of metal non-metal facilities.
  - Focus on structural support, decking and overloading.
  - Attention directed at type and frequency of structural analysis conducted by mine operators.
Subsequent Events Raise Concerns

- 2015 sand silo failure

- Enforcement focus on corroded, internal connections and material wear.

- Comprehensive analysis of past structural examinations.
Corrosion of Inaccessible Connections
Issues Identified for Closer Review in Inspections

- Delamination and cracking on silo walls
- Corrosion of beams and supports
- Decking plate thickness and wear
- Examination of Inaccessible support structure and connections
- Overloading
- Operator follow-up on structural inspections and recommendations
MSHA Inspection Focus

- **Silos** – Close attention to cracks, delamination, exposed rebar, spalling and roof housekeeping.

- **Buildings** – Look for evidence of deterioration of beams, supports and connections (rust, holes)

- **Conveyors** – Look for signs of deterioration of supports.

- **Stairs** – Concentration on foundational support and corrosion.
**Silos** – Horizontal, vertical and diagonal cracking.
Silos – Exposed Rebar
Buildings – Rust and deterioration on I-Beam supporting floor.
Conveyors – Holes in Supports that were hidden by accumulation of material.
Stairs – Inadequate foundational support
MSHA Inspection Strategy:
Enforcement Framework

1. Identify Structural Issues
2. Review Workplace Exams
3. Request Engineering / Structural Integrity Studies
4. Enforcement Action
   • Citation (104a / 104d)
   • Imminent Danger Order (107a)
   • Abatement (104b)
Technical Support Personnel have no enforcement authority; but

- Integral to the inspection;
- Key driver of duration of structural review and severity of enforcement action;
- *Agency sometimes uses threat of Tech Support as leverage to induce operator abatement action.*
MSHA Requests for Engineering / Structural Integrity Studies

1. Not a Mandatory Document / No requirement to disclose
2. Tougher call if confronted with withdrawal order / abatement challenge
3. Work Product Privilege
   ➢ *In anticipation of litigation*
4. No Self-Audit Privilege
Enforcement Action

• Citation severity and timing based on several factors:
  - Knowledge of condition identified in workplace exams, structural reports, supervisor statements;
  - Perceived severity of condition;
  - Abatement leverage

• Range of Options
  - Citation (104a / 104d)
  - Imminent Danger Order (107a)
  - Abatement (104b)
Regulations Cited by MSHA (30 C.F.R.)

- 56/57.14100(b)(c) – Correction of Safety Defects
- 56/57.11001 – Safe Access
- 56/57.11002 – Substantial Construction
  - Stairs, handrails, crossovers, ramps
- 56/57.18002(a) – Workplace Examinations
Case Study

- Inspector arrives at aggregate mine and immediately begins examining structural supports, stairways, and conveyor support structures;
- Requests workplace examination records for these specific areas;
- Requests copy of third party structural engineering report;
- Requests copy of operation’s color-coded priority repair spreadsheet (based on Eng. Report).
Case Study: MSHA Document Request

Management is requested to provide MSHA with the following information within 7 days of this request:

1. Copies of all structural studies of silos, bins, structures and conveyors conducted in the past 10 years.

2. Specific procedures/policies in place at the operation for inspecting structures.

3. Copy of operation’s structural repair spreadsheet. (Color coded).
Case Study: 104(d)(1) Citation
30. C.F.R. § 56.11001

Plant has numerous areas that have not been maintained and affect safety. The C6 and C7 conveyors have structural deterioration in the supporting cross braces. I beams supporting roof on the second level have corrosion, holes and rust. These conditions have been noted in several workplace examination over the past six months. Personnel are exposed to these hazards every shift as they traverse the work area and perform their duties. This violation is an unwarrantable failure to comply with a mandatory standard.
Case Study: 104(d)(1) Order
30. C.F.R. § 56.14100(b)

The stairs leading from the plant building to the transfer building has structural damage affecting safety. There is significant deterioration in the support securing the stairs. This condition exposes miners to injuries from falling or collapsing structures. This condition was identified in a maintenance spreadsheet which assigned it medium priority (correct within 6 months). That priority was set 12 months ago. This violation is an unwarrantable failure to comply with a mandatory standard.
The repairs to the structure were completed pursuant to an abatement plan submitted to MSHA and reviewed by MSHA Technical Support. The repairs were inspected by ACME Engineering, LTD on 01/01/2018 and the repairs were certified to be substantial. The repairs were photographed and sent to Technical Support and were deemed to be substantial. All repairs made to the structures and stairs were confirmed by the mine operator to be of a substantial nature.
Best Practices for Mine Operators Moving Forward

1. Review workplace exam records for descriptions of conditions indicative of structural deterioration (delamination, exposed rebar, corrosion);

2. Schedule periodic inspections of silos and structures to identify evidence of weakened beams, wall fatigue, damaged or missing connections.

3. Include a process for internal inspections of silos and bins.

4. Understand that structural inspection reports may not be confidential.

5. Understand that MSHA will second-guess your prioritization of conditions to be immediately addressed.
MSHA ENFORCEMENT OF STRUCTURAL INTEGRITY ISSUES

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