ASSE MPS Open Call

Serious Injury and Fatality Prevention: A case study

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Serious Injury & Fatality (SIF) Prevention

AGENDA

Overview of Mosaic
Background on SIF
Mosaic’s SIF Journey
Prevention
Metrics
Closing
About The Mosaic Company

Our Work
We are the world's leading integrated producer and marketer of concentrated phosphate and potash.

Our Mission
We help the world grow the food it needs
- 100 years of phosphate mining history in U.S.
- 50 years of potash mining history in Canada

Nearly 9,000 employees in operations:

<table>
<thead>
<tr>
<th>United States</th>
<th>Paraguay</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>China</td>
<td>Peru (JV)</td>
</tr>
<tr>
<td>Brazil</td>
<td>India</td>
<td>Saudi Arabia (JV)</td>
</tr>
</tbody>
</table>
Common trend of injuries versus fatalities

Heinrichs’s Loss Pyramid

- Fatality: 1
- Lost Time: 3
- Recordable: 10
- First Aid: 100
- Near Miss: 600
Heinrichs’s Loss Pyramid re-examined

- Not all incidents have an equal probability of resulting in serious injury.
  - i.e. Incidents involving the following generally have a higher probability of a more serious outcome:
    - Confined space
    - Working at heights
    - Mobile equipment
    - Lifting / rigging activities
- A reduction at the bottom does NOT correspond to a reduction at the top
- Different intervention strategies
Mosaic’s SIF Journey

2004-2008
- Formed in 2004
- Numerous programmatic improvements

2009-2011
- ISO14001 & OHSAS18001 Registrations
- Joined BST/Dekkra SIF Working Group

2012 – 2015
- Develop SIF concept within EHS
- Define Mosaic specific “SIF” definition
- Socialize SIF concept with leaders
- Targeted Interventions

2016 and beyond
- Branding SIF as Potentially Serious Incidents
- Delineated Environmental potential
- Strategic approach to improving controls
- Deployed PSI across organization
PSI Definitions:

An **Safety Potential Serious Incident (PSI)** is an event that could potentially and reasonably result in a fatality or permanent disabling injury if only *one factor* changed.

An **Environmental Potential Serious Incident (PSI)** is an event, if only *one factor* was changed, that could potentially and reasonably result in a:

- Significant environmental impact that takes weeks or months to remediate.
- Receipt of enforcement AND media coverage.

A **Factor** could be a control, the weather, time of day, person’s location, etc.

**PSI Quality Assurance Process - Overview**

**Site**
- Reviews and determines if incidents are PSI in real time
- Maintains PSI category in Incident information system
- Reports and investigates incidents per Investigation & CAPA procedure

**Business Unit**
- Conducts monthly review to determine:
  - Incorrectly determined or categorized PSI (*false positives*)
  - Review of non-PSIs (*false negatives*)

**Corporate**
- Conducts periodic review to determine:
  - Incorrectly determined or categorized PSI (false positives)
  - Missed PSI (false negatives)
  - Generates reports / metrics
SIF Prevention Approach

Prevention

SIF Prevention Approach

Analysis or Accident

Update

SIF Prevention

Ensure effectiveness

Determine Improved Controls
SIF/PSI by Category

Defining further

Falling Objects

- Lifting and Rigging
- Structural
- Dropped/Unsecured Objects
Intervention: Prevention of Dropped Objects

- Developed Corporate Standard
- Created communication strategy
  - Stop the Drop
- Trained employees on requirements
- Procured tools to enable employee success
- Conducted field checks for coaching & feedback
- Integrated into Management System self assessment & audit programs

Dropped/Unsecured Objects

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Count of Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td></td>
</tr>
<tr>
<td>2017*</td>
<td></td>
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</tbody>
</table>

*2017 prorated for full year

>70% reduction
SIF by Category

Life Critical Standards

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Life Critical Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Icon]</td>
<td>Lockout/Tagout &amp; Linebreak</td>
</tr>
<tr>
<td>![Icon]</td>
<td>Confined Space Entry</td>
</tr>
<tr>
<td>![Icon]</td>
<td>Work at Height</td>
</tr>
<tr>
<td>![Icon]</td>
<td>Falling Objects</td>
</tr>
<tr>
<td>![Icon]</td>
<td>Lifting Operations</td>
</tr>
<tr>
<td>![Icon]</td>
<td>Electrical Safety</td>
</tr>
<tr>
<td>![Icon]</td>
<td>Mobile Equipment Safety</td>
</tr>
<tr>
<td>![Icon]</td>
<td>Underground Ground Control</td>
</tr>
<tr>
<td>![Icon]</td>
<td>Machinery Safety</td>
</tr>
<tr>
<td>![Icon]</td>
<td>Working Around Water</td>
</tr>
</tbody>
</table>
Utilizing Hierarchy of Controls

Hierarchy of Controls

- **Elimination**: Physically remove the hazard
- **Substitution**: Replace the hazard
- **Engineering Controls**: Isolate people from the hazard
- **Administrative Controls**: Change the way people work
- **PPE**: Protect the worker with Personal Protective Equipment

Metrics and Measures
Leading Metrics

Hierarchy of Controls
• Focus on Elimination, Substitution, & Engineering
• % of corrective actions

Pre-Job Hazard Assessments
• PJHA Quality - leading indicator
• Safe Work Permit use

Effectiveness of Pre Job Hazard Assessments

Leading Metrics

Safety & Health PSI Rate

Time

Number of PSI Incidents

Example data
Closing

Our Next Steps:

Implementation of Life Critical Standards

Advance Environmental PSI

Using data to provide more insight

Expand knowledge sharing
Benefits

Spend time and energy commensurate to the risk

Increased awareness and visibility of environmental and safety risk

Improved identification of PSI exposures in the workplace

Improved controls

Summary

- Develop your definitions/program
- Analyze the data
- Take Action
- Measure and communicate
- Refine

- Importance of SIF concept
- Be an SIF prevention leader