

Serious Injury and Fatality Prevention

A full-page background image showing a male worker in profile, facing left. He is wearing a white hard hat with a Mosaic logo, a bright yellow-green high-visibility long-sleeved shirt with reflective stripes, and dark blue work pants with reflective stripes. He is standing on a concrete or metal platform. To his left is a large, dark, complex piece of industrial machinery, likely a conveyor system or a large pump, with many bolts and metal plates. The background is a reddish-brown, textured wall, possibly a mine tunnel or a large storage silo. The image is overlaid with several large, semi-transparent, light-colored circles.

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Aug 2, 2017



Serious Injury & Fatality (SIF) Prevention

AGENDA

Overview
SIF Background
Mosaic's SIF Journey
Using the data
Closing



About The Mosaic Company

(NYSE: MOS)

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.



Who We Are

- Fortune 500 company incorporated March 2004, combination of IMC Global Inc. & Cargill fertilizer businesses
 - 100 years of phosphate mining history in U.S.
 - 50 years of potash mining history in Canada
- Approximately 22.2 million tonnes of operational capacity
- \$7.2 billion in sales in calendar 2016
- Customers in approximately 40 countries
- Nearly 9,000 employees in operations and joint ventures (JVs) in:

United States

Paraguay

Australia

Canada

China

Peru (JV)

Brazil

India

Saudi Arabia (JV)

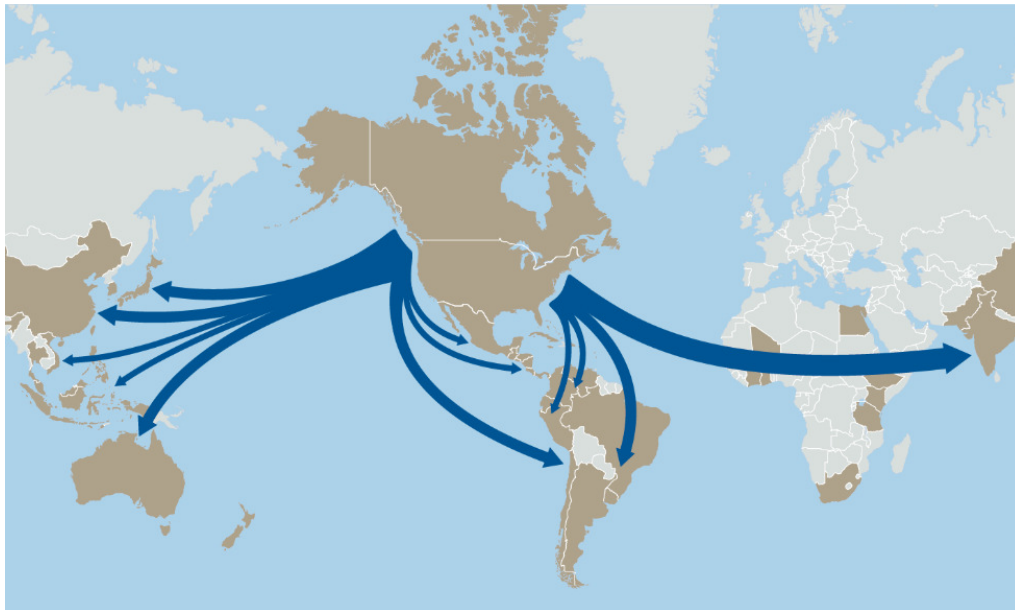


Global Offices & Operations



Distribution and Markets

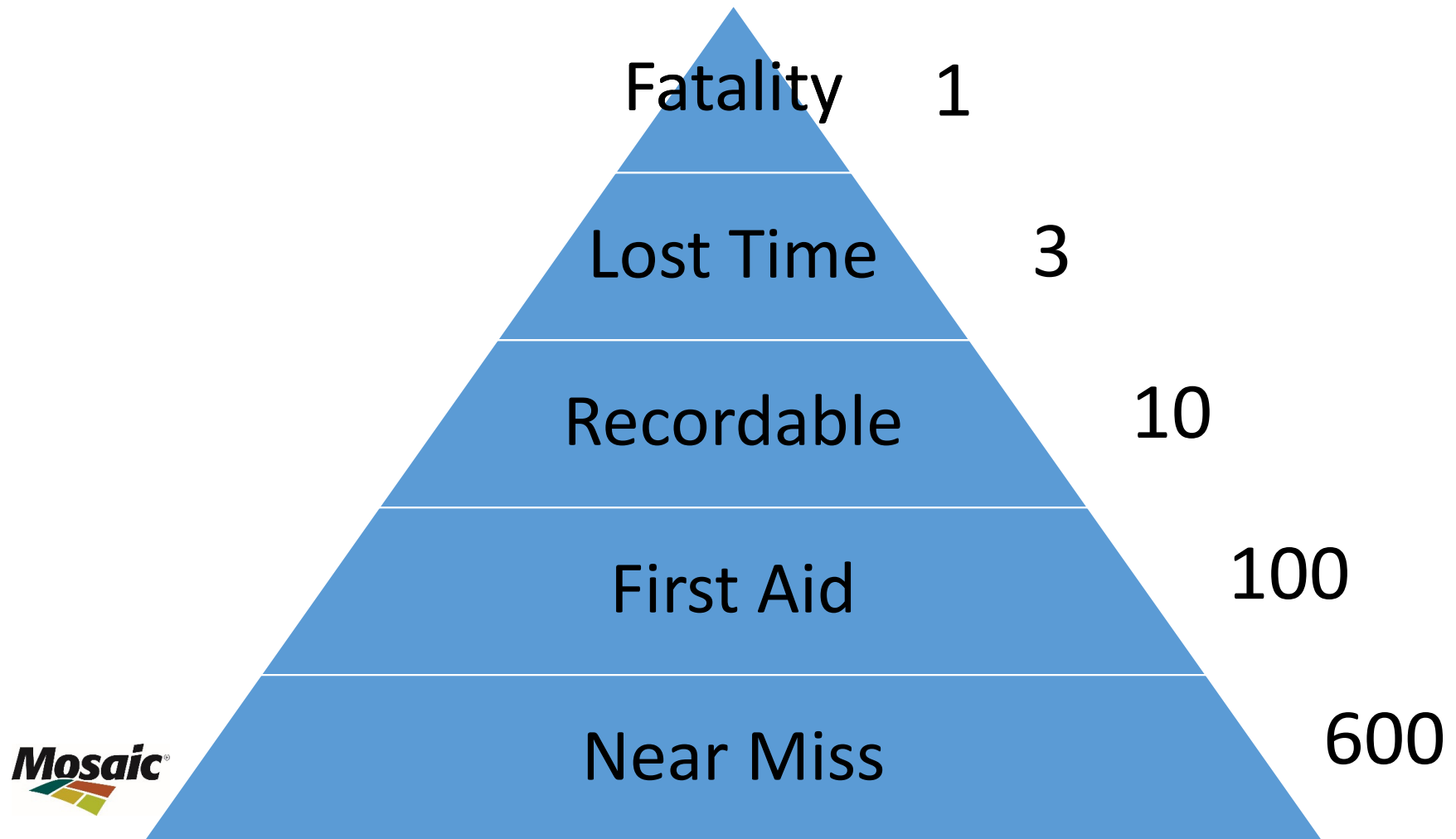
Daily global distribution:
Approx. 50,000 tonnes



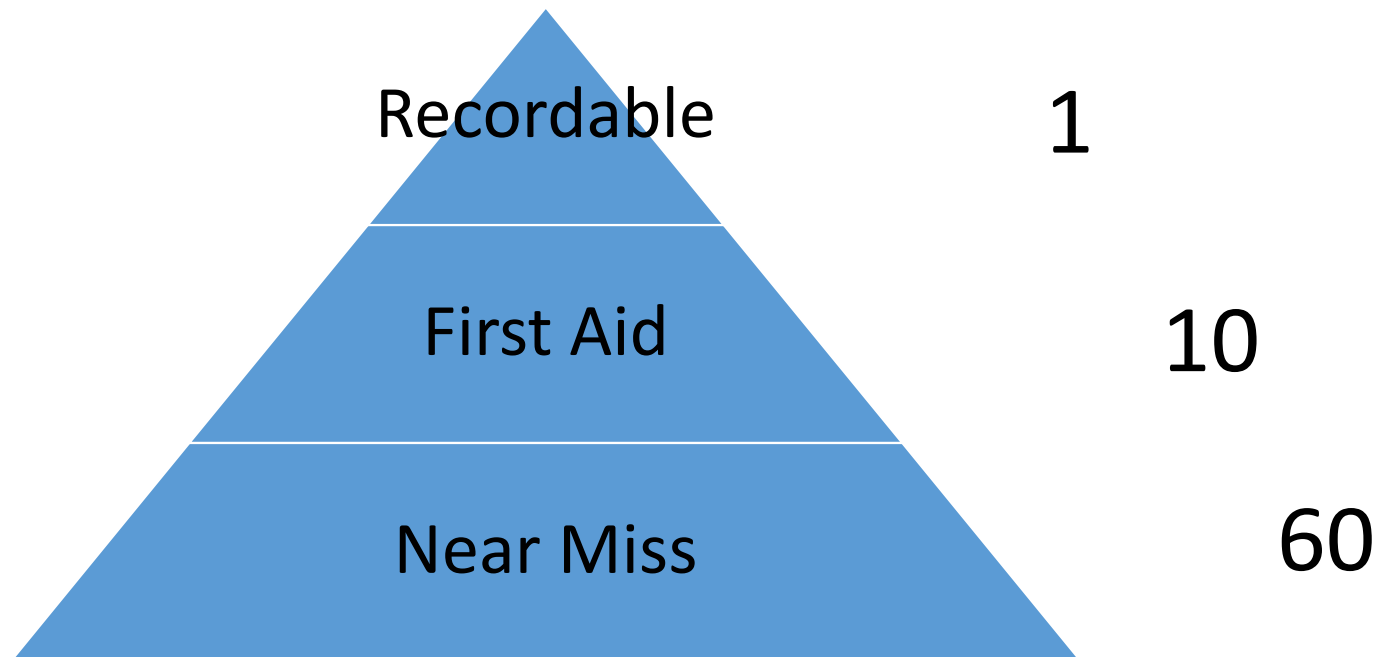
SIF Background



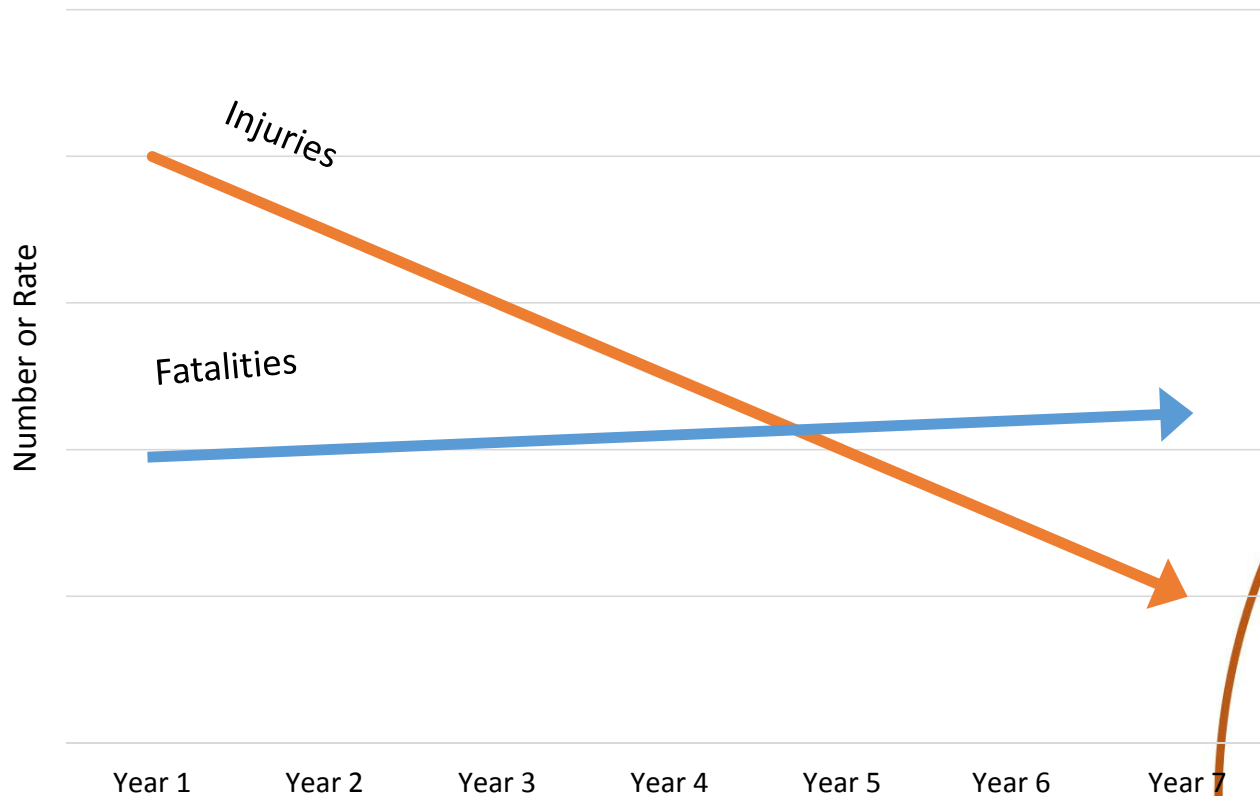
Heinrich's Loss Pyramid



Heinrich's Loss Pyramid



Common trend of injuries versus fatalities

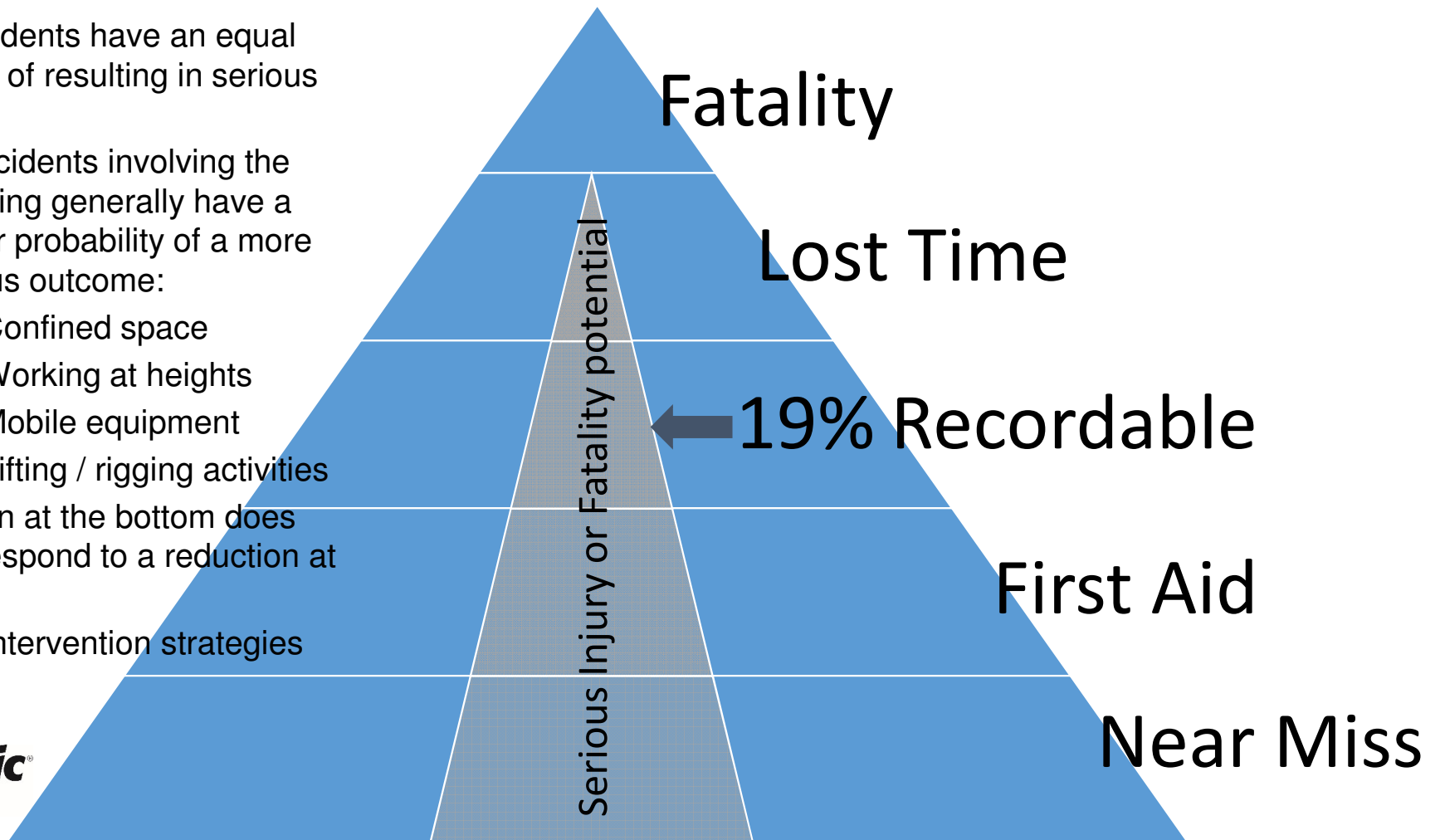


Year 1 Year 2 Year 3 Year 4 Year 5 Year 6 Year 7



Heinrich'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



Mosaic's SIF Journey

2004-2008

- Formed in 2004
- Utilized DNV Loss Control Theories
- Numerous programmatic improvements

2009-2011

- Obtained ISO14001 & OSHAS18001 Registrations
- Joined Serious Incident & Fatality (SIF) Working Group

2012 – 2015

- Develop SIF concept within EHS
- Measure "SIF" data
- Socialize SIF concept with leaders
- Targeted Interventions

2016 and beyond

- Branding of Potentially Serious Incidents
- Included Environmental potential
- Deployed PSI across organization



SIF Initially Defined at Mosaic:

Serious Injury/Illness or Fatality (SIF)

- Fatality
- Life-threatening injury or illness requiring emergent care (EMS)
- Life-altering injury or illness (Permanent)



Developed SIF Decision Tree

.....

SIF POTENTIAL

- 1) Did the incident involve:
 - a) Fatal or life-altering injury?
 - b) Confined Space w/o adequate safe-guards?
 - c) Critical lifts, suspended loads, unsecured loads, improper rigging or heavy objects falling over 5' (i.e. needs enough height and/or weight to contain SIF potential)?
 - d) Structural failure or corroded structural steel?
 - e) Elevated work without proper fall protection (tie off at 4') or opening with insufficient guarding?
 - f) Energized equipment – electrical => 110 v or other potential energy?
 - g) High pressure water blasting, abrasive blasting, etc.
 - h) Operating mobile equipment/vehicles in hazardous conditions (weather or people)?
 - i) Working around water > 5' deep?
 - j) Crane near overhead power lines?
 - k) Ground fall?
 - l) Working around hazardous materials at high volumes, temperatures, pressures or concentrations?
 - m) Human interaction with operational equipment with high potential energy?
 - n) Hand-held high-powered tools?
 - o) Severe weather (wind, tornado, lightning, etc.)?
 - p) Excavation w/o adequate safe-guards?
 - q) Hot work?

CARDINAL RULE DETERMINATION

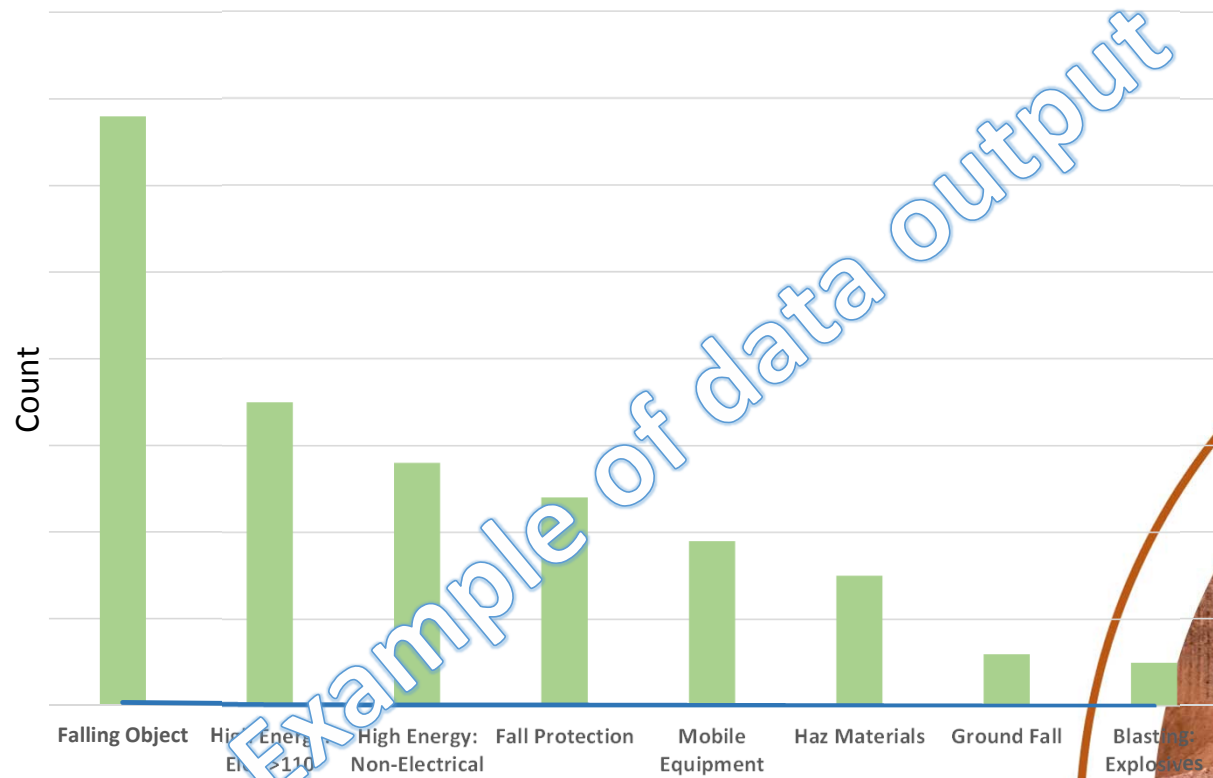
- 1) Did the SIF involve the Violation of a Cardinal Rule (Life Critical Program)?

NOT SIF POTENTIAL

- 1) Did the incident involve:
 - a) Fall from same level?
 - b) Hearing shift?
 - c) Insect bite/sting?
 - d) Discussion for more than 5 minutes?



SIF by Category



Intervention: Prevention of Falling 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 EHS Management System self assessment program



Refined and Rebranded SIF: Potentially Serious Incidents (PSIs)

Refined SIF Program

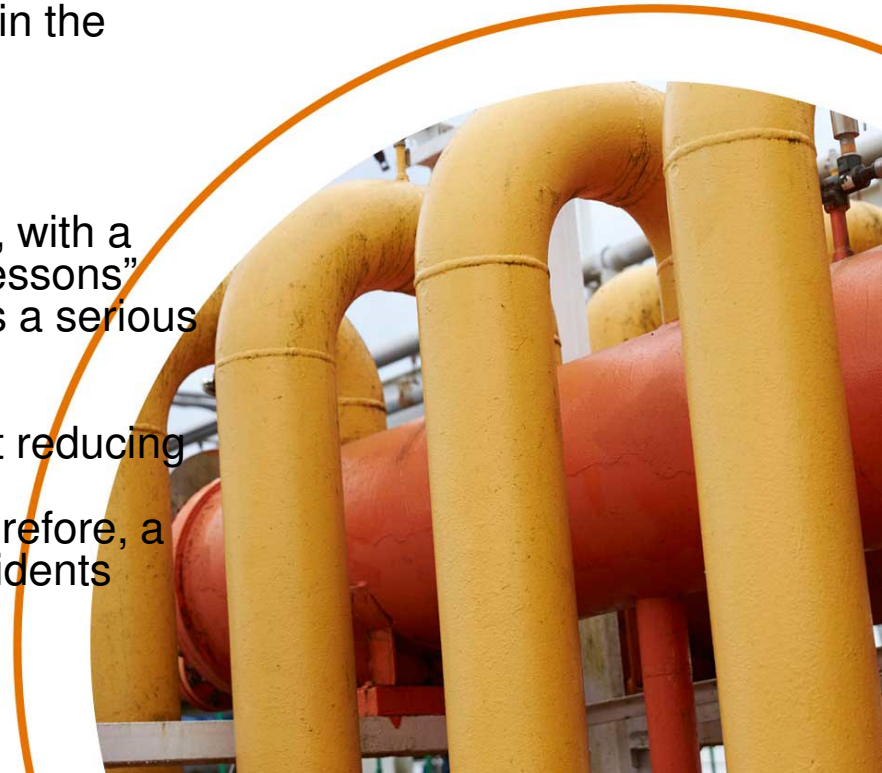
- Branded internally as Serious Incidents (SI) and Potentially Serious Incidents (PSIs)
 - Emphasizing Potential
- Updated definition and Updated categories
- Transitioned PSI determination to Operations
- Communicated across company
- Created Quality Assurance Process
- Communicated Initial Notices of PSIs to Mosaic leaders with investigations
- Applied SIF concept to Environment



Communication Points:

Serious & Potentially Serious Incidents

- Serious safety incidents are life altering and impact families, friends, and co-workers.
- Serious environmental incidents can affect our license to operate a facility, part of a facility or obtain permits in the future.
- Serious incidents can also affect our public image.
- Incidents, including near misses or minor incidents, with a potential to have serious consequences are “free lessons” and should be treated with the same importance as a serious incident.
- Recent research has taught the safety industry that reducing or attacking the frequency of incidents does NOT simultaneously achieve a reduction in severity. Therefore, a different strategy is required to reduce high risk incidents than a strategy to reduce all incidents.



Serious and Potentially Serious

Mosaic is defining and using the term **serious** to describe incidents that are or can be:
life altering or
affect our license to operate.

A **Serious Incident (SI)** is an event that:
Actually resulted in an A or B consequence on the RAM

A **Potentially Serious Incident (PSI)** is an event that:
Potentially could reasonably result in an A or B consequence on the RAM if only one factor around the event was changed.

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



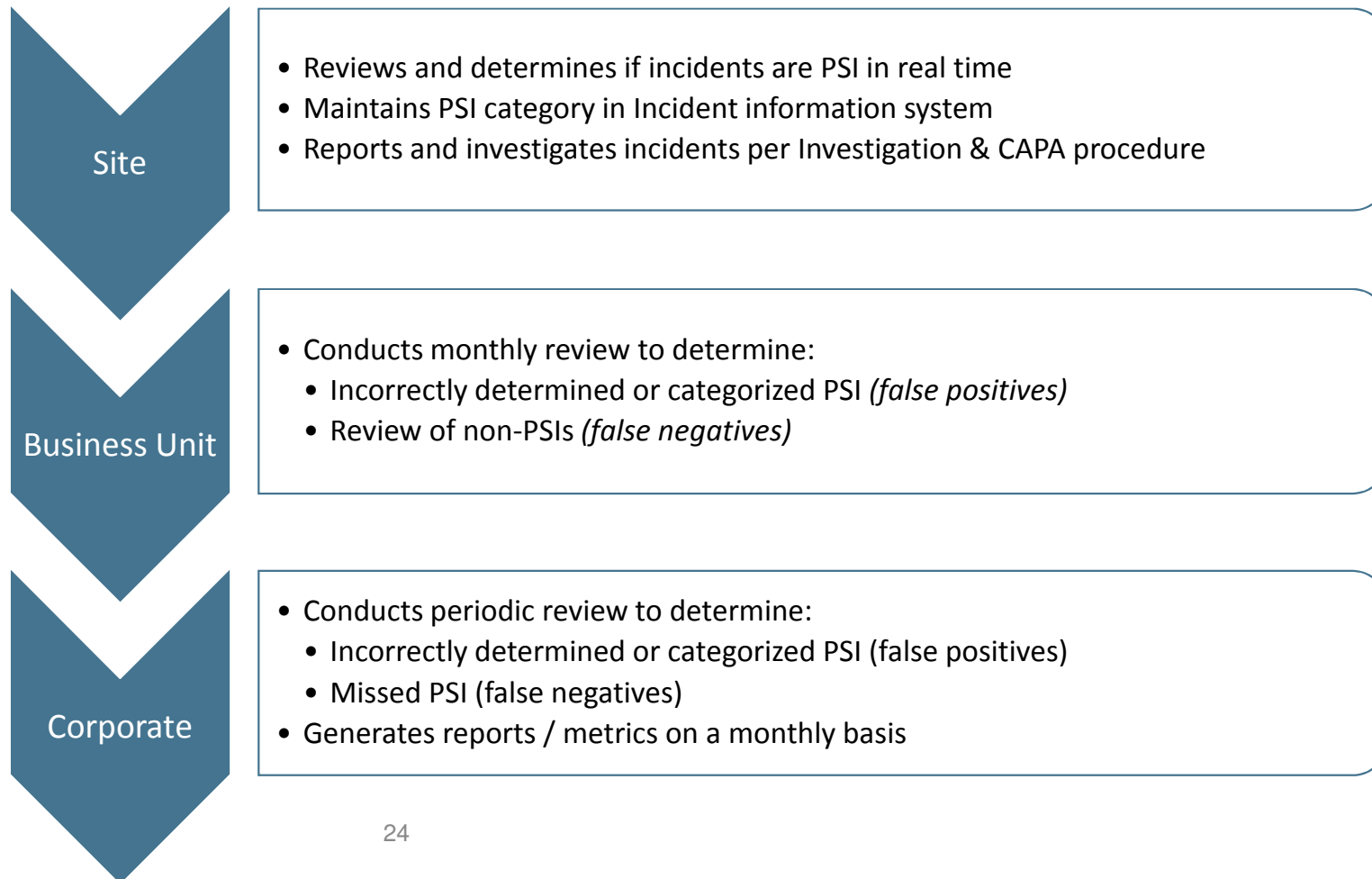
Mosaic Risk Assessment Matrix

	Consequences (types of consequences are mutually exclusive)	
	Safety Impact	Environmental Impact
A	Fatality OR release of materials that pose a widespread threat to the health and safety of employees or members of the public.	Release of material that poses a widespread threat to the environment or irreversible damage to ecosystem
B	Permanent Disabling Injury OR multiple people injured	Any Regulatory Non Compliance with a localized environmental impact that can be remediated over months or years
C	Injury/Illness with work restrictions	Any Regulatory Non Compliance, including those with quickly reversible^ environmental impact
D	Injury/Illness with minor severity	Release with minimal impact

PSI Health & Safety Categories

Letter	Category	Letter	Category
A	Abrasive & Water Blasting	M	Mobile Equipment
B	Blasting (explosives)	O	Operating Equipment
C	Confined Space	P1	Fall Protection
E1	Electrical contact	P2	Unprotected Openings
E2	Overhead Power Line	Q	Hot work
F1	Falling Object - lifting	R	Fire
F2	Falling Object - unsecured	S	Severe Weather
F3	Falling Object - structural	T	Hand Held Powered tools
G1	Ground Conditions - Underground	U	Hazardous Wildlife
G2	Ground Stability - Surface	V	Vehicle Travel
H	Hazardous Materials	W	Water
I1	Energy Isolation	X	Other
I2	Stored Energy		

PSI Quality Assurance Process - Overview

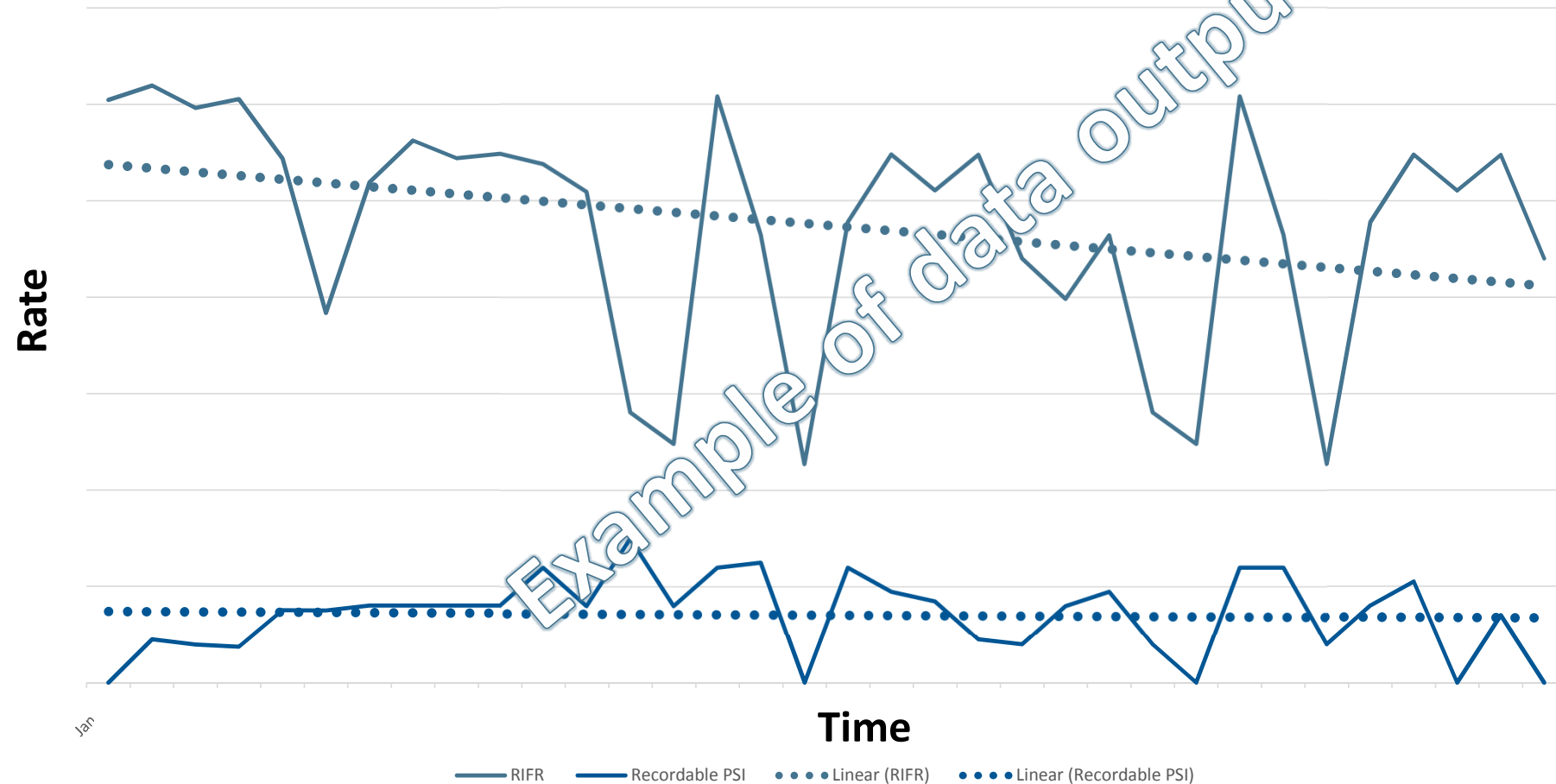


Using the information to make a safer workplace

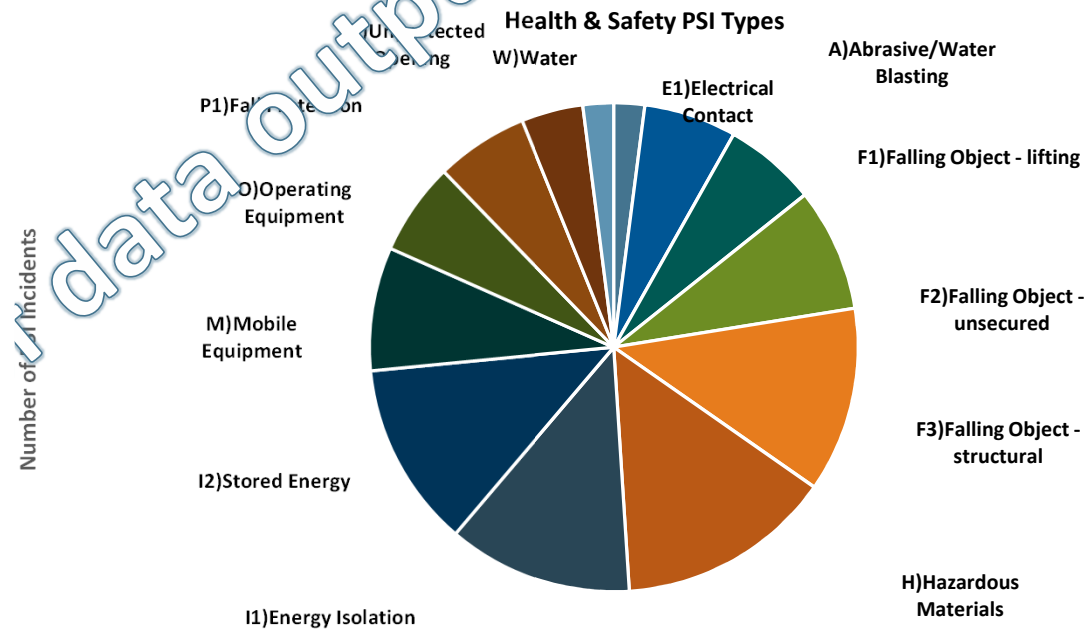


Decreasing RIFR vs Flat PSI Recordable Rate











Recordable Injury Rate vs. Potentially Serious Recordable Injury Rate



Monthly metrics



Improving Controls from SIF/PSI work

Pictogram	Life Critical Standard
	Lockout/Tagout & Linebreak
	Confined Space Entry
	Work at Height
	Falling Objects
	Lifting Operations
	Electrical Safety
	Mobile Equipment Safety
	Underground Ground Control
	Machinery Safety
	Working Around Water



Closing

- Importance of SIF concept
- Develop your definitions
- Analyze the data
- Take Action
- Refine





PSI Metrics

Health & Safety	Calculation	Purpose	Target
Serious Incidents	$\frac{\# \text{ Actual SI} \times 200,000}{\# \text{ work hours}}$	Reactive – Reporting	NA
Serious & Potentially Serious Incidents (Recordables w/ PSI potential)	$\frac{\# \text{ RI (as PSI)} \times 200,000}{\# \text{ work hours}}$	Proactive – Trending	NA
All safety incidents w/ PSI potential (inc. near miss & FAs)	$\frac{\# \text{ Incidents PSI} \times 200,000}{\# \text{ work hours}}$	Proactive – Trending	NA
Environmental	Calculation	Purpose	Target
Environmental Serious Incidents	$\frac{\# \text{ Actual PSI} \times 200,000}{\# \text{ work hours}}$	Reactive – Reporting	NA
Reportable w/ PSI potential	$\frac{\# \text{ RI (as PSI)} \times 200,000}{\# \text{ work hours}}$	Proactive – Trending	NA
All incidents w/ Env PSI potential	$\frac{\# \text{ Incidents PSI} \times 200,000}{\# \text{ work hours}}$	Proactive – Trending	NA

PSI Health & Safety Categories – DETAIL

Letter	Category & Explanation
A	Abrasive Blasting - Inadequate safe-guards
B	Blasting - Use and Handling of Explosives
C	Confined Space - Inadequate safe-guards
E1	Electrical contact - Person, tool, or equipment accidental contact with live electrical 110 V or greater (arc flash, cable strike, etc...)
E2	Overhead Power Line - Crane/ equipment contact or operating near
F1	Falling Object - lifting - Mechanical failure; Lifting, Rigging, Suspended loads falling over 5 feet
F2	Falling Object - unsecured - Unsecured loads over 5 feet; dropped or falling object
F3	Falling Object - structural - Structural failure or corroded structural steel falling over 5 feet
G1	Ground Conditions - Underground - Underground mining ground fall (unexpected)
G2	Ground Stability - Surface - Surface ground conditions / Unstable ground / Excavations (sloughs, cracks, washouts; includes mobile equipment on unstable ground)
H	Hazardous Materials - Human Exposure to materials that are hazardous by temperatures, pressures, volume and/or concentrations. [Thermal, pressure, and/or chemical energy]
I1	Energy Isolation - Improper control of hazardous energy (which should have been isolated) (i.e. Lockout/Tagout; Line Break)
I2	Stored Energy - Human Exposure to stationary equipment (i.e. pipe flex, spring release)

PSI Health & Safety Categories – DETAIL

Letter	Category & Explanation
M	Mobile Equipment - Mobile equipment: Human interaction with mobile equipment or operation in hazardous condition/environment (includes trains, dump trucks, mobile cranes, high reaches...)
O	Operating Equipment - Human interaction with operational process equipment and rotating assets (pinch points, nip points) [Mechanical Energy]
P1	Fall Protection - Elevated work over 4 feet with inadequate fall protection
P2	Unprotected Openings - Unguarded or unprotected opening or edge; greater than 4 feet fall distance
Q	Hot work - Inadequate safe-guards
R	Fire - Underground fire or significant fire hazard
S	Severe Weather - Human exposure to severe weather event
T	Hand Held Powered tools - Human interaction with hand held power tool
U	Hazardous Wildlife - Hazardous Wildlife & Plants: snakes, spiders, reptiles, moose, etc.
V	Vehicle Travel - Vehicle travel: within a site, between sites, or any use on company business (autos, pick up trucks, gators, golf carts, 4x4s, etc...) incidents associated with driving
W	Water - Working around water: People or equipment > 5' water with inadequate safeguards
X	Other - Not otherwise Classified