

# Newly Developed Anti-Caking Agents (WSS-18-069)

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Compass Minerals



What is caking of sodium chloride and how does it occur?

Common strategies to avoid the caking of sodium chloride

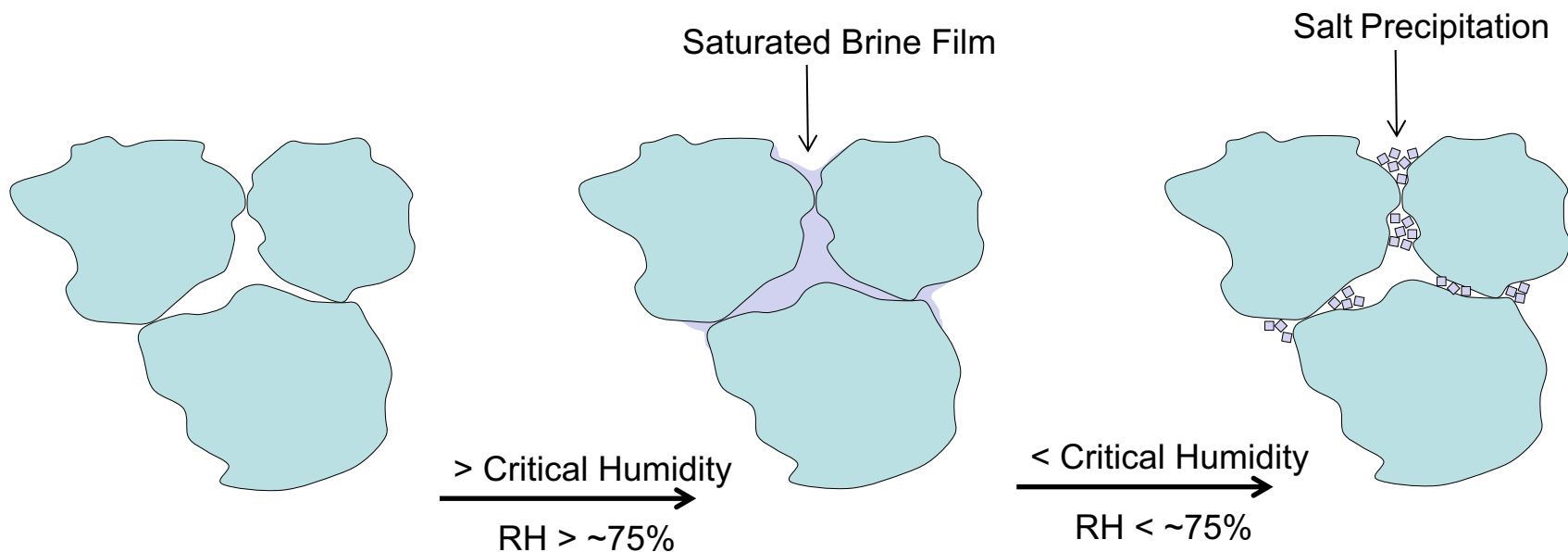
Why the industry needs a YPS alternative

Large scale additive field testing

Overview of data collected from field trial

## What is Caking?

- Caking is a process where individual salt grains amalgamate into a larger mass.



# WORLD SALT SYMPOSIUM

June 19-21, 2018

Park City UT, USA



Crystal  
Modifiers

Salt  
Precipitation

Dry Salt

Humidity  
Increase

## Cycle of Caking

~30 ft

Moisture  
Modifiers

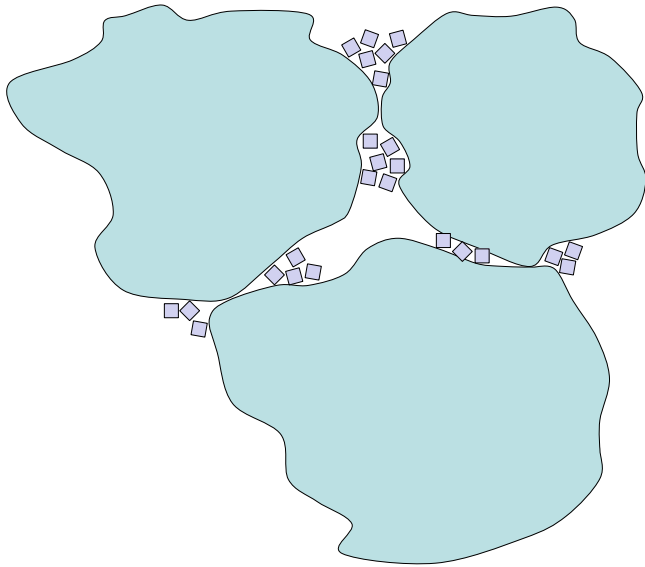
Humidity  
Decrease

Water  
Absorption

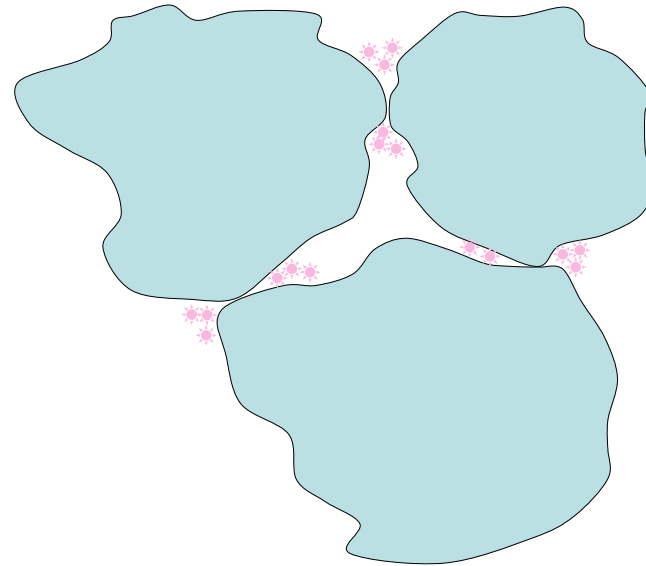
Desiccants

# How Does YPS Work?

Without YPS



With YPS



## YPS Terminology

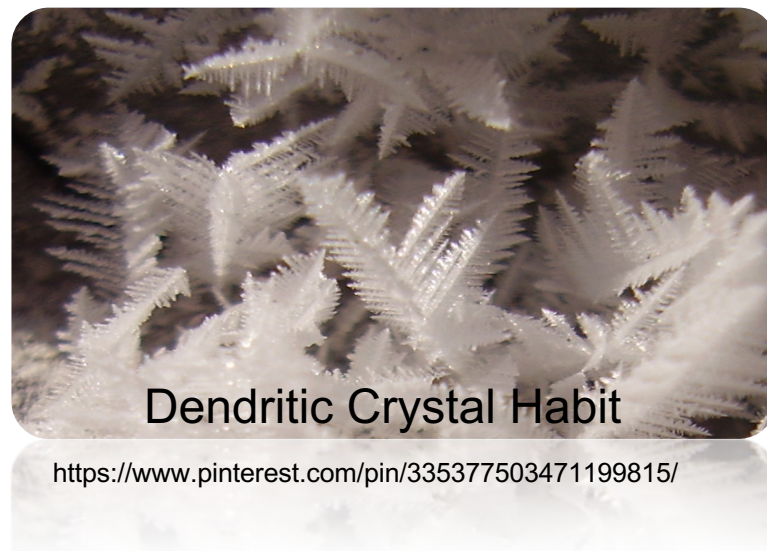
1. Yellow Prussiate of Soda (YPS)
2. Sodium Ferrocyanide

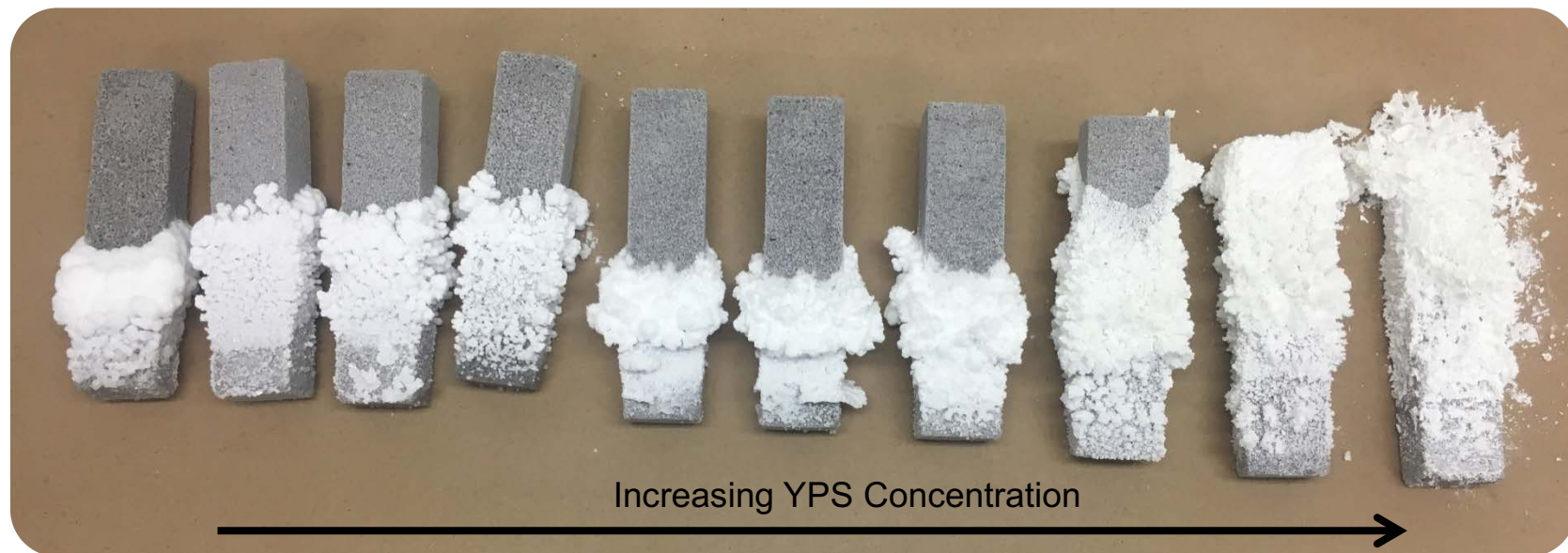


# Crystal Habit Modification



<http://dmishin.blogspot.com/2014/08/crystal-growing-table-salt-sodium.html>





0 ppm



0.5 ppm

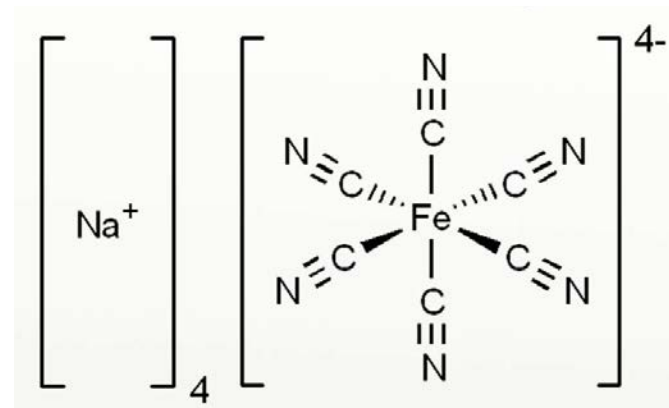


500ppm



## What is the Problem With YPS?

1. Crystal Creep
2. Environmental Concerns
3. Health Concerns



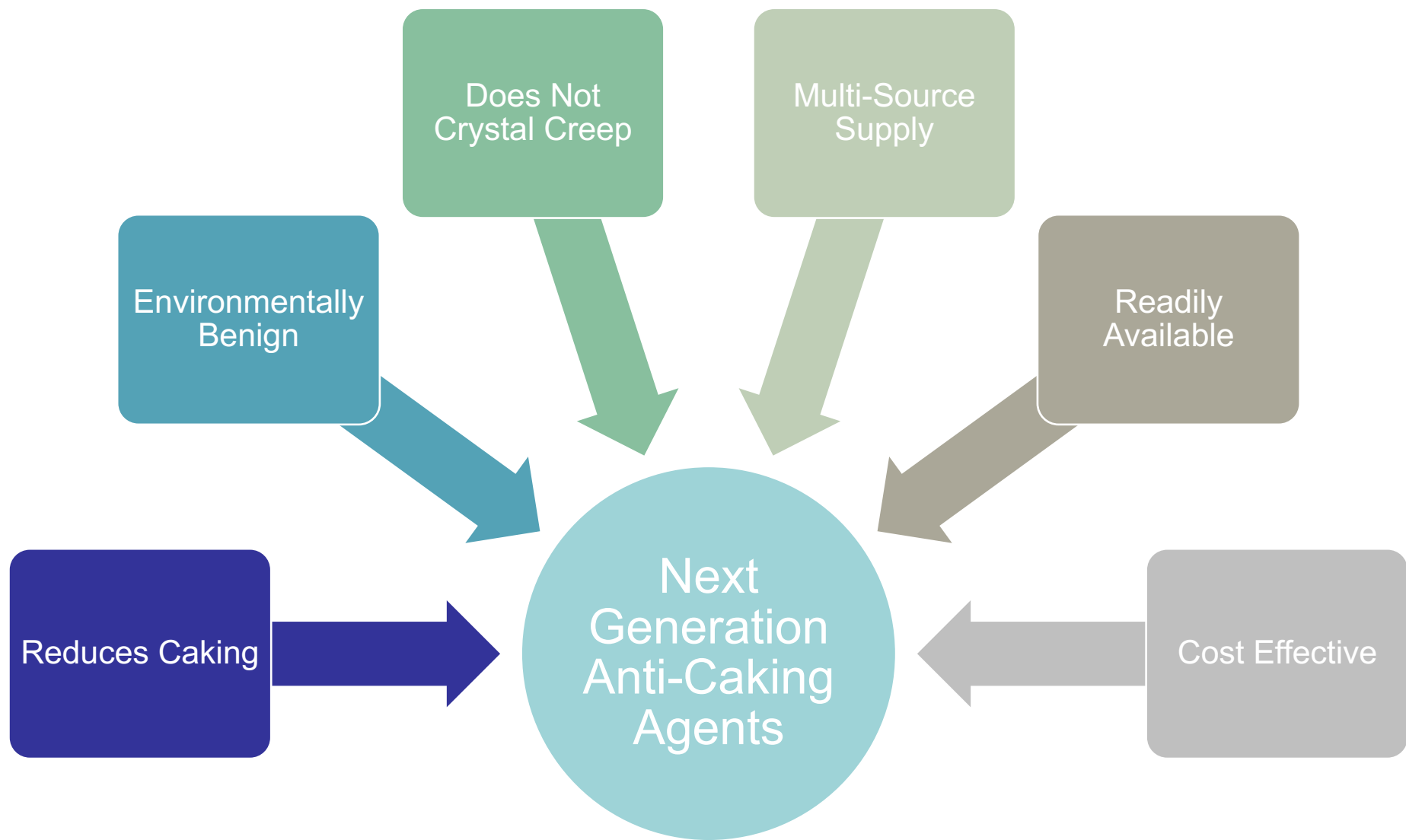


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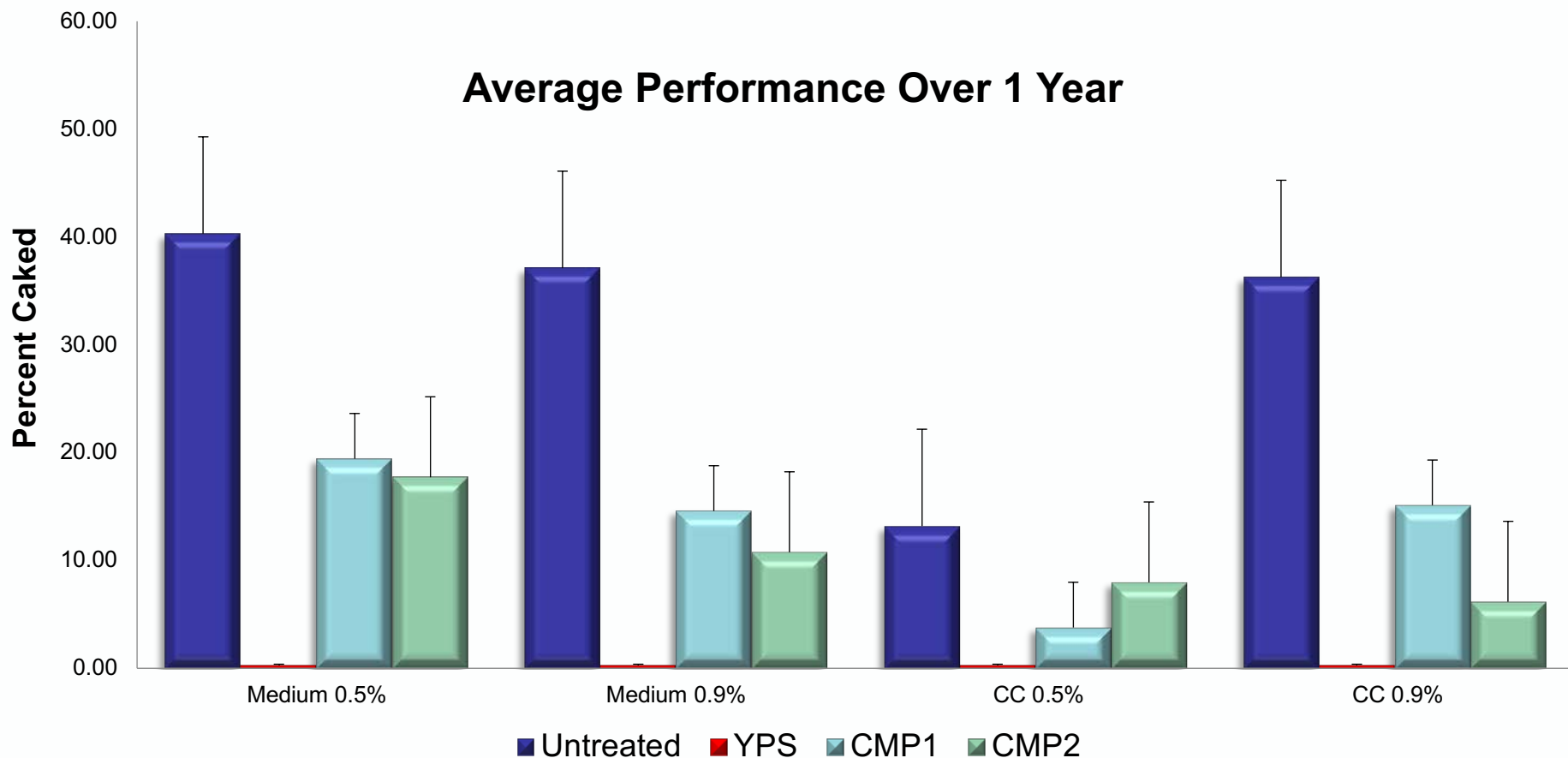


## Field Trial Experimental Design

Grain Size	Coarse Crush	Medium
Bag size	25 lb	50 lb
Moisture	0.5%	0.9%
Additive	CMP1	CMP2

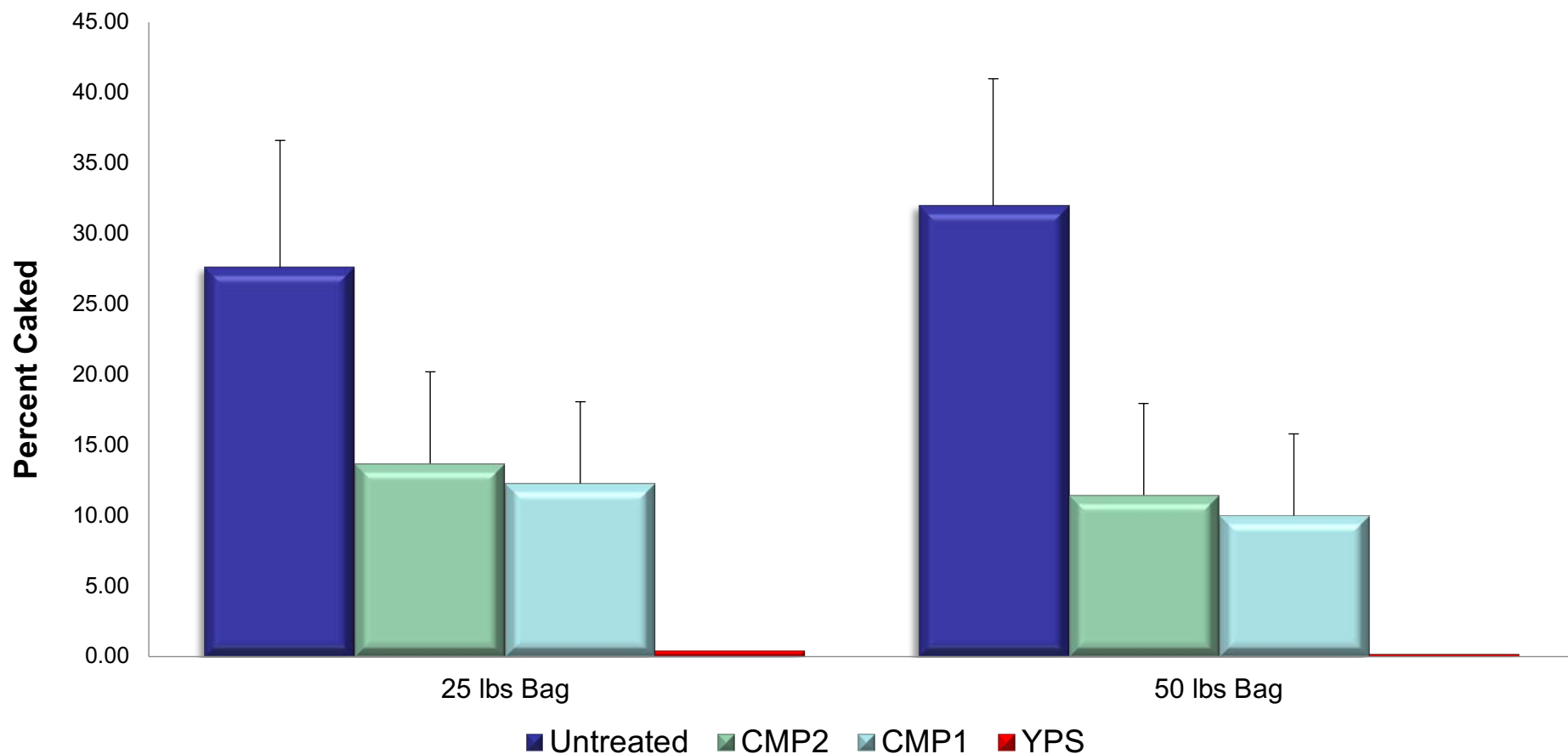


## Overview of Field Results



- CMP1 reduced caking on average by 55.5% and CMP2 reduced by 59.7%
- Anti-cake additives dosed at 25 ppm

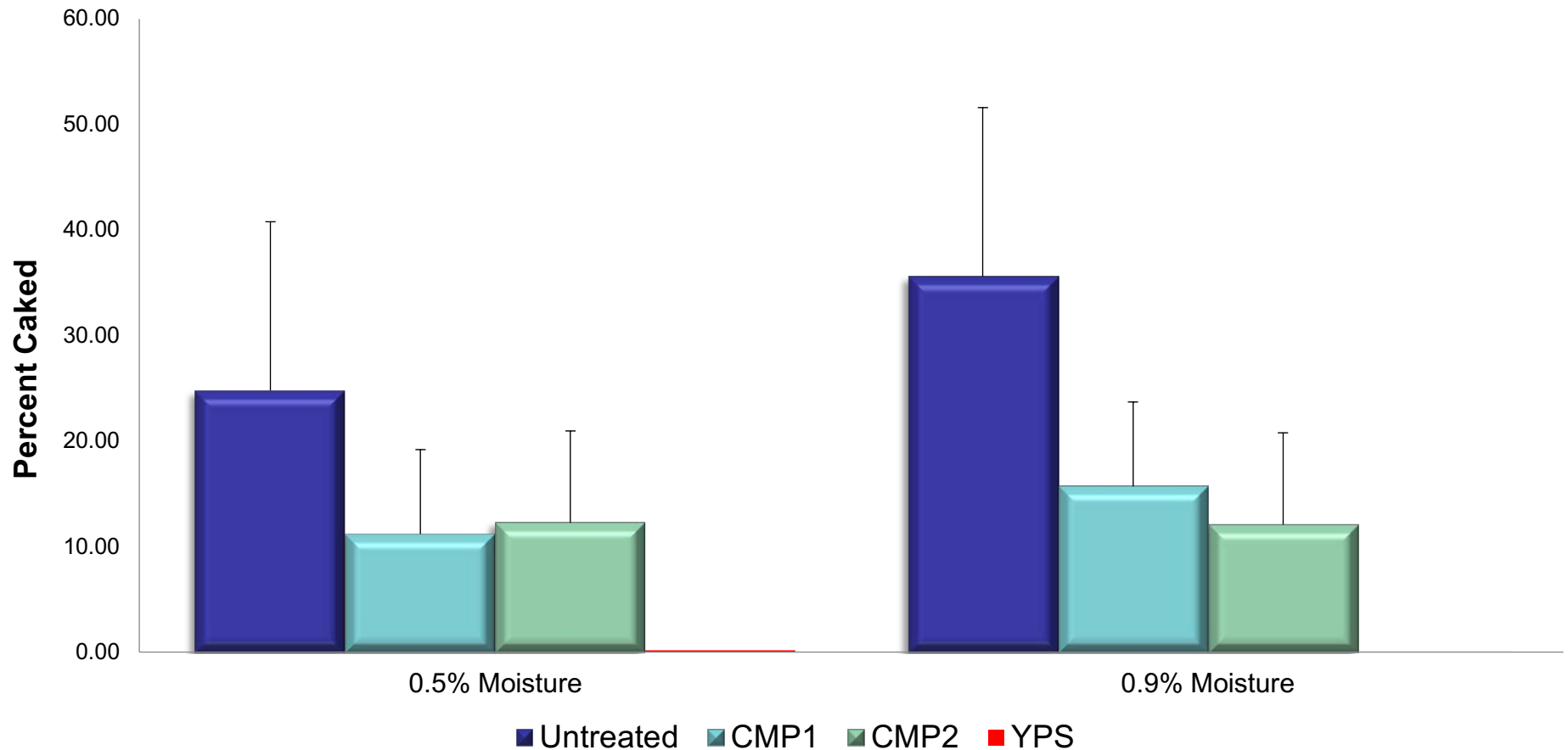
## Impact of Bag Size on Caking



Surprisingly, bag size has little influence on caking

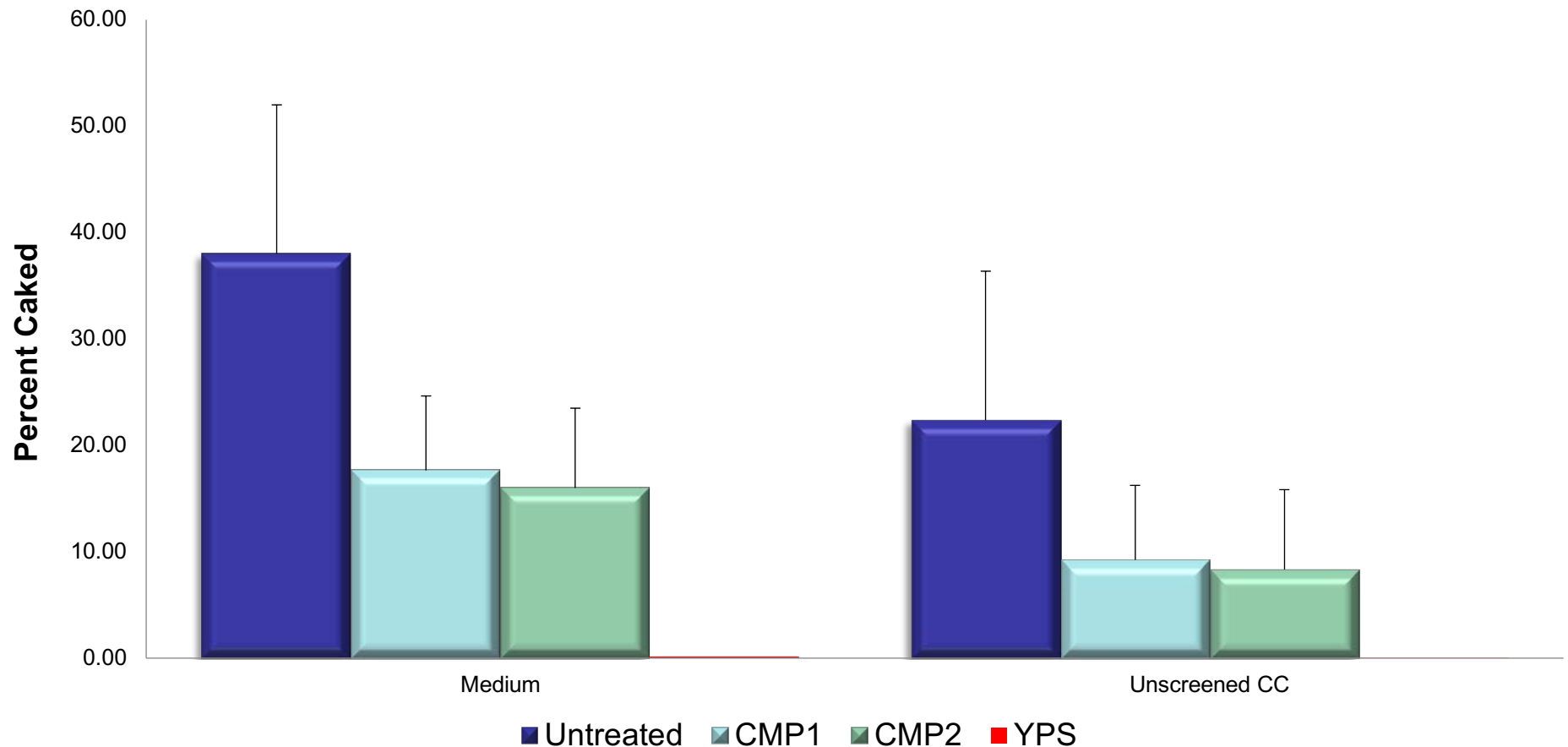


## Impact of Moisture on Caking



- Increased moisture showed largest impact on untreated salt

# Impact of Gradation on Caking



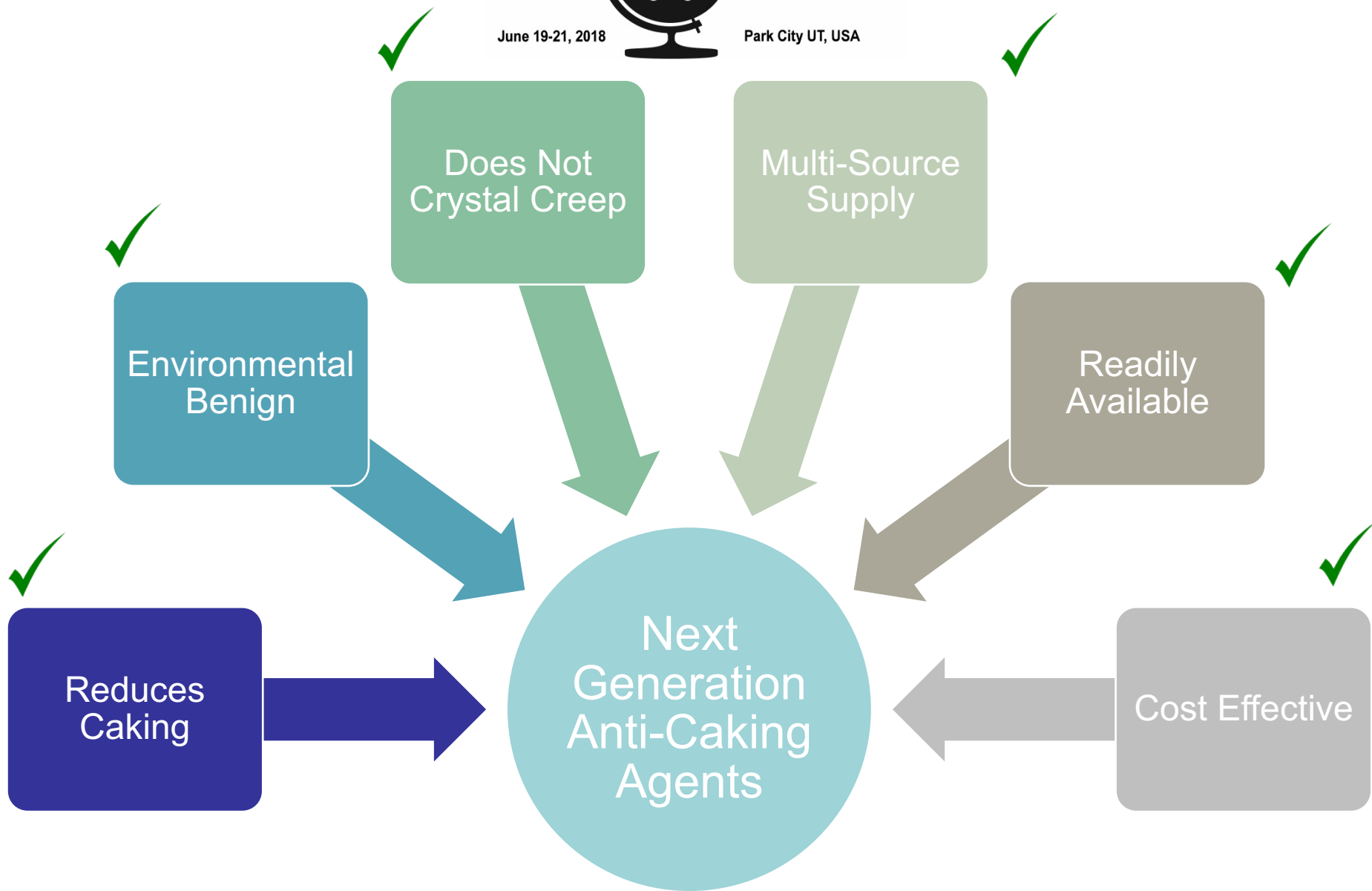
- Fine grained material induced more caking than did course grained

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## Conclusions

### Moisture

- The amount of caking in the salt increased with moisture in untreated salt but increased moisture did not affect treated salt.

### Bag Size

- Bag size had a minimal impact on the degree of caking.

### Gradation

- Larger amounts of fine grained material increased the level of caking. This was found to be the largest external factor that contributed to caking in this study.

### Caking

- Experimental anti-cake agents, CMP1 and CMP2, show as a YPS replacement, especially in bagged products.





Questions?

