Airborne Sulfur Dust: Composition and Control

Jerry d’Aquin
Con-Sul, Inc. USA
consulinc.com

Member TSI, TFI, IFA
INTRODUCTION

• Who is Con-Sul?
  Client-Specific “Commercial Consulting” since 1987
  Formed Sulfur Expertise since 1983

• Why speak at MESPON 2015?
  YOU ARE THE CENTER of global sulfur PRODUCTION
  Safety, Health & Environment is your RESPONSIBILITY
  Angie’s goal: Truthful Problem Solving Exchanges
Airborne Sulfur Particulate

NO ONE WANTS THIS

Sulfur can burn, explode
Dust is harmful to all
PURPOSE of PRESENTATION

• PROMOTE SAFETY
• Safe guidelines
• SHE responsibility
AIRBORNE SULFUR PARTICULATE

Pollutes environment when uncontained
Irritates throat, lungs, skin, eyes of workers...families? and citizens
Static electricity can ignite
TODAY’S OUTLINE

• What is “Formed Sulfur”
• What is size distribution, pre/post shipping
• What is Airborne Sulfur Particulate
• Mitigating Airborne Particulate
WHAT IS FORMED SULPHUR, what is not?

- **Formed Sulphur:** Pastille, Prill or Granule
  Each uses a different manufacturing process

- **Not Formed Sulphur:** Irregular shaped pieces -- dusty “Slate” to very dusty “Crushed Bulk”, “Lump” – over 15% under 300 micron
FORMED SULFUR – PRODUCER SAMPLES

PASTILLES

WET-FORMED PRILLS

GRANULES
PARTICLE SIZES OF THE THREE FORMED SULPHUR TYPES

- **Pastille -- Shantz**
- **Granule -- East Calgary**
- **Wet Prill -- Long Beach**
PARTICLE SIZES OF THE THREE FORMED SULFUR TYPES
(Samples Taken at Ship’s Destination)

- Sandvik, Wadi Sudr-Top (Qingdao)
- D-II - Beaumont (Unloaded SAFI)
- Safi - ADNOC Vessel Hold
COMPOSITION, SIZE and DUST CONTENT VARY SAME SHIP, retention sample GRANULE – ODESSA, Ukraine
GRANULAR SULFUR PARTICULATE SUB-50 MESH 300 micron (0.3mm)
ODESSA
Granular Sulfur Particulate: sub-50 mesh, 300 micron Screened at Odessa
Airborne Sulfur Particulate

SUB- 100 Mesh, 150 micron

0.5% of the total cargo is not much
KEEP IT FROM FROM BLOWING IN THE WIND!
Airborne Sulfur Particulate

MICROSCOPIC SULFUR PARTICULATE
AIRBORNE SULFUR PARTICULATE

ESTIMATED  minus 100 mesh to 200 mesh US
Minus 150 micron to plus 75 micron particles
equaled ONE-HALF OF ONE PERCENT (0.5%) of each sample

A 30,000 ton cargo of formed sulfur could include
150 tons of such tiny particle
(in this case, minus 75 micron particles add another 14 tons)
WHAT MAKES SULPHUR DUST?
BULK HANDLING A FRIABLE PRODUCT
Airborne Sulfur Particulate

CAUSES DEGRADATION and DUST
MOISTURE IS USEFUL TO PREVENT BLOWING DUST

SPRAY WATER, SURFACTANT, FOAM

LIMITED EFFECTIVENESS

WITH DRY SULFUR PARTICULATE

Brake, Germany
Airborne Sulfur Particulate

MUST HAVE THOROUGH MIXING TO MOISTEN ALL PARTICLES -
NOT EASY WITH RAPIDLY MOVING CONVEYORS

WATER DOES NOT PERMEATE THE SULFUR ‘COCOA EFFECT’
SULFUR DUST MUST BE MOIST TO LIMIT AIRBORNE PARTICULATE

- MIXED IN WATER, SULFUR PLATELETS WILL ADHERE TO ONE ANOTHER’S FLAT SURFACES THROUGH WATER’s “SURFACE TENSION”
- MOISTURE BETWEEN THESE FLAT PARTICLES WILL BE ATTRACTED TO SIMILARLY-LINKED WATER MOLECULES
- MOIST SULFUR PARTICLES WILL LINK INTO LARGER PIECES, LIMITING AIRBORNE DUST
WATER WORKS TO LIMIT ARBORNE PARTICULATE

September 2015, Alpine Laboratory

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ALTERNATIVES TO ACHIEVE MOISTURE CONTENT FOR PARTICULATE-FREE TRANSFERS

• USE VERY FINE SPRAYS and MIXING ON CONVEYER BELTS and AT TRANSFER POINTS -- have complete storage and reclaim delivery system checked by experts in sulfur handling

• THOROUGHLY WET PRIOR TO RECLAMATION

• SOLIDIFY BY DIRECT IMMERSION IN WATER
AIRBORNE SULFUR PARTICULATE

ALWAYS REMEMBER

• Sulfur is brittle and fractures easily
• DRY Sub-150 micron easily becomes airborne
• Moisture prevents airborne particulate
• BE CLEAN – BE SAFE: +1 to 2% moisture specification for your Formed Sulfur, properly applied
CONCLUSION -- USE + 1% MOISTURE MINIMUM

• VERY LITTLE:

• Additional cost for 1% to 2% moisture is insignificant compared to cargo value

• IT IS CHEAP FOR SAFETY, HEALTH and ENVIRONMENTAL PROTECTION it provides at PRODUCER and CONSUMER LOCATIONS

IT IS THE RIGHT WAY TO GO
OTHER ASPECTS OF SULFUR FORMING, TRANSPORT & HANDLING CAN BE IMPROVED

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THANK YOU!