

Pennsylvania Mine Reclamation Conference August 3, 2012

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AGENDA

Introduction
 Who is Harsco?

- 3. Mineral CSA & AMD
- 4. Projects
- 5. What's New?
- 6. Wrap-up





Harsco Global Business Platforms

Harsco Corporation (HSC) is a diversified, global industrial services and engineered products company serving major industries that are fundamental to worldwide economic growth.

> The world's most complete global organization for highly engineered rental scaffolding, shoring, concrete forming and other access-related services. Operating at approximately 200 sites in over 40 countries





HARSCO

RAIL

HARSCO

INFRASTRUCTURE

- The world's largest provider of on-site, outsourced services to the global metals industries. More than 160 sites in 30 countries
- Global railway track maintenance services and equipment







INDUSTRIAL

ARS

- Environmentally-responsible, mineral-based products for a range of commercial and industrial uses
- Energy-efficient air-cooled heat exchangers, heat transfer equipment, and industrial grating products











Reed Minerals

- Utility Services
- BLACK BEAUTY®
- Abrasives
- Roofing Granules
- National 21 sites
- 190 employees



Excell Minerals

- Stainless Services
- Metal Recovery
- AgrowSil[™]
- Excellerator[™] Turf
- Global 8 sites
- 260 employees



Performix

- Metallurgical Additives
- Briquettes
- •

Desulfurizers/Deoxidizers

- Analytical Support
- National 2 sites
- 40 employees

Delivering innovative economic and green solutions for mineral recovery















Company Overview

- Recmix 1989 in Canonsburg
- Recmix 1996 in Sarver
- Harsco purchased company in early 2007
- Unique processing & blending process
- 99.95+% of all free metallics removed
- Plants in PA, KY, Belgium, France, Brazil, South Africa, & soon to come China





WHAT IS MINERAL CSA?

- Harsco Mineral CSA is a finely ground, engineered calcium silicate aggregate.
- It's parent material is a downstream stainless steel furnace slag that undergoes proprietary "ageing" processes, fine grind pulverizing, blending, and extensive metal separation (>99.95% of all metals removed) to remove impurities.
- Harsco Receives 95% of all stainless steel in the U.S.







Harsco Mineral CSA

- 100% Recycled Product
- Approved by the Department of Environmental Protection
- In use for more than 20 years
- More than 5 million tons used at numerous Western Pennsylvania







Recycling Process



Material that once raised environmental concerns is now completely and beneficially reused.







Typical Analysis

Calcium	24%
Total Silicon (compared to wollastonite)	113-149%
pН	12.4
Calcium Carbonate Equivalent	86%
Relative Neutralizing Value	80%
Minimum Passing #20 Mesh Screen	95%
Minimum Passing #100 Mesh Screen	65%
Max. Moisture Content*	20%





AMD Prevention & Remediation

- High relative Neutralizing Value (RNV)
- Enhanced ability to immobilize, detoxify, and precipitate metals
- Can use 30% less material that limestone
- Proven 20 year track record in AMD treatment
- Calcium carbonate equivalent is higher than limestone
- Will not armor, retaining long term effectiveness
- Soluble alkalinity is more that 5,000 times higher that typical limestone
- Soluble silicon is more than 2,000 times higher than typical limestone
- Consistent chemistry and performance





AMD PREVENTION

Mineral CSA is not just a lime material ...not even close.

tals
Sustainability
Reduces CO2 production +
Immobilize and Detoxify Metals
Will Not Armor
Consistency/Uniformity
Precipitates Metals
pH Control

Precipitates Metals pH Control

CaCO₃,LKD, & CKD

Mineral CSA

Faster Acting – Longer Lasting

Reduced Exposure to Risk

Mineral CSA treats more... and leaves more in your pocket.





- Limestone raises the pH and precipitation of metal hydroxides is normally accelerated and the potential of armoring of limestone particles increases significantly.
- Due to its loose crystalline structure and fine gradation, its Relative Neutralizing Value is greater than 86% compared to Agricultural Limestone which is approximately 65%.







Limestone







Armored Limestone

Coal Refuse

MINERAL CSA





Harsco MINERAL CSA vs. LIMESTONE







MCSA Success – Acid Mine Drainage (AMD)

250k – 300k ton Market annually









CSA Success – AMD, Water Treatment





- Environmental Partnerships with Stream Restoration Inc
- ODNR, Consol, & Oxford Mining







CSA Success – AMD, Water Treatment- Consol Trial

Consol Energy Powellton, WV site: Closed Mine

Valley Fill barrier design

Supplement Caustic materials to decrease legacy water treatment costs





























Rosebud Mining Company, Kittanning, PA









Champion Processing, Inc., McDonald, PA

November 2009

Champion Processing, Inc., McDonald, PA

HARSCO



Montour Trail





Stream Restoration Inc.

McIntire bond forfeiture mine site needed to treat a highly acidic mine discharge with high concentrations of iron, aluminum, and manganese. The discharge is one of the worst quality discharges in the Slippery Rock Creek Watershed. Mineral CSA is used on this site to line the walls of the settling ponds for alkaline addition.







Stream Restoration Inc.

Neal Run Restoration

Mineral CSA was used as an alkaline amendment to help abate the severely degraded drainage issuing from the site.

The project was recently completed and is expected to prevent over 100,000 lbs. (50 tons) of metals and nearly 400,000 lbs. (200 tons) of acidity every year from entering Neal Run







Reeds Run Armstrong Township, Clarion County

The Reeds Run Remediation Project is took nearly a decade to restore the headwaters of Reeds Run, a small stream in Indiana County, Pa. The project involved removing the source of the abandoned mine drainage, a coal refuse pile, and construction a ³/₄ acre aerobic wetland. We were excited to see fish return to a section of Reeds Run that had been void of life for aver 50 years du the impacts of acid mine drainage.







Reeds Run Armstrong Township, Clarion County





Removal and special handling of coal refuse to reduce the impact of degraded drainage in the Reeds Run Watershed



















Mineral CSA (Harsco Minerals) used for temporary treatment of degraded water from the coal refuse pile and used as an alkaline amendment during reclamation



Reeds Run AMD Remediation Project

BEFORE

8/21/2003 12:44







Wetlands were heavily impacted by degraded drainage of the coal refuse.



Reeds Run AMD Remediation Project









Jennings Environmental Education Center is located near Slippery Rock, PA. The site here is used as a place to teach people of all ages about abandoned mine drainage and the many ways that it can be treated. There is a Vertical Flow Pond on site that was recently re-done after a longer-than-expected life of 15 years. Mineral CSA was used on this site to encapsulate the removed, old mixture of spent mushroom compost and limestone.













- Harsco conducted an in house coal refuse study
- Simulated a coal refuse pile
- Used varying methods of applying Mineral CSA
 - Control coal refuse
 - Mineral CSA on top of refuse
 - Mineral CSA top & bottom
 - Mineral CSA 5% blended with refuse
 - Mineral CSA 10% blended with refuse

Coal Refuse Tests

















Questions? Comments?