

4th Annual
Midwest Soil Improvement Symposium:
2014
Research and Practical Insights into Using Gypsum

**How Gypsum is Made and
How We Know it is Safe**

Jared Morrison
*Environmental Manager of Water and Waste Programs
Westar Energy
Topeka, Kansas*



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JARED MORRISON, WESTAR ENERGY

**Midwest Soil Improvement
Symposium**



Taking energy to heart.



How Gypsum is Produced

Westar Energy – Jeffrey Energy Center

- Located Near St. Marys, KS
- 3 – 800 MW Coal-Fired Units
- 10,500 acres



Flue Gas Desulfurization

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- 2010 – Air Regulations Require Sulfur Dioxide Control
- Wet Scrubbing Units Modified and Upgraded



FGD Process – Limestone

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FGD Process – Ball Mill

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FGD Process – Slurry Injection

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FGD Process – Gypsum Slurry

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FGD Process – Gypsum Drying

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FGD Gypsum Production

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- 173,500 tons produced in 2013
- Two Options
 - Re-use
 - Agriculture
 - Wall Board
 - Structural Fill
 - Landfill



Safety of FGD Gypsum

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FGD Gypsum Use in Agriculture

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- Sampling and Analysis
- Beneficial Use Evaluation and Approval
- State Agency Review

Trace Constituent	FGD Gypsum (ppm)	Mined Gypsum (ppm)	National Background in Soils Lower 25 th percentile (ppm)
Antimony	2.0 – 9.1	0.02 – 0.28	0.3
Arsenic	0.6 – 4.0	0.19 – 3.0	4.21
Cadmium	0.2 – 1.2	<2 – 0.5	0.19
Chromium	1.3 – 42.0	8.7 – 30.5	28.6
Lead	0.8 – 12.0	All <5	14.5
Mercury	0.01 – 1.4	0.00044 – 0.025	0.039
Molybdenum	0.5 – 12.0	All <3	0.44
Nickel	0.73 – 20.1	<4 – 11.9	11.8
Selenium	2.0 – 30.0	11.3 – 21.1	0.21
Thallium	0.6 – 2.0	All <15	0.3
Vanadium	<1 – 73.2	<2 – 12.7	45.9
Zinc	3.4 – 47.5	13.1 – 27.5	36.8

Sources: DOE, 2007. Unpublished data. U.S. Department of Energy. EPA, 2007. Unpublished data. Office of Research and Development. U.S. Environmental Protection Agency. EPRI, 2007. Unpublished data. Electric Power Research Institute. OSU, 2006. Gypsum for Agricultural Use in Ohio—Sources and Quality of Available Products. Ohio State University Extension Fact Sheet, ANR-20-06. [OSU Extension and Boersgen, 1984. Element Concentrations in Soils and Other Surface Materials of the Conterminous United States. U.S. Geological Survey Professional Paper 1270. Washington, D.C. U.S. Government Printing Office. USGS, 2005. Major and Trace-Element Concentrations in Soils from Two Continental States, Tracts of the United States and Canada. Open-File Report 2005-1283. U.S. Geological Survey.](#)



Beneficial Use Approval

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- Description of Beneficial Use for Land Application
 - When a byproduct is to be used beneficially it must have chemical or physical properties similar to the raw material it is replacing
 - When incorporated into another product, its use must have some enhancing qualities to the final product



Beneficial Use Approval

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- Kansas statute prohibits land application if it creates a public nuisance or adversely affects the public health. If there is a complaint or a concern that either of these have occurred, land application may be required to cease.



FGD Gypsum – State Agency Review

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- 15 plus state agencies have reviewed and issued approval for the use of FGD gypsum for agricultural applications.
- Kansas Department of Health and Environment (KDHE) completed review and provided approval in 2012.



Questions

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- Jared Morrison
jared.morrison@westarenergy.com

