

Use of FGD Material in Florida: A State Perspective

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Overview

- **Background:**
 - **Definition of Solid Waste**
 - **Industrial Byproducts Exemption**
 - **Cleanup Target Levels (CTLs)**
 - **Possible Impacts from FGD Gypsum**
 - **DACS's Definition of Gypsum**
- **Uses of FGD Gypsum**
- **One "Problem" Case**
- **Conclusions**
- **Overcoming the Regulatory Hurdles**

Definition of Solid Waste

- **Generally the Department regulates wastes, including both disposal and recycling, but not products. We usually have a hard time deciding when a waste becomes a product.**
- **Section 403.703(13), F.S. defines “solid waste” to include any discarded material resulting from domestic, industrial, commercial, mining, agricultural or governmental operations. This would include FGD gypsum.**

Industrial Byproducts Exemption

- **Section 403.7045(1), F.S. exempts industrial byproducts from regulation as solid waste if:**
 - 1. Majority recycled in one year,**
 - 2. Materials are not managed to pose: (1) a significant threat to public health; or (2) a threat of contamination in excess of water quality standards or criteria or air quality standards; and**
 - 3. The materials are not a hazardous waste.**
- **Uses of FGD gypsum that qualify for this exemption are not regulated as a solid waste in Florida.**

Cleanup Target Levels (CTLs)

- **The Department has established Cleanup Target Levels (CTLs) for soil and water at contaminated sites. They are conservative (1×10^{-6} excess cancer risk for carcinogens; $HQ > 1$ for non-carcinogens) and are based upon threats to human health by exposure to contaminants in the soil, ground water or surface water.**
- **While not applicable to beneficial use projects, the CTLs are used as guidelines when evaluating if the use of an industrial byproduct can pose a significant threat to human health or be expected to result in a threat of contamination.**

Possible Impacts from FGD Gypsum

- **Direct Exposure (RTC 1993 data):**
 - Reported above the residential CTL values for: arsenic, mercury, thallium and vanadium.
- **Leaching Potential (leaching data from two power plants in Florida):**
 - Reported above CTLs for: aluminum, antimony, arsenic, boron, chloride, fluoride, iron, lead, manganese, molybdenum, nickel, selenium, sodium, sulfate, TDS and vanadium.
 - 9 of these 16 parameters (56%) also appeared in ground water or surface water data for these two facilities.
- **It is unknown how many of these potential contaminants are from cross contamination by other waste streams rather than just FGD alone.**

Limited FGD Waste Total Metals Data

PARAMETER	CRITERIA	TOTALS
	DEP RESIDENTIAL CTL (mg/kg)	RTC 1993 DATA TOTAL AVE. CONC. (mg/kg)
Arsenic, As	2.1	53.6
Mercury, Hg	3	5.2
Thallium, Tl	6.1	9
Vanadium, V	67	104.9

Limited FGD Waste Leaching Data

PARAMETER	CRITERIA		LEACHING DATA			
	GROUND WATER CTL (mg/L)	CLASS III FRESH SURFACE WATER CTL (mg/L)	FACILITY #1 GYPSUM		FACILITY #2 FGD LF LEACHATE OPEN TEST HOLES	
			STACK SPLP AVE. CONC. (mg/L)	FILTER CAKE SPLP AVE. CONC. (mg/L)	TMW-48A (mg/L)	TMW-49A (mg/L)
Aluminum, Al	0.2 (S)	0.013 (G)	<0.2		27	165
Antimony, Sb	0.006 (P)	4.3	0.006	0.009		
Arsenic, As	0.01 (P)	0.05	<0.1		0.05	0.19
Boron, B	1.4 (G)		0.32	41.8	13	17
Chloride	250 (S)		8.2	346	7380	13400
Fluoride	4 (P), 2 (S)	10	2.3	4.12		
Iron, Fe	0.3 (S)	1	<0.05	0.82		
Lead, Pb	0.015 (P)	0.54-18.6	<0.015		0.01	0.16
Molybdenum, Mo	0.035 (G)		0.013	0.039		
Nickel, Ni	0.1 (P)	48.8-510	<0.05		0.02	1.2
Selenium, Se	0.05 (P)	0.005	<0.01	0.1		
Sodium, Na	160 (P)		4.35	47	491	972
Sulfate	250 (S)		1517	1660	373	915
TDS	500 (S)				12900	31100
Vanadium, V	0.049 (G)		<0.01	0.054		

Limited FGD Waste Ground Water Data

PARAMETER	CRITERIA		GROUND WATER DATA			
	GROUND WATER CTL (mg/L)	CLASS III FRESH SURFACE WATER CTL (mg/L)	FACILITY #1 GYPSUM STORAGE		FACILITY #2 FGD LANDFILL	
			MICROWELL DP-115S (mg/L)	MICROWELL DP-117S (mg/L)	UPPER SAND ZONE A AVE. CONC. (mg/L)	DEEP SAND ZONE B AVE. CONC. (mg/L)
Aluminum, Al	0.2 (S)	0.013 (G)	0.2	<0.2	8.38	22.6
Boron, B	1.4 (G)		1.4	27	29.28	10.15
Chloride	250 (S)		120	120	10041	2523
Iron, Fe	0.3 (S)	1	20	16		
Lead, Pb	0.015 (P)	0.54-18.6	<0.01	<0.01	0.018	0.01
Manganese, Mn	0.05 (S)		0.16	0.77		
Sodium, Na	160 (P)		240	55	713	192
Sulfate	250 (S)		720	1200	843	305
TDS	500 (S)		1600	2500	19930	6875

DACS's Definition of Gypsum

- **The Department of Agriculture and Consumer Services (DACS) has both statutes and rules for regulating fertilizers.**
- **DACS treats gypsum as a source of secondary plant nutrients (Ca, Mg, S) and does not regulate its trace metal content.**
- **To qualify as gypsum product by DACS the material must have a CaSO_4 content $\geq 60\%$.**

Uses of FGD Gypsum in Florida

- **Material that meets the definition of “gypsum” by DACS are not regulated by the Department as solid wastes when beneficially used in:**
 - **Wallboard manufacturing (on-spec gypsum: low moisture and chlorides); and**
 - **Land application, such as peanuts, tomatoes and citrus groves (off-spec gypsum: high moisture and chlorides).**
- **Any other uses must meet the industrial byproduct exemption to not be regulated as solid wastes.**

Uses of FGD Gypsum in Florida

- **To land apply off-spec FGD gypsum as a soil amendment, it is expected that:**
 - **The material will be managed off-site in a way to prevent the discharge of contaminants to ground or surface water; and**
 - **The DACS BMP entitled, “Agrichemical Handling and Farm Equipment Maintenance,” May, 1998, will be followed. This BMP recommends fertilizers be stored protected from rainfall and on a concrete or asphalt pad.**
- **In 2002, DACS reported that 52,000 tons of gypsum were sold in Florida with 97% of that used on farms. It is not known how much of this is mined gypsum rather than FGD gypsum.**

Uses of FGD Gypsum in US

- **2006 Beneficial Use Survey by the ASTSWMO BU Task Force.**
- **15 of 34 responding States said they have received requests to beneficially use FGD gypsum.**
- **The 15 States were: FL, KS, MD, MI, MN, MS, NJ, NY, NC, ND, OH, PA, VA and WI.**

Uses of FGD Gypsum in US

- **Requests for use reported “approved” by the States, according to the survey, included:**
 - 1. Landfill cover: KS, NJ, VA**
 - 2. Fill Material: MD, OH, VA**
 - 3. Land Application: MI, NC**
 - 4. Soil Amendment: FL, MS**
 - 5. Wallboard/Drywall: KY, NJ, NC, WI**

The use of “quality” FGD gypsum seems to be relatively common in Florida and other states.



One “Problem” Case

- Sludge from a coal-fired power plant settling pond was considered “gypsum” and moved for sale to farmers at an off-site distribution facility.





2 13 '03

One “Problem” Case

- **Test results from sludge samples:**
 - **Direct Exposure**: exceeded CTLs for arsenic and vanadium.
 - **Leaching Potential**: exceeded CTLs for manganese, molybdenum and selenium in SPLP tests (EPA Method 1312).
 - **Gypsum Content** ~ 5.2 % by weight (<<60%).
- **Not “gypsum” by DACS’s definition. Did not meet the Department’s exemption as an “industrial byproduct.” The material was taken back to the generating facility for management.**
- **This case appears to be more the exception than the rule.**

Conclusions

- **Florida has no objection to the use of FGD gypsum in wallboard construction or as a soil amendment provided it meets DACS's definition of "gypsum."**
- **Other wastes associated with FGD gypsum production can only be beneficially used in Florida if the use qualifies for the industrial byproducts exemption.**
- **Will have to wait and see the impacts from mercury on use of FGD gypsum.**

Overcoming the Regulatory Hurdles

- **“Environmental Regulator Dilemma” – How do we decide if a proposed use of a waste is safe?**
 - Environmental groups demand “zero risks.”
 - Sometimes industry seems to say, “Trust me, it’s safe.”
 - We need to balance these two extremes by determining what is an acceptable risk level for the proposed use.
 - We need “reasonable assurance” not “absolute assurance” that this risk level will not be exceeded.
- **“Safe” means we have reasonable assurance the use does not pose an unacceptable risk to human health or the environment.**



How To Be Safe?

i.e., tips for how to convince your regulator that your proposed use should be approved.

How To Be Safe?

- **S: “Simplify your Proposal”**
 - Don’t list 17 uses for your material and then call back later with five changes to them and three more uses. Option overload!
 - Until we get a better track record with beneficial use of wastes, pick the top two or three, larger volume uses and focus on them.
 - This will help the regulators decide what questions to ask and help you develop the answers.

How To Be Safe?

- **A: “Analyze your material”**
 - We need data from total and leaching analyses for contaminants of concern at low enough detection limits to evaluate potential impacts to groundwater, surface water and human health. This may be very hard to do.
 - One TCLP is not sufficient. May need to do SPLP, lysimeters or field tests too. Then may need to model with EPA’s IWEM or other models?
 - In the 2006 ASTSWMO BU Survey, all reporting States listed inadequate waste analytical data as the key barrier.
 - Alternative: How does your material compare to other products already used? Data to show similarities?
 - Need to standardize the sampling, analysis and reporting requirements so data can be documented as reliable and then shared by States.

How To Be Safe?

- **F: “Follow-up on Actual Uses”**
 - **Is your material actually being used as approved by the regulator?**
 - **We need to get this right. One bad case can really hurt progress with beneficial use.**
 - **For now, don’t assume if you sell it the material is no longer your problem. You may need to step in and fix a mess someone else makes with your material.**
 - **In the 2006 ASTSWMO BU Survey 29 of the responding States said they had compliance problems with one or more of their beneficial use approvals.**
- **One example.**





Approval for use given 07-25-05

- **For uses in road and parking lot sub-bases, final surfaces in road and lay down yards, and some other uses.**
- **With the understanding that:**
 - **trucked directly to the area of intended use and installed with little storage, and**
 - **not used or stored next to wetlands or used in contact with groundwater or surface water.**

















27 10:45 AM



27 12:03 PM

Correction Taken

- **In this case the generating facility:**
 - Took back the stockpile of material.
 - Assumed more control over the marketing of the material and training users in its proper application.
 - Helping with the public concerns over this use.
- **Regulators are trying to sort out the differences between routine construction practices and misuse of material in a project.**

How To Be Safe?

- **E: “Explain the Benefits”**
 - There has to be some environmental benefit to distinguish the use from disposal.
 - Is “Life Cycle Analysis” sufficient?
 - “OK, you are saving the planet, but I don’t want this stuff next to my house!”

How To Be Safe?

- **S: “Simplify your Proposal”**
- **A: “Analyze your material”**
- **F: “Follow-up on Actual Uses”**
- **E: “Explain the Benefits”**

Well, maybe this is a starting point at least...

Questions?

