



# FGD Gypsum in Wallboard and Other Products

# FGD Gypsum Wallboard and Other Markets

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- Key commercial properties of gypsum
- Use in wallboard
- Other manufactured gypsum products
- Challenges for increased usage

# Gypsum

## Key Commercial Properties

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- Safe and non-toxic mineral
- Relatively abundant and low cost to mine
  - Over 100 million tons mined globally
  - Large deposits close to the surface
- Common by-product from sulfur processing
  - FGD Gypsum
  - Phosphogypsum
  - HF, TiO<sub>2</sub>, Lactic Acid, Citric Acid, other waste H<sub>2</sub>SO<sub>4</sub> streams

# Gypsum

## Key Commercial Properties

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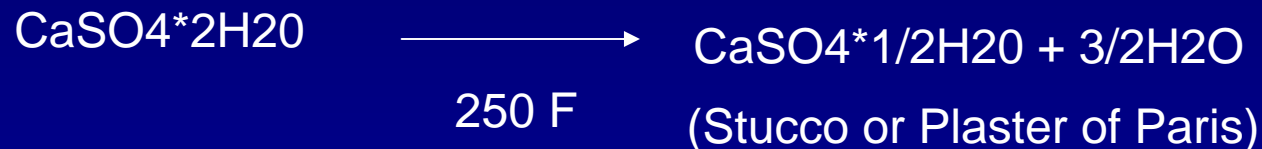
- Source of Calcium and Sulfate
  - Agriculture
  - Cement

# Gypsum

## Key Commercial Properties

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- Can be calcined at low temperatures forming Hemihydrate or Anhydrite
    - Provides fire resistance
    - Produces a low cost inorganic binder
- 



# Stucco - $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$

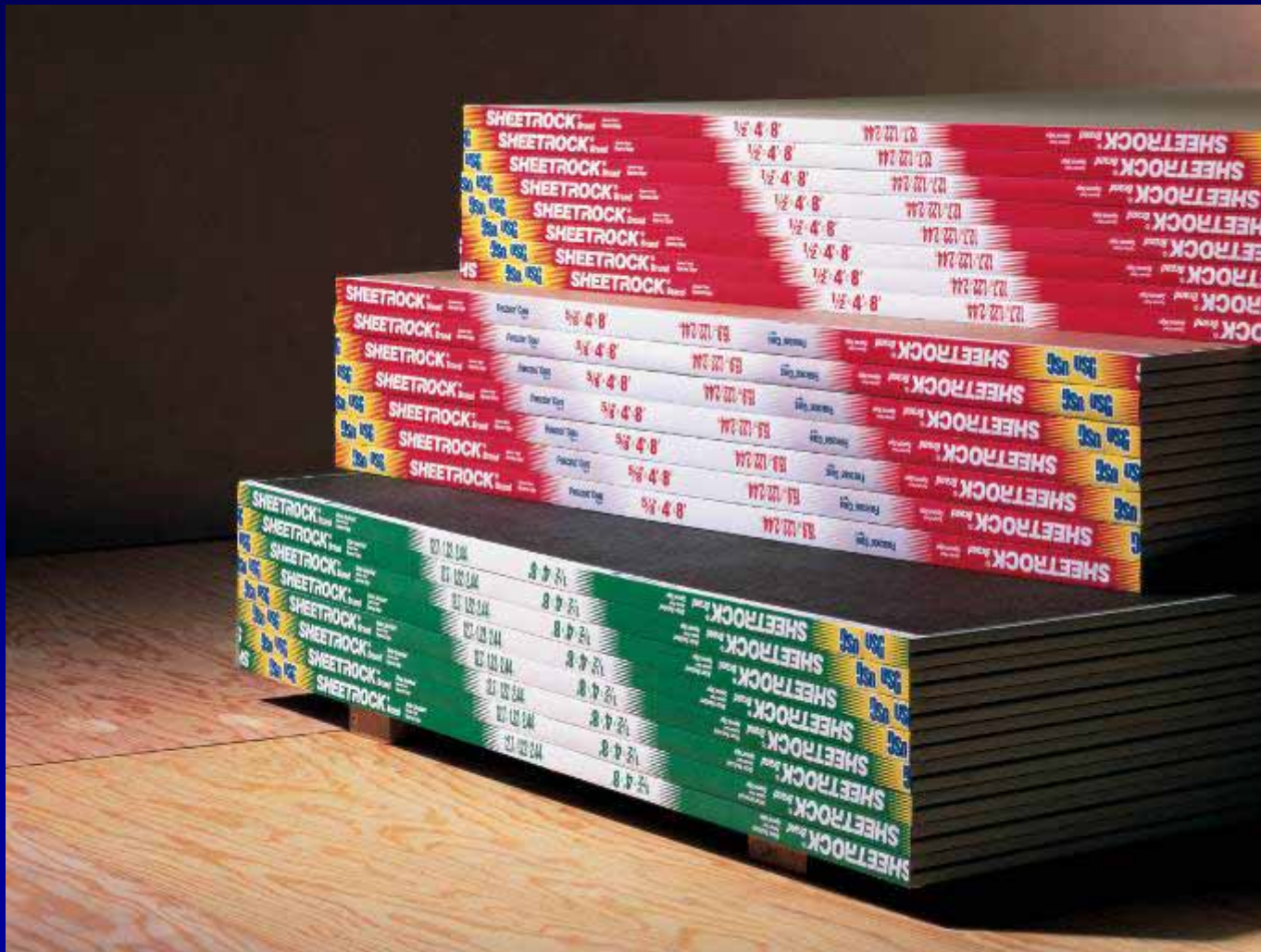
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- Reacts with water to reform rock
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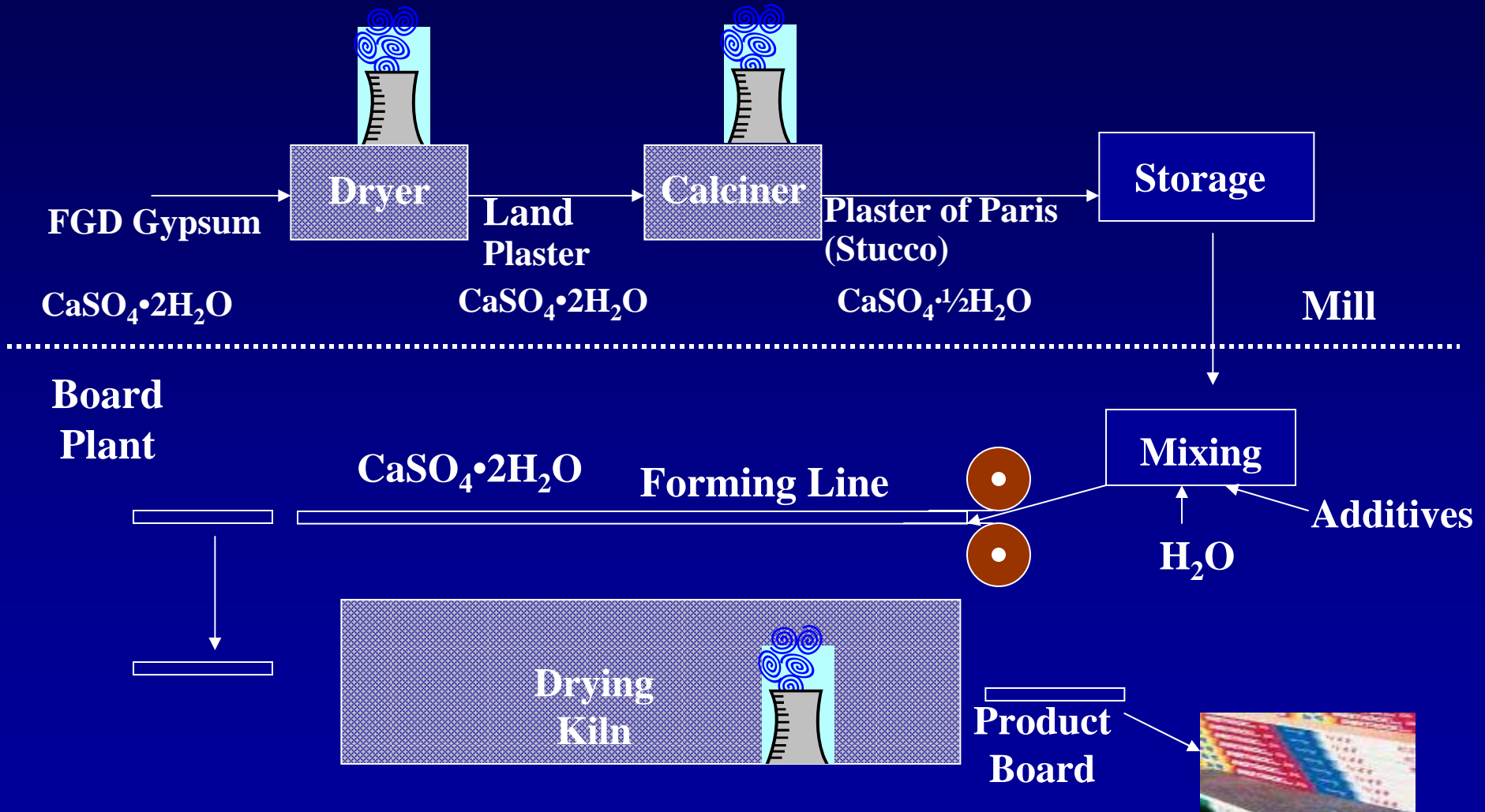


- Fast reaction (<30 minutes)
- Strong, fire resistant casts (10,000 psi possible)

# FGD Gypsum in Wallboard



# Simplified Flow Diagram of FGD Gypsum used for Wallboard Production





# FGD Gypsum vs Rock Gypsum

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- Gypsum is Gypsum – FGD or Rock
- FGD and Rock Gypsum have similar major impurities
  - Limestone, Salts
- FGD is a moist cake (10%) versus dry rock
  - Freight penalty due to water
  - Energy costs to dry
  - Added capital costs to handle and dry

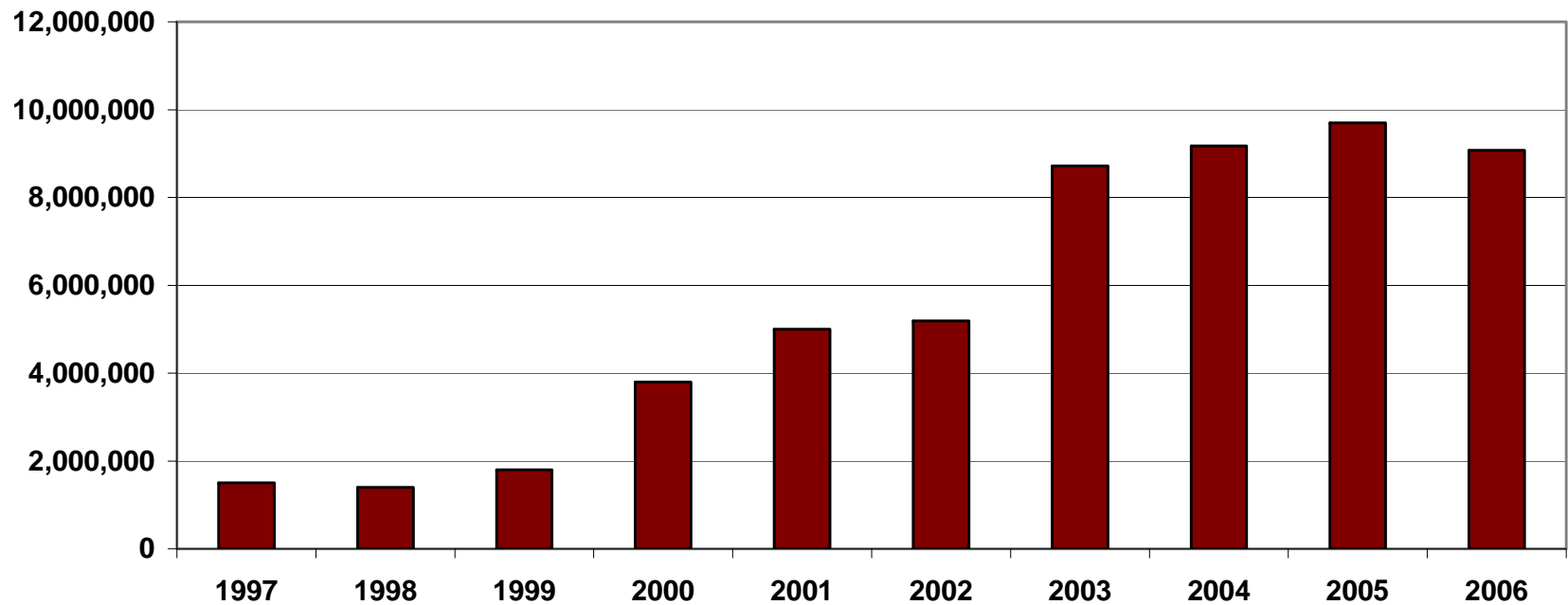
# **FGD Gypsum in Wallboard Current Usage**

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- **63% of all FGD Gypsum produced is recovered into wallboard (ACAA)**
- **Over 27% of wallboard produced from FGD Gypsum**
- **12 new wallboard lines built to handle FGD Gypsum**
- **4 new lines announced**

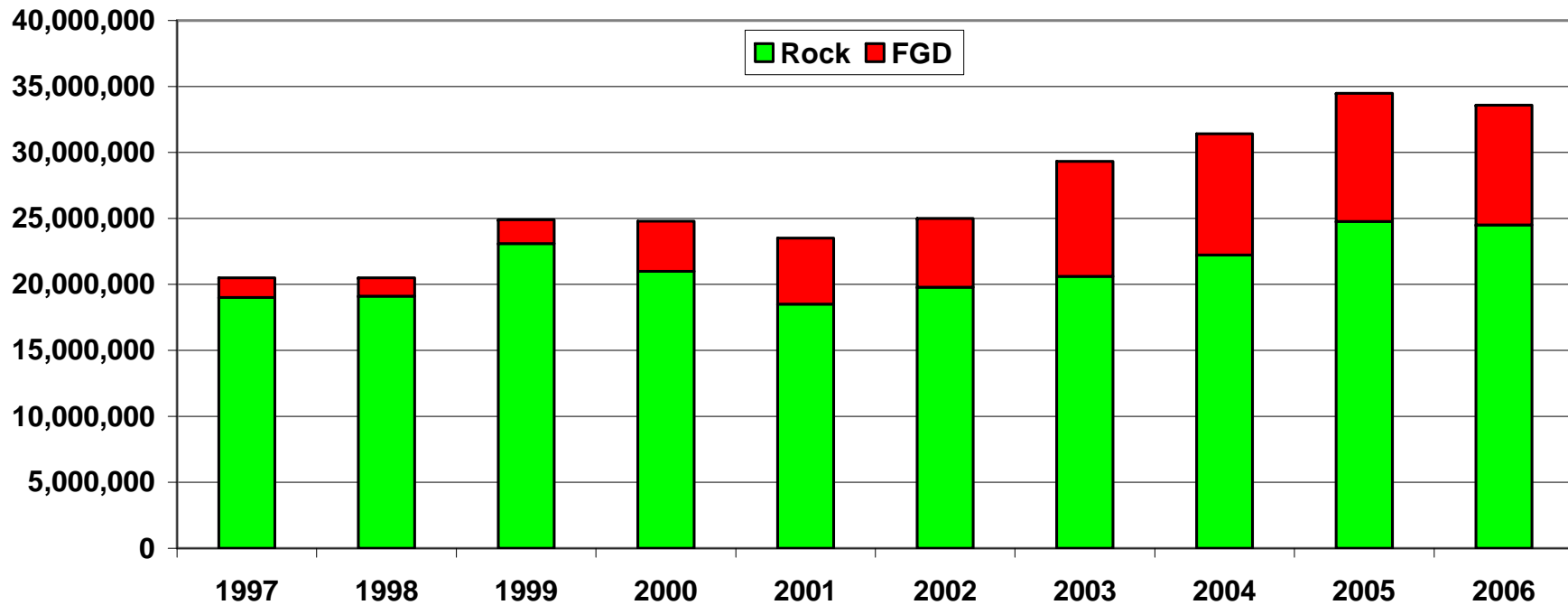
# Wallboard Industry

## Synthetic Gypsum Usage, tons



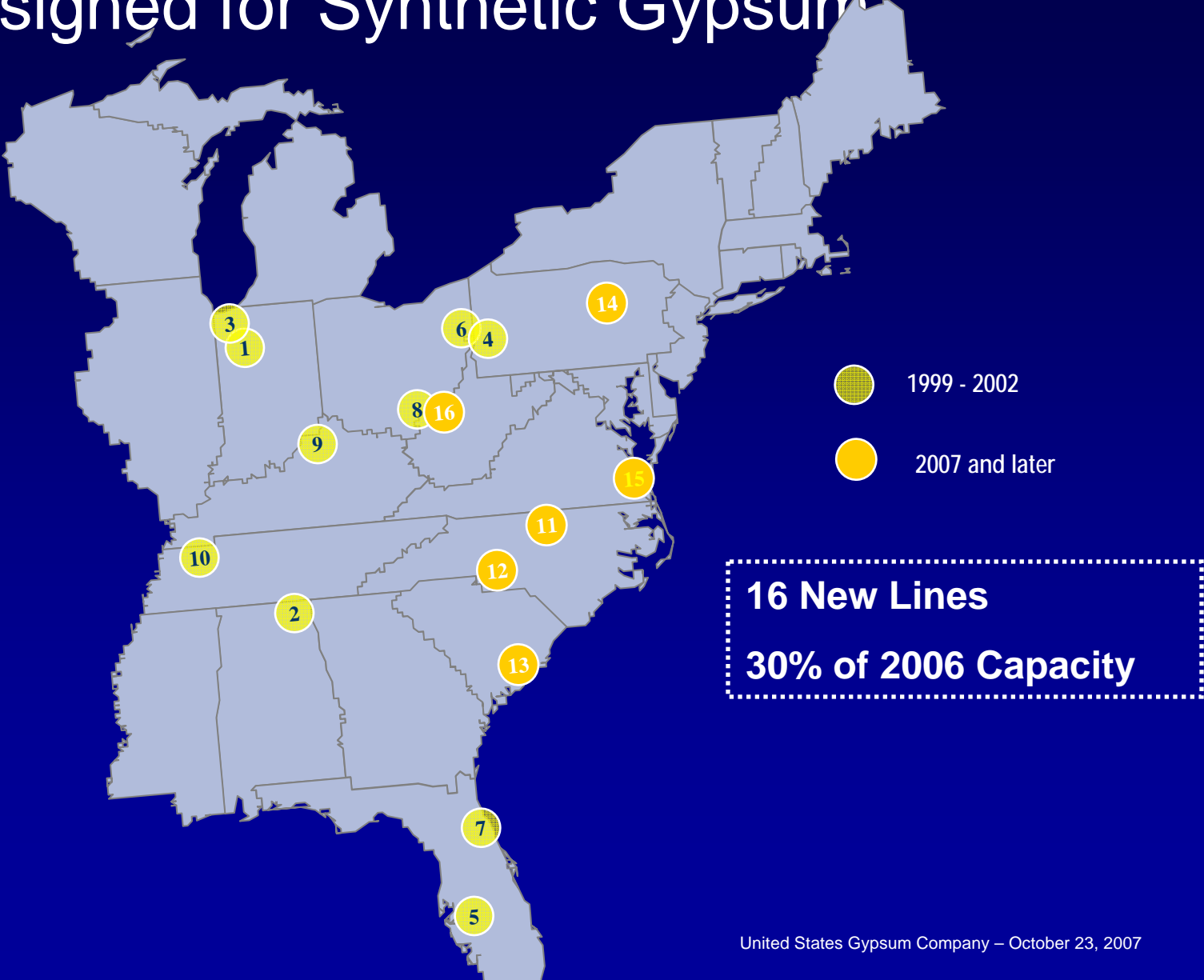
# WALLBOARD INDUSTRY

## Synthetic Gypsum Growth



Based on Gypsum Association Data

# New Wallboard Lines Designed for Synthetic Gypsum



# FGD Gypsum Wallboard Market Fundamentals

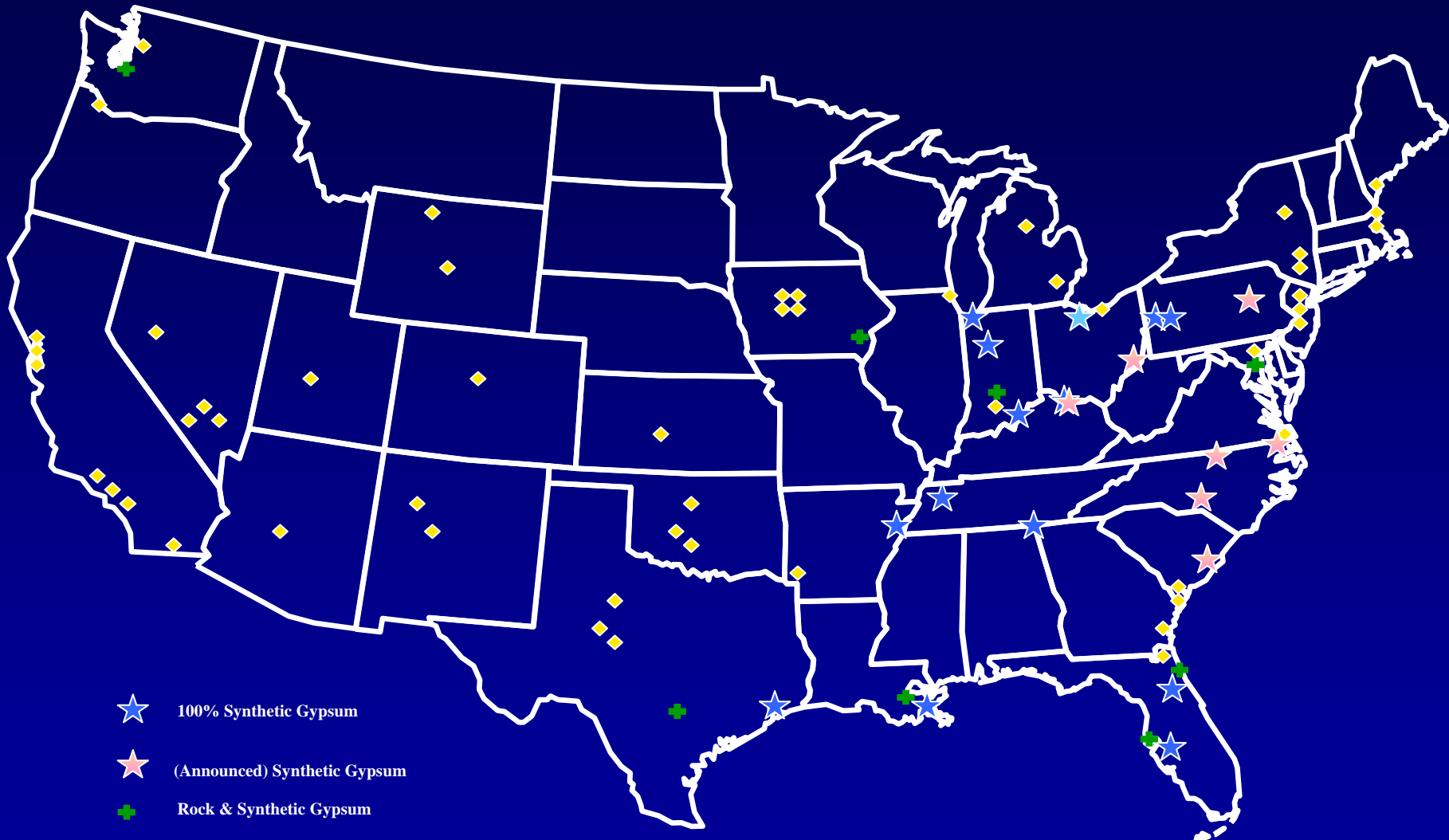
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- Location, Location, Location
  - Markets are near metropolitan areas and growth areas
  - Wallboard plants located near major markets or near low cost mines
    - East Coast supplied from Nova Scotia
    - West Coast supplied from Mexico



# United States Wallboard Plants

By Source of Gypsum

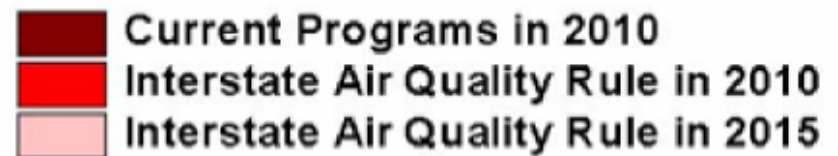


- ★ 100% Synthetic Gypsum
- ★ (Announced) Synthetic Gypsum
- ✚ Rock & Synthetic Gypsum
- ◆ Rock Gypsum
- ★ FIBEROCK® 100% Synthetic Gypsum

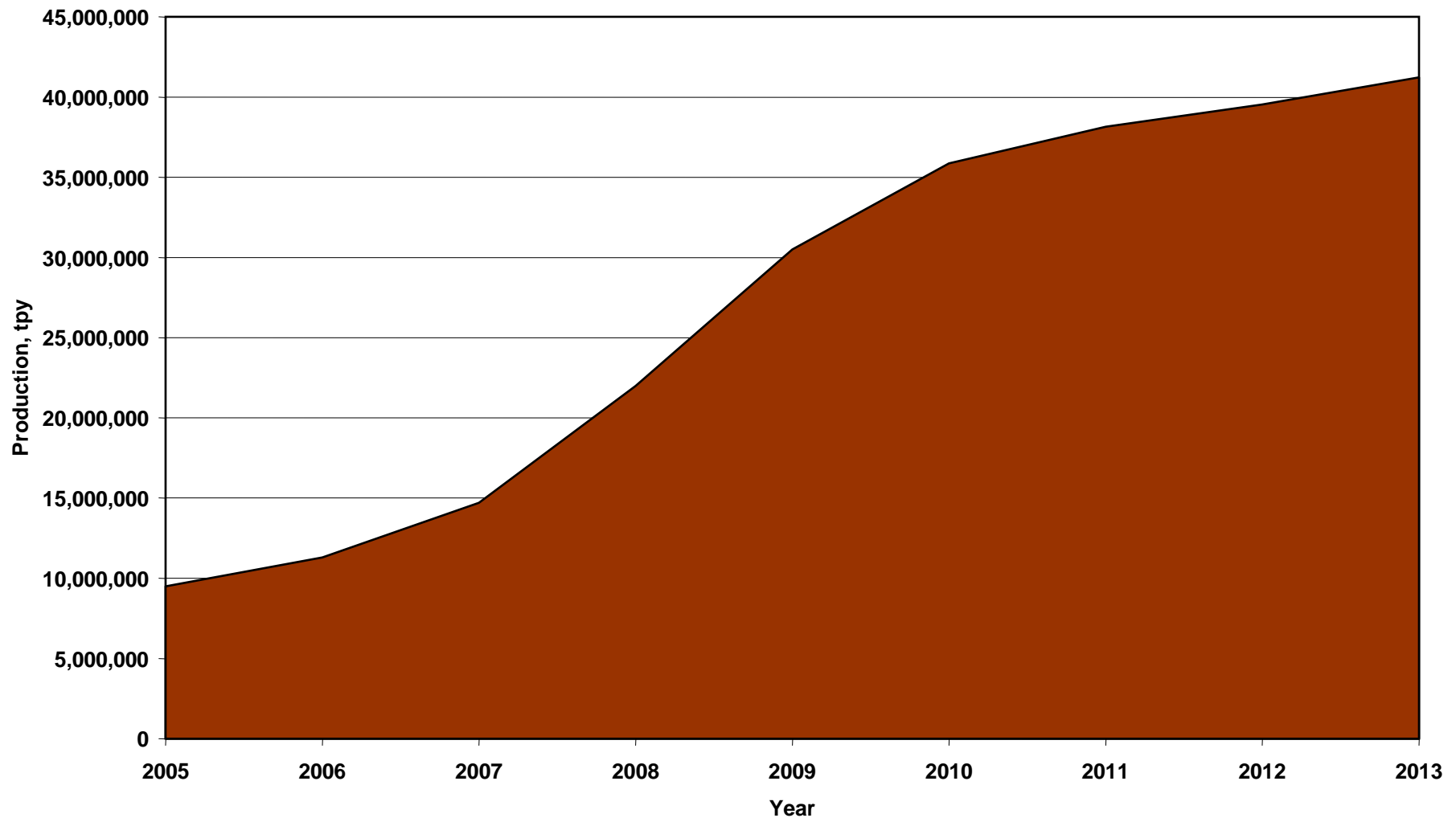
United States Gypsum Company – October 23, 2007



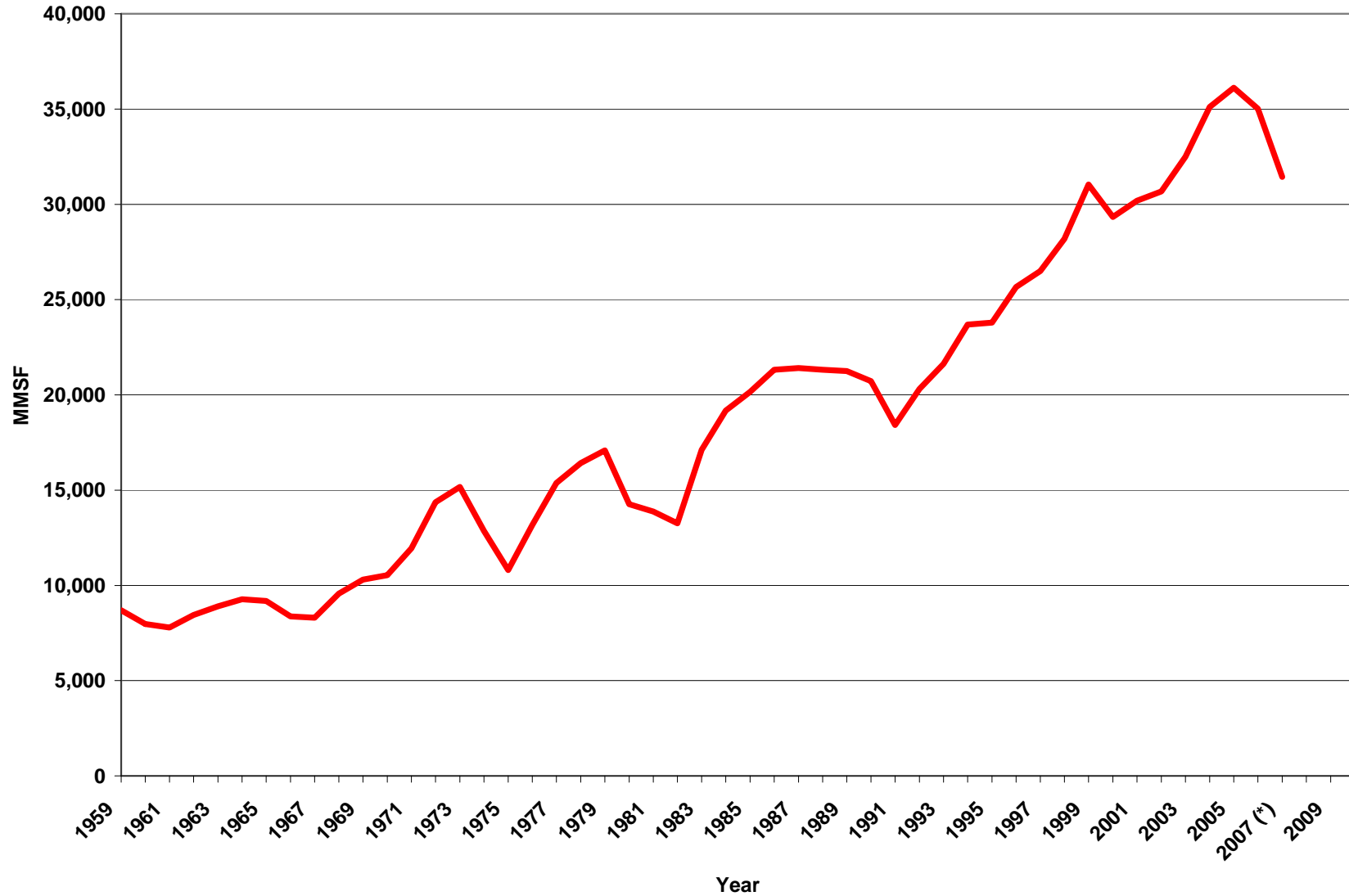
## Projected Emissions of Sulfur Dioxide Under the Interstate Air Quality Rule



# Potential FGD Gypsum Growth



# Wallboard Market Growth



Based on Gypsum Association Data

United States Gypsum Company – October 23, 2007

# FGD Gypsum in Wallboard Future Challenges

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- **FGD Gypsum expected to grow in the next 10 yrs.**
  - **Primarily in the Midwest**
    - **Limited new capacity needed in Midwest**
  - **Supply to exceed demand in the near future**
- **No scrubbers planned in key markets**
  - **West Coast**
  - **Northeast**

# Other Industrial Products

## FGD Gypsum

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- **Plasters**
- **Fillers**
- **Gypsum Fiber Board**

# Plaster Products

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- **Building Plasters**
- **Industrial Plasters**
- **Environmental Binders**

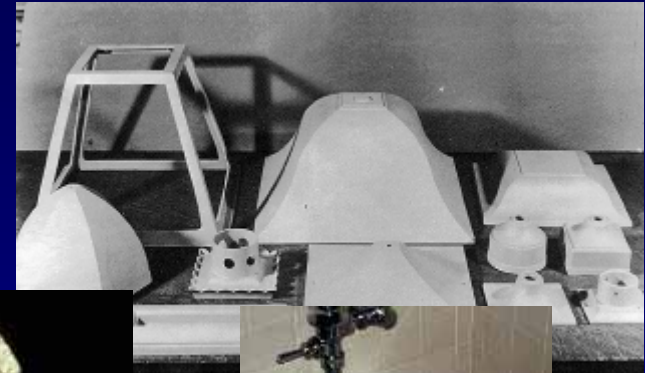
# Building Plasters

Veneer Plasters  
Fire proofing  
Flooring



# Industrial Plasters

- **Molding Plaster**
  - Arts & Crafts
- **Non ferrous casting**
- **Ceramic slip casting**
  - Statuary
  - China
  - Sanitary
  - Lamps
- **Machinable casts**
- **Tool manufacturing**
- **Fireproof fill**
- **Dental**
- **Medical Implants**





# Environmental Binder

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- **Spray Applied**
- **Dust Control**
- **Stop Erosion**
- **Reclaim slopes**



# Gypsum Fillers

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- **Food & Pharmaceutical**
- **Plastics**
- **Paper**
- **Better properties than limestone**
  - **Lower density**
  - **Less abrasive**
  - **pH neutral**
  - **Alternate crystal shapes and sizes**

# Multiple Products and Formulations

## USG Specialty Products Division

([www.gypsumsolutions.com](http://www.gypsumsolutions.com))

**AIRTROL™**  
Geobinder



**USG LEVELROCK™ Brand**  
Floor Underlayment 3500

- Fast application
- Ideal for wood frame and light commercial construction
- Available in 5000, 6000 and 7000 configurations

**sof'n-soil™**  
LAWN & GARDEN GYPSUM

**DUSTROL™**  
Dust Control

**Fiber Art**

Statuary Plaster



**USG WhiteArt Plaster**

**Duramold™**  
Pottery Plaster



**ULTRACAL 30**  
Gypsum Cement

**USG CAS-20™-4 Filler**  
ANHYDROUS CALCIUM SULFATE

**Hydro-Stone™**  
Gypsum Cement

**Hydrocal**  
Gypsum Cement

**DRY Stone™**  
casting media

**USG LEVELROCK™ Brand**  
Floor Underlayment

**USG No.1**  
**MOULDING PLASTER**

**Gardencast™**  
Gypsum Cement



**Ben Franklin®**  
Agricultural Gypsum

**EnduraCast™**  
Sprayable Casting Medium

**USG CAS-20™-4 Filler**  
ANHYDROUS CALCIUM SULFATE

**USG READYROCK™ Brand**

**USG CA-5™ Filler**  
ANHYDROUS CALCIUM SULFATE

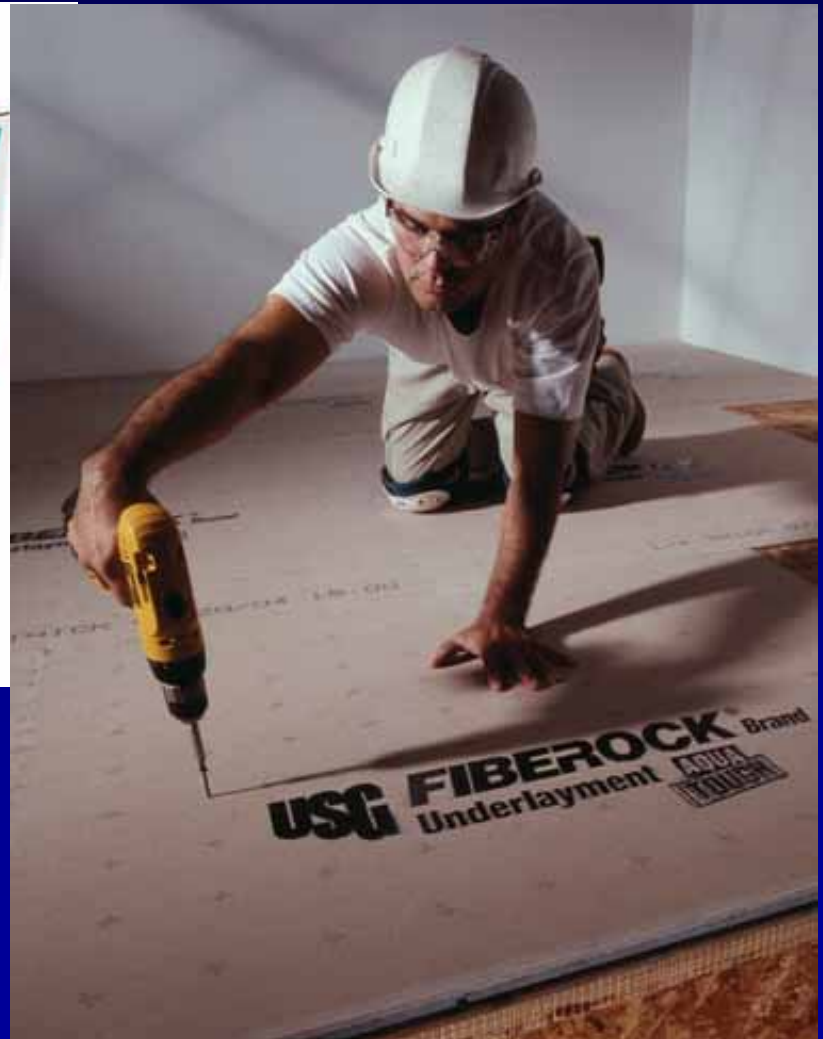
**USG TERRA ALBA**  
HYDRIOUS CALCIUM SULFATE

**USG SNOW WHITE Filler**  
ANHYDROUS CALCIUM SULFATE

**Rayite™ 100**  
MACHINABLE MEDIA



# New Products for FGD Gypsum Gypsum Fiber Board



# Gypsum Fiber Board (FIBEROCK®)

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- **95% Recycled content – Green Cross Certified**
- **Consumes over 200,000 tpy of FGD Gypsum**
- **Made with recycled paper**
- **Easy to cut, staple, nail or screw**
- **Mold resistant, fire resistant**
- **Used as a floor underlayment**
- **Sheathing and roofing applications**

# Further Growth

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- **Location & transportation**
- **Low costs**
- **Consistent Quality**
  - **Color**
  - **Particle Size**
  - **Purity**
- **R&D for new applications**

# FGD Gypsum Summary

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- **Current success in wallboard**
  - High utilization rates
  - Growing Industry acceptance
- **Challenge for the Future**
  - Large supply coming
  - Locations that are not near markets
- **Potential for Growth**
  - Continued Growth in Wallboard
  - Acceptance in other gypsum products
  - New Products