



# VersaLime

2011 Your Way To Grow  
Drayton



American  
Crystal  
Sugar  
Company



# Agenda

- VersaLime
  - Source and Origin
  - Factory Use & Production
  - Landfill Storage
  - Reclamation Procedures Utilized
- 2011 VersaLime Web Site [www.crystalsugar.com](http://www.crystalsugar.com)
- 2010 Lessons Learned
- Q & A



# Source & Origin

- Limestone
  - Stone composed of skeletons of ancient marine animals
  - Usually formed in warm, clear, shallow marine waters
  - Used as dimensioned stone, portland cement, aglime, animal feed filler, and purifying agent
  - Chemical formula:  $\text{CaCO}_3$



# Lime Quarry



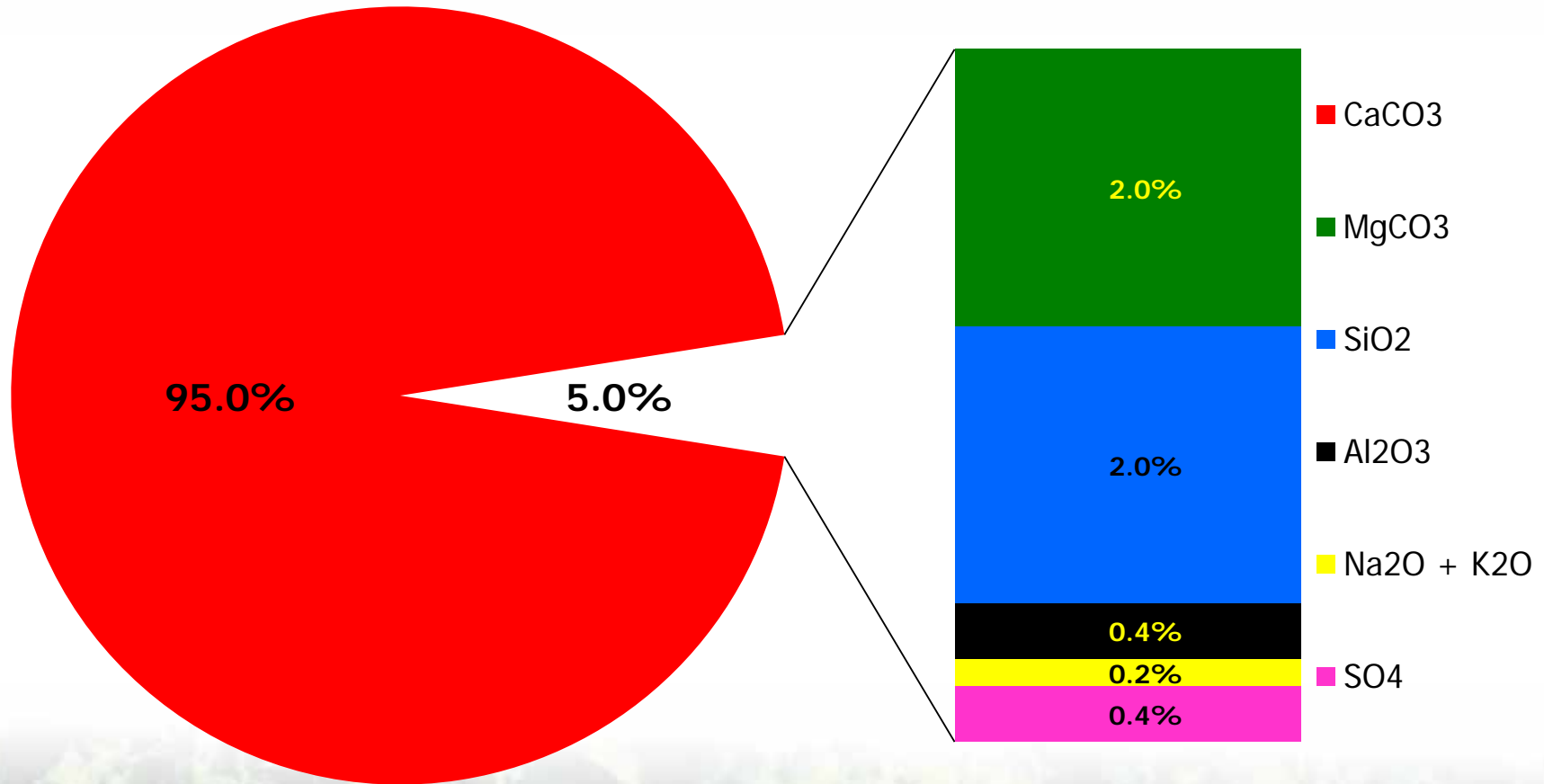


# Sugar Industry Lime

- Lime used for sugar manufacturing must;
  - Be uniform size: 3" by 5" in size
  - Contain more than 95%  $\text{CaCO}_3$  by weight
  - Be low in silica content: less than 2%  $\text{SiO}_2$  by weight

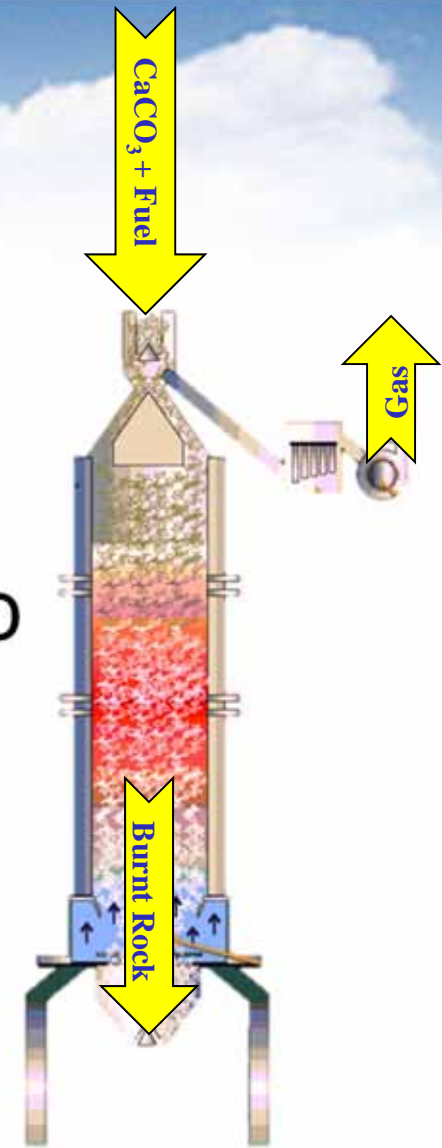


# Limestone Composition



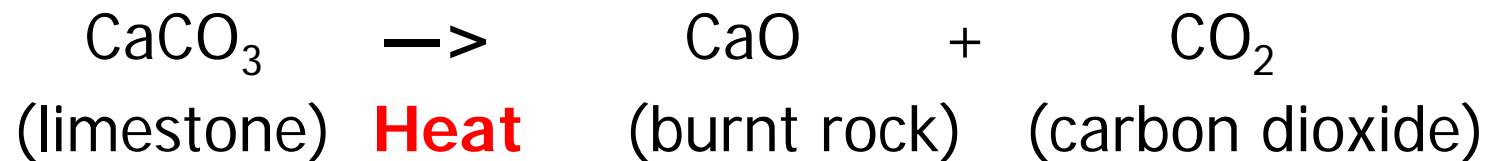
# Process Lime

- Mined limestone must be processed prior to use
- Limestone mixed with fuel source (coke) to provide heat to drive off  $\text{CO}_2$
- Kiln temperatures 1650 °F to 2200 °F
- $\text{CO}_2$  gas and burnt rock are collected for use in purification process



# Process Lime

- Lime kiln chemical reaction



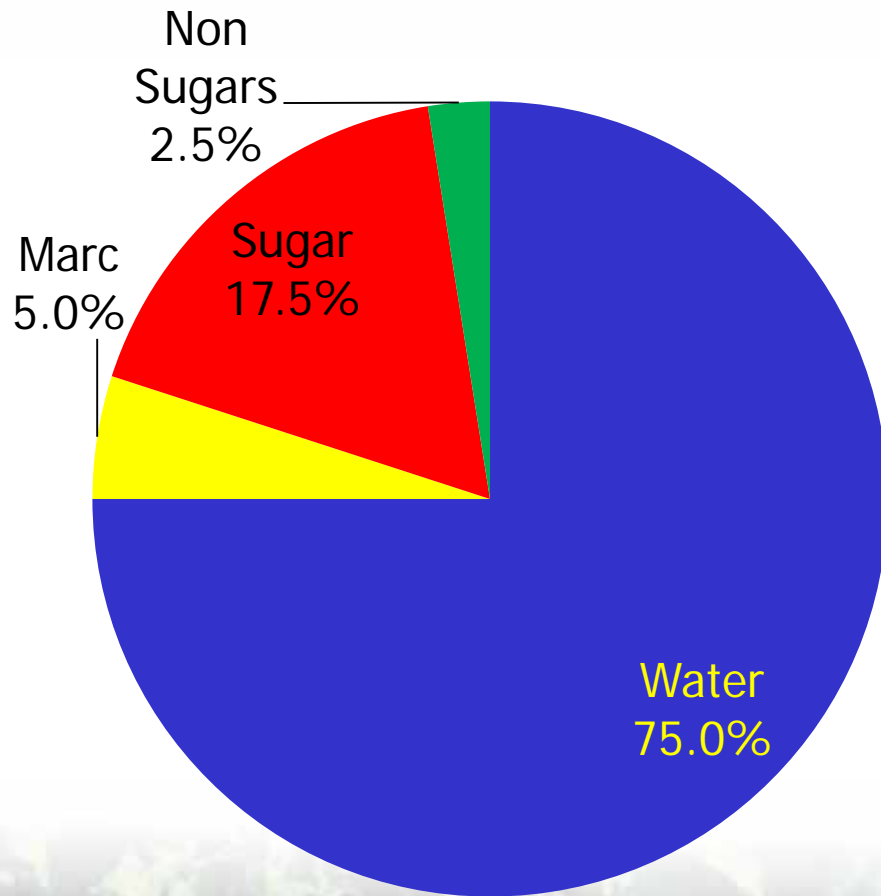
- Burnt rock
  - Mixed with beet juice to make slurry
  - Added to tanks in juice purification
- CO<sub>2</sub> gas
  - Gas is pulled through the kiln by a fan
  - Fan pushes gas into purification tanks



# Why Add Lime?

- Sugarbeets entering the process contain;
  - Considerable amount of non-sugars
  - Soil/ Dirt
- Lime
  - Destabilizes the non-sugars
  - Filters out soil/dirt
  - Can be easily removed with the addition of  $\text{CO}_2$

# Beet Composition



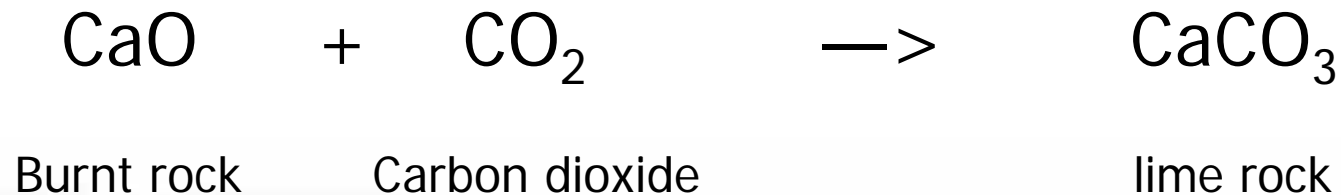
- Non Sugars
  - 1.1% Nitrogenous
  - 0.9% Invert/Raffinose
  - 0.3% Minerals (K<sup>+</sup>, Na<sup>+</sup>)
  - 0.2% Others
- Marc
  - 2.4% Pectin
  - 1.2% Cellulose
  - 1.1% Hemicellulose
  - 0.1% Protein
  - 0.1% Saponin
  - 0.1% Minerals

# Juice Purification

- Process juice is added to burnt rock to make a liquid lime slurry
- Lime slurry is added to two carbonation vessels to increase the pH
- pH increase causes
  - Proteins, pectins, and some minerals to precipitate
  - Destroys invert
  - Stabilizes juice to enable evaporation at elevated temperatures

# Juice Purification

- Beet juice remains at high pH between 1 and 1 <sup>1/2</sup> hours to allow reactions to complete
- CO<sub>2</sub> is then bubbled into gassing tank to reform limerock compound and decrease pH



# Filtration

- Lime and removed non-sugars settle to bottom of tanks
- Settled material is pumped to filters
  - Contains 50% solids and 50% purified juice
- Filters
  - Recover the purified juice for further processing
  - Separate the solids from the process (lime and removed beet non-sugars)

# Filtration

- Separation occurs as the slurry is pumped through a tight weaved fabric
- Dissolved materials pass through fabric
- Water is added to remove sugar from solids trapped by fabric
- Press solids contain 30 – 35% moisture



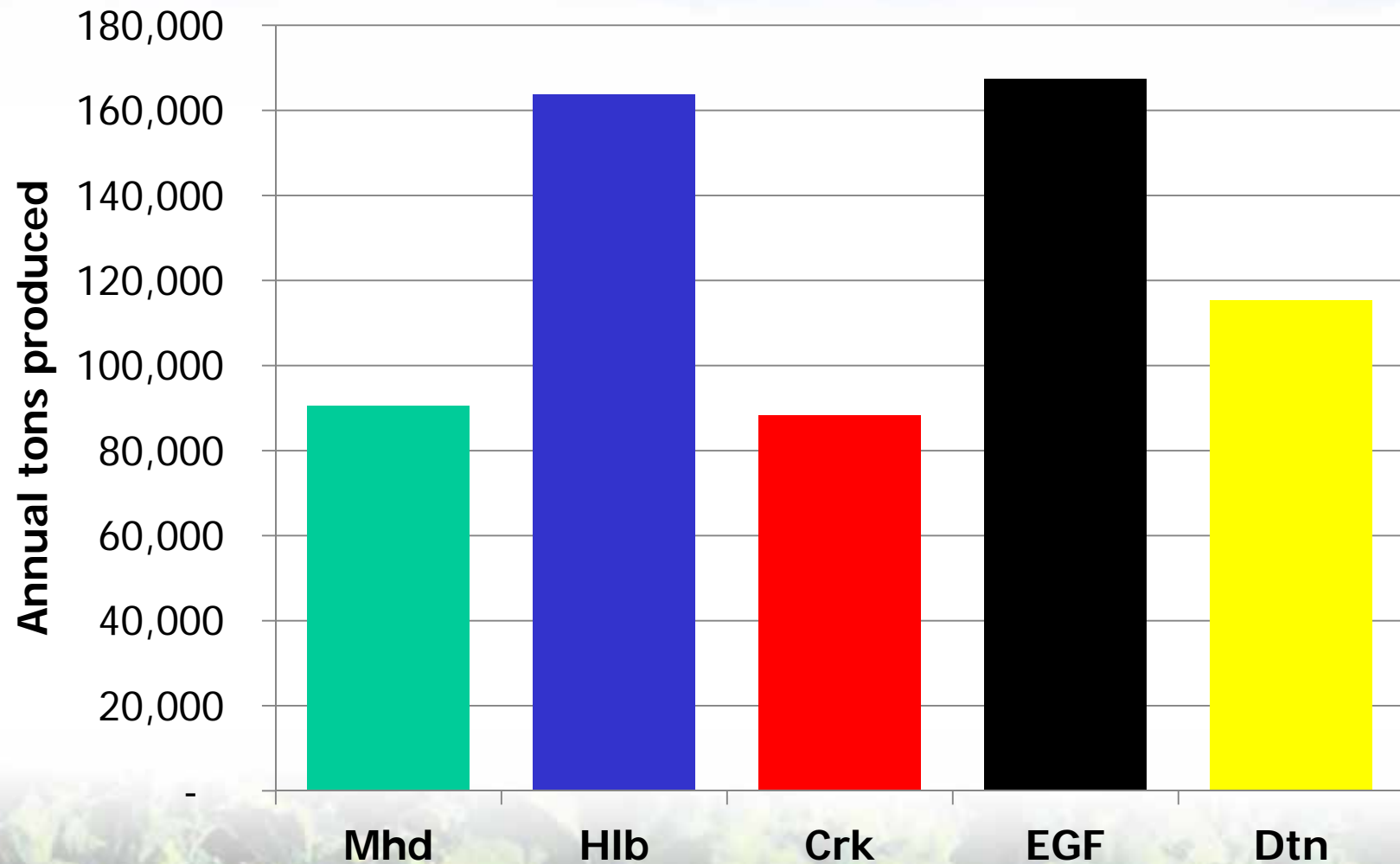


# Juice Purification

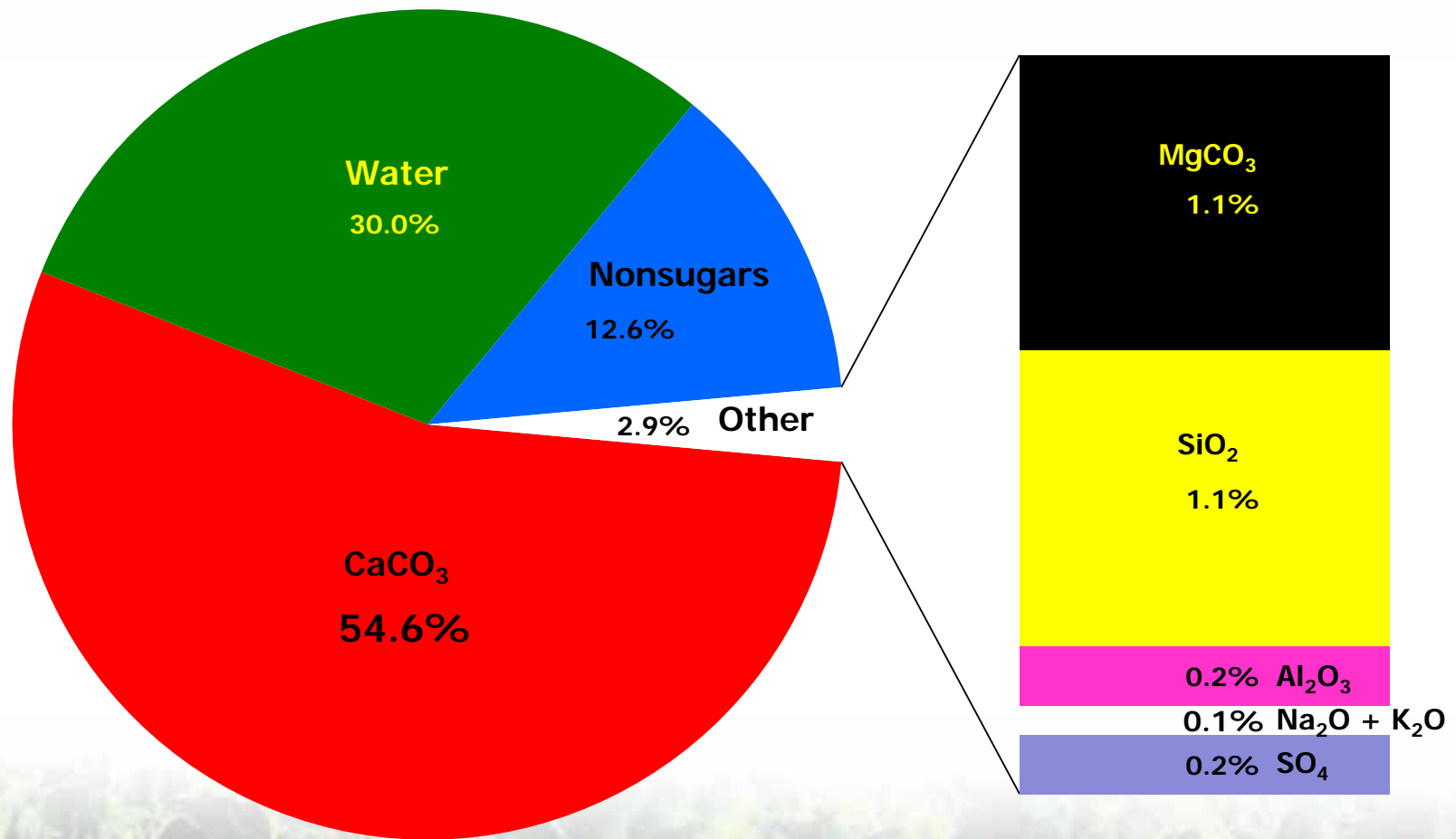
- In the end, juice purification removes;
  - 35% of nonsugars
  - 100 % of lime
- For each ton of beets processed
  - 50 lbs nonsugars enter —> 17.5 lbs exit in lime
  - 80 lbs limerock used —> 80 lbs exit in lime
- Remaining nonsugars end up in molasses



# Annual Lime Production



# VersaLime Composition



# VersaLime Nutrient Summary



**VersaLime**  
crystalsugar.com

## ACSC VersaLime Average Annual Nutrient Values

2011

	<u>Mhd</u>	<u>Hlb</u>	<u>Crk</u>	<u>EGF</u>	<u>Dtn</u>
<b>Total Nitrogen (As Received) lbs/ton</b>	5.2	4.7	5.7	4.8	5.1
<b>Lime P<sub>2</sub>O<sub>5</sub> Content (As Received) lbs/ton</b>	16.0	13.3	15.5	15.5	18.4
<b>Lime K<sub>2</sub>O Content (As Received) lbs/ton</b>	1.2	1.3	1.3	1.4	1.5
<b>Lime Sulfur Content (As Received) lbs/ton</b>	7.0	4.8	5.0	4.4	6.3
<b>Moisture Content</b>	31%	34%	31%	36%	30%



# Landfill Storage

- Filtered material is placed in trucks and sent to on site permitted solid waste landfills
- Landfills are required by pollution control agencies because all solids on site are considered industrial waste
- Solids considered as waste by pollution control agency
  - Rocks, mud, lime, construction material, lime kiln waste, resin, process tank solids, discard beets

# Landfilled Storage

- Beneficial re-use of lime began around 2004 in Moorhead
- Up until this time, solids were mixed in landfills
- VersaLime is now segregated from other solid materials
- Screening will be required to recover any non-segregated material



# Landfilled Lime

- Not all lime is the same
- Nutrients in Versalime are the removed non-sugars from beet processing
- Lime produced during;
  - Beet campaign contain nutrients
  - Juice campaign does not contain nutrients
- EGF and Hlb are the only factories with juice campaign lime
  - Material is being separated from beet campaign lime at these locations



# Reclamation Procedures

- Procedures required to reclaim landfilled VersaLime depends upon quantity
  - Quantity < Production; minimal effort required
    - Separate current production
    - Piling material for drying
    - Future production placed in void
  - Quantity > Production; landfill mining required
    - Cover removal
    - Piling material for drying
    - Screening
    - Re-close landfill area

# Mhd Reclamation



# Dtn Reclamation



# Dtn Reclamation

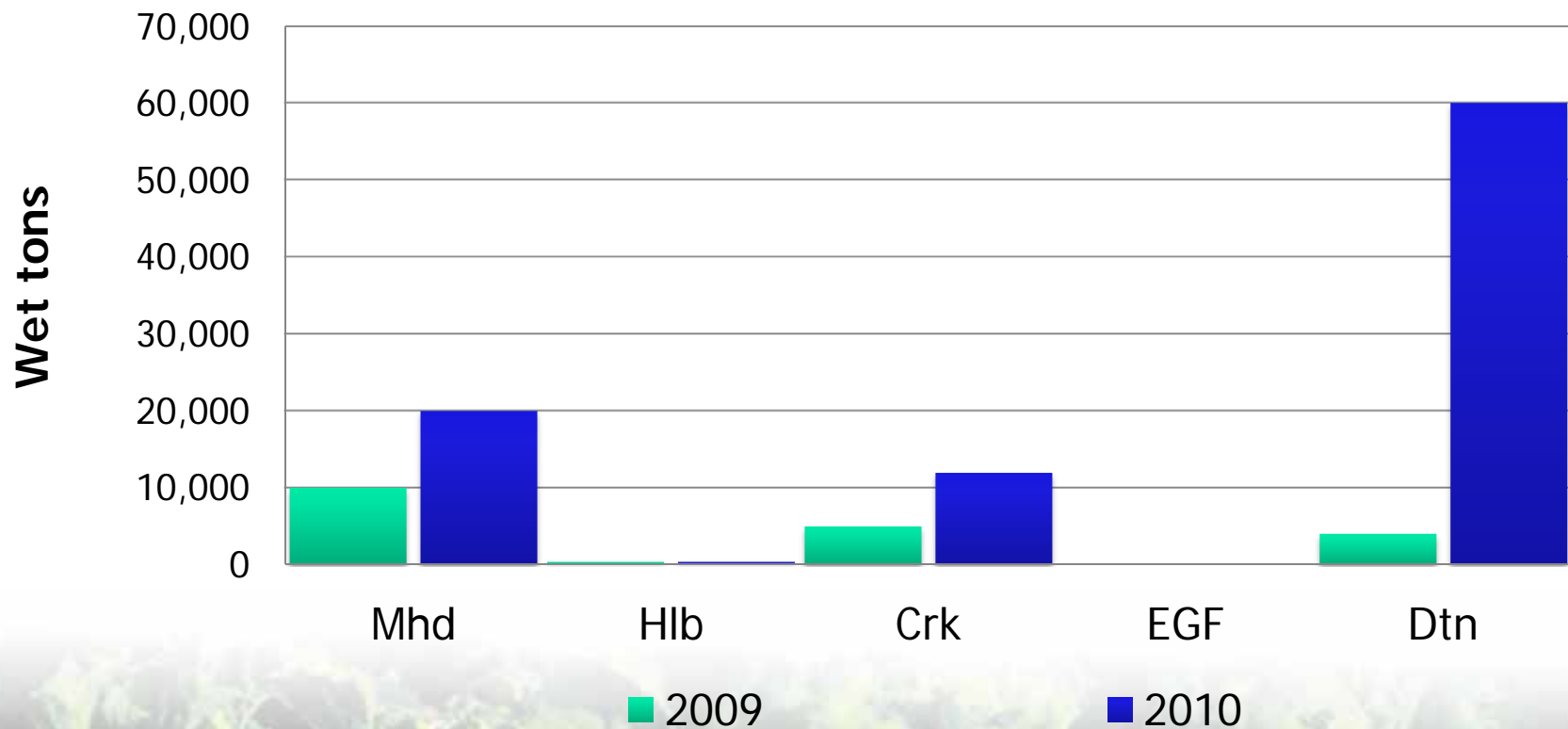


# Dtn Reclamation



# 2010 Beneficial Use

## Versalime Use by Location





# VersaLime Responsibilities

- Agriculturalist
  - Agronomic Recommendations to Growers
  - VersaLime Demand Estimate
- Factory
  - Required Forms
  - Coordinate VersaLime Load-out
- Business Development / Crp
  - Program Coordination and Changes
    - Land app, website mgmt, nutrient analysis, permits, etc.



# VersaLime Web Site

- ACSC Internet Website
  - Products and Processing
    - VersaLime
      - All Information In One Location
      - Continually Updated
      - Responsibilities, Forms, Procedures, Data and Research
      - Updates Managed Through One Point “Consistency”



American Crystal Sugar Company - Windows Internet Explorer

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# Growing Beets. Making Sugar. Tasting Sweet.

Employee Email Login



**American Crystal Sugar Company**

**Growing Beets.**  
Progressive on-farm production methods coupled with the fertile soil of the Red River Valley make sugarbeets a leading regional crop.



Sugarbeet Agronomy	Cooperative Profile	Products & Processing	Members Only
<ul style="list-style-type: none"> <li>• Gold Standards</li> <li>• Ag Notes</li> <li>• Ag Tools</li> <li>• Beet Seed</li> <li>• Classifieds</li> <li>• Resources</li> </ul>	<ul style="list-style-type: none"> <li>• Annual Reports</li> <li>• Economics</li> <li>• Facilities</li> <li>• History</li> <li>• Joint Ventures</li> <li>• Sugar Facts</li> </ul>	<ul style="list-style-type: none"> <li>• Agri Products</li> <li>• Industrial</li> <li>• Recipes</li> <li>• Retail</li> <li>• Sugar Processing</li> <li>• VersaLime</li> </ul>	<ul style="list-style-type: none"> <li>• Shareholder Records</li> <li>• Sugar Reports</li> <li>• Accessing Tips</li> <li>• Request Password</li> </ul>

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**What's New:**

- [The 41st Annual Research Reporting Session](#)

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Sugarbeet Agronomy | Cooperative Profile | **Products & Processing** | Members Only



**We Won't Charge You A Dime To Get The Benefits Of VersaLime.**

**What is VersaLime?**

VersaLime is the same lime we have offered to area growers for years. This byproduct of beet sugar purification is proven to help control Aphanomyces root rot and provides other benefits, such as adding valuable nutrients, raising soil pH and improving soil structure.

**Effective VersaLime application**

- Apply 7 - 10 tons per acre
- Apply 1 year before sugarbeets
- Spread as evenly as possible
- Thoroughly incorporate with tillage

**Our by-product is your benefit**

American Crystal's five Red River Valley factories produce 350,000 tons of lime each year. And it's available to you for NO CHARGE.

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VersaLime - Windows Internet Explorer

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VersaLime

Edge Safety Tools

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**VersaLime Locations**

- [Crookston](#)
- [Drayton](#)
- [East Grand Forks](#)
- [Hillsboro](#)
- [Moorhead](#)

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**Additional Information**

**Required Form**

- [Lime Removal Agreement](#)

**Lime Benefits/ Research**

- [Ag Notes 527](#)
- [Ag Lime Fact Sheet](#)
- [A Case For The Use Of Limestone In North Dakota](#)
- [Impact of Lime on Soil Physical Properties](#)
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- [Lime Rate Effects on Sugarbeet, Wheat and Soybean Yields Larry Smith, UM](#)

**Product Analysis**

- [VersaLime Nutrient Summary](#)
- [Ag Lime Stockpile Analysis](#)
- [Ag Lime Stockpile Analysis - Drayton](#)

**Hauling/ Spreading Services**

- [2010 Lime Spreading Service Providers](#)
- [2010 Lime Hauling Service Providers](#)

**Environmental Considerations**

- [Guidelines for Land Application of By-Product Limes](#)

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# VersaLime Procedures

- Required Forms
  - Factory Specific Instructions
    - Contacts
    - Load-out Locations
    - Times
  - VersaLime Agreement
  - Site Suitability Checklist
- Environmental regulation





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**[VersaLime](#)**

## Drayton - VersaLime

### Contact Info

Earlene Lasch: (701) 454-3233

- [Pickup Map](#)

[Drayton VersaLime Give Away Instructions](#)

[MSDS](#)

### Required Forms

- [Lime Removal Agreement](#)
- [Site Suitability Checklist](#)

### Product Analysis

- [Aq Lime Stockpile Analysis - DTN](#)

# Factory Giveaway Instructions

## ACSC Procedure to Acquire Lime from Drayton Site

### Growers will need to do the following:

1. Contact the following staff member at the Drayton Factory at least 24 hours before expected receipt of first load:  
**Earlene Lasch: (701) 454-3233**
2. Complete a copy of the Lime Removal Agreement. A copy of the **Lime Removal Agreement** may be obtain from Factory contact or online at [www.crystalsugar.com/products/versalime.aspx](http://www.crystalsugar.com/products/versalime.aspx)
3. Determine the location for application (Twp, range, section)
4. Determine acreage for the land description in Step 3.
5. Determine agronomic application rate (tons spread per acre)
6. Complete VersaLime Site Suitability Checklist for each location lime will be applied to. **Site Suitability Checklist** may be obtain from Factory contact or online at [www.crystalsugar.com/products/versalime.aspx](http://www.crystalsugar.com/products/versalime.aspx)

**Steps 1 through 5 will need to be completed and documents turned in to Factory contact prior to picking up the first load.**

7. Determine the time the Grower plans to pick up the lime (date and time of day) and communicate to Factory contact.

### Agriculturalist Instructions:

1. Answer questions pertaining to application rates and agronomic benefits
2. Refer interested growers to Factory contact listed above for all anticipated lime receipts

### Truck Driver Instructions:

1. Factory loading hours run from 7:00 a.m. – 3:00 p.m. weekdays during the summer and daylight hours during campaign. If additional hours or weekend hours are needed, make arrangements with Factory contact at least 24 hours prior to arriving (required to make sure lime and loading are both available).
2. After the first load, if known, inform the loader operator of the approximate time your next load will be picked up. Work with the loader operator on the times you will be arriving and when the operator is available to assist.
3. **Loads may be required to be wetted or covered before leaving ACSC property. No material can blow off the truck during transportation.**

# VersaLime Agreement

## LIME REMOVAL AGREEMENT

THIS AGREEMENT is entered into effective as of \_\_\_\_\_, 2010, by and between American Crystal Sugar Company, a Minnesota cooperative corporation ("ACSC"), and \_\_\_\_\_ ("Contractor").

WHEREAS, ACSC is in the business of processing sugarbeets into sugar, and in connection therewith, has spent lime ("Lime") available for use by third parties;

WHEREAS, Contractor is willing to remove, at no expense to ACSC, an agreed upon quantity of the Lime and land apply (or contract for the application) the Lime as a soil conditioner.

WHEREAS, the parties hereto desire to enter into a contract for the removal and use of Lime.

NOW, THEREFORE, in consideration of the foregoing, and the mutual covenants and conditions set forth herein, ACSC and Contractor agree as follows:

1) **Removal of Lime.**

- (a) ACSC grants Contractor the right to remove Lime in amounts to be mutually agreed upon at no cost to either Contractor or ACSC from the \_\_\_\_\_ Factory (the "Factory"). The removal of the Lime by Contractor shall be referred to as the "Removal". Removal shall occur at such times and in such amounts as are mutually agreed upon, subject to the following schedule:

**[insert quantity and monthly schedule].**

- (b) ACSC will load the Lime into Contractor's trucks. Contractor shall be responsible for clean-up and removal of any Lime which may spill during transport, and in the event of such a spill the Contractor agrees that he or she will immediately notify the Factory and the ACSC Regulatory Affairs Department. Contractor shall be responsible for undertaking and completing any required road repair resulting from Contractor's removal activities.
- (c) Contractor agrees to operate in a professional manner while removing the Lime and agrees to follow any guidelines and safety and security requirements that may be established by ACSC with regard to activities occurring on ACSC property.

# Site Suitability Checklist



VersaLime

## SITE SUITABILITY CHECKLIST AMERICAN CRYSTAL SUGAR COMPANY

Owner of Site: (please print) \_\_\_\_\_ Date: \_\_\_\_\_

Street Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Phone Number: ( ) \_\_\_\_\_ Is The Lime being added for pH control: Yes:  No:

If VersaLime is **not** being used for pH control, **one** composite soil sample must accompany this form prior to lime receipt. Additional samples will be required if field is greater than 160 acres.

Does the site meet the suitability criteria below: Yes:  No:

Storage should not occur in areas with greater than two percent slope.
Storage sites should not be located on areas subject to flooding.
Storage will not take place in or near any wetland areas.
Storage (up to 7 months) will be on Lake Agassiz clay soils.
Low soil berm will be provided around stockpile to prevent surface water run-on or run-off.
Stockpile will have no more than an individual farmer can use.
Lime will be applied and incorporated by November 15 <sup>th</sup> and any unused lime will be returned to ACS for proper disposal.

Site Location (County): \_\_\_\_\_ Site Location (Township): \_\_\_\_\_

Site Location (Range): \_\_\_\_\_ Site Location (Section): \_\_\_\_\_

Site Location (Quarter): \_\_\_\_\_ Acres: \_\_\_\_\_

Agronomic Application Rate (tons- as received per acre): \_\_\_\_\_

Tons of Lime Required for Site Location (Acres multiplied by Agronomic Rate): \_\_\_\_\_

Lime Hauled by: \_\_\_\_\_

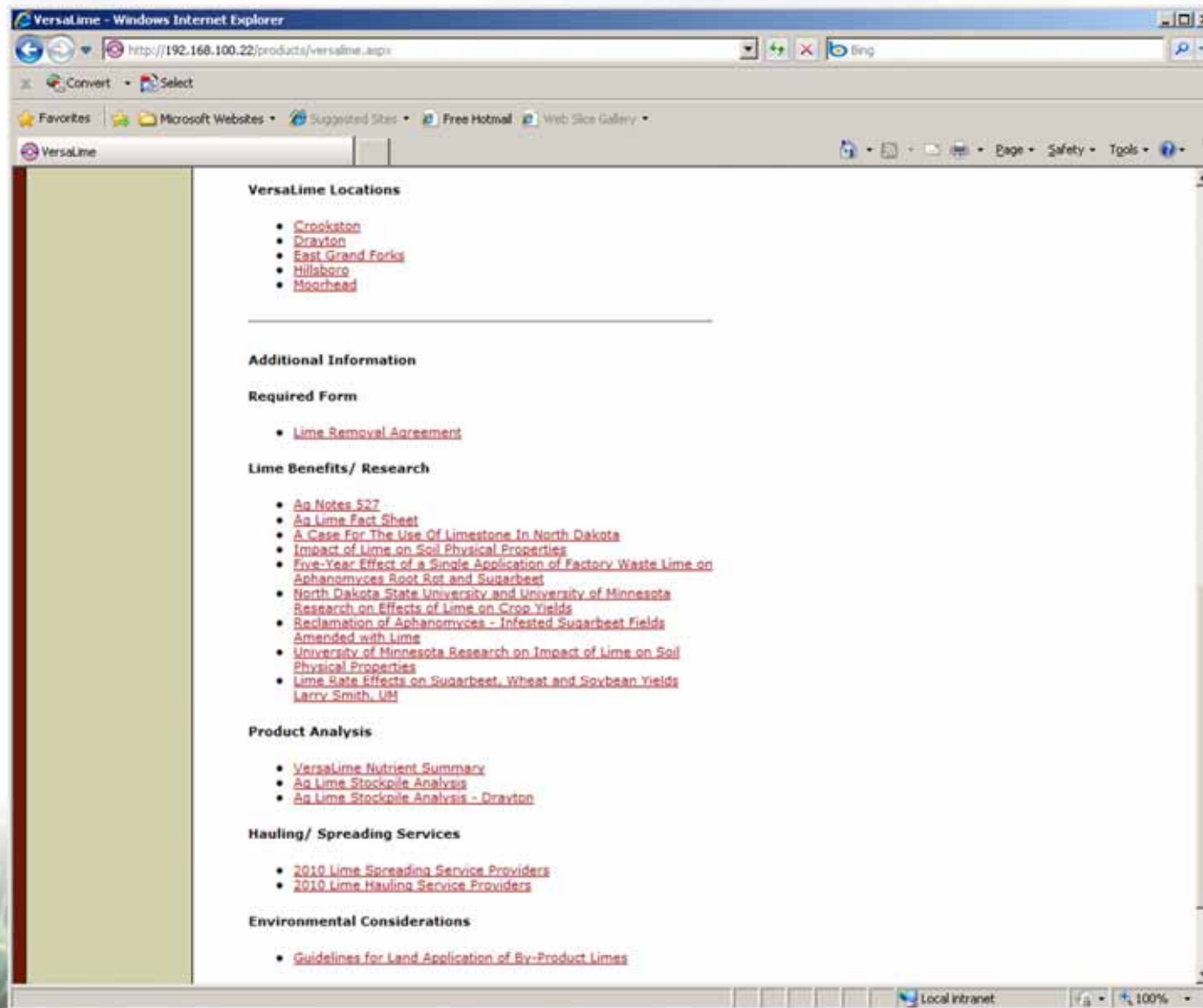


# VersaLime Research

- Research Includes
  - ACSC Ag Notes
  - ACSC Ag Lime Fact Sheets
  - University Research Studies
  - Product Analysis & Nutrient Summary
  - Rotational Crop Studies  
(Wheat/Soybean/Canola)



# VersaLime Research



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#### Environmental Considerations

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# VersaLime

- 2010 Lessons Learned
  - Procedures & Paperwork
  - Hauling – Truck Tarping Required
  - VersaLime Availability vs. Demand
  - Contract haulers and spreaders





Any Questions



American  
Crystal  
Sugar  
Company