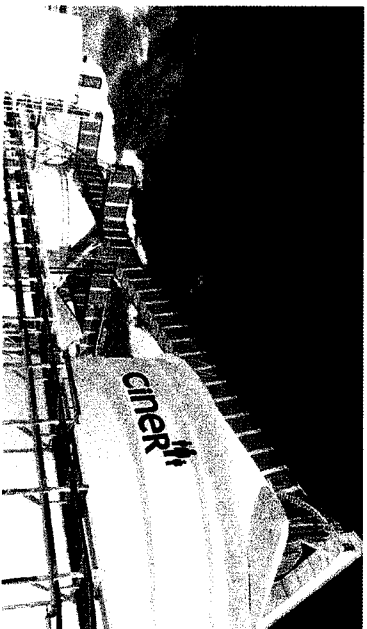


Trona Industry Overview

ciner^{iti}

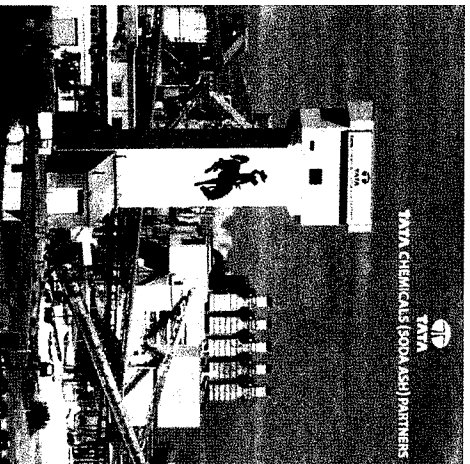


SOLVAY
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TATA

TATA CHEMICALS (SODA ASH) PARTNERS

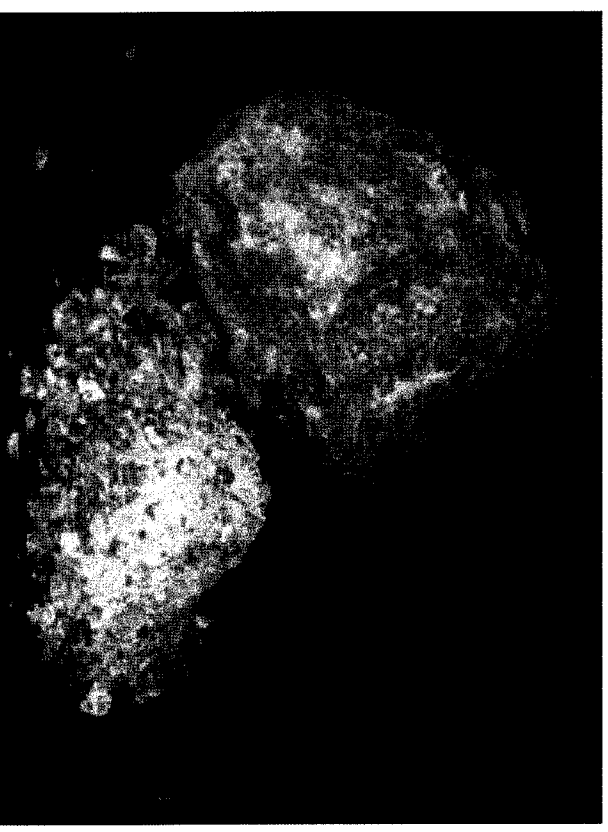


genesisalkali



What Is Trona

- Trona (ore that contains sodium sesquicarbonate) is a relatively rare sodium-rich mineral found in the United States, Africa, China, Turkey and Mexico.
- Chemically, Trona is a double salt
 - Sodium Carbonate + Sodium Bicarbonate + 2 Waters
 - Or symbolically: $\text{Na}_2\text{CO}_3 \bullet \text{NaHCO}_3 \bullet 2\text{H}_2\text{O}$



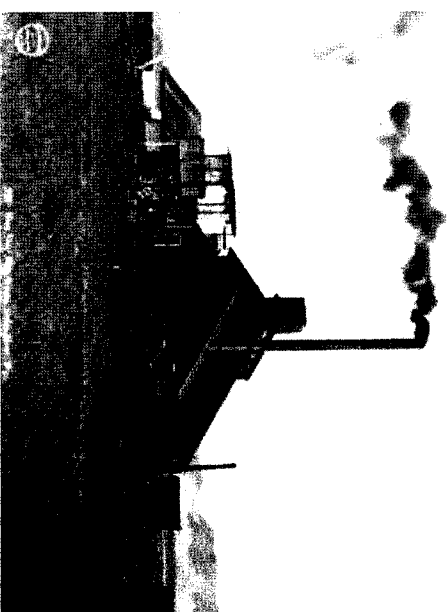
Soda Ash Applications Overview

Market Segment	Typical End Uses	End Use Value
Flat Glass	<ul style="list-style-type: none"> windshields residential windows commercial construction furniture / home furnishing 	
Container Glass	<ul style="list-style-type: none"> beer & beverages wine and spirits perfume 	<ul style="list-style-type: none"> lowers glass production energy use lowers viscosity of molten glass providing increased flexibility in molding
Other Glass	<ul style="list-style-type: none"> fiberglass insulation light bulbs tableware 	
Detergents	<ul style="list-style-type: none"> soda ash directly in powdered detergent box (home laundry, dishwashers, institutional) 	<ul style="list-style-type: none"> alkalinity surfactant carrier filler
Chemicals	<ul style="list-style-type: none"> sodium silicates sodium phosphates sodium bicarbonate 	<ul style="list-style-type: none"> sodium source
Other	<ul style="list-style-type: none"> mining water treatment flue gas desulfurization oil and gas 	<ul style="list-style-type: none"> alkalinity

Sources: Industry information

History of Development

- Trona was discovered in Sweetwater County in 1938 during oil and gas exploration.
- The first mine shaft was sunk in 1946, and commercial soda ash production began in 1948. Up until that time, all soda ash in the United States was produced synthetically.
- Today the four Wyoming producers mine over 18 million tons of trona each year and directly employ over 2,300 people.
- The trona is brought to the surface where it is refined into soda ash. The soda ash is then shipped by trucks, trains and ships to markets across the United States and the world.
- About 50% of the almost 12 million tons of soda ash produced in Wyoming is now exported to markets overseas. It is Wyoming's top export and the largest inorganic chemical exported from the USA.
- The Wyoming trona industry is now a ~ \$2 billion per year business.



SURFACE

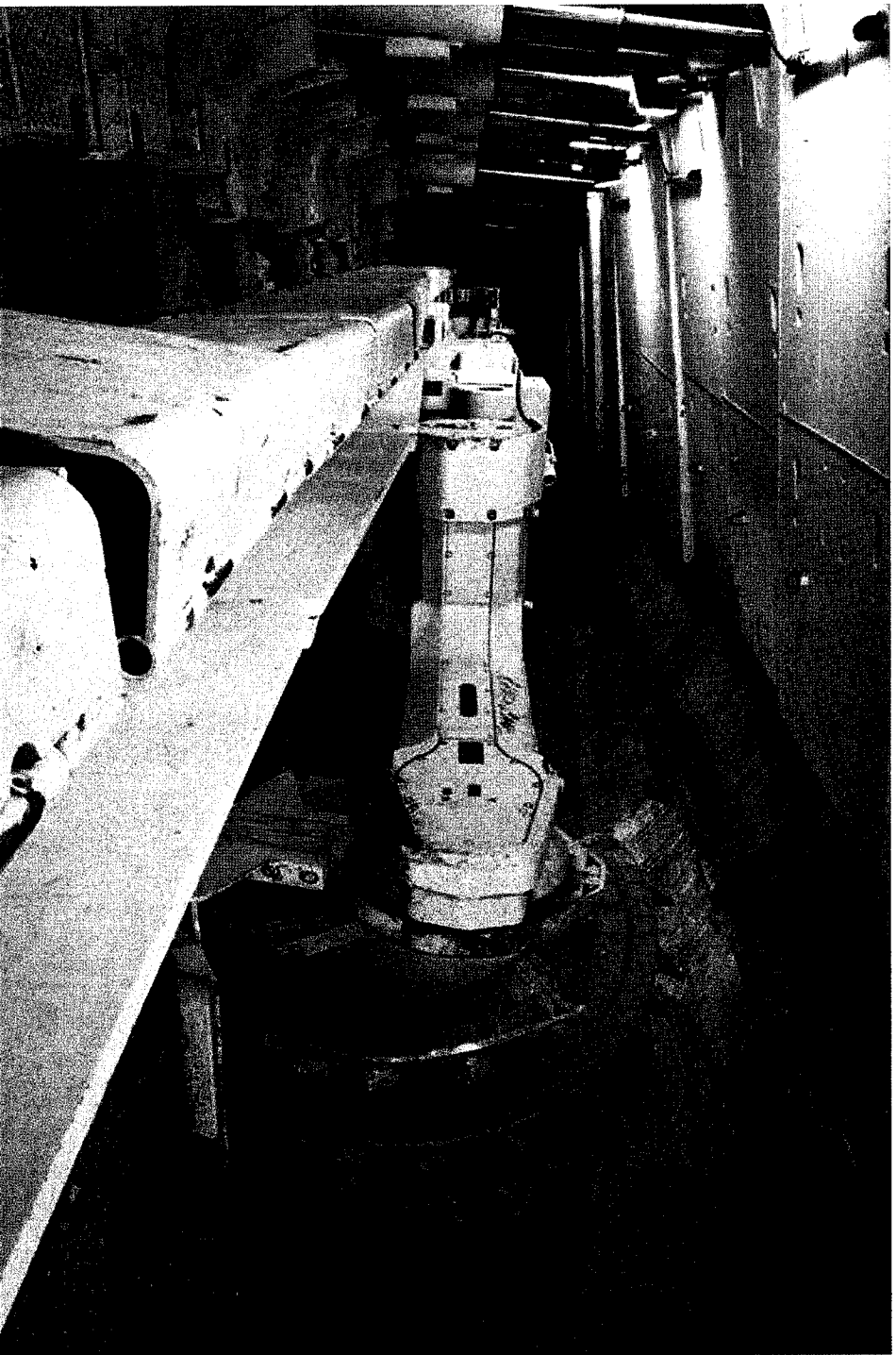
130 BILLION TONS RESERVES
25 BILLION MINABLE BY MECHANICAL
MINING METHODS
42 TRONA BEDS

SOUTH

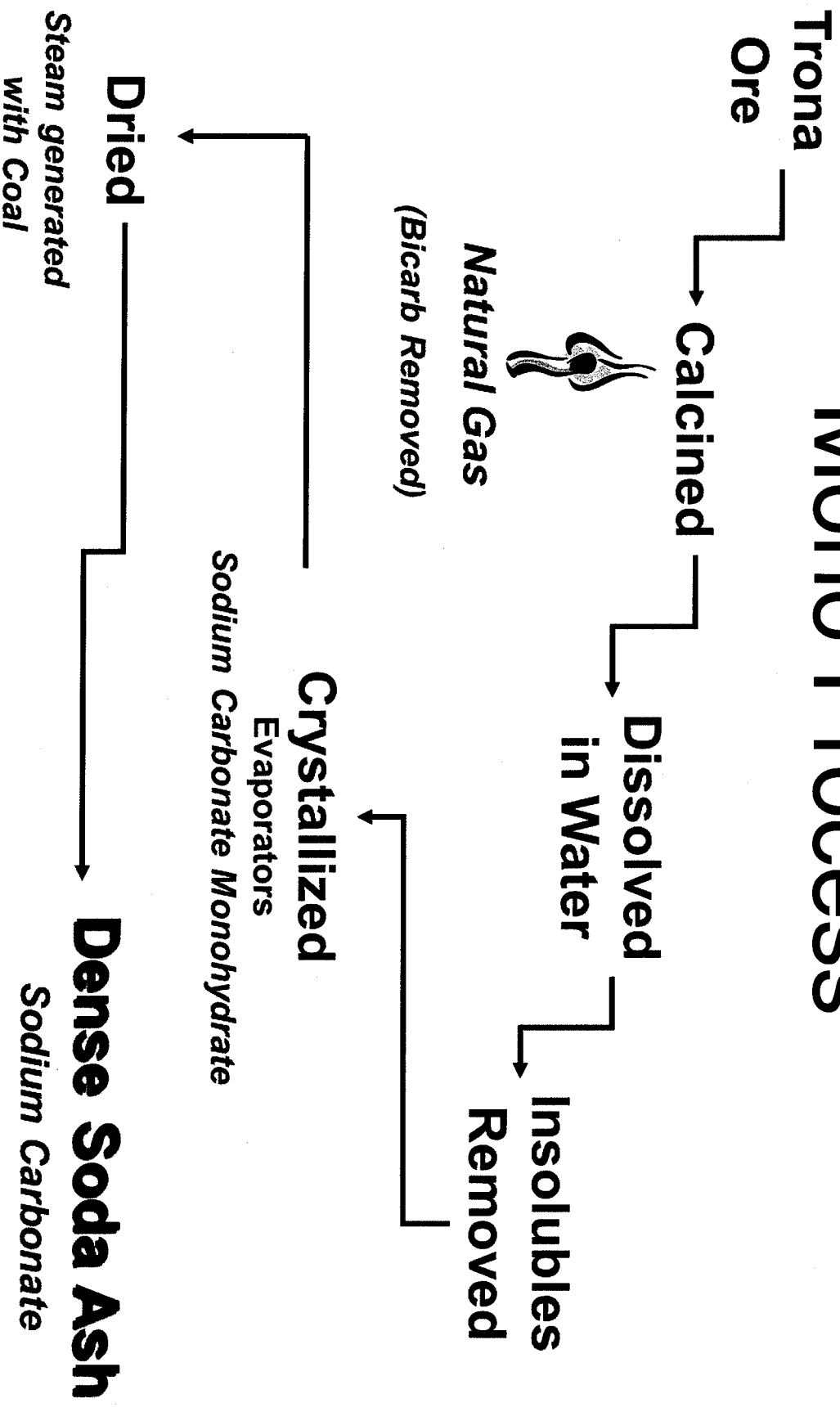
#3

Wyoming Trona, Worlds Largest Deposit

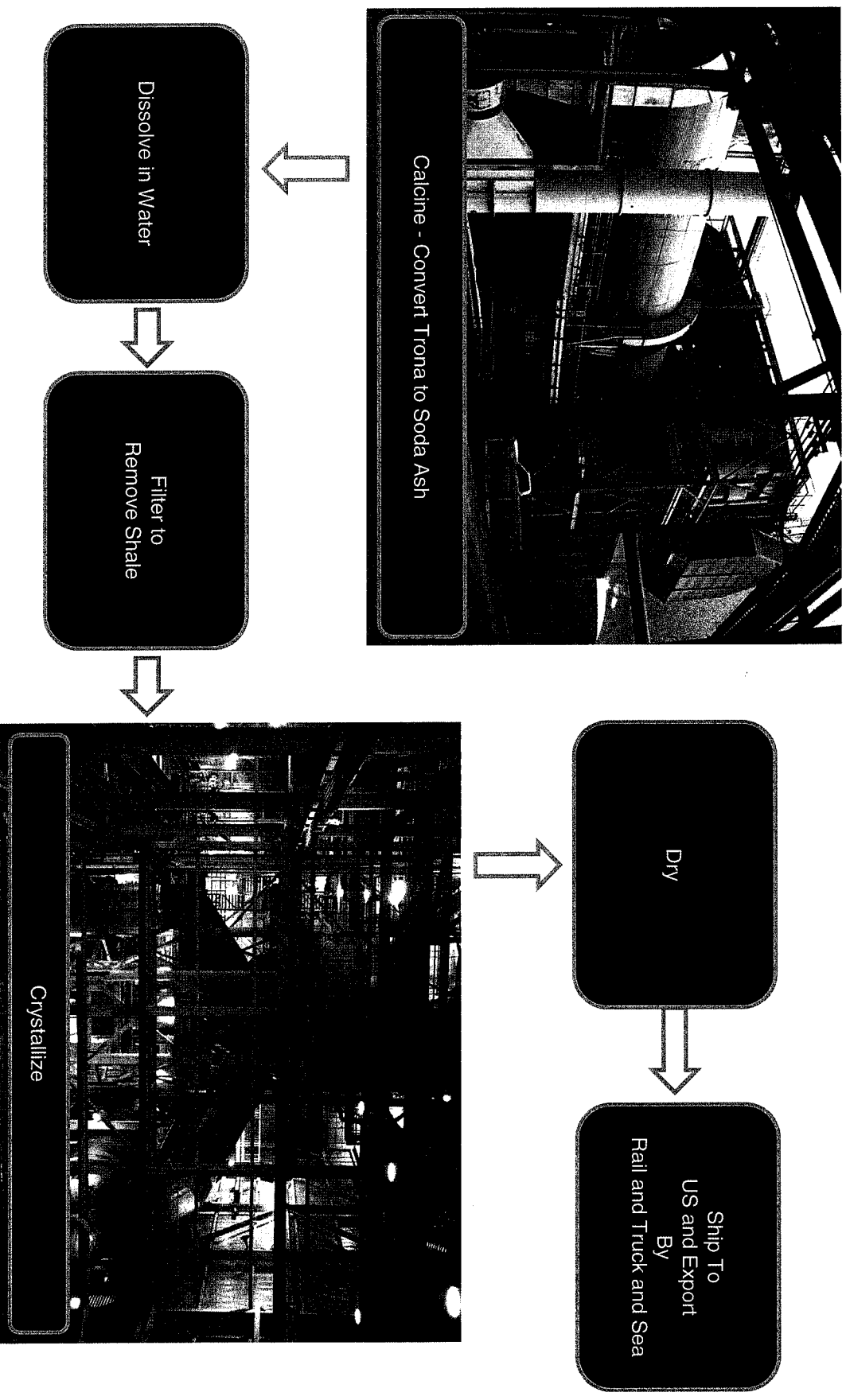
Longwall Mining



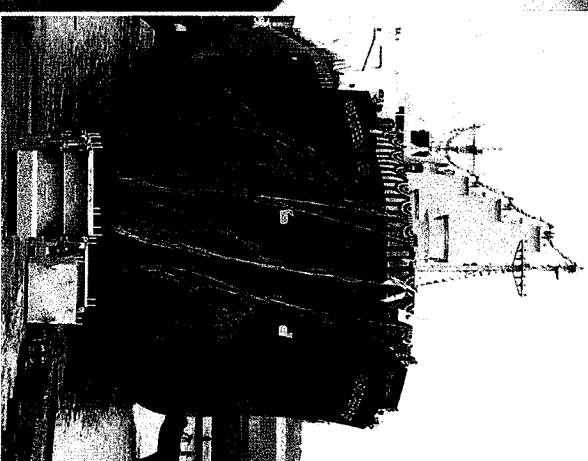
Mono Process



Soda Ash Production



Nearly 60% of our products are exported

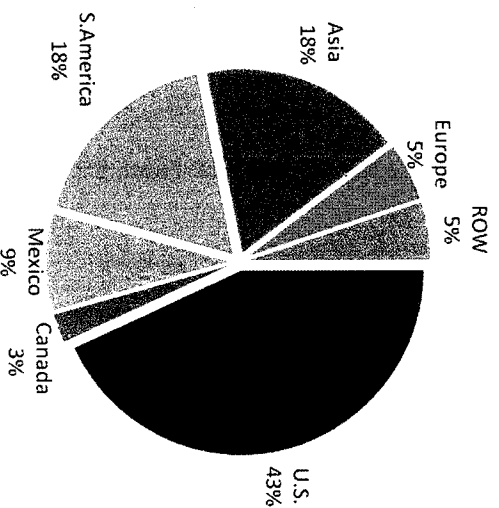


Soda Ash is Wyoming's Largest Export

The U.S.-based natural trona industry is the largest exporter of inorganic chemicals, totaling more than \$1 billion annually.

Demand for US soda ash in global markets

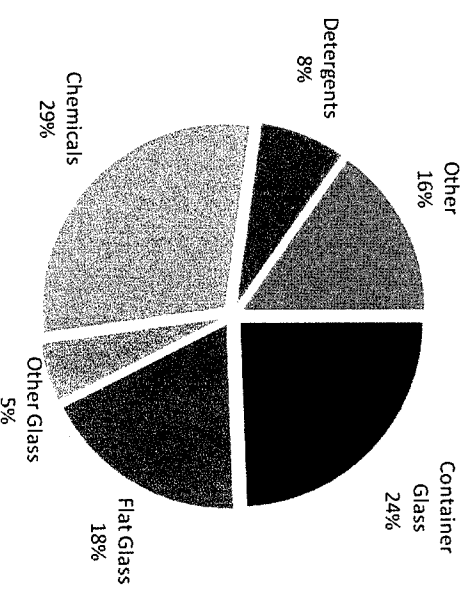
US Production - Destinations



*USGS, ITC data

- Full utilization of U.S. effective capacity is expected to continue
- Supply is projected to grow but some headwinds on the horizon
- Exports account for >50% of demand, driving the majority of the growth.

US Domestic Demand



*IHS data

- US domestic demand growth is modest
- Demand in Flat Glass and Chemicals markets is growing.
- Demand in laundry powders is declining.

The Value of Trona to Wyoming

Estimated Value in 2016

<i>Production in tons of trona</i>	<i>17,507,981</i>
<i>Severance Tax</i>	<i>\$ 18,537,920</i>
<i>Ad Valorem Tax on Production</i>	<i>\$ 32,900,869</i>
<i>Federal Mineral Royalty (Wyoming share)</i>	<i>\$ 29,539,486</i>
<i>Ad Valorem Tax on Real and Pers. Prop.</i>	<i>\$ 7,761,679</i>
<i>State Royalties</i>	<i>\$ 17,416,363</i>
<i>Sales Tax</i>	<i><u>\$ 7,718,557</u></i>
<i>Total</i>	<i>\$ 113,874,874</i>
<i>Payroll Including Benefits</i>	<i>\$356,022,908</i>
<i>No. of Employees</i>	<i>2328</i>

Source: Wyoming Mining Association Industry Survey

Major Water Users on the Green River

- Industrial water users on the Green River (from WWDO)
 - Industrial users draw 56,800 acre-feet per year
 - Trona industry draws 16,400 acre-feet per year with potential growth to 30,000 acre-feet per year
 - Utilities draw about 40,000 acre-feet per year (Supply over 50% of our power)
- Water is essential to our operations, without it, there would be no trona industry.
 - Steam for heat and power (some producers co-generate power)
 - Dissolution of ore
 - Essential to crystallization and refinement of trona to soda ash
 - Cooling water
- All 4 producers have very high water re-cycle rates
 - A molecule of water is used many times over
 - recycled from processing on the surface to the mine and back to the surface
 - Only losses are to evaporation
 - These are zero discharge facilities

Trona Industry Concerns

- Fontenelle Expansion
 - We support this project; however, we have concerns
 - Little or no stored water during project (at least one year)
 - Even small disruptions in water supply have negative consequences for our continuous manufacturing processes (more severe in winter)
 - Risks not only to our operations but also to the production of power from our utility provider
 - Customer impact from a potential disruption of supply
 - Wyoming Soda Ash Industry is marketed as the worlds most reliable soda ash supply
 - Potential to opening the door for Chinese and Turkish producers
- Water shortages in lower basin states and how the resolution of those issues evolves over time
- Would prefer alternatives to drainage of Fontenelle during construction
 - Use of dredge to allow for some storage
 - Other alternatives ???

