

## WELCOME

# TO SÃO LUIS!



#### 

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Users of : Pacemaker and contact lenses Let us know





#### March 23rd

- 08:15am Alumar presentation
- 10:15am Site visit Casthouse and Smelter
- 11:45am Lunch
- 1:00pm Site Visit Port and Refinery including Expansion
- 3:00pm Depart for Airport



### Location







### **ALUMAR** INSTITUTIONAL HIGHLIGHTS

























### 1,500,000 tpy









### 440,000 tpy



### Current capacity and shareholder equity

	Start-Up	Current Capacity (TPY)	Const. cost. (US\$)
Total Port	Sep.83	4,900,000	274M
	Mai.84	500,000	560M
Refinery	Jan.05	1,000,000	62,3M
	Future	2,000,000*	1,800M
Total Refinery		3,500,000*	2,422,3M*
Smelter-L.I	Jul.84	127,082	372 M
Smelter-L.II	Feb.86	155,738	213 M
Smelter-L.III	Sep.90	97,180	308 M
Expansion-L.III	Apr.06	60,000	185 M
Total Smelter		440,000	1,078 M
Total Plant		*Including Refinery Expansion	<u>3,774,3 M*</u>
REFINERY		SMELTER	
10% 36%	Alcoa BHPBilliton Alcan Abalco	40% 60%	<ul><li>Alcoa</li><li>BHPBilliton</li></ul>













Population





Tenure







**Refinery Expansion Construction** 2006 Line III Expansion start-up 2006 **SA8000 certification – Social Accountability** 2004 **OHSAS 18001 Certification – Occupational Health and Safety** 2002 2000 ISO 14001 Certification – Environmental Management System **ABS Implementation** 1997 **1996 Environmental Park Implementation 1996 ISO9001 Certification – Quality Management System 1990** Line III start-up (phase I) **1986 Line II start-up** 

**1984 Plant Operations start-up** 

**1983 Port Operations start-up** 







### **ALUMAR** EHS Performance

ALCOA bhpbilliton

ALCAN



### Alumar Total Injury Rate



# ALUMAREHS PerformanceImage: Image: I



















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**ALUMAR** EHS Performance

### 🚨 🚅 📥 Fluoride Emissions – kg/tAl

#### Root Causes

- •Load Creep
- Setting Cycle (28 to 26 days)
- Pot Dressing frequency Reduction
- High Anode Effect
- Higher Burn Off
- Line 3 Completion Start Up

#### **Countermeasures**

- Double draft conclusion
- Extra pot dressing between settings
- Anode effect further reduction (resolve alumina issue)
- Kaizen Event (pot dressing, air blasting and exhaustion piping cleaning)

#### **Improvement Actions**

- Double draft expansion (~\$20 MM)
- •Intelligent crust breaker (~\$20 MM)
- •Butts pallet cover (~\$3.5 MM)







0 -May- Jun-Jul- Aug- Sep- Oct- Nov-Feb-Mar-Apr-Dec-Jan-Jan-



#### Initiatives:

- Implementation of slotted anode reducing Anode Effect (AE) frequency by 50% (Jan 2003).
- Revision of AE termination logic (April 2004).

• AE rate affected by start-up of new pots in Line #3 (Dec 05 – Apr 06)









**ALUMAR EHS** Performance Water Consumption (ML)



#### Water reduction projects:

- Use of storm water in pot and anode cooling
- Use of compressed air in baking furnaces
- · Use of treated wastewater in landscaping





#### Root Causes

• Waste Generation from Expansion

Projects – Smelter and Refinery.

• ESP Dust Generation;

#### **Countermeasures**

- Develop alternatives for ESP Dust Recycling;
- Implement wastes minimization initiatives in Expansion Projects.

#### **Improvement Actions**

• Develop new SPL Co-processor;







- Outstanding result on recordkeeping audit performed by Bill Taylor (CTJS-OSHAS) consultant
- All plant leadership was trained in Human Performance by Rob Fischer, Alcoa consultant
- 53 fatality risks eliminated
- No new environmental non compliance
- Replacement of fossil fuels by Biodiesel (2%) in baking furnaces and industrial vehicles
- Groundwater consumption reduced by 44% from 2001 basis





- Continue to eliminate fatality risks, implement Fatality Prevention Protocol
- Full integration of the current safety Continuous Evaluation Process (PAC) with Alcoa Self Assessment Tool (ASAT) testing activities
- Human performance training deployment for Alumar and its Contractors employees
- Reduce fluoride emissions to benchmark levels
- Establish a Water Strategy aiming to avoid process water discharges, reuse of waste waters and potable water consumption
- Improve biofuels utilization, including biomass, in our processes.





✓ Alumar is the largest private employer in Sao Luis

✓ Among employees and contractors, more than 5,000
 families depend direct or indirectly on Alumar businesses

 Excluding Raw Materials and Power, Alumar purchases in Sao Luis and/or Maranhão state about 54% of its needs, in a total of more than US\$ 214 MM/year

### ALUMAR INSTITUTIONAL HIGHLIGHTS



### Community Activities

#### **Community Actions**

Developed by Alumar Employees with the partnership of Alumar contracted companies





### Cultural projects developed with the community

CD's, theater plays, plastic arts exhibition, books etc.



### Alcoa Institute / Alcoa Foundation Projects

Developed by a philanthropic institution or the government, financially supported by the Alcoa Institute





#### JUNIOR ACHIEVEMENT – MINI-ENTERPRISE:

Developed with high school students





### Developed with elementary school students



## **ALUMAR**INSTITUTIONAL HIGHLIGHTSImage: Image: Imag

### High School: CEM Prof. Mário Martins Meireles

Capacity: 1,200 students

8 communities benefited





## ALUMAR INSTITUTIONAL HIGHLIGHTS Investments Investments

### **Social Projects 2006**



### **Investments 2006**

Total: US\$ 2,482,245





Number of employees



Community Projects

Bravo! Program

## REFINERY

1 1.165

## **ALUMAR**

### **REFINERY MACRO FLOW**

BAUXITE



**ALUMAR REFINERY PERFORMANCE** 

bhpbilliton

### Smelter Grade Alumina (SGA) production (kton/y)

### 3.500 with Expansion





### **ACHIEVEMENTS**

- ✓ PRECIPITATION SIZE STABILITY
- ✓ SPENT LIQUOR SCALE INHIBITOR TEST
- ✓ EARLY EXPANSION GAINS
- ✓ KEEP SECOND RENTAL BOILER

### **CHALLENGES**

- ✓ PASTE WASHERS IMPLEMENTATION
- ✓ LONG TERM CONTRACT FOR CRITICAL MAINTENANCE ACTIVITIES
- ✓ EARLY EXPANSION GAINS
- ✓ NEW BAUXITE FREIGHT CONTRACT





### REFINERY EXPANSION PROJECT









Upgrade existing unit with new unit 2

- New Capacity3.5 mtpyProduction availability96.0%Recovery96.5 %
  - Precipitation seed ratio
  - Precipitation yield

1000 grams per liter (gpl) 98 gpl (Gross) - Benchmark



### **Refinery Expansion Project**



Cost Reduction & Environmental Considerations in the basic design

#### **ENERGY**

Additional heater for washer flow heating at Digester Unit #1 Installation of axial cyclones at the Digester units to improve flash vapor quality Heat recovery from excess condensate at 35E tanks Co-generation at Powerhouse

#### **CAUSTIC SODA**

Indirect slurry heating of bauxite slurry at Digestion Units #1 & #2 Application of E-duct technology at Thickeners and Washers Installation of DIASTAR filters Additional evaporation unit

#### **BAUXITE (Recovery)**

Installation of cyclones at new bauxite mills Increase of Digestion temperature to 150° C

#### **ENVIRONMENTAL**

Lower sulfur oil in Calcination Reduction of potable water use by using condensate at Cooling Towers Bldg #45 Avoid using cooling towers in Bldg 50

#### **ABS PRINCIPLES (Operability improvements)**

Flow path simplification at 42A / Bldg 42 Unitized systems, 35D, Disc filters.

### **ALUMAR** ABS – ALCOA **BUSINESS**

SYSTEM

**bhp**billiton

ALCAN

ALCOA





## WHAT IS ABS ?

### **Alcoa Business System**

It is a system based on the following principles:

- Understanding precisely our customers' requirements.
- Pre-specifying the activities, the pathways, and the connections
- Safeguarding what we have pre-specified with built-in tests to identify and prevent problems
- Enabling every employee to recognize and trace problems back to their root cause and eliminate them.
- This system provides the most efficient way for eliminating and preventing waste by enabling us to supply customers, on demand, with defect-free products at the lowest cost and with the highest degree of safety.



### **Alcoa Business System**

### ABS

represents strong alignment of goals and methods. Everybody in the organization understands the goals and everybody uses the ABS methods and its countermeasures







### **Suppliers**

**ΛLUMΛR** 

ALCOA bhpbilliton

ALCAN

Customers

Redesigned to Connect to the Customers Redesigned to Stabilize work place

- Flow path, connections & activities
- Built in tests

Redesigned People System to provide help chain Redesigned to Connect to Suppliers

ΛLUMAR	<b>ABS Achievement</b>	S		Cidade Instituto Cidade Instituto Exercise Cidade Instituto
	Gains & Savings US\$	(000)		
Valu	e to the Business*			
Invent	tory reduction	US\$	17,142,000	
Cash	cost reduction:	US\$	15,551,000	
Outpu	it:	US\$	46,449,000	
Avoided Capital Expend:		US\$	1,310,000	
Total :		US\$	80,452,000	

Both Alumar Smelter and Refinery have been considered as ABS worldwide Benchmark Plants as per Alcoa Operational Excellence Audit Process throughout Global Primary Product Business Units.

## ABS Achievements and Challenges



### **Operational Aspects**

- **Employees Engagement**
- **Plant Stability**
- **Predictive and Preventive Maintenance Improvement**
- **Operational Excellence**
- **Technology Sharing and Best Practices Transfer**

### <u>Main Goals</u>

- **Production Output**
- **Metal Purity**
- **Energy Consumption**
- **Productivity Improvement**
- **EHS related Issues**

## **SMELTER**

1 1.165

## **ALUMAR**

### **SMELTER MACRO FLOW**



SMELTER PERFORMANCE

### METAL PRODUCTION (kton/y)



ΛLUMAR

ALCOA











#### **ACHIEVEMENTS**

- ✓ 52 POTS START-UP WITH NO INCIDENT
- ✓ BEST EVER SAFETY RESULT
- ✓ ANODE QUALITY
- ✓ ABS OpEx ASAT RESULT
- ✓ 95% PLANT STABILITY

#### **CHALLENGES**

- ✓ CONSISTENT OPERATIONAL STABILITY
- ✓ IMPROVE PLANT RELIABILITY AND ASSET INTEGRITY APPLICATION
- ✓ SIGNIFICANT PRODUCTIVITY IMPROVEMENT
- ✓ PROACTIVE COST CONTROL
- ✓ CONSOLIDATION OF DMS/PPS/ABS-ASAT



✓ Focus on customer and company's business case, execution and follow-up

✓ Leadership (Beware, Believe and Behave)

✓ Strong focus on stability of processes, equipments and people

✓ People engaged in problem solving using scientific methodology

✓KISS – Keep It Simple and Same

✓Continuous improvement Culture

✓People development (Expectation - Execution - Feedback)

✓ End-to-End organization engagement

✓ Learning-oriented organization: Learn by Doing and Teaching

## INSTITUTIONAL VIDEO

1.1.1

## **ALUMAR**