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BARRIOS
INTERNATIONAL
SYMPOSIUM

on Sustainable Non-ferrous Smelting
& Hydro/Electrochemical Processing

December 2016

RESUME – P. Barrios

RESUME

EDUCATION:

BSc. Chemistry - University Seville, Spain

MSc. Chemical Engineering - University Seville, Spain

PhD. Chemistry - University Seville, Spain; Thesis: "Kinetics of the Copper Blow Stage during pyrometallurgical Copper-Making" (A Kinetic Model) Dipl. Environmental Eng. - Technical University Madrid, Spain

Dipl. R&D Management - CSIC (High Counsel Scientist Research) Madrid, Spain

Dipl. Business Administration -ESADE Barcelona, Spain, and The International Social Science Council Paris, France

PROFESIONAL EXPERIENCE:

January 2016 – Present: Aurubis AG; Principal Adviser – Primary Copper. Responsible to provide high level strategic advice to the EVP-Primary Copper BU which includes assisting on the overall direction and function of Business Development, participating on special projects, including liaison and development of key relationships with selected business partners.

April 2008 – December 2015: Aurubis AG (new public company resulting from the merging of Cumerio and Norddeutsche Affinerie ,with operations and activities in 22 countries around Europe, North America and Asia, totaling 6400 employees and 13.8 Billion € revenues): Senior Vice President - Projects Primary Copper. Responsible for Primary Copper Business Unit's growing projects, with main focus on new business opportunities and external projects.

April 2006 – April 2008: Cumerio (public Belgian company resulting from the carve-out of the former Union Miniere's Copper operations): Vice President Operations & ExCom Member. Full corporate responsibility for the Cumerio Group operations: Copper Refining BU and Copper Products BU with operations in Pirdop (Bulgaria), Olen (Belgium) and Avellino (Italy); totaling 1500 employees and 3.5 Billion € of revenues.

2005 – March 2006: Associated, as Senior Adviser- Non Ferrous Metals at Hatch Corporate Finance (HCF) International Advisers (formerly HB Advisers) –Hatch Group-; a London based leading corporate finance advisory firm focused exclusively on the metals and mining sectors worldwide.

1999 - June 2004 Atlantic Copper – Freeport McMoRan Copper&Gold: Senior Vice President Corporate Development (full corporate responsibility for the Smelting & Refining Unit in Huelva and the Copper Products Units in Cordoba and Barcelona and Business Development); Executive Board Member.

1993 - 1999 Atlantic Copper – Freeport McMoRan Copper&Gold Group (former Rio Tinto Metal)-: Senior Vice President Operations (full corporate responsibility for the Smelting & Refining Unit in Huelva and the Copper Products Units in Cordoba and Barcelona totaling 800 employees and 900 million € sales). Executive Board Member.

1993 - 1996 Rio Tinto Metal (new company, controlled by Freeport McMoRan Copper and Gold, as the result of the carved out of the Rio Tinto Minera's smelting and refining activities): Vice President Metallurgy & ExCom Member (full responsibility for the Huelva Smelting & Refinery site, totaling 600 employees and 450 million € revenues).

1986 - 1992 Rio Tinto Minera: Smelting and Refining Production General Manager.

1978 - 1986 Rio Tinto Minera (mining & smelting company controlled by RTZ): / Planning and Metallurgical Department Manager of the Huelva Smelter.

1975 - 1978 Rio Tinto Patiño: Process Engineer at the Planning & Metallurgical Department of the Huelva Smelter.

1973 - 1975 Rio Tinto Patiño (RTZ & Patiño Mining Co. mining & smelting joint venture): Head Labs at Huelva Smelter.

SUPERVISORY BOARD / BOARD EXPERIENCE:

Cumerio Belgium: Belgian Subsidiary of Cumerio Group. Supervisory Board Member (SBM)

Cumerio Med JSCO: Bulgarian Subsidiary of Cumerio Group. Executive Director & SBM

Abrasivos Huelva: Rio Tinto Minera Holding. Supervisory Board Member (SBM)

Rio Tinto Energía: Rio Tinto Minera & Sevillana-Endesa Joint Venture. Chairman of the Board

AEGE: Spanish Association of Great Energy Consumers. (SBM)

CEFIC-ABM: European Confederation of Chemical Industries-Associated Business. (Exec Board)

EUROMETAUX: European Association of Metal Industries. (Technical & Management Board)

FEIQUE-AIQB: Spanish Federation of Chemical Industries-Association of Chemical and Basics. (Vice President & SBM)

AICIA: Andalusian Foundation for Research and Industrial Cooperation. (SBM)

CEA: Andalusian Confederation of Enterprises. (SBM)

University of Huelva: Trustee

International University of Andalusia: Trustee

TECHNICAL SOCIETY MEMBERSHIPS:

GDMB GESELLSCHAFT FÜR BERGBAU, METALLURGIE, ROHSTOFF- & UMWELTTECHNIK

TMS THE METALLURGICAL SOCIETY OF AIME (From 1985 – 2005)

RSFQ SPANISH ROYAL SOCIETY OF PHYSIC & CHEMISTRY

ANQUE SPANISH ASSOCIATION OF CHEMISTRY

AAII ANDALUSIAN ASSOCIATION OF INDUSTRIAL ENGINEERING (Honorary Fellow)

AWARDS AND HONORS:

- 1996: “President’s Award” individual award conceded by the Chairman of Freeport McMoRan Copper & Gold for a transcendent contribution.
- 1999: “Best Environmental Industrial Practices” in the Enterprise and the Environment Prize, sponsored by Arthur Andersen & Expansion.
- 1999: “Best Environmental and I+D Industrial Practices” in the I Edition of the Andalusian Business Excellence Prize, sponsored by the Andalusian Regional Government.
- 2000: “Prince Felipe Prize” under the section of Industrial Environmental Management in the VI Prince Felipe Prizes for Business Excellence, sponsored by the Ministries of Economic and Science & Technology.
- 2001: “Best Practices in Process Management” in the II edition of the Andalusian Business Excellence Prize, year 2001, sponsored by the Andalusian Regional Government.
- 2003: “Best Environmental Practices” in the II edition of the Andalucía Economica Prizes.
- 2003: “Andalusian Prize for Business Excellence” in the IV edition of the Andalusian Business Excellence Prizes.
- 2003: “Prince Felipe Prize” under the section of Quality Management, in the VIII edition of the Prince Felipe Prizes for Business Excellence, sponsored by the ministries of Economy and Science & Technology.
- 2004: “Prize Doñana to the Sustainable Development”, IV edition, sponsored by the Doñana Foundation.

**TYPE OF EXPERIENCE: Senior
Management:**

April 2008 – Present: Aurubis AG

Full corporate responsibility for Copper smelting and refining growing projects.

Due diligences: Technical, EH&S and economic.

Searching and evaluation of business opportunities.

High-level negotiations: partnership, acquisitions

Build and develop a partnership with a leading mining company to jointly adapt an existing Cu concentrate leaching technology to the treatment of high-Arsenic bearing Copper concentrates in a sustainable way. As a result of that the partners have jointly patented a new breakthrough mine-to-metal technology that allows unlocking the development of Copper mine projects with high Arsenic content.

April 2006 – April 2008: Cumerio

Full corporate responsibility for the development and execution of strategic projects at Pirdop:

- a) Low-CAPEX debottlenecking expansion to raise the capacity to 290Kt/a, which prepared the smelter for a further expansion with no need of major shutdown;

- b) Greenfield Copper Refinery with a design capacity of 180Kt/a, but prepared for increasing the current density to achieve up to 230Kt/a of Cathodes
- c) Environmental compliance program to match the EU IPPC Directive.
- d) Slag Flotation Plant Expansion to achieve a treatment capacity of 700Ktpa and a second step to achieve 870Ktpa.

OPEX achievements:

2006: Worldwide third lower Smelting Direct Cash Costs Copper producer 9.2 c/lb (source Brook & Hunt)

2007: Worldwide second lower Smelting Direct Cash Costs Copper producer 8.6 c/lb (source Brook & Hunt)

2005 – March 2006: HB Advisers

Provide strategic advice to several international clients on non-ferrous metal Merging & Acquisition opportunities and advising them on the structuring options of the transaction execution.

Several assignments from clients were settled.

1993 – June 2004: Rio Tinto Metal & Atlantic Copper

- Full corporate responsibility for the Operation Business Units, including EHS, production, maintenance, engineering, quality and continuous improvement management, sampling, laboratory, R&D, purchasing, logistic, data processing systems, and human resources, totaling 800 employees and 1 billion US\$ sales:

- a) Copper Smelting-Refining (1,000,000 MT concentrates; 350,000 MT Anodes; 260,000 MT Cathode; 25 MT Gold; 60 MT Silver; 1,000,000 Mt Sulphuric Acid; other by-products) b)

Continuous Casting Plant (190,000 MT copper wire-rod and 40,000 MT wire)

- c) Wire drawing Plant (30,000 MT wires and cables)

- Full corporate responsibility for the investigation and development of business growing opportunities, exploring internal potentiality as well as per acquisition or merging.

- Full corporate responsibility for the Huelva Expansion Project (EPCM Turn Key Project, Capex: 200 million €)

- Company representative and spokesperson before various public administrations, associations and other institutions (local, regional, national and EU)

Main achievements:

Smelter & Refining

1992-1994: Increase of the smelting production capacity from 130 to 160 Ktpa New Copper (No Capex)

1992-1994: Increase of the Copper Cathode production capacity from 125 to 140 Ktpa. (No Capex)

1994-1996: Increase of the smelting production capacity from 160 to 270 Ktpa New Copper (1) 1994-1996:

Increase of the Copper Cathode production capacity from 140 to 215 Ktpa (2)

(1) + (2) Capex: 200 million €, or 1,818 €/t vs. 3,000 €/t New Copper Greenfield)

1997: Increase of the refining capacity from 215 to 227 Ktpa (Capex: 12 million €)
1997: Worldwide lower Smelting Direct Cash Costs Copper producer 9.4 c/lb (source Brook & Hunt)
1998-2000: Increase of the smelting production capacity from 270 to 300 Ktpa New Cu (No Capex)
1998-2000: Increase of the Copper Cathode production capacity from 227 to 260 Ktpa (No Capex)
2000-2002: Increase of the smelting production capacity from 300 to 350 Ktpa New Cu (Capex: 10m €)

Copper Products

1996-2002: Increase of the Copper Wire Rod production capacity from 125 to 190 Ktpa (No Capex)
1996-2002: Increase of the wire & cable capacity from 11 to 40 Ktpa (Capex: 2 million €)

Plant Operations:

- All levels in plant operations and engineering of smelter, refinery and precious metals.
- Commissioning of copper smelting and refining complexes, including overall operations responsibility. -
Copper plant operations: smelter, refinery, downstream copper products manufacturing facilities, laboratory and sampling.
- Sulphuric Acid and other Chemicals production.

EH&S and Sustainability:

- Full responsibility for development and execution of the Environmental Policy: mission statement, concept design of environmental compliance programs, voluntary agreements, control and permitting for operating licenses. ISO 14001 and EMAS certifications.
- All aspects of Sulphur and dust fixation from smelter gases including gas cleaning, acid production, as well as effluent and residue treatment.
- Experience based on studies, project execution and plant operation including permitting procedures for plant operating licenses.
- Development and execution of an in plant Hygienic Program including risk analyses, procedures, in plant and biological monitoring
- Full responsibility for development and execution of the Safety Company Policy, including continuous improvement process under Dupont methodology.
- Sustainability and Environmental reports

Optimization and continuous improvement programs:

- Development and execution of cost cut procedures and plant operation optimization programs. -
Development and execution of a continuous improvement plan under European Foundation for Quality Management and Six Sigma methodologies.
- Review of plant operations and operational shortcomings.
- Quality control and data processing systems and ISO 9000 certifications.
- Development and execution of energy management programs and projects aiming to reduce energy consumption and to accomplish with the UE CO2 trading directive and Kyoto targets.

Strategic Planning:

- Strategic planning for long-term corporate investment guidelines into smelting, refining and downstream copper product facilities, including: market development investigations, investment strategy for modernization, revamping, new projects and feasibility evaluations.
- Process and technology benchmarking and evaluation, strategies of modernization, feasibility studies for smelter/refinery projects and overall outage.

Merging & Acquisitions:

- Technical, EH&S and economic due-diligences, company value determination and acquisition negotiations.
- Direct high-level experience in merging and acquisitions deals.

Project Management:

- Project management of investments into copper smelting & refining and copper products complexes including engineering, procurement and construction.
- Development of technical concepts of a smelter Brownfield modernization project including feasibility studies.
- Development of R&D Projects, laboratory and pilot plant tests, process developments and patents registration.

CONSULTING EXPERIENCE:

2005 Acting as Senior Adviser for a leading corporate finance advisory firm, several mandates of international companies on the metals and mining sector.

In company experience:

Management and overview of the technical and economic consultancy process, including: process selection; technical training; plant modernization and feasibility studies for various copper producing companies.

1980-1991: Acting as project engineer and/or project manager for Rio Tinto Patino/Rio Tinto Minera
1992-2004 Full responsibility for the Technical Services Division of Rio Tinto Minera/ Atlantic Copper

Among other projects:

1980: Technical consultancy to a major Indian mining and metals producer for reducing copper inventory in the smelter.

- 1985: Technical consultancy to a major British mining and metals company related to the smelting process control systems.
- 1986: Technical consultancy and flash smelting operational training to a major Mexican copper smelter.
- 1987: Technical consultancy and flash smelting operational review to a major Brazilian copper smelter.
- 1988: Technical consultancy and flash smelting operational training to a major USA copper smelter.
- 1989: Technical consultancy and electric furnace operational training to an Australian copper smelter.
- 1990: Technical consultancy to a major Portuguese mining company related to the effects of the copper concentrate particle sizing in the flash smelting process.
- 1992: Technical consultancy to a Chilean copper producer for process and engineering overview related to a Greenfield flash smelting project.
- 1994: Technical consultancy and flash smelting operational training to a major USA copper smelter.
- 1998: Technical consultancy and flash smelting operational training to a major Bulgarian copper smelter.

- 1998: Technical and economic consultancy to a major USA copper producer for a cost review and saving opportunities exercise.
- 1999: Technical consultancy to a major Indian copper producer related to process improvement.
- 2002: Technical consultancy to a Chilean copper producer for reviewing design basis and concepts for a smelter optimization project.