

# CURRICULUM VITAE

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## **RICHARD A. DANIELE**

**Title** Metallurgical Engineer

**Expertise** Innovative Technology Development and Installation  
Environmental Assessments  
Hazardous Waste Management and Processing  
Pyrometallurgy  
Marketing  
Production Operations  
Project Management

**Academic Background** Metallurgical Engineer, Colorado School of Mines, 1960

**Experience** Mr. Daniele has 51 years of experience, which include 17 years in production operations, 23 years in engineering design and construction, and 11 years as an independent consultant. The combination of production operations and engineering design give him the unique ability not only to understand a wide variety of process operations, but also to understand how to meet environmental requirements with good engineering. His experience with innovative technology development and installation, environmental assessments, mining and metallurgy provide the broad-based experience and expertise to fully comprehend the intricacies of mineral processing and smelting facilities and their potential environmental implications. He has performed more than 40 mineral property environmental assessments and has executed projects in 22 countries worldwide. Mr. Daniele's professional experience includes the following:

### **Most Recent Experience - El Capitan Precious Metals**

- Began independent caustic fusion evaluations at the request of El Capitan Precious Metals, Inc. (ECPN) in June 2005. Work in evaluating and verifying innovative fire assaying techniques and other support ended May 2009.
- The first evaluations took place at the AuRIC Metallurgical Laboratories (AuRIC) in Salt Lake City, UT. After several weeks of work and observation, concluded that AuRIC's caustic fusion analytical procedure was a verifiable method for precious metals analyses of ECPN rock.
- Recommended further evaluation and verification with Chain of Custody samples at a second laboratory, Wendell & Company (Wendell), Centennial, CO. The Chain of Custody samples were provided by Dr. Clyde Smith, and shipped direct to Mr. Daniele who had them prepared for analyses. (These samples were used extensively over the next 18 months for analytical testwork and verification.)
- AuRIC analyzed the Chain of Custody samples first to establish the basis for precious metals content. Mr. Daniele observed and verified the Chain of Custody results in July 2005. In August 2005 the Wendell initiated the second laboratory verification work. AuRIC participated in the initial alkali fusion procedure familiarization at Wendell & Company. The Wendell work confirmed and verified the AuRIC caustic fusion results.
- Initiated evaluation of tin precious metals recovery and analyses at the ECPN property in NM in September 2005. An independent bench scale tin test was conducted. Extensive laboratory and Scanning Electron Microscope with Noran EDS analyses were performed, but results were inconsistent. Four different laboratories (AURIC, Wendell, MHS Research, Roger Smid) performed agreed upon analytical procedures before the tin analytical approach was discontinued.
- Worked to establish multiple methods of innovative approaches for analyses using techniques more familiar to the precious metals were undertaken by Michael P. Thomas, MHS Research.

### **Project and Technology Management**

- Provided technical support and project development guidelines for clients working on innovative technology developments for precious metals including gold and platinum group elements (PMs). Participated in confirmation studies and further development of the new PMs technology involving clusters, also referred to as nanomolecular particles.
- Provided Phase 1 benchmark environmental assessments on 10 sites for an International client seeking non-ferrous metal acquisitions. Activities included document reviews, site visits, evaluations of potential and observed environmental impacts from current and former operations. Facilities included mines, concentrators, smelters, and SX EW plants. Participate with client's legal staff in evaluating documents and sites. Prepared reports to include next step recommendations and preliminary scoping of remediation costs.
- Provided third party, independent evaluation of: fire assay techniques and procedures; tests on repeatability precision and accuracy; and extraction of gold from an unusual rock matrix. The oversight work was performed at the client's metallurgical laboratory specializing in gold and platinum group metals extraction.
- Provided project management and technical services as a third party evaluator to a junior mining company with a gold prospect in an unusual rock matrix. Directed the activities of the geologists performing field mapping, exploration, drilling, and prospect development evaluation; the GIS map generation; and environmental studies.
- Directed and managed the activities to evaluate a gold and platinum group metals prospect using an innovative extraction technology. Activities included flowsheet development and feasibility study for a 220 short ton per day demonstration plant, outside laboratory evaluation of the client's analytical methods, and duplicate analyses of the pilot plant feed and products.
- Participated in United States Agency for International Development (USAID) projects in Romania, and Slovakia as senior technical consultant. Evaluated operating practices and emission sources for three copper smelters, a lead smelter and a battery manufacturer. Developed technology alternatives, assisted in evaluating proposals, and provided innovative technology guidance to reduce particulate and sulfur dioxide emissions while increasing production. Plants assisted include reverberatory and flash furnace copper smelters, a primary sinter/blast furnace lead smelter, an Imperial Smelting Process (ISP) lead/zinc smelter, acid lead battery manufacturer, and a magnesite/magnesia facility.
- Organized and participated in innovative copper and lead industry technology tours of the United States for Romanian and Slovakian technical and managerial personnel.
- Directed a copper flue dust Remedial Investigation/Feasibility Study (RI/FS), provided oversight of all RI/FS phases including subcontractor work, budgets, cost control, and client contact as executed by project manager and team members.
- Served as chief metallurgical engineer, guided, directed, and participated in the selection, evaluation, and treatability testing of remedial alternatives, including development of a solidification/stabilization (S/S) mixture accepted for the Record of Decision (ROD). Provided senior-level consulting services regarding process technologies. Solved heavy metal problems including arsenic, cadmium, lead, mercury and selenium.
- Managed activities of multi-discipline personnel in preparing work plans and cost estimates for an operable unit at a Denver radium site. Provided technical guidance and participated in test plan implementation, data evaluation, and generation of further process concepts for additional treatability test plans. Planning and project execution covered four phases and encompassed physical separations, chemical separations, and S/S. S/S was the ROD choice based on the effective results. Provided

oversight of on-site, in situ vitrification (ISV) treatability test conducted under agency direction. Prepared work plans for on-site pilot scale treatability studies.

- Participated in inception work for the Russian agency Centre for Preparation and Implementation of International Projects on Technical Assistance (CPPI) for developing Sectoral Environmental Action Plans (SEAP) for the Russian non-ferrous metals industry. Directed preparation of the Inception Report and prepared the Overview of Environmental and Economic Aspects of International Non-ferrous Metals Industry. Performed environmental and technology assessment of the JCS Sredneuralsky Industrial complex covering concentrator, smelter, acid plant, fertilizer plant and all associated wastes and emissions. Problems covered heavy metals (As, Cd, Pb, Hg, Se) and fertilizer wastes.
- Performed six market studies evaluating the potential application of client's new pyrometallurgical smelting process, Flame Reactor, to primary and secondary nonferrous metals and residues, weak acid neutralization sludges, incinerator ash, wood treating chemicals and residues, electroplating sludges, lead-based paint residues, water/wastewater treatment sludges, and aluminum processing residues.
- Provided consulting services to an international engineering/construction firm on an innovative copper smelting technology for a new copper smelter in a third-world country. Provided technical direction on process planning, equipment sizing, material balance requirements, process equipment selection and sulfur dioxide scrubbing.
- Provided process consulting services for arsenic control, elimination, recovery, and marketing from mining through smelter flue dust for a large Chilean copper complex. Participated in the evaluation of 16 conceptual approaches to arsenic control. Provided technology input and direction on 15 of the concepts.
- Participation in international assignments have involved routine use of the World Bank Environmental Guidelines, Occupational Health and Safety Guidelines, Environmental Assessment Sourcebook, Volumes I & II; current working draft environmental guidelines; the Lucerne Agreement and familiarity with "responsible care." For 11 years provided technical guidance to Dames & Moore national and international offices on nonferrous metals processing, arsenic and mercury recovery, and contaminated soil and sludge fixation.
- Participated in a cobalt roasting research program at Lurgi Chemie in West Germany, nickel/cobalt leaching and extraction program at Sherrit Gordon Mines Ltd. In Canada, and visited cobalt facilities in the copper belt of Zambia for a United States Cobalt project.
- Participated in and directed an innovative coal drying technology program. Provided laboratory oversight and guidance, developed preliminary flowsheets and order-of-magnitude costs, evaluated laboratory results, and developed pilot plant program including capital and operating cost estimates.

### **Design Services**

- Directed and participated in the conceptual engineering for an innovative precious metal recovery project, (gold and platinum group metals) for a 220 short ton per day demonstration plant providing technical guidance on the pilot plant, and working with innovative metal recovery technologies.
- Performed metallurgical calculations, sized equipment, wrote specifications, evaluated quotations, guided layouts, wrote proposals, and participated in plant engineering and process design such as Afton's 30,000 TPY TBRC copper smelter, Cerro's 180,000 and 65,000 TPY electric furnace/Peirce-Smith converter copper smelter and electrolytic refinery, Essex's 40,000 TPY copper scrap smelter and refinery, and start-up of INCO's TBRC nickel smelter.

- Visited all Zambian copper belt metallurgical facilities and South African platinum smelters to develop electric furnace and converter design criteria for an innovative copper smelter design for Cerro Corporation.
- Managed the design engineering, process development, procurement, scheduling, and cost control for feasibility through an engineer, procure, construct (EPC) contract on Gould's 56,000 TPY West Coast secondary lead smelter; and feasibility through engineering on their East Coast secondary lead smelter.
- Provided process and technology functions, and project management services to Gould, Inc. for evaluating their innovative battery beneficiation process, and performed feasibility studies for electrolytic lead refining and new automotive battery recycling plants.
- Performed feasibility studies for new technologies for primary lead and lead/zinc smelting facilities. Conducted environmental audits on lead smelters. Projects included chloride leaching of lead concentrate, modernization feasibility of a Missouri lead smelter, use of the TBRC Process for lead concentrate smelting, technical assistance on the QS process, the precursor to the QSL continuous lead process, and audited a Bolivian lead/zinc smelter using the Kivcet Process.
- Developed improved plant flowsheet and assisted in the design and installation of changes to Bers Metals Company's secondary lead recycling smelter.
- Directed and participated in pilot plant testing of Afton's unique copper concentrates. Directed activities of engineer, client, and constructor in final phases, including startup, of Afton's 30,000 TPY TBRC copper smelter.

### **Environmental Assessments**

- Provided consulting services for development of a draft international working document for the handling of secondary metals. Input focused on non-ferrous recyclable metals such as aluminum, copper, lead, and zinc for a "white paper" report for the Ottawa, Canada based International Council for Metals. The input included a brief overview of the importance of recycling non-ferrous metals in the world market and a sense of the environmental issues that arise with recycling in regard to ISO 1400 and the Bazel Convention.
- Participated in a multi-national (Brazil, Jamaica, Suriname, United States) environmental assessment of world-class bauxite mining, alumina refining, and aluminum smelting facilities. Provided process technical input and guidance to the team; and evaluated process conditions, developed capital cost estimates for remediations, evaluated innovative technologies for reclamation, and prepared reports with definitive analyses of conditions.
- Participated in a multi-national (Australia, Philippine, United Kingdom, United States) environmental assessment of a world-class, integrated custom copper smelter and refinery. Evaluated status and conditions of air, water, and solid waste procedures and controls. Developed technological alternatives for processes to improve operating and environmental conditions. Wastes contained arsenic, antimony, cadmium, lead, mercury, and selenium. Estimated capital costs for improvements.
- Directed and participated in multi-national (United States, Brazil), multi-company (Dames & Moore, CVRD, OTA) environmental assessment team to conduct an environmental assessment of an underground salt mine and associated concentrator for producing fertilizer raw materials. Prepared guidelines for CVRD to establish their own internal environmental assessment procedures and teams.
- Performed more than 40 mineral property environmental assessments for US and International companies and executed projects in 22 countries worldwide. Environmental assessments have covered various minerals and metals including arsenic, barite, bicarbonate chemicals, bauxite, alumina, aluminum, coal, cobalt, copper, gold, lead, magnesia, platinum group metals, sylvite (for fertilizer), tin,

tungsten, and zinc. A number of the mineral environmental assessments required meeting International Finance Corporation (IFC), World Bank (WB), and European Bank for Reconstruction and Development (EBRD) environmental criteria as well as the US Bureau of Mines document, SP-06-95, Pollution Prevention in Mining and Mineral Processing.

- Directed and participated in three to six member teams in conducting environmental audits involving six gold mining/processing operations. Provided primary evaluations regarding environmental and operational aspects of a broad spectrum of gold processing technologies and chemicals including heap leaching, size reduction, gravity separation, carbon in pulp/carbon in leach (CIP/CIL), roasting, chemical oxidation, and cyanide destruction.
- Directed and participated in eight environmental assessments for sale and/or purchase of natural gas production facilities. These multi office, team efforts, included up to 12 personnel in the field simultaneously. Assessments included data gathering; site drilling; sample collection, analyses, and evaluations; regulatory requirement analyses; report preparation; remediation cost estimates; and a lump sum bid for PCB remediation.
- Directed and participated in a multi-office, multi-task team effort for combined Phase I/Phase II environmental assessment for a high grade copper smelting/refining, recycling complex. Project involved a clear understanding of process parameters for investigation of air emissions, soils, sediment, water, and equipment evaluations. Based on the assessment findings, directed remediation of the site.
- Directed a multi-office team in an environmental audit of an underground platinum mine, concentrator, and smelter. The audit included data gathering and evaluation of mine ground water, concentrator reagents, smelter air emissions, and surface residuals from earlier operations.
- Directed and participated in a multi-national team (Brazil, United States) environmental assessment of three sites in Brazil. The assessments covered a mine with major mine waste restoration, a chemical plant processing barite ore to produce barium chemicals, and a chemical plant producing sodium bicarbonate, sulfite, and metabisulfite products.
- Participated in multi-office, multi-task, team efforts to prepare an Environmental Impact Assessment to meet International Finance Corporation (IFC) funding requirements. Inspected project sites in Toquepala, Cuajone, and Quebrada Seca Valley, Peru to collect and review data for copper oxide leaching, solvent extraction/electrowinning (SX-EW) for copper recovery, and tailings dam impoundments. Completed a baseline environmental characterization for the project area.
- Performed an environmental due diligence investigation of a copper mining/production operation in Mexico for use in evaluating an investment. The investigation focused on the copper smelter with an overview of the entire mining complex. Environmental issues investigated were air, water, and solid waste. A report, recommendations, and Terms of Reference (scopes of work for investigations) were submitted. The key issue was to determine ways to allow the existing smelter to continue to operate through technological improvements in the smelter.
- Directed and participated in an environmental and technological assessment of a thermal process magnesium production facility in Italy. Evaluated the process equipment condition for potential purchase with European Bank for Reconstruction & Development (EBRD) funding.
- Participated in a multi-national (Bolivia, Canada, United States) environmental assessment of 20 major Bolivian mining/processing/manufacturing facilities. The sites belong to COMIBOL and were assessed as part of COMIBOL's privatization plans. Sites included silver/tin/complex metal and tungsten mines, beneficiation plants for the ores, hydrometallurgical silver plant, and equipment manufacturing facilities.
- Participated in and directed a multi-office (US, Santiago, Chile) environmental audit for the La Camorra Gold Project, El Callao, Venezuela. The audit included review of the background environmental report, site investigation, evaluation of preliminary engineering for environmental aspects, translation (Spanish

to English), evaluation of new Venezuelan environmental regulations, and review of documents for financing. Provided environmental support during engineering to assist with meeting the financial institution requirements.

- Participated in and directed a maintenance planning adequacy assessment to independently evaluate maintenance plans and investments for a financial institution. Project involved technology and procedures evaluation for a complex solar evaporation/chemical processing complex.

### **Production Operations**

- Served as General Manager and Vice President Project Development, organizing and directing the \$120 million cobalt/nickel Madison Project including geology, mine engineering and metallurgical engineering, including international testwork. Met with numerous federal government agencies in regard to the Defense Production Act, and with state and federal agencies on environmental permitting.
- Developed criteria and schedule for geology, mining, and metallurgy to include tighter expenditure controls, more detailed and longer range planning. Negotiated and controlled major contracts including environmental background audit, mine development, and metallurgical development.
- Established an operating policy manual, wage structure, benefit, and medical plans. Developed and executed a fair and equitable closure plan for the Madison Project and closed it in an orderly fashion.
- Restructured a company producing arsenic acid, chromated copper arsenate (CCA), and mercury to operate in a more competitive manner. Improved personnel efficiency and leadership. Reduced costs more than 50 percent. Increased sales and production of arsenic acid fourfold. Expanded product base fourfold including new products. Increased customers from one to eight.
- Directed research and development on the extraction and processing of existing and new arsenic-containing dusts and residues. Implemented technology improvements.
- Planned, directed, and participated in regulatory matters encompassing EPA CERCLA - Superfund site evaluation; FIFRA - pesticide registration application; RCRA - interim Part B application; DOT hazardous material and hazardous waste transport; and Wyoming DEQ covering permit applications, public hearings, and negotiations.
- Served as General Foreman, receiving, storing, and smelting 400,000 TPY of materials and shipped 100,000 TPY copper. Directed activities of 10 salaried and 90 hourly employees.
- Initiated successful local public relations efforts, including environmental acceptance.

### **Waste Management**

- Prepared the Data Evaluation Report for the smelter complex RI at an Idaho lead/zinc Superfund site, which required the evaluation and selection of data from 20 areas of the smelter complex including lead sintering and zinc roasting, leaching and electrowinning processing facilities. Data evaluation encompassed solid materials, soils, surface water, and ground water. Determinations included sources and transport; relationship of data to background, ore, and concentrate; and potential regulatory classifications.
- Participated in and directed preparation of the work plan and project screening report for feasibility of recycling a 30 million ton cinder bank at a zinc Superfund site. Screening covered five technology types and more than 100 process options for the technologies. Determined five effective processes for conceptual studies.

- Participated in preparing work plans for soil treatability studies to clean plutonium- containing soils to regulatory levels. Prepared sampling plan for collection and splitting of soils for multiple treatability studies at three different government installations.

#### **Litigation Support**

- Provided analyses and expert guidance on various analytical procedures and extraction methods for difficult to determine precious metals.
- Provided analysis and expert opinion on proper design engineering, procurement, and construction sequencing involving precious metals recovery.
- Provided mineral processing consulting services in support of a Primary Responsible Party (PRP) group legal action.
- Provided deposition as an expert knowledgeable in the activities of environmental remediation as part of a cobalt underground mine and surface facilities project. The project encompassed a thorough analysis of the site's historical beneficiation processes including chemical and solid waste disposal practices.
- Provided court testimony as an expert on pyrometallurgical process equipment operation during an insurance lawsuit trial.
- Provided environmental court testimony as an expert on pyrometallurgical processing and pollution control systems for the facilities during a permit challenge.
- Provided data analyses and deposition as an expert. Knowledgeable in the beneficiation of complex ores (Cu-Pb-Zn) including the use and transport of many reagents.

#### **Professional History**

Metallurgical Engineer, Daniele Metal-Mineral Services, Lakewood, CO 2000-Present  
Chief Metallurgical Engineer, Dames & Moore, Denver, CO, 1989-2000  
Senior Vice President, W.R. Metals Industries, Inc., Wheat Ridge, CO, 1984-1989  
Vice President, Project Development, Anschutz Mining Corporation, Denver, CO, 1981-1984  
Technical Manager, Project Manager, Project Engineer, Process Engineer, Dravo Corporation, Pittsburgh, PA, Denver, CO, 1969-1980  
General Foreman, Production Activities - Kennecott Copper Corporation, Hurley, NM; McGill, NV, 1960-1969

#### **Professional Affiliations**

AIME, Committee Chairman  
ASM International, Co-founder, First Extractive Metallurgy Chapter of Denver (EMCD)  
EMCD, Chairman  
CSMAA, President, CSMF, Board Member and Chairman, Budget & Personnel Committee

#### **Citizenship**

United States

#### **Countries Worked In**

United States, Algeria, Belgium, Bolivia, Brazil, Canada, Chile, England, Germany, Italy, Jamaica, Mexico, Peru, Philippines, Romania, Russia, Slovakia, South Africa, Suriname, Sweden, Venezuela, Zambia.

#### **Publications**

TBRC, A New Smelting Technique, 1972 Annual AIME Meeting, February 20-24, 1972.

Full Scale TBRC Smelting Tests of Copper Concentrate, 1974 Annual AIME Meeting, February 24-28, 1974.

Selection of  $SO_2$  Control Systems for Non Steady-State Operating Conditions, Proceedings Sulfur Dioxide Control in Pyrometallurgy, The Metallurgical Society of AIME, 1981.

New Challenges for US Engineering and Construction - Dravo's Afton Smelter A Case Study, Mining Engineering Article.

Top Blown Rotary Converter (TBRC) Process for Non-Ferrous Smelting, Q-S Oxygen Process, Oxygen Sprinkle Process, British Columbia Copper Smelting & Refining Technologies Seminar, November 1980.

TBRC, QS and Oxygen Sprinkle Smelting Processes, DOE-An Assessment of Energy Requirements in Proven and New Copper Processes, December 1980.

From Arsenical Dusts and Residues to Commercial Products, EPA Arsenic & Mercury Workshop, August 17-20, 1992.