

THE UNIVERSITY OF BRITISH COLUMBIA
Curriculum Vitae for Faculty Members

Date: May 21, 2014

1. **SURNAME:** MEECH **FIRST NAME:** JOHN
MIDDLE NAME(S): ATHOL
2. **DEPARTMENT/SCHOOL:** Norman B. Keevil Institute of Mining Engineering
3. **FACULTY:** Applied Science
4. **RANK:** Professor & Director, CERM3 (Centre for Environmental Research in Minerals, Metals and Materials)

5. POST-SECONDARY EDUCATION

University or Institution	Degree	Subject Area	Dates
McGill University	B. Eng.	Metallurgical	1970
Queen's University	M.Sc.(Eng.)	Mining Engineering	1975
Queen's University	Ph.D.	Mineral Processing	1979

Special Professional Qualifications

Registered Professional Engineer - Professional Engineers and Geoscientists of British Columbia

6. EMPLOYMENT RECORD

(a) *Prior to UBC*

University, Company or Organization	Rank or Title	Dates
Queen's University, Department of Mining Engineering, Goodwin Hall, Kingston, Ontario	Associate Professor	1982-1989
	Assistant Professor	1979-1982
	Adjunct Professor	1976-1979
Roan Consolidated Mines Ltd., Concentrator, Luanshya, Zambia	Senior Assistant Metallurgical Engineer	1971-1973
	Assistant Metallurgical Engineer	1970-1971
Roan Consolidated Mines Ltd., Concentrator/Smelter/Refinery, Mufulira, Zambia	Metallurgist	1969
Quebec Iron and Titanium Corporation, Research Department, Sorel, Quebec	Metallurgist	1968
Bell-Canada Limited, Expo-67, Montreal, Quebec	Pavilion Host	1967
Canadian Petrofina Limited, Point-aux-Trembles, Quebec	Laboratory Sampler	1966

(b) *At UBC*

Rank or Title	Dates
Director of CERM3	July 26, 2000
Professor	July 1, 1998
Associate Professor	1989 to 1998
Tenure	1989

7. **LEAVES OF ABSENCE:** July 1, 1996 - June 30, 1997 (Brazil, Chile, Toronto, Australia)

During my Sabbatical leave of absence, I accomplished the following:

- presented an Industrial AI Workshop at the University of Chile, Santiago, Chile (May 96)
- presented a Key Note Address at CCECE, Calgary, Alberta (June 96)
- conducted AI research at Comdale Technologies, Toronto, Ontario (July 96 - Sept. 96)
- presented a Workshop on Mineral Processing at Comdale Technologies, Toronto, Ontario (Sept. 96)
- presented a paper at SAG'96 Conference, Vancouver, BC (Oct. 96)
- presented a Key Note Address at Convergencia'96, Antofagasta, Chile (Oct. 96)
- presented an invited talk on Hg Pollution, University of Toronto, Ontario (Jan. 97)
- presented 3-week Expert Systems Workshop, CETEM R&D Centre, Rio de Janeiro, Brazil (May 97)
- prepared the Technical Program for IPMM'97, Gold Coast, Australia (Jan. - Jun. 97)
- attended IPMM'97 as Program Chairman and delivered three papers (July 97)

8. **TEACHING**

(a) Current teaching assignments includes:

MINE 292 Introduction to Processing MINE 432 Robotics and Industrial Automation
 MINE 578 Industrial Expert Systems MINE 496 Advanced Computer Applications in Mining
 MINE 497H Directed Studies in Autonomous Ground Vehicles

I have also taught Flotation, Unit Operations, Plant Design, Capital Cost Estimation, Precious Metals Processing, Chemistry for Mining Engineers and Engineering Report. In 1991, I assisted Dean Axel Meisen in developing a new course for First Year Engineering students APSC121 - Society and the Engineer, which introduced many social issues such as Professional Engineering Behaviour and Ethics, Sexual Harassment, Employment Equity, First-Nations issues and Safety in the Work Place. I taught this course until 1994. My Industrial Expert Systems course is popular with students from other departments. Many students have developed Expert Systems for use as teaching material in other courses (MINE292, 295, 432). In 2004-2005, I introduced a Directed Studies course in Autonomous Ground Vehicles to develop a robotic vehicle to enter the 2005 DARPA Grand Challenge in California. In 2010, I advised a group of graduate students who formed the UBC Geothermal Working Group to develop a program of study in Geothermal Energy Systems.

(b) *Courses Taught at UBC*

Session	Number	Course Title	hours/week	Class Size
2013-2014	MINE292	Introduction to Mineral Processing	5	57
	MINE 497H	Autonomous Ground Vehicles	3	1
	MINE 432	Robotics and Industrial Automation	5	60
2012-2013	APSC 150	Engineering Case Studies (T1 & T2)	6x3 & 9x2 weeks	620
	MINE 292	Introduction to Mineral Processing	5	58
	MINE 497Z	Geothermal Energy Systems	3	2
	MINE 432	Robotics and Industrial Automation	5	42
2011-2012	MINE292	Introduction to Mineral Processing	5	46
	APSC150	Engineering Case Studies (T1 & T2)	6x3 & 9x2 weeks	460
	MINE432	Robotics and Industrial Automation	5	32
2010-2011	MINE292	Introduction to Mineral Processing	5	46
	APSC150	Engineering Case Studies (T2)	6 for 3 weeks	420
	MINE497Z/590X	Introduction to Geothermal Energy Systems	3	35
2009-2010	MINE292	Introduction to Mineral Processing	5	46
	MINE432	Robotics and Industrial Automation	5	42
	MINE497H	Autonomous Ground Vehicles	6	3
2008-2009	MINE292	Introduction to Mineral Processing	5	45
	MINE432	Robotics and Industrial Automation	5	37
	MINE497H	Autonomous Ground Vehicles	6	2
2007-2008	MINE290	Introduction to Mining and Processing	5	45
	MINE432	Robotics and Industrial Automation	5	30
	MINE578	Industrial Expert Systems	3	1

Session	Number	Course Title	hours/week	Class Size
2006-2007	MINE290	Introduction to Mining and Processing	5	36
	MINE432	Robotics and Industrial Automation	5	26
	MINE496/578	Industrial Expert Systems	3	5
	MINE497H	Autonomous Ground Vehicles	6	3
2005-2006	MINE290	Introduction to Mining and Processing	5	28
	MINE432	Robotics and Industrial Automation	5	20
	MINE496/578	Industrial Expert Systems	3	11
	MINE497H	Autonomous Ground Vehicles	6	15
2004-2005	MINE290	Introduction to Mining and Processing	5	35
	MINE432	Robotics and Industrial Automation	5	14
	MINE497H	Autonomous Ground Vehicles	6	20
2003-2004	MINE290	Introduction to Mining and Processing	5	22
	MINE432	Robotics and Industrial Automation	5	17
	MINE496/578	Industrial Expert Systems	3	8
2002-2003	MINE290	Introduction to Mining and Processing	5	24
	MINE432	Industrial Automation	5	4
2001-2002	MMPE290	Introduction to Mining and Processing	5	20
	MMPE432	Industrial Automation	5	8
2000-2001	MMPE290	Introduction to Mining and Processing	5	8
	MMPE432	Mineral Process Control	5	8
	MMPE496/578	Industrial Expert Systems	4/4	6/4
1999-2000	MMPE290	Introduction to Mining and Processing	5	24
	MMPE432	Mineral Process Control	5	8
	MMPE496/578	Industrial Expert Systems	4/4	3/3
1998-99	MMPE290	Introduction to Mining and Processing	5	28
	MMPE431	Mine/Mill Feasibility Study	4	2
	MMPE432	Mineral Process Control	5	2
	MMPE494	Engineering Report	3	14
	MMPE496/578	Industrial Expert Systems	4	18/4
1997-98	MMPE290	Introduction to Mining and Processing	5	31
	MMPE431	Mine/Mill Feasibility Study	4	2
	MMPE432	Mineral Process Control	5	14
	MMPE496/578	Industrial Expert Systems	4/4	18/10
1996-97	on Sabbatical leave of absence			
1995-96	MMPE290	Introduction to Mining and Processing	4	18
	MMPE295	Computer Applications in MMPE	4	18
	MMPE333	Flotation	5	18
	MMPE432	Mineral Process Control	5	8
	MMPE499/578	Industrial Expert Systems	4	4/8
1994-95	MMPE290	Introduction to Mining and Processing	4	16
	MMPE295	Computer Applications in MMPE	4	18
	MMPE432	Mineral Process Control	5	1
	MMPE499/578	Industrial Expert Systems	4/4	1/10
1993-94	APSC121	Society and the Engineer	1	594
	MMPE295	Computer Applications in MMPE	4	13
	MMPE432	Mineral Process Control	5	8
	MMPE499/578	Industrial Expert Systems	4/4	1/10
	MMPE590L	Real-Time Intelligent Control	3	1
1992-93	APSC121	Society and the Engineer	1	604
	MMPE290	Introduction to Mining and Processing	4	16
	MMPE395	Computer Applications in MMPE	4	21
	MMPE432	Mineral Process Control	5	7
	MMPE499/578	Industrial Expert Systems	4/4	4/12
	MMPE590L	Real-Time Intelligent Control	3	1

Session	Number	Course Title	hours/week	Class Size
1991-92	APSC121	Society and the Engineer	1	544
	MMPE395	Computer Applications in MMPE	4	14
	MMPE432	Mineral Process Control	5	7
	MMPE499/578	Industrial Expert Systems	4/4	4/10
1990-91	APSC121	Society and the Engineer	1	564
	MMPE432	Mineral Process Control	5	9
	MMPE331	Unit Operations I	6	18
	MMPE434	Precious Metals Processing	3	14
	MMPE590M	Industrial Expert Systems	3	8
1990-91	MMPE432	Mineral Process Control	5	5
	MMPE390	Summer Report Writing	1	12
	MMPE360	Capital Cost Estimation	3	12
	MMPE590M	Industrial Expert Systems	3	8
1989-90	MMPE432	Mineral Process Control	5	5
	MMPE434	Precious Metals Processing	3	14

(c) Graduate Students Supervised

Student	Program	Dates	Topic	Co-supervisor
Peipei Shi	M.A.Sc.	2013-	Hyperaccumulation of PGMs	
Stephen Mak	M.A.Sc.	2012-	Modeling Geothermal Resources	E. Eberhardt
Ehsan Esfahanian	M.A.Sc.	2012-	European Truck Facilities and Automation	
Sixto Aguero	M.A.Sc.	2012-	Comminution Energy Efficiency	
Juliana Parreira	Ph.D.	2008-2013	Autonomous Haulage Trucks	
Bahador Mousavi	M.A.Sc.	2009-2012	High Impact Velocity Comminution	
Jessica Wang	M.A.Sc.	2009-2012	Copper Recovery from Tailings Dams	
Sarah Kimball	M.A.Sc.	2008-2010	Geothermal Energy in BC	
Nastaran Arianpoo	M.A.Sc.	2007-2009	Geothermal Energy in Fort Nelson	
Babak Khalili	M.A.Sc.	2007-2008	On-line Measurement of Crusher Gap	R. Hall
Ladan Mohammadi	Ph.D.	2006-2009	Confined Space Accidents: risk assessment	
Sepehr Sedrai	Ph.D.	2003-2007	Energy Efficiency in Comminution	D. Tromans
Brennan Lang	Ph.D.	2000-2005	Design of the Millennium Plug	R. Pakalnis
Ryan Ulansky	M.A.Sc.	2001-2003	Electromagnetic Hoisting	
Karen Wolff	M.A.Sc.	1998-2001	Agglomeration of Tailing Material	
Judita Raskaukas	M.A.Sc.	1997-2001	Expert System for ARD Remediation	
Vanessa Torres	Ph.D.	1998-99	Expert System for Gold Plant Design	A. Chaves (USP)
Ning Dai	M.A.Sc.	1997-99	Acid Rock Drainage at Eskay Creek	
Saiedeh Forouzi	M.Eng.	1997-99	Neural Network Model at Brunswick	
Clifford Mui	M.A.Sc.	1993-98	Delay Scheduling for Reheat Furnaces	P. Barr
Randy Gurton	Ph.D.	1993-97	Mechanical Signals from Concasting	I.V.Samarasekera
Kenneth Scholey	Ph.D.	1991-96	3-D Model of Billet Reheat Furnace	P. Barr
Colleen Legzdins	M.A.Sc.	1993-96	Expert System for MMC Design	I.V. Samarasekera
Sunil Kumar	Ph.D.	1992-96	The 'Intelligent' Mould for Concasting	J.K. Brimacombe
Philippe Poirier	M.A.Sc.	1992-95	On-line Advising System at HVC	
Edgardo Cifuentes	Ph.D.	1994-95*	Modeling Tonnage Restrictions at HVC	A.L. Mular
Vladimir Rakocevic	M.A.Sc.	1993-95	Real-time Monitoring of Concasting	I.V.S., J.K.B.
Marcello Veiga	Ph.D.	1993-94 ⁺	Reducing Hg Pollution in the Amazon	
Paul Benford	M.A.Sc.	1991-93	Off-line Advising System at HVC	
Sunil Kumar	M.A.Sc.	1989-91	Diagnosing Quality Issues in Concasting	I.V.S., J.K.B.
Lester Jordon	M.A.Sc.	1988-90	Adaptive Fuzzy Control of Crushers	

* took over supervision of this student in Jan. 1994 from A.L. Mular

⁺ student transferred from a Ph.D. program begun in 1990 at the University of Sao Paulo, Brazil

At Queen's University

Student	Program	Dates	Topic	Co-supervisor
ShangYu Wang	M.Sc.(Eng.)	1988-90	Expert System for Mineral Processing	W.T. Yen
Wesley Ulan	M.Sc.(Eng.)	1987-89	Gold Ore Cyanidation Studies	W.T. Yen
Donald Hyma	M.Sc.(Eng.)	1985-87	Sands/Slimes Processing at QCM	
Gregory Baiden	M.Sc.(Eng.)	1984-86	Simulating the Mine/Mill Interface	
Chris Chapman	M.Sc.(Eng.)	1983-85	Agglomeration using Iron Carbonyl	
C. Anthony Harris	M.Sc.(Eng.)	1983-85	Secondary Crusher Fuzzy Logic Control	
Miriam Diamond	M.Sc.(Eng.)	1982-84	Environmental Studies of Kognak River	
Stuart Manktelow	M.Sc.(Eng.)	1982-84	Copper Adsorption on Activated Carbon	J.G. Paterson
Alistair Holden	M.Sc.(Eng.)	1983-84	Regenerating Loaded Activated Carbon	
Irene Cristoveanu	M.Sc.(Eng.)	1982-84	Carrier Flotation of Iron Ores	
Robert J. Tucker	M.Sc.(Eng.)	1980-82	Simulation of Secondary Crushing	
Joachim Bayah	M.Sc.(Eng.)	1979-81	Deoxygenation of Air by Backfill Material	

Member of Supervisory Committee or Comprehensive Examination Committee

Student	Program	Dates	Supervisor
Givemore Sakuhuni	Ph.D. (Mining)	2011	B. Klein
Persio Rosario	Ph.D. (Mining)	2010	R. Hall
Shefa Seigel	Ph.D. (Mining)	2007	M. Veiga
Alaa Abdalla	Ph.D. (Civil)	2004	Z. Shawwash
Wook Kang	Ph.D. (Civil)	2004	T. Sahid
Nicolas Lauzon	Ph.D. (Civil)	2001-02	B. Lence
Reza Ghodsi	Ph.D. (Mech)	2001	F. Sassani
Arezou Pouria	Ph.D. (Civil)	2001	T. Froese
Sanjaya de Zoysa	Ph.D. (Civil)	2001	S.O.D. Russell
A. Udaipurwala	Ph.D. (Civil)	2000	A.D. Russell
Ziad Shawwash	Ph.D. (Civil)	2000	S.O.D. Russell
Khaled El Ghindy	Ph.D. (Civil)	1999	A.D. Russell
Masood Khoshshaban	Ph.D. (Mech)	1997	F. Sassani
Yihong Zhou	Ph.D. (Mining)	1997	J. Laskowski
Andrew Burkhart	Ph.D. (Mining)	1994	A.L. Mular

University Examiner

Student	Program	Date	Supervisor
Persio Rosario	Ph.D.	2010	R. Hall
Ana-Carolina da Silva	Ph.D.	2008	M. Veiga
Mark Ma	Ph.D.	2007	M. Pawlik
Joe Hunter	M.A.Sc. (Mining)	2006	R. Hall
Donald Tolfree	M.A.Sc. (Mining)	2004	R. Hall
E. Bozorgebrahimi	Ph.D. (Mining)	2004	R. Hall
Persio Rosario	M.A.Sc. (Mining)	2003	R. Hall
Jian Yue	M.A.Sc (MMPE)	2003	B. Klein
Junqiang Fan	Ph.D.(ELCE)	2003	G. Dumont
Bernhard Klein	Ph.D. (MMPE)	1991	J. Laskowski

- (d) Continuing Education Activities
 - Industrial Short Courses Presented

Apr. 2002	Research Opportunities in Mining & the Environment	CIM/AGM, Vancouver (with CANMET)
Feb. 2002	Mining Stock Scams: How to identify, police, & eliminate them!	Vancouver, B.C. (MABC and CIM)
May 2000	Expert Systems in the Mining Industry	ISA-Minnesota, Eveleth, Minnesota
Aug. 1999	Fuzzy Expert Systems for Mining	University of Sao Paulo, Brazil
Jun. 1999	Fuzzy Expert Systems for Mining	University of Jujuy, Jujuy, Argentina
May 1998	Computational Intelligence for realtime systems	University of Chile, Santiago, Chile
May 1997	Building Fuzzy Expert Systems	CETEM, Rio de Janeiro, Brazil
May 1996	Knowledge Engineering for Expert Systems	University of Chile, Santiago, Chile
Aug. 1995	Knowledge Engineering for Expert Systems	ATAN, Belo Horizonte, Brazil
May 1995	Fuzzy Expert Systems	INCO Limited, Sudbury, Ontario
Dec. 1994	Fuzzy Expert Systems	Materials Eng., Univ. Sao Carlos, Brazil
May 1993	Fuzzy Expert Systems	IEEE Computer Society, Vancouver, BC.
Jul. 1992	Real Time Control	Comdale Technologies, Toronto
Aug. 1991	Industrial Expert Systems	Helsinki Institute of Technology
May 1991	Industrial Expert Systems	CIM AGM/U.B.C.
Aug. 1989	Expert Systems for Metallurgists	CIM MetSoc Conf., Halifax
Apr. 1989	Expert Systems for the Mineral Industry	Queen's University
Mar. 1988	Expert Systems for the Mineral Industry	Queen's University
Dec. 1988	Expert Systems for Industry	Laurentian University
Nov. 1988	Expert Systems for the Mineral Industry	Queen's University

(e) *Visiting Lecturer (indicate university/organization and dates):*

- Oct. 2007 - BHP-Billiton Nickel West Division, Perth, Australia
 Aug. 2002 - CSIRO Research Laboratories, Sydney, Australia
 Aug. 2000 - Institute for Materials Research, Kawazoe Lab, Tohoku University, Sendai, Japan
 Aug. 1999 - Mining Engineering Department, University of Sao Paulo, Sao Paulo, Brazil
 Aug. 1999 - CVRD Research Centre, Belo Horizonte, Brazil
 June 1999 - Mining Engineering Department, University of Jujuy, Jujuy, Argentina
 May 1998 - Department of Mining Engineering, University of Chile, Santiago, Chile
 May 1997 - CETEM Mineral Research Centre, Rio de Janeiro, Brazil
 Jan. 1997 - Mining Eng. Program, University of Toronto, Toronto, Canada
 May 1996 - Department of Electrical Engineering, University of Chile, Santiago, Chile
 July 1995 - CETEM Mineral Research Centre, Rio de Janeiro, Brazil

9. SCHOLARLY AND PROFESSIONAL ACTIVITIES

(b) *Research or equivalent grants (indicate under COMP if grants were obtained competitively (C) or non-competitively (NC)) (Except where indicated, I am the principal investigator on these projects.)*

YEAR	CONTRACTING AGENCY	COMP	TITLE	AMOUNT (\$)
2012	G8 Funding Agencies (NSERC)	C (3yr)	PhytoCAT – Growing PGM Metals ***	350,000
2011	BHP-Billiton	NC	Simulation of Automated Haulage Trucks	60,000
	TLEF/Encompass/Rockwell	C(A)	Process Control Simulation Laboratory	320,000
	UBC TLEF	C(A)	Electric Car Project	95,000
	UBC TLEF	C(A)	Pacific Centre for Geothermal Education	95,000
	UBC TLEF	C(A)	Thunderbots RoboCup Soccer	90,000
	UBC TLEF	C(A)	Thunderbird Robotics	65,000
	APSC PAF Fund	C	Thunderbird Robotics	35,000
2010	I.C.E. Fund	C	Fairfield Propagators Geothermal Heating	1,260,000
	WorkSafeBC	C	Confined Space Accidents – mine sites	29,000
	BHP-Billiton	NC	Simulation of Automated Haulage Trucks	60,000
	UBC TLEF	C	Thunderbird Robotics	118,000
	APSC PAF Fund	C	Thunderbird Robotics	28,000

2009	MITACS / Century Holdings	C	Geothermal Energy – District Heating	30,000
	BHP-Billiton	NC	Simulation of Automated Haulage Trucks	65,000
	UBC TLEF	C	Thunderbird Robotics	94,000
	APSC PAF Fund	C	Thunderbird Robotics	24,000
2008	MITACS / CanGEA	C	Geothermal Energy & Spent Oil/Gas Wells	30,000
	BHP-Billiton	NC	Simulation of Automated Haulage Trucks	75,000
	APSC PAF Fund	C	Thunderbird Robotics	30,000
2007	Assorted Sponsors	NC	The DARPA Urban Challenge	60,000
	Canadian Gov't. NCE Program	C	Centre of Excellence in Geothermal Energy	20,000,000
	APSC PAF Fund	C	Thunderbird Robotics	24,000
2006	Canada Foundation for Innovation++	C No Award	Canadian Centre for Research in Sustainable Mining	10,999,997
	APSC PAF Fund	C	Thunderbird Robotics	22,000
	NSERC Discovery	C	Reducing Energy Consumption in Grinding	17,000
2005	Walter Gage Fund, APSC PAF, Richmond Chrysler, Domino's, MREF, SmartWorX, CAT Signs, SICK, PNI, Tri-M Systems, Leeson-Canada, NovAtel	NC	DARPA Grand Challenge	52,430
	NSERC Discovery	C	Reducing Energy Consumption in Grinding	17,000
2004	Canada Foundation for Innovation ++	C No Award	Innovations to Meet the Challenges of Mining in the 21 st Century – the Canadian Environmental Mining Research Centre	10,623,996
	NSERC Discovery	C	Reducing Energy Consumption in Grinding	17,000
2003	UBC, BC Museum of Mining, SLRD, MacDonald Dev. Corp.	NC	Sustainable Development Design Plan for Britannia Beach	60,000
	NSERC Discovery	C	Reducing Energy Consumption in Grinding	17,000
	UBC, Western Economic Diversification	NC	Sustainable Development Design Plan for a Research Centre at Britannia Beach	20,000
2002	NRCAN-CANMET	NC	Research in Mining & the Environment	25,000
2001	US Air Force Research Labs	NC	Intelligent Agents for Web Sites	15,000
	Canada Foundation for Innovation**	C	Centre for Environmental Research in Minerals, Metals and Materials	3,268,000
2000	US Air Force Research Labs	NC	Intelligent Agents for Web Sites	15,000
1999	Eskay Creek Mining	NC	Agglomeration of Mill Tailing	10,000
	Eskay Creek Mining	NC	Acid-Rock-Drainage Characterization	15,000
1998	NSERC Research	C	Fuzzy-Neural Expert Systems	19,100
	Eskay Creek Mining	NC	Agglomeration of Mill Tailing Acid-Rock-Drainage Characterization	40,000 45,000
1997	NSERC Research	C	Fuzzy-Neural Expert Systems	19,100
1996	NSERC Research	C	Fuzzy-Neural Expert Systems	19,100
	NSERC(CRD)*	NC	Intelligent Casting/Reheat Furnace	182,250
	Metals Research	NC	Colloidal Gold Recovery at Lillooet Delta	133,539
1995	NSERC Research	C	Fuzzy-Neural Expert Systems	19,100
	NSERC(CRD)*	NC	Intelligent Casting/Reheat Furnace	182,250
	Canada Manpower/CANMET	C	Development of A.I. Software	7,700
	Teck Corporation	NC	Copper recovery improvements at Afton	10,000
	UBC Teaching/Learning ⁺	C	TxDent: Expert System to Train Dentists	29,998

1994	NSERC Operating	C	Integration of Expert Systems & ANN	17,900
	NSERC(CRD)*	NC	Intelligent Casting/Reheat Furnace	170,250
	UBC Teaching/Learning	C	Undergraduate Computerized Teaching	26,998
	CANMET	NC	Update of HyperManual on ES	5,000
1993	NSERC(CRD)*	NC	Intelligent Casting/Reheat Furnace	183,250
	NSERC Operating	C	Expert Systems for the Mineral Industry	26,900
	Highland Valley Copper	NC	Real-Time Advising Expert System	10,000
	CANMET	NC	Update of HyperManual on ES	5,000
1992	NSERC (CRD) *	NC	Intelligent Casting/Reheat Furnace	176,850
	NSERC Operating	C	Expert Systems for the Mineral Industry	26,900
	Highland Valley Copper	NC	Real-Time Flotation Control	12,000
1991	NSERC Operating	C	Expert Systems for the Mineral Industry	26,900
	DEMR/CANMET	NC	HyperManual on Expert Systems	24,000
	Highland Valley Copper	NC	Real-Time Flotation Control	9,000
1990	NSERC Operating	C	Interparticular Phenomena	24,000
	UBC/NSERC Equipment	C	Sun SPARCStation Computer	11,000
1989	NSERC Operating	C	Interparticular Phenomena	24,000
	International Coast Minerals	NC	Retreatment of Copper Tailing	10,500
1988	NSERC Operating	C	Interparticular Phenomena	24,000
	Comdale Technologies	NC	Evaluation of COMDALE/X	8,000
	Quebec-Cartier	NC	Sand-Slime Separation Circuit	4,500
	Canada Manpower	C	Development of AI Software	5,400
1987	Quebec-Cartier	NC	Derrick Screening Testwork	4,000
	Canada Manpower	C	Development of A.I. Software	5,400
	NSERC Operating	C	Interparticular Phenomena	20,000
79 - 86	Grants & Contracts			394,500
Total for 1979-2012 =				\$15,926,811

*** Awarded a total of \$1.4 million to UBC, University of York (UK), and Yale University (USA)

++ Applied for by J.A. Meech together with 36 other Research Scientists at UBC (funding to derive from CFI, BCKDF, BCMEMPR, UBC, and numerous mining companies)

** Awarded to J.A. Meech/ M. Scoble together with 33 other Research Scientists at the University of British Columbia from 10 different departments – funding received from CFI, BCKDF, & Stewart Blusson UBC Endowment Fund..

* Awarded to I.V. Samarasekera with J.A. Meech, P. Barr and J.K. Brimacombe as co-investigators under the NSERC Research Partnership Program.. Five Industrial Partners are involved in this work: Alta-Steel, Edmonton, Alta., Manitoba Rolling Mills, Selkirk, Man., Hatch Associates, Mississauga, Ont., Accumold, Huron Park, Ont., and Comdale Technologies Inc., Toronto, Ont.

+ Awarded to Dr. Michael MacEntee, Faculty of Dentistry in collaboration with J.A. Meech

(c) *Invited Presentations*

Sep 2013 Keynote Speaker, Mine Optimization Conference, Toronto, ON
 Aug 2013 Keynote Speaker, IFAC-Automation, San Diego, CA
 Nov 2012 Presentation to Ecuador Ministry of Mines, Quito, Ecuador
 Aug 2012 Keynote Speaker – IPMM2012, Foz do Iguacu, Brazil
 Oct 2010 Invited Talk on Thunderbird Robotics, IEEE-Vancouver Branch, BCIT, Burnaby
 Sep 2010 Invited Talk on Thunderbird Robotics, Helsinki University of Technology, Helsinki, Finland
 May 2008 Invited Talk on UBC Robotics Research, BHP-Billiton, Ni-West, Perth, Australia
 Jun 2006 Keynote Speaker MPMSC (Mineral Processing Modeling, Simulation & Control) Sudbury, ON
 Apr 2006 Invited presentation on Mining Engineering Education – SME AGM, St. Louis, Mo.
 Mar 2006 Invited presentation on Robotics – University of Salerno, Fiscano, Italy
 Nov 2005 Invited Speaker, BISC-05, Special Sym. on 40 Years of Fuzzy Logic, Berkeley, CA.
 Dec 2003 Invited Speaker, 3rd FLINT Workshop – Fuzzy Logic in Biometric Applications, Berkeley, CA.

- Jun 2002 Presented talk on Britannia Mine to the Delta Rotary Club, Delta, B.C.
- Jun 2002 Invited Speaker on Britannia Mine to CSC Annual Conference at UBC, Vancouver, B.C.
- May 2002 Presented talk on Britannia Mine to the Richmond Sunrise Rotary Club, Richmond, B.C.
- Dec 2001 Invited Speaker, 7th ARD Workshop, BC Ministry of Energy and Mines, Vancouver, BC
- Nov 2001 Invited Speaker, Assoc. of Professional Engineers and Geoscientists of BC, Vancouver, B.C.
- Aug 2001 Invited Speaker, 1st FLINT Workshop – Fuzzy Logic on the Internet, Berkeley, California.
- May 2001 Invited Speaker, Integrating the Mine and Mill - Lessons from Manufacturing Southern Hemispheric Conf. on Mineral Technology - Rio de Janeiro, May 27-June 1, 2001.
- May 2001 Presented Keynote Paper, CIM/AGM, Quebec City, Quebec
- Apr 2001 CIM Distinguished Lecturer presentation to the Ottawa CIM Branch, Ottawa, Ontario.
- Mar 2001 CIM Distinguished Lecturer presentation to the Vancouver CIM Branch, Vancouver, BC.
- Feb 2001 CIM Distinguished Lecturer presentation to the Calgary CIM Branch, Calgary, Alberta.
- Nov 2000 CIM Distinguished Lecturer presentation to the Edmonton CIM Branch, Edmonton, Alberta.
- Nov 2000 CIM Distinguished Lecturer presentation to the Rocky Mountain CIM Branch, Hinton, Alberta.
- Aug 2000 Invited Keynote Speaker, Workshop on Materials Design by Computer Simulation, Sendai International Center, Tohoku University, Aug. 18-19, 2000
- Mar 2000 Integrating the Mine and Mill - Lessons from Manufacturing, Mining Millennium 2000 - CIM AGM, Toronto, March 5-10, 2000.
- Aug 1999 Integration of Intelligent Manufacturing Systems into the Mining and Metallurgical Industries, 1999 CIM Conference of Metallurgists, Quebec City, August 22-25, 1999.
- Jun 1999 Mining Engineering Curriculum Development Conference, Jujuy, Argentina, June 7-12, 1999
- Oct 1997 Predicting the Impact of Mercury Pollution with a Fuzzy Expert System
1997 IEEE International Conference on Systems, Man and Cybernetics, October 12-15, 1997
- May 1997 Preventing Mercury Pollution in the Amazon - an expert system approach.
Prof. Olaf Malm, Federal University of Rio de Janeiro, Rio de Janeiro, Brasil
- Jan 1997 Preventing Mercury Pollution in the Amazon - an expert system approach.
Prof. Margarete Kalin, Mining Engineering Program, University of Toronto, Ontario
- Oct 1996 EXPOMIN-Convergencia'96, Antofagasta, Chile (Key Note Presentation)
Organizer: Dr. Manuel Duarte, University of Chile, Oct. 6-9, 1996
- Jun 1996 Industrial Applications of Artificial Intelligence and Expert Systems (Key Note Presentation)
Canadian Conference of Electrical and Computer Engineering, Calgary, Alberta
Organizer: Dr. Jeff Pieper, University of Calgary
- Jul 1995 Artificial Intelligence Techniques in the Minerals and Metals Industry
Dr. Alesandro Costa de Silva, Federal University of Fluminense, Volta Redondo, Brazil
- Jul 1995 Artificial Intelligence Techniques in the Minerals and Metals Industry
CETEM, Rio de Janeiro, Brazil -- Organizer: Dr. Marcello Veiga
- Jul 1995 AI Applications in the Mining Industry into the 21st Century (Key Note Presentation)
APCOM XXV Conference, Brisbane, Australia
Organizer: Dr. Don McKee, Director, JKMRRC, Brisbane
- May 1992 Managing Uncertainty in Fuzzy Expert Systems, Uncertainty Management Workshop at AI/GI/VI'92 at UBC. Organizer: Dr. Mary Deutsch-McLeish, University of Guelph.
- Nov 1991 Leadership and Organizations. Seminar on Novel Teaching Methods.
Organizer: Gail Riddell, Centre for Continuing Education, UBC

(d) *Other Presentations*

Numerous presentations on Mining Engineering as a Career at: Kwantlen College, Caribou College, MABC Education Committee Seminars, High Schools, Elementary Schools between 1989 and present.

(e) *Other*

CIM Distinguished Lecture Tour

- Apr. 2001 CERM3 and The Millennium Plug - CIM AGM, Quebec City, April 29, 2001
- Apr. 2001 CERM3 and The Millennium Plug – CIM Ottawa Branch, Apr. 20, 2001
- Mar. 2001 CERM3 and The Millennium Plug – CIM Vancouver Branch, Mar. 27, 2001

Mar. 2001 CERM3 and The Millennium Plug – CIM Calgary Branch, Mar. 27, 2001
 Nov. 2000 Integrating the Mine and Mill - Lessons from Manufacturing – CIM Rocky Mountain Branch
 Nov. 2000 Integrating the Mine and Mill - Lessons from Manufacturing – CIM Edmonton Branch

(f) *Conference Participation (Organizer, Keynote Speaker, etc.) (since 1989)*

Sep 2013	Keynote Speaker, Mine Optimization Symposium, Toronto, Ontario
Aug 2013	Keynote Speaker, IFAC Control, Optimiz., & Automation in MMM – San Diego, CA
Oct 2012	Keynote Speaker, AutoMine Conference – Santiago, Chile
Sep 2012	Keynote Speaker, IPMM'12, Intelli. Process. & Manuf.of Materials – Iguacu, Brazil
Jun 2007	General Chairman, IPMM'07, Intel. Process. & Manu. of Materials – Salerno, Italy
Nov 2005	Invited Speaker, BISC-05, Special Symposium on 40 Years of Fuzzy Logic in honor of Lotfi Zadeh, Berkeley, CA.
Apr 2005	Participated in Conference on European Robotics (EURON) - Brussels, Belgium
Apr 2005	Attended EURON Annual General Conference – Palermo, Italy
Jul 2005	General Chairman, IPMM'05, Intelligent Processing and Manufacturing of Materials – Monterey, California
May 2003	General Chair, IPMM'03, Intelligent Processing and Manufacturing of Materials – Sendai, Japan
Jun 2002	Invited Sessional Speaker, Chemical Soc. of Canada, – UBC, Vancouver, B.C.
Jul 2001	General Chair, IPMM-2001, Intelligent Processing and Manufacturing of Materials – Vancouver, B.C.
May 2001	Invited Keynote Speaker, 22 nd Southern Hemispheric Conference on Mineral Processing, Rio de Janeiro, Brazil.
May 2001	Presented Keynote Paper, CIM/AGM, Quebec City, Quebec
Aug 2000	Invited Keynote Speaker, International Symposium on Research and Education in the 21 st Century University, Tohoku University, Sendai, Japan, Aug. 20-25, 2000
Aug 2000	Invited Keynote Speaker, Workshop on Materials Design by Computer Simulation, Sendai International Center, Tohoku University, Aug. 18-19, 2000
Apr 2000	Presented paper, IEEE Advanced Process Control Workshop, Vancouver, B.C.
Mar 2000	Presented Keynote Paper, CIM AGM, Mining Millennium-2000, Toronto
Aug 1999	Presented Keynote Paper, CIM Conference of Metallurgists, Quebec City.
Jul 1999	General Chair, IPMM'99, Intelli. Process.& Manuf. of Materials – Honolulu, Hawaii
Jun 1999	Session Chair - NAFIPS Conference, New York City, New York.
Apr 1999	Presented paper, IEEE Advanced Process Control Workshop, Vancouver, B.C.
Apr 1998	Session Chair - 100th AGM of CIM, Montreal, Quebec
Oct 1997	Invited Paper/Session Chair - SMC'97, Orlando, Florida
Jul 1997	Program Committee Chairman, IPMM'97, Australia (3 paper and 2 session chairs)
Oct 1996	Keynote Speaker - Workshop on AI, Convergencia'96, Antofagasta, Chile.
May 1996	Keynote Speaker - Can. Conf. on Electrical and Computer Eng., Calgary, Alta.
Oct 1995	Session Chair - IEEE, SMC Conference, Vancouver, B.C. (Presented paper)
Jul 1995	Keynote Speaker - APCOM' XXV, Brisbane, Australia (Session Chair)
Aug 1995	Session Chair - 34th Conference of Metallurgists, Vancouver, BC, 1995
1993 - 1995	Registration Chair: 34th Conference of Metallurgists, Vancouver, BC, 1995
Oct 1994	Presented two papers - CIM District 6 AGM , Oct. 1994, Session Organizer
1992 - 1994	Education Committee Chair - CIM District 6 AGM Committee, Oct. 1994
Oct 1993	Invited paper: Randol on Opportunities for Mining in Latin Am, Acapulco, Mex
Sep 1993	Session Chairman - 2nd IEEE Conf. on Control Applications, Vancouver, B.C.
1992 - 1993	Member, Steering Committee - 2nd IEEE Conf. on Control Apps - Vancouver, B.C.
Aug 1992	Session Organizer and Chair - 31st Conf. of Metallurgists, Edmonton, Alta. -
Feb 1992	Invited paper - Randol Gold Forum, Vancouver, B.C.
Sep 1991	Presented paper - CAMI Conference, Vancouver, B.C. - Session Chair
Aug 1991	Invited Speaker, AI Applic. in the Metals and Minerals Industry, Helsinki Univ.
May 1991	Session Chair, AI in Mineral Industry, CIM-AGM, Vancouver, B.C.

1990 - 1991	Member, CIM-AGM Organizing Committee (Audio/Visual Services)
Aug 1990	Session Chair, Expert Systems in the Minerals Industry, CIM 29th CoM, Hamilton
Aug 1989	Session Chair, Expert Systems in the Minerals Industry, CIM 28th CoM, Halifax

10. SERVICE TO THE UNIVERSITY

(a) *Memberships in committees, including offices held and dates*

Service at UBC

- Founder and Leader, Thunderbird Robotics Student Club, 2004 – present
- Search Committee, Head of UBC-Mining, 2007/08
- Search Committee, two Faculty Positions, MINE, 2006
- ARTP Faculty Committee, 2003-2004
- Search Committee, two Faculty Positions, MINE, 2002
- Search Committee, Environmental Chair, MMPE, 1999
- Search Committee, Environmental Junior Chair, Geological Sciences, 1999
- Chair, Department Space Committee, 1998-2002
- Chair, Department Computing Facilities, 1997-2000
- Search Committee, Head, MMPE, 1998
- Search Committee, Head, Electrical Engineering, 1997
- Time Table Representative, 1991-95
- Chair, Faculty Curriculum Committee, 1989-94
- Associate, Centre for Metallurgical Process Engineering, 1989-present

Service at Queen's

- Chair, Division III School of Graduate Studies & Research, 1987-89
- Associate Chairman, Division III, 1984-87
- University Senate Budget Review Committee, 1982-88
- Chair, Graduate Studies - Mining Engineering, 1980-86
- Chair, Advisory Research Subcommittee, Division III, 1986-87
- Member, Advisory Research Subcommittee, Division III, 1984-86
- Member, University Senate Budget Review Committee, 1982-89

11. SERVICE TO THE COMMUNITY

(a) *Memberships in scholarly societies, including offices held and dates*

2012 – present	- Society of Mining Engineers
2001 – 2003	- Society of Manufacturing Engineers.
1997 – 2005	- North American Fuzzy Information Processing Society
1997 – 2005	- Systems, Man and Cybernetics, IEEE
1997 – 2005	- Society for the Advancement of Material Process Engineering
1977 – 2011	- Canadian Institute of Mining, Metallurgy and Petroleum
1974 – present	- Canadian Mineral Processors
1992 – 1999	- The Metallurgical Society of AIME
1991 – 1999	- Computer Society, IEEE
1989 – 1999	- Vancouver Branch Executive of CIM 1989 - 1992 Education Committee 1993 Vice Chairman 1994 Chairman 1995 Past-Chairman 1996/97 Centennial Organizing Com.

(a) *Memberships in other societies, including offices held and dates*

Registered Professional Engineer - Professional Engineers and Geoscientists of British Columbia
 Director, Britannia Beach Historical Society (British Columbia Museum of Mining) 2002-2005
 President, Intelligent Processing and Manufacturing of Materials, Vancouver, B.C. 2001-2008

(c) *Memberships in scholarly committees, including offices held and dates*

Participated in the UBC Sustainability Curriculum Initiative – 2009-2010

- (d) *Memberships in other committees, including offices held and dates*
- (e) *Editorships (list journal and dates)*
 1989 – 2005 Member, Editorial Board – Minerals Engineering Journal
- (f) *Reviewer (journal, agency, etc. including dates)*
 1997 Killam Award - Canada Council
 1996 BC Science Council
 1989 – present NSERC
 1989 – present Minerals Engineering – Editorial Board
 1989 – present Metallurgical Quarterly
- (g) *External examiner (indicate universities and dates)* McGill University, 1988
 University of Stellenbosch, 2000
 University of Melbourne, 2001/2002
 Helsinki University of Technology, 2009
- (h) *Consultant (indicate organization and dates)*
 I practice Professional Engineering providing services in process control, plant trouble-shooting, flowsheet design, environmental issues, computer applications, flotation. Some of my clients include:
- | | |
|-----------------------------------|----------------------------------|
| Alcan | Kingston, Ontario |
| ATAN Process Control | Belo Horizonte, Brazil |
| Bauer, Calder and Workman | Washburn, North Dakota |
| BHP-Billiton | Perth, Australia |
| Comdale Technologies Inc. | Toronto, Ontario |
| Companhia Vale do Rio Doce | Carajas, Para State, Brazil |
| Copper Beach Estates Limited | Britannia Beach, B.C. |
| Cullaton Lake Goldmine | Keewatin, North West Territories |
| Dome Gold Mines | Timmins, Ontario |
| Equity Silver Mines | Houston, British Columbia |
| Falconbridge Nickel | Toronto, Ontario |
| Federal University of Bahia | Salvador, Brazil |
| Gibraltar Mines Ltd.. | Williams Lake, B.C. |
| Highland Valley Copper Mine | Logan Lake, B.C. |
| Inco Metals Limited | Thompson, Manitoba |
| International Coast Minerals | Vancouver, British Columbia |
| Iron Ore Company of Canada | Labrador City, Newfoundland |
| Les Mines Selbaie | Joutel, Quebec |
| Metals Research | Texada Island, B.C. |
| Ministry of the Environment | Toronto, Ontario |
| Mining Engineering Resources | Kingston, Ontario |
| MinnovEX Technologies Inc. | Toronto, Ontario |
| Mintek | Johannesburg, South Africa |
| Pamiba Estates | Sudbury, Ontario |
| Quebec Cartier Mining | Fermont, Quebec |
| Raytheon Corporation | Dallas, Texas |
| Teck-Cominco | Vancouver, B.C. |
| Terasen Utilities Services | Richmond, B.C. |
| Unipure (Europe) Inc. | London, U.K. |
| Western GeoPower Corporation | Vancouver, B.C. |
| Williams Lake Chamber of Commerce | Williams Lake, B.C. |

(i) *Other service to the community*

May 1, 2014	Invited Panelist, NATO Parliamentary Assoc. discuss on Pacific Gateway Initiative
2012 - present	Member of the Board of Directors, <i>Deltassist</i> , Delta, B.C.
2007 - 2010	Member of the Southlands Community Planning Team, Tsawwassen, B.C.
2005	Institutional Review of the Sustainable Minerals Institute, Brisbane, Australia
2004 - present	Faculty Advisor – Thunderbird Robotics undergraduate student team
2004	Institutional Review of Mintek, Johannesburg, South Africa
1998	Evaluation Committee for BCIT Electrical Engineering Technology Degree Program
1996 - 1997	Mineral Processing Examiner – APEGBC
1990 - 1996	Member, BCIT Mining Technology Industrial Advisory Committee
1989 - 1995	Member, MABC Education Committee
1994 - 1995	Member, MABC Mining Week Committee
1990 - 1995	Member, Scientists in the Schools Program - Science World
1991	Judge, Canada-Wide Science Fair, Vancouver, B.C.
1990	Judge, British Columbia Science Fair, Richmond, B.C.
1990 - 1991	Chairman, CCPE 1991 Syllabus Review for Mining Engineering
1990 - 1991	Basketball Coach - Tsawwassen Jr. Sec. and South Delta Sec. Schools
1982 - 1989	League Convenor - Pacers Basketball Club, Kingston Ontario
1989	Head Coach of the Ontario AA Mini-Boys Championship Team
1986 - 1989	Coordinator of Special Projects, Kingston Branch of CIM
1984 - 1986	Treasurer, Kingston Branch of CIM
1980 - 1984	Chair, Nominating Committee - Kingston Branch of CIM
1982 - 1886	Mineral Processing Examiner - APEO/APEM(Manitoba)

12. AWARDS AND DISTINCTIONS(a) *Awards for Teaching*(b) *Awards for Scholarship*

2004 - Best Paper Award - Geothermal Resources Council, presented at the GRC-AGM, Indian Wells, CA

2001 - Williams Prize from the Institute of Materials, UK (with Indira Samarasekera)

2000 - Distinguished Lecturer for the Canadian Institute of Mining, Metallurgy and Petroleum for 2000.

1999 - Best Paper Presentation Award - IEEE Advanced Process Control Workshop, Vancouver, B.C.

1973-1976 Noranda Research Fellowship - Noranda Research, Pointe Claire, Que.

1973-1975 W.W. King Fellowship - Queen's University School of Graduate Studies

(c) *Awards for Service*

2007 – UBC-AMS “Just Desserts” Award for the founding of Thunderbird Robotics

1992 - Fellowship of the Canadian Institute of Mining, Metallurgy and Petroleum

(for outstanding contributions to the Canadian Minerals Industry and to CIM)

13. OTHER RELEVANT INFORMATION

In 2004, I founded an organization at UBC called Thunderbird Robotics to engage undergraduate students in preparing an autonomous ground vehicle for the 2005 DARPA Grand Challenge which took place in the Mojave Desert. In 2007, we entered the same vehicle in the DARPA Urban Challenge which was held in Victorville, CA. Thunderbird Robotics has involved over 500 students (~70 each year) in a variety of sub-projects that include 1/10th scale robot racing cars, RoboCup soccer, the NASA Moon Excavator Centennial Competition, and the Electric Car Club. At the 2009 Robot Racing event, our team finished 2nd, 3rd, 4th, 5th, and 6th out of 15 entries and in 2010, our team won the Grand Prize in Windsor, ON. In 2011, our group finished second. At the 2009 NASA Excavator Challenge at Ames Air Force Base in Mountainview, CA, our team finished 6th out of 24 teams. In 2007 and 2008, we developed an entry into the NASA Centennial Challenge aimed at creating a light-beam-powered space elevator. In 2010, the Electric Car Club converted a 1972 Volkswagen Beetle to all-electric and in August 2010, we drove it across Canada from Vancouver to Halifax in 14 days of driving using existing infrastructure to recharge along the way. This is the first all-electric vehicle to accomplish that feat. These projects have given

students from all engineering disciplines and from computer science hands-on learning in a team-environment. It is one of the most rewarding experiences in all my years as a university professor.

I have continued my involvement with IPMM – Intelligent Processing and Manufacturing of Materials – an organization which I founded with Tara Chandra of the University of Wollongong in Australia at IPMM'97 in Gold Coast, Australia. Membership has steadily grown to 500 members from all parts of the world. The 6th International Conference was held in Salerno, Italy in June 2007 and I acted as Co-Chair of the Technical Program. The 5th International Conference took place in Monterey, California and I acted as General Chair of the Conference and President of IPMM. In May 2003, I was Co-General Chair with Dr. Yoshiyuki Kawazoe from Tohoku University at the 4th International Conference (IPMM'03) held in Sendai, Japan. In July 2001, I was General Chair for IPMM-2001 held in Richmond, B.C. In July 1999, I was General Chair for IPMM'99 in Honolulu, Hawaii. These events each attracted between 150 and 250 delegates from over 30 countries from a wide-variety of diverse backgrounds. The 7th IPMM Conference was held in Foz do Iguacu, Brazil in August 2012 organized by the University of Sao Paulo..

In 2001, I took on the directorship of CERM3 (The Centre for Environmental Research in Minerals, Metals, and Materials. CERM3 consists of ~35 researchers across UBC from over 10 departments who are conducting collaborative studies on mining and the environment. The facilities consist of 5 interlinked laboratories and a field research station located at Britannia Mine. This station was set up to design earth plugs to seal mine tunnels that last 1000 years. The installation of this facility had the spin-off benefit of stopping all pollution into Britannia Creek and the surface waters of Howe Sound. Over 20% of copper emissions were eliminated through placement of this plug in the 2200 Level adit. Our work has helped draw a number of important collaborators to the site to transform it into a major tourist destination that will showcase Canadian Sustainable Mining practices. In November 2011, reports appeared in the Press of adult pink salmon 4 km upstream of the mouth of Britannia Creek.

My research activities have also evolved into the field of geothermal energy systems in close collaboration with Dr. Mory Ghomshei in both low- and high-temperature applications. Our work has identified a major anomaly near Fort Nelson that could be a site for an Enhanced Geothermal Energy project to support a capacity of 250 MW in perpetuity. A project to identify the potential for geothermal energy applications in British Columbia was completed in 2010. Stephen Mak is currently completing a Masters project on a permeability analysis of the Pebble Creek resource.

One of my Ph.D. graduates, Ladan Mohammadi, studied the confined space accident that occurred at the Sullivan Mine reclamation site in 2006. She identified the relationship between atmospheric temperature and pressure changes and the flow of pore gas from within the dump into a sampling shed in which four people died. She created a Fuzzy Expert System to conduct an atmospheric risk assessment at other sites to ensure that conditions which might create such danger are designed out of the reclamation plan. A hand-help version of the system is available for First Response personnel to help them decide to enter or not a confined structure.

My research is aimed at reducing the footprint of mining and processing through integrating batch processes and reducing energy use. One project developed a Magnetic Levitation Hoisting system in which ore can be loaded into vehicles at the mine face and delivered directly to the surface storage facility for processing. The integration of underground haulage and hoisting can significantly reduce costs and the size of on-surface facilities. A second project is aimed at understanding the fundamental reasons why comminution (crushing and grinding) is such an inefficient process (~1-2%). We are studying high velocity impact fracture of rocks and minerals.

Over the years, I have performed considerable research on the use of Artificial Intelligence in industry, an activity that evolved from earlier work on process control simulation models. In 1983, we reported on crushing plant models while in 1985, studies with Fuzzy Logic extracted rules-of-thumb from plant operators for supervisory control. This work resulted in the founding of Comdale Technologies (Canada) in 1986 by my former graduate student - Tony Harris. Comdale was the first company to market Expert System solutions to the mining industry. My team collaborates closely with industry and we have build over 100 systems in areas that include: Qualitative Mineralogy, Mining Method Selection, Flotation Reagent Advice, Fuzzy Logic Control, Froth Recognition (Highland Valley Copper), Steel Reheat Furnace Operations, Small Hydro Plant Site Selection, Wastewater

Process Selection, Automated Speed Zone Design, Acid Rock Drainage Sampling, Mercury in the Amazon, Continuous Casting Diagnosis and Control. Several of these systems are marketed under license from UBC:

- ARDx: An AI Approach to Designing ARD Remediation Systems
- IntelliGOLD: An Expert System to Design Gold Processing Plants
- ESMAN: A HyperManual on Expert Systems
- MMCx: An Expert System to Design Metal-Matrix Composites
- MINEX: An Expert System on Qualitative Mineralogy
- Proc/ES: Introduction to Mineral Processing
- CRAC/X: Troubleshooting Continuous Billet Casting Quality Problems
- TxDENT: A Training Tool for Dentistry Students (collaborative work with UBC Dental Clinic)

The billet quality system is used at 20 mini-steel mills around the World. We helped Highland Valley Copper to formulate a real-time advisory system for plant operators. Many industrial short courses have been presented.

Together with Dr. Marcello Veiga, I have published several papers on mercury emissions used by artisanal miners. We detailed a number of important vectors and sources of this insidious material. Our publication in *Nature* (368) 1994, was the seminal work identifying deforestation as a significant activity in dispersing mercury over wide areas in Brazil. We are examining mercury pollution from the viewpoint of reducing its impact on a local and global basis.

CERM3 commenced a number of research projects into biological solutions to environmental issues. These include: Passive treatment system design for ARD; Bioindicators of bioaccumulation; Isolation of bacteriophage for *Thiobacillus ferrooxidans*. In 2003, we build a phytoreclamation facility in Bahia, Brazil to extract gold into plants from a spent heap leach pad. This work was a collaboration between CVRD (Companhia Vale do Rio Doce) and Dr Chris Anderson from Massey University in New Zealand. We showed that certain crops can concentrate gold from 0.6 ppm in the ground to over 35 ppm (dry weight) in the plants. The process has potential to be an economically commercial process for mining or reclamation as certain other plants are known to beneficiate mercury, nickel, zinc, copper, and lead. This work has generated much interest around the world and we are now collaborating with York University in the U.K. and Yale University in the U.S. on the extraction of PGMs from waste materials that can become natural catalysts. This work was funded by the G8 Research Funding Agencies.

In 2013, Juliana Parreira completing her doctoral thesis entitled Simulation of Autonomous Haulage Truck (AHT) systems under contract with BHP-Billiton in Perth, Australia. She developed a stochastic simulation tool together with a deterministic model of haulage truck movement to characterize the changes that can be expected in Key Performance Indices (KPIs) when an AHT system replaces human drivers. The sub-models of this tool include fuel consumption, truck movement and productivity, maintenance, tire wear and tire temperature, together with an economic assessment of reduced labour costs and increased safety.

Together with Professor Marcello Veiga, I have developed a methodology to transfer the Mining Engineering curriculum at UBC to other countries looking to start-up a Mining Engineering program. The program consists of 30 courses each with 24 lectures and all necessary assignments and laboratories. We are currently creating programs in three Latin American countries and one in Asia.

THE UNIVERSITY OF BRITISH COLUMBIA**Publications Record****SURNAME:** MEECH**FIRST NAME:** JOHN**MIDDLE NAME(S):** ATHOL**Date:** May 21, 2014.**Refereed Publications (228)****Journals:** 57**Conference Proceedings:** 162**Other:** 9**Non-Refereed Publications (7)****Journals:** 3**Other:** 4**Books (33)****Authored:** 11**In Edited:** 21**Patents (1)**

1

Special Copyrights (10)**Software:** 7**Course Notes:** 3**In Progress: (1)**

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1. REFEREED PUBLICATIONS*(a) Journals*

57. M.M. Veiga, G. Angeloci-Santos, J.A. Meech, 2014. "Review of Barriers to Reduce Mercury Use in Artisanal Gold Mining", Journal of the Extractive Industries and Society, Vol. 2, April, (in press), pp.22. <[dx.doi.org/10.1016/j.exis.2014.03.004](https://doi.org/10.1016/j.exis.2014.03.004)>.
56. V. Wilson-Corral, C.W.N. Anderson, M.C. Rodriguez-Lopez, J.I. Sarmiento-Sanchez, and J.A. Meech, 2014. "Initial exploration of two areas of Mexican gold tailings as a potential resource for gold phytomining operations", International Journal of Mining, Reclamation, and Environment, accepted, January 2014; pp.18.
55. A.J. Hunt, C.W.N. Anderson, N. Bruce, A.M. García, T. Graedel, M. Hodson, J.A. Meech, N. Nassar, H.L. Parker, E.L. Rylott, K. Sotiriou, Q. Zhanga and J.H. Clark, 2014. "Phytoextraction as a tool for green chemistry", published online (Jan. 9, 2014) in Green Processing and Synthesis, (GREENPS), 3, 3- 22. <www.phyto-cat.org/PDFs/gps-2013-0103.pdf>
54. L. Mohammadi and J.A. Meech, 2013. "AFRA - Heuristic expert system to assess the atmospheric risk of sulphide waste dumps", Journal of Loss Prevention in the Process Industries, 26(1), 261–271.
53. M. Nadin, 2012. "Book Review: Concepts and fuzzy logic", Inter. J. of General Syst., 41(8), Sept. 24, 860-867. (comments on J.A. Meech, 2011, 'How Some Simple Fuzzy-Thinking Might have Prevented the Challenger Accident,' Apr. 7, 2011, BISC discussion group. <www.jmeech.mining.ubc.ca/Fuzzy_Thinking_and_the_Space_Shuttle.pdf>)
52. J. Parreira and J.A. Meech, 2011. "An interactive simulation model of human drivers to study autonomous haulage trucks", Procedia Computer Science, 6, 118-123.
51. R.N. Sousa, M.M. Veiga, J. Meech, J. Jokinen, A.J. Sousa, 2011. "A simplified matrix of environmental impacts to support an intervention program in a small-scale mining site", J. Cleaner Product., 19(6), 580-58.
50. J. Parreira and J.A. Meech, 2011. "Autonomous Haulage Systems - Justification and Opportunity", Autonomous and Intelligent Systems: Second International Conference, AIS 2011, LNAI6752, Eds. M. Kamel, F. Karray, W. Gueaieb, A. Khamis, Springer-Verlag, Berlin, 63-72.
49. S. Sadrai, J.A. Meech, D. Tromans, F. Sassani, 2011. "Energy efficient comminution under high velocity impact fragmentation", Minerals Engineering 24, 1053–1061.
48. L Mohammadi and J.A. Meech, 2011. "Confined Space Risk at Mine Reclamation Sites", J. Reclamation Practice, accepted for publication, Feb., pp. 31.
47. M. Ghomshei, J.A. Meech and R. Naderi, 2008. "War, Peace, and Fuzzy Logic", Cybernetics and Systems, Feb.; 39(2), 113-135.

46. M. Ghomshei, J.A. Meech, and R. Naderi, 2008. "Fuzzy Logic in a Postmodern Era", M. Nikravesh et al. (Eds.); Forging the New Frontiers: Fuzzy Pioneers II, Springer-Verlag, Berlin-Heidelberg, 2, 363-376.
45. S. Sadrai, J.A. Meech, M. Ghomshei, F. Sassani, D. Tromans, 2006. "Influence of impact velocity on fragmentation and the energy efficiency of comminution", Inter. Journal of Impact Engineering, 33, 723-734.
44. J.A. Meech, M. McPhie, K. Clausen, Y. Simpson, B. Lang, E. Campbell, S. Johnstone, P. Condon, 2006. "Britannia Beach - Transformation of a Derelict Mine Site into a Sustainable Community", Journal of Cleaner Production: Special Issue on Mining, 14, 349-365.
43. F.N. Moreno, C.W. Anderson, R.B. Stewart, B.H. Robinson, M.M. Ghomshei, J.A. Meech, 2005. "Induced plant uptake and transport of mercury in the presence of sulphur-containing ligands and humic acid", New Phytologist, May;166(2), 445-454.
42. J.A. Meech, 2005. "Re: Joly, Majerus, Westaway, 2005. The effect of diethylenetriamine on the formation of Cu²⁺ -, Ni²⁺ -, and Fe³⁺ -amyl xanthate ion complexes", Minerals Engineering, 17(9-10), 1023-1036.
41. C. Anderson, F. Moreno, F. Geurts, C. Wreesmann, M. Ghomshei and J. Meech, 2005. "A comparative analysis of gold-rich plant material using various analytical techniques", Microchemical Journal, 81(1), 81-85.
40. F.N. Moreno, C. Anderson, R.B. Stewart, B.H. Robinson, R. Nomura, M. Ghomshei, and J.A. Meech, 2005. "Effect of Thioligands on Plant-Hg Accumulation and Volatilisation from Mercury-contaminated Mine Tailings", Plant and Soil Journal, 275(1&2), 233-246.
39. C. Anderson, F. Moreno, and J. Meech, 2005. "A field demonstration of gold phytoextraction technology", Minerals Engineering, 18, 385-392.
38. J.A. Meech, M.Scoble, W.Wilson, R.Pakalnis, B.Klein, M.Veiga, R.Hall, M.Ghomshei, S.Baldwin, L.Lavkulich, C.Suttle, J.Mortensen, D.Weis, L.Smith, K.Hall, D.Dixon, D.Tromans, D.Dreisinger, S.Dunbar, M.Pawlik, M.Morin, W.Cullen, K.Teschke, G.Gibson, R.Ulansky, J.Hinton, B.Wickland, Y.Bissiri, B.Lang, 2003. "CERM3: The Centre for Environmental Research in Minerals, Metals, and Materials and its Contribution to Providing Sustainable Research for the Mining Industry", CIM Bulletin, 96(1067), 72-81.
37. D. Tromans and J.A. Meech, 2003. "Fracture toughness and surface energies of covalent minerals: theoretical estimates", Minerals Engineering; 17(1), 1-15.
36. D. Tromans and J.A. Meech, 2002. "Fracture toughness and surface energies of minerals: theoretical estimates for oxides, sulphides, silicates and halides", Minerals Engineering; 15(12), 1027-1041.
35. D. Tromans and J.A. Meech, 2002. "Enhanced dissolution of minerals: modeling conjoint effects of particle size and microtopography", Minerals Engineering; 15(5), 263-269.
34. D. Tromans and J.A. Meech, 2001. "Enhanced dissolution of minerals: stored energy, amorphism and mechanical activation", Minerals Engineering; 14(11), 1359-1377.
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