

Aleksandar (Sasha) Živković, dipl. ing., P.Eng

S1005-112 George Street
Toronto, ON, Canada M5A 2M5
Phone: +1.647.296.2604
E-Mail: sasha@geominainc.com



September 13, 2017

Dear Sir/Madame:

I'd like to apply for the position of Principal Geotechnical Engineer.

I'm a Professional Engineer with over 30 years of experience related to the design, project and construction management of mine / nuclear waste management, mining, heavy construction, urban / municipal and hydropower projects.

For 20 years my focus was on the application of multi-disciplinary engineering and project management expertise to design, environmental permitting, construction, operation and closure of numerous mine waste management and civil-mine infrastructure projects in Canada and worldwide. I initiated the development of the multi-disciplinary mining services companies and served as Client Team Leader. I also led the geotechnical function as it relates to business development, technical expertise and provided project delivery and technical leadership to teams across North America.

In my latest role as a Manager of Engineering for the Deep Geologic Repository (DGR), my geo-environmental, mining and project management expertise has expanded through its application to Nuclear Waste Management Organization's (NWMO's) projects. My responsibilities include project delivery leadership through strict application of NWMO project quality standards while managing engineering contracts in relation to the conceptual through detailed designs and inputs for construction of both underground and surface domains of a major national infrastructure project with an estimated cost of up to \$24 billion. I am interfacing with international projects in this area, collaborate with other disciplines as well as legal, procurement and project controls services and other stakeholders (e.g., Council of Elders and Youth for incorporation of Traditional Knowledge) within NWMO, and participate in public engagement activities, as required.

I will be glad to meet and discuss potential contribution of my skills and international expertise to your diverse and growing group of professionals in the field of forensic engineering.

Sincerely,

Aleksandar (Sasha) Živković

Summary of Experience

Aleksandar (Sasha) Živković is a Professional Engineer with over 30 years of experience related to the design, project and construction management of mine / nuclear waste management, mining, heavy construction, urban / municipal and hydropower projects.

For 20 years Sasha's focus was on the application of multi-disciplinary engineering and project management expertise to design, environmental permitting, construction, operation and closure of numerous mine waste management and civil-mine infrastructure projects in Canada and worldwide. Sasha also initiated the development of the multi-disciplinary mining services companies and served as Client Team Leader. He led the geotechnical function as it relates to business development, technical expertise and provided project delivery and technical leadership to teams across North America.

In his latest role as a Manager of Engineering for the Deep Geologic Repository (DGR), Sasha's geo-environmental, mining and project management expertise has expanded through its application to Nuclear Waste Management Organization's (NWMO's) projects. Sasha's responsibilities include project delivery leadership through strict application of NWMO project quality standards while managing engineering contracts in relation to the conceptual through detailed designs and inputs for construction of both underground and surface domains of a major national infrastructure project with an estimated cost of up to \$24 billion. He is interfacing with international projects in this area, collaborates with other disciplines as well as legal, procurement and project controls services and other stakeholders (e.g., Council of Elders and Youth for incorporation of Traditional Knowledge) within NWMO, and participates in public engagement activities, as required.

Areas of Expertise

- | | | |
|------------------------------------------------------------------------------------------------------------------|----------------------------|---------------------------------------|
| ❖ Engineering/Project Management | ❖ Due Diligence | ❖ Third Party Reviews |
| ❖ Ni 43-101 Qualified Person (QP) | ❖ Geotechnical Engineering | ❖ Tailings Storage Facilities Designs |
| ❖ Nuclear Waste Management | ❖ Mine Water Management | ❖ Construction Management |
| ❖ Earthen & Earth-Rock Dams Designs | ❖ Waste Rock Dumps Designs | ❖ Business Development |
| ❖ Presentations to Regulators | ❖ Dam Safety Reviews | ❖ Risk Assessments |
| ❖ Mine Closure Design | ❖ Cost Estimate Reviews | ❖ Technical Leadership/Mentorship |
| ❖ Mine Permitting Support | ❖ Business Development | ❖ Cold Regions Construction |
| ❖ Direction and Review of Geotechnical and Civil Engineering Investigations, Modeling and Analyses | | |
| ❖ Innovative & Specialized Solutions (Co/Concurrent-Disposal Tailings and Waste Rock Management Facilities) | | |
| ❖ Tailings Options Analyses (conventional – thickened – paste – filtered) in terms of issues/opportunities/costs | | |

Employment

Nuclear Waste Management Organization (NWMO)

2015-Present

Manager, Repository Engineering

The HUB.Mining Solutions Ltd., Toronto, ON, Canada Principal - Geotechnical & Tailings Engineering	2014-2015
GeoMina Inc., Toronto, ON, Canada President & Principal Geotechnical Engineer	2014-2015
Ausenco, Toronto, Ontario Canada Manager Geotechnical Services & Principal Geotechnical Engineer	2012 -2014
Foth Canada Corporation, Toronto ON, Canada Principal Geotechnical Engineer / Office Leader	2011 -2012
Wardrop, A Tetratech Company, Toronto ON, Canada Divisional (Canada-wide) Manager, Geotechnical Engineering – Chief Discipline	2007-2011
SNC-Lavalin Engineers & Construction Inc., Toronto, ON, Canada Senior Engineer – Geotechnical	2006-2007
Klohn Crippen Berger Ltd., Mississauga, ON, Canada Lead Geotechnical Engineer – Geotechnical Divisional	2004-2005
AMEC Earth & Environmental Ltd., Mississauga, ON, Canada Senior Geotechnical Engineer – Geotechnical Divisional	2000-2004
SNC-Lavalin Engineers & Constructors Inc., Toronto, ON, Canada Geotechnical Engineer	1997-2000
Shaheen & Peaker Consulting Geo-Environmental Engineers Ltd., Toronto, ON, Canada Geo-Environmental Engineer/Manager of Field and Laboratory Operations	1994-1997
Energoproject Consulting Engineers Ltd., Belgrade, Serbia Junior – Intermediate - Senior Geotechnical Engineer	1986-1993

Education

University of Belgrade, Faculty of Mining & Geology BESc, Geotechnical Option of Geological Engineering	1979-1986
-----------------------------------------------------------------------------------------------------------------------	------------------

Professional Registrations

Professional Engineers of Ontario

Since 1996

Key Leadership Responsibilities

- ❖ In 2015, took on engineering / project management responsibilities for the NWMO's Adaptive Phase Management (APM) Deep Geologic Repository (DGR) project conceptual design update / proof testing and engineering support for site selection.
- ❖ In 2014, as member of the core group of mineral industry experts, started The HUB.Mining Solutions Ltd., a multi-disciplinary consultancy that provided global services in areas of Due Diligence, Operational Assistance and NI 43-101 reports.
- ❖ In 2014, started an independent geotechnical consultancy GeoMina Inc.
- ❖ In 2012, led the Geotechnical function for Ausenco's Eastern Canada operations (Toronto and Montreal offices) as it relates to business development, technical expertise and leadership.
- ❖ In 2011, initiated the development of the multi-disciplinary mining services at the Foth Canada Corporation office in Toronto (Foth's first international office), served as Client Team Leader, and provided technical leadership to teams across Upper Midwest USA offices.
- ❖ In 2007 established and managed a geotechnical engineering group in the Mining Division of Wardrop Engineering and also served as divisional (Canada-wide) chief discipline.
- ❖ In 1993, led Field and Laboratory Operations group at Shaheen & Peaker Ltd.

Publications & Presentations

- ❖ J.O.C. Imrie, D. Witow, A. Lee, A. Zivkovic, "Ventilation and Traffic Study for Used Fuel Adaptive Geologic Repository", co-presentation (J.O.C. Imrie/A. Zivkovic) at the American Nuclear Society International High-Level Radioactive Waste Management Conference (IHLRWM 2017), Charlotte, North Carolina, USA, April 9-11, 2017
- ❖ J. Carvalho, A. Zivkovic, A. Lee, "Evaluation of an Adaptive Used Fuel Deep Geologic Repository Layout for a Crystalline Geosphere", presentation at the American Nuclear Society International High-Level Radioactive Waste Management Conference, (IHLRWM 2017), Charlotte, North Carolina, USA, April 9-11, 2017
- ❖ J.O.C. Imrie, D. Witow, A. Lee, A. Zivkovic, "Ventilation and Traffic Study for a Proposed Deep Geologic Repository in Crystalline Geosphere", 3rd Canadian Conference on Nuclear Waste Management, Decommissioning and Environmental Restoration, Ottawa, Ontario, Canada, September 11-14, 2016.
- ❖ J. Carvalho, A. Zivkovic, C. Ferrer, "Evaluation of an Adaptive Used Fuel Deep Geologic Repository Layout for a Crystalline Geosphere", presentation at 3rd Canadian Conference on Nuclear Waste Management, Decommissioning and Environmental Restoration, Ottawa, Ontario, Canada, September 11-14, 2016.
- ❖ Environmental Risk Mitigation through Novel Concurrent Disposal of Tailings and Mine Waste Rock in Central Canada, Presentation at Society for Mining, Metallurgy & Exploration, Minnesota Section, 85th Annual Meeting of Minnesota Section of SME, 73rd Annual University of Minnesota Mining Symposium, Duluth, Minnesota, USA, April 11, 2012.

- ❖ Examining Technologies & Strategies for Managing the Impact of Acid Mine Drainage on Water Quality, Guest Lecturer, Env. S & P 724, Hazardous and Toxic Materials Fall Semester, University of Wisconsin, Green Bay, Wisconsin, USA, November 3, 2011.
- ❖ Examining Technologies & Strategies for Managing the Impact of Acid Mine Drainage on Water Quality (Part 2): Innovative Water Management Approach through Concurrent Disposal of Tailings and Waste - Minago Project, Canada, presentation at the Global Mining Water Management Initiative Conference, Las Vegas, USA, March 30, 2011.
- ❖ Benchmarking Best Practices for Measuring and Monitoring Water Quality to Provide a Detailed Impacts Analysis of the Effects of Mining Operations on Water Quality (Part 2): A Case Study for the Proposed Nickel Mine, Northern Manitoba, Canada, presentation on behalf of Victory Nickel / Nuinsco at the Global Mining Water Management Initiative Conference, Las Vegas, USA, March 30, 2011.
- ❖ Evaluating the Available Technologies and Processes for Water Management Post Mine-Closure to Ensure Regulatory Compliance, presentation on behalf of Victory Nickel/Nuinsco at the Global Mining Water Management Initiative Conference, Las Vegas, USA, March 31, 2011.
- ❖ A.S. Zivkovic, D. Mchaina, M. Henderson, F. Matich, "Environmental Risk Mitigation Through Concurrent Disposal of Tailings and Mine Waste Rock at the Minago Mine in North-Central Manitoba, Canada", Mine Waste 2010, First International Seminar on the Reduction of Risk in the Management of Tailings and Mine Waste, Perth, Australia, October 1, 2010.
- ❖ Minago Project, Feasibility Study, Geotechnical Considerations (overburden dredging, concurrent disposal of tailings and waste rock and waste rock dumps on soft ground) ", presentation on behalf of Victory Nickel Inc. to Manitoba Conservation and Federal Ministries, Winnipeg, Manitoba, Canada, May 24, 2010.
- ❖ "Raglan Tailings Stack Reclamation Cover Design Versus Field Performance", presentation on behalf of Falconbridge/Société Minière Raglan du Québec Ltée (SMRQ) to Kativik Commission for Environmental Quality, Ministry of Environment Quebec and Kativik Regional Government, Quebec City, Quebec, Canada, September 11th, 2003.
- ❖ M.B. Szymanski, A. Zivkovic, A. Tchekhovski and B. Swarbrick, "Designing for Closure of an open pit in Canadian Arctic", oral presentation at the University of Zurich, Switzerland on July 22, 2003/Proceedings of International Conference on Permafrost (ICOP) Zurich, Switzerland, 2003.
- ❖ "Geotechnical and Hydrogeological Conditions for the Construction of a 240 m High Bekhme Dam and Large Appurtenant Underground Structures", presentation at International Board of Experts meeting, Kurdistan, Iraq, 1989.

Certifications

- ❖ Paste 2013, Short Course on Tailings Preparation, Transport and Deposition, InfoMine Inc., Belo Horizonte, Brazil, June 17, 2013.
- ❖ Workshop on Foundations in Permafrost and Frost Susceptible Soils, Cold Climate Housing Research Centre, Fairbanks, Alaska, USA, June 2008.
- ❖ 4th International Conference on Earthquake Engineering, and International Society for Soil Mechanics and Geotechnical Engineering, Aristotle University, Thessaloniki, Greece, June 2007.
- ❖ Tailings and Mine Waste 2004 conference and Short course on Reactive Waste Covers, Colorado State University's Division of Continuing Education, Vale, Colorado, USA, October 2004.
- ❖ "Business Approach to Project Management", Impact Consulting Group, Toronto, Ontario, Canada, 2000.
- ❖ Professional Practice Examination Certificate, Chamber of Commerce of the Republic of Serbia, March 13, 1990 (P.Eng. Status Equivalent).

Other Education / Training

- ❖ 16th International Seminar on Paste and Thickened Tailings, Belo Horizonte, Brazil, June 17-20, 2013.
- ❖ Integrity Selling, Integrity Selling Solutions LLC, June 2012.
- ❖ Geosynthetics in Mining Applications, CETCO/Geosynthetic Webinar, January 2011.
- ❖ 64th Canadian Geotechnical Conference and 14th Pan-American Conference on Soil Mechanics and Geotechnical Engineering, Toronto, Ontario, Canada, 2011.
- ❖ Wardop's Mining Division Chief Discipline Conference, Bath, England, 2008.
- ❖ IX International Conference on Permafrost (ICOP), Fairbanks, Alaska, USA, 2008.
- ❖ Manitoba Mining and Minerals Convention, Winnipeg, Manitoba, 2007
- ❖ Geotechnical Risk Assessment and Reliability Based Design, One-Day Seminar, Canadian Geotechnical Society, Southern Ontario Section, Concord, Ontario, 2006.
- ❖ Mining Sector Business Development in South East Europe, South East European Exploration conference and Field Trip, South East Europe Geoscience Foundation, University of Sofia, Bulgaria, 2005.
- ❖ A short course on Evaluation of Soil Liquefaction and its links to 2005 NBCC, Canadian Geotechnical Society, South Ontario Section, Concord, Ontario, Canada, 2005.
- ❖ Cold Regions Engineering and Construction, Conference, American Society of Civil Engineers/Canadian Society of Civil Engineers/International Winter Construction Symposium and Expo Association of Alberta, Edmonton, Alberta, Canada, 2004.

Countries Worked In

Australia, Argentina, Bosnia & Herzegovina, Brazil, Canada, China, Republic of Congo, Croatia, Iraq, Madagascar, Montenegro, Papua New Guinea, Romania, Serbia, Tanzania, USA

Languages

English, Serbo-Croatian, French (basic), Spanish (basic)

Key Project Experience

Nuclear Waste Management Projects

NWMO on behalf of OPG, OPG's DGR Project, Long-term Rock Support Monitoring (2015-2016) - Engineering / Project Manager for providing direction, collaborative reviews and final review and acceptance of project deliverables.

NWMO (Employer), APM DGR Project, Evaluation of Underground Repository Layout (2015-2016) - Engineering / Project Manager for providing direction, collaborative reviews and final review and acceptance of project deliverables; also including preparation and processing of the Design Change Notice for the transition from reference to adoptive layout.

NWMO (Employer), APM DGR Project, Underground Repository Traffic and Ventilation Study (2015-2016) - Engineering / Project Manager for providing direction, collaborative reviews and final review and acceptance

of project deliverables.

NWMO (Employer), APM DGR Project, Thermo-Mechanical Analysis of a Multiple-Level Underground Repository in Crystalline Rock (2015-2016) - Engineering / Project Manager for providing direction, collaborative reviews and final review and acceptance of project deliverables.

NWMO (Employer), APM DGR Project, Crystalline DGR Facility Construction Plan (2016-2017) - Engineering / Project Manager for providing direction, collaborative reviews and final review and acceptance of project deliverables.

NWMO (Employer), APM DGR Project, Initial Criteria and Calculations (2016–Ongoing)- Engineering / Project Manager for providing direction, collaborative reviews and final review and acceptance of several project deliverables (groundwater inflow estimate, service and potable water demand, service water recycling, etc.).

NWMO (Employer), APM DGR Project, Geotechnical Investigation Plan (2016–2017) - Engineering / Project Manager for providing direction, collaborative reviews and final review and acceptance of several project deliverables.

NWMO (Employer), APM DGR Project, Sealing for Operations, Closure and Decommissioning (2017–Ongoing) - Engineering / Project Manager for providing direction, collaborative reviews and final review and acceptance of several project deliverables.

NWMO (Employer), APM DGR Project, V0 Engineering Evaluations for Potential Repository Areas (PRAs) in Ignace, North of Superior and North of Huron Regions (2016-Ongoing)- Engineering / Project Manager for providing direction, collaborative reviews and final review and acceptance of several project deliverables).

NWMO (Employer), APM DGR Project, Proof Testing, Emplacement Room Mock-up Simulation – Design, Fabrication and Assembling (2016-Ongoing) - Project Manager for preparation of technical specifications and scope of work, purchase requisition, bids evaluation, collaborative reviews and final review and acceptance of project deliverables (project quality and design management plans, materials inspection and testing plan, design report and drawings, construction drawings, at phased assembling at NWMO's facility).

NWMO (Employer), APM DGR Project, V1 Surface and Underground Layouts Engineering for Selected Repository Areas (PRAs) in Ignace, North of Superior and/or North of Huron Regions (2017-Ongoing) - Engineering / Project Manager for providing direction, collaborative reviews and final review and acceptance of several project deliverables).

NWMO (Employer), APM DGR Project, Adaptive Underground Repository MTOs (2017-Ongoing) - Engineering / Project Manager providing direction, collaborative reviews, and final review and acceptance of project deliverables).

Mine Waste and Tailings Engineering Projects

Newmont USA Limited, Conga Re-start Project Study, near Cajamarca, Peru (2014) – TSF Engineer for review of TSF for Base Case (570Mt of tailings), Base Case optimizations, and conceptual TSF designs for Small Project Case (240Mt of tailings) involving a smaller process plant and stepped implementation approach to Minas Conga. **Co-author** of residue and water management contributions to the Conga Re-start Study report framing options in terms of issues, opportunities and comparative costs (e.g., Base Case TSF cost of \$670M (40% of the total project cost), versus Smaller Project Case cost savings in the order of \$420M and the lowest cost/tonne of tailings).

BHP Billiton (BHPB) – Pampas Norte Business Unit, Spence Project Growth Option - Gate 1, Atacama Desert, Northern Chile (2013-2014) – Senior Reviewer of tailings study completed by Golder Associates for the new 95,000 t/d BHPB's Spence Concentrator for a 84 year mine life with a specific focus on findings in support of both the long-term and short-term technical (e.g., risk, design including water balance, construction, closure, etc.), environmental and business drivers. **Author** of Technical Design Memorandum on TSF Design Review.

Magellan Minerals Ltd., Coringa Project, Para Province, Brazil (2012-2013) – Proposal Manager for feasibility study scope including TSF design, design of plant site foundations and underground mine geotechnical and

hydrogeological studies; **Project Manager/Technical Lead** for TSF options study, geotechnical investigation specification for preferred TSF option, and preliminary TSF water balance.

Lumina Copper Corporation, Taca Taca Project, Salta Province, Argentina (2012) – Geotechnical Consultant for scoping study geotechnical engineering components including slope stability aspects of open pit encroachment into local salar.

PolyMet Mining, Inc., NorthMet Project, near Babbitt and Hoyt Lakes, north-eastern Minnesota, USA (2012) – Technical Lead for a third party review of Adaptive Water Management Plan (AWMP) prepared by Barr Engineering.

Intrepid Potash, Nash Draw Investigation/Water Control System Redesign Project, New Mexico, USA (2012) – Principal Engineer for main geotechnical input to a project including review of background data and formal site evaluations (dam safety inspections) and reporting for Catch Basin Dyke, Pre-Catch Basin embankment, Tailings Brine Recirculation (TBR) containment structure, Secondary Containments 1 and 2, and embankment containing several brine ponds along the east site limit.

Victory Nickel Inc., Minago Project, MB, Canada (2010-2012) – Principal Mine Waste & Tailings Engineer/Client Team Leader for feasibility study update of tailings and waste rock management facility (TWRMF) and Polishing Pond (PP). The project involved a significant modification of the design of the TWRMF resulting from the required relocation of TWRMF and PP to an area of new land lease purchases. The updated scheme continues to represent design of concurrent disposal (co-disposal) of PAG-waste rock and tailings remains to be without any direct long-term precedents applied to geographic and climatic conditions similar to Minago.

Aquila Resources, Inc. and HudBay Michigan, Inc. Joint Venture, Back Forty Project Pre-feasibility Study, Michigan, USA (2010-2012) – Senior Technical Reviewer for the design of Tailings and Waste Rock Management Facility (TWRMF), also responsible for directing all geotechnical and mine permit application activities.

Pebble Partnership, Pebble Project Preliminary Economic Assessment Project, Alaska, USA (2010) – Reviewer for tailings management facility (TMF) designs developed by Knight Piésold Consulting and co-author / Qualified Person (QP) for the TMF section of the National Instrument 43-101 (NI 43-101) report.

Quest Rare Minerals Ltd., Strange Lake B Zone Preliminary Economic Assessment Project, QC, Canada (2010) – Geotechnical Lead for the tailings management facility (TMF) designs and author/Qualified Person (QP) for preparation of the TMF section of the National Instrument 43-101 (NI 43-101) report.

Cameco, Cigar Lake Project, Slimes Pond #4, SK, Canada (2009-2010) – Technical Lead for development of detailed design of Slimes Pond #4 preparation of inputs for vendor packages. The containment structure includes secondary containment (drainage net sandwiched between double HDPE liner), leak collection/detection chamber, and truck off-loading platform.

Kria Resources, Halfmile Lake and Stratmat Project, NB (2009) – Lead Engineer for the review of the use of existing Heath Steel mine Tailings Management Facility as recommended by previous consultants and design preliminary modification to account for additional storage requirements for the combined tailings production from Half Mile Lake and Stratmat mines. The proposed design involved raising the powerline dam, north road embankment, old tailings dam and internal dam in compliance with the National Instrument 43-101 (NI 43-101) Preliminary Economic Assessment and Technical Report.

Minco Silver Corporation, Fuwan Silver Project, Guangzhou Province, China (2008-2010) – Reviewer of tailings management facility (TMF) designs developed by the China Nerin Engineering Co. Ltd. and co-author / Qualified Person (QP) for the TMF section of the National Instrument 43-101 (NI 43-101) Compliant Bankable Feasibility Report for the Fuwan Silver Deposit.

Crowflight Minerals, Bucko Lake Project, Wabowden, MB, Canada (2008-2010) – Geotechnical Lead for pre-feasibility to detailed designs and construction of the Interim Tailings Management Facility (ITMF) allowing the project to go into production while waiting for regulatory approval for the proposed subaqueous tailings facility in Bucko Lake. **Senior Reviewer** for 2010 ITMF raise design and construction.

Victory Nickel Inc., Minago Project, MB, Canada (2007-2009) – Geotechnical Lead for feasibility level designs of tailings and waste rock management facility (T&WRMF), waste dumps, overburden disposal facility hosting

dredged overburden from the open pit; geotechnical inputs for the general site layout involving access and haul roads, infrastructure buildings and drainage measures; senior review of geotechnical contribution to the of National Instrument 43-101 (NI 43-101) Feasibility Report. The site is located in low, perennially flooded muskeg terrain underlain by weak glacio-lacustrine clays. The project involved design of concurrent disposal (co-disposal) of PAG-waste rock and tailings that has no direct long-term precedent applied to geographic and climatic conditions similar to Minago.

Independent Nickel, Lynn Lake Nickel Project, Lynn Lake, MB, Canada (2007-2008) – Geotechnical Lead for pre-feasibility design of tailings management facility and preparation of geotechnical contribution to the of National Instrument 43-101 (NI 43-101) Pre-Feasibility Report.

San Gold Corporation, Bissett Gold Mine TM-1 and TM-2 Project, Rice Lake Gold mine site near Bissett, MB, Canada (2007) – Geotechnical consultant for the condition survey of the 2005 clarification pond dam breach and design and implementation of the permanent reclamation.

Dynatec Corporation, Ambatovy Nickel Project, Antananarivo (2006-2007) – Toamasina, Madagascar - Site Manager during pre-feasibility study site investigations by Knight & Piesold, **Geotechnical Designs/Field Investigation Co-ordinator** for detailed designs of infrastructure in Toamasina, tailings management facility site, Ambatovy mine site runoff control dams and waste dumps/low grade ore stock pile and 230 km long ore slurry pipeline.

Potasio Rio Colorado, Rio Tinto, Argentina (2006) – SNC Lavalin's Reviewer of geotechnical designs by Kohn Crippen Berger Ltd.

Kabanga Nickel Company Ltd., Kabanga Nickel Project, Tanzania (2006) – Reviewer for the site investigation program during pre-feasibility study, training of field staff in rock core logging for engineering purposes.

Centerra Gold, Gatsuurt Gold Project, Mongolia (2006) – Reviewer of the main zone open pit slope design, Project Engineer for conceptual designs of acid generating (AG) and non-AG (NAG) waste dumps and reclamation cover for PAG waste in semi-arid climate.

Barrick Gold Corp., Tailings Facility Design, Operations and Information Management Guideline, Salt Lake City, Utah, USA (2005) – Project Engineer for the preparation of tailings management and information technology guideline for Barrick Gold's worldwide tailings facility operations.

Placer Dome Canada, Dona Lake Construction, Pickle Lake, ON, Canada (2004-2005) – Project/Construction Manager for the construction of 2004-2005 closure works, preparation of construction summary report for 2003-2004/5 closure works and coordination of closure plan/cost update to demonstrate the conditions required for the voluntary surrender of the mine to the Crown.

Confidential Client, Golden Giant Mine Closure Review, ON, Canada (2004) – Project Manager for independent review of closure plan/cost estimate.

Inco Technical Services/Lonmin Plc, Preliminary Property Characterization Studies, Sudbury, ON, Canada (2004) – Project Engineer for characterization of six mining properties in the Sudbury area involving flight over survey, field reconnaissance and reporting.

Harmony Gold, Hidden Valley/Hamata Project, Wau Papua New Guinea (2004) – Project Engineer for engineering geological mapping for assessment of Pihema Creek diversion and tailings dam stability and selection of an alternative for creek diversion.

Taseko Mines, Gibraltar Mine, McLeese Lake, BC, Canada (2005) – Project Engineer for redesign of 100 m high cycloned sand tailings dam required for the 2004 restart of tailings deposition/closure design.

Lihir Gold Limited/Lihir Management Company Ltd., Lihir Gold Project, Lihir Island, Papua New Guinea (2004) – Project Engineer for conduction geo-environmental investigation for the acid rock drainage management design around low grade ore stockpiles located within the caldera of an extinct volcano with remnant hydrothermal activity.

Kerramerican Inc., Blue Hill Project, Maine, USA (2002) – Lead Engineer for site remediation designs including detailed designs of north and northwest diversion ditches and auxiliary structures (berm with wide crested weir, temporary road crossing and diversion berm and discharge channel).

Noranda Mining & Exploration Inc., Mattabi Mines Closure Project, Ignace, ON, Canada (2001) – Project Manager/Lead Engineer for the design of yard ditch to intercept contaminated overland runoff/groundwater flow in the northern plant site area and divert it into existing mine creek collection ponds, including impacts of the yard ditch on the existing collection ponds storage capacity.

Société Minière Raglan du Québec Ltée, Raglan Mine Project, Rouyn-Noranda, PQ, Canada (2000-2004) – Project Manager/Lead Engineer for study of alternative tailings disposal options, detailed design of dry-stacked tailings reclamation cover and runoff diversion berm (in permafrost conditions), test pad design/construction and geothermal data analyses, short-term tailings deposition planning.

Noranda Inc., Brenda Mines Closure Project (Sludge Disposal), Kelowna BC, Canada (2000-2002) – Project Manager for conceptual study of alternative sludge disposal options and feasibility study through to detailed design of sludge disposal facility (in unlined pond), preparation of tender documents, construction drawings and design report.

Lac Properties, MacLeod Slope Regrading, Geraldton, ON, Canada (1999) – Project Engineer for design of three spillways. Construction engineer for supervision of tailings slope regarding, construction of three emergency spillways and recommendation of remedial work for freeze-thaw induced lateral cracking.

Diavik Diamonds Mines, Diavik Diamonds Project, Lac de Gras, NT, Canada (1999) – Project Engineer for assessment of subsurface conditions for country rock pile and processed kimberlite containment and preparation of geotechnical cross-sections for sediment containment dikes.

Malaysia Mining Corp., Taldy-Bulak Leftbank Gold Project, Kyrgyzstan (1998-1999) – Project Engineer for tailings dam site selection study based on feasibility study factual geotechnical report, pre-feasibility dam design and environmental impact and mitigation assessment.

Agrium Inc., Kapuskasing Phosphate Rock Project, Kapuskasing, ON, Canada (1998-1999) – Site Engineer for recommendations/supervision for tailings dam leak repair.

Inmet Mining Corp., Sturgeon Lake Mine Remediation Project, ON, Canada (1998-1999) – Project Engineer for the detailed design of cells number one and two emergency spillways and open pit dyke, construction supervision and the preparation of design and as-built reports.

Mattabi Mines, Mattabi Mine Rehabilitation, Ignace, ON, Canada (1998-1999) – Project Engineer for the design of south tailings dam reconstruction, dam stability analyses, detailed spillway design, construction supervision and preparation of design and as-built reports.

Molycorp, Tailings Pond Settlement Evaluation, California, USA (1998) – Project Engineer for settlement analyses of tailings pond.

Barrick Gold Corp., Pierina Gold Project, Peru (1997-1998) – Project Engineer for determining the geologic/geotechnical conditions and design parameters for earthworks, process plant, primary/secondary crushers, administration complex, truck shop and overland conveyor foundations; detailed designs of a 60 m high collection and 30 m high polishing pond dams and collection pond under-liner drainage. Work also included assessment of borrow sources for concrete aggregates/embankments, QA/QC site visits, mapping of landslides along site access road and preparation of design reports, tender documents and construction drawings.

Mine Pit Slopes & Reclamation

Cameco, Rabbit Lake Project, In-pit Tailing Management Facility, SK, Canada (2010) – Technical Lead for the development of feasibility study through detailed designs of the Rabbit Lake in-pit tailing management facility (RLITMF). This is a multi-disciplinary project involving co-ordination and synthesis of the work carried out by a number of geotechnical, mining, and environmental sub-consultants.

Cameco, Key Lake Project, Deilmann Tailings Management Facility (DTMF), SK, Canada (2009) – Senior Reviewer for development of action plan for the timely installation of long-term stabilization measures for the DTMF pit walls in outwash sands in support of Cameco's long-term vision for tailings storage at Key Lake and fulfilling the Uranium Mill Operating License.

Victory Nickel Inc., Minago Project, MB, Canada (2008-2009) – Reviewer for feasibility level Minago pit wall stability assessment.

Largo Resources Ltd, Northern Dancer W-Mo Project, YT, Canada (2007-2008) - Geotechnical Lead for pre-feasibility level assessment of the potential for optimization of slopes for a 450 m deep open pit.

Centerra Gold, Gatsuurt Gold Project, Mongolia (2006) – Reviewer of preliminary flooding rate estimate for the central zone open pit closure.

Société Minière Raglan du Québec Ltée, Raglan Mine Project, Rouyn-Noranda, PQ, Canada (2002-2004) – Project Manager/Lead Engineer for design of Zone 2 open pit closure in permafrost conditions including pit backfilling and reclamation cover based on hydrological and thermal evaluations and basic input for the thermal modeling. Study also included the development of comprehensive, integrated water and waste rock management and reclamation plan including conceptual designs for the progressive through final reclamation of two existing and future seven open pits and associated permanent ore pad and temporary waste rock dumps.

Plievlia Mine, Plievlia Open Pit Mine Slope Stabilization, Plievlia, Montenegro (1992) – Project Engineer for detailed design of open pit mine slope stabilization project (3x106 m3 re-activated old rock failure that breached the pit perimeter grout curtain and diversion ditch leading to discharge of a karst spring into the pit). Work included site investigations to determine a regional structural geology pattern, detailed geotechnical mapping of rock surficial exposures, hydrogeological mapping, and supervision of drilling, packer/slug tests, slope movement/groundwater monitoring, and slope stability analyses.

Foundations/Infrastructure/Environmental Assessments (Mining/Urban/Municipal)

Cominco Resources Ltd., Hinda Phosphate Project, Republic of Congo (2014) – Senior Reviewer for direction of feasibility study level geotechnical investigation for the civil-mine infrastructure including plant and port site facilities as well as 45 km long ore slurry pipeline. The project involved initial site visit and GAP Analysis meeting in Cardiff.

Tazadit Underground Mine SA, Tazadit Project, Mauritania (2013-2014)- Geotechnical Advisor for detailed engineering geotechnical investigation and engineering recommendations for secondary and tertiary crushers, 15000T load out station, tunnel under 90000T product stockpile, accommodation complex, and rail spur.

Royal Nickel Corporation, Dumont Project, QC, Canada (2013-2014) – Geotechnical Advisor for detailed engineering geotechnical investigation and engineering recommendations for foundation design for a 105,000 TPD primary crushing facility and process plant.

Surgold (Newmont Mining), Merian Gold Project, Suriname (2013) – Geotechnical Consultant for third party review of geotechnical investigation and foundation recommendations memoranda and report for plan facilities prepared by Golder Associates.

Independent Nickel, Lynn Lake Nickel Project, Lynn Lake, MB, Canada (2007-2008) – Geotechnical Lead for inputs for foundation designs for surface mine infrastructure and preparation of geotechnical contribution to the of National Instrument 43-101 (NI 43-101) Pre-Feasibility Report.

Dynatec Corporation, Ambatovy Nickel Project, Toamsina, Madagascar (2007) – Reviewer of Knight Piesold's foundation recommendations for the process plant.

Gold Reserve Inc., Brisas Gold Project, Venezuela (2006-2007) – Lead Foundation Engineer for detailed foundation designed for process plant, primary crusher, ore stockpile and reclaim tunnels and preparation of technical memoranda.

Saint Lawrence Seaway Management Corporation, Welland Weir Generating Project, ON, Canada (2005) –

Foundation Engineer for evaluation of geotechnical input for three subgrade reinforced concrete powerhouses to be constructed downstream of regulatory weirs.

Northern Logistics Inc., Fort Albany/Kashechewan Flood Protection, James Bay, ON, Canada (2004-2005) – Lead Engineer for review of existing ring dyke evaluation and finalization of conceptual designs for flood protection.

Inco Technical Services, Copper Cliff No. 17 Substation Geotechnical Investigation, Sudbury, ON, Canada (2004) – Foundation Engineer for subsurface conditions determination and recommendations for foundations.

Harmony Gold, Hidden Valley/Hamata Project, Wau Papua New Guinea (2004) – Project Engineer for geotechnical investigation of site facilities.

KMK Consultants, Whitby Zone 3 Water Facility, Whitby, ON, Canada (2002) – Project Engineer for geotechnical investigation/foundation design.

De Beers Canada, Victor Diamond Project, James Bay Area, ON, Canada (2000-2004) – Lead Foundation Engineer for proposal preparation and conduction pre-feasibility and feasibility level geotechnical investigations for the determination of overall geologic and geotechnical conditions including design parameters for design of earthworks and foundation for all mine facilities, both at Victor site and in the community of Attawapiskat. The Study included assessments of settlement and dewatering characteristics of fan and bog peatlands and borrow sources for concrete aggregates/embankments.

SLF Joint Venture, Highway 407 and Woodbine Avenue Interchange, Markham, ON, Canada (1999) – Project Manager for proposal preparation, overall project management, main technical input, recommendations for design/construction of existing ramps realignment, three new ramps, two basket weave structures and widening of Highway 404 overpass over Highway 407.

SLF Joint Ventures, Highway 407 and Britannia Road Interchange, Milton, ON, Canada (1999) – Project Manager for proposal preparation, overall project management, technical input, design/construction recommendations for 4 ramps, bridge widening over 16 Mile Creek, Britannia Road overpass.

Barrick Gold Corp., Bulyanhulu Gold Mine, Tanzania (1999) – Foundation Engineer for detailed design of foundations for headframe, shaft and hoist houses, crusher building, crushed ore bin, process plant and auxiliary structures.

Town of New Tecumseth, Collingwood-Alliston Water Transmission Line, ON, Canada (1998-1999)– Project Manager for site investigation for design and construction of 56 kilometre long pipeline, including assessment of dewatering requirements, trench stability and support requirements, river/creek crossings conditions, jack and bore tunneling conditions and suitability of native materials for bedding and backfill, as well as detailed geotechnical designs for river/creek crossings.

Malaysia Mining Corp., Taldy-Bulak Leftbank Gold Project, Kyrgyzstan (1988-1999) – Project Engineer processing plant site selection and design recommendations for process plant crushing and transfer buildings as well as fine and coarse ore bins.

Agrium Inc., Kapuskasing Phosphate Rock Project, Kapuskasing, ON, Canada (1998-1999) – Project Engineer for foundation design recommendations for concentrate thickener tank, freshwater tank and pump house and recommendations/supervision for tailings dam leak repair.

NLK Consultants, Plant Upgrade for St. Mary's Paper Inc., Sault Ste. Marie, ON, Canada (1997-1998) – Project Engineer for geotechnical foundation investigation for proposed cull pulper, core room and winders.

Barrick Gold Corp., Pierina Gold Project, Peru (1997-1998) – Project Engineer determining the geologic/geotechnical conditions and design parameters for earthworks, process plant, primary/secondary crushers, administration complex, truck shop and overland conveyor foundations.

Public and Private Sector Clients of Shaheen & Peaker Consulting Geo-Environmental Engineers Ltd., ON, Canada (1993-1997) – Geo-environmental Engineer for numerous urban geo-environmental projects (commercial and industrial structures, roads & pavements, water mains, etc.) with responsibilities including

geotechnical & environmental investigations, Phase I Audits and Phase II Audits, project management and preparation of engineering reports. **Manager of Field and Laboratory Operations** responsible for training and supervision of 20 engineers, technologists and technicians involved in geotechnical field control of compaction, foundation inspections (spread and strip foundations, pile driving, caissons), road subgrade inspections, QC testing for pavement, vibration monitoring, record keeping, certification of work progress/quantities, and laboratory testing soils, aggregates, asphalt and concrete. Key projects:

- ❖ **Molson Breweries, Molson Amphitheatre at Ontario Place for, Toronto, Ontario, Canada (1993-1994) - Field Engineer** for construction supervision for the movement of a large quantity of fill, caissons and driven pile installations, spread and strip foundations in challenging soil conditions, open lake fill, mechanically stabilized earth slopes and contamination cleanup.
- ❖ **Bayview Country Estates, Summit Trail on Bayview Subdivision, Richmond Hill, Ontario, Canada (1993) – Field Engineer** for construction supervision of 40,000 m³ cut/fill operations including engineered fill, roads, storm drainage facilities and appurtenances.

Mali Ston Municipality, Mali Ston Environmental Impact Assessment Study, Croatia (1992) – Project Engineer for EIA in relation to influence of freshwater sources from karstic hinterland on Mali Ston Bay brackish aqua culture.

Gorni Milanovac Municipality, Water Treatment Plant Project, Serbia (1990-1991) – Project Engineer for foundation investigation including engineering geological mapping, drilling supervision, soil sampling (weathered zone), rock core logging and in-situ hydraulic conductivity testing.

Hydropower & Water Resources - Water Retention Dams and Appurtenances

Arrow Lakes Power Corporation, Arrow Lakes Generating Station Project, Castlegar, BC Canada (2005) - Reviewer of 2005 semi-annual inspection report including interpretation of geotechnical instrumentation data in relation to the damage of the approach channel and exposure of under drainage system and proposal for permanent repairs.

Ontario Power Generation, Niagara River Sites Dam Safety Review, Niagara Falls, ON, Canada (2005) - Lead Geotechnical Engineer for the provision of the main geotechnical input for about 7.4 km long pump generating station (PGS) dyke/headwork and Sir Adam Beck Niagara 1 and 2 generating stations based on review of background data and formal site evaluation through low and high water inspections.

Nova Scotia Power, Nictaux Hydro System Dam Safety Review, Nictaux Falls, NS, Canada (2005) - Lead Geotechnical Engineer for the assessment of five earthfill dams and development of remedial measures.

Conservation Hamilton, Kelso Dam Safety Review, Milton, ON, Canada - Lead Engineer for main geotechnical input to project involving general project guidance, site evaluations and reporting.

Conservation Hamilton, Kelso Dam Safety Review, Milton, ON, Canada (2005) - Lead Engineer for main geotechnical input to project involving general project guidance, site evaluations and reporting.

Niagara Peninsula Conservation Authority, Binbrook Dam Emergency Spillway, Binbrook, ON, Canada (2005) - Lead Geotechnical Engineer for main geotechnical input into project including site investigation and reporting.

Quinte Conservation Authority, Belleville Ice Control Damson the Moira River Safety Reviews, Belleville, ON, Canada (2004-2005) - Lead Geotechnical Engineer for main geotechnical input to project including review of background data and formal site evaluations and reporting.

Great Vancouver Regional District, Seymour Dam Seismic Upgrade for, Vancouver, British Columbia, Canada (2004) - Project Engineer for literature review for interpretation of results of explosive densification in foundation.

Guinean Government, Millo Earth Fill Dam, Guinea (1992-1993) - Geotechnical Engineer for a desk study for a 30 m high earth fill dam.

Plievlia Mine, Plievlia Open Pit Mine Development, Plievlia, Montenegro (1992-1993) – Project Engineer for feasibility study of 20 m high arch dam, 380 m long tunnel and 3.2 km long channel for Cehotina River detour

for the development of Plievlia coal mine, including geodetic mapping of structural geology features near dam abutments and engineering report preparation.

Iraqi State Commission for Dams, Bekhme Dam, Kurdistan, Iraq (1988-1990) - Project/Construction Engineer for geotechnical hydrogeological aspects for design during construction of 240 m high earth-rock dam and large appurtenant underground structures. Work included detailed engineering geologic mapping and additional geotechnical/hydrogeological investigations to optimize decisions taken by previous consultants/international board of experts; assessment of project site karstification near core foundation and grouted cut-off; construction supervision of high open and large underground excavations, rock mass classifications, rock reinforcement for temporary works and proposal for grouting curtain delineation.

Dubrovnik Hydropower Plants, Underground Water Storage, Dubrovnik, Croatia (1989-1991) - Project Engineer for feasibility study of water storage by building a one hundred meter high underground dam (grouting curtain) in the hinterland of karst spring Ombla, including geological/hydrogeological mapping of dam site, air photo and satellite imagery interpretation, supervision of drilling and pack testing, logging of rock cores, geotechnical mapping of underground exposures in access and grouting gallery and groundwater tracer tests.

Serbia Hydro, Mlava-Gornjak Multipurpose Water Development System, Serbia (1989-1990) - Project Engineer for feasibility siting study, geotechnical/hydrogeological investigation including air photo and satellite imagery interpretation, engineering geological/hydrogeological mapping, logging of drill cores, locating of rock quarries and borrow areas.

Bosnia Hydro, Buk Biela Arch Dam, Bosnia (1986-1987) - Project Engineer for foundation design of one hundred meter high arch dam, including investigation of jointed conglomerate in investigation audits and deformability evaluation, drilling supervision and rock core logging.

Serbia Hydro, Iron Gate Dam, Negotin, Danube River, Serbia/Romania (1986-1987) - Project Engineer for stabilization of the second phase cofferdam area involving geotechnical investigation of an active landslide. Work included engineering geological mapping, supervisions of drilling and test pitting and preparation of engineering report. **Construction Engineer** for the supervision of foundation excavation for the Serbian navigation lock.