COMPETENCY ASSESSMENT

CATEGORY	COMPETENCIES (10)	
1. Technical Competence (10 competencies)	1.1 Demonstrate your knowledge and awareness of Canadian regulations, codes and standards. This includes local engineering procedures and practices as applicable.	1. Identify and comply with legal and regulatory requirements for project activities 2. Incorporate knowledge of codes and regulations in your area of practice 3. Understand regulations that affect the handling, transportation and disposal of waste materials 4. Experience using standards (e.g. ASTM) for testing 5. Demonstrate awareness of safety documents, standards and regulations (e.g. Work-Safe/Workers' Compensation Board, ASHRAE, material safety data sheets)
	1.2 Demonstrate knowledge of materials, or operations as appropriate, project and design constraints, design to best fit the purpose or service intended and address inter-disciplinary impacts.	1. Demonstrate knowledge of materials application, usage and/or operations: cost, storage, quality & handling problems 2. Develop and implement evaluation, maintenance or rehabilitation programs for facilities and operations 3. Coordination with other disciplines 4. Materials selection and design for specific applications (e.g. biomedical, automotive, aerospace, electronics)
	1.3 Analyze technical risks and offer solutions to mitigate the risks.	1. Demonstrate familiarity with metallurgical system protection objectives, philosophies, and functions 2. Identify risk areas 3. Demonstrate an understanding of the development of risk management plans 4. Demonstrate an understanding of the difference between technical risk and public safety issues 5. Demonstrate awareness of Statistical Process Control and its role in detecting process deviations and associated risks

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	1.4 Apply engineering knowledge to design solutions.	1. Perform heat and mass balance calculations including data reconciliation 2. Report on metallurgical accounting in a plant 3. Circuit design and selection. Equipment sizing including throughput, residence time, and chemical kinetics calculations 4. Failure analysis using microstructural and analytical characterization techniques (OM, SEM, TEM, XRD, AA). Demonstrate understanding of failure modes (e.g. creep, fatigue, corrosion, hydrogen cracking) 5. Use of equilibrium phase diagrams (temperature-composition, eH-pH, and Evans Diagrams) or non-equilibrium diagrams (TTT diagrams), or experimental determination of phase equilibria 6. Perform alloy composition calculations. Demonstrate understanding of effects of alloying ingredients and strengthening mechanisms 7. Demonstrate pilot-scale testing of new processes 8. Design and implementation of environmental control technologies for gas, liquid, and solid waste streams. Demonstrate understanding of strategies for tailings disposal 9. Demonstrate understanding of mechanical properties and testing: stress-strain behaviour, fracture mechanics, fatigue, creep, toughness 10. Design for corrosion prevention (coatings, thin films, materials selection) 11. Design weld parameters and prepare welding procedures
	1.5 Be able to understand solution techniques and independently verify the results.	1. Participate in an independent review process 2. Demonstrate an understanding of the engineering principles used in the application of computer design programs
	1.6 Demonstrate your knowledge and awareness of Canadian regulations, codes and standards pertaining to safety.	1. Use of non-destructive evaluation techniques for weld evaluation 2. Review and assess results for equipment and material evaluation 3. Understand and account for safety risks associated with processes. Identify relevant metallurgical processes and personal protection equipment to mitigate safety risks 4. Review, identify and incorporate safety procedures, system operating procedures, processes and equipment 5. Demonstrate specific knowledge of safety regulations 6. Incorporate explicit human and public safety considerations in design and all other professional activities
	1.7 Demonstrate understanding of systems as well as of components of systems.	1. Demonstrate understanding of complex process flow diagrams and of each unit operation in the process 2. Develop process improvement initiatives. Demonstrate understanding of continuous improvement philosophy and practice 3. DDemonstrate understanding of effects of process modifications on downstream processes and final product 4. Demonstrate familiarity with control systems and strategies 5. Demonstrate understanding of limitation of process control

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	1.8 Exposure to all stages of the process/project life cycle from concept and feasibility analysis through implementation.	1. Demonstrate awareness of project concerns and roles of other stakeholders in the project stages: ◦ **Identification:** generation of the initial project idea and preliminary design ◦ **Preparation:** detailed design of the project addressing technical and operational aspects ◦ **Appraisal:** analysis of the project from technical, financial, economic, social, institutional and environmental perspectives ◦ **Preparation of specifications and tender documents:** preparation of tender document, inviting and opening of tenders, pre-qualification, evaluation of bids and award of work ◦ **Implementation and monitoring:** implementation of project activities, with on-going checks on progress and feedback ◦ **Evaluation:** periodic review of project with feedback for next project cycle
	1.9 Demonstrate your understanding of the role of peer review and quality management that is essential to engineering practice in Canada.	1. Conduct field checks to verify the validity of design and fabrication 2. Follow Quality Management principles in practice 3. Prepare quality assurance plans, including frequency and test parameters, for specific construction processes or products 4. Evaluate test results and determine adequacy 5. Carry out or supervise field testing of materials or welds 6. Carry out or supervise implementation of new processing equipment
	1.10 Transfer design intentions to drawings and sketches; Understand transmittal of design information to design documents.	1. Demonstrate communication of ideas and concepts to project team members 2. Demonstrate understanding of value of project completion reports and lessons learned reports, to application in future projects by self or others 3. Review designs of others and communicate findings and issues, including suggested alternatives 4. Develop welding data cards