APEGS
Association of Professional Engineers & Geoscientists of Saskatchewan

COMPETENCY ASSESSMENT GUIDE

FOR APPLICANTS AND VALIDATORS

Version 19 – January 15, 2024
Adapted from Engineers & Geoscientists BC's *Competency Assessment Guide*

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1 INTRODUCTION

This Guide is intended to assist professional engineering (P.Eng.) or professional geoscience (P.Geo.) applicants in completing their competency submission, as well as to guide Validators in verifying the submissions.

Only engineers or geoscientists licensed with APEGS, or those practicing under the direct supervision of a P.Eng., P.Geo., Engineering Licensee or Geoscience Licensee licensed with APEGS, have a legal right to practice engineering or geoscience on projects or properties located in Saskatchewan. The competency assessment system is intended to preserve the quality, responsibility, professionalism, and reputation of the professions. The **Competency Framework**, was designed to ensure that professional registration requirements uphold and protect the public interest while maintaining an equitable, transparent, consistent and efficient registration process. The **Competency Framework** comprises the required proficiencies to enter the engineering or geoscience profession.

Competency assessment is conducted to determine whether applicants have progressed to a professional level of competency during their engineering or geoscience work experience.

2 COMPETENCY FRAMEWORK

2.1 ELEMENTS AND DEFINITIONS

Competency

Competency can be defined as the ability to perform the tasks and roles of an occupation to standards expected and recognized by employers and the community at large.

Competencies

Competencies are skills or knowledge the applicant must demonstrate at a required level of expertise.

Competency Categories

Competency Categories are groupings of related competencies.

For engineering the categories are:

1. Technical competence
2. Communication
3. Project and financial management
4. Team effectiveness
5. Professional accountability
6. Social, economic, environmental and sustainability
7. Personal continuing professional development (CPD)

For Geoscience the categories are:

1. Professional Competencies - Professionalism
2. Competencies in Scientific Method
3. Competencies in Area of Geoscience Practice
4. Complementary Competencies - Communication and Management

Level of Competence

Each competency is rated on a scale of zero to five. The rating scale is used to assess the level of competence demonstrated by the example. The **Competency Rating Scales** are explained in section 2.

Indicators / Workplace Examples

The term *Indicators* is used in the engineering online system and *Workplace Examples* is used in the geoscience online system. They are examples of types of activities, actions, skills or behaviours that an applicant could use to demonstrate the competency. A list of *Indicators* and *Workplace Examples* are provided for each Competency to help applicants understand what to describe for their area of practice, they are not requirements.

Indicators - Engineering

There is one generic indicator list that covers all the **Competency Categories** for all engineering disciplines. There are also discipline-specific indicator lists for the Technical Competence category (Category 1) for several engineering disciplines, including:

- Structural.
- Civil: Municipal/Infrastructure.
- Electrical: Power and Industrial.
- Materials, Metallurgical and Mineral Processing.
- Building Enclosure.
- Software.

Even if your work experience was in one of the above areas, it is your choice as to whether or not you refer to the discipline-specific indicators when completing your entries or if you use the generic indicator list. The indicator lists are found in Appendices E-2 to E-8.

Workplace Examples - Geoscience

There is one generic Workplace Example list that covers all the **Competency Categories** for all geoscience disciplines.

Competency Assessment System

The system operates through an efficient, easy-to-use online system. Through the **Competency Assessment System**, applicants can save their work experience information, monitor their progress towards meeting the competency requirements, and submit this information for online validation and assessment.

2.2 COMPETENCY RATING SCALE

The **Competency Rating Scale** is used to determine whether an applicant has achieved the required level of competence.

See Table 1 (engineering) and Table 2 (geoscience) for a brief outline of the **Competency Rating Scales**. The rating scale descriptions in the tables below are abridged. Refer to the actual wording in the online system when selecting your ratings.

Each competency category has an average rating that is required for an applicant to pass. If the category average is below the required passing rating or a rating of zero is assigned to any individual competency, then that category fails and all competencies below the required average rating must be resubmitted.

The required average ratings to pass are shown in Appendix E1 for engineering and G1 for Geoscience.

TABLE 1 – COMPETENCY RATING SCALE – ENGINEERING - Abridged (2 pages)

Compe-tence Level	Category 1	Short Description: Categories 2-6	Short Description: Category 7	Direct Supervision Required	Responsibility & Risk	Complexity of applicant's work	Supervision & Development of Others* *Category 1 only
0	Little or no exposure to the competency	Little or no exposure to the competency	No CPD completed and/or planned; no gap analysis	N/A	N/A	N/A	N/A
1	Training Level: A general appreciation and awareness of the competency is required	Training Level: A general appreciation and awareness of the competency is required	Minimal amount of CPD completed and/or planned; CPD completed may not address professional competence; an incomplete gap analysis	Significant	Minimal	Minimal	None
2	Requires knowledge and understanding of objectives; uses standard engineering methods and techniques in solving problems	At a level of limited experience; carries out activities of limited scope and complexity; requires knowledge and understanding of objectives	A marginal amount of CPD completed and planned; a marginal/insufficient gap analysis	Considerable	Some	Some	Limited
3	Carries out assignments of moderate scope and complexity; is typically seen to be prepared to assume professional engineering responsibilities	Approaching a professional level; carries out activities of moderate complexity	Adequate amount of CPD completed and/or planned; an adequate gap analysis	Some	Considerable	Moderate	Some

Compe-tence Level	Category 1	Short Description: Categories 2-6	Short Description: Category 7	Direct Supervision Required	Responsibility & Risk	Complexity of applicant's work	Supervision & Development of Others* *Category 1 only
4	Carries out responsible and varied assignments requiring general familiarity with a broad field of engineering and knowledge	Working at a professional level; carries out responsible and varied activities	A good amount of CPD completed and/or planned; a strong gap analysis	Minimal	Significant	Considerable	Some
5	Uses mature engineering knowledge; independent accomplishment, and coordination of difficult and responsible assignments	At a mature professional level; independent coordination of difficult and responsible activities	Provides and demonstrates leadership in Continuing Professional Development (CPD) activities; a superior gap analysis	Autonomous	Total	Significant	Some

TABLE 2 – COMPETENCY RATING SCALE – GEOSCIENCE

Competence Level	The applicant's provided example demonstrates:
0	No exposure to the competency
1	A general awareness of the competency and its significance in practice
2	Application of the competency, or components of the competency, with considerable supervision, in situations of low complexity and low risk
3 (entry to practice)	Application of all components of the competency with limited supervision, in situations of moderate complexity and moderate risk. This may include situations in which the applicant supervises others in application of aspects of the competency, while maintaining accountability for their work
4	Application of the competency with minimal supervision, in situations of considerable complexity and moderate risk. This may include situations in which the applicant supervises others in application of aspects of the competency, while maintaining accountability for their work
5	Application of the competency without supervision, in situations of significant complexity and high risk. This may include situations in which the applicant supervises others in application of aspects of the competency, while maintaining accountability for their work

2.3 Roles & Responsibilities

The following is an overview of the roles and responsibilities of each participant in the competency assessment system.

APPLICANT

- Provides work experience details through the **Competency Assessment System**, including work experience chronology and specific examples to address each **Competency**.
- Provides self-assessed **Competence Level** for each **Competency** according to the **Competency Rating Scale**.
- Provides contact information for Validators to verify and provide feedback on their competency assessment. Applicants must not validate their own competencies.

VALIDATORS

- Confirms the work experience information of which they have personal knowledge.
- Provide independent **Competence Level** ratings for **Competencies** assigned to them.
- Provides overall feedback on the applicant's readiness for professional registration.
- Applicants must not assist their validators. If validators need assistance, please contact APEGS.

ASSESSORS

- Reviews applicant's submission as well as Validators' feedback.
- Provides ratings for each **Competency**.
- Provide guidance on competencies that must be resubmitted.
- Makes a recommendation on applicant's readiness for professional registration.

3 Documentation and Instructions

3.1 Submission Components

There are two main components that applicants must complete as part of their competency assessment, which are both submitted through the **Competency Assessment System**:

1. A brief, chronological **Employment History**. This provides a short form overview of an applicant's experience.
2. A **Competency Self-Assessment** using examples drawn from work experience to demonstrate achievement of each **Competency**.

3.2 Before You Apply

- Familiarize yourself with the **Competency Framework** in appendix E1 for Engineering and G1 for Geoscience. The framework is also available within the **Competency Self-Assessment** section of the online system.

- For engineering applicants there is also a tutorial in the online system.

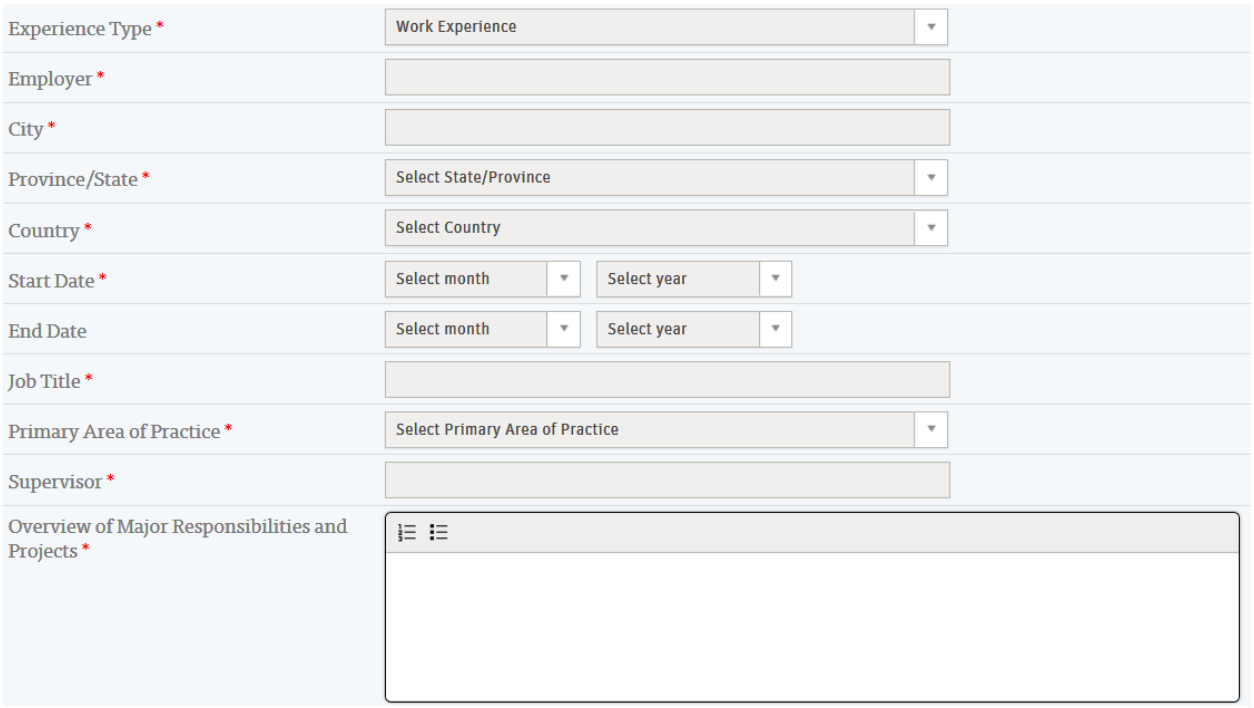
3.3 EMPLOYMENT HISTORY

All applicants must complete an **Employment History** summary through the **Competency Assessment System**. The Employment History section creates a chronological overview of an applicant's experience, including responsibilities in each position. The summary can be edited at any time before an applicant submits their final **Competency Self-Assessment**.

Remember to:

- Briefly explain any gaps or overlaps in time periods.
- Demonstrate evidence of progression of experience and responsibility throughout your career.

The format of entries in the Employment History section is as follows:



For each item, you select "add employment history" and enter the relevant information. You are asked to classify each item as "work experience", "other/non-engineering", "other/non-geoscience" or "thesis."

In the "Overview of Major Responsibilities and Projects" section, provide a brief outline of the major projects and a description of your role. Point form is permitted.

<u>Four years of experience requirement</u>

You must enter at least 4 years of experience in the Employment History table. APEGS staff will check to

make sure you have at least 4 years of work experience that is eligible for assessment. For an employment period to count, it must be properly validated, as per section 3.4.1 and the validator must indicate that the work was engineering or geoscience.

If you have significantly more than 4 years of work experience it is recommended that you enter it all in the Employment History table even if you are not using any examples from some employment periods. By including all your relevant experience, you provide the assessor with a clear understanding of your entire experience background. Types of Eligible Experience

Eligible experience is counted as follows:

Post-bachelor's experience – Acceptable full-time engineering or geoscience experience is counted based on the number of months of experience. If experience was less than full-time then you must indicate the percentage in the Overview box. Lay-offs and leaves of absence are not counted for the four years. The time counted cannot exceed calendar time so if you worked more than 40 hours per week you cannot count that as additional time worked.

Pre-graduation experience – One year maximum can be counted. Experience must be from after half of the bachelor level university program of study was completed and must have been supervised by a professional engineer, professional geoscientist, engineering licensee (if the experience was within their scope of practice) or geoscience licensee (if the experience was within their scope of practice) registered anywhere in Canada or the USA.

Completed thesis-based Master's degree in engineering or geoscience – One year maximum can be counted. Attach the thesis abstract and list of publications in the online system. A course-based Master's is not eligible to be counted for experience.

Completed PhD in engineering or geoscience – Two years maximum can be counted if the PhD program was entered directly after a bachelor program. Only one year can be counted when a Master's was completed; i.e. the maximum allowable experience counted for all graduate studies is two years. Attach the thesis abstract and list of publications in the online system.

Engineering or Geoscience work while doing graduates studies – Any engineering, geoscience or Teaching Assistant / Research Assistant work not related to your graduate degree work is eligible to be counted. Engineering or geoscience experience gained with an employer outside the university setting is also eligible. The number of months experience counted cannot exceed the actual calendar time. This experience is entered as separate employment periods from your graduate degree even though the time periods might overlap.

Teaching of engineering or geoscience – Examples from this type of experience are eligible for submission. You include the applicable content of what you taught to demonstrate the competency. Engineering courses taught must have engineering science and/or engineering design content as defined by the Canadian Engineering Accreditation Board to be eligible.

Technologist experience prior to completing bachelor degree - One year maximum can be counted in exceptional cases where an applicant has, at a minimum, a technologist level education prior to going back to university to obtain a bachelor level degree in engineering or geoscience. This

experience must have been supervised by a professional engineer, professional geoscientist, engineering licensee (if the experience was within their scope of practice) or geoscience licensee (if the experience was within their scope of practice) in order to be considered.

Recent experience – Applicants must have at least 6 months of work experience within the two years immediately prior to submitting their application.

3.4 VALIDATORS REQUIREMENTS

Through the **Competency Assessment System**, applicants provide the names and email addresses of Validators. Validators verify and provide feedback on the engineering or geoscience experience.

Validator Types, Roles, and Requirements

Competency Validators are assigned to validate one or more competency examples.

- They must have firsthand knowledge of the competency examples they are validating and must have been working with the applicant during the employment period for the example.
- They must be an experienced engineer or geoscientist (at least 4 years of professional level engineering/geoscience experience), or other person with technical expertise in the area of practice relevant to the example. For experience that took place in Canada, they should be the licensed engineer or geoscientist taking professional responsibility for the work.
- They would typically be a supervisor, colleague, or client.

Professional Reference Validators are Canadian licensed professional engineers or professional geoscientists (or equivalent*). They are not validating specific competencies but providing their professional assessment of the applicant's character and readiness for licensure by answering the general feedback questions (see below for detailed list of questions).

- They must have worked with the applicant during at least one period of their employment history.

Employment History Validators are to validate an employment period that has not been validated either by using a competency example during that period, or by a *Professional Reference Validator* from that period.

- They could be a colleague, supervisor, or other person with appropriate authority with the same organization or another organization who they worked with, to confirm the position and employment period (e.g. Owner, President or HR Manager, etc.).

*or equivalent, includes engineering licensee and geoscience licensee (or equivalent titles elsewhere in Canada) and licensed professional engineers from countries that are members of the International Professional Engineers Agreement or Asia Pacific Economic Cooperation Agreement under the International Engineering Alliance and those licensed as a Professional Geoscientist in the United States

In extenuating circumstances, upon applicants providing acceptable documentation, the Director of Registration may approve the request to use a validator that does not meet the above requirements.

Validation of Employment History

Applicants must have a minimum of 48 months of experience from their employment history table validated. Credit will only be given for the number of months in an employment period if:

- At least one competency example from that period has been validated by a *Competency Validator* and the validator indicated that the work during that period was engineering/geoscience and provided acceptable answers to the general feedback questions.

OR

- At least one *Professional Reference Validator* indicated that the work during that period was engineering/geoscience and provided acceptable answers to the general feedback questions.

OR

- At least one *Employment History Validator* indicated that the work during that period was engineering/geoscience and provided acceptable answers to the general feedback questions.

Number of Validators Required

A minimum of four validators are required, including at least two that are licensed professional engineers or geoscientists in Canada (or equivalent*). Applicants may require more than four to ensure that a minimum of four (4) years of experience in the employment history has been validated.

Validator Identity and Qualifications

APEGS requires evidence that validators are qualified to assess competence in professional engineering or professional geoscience, as well as proof of their identity. For validators that are licensed professional engineers or geoscientists in Canada (or equivalent*), APEGS can independently verify both of those things based on their registration number, which they are required to provide as part of the validation process. Validators who are not licensed professional engineers or professional geoscientists in Canada (or equivalent*), are required to provide a brief resume of their professional engineering/geoscience experience and academic qualifications (in English). In some circumstances APEGS may contact validators to verify their identity.

Applicants should ensure that their Validators have sufficient English language competence to understand the process and the competencies they are validating, without any help from the applicant. If applicants assist their validators, the validation may have to be redone. If validators need help to undertake their validation, applicants must contact APEGS for assistance.

Validator Requirements for Academic Confirmation

For applicants whose bachelor level education is from outside of Canada, APEGS must confirm that the level of education is comparable to that in Canada. This verification is usually done by writing confirmatory exams. However, applicants may be given the option of submitting work experience to try and get the exams waived. In this case applicants will only have the technical competency category(s) assessed and the validator requirements are different than those outlined above.

A minimum of two (2) validators are required and none of the validators are required to be licensed professional engineers or geoscientists in Canada (or equivalent).

Once applicants become a member-in-training they will be required to complete a full competency assessment and meet the validator requirements above before they are eligible to apply as a professional engineer or professional geoscientist.

Validator General Feedback Questions

All validators must provide acceptable answers, as determined by the Director of Registration, to the following general feedback questions. These questions serve the purpose of providing a reference as well as validation of specific periods of work experience.

1. Please specify your current employer and position.
2. What is your professional designation?
3. What is your jurisdiction of registration?
4. What is your discipline of engineering/geoscience?
5. What is your registration/license number, if applicable?
6. What is your relationship with the applicant?
7. During what time period have you known the applicant?
8. During which time period did you have a professional/business relationship with the applicant?
9. What is or was your professional/business relationship to the applicant?
10. Have you reviewed and taken responsibility for the applicant's work?
11. In your opinion, is the applicant's character acceptable?
12. In your opinion, are the applicant's English language skills related to the provision of engineering/geoscience services at a level sufficient to protect the interest of the public?
    a. reading
    b. writing
    c. listening
    d. speaking
13. In your opinion, does the applicant:
    a. apply engineering/geoscience principles in a knowledgeable and accurate manner?
    b. have the ability to recognize and work within their limitations?
    c. possess sound professional judgment?
    d. adhere to the provincial licensing body's Code of Ethics?
14. Do you feel that you have enough support and information to complete the task of validation and to make a judgement whether the applicant is ready to assume professional responsibility?
15. In your judgment, how much of the applicant's experience with which you are specifically familiar was engineering/geoscience?
16. In your judgment, has the applicant reached a "professional level" in their work? If your answer is "Yes", you are indicating that the applicant can accept full professional responsibility and has reached the level of professional maturity needed to judge when they are out of their area of competence.

Validator Participation

It is highly recommended that applicants contact their validators ahead of time to ensure they are willing to undertake the validation process. This will help to ensure that they are ready and willing to undertake the validation when they are contacted through the online system. It is the applicant's responsibility to ensure that their validators participate in the process in a timely manner.

3.5 Quality Control Check

All competency-based assessment submissions will be reviewed by a professional staff assessor (*Admissions Engineer/Admissions Geoscientist*) before being reviewed by a volunteer assessor. The *Admissions Engineer* or *Admissions Geoscientist* will check to ensure that the experience described in the employment history table is engineering or geoscience work and that it could be at a professional level. If they think it might not be, it will be sent to the Experience Review Committee (ERC) to determine whether it warrants an assessment. If the ERC determines the work is not likely to qualify as professional engineering/geoscience as defined in the Engineering and Geoscience Professional Act, the applicant will be advised that it does not qualify for assessment.

If the *Admissions Engineer* or *Admissions Geoscientist* is not able to understand the submission because spelling or grammar, or the amount of information provided is insufficient, the applicant will be advised that the quality of the submission is not good enough to qualify for assessment. In this case, the assessment will be reopened, and the applicant will be required to rewrite all the competencies and have them revalidated.

3.6 Competency Example Requirements

Applicants should choose the best example from any time in their work experience history, to address each competency. The same project may be used for multiple examples, but the details must be adapted to demonstrate aspects of the work that relate to the specific competency.

Applicants must ensure that:

- Every Competency example clearly identifies that it was undertaken within an engineering or geoscience context. If it does not, it will receive a rating of zero.
- Every example clearly explains how it addresses the Competency. If it does not relate to the Competency, it will receive a rating of zero, even if the work described is engineering or geoscience.
- Examples include specific details that demonstrate the work is engineering or geoscience.
- Examples demonstrate the appropriate level of involvement of the applicant.

Any Competency that receives a rating of zero must be rewritten, revalidated and resubmitted.

3.6.1 Entering Examples in the Online System

Under each **Competency**, you are asked to describe the example of your engineering or geoscience activities that best demonstrates your achievement of the competency. In the online system *Indicators / Workplace Examples* are provided for each competency to assist in identifying types of work to submit.

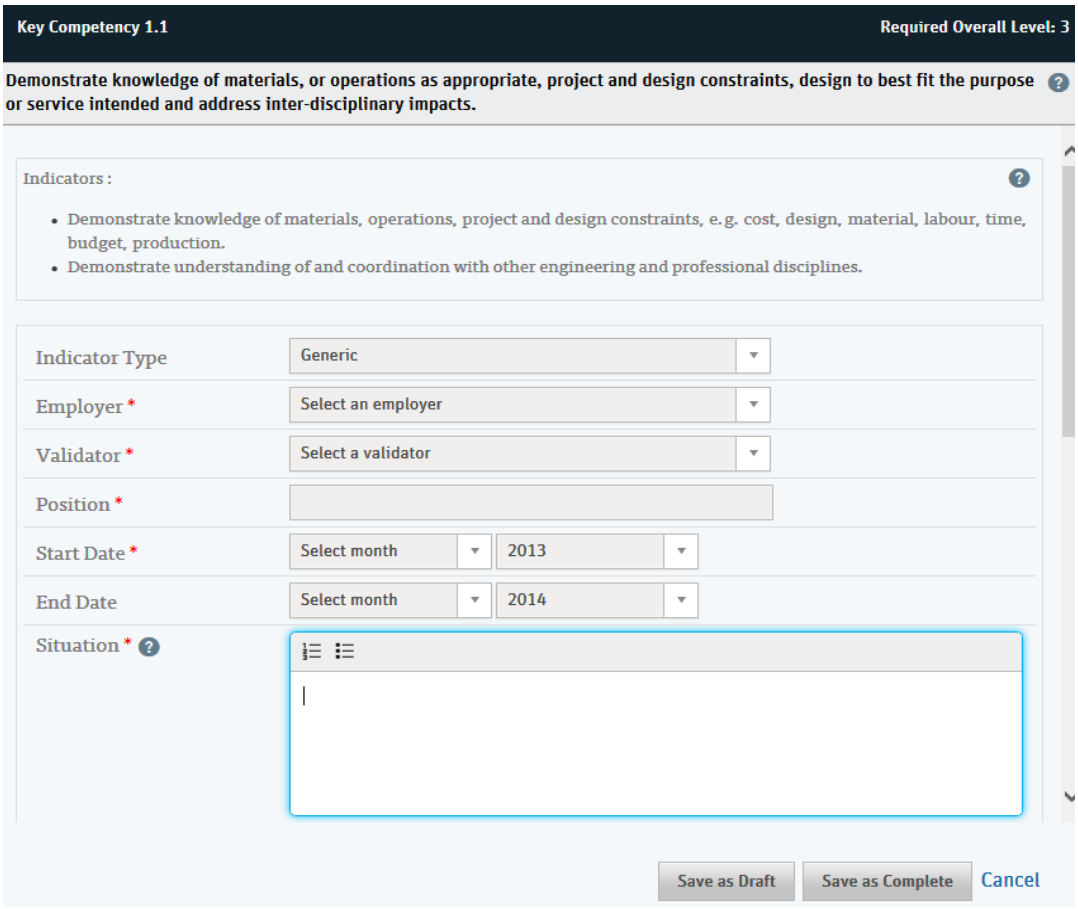
For each **Competency** for engineering applicants, you may view different types of indicators from the "indicator type" drop-down list; the generic indicators are recommended for most situations, but

discipline specific indicators are also available for Category 1.

Each competency example is linked to an entry in the employment history table and includes the following information:

- **Employer and Position**: Your employer and position at the time of the work described in the example.
- **Validator:** The professional engineer or professional geoscientist (or equivalent*) that has first-hand knowledge of the work you are asking them to validate.
- **Start Date and End Date (Month/Year)**: The time period covered by your specific example for this competency.
- **Situation**: A brief overview of a specific situation or problem. The same situation can be used to cover multiple **Competencies**.
- **Action**: The actions that you took in response to the situation, including engineering or geoscience judgments made or solutions found. This section is typically the longest portion of the example and should include details about the specific actions that you took that demonstrate completion of the **Competency**.
- **Outcome**: The impact that your actions, solutions or judgments generated.
- **Canadian Example**: Indicate whether this experience was gained in a Canadian environment (Yes or No). See section 3.5.5 for details on Canadian Environment Experience.
- **Self-Assessed Competence Level**: The level on the **Competency Rating Scale** that you believe you have demonstrated in the example.

The image below shows what a competency example looks like in the online system.



Warning: You cannot edit the content of your competencies or your Validator assignments after you have selected the button to submit your assessment for validation. Do all the necessary checks to ensure accuracy, like you would do in your professional practice, prior to submitting.

3.6.2 Canadian Work Experience

Work experience in Canada is not a requirement for those applying as a professional engineer. However, for certain competencies applicants must demonstrate that they understand the Canadian context. These competencies are called *Canadian Environment Competencies (CECs)*.

For those applying as a professional geoscientist, one year of Canadian Experience is required until the Canadian Work Environment Competencies (CWECs) come into effect for geoscience.

3.6.2.1 Canadian Environment Competencies – Engineering

Engineering applicants are required to demonstrate the following eight competencies in a Canadian or equivalent-to-Canadian work environment*: 1.1, 1.6, 1.9, 2.1, 2.2, 2.3, 5.1, 6.2. Each of these competencies must be passed with a rating of the applicable Category average.

In the online system there is guidance provided for each of the CECs on how to demonstrate understanding of the Canadian context.

3.6.2.2 Canadian Environment Experience - Geoscience

Geoscience applicants are required to have at least one year of experience in a Canadian or equivalent-to-Canadian environment. This is shown in the Employment History table. Canadian Work Environment Competencies (CWECs) will be implemented soon. Please contact experience-review@apegs.ca for more information.

3.6.2.3 How to request "equivalent-to-Canadian"

If the experience in any example was obtained outside of Canada and you have indicated that it is a Canadian example, then you must include that information within the competency description so it can be validated. Additional information may be uploaded to the "Supporting Documents" screen in the online system, but that information will not be validated so carries less weight, unless the information you upload has been physically signed by the validator. The information should include a detailed description of why you think the experience should be considered equivalent-to-Canadian. Include **specific** references to the standards, customs, codes and/or climates that were a part of your experience that are the same as in Canada (or North America if your discipline of practice uses international standards).

If you are unsure if the international experience could count as equivalent-to-Canadian, email experience-review@apegs.ca .

3.6.3 Tips on Writing Examples

- Make the level of complexity of the project clear. Details on the project size such as dollar value and duration are helpful.
- Clearly identify your role in the project. What was your level of responsibility and how did you contribute to the outcomes.
- Provide sufficient detail to demonstrate how the example relates to engineering or geoscience work. If the example does not clearly relate to engineering or geoscience work, it will receive a rating of zero.
- For technical competency categories you must demonstrate how you applied engineering/science/geoscience principles.

3.6.4 Confidential Information

Where project details are required to be kept confidential, indicate so with a statement to that effect in the appropriate box within the reporting system where the information is being provided by the applicant. Provide as much detail as you are permitted with the goal of providing sufficient evidence that you can practice competently as a professional engineer or professional geoscientist. This could be demonstrated by documentation that describes the nature of your work and its complexities without disclosing confidential details about solutions, business processes, client names or locations. You may use surrogate names such as "Project X" in "City/Town Q" then inform the Validator separately which project you are referring to by "Project X" and "City/Town Q". Note that although all APEGS Assessors are bound

by confidentiality, it is wise not to disclose proprietary or confidential information because Assessors may work in the same industry or sector as you.

4 VALIDATION OF A SUBMISSION

4.1 VALIDATION PROCESS

The online validation process is as follows:

1. When the applicant selects the button to submit for validation, the Validators receive a link by email which includes login information to complete their validation through the online system. It is recommended that the applicant contact the Validator(s) before or immediately after releasing the completed submission for validation to confirm they received their link. **Note:** If the Validation e-mail was not received by the Validator, check the spam filter. The domain name of the email is competencyassessment.ca.

2. Validators use the link to access the **Competency Assessment System**.

3. The Validator first views the applicant's education and employment history. No input is required from the Validator in these sections, but they provide the Validator with the opportunity to review chronological summaries of the applicant's education and experience.

4. Validators then have an opportunity to decline to complete the process if they are not willing or not able to verify the applicant's experience. A reason must be provided if the validation is declined, and a comment box is provided. The reason, along with all Validator feedback, is confidential and is not visible to the applicant.

5. The Validator is asked to review the applicant's **Competency Self-Assessment** and provide feedback on any examples that the applicant has assigned to them. The Validator provides a rating on the **Competency Rating Scale** and is given the option to provide a comment. **Validator comments on the examples are encouraged** and help to provide valuable additional feedback and information to Assessors.

6. Finally, Validators are asked to provide overall feedback on the applicant's readiness for registration or licensure as described in section 3.5.

Note: Validators must do the validation independently. If applicants access the validator link this may result in APEGS requiring the validation to be redone.

5 ASSESSMENT

APEGS uses a confidence-based approach to assessing applicants' qualifications for registration. In cases where APEGS has high confidence that the applicant meets the requirements to practice safely in the public interest, the review will be limited. In cases where APEGS has low confidence, the review will be

more rigorous. Detailed assessments will be undertaken by professional staff, with oversight and auditing of their work by volunteer assessors and Experience Review Committee.

5.1 CONFIDENCE LEVELS

APEGS has defined three confidence levels for evaluating work experience submissions received through the competency assessment system. The confidence levels reflect APEGS confidence that the work experience is at a level acceptable to practice professional engineering or professional geoscience safely in Canada. The rigor of the assessment process is commensurate with level of confidence.

5.1.1 Confidence level 1

This level requires that at least four years of experience have been supervised by a licensed professional engineer, or geoscientist or equivalent*, and all the competencies have been validated by a licensed professional engineer or professional geoscientist or equivalent*.

The assessment will be completed by a professional staff assessor (*Admissions Engineer*/*Admissions Geoscientist*). If the staff assessor needs additional expertise on specific competencies, then a volunteer assessor with technical knowledge of the area of practice will do an assessment of specific competencies. The volunteer assessor will determine the rating on those competencies.

5.1.2 Confidence level 2

This level requires that some of the experience (but less than 4 years) has been supervised by a licensed professional engineer, or geoscientist or equivalent*, and/or some (but not all) of the competencies have been validated by a licensed professional engineer or professional geoscientist or equivalent*.

An initial assessment will be completed by a professional staff assessor (*Admissions Engineer*/*Admissions Geoscientist*). At least one volunteer assessor will also review the technical competencies. The final assessment will be based on the combined input of the professional staff and volunteer assessors.

5.1.3 Confidence level 3

This level includes anyone who does not have any of their experience under the supervision of a licensed professional engineer, or geoscientist or equivalent*, and none of the competencies have been validated by a licensed professional engineer or professional geoscientist or equivalent*.

An initial assessment will be completed by a professional staff assessor (*Admissions Engineer*/*Admissions Geoscientist*). A volunteer assessor will also review the all the competencies. The final assessment will be based on the combined input of the professional staff and volunteer assessor and will be approved by the Experience Review Committee.

**or equivalent* includes engineering licensee and geoscience licensee in Saskatchewan (or equivalent titles elsewhere in Canada) and licensed professional engineers from countries that are members of the International Professional Engineers or Asia Pacific Economic Cooperation Agreement under the International Engineering Alliance and those licensed as a Professional Geoscientist in the United States.

5.2 Assessment Outcomes

Based on the evidence provided in the examples, the Assessor assigns the applicant a rating on the **Competency Rating Scale** for each **Competency** in the category. The applicant's self-assessed rating as well as the Validator's feedback are available for reference, as well as the detailed descriptions of each **Competence Level** which are provided in the online system.

The online system calculates the average for each **Competency Category** based on the ratings assigned by the Assessor. If any individual competency is given a rating of zero, the category is automatically failed. If there are no zeros and the average is equal to or higher than the required average for that category, then the applicant has passed that category. If the category average rating is below the required average, the applicant has failed to satisfy the requirements for that category.

If a competency was failed because there was not enough information provided in the example, Assessors will give guidance on why the competency failed and applicants will be given an opportunity to resubmit that example.

5.3 Results

Within approximately three months of a completed submission (i.e., all validations complete) applicants should receive feedback as to whether the experience is acceptable. Applicants will receive their results via email and the result will also be entered into each applicant's online profile.

If the initial assessment lacks specificity, evidence of engineering/geoscience context, or sufficient detail, the applicant will be provided with feedback from the Admissions Engineer or Admissions Geoscientist. Once the information submitted by the applicant is sufficient to rate all the Competency examples, the applicant will receive one or more of the following outcomes.

5.3.1 Competencies **Are Not Professional Level**

If any Competency Category average has failed, all the individual Competencies rated below the passing level have not been demonstrated at a professional level. Applicants will be advised to obtain additional experience and then resubmit the Competencies using different examples. Applicants will not be permitted to resubmit the same examples for reassessment unless they have gained additional experience in the position.

5.3.2 Competencies **Are Not Equivalent to Canadian**

Any Canadian Environment Competency (CEC) that has not received a rating equal to or greater than the required category average, has been failed because it has not demonstrated a sufficient understanding of Canadian context. Engineering applicants must take the relevant section(s) of the Working in Canada Seminar, then resubmit the failed competencies using different examples. Geoscience applicants must resubmit the competency using a different example or obtain more experience in the position and then resubmit the same example.

5.3.3 Work Experience is Acceptable

If the applicant has 48 months of acceptable work experience and all the Competency requirements have been met, then the work experience will be accepted.

5.4 Re-submission of Competencies

In cases where one or more competencies are assessed as insufficient, the applicant is informed with specific comments and is given an opportunity to re-submit. The specific competencies are made available in the **Competency Assessment System** for the applicant to re-enter information. Once completed, those competencies are released for the Validator(s) and Assessors to review again using the same process as before.

5.5 Appeals

There are three levels of appeal explained in detail below:

a) to the Experience Review Committee;
b) to Council;
c) to the Court of Queen's Bench.

The Experience Review Committee's decision on satisfactory experience is a recommendation to the Registrar, who is an APEGS staff person appointed by Council. If the experience is not approved because of a negative assessment by the Experience Review Committee, the member-in-training is given the opportunity to re-submit one or more times to the Experience Review Committee. Note that further assessment is part of the standard process for all cases where re-submission is flagged by the original Assessors, as outlined in section 5.1 of this Guide.

Should the re-submission(s) to the Experience Review Committee not be successful and the applicant disagrees with the results, this effectively means one component of a professional member application is being denied and the applicant has the opportunity to appeal the decision of the Registrar directly to Council as per section 24 of *The Engineering and Geoscience Professions Act*. Section 19 of the *Regulatory Bylaws* requires that an appeal to Council must be launched within 30 days and the applicant must set out the grounds on which he or she alleges that the Registrar's decision is in error, together with any documentation necessary to support the allegation. The Bylaws also provide the right to make a verbal presentation to Council.

Should Council uphold a decision of the Registrar, then the applicant subsequently can appeal to the Court of King's Bench as per section 25 of *The Engineering and Geoscience Professions Act*. The assessment of qualifications is the aspect of self-regulation that the Courts typically defer to the expertise of the profession (i.e., the Experience Review Committee). The Court's role in an appeal is to review the process followed to make sure the Association followed the established process correctly.

6 Applicant Stages

6.1 When to Start Entering Your Competencies

You can create an account for the **Competency Assessment System** when you are eligible to start using the system which is in one of these two circumstances:

1. You are approved as a member-in-training with APEGS, or;

2. You are a member-in-training applicant **and** you are an international graduate who has been given the opportunity to submit work experience by the Academic Review Committee.

You access the system online here: https://competencyassessment.ca/

Once you have followed the instructions to set up an account, APEGS will be notified automatically to approve your account, and you will be notified by email when it is ready to begin entering your information.

6.2 Tracking Progress of Your Assessment

Once you have submitted your **Competency Self-Assessment** through the **Competency Assessment System**, you are able to log back into the system at any time to track the progress of your Validators in verifying your submission. This information is available in the **Competency Self-Assessment** screen.

6.3 When to Apply for Professional Membership

Once you are notified that your competency assessment has passed and you have also written the Professional Practice Exam (anticipating that you passed), you can apply for professional membership. More information about this application is available on the APEGS website under Apply, Professional Member:

http://www.apegs.ca/Portal/Pages/Professional-Member

If your professional member application is locked in APEGS Central when you are ready to apply, contact experience-review@apegs.ca.

7 Academic Review Cases

This section applies to international graduates who obtained their bachelor's degree outside Canada and are not yet approved as a member-in-training. This section does not apply to you if you are already registered as a member-in-training.

If you are a member-in-training ***applicant*** who received your **bachelor's** degree outside of Canada and you have more than four years of engineering experience according to your résumé, the Academic Review Committee (ARC) may give you the opportunity to submit work experience to try and get confirmatory exams waived. If you are given this opportunity, you will be informed in writing and provided details on next steps.

The ERC is looking for evidence that demonstrates that the applicant obtained a bachelor level education in engineering or geoscience. The level of experience required for the purpose of waiving confirmatory exams is the same as the level required for professional registration. However, for waiving of exams the experience must be in the same discipline as the bachelor's level education.

For engineer-in-training applicants only competency category 1 will be assessed. If category one is passed, the confirmatory exams will be waived, and the applicant will be approved as an engineer-in-

training. If after three submissions (the initial one plus two resubmissions) category one has not been passed, then the applicant must write the exams.

For geoscientist-in-training applicants only categories 2 and 3 will be assessed. If both categories are passed, the confirmatory exams will be waived, and the applicant will be approved as a geoscientist-in-training. If after three submissions (the initial one plus two resubmissions) these categories have not been passed, then the applicant must write the exams.

The validator requirements for confirmation of academics are different than for the full competency assessment. See section 3.5 for details.

Applicants do not need to meet the Canadian Environment competencies to get confirmatory exams waived.

Once applicants have been approved as a member-in-training they will have to meet all the competencies and validator requirements before they are eligible to apply as a professional registrant.

8 Frequently Asked Questions

FAQs about the competency assessment process can be found on the APEGS website under Apply, FAQs – Applicants, FAQs pertaining to experience reporting: https://www.apegs.ca/Portal/Pages/faq-applicants

Appendix E-1 – Engineering Competency Framework

1. Technical Competence (minimum overall competence level: **3**)

Competencies

- **1.1** Demonstrate knowledge of regulations, codes, standards, and safety - this includes local engineering procedures and practices as applicable.
- **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.
- **1.3** Analyze technical risks and offer solutions to mitigate the risks.
- **1.4** Apply engineering knowledge to design solutions.
- **1.5** Be able to understand solution techniques and independently verify the results.
- **1.6** Safety awareness: Be aware of safety risks inherent in design; and demonstrate safety awareness – on-site; possible safety authorization/certificate as appropriate.
- **1.7** Demonstrate understanding of systems as well as of components of systems
- **1.8** Exposure to all stages of the process/project life cycle from concept and feasibility analysis through implementation.
- **1.9** Understand the concept of quality control during design and construction including independent design check and independent reviews of design, field checks and reviews.
- **1.10** Transfer design intentions to drawings and sketches; Understand transmittal of design information to design documents.

2. Communication (minimum overall competence level: **3**)

Competencies

- **2.1** Oral.
- **2.2** In writing.
- **2.3** Reading and comprehension.

3. Project and Financial Management (minimum overall competence level: **2**)

Competencies

- **3.1** Awareness of project management principles.
- **3.2** Demonstrate increasing level of responsibility for project planning and implementation.
- **3.3** Manage expectations in light of available resources.
- **3.4** Understand the financial aspects of their work.
- **3.5** Ask for and demonstrate response to feedback.

4. Team Effectiveness (minimum overall competence level **3**)

Competencies

4.1 Work respectfully and with other disciplines/people.

4.2 Work to resolve differences.

5. Professional Accountability (Ethics & Professionalism) (minimum overall competence level: **3**)

Competencies

5.1 Work with integrity, ethically and within professional standards.

5.2 Demonstrate an awareness of your own scope of practice and limitations.

5.3 Understand how conflict of interest affects your practice.

5.4 Demonstrate awareness of professional accountability.

5.5 Demonstrate an understanding of appropriate use of the stamp and seal.

5.6 Understand own strengths/weaknesses and know how they apply to one's position.

6. Social, Economic, Environmental and Sustainability (minimum overall competence level: **2**)

Competencies

6.1 Demonstrate an understanding of the safeguards required to protect the public and the methods of mitigating adverse impacts.

6.2 Demonstrate an understanding of the relationship between the engineering activity and the public.

6.3 Understand the role of regulatory bodies on the practice of engineering.

6.4 Be aware of any specific sustainability clauses that have been added to practice guidelines that apply to their area.

6.5 To the extent possible, recognizing the applicant's position of influence, consider how sustainability principles could be applied and promoted in their specific work.

7. Personal Continuing Professional Development (minimum overall competence level: **3**)

Competencies

7.1 Demonstrate completion of professional development activities.

7.2 Demonstrate awareness of gaps in knowledge and areas requiring further development.

7.3 Develop a professional development plan to address gaps in knowledge and maintain currency in field of practice.

Appendix E-2 – Engineering Competency Indicators – All Disciplines

Competency Category 1 – Technical Competence

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
1.1 Demonstrate knowledge of regulations, codes, standards, and safety - 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 design materials.* *3. Prepare reports assessing project compliance with codes, standards, and regulations.* *4. Recognize the need to design for code compliance while achieving constructability*
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, operations, project and design constraints, e.g. cost, design, material, labour, time, budget, production.* *2. Demonstrate understanding of and coordination with other engineering and professional disciplines*
1.3 Analyze technical risks and offer solutions to mitigate the risks.	*1. Demonstrate familiarity with system protection and/or damage/hazard mitigation objectives, philosophies, practices, procedures, and functions.* *2. Identify risk areas including causes of risks and their impacts.* *3. Develop risk management/mitigation plans.* *4. Demonstrate an understanding of the difference between technical risk and public safety issues.*
1.4 Apply engineering knowledge to design solutions.	*1. Prepare technical specifications.* *2. Demonstrate use of theory and calculations to arrive at solutions.* *3. Demonstrate the development of a unique design solution which could not be accomplished with a standard design solution.*
1.5 Be able to understand solution techniques and independently verify the results.	*1. Demonstrate an understanding of the engineering principles used in the application of computer design programs and show/describe how the results were verified as correct.* *2. Participate in an independent review and verification of solution techniques or analysis methods.*
1.6 Safety awareness: Be aware of safety risks inherent in design; and demonstrate safety awareness – on-site; possible safety authorization/certificate as appropriate.	*1. Identify, incorporate, and/or participate in review of safety considerations, safety procedures and safety equipment as they apply to system operations and/or maintenance programs.* *2. Demonstrate specific knowledge of safety regulations.* *3. Incorporate explicit human and public safety considerations in design and all other professional activities.* *4. Understand and account for safety risks associated with processes. Identify relevant protection equipment and process modifications to mitigate safety risks.*
1.7 Demonstrate understanding of systems as well as of components of systems.	*1. Demonstrate an understanding of each element in a process.* *2. Demonstrate and understanding of the interactions and constraints in the behavior of the overall system.* *3. Manage processes within the overall system (monitor and, where needed, modify processes to achieve optimum outcomes).*
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:* i. ***Identification**: generation of the initial project idea and preliminary design* ii. ***Preparation**: detailed design of the project addressing technical and operational aspects* iii. ***Appraisal**: analysis of the project from technical, financial, economic, social, institutional and environmental perspectives* iv. ***Preparation of specifications and tender documents:** preparation of tender document, inviting and opening of tenders, pre-qualification, evaluation of bids and award of work* v. ***Implementation and monitoring**: implementation of project activities, with on-going checks on progress and feedback*

COMPETENCIES (each require one example)	INDICATORS (suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)
	vi. ***Evaluation**: periodic review of project*
1.9 Understand the concept of quality control during design and construction including independent design check and independent reviews of design, field checks and reviews.	*1. Conduct checks, including field checks, to verify the validity of design.* *2. Follow Quality Management Principles in Practice.* *3. Prepare quality control plans, including frequency and test parameters, for specific processes or products.* *4. Evaluate test results, determine adequacy, and develop recommended action.* *5. Demonstrate peer review.* *6. Demonstrate completed project, systems or sub-systems meet project objectives in terms of functionality and operational performance*
1.10 Transfer design intentions to drawings and sketches; Understand transmittal of design information to design documents.	*1. Ability to review designs of others and communicate findings and issues, including suggested alternatives.* *2. Demonstrate communication of ideas and concepts to project team members.* *3. Demonstrate understanding of value of project completion reports and lessons learned reports to application in future projects by self or others.* *4. Produce sketches, notes, documentation and design documents to prepare proposals, preliminary, and final design drawings for acceptance by the client and approval by regulatory authorities.*

Competency Category 2 – Communication

COMPETENCIES (each require one example)	INDICATORS (suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)
2.1 Oral.	*1. Communicate in a simple and concise manner.* *2. Communicate official project data with team members, clients, contractors* *3. Ability to express both technical and non-technical issues and ideas clearly to both technical and non-technical personnel.* *4. Presentations to technical and non-technical groups; presentations to superiors and subordinates; internal (colleagues) and external (clients) presentations* *5. Presentation of project parameters to the public* *6. Demonstrate active participation in and contribution to meetings*
2.2 In writing.	*1. Tailor communications to the intended audience.* *2. The ability to write and review technical documents* *3. Ability to write clear memos and reports to both technical and non-technical personnel.* *4. Use drawings and sketches to demonstrate key points and concepts* *5. Demonstrate a written report on a technical subject* *6. Demonstrate a written report on field observations* *7. Take training in technical report writing* *8. Work with common office programs (e.g. Excel, Word, Outlook, internet browsers)*
2.3 Reading and comprehension.	*1. The ability to review technical documents, to understand the implications and to summarize key points.*

Competency Category 3 – Project and Financial Management

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
3.1 Awareness of project management principles.	*1. Awareness of resource planning, budgeting, change management, scope management, schedule and unforeseen issues in managing a project from start to end.* *2. Understand the impacts that benefits and risks of various design solutions have on a project* *3. Understand the needs and expectations of internal and external clients*
3.2 Demonstrate increasing level of responsibility for project planning and implementation.	*1. Follow and contribute to development of project management plans* *2. Be aware of future improvements and demands as well as other ongoing projects.* *3. Demonstrate increasing responsibility for client contact and management* *4. Demonstrate how project planning activities and interaction with others has increased over the training period.* *5. Participate in managing and adapting a schedule.* *6. Demonstrate awareness of issues related to other disciplines that might affect the project, maintaining contact and communication to discuss and resolve issues.*
3.3 Manage expectations in light of available resources.	*1. Update schedule and budget on regular basis and communicates status* *2. Provide market assessment and availability of materials for a project.* *3. Meet deadlines*
3.4 Understand the financial aspects of their work.	*1. Demonstrate cognizance of project budget during design and construction* *2. Provide technical/financial report and compare the options.* *3. Demonstrate the understanding of the place of finance in business decisions* *4. Understand principles of budgeting and financing* *5. Understand the relevant business processes* *6. Demonstrate an understanding of working with and developing contracts*
3.5 Ask for and demonstrate response to feedback.	*1. Demonstrate implementation of lessons learned, and performance reviewed in meetings* *2. Show willingness to accept comments and criticism* *3. Identify situations where you received feedback and how you responded to that feedback.* *4. Demonstrate appreciation of the scope of a project and an appropriate response when a project varies beyond the scope.*

Competency Category 4 – Team Effectiveness

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
4.1 Work respectfully and with other disciplines/people.	*1. Demonstrate respect for others' responsibility and expertise.* *2. Integrate engineering with other professional input.*
4.2 Work to resolve differences.	*1. Demonstrate leadership in achieving team goals and resolving conflict.* *2. Work to facilitate beneficial conflict resolution.* *3. Exposure to training in conflict resolution.*

Competency Category 5 – Professional Accountability (Ethics & Professionalism)

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
5.1 Work with integrity, ethically and within professional standards.	*1. Comply with the Code of Ethics in the jurisdiction of practice* *2. Apply professional Ethics in meeting corporate directives*
5.2 Demonstrate an awareness of your own scope of practice and limitations.	*1. Ask for help and incorporate input* *2. Demonstrate interaction with your supervisor* *3. Ask questions when needed* *4. **Structural applicants only**: Understand the role of the StructEng (this indicator only shows if an applicant chooses to report against the structural indicators)*
5.3 Understand how conflict of interest affects your practice.	
5.4 Demonstrate awareness of professional accountability.	*1. Awareness of the potential professional liability involved in all aspects of the design, construction and inspection process.* *2. **Structural applicants only:** Understand the role of the StructEng and Independent Peer Reviews of work (this indicator only shows if an applicant chooses to report against the structural indicators)*
5.5 Demonstrate an understanding of appropriate use of the stamp and seal.	*Please note that understanding and awareness is what is required for this Competency.*
5.6 Understand own strengths/weaknesses and know how they apply to one's position.	*1. Prepare a self-criticism list and the ways to mitigate or eliminate the weaknesses*

Continued…

Competency Category 6 – Social, Economic, Environmental and Sustainability

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
6.1 Demonstrate an understanding of the safeguards required to protect the public and the methods of mitigating adverse impacts.	*1. Prepare public safety regulations and advice during design and implementation of a project.* *2. Understand potential effects of Climate Change*
6.2 Demonstrate an understanding of the relationship between the engineering activity and the public.	*1. Recognize the value and benefits of the engineering work to the public* *2. Prepare a report regarding the impact of a project to public.*
6.3 Understand the role of regulatory bodies on the practice of engineering.	*1. Recognize the importance of respecting the regional traditions and native regulations towards a project.* *2. Understand the role and regulations of other professions whose practices overlap or interface with the practice of professional engineering.*
6.4 Be aware of any specific sustainability clauses that have been added to practice guidelines such as Practice Guidelines, legislation, standards, community sustainability plans or sustainability requirements that apply to their area of practice.	*Be aware of any specific sustainability clauses that have been added to practice guidelines such as Practice Guidelines, legislation, standards, community sustainability plans or sustainability requirements that apply to their area of practice.*
6.5 To the extent possible, recognizing the applicant's position of influence, consider how sustainability principles could be applied and promoted in their specific work.	*1. Include sustainability analysis in project descriptions.* *2. Provide a list of revisions made during design and implementation period of the project.*

Competency Category 7 – Professional Continuing Professional Development

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
7.1 Demonstrate completion of professional development activities.	*1. Participation in Community, Technical, Industry and/or professional association committees and task forces* *2. Engagement in a variety of self-directed and formal professional development activities to learn and maintain currency in field of practice and report progress to applicable parties*
7.2 Demonstrate awareness of gaps in knowledge and areas requiring further development.	*1. Gap analysis of knowledge and skills; highlight the 'gaps' that exist* *2. Identification of areas of weakness where additional training is needed*
7.3 Develop a professional development plan to address gaps in knowledge and maintain currency in field of practice.	*1. Plan to pursue training in areas of weakness and remedy gaps in knowledge* *2. Planned activities may include in a variety of self-directed and formal professional development activities to learn and maintain currency in field of practice*

Appendix E-3 – Engineering Competency Indicators for Structural – Category 1 only

You may choose to use the generic indicators for Technical Competence Category 1 shown in Appendix 2 or you may use the discipline-specific indicators when completing your entries. Categories 2 through 7 are the same for all disciplines.

Competency Category 1 – Technical Competence for Structural Engineering

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
1.1 Demonstrate knowledge of regulations, codes, standards, and safety - this includes local engineering procedures and practices as applicable.	*1. Identify and comply with legal and regulatory requirements for project activities.* *2. Prepare Permit Applications.* *3. Incorporate knowledge of codes and regulations in design materials.* *4. Prepare reports on standards and project compliance.* *5. Recognize the need to design for code compliance while achieving constructability.* *6. Experience with use of applicable Canadian codes and standards for design, constructions and testing.* *7. Ability to research and apply suitable international codes as needed.*
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.	*Demonstrate through examples knowledge of:* *1. Interaction behaviours of structures with different materials.* *2. Properties of various materials (e.g., steel, concrete, pre-stressed concrete, reinforced concrete, wood, masonry).* *3. Material specifications and selection.* *4. Constraints imposed on the structural system by requirements of other disciplines.* *5. Optimal design and construction economics.*
1.3 Analyze technical risks and offer solutions to mitigate the risks.	*1. Understanding fundamental structural phenomena of how structures are damaged or fail.* *2. Understanding structural phenomena responses for preventing failure (structural stability).* *3. Understand the various components of the design and how they contribute to the mitigation of risk.* *4. Understand potential effects of Climate Change.*
1.4 Apply engineering knowledge to design solutions.	*Demonstrate through examples, knowledge of:* *1. Loads and climactic data.* *2. Tolerances, concrete placement, reinforcement, embedment, and welded and bolted connections.* *3. Knowledge of overall design of structure and its response to the loads and demands.* *4. Understand issues of serviceability and long term maintenance and function.* *5. Selection of structural system, material to be used for the project.* *6. Ability to design in more than one material.* *7. Ability to analyze, design and detail lateral load resisting systems in the horizontal and vertical plane, including variable stiffness systems, geometric and/or mass irregularities.* *8. Demonstrate design experience (or working knowledge of) the basic elements of a bridge (Abutments, Piles, Piers and pier caps, Retaining walls, Bridge deck systems).* *9. Design to account for effects of elastic shortening, creep, shrinkage, relaxation of pre-stressing strands and differential settlement.* *10. Design to account for temperature variations.* *11. Identify and accommodate site-specific logistical issues in design and construction plans.* *12. Demonstrate seismic knowledge using capacity design principles* - mandatory for Engineers & Geoscientists BC applicants
1.5 Be able to understand solution techniques and independently verify the results.	*1. Demonstrate an understanding of the engineering principles used in the application of computer design programs.* *2. Understand and have the ability to do approximate analysis to independently verify the results of technical software and solution.* *3. Participate in an independent review process.*

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
1.6 Safety awareness: Be aware of safety risks inherent in design; and demonstrate safety awareness – on-site; possible safety authorization/certificate as appropriate.	*1. Be aware of safety risks associated with the construction of the structure.* *2. Demonstrate an understanding of safety regulations for construction, presence of adjacent structures, geotechnical considerations, impact to the environment.* 3. *Demonstrate specific knowledge of safety regulations.* *4. Understanding of site safety and worker compensation act.* *5. Knowledge and experience with use of WCB regulations for design of fall arrest and fall protection lanyards, lifelines, anchors etc.* *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 and understanding of the interactions and constraints in the behavior of the overall system.* *2. Understand the role and responsibility of a specialty structural engineer.* *3. Understand the integration of components to generate load paths.*
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:* i. ***Identification****: generation of the initial project idea and preliminary design.* ii. ***Preparation****: detailed design of the project addressing technical and operational aspects.* iii. ***Appraisal****: analysis of the project from technical, financial, economic, social, institutional and environmental perspectives.* iv. ***Preparation of specifications and tender documents:*** *preparation of tender document, inviting and opening of tenders, pre-qualification, evaluation of bids and award of work.* v. ***Implementation and monitoring****: implementation of project activities, with on-going checks on progress and feedback.* vi. ***Evaluation****: periodic review of project with feedback for next project cycle.* *2. Prepare feasibility reports and proposals.* *3. Demonstrate an understanding of how the different disciplines interact for a particular structural project; and how the structural engineers needs to obtain information from all these disciplines.* *4. Demonstrate an understanding of the progression in design and economics from concept through to decommissioning.*
1.9 Understand the concept of quality control during design and construction including independent design check and independent reviews of design, field checks and reviews.	*1. Demonstrate Quality Control in the Production of Structural Drawings & Engineering Calculations and reports, including review by the supervising professional.* *2. Participate in independent structural concept review by a third party professional engineer.* *3. Conduct site visits to observe and verify construction process as well to write field reviews for as built structural conformance to construction drawings.* *4. Review shop drawings for compliance with design.* *5. Participate in field review and demonstrate an understanding of roles of testing agencies in the field inspection process. Respond appropriately to site changes or work that is not compliant.* *6. Operate in an ISO9001-certified environment.*
1.10 Transfer design intentions to drawings and sketches; Understand transmittal of design information to design documents.	*1. Supervise the drafting of their design and produce sketches for the drafters/CAD technicians, and demonstrate document coordination and control.* *2. Ensure that drawings reflect the design models and required behaviour.* *3. The production of technical specifications for construction.* *4. Be able to review and analyze designs of others and communicate findings and suggest alternatives.*

Appendix E-4 – Engineering Competency Indicators for Civil: Municipal/Infrastructure – Category 1 only

You may choose to use the generic indicators for Technical Competence Category 1 shown in Appendix 2 or you may use the discipline-specific indicators when completing your entries. Categories 2 through 7 are the same for all disciplines.

Competency Category 1 – Technical Competence for Civil: Municipal/Infrastructure Engineering

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
1.1 Demonstrate knowledge of regulations, codes, standards, and safety - this includes local engineering procedures and practices as applicable.	*1. Identify and comply with legal and regulatory requirements for project activities.* *2. Prepare Permit Applications.* *3. Incorporate knowledge of codes and regulations in design materials.* *4. Prepare reports on standards and project compliance.* *5. Recognize the need to design for code compliance while achieving constructability.* *6. Interpret and apply regulations that affect the handling, transportation and disposal of waste materials.*
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 and/or operations: Cost, Storage, Quality & Handling problems.* *2. Develop and implement evaluation, maintenance or rehabilitation programs for infrastructure and operations.* *3. Coordination with other disciplines.*
1.3 Analyze technical risks and offer solutions to mitigate the risks.	*1. Demonstrate familiarity with system protection objectives, philosophies, and functions.* *2. Identify risk areas.* *3. Develop risk management plans.* *4. Demonstrate an understanding of the difference between technical risk and public safety issues.*
1.4 Apply engineering knowledge to design solutions.	*1. Collect, record, and analyze information from sources such as geological reports, subsurface investigations, and in situ testing.* *2. Calculate material quantities and volumes using mathematical formulae, measurements and data from construction drawings and specifications.* *3. Preparation of technical specifications.* Water & Wastewater Treatment: *1. Conduct inventories of water supplies and assess impact of projected population growth on water supply demands. (Design water supply systems from wells, rivers, or lakes; Sample/analyze source water for purity and human suitability; Determine physical, chemical, and bacteriological characteristics of available water).* *2. Design sanitary sewer systems.* *3. Conduct model and flow analysis for public sewer facility design.* *4. Demonstrate knowledge of lift station design.* *5. Conduct inflow/outflow infiltration studies.* *6. Design water treatment facilities (e.g. operations for sedimentation, flocculation and coagulation, filtering, disinfection and chlorination).* *7. Apply methods of alternate technology (e.g. precipitation, absorption oxidation and ion exchange to remove metals and soften water).* *8. Use standard methods for the treatment of waste water (Sample and assess waste water for physical, chemical and microbiological characteristics using tests; Select treatment processes for septic tanks and tile beds).* *9. Select tertiary treatments for waste water.*
1.5 Be able to understand solution techniques and independently verify the results.	*1. Demonstrate an understanding of the engineering principles used in the application of computer design programs.* *2. Participate in an independent review process.*

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
1.6 Safety awareness: Be aware of safety risks inherent in design; and demonstrate safety awareness – on-site; possible safety authorization/certificate as appropriate.	*1. Identify and incorporate safety procedures, processes, and equipment.* *2. Review and incorporate safety or system operating procedures.* *3. Demonstrate specific knowledge of safety regulations.* *4. 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. Calculate and assess current or projected infrastructure needs according to their area of practice (include assessment for projected population growth). [a) Water supply and distribution networks, b) Sanitary sewer networks, c) Traffic systems (city, highway, lighting), d)Waste and waste water treatment, e) Solid waste management and disposal, f) Underground services].* *2. Demonstrate an understanding of each element in the process, and the infrastructure required.*
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:* vii. ***Identification**: generation of the initial project idea and preliminary design.* viii. ***Preparation**: detailed design of the project addressing technical and operational aspects.* ix. ***Appraisal**: analysis of the project from technical, financial, economic, social, institutional and environmental perspectives.* x. ***Preparation of specifications and tender documents:** preparation of tender document, inviting and opening of tenders, pre-qualification, evaluation of bids and award of work.* xi. ***Implementation and monitoring**: implementation of project activities, with on-going checks on progress and feedback.* xii. ***Evaluation**: periodic review of project with feedback for next project cycle.*
1.9 Understand the concept of quality control during design and construction including independent design check and independent reviews of design, field checks and reviews.	*1. Conduct Field Checks to verify the validity of design.* *2. Complete Quality Management Plan Checklist, and follow Quality Management Plan.* *3. Prepare quality control 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 construction processes.*
1.10 Transfer design intentions to drawings and sketches; Understand transmittal of design information to design documents.	*1. Demonstrate familiarity with CAD software and techniques for specific design requirements.* *2. Demonstrate knowledge of capture and validation of as-built information.* *3. Prepare complete drawings with sufficient cross sections and details and eliminate any discrepancies; Provide technical specification; Refer to the related items of the specification on each part and detail on the drawings.* *4. Prepare rough sketches for the drafter and explain your intentions.* *5. Ability to review designs of others and communicate findings and issues, including suggested alternatives.*

Appendix E-5 – Engineering Competency Indicators for Electrical: Power and Industrial – Category 1 only

You may choose to use the generic indicators for Technical Competence Category 1 shown in Appendix 2 or you may use the discipline-specific indicators when completing your entries. Categories 2 through 7 are the same for all disciplines.

Competency Category 1 – Technical Competence for Electrical: Power and Industrial Engineering

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
1.1 Demonstrate knowledge of regulations, codes, standards, and safety - 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 design materials.* *3. Prepare reports on standards and project compliance.* *4. Recognize the need to design for code compliance while achieving constructability.*
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. Have knowledge of plant layout and operations.* *2. Preparation of technical specifications.* *3. Coordination with equipment vendors and other discipline engineers.* *4. Demonstrate involvement with feasibility studies.*
1.3 Analyze technical risks and offer solutions to mitigate the risks.	*1. Demonstrate familiarity with system protection objectives, philosophies, and functions.* *2. Identify risk areas.* *3. Develop risk minimization plans.*
1.4 Apply engineering knowledge to design solutions.	*Note: Each example should demonstrate a different design solution or facet of your application of knowledge.* *1. Demonstrate an understanding of the engineering principles used in the application of computer design programs.* *2. Demonstrate use of theory and calculations to arrive at solutions.* *3. Demonstrate why a unique design solution could not be accomplished with a standard design solution.* *4. Ability to calculate fault levels and select equipment to withstand the available fault current.* *5. Understanding ground currents and potential rise and designing grounding system that would protect life and property.* *6. Perform load calculations for sizing service and distribution equipment including future provisions.* *7. Design circuits and systems with consideration for efficiency and power quality.* *8. Using engineering principles, determine voltage level, transformation and distribution methods that provide the most economic and sustainable system.* *9. Understand source and cause of harmonics and methods used to minimize the effects of harmonics on the system.* *10. Design electrical control and protection schemes for transmission and distribution systems.*
1.5 Be able to understand solution techniques and independently verify the results.	*1. Demonstrate an understanding of the engineering principles used in the application of computer design programs.* *2. Perform Field Checks.*
1.6 Safety awareness: Be aware of safety risks inherent in design; and demonstrate safety awareness – on-site; possible safety authorization/certificate as appropriate.	*1. Identify and use relevant safety procedures, processes, and equipment.* *2. Develop maintenance programs.* *3. Design test plans and equipment.* *4. Implement inspection results.* *5. Review and alter safety or system operating procedures when necessary.* *6. Demonstrate specific knowledge safety regulations.*

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
1.7 Demonstrate understanding of systems as well as of components of systems.	*1. Demonstrate a working knowledge of the basic components of power generation -- Including: generators, switchgears, transformers, electronic drives, capacitors/reactors, voltage regulators, high and low voltage switches, cables/trays and conduits, overhead lines, protection and control equipment, fault protection/isolation devices and their coordination, specification of power grid interfaces, grounding systems.* *2. Manage processes within the overall system (monitor and, where needed, modify processes to achieve optimum outcomes).*
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:* i. ***Identification**: generation of the initial project idea and preliminary design.* ii. ***Preparation**: detailed design of the project addressing technical and operational aspects.* iii. ***Appraisal**: analysis of the project from technical, financial, economic, social, institutional and environmental perspectives.* iv. ***Preparation of specifications and tender documents:** preparation of tender document, inviting and opening of tenders, pre-qualification, evaluation of bids and award of work.* v. ***Implementation and monitoring**: implementation of project activities, with on-going checks on progress and feedback.* vi. ***Evaluation**: periodic review of project with feedback for next project cycle.*
1.9 Understand the concept of quality control during design and construction including independent design check and independent reviews of design, field checks and reviews.	*1. Demonstrate peer review.* *2. Demonstrate completed project, systems or sub-systems meet project objectives.* *3. Participate in regular meetings and discussions with project members, both electrical and other disciplines, to ensure quality, scheduling, deadlines and budgeting are not compromised during both design and construction stages.* *4. Review designs, procedures and manuals to ensure design guidelines are adhered to.* *5. Consult with and seek input, including design and field review, from other project members throughout the project design and construction.* *6. Perform testing and commissioning upon completion of the product/project to ensure all design criteria, terms and conditions and applicable safety standards and regulations have been met.* *7. Demonstrate understanding of ISO 9000.*
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 produced design documents required minimum additional interaction with other designers, contractors and commissioning personnel.* *3. Demonstrate the value of project completion reports and lessons learned reports to application in future projects by self or others.* *4. Understand established and acceptable symbols and terminology used in preparation of design drawings.* *5. Create sketches, notes and documentation to prepare proposals, preliminary, and final design drawings for acceptance by the client and approval by regulatory authorities.*

Appendix E-6 – Engineering Competency Indicators for Materials, Metallurgical and Mineral Processing – Category 1 only

You may choose to use the generic indicators for Technical Competence Category 1 shown in Appendix 2 or you may use the discipline-specific indicators when completing your entries. Categories 2 through 7 are the same for all disciplines.

Competency Category 1 – Technical Competence for Materials, Metallurgical and Mineral Processing Engineering

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
1.1 Demonstrate knowledge of regulations, codes, standards, and safety - 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., WorkSafe, 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 and 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.*
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. 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.*

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
1.6 Safety awareness: Be aware of safety risks inherent in design; and demonstrate safety awareness – on-site; possible safety authorization/certificate as appropriate.	*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. Development of process improvement initiatives. Demonstrate understanding of continuous improvement philosophy and practice.* *3. Demonstrate understanding of effects of process modifications on downstream processes and final product.* *4. Demonstrate familiarity with control systems and strategies. Demonstrate understanding of limitation of process control.*
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:* i. ***Identification**: generation of the initial project idea and preliminary design.* ii. ***Preparation**: detailed design of the project addressing technical and operational aspects.* iii. ***Appraisal**: analysis of the project from technical, financial, economic, social, institutional and environmental perspectives.* iv. ***Preparation of specifications and tender documents:** preparation of tender document, inviting and opening of tenders, pre-qualification, evaluation of bids and award of work.* v. ***Implementation and monitoring**: implementation of project activities, with on-going checks on progress and feedback.* vi. ***Evaluation**: periodic review of project with feedback for next project cycle.*
1.9 Understand the concept of quality control during design and construction including independent design check and independent reviews of design, field checks and reviews.	*1. Conduct Field Checks to verify the validity of design and fabrication.* *2. Complete Quality Management Plan Checklist, and follow Quality Management Plan.* *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. Ability to review designs of others and communicate findings and issues, including suggested alternatives.* *4. Development of welding data cards.*

Appendix E-7 – Competency Indicators for Building Enclosure Engineering – Category 1 only

You may choose to use the generic indicators for Technical Competence Category 1 shown in Appendix 2 or you may use the discipline-specific indicators when completing your entries. Categories 2 through 7 are the same for all disciplines.

Competency Category 1 – Technical Competence for Building Enclosure Engineering

COMPETENCIES (each require one example)	**INDICATORS** (suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)
1.1 Demonstrate knowledge of regulations, codes, standards, and safety - this includes local engineering procedures and practices as applicable.	*1. Identify and comply with legal and regulatoryrequirements for project activities.* *2. Prepare or review drawings and specifications forpermit applications, tender, and construction.* *3. Incorporate knowledge of codes, standards and regulations in design documents, particularly Parts 5, 9 and 10 (BC Building Code of the applicable code, those sections associated with condensation control, water penetration control, heat, air and moisture transfer, and Parts 3 and 4of the applicable code and Vancouver Building Bylaw as they apply to the buildingenclosure.* *4. Recognize the need to design for code compliancewhile achieving constructability.* *5. Use knowledge of applicable codes and standardsfor construction and testing.*
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.	*Demonstrate a thorough understanding of the following areas of theory and technical knowledge as they relate to the performance of the building enclosure and as outlined in the references to the Professional Practice Guidelines for Building Enclosure Engineering Services (BC) or the guideline for the jurisdiction in which you propose to practice:* *1. **Materials Knowledge** including physical and chemical properties, mechanisms of deterioration, behaviour and performance thresholds withrespect to other materials and environments (Section 3.1.2.1.1 of the referenced guideline).* *2. **Building Physics** including boundary conditions, environmental impact, structural loads, hygrothermal calculations, analysis simulation, consideration and accommodation to prevent problematicaccumulation of moisture within the building enclosure (Section 3.1.2.1.2 of the referenced guideline).* *3. **Components, Assemblies and Other Building Systems** including interdependence, integration of theoretical and technical knowledge andassessment of the appropriate of heat, air and moisture control functions with respect to elements that comprise the building enclosure (Section 3.1.2.1.3 of the referenced guideline).*
1.3 Analyze technical risks and offer solutions to mitigate the risks.	*1. Demonstrate the ability to apply informed,professional judgment calls where risk assessment is concerned.* *2. Identify risks and benefits of alternatives.* *3. Determine the consequences of selection ofalternatives, decisions and actions.* *4. Determine relative costs of various acceptable alternatives.* *5. Demonstrate an understanding of implications to risk ofthe application of local construction practices.*
1.4 Apply engineering knowledge to design solutions.	*Demonstrate familiarity with the content and preparation of building enclosure related construction documents and apply this knowledge to the design and design review of building enclosures, including:* *1. assessment of exposure conditions related the building site, determination of appropriate external environmental loads and assessment of internal loads imposed on the building enclosure due touse and occupancy.* *2. development and determination of appropriate building enclosure assemblies, selection of components and materials for the environmental conditions and compatibility with adjoiningmaterials and consideration of service lives and relative durability of materials and components.* *3. calculation of heat, air and moisture transferthrough elements and assemblies in conformance with good practice.* *4. confirmation of continuity of primary heat, airand moisture control functional surfaces or barriers throughout the building enclosure.* *5. review and analysis of designs of others. Communication of findings and suggestionof alternatives.*

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
1.5 Be able to understand solution techniques and independently verify the results.	*1. Demonstrate an understanding of the building science/engineering principles used in theapplication of computer design programs.* *2. Understand and have the ability to doapproximate analysis to independently verify the results of technical software and solution.* *3. Participate in an independent review process.*
1.6 Safety awareness: Be aware of safety risks inherent in design; and demonstrate safety awareness – on-site; possible safety authorization/certificate as appropriate.	*1. Demonstrate awareness of safety risks associated withthe evaluation, design and construction of the building enclosure.* *2. Demonstrate knowledge of site safety andworker compensation act.* *3. Demonstrate knowledge and experience of regulations for design and use of fall arrest and fall protectionsystems.* *4. Incorporate explicit human and public safetyconsiderations in design and all other professional activities.* *5. Demonstrate knowledge of how safetyconsiderations affect design decisions.*
1.7 Demonstrate understanding of systems as well as of components of systems.	*1. Demonstrate understanding of the interactions and constraints in the behaviour of the building enclosure inthe context of the overall building as well as other functions that the building enclosure may perform.* *2. Demonstrate understanding of the integration of the building enclosure system with the other buildingsystems.*
1.8 Exposure to all stages of the process/project life cycle from concept and feasibility analysis through implementation.	*Demonstrate awareness of project concerns and roles of other stakeholders in the project stages:* *1. **Identification:** generation of the initial projectidea and preliminary design.* *2. **Preparation:** detailed design of the project addressing technical and operationalaspects.* *3. **Appraisal:** analysis of the project fromtechnical, financial, economic, social, institutional and environmental perspectives.* *4. **Preparation of specifications and tender documents:** preparation of tender document, inviting and opening of tenders,pre-qualification, evaluation of bids and award of work.* *5. **Implementation and monitoring:** implementation of project activities, withongoing checks on progress and feedback.* *6. **Evaluation:** periodic review of project withfeedback for next project cycle.* *For non-construction projects, demonstrate exposure to all phases of the project from initial considerations and client contact to final conclusions.*
1.9 Understand the concept of quality control during design and construction including independent design check and independent reviews of design, field checks and reviews.	*1. Demonstrate an understanding of roles and responsibilitiesof others in the construction quality assurance and control process (architect, contractors, testing agencies).* *2. Demonstrate quality control in the production of drawings, calculations and reports, including review by thesupervising professional.* *3. Conduct site visits to observe and verify construction of building enclosure elements, and write field review reports for the purpose of confirming substantial compliance with the construction documents and the building code.* *4. Identify deviations from the design intent as wellas variations in site conditions from those planned or expected and respond appropriately to site changes or work that is not compliant.* *5. Review test results, manufacturers' product information,shop drawings, prototypes, and samples in order to assist in determining whether the construction of the building enclosure is in substantial compliance with the construction documents.* *6. Demonstrate an understanding of thedifference between Quality Control and QualityAssurance.*
1.10 Transfer design intentions to drawings and sketches; Understand transmittal of design information to design documents.	*1. Design and prepare detail drawings that clearly identify the work required at various building enclosure locations and identify if designs produced by others adequately address requiredperformance.* *2. Produce sketches, notes, documentation anddesign documents to prepare proposals, preliminary, and final design drawings for acceptance by the client and approval by regulatory authorities.* *3. Incorporate figures and sketches into reportsto convey engineering opinions.* *4. Review designs of others and communicatefindings and issues, including suggested alternatives.*

Appendix E-8 – Competency Indicators for Software Engineering – Category 1 only

You may choose to use the generic indicators for Technical Competence Category 1 shown in Appendix 2 or you may use the discipline-specific indicators when completing your entries. Categories 2 through 7 are the same for all disciplines.

Competency Category 1 – Technical Competence for Software Engineering

COMPETENCIES (each require one example)	**INDICATORS** (suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)
1.1 Demonstrate knowledge of regulations, codes, standards, and safety – this includes local engineering procedures and practices as applicable.	*1. For design and project activities, identify legal and regulatory requirements for information control, auditing and security (e.g. Bill C198 CSOX) – information access and protection of privacy legislation, and non-disclosure or intellectual property agreements.* *2. Incorporate knowledge of standards (such as: coding standards, interface standards for hardware and software operating systems, external standards for programming languages and tools, technical interfaces, internal standards, IEEE/ISO/IEC Standards) in design materials.* *3. Prepare reports assessing project compliance with codes, standards, and legal/regulatory requirements.* *4. Ensure that appropriate codes, standards, and legal/regulatory requirements are complied with in the design and implementation process.*
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 business or industrial processes, operations, project and design constraints, e.g. timeline, cost, physical, operational availability, reliability, user competence, failure rate, maintenance downtime and support. 2. Demonstrate knowledge of appropriate existing software components, package, frameworks, APIs, libraries, development stacks, software patterns, both internal (to the development organization) and external (open-source or proprietary). 3. Demonstrate understanding of and coordination with other engineering and professional disciplines. 4. Demonstrate use of software development best practices (e.g. code reviews, revision management, and automated deployment) to ensure process integrity.
1.3 Analyze technical risks and offer solutions to mitigate the risks.	*1. Demonstrate familiarity with system protection, security and/or damage/hazard mitigation (e.g. from unexpected loads, unintended uses, cyberattacks, catastrophic failures and losses, etc.).* *2. Identify risk and threat areas including causes of risks and their impacts to the client and public.* *3. Perform FMEA. Clearly identify the remaining risks and worst case scenario.* *4. Develop risk management/mitigation plans.*
1.4 Apply engineering knowledge to design solutions. Adopt application-proven and field-proven design approaches whenever feasible.	*1. Conduct Business or Industrial Process Analysis.* *2. Identify functional requirements and non-functional requirements (relevant quality attributes).* *3. Apply Software Engineering Principles to System Synthesis and Design of a software-intensive system to obtain optimal results (Develop or select a suitable system and software architecture; Select an appropriate. development technology (framework, language, tools) Decompose the system; design interfaces between software components; etc. Trace key design choices to functional and non-functional requirements, etc.).* *4. Demonstrate the development of a unique solution which could not be accomplished with a standard design solution.* *5. Adopt application-proven and field-proven design approaches whenever feasible.*
1.5 Be able to understand solution techniques and independently verify the results.	1. Demonstrate an understanding of the application, selection and adaptation of available software engineering tools to support specific tasks in the software development life-cycle. 2. Show /describe steps taken to independently verify the results of available software engineering tools, APIs, frameworks, libraries etc.

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
1.6 Safety awareness: Be aware of safety risks inherent in design; and demonstrate safety awareness – on-site and possible safety authorization/certificate as appropriate.	*1. Demonstrate compliance to local design and programming standards, including privacy regulations, language, product quality and functional safety standards, cybersecurity standards , system and software quality requirements and evaluation, requirements for specific regulatory purposes and ethical considerations.* *2. Demonstrate application of crossover domains and protection of data.* *3. Demonstrate incorporation of elements in software design that protects/ensures public interest, user protection, security and safety.* *4. Demonstrate post-failure analysis of causes of failure and suggest solutions to prevent further disasters.* *5. Identify risks through operations with respect users goals, how you ensure safety of data and user integrity and how implement xxx to ensure user integrity.* *6. List the risk or fault exclusion terms or conditions.*
1.7 Demonstrate understanding of systems as well as of components of systems.	*1. Demonstrate a decomposition and understanding of the modularity of a software solution.* *2. Show an understanding of the software's operating environment (e.g. operating systems, network components, physical devices, software libraries and frameworks, external systems), and constraints in the behaviour of the overall system.* *3. Demonstrate understanding of systems architecture from a safety perspective as well as of components of systems on their safety data or statistics from manufacturers.*
1.8 Exposure to all stages of the process/project life cycle from concept and feasibility analysis through implementation.	*Demonstrate the applicant's contribution to the following stages of the project lifecycle:* *1. **Identification/Elicitation of Requirements:** confirmation of operational distribution or deployment mission profile or scenario, critical system performance parameters, utilization requirements, operational life-cycle and operating environment, user expectations and system operational requirements.* *2. **Preparation:** effective use of software development process or life cycle and adaptation of development process to the requirements, including use of third-party simulation schemes such as HIL techniques.* *3. **Appraisal:** analysis of the project or features from technical, timeline/financial, economic, social, user requirements, institutional and environmental perspectives.* *4. **Preparation of specifications, design team integration and subcontracting:** preparation of design specifications, integration of design team, engagement and integration of external system suppliers or subcontractors.* *5. **Implementation, validation and monitoring:** implementation of project activities with on-going checks on progress and feedback; project management (agile or waterfall/traditional), training and support of users including user documentation.* *6. **System Life Cycle Support:** system maintenance, review of system efficiency, iterative optimization, system retirement.*
1.9 Understand the concept of quality control during design and construction including independent design check and independent reviews of design, field checks and reviews.	*1. Ensure user and stakeholder expectations are met.* *2. Ensure the software design meets technical expectations,* *3. Prepare quality control plans for the entire design and implementation process, including frequency and test parameters, for specific processes or products.* *4. Evaluate test results, determine adequacy, and develop recommended action.* *5. Demonstrate independent peer review and validation of design.* *6. Demonstrate that completed project, systems or sub-systems meet project objectives in terms of functionality, operational performance and cost.* *7. Understand design limitations and exclusions in terms of safety.* *8. Demonstrate root cause analysis in production/live systems.*

COMPETENCIES **(each require one example)**	**INDICATORS** **(suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)**
1.10 Transfer design intentions to drawings and sketches; Understand transmittal of design information to design documents.	*1. Demonstrate the ability to prepare or review software-specific drawings and sketches (ER diagrams, UML (Unifed Modeling Language) diagrams, IDEF0, statecharts, pseudo-code etc.) of others and communicate findings and issues, including suggested alternatives.* *2. Demonstrate communication of ideas and concepts to project team members.* *3. Demonstrate understanding of value of project completion reports and lessons learned reports to application in future projects by self or others.* *4. Produce software engineering design documentation with respect to requirements, architecture, technical (code, algorithms, interfaces and APIs) and end user documentation, including training and standard operating procedures, and document design and specifications for acceptance by the client/user and approval by regulatory authorities.*

Appendix G-1 – Geoscience Competency Framework

WORK EXPERIENCE COMPETENCIES (each require one example)		WORKPLACE EXAMPLES (suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)	
1. PROFESSIONAL COMPETENCIES (PROFESSIONALISM)			
1.1	Comply with relevant legislation, regulations, and statutory reporting requirements		
		a	Apply for licenses and permits
		b	Undertake stakeholder consultations
		c	Complete and file reports and notifications
1.2	Practice within the bounds of personal expertise and limitations		
		a	Undertake self-assessment to identify personal limits
		b	Seek advice from professionals with more appropriate expertise
		c	Refer client to other professionals
1.3	Increase relevant knowledge, skills and level of performance over time		
		a	Attend conferences, workshops or courses related to area of practice
		b	Undertake focused research or learning to address knowledge gaps
		c	Obtain relevant specialty training or certification
1.4	Maintain constructive working relationships		
		a	Undertake and apply diversity training
		b	Provide and accept constructive feedback
		c	Contribute to workplace conflict resolution
1.5	Apply ethical principles		
		a	Communicate consequences of disregarding professional advice
		b	Respond to unethical behaviour of others
		c	Identify and address conflict of interest

WORK EXPERIENCE COMPETENCIES (each require one example)		WORKPLACE EXAMPLES (suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)	
1.6	Respond to obligations and responsibilities to the public, to the natural environment, to clients and to employers		
		a	Undertake work activities in a manner that minimizes environmental impact
		b	Make decisions consistent with client or employer needs that protect the safety, health and welfare of the public
		c	Provide accessible and appropriate information to minimize public concerns
1.7	Contribute to health and safety in the workplace		
		a	Proactively address workplace health and safety
		b	Identify unsafe practices or hazardous situations
		c	Contribute to development of site-specific health and safety requirements
2. COMPETENCIES IN SCIENTIFIC METHOD			
2.1	Apply scientific principles		
		a	Use mathematical and statistical principles to analyze data
		b	Use principles of chemistry and physics to interpret data
		c	Formulate, test and evaluate hypothesis
2.2	Effectively utilize scientific literature		
		a	Undertake a literature search
		b	Critically analyze and incorporate published research
		c	Identify and acknowledge relevant sources
2.3	Identify uncertainty and ambiguity in data, and limits to knowledge		
		a	Identify bias in data collection
		b	Evaluate margin of error on results
		c	Display uncertainty in analytical results or interpretation

WORK EXPERIENCE COMPETENCIES (each require one example)		WORKPLACE EXAMPLES (suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)	
2.4	Apply principles of quality assurance and quality control (QA / QC)		
		a	Follow established protocols in data collection or analysis
		b	Review project outcomes relative to quality standards
		c	Establish QA / QC standards
2.5	Undertake relevant investigation and due diligence		
		a	Research complete background information
		b	Review similar situations to identify known hazards and risks
		c	Consider potential unanticipated outcomes
3. COMPETENCIES IN AREA OF GEOSCIENCE PRACTICE			
3.1	Plan investigations based upon purpose of study, incorporating existing site-specific information and appropriate approaches		
			Examples of investigations:
		a	geological mapping
		b	geophysical survey
		c	baseline monitoring
		d	geohazard assessment
		e	drilling program
		f	sampling program
		g	environmental site assessment
		h	research project
3.2	Acquire, process and analyze data using appropriate methodologies		
		a	Use effective devices and instruments to acquire data
		b	Apply locational tools and principles to georeference data
		c	Analyze and process data using 3-D modelling software

WORK EXPERIENCE COMPETENCIES (each require one example)		WORKPLACE EXAMPLES (suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)	
3.3	Incorporate relevant data from other sources		
		a	Integrate historical and current data
		b	Include local or regional information
		c	Identify analogs
3.4	Interpret and evaluate data to construct models consistent with purpose of investigation		
		a	Prepare and interpret logs, sections or maps
		b	Prepare and interpret spreadsheets, charts or diagrams
		c	Apply geoscience principles to generate models
3.5	Critically evaluate models		
		a	Address uncertainty and bias
		b	Compare and contrast analogous models
		c	Evaluate validity of model relative to objectives
3.6	Formulate conclusions and recommendations		
		a	Define drilling targets
		b	Assess site suitability and determine mitigation measures
		c	Assess feasibility based on resource estimation
		d	Provide alternative solutions and make recommendations
3.7	Adapt methodologies to address unfamiliar situations		
		a	Modify mapping or sampling methodologies in unfamiliar terrain or geological settings
		b	Adapt approach based on stakeholder values
		c	Integrate additional knowledge & skills to address unfamiliar situations
		d	Develop new techniques

WORK EXPERIENCE COMPETENCIES (each require one example)		WORKPLACE EXAMPLES (suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)	
4. COMPLEMENTARY COMPETENCIES - COMMUNICATION AND MANAGEMENT			
4.1	Deliver and comprehend oral communication		
		a	Participate in a consultation or working group
		b	Deliver a geoscience lecture or presentation
		c	Describe a geoscience model to a client, peer or supervisor
4.2	Deliver and comprehend written communication		
		a	Prepare and respond to business correspondence
		b	Write a project or funding proposal
		c	Interpret and synthesize written information
4.3	Communicate technical information effectively to a variety of audiences		
		a	Create or adapt a presentation for technical and non-technical audiences
		b	Create or modify written material for technical and non-technical audiences
		c	Deliver a geoscience presentation to students
4.4	Manage activities		
		a	Plan or coordinate geoscience field work
		b	Plan or coordinate data collection or analysis
		c	Organize a conference, workshop or meeting
4.5	Use time management skills		
		a	Prioritize activities to meet deadlines
		b	Use scheduling tools
		c	Adapt schedule to changing situations
4.6	Provide direction to others		
		a	Provide instructions to students
		b	Advise team members or co-workers
		c	Supervise the work of others

WORK EXPERIENCE COMPETENCIES (each require one example)		WORKPLACE EXAMPLES (suggestions (not mandatory) on example content that is appropriate to demonstrate the competency)	
4.7	Contribute to budgetary management		
		a	Evaluate quotes
		b	Estimate costs
		c	Control expenditures
4.8	Apply basic principles of risk management		
		a	Mitigate risk associated with field work
		b	Coordinate activities to manage risk
		c	Communicate business risks associated with geoscience interpretations
4.9	Contribute to secure data management		
		a	Use data security software
		b	Protect confidential information or materials
		c	Develop or follow organizational data management protocols
4.10	Maintain comprehensive professional records		
		a	File and archive comprehensive and clear field observations
		b	Label, store and catalogue samples
		c	Prepare and retain business and administrative records