



EXAMINATION GUIDE FOR EXAM CANDIDATES

ROSTER OF APPROVED PROFESSIONAL EXAMINATION TECHNICAL — RISK-BASED STANDARDS ASSESSMENT

Roster Qualifications and Functions

The Roster of Approved Professionals (the Roster) is a roster of individuals who have proven, through examination and experience, their expert knowledge in contaminated site assessment, management, and remediation.

Approved Professionals are authorized, under section 49(1) of the Contaminated Sites Regulation (CSR), to recommend to the BC Ministry of Environment and Parks (BC ENV) issuance of Approvals in Principle, Certificates of Compliance, Determinations that a site is or is not contaminated and approval of background release exemptions (as per Protocol 6 - Eligibility of Applications for Review by Approved Professionals).

There are two categories of Approved Professionals: Numerical Standards Assessment Specialists, whose recommendations are based on the application of the numerical standards of the CSR; and Risk-based Standards Assessment Specialists, whose recommendations are based on the application of the risk-based standards of the CSR.

The qualifying examination is offered in three parts: Technical – Numerical Standards Assessment, Technical – Risk Assessment, and Regulatory. To be appointed to the Roster, candidates must achieve a pass in both the regulatory part and the technical part associated with the category in which they seek appointment. Candidates must satisfy all minimum requirements in the year of appointment.

More information on the Roster is available at www.csapsociety.bc.ca. Please email exams@csapsociety.bc.ca for the Approved Professional Roster Pack.

Examination Format

The Technical - Risk Assessment examination is offered in a computer-based format and is held in a computer lab. The examination consists of approximately **70 multiple-choice questions** worth 1 point each. Candidates are given **4 hours** to complete the Regulatory examination. A basic, non-programmable calculator (Texas Instruments TI-30Xa Solar), a #2 mechanical pencil, an eraser, writing papers and a package of page markers (eg *Post-it Brand* flags) will be provided to, and retrieved from, candidates with their examination paper. Candidates will not be permitted to use their own calculator or writing instruments.

Candidates will be provided with a list of reference materials (*see Attachment 2*) to help prepare for the examination. Candidates are expected to prepare their own **printed** reference materials which can be brought into and used during the examination. Laptops or electronic materials are **NOT** permitted. The examination is not limited to testing knowledge of only those materials in the reference list, but can include any related materials considered relevant knowledge for an Approved Professional.

Objectives of the Technical-Risk Assessment Exam

The objectives of the Technical – Risk Assessment examination include the testing of the understanding and application of combined aspects of ecology, toxicology, and environmental chemistry for the review of human health and ecological risk assessments. Candidates are also expected to have a general understanding of related areas such as for example, basic contaminant transport in various media.

Examination Content and Guide to Preparation

This Guide to Examination Candidates is intended to give candidates guidance in their preparation for the exam. The information contained in this document and its attachments is to assist only and is subject to change. Areas and materials not specifically mentioned may also be examined.

Information useful in preparing for the exam is included in the following attachments.

1. Syllabus
2. List of Reference Materials

ATTACHMENT 1 – SYLLABUS

Candidates should read the Guide to Examination Candidates – Roster of Approved Professionals Examination – Technical – Risk Assessment before reading this syllabus. The percentage in brackets indicates the approximate percentage of the examination that will cover each major content area. While the ½ percentage weightings appear to be quite specific; they are, in fact, approximate only. Particularly important areas of knowledge include:

ECOLOGICAL RISK ASSESSMENT

1. Problem Formulation (15%)

- a. Risk Assessment Planning
- b. Integration of Available Information
- c. Identification of stressors
- d. Potentially Exposed Receptors
 - i. Complete and incomplete pathways
 - ii. Risk controls
- e. Selecting Assessment and Measurement Endpoints
- f. Conceptual Models
- g. Data Gap Analysis
- h. Sampling and Analysis Plan

2. Exposure Assessment (12.5%)

- a. Characterization of Exposure
- b. Evaluating Data and Models for Analysis
 - i. Strengths and Limitations of Different Types of Data
 - ii. Literature Data – relevant species, study conditions
 - iii. Site Data/Observations - measurement and assessment endpoints; species diversity, richness, abundance
- c. Measurement and/or Modeling Studies

3. Effects Assessment (12.5%)

- a. Quantitative and Qualitative Site Observations
 - i. Terrestrial Receptors
 - ii. Aquatic Receptors
- b. Bioassays
 - i. Field studies
 - ii. Laboratory toxicity tests
- c. Toxicity Reference Values
 - i. Selection
 - ii. Derivation
- d. Ecosystem – context of scale relative to contaminated sites
- e. Ecological Responses
 - i. Stressor-Response Analysis
 - ii. Establishing Cause-and-Effect Relationships
 - iii. Linking Measures of Effect to Assessment Endpoints

4. Risk Characterization, Uncertainty Analysis, Risk Management and Requirements (10%)

- a. Quotient Method
- b. Observation Method
- c. Weight of Evidence
- d. Reporting Risks

SYLLABUS CONT'D

- e. Identifying Major Types of Uncertainty
- f. Use of Uncertainty Factors
- g. Sensitivity Analysis

- h. Performance Verification Plans
- i. Risk Management
- j. Other Risk-based Submission Requirements

HUMAN HEALTH RISK ASSESSMENT

1. Problem Formulation (15%)

- a. Data Collection
 - i. Background Information Useful for Data Collection
 - ii. Review of Available Site Information
 - iii. Addressing Modeling Parameter Needs
 - iv. Preliminary Identification of Potential Human Exposure
 - v. Strategy for Sample Collection
 - vi. QA/QC Measures
- b. Data Evaluation
 - i. Combining Data Available from Site Investigations
 - ii. Evaluation of Analytical Methods
 - iii. Evaluation of Quantitation Limits
- c. Chemicals of Potential Concern
 - i. Comparison of Samples with Criteria/Guidelines
 - ii. Comparison of Samples with Standards
- d. Potentially Exposed Receptors
- e. Potential Exposure Pathways
 - i. Complete and incomplete pathways
 - ii. Risk controls
- f. Conceptual Model
- g. Data Gap Analysis

2. Exposure Assessment (15%)

- a. Characterization of Exposure Setting
 - i. Characterize Physical Setting
 - ii. Characterize Exposed Receptors
 - iii. Identification of Exposure Routes
 - iv. Identification of Reasonable Maximum Exposure
- b. Quantification of Exposure: Determining Exposure Concentrations
 - i. Estimation of Chemical Intakes
 - ii. Exposure Concentrations in Various Media
 - iii. Combining Chemical Intakes Across Pathways

3. Toxicity Assessment (10%)

- a. Types of Toxicological Information Considered in Toxicity Assessment
- b. Toxicity Assessment for Noncarcinogenic Effects
- c. Toxicity Assessment for Carcinogenic Effects
- d. Identifying Appropriate Toxicity Values for Site Risk Assessment
- e. Evaluating Chemicals for which no Regulatory Toxicity Values are Available

SYLLABUS CONT'D

4. Risk Characterization, Uncertainty Analysis, Risk Management and Requirements (10%)

- a. Quantifying Risks
 - i. Risks for Individual Substances
 - ii. Risks for Multiple Substances
- b. Combining Risks Across Exposure Pathways
- c. Consideration of Site-Specific Human Studies
- d. Risk Characterization Results
- e. Risk controls
- f. Identifying Major Types of Uncertainty
- g. Use of Uncertainty Factors
- h. Sensitivity Analysis
- k. Performance Verification Plans
- l. Risk Management
- m. Other Risk-based Submission Requirements

ATTACHMENT 2 – LIST OF REFERENCE MATERIALS

Candidates should read the **Guide to Examination Candidates – Roster of Approved Professionals Examination – Technical – Risk Assessment** before reading this attachment. This list of reference materials includes materials upon which some, but not all, of the exam questions have been developed. Other questions are drawn from the general principles to be tested and, in some instances, what is considered to be general knowledge. In addition to relevant portions of those materials listed here, candidates should study generally accepted, up-to-date texts in the subject matter to be tested. (Note: BC ENV = BC Ministry of Environment and Parks; USEPA = United States Environmental Protection Agency)

1. BC ENV. A Guidance Manual to Support the Assessment of Contaminated Sediments in Freshwater, Estuarine, and Marine Ecosystems in British Columbia Volume I – Volume I – An Ecosystem-Based Framework for Assessing and Managing Contaminated Sediments. Prepared by MacDonald Environmental Sciences Ltd. May 2002 https://www.cerc.usgs.gov/pubs/sedtox/gm_vII_062003.pdf
2. BC ENV. A Guidance Manual to Support the Assessment of Contaminated Sediments in Freshwater, Estuarine, and Marine Ecosystems in British Columbia Volume II – Design and Implementation of Sediment Quality Investigations in Freshwater Ecosystem. Prepared by MacDonald Environmental Sciences Ltd. November 2003 <https://a100.gov.bc.ca/pub/eirs/finishDownloadDocument.do?subdocumentId=3330>
3. BC ENV. Ambient Water Quality Criteria for Polycyclic Aromatic Hydrocarbons (PAHs). February 1993. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/water-quality-guidelines/approved-wqgs/bc_env_pah_waterqualityguideline_technical.pdf
4. BC ENV. B.C. Environmental Laboratory Manual. 2023. <https://www2.gov.bc.ca/gov/content/environment/research-monitoring-reporting/monitoring/laboratory-standards-quality-assurance/bc-environmental-laboratory-manual>
5. BC ENV. Procedure 8 Definitions for Contaminated Sites. February 1, 2023. <https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/procedures/procedure8.pdf>
6. BC ENV. CSR Last amended July 1, 2026 by B.C. Reg. 102/2026 including Schedules 3.1, 3.2, 3.3, 3.4. https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/375_96_00
7. BC ENV. Technical Guidance 15 Concentration Limits for Protection of the Aquatic Receiving Environments. Version 2.0, November 1, 2017. <https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/technical-guidance/tg15.pdf>
8. BC ENV. Technical Guidance 4 Vapour Investigation and Remediation. Version 2, effective date: November 1, 2017. <https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/technical-guidance/tg04.pdf>
9. BC ENV. Contaminated Sites Guidance Documents and Forms. <https://www2.gov.bc.ca/gov/content/environment/air-land-water/site-remediation/guidance-resources>
10. BC ENV. Performance Verification Plans. <https://www2.gov.bc.ca/gov/content/environment/air-land-water/site-remediation/remediate-a-contaminated-site/performance-verification-plans>
11. BC ENV. Policies and Standards Documents. <https://www2.gov.bc.ca/gov/content/environment/air-land-water/site-remediation/guidance-resources>
12. BC ENV. Procedure Documents. <https://www2.gov.bc.ca/gov/content/environment/air-land-water/site-remediation/guidance-resources>
13. BC ENV. Protocol 1 Detailed Risk Assessment. <https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/protocols/protocol01.pdf>
14. BC ENV. Protocol 12 Site Risk Classification, Reclassification and Reporting. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/protocols/sr_protocol12.pdf
15. BC ENV. Protocol 13 Screening Level Risk Assessment. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/protocols/sr_protocol13.pdf
16. BC ENV. Protocol 14 Determining Requirements for Barite Sites https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/protocols/protocol_14.pdf

17. BC ENV. Protocol 20 Detailed Ecological Risk Assessment Requirements.
<https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/protocols/protocol20.pdf>
18. BC ENV. Protocol 21. Water Use Determination. https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/protocols/protocol_21.pdf
19. BC ENV. Protocol 22 Application of Vapour Attenuation Factors to Characterize Vapour Contamination
https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/protocols/protocol_22.pdf
20. BC ENV. Protocol 28 2016 Standards Derivation Methods.
https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/protocols/p28_jan_2021_revisions_final_signed.pdf
21. BC ENV. Protocol 30 Classifying Substances as Carcinogenic.
https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/protocols/protocol_30.pdf
22. BC ENV. Protocol 4 Establishing Local Background Concentrations in Soil.
<https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/protocols/protocol04.pdf>
23. BC ENV. Protocol 6 Applications with Approved Professional Recommendations and Preapprovals.
https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/protocols/p6_jan_2021_revisions_final_signed.pdf
24. BC ENV. Protocols for Contaminated Sites Documents.
<https://www2.gov.bc.ca/gov/content/environment/air-land-water/site-remediation/legislation-and-protocols>
25. BC ENV. Technical Guidance 1 Site Characterization and Confirmation Testing. Effective March 2023.
<https://www2.gov.bc.ca/assets/gov/environment/air-land-water/site-remediation/docs/technical-guidance/tg01.pdf>
26. BC ENV. Technical Guidance Documents: <https://www2.gov.bc.ca/gov/content/environment/air-land-water/site-remediation/guidance-resources> BC ER. British Columbia Energy Regulator. Site Remediation and Reclamation Manual., Version 1.7 November 2023. <https://bc-er.ca/files/operations-documentation/Remediation-Reclamation-and-Restoration/site-remediation-and-reclamation-manual.pdf>
27. BC ENV. 2026. Guidance for Risk Assessors. Available at:
<https://www2.gov.bc.ca/gov/content/environment/air-land-water/site-remediation/remediate-a-contaminated-site/guide-for-risk-assessment>
28. BC ENV. 2026 Performance Verification Plans. Available at:
<https://www2.gov.bc.ca/gov/content/environment/air-land-water/site-remediation/remediate-a-contaminated-site/performance-verification-plans>
29. CCME (Canadian Council of Ministers of Environment). 1996. A Framework for Ecological Risk Assessment: General Guidance. Prepared by the CCME Subcommittee on Environmental Quality for Contaminated Sites for the National Contaminated Sites Remediation Program. March 1996.
https://publications.gc.ca/collections/collection_2014/ec/En108-4-10-1996-eng.pdf
30. CCME (Canadian Council of Ministers of Environment). 1997. A Framework for Ecological Risk Assessment: Technical Appendices. Prepared by the CCME Subcommittee on Environmental Quality for Contaminated Sites for the National Contaminated Sites Remediation Program. March 1997.
https://publications.gc.ca/collections/collection_2014/ec/En108-4-10-1-1997-eng.pdf
31. CCME (Canadian Council of Ministers of Environment). 2006. A Protocol for the Derivation of Environmental and Human Health Soil Quality Guidelines.
https://publications.gc.ca/collections/collection_2010/ccme/En108-4-8-2006-eng.pdf
32. CCME (Canadian Council of Ministers of Environment). 2020. Ecological Risk Assessment Guidance Document. PN1585. https://ccme.ca/en/res/eraguidance_e.pdf

33. Environment Canada. Biological Test Method: Test of Larval Growth and Survival Using Fathead Minnows. EPS 1/RM/22 Second Edition, February 2011.
http://publications.gc.ca/collections/collection_2011/ec/En49-7-1-22-eng.pdf
34. Environment Canada. 2013. Federal Contaminated Sites Action Plan (FCSAP) Ecological Risk Assessment Guidance. March 2012. Prepared for Environment Canada by Azimuth Consulting Group.
35. Health Canada. 2024. Federal Contaminated Site Risk Assessment in Canada. Part I: Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA), Version 3.0. Prepared by Contaminated Sites Division, Safe Environments Directorate, Health Canada.
36. Health Canada. 2010. Federal Contaminated Site Risk Assessment in Canada. Part V: Guidance on Human Health Detailed Quantitative Risk Assessment (DQRA_{CHEM}). Prepared by Contaminated Sites Division, Safe Environments Directorate, Health Canada.
37. Health Canada. 2023. Federal Contaminated Site Risk Assessment in Canada. Supplemental Guidance for Soil Vapour Intrusion Assessment At Federal Contaminated Sites. Prepared by Contaminated Sites Division, Safe Environments Directorate, Health Canada.
38. Health Canada. 2013. Federal Contaminated Sites Risk Assessment in Canada. Interim Guidance on Human Health Risk Assessment of Short-Term Exposure to Carcinogens at Contaminated Sites.
39. Health Canada. 2017. Federal Contaminated Site Risk Assessment in Canada. Supplemental Guidance on Human Health Risk Assessment of Contaminated Sediments: Direct Contact Pathways. Prepared by Contaminated Sites Division, Safe Environments Directorate, Health Canada.
40. Health Canada. 2025. Guidelines for Canadian Drinking Water Quality . Water and Air Quality Bureau, Healthy Environments and Consumer Safety Branch, Health Canada, Ottawa, Ontario.
41. Health Canada. August 2017. Federal Contaminated Site Risk Assessment in Canada. Supplemental Guidance on Human Health Risk Assessment of Oral Bioavailability of Substances in Soil and Soil-Like Media).
42. Health Canada. March 2024. Federal Contaminated Site Risk Assessment in Canada. Preliminary Quantitative Risk Assessment (PQRA). Version 4.0.
43. Health Canada. March 2021. Federal Contaminated Site Risk Assessment in Canada. Toxicological Reference Values (TRVs). Version 3.0.
44. Province of BC. 2004. Environmental Management Act [SBC 2003] Chapter 53. King's Printer, Victoria BC.
https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/375_96_00
45. Province of BC. Contaminated Sites Regulation. King's Printer, Victoria BC.
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<https://rais.ornl.gov/documents/tm13391.pdf>
47. Science Advisory Board for Contaminated Sites (2010). Guidance for a Weight of Evidence Approach in Conducting Detailed Ecological Risk Assessments (DERA) in British Columbia. <https://sabcs.ca/documents/>
48. Science Advisory Board for Contaminated Sites in British Columbia (2006). Guidance for Detailed Ecological Risk Assessment (DERA) in British Columbia. <https://sabcs.ca/documents/>
49. Science Advisory Board for Contaminated Sites in British Columbia (2008). Detailed Ecological Risk Assessment (DERA) in British Columbia, Technical Guidance. <https://sabcs.ca/documents/ites>
50. Society of Contaminated Sites Approved Professionals of British Columbia (CSAP). Practice Guidelines and Detailed Ecological Risk Assessment Policy Summary Documents. <https://csapsociety.bc.ca/for-members/resources/guidelines/practice/#::~:~:text=The%20guidelines%20specify%20tasks%20and%20identify%20general%20standards,bylaws%20of%20CSAP%20Society.%20CSAP%20Numerical%20Practice%20Guidelines>
51. Suter, G. W., II. 1993. Ecological Risk Assessment. Ann Arbor, MI: Lewis Publishers.
52. Suter, G.W. II. 2007. Ecological Risk Assessment, Second Edition. Boca Raton, FL. CRC Press,
53. Suter, G.W., II, R.A. Efroymsen, B.E. Sample, and D.S. Jones. 2000. Ecological Risk Assessment for Contaminated Sites. Lewis Publishers.

54. USEPA (United States Environmental Protection Agency). April 1998. Guidelines for Ecological Risk Assessment. EPA/630/R-95/002F. EPA – You may look for Publication Number EPA 540-R-97-006
55. USEPA (United States Environmental Protection Agency). June 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. Interim Final. EPA 540-R-97-006
56. USEPA (United States Environmental Protection Agency). March 2005. Guidelines for Carcinogen Risk Assessment. EPA/630/P-05/001F
57. USEPA (United States Environmental Protection Agency). January 2009. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment). EPA-540-R-070-002.
58. USEPA (United States Environmental Protection Agency). November 2003, revised March 2005. Guidance for Developing Ecological Screening Levels. OSWER Directive 9285.7-55.
59. USEPA December (1993) Wildlife Exposure Factors Handbook, EPA/600/R-93/187
60. USEPA Integrated Risk Information System (IRIS). <https://www.epa.gov/iris>
61. USEPA. 1999. Risk Assessment Guidance for Superfund, Volume 3 Process for Conducting Probabilistic Risk Assessment. EPA 540-R-02-002
62. USEPA. 1989. United States Environmental Protection Agency, Office of Emergency and Remedial Response, December 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), Interim Final. EPA/540/1-89/002.
63. USEPA. 1989. United States Environmental Protection Agency, Office of Emergency and Remedial Response, December 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Interim. EPA/540/R/99/005.
64. USEPA. 2002. USEPA Region 9 Biological Technical Assistance Group (BTAG) Recommended Toxicity Reference Values for Mammals.
65. USEPA. 2005. Guidance for Developing Ecological Risk Assessment Soil Screening Levels. November 2003. Revised February 2005.
66. USEPA. 2015. Determination of the Biologically Relevant Sampling Depth for Terrestrial and Aquatic Ecological Risk Assessments. EPA/600/R-15/176 ERASC-015F October 2015.
67. US EPA. 2025. EPA EPA EcoBox. A Toolbox for Ecological Risk Assessors. <https://www.epa.gov/ecobox>
68. US EPA. 2025. Ecological Risk Assessment. Conducting an Ecological Risk Assessment. <https://www.epa.gov/risk/conducting-ecological-risk-assessment>
69. Washington State Department of Ecology. 2021. Sediment Cleanup User's Manual SCUM. <https://apps.ecology.wa.gov/publications/SummaryPages/1209057.html>

NOTE:

Health Canada documents may be ordered by request to Health Canada at:

<http://www.hc-sc.gc.ca/ewh-semt/contamsite/docs/index-eng.php>

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