



DRAFT
REGULATORY
STANDARD

**Environmental Monitoring Program at
Class I Nuclear Facilities and Uranium
Mines and Mills**

S-224

Issued for public comment
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REGULATORY DOCUMENTS

The legal framework within which the Canadian Nuclear Safety Commission (CNSC) operates includes the *Nuclear Safety and Control Act*, its Regulations and other legal instruments such as licences, certificates and orders. The legal framework is supported by regulatory documents issued by the CNSC, the main classes of which are:

Regulatory Policy (P): a document that describes the philosophy, principles or fundamental factors that underlie the CNSC's approach to its regulatory mission. It provides direction to CNSC staff and information to stakeholders.

Regulatory Standard (S): a document that describes CNSC requirements. It imposes obligations on the regulated party, once it is referenced in a licence or other legally enforceable instrument.

Regulatory Guide (G): a document that indicates acceptable ways of meeting CNSC requirements, as expressed in the Act, Regulations, regulatory standard or other legally-enforceable instrument. It provides guidance to licensees and other stakeholders.

Regulatory Notice (N): a document that provides licensees and other stakeholders with information about significant matters that warrant timely action.

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Environmental Monitoring Program at Class I Nuclear Facilities and Uranium Mines and Mills

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About this Document

This draft Regulatory Standard sets out the Environmental Monitoring Program that licensees shall implement at Class I nuclear facilities and uranium mines and mills when a licence condition requires such a program.

Comments

The CNSC invites interested persons to assist in the further development of this draft regulatory document by commenting in writing on its content and potential usefulness. Please respond by October 15, 2004. Direct your comments to the postal or e-mail address provided below, referencing file 1-8-8-224.

The CNSC will take the comments received on this draft into account when developing it further. These comments will be subject to the provisions of the federal *Access to Information Act*.

Document availability

This document can be viewed on the CNSC Internet web site at www.nuclearsafety.gc.ca. To order a printed copy in English or French, please contact:

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**ENVIRONMENTAL MONITORING PROGRAM AT CLASS I
NUCLEAR FACILITIES AND URANIUM MINES AND MILLS**

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ENVIRONMENTAL MONITORING PROGRAM AT CLASS I NUCLEAR FACILITIES AND URANIUM MINES AND MILLS

1.0 PURPOSE

The purpose of this Regulatory Standard, when incorporated in a licence or other legally enforceable instrument, is to help assure that licensees implement adequate Environmental Monitoring Programs (EMP) at Class I nuclear facilities and uranium mines and mills, in accordance with the *Nuclear Safety and Control Act* (“*NSC Act*,” “*Act*”) and regulations.

2.0 SCOPE

This Regulatory Standard sets out the Environmental Monitoring Program that licensees shall implement at Class 1 nuclear facilities and uranium mines and mills when a licence condition requires such a program.

3.0 RELEVANT LEGISLATION

The following legislation is relevant to the proposed Regulatory Standard:

Subsection 24(4) of the *NSC Act* prohibits the Commission from issuing, renewing, amending or replacing a licence, unless in the opinion of the Commission, the applicant (a) is qualified to carry out the activity that the licence will authorize the licensee to carry on, and (b) will, in carrying out that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed;

Subsection 24(5) of the *NSC Act* provides that a licence issued by the Canadian Nuclear Safety Commission may contain any term or condition that the Commission considers necessary for the purposes of the Act;

Paragraph 3(h) of the *Class 1 Nuclear Facilities Regulations* stipulates that an application for a CNSC licence, other than a licence to abandon, shall contain, in addition to other information, “the proposed ... environmental monitoring programs”;

Paragraph 3 (c)(vi) of the *Uranium Mines and Mills Regulations* stipulates that an application for a licence in respect of a uranium mine or mill, other than a licence to abandon, shall contain, in addition to other information, “the proposed...environmental monitoring programs.”

4.0 TERMINOLOGY

The Glossary at the end of the document defines the special terms used in this regulatory standard.

5.0 ENVIRONMENTAL MONITORING PROGRAM

The environment is defined as the components of the Earth, including (a) land, water, and air, including all layers of the atmosphere; (b) all organic and inorganic matter and living organisms; and (c) the interacting natural systems that include those components referred to in (a) and (b).

An EMP is an integrated and documented set of activities that sample, measure and analyze radiological and hazardous substances, and physical and biological parameters. The EMP shall be based on facility characteristics, environmental characteristics, and the anticipated environmental effects. The licensee shall implement an EMP that is appropriate to the nature and scale of the licensed activity. The EMP shall demonstrate that adequate measures have been taken to protect the environment and to keep radiation doses to members of the public as low as reasonably achievable (ALARA), social and economic factors taken into account.

The EMP shall contain five separate elements, as described in the documents listed below:

1. Design Document;
2. Staff Qualifications and Training Document;
3. Quality Assurance and Quality Control (QA/QC) Document for Field and Laboratory Activities;
4. Sampling and Analytical Procedures Document; and
5. Audit and Review Process Document.

The subsequent sections describe each document in further detail.

5.1 Design Document

The Design Document shall describe the structural framework, environmental monitoring components, and associated rationale for the EMP. It shall include the following information:

1. A detailed description of EMP objectives, principles, and monitoring rationale;
2. Methodology and criteria to identify all radiological and hazardous substances, and physical and biological parameters that require monitoring;
3. Sampling and analytical frequency;
4. Sampling locations;
5. Environmental media to be sampled (e.g., groundwater, surface water, soil, sediment, air, biota);
6. Analytical detection limits;
7. Document control system to track program design changes;
8. Methodology and criteria to identify circumstances under which supplementary or special studies are undertaken; and
9. Performance indicators; performance targets; action levels for monitored radiological and hazardous substances, and physical and biological parameters; and the corresponding action plan, if action levels or performance targets are exceeded.

5.2 Staff Qualifications and Training Document

The Staff Qualifications and Training Document shall outline the training program required for staff and contractors who will conduct the activities identified in the EMP.

5.2.1 Training Program

A training program shall be

1. based on a systematic approach to training (SAT); and
2. commensurate with the complexity of the EMP activity, the employees' educational background, demonstrated level of competence, and previous work experience.

The licensee shall implement a continuing training program in accordance with the principles of a SAT.

5.2.2 Personnel Qualifications, Training and Assessment

Qualification and training needs shall be defined and met for each staff or contractor performing any EMP activity (e.g., developing the EMP design or performing internal audits). As a minimum, a job description shall include the following information:

1. The position title;
2. Minimum qualifications (e.g., education, experience and training) for the position;
3. Responsibilities;
4. Reporting relationships; and
5. Any supervisory responsibilities.

5.2.3 Maintenance of Training Records

The licensee shall have in place a process to describe the maintenance of records documenting the education, training, and technical experience of staff and contractors.

5.3 Quality Assurance and Quality Control Document for Field and Laboratory Activities

QA monitors, documents, and controls the quality of the process on a continual basis. QC comprises those activities that specifically monitor and control discrete laboratory and field tasks. QC activities allow for independent verification of the accuracy of the EMP data generated or for identification of deficiencies requiring corrective action. The QA/QC plan shall instill confidence in the independence and integrity of the results of the EMP.

The QA/QC Document for Field and Laboratory Activities shall include the following information:

1. The roles, responsibilities and inter-relationships of staff (and contractors) within the EMP, including

- a) a staff position with the appropriate authority, resources and responsibility for the QA/QC plan and associated documents; and
 - b) ensuring that staff have the authority and resources needed to perform EMP activities.
2. The process or processes required for performance verification, including
 - a) verification that procedures are correctly followed;
 - b) a description of the quality control requirements to verify sampling and analytical method performance;
 - c) identification of the physical and administrative controls to manage failure of equipment; and
 - d) methods to ensure that appropriate and adequate equipment is available.
 3. A process for identifying and managing non-conformances.
 4. A process for the development of procedures, including
 - a) a master list of all procedures;
 - b) a methodology for developing, validating, authorizing, implementing, documenting, revising and maintaining procedures, including a specified frequency of review;
 - c) document control (i.e., identification, distribution, storage and retrieval); and
 - d) record keeping and retention periods for all documents and data associated with the EMP.

5.4 Sampling and Analytical Procedures Document

The Sampling and Analytical Procedures Document shall contain all the procedures necessary to support and implement an EMP. At a minimum, procedures shall be written for the following activities:

1. All field sampling methods, laboratory analytical methods, and associated equipment, including
 - a) handling, identification, packaging, shipment and receipt of field samples; and
 - b) handling, identification, preparation, and processing of laboratory samples.
2. Verification of equipment performance, including
 - a) calibration and maintenance of field and laboratory equipment; and
 - b) achievement of traceability of measurements, samples and use of reference materials.
3. Data management, including
 - a) protection of the security and integrity of data entry, capture, storage, transmission and processing; and retention of all original data and calculations;
 - b) data validation (e.g., accuracy of calculations, conversions, and data transfer) and criteria for recognizing data outliers/abnormalities; and
 - c) documentation and verification of the adequacy of all computer software and programs for use before initial routine use and after each program modification.

5.5 Audit and Review Process Document

Audits and reviews shall help assure that the EMP operates in accordance with the EMP documents. A review of each element in the EMP (i.e., EMP design, staff qualifications and training, QA/QC plan, sampling and analytical procedures, and the audit and review process) shall be undertaken within a five-year cycle. The audit and review process shall

1. be documented;
2. designate a staff position with the appropriate authority, resources and responsibility for the audit and review plan and associated documents;
3. describe the methodology, scope, criteria, and corrective action plan process;
4. determine the suitability and effectiveness of each element of the EMP;
5. identify and assess deficiencies, and implement and verify the effectiveness of the corrective action plan; and
6. be performed by persons who are uninvolved in the management or implementation of the EMP.

6.0 ENVIRONMENTAL MONITORING PROGRAM REPORTING REQUIREMENTS

6.1 Annual Reporting Requirements

The licensee shall submit the following information to the CNSC on an annual basis:

1. Results of the EMP, including
 - a) measurements of the monitored radiological and hazardous substances, physical and biological parameters, including their statistical analyses (i.e., assessments of changes through time and space);
 - b) individual radiation doses calculated as doses to the critical group or groups;
 - c) an assessment of the EMP results compared with the predicted performance indicators and targets; and
 - d) documentation and justification of any deviations from field sampling, and analytical and data management procedures.
2. A summary and assessment of the field and laboratory QA/QC results, including any non-conformance.
3. A summary of the audit and review results and subsequent corrective action plans.
4. A summary of any proposed modifications to the EMP.
5. Documentation, assessment and review of any special and/or supplementary studies that have been initiated, completed or both.

6.2 Special Reporting Requirements

The licensee shall submit to the CNSC, at least three months before commencing the study, documentation of any proposed special study, supplementary study, or both to address findings from the EMP, including the proposed QA/QC plan.

GLOSSARY

ALARA

As low as reasonably achievable, social and economic factors taken into account

Environmental Characteristics

The abiotic and biotic features of a facility's site and surrounding environment that may influence the environmental fate and transport of any hazardous substance or radioactive nuclear substance released from the facility resulting in the potential exposure of human and non-human biota to these substances. Abiotic components include topography, hydrology, drainage, climate, meteorology, and land-use patterns by members of the public. Biotic components include any part of the environment considered important by the licensee, members of the public, the scientific community, the government of Canada, and any environmentally sensitive habitat.

Environmental Effect

Any change that a licensed activity, substance, equipment, or facility may cause in the environment, including any effect of any change on health and socio-economic conditions; on physical and cultural heritage; on the current use of lands and resources for traditional purposes by aboriginal persons; or on any structure, site, or thing that is of historical, archaeological, paleontological or architectural significance. An environmental effect is also any change to any licensed activity, substance, equipment, or facility that is caused by the environment, whether such a change occurs within or outside Canada.

EMP

Environmental Monitoring Program

Facility Characteristics

Information describing the location of points of release, the maximum quantities and concentrations, and the volume and flow rate of releases of nuclear substances and hazardous substances into the environment, including their physical, chemical, and radiological characteristics as well as the site-specific structures, processes, and contaminant sources that may influence the surrounding environment. ^{[3][4]}

Performance Indicator

A quantifiable variable related to the actions of a proposed or licenced activity that may cause or indicate an adverse environmental effect if a certain threshold value is reached.

Performance Target

A limit on a performance indicator designed to prevent unreasonable risks to the environment. More than one limit may be set or considered for a performance indicator.

SAT

Systematic approach to training

REFERENCES

1. *Nuclear Safety and Control Act*, Canadian Nuclear Safety Commission, Ottawa, 2000.
2. *General Nuclear Safety and Control Regulations*, Canadian Nuclear Safety Commission, Ottawa, 2000.
3. *Class I Nuclear Facilities Regulations*, Canadian Nuclear Safety Commission, Ottawa, 2000.
4. *UMM Facilities Regulations*, Canadian Nuclear Safety Commission, Ottawa, 2000.