Regulatory Document

Texte de réglementation

Atomic Energy Control Board

Commission de contrôle de l'énergie atomique

REGULATORY DOCUMENT R-10

Regulatory Policy Statement

THE USE OF TWO SHUTDOWN SYSTEMS IN REACTORS

Effective date:

January 11, 1977

Canada

PREFACE

1. Siting, design, manufacture, construction, commissioning, operation, and decommissioning of nuclear facilities, or the production, possession, use and disposal of prescribed substances, in Canada or under Canadian control, are subject to the provisions of the Atomic Energy Control Act and Regulations administered by the Atomic Energy Control Board (AECB).

2. In addition to the Atomic Energy Control Regulations, three other categories of Regulatory Document are employed by the AECB. These are:

   Generic Licence Conditions - standard sets of conditions that are included in particular AECB licences of a common type, unless specific circumstances indicate otherwise;

   Regulatory Policy Statements - firm expressions that particular "requirements" not expressed as Regulations or Licence Conditions be complied with or that any requirements be met in a particular manner but where the AECB retains the discretion to allow deviations or to consider alternative means of attaining the same objectives where a satisfactory case is made; and

   Regulatory Guides - guidance or advice on any aspect of the AECB's regulatory process that is given in a manner less rigid than that intended by Policy Statements.

3. In developing Regulatory Documents, the AECB publishes its proposals as Consultative Documents in order to solicit comments both from the nuclear industry and from the public. This is done prior to releasing any Regulatory Document in final form. In certain cases, after the period for public comment, a Consultative Document may be issued for "trial use". This is done for a limited period of time to gain practical experience. Following the period of trial use, the revised document is re-issued for further public comment prior to release in final form.

4. Comments on Consultative Documents and suggestions for new Regulatory Documents and for improvement to those that exist are encouraged and should be directed to the Regulations Development Section of the AECB.

5. Copies of Consultative Documents, Regulatory Documents and related index lists are available in both English and French on request from the Office of Public Information. Requests for technical information on and interpretation of documents should be addressed to this office.

6. The Atomic Energy Control Board may be contacted as follows:

Postal address: Atomic Energy Control Board
P.O. Box 1046
Ottawa, Ontario
K1P 5S9
CANADA

Telephone
General Inquiries: (613) 995-5894

DATE: 11, January 1977

THE USE OF TWO SHUTDOWN SYSTEMS IN REACTORS

PART I - Licensing Requirements

Pursuant to Section 10 Subsection (4) of the Atomic Energy Control Regulations SOR/74-334 the Atomic Energy Control Board gives notice of the following requirements for protective shutdown systems in nuclear power reactors.

1) All nuclear power reactors licensed for construction in Canada after January 1, 1977 shall incorporate two independent protective shutdown systems unless otherwise approved by the Board.

2) The quality of the detailed design, construction, commissioning, testing, maintenance and operation of each protective shutdown system shall be at least equal to the quality expected of the protective shutdown system in plants licensed for operation prior to January 1, 1976. Compliance with applicable codes, standards and practices in effect at the time of licensing will be required.

3) The protective shutdown systems shall be of diverse designs and each shall be physically and functionally separate from the other, from process systems, and from other special safety systems.

4) The applicant for an operating licence shall show by analysis, adequately supported by experimental evidence that when protective shutdown action is necessary, the combined action of the two protective shutdown systems is not required to prevent the consequences of a failure from exceeding those shown in Table 1. This requires that the applicant show that:

   i) the consequences of all serious process failures can be limited by at least one of the two protective shutdown systems acting alone to shut down the reactor to less than those shown in Table 1 for Class 1 failures, assuming proper operation of the containment and emergency core cooling system;

   ii) the consequences of all serious process failures can be limited by each of the protective shutdown systems acting alone to shut down the reactor to less than those shown in Table 1 for Class 2 failures, assuming proper operation of the containment and assuming unavailability of the emergency core cooling system;

iii) the consequences of all serious process failures can be limited by each of the shutdown systems acting alone to shut down the reactor to less than those shown in Table 1 for Class 2 failures, assuming proper operation of the emergency core cooling systems and assuming impairment of the containment.

Table 1: Reference Dose Limits for Postulated Failure Conditions

Situation	Meteorology to be used in Calculation	Maximum Individual Dose Limits	Maximum Total Population Dose Limits[c]
Class 1 Failure	Either worst weather existing at most 10% of time or Pasquill F condition if local data incomplete	0.5 rem whole body 3 rem to thyroid[a]	10^4 man-rem 10^4 thyroid-rem
Class 2 Failure	Either worst weather existing at most 10% of time or Pasquill F condition if local data incomplete	25 rem whole body 250 rem thyroid[b]	10^6 man-rem 10^6 thyroid-rem

(a) For other organs use 1/10 ICRP occupation values.

(b) For other organs use 5 times ICRP annual occupational dose.

(c) For purposes of safety analysis the population dose is integrated from the station boundary out to a distance where the individual dose is 1% of the dose to an individual at the boundary.

PART II - Application of Part I

1) Preamble

1.1) It is considered credible that any one of the special safety systems may fail to perform its required function when called upon to counteract any serious process system failure. Consequently, a plant design must ensure that under such circumstances the release of radioactive material will be within the limits specified by the Atomic Energy Control Board. Because of the particular importance of reactor protective shutdown action the application of the single failure/dual failure approach previously used in assessing nuclear plant safety is modified when two protective shutdown systems are incorporated as part of the plant design.

1.2) For those plant designs incorporating two independent reactor protective shutdown systems of suitable design amongst the special safety systems, it is accepted that at least one of them will operate as designed when protective shutdown action is required.

1.3) The design and performance of each protective shutdown system should meet the requirements of Part II of this document unless otherwise specifically approved.

2) Definitions

2.1) A serious process system failure means any failure of process equipment or procedure which could lead to a significant release of radioactive material from the station in the absence of special safety system action.* A significant release is one which would result in individual or population doses in excess of those given in Table 1 for Class 1 failures.

2.2) A Class 1 failure means a serious process failure with the following assumptions regarding performance of the special safety systems:

(a) Protective Shutdown System 1 operates as designed, the containment operates as designed and the emergency core cooling system operates as designed;

or

(b) Protective Shutdown System 2 operates as designed, the containment operates as designed and the emergency core cooling system operates as designed .

2.3) A Class 2 failure means a serious process failure with the following assumptions regarding performance of the special safety systems:

*The identification of those serious process system failures which must be considered in the design of the plant is outside the scope of the

(a) Protective Shutdown System 1 operates as designed, the containment operates as designed and the emergency core cooling system is unavailable;
or

(b) Protective Shutdown System 2 operates as designed, the containment operates as designed and the emergency core cooling system is unavailable;
or

(c) Protective Shutdown System 1 operates as designed, the emergency core cooling system operates as designed and the containment is impaired;*
or

(d) Protective Shutdown System 2 operates as designed, the emergency core cooling system operates as designed and the containment is impaired.*

3) Design Requirements

3.1) Each of the two protective shutdown systems, acting alone to shut down the reactor, shall be capable of preventing failure of the primary heat transport system due to overpressure, excessive fuel temperatures or fuel break-up. The action of safety-related devices, such as overpressure relief valves, may be taken into account if the design of such devices is commensurate with the design of special safety systems.

*The identification of those modes of containment failure which must be considered in the design of the plant is outside the scope of this document.

3.2) Following a serious process failure, each of the two protective shutdown systems, acting alone to shut down the reactor shall be capable of limiting both the rate of energy production and the total energy production to the extent that the integrity of the containment system is not jeopardized.

3.3) Each of the two protective shutdown systems, acting alone, shall be capable of maintaining the reactor in a suitable subcritical shutdown state indefinitely or, alternatively for a period long enough to permit the protective shutdown system to be supplemented reliably.

3.4) Each protective shutdown system shall incorporate sufficient redundancy to ensure that no single failure results in the loss of its protective action.

3.5) Where practicable, two diverse trip parameters shall be incorporated into the sensing and control logic of each protective shutdown system for each of the serious process failures requiring shutdown action. Manual actuation is acceptable as a "trip parameter" provided it is shown that adequate information and time are available to alert an operator and to permit him to assess the need for intervention and to actuate the protective shutdown system manually.

3.6) Each protective shutdown system shall be readily testable at a frequency sufficient to demonstrate to the extent practicable that its unavailability is less than 1×10^{-3} years per year.

3.7) Each protective shutdown system shall be readily maintainable without increasing the probability that the system may become unavailable.

3.8) Each protective shutdown system shall be designed to fail in the safe direction unless the required availability can be otherwise demonstrated.

3.9) The design of each protective shutdown system shall be such that partial or incomplete operation of one system will not render the other system ineffective.

3.10) In the safety analysis the action of process systems to complement or supplement the safety action of one or both of the protective shutdown systems shall not be taken into account except to show that normal functioning of process systems does not impair the effectiveness of one or both of the protective shutdown systems.

Regulatory Document

Texte de réglementation

Atomic Energy Control Board

Commission de contrôle de l'énergie atomique

REGULATORY DOCUMENT R-58

Regulatory Guide

BIOASSAY REQUIREMENTS FOR ^{125}I AND ^{131}I IN MEDICAL, TEACHING AND RESEARCH INSTITUTIONS

Effective date:

September 15, 1983

Canada

THE AECB REGULATORY DOCUMENTS SYSTEM

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BIOASSAY REQUIREMENTS FOR ^{125}I AND ^{131}I

1. SCOPE OF DOCUMENT

The more widespread use of radioactive isotopes of iodine (collectively referred to as radioiodines) as a research tool, coupled with their diagnostic and therapeutic uses in nuclear medicine, has resulted in an increased number of personnel who are exposed to these radioisotopes and who therefore should be monitored for internal radioiodine contamination.

This document describes the minimum acceptable features of a bioassay programme which the Atomic Energy Control Board (AECB) requires to be available in institutions holding a prescribed substance licence[1] authorising the use of significant quantities of ^{125}I or ^{131}I or both (see Table 1). A licensee may submit details of his own proposed bioassay programme to the AECB for approval. If such a programme fails to be approved, the programme described below shall be adhered to. (See Figure 1.) This document does not deal with individuals who are likely to maintain a significant chronic thyroid burden of radioiodine.

It is assumed that the radioiodine taken into the body is in a soluble, inorganic form (I_2, iodide or iodate) or in an organic form (e.g. methyl iodide) which is metabolised in the body with a resultant release of iodide. Radioiodinated organic compounds which are not catabolised to iodide in the body to any significant degree are not the subject of this document, since the metabolism of the radioiodine will be dictated by the metabolism of the compound. This means that individuals whose only exposure to radioiodine is in the form of prepared radioiodinated compounds such as antigens and antibodies (e.g., individuals using radio immuno assay kits in which the antigen or antibody is supplied as radioiodinated material) are not required to participate in this bioassay programme for radioiodine.

Enquiries on bioassay requirements for other radioiodines should be directed to the Radioisotopes and Transportation Division, Atomic Energy Control Board, P.O. Box 1046, Ottawa, Ontario, K1P 5S9, telephone no. (613) 995-1473. It should be noted that advice on comprehensive bioassay requirements for radioiodines is being prepared by a Federal-Provincial group working on bioassay requirements.[2] The reader should also be aware that other regulatory guides may exist or be in preparation that address other specific dosimetry programs, both external and internal, as well as the broad aspects of dosimetry programs in general such as quality assurance, dose records and approval procedures. The AECB should be consulted to see which guides are appropriate for a particular licensed operation.

A glossary of terms is appended (Appendix D).

2. INTRODUCTION

Many of the uses of radioiodine involve the manipulation of open sources with the attendant hazard of volatile radioiodine being released to the work environment. While safe working procedures (see Appendix A) will minimize the likelihood of radioiodine being ingested, inhaled or absorbed, it is necessary to ensure that adequate precautions are being taken. Detection of significant levels of radioiodine in the body or body fluids may serve as a warning that working conditions or procedures are potentially unsafe. Routine bioassays for radioiodine will therefore play an important role in a comprehensive radiation safety programme.

3.1 Direct Estimation of Thyroid Burden

The thyroid gland is an H-shaped organ in the neck slightly above the sternal notch (see Figure 2). The depth of the gland beneath the surface of the neck is variable[5], and therefore detector response may vary from subject to subject depending on the degree of attenuation by the tissue overlying the thyroid gland. This is especially important for ^{125}I which, because of its decay by electron capture and subsequent emission of weak X-rays (30keV max.), is susceptible to large estimation errors due to such variation in degree of tissue attenuation. Direct measurement of radioiodine levels in the thyroid can be achieved by use of equipment capable of detecting the gamma radiations of the radioiodine of interest. Equipment used to detect radioiodines in the thyroid should be calibrated for the isotope of interest under conditions mimicking the thyroid in the neck. It should be noted that instrumentation appropriate for the detection of ^{125}I (e.g., thin sodium iodide crystal) is not necessarily appropriate for the efficient detection of ^{131}I - and vice versa. The sensitivity of the detector can be calculated by taking the count rate shown on the detector and dividing by the known amount of the radioiodine in the phantom in becquerels (disintegrations per second). If one uses the same set-up when measuring thyroid burdens in humans, the sensitivity as determined above can be used as a reasonable approximation. To minimize errors, a standard procedure for performing measurements should be followed. (See Reference 6.)

3.2 Calibration

It is projected that reference thyroid phantoms will be available for intercomparison testing under the guidelines of the AECB policy regarding calibration of dose measuring instruments in cooperation with the Radiation Protection Bureau of the Department of National Health and Welfare. It should be noted that phantoms for ^{125}I and ^{131}I are available commercially.

4. BIOASSAY PROGRAMMES FOR ^{125}I AND ^{131}I

4.1 Participation

4.1.1 Bioassay shall be done when open source quantities of radioiodine exceeding those shown in Table 1 are used. These quantities apply to the total amount of radioiodine used over any three-month period.

4.1.2 People who work with amounts of radioiodine in excess of the quantities shown in Table 1, or who are sufficiently close to the process that significant intake is possible, shall participate in the bioassay programme. The decision to include or exclude individuals will call for familiarity with the specific work conditions at an institution and therefore should be made by the individual(s) designated by the licensee as responsible for radiation safety; if desired, the proposed list of individuals may be checked for suitability by the Radioisotopes and Transportation Division of the AECB.

4.2 Frequency of Bioassay*

The minimum frequencies of bioassay are detailed below.

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*Bioassay should be performed after 6 hours but within 7 days following work with radioiodine.

level shown in Table 3. A follow-up bioassay shall be performed within 24 hours of the incident. If the thyroid burden exceeds the appropriate investigation level, further bioassays shall be performed at ten-day intervals for ^{125}I and two-day intervals for ^{131}I until the thyroid burden drops below the appropriate investigation level. These measurements will aid in estimating the maximum thyroid burden and retention function for the individual and hence the radiation dose received by the thyroid.

4.2.4 Pre-operational and Post-operational Bioassay

Wherever possible, an individual should undergo bioassay prior to beginning work with amounts of radioiodine in excess of the quantities shown in Table 1. This could be associated with a pre-operational radiation safety briefing. The purpose of this bioassay is to ensure that any pre-existing thyroid burden of radioiodine is detected before the person starts working with radioiodine.

Again, if possible, any individual who has ceased to work with radioiodine should undergo bioassay within seven days following the last use of the radionuclide.

4.2.5 Pregnant Workers

Since the foetal thyroid is capable of taking up iodine beginning about the tenth week of gestation[7], and since maximum foetal thyroid doses are about a factor of 2 above those to the mother's thyroid[8], it is appropriate that special consideration be given to bioassay and working conditions of pregnant women.

4.2.6 Records

A written record of bioassay results shall be maintained. (See Appendix B.)

4.2.7 Qualitative Thyroid Checks

It is good practice to check for internally deposited contamination as frequently as practical. For example, it may be possible for personnel to use the contamination monitor in their laboratory for a qualitative thyroid check on each day that radioiodine is used. When this is done, the sensitivity of the contamination monitor should be known to ensure that its use is appropriate (see Section 3). This practice should not replace the bioassay programme described above but rather be an adjunct to such a programme.

4.3 Thyroid Burdens

4.3.1 Investigation Level

If the thyroid burden exceeds the investigation level* of Table 3 but is below the reporting level shown in Table 3 the following action should be taken:

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*If an individual has a chronic thyroid burden greater than the appropriate investigation level (see Table 3), it is probable that the maximum annual permissible dose to the thyroid will be exceeded. The AECB should be contacted (613-593-5408) for advice if an individual shows a thyroid burden greater than the investigation level more than 3 times/year. (Measurements should be more than 15 days apart for ^{131}I and 80 days apart for ^{125}I.)

REFERENCES

1. Atomic Energy Control Regulations Chapter 365 Consolidated Regulations of Canada (1978), amendments SOR/78-58 and SOR/79-422.

2. Pomroy, C.T., "Bioassay Guidelines - Publications of the Federal-Provincial Working Group on Bioassay and In Vivo Monitoring Criteria," Proceedings of the 3rd Annual Meeting of the Canadian Radiation Protection Association, Vancouver, May 1982.

3. Atomic Energy Control Board Information Bulletin 80-3, "Atomic Radiation Workers - Some Questions and Answers", 1980.

4. Annals of the International Commission on Radiological Protection, Vol. 2, Number 3/4, Publication 30, Pergamon Press, 1979, p.88.

5. ICRP, Publication 23 "Report of the Task Group on Reference Man," Toronto, Pergamon Press, 1975, p.196.

6. Brucer, M., "Thyroid Radioiodine Uptake Measurement," ORINS-19, United States Atomic Energy Commission, 1959.

7. National Council on Radiation Protection and Measures (NCRP) Report No. 55, Section 2.2.2.3, 1977, p.9.

8. Johnson, J., Health Physics, 1982, Vol. 43, No. 4, pp. 573-581.

9. Johnson, J., "Annual Limits on Intake and Derived Air Concentrations for the Radioiodines with Mass Numbers from 123 to 135," Atomic Energy of Canada Limited, Document AECL-5701, (1977).

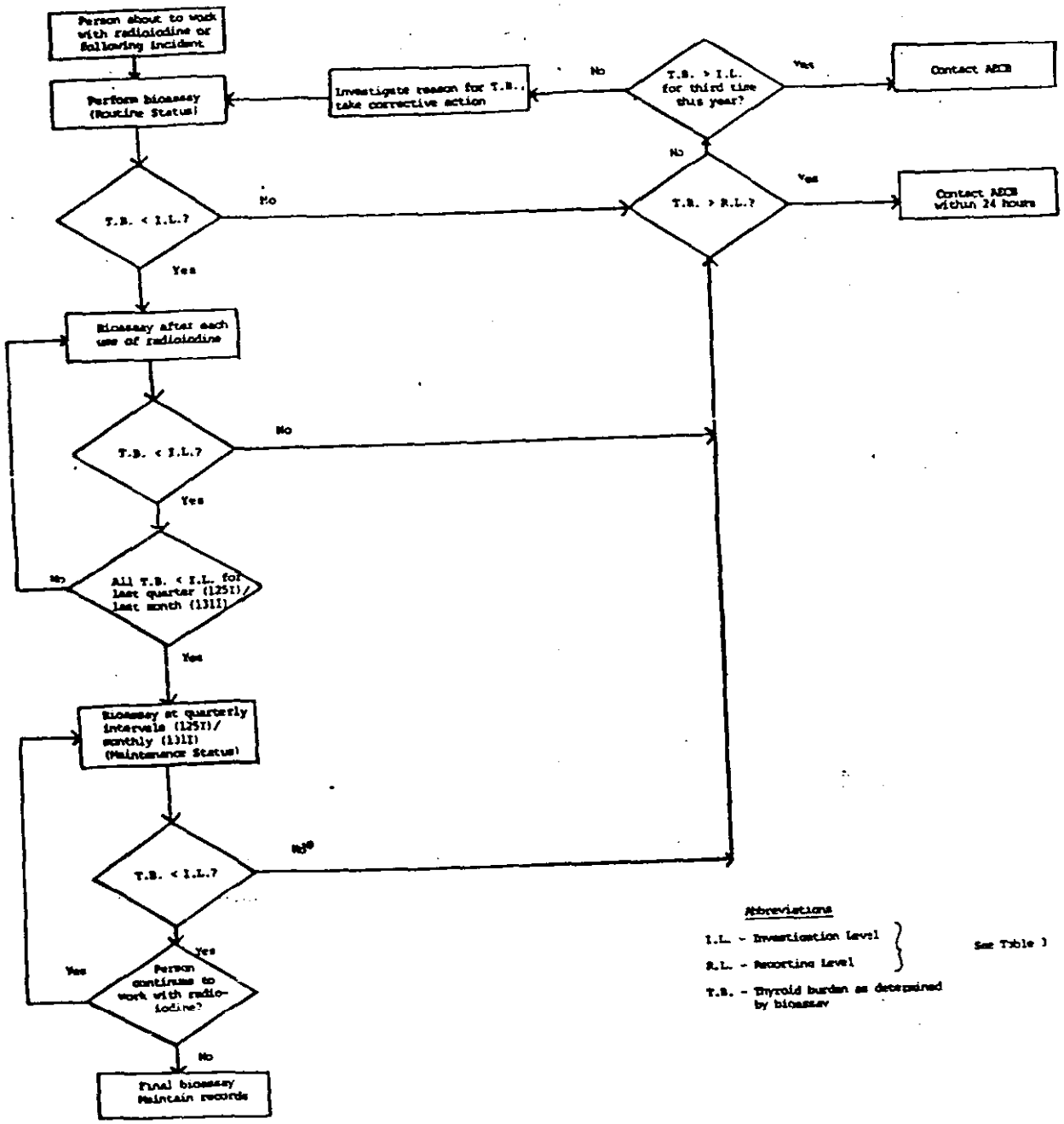
TABLE 2

RADIOIODINE DATA[9]

	^{125}I	^{131}I
Radioactive half-life (days)	60.3	8.06
Effective half-life (days)	40	7.6
Dose rate per unit activity in the thyroid (μSv/Bq.day)*	2.0×10^{-2}	1.4×10^{-1}
Time to maximum thyroid burden after acute exposure (days)	1.8	1.2

*1 μSv/Bq.day = 3.7 rem/μCi.day

FIGURE 1: FLOWCHART OF BIOASSAY PROGRAMME



APPENDIX A

SUGGESTED PROCEDURES TO BE FOLLOWED WHEN WORKING WITH RADIOIODINES

1. Wear a lab coat, safety glasses and two pairs of disposable gloves. Change if contamination is suspected.

2. On receipt from supplier, check iodine container for significant contamination by wiping outside of primary container and measuring level of radioactivity on the wipe.

3. Wash hands immediately following work with radioiodine.

4. Work in fume hood which has a non-turbulent linear flow rate of between 30 and 60 metres per minute (100-200 linear feet per minute).

5. Vials containing radioiodine should be opened in a fume hood. If a fume hood is unavailable, use a syringe through the rubber stopper of the vial to withdraw the required amount of liquid.

6. Keep containers of radioiodine capped as much as possible.

7. If waste contaminated with radioiodine is to be stored, it should be in a fume hood or other well ventilated area, with appropriate shielding to reduce the dose rate at the working location to less than 2.5 μSv/h.

8. Wherever possible keep the pH of radioiodine solution above pH 8 to minimize production of vapours.

9. Monitor carefully for contamination using appropriate detection equipment.

10. Clean up spills of radioiodine with a solution of 0.1 M sodium iodide, 0.1 M sodium hydroxide and 0.1 M sodium thiosulphate.

11. Avoid direct contact with unshielded containers of radioiodine.

12. Use shielding material and minimise the time spent in close proximity to radioiodine, in order to limit the dose of external radiation.

13. Participate in the bioassay programme as set out in this guide.

APPENDIX B

DATA TO BE INCLUDED ON BIOASSAY RECORD FORM

Name, date of birth and sex.

Radioiodine checked for and efficiency of detection system for that radioisotope.

Adequate space should be left for comments on factors that may affect the bioassay result, e.g., medication, nuclear medicine procedures and any other pertinent information such as pregnancy.

For each measurement, note the date radioiodine was last handled, the date of measurement, measurement in counts per minute from thyroid, and background counts per minute.*

If the individual has a thyroid burden at, or above, the appropriate investigation level (Table 3), the committed dose shall be calculated and the result recorded.

*Background counts per minute obtained by measuring on arm or thigh to correct for radioiodine in the circulatory system and body tissues other than thyroid.

APPENDIX C

POINTS TO BE COVERED BY POSTED EMERGENCY PROCEDURES
(SEE 4.2.4, 4.3.3)

1. Phone number of Radiation Safety Officer (R.S.O.)
2. Phone number of physician (if appropriate - see 4.3.3).

Minor Spills

- Inform co-workers.
- Cover liquid with absorbent paper.
- Delineate outer area of spill.
- Decontaminate, taking care not to spread contamination.
- Wipe test for residual loose contamination - acceptable levels should be less than twice background.
- Repeat decontamination until wipe tests show acceptable levels of contamination.
- Survey for fixed contamination - if any is detected, contact R.S.O. for advice.
- Submit written report of incident to laboratory supervisor and R.S.O.
- Consult R.S.O. to determine need for bioassay.

Major Spills (e.g., involving contamination of personnel, release of volatile material)

- Evacuate laboratory, contact R.S.O. immediately.
- Stop any operations that may worsen the situation.
- Leave fume hood running.
- Ensure people leaving the laboratory stay in the immediate vicinity until monitored (N.B. footwear).
- Decontaminate skin with copious quantities of tepid water, followed by soap and water. Do not abrade the skin.
- Post warning signs to prevent entry into contaminated area.
- The R.S.O. will direct clean up operation.
- All occupants of the laboratory should undergo bioassay.
- Submit written report to the R.S.O.
- The R.S.O. should submit a written report to the AECB.

Notes:

(1) The points listed above are suggestions only; emergency procedures should be worked out at the place of use by individuals familiar with work procedures and hazards peculiar to that workplace.

(2) Major and minor spills have not been defined, as circumstances will dictate action. The individual responsible for generating Emergency Procedures should make this decision and provide criteria.

(3) If it is deemed likely that an overexposure has occurred, the AECB shall be contacted within 24 hr. of occurrence as laid out in Section 21 of the Atomic Energy Control Regulations.[1]

APPENDIX D

DEFINITION OF TERMS

Bioassay: The detection of internal contamination by the measurement of radioactivity in biological samples or by direct in vivo measurement.

Biological halflife: The time in which half the atoms of a nuclide are eliminated from the body or organ.

Committed dose equivalent: The total dose equivalent averaged throughout an organ or tissue in the 50 years after intake of a radionuclide into the body.

Effective halflife in the thyroid: A function of the physical halflife and the biological halflife in the thyroid.

Intake: The amount of radioactive material entering the body via nose, mouth or wound or absorbed through the skin.

Investigation level: Value of dose equivalent or uptake above which the results are considered sufficiently important to justify further investigations.

Open source: A source from which radioactive material can readily be removed or escape.

Organ burden: The amount of radioactive material in a specific organ.

Physical halflife: The time in which half the atoms of a radionuclide are transformed through radioactive decay.

Radioiodine: For the purposes of this document, this term is used in a generic sense to include radioactive iodide, iodate or elemental iodine.

Shall, must: Used to designate actions essential to the bioassay programme.

Should: Used to designate actions which are recommended but not essential.

Uptake: The amount of radioactive material absorbed from the extracellular fluid by an organ and deposited within that organ.

ANNEXE D

GLOSSAIRE

Activité d'un organe: quantité de matière radioactive dans un organe donné.

Apport: quantité de matière radioactive absorbée du liquide extracellulaire par un organe et déposée dans cet organe.

Équivalent de dose engagée: moyenne de l'équivalent de dose total dans un organe ou un tissu au cours des 50 années suivant l'incorporation d'un radionucléide dans l'organisme.

Essai biologique: détection de contamination interne en mesurant la radioactivité dans des échantillons biologiques ou par une mesure directe in vivo.

Incorporation: quantité de matière radioactive qui pénètre dans l'organisme par le nez, la bouche ou une lésion, ou qui est absorbée par la peau.

Iode radioactif: dans le présent document, ce terme est employé dans un sens générique et englobe l'iodure, l'iodate et l'iode élémentaire.

Niveau d'investigation: valeur de l'équivalent de dose ou de l'apport au-dessus de laquelle les résultats sont considérés comme assez importants pour justifier des essais plus poussés.

On devrait, il faudrait: désignent des mesures qui sont recommandées, mais non essentielles.

On doit, il faut: désignent des mesures essentielles au programme d'essais biologiques.

Période biologique: temps nécessaire pour éliminer de l'organisme ou d'un organe la moitié des atomes d'un radionucléide.

Période effective dans la thyroïde: fonction de la période physique et de la période biologique dans la thyroïde.

Période physique: temps nécessaire à la transformation de la moitié des atomes d'un radionucléide par décroissance radioactive.

Source non scellée: source dont la matière radioactive peut aisément être retirée ou dont elle peut s'échapper.

Regulatory Document

Texte de réglementation

Atomic Energy Control Board

Commission de contrôle de l'énergie atomique

REGULATORY DOCUMENT R-75

Regulatory Guide

PREPARATION OF AN APPLICATION FOR A PRESCRIBED SUBSTANCE LICENCE

Effective date:

July 31, 1987

Canada

C. APPLICATION FOR A PRESCRIBED SUBSTANCE LICENCE

1. Introduction

The PSL application form is included as Appendix A to this guide. The following are explanatory notes regarding the completion of this form.

2. Completing the Application Form

2.1 Section 1

This is self-explanatory.

2.2 Section 2

This is self-explanatory.

2.3 Section 3

Specify the legal name and address of the organization which is requesting the PSL. This may not necessarily be the same as the address requested in Section 7.

2.4 Section 4

The contact person is someone who is familiar with the activities which are being proposed (for example, the researcher who is doing the work), but is not necessarily the person responsible for applying for and performing administrative duties with respect to the PSL (Section 8).

2.5 Section 5

List all prescribed substances for which the PSL is required, the quantity of each, and the name and address of each supplier. In the case of large quantities which will be acquired over a period of time, indicate the time period.

2.6 Section 6

Describe in detail the intended use of each prescribed substance. If the space available on the form is not sufficient, provide an attachment.

2.7 Section 7

Give the address(es) at which the licensed activities will be performed. This (these) may not necessarily be the same as the address requested in Section 3.

2.8 Section 8

The person who has the authority to sign the application and who will be responsible for the administration of the PSL signs here. This need not be the same as the person requested in Section 4.

2.9 Section 9

This section requests additional information about the facility and about procedures that are or will be followed.

For the most part, the requirements of this section are self-explanatory. If pertinent written procedures or instructions already exist, append them to the application.

Some further guidance regarding this section is provided below.

(a) Subsection 9(a)

Include a plan of the premises which also shows the equipment layout.

(b) Subsection 9(b)

Include details regarding types of doors, windows and locks, any intrusion detection system, manned or remote surveillance, and response procedures in the event of an incident.

(c) Subsection 9(c)

Include details of the methods used to detect and record the presence and amount of ionizing radiation, and give details of the monitoring devices and other methods used for measuring dose.

(d) Subsection 9(d)

Address the disposal of liquid and solid wastes generated by the use of the prescribed substance(s) and the disposal of any remaining, unprocessed prescribed substance(s).

(e) Subsection 9(e)

Provide detailed calculations for all types of discharges of liquid and airborne effluents.

(f) Subsection 9(f)

This is self-explanatory.

(g) Subsection 9(g)

Include details of instructions to be given to workers respecting the hazards of ionizing radiation.

(h) Subsection 9(h)

Provide pertinent information which may not be covered by any of the above sections or subsections.