



International Isotopes Inc.

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Radiation Safety Manual



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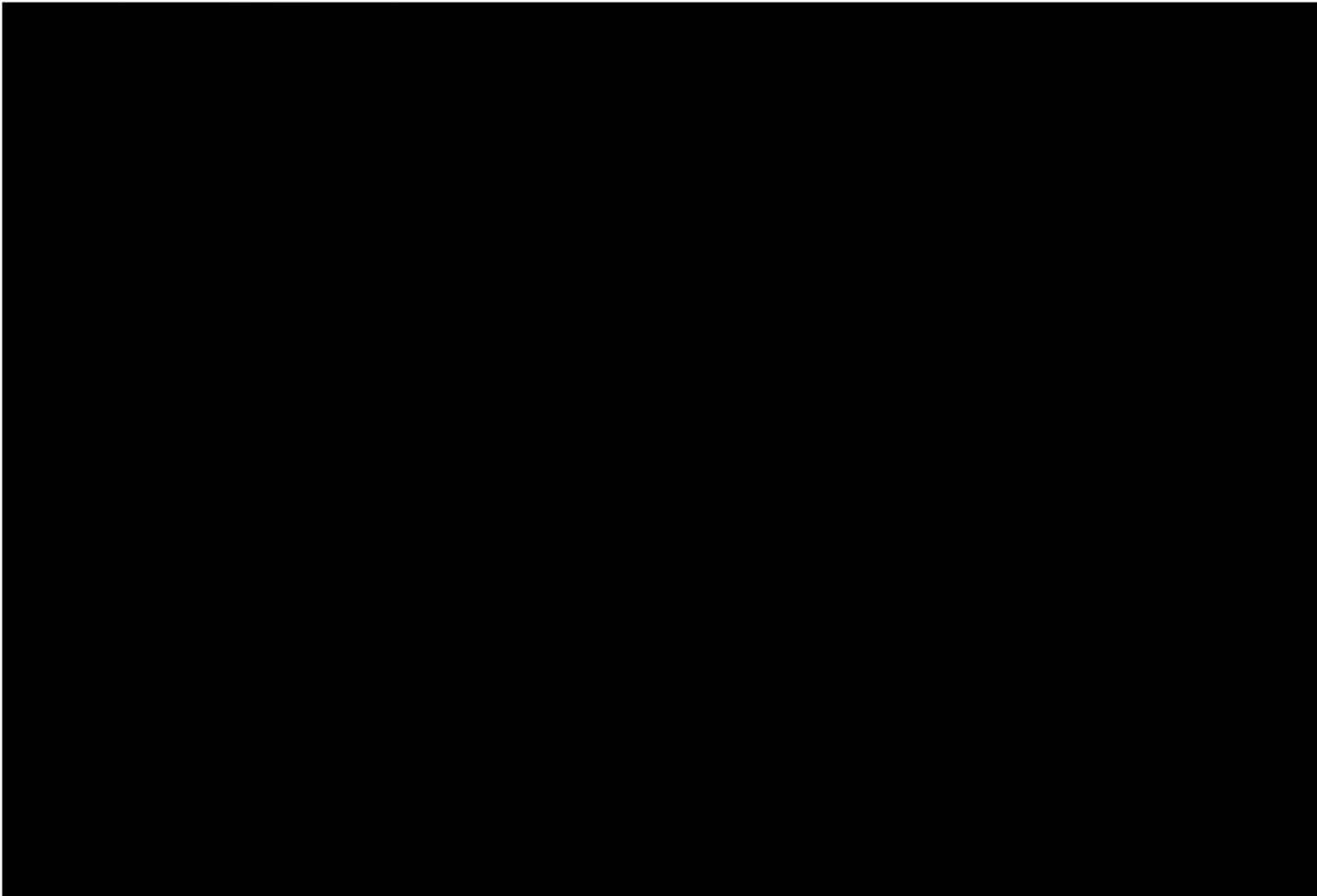
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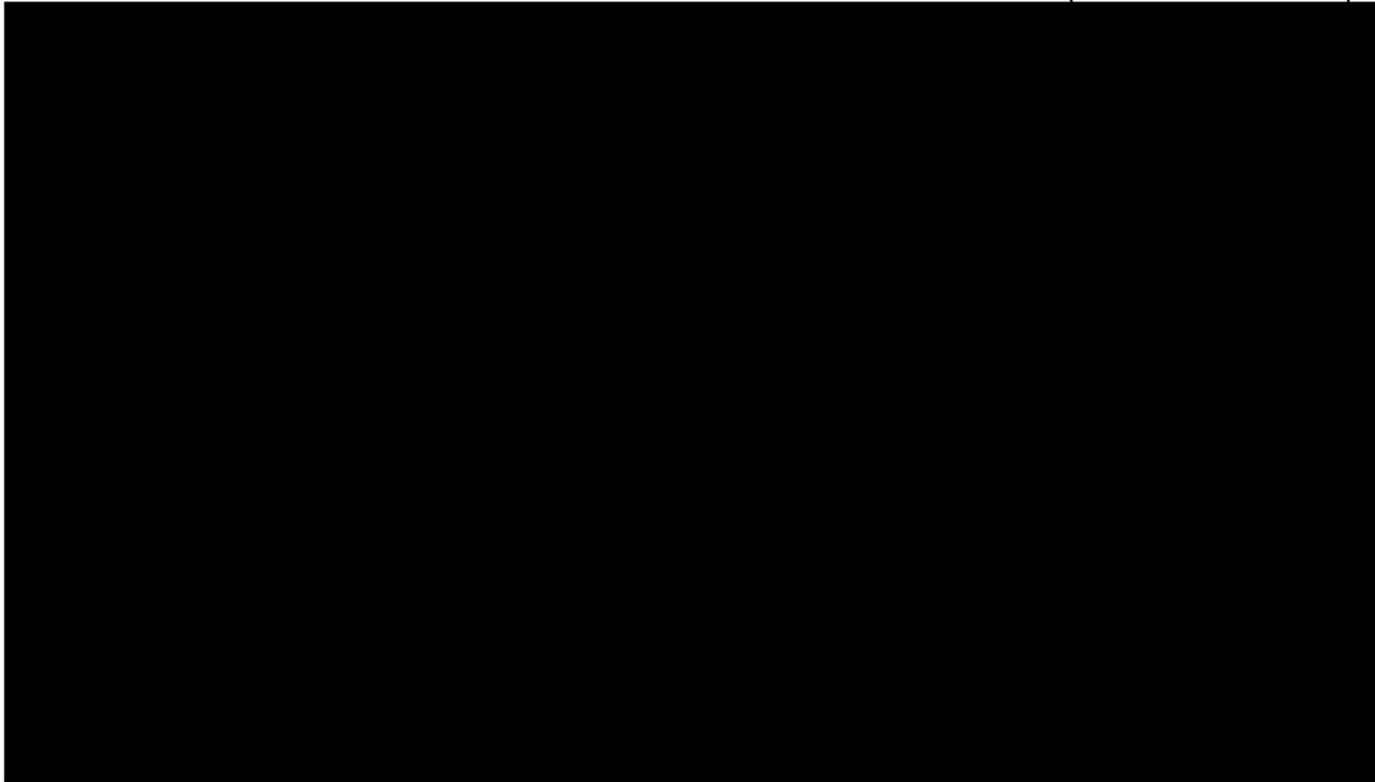
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Introduction to the Radiation Safety Manual

International Isotopes Inc. (INIS) radiological operations are regulated by the United States Nuclear Regulatory Commission (NRC). The 4137 Commerce Circle, located in Idaho Falls, ID operates under a NRC License Number, 11-27680-01MD and 11-27680-01E. The 4137 facility receives, stores, handles and distributes byproduct radioactive isotopes and sources. NRC license 11-27680-01E governs the exempt distribution of irradiated gemstones and sealed sources whereas license 11-27680-01MD covers all other operations. INIS had operated under SUB-1587 at the 1359 Commerce Way source material facility. This facility utilized depleted uranium tetrafluoride to produce high purity fluoride gas compounds and depleted uranium oxides and operated from 2005 until 2011 in a research and development environment. Building 1359 has been decommissioned and returned to the property owner. NRC License SUB-1587 has been terminated.

All individuals using radioactive materials/sources or are responsible for the supervision of persons using radioactive materials/sources, are required to familiarize themselves with all portions of this Manual that apply to their operations.

NOTE: No employee is ever authorized to take an action that could lead to personal injury or serious property loss.

Radiation can be an invaluable tool in the diagnosis and treatment of disease, in research and in industry. When properly used, radiation can provide great benefits to mankind with little or no attendant risk. However, improper use can bring risk of high radiation exposure resulting in chronic illness, injury, or even death.

Use of radiation sources implies acceptance by the user of some increased exposure above the natural background radiation to which man has always been exposed. Common sense dictates that such increase in personnel exposures and contamination levels should be kept to the minimum consistent with reasonable effort and expense. Many years of experience have demonstrated that minimums considerably lower than the regulatory limits can be maintained provided the user has training, education and experience to use the proper facilities, equipment and procedures for handling sources of radiation. INIS is committed to keeping all radiation exposures to staff, the public, and the environment As Low As Reasonably Achievable (ALARA).

In general, it is the responsibility of the individual to understand and conduct operations in an acceptable manner to minimize hazards to the user and to others.



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It is the responsibility of each supervisor to ensure that all supervised personnel are properly instructed with respect to the nature of the hazards and the necessary safety procedures in the work area and that they possess the necessary skills and disposition to cope with radiation hazards. The supervisor is also responsible for ensuring necessary safety equipment is available and in working order.

The radiation safety staff is responsible for assisting all users and supervisors by providing consultation and certain services in matters of safety.

The Radiation Safety Officer (RSO) is responsible for establishing radiation safety policies, for reviewing the work of the radiation safety staff, and advising both them and the radiation users on particular problems.

Safety Philosophy at INIS

INIS operates on the basis that the safety and health of employees are of the greatest importance, ranking along with quality, production, and employee morale. Safe operating procedures and practices are of benefit far beyond any monetary savings that may be achieved bypassing safety controls. Success of INIS's effort depends upon a thorough understanding and acceptance of the following principals:

- All injuries or any damage to health can be prevented.
- The prevention of bodily injury and the safeguarding of an individual's health must be the first consideration in all actions and are the responsibility of each employee.
- Rules and procedures to minimize the possibility of bodily injury or damage to health are essential parts of the company health and safety program. Each individual is responsible for knowing and following the health and safety rules and procedures applicable to their assignments. In addition to strict adherence to these rules, each individual is responsible for using sound judgment on each assignment and for being aware of potential hazards to himself/herself or others before taking action.
- Supervision is responsible for correcting work conditions and employee actions which may cause bodily injury or damage to health, property and environment and to inform employees of known potential hazards encountered in the workplace.
- Supervision has responsibility for ensuring the proper training of individuals and making equipment and appropriate job procedures available so that each assignment can be completed without bodily injury or damage to health, property or environment.
- Employees are responsible for their own safety. This means that employees are responsible for learning how to do their jobs in a safe manner and for following the rules, procedures and



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practices they have been taught in the conduct of their jobs. Employees should notify supervision of any task or equipment whose safety may be in question.

- ALL EMPLOYEES are authorized to stop work if they perceive the controls in place or the lack of controls would result in an unsafe condition.
- Authorized visitors must be provided appropriate escort, training and equipment necessary for the protection of their health while on site or while handling company property.
- Work assignments involving working alone without normal access to assistance may entail increased risk due to this isolation. A careful review of such operations should be conducted to identify the most appropriate means of minimizing these risks.
- Orderliness and cleanliness (housekeeping) of the work environment are integral parts of the prevention of injuries and damage to health.

Regulations Pertaining to Radiation Use

The Federal regulations are voluminous and many of them concern matters which have limited bearing on INIS's work or responsibilities. Some regulations that affect INIS are only of administrative concern while others impose certain rules, standards and limitations having direct bearing on our radiation safety program. Some of the provisions directly concern only the RSO, but many of them apply directly to the individual users.

Specific operating conditions and limitations for the INIS facilities are addressed within the respective NRC licenses. Users of radioactive materials must be familiar with the license conditions that affect their job responsibilities. General facility employees should have a basic understanding of the NRC license that governs operations in the facility in which they typically work.

It is, of course, the responsibility of each supervisor and individual user to comply in all matters related to the rules and regulations that govern the use, storage or disposal of radioactive materials. However, the RSO will provide aid and support in meeting these requirements.



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Section I - Responsibility of Groups and Individuals

A. ALARA Committee:

The INIS ALARA Committee is responsible for ensuring the company’s health and safety philosophy and policy is effectively implemented. The Committee is comprised of the President /C.E.O., the Radiation Safety Officer, the Quality Assurance Manager, the Operations Supervisor and Senior Management from each INIS business segment. While not members of the committee, facility health physicists and radiological control technicians, and Technical personnel for the respective work areas are welcome to participate in ALARA Committee activities. In special cases, an outside radiation safety consultant will participate in the ALARA Committee.

The responsibilities of the ALARA Committee include the following:

1. Establish or modify radiation safety policies/procedures.
2. Review proposals for unusually hazardous operations and establish criteria for equipment and procedures to ensure employee and public radiation safety.
3. Review cases which involve repeated infractions of radiation safety rules and regulations.
4. Review accidents, incidents and other cases for which reports to outside regulatory authorities are required.
5. Review public relations problems which involve radiation safety issues.
6. Review current radiation safety issues.
7. Review current status of company radiation safety programs.
8. Reviews dose received by employees and develops annual exposure goals based on the job task.
9. Meet formally as often as necessary, but at least quarterly.

B. Radiation Safety Officer (RSO)

The specific duties of the RSO include, but are not limited to, the following:

1. To establish and oversee operating, safety, emergency, and ALARA procedures, and to review them at least annually to ensure that the procedures are current.
2. To oversee and approve all phases of the radiation training program for operations and/or personnel so that appropriate and effective radiation protection practices are taught.
3. To ensure that required radiation surveys and leak tests are performed and documented in accordance with the regulations, including any corrective measures when levels of radiation exceed established limits.



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4. To ensure that personnel monitoring is used properly by occupationally-exposed personnel, that records are kept of the monitoring results, and that timely notifications are made as required by the regulations.
5. To investigate and cause a report to be submitted to the NRC for each known or suspected case of radiation exposure to an individual or radiation level detected in excess of limits established by regulations and each theft or loss of source(s) of radiation, to determine the cause(s), and to take steps to prevent a recurrence.
6. To investigate and cause a report to be submitted to the NRC for each known or suspected case of release of radioactive material(s) to the environment in excess of limits established by the regulations.
7. To have a thorough knowledge of management policies and administrative procedures of INIS.
8. To assume control and have the authority to institute corrective actions, including shutdown of operations when necessary in emergency situations or unsafe conditions.
9. To ensure that records are maintained as required by 10 CFR 20 Subpart L.
10. To ensure the proper storing, labeling, transport, and use of sources of radiation, storage, and/or transport containers.
11. To ensure that inventories are performed in accordance with the activities for which INIS is authorized.
12. To ensure that personnel are complying with the conditions of the license and/or registration, and the operating, safety, and emergency procedures of INIS.

NOTE: For the purposes of this manual, all further references to the RSO shall be interpreted to mean any radiation safety staff member authorized by the RSO to perform that function.

C. Supervisor

In addition to assuming all the responsibilities of an individual user, each supervisor is responsible for all activities and personnel, including visitors, in the supervisor’s designated jurisdiction. This responsibility requires the supervisor to:

1. Ensure that all work with sources of radiation is performed in accordance with the RWP, this manual, and all other INIS policies and procedures that are pertinent to the operation.
2. Be responsible that all personnel, particularly new personnel, who have access to radiation sources under the supervisor’s jurisdiction possess the necessary skills and disposition to cope with radiation safely and are properly instructed and understand:
 - a. This Manual as it applies to their work.
 - b. Applicable Federal, State, and local regulations.



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- c. The nature of local radiation sources and their particular hazards.
 - d. Proper use of instruments in the area--especially their limitations.
 - e. Routine procedures for handling work safely.
 - f. Emergency procedures.
3. Determine needed radiation sources, equipment and facilities and procedures.
 4. Prepare specific written routine and/or emergency procedures applicable to the supervisor's operations.
 5. Ensure that the procedures for purchase, acquisition, use, and transfer of radioactive materials are followed. This includes keeping accurate records of receipt, inventory, transfer and disposal.
 6. Routinely check protective equipment and instruments to ensure they are working properly and adequately performing their intended functions.
 7. Actively seek the assistance of and cooperate with the RSO in solving radiation safety problems and in correcting violations of the rules and regulations imposed by federal, state or local regulatory agencies.
 8. Provide whatever action and information necessary with respect to the supervisor's operations to assist the RSO in complying with existing laws and license requirements (maintenance of records, preparation of reports, etc.).

NOTE: All actions requiring notification of the supervisor shall notify the next level supervisor in the absence of the direct supervisor.

D. Individual User

The individual user is the one ultimately responsible for the safe use of the radiation sources to which he/she has access. Each user must be authorized by the RSO and the area supervisor to have access to and/or to work with radiation sources. The user shall:

1. Keep radiation exposures As Low As Reasonably Achievable (ALARA).
2. Be aware of and comply with the applicable Radiological Work Permit (RWP).
3. Wear assigned personnel monitoring devices in an approved manner.
4. Be familiar with and comply with all sections of this Manual applicable to the user's work.
5. Be familiar with the nature of the area's radiation sources, the extent of their potential risk and use the proper means of coping with them safely.
6. Monitor the area frequently for contamination.
7. Clean up minor spills immediately.
8. Dispose of radioactive waste in an approved manner.



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9. Inform supervisor when sources, containers, or areas are not properly labeled and posted.
10. Assist the supervisor in maintaining required records and inventories.
11. Prevent unauthorized persons from having access to radiation sources in the area.
12. Allow no maintenance or repairs of area facilities or equipment unless approved by the area supervisor and the RSO.
13. Be prepared to handle accidents or injuries with common sense and in the spirit of the Emergency Procedures. Notify and seek the assistance of the immediate supervisor and the RSO as soon as possible in emergencies.



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SECTION II - ALARA

A. INIS ALARA Policy and Charter

INIS will conduct all aspects of operations with continual emphasis upon incorporation of ALARA principals. These INIS ALARA principals shall be applied not only to minimizing personnel radiation exposure, but also to reducing the magnitude or frequency of entries into radiological environments and reducing radiological waste generation. The management of INIS recognizes that the same good engineering and operating fundamentals that contribute to safe and efficient operations also constitute effective ALARA measures. Therefore, INIS supports the ALARA program not only as a means of reducing personnel radiation exposure, but as a comprehensive strategy of conducting business operations in the safest and most cost efficient manner possible.

To establish the INIS ALARA Charter: The INIS ALARA Charter establishes the membership, responsibilities, meeting frequency, and typical agenda for the committee. The committee shall:

1. Review and approve changes to the INIS Radiation Safety Program, INIS procedures which affect or establish radiation safety controls, or INIS facility modifications or equipment acquisition that may affect radiation safety prior to implementation or acquisition.
2. Implement Radiation Safety Program and procedural changes.
3. Conduct reviews of projects and operations.
4. Conduct formal risk analysis on processes, product designs, or systems, as appropriate using approved methodology.
5. Conduct audits and surveillances of licensed operations to determine compliance.
6. Take appropriate actions when noncompliance is identified, including analysis of the cause, corrective actions and actions to prevent recurrence.
7. Review the status of personnel radiation exposure, administrative limits, and facility waste generation goals.
8. Review ALARA concepts and innovations from other companies for incorporation into the INIS ALARA program.
9. Determine actions necessary to strengthen the implementation of the ALARA program and principals into routine work evolutions.
10. Fulfill the requirements of the Radiation Safety Committee as described in NUREG-1556 Volume 11 Section 8.7.2.



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B. Membership

The INIS ALARA Committee shall be comprised of the following key groups.

1. INIS President and C.E.O.
2. INIS Radiation Safety Officer
3. INIS Quality Assurance Manager
4. INIS Operations Supervisor
5. INIS Senior Management
6. Independent Radiation Safety Consultant (case-by-case basis for specific committee reviews).

To constitute a quorum, 3 of the 5 groups will be in attendance for each meeting. For special reviews that include a third-party reviewer a quorum must include 3 of the 5 INIS groups and the independent consultant.

C. Responsibilities

1. Chairperson
 - a. The President and CEO acts as the Chairperson. In the absence of the President and CEO, the INIS RSO or member of INIS Senior Management in attendance shall serve as the Chairperson of the Committee.
 - b. The Chairperson shall ensure that a meeting agenda is used and that the meeting is properly documented.
 - c. Shall ensure that discussion on issues is complete and any issues identified as either resolved or identified for specific action.
 - d. Provide the final approval of goals and work procedures or processes before the committee’s review.
 - e. Specifically approve an individual to exceed their personnel ALARA dose goal that had been established by the ALARA Committee.
 - f. To review changes to procedures, work instructions, equipment and new processes and determine when a full committee review of these changes is required.
2. ALARA Coordinator
 - a. The RSO will act as the ALARA Coordinator. In the absence of the RSO, a member of the Radiation Safety Staff will act as the Coordinator.



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- b. Maintain files of meeting minutes and other documentation of ALARA committee activities including job reviews and process improvement suggestions.
- c. Complete preliminary review of planned work activities and make initial determinations on the requirement for full committee reviews. The following trigger levels shall be used as a guide in determining when a full committee review, including the participation of a third-party radiation safety consultant, is required:
 - i. For work that may result in an individual exceeding 10% of the authorized annual dose limit in a single event or per entry.
 - ii. Work in that may result in an individual receiving up to 20 DAC-hr exposure with or without respiratory protection.
 - iii. For work in general body field of 1 Rem/hr or greater.
 - iv. For the first time completion of large projects or the start of what is to be a new process. "Large projects" implies large person-hour requirements in radiological areas.
 - v. Special reviews of ongoing projects or operations which have presented exceptional radiological challenges.
 - vi. Full committee reviews may be performed at trigger levels below the above threshold at the discretion of the ALARA Chairman or Radiation Safety Officer. Discretionary ALARA Committee reviews may or may not include the third-party radiation safety consultant.
- d. Complete preliminary review of new equipment or systems or modifications to existing equipment or systems that serve a radiological control function and determine if a full committee review is needed. The following trigger levels shall be used as a guide in determining when a full committee review is required:
 - i. The equipment/system is relied upon to shield dose rates that would exceed 1 R/hr at 30 cm from the radiation source
 - ii. The equipment/system is relied upon to provide containment for unsealed radioactive material with activity exceeding 1 mCi.
 - iii. The equipment/system is relied upon that could impact the effluent release of radioactivity.
- e. Anytime a work document or project, that had initially received a full ALARA committee review, and which is modified or revised, shall be reviewed by the ALARA Chairperson, as a minimum, to determine whether a full committee review of the modified work process is required.



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- f. All ALARA committee job reviews will be annotated in the ALARA meeting minutes along with the decision of the committee to approve or disapprove the work or project. Anytime blanket ALARA committee approval is granted for redundant work activities the minutes shall reflect the blanket approval and any limitations imposed upon such blanket approval.
- g. Comments made by the ALARA committee during a job review which require resolution will be recorded on the “ALARA Committee Comment Sheet”. The Chairperson will assign a person responsible for resolution of the comment. The responsible person will take action to successfully resolve the assigned comments. Completion will be annotated by initialing and dating the Comment Sheet for the applicable comment line. The ALARA Coordinator will review the completed Comment Sheet and the applicable support documents (i.e. RWP, ALARA Review, etc) to ensure they are properly included in the work control document. The ALARA Coordinator will then forward the completed Comment Sheet and a copy of the work control document to the Chairperson for review and approval. Once the Comment Sheet has been reviewed and approved, the work control document shall be considered ready for work by the ALARA Committee.

3. Other Committee Members

- a. Attend meetings and offer suggestions and input.

D. Meeting Frequency

- 1. Meetings shall normally be conducted quarterly.
- 2. Special meetings shall be conducted as necessary to review new work projects, large maintenance tasks, or to review problems encountered in operations.

E. Meeting Agenda

- 1. A typical agenda for the committee shall be as follows:
 - a. Review the status of ALARA Goals and individual personnel exposure. Annual ALARA Goals will be established during the first quarter ALARA meeting and will be based on prior year dose and anticipated work load for the current year.
 - b. Discuss any applicable radiological occurrences, accidents, problems, or suggestions which have come to light since the last meeting.
 - c. Action items required to resolve issues or improve performance.
 - d. Lessons Learned from INIS operations or from industry.



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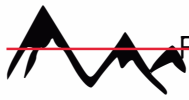
F. Company ALARA Administrative Control Limits

1. INIS has Administrative Control Limits as follows:

- a. 100 mRem/yr for occupationally exposed administrative personnel.
- b. 500 mRem/yr for occupationally exposed Supervisory personnel.
- c. 2500 mRem/yr for occupationally exposed Technical Operators.

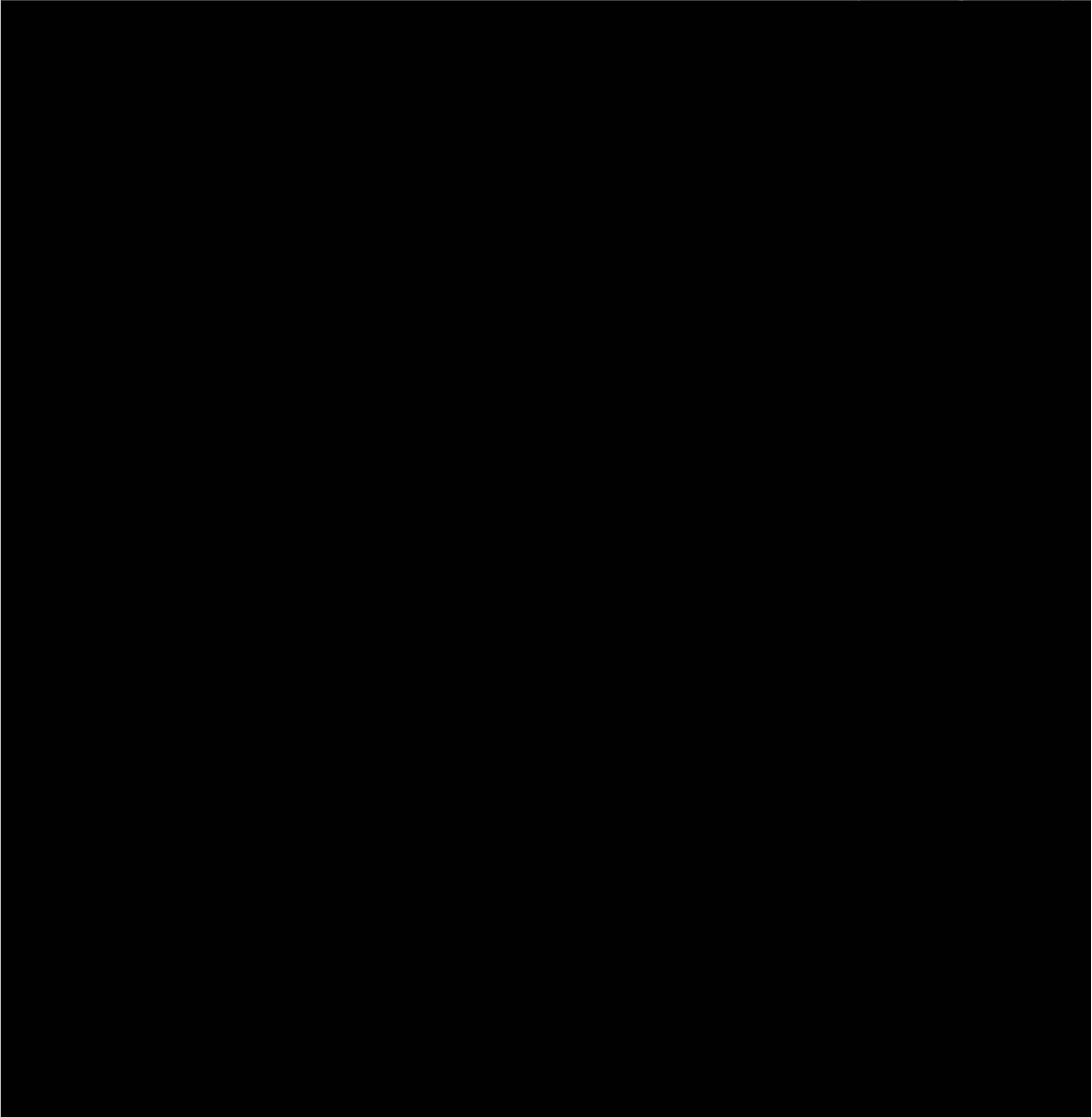
Duty specific goals will be developed annually based on operational history and may be higher or lower than those cited above.

2. The ALARA Chairman shall approve establishment of any ALARA Goal greater than 3.0 Rem/yr.



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Screening Levels for Clearance and Activity Limits for Work Area/Laboratory Type

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International Isotopes Inc.

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International Isotopes Inc.

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

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International Isotopes Inc.

[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

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[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]