EHS&L Document

SNM-1227 - Chapter 4
Radiation Protection

Nature of Changes

Item	Paragraph	Description	Justification
1.	Entire Document	Changed AREVA Inc. to Framatome Inc.	Company Name Change
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
List Below any Documents, including Forms & Operator Aids which must be issued concurrently with this document revision:			

This Document contains a total of 14 pages excluding the signature page.

DOCUMENT REVIEW/APPROVAL/DELETION CHECKLIST

All new and/or revised procedures shall be approved by the change author, cognizant manager(s) of areas affected by the changes, and by applicable manager(s) of any function that approved the previous revision of the document unless responsibility for such approval has been transferred to another organization. Also, the procedure shall be approved by manager(s) of functional organizations that provide technical reviews with the exception of the Training Department. Finally, Document Control shall verify that the required approvals have been properly obtained and that any documents that must be issued concurrently are ready to be issued.

Document Reviews			Document Approvals	
Purpose/Function of Review	Specify Reviewer(s) (Optional except for change author)	(Check all that apply)	Title of Approver	(Check all that Apply)
Document Control (Automatic)		☒	Document Control (Automatic)	☒
Change Author	CD Manning	☒	Author	☒
Independent Technical Review		☐		
Operability Review(s)			Mgr, Richland Operations[1]	☐
Conversion		☐	Mgr, Uranium Conversion & Recovery Operations[1]	☐
Recovery		☐		
Ceramics		☐	Mgr, Ceramic Operations[1]	☐
Rods		☐	Mgr, Rods & Bundles[1]	☐
Bundles		☐		
Components		☐	Mgr, Component Fabrication[1]	☐
Maintenance Review		☐	Mgr, Maintenance[1]	☐
Lab Review		☐	Mgr, Production Support[1]	☐
Transportation		☐	Mgr, Ops Strategy & Supply Chain	☐
EHS&L Review(s)			Mgr, EHS&L[2]	☒
Criticality		☐	Mgr, Nuclear Safety[2]	☐
Radiation Protection	CD Manning	☒ ~~☐~~		
Safety		☐	Mgr, Safety[2]	☐
Security/Emergency Prep.		☐	Mgr, Security & Emergency Preparedness[2]	☐
Fire Safety		☐		
MC&A	~~CD Manning~~	☐ ~~☒~~	Mgr, Licensing & Compliance[2]	☐
Transportation		☐		
Environmental		☐		
Mechanics Richland Review		☐	Mgr, Mechanics Richland	☐
Mechanics Lynchburg Review		☐		
Thermal-Hydraulics Richland Review		☐	Mgr, Thermal-Hydraulics Richland	☐
Thermal-Mechanics Richland Review		☐	Mgr, Materials & Therm-Mechs	☐
Project & Reliability Review		☐	Mgr, Project & Reliability Eng.	☐
Quality Review		☐	Mgr, Richland Site Quality	☐
Purchasing Review		☐	Mgr, PP&CPC	☐
Others:		☐	Mgr, Richland Site/Other	☐
Document Control		☐	Richland Records Management	☐
Training & Employee Dev.:[3]		☐	Training & Employee Dev.	☐

[1] Note: If approvals include 2 or more product center managers, the Operations manager can be substituted for the applicable product center managers.

[2] Note: If approvals include 2 or more EHS&L functional managers, the EHS&L manager can be substituted for the applicable EHS&L functional managers.

[3] Note: Training department review is required for all procedures that require or affect a Learning Plan and if additional training materials or curriculum must be revised before issuing procedure.

23371 (Rev. 001, 01/09/2018)

EHS&L CHANGE IMPACT EVALUATION FORM

The scope and content of this document have been determined by EHS&L to not impact the safety disciplines checked below. Future revisions do not require review by those EHS&L component(s) unless the scope changes such that a previously excluded safety discipline may be impacted.

☐ Criticality ☐ Radiation Protection ☐ Safety/Security ☐ Emergency Preparedness ☐ MC&A ☐ Transportation ☐ Environmental

DOCUMENT VERSION:	EHS&L REVIEW COMPONENT:	EVALUATION DATE:	CHANGE EVALUATOR*: 2ND PARTY APPROVAL*:

The scope and content of this document have been determined by EHS&L to not directly impact the safe handling of licensed materials (enriched uranium). Future revisions to this document do not require the **10CFR 70.72** change evaluation unless the scope of the document changes such that it directly impacts the handling of licensed materials. ☐

DOCUMENT / ECN NO**:	EVALUATION DATE:	CHANGE EVALUATOR:
E10-08-004	1/19/18	CD Manning

Does the change potentially impact Criticality Alarm System (CAS) coverage?	☐ YES ☒ NO
EVALUATION OF NRC PRE-APPROVAL:	
IS NRC PRE-APPROVAL (LICENSE AMENDMENT) NEEDED? ➢ Based on "**YES**" answer to any of five questions below. ➢ Based on "**NO**" answer to all five questions below.	☐ YES ☒ NO
1. Does the change create new types of accident sequences that, unless mitigated or prevented, would exceed the performance requirements of **10 CFR 70.61** (create high or intermediate consequence events) and that have not previously been described in Framatome's ISA Summary?	☐ YES ☒ NO
2. Does the change use new processes, technologies, or control systems for which Framatome has no prior experience?	☐ YES ☒ NO
3. Does the change remove, without at least an equivalent replacement of the safety function an item relied on for safety **(IROFS)** that is listed in the ISA Summary?	☐ YES ☒ NO
4. Does the change alter any item relied on for safety, listed in the ISA Summary, that is the sole item preventing or mitigating an accident sequence of high or intermediate consequences?	☐ YES ☒ NO
5. Does the change qualify as a change specifically prohibited by NRC regulation, order or license condition?	☐ YES ☒ NO
Evaluation of Actions Required PRIOR TO OR CONCURRENT with Change Implementation:	
6. Modification / Addition to CAS system or system coverage documentation	☐ YES ☒ NO
7. Acquire NRC pre-approval (LICENSE AMENDMENT)	☐ YES ☒ NO
8. Conduct/modify ISA	☐ YES ☒ NO

9. Modify / update the following:	☒ None ☐ Other	☐ ISA Database ☐ Red-Line Drawings/P&ID	☐ NCSA ☐ NCSS	☐ NCSP ☐ PHA	☐ RHA ☐ FHA	☐ ChHA ☐ Procedures
Evaluation of Actions Required SUBSEQUENT TO Change Implementation:						
10. Modify / update the following:	☒ None ☐ Other	☐ ISA Database ☐ AS-Built Drawings/P&ID	☐ NCSA ☐ NCSS	☐ NCSP ☐ PHA	☐ RHA ☐ FHA	☐ ChHA ☐ Procedures

Justification Section for "YES" preceding Questions 1 – 8 or other for 9, 10: Being prepared as part of a License Amendment, however pre-approval of the amendment prior to issuing is not required.

(*) Only required if one or more of the boxes to exclude a particular safety discipline review is checked.

(**) If this form exists as a part of a document, the document number is not required.

23371 (Rev. 001, 01/09/2018)

EHS&L CHANGE IMPACT EVALUATION FORM

The scope and content of this document have been determined by EHS&L to not impact the safety disciplines checked below. Future revisions do not require review by those EHS&L component(s) unless the scope changes such that a previously excluded safety discipline may be impacted.

☐ Criticality ☐ Radiation Protection ☐ Safety/Security ☐ Emergency Preparedness ☐ MC&A ☐ Transportation ☐ Environmental

DOCUMENT VERSION:	EHS&L REVIEW COMPONENT:	EVALUATION DATE:	CHANGE EVALUATOR*: 2ND PARTY APPROVAL*:

The scope and content of this document have been determined by EHS&L to not directly impact the safe handling of licensed materials (enriched uranium). Future revisions to this document do not require the **10CFR 70.72** change evaluation unless the scope of the document changes such that it directly impacts the handling of licensed materials. ☐

DOCUMENT / ECN NO**:	EVALUATION DATE:	CHANGE EVALUATOR:

Does the change potentially impact Criticality Alarm System (CAS) coverage?	☐ YES ☐ NO
EVALUATION OF NRC PRE-APPROVAL:	
IS NRC PRE-APPROVAL (LICENSE AMENDMENT) NEEDED? ➢ Based on "**YES**" answer to any of five questions below. ➢ Based on "**NO**" answer to all five questions below.	☐ YES ☐ NO
1. Does the change create new types of accident sequences that, unless mitigated or prevented, would exceed the performance requirements of **10 CFR 70.61** (create high or intermediate consequence events) and that have not previously been described in Framatome's ISA Summary?	☐ YES ☐ NO
2. Does the change use new processes, technologies, or control systems for which Framatome has no prior experience?	☐ YES ☐ NO
3. Does the change remove, without at least an equivalent replacement of the safety function an item relied on for safety **(IROFS)** that is listed in the ISA Summary?	☐ YES ☐ NO
4. Does the change alter any item relied on for safety, listed in the ISA Summary, that is the sole item preventing or mitigating an accident sequence of high or intermediate consequences?	☐ YES ☐ NO
5. Does the change qualify as a change specifically prohibited by NRC regulation, order or license condition?	☐ YES ☐ NO
Evaluation of Actions Required PRIOR TO OR CONCURRENT with Change Implementation:	
6. Modification / Addition to CAS system or system coverage documentation	☐ YES ☐ NO
7. Acquire NRC pre-approval (LICENSE AMENDMENT)	☐ YES ☐ NO
8. Conduct/modify ISA	☐ YES ☐ NO

9. Modify / update the following:	☐ None ☐ Other	☐ ISA Database ☐ Red-Line Drawings/P&ID	☐ NCSA ☐ NCSS	☐ NCSP ☐ PHA	☐ RHA ☐ FHA	☐ ChHA ☐ Procedures
Evaluation of Actions Required SUBSEQUENT TO Change Implementation:						
10. Modify / update the following:	☐ None ☐ Other	☐ ISA Database ☐ AS-Built Drawings/P&ID	☐ NCSA ☐ NCSS	☐ NCSP ☐ PHA	☐ RHA ☐ FHA	☐ ChHA ☐ Procedures

Justification Section for "YES" preceding Questions 1 – 8 or other for 9, 10:

(*) Only required if one or more of the boxes to exclude a particular safety discipline review is checked.

(**) If this form exists as a part of a document, the document number is not required.

Table of Contents

4.0 **Radiation Protection**

4.1 ***Radiation Protection Program Implementation***

Framatome Inc. (Framatome) shall develop, document and implement a Radiation Protection Program to protect the radiological health and safety of its workers in accordance with the regulatory requirements of 10 CFR Parts 19, 20 and 70. Programs to protect the environment and the health and safety of the public from radiological releases are presented in Chapter 9, *Environmental Protection*.

The Radiation Protection Program shall control the receipt, possession, use and transfer of radioactive materials such that the occupational radiation exposure dose limits of 10 CFR Part 20 are not exceeded under normal operations. Additionally, the Radiation Protection Program incorporates the ALARA philosophy which provides a systematic approach to reducing occupational exposures through engineering, administrative, or other applicable controls.

Radiological safety analyses of individual facility processes are conducted as part of the facility's Integrated Safety Analysis (ISA) to systematically evaluate radiological hazards and credible upset conditions (accident scenarios) in which the exclusive loss of radiological controls could lead to personnel exposures exceeding the radiation exposure performance criteria of 10 CFR 70.61(b) and (c). Such analyses identify the administrative and engineered controls to ensure that radiation safety-related parameters remain within their specified limits and prevent, or mitigate the radiological consequences of, upset (accident) conditions. Radiological hazards and safety controls that are designated to be Items Relied On For Safety (IROFS) with respect to these hazards are presented in the ISA Summary.

4.2 ***ALARA Program***

The ALARA Program is an integral component of the Radiation Protection Program. The ALARA Program shall be consistent with the regulatory requirements of 10 CFR 20.1101 and shall be implemented through written policies and procedures.

The Richland Site Manager shall be responsible for ensuring adherence to the ALARA philosophy for all activities utilizing radiological materials. That responsibility is met in conjunction with a qualified management team as described in Chapter 2, Organization and Administration. Technical responsibility for the ALARA program is assigned to the radiation protection function within the Environmental, Health, Safety, and Licensing function. Principal organizations involved with the use and handling of licensed material are represented on the ALARA Committee as discussed below. Furthermore, the ALARA philosophy will be incorporated into the written procedures of these organizations as they relate to work with licensed materials.

The ALARA Committee shall oversee the implementation of the ALARA Program. The ALARA Committee, chaired by a key member of the Radiation Protection group, or a designee, and including key managers (or designees) from operations and engineering functions, shall maintain an awareness of the radi**o**logical trends in employee dose and radiological environmental releases. The Committee shall meet at least annually and shall prepare an

annual ALARA Report that documents radiological trends in employee dose and environmental releases, identifies potential areas for improvement and tracks the recent (normally the previous calendar year's) ALARA projects.

The ALARA Committee, which includes the EHS&L manager, is an advisory committee and makes recommendations to site management as to which areas/equipment are potential candidates for ALARA action. Based upon expected improvement, updated performance data, economics, and consideration of other site priorities, management decides which target(s), if any, will be pursued.

Framatome shall review and revise, when it deems appropriate, the ALARA program goals and objectives. New approaches, technologies, and operating procedures that could reduce radiation exposures will be incorporated when suitable; such decisions will consider the ALARA philosophy.

4.3 *Organization and Personnel Qualifications*

Personnel trained in radiation protection practices and who are well-versed in applicable regulations and the facility's ISA shall implement the Radiation Protection Program. The functional organization responsible for radiation protection, including the minimum qualifications and responsibilities of key individuals, is presented in Chapter 2, *Organization and Administration*.

4.4 *Written Procedures*

Written and approved procedures shall govern activities involving the handing of radioactive materials. Radiation protection requirements shall be incorporated into operating procedures, equipment maintenance procedures, Radiation Work Permits (RWPs), and/or Radiation Job Permits (RJPs) to alert workers to special hazards or controls necessary for their protection.

Radiation protection procedures shall be authorized, approved and distributed in accordance with site procedures.

RWPs are standing procedures that apply to various routine operations, e.g., ceramic operations, or topics, e.g. respiratory protection. RWPs will be approved in accordance with plant methodology for procedures and reside in Framatome's document control system. Training to RWPs is part of the formal learning plans of affected personnel. RJPs are written by the Radiation Protection function on an as-needed basis for non-routine or special activities not adequately addressed by a standing RWP and when the job-associated doses are deemed sufficient to warrant an RJP. RJPs, after preparation/issuance by staff within the Radiation Protection function, are signed by personnel participating in the job but are not managed in the site's formal document control system. The standing RWPs and ad-hoc RJPs instruct workers on items such as personal protective equipment, dosimetry requirements, and special steps to be taken to help reduce dose.

4.5 *Radiation Protection Training*

The radiation protection training program shall comply with the regulatory requirements of 10 CFR Parts 19 and 20. Training that serves as a management measure to ensure that an

administrative control IROFS is available and reliable when required is addressed in Chapter 11, *Management Measures*.

Unescorted individuals entering areas of the facility that contain NRC licensed material shall be appropriately trained. The following topics may be included:

- dose limits and the ALARA principle
- precautions and procedures for the safe handling of radioactive material
- access and egress controls, personal surveys and escort procedures
- radiation safety principles, policies and procedures, including health problems associated with exposure to radiation
- contamination control, including protective clothing and equipment for the minimization or control of exposure to radioactive material or radiation
- purposes and functions of protective devices (including IROFS) used to control exposure to radiation and radioactive material
- emergency response

The level of radiation protection training shall be commensurate with a worker's risk of exposure to radioactive materials. Only personnel who have successfully demonstrated their understanding of radiological protection principles through oral evaluations, written evaluations or observation of their performance will be authorized to work with radioactive materials and to have unescorted access to facility areas where the likelihood exists to receive radiation doses greater than 100 mrem in a calendar year. Facility visitors will either be provided with appropriate training (commensurate with the scope of their visit) or be escorted by trained employees.

Workers shall receive radiological refresher training at least every three years .

The adequacy of the radiation protection training program shall be reviewed on at least a triennial basis.

4.6 ***Ventilation and Respiratory Protection***

Ventilation systems and respiratory protection programs are designed to reduce worker exposure to radioactive airborne contamination.

4.6.1 Ventilation

Ventilation systems are designed to limit the spread of airborne contamination by maintaining contaminated areas at slightly negative pressures compared to adjacent clean areas and to maintain exposures to airborne radioactivity to below that permitted by 10 CFR Part 20. Hoods, hybrid-glove boxes, downdraft tables and other localized ventilation designs may also be used to limit the potential for intake by inhalation. Ventilation of a contaminated area of the facility may be suspended when no processing of radioactive materials is underway or when, for example, the plant is shut down. In these circumstances appropriate precautions will be taken to contain contamination and protect individuals.

Ventilation system performance shall be demonstrated in accordance with written procedures issued and approved by the Maintenance function, with review/approval by the safety organization (EHS&L). The procedures will specify the frequency and acceptance criteria for performance testing; such testing shall include:

- Techniques to ascertain flow direction (from clean to contaminated areas) such as smoke tests and/or differential pressure readings.
- Measurements of the differential pressure across HEPA filters installed for general recirculation or exhaust air. A differential pressure reading of greater than 5.0 inches of water across a final HEPA filter will precipitate a scheduled shutdown of the ventilation system to allow for a change-out of the HEPA filter.
- Measurement of average air velocity through openings in uranium handling hoods and laboratory hoods containing readily dispersible uranium. The requirements for the minimum average linear velocities shall be established by procedure. Flow rates below these minimum values shall result in the temporary suspension of hood work or require the use of respiratory protection.

Requirements relative to the use and performance testing of HEPA filters are presented in Chapter 9, Environmental Protection.

4.6.2 Respiratory Protection

Workers' intake of airborne radioactive material is primarily controlled through use of process or other engineered controls. In the absence of such controls or when enhanced controls are desired, use of respiratory protection equipment may be appropriate.

The respiratory protection program shall meet the requirements of 10 CFR Part 20, Subpart H and be governed by written procedures. Respiratory protection devices for radioactive materials shall be approved by the National Institute for Occupational Safety and Health (NIOSH). When respiratory protection devices are used, appropriate protection factors (no greater than those listed in 10 CFR Part 20) shall be applied when calculating intake or the Committed Effective Dose Equivalent (CEDE).

Personnel who wear respiratory protection devices shall be quantitatively fit tested and trained in proper methods for donning and doffing respiratory protection devices and in limitations for their usage. A physician shall medically qualify individuals prior to respirator fit-testing. Such individuals shall be re-qualified either annually or as a physician may thereafter determine.

Initial training in respiratory protection shall be provided prior to respirator use and retraining shall be provided at least every three years thereafter. Individuals must successfully pass a test to demonstrate an adequate understanding of respirator use.

4.7 ***Radiation Survey and Monitoring Programs***

A radiation survey and monitoring program that is consistent with the regulatory requirements of 10 CFR Part 20, Subpart F shall be implemented. The program will monitor airborne contamination, workers' external and internal occupational radiation doses and help prevent the spread of contamination from radiologically contaminated areas. This program is designed to

ensure that occupational radiation exposures remain below the limits of 10 CFR Part 20.1201(a).

Key components of the comprehensive Richland radiation survey and monitoring program are described in Sections 4.7.1 through 4.7.5, below. Each of these components will be governed by written procedures. The procedures will specify monitoring frequencies, action levels protective of regulatory limits (where such limits exist) and follow-up actions for instances when action levels are exceeded, including investigation as appropriate. Occurrences involving exceeding of regulatory limits will be formally investigated under the site corrective action program.

4.7.1 Radiation Surveys

Routine radiation surveys shall be performed in areas of the facility in which radioactive materials are stored or processed and to which personnel have access. New facility operations, or operations that have been modified in a manner that could substantially increase the potential for worker external dose, shall be surveyed during process commissioning, i.e. during the introduction of radioactive materials. The frequency and scope of future radiation surveys on such new or modified processes shall be based on potential dose rates.

Routine surveys shall be performed for the controlling type or types of radiation of concern at frequencies that will ensure that annual permissible exposure limits for workers are not exceeded. The frequency and locations of surveys will be specified in written procedures as will action levels set to assure proper area postings, e.g. Radiation Area, High Radiation Area, etc. Follow-up actions to instances in which action levels have been exceeded will be specified. Retention of survey results will be in accordance with 10 CFR 20.2103.

Radiation detection instruments in sufficient numbers and with detection ranges and lower detection limits adequate for contamination at levels of concern shall be used to perform the radiation surveys. GM meters, alpha scintillation detectors and counters, proportional counters, ionization chambers and solid state detectors may all be used. Unless taken out of service, radiation detection instruments shall be calibrated following maintenance that could adversely affect their current calibration and, at a minimum, annually. Calibration sources shall be traceable to a National Institute of Standards and Technology (NIST) standard or other recognized reference material or standard. Portable survey instruments shall be source-checked each day of use. Documentation of the daily source check is not required and use of a calibrated standard is not necessary.

4.7.2 Personnel Monitoring Program -- External Radiation Exposure

Workers who require external exposure monitoring per 10 CFR Part 20.1502(a) shall wear beta-gamma sensitive dosimeters in areas of the facility in which radioactive materials are processed or stored or in areas posted as radiation areas. The beta-gamma dosimeters may be supplemented, as appropriate, by other types of dosimeters (e.g. direct-reading dosimeters, neutron dosimeters) and/or by radiation measurements made with radiation survey instruments. Thermoluminesecent dosimeter readings, with the possible exception of extremity dosimeters, shall be analyzed and evaluated by a processor holding current accreditation from NIST's National Voluntary Laboratory Accreditation Program (NVLAP). Personnel dosimeters shall

normally be exchanged on a quarterly basis. Dosimetry data shall be included in the facility's exposure summation report as specified in 10 CFR Part 20.1202.

4.7.3 Personnel Monitoring Program -- Internal Radiation Exposure

The internal dose for workers who require radiation exposure monitoring per 10 CFR Part 20.1502(b) shall be established by means of a dose tracking system that determines intake based upon air sample results and stay times, modified by respiratory protection factors when respirators are used. Results from diagnostic bioassay studies (urine analysis, lung counting, fecal analyses, nasal swipes) may supplement or substitute for determinations from the dose tracking system. Bioassay results may also be used to determine or adjust the CEDE values.

Written bioassay procedures will identify those workers to be surveyed, frequencies of measurement, action levels at which the cause(s) of the elevated readings will be investigated, and corrective actions including procedure modifications, work restrictions or other measures.

The minimum frequency for submitting urine samples by personnel routinely exposed to Type F uranium compounds and who require internal dose monitoring according to NRC regulations is semi-annually. The minimum frequency for lung counts for personnel routinely exposed to Type M or Type S uranium compounds and who require internal dose monitoring according to NRC regulations is annually.

Urine sample concentrations are analyzed by either KPA or ICPMS. Framatome procedures will specify action levels designed to protect against toxicological damage to the kidney. Framatome will have in vivo procedures specifying action levels designed to prevent an individual from exceeding an intake of 1 ALI in a calendar year.

Bioassay results shall be interpreted using internationally-accepted consensus models and may make use of incident-specific data and/or an exposed individual's personal characteristics.

In accordance with the requirements of 10 CFR Part 20.1202, for each person who requires both internal dose monitoring and external dose monitoring, the TEDE will be calculated by adding the Deep Dose Equivalent (DDE) to the CEDE. The TEDE will not exceed the 10 CFR Part 20 dose limits.

4.7.4 Airborne Radiation Sampling Program

Measurements of airborne radioactive materials shall be made in areas of the facility where non-encapsulated radioactive licensed materials are handled or processed and where the concentrations of airborne radioactive materials are likely to exceed 10% of DAC. DAC is based upon ICRP 66 and 68 assuming an Activity Median Aerodynamic Diameter (AMAD) of 5 micrometers.

Framatome may also elect to take credit for measured particle size distributions, based upon the ICRP 66 model, that is, further adjust ALI and DAC when particle size data indicate AMADs are in excess of 5 micrometers. Such adjustments would increase ALI and DAC by the same ratio as the ratio of the committed effective dose equivalent assuming the AMAD of 5 micrometers to the committed effective dose equivalent derived from the measured AMADs.

If Framatome chooses to adjust DACs and ALIs by particle size, a particle size measurement and analysis will be performed at least semi-annually in each group of locations for which particle size credit is taken. After one year, the radiation protection function may relax the frequency to once per calendar year if DAC determined by new measurement(s) for a group of locations does not differ significantly from that established from previous measurements.

The frequency of air sampling in contaminated areas shall be based on historical experience for each sampling area. At minimum, areas posted as Airborne Radioactivity Areas will have air samples changed at least once per day when production is ongoing in those areas. Other contaminated areas where licensed materials are handled but that are not Airborne Radioactivity Areas and where the airborne is expected to average greater than 1% DAC, e.g., analytical laboratories, will have air samples changed at least every two weeks when work with licensed materials is ongoing. Specialized air sampling and monitoring equipment, such as continuous air monitors, portable high volume and/or lapel air samplers, may be utilized in lieu of a fixed air sampling network.

Air sample rotameters or critical orifice devices will either be calibrated or checked annually with a secondary standard. For airflow devices that operate across a narrow range, the annual calibration may be made at one point.

The results of fixed air sampling shall be periodically evaluated to ensure they are reasonably representative of worker intakes. Re-evaluation of their representativeness shall be conducted annually for those workstations that averaged 25% or greater of DAC for the previous calendar year, and biennially for workstations whose average concentrations exceeded 10% of DAC for the previous calendar year.

Fixed air sampling results, lapel or other special air sampling results may be used to determine worker intake and to calculate CEDE in areas for which internal dose assessment is required. Correction factors may be applied to airborne concentrations determined from fixed air samplers or to intake concentrations to take into account the representativeness of fixed air samples.

4.7.5 Surface Contamination Control

Contamination surveys shall be conducted to minimize the spread of contamination from radiologically contaminated areas to clean areas and to help maintain worker doses ALARA. Framatome will maintain procedures that specify the types of surveys, their frequencies, and applicable action levels. Areas of the plant where contamination levels exceed action levels shall be cleaned in a timely manner. Except as noted in this chapter, contamination surveys shall be performed on all persons leaving contaminated areas, on materials and equipment to be released from radiation protection requirements and on incoming and outgoing shipments of radioactive materials.

The Radiation Protection Program may require use of protective clothing to minimize opportunities for personnel and their clothing to become contaminated. Protective clothing requirements shall be commensurate with anticipated work conditions. Persons shall be surveyed for contamination with a survey instrument or monitor located at respective step-off areas, generally following removal of protective clothing. Exceptions shall be made for emergencies and emergency drills. If contamination is detected in excess of procedural limits,

the individual shall be decontaminated, but if such efforts are not sufficiently effective, a member of the radiation protection group may release the individual. Follow-up surveys will be performed as deemed appropriate and practical.

Materials, equipment, and facilities shall be free-released from contaminated areas of the facility in accordance with NRC Branch Technical Position entitled "*Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for* Byproduct*, Source or Special Nuclear Material*" (April, 1993). Volumetrically contaminated materials may be free-released if the concentration of uranium is less than 30 pCi/g. Contaminated materials may also be free-released if analysis by one of the RESRAD family of codes demonstrates that the calculated TEDE is less than 1 mrem/yr to an average member of the critical group.

Equipment and materials may be transferred from one contaminated area through a non-contaminated area into a second contaminated area if the exterior surfaces of the item or its container have smearable contamination levels meeting allowable levels for clean areas. The level of smearable contamination is the activity transferred to a swab or smear from a surface being rubbed with moderate pressure. Transfers may be made without a survey if the material is entirely sealed/packaged within clean packaging in a transition area. Transfers of radioactive material in externally clean overpacks, from one contaminated area to another, on site, when the overpacks have not entered contaminated areas, shall be permitted without performance of a survey. When contaminated items are transferred through the clean area, the route should be such as to minimize transfer time and the possibility of accidental release.

Rods and/or other items that can be shown to have a greater than 95% probability of not being contaminated at levels exceeding the release criteria may be removed from contaminated areas without a radiological survey. These rods and/or other items that are candidates for release without surveys shall have significant historical evidence that such releases are below release levels. Note: The items referred to in this paragraph are not released to the general public, but rather to licensees, such as reactors or other fuel fabrication facilities.

4.8 ***Additional Program Commitments***

4.8.1 Self Assessments

Framatome has committed to conduct audits and assessments as part of its Radiological Protection Program. These activities will assess compliance of the program with applicable radiological regulatory requirements and license commitments, achievement of corporate radiological protection objectives and facility-wide application of ALARA principles.

Instances in which radiation exposure regulatory limits are exceeded will be investigated in accordance with Framatome's formal corrective action program. This includes 10 CFR 20 worker dose exposure limits, modified Appendix B concentration limits (over the period permitted), and events causing notifications in accordance with 10 CFR 70.50. The assigned issue owner (investigator) may be the pertinent operating organization but, at minimum, the safety organization will provide review and approval of the investigation. In accordance with the corrective action program, the evaluation will identify incident cause(s) as well as actions to minimize the probability of recurrence; corrective actions will be formally tracked to completion. Incidents involving the exceeding of sub-tier action levels will be addressed and investigated, as

applicable, in accordance with the governing monitoring procedures. Investigation under the formal corrective action program will be undertaken if dictated by the radiological safety significance represented by the incident.

In accordance with the requirements of 10 CFR 20.1101(c), the content and implementation of the Radiation Protection Program shall be reviewed at least annually to ensure that its objectives, survey approaches and methodologies continue to protect workers from radiation and radioactive materials. Additional discussion of the audit and assessment and incident investigation functions as they apply to IROFS is presented in Chapter 11, *Management Measures*.

4.8.2 Records Management

Framatome shall maintain records of the Radiation Protection Program, including bioassay data, dose records, radiation protection (and contamination control) records, radiation training and re-training records, RWPs and RJPs as required by regulation. Information on corrective actions that were implemented as a result of abnormal event investigations shall also be retained. Changes to the Radiation Protection Program resulting from changes to the facility ISA will also be maintained. Additional discussion of records management is presented in Chapter 11, *Management Measures*.

4.8.3 NRC Reporting Program

Written procedures will govern reporting to the NRC within the timeframes specified in 10 CFR Parts 70.74 and 20.2202 for events that result in occupational radiation exposures that exceed regulatory limits. The annual report of worker radiation monitoring required by 10 CFR 20.2206(b) shall be prepared and submitted in accordance with regulatory requirements.

4.8.4 Signage

Appropriate radiation warning signs shall be posted for areas that meet the 10 CFR 20 definitions of radiation areas, high radiation areas, airborne radioactivity areas and radioactive material areas.

4.8.5 Shipments of Radioactive Materials

Surveys shall be performed on incoming and outgoing shipments of radioactive materials in accordance with facility shipping procedures that are consistent with applicable U.S. Department of Transportation (49 CFR Part 173) and NRC (10 CFR Part 20.1906) regulations.

For clarification purposes:

- The three hour clock referenced in 10 CFR 20.1906, as it applies to the contents of a van or similar closed conveyance, begins when the tamper indicating seal to the outer conveyance is broken.