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February 20, 2014
14-026

Attn: Document Control Desk
Director, Office of Nuclear Material Safety and Safeguards
U. S. Nuclear Regulatory Commission
Washington D.C. 20555-0001

Reference: 1) License SNM-42, Docket No. 70-027

Subject: Revision to Chapter 4, *Radiation Safety*, of the License SNM-42 License Application

Dear Sir or Madam:

Babcock & Wilcox Nuclear Operations Group, Inc. (B&W NOG), forwards to the U.S. Nuclear Regulatory Commission (NRC) the enclosed revision dated 11/11/13 to Chapter 4, Radiation Safety, of License SNM-42 License Application in accordance with License Condition S-13 (See Enclosure 1). B&W NOG has determined that the revision meets the provisions as defined by License Condition S-13.

The tables located on pages 4-8 and 4-9 were updated to include a new radiation monitoring instrument that is in use at NOG.

License Condition S-13 states that B&W NOG may make changes to the License Application that do not reduce the effectiveness of the License Application, without prior NRC approval, if the change meets certain criteria listed below:

The change does not decrease the level of effectiveness of the safety basis as described in the License Application.

The change is minor in nature and does not impact the effectiveness of the safety basis as described in the License Application.

The change does not result in a departure from the approved methods of evaluation described in the License Application.

This change simply adds a new radiation detection instrument to the tables located on pages 4-8 and 4-9 of License SNM-42 License Application, Chapter 4. This new instrument will undergo the same calibration and performance testing rigor specified within our instrumentation program. There are no changes to the approval methods described in the License Application.

The change does not result in a degradation of safety.

This change does not result in a degradation of safety.

The change does not affect compliance with applicable regulatory requirements.

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The change does not affect compliance with the applicable regulatory requirements. The performance requirements of 10 CFR 70.61 are maintained.

The change does not conflict with an existing license condition.

The change does not conflict with an existing license condition.

Within six months after each change is made, the licensee would submit the revised chapters of the License Application to the Director, Officer of Nuclear Material Safety and Safeguards, using an appropriate method listed in 10 CFR 70.5(a), and a copy to the appropriate NRC Regional Office.

The submittal of this letter satisfies this requirement.

If there are any questions in the regard, please contact me at 434-522-6405

Sincerely,

Charles A. England
Manager, Licensing & Safety Analysis
Babcock & Wilcox Nuclear Operations Group, Inc. - Lynchburg

Enclosure

cc: NRC, M. Baker
NRC, Region II
NRC, Resident Inspector

ENCLOSRE 1
SNM-42 Chapter 4, (Radiation Safety)

SNM-42

CHAPTER 4

RADIATION SAFETY

CHAPTER 4
RADIATION SAFETY
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4.1 Administrative Philosophy

The basic philosophy of the Babcock & Wilcox Nuclear Operations Group, Inc., Mt. Athos site will be followed in maintaining license conditions in the area of health and safety. That philosophy defines that the company in the role of employer is legally and morally responsible for providing its employees with a safe place to work and that the ALARA (As Low As Reasonably Achievable) concept will be applied. Each employee is responsible for the prevention of injury to personnel through proper and careful use of equipment and proper work methods. The supervisor is the company's first line safety representative and is primarily responsible for promoting and enforcing designated safety standards and practices. Advisory and staff functions are provided to assist line management in the analysis of operations within their control and to provide measurements, determinations and information which aid in the analysis of specific operations or situations. The assistance does not relieve the line manager of responsibility for operation of his area and for ascertaining that adequate service is provided. Basic policies and procedures are established by line management in conjunction with the advisory and staff functions. The line manager has the basic responsibility to operate his area in a safe and orderly manner, and in accordance with applicable approved procedures.

Procedures for the control of radiation safety of the facility, its operations, and the environment and to ensure compliance with regulatory requirements are maintained. These procedures are reviewed and updated as necessary, at least every 5 years. Any member of the Radiation Protection Unit may generate new procedures or change existing procedures, but new procedures and changes must be reviewed and approved by the Manager, Radiation Protection prior to implementation. Applicable procedures are maintained electronically or in notebooks located in radiation control work areas along with a plan list of current procedures. This plan list is generated at least quarterly and is issued with all changed and new procedures. These procedures address all Radiation Control activities such as survey frequency and action levels, instrument calibration, sample collection and analysis, etc.

The major programmatic provisions of the Radiation Protection Program are set forth in the Radiation Protection Manual, including but not limited to the following elements: ALARA, Contamination Control, External and Internal Exposure Control, Respiratory Protection, Radiation Work Permits, Instrumentation, Environmental Monitoring and Controls, Transportation, Training, Records Retention, Posting and Precautionary Measures, and Control of Sealed Sources.

4.2 Training

The degree of training presented to individuals is based primarily on the type of job assignment they perform. The type of radiation training provided to employees is dependent on work location and involvement in using radioactive materials and sources. Training shall be provided in the following categories:

- All Employees (General)
- Employees Handling Readily Dispersible Radioactive Material

- Emergency Team Members
- Radiation Control/Health Physics Technicians
- Employees Using Radioactive Sources
- Individuals Entering High or Very High Radiation Areas

Training given in these areas shall be documented to show attendees, subject, date, and testing results when required.

4.2.1 All Individuals

All individuals receive training in radiation protection subjects prior to being granted unescorted access to Restricted Areas as defined by 10 CFR 20. New individuals are tested on this training. Individuals are retrained at least annually. This training consists of:

1. Plant organization for radiation protection.

2. Steps taken to minimize exposure to radiation and radioactive material.

3. Health problems associated with overexposure to radiation and radioactive materials.

4. Requirements to obey applicable provisions of Commission regulations, license conditions, and approved procedures for protection of personnel from exposures.

5. Employee responsibility to report unsafe conditions or conditions which may lead to violations of applicable regulations, license conditions, and/or approved procedures.

6. Actions to be taken in response to alarms that may involve exposures.

7. Data, which is maintained on exposure of employees to radiation and radioactive material and the employee's right to access the data.

4.2.2 Individuals Handling Readily Dispersible Radioactive Material

Upon assignment of an individual to an operation in which he will be working directly with radioactive materials in a readily dispersible form, additional on-the-job training is provided. These employees are retrained at least annually. This training consists of :

1. Safe handling procedures for unclad uranium, irradiated fuel, or beta/gamma emitting materials, as appropriate.

2. Bioassay procedures.

3. Respiratory protection procedures.

4. Contamination control procedures.

5. Techniques used to measure and control airborne radioactivity.

4.2.3 Emergency Team Members

Employees assigned to the Emergency Team are instructed in the proper procedures for handling emergencies involving radioactive material. These employees are reinstructed at least annually. These procedures include:

1. Use of respiratory protection equipment.

2. Treatment of injuries involving radioactive material.

3. Steps taken to limit exposures of rescuers.

4. Types of accidents involving radioactive materials which might occur.

4.2.4 Radiation Control/Health Physics Technicians

Radiation Control & Health Physics technicians are trained in aspects of radiation protection applicable to plant operations. Retraining is provided annually. This training is given in the following areas:

1. Use, capabilities, and limitations of radiation measuring instruments available.

2. Approved measuring techniques.

3. Actions to be taken in emergencies.

4. Policies of the division with respect to radiation protection.

5. Applicable regulations and license conditions.

6. Principles of radiation protection.

4.2.5 Employees Using Radioactive Sources

Upon assignment of an employee to an operation in which a source of radiation is used, additional training is provided. Retraining is provided annually. This training consists of:

1. Safe operating procedure for using radioactive sources to be handled.

2. Operation of appropriate radiation measuring and detecting instruments.

3. Acceptable radiation levels and actions to be taken if these levels are exceeded.

In addition to these subjects, neutron gauge operators must pass a certification test to demonstrate their knowledge of procedures, and safety requirements, prior to operation of the equipment.

4.2.6 Individuals Entering High or Very High Radiation Areas

Prior to being granted access to high or very high radiation areas, personnel shall be trained in the following areas:

- The hazards of working in high or very high radiation areas
- The methods of minimizing exposure
- Operation of appropriate radiation measuring and detection instruments
- The ALARA concept

Retraining shall be conducted annually.

4.2.7 Evaluation of Training

The effectiveness of the radiation safety training is judged by the following methods.

Daily radiation safety inspections of the entire plant reveal how well personnel understand the safety controls as a function of the number of violations found.

Another method of evaluating how well employees understand the safety requirements is the supervisor's close contact with the employee. Through discussions and job performance appraisals a supervisor is well informed to determine if an employee understands the safety controls. As the supervisor thinks necessary, an employee may be retrained to the point where his supervisor's confidence in him is raised to an acceptable level.

Triennially, review the content and evaluate the effectiveness of the radiation safety training.

4.3 General Radiation Protection

Access to various areas of the site is restricted for the purpose of radiation protection. Non-radiation workers are permitted access to any areas of the site in which the levels of radiation or radioactive materials do not exceed those levels permitted the general public by 10 CFR 20.1301(a) and Appendix B, Table II.

4.3.1 Protection of Personnel from Radiation Exposure

Exposures to radiation workers shall be limited such that total effective dose equivalents (TEDE) shall be less than 5 rem per year. Exposures in excess of 3

rem per year shall be approved by the Manager, Nuclear Safety & Licensing. Internal and external exposures shall be limited as specified in sections 4.3.1.1.6 and 4.3.1.2.2. Exposures to individuals which exceed action levels shall be investigated. Corrective action shall be reported to the appropriate manager according to approved procedures.

4.3.1.1 Protection From Internal Exposure to Radioactive Material

4.3.1.1.1 Operations and equipment that produce airborne radioactive material concentrations in excess of 10% of the Derived Air Concentrations (DAC) values based on dose coefficients published in ICRP Publication No. 68 shall be monitored.

4.3.1.1.2 Respiratory protection shall be used in accordance with Regulatory Guide 8.15, "Acceptable Programs for Respiratory Protection," to limit exposure to airborne radioactivity.

4.3.1.1.3 Local exhaust systems shall be used where practical to prevent the release of radioactive material into the workplace. Capture airflow velocities shall be obtained from recommendations established by committees such as the Committee on Industrial Ventilation. An airflow of 100 linear feet per minute is the acceptable minimum capture velocity to capture and convey the dispersed contaminate into the exhaust stream. Airflow velocity measurements shall be performed monthly or after significant changes to the system have been made. Checks such as smoke tests may also be used to verify that proper ventilation is being maintained.

In addition, air sampling is conducted in part to confirm the adequacy of the ventilation systems.

Insufficient airflow velocity shall be brought to the attention of the area supervisor for corrective action. Corrective action may consist of having filters changed, adjustment of dampers to balance airflow, or repairing broken or leaking duct. Failure to obtain adequate air flow shall be cause to cease operations associated with the hood.

4.3.1.1.4 Static pressure manometers are utilized where practical to give operators a continuous indication of the operating condition of the exhaust unit. When manometers are used, the action levels should be posted on, or in close proximity to, the manometer gauge.

4.3.1.1.5 The differential pressure buildup across final HEPA filters is measured utilizing a pressure drop gage or other static measuring instrument. A static pressure drop exceeding 4 inches of water across a HEPA filter is sufficient loading to require the filter to be changed, except hot cell filters which shall be limited to 5 inches of water. Adequacy of the filtration is verified by the collection of air samples.

4.3.1.1.6 Committed effective dose equivalents to workers shall be limited to 1250 mrem per quarter unless approved by the Manager, Nuclear Safety & Licensing.

4.3.1.2 Protection of Personnel from External Radiation

4.3.1.2.1 Engineering controls, procedures, and periodic radiation surveys shall be used to minimize an individual's exposure to external radiation. Personnel monitoring (dosimeters) and action levels are established based on areas to be accessed and the type of work to be performed, based on the following table:

Category	Type of Monitoring/ Minimum Frequency	Action Level
Personnel not requiring monitoring per 10 CFR 20.1502(a) who have unescorted access to restricted areas	Annual dosimeter*	500 mRem/yr
Personnel requiring monitoring per 10 CFR20.1502(a)	Quarterly dosimeter*	250 mRem/qtr
Personnel expected to work in radiation areas	Monthly dosimeter* and Self-Reading Dosimeter (SRD)	100 mRem/wk
Personnel handling sealed sources	Monthly dosimeter* SRD; extremity monitoring	100 mRem/wk
X-ray Operators	Monthly dosimeter*; SRD	100 mRem/wk
Neutron source operators	Monthly dosimeter* (neutron sensitivity); SRD	100 mRem/wk

* Dosimeters include TLD, Film, or OSL badge or other equivalent dosimeter from a NVLAP Accredited Vendor Program.

4.3.1.2.2 Whole body dose equivalents to workers shall be limited to 1250 mrem per quarter by the worker's supervisor unless approved by the Manager, Nuclear Safety & Licensing.

4.3.1.2.3 Whole body dose equivalents to workers shall be limited to 300 mrem per week unless approved by the Manager, Radiation Protection.

4.3.2 Instrumentation

A wide range of instrumentation is maintained by Radiation Protection. A tabulation of typical survey equipment used at the present time is presented below.

The instruments are examples of those used in the radiation protection program. They may be replaced with instruments of the same or improved specifications. Instrument calibrations shall be performed according to approved procedures and shall utilize NIST traceable sources, where applicable.

The frequency of calibrations shall be specified in procedures, according to the table below. Calibration shall also be performed after instruments are repaired, if the repair affects the calibration.

Radiation Detection Instruments			
Type of Instruments	Radiation Detected	Sensitivity / Efficiency/Range	Use
(1) DCA Model 862 Direct Reading Dosimeters	Low Level Beta and/or Gamma	0 to 200 mR	Monitoring
(2) Beta-Gamma Film Badges, Type G-1	Beta-Gamma exposures	10 to 500,000 mR for High Energy Photons	Monitoring/ Measuing
(3) Beta-Gamma, and Neutron Film Badges	Beta, Gamma, and Neutron	Same as (2) for Gamma. 20 mR to 20 R for Neutron, Dependent on Gamma Background	Monitoring/ Measuring
(4) Eberline Area Criticality Monitoring System	Gamma Radiation from Accidental Radiation Incidents	0.1 to $1x10^4$ mR/hr	Monitoring
(5) Tennelec Gas Flow Proportional Counter	Alpha/Beta	0.1 pCi (minimum)	Measuring
(6) Berthold Low Background	Alpha/Beta	0.1 pCi (minimum)	Measuring

Radiation Detection Instruments			
Type of Instruments	Radiation Detected	Sensitivity / Efficiency/Range	Use
Proportional Counter			
(7) Nuclear Measurement Corp., Gas Flow Proportional Counter	Alpha/Beta	0.1 pCi (minimum)	Measuring
(8) Eberline Scintillation Alpha Counter	Alpha	4.5 pCi (minimum)	Measuring
(9) Eberline Model PNR-4 Neutron Monitor	Neutron	0 to 5x 10^3 mRem/hr	Surveying
(10) Eberline PAC-4G Gas Proportional Alpha Survey Instrument	Alpha	0 to 5x10^5 CPM	Surveying
(11) Eberline Mod. RM-20 with AC 3-8 Probe	Alpha	0 to 5x10^5 CPM	Surveying/ Monitoring
(12) Eberline Mod. RO-2 Ion Chamber	Beta/Gamma	0 to 5x10^3 mR/hr	Surveying/ Monitoring
(13) Eberline Mod. RM-20 with HP-210 Probe	Beta/Gamma	0 to 2x10^3 mR/hr	Surveying
(14) Eberline Mod. RM-20 with HP-260 Probe	Beta/Gamma	0 to 5x10^5 CPM	Surveying/ Monitoring
(15) Eberline Model E-400 with G-M detectors	Low Level Beta and/or Gamma	0.1 to 200 mR/hr	Surveying
(16) Eberline Model EC-2 monitors with RD-2A Detectors	Gamma	0 to 1x10^4 CPM	Monitoring
(17) Eberline Mod. HFM-7A Hand & Foot Monitor	α/β	$\beta \sim 4\pi$ 20% $\alpha \sim 4\pi$ 15%	Surveying / Monitoring
(18) Eberline Mod. RM-24 with HP-100B Detector	$\alpha/\beta/\gamma$	β/γ ~31% $\beta \sim 4\pi$ 30% $\alpha \sim 4\pi$ 26%	Surveying / Monitoring
(19) MGP Instruments Model DMC 2000 S	γ / x-ray	0 to 1000 Rem/hr and 0.1 mrem to 1000 Rem total dose	Secondary criticality monitor, personnel monitoring, survey instrument

Calibration of Instruments

TYPE	*EXAMPLES	METHOD	FREQUENCY
Fixed Location Hand Held Survey Instruments	No. 11, 13,14, 18	NIST Traceable Alpha, Beta, Gamma or Neutron source as appropriate	Annually
Portable Hand Held Survey Instruments	No. 9, 10, 12, 15	NIST Traceable Alpha, Beta, Gamma or Neutron Source as appropriate	Semiannually
Fixed location survey instruments	No. 17	NIST Traceable Alpha, Beta, or Gamma as appropriate	Semiannually
In-Line Liquid Waste Monitors	No. 16	Prepared Standard	Semiannually
Criticality Monitoring System	No. 4	NIST Traceable Gamma Source	Annually
Fixed Location Counting Equipment	No. 5, 6, 7, & 8	NIST Traceable Alpha and/or Beta Source or Prepared Standard, as appropriate	Annually
Self-Reading Dosimeters	No. 1	NIST Traceable Gamma Source	Semiannually
Electronic Dosimeter	No. 19	NIST Traceable Gamma Source	Annually

* Numbers refer to example instruments in the preceding table.

4.3.3 Radiation Surveys

4.3.3.1 Fixed Air Sampling

Air samples are continuously collected by using fixed air sampling stations during operation of areas where a potential for airborne radioactive materials in excess of 10% of the DAC value based on the dose coefficients published in ICRP Publication No. 68. When fixed air samples are used to assign exposures, a representative study shall be performed. Representative studies will be performed using guidance in Regulatory Guide 8.25.

4.3.3.1.1 Analyses of the air samples are made after natural activity has had sufficient time for decay, at least 12 hours after sampling completion.

4.3.3.1.2 Action levels for fixed air samples are:

	Result	Action
1.	Daily result exceeding two times the DAC values based on dose coefficients published in ICRP Publication No. 68.	a. Investigate and report corrective action taken.
2.	Weekly average exceeding the DAC values based on dose coefficients published in ICRP Publication No. 68.	a. Investigate and report corrective action taken. b. Review personnel exposures for effected area.
3.	Monthly average exceeding 50% of the DAC values based on dose coefficients published in ICRP Publication No. 68.	a. Investigate and report corrective action taken. b. Review personnel exposures for effected area. c. Consider work restrictions or installation of engineering controls.
4.	Quarterly average exceeding 25% of the DAC values based on dose coefficients published in ICRP Publication No. 68.	a. Investigate and report corrective action taken. b. Review personnel exposures for effected area. c. Consider work restrictions or installation of engineering controls.
5.	Monthly average exceeding the DAC values based on dose coefficients published in ICRP Publication No. 68.	a. Consider termination of operation until process or engineering changes are installed.

4.3.3.2 Personal Air Sampling

Personal air sampling shall be the primary method of monitoring internal exposures. Annual Limit on Intake (ALI) and DAC values shall be based on the dose coefficients published in ICRP Publication No. 68. The action levels for exposures measured by personal air samples are:

	Result	Action
1.	A daily exposure exceeding 50 mrem CEDE	a. Investigate and report corrective action.
2.	Weekly exposure exceeding 100 mrem CEDE	a. Investigate and report corrective action b. Review annual exposure, consider work restrictions.

4.3.3.3 Removable Surface Contamination

Surface contamination surveys are made on a regular scheduled frequency in production areas of the facility or areas where unencapsulated radioactive material is handled. Surveys are performed on a sampling basis at a frequency determined by the type of operation being performed in any area as described in Section 4.3.5.

Large area smears may be used to survey many square meters of surface area. To determine if these smears indicate that an action level has been exceeded, the assumed area covered shall not exceed 1-square meter.

4.3.3.4 Exhaust Units and Effluent Stacks

Exhaust units and effluent stacks which emit radioactive material are surveyed for airflow quarterly unless continuously monitored for radioactivity. Those stacks continuously monitored for radioactivity shall be surveyed for airflow semi-annually. A change of more than 30% from the previous survey is cause for investigation.

4.3.3.5 Sealed Sources

4.3.3.5.1 Each sealed source containing more than 100 microcuries of beta and/or gamma emitting material, other than tritium, or more than 10 microcuries of alpha emitting material with a half-life greater than 30 days and in any form other than gas, shall be tested for leakage and/or contamination at intervals not to exceed 6 months.

In the absence of a certificate from a transferor indicating that a test has been made within 6 months prior to the transfer, the sealed source shall not be put into use until tested.

4.3.3.5.2 The test shall be capable of detecting the presence of 0.005 microcurie of contamination on the test sample. The test sample shall be taken from the source or from appropriate accessible surfaces of the device in which the sealed source is permanently or semipermanently mounted or stored. Records of leak test results shall be kept in units of microcuries and maintained for inspection by the Commission.

4.3.3.5.3 If the test reveals the presence of 0.005 microcurie or more of removable contamination, the licensee shall immediately withdraw the sealed source from use and shall cause it to be decontaminated and repaired by a person appropriately licensed to make such repairs or to be disposed of in accordance with the Commission's regulations. Within 5 days after determining that any source has leaked, the licensee shall file a report with the Director, Division of Industrial and Medical Nuclear Safety, U. S. Nuclear Regulatory Commission, Washington, DC 20555, describing the source, test results, extent of contamination, apparent or suspected cause of source failure, and corrective action taken. A copy of the report shall be sent

to the Administrator of the nearest NRC Regional Office listed in Appendix D of Title 10, Code of Federal Regulations, Part 20.

4.3.3.5.4 The periodic leak test required by this condition does not apply to sealed sources that are stored and not being used. The sources excepted from this test shall be tested for leakage prior to any use or transfer to another person unless they have been leak tested within 6 months prior to the date of use or transfer.

4.3.4 Bioassay Program

Bioassay is performed for all employees who spend 25% or more of their time on a quarterly basis in areas where air sampling is required by 4.3.3.1. In general, these are processing areas where readily dispersible radioactive material is handled.

The bioassay program for uranium, fission and activation products, and other isotopes shall comply with the guidance provided in Regulatory Guide 8.9, July 1993, "Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program" using ALI and DAC values based on dose coefficients published in ICRP Publication No. 68.

4.3.5 Contamination Control

An effort is made to maintain removable contamination to the lowest levels reasonably achievable. Areas are classified into uncontrolled, intermediate, and controlled areas, based on the levels of removable contamination and the nature of the operations. The controlled areas of all manufacturing areas are provided with intermediate areas through which all personnel must pass to enter an uncontrolled area. The controlled areas of other areas, such as the Laundry and LTC, have a clearly visible changeline checkpoint through which all personnel must pass to enter an uncontrolled area.

All personnel are to monitor their hands and shoes or perform a whole body frisk as appropriate before entering an uncontrolled area upon exiting from either a controlled area or an intermediate area. Personnel may not enter an uncontrolled area if the direct contamination reading (fixed plus removable) on either their hands or shoes exceeds background. If this level is exceeded and initial decontamination efforts in accordance with internal procedures are unsuccessful, then radiation control will be notified. Personnel may leave the area under radiation control supervision to go to another area of the facility for decontamination. Personnel contamination incidents will be investigated and reported in accordance with approved procedures. Items, such as tools or equipment, are monitored for contamination prior to removal from a controlled area.

4.3.5.1 Controlled Areas

A controlled area is an area in which readily dispersible radioactive material is handled.

4.3.5.1.1 The action levels for removable surface contamination are listed in the table below. If an action level is exceeded, access shall be restricted and decontamination shall begin during the next working shift, except during periods when elevated contamination is expected and additional controls are in place to protect personnel (e.g., during extended RWP work).

4.3.5.1.2 Smear surveys of controlled areas for removable contamination shall be performed at the frequency specified in the table below, when the area is in operation.

For new processes, or when processing a new type of material, surveys shall be performed each shift, when in operation, during the first 30 days of operation. This frequency shall continue if the results of these surveys show contamination above the controlled area action level.If the results are below the controlled area action level, these surveys shall be performed as specified in the table below, thereafter.

Smear surveys shall also be performed if there is any indication of a release of material. Smears shall be analyzed at the same frequency specified for surveying.

Controlled Area	Survey Frequency*	Action Levels (dpm/100 cm^2)	
		Alpha	Beta+ Gamma
Advanced Fuel	Weekly	5000	5000
Laboratories	Weekly	5000	5000
Central Vault	Weekly	5000	5000
Recovery/SFF	Weekly	5000	5000
RTRT	Weekly	5000	5000
Waste Treatment	Weekly	5000	5000
LTC Controlled Areas	Biweekly	500	5000
Other Controlled Areas	Weekly	5000	5000

* When in operation

4.3.5.1.3 Protective clothing is worn by all personnel in the area. Labcoats and shoe covers are required as a minimum. Additional protective clothing requirements are based on an individual's particular job as evaluated by Radiation Protection management.

4.3.5.1.4 The area is visibly defined from uncontrolled areas and change areas by floor markings, such as magenta-yellow tape or roped barriers accompanied by postings.

4.3.5.1.5 Air sampling is performed and the samples changed after each working shift except as noted in 4.3.3.1.

4.3.5.1.6 Ventilation is maintained such that air flows from areas of lower contamination potential into areas of higher contamination potential. This shall be verified quarterly by measurements such as smoke tests. If this airflow cannot be maintained, surveys are performed to ensure that any potential spread of contamination is kept within applicable limits. Exhaust air from recirculating ventilation systems that service both controlled and uncontrolled areas or controlled areas where continuous lapel air sampling is not required, shall be either HEPA filtered or continuously sampled. If continuous sampling indicates levels in excess of 25% of the DAC values, based on dose coefficients published in ICRP Publication No. 68, the air shall be recycled through a HEPA filter.

4.3.5.1.7 No smoking, eating or drinking is permitted in the area.

4.3.5.2 Intermediate Areas

Certain areas are classified as intermediate areas for the purpose of controlling minimal amounts of contamination. Entry and exit to the controlled areas of all manufacturing areas is also directed through intermediate areas.

4.3.5.2.1 The action levels for removable surface contamination are listed in the table below. If an action level is exceeded, access to the area shall be restricted, and decontamination shall begin during the next working shift.

4.3.5.2.1 Smear surveys of intermediate areas for removeable contamination shall be performed at the frequency specified in the table below, when the area is in operation.

For new processes, or when processing a new type of material, surveys shall be performed each shift, when in operation, during the first 30 days of operation. These surveys shall be performed as specified in the table below, thereafter.
Smear surveys shall also be performed if there is any indication of a release of material. Smears shall be analyzed at the same frequency as specified for surveying.

		Action Levels (dpm/100 cm²)	
Area	Survey* Frequency	Alpha	Beta+ Gamma
LTC Intermediate Areas	Monthly	200	2000
Other Intermediate Areas	Weekly	200	2000
Controlled Area Exits	Daily	200	2000

*When in operation

4.3.5.2.3 The area is visibly defined from the controlled areas by floor markings, such as magenta-yellow tape and from uncontrolled areas by floor markings such as yellow tape.

4.3.5.2.4 All personnel are required to monitor their hands and shoes or perform a whole body frisk as appropriate before exiting an intermediate area. Personnel may not exit an intermediate area with a contamination reading (fixed plus removable) which exceeds background on hands and shoes. If this level is exceeded and initial decontamination efforts in accordance with internal procedures are unsuccessful, then Radiation Control will be notified. Personnel may leave the area under Radiation control supervision to go to another area of the facility for decontamination.

4.3.5.2.5 Ventilation is maintained such that air flows from areas of lower contamination potential into areas of higher contamination potential. If this airflow cannot be maintained, surveys are performed to ensure that any potential spread of contamination is kept within applicable limits.

4.3.5.2.6 No smoking, eating or drinking is permitted in the area.

4.3.5.3 Changeline Checkpoint

Changeline checkpoints are used in non-manufacturing areas to separate a controlled area (4.3.5.1) from an uncontrolled area (4.3.5.4).

4.3.5.3.1 The changeline is a yellow or magenta and yellow stripe located on the floor to delineate a radiological controlled area from an uncontrolled area.

4.3.5.3.2 All personnel are required to monitor their hands and shoes or perform a whole body frisk before entering an uncontrolled area. Personnel may not enter an uncontrolled area with a direct contamination reading (fixed plus removable) which exceeds background on hands and shoes. If this level is exceeded and initial decontamination efforts in accordance with internal procedures are unsuccessful, then Radiation Control will be notified. Personnel may leave the area under radiation control supervision to go to another area of the plant for decontamination.

4.3.5.4 Uncontrolled Areas

An uncontrolled area is an area in which licensed material is handled in the form of non-readily dispersible radioactive material or not handled at all.

4.3.5.4.1 The action levels for removable surface contamination in uncontrolled areas are listed in the table below. If an action level is exceeded, access shall be restricted, and decontamination shall begin during the next working shift.

4.3.5.4.2 Smear surveys of uncontrolled areas for removable contamination shall be performed at the frequency specified in the below table, when the area is in operation.

		Action Levels (dpm/100 cm²)	
Area	Survey* Frequency	Alpha	Beta+ Gamma
Uncontrolled Areas	Monthly	200	1000
Eating areas (adjacent to controlled areas	Daily	20	100
Cafeterias	Daily	20	100

* When in operation

4.3.6 Caution Signs and Labels

Caution signs are maintained as required by 10 CFR 20.1902 with the exception that facility entrances are posted with a sign bearing the standard radiation symbol and the statement:

> "Caution - Radioactive Materials - Any Container Within this Plant may contain Radioactive Materials,"or equivalent, in lieu of the requirements outlined in 10 CFR 20.1902(e) and 10 CFR 20.1904(a).

4.4 Waste and Scrap Handling

4.4.1 Solid Waste Disposal

Solid materials contaminated with radioactive material or solid material homogeneously mixed with radioactive material shall be disposed of in accordance with 10 CFR 61.

4.4.2 Liquid Treatment

4.4.2.1 Processing Scrap Solutions

Uranium bearing solutions are disposed of in accordance with their uranium content or concentration. Scrap solutions with high value uranium content are processed through the Scrap Recovery Plant. Solutions with low uranium content are normally introduced into the contaminated waste drain system.

The final disposition of very low level solutions will be into the James River after passing through the retention tanks, and radioactive liquid waste treatment plant, and a settling pond. A reduction in uranium concentrations is accomplished by the treatment facility prior to release to the river.

4.4.2.2 LTC Liquid Waste

Process liquid wastes will be collected and stored indoors. These wastes will be solidified and handled as solid waste.

Liquid waste to be discharged is stored in tanks at LTC prior to discharging it to the Waste Treatment facility. Each tank is sampled and analyzed for alpha and beta/gamma activity prior to discharge to the Waste Treatment facility. Action levels shall be established through internal procedures to require isotopic analysis of liquid prior to discharging. This material is then treated and discharged as described in 4.4.2.1, above.

Storage tanks in the Liquid Waste Disposal Facility (at LTC) shall be inspected visually upon each tank voiding, or annually, whichever is sooner, to assure there is no unsafe accumulation of special nuclear material. Storage tanks that have not been used during a year will not be inspected.

4.5 Reports and Records

4.5.1 The following types of records shall be retained for the specified frequencies. Records may be kept in original form, microfilm or optical disk. An asterisk (*) indicates that the record will be retained until the NRC authorizes its disposal. (Note: All types of required records may not be listed and this section in no way changes the requirement to maintain unlisted records.)

	Retention Period
1. Daily Radiation Control Audit Reports	3 years
2. Reports of exceeded action levels/limits	*
3. Weekly fixed air sampling reports	*
4. Monthly fixed air sampling summaries	3 years
5. Weekly stack sample reports	*
6. Monthly stack sampling summaries	3 years
7. Weekly smear sample reports	*
8. Monthly smear sampling summaries	3 years
9. Monthly liquid effluent monitoring reports	*
10. Results of personal air sampling	*
11. Results of urine sampling	*
12. Results of lung counting	*
13. Results of whole body counting	*
14. Results of TLD/film badge monitoring	*
15. Monthly summaries of exceeded action levels/limits	3 years
16. Results of environmental sampling	*
17. Results of well water sampling	*
18. Results of leak testing sealed sources	3 years
19. Radiation Work Permits	*
20. Training Records	*
21. Quarterly summary of audit findings	3 years
22. Annual ALARA Report	3 years

The annual ALARA report is a review of the program as required by 10CFR20.1101(C) and shall include:

1. Data to indicate any upward trends in personnel exposures, types of operations, and effluent releases.

2. An assessment as to whether exposures and effluent releases might be lowered in accordance with the ALARA concept.

3. Measurements indicating whether equipment for effluent and exposure controls are being properly used, maintained, and inspected.

4. A review of required audits and inspections performed since the previous year's ALARA report.

5. Consideration of potential facility changes, new technologies, or other process enhancements that could improve the overall program effectiveness.

4.5.2 Reports required by regulation shall be provided in accordance with approved procedures.