F2	RADIATION SAFETY	NUMBER: F2
		REV: 43

INFORMATION USE
• ***Procedure should be available, but not necessarily at the work location.***
• ***Procedure may be performed from memory.***
• ***User remains responsible for procedure adherence.***

PORC REVIEW DATE:	APPROVAL:
NR	PCR #: 602000006722

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1.0 ALARA

1.1 General Discussion

The objective for all Radiation Safety practices at Prairie Island is to keep radiation exposures to Plant workers and the general public "As Low as Reasonably Achievable" - ALARA. The ALARA goals are (1) to maintain the annual dose to individual employees as low as reasonably achievable and (2) to keep the annual integrated dose for all station workers as low as reasonably achievable (i.e., total station Person-REM ALARA). All personnel on site **SHALL** be responsible for ALARA. The design and operation of the ISFSI (Independent Spent Fuel Storage Installation) **SHALL** fall under the Plant's ALARA program. The details of the ALARA Program are contained in Radiation Protection Implementing Procedure, RPIP-1004.

The Management of Prairie Island is and has been committed to safety and ALARA. ALARA is now required by 10CFR20.1101(b): "The licensee **SHALL** use to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA)." Therefore, all Plant personnel should continually look at means to maintain radiation exposure ALARA.

1.2 Radiation Sources

There are two main sources of radiation to personnel at Prairie Island. The largest source of radiation is from the activation of corrosion products. Corrosion products are formed in the Reactor Coolant System (RCS) and activated when they pass through or are deposited in the reactor core neutron field. The major source term for dose from corrosion products is the isotope Cobalt-60. Cobalt materials are typically used where hard wear surfaces are desired. Any wear or corrosion of these surfaces will result in the release of the cobalt material which will become activated in the reactor and later settle on out of core surfaces. The corrosion products will be deposited in low flow areas or crevices; such as, drain valves, instrument tap-offs, in the gap in socket welds, and pipes with low flow section.

The other largest contributor to radiation fields is the fission products that are formed when the nuclear fuel fissions. These fissions products may leak from the fuel into the RCS and be transported throughout the Plant primary systems.

1.3 Plant Operations to Minimize Doses

Below is a listing of practices that are used to minimize the transport of corrosion products from the fuel to ex-core areas and limit the resulting doses to Plant personnel.

1.3.1 The RCS is operated with dissolved hydrogen in the water which helps maintain a slightly base chemistry.

1.3.2 The oxygen levels in the Reactor Makeup Water Systems are minimized.

1.3.3 Purification of the RCS is maximized during outages, shutdowns, and startups. Resin choices are optimized during outage and non-outage times to ensure the best practical cleanup efficiency.

1.3.4 The power rate changes are minimized to help reduce the amount of fission products that are released into the RCS. The reactor return to power rates are established to prevent fuel damage by conditioning the fuel.

1.3.5 If fuel leaks are detected, the fuel is sipped during the refueling outage to prevent putting leaky elements back into the core without being repaired.

1.3.6 Crud traps and hot spots are flushed to remove the radioactive material and lower the dose rates.

1.4 Plant Design and Modification That Minimize Radiation Doses

Prairie Island was designed to minimize radiation doses. Equipment with large source terms were placed in vaults to help minimize doses to personnel. Piping and tanks that carry or store highly radioactive materials were shielded or routed through areas that have high dose rates. The Spent Resin Tank and the Waste Gas Tanks were placed in cubicles to control access.

Several modifications have been made that have helped reduce the doses at Prairie Island such as Containment Cleanup Fan suction routed to the Steam Generator (SG) primary manways for ventilation during the Eddy Current (EC) testing of the SGs; the grids on the fuel have been changed from inconel to zircalloy because of the cobalt in the inconel; a permanently installed purification system was put in place as part of the Chemical and Volume Control System (CVCS) system for when the Plant is shut down.

1.5 ALARA Reviews of Modifications

The Plant Radiation Protection (RP) Staff has been given the responsibility of reviewing all modification within the Radiological Controlled Area (RCA). A figure of $25,000 per Person-REM should be used for purposes of cost benefit analysis.

1.6 ALARA Reviews as Part of Work Control Process

1.6.1 The Plant System Engineers should keep the Radiation Protection Group (RPG) informed of major tasks that involve their systems. The work tasks should be discussed by Work Supervisors, Work Planners, Plant Management, Engineers, Workers, and the Radiation Protection Group. These discussions should center on the work procedures and means by which the radiation exposure can be minimized.

As part of the Radiation Work Permit (RWP) generation process, the Radiation Protection Specialist (RPS) should look at each job to assure that radiation exposures are ALARA.

When appropriate, ALARA post work reviews should be conducted per Fleet procedure FP-RP-SEN-02.

1.6.2 The RPIPs of the Radiation Protection & Chemistry Manual describes the RWP requirements and procedures for routine high dose/dose rate jobs.

1.6.3 The Radiation Protection Manager, as a member of the Plant Operations Review Committee (PORC), **SHALL** consider minimizing radiation exposure and radioactive waste generation when reviewing procedures as part of the PORC.

1.6.4 Engineers performing design changes will be performed in accordance with Fleet procedure FP-E-MOD-02.

1.6.5 When ordering new or replacement parts for equipment associated with the primary systems (CVCS, RCS, reactor internals, and SGs), the System Engineer should specify low cobalt materials.

1.6.6 Operations **SHALL** consider minimizing radiation exposures and radioactive wastes during operations including isolating and draining equipment for maintenance.

1.6.7 Operations **SHALL** notify RP prior to isolating and draining Radioactive Filters.

1.6.8 Operations **SHALL** notify RP when starting and stopping radioactive liquid processing for release.

1.6.9 All Prairie Island employees, outside contractors and vendors **SHALL** minimize radiation exposure while working in the Radiological Controlled Area. Examples of what should be done are: (1) minimizing time in radiation areas; (2) utilize existing shielding or request additional shielding as needed; (3) when not physically necessary, stand away from radiation sources as much as possible; (4) work with the RP personnel to minimize exposure.

1.6.10 The scheduling of work activities should be consistent with ALARA for minimizing radiation exposures.

1.6.11 Engineering controls **SHALL** be used to the extent practical to minimize airborne radioactivity and the use of respiratory protection. Work generally can be accomplished faster when respirators are not required.

1.6.12 Radiation dose fields can be reduced by maintaining good chemistry control on the RCS. The boron to lithium should be kept within the band recommended by Westinghouse. The hydrogen concentration should be maintained properly. The reactor should be operated conservatively to maintain the integrity of the fuel.

The chemistry of the secondary system and other systems **SHALL** be monitored to minimize the potential for corrosion damage to these systems. This can prevent failures, reduce maintenance and reduce radiation exposures.

1.6.13 The Plant **SHALL** be maintained as clean as possible to reduce radiation levels and contamination levels in the Plant. By maintaining clean areas, less dose and rad waste are generated for maintenance and construction activities. Cleaning and decontamination of equipment can save exposure by allowing work without respirators. However, consideration should be given to the potential dose for deconning and not deconning and the method giving the least dose should be chosen.

1.6.14 The high quality of maintenance and preventative maintenance of Plant equipment is an ALARA tool. By maintaining equipment in proper working order, leaks and failures will be minimized which greatly reduces exposures.

1.6.15 All badged Plant personnel (excluding office personnel) **SHALL** have training on keeping exposures and rad waste ALARA.

1.7 Source Term Reduction Program

A major item in a Plant ALARA program is to maintain dose rates in the Plant as low as possible. It is desired to keep the source of radiation as low as reasonably achievable. This procedure describes, in general terms, the program to reduce the radiation sources.

1.7.1 Fuel Integrity

The major radioactive source available in the Plant is the fuel. By maintaining the integrity of the fuel we keep that source of radiation in a controlled location. The Fuel Integrity Control Program assures that the Plant is operated to maintain fuel integrity.

If a major fuel defect is indicated by high alpha activity or high cesiums, ceriums, or rutheniums in the RCS, an evaluation must be made to determine if a mid cycle shutdown is needed for fuel inspection. Major Plant problems will develop if fuel damage occurs.

If there is fuel leakage but not major fuel damage, no significant dose rate increases will be observed in areas like the S/G channel heads; but there will be significant increases in the Volume Control Tank (VCT), Ion Exchangers, and Waste Gas System areas due to radioactive gasses. Airborne activity from iodines will be a problem.

1.7.2 Chemistry

Chemistry controls have a major impact on the dose rates in the Plant. The RCS chemistry is controlled according to a coordinated Lithium-Boron regime which is consistent with fuel vendor recommendations and industry best practices.

If fuel cladding failure causes elevated RCS activity, steps will be taken to minimize the effect on Plant dose rates.

1.7.3 RCS Purification

The CVCS Purification Systems are operated to the maximum extent practical, both during operation and during outages.

Shutdown and startup practices are modeled on industry standard methods to help limit the transport of activated corrosion products from the core to the ex-core areas.

1.7.4 Scheduling

The timing of various work activities can have a large impact on the dose received for that job. The scheduling department is experienced at scheduling work in the Plant when the dose rates in the areas are the lowest. For example, the work in the Residual Heat Removal (RHR) pit is done right before a shutdown as that is the lowest dose rate time for that area.

1.7.5 Maintenance

Maintenance shall be performed in accordance with the Fleet Foreign Material Procedure FP-MA-FME-01.

1.7.6 Modifications

Modifications **SHALL** be performed in accordance with fleet procedure FP-E-MOD-02.

1.7.7 Flushing

Hot spots on various piping and drain lines are monitored for high radiation. If an area has elevated radiation levels that can be reduced by flushing, an evaluation is made that will determine if the flush can be done.

Another method of removing hot spots is to do tank cleaning. This is normally done by using a sludge type pump to pump the sludge to a spent resin liner or to a 55 gal drum. The amount of sludge that builds up is minimized by using filters in the floor drains.

1.7.8 Decontamination

Decontamination is performed to reduce source terms. An example is the cavity decon which is done to reduce the source of radiation in the work area and to reduce the airborne source term.

2.0 GENERAL REQUIREMENTS

2.1 Description

This section of the Operations Manual contains the radiation safety rules and procedures applicable to all personnel on site. Other specific radiation protection procedures and requirements applicable to RP Personnel appear in RPIP's of the Radiation Protection Manual, Count Room Manual, Computer Manual, and Chemistry Manual.

2.2 Emergency RCA Entry

The requirements of this procedure do not apply under emergency conditions that require immediate RCA access for responders. Examples where immediate access may be required are Fires, Medical Emergencies, and Emergency Operations (EOP Actions). Emergency dosimetry is available for these entries. Normal RCA controls should be established as soon as practicable after the emergency is under control.

2.3 Responsibilities

The following categorizes radiation protection responsibilities of various groups:

2.3.1 Individuals

Individual **SHALL** have the following radiation protection responsibilities:

A. Wear their Dosimeter of Legal Record (DLR) with their Site Security Badge at all times when entering the Owner Controlled Area with exception of personnel as allowed in Section 16.

B. Comply with the rules established in this section of the Operations Manual.

C. Read carefully and observe all requirements as spelled out on applicable RWP's or as displayed on the Self-Reading Dosimeter Log-In screen.

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(Step 2.3.1 continued from preceding page. . .)

D. In Contaminated Areas, workers SHALL refrain from touching unprotected personal areas; for example, unprotected skin (face, neck, etc.), glasses, security badges and Self Reading Dosimeters (SRDs).

E. Upon exiting a contaminated area, personnel should proceed as soon as practical to the nearest Personnel Contamination Monitor for whole body contamination monitoring

F. Workers **SHALL** refrain from reaching across Contaminated Area boundaries and touching material inside the area. Reaching across boundaries with protective clothing is allowed per the RWP, where permitted by special status signs, and on a case by case basis with RP approval.

Workers **SHALL NOT** reach from inside the contaminated area to outside the contaminated area.

G. The RP group will administratively lock personnel out of the RCA in accordance with RPIP 1106. This will apply during online and outage.

H. Observe and ensure understanding of radiological postings.

I. Correctly record their exposure upon leaving the RCA as necessary.

J. Keep exposure ALARA by refraining from lingering in radiation fields, by maximizing distance from radiation source, by utilizing existing shielding, and by reviewing work procedures, being knowledgeable of work area radiological conditions and conducting as much preliminary work outside radiation areas as feasible.

K. Report all wounds and skin contamination received while in the RCA.

L. Provide feedback to Supervisors and RP Group on ways to reduce exposure. These can be submitted as Action Requests in the Action Tracking System.

M. Minimize radioactive waste by removing materials from packages prior to entry into the RCA and by minimizing materials taken into contaminated areas. Green bags will be used inside the RCA to transport clean materials and for “clean” area trash disposal. Yellow bags labeled as Radioactive Material will be used to transport contaminated materials and for contaminated trash disposal.

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N. Auxiliary Building Floor Drains - Only materials considered nonhazardous and approved in accordance with the current National Pollutant Discharge Elimination System (NPDES) permit, may be released to the radioactive waste treatment system. Contact the Radwaste System Engineer, Environmental Compliance Coordinator or designee for material disposal instructions in the Auxiliary Building. Refer to D14.5, Hazardous and Nonhazardous Material Storage, Disposal and Labeling Requirements, for disposal, storage and labeling requirements.

O. Eating, smoking or chewing (gum, tobacco, toothpicks, etc.) **SHALL NOT** be permitted in the RCA. Special areas may be established per Site procedures to allow drinking in the RCA as designated by RP Supervision. All personnel **SHALL** follow posted drinking instructions.

P. Wear SRD and DLR in the following manner:

1. DLR and SRD should be within a hand's width of each other on the upper body (chest area), or as directed by the RWP.

2. IF entering radiation fields greater than 100 mR/hr or performing an at-power containment entry,

   THEN wear DLR and SRD within an inch of each other on the upper body (chest area), or as directed by the RWP.

3. The SRD **SHALL** be worn in a secure manner (such as in a chest pocket, on a dosimeter loop, or other method) that allows the wearer to read the dosimeter and hear the audible alarm.

4. If entering an Foreign Material Exclusion (FME) Level 1 zone and wearing OREX Ultra PCs, the DLR and SRD shall be placed in clear plastic (such as a 'whirly pack') and secured in the PC pocket in such a way as to be readable through the pocket window.

5. If entering an FME Level 1 zone and wearing OREX Deluxe PCs, the DLR and SRD shall be placed in clear plastic (such as a 'whirly pack') and secured in the Protective Clothing (PC) pocket in such a way as to be able to read it.

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6. An alternative option to the practices listed above is available if the wearer can exit and re-enter the FME 1 zone relatively easily without having to remove PCs. (An example would be stepping out of the D21 boundary at the Reactor cavity.) In this case the wearer can have their DLR and SRD in clear plastic (such as a 'whirly pack') and placed unsecured into his pocket. The pocket is then taped closed. On a periodic basis the worker can step out of the FME 1 zone, remove the tape to open the pocket, read the SRD, and then reclose the pocket with tape and re-enter the area.

Q. In addition to the above requirements, abide by the following Generic RWP requirements:

1. **COMPLY** with the RWP and Access Computer Log-in Screen requirements.

2. **ENSURE** proper dosimetry is worn (DLR and SRD at a minimum) and verify SRD is turned ON.

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(Step 2.3.1.Q continued from preceding page. . .)

3. IF the following criteria are met:

   - Work to be performed is radiological low risk and does not involve any of the following:
     - Abrasive work, such as grinding or cutting
     - Access to areas at a height greater than 8 feet
     - Transfer of radioactive material out of an Radiation Area (RA), High Radiation Area (HRA), or Locked High Radiation Area (LHRA)
     - Opening of contaminated containers
     - Contaminated system breaches or operation of a system where radioactive material may be moved, such as opening a valve that may allow radioactive material to transfer through a pipe
   - Work area does rates are less than 25 mrem/hr whole body
   - Work area contamination is less than 10,000 dpm/100 cm2
   - Work area is Alpha Level 1
   - Work area is not and does not have the potential to become an Airborne Radiation Area (ARA)
   - Work area is not inside of a posted HRA

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(Step 2.3.1Q.3 continued from preceding page. . .)

THEN, an RCA entry self-briefing can be performed. The worker shall review the current radiological information of the work area, with particular attention to: dose rates, contamination levels and locations, and back out criteria, before entering the RCA.

OTHERWISE an RP representative shall be contacted prior to entering the RCA as required by the RWP.

4. Prior to any entry into a HRA or LHRA, personnel **SHALL** receive an ALARA briefing from an RPS. This briefing **SHALL** be conducted per the applicable RPIP.

5. **BE** knowledgeable of work area dose rates (including hot spots) and minimize dose using time, distance and shielding.

6. **ABSOLUTELY** no entry into "Radiographing in Progress Areas".

7. **UPON** observing a radiological alarm (self-reading dosimeters, area monitor, or Continuous Air Monitor (CAM) immediately evacuate the area and contact the RP Group.

8. **OBSERVE** special requirements for High Radiation Area entries. **Verify** barrier/barricade (swing gate, rope, door) is CLOSED or back in place after entering or exiting.

9. Prior to cutting, welding, grinding, burning, sanding, buffing, or anything that will disturb contamination, **CONTACT** RP Group to determine contamination levels.

10. **OBSERVE** radiological postings and barriers. Postings and barriers **SHALL** only be moved under the direction of RP Group. Ensure all entrance barriers are in place after each entry/exit.

11. **OBTAIN** RP survey and approval prior to removing items from the RCA.

12. Radiation Protection **SHALL** be present when moving Spent Fuel, or when removing any item from the Spent Fuel pool or Reactor Cavity.

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(Step 2.3.1Q continued from preceding page. . .)

13. DO NOT **MOVE** or reposition any shielding.

14. **CONTACT** the Containment RPS each entry.

15. When personnel are required to wear a single set or double sets of Anti-Contamination Clothing (Anti-C's), personnel **SHALL** wear modesty clothing into the RCA. Personnel **SHALL NOT** change clothing inside the RCA.
    It is highly recommended for any radiological work performed in the RCA that personnel wear modesty clothing (e.g. Scrubs). Prairie Island will not replace clothing contaminated due to poor radiological work practices.

16. **Stop** work AND **contact** Radiation Protection prior to changes in work scope, work location, or if radiological conditions change.

17. **MONITOR** for contamination using Two Step Monitor or as defined by the RP Supervisor or designee.

18. Individual **SHALL** self-monitor and leave the work area prior to reaching the alarm setpoints. As an individual's dose approaches the SRD alarm setpoint, the SRD should be checked more frequently and exit the area prior to reaching the alarm setpoint.

19. **CONTACT** RP Group prior to entering areas eight (8) feet above the floor (with the exception of areas with permanent ladders). Areas eight (8) feet above the floor are not routinely surveyed.

20. **Notify** your Supervisor and RP group of any medical treatments where a radiopharmaceutical is used. This should be done at the earliest opportunity upon return to work.

2.3.2 Supervisor

Each Supervisor **SHALL** have the responsibility to:

A. Ensure their workers obey the rules spelled out in this section and the instructions on the RWP.

B. Ensure their workers follow the self-briefing requirements and have reviewed the radiological conditions of their work area.

C. Oversee individual exposures received and authorize exposure of personnel based on present and future work requirements.

D. Assist RP in pre-work training exercises designed to reduce work exposure.

E. Assure their workers are covered under the protective requirements of a RWP when working in posted areas and the RCA.

F. Attempt to keep their workers' exposure ALARA by reviewing work procedures.

G. Review previous day's dose goal versus actual dose received. Any significant discrepancy of total dose **SHOULD** be investigated. The investigation should be forwarded to the ALARA group for documentation.

H. Ensure their workers minimize the amount of radioactive waste produced by removing packaging materials from components prior to entry into the RCA.

I. Ensure their workers process oil and solvents as per D14, Hazardous Waste.

J. Minimize the number of workers assigned to work inside the RCA.

2.3.3 Radiation Protection Group

The responsibilities of the RP Group are spelled out in 5AWI 3.1.0 and in the RPIPs.

2.3.4 Engineering Personnel

Engineers and Work Planners **SHALL** be aware of radiation exposure concerns while writing design changes and Work Order packages keeping in mind the ALARA concept.

2.3.5 Work Planning Group

Planners **SHALL** use the ALARA concept and the ALARA Planner when writing Work Orders.

2.4 Radioactive Waste Management

This section addresses an ANI concern. Radioactive Waste Management at Prairie Island is the responsibility of the RP Group. An RP Radioactive Shipper will keep track of solid waste generation, storage, and shipping schedules. The RP Group will direct the packaging and procedures for shipping radioactive waste off-site. The RP Group will write the required procedures and work orders for solid waste management. Chemistry department personnel monitor and direct the processing and handling of liquid and gaseous radioactive waste systems. Chemistry is responsible to communicate their flow path direction to the Operations Department.

3.0 AREA CONTROL

3.1 Areas will be posted per Technical Specification 5.7, Fleet Directive CD 9.3, and applicable RPIPs.

3.2 Access to areas will be control per Technical Specification 5.7, Fleet Procedures, and applicable RPIPs.

3.3 Keys for access to certain radiological areas of concern will be controlled per 5AWI 5.3.0, Key and Seal Control, and applicable Site RPIPs.

3.4 Access Control

The following are requirements for access into the RCA:

3.4.1 All personnel are required to follow the requirements of a RWP while in the RCA.

3.4.2 Normally only one manned access control point is permitted to control entry into the RCA. Entries other than this point **SHALL** be cleared with the RPM or designee.

3.5 Radiation Work Permit (RWP)

3.5.1 All entries into the RCA require the use of an RWP. The RWP is a method of communicating and controlling the radiological precautions necessary to ensure safe work practices.

3.5.2 Instructions and requirements in RWPs **SHALL** be followed by all personnel.

3.5.3 A copy of the RWP is located at Access Control.

3.5.4 All personnel **SHALL** be aware of the requirements of the RWP covering their activity and be familiar with the radiological conditions for the area.

3.5.5 Personnel should carefully read the protective clothing requirements and ensure they understand the requirements.

3.6 Indoctrination and Access Control

3.6.1 If the dose estimate is reached for a particular task, the work will be placed in a safe configuration and secured.

NOTE:	**In some cases, exceeding the dose estimate may not be recognized until all members of the work crew exit the RCA and sign off the computer system. In these cases, work is secured and corrective measures are implemented prior to subsequent entry.**

3.6.2 If a dose estimate is reached during non outage, as appropriate, leads, supervisors, managers, and RP staff will evaluate the work to understand the reason for the mismatch, and determine if any additional action is required prior to proceeding.

Dose AboveTask Estimate	Decision Maker for Restart
0-19 mRem	Lead Craft/Operator with RPS concurrence.
20-99 mRem	Task Supervisor with RP Supervisor concurrence.
100 mRem or greater	Plant Manager with RPM concurrence.

4.0 PERSONNEL PROTECTION AND CONTROL

4.1 Radiation Exposure

Radiation exposure will be controlled per applicable Fleet and Site procedures.

4.2 Personnel Exposure Control (Plant Administrative Controls)

Periodically, supervisors should review the exposure history for their workers.

Visitors are allowed access to the RCA in accordance with fleet and site radiation protection procedures.

Further exposure control techniques are specified in the RPIPs.

4.3 Personnel Monitoring Techniques

4.3.1 External Monitoring

SRDs and DLRs **SHALL** be worn on the upper area of the body (chest) within one hand's width of each other or as directed by RWP. The self-reading dosimeter **SHALL** be worn in a secure manner (such as in a chest pocket, on a dosimeter loop, or other method) that allows the wearer to read the dosimeter and hear the audible alarm.

If personnel are hearing impaired or SRDs will be used in a loud environment, THEN SRDs should be provided with supplemental alarm capabilities (e.g. light or vibrating).

External monitoring is accomplished using DLR, SRDs, and direct reading dosimeters. Official exposure is obtained from the vendor DLR results for whole body Deep Dose Equivalent (DDE), whole body Skin Dose Equivalent (SDE,WB), extremity SDE (SDE,E), and Lens of the eye Dose Equivalent (LDE).

4.3.2 Internal Monitoring

Whole body counts are obtained and performed per RPIP specifications. Passive whole body monitoring is performed during egress from the RCA and ensures significant internal exposures are detected in real time.

4.4 Personnel Contamination Control

The following are methods employed at Prairie Island to protect personnel from radioactive contamination and to monitor for contamination.

4.4.1 Protective Clothing

The use of protective clothing is outlined in section 10.0.

4.4.2 Personnel Contamination Check

All personnel who exit the Site normally pass through the exit portal monitor located in the Security Access Facility (SAF). All personnel who exit the Aux Bldg **SHALL** pass through the Two Step Monitor at Access Control or perform personnel frisking at Access Control. IF work requires alternative exit, THEN obtain RP Supervisor approval and frisking requirements. If any of these monitors are out of service, the RP Supervisor or designee **SHALL** determine the appropriate personnel monitoring at Access Control.

A. Frisking of hands, feet, and suspect areas **SHALL** be performed per RWP at closest available Frisker prior to putting on personnel clothing.

1. Slowly (no more than 2 inches per second) move both hands close to the frisking probe (within ½ inch of the probe face) and check hand not contaminated (clean) prior to picking up probe. Listen for an increase in the count rate and stop the probe if the count rate increases. The Frisker probe should be within ½″ of the body surface and it is permissible to touch the probe against the body or article being frisked.

2. Slowly frisk to ensure there is no contamination present. Pay particular attention to the exposed areas of the body and areas that may have rubbed against surfaces, such as the knees, arms, or back.

3. Frisk the DLR and SRD if they were worn outside the protective clothing or are suspected to have come into contact with

4. If the alarm on the Frisker sounds or the count rate has increased on any part of the body, contact the RP group for assistance. If there is no one at the area that can contact the RP group, suit up in clean Anti-C's, including shoe covers and gloves and proceed directly to Access Control.

4.4.3 Contamination Monitoring Equipment

The following outlines the use of equipment to ensure contamination control:

A. G-M Ratemeters (Friskers) - Eberline RM-14 or equivalent count rate meters equipped with shielded pan-cake probes are located at strategic locations. They are used for body frisking after Anti-C removal in cases where the individual suspects body contamination or as required on the RWP. The friskers are very inefficient if they are not moved slowly over the body; the maximum speed should not exceed 2 inches per second.

B. Sensitive plastic scintillation detector portal monitors are located at the SAF. Personnel should place both feet on pad, wait for the count to complete, then proceed through the monitor.

   If the monitor displays a valid contamination alarm, contact the RP Group.

C. The Two Step monitor should be used.

D. Gas flow proportional detectors (Hand and Foot Monitors may be used in lieu of friskers after exiting Contamination Areas.

4.4.4 Personnel Decontamination

Contact the Radiation Protection Specialist for assistance if you detect contamination on yourself. Personnel decontamination procedures are described in detail in the RPIPs. In almost all cases, washing or showering is a sufficient method of decontamination.

4.5 Access Control Procedures

4.5.1 Personnel who enter the RCA are required to log-in on the Access Control Computer System or on the Access Control Cards as directed by the RP Group. A paper copy of the RWP is also located at Access and **SHALL** be read and understood prior to entry

4.5.2 When exiting the RCA, all personnel **SHALL** go through the Two Step Monitor or frisk as defined by the RP Supervisor or designee.

4.5.3 When exiting the RCA, personnel should record their SRD reading by logging out on the Access Control Computer System or as directed by the RP Group. In the event that the entry was into a neutron radiation area and exposure was received, do not attempt to log out via the Access Computer. Present your self-reading dosimeter to RP and they will provide guidance for you to log out and make the appropriate adjustment to your dose to account for the neutron exposure.

4.6 Discrete Radioactive Particle (DRP) Program

General Discussion

With the advent of new highly sensitive portal and booth type monitors, many Nuclear Plants have been able to detect discrete particles (invisible to the naked eye) with high specific activity. At some Plants the DRPs are fission products with very high beta energies. Prairie Island has only observed Cobalt-60 DRPs which have low beta energies, but high dose rates which can cause very high doses in localized areas.

Work around the spent fuel pool requires extra protective clothing if for removing materials from the pool or for laying on the floors. Masslinn (oil cloth) surveys in fuel pool areas are conducted periodically.

A special dose assessment procedure will be conducted for individuals who do get DRPs on their skin greater than 50,000 corrected counts per minute distributed contamination greater than or equal to 5,000 corrected counts per minute.

4.7 IF you are traveling to a non-XCEL/NSPM Site where you may be monitored for occupational exposure,

THEN contact Dosimetry at extension 4452 to schedule a whole body count and have off-site exposure tracking initiated.

4.8 IF you receive occupational exposure from a non-XCEL/NSPM Licensee,

THEN immediately inform Dosimetry at extension 4452 so that your off-site dose can be added to the dose tracking database.

5.0 EQUIPMENT CONTROL

The purpose of equipment control is to prevent the spread of radioactive material and contamination into clean or uncontrolled areas and to minimize dose. Refer to Control of Radioactive Materials section of this procedure for contaminated tool and equipment control.

Conditional Release to the Clean Area (white tag)

Radioactive equipment used in the RCA may be conditionally released from the RCA per the applicable site RPIP.

6.0 RADIOACTIVE MATERIAL HANDLING

6.1 Procedure for handling radioactive material such as waste shipments, source handling, radioactive effluents, fuel receipt, equipment decontamination, etc., appears in appropriate C, D, and G sections of the Operations Manual and the RPIPs.

6.2 Removing Materials from a Contaminated Area

6.2.1 RP will be contacted to remove items from a Contaminated Area. Items **SHALL NOT** be removed from a contaminated area without a Radiation Protection Specialist.

6.2.2 If the work area is highly contaminated, it is the RPS's responsibility to oversee bagging, transporting, and decontamination of contaminated material. This may be accomplished by special instruction on the RWP or by RPS personal control.

7.0 RADIATION OCCURRENCES

7.1 General

A course of action is required to deal with radiation occurrences. This is necessary for evaluation of compliance with licenses and regulations, and to determine the adequacy of the Radiation Protection Program. Outlined below are the criteria and reporting requirements and the course of action necessary.

7.2 Criteria for Judging Radiation Occurrences

Radiation occurrences are normally events involving radioactive materials or contamination. They are events not normally expected and, therefore, not normally anticipated. They can result from rule violations and carelessness. In general, they consist of:

7.2.1 Unexpected contamination (personnel and area).

7.2.2 Unexpected radiation exposures or electronic dosimeter dose alarms.

7.2.3 Unexpected internal uptake of radioactive material.

7.2.4 Unauthorized radioactive material releases to the environment.

7.2.5 Unexpected radioactive material released in the Plant.

7.2.6 Loss of radioactive material.

The Corrective Action Process is used for problems of this nature identified at Prairie Island.

7.3 Reporting Radiation Occurrences

Each individual **SHALL** have the responsibility to report detected Radiation Occurrences to the RP Group. Action Requests may be submitted and a direct call to the Lead RPS @ 4475 can be performed.

7.4 Action Required

Immediate emergency action may be necessary as described in the Emergency Plan, Section F3-2. Follow-up action is required by the Radiation Protection Manager. With the assistance of the RP Group, the Radiation Protection Manager **SHALL** evaluate the radiation occurrence as rapidly as possible and determine what additional action may be necessary.

An Action Request **SHALL** be filled out for all occurrences. The Radiation Protection Manager **SHALL** ensure assessments of these Action Requests are performed.

8.0 RESPIRATORY PROTECTION

Purpose and Policy Statement

Airborne radioactive materials within the Plant are maintained below the Derived Airborne Concentration (DAC) whenever practical by use of process engineering controls, Containment ventilation, and portable ventilation filter units.

It is necessary, however, that some work be performed in respirators in confined or localized areas of high airborne activity such as steam generator nozzle dam installation, reactor cavity decon, cutting into radioactive systems, or repairing radioactive equipment.

Respiratory protective equipment allows the required work in some airborne situations to be accomplished with greater safety and lower exposure to radioactive materials than by not using respiratory protective equipment. Further details of the Respiratory Protection Program are defined in the RPIPs and H-26 procedure.

9.0 CONTAINMENT ENTRY PROCEDURE

9.1 General Discussion

Containment entries are NOT allowed during flux mapping with the reactor critical. The following procedure outlines the measures necessary for Containment entry during Mode 2, Startup and Mode 1, Power Operation. Plant Manager and Radiation Protection Manager authorization is required for emergent at power entries.

9.1.1 Containment entry during Mode 6, Refueling, Mode 5, Cold Shutdown, Mode 4, Hot Shutdown, and Mode 3, Hot Standby are controlled by the issuance of RWPs in conjunction with RPIP-1729; Initial Containment Entry.

9.1.2 Containment or Containment Annulus entry is NOT permitted during reactor startup or during reactivity changes while the reactor is critical without worker safety review and Radiation Protection Manager authorization.

9.1.3 All entries during Mode 2, Startup and Mode 1, Power Operation **SHALL BE MADE** by more than one person and a qualified Radiation Protection Specialist should accompany the entering party.

9.1.4 Entries by a single individual are permitted during Mode 3, Hot Standby, Mode 4, Hot Shutdown, and Mode 5, Cold Shutdown based on a supervisory review of work hazards. The work area ambient conditions should be considered when allowing individual entries.

NOTE:	Transient Combustibles are defined as combustible materials that are not fixed or stored or constantly attended.

9.1.5 To provide adequate fire protection when installed fire protection systems are inoperable (such as containment fire protection spoolpiece, firehoses, or extinguishers not in place), any quantity of transient combustibles brought into containment during Modes 1 or 2 **SHALL** require a Combustible Control Permit (CCP) IAW FP-PE-CC-01 and a dedicated fire watch. The fire watch **SHALL** be equipped with an extinguisher.

There are two parts to this procedure; normal entry into Mode 1, Power Operation and Mode 2, Startup and emergency entry into Mode 1, Power Operation and Mode 2, Startup. Emergency entry is defined as an entry which is not controlled by the RP Group.

9.2 Containment Airlock Handwheel Cover Locks

Metal lock boxes are installed on the outer airlock door handwheels when the Unit is at power and the Containment is required to be posted a “Locked High Radiation Area”. The lock boxes prevent unauthorized entry into Containment, while still allowing operation of the handwheel from inside Containment for the purpose of emergency egress. If an emergency situation arises that would necessitate exit through the alternate airlock, the outer airlock door could be opened from inside Containment. To close the outer door, a Locked High Radiation Area key for that specific airlock would then have to be obtained from the affected Unit Operations Shift Supervisor, or, as a last resort, there is a red glass pane box at the Access Control leads desk with an emergency key to unlock the Locked High Radiation Area key box to obtain the needed key. In the event there are other personnel who must exit with the outer airlock door already opened, they will need to close the outer door from inside Containment first, which could be accomplished by a person operating the doors from within the airlock until all personnel are out of Containment.

9.3 Requirements

Specific requirements for Containment entry while in Mode 2, Startup, and Mode 1, Power Operation, are spelled out in these procedures.

9.3.1 The entry team **SHALL** be equipped with dosimeters, SRD's,DLRs, and a beta-gamma survey instrument.

9.3.2 Entry into the RC loops and Reactor Cavity **SHALL NOT** be permitted without permission from the Radiation Protection Manager or designee.

9.3.3 Prior to Containment entry, contact the Shift Supervisor to confirm the following:

A. There is not flux mapping or incore detector movement in progress. Very high radiation dose rates and possible overexposures can be caused by the incore detectors.

B. The Shield Building Ventilation Systems are not running.

9.3.4 IF the Unit is in one of the following Modes:

Mode 1, Power Operation

OR

Mode 2, Startup

OR

Mode 3, Hot Standby

OR

Mode 4, Hot Shutdown

THEN one Shield Building door at each entry **SHALL** be closed at all times.

9.3.5 Before entry, a pre-job briefing **SHALL** be conducted with those entering and Control Room personnel, as appropriate. This pre-job briefing **SHALL** include a discussion of all tour/work locations, anticipated radiation levels (PINGP 1112) and heat stress work/recover regimens (Fleet Procedure FP-IH-SAF-01).

9.3.6 All personnel entering the Containment **SHALL** check in with the Control Room, or the designated person at the airlock, if posted.

When contacting Control Room prior to Containment entry at power, **ensure** all personnel are wearing a DLR and SRD and the SRD is turned on (number and mRem indicated within the window).

9.3.7 The guidelines for heat stress in Fleet Procedure FP-IH-SAF-01 should be reviewed. Stay times may be required.

NOTE:	**Transient Combustibles are defined as combustible materials that are not fixed or stored or constantly attended.**

9.3.8 Any quantity of transient combustibles brought into containment during Modes 1 or 2 **SHALL** require a Combustible Control Permit (CCP) IAW FP-PE-CC-01 and a dedicated fire watch. The fire watch **SHALL** be equipped with an extinguisher.

9.3.9 During Containment at power entries, RP **SHALL**:

A. Ensure that Control Room personnel are contacted prior to operating the airlock doors.

B. Ensure that Control Room personnel are contacted after the airlock doors are secured upon entry in Containment to verify that all alarms have cleared.

C. Ensure that Control Room personnel are contacted after the airlock doors are secured upon exit from Containment, prior to installing locking mechanism, to verify that all alarms have cleared.

9.3.10 When all personnel are out of Containment, the RPS **SHALL** lock the entry airlock and obtain verification of locked door. Both RPS & verifier **SHALL** sign or initial LHRA key Log.

9.3.11 Post-job review required per applicable Site procedure.

9.4 Procedure

9.4.1 Normal Entry into Mode 1, Power Operation and Mode 2, Startup

This procedure is for routine inspection, operation, and work.

A. Refer to the general requirements in this procedure Section 9.3.

B. Verify the internal cleanup fans are operating 24 hours prior to entry, if necessary.

C. Contact the Radiation Protection Group at least 6 hours before the entry for an air sample.

D. IF remote sampling capabilities are lost (per RPIP 1221), THEN verify **R-10/R-11** and **R-12** readings are acceptable AND confer with Safety Group on confined space requirements.

E. The Radiation Protection Group should draw samples and analyze for the following:

1. Particulate Activity
2. Gaseous Activity
3. Iodine
4. Tritium
5. O_2, CO, Combustibles, and H_2S using a gas analyzer

F. Observe the requirements of the Radiation Work Permit.

G. Observe the requirements of the Confined Space Data Sheet.

9.4.2 Emergency Entry into Mode 1, Power Operation and Mode 2, Startup

Emergency entry is defined as non-routine entry for inspection or operation such as a fire alarm or a limit switch position check.

A. Duty RPS's shall perform the following before accepting responsibility for the shift:

1. Verify that the keys for containment entry at power are available.

2. Review containment entry at power RWP.

3. Verify containment radiation monitor conditions AND record abnormalities in the SOMS log.

4. Verify O2 Monitor at Access is operational.

B. IF a fire alarm is concurrent with a valid containment radiation monitor alarm, OR flux mapping is in progress,

THEN NO entry into containment shall be made.

NOTE:	**Duty RPS's should be prepared to use booties and gloves suit up criteria for entry to comply with emergency response requirements.**

C. Emergency entry teams shall consist of a minimum of two individuals, one of which shall be a qualified RPS equipped with an O2 Monitor.

NOTE:	**Emergency SRDs are set to containment entry at power RWP limits. RWP sign in can occur after containment egress.**

D. Entry team members shall wear an emergency SRD.

(This step continued on the next page . . .)

(Step 9.4.2 continued from preceding page. . .)

NOTE:	**Permission for containment entry at power is granted in the RWP for fire alarm response.**

E. Upon entry into containment, entrants shall immediately report to the control room conditions encountered, particularly visual or olfactory indications of smoke.

F. IF there is a lack of smoke indication,

THEN entrants should make an orderly sweep of the normally accessible areas of containment at power to validate no localized abnormal conditions exist AND immediately notify the control room of the results of the sweep.

G. The results of the entry shall be documented in a CAP, and an entry in the SOMS log created including the CAP number.

10.0 ANTI-C CLOTHING AND REMOVAL PROCEDURE

10.1 General Discussion

This procedure is designed to familiarize all personnel with the preferred procedure to use when removing single and double sets of Anti-C clothing at SOPs. The intent of proper clothing removal is to keep personnel free of contamination, keep contamination in a controlled area, and keep the SOP itself clean. Some circumstances will arise calling for better protection by wearing rubber suits and air fed suits. In these situations, the Rad Protection Group should be available to help with the unsuiting process.

The general intent of clothing removal at a multiple SOP is to remove the most contaminated item first, normally the outer gloves. Then the outer head protection and respiratory protection; if worn, should be removed. The coveralls should then be removed followed by outer footwear while stepping onto the SOP. Usually a RPS assists removing a double suit-up.

10.2 Protective Clothing

The purpose of protective clothing is to prevent personnel contamination of the skin. In some cases the protective clothing also prevents skin exposure from beta radiation. The different types of protective clothing are specified on the Radiation Work Permit.

10.2.1 Personal clothing, including caps and other headgear, **SHALL NOT** be considered part of any Anti-C suit-up.

10.2.2 Scrubs are available to all individuals that work at Prairie Island in radiologically controlled areas. The use of scrubs precludes the possibility of personnel clothing contamination. Any personnel clothing worn in a radiologically controlled area that is contaminated will not be reimbursed or released.

10.2.3 Scrubs used as outer protective clothing for hands-on work in contaminated areas (e.g., system breach, equipment assembly/disassembly, decontamination, kneeling, sitting, climbing, etc.) should be treated as potentially contaminated material and should not be removed from the RCA. This practice **SHOULD** be minimized. This practice is for use mainly during high heat conditions when personnel safety warrants reduced clothing requirements.

10.2.4 Street Clothes **SHALL NOT** be worn under full Anti-C suit ups.

10.2.5 Cotton liners **ARE NOT** considered protective clothing and **SHALL NOT** be worn without additional protection.

10.2.6 Rubber gloves should be used whenever working with a wet surface or when working on the internals of a radioactive system. Cloth (canvas) gloves may be used for all other situations with Radiation Protection permission.

10.2.7 The booty and glove suit up **SHALL** follow these requirements:

A. Personnel **SHALL** contact Radiation Protection prior to utilizing bootie and glove suit up.

B. The RWP **SHALL** allow the bootie and glove suit up.

C. Contamination levels in the area accessed should be <2000 dpm/100cm2.

D. This suit up can be worn with street clothes.

E. This suit up **SHALL** only be used for inspection, observation, valve manipulation, or valve tagging; provided personnel will not be in close contact with items in the contamination area, and there will be no kneeling, sitting, climbing, or system breach.

10.2.8 The self-reading dosimeter [**SHALL**] be worn in a secure manner, such as in a chest pocket, which allows the wearer to read the dosimeter and hear the audible alarm. The dosimeter [**SHALL**] be worn in a plastic bag outside paper or plastic suit-ups.

10.3 Procedure

10.3.1 Single set of Anti-C's

When donning a single set of Anti-C's scrubs **SHALL** be worn. The following is a list of the minimum protective clothing requirements for a Single set of Anti-C's:

A. OREX Shoecover (or equivalent material).

B. Set of OREX Deluxe or OREX Ultra's (depending on RWP and/or RP requirements).

C. Glove liners.

D. Rubber shoecover.

E. Rubber Gloves – RP permission required to use surgeon's gloves in lieu of standard gloves that cover the forearm.

F. Surgeon's Cap.

G. IF work will require items to be carried on workers shoulders, THEN a Hood is required.

H. IF work will require the worker to kneel, THEN Kneepads are required and should be taped to the suit up.

RP may require worker to wear additional protective clothing based on the work or work area (eg. Sleevets, faceshield, hood, extra gloves, apron, etc.)

10.3.2 Double Set of Anti-C's

A double set of Anti-C's is used when additional protective measures are needed to prevent personnel contamination. There are different types of double suit ups. The outer set of protective clothing may be either OREX Ultra or Plastic. The RWP, work area conditions and RP will determine which is required. The following is a list of the minimum protective clothing requirements for a Double set of Anti-C's:

A. A complete single set of Anti-C's suit up as defined in 10.3.1.

B. OREX or Waterproof Shoecover.

C. Outer set of protective clothing (either OREX Ultra's or Plastics).

D. Rubber Shoecover.

E. Rubber Gloves – RP permission required to use surgeon's gloves in lieu of standard gloves that cover the forearm.

F. Hood (only one hood will need to be worn).

G. IF work will require the worker to kneel, THEN Kneepads are required and should be taped to the outer suitup only.

IF Plastics are worn as the double suit up THEN the outer Shoecovers and Rubber Gloves SHALL be taped to the Plastic Suit up.

NOTE:	Plastic suitups will be cut off of workers. Ensure that the tape is applied so it allows the glove and the arm of the suitup to be able to slide off without needing to be cut.

10.3.3 Single Set Anti-C's Removal

This procedure is written for a full single set of Anti-C's as described in the General Discussion and used at a single SOP other than the Containment SOP. The last thing to be removed prior to stepping onto a SOP is the protective clothing on the feet.

The only suit-up clothing a person should have on while standing on the SOP is cotton or nylon liners.

The following procedure should be followed to minimize the spread of contamination:

A. Approach the SOP area, remove the elastic band or tape, if necessary, around the rubber gloves or ankle booties and place elastic bands in clothing container cart.

B. Remove the rubbers on the feet and deposit in the appropriate container.

C. Remove the rubber gloves inside out and place in the clothing container.

D. Remove SRD and place the SRD on lanyard.

E. Lift hard hat to rear of head with cotton liner covered hand. Hold until Step F is complete and replace on head.

(This step continued on the next page . . .)

(Step 10.3.3 continued from preceding page. . .)

F. Carefully remove the hood or surgeon's cap, if worn, opening the seam at the chin, pulling both sides around to the back of the head, and depositing in the clothing container.

G. If respirator is worn, seek RP guidance on removal and placement of hard hat. Remove the respirator, if worn, by pulling up and back on the chin piece. Place respirator in clean poly bag.

H. Remove the coveralls inside out by slipping over shoulders; continue removing coveralls and place in clothing container.

I. Remove one foot bootie and place that foot down on the SOP and place bootie in proper clothing container. Remove the other foot bootie and place that foot down on the SOP and place the bootie in the proper clothing container

J. Remove the glove liners and place in the trash container.

K. Monitor as required by the RWP.

10.3.4 Double Anti-C Removal

A. This section is written in general terms for the removal of the outer set of clothing at the first SOP encountered when exiting an area. The inner set of clothing is removed as per the above "Single Set Anti-C Removal" procedure. This procedure is written in general terms as many types of double suitups may be encountered. Suit-ups more complicated than this will normally require direct RPS assistance.

B. Remove the outer set of gloves.

C. Remove outer head protection and respirator, if worn.

D. Remove the SRD, and place on inner set of coveralls.

E. Remove outer set of coveralls.

F. Remove one outer shoe cover and step onto SOP in one continuous motion.

G. Remove the other outer shoe cover and step onto SOP in one continuous motion.

H. Proceed to second SOP and remove inner set of clothing as per single set Anti-C removal.

11.0 CONTROL OF RADIOACTIVE MATERIALS AND RAD WASTE

11.1 Purpose

The purpose of this instruction is to provide guidelines for minimizing radioactive waste and establish a definite procedure for control of contaminated tools and equipment. This procedure is designed to maximize the control of contaminated equipment and minimize personnel inconvenience and exposure.

11.2 Precaution

Read all signs on tool and equipment racks prior to touching or removing equipment. When in doubt, contact an RPS.

11.3 Minimizing Radioactive Waste

Disposal of radioactive waste is very expensive, labor intensive, and uses limited waste disposal site capacity. The cost to dispose of a roll of tape is greater than the original cost of the tape. Therefore, exceptional efforts should be taken to minimize the generation of radioactive waste. To this extent, permission **SHALL** be obtained from the RP Supervisor prior to taking any materials into the RCA.

11.3.1 Packing materials should not be taken into the RCA.

11.3.2 Waste should be segregated at the source as defined by the RP Group.

11.3.3 Prior to bringing any tool into the RCA, the worker should ensure the tool is not already present in the RCA. If a tool must be brought into the RCA, the worker should obtain permission from a Radiation Protection Specialist. If taking a tool into a contaminated area and the tool will need to be released for unrestricted use, THEN the worker will contact Radiation Protection for contamination controls to be used during the tool use that will allow the tool to be released for unrestricted use.

11.4 General Discussion

This instruction is written to help solve many of the problems associated with control of contaminated tools and equipment.

Three large storage racks have been established for control of radioactive equipment in the Decon Area (695′).

11.4.1 Items to be Decontaminated (Rack A)

The rack labeled “Items to be Decontaminated” is for tools that are to be decontaminated. Tools **SHALL NOT** be removed from Rack A except for decon or with RP Group permission. Equipment or parts placed on this rack should not be deconned unless specific instructions are supplied and the individual responsible has tagged the parts.

11.4.2 Decontaminated Items to be Cleared by RPS (Rack B)

The rack labeled “Decontaminated Items to be Cleared by RPS” is for tools that have been decontaminated and are in the process of being smeared and cleared by an RPS. Tools **SHALL NOT** be removed from this shelf without the approval of the duty RPS.

11.4.3 Clean Items for General Use (Rack C)

The rack labeled “Clean Items for General Use” is for clean tools that can be removed for storage or reuse.

11.5 Contaminated Tool Control

11.5.1 Containment Tools

Workmen who use tools from the Containment tool rack should return them to the rack after work completion and wipe them down unless stated otherwise on the Radiation Work Permit. All tools that require removal from Containment should be placed outside Containment in the area marked “Tools to be Cleared”. If a worker requires special control of a tool or piece of equipment, it is his responsibility to mark the part. This tag should include the special precaution and the individual responsible.

11.5.2 Tools and Equipment in Other Contaminated Areas

A. It is the responsibility of the individual using the tools and equipment in contaminated areas to check with the duty RPS for the proper method of tool clearance and specific instructions concerning decontamination.

B. It is the responsibility of the individual worker to tag materials requiring special control. He must ensure his name and/or special instructions are on the tag.

C. Personnel **SHOULD** contact Radiation Protection when items require removal from a contaminated area. The items **SHOULD** be placed near the edge of the contaminated area. Placing items near the Step Off Pad should be minimized due to the potential to create a safety hazard. It is the RPS's responsibility to oversee bagging, transporting, and decontamination of contaminated material. This may be accomplished by special instructions on the RWP or by personal control.

11.5.3 Tools to be Decontaminated

A. The NPSA (Nuclear Plant Services Attendant) will remove the equipment and:

1. Frisk and separate equipment according to the amount of contamination.

2. Decontaminate the lowest contaminated equipment first and the highest last.

3. Decontaminated tools will be placed in the rack "Decontaminated Items to be Cleared by RPS". (Rack B)

B. The RPS should survey for loose and fixed contamination. The tools that are clean will be placed on the rack "Clean Items for General Use". (Rack C)

If tools are removed from Rack C for use in a contaminated area, they **SHALL** be returned to Rack A for decontamination.

11.5.4 Precautions

A. Personnel who use headsets in contaminated areas should make every feasible attempt to keep them off the floors.

B. If you suspect contamination on a headset, have it evaluated by an RPS.

11.5.5 Equipment Removal from the Radiologically Controlled Area

All tools and equipment **SHALL** be checked by an RPS for smearable contamination and fixed contamination prior to removal from the Radiologically Controlled Area.

A. Equipment is normally smeared to check for loose contamination and passed through the Tool Monitor or equivalent to check for fixed contamination. RP Supervisor permission is required if unable to remove equipment from Access Control.

B. Personal items (hard hats, clip boards, pens, note books, etc.) that have NOT been taken into a Contaminated Area and that stay in possession of the owner can be removed from the RCA by passing though the tool monitor or equivalent.

C. All personnel are responsible for their own material left at Access Control for release from the RCA. IF it is not possible to wait for the item to be cleared, THEN arrangements should be made with the RP Group (i.e., a phone number placed on the item that you may be reached at when the item is cleared). Any items (including those that have been cleared) not removed from Access Control in a timely manner (normally that same day) will be removed by the NPSA Group and taken to a storage location or trashed.

12.0 PROCEDURES FOR HANDLING LARGE RADIOACTIVE SPILLS

Large radioactive spills can result in personnel contamination and can present airborne radioactivity problems. A general procedure for handling spills is outlined below:

12.1 The individual discovering a spill **SHALL**:

12.1.1 Evacuate the area immediately.

12.1.2 Contact the Control Room and supply all information available on the emergency.

12.1.3 Remain near the area and keep all personnel out until the Fire Brigade Chief or Radiation Protection Staff arrives at the scene.

12.2 The Fire Brigade Chief should:

12.2.1 Go to the affected area and evaluate the emergency. Report severity to Control Room.

12.2.2 Protective clothing will be required in the general area of the spill which is available in the emergency supplies and the Anti-C Clothes Storage Area.

NOTE:	**Wear plastic outer clothing with hood and use a full face respirator with a P-100 air filter.**

12.2.3 Call Radiation Protection personnel for assistance as necessary.

12.2.4 Confine the spill with barricades, ropes, locked doors, etc., and keep personnel out of the affected area.

12.2.5 Assist any contaminated personnel with decontamination.

12.2.6 Watch for airborne radioactivity, utilizing continuous air monitors and grab samples. If the hazard is not completely evaluated, take all precautions to protect emergency team members by requiring them to wear self-contained breathing equipment besides the plastic outer clothing.

12.2.7 The first step in decontamination is directing water over the area from outside to a drain if possible (this removes the larger portion of loose contamination). If this is not possible, cover the spill with absorbent paper or mop up the spill.

12.2.8 After initial hosing, apply procedures for floor and equipment decontamination as described in Section D13, Decontamination.

12.2.9 Watch exposures of all personnel assisting in the decontamination.

12.2.10 With assistance from Radiation Protection, clean the area toward a central location (usually a drain) and move barricades after smear surveys indicate satisfactory decontamination.

12.2.11 Observe SOP areas and monitor all personnel.

12.2.12 Take the possibility of a Plane Source into consideration when dealing with leaks of primary water which cover an area greater than 2 square meters.

13.0 ENTRANCE INTO THE RESIN DISPOSAL BUILDING AND THE WASTE STORAGE AREA

The Resin Disposal Building, Rad Waste Building and Barrel Yard are controlled areas. People entering these areas **SHALL** have dosimetry as per the RWP for the area. Entrance should be made from the Auxiliary Building.

At times, areas outside the Plant may be controlled areas (roped off). Entrance into these areas should be made under an RWP with appropriate dosimetry.

Personnel should not enter the Auxiliary Building from the outside doors except with RPS approval and an RWP or in case of an emergency.

14.0 PRAIRIE ISLAND FETAL PROTECTION PROGRAM

14.1 Background

Generally, cells that are reproducing rapidly are more susceptible to radiation damage. Such is the case with the human embryo. Furthermore, there is evidence that the embryo/fetus is particularly radiosensitive during the first 2 to 3 months after conception, when a woman may not be aware that she is pregnant.

In light of this situation, the National Council on Radiation Protection (NCRP) has recommended the dose equivalent to the unborn child from occupational exposure of the mother be limited to 500 mrem for the term of the pregnancy. In response to the recommendation, the Nuclear Regulatory Commission (NRC), in its Standards for Protection Against Radiation (10CFR20), provides the following rights to females:

- It is the right of a female, who declares in writing that she is pregnant, to have her occupational exposure during the term of the pregnancy limited to 500 mrem and to have the exposure fairly evenly distributed over that time.

- It is the right of a pregnant female to not have her exposure limited during the pregnancy if she chooses.

- It is the right of a declared pregnant female to change her status from “declared” to “undeclared” at any time.

14.2 Prairie Island Fetal Protection Program

To ensure the health and safety of the unborn child, as well as the rights of pregnant females, Prairie Island has developed the Fetal Protection Program (FPP).

The main points of the program are:

- All females who enter the Prairie Island Restricted Area (inside double security fences) on any frequency or who are employed on the Prairie Island site are eligible for the 100% voluntary FPP.
- All eligible females who are planning a family or who are pregnant are encouraged to take advantage of the FPP by declaring so in writing. If the female is planning a family and wishes to enter the program an additional notification is required when pregnant so that the dose to the unborn child can be tracked.
- Upon entering the FPP, occupational dose will be limited to 50 mrem per month or 450 mrem for the entire gestation period, whichever is more limiting, such that the total dose during the term of the pregnancy does not exceed the NRC limits (500 mrem for term of pregnancy).
- Prairie Island is required by NRC rules to track the dose to each unborn child of declared pregnant females. Therefore, when each pregnancy is terminated, the declared pregnant female should un-declare the pregnancy so the dose to the child can be determined. After termination of a pregnancy, if a person wishes to remain on the FPP for the purposes of another pregnancy, another declaration must be made.
- The declared pregnant female's Supervisor will be notified of the lower exposure limits so that alternative work assignments can be made, if necessary, to reduce, or where possible, to eliminate exposure.
- Furthermore, all declared pregnant females who enter the Restricted Area (double security fence) **SHALL** report to RP Group and be issued a DLR badge. A base line wholebody count will also be conducted when declaring pregnancy.

To enter the FPP, contact the Plant Nurse (ext. 4080) or Radiation Protection Group (ext. 4475). They will assist you with completing the written declaration and with questions you may have.

Additional information on the topic of prenatal radiation exposure may be found in Regulatory Guide 8.13, which was handed out during General Access Training (GAT). Questions may also be directed to the Radiation Protection Manager, the Plant Health Physicist, or the duty RP (ext. 4475).

15.0 SATELLITE RADIOLOGICAL CONTROLLED AREAS

Discussion

At various times during the Plant life, it becomes necessary to expand the current RCA or have satellite RCAs for staging of materials for an outage or for processing material. Most of the time these satellite RCAs are inside the Protected Area, but in some cases it may be necessary to have satellite RCAs outside the Protected Area but within the Controlled Area as defined by 10CFR20. The Controlled Area is defined by 10CFR20 and is typically referred to as the Owner Controlled Area.

Two (2) types of RCAs are permitted by this section, an RCA containing materials with loose surface contamination which could be exposed to open air, and an RCA where contamination is confined and external radiation exposure is the only concern.

This section provides limitations for these areas based on Safety Evaluation Screening # 2192. This section does not apply to materials that are packaged for shipping and are in the shipping process.

15.1 Posting and Dose Control for Any Satellite RCAs

15.1.1 Plans and controls for temporary RCAs **SHALL** be approved by the Radiation Protection Manager.

15.1.2 These satellite RCAs **SHALL** be controlled in order to limit the TEDE (Total Effective Dose Equivalent) to members of the Public within the Controlled Area and outside the Controlled Area to less than 100 mrem/yr, whether from scattered radiation (sky shine), direct radiation from the materials, or from effluent releases from the Plant and the temporary RCA within the Controlled Area.

15.1.3 Typically, radiation to Members of the Public is monitored by area DLR badges and effluent release calculations. Other controls may be necessary if the temporary RCA is not for a short period of time.

15.1.4 Time, distance, shielding and postings **SHALL** be used to limit the dose to a Member of the Public within the Controlled Area (Owner Controlled Area) and off site to less than 100 mrem per year per 10CFR20.1301.

15.1.5 Calculations will be performed, using a conservative temporary RCA occupancy factor, in order to determine the dose rate at which the RCA requires posting and access limitations.

15.1.6 As per 10CFR20.1301, the dose rate limit in an Unrestricted Area, as defined in RPIP 1001, **SHALL** be less than 2.0 mrem in one hour.

This **SHALL** be limited by posting of the area as a Radiological Controlled Area and Radiation Area.

15.1.7 The areas **SHALL** be posted as per RPIP 1120, Posting of Restricted Areas.

15.2 Satellite RCA Containing Material with Loose Surface Contamination

These satellite RCAs may contain materials with loose surface contamination with a Containment device that could be compromised in high winds or during a tornado. The loose surface contamination materials can be exposed to the environment inside a Facility or Containment device for processing. This type of RCA could exist as a temporary facility used to decontaminate materials following an outage or large Plant modifications. This section of the procedure could also apply for temporary expansion of the current RCA for an Access Control facility or other processes.

15.2.1 These satellite RCAs may also contain radioactive materials that are in containers, but are not robust enough to prevent radioactive releases during a tornado.

15.2.2 These satellite areas **SHALL** be greater than 528 feet from the site boundary.

15.2.3 The total activity of all satellite RCAs of this type **SHALL** be limited to 50 curies and **SHALL** be tracked per the RPIPs.

15.2.4 When contaminated items are exposed, measures **SHALL** be taken to minimize airborne release and keep dose to Plant Workers and the Public ALARA.

15.2.5 Airborne activity **SHALL** be monitored routinely when loose surface contamination is exposed to building or containment device environments or when work is in progress.

15.2.6 Airborne surveys **SHALL** be performed routinely in order to quantify radioactive releases.

15.2.7 Radioactive releases **SHALL** be quantified per H4, Offsite Dose Calculation Manual.

15.3 Satellite RCA Containing Materials with No Loose Surface Contamination

This would be an area containing radioactive materials with no loose surface contamination or with loose surface contamination that is sealed within a container which could not be breached in an accident situation. An accident situation in this instance is assumed to be a tornado, which could transfer the activity off site. For example, this could be a used steam generator with a weight limiting its movement from a tornado.

15.3.1 The curie activity is not limited in these areas due to the radioactivity being sealed within a container.

15.3.2 The dose limits and controls of 15.1 apply for ensuring Members of the Public inside and outside the Controlled Area do not receive doses above the limits.

16.0 DLR HANDLING

Discussion

Most plant radiation workers are required to carry their DLRs offsite with them at the end of the workday. Personnel assigned to the Prairie Island site (and outage workers) are required to keep their DLR attached to their security badge lanyard. Personnel not assigned to the Prairie Island site (Corporate, Monticello, NRC personnel, etc.) store their DLRs in a rack in the Security Access Facility (SAF).

16.1 The following rules govern handling of DLRs by personnel:

16.1.1 Do not take your Prairie Island DLR to another nuclear plant

16.1.2 Do not pass your DLR through the security x-ray machines at the plant, the airport, or wherever they are encountered

16.1.3 Do not wear your DLR while being x-rayed at the dentist or clinic/hospital

16.1.4 Do not take your DLR on an airplane

16.1.5 If you are an outage worker who is directed to leave the site and return within a short period of time, contact Dosimetry at extension 4452 to make arrangements for your DLR.

16.1.6 Do not store your DLR near radioactive material (contact Radiation Protection with questions about the radioactivity of material — do not bring the material to the plant)

16.1.7 Do not store your DLR at the Prairie Island site unless you have made arrangements with Dosimetry to store it in the SAF or the Whole Body Count room

16.1.8 Keep your DLR out of the reach of children and pets

16.1.9 Inform Radiation Protection if administered a radiopharmaceutical—whether it be a worker, family member, or a pet (DLR s must be kept at a distance from the person or pet)

16.1.10 Return your DLR for exchange at the designated times throughout the year (DLR exchange will take place in the Security Building Lobby) or contact Dosimetry at extension 4452 if unable to exchange your DLR at the designated time

16.1.11 If the DLR badge comes apart, all pieces are to be collected and a report made to the RP department at the earliest opportunity (do NOT attempt to reassemble the DLR)

16.1.12 Report any lost DLRs to the RP department at the earliest opportunity

16.1.13 Contact Dosimetry (extension 4452) regarding any questions about DLR handling.

17.0 APPENDIXES

NONE

18.0 ATTACHMENTS

NONE