Arkansas Nuclear One - Administrative Services
Document Control
Thursday, December 28, 2000

Document Update Notification

COPYHOLDER NO:	**103**
TO:	**NRC - WASHINGTON**
ADDRESS:	**DOC CNTRL DESK MAIL STOP OP1-17 WASHINGTON DC 20555**
DOCUMENT NO:	**OP-1905.001**
TITLE:	**EMERGENCY RADIOLOGICAL CONTROLS**
REVISION NO:	**013-02-0**
CHANGE NO:	**PC-02**
SUBJECT:	**PERMANENT CHANGE (PC)**

A045

ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE

TITLE: Emergency Radiological Controls	PROC/WORK PLAN NO. 1905.001	CHANGE NO. 013-02-00
SET # 103	WORK PLAN EXP. DATE n/a	TC EXP. DATE n/a
	SAFETY-RELATED ☒YES ☐NO	IPTE ☐YES ☒NO
	TEMP ALT ☐YES ☒NO	

When you see these *TRAPS*	Get these *TOOLS*
Time Pressure	Effective Communication
Distraction/Interruption	Questioning Attitude
Multiple Tasks	Placekeeping
Over Confidence	Self Check
Vague or Interpretive Guidance	Peer Check
First Shift/Last Shift	Knowledge
Peer Pressure	Procedures
Change/Off Normal	Job Briefing
Physical Environment	Coaching
Mental Stress (Home or Work)	Turnover

VERIFIED BY	DATE	TIME

FORM TITLE: VERIFICATION COVER SHEET	FORM NO. 1000.006A	CHANGE NO. 048-00-0

ENTERGY OPERATIONS INCORPORATED
ARKANSAS NUCLEAR ONE

TITLE: Emergency Radiological Controls	PROC/WORK PLAN NO. 1905.001	CHANGE NO. 013-02-0
☒ PROCEDURE ☐ WORK PLAN, EXP. DATE n/a		PAGE 1 OF 1

TYPE OF CHANGE:
☐ NEW Procedure or Work Plan ☐ REVISION ☒ PC ☐ EZ ☐ TC ☐ DELETION
EXP. DATE: n/a

AFFECTED SECTION: (Include step # if applicable)	DESCRIPTION OF CHANGE: (For each change made, include sufficient detail to describe reason for the change.)
Form 1905.001A Step II.6	Changed "PASS" to "Post-Accident" because of the removal of the PASS system from service.

SECTION — PAGE NO.

1.0 Purpose 2

2.0 Scope 2

3.0 References 2

4.0 Definitions 3

5.0 Responsibilities 4

6.0 Instructions 4

6.1 General Guidelines for Emergency Radiological Control 4

6.2 Control Point Establishment 5

6.3 Respiratory Protection 6

6.4 Iodine Canister Use 7

6.5 Personnel Monitoring 8

6.6 Decontamination of Evacuees 10

7.0 ATTACHMENTS AND FORMS 10

7.1 ATTACHMENTS

7.1.1 ATTACHMENT 1 - "Emergency Radiological Conditions Action Levels" 11

7.2 FORMS

7.2.1 Form 1905.001A - "Emergency Radiological Controls Checklist" 13

7.2.2 Form 1905.001B - "Access and Exposure Control Log" 15

1.0 PURPOSE

This procedure provides guidance for the following radiological control practices during emergency situations:

1.1 Personnel Monitoring.

1.2 Respiratory Protection.

1.3 Contamination Control.

2.0 SCOPE

2.1 This procedure is applicable during Alert, Site Area or General Emergency conditions.

2.2 This procedure applies to ANO emergency support personnel and emergency response facilities within the ten mile Emergency Planning Zone.

3.0 REFERENCES

3.1 REFERENCES USED IN PROCEDURE PREPARATION.

3.1.1 Emergency Plan.

3.1.2 1903.043, "Duties of the Emergency Radiation Team".

3.1.3 1000.031, "Radiation Protection Manual".

3.1.4 1903.033, "Protective Action Guidelines For Rescue/Repair and Damage Control Teams"

3.1.5 1903.023, "Personnel Emergency"

3.1.6 1012.019, "Radiological Work Permits"

3.1.7 Letter H-5, 79-739, of May 16, 1976 from Mr. Alan Hack, LASL, Respirator Research and Development Section to Mr. John Collins, USNRC RE: Respiratory Protection at TMI.

3.1.8 10 CFR 20

3.1.9 10 CFR 50

3.1.10 NRC Information Notice 90-08

3.2 REFERENCES USED IN IMPLEMENTING THIS PROCEDURE.

3.2.1 1903.033, "Protective Action Guidelines for Rescue/Repair and Damage Control Teams"

3.2.2 1903.030, "Evacuation"

3.2.3 1601.209, "Whole Body Counting Bioassay"

3.2.4 1601.201, "Issue/Control of TLD's"

3.3 RELATED ANO PROCEDURES

3.3.1 1903.066, "Emergency Response Facility - Operational Support Center (OSC)"

3.3.2 1903.067, "Emergency Response Facility - Emergency Operations Facility (EOF)"

3.4 REGULATORY CORRESPONDENCE CONTAINING NRC COMMITMENTS WHICH ARE IMPLEMENTED IN THIS PROCEDURE: **[BOLD]** DENOTES COMMITMENTS

3.4.1 OCAN078609, (P-4235), Section 6.2

3.4.2 0CAN038313, (P-4192), Form 1905.001 A Section IIB1

3.4.3 LIC94-226 (P-14029), 6.5.2 Note

4.0 DEFINITIONS

4.1 Controlled Access Area - Any area where full radiological controls are in effect for the purpose of providing protection and/or information to the individual. (Includes the auxiliary buildings inside the turnstyles, both reactor buildings, and inside the fenced area of the BWST/RWT.)

4.2 Control Point - An area established on the perimeter of, and in the normal access route to/from an RCA for the purpose of controlling personnel and or material movement.

4.3 Radiologically Controlled Area - A Radiologically Controlled Area (RCA) is defined as an area within the plant site in which radioactive material and/or radiation may be present in quantities sufficient to require protective measures. (The Controlled Access Area, for example, is a Radiologically Controlled Area).

4.4 Emergency Operations Facility (EOF) - A near site emergency response facility located approximately 0.65 miles northeast of the reactor buildings (the ANO Training Center).

4.5 Technical Support Center (TSC) - Located within the ANO Administration Building equipped with instrumentation and communication systems and facilities useful in monitoring the course of an accident; this center is located in the 3rd Floor Conference Room.

4.6 Emergency Response Organization (ERO) - The organization which is composed of the Initial Response Staff (IRS), the EOF staff, the TSC staff, the OSC staff and the emergency team members. It has the capability to provide manpower and other resources necessary for immediate and long-term response to an emergency situation.

4.7 Operational Support Center (OSC) - The Emergency Response Center within the ANO maintenance facility, that serves as the assembly point and briefing area for rescue/repair and damage control teams. The OSC is where the following functions are coordinated:

4.7.1 On-site Radiological Monitoring

4.7.2 Maintenance

4.7.3 Nuclear Chemistry

4.7.4 Emergency Medical Support

4.7.5 Fire Fighting Support

4.8 HEALTH PHYSICS NETWORK (HPN) TELEPHONE

Dedicated telephone system established by the NRC during its standby or initial activation mode of operations after the licensee's TSC/EOF has been activated and is operational. The HPN is the primary means of communicating radiological data (on-site and off-site measurements and dose assessment information) from the licensee to the NRC.

5.0 RESPONSIBILITIES

5.1 MANAGER, RADIATION PROTECTION AND RADWASTE

5.1.1 Responsible for the overall control and implementation of this procedure.

5.2 HEALTH PHYSICS SUPERVISOR

5.2.1 Responsible for the implementation of this procedure within the ANO site boundary fence.

5.2.2 Responsible for directing on-site monitoring and assigning personnel to the on-site and off-site radiological monitoring sections of the Emergency Radiation Team.

5.3 EOF HEALTH PHYSICS SUPERVISOR

5.3.1 Responsible for ensuring that the appropriate control points and radiological control measures are established and implemented at the Emergency Operations Facility/ Alternate Emergency Operations Facility.

6.0 INSTRUCTIONS

NOTE

In an emergency, the Health Physics Supervisor may allow normal radiological work practices to be disregarded in order to expedite repair and damage control actions if necessary to protect the health and safety of the public.

6.1 GENERAL GUIDELINES FOR EMERGENCY RADIOLOGICAL CONTROL

6.1.1 The Health Physics Supervisor should use Form 1905.001A as a checklist for ensuring appropriate radiological controls have been implemented.

6.1.2 As manpower becomes available, the Health Physics Supervisor should assign at least one (preferably two) H.P. technicians to report to the EOF to assist the EOF Health Physics Supervisor.

6.1.3 Upon receipt of survey results, the Manager, Radiation Protection and Radwaste should check Attachment 1 to ensure appropriate emergency response actions such as evacuation or notification are implemented. Radiological survey results should be posted in the Technical Support Center and the Operational Support Center.

6.1.4 Based on reported radiological survey data and as directed by the Manager, Radiation Protection and Radwaste, the Health Physics Supervisor shall establish Radiologically Controlled Area boundaries in accordance with Radiation Protection procedures.

6.1.5 IF an emergency condition lasts longer than 8 hours, THEN the Manager, Radiation Protection and Radwaste shall establish an Emergency Radiation Team working schedule.

6.1.6 Beta radiation from Kr-85 gas is a significant hazard in an accident involving spent fuel. Direct exposure to Kr-85 gas could result in a skin dose up to 100 times the Deep Dose equivalent dose. The half-life of Kr-85 is 10.76 years. For these reasons,
IF the accident involves spent fuel,
THEN the Health Physics Supervisor shall have the affected area surveyed for beta radiation.

6.2 **[CONTROL POINT ESTABLISHMENT]**

6.2.1 IF radiation levels exceed 2.5 mRem/hr or significant (greater than 1 DAC particulate or iodine) airborne activity exists outside confines of Auxiliary and Turbine buildings,
THEN control points should be established at RCA boundaries as defined by survey results.

6.2.2 Once the extent of contamination, radioactive airborne concentrations and radiation exposure rate conditions are known, the control point for Emergency Team entries should be located as close to the Controlled Access Area as possible without sacrificing communications and ease of entry/exit control.

A. Radiological conditions permitting, the normal controlled access area control points in Unit One and Two Auxiliary Building (Elev. 386') should be used as the control point for emergency response operations into the Auxiliary Building.

6.2.3 IF radiation levels exceed 2.5 mRem/hr or significant (greater than 1 DAC particulate or iodine) airborne activity exists at the EOF,
THEN a control point should be established at the entrance to the EOF and the need for a contamination control point evaluated.

6.2.4 The following radiological controls should be instituted at control points.

A. Personnel entry log including time in, out and Dosimeter reading(s) should be maintained for all entries on Form 1905.001B.

B. A frisking station should be used to check personnel for contamination when exiting a radiologically controlled area.

C. Air samples should be taken every hour and shall be taken once every four hours.

D. A survey of the control point area should be conducted if the friskers indicate a rise in the area radiation level.

IF no friskers are set up at the control point, THEN hourly area surveys should be conducted. Air sample and dose rate data should be maintained on appropriate forms and data reviewed periodically by the Health Physics Supervisor to determine increases or trends. Significant changes should be reported to the Manager, Radiation Protection and Radwaste as soon as practical.

6.3 RESPIRATORY PROTECTION

6.3.1 Respiratory Protection Guidelines

A. Although doses should be maintained as low as reasonably achievable during an emergency, respirators should not be assigned to emergency team members or emergency response facility personnel if the use of respirators will have an adverse affect on the timely implementation of emergency measures and projected dose is less than 40 DAC-hrs/week.

B. During emergency conditions, higher uptakes may be authorized in a manner similar to that for increased external exposure as specified in 1903.033 "Protective Action Guidelines for Rescue/Repair and Damage Control Teams".

C. Protection factors for respirators are identified in 1000.031, "Radiation Protection Manual" and 10 CFR 20 Appendix A. However, the Respiratory Protection Manual specifies that these protection factors are not applicable unless the respirator has been quantitatively fit tested on the wearer.

D. The Health Physics Supervisor shall ensure the following data, on personnel entering the RCA(s), is recorded on Forms 1601.209D and F or tracked on the ERIM system.

1. Occupancy time and airborne concentrations

2. DAC-Hrs (each entry, each day, and last 7 days)

3. Protection factor for the respiratory protection device worn

E. All individuals entering radiologically controlled areas shall have whole body counts or bioassays performed, as soon as practical, if their exposure to radioactive airborne concentration exceed 4 DAC-HRS per day or 12 DAC-HRS/wk or 40 DAC hours since last whole body count.

6.4 IODINE CANISTER USE

6.4.1 NUREG-0041 and Regulatory Guide 8.15 do not provide a protection factor for iodine canisters for routine use because of difficulties ensuring continued protection. As a result, the only respirators which are suitable in iodine atmospheres are air supplied devices, such as SCBA and air line masks. (NUREG-0041 prohibits the use of air line masks in rescue operations). However, in addition to airborne radioactivity, the areas in which the respirators are likely to be used may also be affected by high dose rates. Since mobility is reduced when wearing SCBAs, it may be more conducive to overall dose reduction to use iodine canisters in lieu of SCBAs. For these reasons, the Manager, Radiation Protection and Radwaste or the Health Physics Supervisor may direct that iodine canisters be used in emergency conditions.

6.4.2 The filter canister authorized is the MSA GMR-I charcoal canister.

6.4.3 The protection factor is 1 for iodine.

6.4.4 The respirator shall not be used in iodine atmospheres greater than 100 times the 10 CFR 20 value for the specific iodine nuclide. For Iodine-131, this is 2 E-6 µCi/cc. (Assumes stay-time control).

6.4.5 The stay-time in affected areas shall not exceed 40 DAC-hours in any seven consecutive days. (This provides for additional subsequent dose).

6.4.6 Appropriate representative air sampling shall be performed.

6.4.7 Suitable DAC-hour records shall be kept in accordance with Section 6.3.1(D).

6.4.8 Personnel exposure to iodine atmospheres with iodine canisters shall be monitored as follows:

A. At least weekly whole body counting while exposures continue.

B. IF results of whole body counting indicate an iodine uptake in excess of 70 nCi,
THEN that individual(s) shall be restricted from further entry to iodine atmospheres pending evaluation by the Manager Radiation Protection and Radwaste.

6.5 PERSONNEL MONITORING

6.5.1 Assignment of Dosimetry

A. Personnel radiation exposure shall be monitored by regulation if 10% of the applicable limit could be received; or they will be entering a High Radiation Area or a Very High Radiation Area.

B. IF a significant release of radioactivity occurs such that an individual would receive a dose in excess of 2.5 mRem in any one hour,
THEN this area shall be designated as radiologically controlled area and Dosimetry shall be worn in affected areas.

C. Emergency response personnel shall wear a TLD at all times while on site during the emergency.

D. When an emergency involves a site evacuation, final personnel dosimetry issue and collection operations should be relocated to the EOF or an alternate low back-ground area designated by the Manager, Radiation Protection and Radwaste.

6.5.2 Assignment of Dosimetry to Emergency Teams

NOTE

Alarming dosimeters may be used in lieu of self-reading dosimeters (SRDs). Personnel should be cautioned to check SRDs frequently since conditions may change rapidly. SRDs should never be allowed to exceed 3/4 scale. Personnel with SRDs reading at or above 3/4 scale should exit immediately unless such action would endanger the plant or another person. Other dosimetry (SRDs or alarming dosimeters) may be assigned by the HP Supervisor or Radiation Protection and Radwaste Manager.

[NOTE

During a "Personnel Emergency" the Emergency Medical Team may go into Radiologically Controlled Areas without SRDs/Alarming Dosimeters as long as an HP Technician is acting as the RWP; and is monitoring dose rates and time in the area. Prompt medical attention shall take precedence over HP procedures when an individual is seriously injured.]

A. Personnel requiring entry into a Radiologically Controlled Area shall wear the following dosimetry as a minimum:

1. TLD

2. SRD (0-200 mR or 0-500 mR) or alarming dosimeter

B. In the event major fuel damage is sustained or suspected, use of 0-200 R dosimeters should be considered in high dose rate areas.

C. The Health Physics Supervisor and the Manager, Radiation Protection and Radwaste shall ensure the following data are maintained for emergency team members on Form 1905.001B.

1. Entry and exit times

2. Dosimeter readings for each entry

3. Cumulative personnel exposures

4. If multiple dosimetry is required, refer to Procedure 1601.201, "Issue and Control of TLD's".

6.5.3 Assignment of Dosimetry to Offsite Emergency Organizations

A. Offsite personnel called upon to provide assistance within the ANO protected area should be issued an unassigned whole body TLD.

1. TLD issue log should include:
   - individual's last name
   - TLD number

2. The TLD issue process shall not delay the response of organizations such as Pope County Emergency Medical Services (PCEMS) or London Fire Department that are responding to protect life or plant equipment necessary for protection of the public.

B. At the termination of the emergency, Security shall notify the dosimetry department of the issue of unassigned TLDs.

C. Security shall forward the badge issue log (or a copy) to the Manager, Emergency Planning.

1. The Manager, Emergency Planning shall review the log and provide the following information to the dosimetry department.

   a. Individual's full name and social security number
   b. Individual's address
   c. Employer's name

D. As directed by the Radiation Protection Manager, the individuals that have been issued unassigned TLDs should have a whole body count as soon as practical following the emergency.

6.5.4 Accelerated TLD Processing

A. More frequent readings of TLDs should be performed during the emergency and, initially, during recovery operations until such time as exposure trends have been identified and exposure control methods established by the Manager, Radiation Protection and Radwaste.

B. In the event of an accidental exposure, or an approved planned emergency exposure, the TLDs of the individuals involved shall be processed as soon as practicable following exposure. Further exposure should not be allowed until the results of their TLD badge readings are available and have been evaluated.

6.5.5 Recording of Personnel Exposures

A. Dosimeter (SRD or alarming dosimeter) readings shall be recorded on Form 1905.001B, "Access and Exposure Control Log" or equivalent ERIM system programs. Form 1905.001B shall be kept by the Health Physics Supervisor for the purpose of interim exposure tracking for individuals performing emergency activities.

B. TLD readings shall be recorded in accordance with procedure 1601.201, "Issue/Control of TLD's".

6.6 DECONTAMINATION OF EVACUEES

6.6.1 During plant evacuation, the Health Physics personnel stationed at the portal monitors should segregate any contaminated individuals until an evaluation/decontamination can be performed.

7.0 ATTACHMENTS AND FORMS

7.1 ATTACHMENTS

7.1.1 Attachment 1 - "Emergency Radiological Conditions Action Levels"

7.2 FORMS

7.2.1 1905.001A, "Health Physics Supervisor Checklist".

7.2.2 1905.001B, "Access and Exposure Control Log"

7.2.3 1905.001C, **DELETED PER PC-1.**

ATTACHMENT 1

EMERGENCY RADIOLOGICAL CONDITIONS ACTION LEVELS

A. Emergency Classifications

	Initiating Condition	Emergency Classification
1.	Two or more ARMS in Rx. Bldg. increase by greater than 2000 mR/hr due to severe degradation in the control of radioactive material.	Alert
2.	Two or more ARMS in Aux. Bldg. or Fuel Handling Area increase by greater than 100 mR/hr due to severe degradation in the control of radioactive materials.	Alert
3.	Greater than 50 mRem/hr TEDE at site boundary.	Site Area Emergency
4.	Greater than 150 mRem/hr Child Thyroid at site boundary.	Site Area Emergency
5.	Greater than 250 mRem/hr TEDE at site boundary.	General Emergency
6.	Greater than 500 mRem/hr Child Thyroid at site boundary.	General Emergency

B. Evacuation

	Initiating Condition	Action
1.	Greater than 2.5 mRem/hr outside CAA	Notify Shift Superintendent/ TSC Director
2.	Greater than 9E-10 µCi/cc outside CAA (un-evaluated)	Notify Shift Superintendent/ TSC Director
3.	Greater than 2.5 mRem/hr radiation levels at TSC, OSC, or remainder of the Administration Building.	*Notify Shift Superintendent/ TSC Director
4.	Greater than 9E-10 µCi/cc in the TSC, OSC, or remainder of the Administration Building (unevaluated).	*Notify Shift Superintendent/ TSC Director
5.	Iodine Airborne levels greater than 2.7E-9 µCi/cc.	Keep Occupancy Log for Affected Area
6.	Iodine Airborne levels greater than 4 DAC (8.0E-8 µCi/cc).	Evacuate Affected Area or Use Respiratory Protection in Affected Area

ATTACHMENT 1

	Initiating Condition	Action
7.	Radiation levels greater than 100 mRem/hr but less than 1 Rem/hr at TSC, OSC, or remainder of the Administration Building.	Evacuate if determined to be a long term condition. If determined to be a short-term condition evaluate the projected personnel accumulated dose.
8.	Radiation levels greater than 1 Rem/hr at TSC, OSC, or remainder of the Administration Building.	Evacuate Immediately

*On-site radiological monitoring section should:

1. Increase surveillance of airborne radioactivity to once per hour.
2. Determine the dose rates in the area every 15 minutes.
3. Evaluate projected personnel accumulated doses and establish appropriate stay times.
4. Post radiological survey results in the TSC and in the OSC.

HEALTH PHYSICS SUPERVISOR CHECKLIST

NOTE

This checklist is to be used in conjunction with the Health Physics Supervisor's Position Guide in Procedure 1903.066, "Emergency Response Facility- Operational Support Center (OSC)"

INITIALS

I. If not already accomplished, contact should be attempted with ERT members either by the plant paging system or by telephone. _____

Request the TSC Support Superintendent to call an assistant for you (if desired). This assistant may be another HP Supervisor or someone from the HP Technical Assistant list in the Emergency Telephone Directory. _____

II. Assign the On-site Radiological Monitoring Section

A. Assign at least one (1) H.P. for monitoring the affected unit's Control Room. _____

B. Assign HP coverage for the TSC, OSC, and EOF HP Supervisor. _____

1. **[Ensure that all radiological surveys are posted in their respective Facilities for staff review]** _____

C. Establish communications:

1. Assign OSC base radio operator. (Instruction booklet with radio.) _____

2. Assign HPN telephone communicator. (Instruction booklet with HPN telephone.) _____

D. Emergency equipment inspected and made operational. _____

E. RCA boundaries established. _____

F. Contamination control point established. _____

G. Control point logs established. _____

H. Personnel decontamination sites designated. _____

I. Emergency dosimetry/respiratory equipment requirements established for ERT members and TSC/OSC staff. _____

J. Determine immediate response needs:

1. On-site surveys, samples required, etc. _____

2. Initial re-entries by other emergency teams. _____

3. Obtain equipment from routine stock as needed. _____

INITIALS

4. Plant Evacuation- one HP technician shall be stationed at the portal monitors at each guard station. Ensure HP personnel have obtained portable radiological monitoring equipment. _____

5. Medical Emergencies- provide assistance to medical personnel in accordance with procedure 1903.023. _____

6. Post-Accident Sample- provide assistance to Nuclear Chemistry personnel in accordance with procedure 1905.003. _____

7. Survey affected area for beta radiation if the accident involves spent fuel. _____

III. Assign the Off-site Radiological Monitoring Team (include appointment of section leaders as necessary).

A. Establish 2 to 4 Off-site Monitoring Teams, each team composed of at least 2 members; have the teams obtain vehicle keys and gas pump keys. The teams are to proceed to the EOF, obtain and inspect field monitoring kits, and report to the Off-site Monitoring Supervisor in Room 264 at the EOF. _____

B. Select one HP technician to report to the Off-site Monitoring Supervisor in Room 264 at the EOF as the Off-site Monitoring team Base Radio Operator. (Instruction booklet with Base Radio in Dose Assessment Room.) _____

C. Select one HP technician to report to the Dose Assessment Supervisor in Room 262 at the EOF as the HPN telephone communicator. (Instruction booklet with HPN telephone). _____

D. Instruct at least 2 HP technicians to report to the EOF HP Supervisor at the EOF. _____

E. After immediate needs are addressed, establish ERT schedule for an extended event. _____

F. Contact the Support Manager in the EOF if additional manpower is required. _____

G. Provide periodic updates to team personnel and the OSC Director. _____

Completed by: _____

Reviewed by: _____
Health Physics Supervisor

Form 1905.001A for records retention.

ACCESS AND EXPOSURE CONTROL LOG

DATE:_____ LOCATION:_____ SHIFT:_____

Name	Badge #	ED/SRD Number	Availible Exposure	Time Departed	Destination/ Comments	Time Returned	Exposure Received

REVIEWED BY:_____ DATE:_____

FORM TITLE: ACCESS AND EXPOSURE CONTROL LOG	FORM NO. 1905.001B	REV. 013-02-0