

50-313  
50-368

---

## Document Update Notification

---

**COPYHOLDER NO:** 103

**TO:** NRC - WASHINGTON

**ADDRESS:** DOC CNTRL DESK MAIL STOP OP1-17  
WASHINGTON DC 20555

**DOCUMENT NO:** OP-1905.003

**TITLE:** RAD PROTECTION REQUIREMENTS FOR  
POST-ACCIDENT SAMPING OF RC

**REVISION NO:** 008-00-0

**CHANGE NO:** AP-08

**SUBJECT:** NEW REVISION



← If this box is checked, please sign, date, and return.



ANO-1 Docket 50-313



ANO-2 Docket 50-368

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

---

**RETURN TO:**

**ATTN: DOCUMENT CONTROL  
ARKANSAS NUCLEAR ONE  
1448 SR 333  
RUSSELLVILLE, AR 72801**

A045

**ENTERGY OPERATIONS INCORPORATED  
ARKANSAS NUCLEAR ONE**

59 of 70

TITLE: Rad Protection Requirements for Post-Accident  
Sampling of RC

PROC/WORK PLAN NO.  
1905.003

CHANGE NO.  
008-00-0

WORK PLAN EXP. DATE

TC EXP. DATE

SET # **103**

SAFETY-RELATED  
 YES     NO

IPTE  
 YES     NO

TEMP ALT  
 YES     NO

**When you see these TRAPS**

**Get these TOOLS**

- Time Pressure
- Distraction/Interruption
- Multiple Tasks
- Over Confidence
- Vague or Interpretive Guidance
- First Shift/Last Shift
- Peer Pressure
- Change/Off Normal
- Physical Environment
- Mental Stress (Home or Work)

- Effective Communication
- Questioning Attitude
- Placekeeping
- Self Check
- Peer Check
- Knowledge
- Procedures
- Job Briefing
- Coaching
- 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**

61 of 70

<b>TITLE:RAD PROTECTION REQUIREMENTS FOR POST-ACCIDENT SAMPLING OF RC</b>	<b>PROC/WORK PLAN NO. 1905.003</b>	<b>CHANGE NO. 008-00-0</b>
---	--	--------------------------------

<input checked="" type="checkbox"/> <b>PROCEDURE</b>	<input type="checkbox"/> <b>WORK PLAN, EXP. DATE _____</b>	<b>PAGE <u>1</u> OF <u>1</u></b>
--	--	----------------------------------

<b>TYPE OF CHANGE:</b>				
<input type="checkbox"/> <b>NEW</b>	<input checked="" type="checkbox"/> <b>REVISION</b>	<input type="checkbox"/> <b>PC</b>	<input type="checkbox"/> <b>TC</b>	<input type="checkbox"/> <b>DELETION</b>
Procedure or Work Plan		<input type="checkbox"/> <b>EZ</b>	<b>EXP. DATE: _____</b>	

<b>AFFECTED SECTION:</b> (Include step # if applicable)	<b>DESCRIPTION OF CHANGE:</b> (For each change made, include sufficient detail to describe reason for the change.)
Section 5.1	<p>Re-sequenced entire section to combine related steps, and improve flow of performance and clarity of steps. Moved CAUTION statement to beginning of section.</p> <p>5.1.1- Corrected procedure references from 1601.001...to...1607.001, and 2601.001...to ...2607.001.</p> <p>5.1.4 - Added wording: "The Control Room will determine and report the degree of clad failure to Chemistry personnel." The affected Control Room in procedures 1607.001, and 2607.001 performs this action.</p> <p>5.1.5 - Changed <b><u>IF THEN</u></b> clause to include direction to terminated sampling activities if estimated fuel cladding failure is <math>\geq 5\%</math> or operations does not request an RCS, and to "go to step 5.1.7"...to continue steps. Changed step reference (5.1.11) to reflect renumbered steps.</p> <p>5.1.6 - Changed <b><u>THEN</u></b> clause to ..."go to step 5.1.7"... to continue steps.</p> <p>5.1.8.A – Added electronic dosimetry dose and dose rate alarm set points.</p> <p>5.1.9 – Removed reference to 1903.033 for performance of pre-job briefing and directed simple briefing of workers on radiological conditions and controls. Procedure 1903.033 prescribes the requirements for a pre-job briefing for re-entry teams dispatched from the OSC. The OSC is not activated at the time this activity is performed, and the surveys and samples performed are investigative of a plant condition which may or may not lead to activation of the ERO.</p>
Section 5.2	<p>5.1.10 - Added instruction to allow Chemistry to sample.</p> <p>5.2.2. D - Removed .."with double face plate is required"... adding to or modification of respirator face shield is not allowed.</p>

<b>FORM TITLE:</b>	<b>DESCRIPTION OF CHANGE</b>	<b>FORM NO. 1000.006C</b>	<b>CHANGE NO. 048-00-0</b>
--------------------	------------------------------	-------------------------------	--------------------------------

<b>PROC./WORK PLAN NO.</b> <b>1905.003</b>	<b>PROCEDURE/WORK PLAN TITLE:</b> <b>RAD PROTECTION REQUIREMENTS FOR POST-ACCIDENT SAMPLING OF RC</b>	<b>PAGE:</b> 1 of 7 <b>CHANGE:</b> 008-00-0
---	--	--

1.0 PURPOSE

The purpose of this procedure is to specify radiological protection requirements to be followed when obtaining a post-accident reactor coolant liquid sample.

2.0 SCOPE

This procedure applies to post accident sampling of the Unit One and Unit Two reactor coolant system with less than or equal to 5% clad failure for the determination of failed fuel for emergency classification determination. This procedure also applies to sampling of the reactor coolant system, containment sump and containment air during any failed fuel level to determine the extent of the reactor core damage.

3.0 REFERENCES

3.1 REFERENCES USED IN DEVELOPING THIS PROCEDURE:

- 3.1.1 ANO Emergency Plan
- 3.1.2 ANO's EAL Bases Document
- 3.1.3 1607.001, "Reactor Coolant System Sampling"
- 3.1.4 2607.001, "Unit 2 Reactor Coolant System Sampling"
- 3.1.5 1203.019, "High Activity in Reactor Coolant"
- 3.1.6 2203.001, "High Activity in RCS"
- 3.1.7 LIR L00-0005, Dose Assessment for RCS sampling during Fuel Cladding failure.

3.2 REFERENCES USED IN CONJUNCTION WITH THIS PROCEDURE:

- 3.2.1 1607.001, "Reactor Coolant System Sampling"
- 3.2.2 2607.001, "Unit 2 Reactor Coolant System Sampling"
- 3.2.3 1203.019, "High Activity in Reactor Coolant"
- 3.2.4 2203.001, "High Activity in RCS"
- 3.2.5 1903.033, "Protective Action Guidelines for Rescue/Repair & Damage Control Teams"

3.3 RELATED ANO PROCEDURES:

- 3.3.1 1903.033, "Protective Action Guidelines for Rescue/Repair & Damage Control Teams"

PROC./WORK PLAN NO. <b>1905.003</b>	PROCEDURE/WORK PLAN TITLE: <b>RAD PROTECTION REQUIREMENTS FOR POST-ACCIDENT SAMPLING OF RC</b>	PAGE: <b>2 of 7</b> CHANGE: <b>008-00-0</b>
--	---	--

3.4 REFERENCE TO NRC COMMITMENTS:

- 3.4.1 OCNA08005 (P-16724), Develop, implement, and maintain the capability for classifying fuel damage events at the Alert level threshold. This capability may utilize the normal sampling system or correlate normal sample system dose rates to coolant concentrations. Section 5.1.
- 3.4.2 OCNA08005 (P-16725), Develop, implement, and maintain contingency plans for obtaining and analyzing highly radioactive samples of reactor coolant, the containment sump, and containment atmosphere. The contingency plans do not have to be demonstrated. Because these are contingency plans, the staff concludes that, in accordance with 10 CFR 50.47 and Appendix E to 10 CFR Part 50 for emergency plans, these contingency plans must be available to be used by the licensee during an accident; however, these contingency plans do not have to be carried out in emergency plan drills or exercises. Complete procedure

4.0 RESPONSIBILITY AND AUTHORITY

- 4.1 The Manager, Radiation Protection is responsible for the overall control and implementation of this procedure.
- 4.2 The Radiation Protection Supervisors are responsible for directing the Health Physics Technicians that carry out the provisions of this procedure.

5.0 INSTRUCTIONS

**NOTE**

For the purpose of this procedure, post accident sampling conditions exist when plant indications show or there is reason to believe that Reactor Coolant System I-131 activity is equal to or exceeds 10 uCi/gm.

**[5.1 Post Accident Sampling For Emergency Action Level Classification]**

**CAUTION**

Post accident sampling for  $\leq 5\%$  clad failure will be performed via the normal sampling system. Due to elevated activities in the RCS, samples returned to the auxiliary building sump may cause airborne conditions in the auxiliary building. Also, an increase in radioactive effluents from the plant may occur during this evolution.

- 5.1.1 Chemistry will align the normal sampling system in accordance with procedure 1607.001 or 2607.001 for the affected unit, Unit 1 or Unit 2, respectively.

PROC./WORK PLAN NO. 1905.003	PROCEDURE/WORK PLAN TITLE: <b>RAD PROTECTION REQUIREMENTS FOR POST-ACCIDENT          SAMPLING OF RC</b>	PAGE: 3 of 7 CHANGE: 008-00-0
---------------------------------	--	----------------------------------

- 5.1.2 Continuous Radiation Protection coverage is required during recirculation and sampling.
- 5.1.3 WHEN the required flush time is complete,  
THEN Radiation Protection shall perform the following:
- A. Determine the dose rate at 12 inches (30 cm) from the designated reactor coolant system sample pipe. See Attachment 2.
1. Unit One - SA-229, located overhead in the hallway on the south wall, elevation 354' (Attachment 2, Figure 1).
  2. Unit Two - 2TCD-19, located inside door 230, overhead in the hallway room 2065, elevation 354' (Attachment 2, Figure 2).
- 5.1.4 Report the dose reading to the affected Control Room. The Control Room will determine and report the degree of clad failure to Chemistry personnel.
- 5.1.5 IF the dose rate indicates >5% clad failure, or operations does not request RCS sampling.  
THEN go to step 5.1.11.
- 5.1.6 IF the dose rate indicates ≤5% clad failure and operations request an RCS sample,  
THEN go to step 5.1.7.
- 5.1.7 Ensure primary sample hood ventilation is operable and in use during post accident sampling if applicable.
- 5.1.8 Determine radiological protection requirements for sampling activities using the expected radiological conditions given in Attachment 1:
- A. Electronic dosimeter alarm set points:  
 dose rate - 6500 mrem/hr, dose - 100 mrem
  - B. Air Sampling
  - C. Respiratory protection
  - D. Anti-contamination protection
  - E. Multiple dosimetry
  - F. Use of shielding
- 5.1.9 Brief Chemistry personnel on the expected radiological conditions and associated controls prior to performing sampling activities.

PROC./WORK PLAN NO. <b>1905.003</b>	PROCEDURE/WORK PLAN TITLE: <b>RAD PROTECTION REQUIREMENTS FOR POST-ACCIDENT SAMPLING OF RC</b>	PAGE: <b>4 of 7</b> CHANGE: <b>008-00-0</b>
--	---	--

5.1.10 Allow Chemistry to perform sampling in accordance with the appropriate procedure.

5.1.11 Request Chemistry to secure from sampling.

A. Sample lines should be flushed, if possible, to reduce radiation levels.

B. Perform post-sampling radiological surveys to confirm area conditions.

5.2 Post-Accident Sampling

**WARNING**

Worst case accident of 100 percent failed fuel would result in an anticipated specific activity of ten curies per milliliter of reactor coolant.

Post-accident sampling may be performed in the primary sample room or other areas of the plant using normal or evaluated sample points. Normally this type of sampling will not be performed in the early phase of an accident, but would rather be performed days or even months after the event.

Following is a list of actions that must be taken and/or considered prior to obtaining and analyzing any sample.

5.2.1 Perform a pre-job briefing in accordance with procedure 1903.033, "Protective Action Guidelines for Rescue/Repair and Damage Control Teams".

5.2.2 Radiological Considerations

A. Continuous Radiation Protection coverage is required during any re-circulation and sampling.

B. Upon establishment of recirculation or sample flow, Radiation Protection will monitor doserates.

C. Determine radiological protection requirements based upon expected conditions to address the following:

- Electronic dosimeter alarm set points
- Air Sampling
- Respiratory protection
- Anti-contamination protection
- Multiple dosimetry
- Use of shielding

<b>PROC./WORK PLAN NO.</b> 1905.003	<b>PROCEDURE/WORK PLAN TITLE:</b> <b>RAD PROTECTION REQUIREMENTS FOR POST-ACCIDENT SAMPLING OF RC</b>	<b>PAGE:</b> 5 of 7 <b>CHANGE:</b> 008-00-0
--	--	--

- D. Consider Self-Contained Breathing Apparatus (SCBA) respiratory protection to be worn by Nuclear Chemists and Health Physics technicians when taking and analyzing samples.

5.2.3 Ventilation Considerations

- A. Consider ventilation needs during sampling.
- B. Ensure sample hoods are in service (if applicable).
- C. Ensure Auxiliary Building ventilation and monitoring system is operable and in service.

5.2.4 Sample Considerations

- A. Pre-determine storage and disposal sites of used and unused portions of the sample.
- B. Consider returning sample to the containment building if possible.
- C. Stationary lead glass shielding is to be used as appropriate
- D. Transfer sample immediately to the sample pig and secure lid.
- E. Perform sample preparations in the sample hood.

5.2.5 Chemistry will perform sampling and analysis using normal procedures for line-up and analysis or evaluated sampling along with the precautions developed in the previous steps.

6.0 ATTACHMENTS AND FORMS

6.1 ATTACHMENTS

6.1.1 Attachment 1 - "Estimated Radiation Levels for 5% Fuel Cladding Failure".

6.1.2 Attachment 2 - "Survey Points"

6.2 FORMS

None

PROC./WORK PLAN NO. 1905.003	PROCEDURE/WORK PLAN TITLE: RAD PROTECTION REQUIREMENTS FOR POST-ACCIDENT SAMPLING OF RC	PAGE: 6 of 7 CHANGE: 008-00-0
---------------------------------	---	----------------------------------

ATTACHMENT 1

Estimated Radiation Levels for 5% Fuel Cladding Failure

Assumptions:

- Fuel cladding failure does not exceed 5%.
- Source term consists of iodine and noble gas isotopes.
- Source term specific activity at 0.5 hours post accident is approximately 8.35+03  $\mu\text{Ci/ml}$  (Unit 1) and 1.24E+04  $\mu\text{Ci/ml}$  (Unit 2).
- Individual performing sampling will maintain whole body approximately 1.5 feet from sample and extremities approximately 0.25 feet from sample when drawing sample, and will maintain whole body approximately 2 feet from sample and extremities approximately 1 foot from sample when analyzing sample.
- Sample times: collect sample, 0.5 min., analyze sample 3.0 min.

Radiation levels

Dose rates (mrem/hr) at the primary sample hood(s) as given in LIR L00-0005 for the body locations given above:

	SDE-ME (mrem/hr)	DDE (mrem/hr)	SDE-WB (mrem/hr)
Unit 1 (5%CF)	14669	5751	6049
Unit 2 (5%CF)	17593	6438	6595

Estimated doses to collect sample:

Unit 1

DDE	0.5 min. x	5751 mrem/hr.	=	48 mrem
SDE-ME	0.5 min. x	14669 mrem/hr.	=	122 mrem
SDE-WB	0.5 min x	6049 mrem/hr.	=	50 mrem

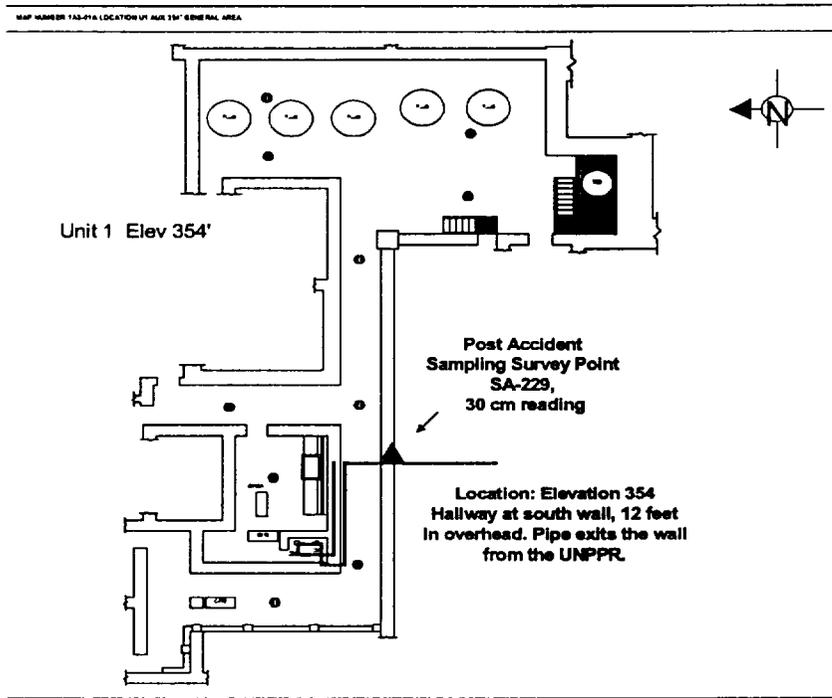
Unit 2

DDE	0.5 min. x	6438 mrem/hr.	=	54 mrem
SDE-ME	0.5 min. x	17593 mrem/hr.	=	147 mrem
SDE-WB	0.5 min x	6595 mrem/hr.	=	55 mrem

Estimated contact dose rate for 1:1000 dilution of maximum 5% clad failure sample:

Unit 1 - 73 mrem/hr                      Unit 2 - 100 mrem/hr

ATTACHMENT 2  
Survey Points



Survey Point, 30 cm - Δ

Figure 1 - Unit 1 Elev. 354 Survey Point

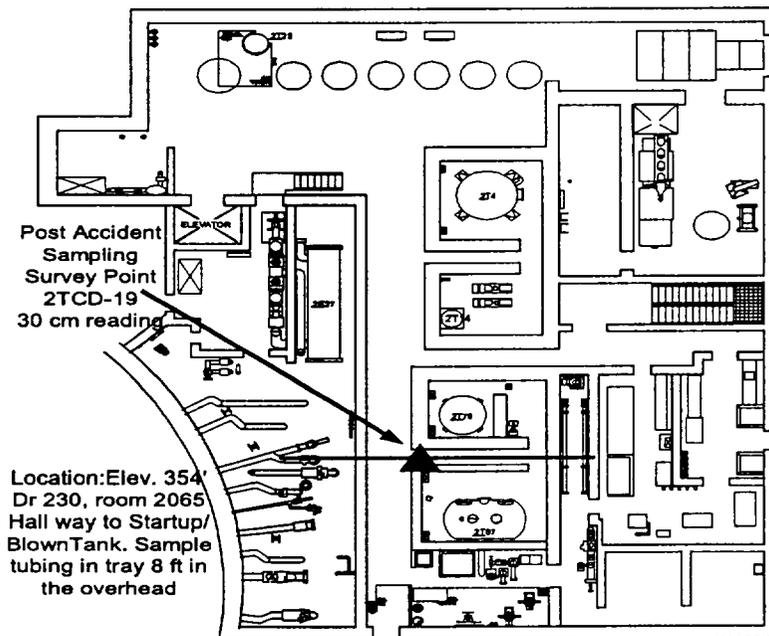


Figure 2 - Unit 2, Elev. 354 Survey Point