

To : NRC NRC
 Facility : CR3 Department :
 Address : CR3-01242 / MAIL CODE: N/A
 DC DESK

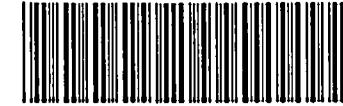
From : CR3DOCSVCS Attention: DOCUMENT SERVICES - SA2A
 Address : FLORIDA POWER CORPORATION
 CRYSTAL RIVER COMPLEX
 15760 WEST POWERLINE STREET
 City : CRYSTAL RIVER State:FL Postal Code: 34428-6708
 Country : UNITED STATES
 Email :
 Contact :

Date/Time : 10/30/03 09:40 Transmittal Group Id:0000013278
 Trans No. : 000131499 Title:
 Total Items: 00001

PASSPORT DOCUMENT

TRANSMITTAL

Page: 1



Item	Facility	Type	Sub	Document Number	Sheet	Doc Status	Revision	Doc Date	Copy #	Media	Copies
0001	CR3	POM	EMG	EM0210A		ACTIVE	006			H	01

If a document was not received or is no longer required check the response below and return to sender.

☐ Documents noted above not received (identify those not received).

☐ I no longer require distribution of these documents (identify those no longer required).

Date: _____ Signature: _____

A045

PROGRESS ENERGY
CRYSTAL RIVER UNIT 3
PLANT OPERATING MANUAL

EMERGENCY PLAN IMPLEMENTING PROCEDURE

EM-210A

**DUTIES OF THE RADIATION MONITORING TEAM:
CR-3 AND GENERATING COMPLEX PERSONNEL AND AREA MONITORING**

TABLE OF CONTENTS

<u>SECTION</u>		<u>PAGE</u>
1.0	PURPOSE.....	3
2.0	REFERENCES.....	3
2.1	Developmental References	3
3.0	PERSONNEL INDOCTRINATION.....	4
3.1	Definitions	4
3.2	Responsibilities	4
3.3	Limits And Precautions	5
4.0	INSTRUCTIONS	5
4.1	OSC Health Physics Coordinator Functions.....	5
4.2	RMT Functions.....	5
4.3	Sample Analysis.....	7
4.4	Rapid Thyroid Dose Estimate By Direct Measurement Using Sam-II/RD22.....	8
4.5	Vehicle Decontamination	9
4.6	Documentation.....	9

ENCLOSURES

1	Radiation Monitoring Team Checklist.....	10
2	Formulas and Instrumentation Data Sheet.....	11
3	Thyroid Dose Estimate, Direct Measurement SAM-II/RD22	12
4	Effects and Symptoms of CO ₂ and Effects and Symptoms of O ₂ Deficiency	13

1.0 PURPOSE

- 1.1 Provides instructions for the Radiation Monitoring Team (RMT), performing personnel and area monitoring for the energy complex, in the event of a radiological emergency. [NOCS 6220]

2.0 REFERENCES

2.1 Developmental References

- 2.1.1 10CFR20, Appendix B
- 2.1.2 10CFR50.47, Emergency Plans
- 2.1.3 10CFR50, Appendix E, Emergency Planning and Preparedness for Production and Utilization Facilities
- 2.1.4 American Conference of Governmental Industrial Hygienists Handbook, Threshold Limit Value
- 2.1.5 EM-104, Operation of the Operational Support Center
- 2.1.6 EM-210B, Duties of the Radiation Monitoring Team: Environmental Sampling and Plume Tracking
- 2.1.7 HPP-409, Inventory and Availability of Emergency Supplies/Equipment
- 2.1.8 Manual of Protective Action Guides and Protection Actions for Nuclear Incidents, EPA-400-R-92-001, Environmental Protection Agency (October, 1991)
- 2.1.9 NGGM-PM-0002, Radiation Control and Protection Manual
- 2.1.10 NUREG-0654, Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants
- 2.1.11 Radiological Emergency Response Plan
- 2.1.12 Response Technical Manual, "RTM-96," Vol. 1 Rev. 4, Section J
- 2.1.13 RSP-101, Basic Radiological Safety Information and Instructions for "Radiation Workers"

3.0 PERSONNEL INDOCTRINATION

3.1 Definitions

- 3.1.1 Qualified - Successfully completed appropriate Radiation Monitoring Team training and currently listed on Emergency Call Roster.
- 3.1.2 Radiations Controls Coordinator - Lead TSC Chemistry or Radiation Protection designee directing Chemistry and Radiological assessment personnel and advising the Emergency Coordinator on these issues.
- 3.1.3 TLV/TWA - Threshold Limit Value/Time-Weighted Average (TLV/TWA) - The time-weighted average concentration for a normal 8-hour workday and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

3.2 Responsibilities

- 3.2.1 The Emergency Coordinator (EC) or designee: [NOCS 13040]
- o Determines where the RMT is to be dispatched.
 - o Authorizes exposure limits in excess of administrative limits.
 - o Ensures ALARA considerations are stressed.
 - o Seeks guidance from the Radiations Controls Coordinator, as required, on radiological matters.
 - o Approves Emergency RWP and Emergency Team Authorization forms in accordance with EM-104.
- 3.2.2 The Radiations Controls Coordinator or designee: [NOCS 13040]
- o Determines areas to be surveyed.
 - o Updates the OSC Health Physics Coordinator of current or changing plant conditions.
 - o Assesses survey results and keeps the EC informed of inplant radiological conditions.
- 3.2.3 The OSC Health Physics Coordinator directs activities of all RMT members except those performing environmental sampling and plume tracking. RMT members performing environmental sampling and plume tracking are directed by the Environmental Survey Team Dispatcher in accordance with EM-210B.
- 3.2.4 The RMT members dispatched from the OSC provide monitoring for the Generating Complex personnel as required and ensure implementation of this procedure.

3.3 Limits And Precautions

- 3.3.1 The RMT complies with the re-entry requirements of and follows the guidelines for exposure of emergency workers during re-entry activities according to EM-104.
- 3.3.2 Personnel shall not enter evacuated areas without portable survey instruments and personnel monitoring devices. Personnel accompanied by a member of the RMT are not required to carry a portable survey instrument. [NOCS 15070]
- 3.3.3 RMT members must be qualified - listed on current Emergency Roster.
- 3.3.4 OSC Health Physics Coordinator must be notified if thyroid dose reaches 5 REM or is projected to reach 25 REM.

4.0 INSTRUCTIONS

4.1 OSC Health Physics Coordinator Functions

The OSC Health Physics Coordinator and RMT leader functions are described in EM-104, Operation of the Operational Support Center. REFER TO Enclosure 1 for RMT checklist.

4.2 RMT Functions [NOCS 10581]

NOTE

The RMT receives verbal or written instructions from the OSC Health Physics Coordinator. Additional written instructions for the RMT are inside monitoring kits.

- 4.2.1 ASSEMBLE at Health Physics area (95' Control Complex) during an Alert Classification for assignment to the OSC or Control Room.
- 4.2.2 REPORT directly to the OSC for assignment to RMT during a Site Area or General Emergency declaration.
- 4.2.3 OBTAIN instruments, dosimetry, portable transceiver(s), clothing, and supplies from the Health Physics area or from the Emergency Kits if in the TSC/OSC.
- 4.2.4 ESTABLISH Radiation Controlled Areas and appropriate access and work precautions where elevated levels of radiation, contamination, and/or airborne radioactivity may exist. [NOCS 15050]
- 4.2.5 PREVENT personnel from crossing lines of controlled access and request unauthorized individuals to evacuate from the controlled area. [NOCS 6260, 10518]
- 4.2.6 SUPERVISE the release of personnel who evacuate on-site assembly areas and DECONTAMINATE as necessary. [NOCS 6260]
- 4.2.7 ISSUE respiratory protection equipment and personnel monitoring devices as required. [NOCS 15070]
- 4.2.8 SUPPORT the Emergency Medical Technicians and Fire Brigade to include contamination control, as required.

- 4.2.9 FILL out Emergency Team Authorization (ETA) form according to EM-104.
- 4.2.10 REVIEW any survey data available for the area(s) to be traversed.
- 4.2.11 OBTAIN dose limit for entry.
- 4.2.12 ATTEND pre-job briefing and review re-entry checklist prior to dispatch according to EM-104.
- 4.2.13 PERFORM radiological surveys as directed by the OSC Health Physics Coordinator.

NOTE

An ion chamber is the preferred instrument, however, other instruments may be used as appropriate.

- 4.2.14 MONITOR areas traversed en route to designated areas using ion chamber survey meter and note any area where unusual dose rates exist. RECORD results on appropriate survey sheets (available in Emergency Kits) or on a form with equivalent information. [NOCS 13040, 14010]

NOTE

- 1) Air samples must be at least 12 cubic feet.
- 2) The maximum flow rate for collecting a gross iodine sample is 5 cfm if using silver zeolite or 10 cfm if using charcoal.
- 3) The use of charcoal cartridges should be avoided if possible because of noble gas interference.

- 4.2.15 Upon arrival at the designated area, CONDUCT a dose rate, contamination, and airborne survey, as needed. RECORD results on appropriate survey sheets.[NOCS 1030, 15050]
- 4.2.16 REPORT dose rate survey results to OSC by portable transceiver or plant communications, as requested.
- 4.2.17 IF dose rates exceed predetermined values,
OR survey is complete,
OR if there are any type of stress related problems (i.e., physiological, psychological).
THEN RETURN to the OSC.
- 4.2.18 REPORT any of the following to the OSC Health Physics Coordinator:
- o Personnel over exposures or suspected over exposures.
 - o Contamination or airborne problems in the TSC/OSC.
 - o Changing conditions in the field.
 - o Shortage of equipment or materials due to failure or contamination, especially dose rate instruments and breathing air cylinders.

- 4.2.19 COLLECT and REPLACE TLDs at stations as appropriate.
- 4.2.20 ENSURE ETA is updated upon return.
- 4.2.21 IF the TSC/OSC or Alternate TSC/OSC CO₂ level reaches 5000 ppm or O₂ levels reach 19.5%,
THEN CONSIDER ventilating, reducing staff, or evacuating the area,
AND CALCULATE the 8 hour Time Weighted Average (TWA) for CO₂
- 4.2.22 IF the 8 hour TLV/TWA for CO₂ is exceeded,
THEN ensure the TSC Radiation Controls Coordinator is notified of possible overexposure.
- 4.2.23 IF the TSC/OSC or Alternate TSC/OSC CO₂ level reaches 20,000 ppm or O₂ levels drop to <19.5%,
THEN VENTILATE or EVACUATE the building within two hours.
- 4.2.24 IF the TSC/OSC or Alternate TSC/OSC CO₂ level reaches 30,000 ppm,
THEN VENTILATE,
OR EVACUATE the building within the next 15 minutes.
- 4.2.25 IF the TSC/OSC is evacuated to Control Complex,
THEN TAKE the CO₂/O₂ instrument to Control Room for monitoring.
- 4.3 Sample Analysis
- 4.3.1 TAKE samples to an appropriate counting station.

NOTE

Enclosure 2, "Formulas and Instrumentation Data Sheet" lists the proper formulas and appropriate efficiencies and conversion factors.

- 4.3.2 Using normal counting techniques, ANALYZE samples collected, using whatever counting system is available. Refer to a, b, c below when using TSC/OSC counting station.
- a. Particulate filter from air sample
*MS-2/RM-14/E-120 with SH-4 sample holder.
 - b. Iodine (Silver Zeolite) cartridge
MS-2/*RM-14/E-120 with SH-4 sample holder/SAM-II.
 - c. Smears
*MS-2/RM-14/E-120 with SH-4 sample holder.
- (*) Indicates preferred counting instrument.
- 4.3.3 RETAIN selected used filters in envelopes (available in the emergency kits) for precise laboratory analysis. LABEL samples with as much information as possible (e.g., time, location, weather conditions, etc.).
- 4.3.4 REPORT results of survey data to the OSC Health Physics Coordinator.
- 4.3.5 REPORT results of any radioiodine sample analysis taken in occupied area (Control Room, TSC/OSC, etc) in which the results are in excess of 8.0×10^{-7} $\mu\text{Ci/cc}$ I-131 for consideration of use of potassium iodide (KI) blocking.

- 4.3.6 USE the formula in Enclosure 2 to estimate thyroid dose from air sample results.
- 4.3.7 IDENTIFY radiation instruments to be used and ENSURE calibration due dates are documented on Enclosure 1.
- 4.4 **Rapid Thyroid Dose Estimate By Direct Measurement Using Sam-II/RD22**
- 4.4.1 ESTABLISH a low background counting area for SAM-II/RD 22.
- 4.4.2 ENSURE SAM II/RD 22 background counts are between 0-10 cpm.
- 4.4.3 RECORD the demographic data on Enclosure 3 for each individual being assessed for thyroid dose.
- 4.4.4 MEASURE the thyroid count rate by holding the RD 22 probe horizontal next to the thyroid (throat area) using a minimum count time of 1 minute.
- 4.4.5 RECORD the thyroid count rate in cpm on Enclosure 3.
- 4.4.6 ESTIMATE the thyroid dose by:
- $\text{Thyroid dose in REM} = (\text{thyroid count rate from step 4.4.4 divided by } 54,970 \text{ cpm per } \mu\text{Ci}) \times (6.5 \text{ REM per } \mu\text{Ci adult})$
- 4.4.7 RECORD the estimated thyroid dose on Enclosure 3.
- 4.4.8 IF the thyroid dose estimate is greater than 5 REM (cladding failure or core melt conditions),
THEN NOTIFY the Health Physics Coordinator for consideration of the use of KI blocking, as directed by the TSC Radiation Controls Coordinator.

4.5 Vehicle Decontamination

4.5.1 Personal Vehicles [NOCS 14050]

NOTE

The following should take place prior to dismissing personnel to the parking lot for evacuation.

- 4.5.1.1 IF a radiological release has occurred or is in progress,
THEN PERFORM a quick beta-gamma survey of a representative sample on the exterior of vehicles in the parking lot.
- 4.5.1.2 IF the results of this survey indicates no contamination,
THEN NOTIFY the OSC Health Physics Coordinator that personnel are cleared for unrestricted egress.
- 4.5.1.3 IF results of this survey indicates contamination,
THEN CONTACT the OSC Health Physics Coordinator,
AND REPORT personal vehicle contamination levels.
- 4.5.1.4 CONSIDER one of the following for implementation:
 - On-site decontamination and monitoring
 - DIRECT employees to take cars to Citrus or Levy County washdown stations for decontamination and monitoring.
IF this method is chosen,
THEN REQUEST OSC Health Physics Coordinator to have the Radiations Controls Coordinator coordinate with the EOF.
 - IF personnel vehicles are unavailable for use,
THEN REQUEST coordination with the EOF for transportation off-site.

4.6 Documentation

- 4.6.1 FORWARD documentation and surveys created as a result of this procedure to the OSC Health Physics Coordinator. Care must be taken to ensure the documents are free from contamination prior to transmittal. Contaminated documents must be bagged, copied, and the originals discarded as radioactive waste. The copies must then be marked "ORIGINALS CONTAMINATED."
- 4.6.2 TRANSMIT documentation and surveys to Document Services under EM-210A.

RADIATION MONITORING TEAM CHECKLIST

OSC Manned

Date: _____

Time: _____

OSC Health Physics Coordinator: _____

CHECK
(when completed)TASK

<input type="checkbox"/>	Technician assigned to Main Assembly Area (personnel frisking/decontamination) [NOCS 24200]
<input type="checkbox"/>	ENSURE sufficient ED's obtained form 95' Control Complex
<input type="checkbox"/>	Control Point established in TSC/OSC
<input type="checkbox"/>	Counting Station set up
<input type="checkbox"/>	CO ₂ /O ₂ Monitor set up (Refer to Enclosure 4 for symptoms)
<input type="checkbox"/>	Ensure sufficient equipment & supplies are available
<input type="checkbox"/>	Computer Data Base with Dose Records Operable (If "NO", see Note 1)
<input type="checkbox"/>	SPDS Data Base Computer Operable (If "NO", see Note 1)
<input type="checkbox"/>	Technician Call-out complete (if required) & Work Schedules established.
<input type="checkbox"/>	Technician Doses reviewed
<input type="checkbox"/>	Emergency RWP written/approved
<input type="checkbox"/>	Sufficient number of SCBA's available (If "NO", see Note 2)
<input type="checkbox"/>	Sufficient number of spare SCBA bottles (If "NO", see Note 3)
<input type="checkbox"/>	Sufficient number of Dose Rate Instruments (If "NO", see Note 2)
<input type="checkbox"/>	<input type="checkbox"/> Master Key at HP office <input type="checkbox"/> Master Key at OSC

NOTES:

- 1) Notify the Radiations Controls Coordinator that Dose Margins/Power Block Radiation Levels are unknown.
Date: _____ Time: _____ Initials: _____
- 2) Notify the Radiations Controls Coordinator that a Re-entry should be made to obtain additional equipment.
Date: _____ Time: _____ Initials: _____
- 3) Notify the Radiations Controls Coordinator that arrangements must be made to have SCBA bottles refilled. Refer to HPP-515.
Date: _____ Time: _____ Initials: _____

DOCUMENT calibration due dates below of radiation instruments used.

INSTRUMENT	CALIBRATION DUE DATE

FORMULAS AND INSTRUMENTATION DATA SHEET**FORMULAS:**

$$\mu\text{Ci} = \frac{\text{Gross CPM} - \text{Background CPM}}{\text{Volume (cc)} \times \text{Detector Eff.} \times \text{FCE} \times 2.22 \text{ E6 (DPM}/\mu\text{Ci)} \times \text{Y.F.}}$$

$$\text{dpm} = \frac{(\text{Net cpm})}{(\text{Eff.})}$$

Net cpm = Gross cpm - Background cpm

Volume cc = Volume ft³ x 2.832 E4 cc/ft³

Y.F. = 1.19 for SAM - II use only
(Accounts for difference in yields Ba¹³³/I¹³¹)

FILTER COLLECTION EFFICIENCY (FCE)

FLOW RATE (CFM) *	SILVER ZEOLITE	CHARCOAL	PART FILTER
1	.90	.90	.95
2	.90	.90	.95
3	.85	.80	.95
4	.80	.70	.95
5	.75	.60	.95

*Should use calibrated flow rates when possible

EFFICIENCIES:

	MS-2	RM-14/E-120	SAM-II
PART	.20	.10	.03
IODINE	.0015	.0015	.03

$$\text{MDC}_{(\text{TSC})} = 1.96 \sqrt{\frac{C_B}{T_S} + \frac{C_B}{T_B}}$$

$$\text{MDC}_{(\text{ESV})} = 3\sqrt{C_B}$$

C_B = Background count rate cpm

T_S = Sample count time min

T_B = Background count time min

THYROID DOSE FROM AIR SAMPLE RESULTS:

(based on 24 hour exposure)

REM Thyroid = (I-131 μCi/cc) (2.88E+7 cc
breathed/24 hrs) (1 REM/μCi)

THUMB RULES: Dose rate can be estimated as follows: 20 mR/min for each R/HR.

INSTRUMENT START-UPS:**MS-2**

- o Power unit up - switch in back
- o Verify dial settings per calibration sticker
- o Ensure proper HP-210 probe used with SH-4 sample holder
 - IF TSC: Run background (5 min. minimum) and calculate MDC.
 - IF ESV: Run 1 minute background at each sample counting location and calculate MDC per simplified formula.
- o Response check detector

SAM-II

- o Ensure high voltage dial is set at zero prior to connecting detector and powering up unit
- o Power unit up - switch in back
- o Set switch and dial settings for CH-1 and CH-2 per cal sticker and label.
- o Increase H.V. gradually until original setting is reached or set per cal sticker
- o Ensure BKG subtract produces BKG reading between 0 and 10 cpm. Adjust using CH-2 window dial
- o Response check detector by placing CH-2 switch to (+). Return to (-) after indication of increasing counts.

RM-14/E-120

- o Check battery response
- o Response check detector
- o If used for air sample counting, use SH-4 sample holder for proper geometry

AMS-2/3

- o Power up - switch in front
- o Inspect/change filter and response check detector.
- o Hook up and start RAS pump
- o Set/Verify flow to indicated value on flow meter
- o Start chart recorder (if desired)

RO-20

- o Check Batteries
- o Response check with source

THYROID DOSE ESTIMATE, DIRECT MEASUREMENT SAM-II/RD22

Name: _____ SSN: _____ TLD: _____

Time and date of measurement: _____

Counting Information:

SAM-II Serial Number: _____ RD22 Serial Number: _____

Calibration Date: _____ Background: Sat [] Unsat []
(0-10 cpm)

Observed thyroid counts: _____ Counting time in min: _____

Observed thyroid count rate: _____ cpm

Calculate thyroid dose by:(Thyroid cpm _____ \div 54,970 cpm/ μ Ci) \times (6.5 rem/ μ Ci) = _____ rem

Estimated time since start of intake: _____ hours

(If estimated time since start of intake < 5 hours, the calculated dose is non-conservative.)

Comments:

Completed by: _____ Date: _____

Verified by: _____ Date: _____

EFFECTS AND SYMPTOMS OF (CO₂)% CO₂

0.04%	Normal air (0.04% = 400 ppm)
2.0%	Deeper Breathing (20,000 ppm) ¹
4.0%	Deeper breathing, considerable discomfort
5.0%	Very labored breathing, nausea
7.0-9.0%	Absolutely the limit of tolerance
10.0-11.0%	Lose coordination, may lose consciousness
15.0-20.0%	Brain damage can occur within minutes
25.0-30.0%	Death within a minute

EFFECTS AND SYMPTOMS OF OXYGEN DEFICIENCYOxygen
by Volume

15-19%	Decreased ability to work strenuously. May impair coordination and may induce early symptoms in workers with coronary, pulmonary, or circulatory problems. ²
12-14%	Respiration increases with exertion, pulse increases, impaired coordination, perception, and judgment.
10-12%	Respiration further increases in rate and depth, poor judgment, lips turn blue.
8-10%	Mental failure, fainting, unconsciousness, ashen face, blueness of lips, nausea and vomiting.
6-8%	8 minutes 100% fatal; 6 minutes 50% fatal; 4-5 minutes recovery with treatment.
4-6%	Coma in 40 seconds, convulsions, respiration ceases, death.

1) 2.0% (20,000 ppm) CO₂ is an action level per step 4.2.23.

2) <19.5% is an action level per step 4.2.23.

SUMMARY for Rev 6 of EM-210B (Nov. 2003)

Procedure Section	Changes and Reason
Title Page	Raise level of procedure from Information to Reference
Throughout	Added NOCS commitment references
Section 2.1	Revised incorrect procedure reference and renumbered to maintain alphabetical order
Section 4.6.2	Correct reference to name change of Organization unit from Records Management to Document Services
Encl 1	Changed incorrect reference from EAD to ED
Encl 2	Deleted incorrect reference to RM-16 to reflect change made to same enclosure for EM-210B