GEORGIA POWER COMPANY

HATCH NUCLEAR PLANT

PROCEDURE

Alert - Operations Supervisor
PROCEDURE TITLE

HNP-4530
PROCEDURE NUMBER

Lab
RESPONSIBLE SECTION

SAFETY RELATED (X) NON-SAFETY RELATED ( )

REV.	DESCRIPTION	APPROVED DEPT. HEAD	APPROVED PLANT MANAGER	DATE
3	Page 1	W R Rogers	C E Jones	3/1/82
4	Page 1	W R Rogers	Harvey Mills	1/21/83
5	Page 1	W R Rogers	Harvey Mills	3/24/83
6	Title Page	R W Sandlin	[illegible] for	6/28/83

MANUAL SET

PROCEDURE REVISION REQUEST

PROCEDURE NO. HNP-11530

Revision No. 5

REQUESTED BY		DEPARTMENT HEAD APPROVAL	
Name:	Date:	Signature:	Date:
Tim J. Kirkham	5/14/83	[signature]	5/20/83

REVISION CHANGES MODE OF OPERATION OR INTENT AS DESCRIBED IN FSAR:
( ) Yes (X) No

CHANGE INVOLVES:
( ) An unreviewed Safety Question ( ) Tech. Specs. (X) Neither
(See back for Safety Evaluation if required).

Safety Related (X) Non-Safety Related ( )

Safety/Non-safety Status Change ( ) Yes (X) No

Attach marked up copy of procedure to this's form.

REASON FOR REQUEST

Title page - change Shift Supervisor to Operations Supervisor

Ref: QA Procedure Review Train # 83-106

Reason - Title change

PRB RECOMMENDS APPROVAL: (X) Yes ( ) No Pierre E. Fortier
PRB Secretary

83-93
PRB Number

5-31-83
Date

HNP-3

MASTER SET

The revision of this procedure does not constitute an unreviewed safety question as explained below.

1. The probability of occurrence and the consequences of an accident or malfunction of equipment important to safety are not increased above those analyzed in the FSAR due to these changes because the revision does not change the purpose or performance of the system.

2. The possibility of an accident or malfunction of a different type than analyzed in the FSAR does not result from this change because the system responds and is operated as before the change.

3. The margin of safety as defined in the Technical Specification's is not reduced due to this revision because the revision does not change any limited safety system settings which would allow a safety limit to be exceeded or to allow a limiting condition for operations to be exceeded as stated in Technical Specifications.

ALERT - OPERATIONS SUPERVISOR

A. CONDITION

Events are in process or have occurred which involve an actual or potential substantial degradation of the level of safety of the plant. Any releases are expected to be limited to small fractions of the EPA Protective Action Guideline (P.A.G.) exposure levels.

B. REFERENCE

HNP-4520.

C. ACTION

1. Proceed to control room.

2. Assume the duties of the Emergency Director until relieved, see HNP-4540 for actions.

3. a. Evaluate actions of Shift Supervisor and Count Room Operator to bring emergency under control.

   b. Assure correct emergency classification has been declared as per HNP-4520.

4. Consult with Shift Supervisor and STA to determine if a more severe emergency class should be declared. Refer to criteria in HNP-4620, 4720 and 4853.

5. The Operations Supervisor is responsible for notification of Plant Management and NRC as per Emergency Call List and other offsite agencies in accordance with notification procedures HNP-4861. The actual notification process may be delegated to other, specifically trained, shift personnel.

6. Augment shift resources as needed to assess and respond to the event.

7. Make a safety assessment to determine if personnel not involved in the emergency recovery effort should be evacuated. If possible, consult with Plant Management concerning this evacuation.

GEORGIA POWER COMPANY

HATCH NUCLEAR PLANT

PROCEDURE

Radiation Exposure Limits
PROCEDURE TITLE

HNP-8002
PROCEDURE NUMBER

Lab
RESPONSIBLE SECTION

SAFETY RELATED (X) NON-SAFETY RELATED ( )

REV.	DESCRIPTION	APPROVED DEPT. HEAD	APPROVED PLANT MANAGER	DATE
10	Pages 1 and 7	W H Rogers	Ken Greene for	3/22/82
11	Page 7	W H Rogers	Harvey Reid	7/21/82
12	Page 1 - 5, 7 & 9	W H Rogers for DW Gwaltney	CF Jones for HCN	11/18/82
13	Pages 1-5, & 7	DW Gwaltney	Harvey Reid	6/22/83

MANUAL SET

WESTINGS.

PROCEDURE REVISION REQUEST

PROCEDURE NO. HNP- 8002

Revision No. 12

REQUESTED BY		DEPARTMENT HEAD APPROVAL	
Name:	Date:	Signature:	Date:
N. Wright	4-29-83	W A Rogers	5-7-83

REVISION CHANGES MODE OF OPERATION OR INTENT AS DESCRIBED IN FSAR:
( ) Yes (✓) No

CHANGE INVOLVES:
( ) An unreviewed Safety Question ( ) Tech. Specs. (✓) Neither
(See back for Safety Evaluation if required).

Safety Related (✓) Non-Safety Related ( )

Safety/Non-safety Status Change ( ) Yes (✓) No

Attach marked up copy of procedure to this form.

REASON FOR REQUEST Pg 1, para B add HNP-8021, delete Rad Health Handbook Pg 2, Para C.4.a, change Plnt Manager to Plant General Manager, Pg 3, Para E.5 add progressive steps of authorizing exposure exceeding administrative limits, Pg 4, Para E.2 add see HNP-8021, Pg 5, Para I change Plnt Manager to Plant General Manager, Pg 7 replace with new Pg 7

PRB RECOMMENDED APPROVAL: (✓) Yes ( ) No Pierre E Fomel
PRB Secretary

83-84
PRB Number

5-19-83
Date

HNP-3

MANUAL SET

SAFETY EVALUATION

The revision of this procedure does not constitute an unreviewed safety question as explained below.

1. The probability of occurrence and the consequences of an accident or malfunction of equipment important to safety are not increased above those analyzed in the FSAR due to these changes because the revision does not change the purpose or performance of the system.

2. The possibility of an accident or malfunction of a different type than analyzed in the FSAR does not result from this change because the system responds and is operated as before the change.

3. The margin of safety as defined in the Technical Specifications is not reduced due to this revision because the revision does not change any limited safety system settings which would allow a safety limit to be exceeded or to allow a limiting condition for operations to be exceeded as stated in Technical Specifications.

APPROVAL	
See Title Page	
DATE	
See Title Page	

E. I. HATCH NUCLEAR PLANT

Georgia Power

PROCEDURE NO	HNP-8002
REVISION NO	13
PAGE NO	1 of 9

RADIATION EXPOSURE LIMITS

A. PURPOSE

To provide limits of exposure for the protection of personnel against radiation hazards arising from work associated with the operation of the Hatch Nuclear Plant.

The limits of exposure as set forth in this procedure are based upon applicable limits as described in 10 CFR 20, Standards for Protection Against Radiation. A continuous effort will be made to reduce levels of radiation and radioactivity in order to maintain radiation doses as low as reasonably achievable below these established limits.

B. REFERENCES

1. 10 CFR 20
2. HNP-8010, 4812, 8005, 8021
3. Reg Guide 8.13
4. Tech. Spec. Unit 1, Sect 6.11

C. MAXIMUM PERMISSIBLE EXPOSURE (10 CFR 20), (Tech. Spec. Section 6.11)

1. The maximum quarterly exposure to the whole body, head and trunk, active blood forming organs, lens of the eyes or gonads shall be limited to 3,000 mRem/quarter.
2. The maximum quarterly exposure to the skin of the whole body shall be limited to 7,500 mRem/quarter.
3. The maximum quarterly exposure to the extremities, hands and forearms, feet and ankles shall be limited to 18,750 mrem/quarter.

NOTE

All limits of exposure are based upon individuals 18 years of age and older. No person under 18 years of age shall be occupationally exposed to ionizing radiation.

4. The limits as set forth above are subject to the following conditions:

   a. The dose to the whole body, when added to the accumulated occupational dose, shall not exceed 5(N-18) rem, where "N" equals the individual's age in years on his last birthday.

   b. The individual's accumulated occupational dose to the whole body has been determined and recorded on Form 1, Occupational External Radiation Exposure History.

   c. No individual will be permitted to receive a whole body exposure in excess of 300 mRem/quarter unless he has submitted a signed statement indicating the amount of occupational exposure received during the current quarter from sources of radiation possessed or controlled by other licensees and a reasonable effort to obtain the individual's prior occupational exposure has been made. In the event an individual is unable to provide exposure information for the current quarter, and his duties are likely to result in an exposure in excess of 300 mRem before such information could be obtained, authorization to 2500 mRem may be granted using Form 2 of this procedure, by the General Manager and the Health Physics Superintendent provided: (1) a current quarter exposure of 1250 mRem is assumed, (2) prior quarter exposures are known or have been calculated in accordance with 10 CFR 20.102(c)(1), and (3) the General Manager has declared the individual critical to start-up or continued operations.

D. MAXIMUM PERMISSIBLE CONCENTRATIONS IN AIR (10 CFR 20)

No individual will be permitted to inhale a quantity of radioactive material in any period of one calendar quarter greater than the quantity which would result from inhalation for 40 hours per week for 13 weeks at uniform concentrations of radioactive material in air as specified in Appendix B Table I, Column 1. If the radioactive materials are of such form that intake by absorption through the skin is likely, individual exposures to radioactive material shall be controlled so that the uptake of radioactive material by any organ from either inhalation or absorption or both routes of intake in any calendar quarter does not exceed that which would result from inhaling such radioactive material for 40 hours per week for 13 weeks at uniform concentrations specified in Appendix B Table 1, Column 1 of 10 CFR 20. Refer to 10 CFR 20. 103 for further details.

E. ADMINISTRATIVE EXPOSURE GUIDES

1. Administrative exposure guides are established to provide guidelines for plant operations in order that personnel exposures will be maintained within the maximum limits as established in 10 CFR 20 and Section B of this procedure.

2. Exposure of the whole body shall be limited to 300 mRem/week. This administrative limit, however, does not relieve the individual or his supervisor from their responsibliity to keep all radiation exposure as low as reasonably achievable (ALARA).

3. Whole body radiation exposure above 300 mRem in any week will require written approval from the immediate supervisor and a Lab Foreman on Form 2, Authorization to Exceed Administrative Exposure Guides.

4. Exposure of the whole body shall be limited to 1,250 mrem/quarter.

5. Whole body radiation exposure above 1,250 mRem/quarter up to 2,000 mrem/quarter will require written approval from the immediate supervisor and a Lab Supervisor on Form 2, Authorization to Exceed Administrative Exposure Guides.

6. From 2,000 up to 2,500 mRem/quarter will require approval of the individuals supervisor and the Health Physics Superintendent and Manager-Health Physics and Chemistry. In no case, except for conditions as specified in Section E.7 and H shall a whole body exposure exceed 2500 mRem/quarter as measured by pocket dosimeter or estimated by portable Health Physics instruments.

7. If the General Manager declares it necessary to start-up or continued operation or the safety of the plant or personnel, he and the Health Physics Manager may, after careful consideration, authorize up to 3,000 mRem/quarter.

8. All female employees working in the Protected Area will be required to acknowledge in writing that they have received instruction concerning prenatal radiation exposure on Form 4. For purposes of administering a program for limiting exposure to pregnant women, the following administrative guides will be established:

   Radiation exposure to female employees will be limited to 500 mRem per two month period unless a higher limit is specifically requested in writing by the employee on Form 4.

Radiation exposure to pregnant women will be limited to 300 mRem during the entire gestation period unless a higher limit is specifically requested in writing by the employee on Form 4.

F. ADMINISTRATIVE CONTROL OF INTERNAL EXPOSURE

1. Exposure to airborne concentrations approaching the MPC's of 10 CFR 20 should be prevented. If exposure above the MPC's are necessary, the wearing of properly fitted respiratory protective equipment or other appropriate methods will be required as determined by the Health Physics staff. HNP-8010 specifies administrative controls for use of respiratory equipment.

2. Plant personnel normally traversing Radiation Control Areas should have a whole body count annually, (see HNP-8021).

G. EXPOSURE LIMITS FOR NON-PLANT PERSONNEL

1. Vendors, subcontractors, and other non-plant personnel who are likely to receive a whole body radiation exposure in excess of 300 mRem in any calendar quarter shall be required to furnish current radiation exposure records.

2. The quarterly exposure to the whole body shall be limited to 1,250 mrem. Any occupational exposure received at another facility during the current quarter (whether actual, based on TLD or film badge results, or estimated, based on pocket dosimeter results, or a combination thereof) shall be considered in the maintenance of this limit. However, if mutual agreement between Georgia Power Company and the pertinent outside organization exists, and provided that the requirements of 10 CFR 20, Section 20.101 have been satisfied, this limit may be exceeded. Refer to Form 2, Authorization to Exceed Radiation Exposure Guides. Subcontractor personnel must have received the Radiation Protection Orientation lectures or demonstrate knowledge covered in the lectures, and must agree to abide by the regulations and policies of the Georiga Power Company prior to gaining access without escort to areas where radiation exposures may be received.

H. EMERGENCY AND ACCIDENTAL EXPOSURE

Although an emergency situation transcends the normal requirements of limiting exposure, there are suggested levels for exposure. Refer to HNP-4812 for guidance.

I. ABNORMAL PERSONNEL EXPOSURES

Whenever a situation occurs involving the suspected or known exposure of personnel to ionizing radiation in excess of 10 CFR 20 limits specified in this procedure, the incident will be promptly investigated and personnel exposures evaluated. Personnel monitoring results that are either excessively high or excessively low with respect to the work that an individual has been known to be doing, will also be immediately investigated.

All such incidents will be immediately reported to the H.P. Laboratory Foreman or his alternate. A committee consisting of the Laboratory Foreman, Health Physics Superintendent or his designee, and supervisor of the group in which the abnormal exposure occurred, will conduct an official investigation and issue a written report of its findings and recommendations to the concerned individual, his immediate supervisor and the Plant General Manager. Every effort will be made to determine if the suspected exposure is actual exposure using, as necessary, special bio-assays, whole body counting, radiation surveys, and reviews of work assignments and working procedures.

The written report submitted will consist of the investigation, the evaluation of results documented on Form 3, Abnormal Radiation Exposure, and a Radiation Occurrence Report (Figure 2 HNP-8005).

J. RELATIVE BIOLOGICAL EFFECTIVENESS (R.B.E.) OR QUALITY FACTOR (Q.F.)

TYPE OF RADIATION	R.B.E. OR Q.F. VALUE*
X-ray, Beta, Gamma	1
Neutrons, Thermal	5
Neutrons, Fast	10
Alpha and Heavy Particles	20

* R.B.E. or Q.F. is Damage Relative to Gamma or X-rays

FIGURE 1
(FORM 1)

OCCUPATIONAL EXTERNAL RADIATION EXPOSURE HISTORY

FORM 1

OCCUPATIONAL EXTERNAL RADIATION EXPOSURE HISTORY

1. NAME (PRINT-LAST, FIRST, AND MIDDLE)			2. SOCIAL SECURITY NO.	
3. DATE OF BIRTH (MONTH, DAY, YEAR)			4. AGE IN FULL YEARS (N)	
OCCUPATIONAL EXPOSURE - PREVIOUS HISTORY			PREVIOUS DOSE HISTORY	
5. PREVIOUS EMPLOYMENTS EMPLOYMENTS INVOLVING RADIATION EXPOSURE - LIST NAME AND ADDRESS OF EMPLOYER	6. DATES OF EMPLOYMENT (FROM-TO)	7. PERIODS OF EXPOSURE	8. WHOLE BODY (REM)	9. RECORD OR CALCULATED (INSERT ONE)
10. REMARKS		11. ACCUMULATED OCCUPATIONAL DOSE-TOTAL		

CURRENT QUARTER EXPOSURE		DATE		NET DOSE (mRem)	(CIRCLE ONE) ESTIMATED/RECORD
YES	NO	FROM	TO		

13. CALCULATIONS - PERMISSIBLE DOSE

WHOLE BODY:

(A) PERMISSIBLE ACCUMULATED DOSE = 5(N-18)
= _____ REM

(B) TOTAL EXPOSURE TO DATE (FROM ITEM 11)
_____ REM

(C) UNUSED PART OF PERMISSIBLE ACCUMULATED DOSE (A - B)
= _____ REM

12. CERTIFICATION: I CERTIFY THAT THE EXPOSURE HISTORY LISTED IN COLUMNS 5, 6, & 7 IS CORRECT & COMPLETE TO THE BEST OF MY KNOWLEDGE AND BELIEF.

EMPLOYEE SIGNATURE

DATE

14. NAME OF LICENSEE

FIGURE 2
(FORM 2)

AUTHORIZATION TO EXCEED

ADMINISTRATIVE EXPOSURE GUIDES

FORM 2
AUTHORIZATION TO EXCEED
ADMINISTRATIVE EXPOSURE GUIDES

_____ IS AUTHORIZED TO RECEIVE AN

EXPOSURE OF _____ TO THE _____ FOR

THE PERIOD _____ TO _____

EMPLOYEE'S CURRENT EXPOSURE IS:

WEEKLY_____QUARTERLY_____

REASON FOR EXPOSURE IN EXCESS OF ADMINISTRATIVE GUIDES:

_____

_____

EMPLOYEE ACKNOWLEDGES_____

APPROVALS	300 to 1,250	DATE
EMPLOYEE'S SUPERVISOR	_____	_____
LABORATORY FOREMAN	_____	_____
APPROVALS	**1,250 to 2,000**	**DATE**
EMPLOYEE'S SUPERVISOR	_____	_____
LABORATORY SUPERVISOR	_____	_____
APPROVALS	**2,000 to 2,500**	**DATE**
EMPLOYEE'S SUPERVISOR	_____	_____
LABORATORY SUPERINTENDENT	_____	_____
LABORATORY MANAGER	_____	_____
APPROVALS	**2,500 to 3,000**	**DATE**
EMPLOYEE'S SUPERVISOR	_____	_____
HEALTH PHYSICS MANAGER	_____	_____
PLANT GENERAL MANAGER	_____	_____
APPROVALS	**1,250 to 2,500**	**DATE**
HEALTH PHYSICS SUPERINTENDENT	_____	_____
PLANT GENERAL MANAGER	_____	_____

FIGURE 3
(FORM 3)

ABNORMAL RADIATION EXPOSURE

FORM 3

ABNORMAL RADIATION EXPOSURE

INCIDENT NO. _____ DATE _____

NAME _____ DEPT. _____

JOB TITLE _____ SUPV. IN CHARGE _____

INVESTIGATION DATA

DATE AND TIME OF INCIDENT _____

LOCATION _____

NATURE OF INCIDENT _____

PROBABLE CAUSE _____

SURVEY INFORMATION _____

RECOMMENDATIONS

COMPLETED BY _____ DATE _____

TLD BADGE READING _____
PROBABLE ACTUAL DOSE _____
DOSIMETER READING _____

"I CERTIFY THAT THE ABOVE INFORMATION IS ACCURATE TO THE BEST OF MY KNOWLEDGE".

SIGNATURE OF MAN EXPOSED _____

SIGNATURE OF SUPERVISOR _____

SIGNATURE OF LAB SUPERVISOR/FOREMAN _____

FIGURE 4
(FORM 4)

RADIATION EXPOSURE LIMITS FOR FEMALES

FORM 4

RADIATION EXPOSURE LIMITS FOR FEMALES

A. I have received oral and written instructions concerning prenatal radiation exposure. I have read the Appendix to Regulatory Guide 8.13, "Possible Risks To Children Of Women Who Are Exposed To Radiation During Pregnancy".

_____ SIGNATURE

_____/_____/_____ DATE

B. I request that my radiation exposure be limited to the following:

1. Same as for male workers.
   Limits as specified in Sections C and Para. E.1 - E.5 of HNP-8002

   SIGNATURE _____ DATE ____/____/____

   OR

2. Limits as specified in Para. E.6. of HNP-8002 i.e., 500 mRem per two month period. For pregnant women, limit of 500 mRem for the entire gestation period.

   SIGNATURE _____ DATE ____/____/____

GEORGIA POWER COMPANY

HATCH NUCLEAR PLANT

PROCEDURE

Continuous Air Monitors Models AM-3D and AM-33-1 Operation and Calibration
PROCEDURE TITLE

HNP-8109
PROCEDURE NUMBER

Lab
RESPONSIBLE SECTION

SAFETY RELATED (X) NON-SAFETY RELATED ( )

REV.	DESCRIPTION	APPROVED DEPT. HEAD	APPROVED PLANT MANAGER	DATE
10	Pages 1, 3-5, 8-14 16 and 18	RW Zavadoski	Harvey Mitt	6/22/83

MANUAL SET

NR 5/11/83.

PROCEDURE REVISION REQUEST

PROCEDURE NO. HNP- 8109

Revision No. 9

14

REQUESTED BY		DEPARTMENT HEAD APPROVAL	
Name:	Date:	Signature:	Date:
R. ANDERSON	1-2-83	W.L. Rogers	5-7-83

REVISION CHANGES MODE OF OPERATION OR INTENT AS DESCRIBED IN FSAR:
( ) Yes (X) No

CHANGE INVOLVES:
( ) An unreviewed Safety Question ( ) Tech. Specs. (X) Neither
(See back for Safety Evaluation if required).

Safety Related (X) Non-Safety Related ( )

Safety/Non-safety Status Change ( ) Yes (X) No

Attach marked up copy of procedure to this form.

REASON FOR REQUEST Page 1 Susan: Safety and References to Put in Hupfolder. Page 3 paragraph F.2.d change: OE to OR. Page 4 paragraph G.6 change: Counting room Supervisor to H.P. Foremen. Page 8 paragraph H.4 a+b change: CESCO to EI change: 65% to 99% change 0.65 to 0.99. change: 8.74E-11 to 5.11E-11 change: 1.45E-10 to 9.62E-11. These numbers change because of the different efficiency of the new filters. Page 11 paragraph J.2.A. omit: using a calibrated magnehelic guage, add used cans. add to assure proper flow on magnehelic or photohelic gnages. Procedure cannot be performed as written. Page 12 paragraph J.2. omit section C., change: D. to C. and add: to the center of the detector, change E to D and F to E, omit: note on E.3. Page 13 paragraph J.2.E.3.A. omit: as needed add: Set: annually

PRB RECOMMENDED APPROVAL: (X) Yes ( ) No Pierre E Fornel
PRB Secretary

83-84
PRB Number

5-19-83
Date

BT

HNP-3

MANUAL SET

SAFETY EVALUATION

The revision of this procedure does not constitute an unreviewed safety question as explained below.

1. The probability of occurrence and the consequences of an accident or malfunction of equipment important to safety are not increased above those analyzed in the FSAR due to these changes because the revision does not change the purpose or performance of the system.

2. The possibility of an accident or malfunction of a different type than analyzed in the FSAR does not result from this change because the system responds and is operated as before the change.

3. The margin of safety as defined in the Technical Specifications is not reduced due to this revision because the revision does not change any limited safety system settings which would allow a safety limit to be exceeded or to allow a limiting condition for operations to be exceeded as stated in Technical Specifications.

PROCEDURE REVISION REQUEST Cont,

PROCEDURE NO. HNP- 8109

Revision No. 9 -2of2

REQUESTED BY		DEPARTMENT HEAD APPROVAL	
Name:	Date:	Signature:	Date:
R. ANDERSON	1-2-83	W.H. Rogers	5-7-83

REVISION CHANGES MODE OF OPERATION OR INTENT AS DESCRIBED IN FSAR:
( ) Yes (X) No

CHANGE INVOLVES:
( ) An unreviewed Safety Question ( ) Tech.Specs. (X) Neither
(See back for Safety Evaluation if required).

Safety Related (X) Non-Safety Related ( )

Safety/Non-safety Status Change ( ) Yes (X) No

Attach marked up copy of procedure to this form.

REASON FOR REQUEST (CONT) ADD: CRD'S ARE TO BE WRITTEN BY INSTRUMENT TECHS. PAGE 13 PARAGRAPH J.2.E.3.E ADD: NOTE AMSD's SCALE READS TO 50,000 CPM ONLY - DISREGARD 800,000 CPM STEP ON AMSD. PROCEDURE CANNOT BE FOLLOWED AS WRITTEN FOR AMSD. PAGE 16 FIGURE 1 REMOVE LINE AND OMITT NOTES. THESE ARE NO LONGER NECESSARY WITH REVISION PAGE 18 FIGURE 2 DATA PACKAGE 2 OMITT: NO ___ AND ADD DATE ___ THE FIGURE HAVE MUST BE CALIBRATED BEFORE USING.

PRB RECOMMENDED APPROVAL: ( ) Yes ( ) No

PRB Secretary

PRB Number

Date

HNP-3

MANUAL SET

APPROVAL	
See Title Page	
DATE	
See Title Page	

E. I. HATCH NUCLEAR PLANT

Georgia Power

PROCEDURE NO	
HNP-8109	
REVISION NO	
10	
PAGE NO	
1 of 18	

BT

CONTINUOUS AIR MONITORS MODELS AM-3D AND AM-33-1 OPERATION AND CALIBRATION

A. PURPOSE

To ensure that the instruments are calibrated properly and to provide operation guides for the user.

B. REFERENCES

1. NMC Air Monitor Model AM-3D Instruction Manual
2. NMC Air Monitor Model AM-33-I Instruction Manual
3. Determination of Concentrations of Airborne Radioactivity, George L. Helgeson, Health Physics Journal 1963 Vol. 9, pp. 931-942

C. SAFETY

Observe Radiation Protection Procedures.

D. TEST EQUIPMENT

1. Minipulser MP-1 or equivalent
2. Cl^{36} check source and source holder
3. Ba^{133} check source and source holder
4. Magnehelic gauge

E. DESCRIPTION OF INSTRUMENT

The NMC models AM-3D and AM-33-I monitors use a continuously moving filter paper so that replacement of the filter is required only infrequently. The function of these instruments is to measure the radioactivity from air particulates and gaseous activity by concentrating these particulates on a filter, detecting, and graphing the activity on a graphic recorder.

In the AM-3D and AM-33-I, air is drawn through a special filter paper at a controlled rate. The build-up of activity on the filter paper is detected by a Geiger-Mueller detector which, in turn, operates a count ratemeter, solid state voltmeter alarm system and a graphic recorder. The alarm system in the AM-3D and AM-33-I particulate channel provides two levels of alarm based

MANUAL SET

upon the level of radio-activity. A high level alarm provides for continuous sounding of a loud bell or sonalert and operation of a red lamp. The low level alarm is used as a fail-safe indicator that the detectable radioactivity is below that expected in a properly functioning instrument. This provides a continuously lighted amber lamp.

In addition to particulate air activity, the model AM-33-I also monitors the filtered air for iodine and gaseous activity. These gases are collected by a fixed activated charcoal cartridge. The Iodine-131 activity build-up on the charcoal cartridge is detected by a scintillation detector. The scintillation detector is coupled to a single window spectrometer system. The spectrometer is provided with a window-width control and high voltage control that is set at the Iodine-131 energy base.

The AM-33-I incorporates a discriminator system, count rate meter, solid state voltmeter alarm system and a graphic 2 channel recorder. The AM-33-I iodine channel has a single (high) alarm system based on the level of iodine and gaseous activity deposited on the charcoal cartridge. This high level alarm provides for continuous sounding as previous described.

F. DESCRIPTION OF CONTROLS

1. External controls.

a. Master switch - Turns power on to the counting ratemeter and moving filters drive unit.

b. H.V. switch - Turns on high voltage for detector operation.

c. H.V. Test switch - Displays the detector voltage on the rate-meter (AM-33-I).

d. Input Mode Switch - In the TEST position, inserts a 3600 CPM signal to the ratemeter input for instrument check. In the OPERATE position it places the GM detector in service for normal operation.

e. D and D switch positions are the boundries of the spectrometer window and operate from the gamma scintillation probe, (AM-33-I).

f. N. switch position is the window position and normal operating condition (AM-33-I).

g. Window Width Switch-Provides 11 window levels from 0 to 5%. The instrument is optimized for the 5% window (setting 5). This setting should be used unless there is significant interference from some other emitter with an energy peak close to that of iodine 131.

h. Alarm Reset Pushbutton - Resets the alarm circuit after alarm condition.

i. Meter Reset Pushbutton - Resets the meter to minimum when depressed.

j. Blower Power Switch - Turns blower ON or OFF.

k. Continuous-Stepwise Switch in CONTINUOUS position, filter paper advances continuously. In STEPWISE position, filter paper advances only when the Fast Advance pushbutton is depressed.

l. Magnehelic gauages:

(1) AM-3D Indicates air flow rate through filter paper. An adjustment screw on the guage provides adjustment of the flow rate control. Clockwise adjustment increases the flow rate.

(2) AM-33-I (Photohelic) Indicates air flow rate through filter paper and charcoal cartridge assembly. Flow rate adjustment is accomplished by dual set point controls. The left set point control governs the minimum flow rate setting. The right set point control governs the maximum flow rate setting.

m. Flow jog indicator lamps- mounted on the right end of the cart.. Yellow lamp ON continually indicates blockage of filter paper. Red lamp ON continually indicated rupture, loss of filter paper or a leak in the system.

2. Internal Controls

a. H.V. Adjust - Allow setting of high voltage on G.M. tube.

b. High potentiometer - Adjusts high alarm setpoint on alarm assembly module.

c. Low potentiometer - Adjusts low alarm setpoint on alarm assembly module.

d. The AM-33-I monitor is labeled "I" or "G" to indicate iodine or G-M detectors adjustment.

e. Bias potentiometer - Calibrates low end of ratemeter scale.

f. High potentiometer - Calibrates high end of ratemeter scale.

g. Low potentiometer - Calibrates mid-scale of ratemeter scale.

G. OPERATION OF INSTRUMENT

1. Install filter paper roll per instructions in paragraph 5.7. Instruction-Manual (AM-3D) or paragraph 2.1 (AM-33-I) also insert the charcoal cartridge in the detector shield plug. (AM-33-I).

2. Switch the Continuous-Stepwise Toggle switch on filter transport mechanism to CONTINUOUS.

   a. The filter paper speed can be varied for either monitor as per paragraph 4.7.1 (AM-3D) or paragraph 1.3 and programming key on Drawing # D005923 (AM-33-I).

3. Plug the instrument into a 115 V.A.C receptacle.

4. Switch the Blower Power switch to ON. Adjust air flow rate to 5 CFM using adjustment on Magnehelic gauge after about 24 hours of operation (AM-3D). Adjust AM-33-I photohelic gauge flow set point controls to 3.5 CFM and readjust after 24 hours if necessary.

5. Switch the Master Switch to ON.

6. Place the Input Mode switch to TEST and observe count ratemeter and recorder. Reading should be 3600 ± 400 CPM, if not report findings to the Health Physics Foreman.

7. Switch the High Voltage switch to ON. The red indicator light should be on.

8. Return the Input Mode switch to "OP" (AM-3D) or "N" (AM-33-I).

H. INTERPRETATION OF INSTRUMENT RESPONSE

1. Background radioactivity

The normal background before collecting may be in the vicinity of 50 C/M. Upon collecting, this count will rise rapidly due to the presence of radon gas and its radioactive daughters in the air. The count should rise to a level between 100 and 5000 C/M, depending upon the environment. the air cleaning used in the facility and atmospheric conditions at the time. This is an exceedingly sensitive instrument and a high rate of count from radon and its progeny is to be expected. (Particulate activity-CAM only).

A fail-safety alert level is set at 10-50 C/M. Whenever the counting meter indicates below this level, the amber lamp on top of the instrument cabinet will light. This is to show that the instrument is operating below the preset level. The amber light will also remain lit after changing or upon advancing the filter paper.

2. Long half-life radioactivity.

In the moving filter CAM, the GM tube only "detects" one half of the activity at any given time because as the paper moves into the suction area, it is just starting to collect particulates, whereas, as the paper moves out of the suction area, it has collected its maximum number of particulates, hence, a factor of 2 is needed to correct for this.

Furthermore, the sampling time is limited, i.e., after the filter paper has moved out of the suction area, it stops collecting particulates.

The following formula (1) applies:

$$C = \frac{5.3 \times 10^{-13} As}{Fga}$$

Where C=Concentration in uCi/cc
A=Count rate in CPM
s=Speed of filter paper in in./hr.
a=Suction area in inches
F=Flow rate in SCFM
g=Detector efficiency

The speed of the filter paper is set at one (1) inch per hour. Shorter speeds can be set; however, a speed of one inch per hour allows greater sensitivity and the added ability to earlier detect changing air concentrations.

The above formula (1) is derived with the basic assumption that airborne radioactivity concentrations are constant during the sampling period of concern. Sudden changes in airborne concentrations will be discussed later.

The average efficiency of the AM-3D, and AM-33-1 continuous air monitors is about .20 (20.0%) and .080 (8%) respectively. A concentration vs count rate graph is attached to each unit. Thus, during periods of "static" conditions the average air concentrations can be determined. By applying the filter speed and CAM detector efficiency and substituting 10, 10^2, 10^3, 10^4, 5×10^4, and 10^6 counts per minute respectively we can exhibit the average concentration for a given count rate.

Substituting formula (1).

Column 2 $\frac{(5.3\times10^{-13})(1)}{(5)(0.2)(2)}$ (cpm)* = uCi/cc=$\frac{(2.65\times10^{-13})(cpm)}{\text{(factor for 20\% efficency) Am-3D}}$

Column 3 $\frac{(5.3\times10^{-13})(1)}{(3.5)(.080)(2)}$ (cpm)*=uCi/cc= $\frac{(5.3E^{-13})(cpm)}{\text{(factor for 8\% efficency) AM-33-I}}$

*Instrument background has been subtracted.

TABLE 1

COLUMN 1 A (cpm)	COLUMN 2 c(uCi/cc for AM-3D)	COLUMN 3 c(uCi/cc for AM-33-I)
10	2.65x10-12	9.46x10-13
100	2.65x10-11	9.46x10-12
1,000	2.65x10-10	9.46x10-11
1,320	3.49x10-10	1.24x10-10
1,600	4.24x10-10	1.51x10-10
10,000	2.65x10- 9	9.46x10-10
50,000	1.32x10- 8	4.73x10- 9
10^5	1.32x10- 7	4.73x10- 8
10^6	2.65x10- 7	9.46x10- 8

3. Rising Air Concentrations

Formula (2) $C = \frac{0.16\times10^{-10}(A)}{fgts}$

Assumes that the concentration is constant only over short intervals. We can determine the rate of rise in cpm/minute and t (sample time) becomes 1 minute (for graph interpretation).

By this method we can observe any portion of the rise or peak activity and determine the concentration for that period. For example: If the air concentration for any given CAM rose from a "static" condition of 200 cpm to 1200 cpm in 10 minutes then:

Average rate of rise (in cpm/min) = $\frac{\text{(rise)} - \text{(static)}}{\text{10 min. (rise time)}} = \frac{1200cpm - 200\ cpm}{10\ min.} = 100cpm/min\ (\Delta A)$

$C = \frac{(.16 \times 10^{-10})(A)}{fgts}$ Formula (2)

Where: c = Concentration in uCi/cc
A = cpm
F = Flow rate in SCFM
g = Detector efficency
t_s = Sample time

The above formula may be reduced by determing the average rate of rise as previously mentioned.

Then: $C = \frac{(.16 \times 10^{-10})(\Delta A)}{Fg}$ Where: ΔA = cpm/min.

Substituting the detector efficiencies and flow rates of the AM-3D and AM-33-I CAMs the following results in Table 2 can be graphed.

Column 2 $\frac{(.16 \times 10^{-10})}{Fg}$ (cpm/min) = uCi/cc = $\frac{(1.60 \times 10^{-11})(cpm/min)}{(factor\ for\ 20\%\ efficency)\ AM-3D.}$

Column 3 $\frac{(.16 \times 10^{-10})}{Fg}$ (cpm/min) = $\frac{uCi/cc = (5.71E^{-11})(cpm/min)}{(factor\ for\ 8\%\ efficency)\ AM-33-I}$

TABLE 2

COLUMN 1 c(uCi/cc for AM-3D) (PARTICULATE)	COLUMN 2 c(uCi/cc for AM-33-I) (PARTICULATE)	COLUMN 3 c(uCi/cc for AM-33-I) (IODINE)
1.60x10-10	5.71x10-10	8.79x10-10
4.80x10-10	1.71x10- 9	2.63x10- 9
8.00x10-10	2.85x10- 9	4.39x10- 9
1.60x10- 9	5.71x10- 9	8.79x10- 9
4.00x10- 9	1.42x10- 8	2.19x10- 8
8.00x10- 9	2.85x10- 8	4.39x10- 8
1.60x10- 8	5.71x10- 8	8.79x10- 8
8.00x10- 8	2.85x10- 7	4.39x10- 7
1.60x10- 7	5.71x10- 7	8.79x10- 7
8.00x10- 7	2.85x10- 6	4.39x10- 6
8.00x10- 6	2.85x10- 5	4.39x10- 5

The following rate of rise rates are equal to the administrative limits of 1×10^{-9} uCi/cc.

	AM-3D	AM-33-I
Particulate B + activity	27 cpm/min	22 cpm/min
Iodine-131	---	12 cpm/min

A rate of rise graph will be attached to each air monitor.

4. Determination of Airborne Iodine Concentrations.

a. The Model AM-33-I air monitor incorporates a scintillation detector and fixed charcoal cartridge to access the Radio-iodine levels. Because the collecting media is fixed and the collecting efficency for Iodine is not 100% the following formulas are necessary to determine the airborne concentrations. Collection efficency of the F & J cartridge is 99% or 0.99.

For "Static" conditions where there is no appreciable rate of rise formula (3) applies;

Column 4 $C=\frac{(1.6\times10^{-11})(\Delta A)}{(F)(\Delta ts)(g)(Ce)}$

Where: ΔA = cpm/min
F = Flow rate in SCFM
Δt_s = Sampling time min.
g = Detector efficency
Ce = Filter Media Collection Efficency
C = Concentration in uCi/cc.

By assuming the flow rate, detector efficiency and filter media collection and the absorption factor is accounted for during detector calibration formula (3) can be reduced to:

$C = \frac{AK'}{t_s}$ Where $K' = \frac{.16\times10^{-10}}{FgCe}$

Then $K' \frac{.16\times10^{-10}}{(3.5)(.08)(.99)} = 5.77E\text{-}11$ and $C = \frac{A\ (5.77E\text{-}11)^{-11}}{t_s}$
F g Ce

From the above data the average Iodine-131 airborne concentration can be determined. For example, if "Static" conditions exist (slow rise or no rise on the chart 10cpm/min). The counting rate is 200 cpm and the sample has been on for 2 hours then.

$\frac{(200)(5.77E\text{-}11)}{120\ min.} = 9.62E\text{-}11$ uCi/cc

b. The average concentration for a change in airborne activity may be determined by subtracting the stable airborne concentration from the peak concentration and dividing the difference by the elapse time period of stable and peak activity. Use formula (1) to determine the results.

$\frac{(\text{concentration at } t_2 - \text{concentration at } t_1)}{t_2 - t_1} = \Delta A$ (in minutes)

Where: ΔA = average rise in cpm/min
t_1 = static condition time
t_2 = peak condition time

For example, over the last two hours the counting rate for Iodine-131 has risen from 0 to 200 cpm but over the last 30 minutes the concentration has risen from 200 to 800 cpm.

Then: $\frac{(800-200)(5.77E-11)}{30} = 1.15E-9$ uCi/cc
$(t_2 - t_1)$

A graph is attached to each CIM exhibiting a static condition and a rate of rise condition. The charcoal cartridge should be changed when the collected activity indicates a level of 5x10 uCi/cc (8500cpm) in 24 hours. The charcoal cartridge will be further assessed by laboratory counting methods. Normally the charcoal cartridge (CESCO) will be changed once per week. The following graphs will be attached to the CIM:

Graph #1. Assumes the Iodine 131 concentrations are essentially constant during the collection periods of 2 to 24 hours.

Graph # 2. Assumes the Iodine 131 concentrations are essentially constant during the collection periods of one to seven days.

Graph # 3 Assumes the Iodine 131 concentrations are constant only during short intervals, where t is reduced to one minute. (rate of rise in cpm/min).

NOTE

Because Iodine-131 has a long half-life, compared with t or t (radioactive decay is not accounted for in the derivations) jtd is essentially zero and jtd = =1, also jts may be expanded neglecting all but the first two terms;

$$C_j = \frac{(0.16x10^{-10})\lambda_j A}{FgCe(1-e^{-\lambda_j ts})} = \frac{(0.16x10^{-10}A)}{FgCe} \cdot \frac{1}{\lambda_j ts - \frac{(\lambda_j ts)^2}{2!} + \ldots}$$

$$C_j = \frac{0.16x10^{-10}}{FgtsCe} A \qquad \text{Formula (3)}$$

MANUAL SET

Where:
ts = sample time
td = delay in minutes before the sample is counted
λj = the decay constant of a particular isotope.
Cj = concentration of a particular isotope.
A = cpm (counting rate on the filter media).
F = flow rate in SCFM.
g = detector efficiency
Ce = collection efficiency of the filter media.

5. Other observations for moving and fixed filter CAMS.

a. Down trend in chart recorder.

(1) This could be due to long half-life activity which has stopped forming and the filter is moving out of the detection area.

(2) A decrease in long half-life airborne concentrations.

(3) Short half-life material decaying, showing a stop or decrease in activity.

(4) A combination of these reasons.

b. Horizontal line straight across chart.

(1) Sudden increase in background from sources or casks.

(2) Extremely high airborne radioactivity.

(3) CAM Filter paper not moving, activity buildup.

I. CAM LOCATIONS AND OPERATION

1. The CAM units shall be placed in areas where the occupation factors and the possibility of air borne problems are most predominated.

2. If possible the CAM's should be placed near air exhaust vents to better access overall airborne concentrations.

3. The CAM's shall be equipped with an air sample intake extension in that the sample collected is representative of a "breathing zone" for personnel.

4. The distance from the airborne source should also be taken into account.

5. The alarm level shall be set in the following manner.

a. The CAMS shall be operated for a 24 hour period to establish a relative Ra-Th equillibrium.

b. The CAM alarm point is set at the administrative level of 3.0×10^{-9} uCi/cc. The actual alarm setting will vary depending on Ra-Th concentration, area background and CAM efficiency. Using the long lived graph the number should be written 1500 cpm ± 10%(AM-3D). For example, if the CAM background is 500 cpm and the 1×10^{-9} uCi/cc criterion is equal to 1500 cpm then the alarm point is set at 2000 cpm.

The CIM alarm point is to be set at the administrative level of 3.0×10^{-9} uCi/cc. The actual alarm setting will vary depending on area background and cim efficiency. A rate of rise of 12 cpm/min or 720 cpm.hr is equal to 1×10^{-9} uCi/cc. (See formula 3 and its variations). It the background is 100 cpm then the alarm point is set at 820 cpm.

J. CALIBRATION AND CHECKS

1. Daily or Shift Check

a. Insure the AM-3D and AM-33-I air flow is maintaining a 5 and 3.5 SCFM flow rate adjust as necessary.

b. Observe the chart and insure the pen is inking.

c. Calculate the present air concentration using the appropriate praph (graph #1). If any spikes or a rate of rise is indicated determine the concentration during the rise and notify the H.P Supervisor (provided the rate of rise is or was in excess of administrative limits-3.0×10^{-9} uCi/cc).

d. Insure there is a sufficient filter paper supply (24 inches per day) and draw a vertical line across the filter paper. The line is used as a reference point to determine if the filter paper is advancing.

e. Note the flow, concentration, date and time on the chart paper and initial the chart paper.

2. Weekly Check (AM-3D)

a. Check flow rates of cams and cim-cams to assure proper flow on magnehelic or photohelic guages and record on DATA SHEET 1, Data Package 1.

b. Place the Input Mode switch to TEST and observe ratemeter and recorder. Reading should be 3600 ± 400 CPM. Record results on Data Sheet 1, Data Package 1. Weekly Continuous Air Monitor Check. Mark "TEST" on the chart paper turn the pump off and open or remove the detector shielding.

c. Place radioactive check source provided to the center of the detector and check the instrument response and alarm setpoint. Record results and complete Data Sheet 1, Data Package 1. Note on the chart paper and insure the c/m meter and chart readout match. If the detecter efficiency is low, calibrate the CAM in accordance with the Semi-Annual checks prescribed below.

For the Model AM33-I CAM, place the radioactive check source on the end of a metal rod and insert the source gently into the detector chamber. Insure the source is centered and against the detector window. Proceed as mentioned in the previous paragraph.

d. After completion of the above checks return the CAM to operation and note on the chart paper the time, date and calibration completed by initial.

e. The CIM (AM-33-I) may be source checked in the following manner.

(1) With the pump off, remove the filter holder-detector shield plug, remove the charcoal cartridge, and place the Ba 133 check source in the filter holder-detector shield plug. Reinsert the detector shield.

(2) Check the instrument response and alarm setpoint. Record the results and complete Data Sheet 1, Data Package 1. Note the results on the chart paper and check the count rate meter and chart readout coincide. If the detector efficency is low, calibrate the cim in accordance with the Semi-Annual checks prescribed below.

(3) Semi-Annual Calibration.

(a) Test Shop will calibrate the magnehelic or Photohelic on the cam or cim-cam (MR's are to be written by Instrument Techs) semi annually.

(b) Note on the chart paper the Semi-annual calibration is occuring. Turn the instrument high voltage off and remove the probe connector.

(c) Connect the output of the Minipulser from positive (red lead) to pin "F" of the input connector (located on left side of probe connector), (AM-3D) Ground the other lead (black) to the frame. Remove the probe connector to the scintillation detector (AM-33-I) and connect output of the Minipulser from positive (red lead) to pin "F" of the connector.

(d) Switch the input mode on the counting ratemeter to "OP" or D.

(e) Set the minipulser at 1.0 volt amplitude. Set the counting rate of the minipulser to 100, 1000, 10,000, 40,000, and 800,000 cpm. Adjust the bias, low and high-end controls as necessary to correspond to the input pulse being generated.

NOTE

Am-3D's scale reads to 50,000 cpm only. Disreguard 800,000 cpm step.

(f) After this calibration insert the check source as prescribed in J.2 and perform a plateau check. (Instrument high voltage back on). See the instruction manual Section IV 4.4. If the high voltage plateau has not drifted and instrument efficiency is within 10% of the last efficiency check, return the instrument to operation. (AM-3D).

(g) The cim detector Iodine 131 operating voltage is set by inserting the Ba 133 source as prescribed in Section J.2.e. With the input mode selector switch in "N" position, adjust the 10- turn high voltage control until the c/m meter indicates and optimum value. Then set the high voltage control 1% lower than indicated reading.

(h) Replace calibration sticker and initial chart.

(i) Complete the necessary forms (see attached forms).

NOTE

The AM-30 and Am-33-I is designed to measure general air trends and changes in these trends. Any unusual rises in airborne activity should be verified by additional air sampling (high or low volume) isotope identification should be made and documented.

PROCEDURE DATA PACKAGE

DOCUMENT NO: HNP-8109-1

SERIAL NO: R10-

MPL NO: _____

RTYPE: C15.14

XREF: _____

TOTAL SHEETS: 2

FREQUENCY: WEEKLY

COMPLETED BY: _____

DATE COMPLETED: _____

I HAVE REVIEWED THIS DATA PACKAGE FOR COMPLETENESS AND AGAINST ACCEPTANCE CRITERIA IN ACCORDANCE WITH HNP-830.

ACCEPTABLE ____ UNACCEPTABLE ____

REVIEWED BY: _____

DATE REVIEWED: _____

REMARKS: _____

FIGURE 1
Page 1 of 2

MANUAL SET

DATA PACKAGE 1
(Data Sheet 1)

WEEKLY CONTINUOUS AIR MONITOR CHECK

SOURCE _____ DPM
SOURCE ASSAY DATE: _____

CIM-CAM MFG. _____ NO. _____
CIM-CAM LOCATION _____
CAM FLOW RATE IS APPROX 8 SCFM.
CIM FLOW RATE IS APPROX 3.5 SCFM

DATE	AIR FLOW RATE (CFM)	3000 CYCLE TEST	BKGD CPM	SOURCE NCPM	EFF. (NCPM/DPM)	ALARM POINT	DET. EFF. AT TIME OF SEMI-ANNUAL CAL.	REMARKS	INIT

FIGURE 1
Page 2 of 2

MANUAL SET

E. I. HATCH NUCLEAR PLANT

Georgia Power

PROCEDURE DATA PACKAGE

DOCUMENT NO: HNP-8109-2

SERIAL NO: R10-

MPL NO: _____

RTYPE: G15.14

XREF: _____

TOTAL SHEETS: _____

FREQUENCY: SEMI-ANNUALLY

COMPLETED BY: _____

DATE COMPLETED: _____

I HAVE REVIEWED THIS DATA PACKAGE FOR COMPLETENESS AND AGAINST ACCEPTANCE CRITERIA IN ACCORDANCE WITH HNP-830.

ACCEPTABLE ____ UNACCEPTABLE ____

REVIEWED BY: _____

DATE REVIEWED: _____

REMARKS: _____

FIGURE 2
Page 1 of 2

MANUAL SET

DATA PACKAGE 2
(Data Sheet 2)

INSTRUMENT CALIBRATION DATA SHEET

INSTRUMENT _____ LOCATION _____

MFL NO. _____

CALIB SOURCES	ACTUAL COUNT RATE	CONTINUOUS AIR MONITOR (CAM) DATE CALIBRATED BY AS FOUND	AS LEFT	CONTINUOUS IODINE MONITOR (CIM) DATE CALIBRATED BY AS FOUND	AS LEFT
Am-241	100 CPM				
B/N	1,000 CPM				
	10,000 CPM				
	40,000 CPM				
	800,000 CPM				
Cs 36	DPM:	SOURCE CPM:	SOURCE CPM:	SOURCE CPM:	SOURCE CPM:
Ba 133	DPM:	EFF. _____ %	EFF. _____ %	EFF. _____ %	EFF. _____ %
INSTRUMENT PARAMETERS					
FLOW	CAM 5 LPM/CIM 3.5 CFM				
H.V.	CHECK PLATEAU				
DISC.	INST. READING				
TEST	2400 CPM				
ALARM	SET POINT (CPM)				
MECHANICAL OR PHOTOELECTRIC CALIBRATED		YES _____ DATE _____		YES _____ DATE _____	
MAINT. PERFORMED		VOM S/N:		VOM S/N:	

NOTE: WHEN CALCULATING DETECTORS EFFICIENCY DENOTE EFF. ON DATA SHEET 1.
LPM _____ X 100 = _____ % EFF.

FIGURE 2
Page 2 of 2

MANUAL SET

GEORGIA POWER COMPANY

HATCH NUCLEAR PLANT

PROCEDURE

ARM Portable Calibration Unit
PROCEDURE TITLE

HNP-8111
PROCEDURE NUMBER

Lab
RESPONSIBLE SECTION

SAFETY RELATED (X) NON-SAFETY RELATED ( )

REV.	DESCRIPTION	APPROVED DEPT. HEAD	APPROVED PLANT MANAGER	DATE
4	Pages 2 and 4-8	with RLDavidson	Harvey Pitt	6/22/83

HNP-9

MANUAL SET

TVE 5/11/83.

PROCEDURE REVISION REQUEST

PROCEDURE NO. HNP- 8111

Revision No. 3

REQUESTED BY		DEPARTMENT HEAD APPROVAL	
Name:	Date:	Signature:	Date:
R. ANDERSON	4-23-83	W. H. Rogers	4-25-83

REVISION CHANGES MODE OF OPERATION OR INTENT AS DESCRIBED IN FSAR:
( ) Yes (✓) No

CHANGE INVOLVES:
( ) An unreviewed Safety Question ( ) Tech. Specs. (✓) Neither
(See back for Safety Evaluation if required).

Safety Related (✓) Non-Safety Related ( )

Safety/Non-safety Status Change ( ) Yes (✓) No

Attach marked up copy of procedure to this's form.

REASON FOR REQUEST Page 4 Graph number one Delete Graph, Add New Page 4 Graph 1. Page 5 Graph number Two Delete Graph, Add New Page 5 Graph 2. Page 7 Graph number 3 Delete Graph & Add New Page 7 Graph 3. Page 8 Graph number 4 Delete Graph, Add New Page 8 Graph 4. Page 6 Figure 1 Add Serial Number 6339537 Change Figure 1 to Figure Two

PRB RECOMMENDS APPROVAL: (✓) Yes ( ) No Pierre E Tonel
PRB Secretary

83-84
PRB Number

5-11-83
Date

HNP-3

MASTER SET

SAFETY EVALUATION

The revision of this procedure does not constitute an unreviewed safety question as explained below.

1. The probability of occurrence and the consequences of an accident or malfunction of equipment important to safety are not increased above those analyzed in the FSAR due to these changes because the revision does not change the purpose or performance of the system.

2. The possibility of an accident or malfunction of a different type than analyzed in the FSAR does not result from this change because the system responds and is operated as before the change.

3. The margin of safety as defined in the Technical Specifications is not reduced due to this revision because the revision does not change any limited safety system settings which would allow a safety limit to be exceeded or to allow a limiting condition for operations to be exceeded as stated in Technical Specifications.

APPROVAL	
See Title Page	
DATE	
See Title Page	

E. I. HATCH NUCLEAR PLANT

Georgia Power

PROCEDURE NO	
HNP-8111	
REVISION NO	
4	
PAGE NO	
1 of 8	

ARM PORTABLE CALIBRATION UNIT

A. PURPOSE

To ensure that the instruments are operated properly.

B. SAFETY

Observe radiation protection procedures.

C. REFERENCES

1. S-17978 GEK-865C Portable Calibration Unit for Area Radiation Monitor
2. HNP-8014 Handling of USNRC Licensed Radioactive Material
3. HNP-8017 Control and Accountability of Radioactive Material

D. DESCRIPTION OF UNIT

The ARM portable calibration units provide a graded series of radiation rates which are used for calibration of area radiation monitors on plant site. When a sensor and converter of an ARM is inserted in the cavity a dose rate can be applied to it by setting the source and shield control levers to an appropriate position. Five discrete dose rates can be set in this manner. A chart furnished with the units show the calibrated dose rates for each position of the levers at the date on the chart. Since the source, Cobalt 60, has a half life of 5.25 years, allowance should be made for decay of the source.

E. DESCRIPTION OF CONTROLS

1. Source control lever - positions source in or out.
2. Shield control levers - positions shields in or out.

F. OPERATION OF UNIT

NOTE

For reference the calibration charts furnished with the units are shown in Figure 1 and in Figure 2. Two units are available for use serial number 6554071 and 6339537. Charts are furnished for both.

CAUTION

This units contain approximately 200 microcuries of Cobalt 60. Exercise care in handling the unit to minimize radiation exposure.

1. Insert the sensor and converter unit to be calibrated into the cavity.

2. Determine the corrected dose rate for the lever positions desired by using Figure 1, graphs 1 and 2; or Figure 2, graphs 3 and 4.

3. If the sensor and converter is supplied with a bug source add the bug source radiation level to the level determined in step F.2 and use this value for ARM calibration.

4. Repeat steps F.1 - F.3 as often as necessary to complete the ARM calibration.

5. When the ARM calibration is complete set the source control to OUT and both shield controls to IN to provide maximum shielding of the source. Install top cover and return unit to area which it is assigned and complete Form 1 of HNP-8014.

NOTE

Sources are controlled by a Laboratory Foreman and are stored at designated areas. All sources used outside the laboratory will require the completion of HNP-8014, Form 1 by the person requesting the source.

FIGURE 1

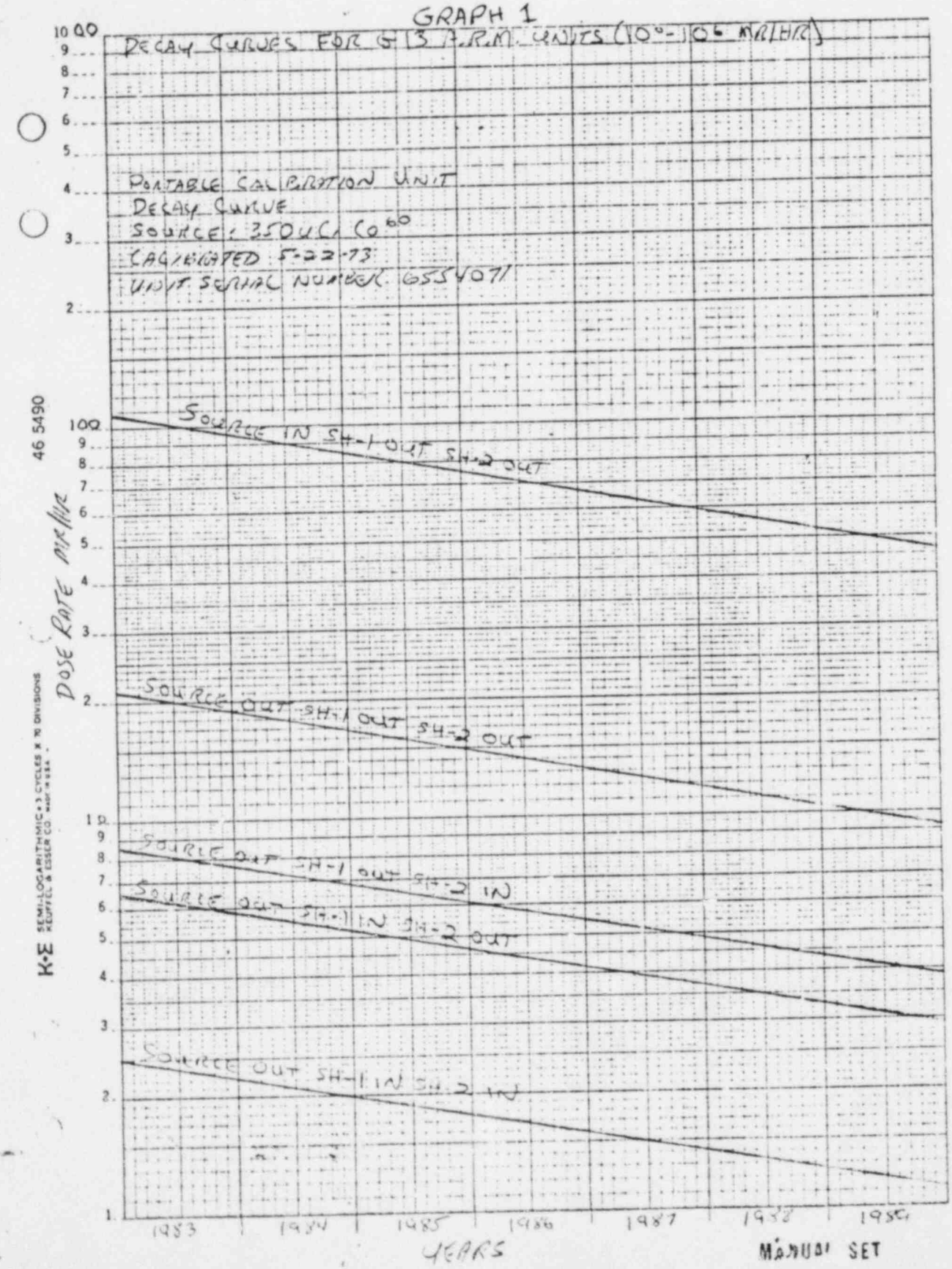
CALIBRATION DATE 5-22-73
SERIAL NUMBER 6554071

SOURCE & SHIELD POSITIONS	GROUPS 11&12	GROUPS 13&15	GROUPS 14,16 &17
SOURCE IN SH 1 OUT SH 2 OUT	354.3 MR/HR	403.0 MR/HR	403.0 MR/HR
SOURCE OUT SH 1 IN SH 2 IN	9.9 MR/HR	9.0 MR/HR	9.0 MR/HR
SOURCE OUT SH 1 IN SH 2 OUT	24.8 MR/HR	23.5 MR/HR	22.5 MR/HR
SOURCE OUT SH 1 OUT SH 2 IN	34.9 MR/HR	32.0 MR/HR	31.2 MR/HR
SOURCE OUT SH 1 OUT SH 2 OUT	82.3 MR/HR	78.5 MR/HR	77.0 MR/HR

NOTE: CALIBRATED WITH A G.E. STANDARD GAMMA COBALT-60 SOURCE IN SAN JOSE.

CAUTION: AFTER USE, PUSH BOTH SHIELDS & SOURCE TO LOCK POSITION.

GRAPH 1



MANUAL SET

APPROVAL	
See Title Page	
DATE	
See Title Page	

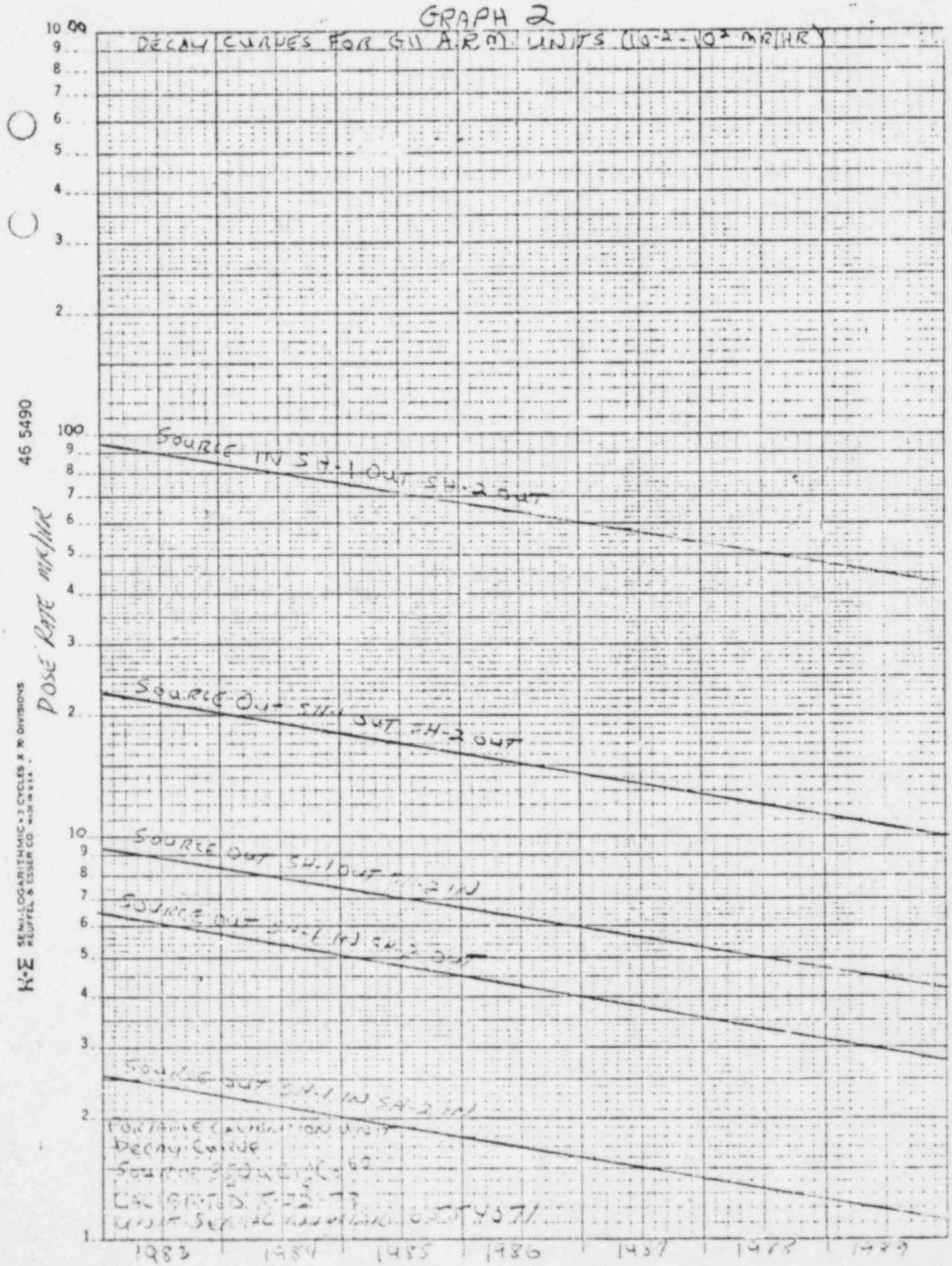
E. I. HATCH NUCLEAR PLANT

Georgia Power

PROCEDURE NO	HNP-8111
REVISION NO	4
PAGE NO	5 of 8

GRAPH 2

DECAY CURVES FOR GAMMA UNITS (10^{-2} - 10^{2} MR/HR)



MANUAL SET

FIGURE 2

CALIBRATION DATE 8-9-77

SERIAL NUMBER 6339537

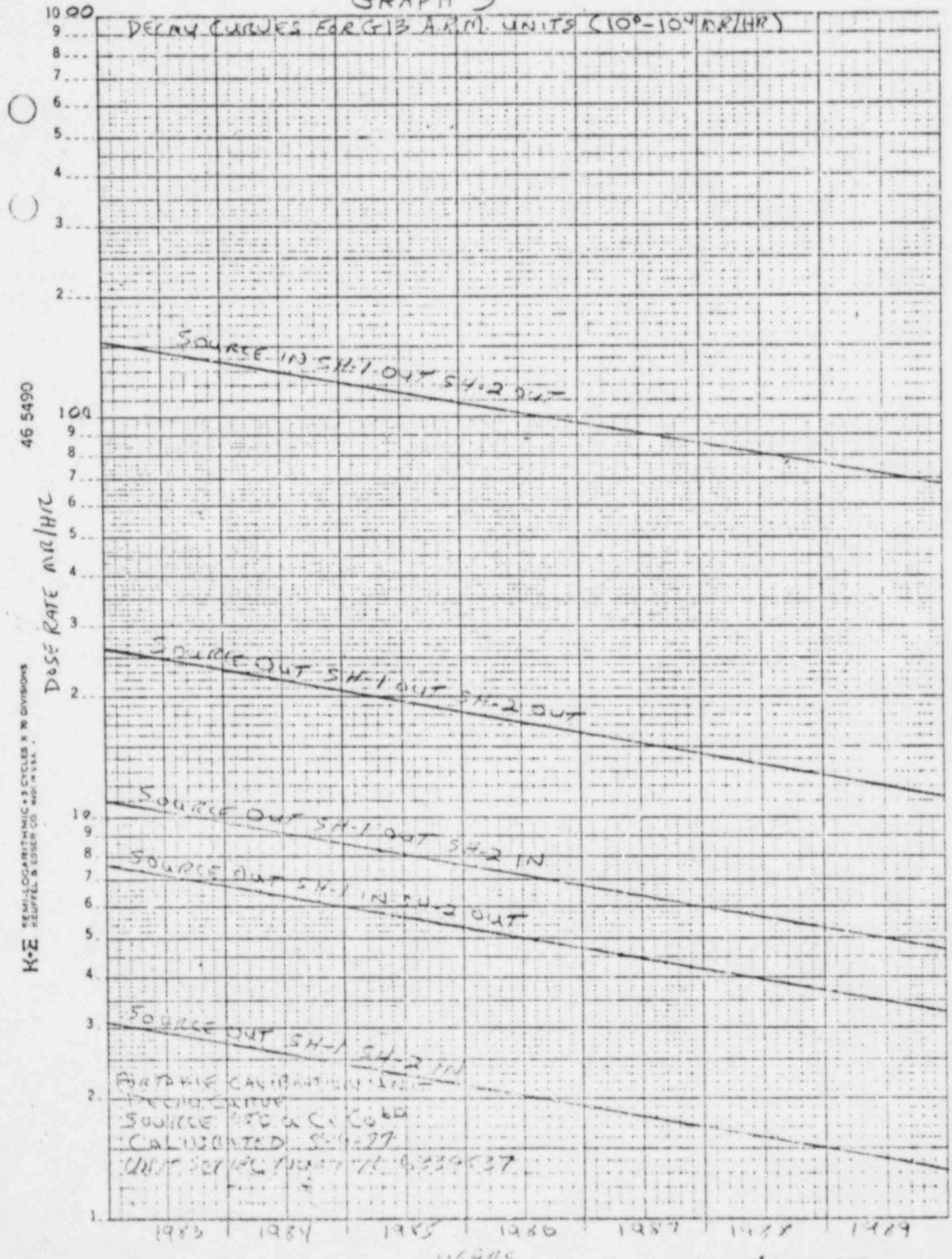
SOURCE & SHIELDS POSITIONS	GROUPS 11 & 12	GROUPS 13 & 15	GROUPS 14, 16 & 17
SOURCE IN SH 1 OUT SH 2 OUT	290.6 MR/HR	303.5 MR/HR	305.9 MR/HR
SOURCE OUT SH 1 IN SH 2 IN	6.97 MR/HR	6.32 MR/HR	6.24 MR/HR
SOURCE OUT SH 1 IN SH 2 OUT	17.47 MR/HR	15.56 MR/HR	15.35 MR/HR
SOURCE OUT SH 1 OUT SH 2 IN	24.53 MR/HR	22.24 MR/HR	21.31 MR/HR
SOURCE OUT SH 1 OUT SH 2 OUT	58.43 MR/HR	53.37 MR/HR	52.1 MR/HR

NOTE: CALIBRATED WITH A. G. E. STANDARD GAMMA COBALT - 60 SOURCE IN SAN JOSE.

CAUTION: AFTER USE, PUSH BOTH SHIELDS & SOURCE TO LOCK POSITION.

GRAPH 3

DECAY CURVES FOR G13 A.R.M. UNITS (10^0-10^4 MR/HR)



MANUAL SET

APPROVAL	
See Title Page	
DATE	
See Title Page	

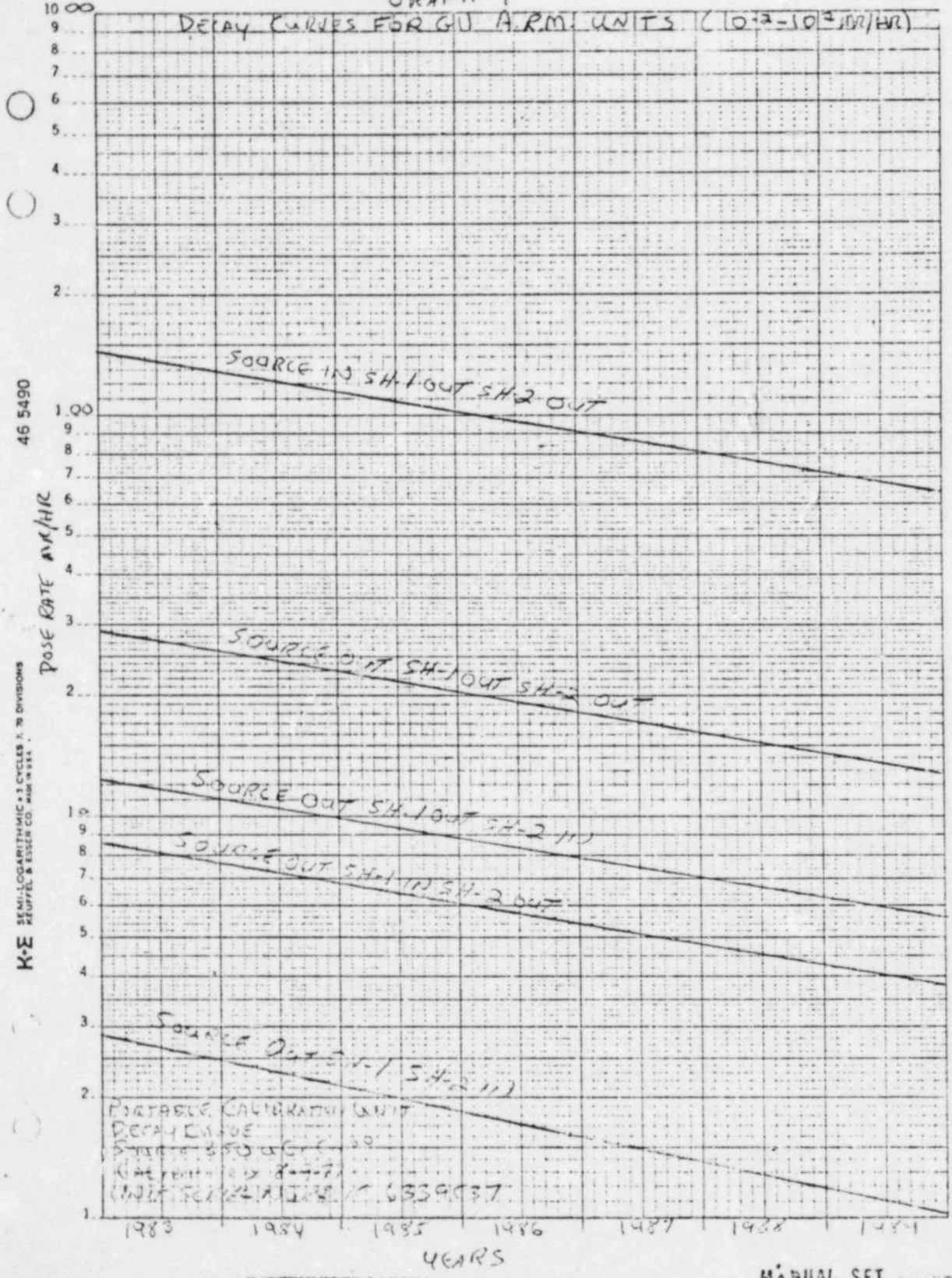
E. I. HATCH NUCLEAR PLANT

Georgia Power

PROCEDURE NO	HNP-8111
REVISION NO	4
PAGE NO	8 of 8

GRAPH 4

DELAY CURVES FOR GU A.R.M. UNITS (10⁻²-10³ MR/HR)



MANUAL SET