

GEORGIA POWER COMPANY

HATCH NUCLEAR PLANT

## PROCEDURE

QUANTITATIVE FIT TESTING  
PROCEDURE TITLE

HNP-8033  
-----  
PROCEDURE NUMBER

LAB  
RESPONSIBLE SECTION

SAFETY RELATED ( )

NON-SAFETY RELATED ( X )

[illegible]

**REFERENCE  
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8206020081 820525  
PDR ADDCK 05000321  
F PDR

HNP-9

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*We*  
PROCEDURE REVIEW REQUEST  
FOR NEW PROCEDURE

*Rec'd 4/14/82*

PROCEDURE NO. HNP- *711D-8033*

SAFETY RELATED ( )

NON-SAFETY RELATED ☒

REQUESTED BY		DEPARTMENT HEAD APPROVAL	
Name:	Date:	Signature:	Date:
<i>Bob Faller</i>	<i>3-25-82</i>	<i>W.H. Rign</i>	<i>4-2-82</i>

Attach marked up copy of procedure to this form.

REASON FOR REQUEST *To provide a procedure for*  
*the use of the quantitative separator*  
*test fit tooth*

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PRB RECOMMENDS APPROVAL: ( ☒ ) Yes ( ) No

*Jessie Kinner*  
PRB Secretary

*82-54*  
PRB Number


*4-13-82*  
Date

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### QUANTITATIVE FIT TESTING

#### A. PURPOSE

1. To instruct Chemical Radiation Technicians in the startup and operation of the Quantitative Fit Booth.
2. To establish parameters and procedures for administering Quantitative Fit Tests to employees required to wear respirators.
3. To document that an individual may obtain a proper seal with a particular face mask.

#### B. GENERAL

Quantitative Fit Testing is a means to establish a relative protection factor for an individual, who must wear a respirator. The test cannot be used to assign higher protection factors than stated in NUREG 0041. The test simply documents that an individual can obtain a seal while wearing a particular face mask.

#### C. REFERENCES

1. NUREG 0041
2. Operational Manual for DynaTech FE 560A/562 Quantitative Fit Testing Apparatus.

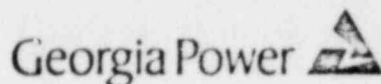
#### D. TEST EQUIPMENT

1. Model FE 560A-NaCl Aerosol Test System
2. Model FE 562-Dehumidifier
3. Fiberglass Testing Booth
4. NaCl (reagent grade)
5. Demineralized Water
6. Liquid Leak Detector (Snoop) <sup>®</sup>
7. Propane (Instrument grade)
8. Aerosol Probe
9. MSA Ultraview Face Mask (Modified with sampling line attached)

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## E. DESCRIPTION OF EQUIPMENT

1. Refer to Operational Manual for DynaTech FE 560A/562 Quantitative Fit Testing Apparatus.

## F. START UP OF EQUIPMENT

### NOTE

During start up refer to Figures 1 and 2 for location of various valves, switches, gauges, lines, etc.

1. Turn valve on Propane Supply Tank OPEN
  - a. Check all fittings with Liquid Leak Detector.
  - b. Adjust propane flow pressure to 1/2 to 6 psig with regulator.
2. Prepare NaCl Solution
  - a. Weigh to the nearest 0.1 gram, 10 grams of reagent grade NaCl. (Non-Iodized)
  - b. To the measured  $10.0 \pm .1$  grams of NaCl, add one Liter of Demineralized H<sub>2</sub>O.
  - c. Stir Solution Vigorously, or shake in a closed Container.
  - d. Allow to stand for 3-5 minutes before using.
  - e. Fill Nebulizer Bottle to a level 1/2" below Nebulizer Stem. (≈ 500ml)

### NOTE

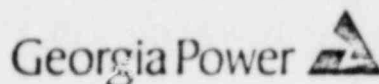
DO NOT add new NaCl Solution to used Solution. (Used solution tends to increase NaCl concentration). New NaCl Aerosol Solution should be used after ≈ 30% of old solution has been used.

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3. Install Nebulizer into Mixing Chamber (#7, Fig. 2).
  - a. Connect 3/8" Tygon Tubing from compressor to inlet nozzle of Nebulizer (vertical nozzle).
  - b. Place Aerosol Outlet Nozzle of Nebulizer through orifice of mixing chamber.

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## CAUTION

Before turning on Power Switch of Aerosol Generating Unit (FE560A) insure Gain Control (High Voltage) is not set above 750 Volts.

4. Turn on Power (# 8, Fig. 1).
  - a. Allow ~ 15 minutes for warm up.

## NOTE

You may continue with Start Up procedure

5. Select Internal or External Air. (# 24, Fig. 1)
  - a. Unless Plant Air is used, Set to Internal Air.
6. Turn Dilution Air Blower on. (# 15, Fig. 1)
7. Turn on Power to Dehumidifier. (# 3, Fig. 1)
8. SET Dilution Air Flow Rate. (# 16, # 17, Fig.1)
  - a. Normal Flow Rate Setting is 2" H<sub>2</sub>O (2" H<sub>2</sub>O ~ 12CFM)

## NOTE


If it becomes difficult to adjust Dilution Air to 2" H<sub>2</sub>O, adjust the 1 1/4" Gate Valve located in the bottom center of FE 560A Cabinet. This is the Dilution Air Dump Valve. (#2, Fig.2)

9. Set flow balance on Dehumidifier (#1, #2, Fig.1).
  - a. Normal Flow Balance Setting is 0.
10. Turn on Generator Air (# 14, Fig.1).
11. Adjust Generator Air Pressure (#18, Fig.1).
  - a. Normal Pressure Setting is 20 P.S.I.
  - b. Check Nebulizer to insure Air Flow (water droplets will appear on bottle):

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## NOTE

It will take  $\approx$  45 min to one hour for booth to reach full concentration. Wait until full concentration has been obtained to ignite burner.

12. Switch on Circulation Fans in Booth.

13. Lighting Burner

a. Press Burner Switch (# 9, Fig. 1). If System is on Internal Air, Combustion Air Pump (# 1, Fig. 2) will turn on. No propane is flowing into system at this time, so gas alarm light will blink and buzzer will turn on. (# 11, Fig 1)

b. Adjust Combustion Air Rotometer. (# 25, Fig. 1)

(1) Normal setting is  $\approx$  11 - 13 LPM.

c. Adjust sample flow rate. (# 27, Fig. 1)

(1) Normal setting is 1.5" H O.

2

d. Press Ignition Switch. (# 10, Fig. 1)

1. Immediately after pressing switch check propane flow rate. (# 28, Fig. 1)

a. Normal Flow Rate is .5 - .8 LPM, gas alarm should deactivate at  $>$  .4 LPM.

2. Ignition should occur within 30 seconds, if not, the gas alarm will activate. Shutdown System and check Propane Tank, Lines, Burner, Combustion Air Flow, and Ignition Spark Assembly and Thermocouple (# 11, Fig. 2).

## CAUTION

DO NOT touch Ignition Spark Assembly while in operation due to High Voltage.  
(# 11, Fig. 2)

3. Ignition system will not operate for 3 minutes after gas alarm activates.

4. To turn flame out, turn off Burner Switch.

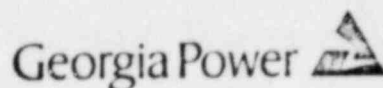
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14. Remove Chimney and Inspect flame (# 7, Fig. 1)
  - a. Flame should take on a "Quilted" appearance, with a small bright blue flame ( $\approx 1/8'' - 3/16''$  High) appearing over each grid opening (disregard flame above flame restrictor on top of glass chimney)

## NOTE

If flame is not acceptable, adjustments are made with Combustion Air Rotometer (# 25, Fig. 1), Propane flow (# 26, # 28, Fig. 1), and Propane Needle Valve (# 8, Fig. 2). Adjustments should not be necessary daily. If Adjustments become necessary consult Operational Manual for DynaTech FE 560A.

15. Turn Power on Strip Chart Recorder. (# 29, Fig. 1)
16. Turn Chart Speed Knob to 2.5 cm/min. (# 29, Fig. 1)
17. Set Range Switch to 0%. (# 20, Fig. 1)
18. Zero chart paper. (# 29, Fig. 1)
19. Insert ink pen into pen holder on Strip Chart Recorder.
20. Switch on Intercom.

## NOTE

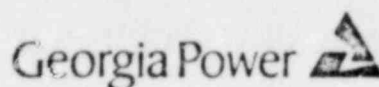
It is necessary to allow the NaCl concentration to reach equilibrium in the booth prior to calibrating equipment ( $\approx 45$  minutes to an hour after equipment startup).

21. Calibration of equipment prior to fit testing.
  - a. Set Range Switch to 100%. (# 20, Fig. 1)
  - b. Switch Sample Mode to "Upstream". (# 12, Fig. 1)
  - c. Adjust Gain to obtain a 80-90% reading on the Percent Penetration Meter. (# 19, Fig. 1)
  - d. Switch Sample Mode to "Clear". (# 12, Fig. 1)

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### NOTE

Allow Percent Penetration Meter to fall below 10% of scale before switching Range Switch to different positions. This prevents meter damage by not allowing meter to peg out.

- e. Switch Range Switch to 10% scale.
  - (1) Allow 2 minute purge of sample line.
- f. Switch Range Switch to 1% scale.
  - (1) Use "Stray Light" control (# 23, Fig. 1) to adjust Percent Penetration Meter to zero.
- g. Switch Range Switch to .1% scale.
  - (1) Adjust "Stray Light" control (# 23, Fig. 1) to obtain  $> 10\%$  but  $< 20\%$  of full scale reading on strip chart.

### NOTE

If "Stray Light" Adjustments are made Gain Settings will be affected.

- h. Repeat steps a. - g. until repeatable readings are obtained which allow an 80%-90% "Upstream" reading on the 100% Range and  $> 10\%$  but  $< 20\%$  "Clear" reading on the .1% range. These parameters are necessary to preform the actual fit test.

### H. ADMINISTERING QUANTITATIVE FIT TEST


- 1. Instructions to subject being tested.
  - a. Don the modified respirator.
    - (1) Assure that subject dons respirator properly and performs negative pressure test for proper seal.
  - b. Open only one Airlock door at a time when entering and exiting booth.
  - c. Cover his sample line inlet until he connects it to downstream sample outlet in booth.

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- d. Leave enough slack on sample line connected to mask so subject can perform exercises without pulling sample line loose from booth fitting.
- e. Inform subject that aerosol in booth is harmless.
- f. Direct subject's attention to "Fit Test Exercises" sign in booth.
- g. Instruct subject to enter booth.
2. Set Sample Switch to "Clear". (# 12, Fig. 1)
  - a. Take a one minute baseline reading (B ) on the .1%  
1  
Range.
  - b. Label baseline reading on strip chart by marking time duration with hash marks or line, and identify by writing the symbol (B ).  
1
3. Set Range Switch to 100%. (# 20, Fig. 1)
4. Set Sample Switch to "Upstream". (# 12, Fig. 1)
  - a. Wait ~ one minute for sample line to reach equilibrium.
  - b. Take a one minute ambient reading (A ).  
1
  - c. Label ambient reading on strip chart by marking time duration with hash marks or line, and identify by writing the symbol (A ).  
1
5. Set Sample Switch to "Downstream". (# 12, Fig. 1)

## NOTE

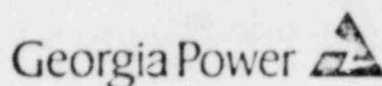
Spiking will occur immediately after switching to "Downstream". This is normal and should be labeled as "Downstream Spike" on strip chart.

6. Set Range Switch to 10% range. (# 20, Fig. 1)
  - a. Allow 2 minutes to pass before switching to lower range. This allows sample line to purge.
7. Set Range Switch to .1% range. (# 20, Fig. 1)

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## NOTE


At this point the fit test exercises should begin, and be recorded on the .1% range. The test may be performed on the 1% range if the .1% range cannot be stabilized.

8. Begin Fit Test Exercises
  - a. Run each test exercise for one minute and label each exercise seperately on strip chart.
    - (1) Normal Breathing
    - (2) Deep Breathing
    - (3) Move head side to side
      - a. Insure that subject does not pull sample line from fitting.
    - (4) Move head up and down
    - (5) Frown
    - (6) Talk
9. Ask subject to intentionally break his seal momentarily.
  - a. Label "Intentional Break" on strip chart.
10. Set Sample Switch to "Clear" (# 12, Fig. 1).
  - a. Obtain second baseline reading (B )  
2
  - b. Label (B ) on strip chart.  
2
11. Set Range Switch to 100%. (# 20, Fig. 1).
12. Set Sample Switch to "Upstream". (# 12, Fig. 1)
  - a. Obtain second Ambient Reading (A ).  
2
  - b. Label (A ) on strip chart.  
2
13. Subject exits Fit Booth.

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## NOTE

Facemask must be sanitized with isopropyl alcohol prior to next use.

### 14. Identification of Fit Test Record

- a. Stamp strip chart with rubber stamp containing the following data:
  - (1) Name
  - (2) Social Security No.
  - (3) Date
  - (4) Operator
  - (5) Average Baseline
  - (6) Average Ambient
  - (7) Average Exercise
  - (8) Remarks (glasses, scars, dentures, etc.)
- b. Record subjects Name, Social Security No., Date, Operator, and Remarks.

### 15. Calculate Protection Factor

- a. Determine average of two baseline readings

$$\bar{B} = (B_1 + B_2) / 2$$

- b. Determine average of two ambient readings

$$\bar{A} = (A_1 + A_2) / 2$$

- c. Locate and label the maximum signal peak for each exercise on strip chart.
- d. Determine average of Fit Test Exercises


$$\bar{E} = (E_1 + E_2 + E_3 + E_4 + E_5) / 5$$

$$\text{Protection Factor} = \frac{\bar{A}}{\bar{E} - \bar{B}}$$

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- e. Record data on strip chart in spaces provided by rubber stamp.
16. Determine whether subject has passed or failed.
  - a. Use the following criteria:  $\geq 50$  protection factor; Pass, and  $< 50$  protection factor; Fail.
  - b. Record pass or fail on strip chart.
17. Remove strip chart paper from recorder and attach individuals results to cover sheet and file record for documentation.

### I. EQUIPMENT SHUTDOWN

1. Turn Burner Switch off. (# 9, Fig. 1)
2. Turn Dilution Air Switch off. (# 15, Fig. 1)
3. Turn Generator Air Switch off. (# 14, Fig. 1)
4. Turn Power off. (# 8, Fig. 1)
5. Turn Strip Chart Recorder off. (# 29, Fig. 1)
6. Turn Circulation Fans off.
7. Remove Nebulizer from mixing chamber, pull air supply Tygon Tubing off. Remove nebulizer from bottle and rinse off with demineralized water.
8. Remove glass chimney (# 10, Fig. 2) and flame restrictor from burner assembly. Clean chimney with soap and water.

### CAUTION


Allow time for burner components to cool.

9. Remove burner grid from burner and clean with demineralized water.
10. Stove nebulizer and burner grid in demineralized water when not in use.
11. Remove Silicone rubber sample line in peristaltic pump (# 13, Fig. 2) and inspect for leaks or worn spots. Clean line with demineralized water. Prior to use insure line is dry before reinstallation in pump.

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### J. MAINTENANCE OF EQUIPMENT

1. Replace peristaltic pump hose monthly or sooner if signs of wear indicate.
2. Clean sample pump flow measurement orifice (# 18, Fig. 2) with demineralized water weekly.
3. Inspect and test hepafilter-weekly.
  - a. Hepa test
    - (1) Turn Dilution air (# 17, Fig. 1) to full flow (clockwise).
    - (2) Turn Dump Valve (# 2, Fig. 2) until Dilution air gauge is full scale pegged.
    - (3) Adjust Dilution air to 2" of H<sub>2</sub>O. (# 17, Fig. 1)
    - (4) If unable to adjust to 2", change hepafilter.
4. Remove NaCl from sample lines (as needed).
  - a. Adjust sample flow to maximum setting (# 27, Fig. 1) while in the "Clear" sample mode.
  - b. Sharply rap burner base, sample lines, and valves with a non metallic object.
  - c. Keep sample flow at a maximum for one to two minutes.
5. Clean sample lines on face masks weekly or replace lines if necessary.


### K. TROUBLE SHOOTING OF EQUIPMENT

1. Refer to Operational Manual for DynaTech FE 560A/562.

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## LEGEND FOR FIGURES

### Figure 1

1. Balance Adjust
2. Flow Balance Gauge
3. Power on (Dehumidifier)
4. Fuse
5. Return Air Inlet(2)
6. Aerosol Outlet
7. Chimney
8. Power on Generator
9. Burner on Switch
10. Ignite Switch
11. Gas Alarm and Burner Temp. Lights
12. Sample Switch (3 modes)
13. Sample Air Gauge
14. Generator Air Switch
15. Dilution Air Switch
16. Dilution Air Gauge
17. Dilution Air Control
18. Generator Air Control
19. Percent Penetration Meter
20. Range switch
21. Fuse
22. Gain
23. Stray Light
24. Combustion Air Switch
25. Combustion Air Rotometer
26. Propane Control
27. Sample Air Control
28. Propane Rotometer
29. Strip Chart Recorder
30. Propane Inlet

### Figure 2


1. Combustion Air Pump
2. Dump Valve
3. Propane Inlet
4. Air Compressor
5. Hepa Filter
6. Nebulizer
7. Mixing Chamber
8. Propane Needle Valve
9. Burner
10. Glass Chimney
11. Ignition Assembly
12. Sample Line
13. Peristaltic Pump
14. Clear Filter
15. Return Air Inlet (2)
16. Aerosol Outlet
17. Dehumidifier Drain Hose
18. Flow Measurement Orifice

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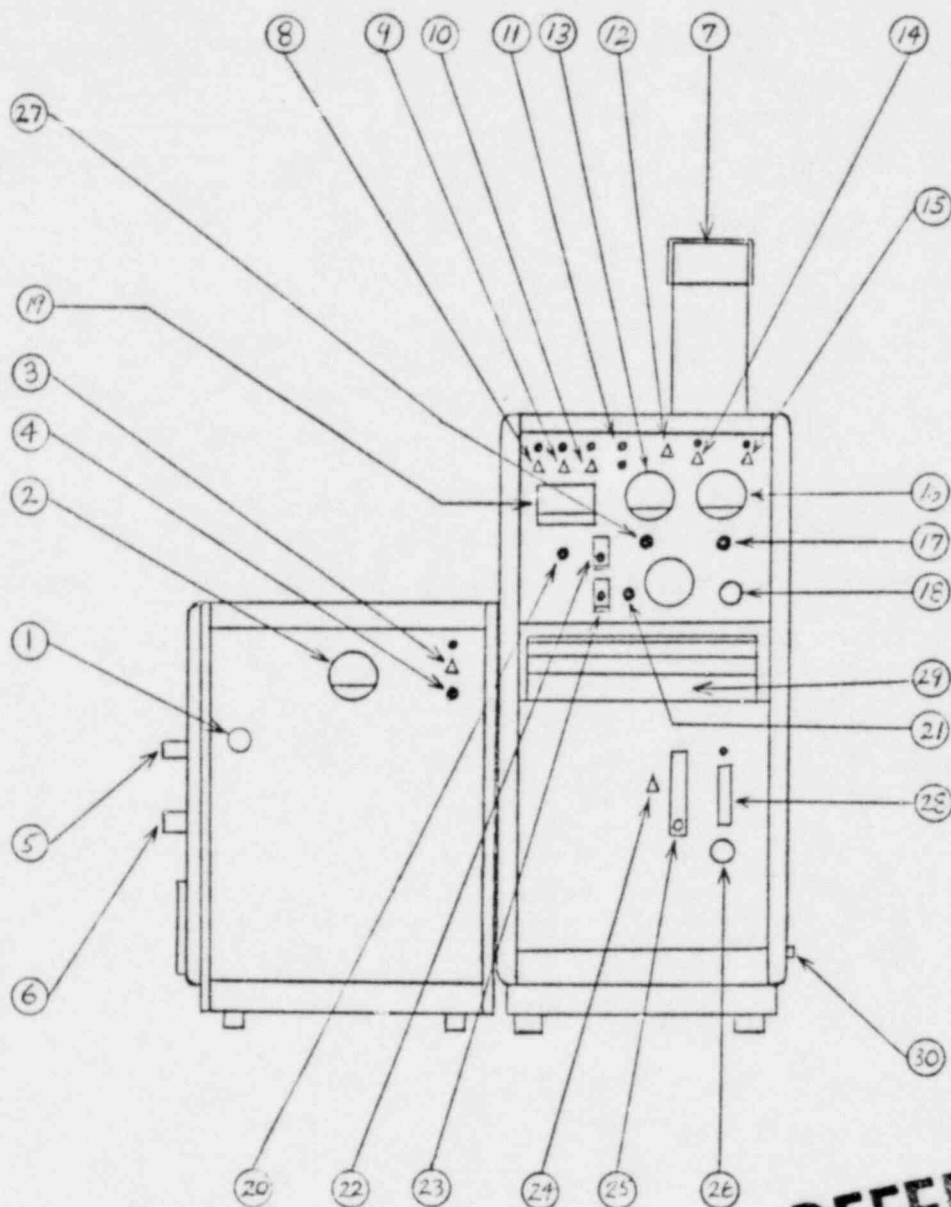
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FIGURE 1  
FRONT VIEW OF FE 560A/562



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