Technical Specifications and Calibration Procedure for

Water Activity Ratemeter used with the AGN 211 Reactor

A. Technical Specifications

1) The Water Activity Monitor provides continuous monitoring of γ activity from the reactor pool water. A scram is initiated if activity increases to a level set according the expectation for reactor power level and length of reactor run.

2) The Water Activity Monitor consists of a scintillation detector [Na I(Tl)], Baird Atomic Model 94224 Preamplifier, and a Baird Atomic Model 435 Linear/Log Ratemeter.

3) The water monitor detector is located within a cylindrical tank shielded with lead bricks, though which the inlet water to the demineralizer is passed.

4) The range of ratemeter extends from 100 CPM to 500k CPM in 12 ranges and will accept pulses of .25v to 10v in amplitude with 0 to 100% pulse height discrimination.

B. Calibration

1) With the power switch "off", adjust the panel meter needle to zero, if necessary. If adjustment is required, use the screwdriver adjustment on the front of the meter face to reset to zero.

2) Set Time Constant swith to Cal. position, the Range switch to 5k, the background supress on 0 per cent. Then set the Pulse Height selector to 20 per cent, the Scale Factor switch to X1 and the Lin-Hv-Log switch to Lin.

3) Set OFF-Standby-ON switch to Standby.

4) The meter should read approximately 3600 CPM.

5) Set Time Constant to 0.1 sec. and check electrical zero. Adjust Zero Adjust Control, if necessary.

6) Check the High Voltage supply output voltage. The voltage reading should indicate the voltage setting on the supply within ±1% of the setting. Adjust the High Voltage supply if necessary. Note: The High Voltage supply used to power the scintillation detector does not have to be the High Voltage supply of the Model 435 Ratemeter.

7) Connect an accurate pulse generator, capable of supplying an appropriate negative pulse at the frequencies indicated on the next page, to the voltage input, J-4.

8) Set the pulse generator to the frequencies listed below and adjust the proper potentiometer, if necessary, for each scale:

Range	Pulse Generator	Indication	Adjust
100 CPM	1.0 PPS	60 CPM	R-43
200 CPM	1.0 PPS	60 CPM	R-44
200 CPM	2 PPS	120 CPM	R-44
500 CPM	2 PPS	120 CPM	R-45
1K CPM	10 PPS	600 CPM	R-46
2K CPM	10 PPS	600 CPM	R-2
2K CPM	20 PPS	1200 CPM	R-2
5K CPM	20 PPS	1200 CPM	R-3
10K CPM	20 PPS	1200 CPM	R-4
10K CPM	100 PPS	6000 CPM	R-4
20K CPM	100 PPS	6000 CPM	R-4
20K CPM	200 PPS	12000 CPM	R-4
50K CPM	200 PPS	12000 CPM	R-4
100K CPM	1000 PPS	60000 CPM	R-5
200K CPM	1000 PPS	60000 CPM	R-5
200K CPM	2000 PPS	120000 CPM	R-5
500K CPM	2000 PPS	120000 CPM	R-5

9) Meter should calibrate on all ranges within ±10% of reading.

10) Connect a variable negative pulse generator to the voltage input, J-4, and set output for a 0.2 volt negative pulse, 60 PPS. Rotate the discriminator setting and observe ratemeter. Count rate should fall to zero when the discriminator setting is set to ~ 20% ± 10% of full scale.

12) Check the Water Monitor Preamplifier as follows:

a) Disconnect the input lead.

b) Connect the pulse generator used in step 11 to the input connector and set the pulse generator for a negative 50 mv output pulse.

c) Connect the output of the preamplifier to an oscilloscope and measure the amplitude of the output pulse.

d) The gain of the preamplifier should be approximately _____.

e) If the gain of the preamplifier is incorrect, set the gain to the correct value by turning R-104 counterclockwise to increase the gain and clockwise to decrease the gain.

f) Record the results of the gain check.

13) After the completion of the calibration of the Water Monitor System, connect all cables and perform the Operational and Response check of the system according to the standard procedure.

14) Record results of the calibration in the master Maintenance Book, the Water Monitor Ratemeter Log Book and on the documentation sheet for this calibration procedure.