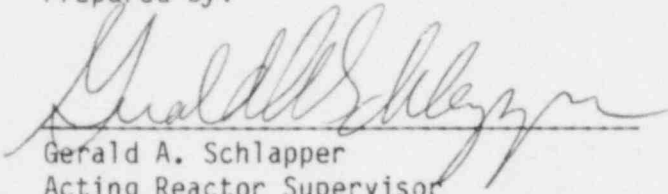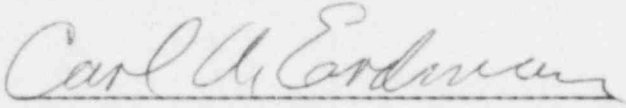ANNUAL OPERATIONS REPORT

of the

TEXAS A&M UNIVERSITY AGN-201M TRAINING REACTOR

NRC LICENSE R-23

June 1, 1981 - May 31, 1982

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1. SUMMARY

This report details the pertinent activities related to the Texas A&M University AGN-201M training reactor facility operated by the Department of Nuclear Enginering during the period June 1, 1981 to May 31, 1982. Furthermore, it is intended that the contents of this report comply with the requirements of 10 CFR 50, Section 50.59 (b) and Appendix A, Technical Specifications, of license R-23.

The utilization of this facility continues to be similar to that of previous years. The general categories of utilization for this past year were support of Nuclear Engineering courses, operator training, RSO radiation safety course, and preventive maintenance. Nuclear Engineering courses supported during the past year were:

ENGR 101G	Engineering Analysis
NE 402	Nuclear Detection and Isotope Technology Laboratory
NE 405	Nuclear Engineering Experiments

During normal preventive maintenance, malfunctioning components were replaced as detailed in Section 4. Facility modifications and component replacement performed during this reporting period do not involve unreviewed safety questions and are not expected to adversely affect the safe operation of this facility.

The results of all major parameter surveillance tests are shown in Table I.

TABLE I. REACTOR PARAMETER SURVEILLANCE MEASUREMENTS

Date		Value
30 January 1982	Safety Rod #1 - Reactivity Worth	1.163% δ k/k
30 January 1982	Safety Rod #2 - Reactivity Worth	1.163% δ k/k
30 January 1982	Coarse Control Rod-Reactivity Worth	1.200% δ k/k
30 January 1982	Fine Control Rod-Reactivity Worth	0.347% δ k/k
22 March 1982	Safety Rod #1 - Drop Time	140 msec
22 March 1982	Safety Rod #2 - Drop Time	180 msec
25 January 1982	Coarse Control Rod - Drop Time	130 msec
30 January 1982	Total Excess Reactivity at 20°C with Glory Hole Empty	0.312% δ k/k

2. OPERATIONAL SUMMARY

Utilization by Category:

(a)	Support of Nuclear Lab Engineering Courses	67.09 hour
(b)	Reactor Operator/Senior Reactor Operating Training	12.16 hour
(c)	Radiation Safety Office Short Course	1.47 hour
(d)	Preventive/Corrective Maintenance	11.32 hour

Total Operating Hours	92.04 hour
Total Watt-hours of Operation	82.36 watt hrs.
Average Power Level of Operation	0.89 watts
Number of Reactor Startups	105

3. UNSCHEDULED SHUTDOWNS

DATE	TYPE	CAUSE	CORRECTIVE ACTION
9/14/81	Chan. 2 High Level Trip	High Level Trip Out of Calibration	Re-Calibrated High Level Trip Set Point
9/14/81	Chan. 3 High Level Trip	Operator Error in Switching Range Switch	Re-instruct Student Operator
2/12/82	Chan. 3 Low Level Interlock	Operator Error in Switching Range Switch	Re-instruct Student Operator
2/25/82	Chan. 2 Short Period Trip	Reactivity Addition By Experiment Manipulation	Caution Laboratory Students and Teaching Assistant

Date			
2/25/82	Chan. 3 High Level Trip	Reactivity Addition By Experiment Manipulation	Caution Laboratory Students and Assign Additional Staff Personnel
3/4/82	Chan 3. High Level Trip	Operator Error in Switching Range Switch	Re-instruct Student Operator
3/9/82	Chan. 3 High Level Trip	Operator Error in Switching Range Switch	Re-instruct Student Operator
3/24/82	Manual Scram	Operator Noted Channel 1 Indication Failing Low During Startup Checks	Troubleshoot and Reset Channel 1 Discriminator
3/25/82	Chan. 3 High Level	Operator Error in Switching Range Switch	Re-instruct Student Operator
3/25/82	Chan. 3 High	Operator Error in Switching Range Switch	Counsel Operator
3/25/82	Loss of Console Power	Console Inadvert- antly De-energized by Technician	Re-Energized Console and Insured Twist Lock Connector was locked
4/12/82	Chan. 3 Low Level Interlock	Range Switch Contacts Dirty, Indication Low During Switching	Cycled switch to clean contacts
4/22/82	Manual Scram	Operator Noted Loss of Control of Fine Control Rod	Fine Control Rod Drive Motor Shorted, replaced with Identical

Summary

(a) Scrams due to Instrument Failure

    or Malfunction   4

(b) Scrams due to Operator Error   7

(c) Scrams due to Experiment Manipulation   2

TOTAL UNSCHEDULED SHUTDOWNS   13

4. CORRECTIVE MAINTENANCE AND COMPONENT REPLACEMENT

Corrective maintenance and component replacement performed as normal maintenance of the Texas A&M University AGN-201M reactor during this reporting period are summarized as follows.

(a) 20 July 1981 - Re-energized Nuclear Instrumentation Channel 2. The instrument was de-energized 5/7/81 due to spurious trips, and repair not completed until this time due to absence of SRO. Replaced V15 and performed maintenance procedure C2TC-6, after which channel 2 operation was determined satisfactory.

(b) 11 September 1981 - During the performance of the start-up check-off procedure, the skirt monitor instrument was noted to have blown fuse. The skirt monitor fuse was replaced and the instrument was determined to be operational.

(c) 14 September 1981 - Due to Channel 2 High Level scram, performed calibration check of the Channel 2 instrument, using data from the most recent power calibration. The high level scram setpoint had drifted low,

out of calibration. Checked channel 2 vacuum tubes, readjusted the high level trip setpoint to specification, and returned channel 2 to operation.

(d) 18 December 1981 - Noted nuclear instrumentation Channel 2, period meter appeared to stick at a reading of approximately 3.3 sec, during the performance of preventive maintenance procedure PD2M-3. Cycled the meter pointer in an attempt to clear any dust or debris from the meter movement. Any further repair was delayed until additional technical assistance was available during future PMS scheduling. The AGN reactor was not operated until such time as repair was completed.

(e) 26 January 1982 - continued trouble shooting and repair of the Channel 2 period meter. Period meter appeared to operate sluggishly and stick. The meter was replaced with an identical meter from the Channel 2 shop spare drawer. The period meter continued to operate improperly. performed PM procedure C2TC-6 and replaced vacuum tubes V-7, V-10, V-11, V-14, and V-17, and obtained satisfactory operation of the meter. The original period meter was reinstalled and the subsequent response check was satisfactory.

(f) 26 January 1982 - Noted nuclear instrument Channel 1 reading abnormally high, at approximately 10^4 cps, with the reactor secured. The channel 1 Amplifier was extremely noisy, and the gain controls were cycled to clean the contacts. The noise problem was corrected and the instrument check was satisfactory.

(g) 11 March 1982 - Noted "carriage engaged" indication for SR2 operating intermittently, yet "carriage up" light indicated normal operation of SR2. SR2 was removed for inspection and the cause of the failure determined to be a loose microswitch on the SR2 chassis. The micro switch, which operates to give "carriage engaged" indication on the reactor console was adjusted. Subsequent tests showed proper operation of all SR2 indicator lights.

(h) 24 March 1982 - Following the manual reactor scram due to Channel 1 count rate indication low, the Channel 1 instrumentation was checked. The discriminator was adjusted and after further checks the channel was determined to be operating satisfactorily.

(i) 25 March 1982 - During normal reactor operation, the readings on Channel 2 appeared to be consistently higher than normal, at various power levels. The reactor was shutdown and troubleshooting revealed a bad calibration battery. The battery was replaced and instrument calibration checks were performed satisfactorily.

(j) 8 april 1982 - Commenced troubleshooting of nuclear instrumentation Channel 1. A 400 V increase in the detector plateau, compared to the previous PMS data, was noted during the performance of maintenance CHIP-3, 6 April 1982. The Channel 1 detector was replaced with an identical model from the AGN spare parts inventory. The replacement detector plateau check was performed using a portable counting system setup.

(k) 9 April 1982 - Upon placing the new Channel 1 detector into service, using the existing reactor Channel 1 instrumentation, proper count rate response could not be obtained as per preventive maintenance procedure CHIP-3.

(l) 12 April 1982 - Continued troubleshooting of Channel 1 instrumentation showed no output from the preamplifier. The preamp was replaced with identical model and type, from the electronic shop spares. A satisfatory operational check was performed and a high voltage plateau was recorded according to maintenance procedure CHIP-3.

(m) 16 April 1982 - Noted an abnormally high count rate reading on nuclear instrument channel 1. Trouble shooting revealed slightly distorted signal pulses from the preamplifier.

(n) 19 April 1982 - Continued troubleshooting of Channel 1 revealed a DC level offset, with the neutron pulses at a level 0.8 VDC above zero. The amplifier DC level was adjusted to less than a 10 mV offset, and the channel 1 discriminator level was reset.

(o) 20 April 1982 - Performed maintenance procedure CHIP-3 and set the Channel 1 high voltage accordingly.

(p) 22 April 1982 - Investigation following the loss of control of the Fine Control Rod, and subsequent manual reactor scram, revealed a blown fuse in the Fine Control Rod DC power circuit. Further checks revealed the FCR control switch contacts had arced and melted slightly. The fine control rod switch was rewired using the switch's adjacent spare contacts, and the power supply fuse was replaced. The FCR was removed for inspec-

tion and it was noted that the motor armature was shorted. An exact-replacement drive motor was installed and operated satisfactory. Applicable preventive maintenance checks were performed prior to reactor start-up.

(q) 29 April 1982 - Noted calibration problem in Channel 1 during the performance of maintenance procedure CH1LT. The log count rate meter could not be calibrated using a precision pulse generator. The AGN reactor was secured until full repairs could be completed.

(r) 19 May 1982 - Replaced the nuclear instrument Channel 1 preamplifier and amplifier with functionally and electronically comparable instruments. The replacement instruments were determined to be of considerably better quality and more state-of-the-art than the existing instruments. The replacement model numbers were Tennelec TC 133 preamp and Tennelec TC 202BLR amplifier. Subsequent testing showed marked improvement in the quality of the Channel 1 nuclear pulse signals at all available test points up to the Channel 1 count rate circuitry. The signal to noise ratio was improved significantly over the previously installed preamplifier and amplifier. Channel 1 was still out of service due to calibration problems in the count rate circuitry.

The corrective maintenance and component replacement performed during this reporting period have no impact on the safe operation of the reactor facility and do not change the description of the facility as submitted in the license application and amendments thereto.

5.   (a) REACTOR MODIFICATIONS

No modification were made to the Texas A&M University AGN-201M reactor during this reporting period.

(b) CHANGES TO PROCEDURES

The AGN-201M Emergency Procedures and Security Procedures were revised to include changes in phone numbers and personnel responsibilities. The procedures were reviewed by the Reactor Safety Board.

(c) NEW EXPERIMENTS OR TESTS

No new experience or tests were performed during this reporting period.

6.   SUMMARY OF SAFETY EVALUATIONS

No changes, tests, or experiments were performed subsequent to 10 CFR 50 paragraph 50.59 during this reporting period; therefore, no safety evaluations were required.

7.   SUMMARY OF RADIOACTIVE EFFLUENT RELEASES

No liquid or solid radioactive waste was released during this reporting period.

8.   ENVIRONMENTAL RADIOLOGICAL SURVEYS

No environmental radiological surveys were performed outside the facility during this reporting period.

9.   RADIATION EXPOSURE

No reactor facility personnel or visitors received radiation exposures greater than 100 mrem (50 mrem for persons under 18 years of age) during this reporting period.

10. REACTOR SAFETY BOARD ACTIONS

   (a) 28 January 82

The Reactor Safety Board performed the yearly review of the AGN-201M Security Plan. The Board also conducted the biennial review of the Emergency Plan. The board agree. that the plans were still satisfactory for their intended purposes.

   (b) 28 January 82

The Reactor Safety Board reviewed audits previously performed.

   (c) 5 March 82

The Reactor Safety Board reviewed and approved changes to the AGN-201M Security Procedures and Emergency Procedures. The revisions consisted of changes in phone numbers and responsibilities of personnel.

   (d) 5 March 82

The Reactor Safety Board reviewed audits previously performed.

11. MISCELLANEOUS

The following personnel participated in the AGN Reactor Operator/ Senior Reactor Operator qualification program. After passing the NRC administered exams the personnel were issued the following licenses:

   Carl Erdman   SOP-4136   effective 13 January 1982

   Gerald Schlapper   SOP-4210   effective 16 January 1982

   David Carpenter   OP-5850   effective 24 February 1982

   Barry Willits   OP-5849   effective 24 February 1982

The Reactor Supervisor position is currently being filled on a temporary basis by Dr. Gerald Schlapper while a permanent replacement is being trained.