UNM SCHOOL of ENGINEERING

Department of Nuclear Engineering

October 13, 2021

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Enclosed is the 2021 Annual Report for the AGN-201M reactor located at the University of New Mexico – Docket 50-252.

We apologize for the tardiness of the report. We have been short-staffed in the wake of department retirements and the concomitant search / hiring process for a new NE Laboratory Supervisor. An additional maintenance activity (replacement of a 100-volt power supply) falling outside the reporting period further delayed completion of the report.

Sincerely,

Carl A. Willis
Chief Reactor Supervisor

Gary W. Cooper, Ph.D.
Reactor Administrator

ec: Ed Helvenston: Edward.Helvenston@nrc.gov

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REPORT ON FACILITY LICENSE NO. R-102

THE UNIVERSITY OF NEW MEXICO

JULY 1, 2020 – JUNE 30, 2021

The University of New Mexico's AGN-201M reactor was only used for teaching and training during 2020 – 2021.

During September and October of 2020, non-routine maintenance activities were undertaken to diagnose and address the stuck-rod situation from Feb. 5, 2020 described in Event Number 54546. Documentation of these activities is appended. We determined that the most likely cause for the rod becoming stuck in the most reactive position was residual magnetization of the ferromagnetic rod armature and / or electromagnet core. Residual magnetic field of about 0.2 millitesla was measured on the armatures of both Safety Rods, and about 0.5 millitesla on the magnet poles following their removal from the reactor. This residual field measurably decreases with time and is presumably much stronger in the first seconds following a scram. The first maintenance activity was like-for-like replacement of resistors, capacitors, and diodes in magnet snubber circuits on the large control rods, followed by measurement of large rod drop times. This activity identified no defective resistors, capacitors, or diodes among the replaced components, and it did not result in any statistically significant differences in measured rod drop times. An additional remedy adopted was insertion of Mylar spacers between the large rod carriages and magnet poles, thereby allowing some magnetic flux leakage and decreasing the likelihood of rod retention by residual magnetization of the magnet cores. 10 CFR 50.59 evaluation was performed for this change and it was reviewed and authorized by the Reactor Safety Advisory Committee. Our Report on the completed maintenance is attached. The insertion of Mylar spacers was associated with substantial reductions in the drop times for two rods and improved statistics on one that appeared to have bimodal distribution; the Coarse Control Rod (CCR) showed an increase in drop time. The major conclusion in this report is that the underlying cause of this type of failure—residual magnetization—is inherent in the AGN-201M reactor design. We would expect likelihood of occurrence to be reduced—though not necessarily to zero—by any number of techniques that reduce magnetic field in the rod electromagnets and armatures, including but not limited to the introduction of a spacer (as we have done), the reduction of current in the magnets (less easily accomplished for us), or the use of alternating current in the magnets rather than DC (which would require major modifications). Operator awareness of the failure mechanism is considered important, and our operators have all been drilled on response to stuck rod scenarios and vigilance for such problems during intentional scrams.

Other maintenance during the reporting period included replacing spacer rods on the control rod drives (deemed like-for-like) in response to thread failure on one of these, and adjusting switch plate positioning on the control rod drives (deemed "simple maintenance") to avoid logical faults (e.g. both Out and In lamps illuminating and inability to drive rods in).

No changes in operating procedures related to reactor safety during the reporting period were made.

COVID – 19 pandemic controls adopted by UNM in the second quarter of 2020 did not impact the use of the reactor as it did in the last year. Student Reactor Operator candidates were trained on the reactor. Two new RO candidates were successfully licensed during the reporting period. Despite the challenges posed by COVID-19, facility security and surveillances were unaffected, and licensed staff maintained currency in operating hours during the reporting period. Consequences of the former NE Laboratory Supervisor's retirement in January 2020 have been more impactful, particularly with respect to attention to administrative tasks. The Department is in the process of recruiting and interviewing candidates to fill the NE Laboratory Supervisor position, and in the meantime those duties have been taken over by Carl Willis (Chief Reactor Supervisor, half time at UNM) and Rowdy Davis (licensed RO and graduate student temporarily serving as part-time laboratory supervisor).

The AGN-201M Reactor Facility is an essential part of our educational program, including public education, and continues to serve us well. The use of the reactor from July of 2020 through June of 2021 was as follows:

Type of Use	**July 1 - June 30 Hours**	**July 1 - June 30 Watt-hours**
Class and Public Demonstrations	1.93	1.53
Faculty Research	0.0	0.0
Graduate Student Research	0.0	0.0
Maintenance and Equipment Check	1.033	2.18
Operator Training and Requalification	12.83	17.42
Teaching	75.1	118.93
Totals for the Year	**90.73**	**140.06**

During the reporting period, there were no unplanned scrams. No reportable events occurred during this period. An upgrade of the entire control panel is envisioned in the future with the goal of making the panel less susceptible to end-of-life failures and extending the overall reliability of the control panel for the AGN-201M.

During the reporting period, there was no liquid radioactive waste released from the facility nor was there any solid waste released. The annual environmental radiation survey was performed and is attached to this report. All personnel exposures during the reporting period were below 50 mrem per person with the majority of personnel receiving below 5 mrem. No facility visitors received measurable exposures.

An outside environmental survey (attached to this report) was performed on April 30, 2021. At 60% licensed operating power, the highest reading outside the facility was 0.164 mR/hr gamma and 0.8 mR/hr neutron dose rate.

Carl A. Willis took over the role of Chief Reactor Supervisor from Dr. Robert D. Busch, effective July 1, 2020.

Dr. Hyoung Koo Lee took over as permanent Department Chair for the Interim Department Chair Dr. Charles Fleddermann on August 3, 2020.

The following licenses are being terminated:

- Gary Cooper
- Kenneth Carpenter

The current personnel assignments are (as of June 30, 2021):

UNM President	Garnett Stokes
Dept. Chair of Nuclear Engineering	Hyoung Koo Lee
Reactor Administrator	Gary W. Cooper
Chief Reactor Supervisor	Carl A. Willis
USNRC-licensed Senior Reactor Operators	Robert D. Busch
	Carl A. Willis
USNRC-licensed Reactor Operators	Erik Boldt
	Rowdy Davis
	Robert Dwyer

The makeup of the Reactor Safety Advisory Committee as of June 30, 2021 is:

James Bryson
Matt Burger
Charles Harmon II
David Hayes
David Hindera
Ron Knief
David Summers

There are currently no vacant positions on the committee.

The University of New Mexico's AGN-201M reactor continues to be used extensively for teaching experiments as a part of our undergraduate and graduate programs. These experiments include approach-to-critical, reactor period and reactivity measurements, importance functions measurements, sample activation, control rod calibrations, and reactor power and neutron fluence measurements. The reactor is also used throughout the Fall, Spring, and summer sessions of the University. All experiments have received prior approval from our Reactor Safety Advisory Committee.

10/22/2021

Gary W. Cooper
Reactor Administrator

Attachments: Environmental Survey
10 CFR 50.59 evaluation, procedures, and report for Mylar spacer installation on large control rods

Attachment 1: Environmental Survey

HEALTH SCIENCES
OFFICE OF RESEARCH

RS-40-7-R3 Nuclear Engineering AGN-201 Reactor Operational Radiation Survey

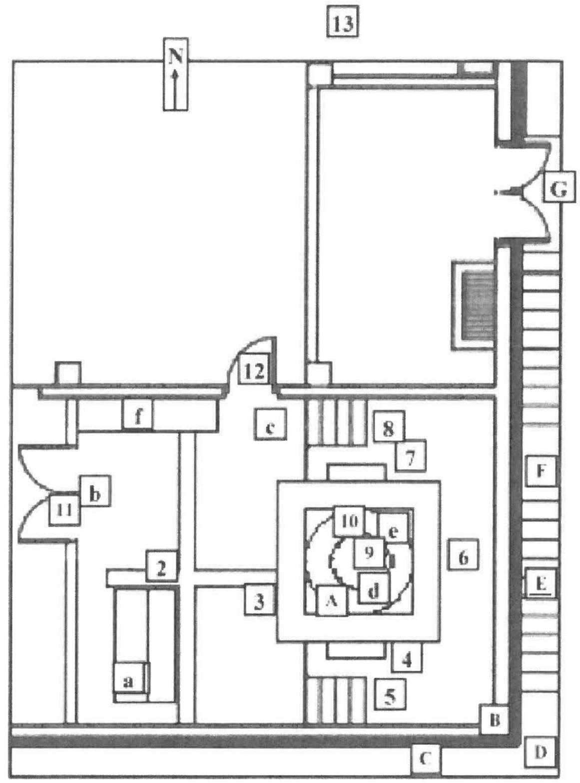
Date: 04/30/2021 ***Surveyed By:*** Mathew Eden

Type of Operation: Routine ***Reactor Power:*** 3 watts Max Operating Power 5 watts

Instruments Used:

Make	Model	SN	Detector	SN	Cal date:	Background					MDA (dpm)		
											(α)	(β)	(γ)
Ludlum	9DP	25009135	Internal		08/28/20	In[1]	0.006	Out[2]	0.010	mR/hr			
Ludlum	12	97339	42-4	PR096733	09/03/20	In[1]	0	Out[2]	0	mrem/hr			
Ludlum	2200	66005	7IEWQ8/2	080316K	12/17/20			235		cpm			139
Protean	M9300	08298136	Internal		04/08/21	(α)	0.2	(β)	0.5	cpm	9	10	

	Location	γ dose rate (mR/hr)	neutron dose rate (mrem/hr)
	Reactor Room 065		
1	Console	0.77	1.0
2	Center – west wall and reactor	7.00	12.0
3	Reactor - glory hole access*	12.00	20.0
4	Reactor - south side access points	6.58	32.0
5	Reactor - south access shield door	20.0	6.0
6	Reactor - east wall	18.40	12.0
7	Reactor - north side access points	9.60	40.0
8	Reactor - north access shield door	1.07	2.0
9	Reactor - top center	164.00	28.0
10	At area monitor on top of reactor	69.00/70.0	NA
11	West door	0.42	1.2
12	North door	1.41	2.4
13	Facility manger office 085	0.024	0
	Outside Measurements		
A	Roof top - 10 in from S and E sides	0.020	0.0
B	Roof top - SE corner	0.009	0.0
C	5' W of SE corner - waist level (1m)	0.012	0.0
D	SE corner of building - ground level	0.012	0.0
E	East side	0.061	0.0
F	Lower flower bed - ground level	0.164	1.8
G	Service doors - east side of building	0.154	0.0



Smear Survey Results
Results (net dpm)

	Location	α	β	γ
a	Operator console	0	0	11
b	Floor – west entry	0	9	21
	Floor – north entry, stair case	0	0	26
u	Top of reactor - shield, ports	1	0	37
e	Top of reactor - floor	1	0	17
f	N. bench top	0	0	29

Comments:
*Glory hole open
[1] Background measured in room 083
[2] Background measured at NE area of roof

Attachment 2: 10 CFR 50.59 evaluation, procedures, and report for Mylar spacer installation on large control rods

REACTOR MAINTENANCE LOG SHEET
The University of New Mexico AGN-201M Reactor Facility

I. REQUEST FOR MAINTENANCE

a. Date: 9/08/2020

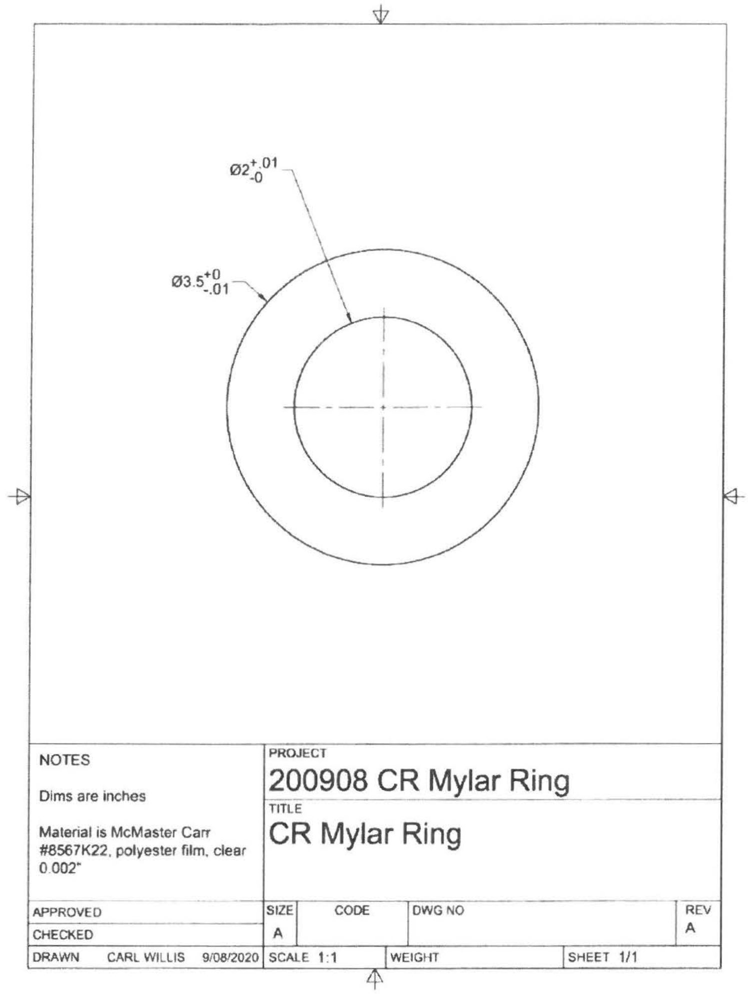
b. Description of Malfunction or possible Malfunction:

Slow rod drop on SR1 noted on Feb. 25, 2020 could be a result of residual magnetization of rod engaging magnet core and / or armature. Similar residual magnetization could affect scram performance of SR2 and the CCR. Residual magnetization in SR1 and SR2 was observed (the CCR has not yet been measured).

c. Proposed Corrective or Preventive Maintenance:

RSAC has previously authorized the temporary use of Scotch tape as a spacer between SR1 rod engaging magnet core and armature. This approach has been demonstrated to be successful at reducing SR1 scram time and keeping it well below the TS 3.2b limit. The proposed maintenance will replace the tape spacer with a more durable, reproducible, and permanent polyester ("Mylar") washer, which will be understood to function as a non-ferromagnetic leakage path for residual magnetic flux in the magnetic circuit composed of the rod engaging magnet core and the rod armature.

1. Tape previously installed on SR1 will be removed.
2. Washer installation will follow a new temporary procedure, 200908_TEMPPRO_Mylar_Washers, as authorized by the Reactor Administrator, RSAC, and Chief Reactor Supervisor following review. Washers will be installed on SR1 and, additionally, SR2 and the CCR. Drawing of proposed washers is copied below.



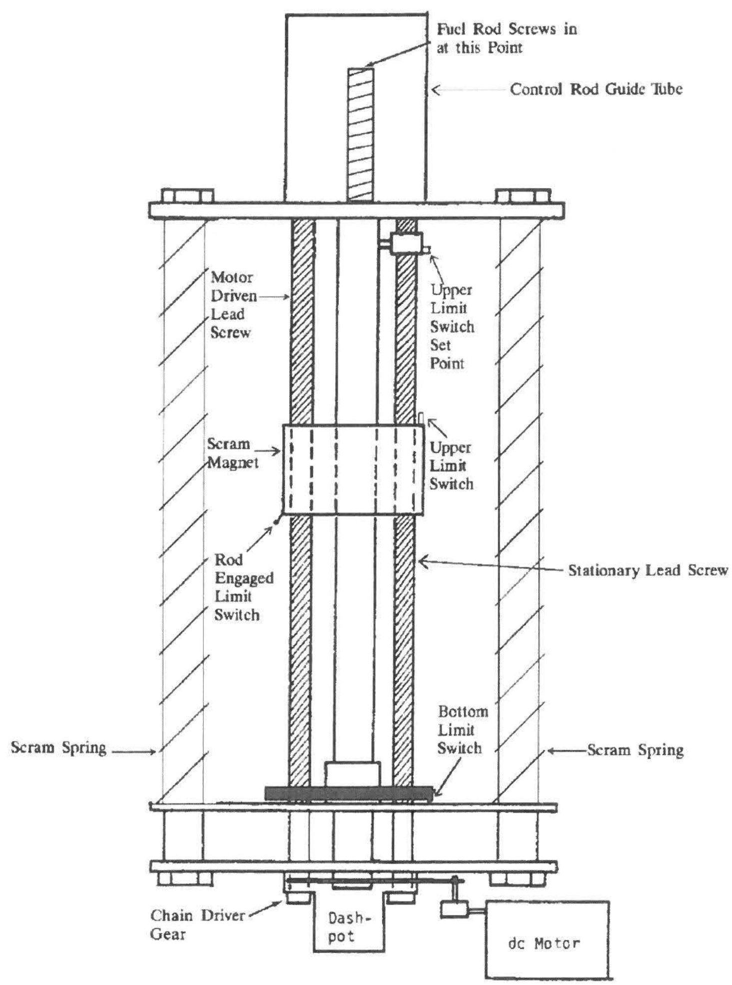
d. Maintenance to be Performed by:

Carl Willis, Ken Carpenter, Bob Busch, Gary Cooper, Rowdy Davis, Jacob Hunt, or any subset thereof consisting of at least two persons and one SRO.

e. Safety Review (50.59 process unless like for like or simple maintenance):

10 CFR 50.59 Screening Questions

1. Is it a change to the Technical Specifications?
   The proposed change does not involve any changes to the Technical Specifications.
2. Is it a change to the facility as described in the final safety analysis report?
   YES, it is a change (addition) to the control rod drive assembly as depicted in Figure 8 of the SAR (see below).



3. Is it a change to the procedures as described in the final safety analysis report?
   The proposed change does not involve any changes to procedures described in the final safety analysis report.
4. Is it the conduct of tests or experiments not described in the final safety analysis report?
   The proposed change is not a test or experiment.

The maintenance as described constitutes a change to the facility and a 50.59 Evaluation is deemed necessary.

10 CFR 50.59 Evaluation Questions

Does the proposed change…

1. Result in more than a minimal increase in the frequency of occurrence of an accident previously evaluated in the final safety analysis report (as updated)?
   a. Accidents evaluated in the SAR are discussed in Sections V and VI.

      The Maximum Credible Accident "could only occur if improper materials were introduced into the reactor." The proposed change does not involve introduction of materials into the reactor, and the change will thus not increase the frequency of the Maximum Credible Accident.

      Equipment failure, specifically if all the rods fail to scram, is analyzed in VI(B)(3) and VI(C)(3) of the SAR. Since the proposed change directly concerns the scram mechanism of the reactor, this type of failure is a relevant consideration. The frequency of two scenarios relating to the proposed change and leading to a stuck rod should be considered in some detail:
      i. Jamming: items introduced into the rod drive assembly could become caught between the rod body and the scram magnet or between the armature and the bottom of the assembly, potentially hindering a rod's descent.
      ii. Rod held up by residual magnetism: if the proposed Mylar washer is not used or if it were to break free of the rod, the assembly would be in a configuration where residual magnetism is potentially high enough to delay scramming of the rod, the scenario the addition of this washer is intended to prevent.

      Scenario (i) above should be considered very unlikely. A closed annular washer of the dimensions proposed would have to undergo rather improbable contortions to become entrained in the space between rod body and magnet. Furthermore, even if this happened, the rod is heavy and the Mylar material proposed is thin and pliable and free of adhesives and would be unlikely to present significant impediment to the rod's descent. The radial dimension of the gap is approximately 1/8 inch whereas the proposed Mylar material is 0.002 inch thick. The other configuration in Scenario (i) involves the introduced material ending up beneath the rod armature when the rod falls. There is no credible way for this configuration to significantly impede the removal of the rod from the reactor, however.

Scenario (ii) is specifically what the change is proposed to remedy. Without the proposed change, Scenario (ii) is MORE likely to occur (and indeed has been observed to occur, on 2/25/2020). It is worth mentioning that neither Scenario (i) nor (ii) leads directly to the all-rods-stuck accident analyzed in VI(C)(3); they are far more likely to result in a one-stuck-rod scenario. As discussed in VI(C)(3), the removal of any single large control rod (SR1, SR2, or CCR) is sufficient to bring the system subcritical, so if one of these rods becomes stuck, two more remain effective in a scram. The relative infrequency of Scenario (i) when compared to Scenario (ii) is favorable toward making the change as proposed, which will result in a decrease in the frequency of occurrence of an accident when compared with the frequency if no action is taken.

2. Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system, or component (SSC) important to safety previously evaluated in the final safety analysis report (as updated)?
    a. The response to Q1 treats this question, having classified a malfunction of the rod scram mechanism as an accident. If it is preferable to consider this as an SSC malfunction rather than an accident, the same language is responsive to this question.
3. Result in a more than minimal increase in the consequences of an accident previously evaluated in the final safety analysis report (as updated)?
    a. Consequences of accidents are discussed in Section VI(C) of the SAR. Consequence severity is limited by the disassembly of the core (melting of the thermal fuse) in the case of very large reactivity insertions, or by thermal feedback, which limits core power to about 10W in the steady state with all rods stuck in the most reactive position. The core fuel remains intact in both cases, and fission products are contained by the core tank.

       The proposed change does not alter the underlying core properties or the fission product barriers that are relied upon in analysis of the consequences of accidents, and so we conclude that the proposed change will not result in a more than minimal increase in the consequences of an accident previously evaluated in the final safety analysis report (as updated).
4. Result in a more than minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the final safety analysis report (as updated)?
    a. In Q1, we identify the simultaneous failure of all rods to scram from their most reactive position to be the consequential issue central to the proposed change. The most important consequence of this malfunction is excessive dose to personnel (80 mrem/hr at steady state at the least advantageous position outside the reactor tank, per VI(C)(3)). A properly trained operator should be able to detect this scenario quickly and shut down the reactor by inserting the cadmium rod into the Glory Hole, limiting consequences.

       The nature, magnitude, and method of control of consequences for this scenario are not altered by the proposed change.

5. Create the possibility for an accident of a different type than any previously evaluated in the final safety analysis report (as updated)?
    a. The proposed change to the control rod drive assembly does not change the failure modes that have been evaluated in the SAR (e.g., stuck rods) and thus, no new accident types are postulated.
6. Create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the final safety analysis report (as updated)?
    a. The proposed change to the control rod drive assembly does not change the failure modes that have been evaluated in the SAR (e.g., stuck rods) and thus, no different results of failures are postulated.
7. Result in a design basis limit for a fission product barrier as described in the FSAR (as updated) being exceeded or altered?
    a. The fission product barriers described in the SAR are the core tank and the core fuel itself. The proposed change does not involve the fission product barriers.
8. Result in a departure from a method of evaluation described in the FSAR (as updated) used in establishing the design bases or in the safety analyses?
    a. All evaluation methods and safety analyses in Section VI of the SAR remain applicable.

f. Remarks:

The answers to the screening questions establish that a license amendment is not needed, and a 10 CFR 50.59 Evaluation is required.

The Evaluation Questions are all answered in the negative; prior NRC approval is not deemed necessary to implement the requested change.

Because a 10 CFR 50.59 process is required, and because a new procedure is proposed for the maintenance, and because this maintenance addresses a Reportable Occurrence and a significant operating abnormality and deviation from normal and expected performance of facility equipment that affects nuclear safety, the RSAC shall review the safety evaluation in this Request for Maintenance and the associated procedure draft per TS 6.4.2. The approval process shall follow TS 6.5.

II. REVIEW OF PROPOSED MAINTENANCE (Required if proposed maintenance has not been previously approved and successfully performed, if it in any way affects the safety of operation, scram levels or scram ability of the reactor, or if it in any way constitutes modification of existing circuitry or equipment)

a. Remarks or Conditions (Safety Review completed):
   Safety Review required (affects scram ability, modification of equipment, not previously approved).

   Temp procedure submitted to RSAC and Reactor Administrator for review. Approvals obtained online via Google Forms.

b. Radiological Safety Conditions:

Remove fuel during work on rod mechanisms per ALARA. Cd in Glory Hole.

Approved: ______________________
Chief Reactor Supervisor

III. REPORT OF COMPLETED MAINTENANCE

a. Date:

10/19/2020

b. Person(s) Performing Maintenance:
Carl Willis, Gary Cooper, Ken Carpenter, Rowdy Davis

c. Items or Parts Replaced with Cost of Each Item:

Mylar washers installed. Cost of raw material is in attached receipt.

d. Maintenance Performed (if different from Item I.c):

Maintenance in temporary procedure followed to completion, testing complete per Annual Maintenance (which is now also complete)

e. Result of Maintenance:

Rod drop times are measured and in specification. The high drop time and bimodal time distribution observed from SR2 before the intervention have been resolved. SR1 drop time is unchanged. Interestingly, the CCR drop time has increased in the post-testing measurements. SR1 bad behavior observed in February was probably occasional or rare, not observed in regular testing. While it is hoped that this intervention decreases the likelihood of a recurrence, continued vigilance will be important. The intervention does not treat the underlying issue (residual magnetization), only reduces its impact.

Before R-C-D replacement			
	SR1	SR2	CCR
Drop time (ms)	276	373	176
Drop time (ms)	253	380	186
Drop time (ms)	278	260	175
Drop time (ms)		249	
Drop time (ms)		243	
Drop time (ms)		393	
Drop time (ms)		264	
Drop time (ms)		374	

AVERAGE drop time (ms)	**269**	**317**	**179**
STDEV drop time (ms)	**13.89244**	**67.91591**	**6.082763**
After R-C-D replacement			
	SR1	SR2	CCR
Drop time (ms)	275	252	175
Drop time (ms)	262	329	166
Drop time (ms)	277	364	173
Drop time (ms)		253	
Drop time (ms)		349	
Drop time (ms)		259	
AVERAGE drop time (ms)	**275**	**301**	**171.3333**
STDEV drop time (ms)	**8.144528**	**52.01154**	**4.725816**
	No diff.	No diff.	Barely significant difference
After Mylar washer installation		Magnet current 66 mA	
	SR1	SR2	CCR
Drop time (ms)	288	131	278
Drop time (ms)	284	134	231
Drop time (ms)	282	113	259
Drop time (ms)	281	134	262
Drop time (ms)	233		
Drop time (ms)	237		

Drop time (ms)	258		
Drop time (ms)	263		
Drop time (ms)	266		
AVERAGE drop time (ms)	**265.7778**	**128**	**257.5**
STDEV drop time (ms)	**20.28409**	**10.0995**	**19.53629**

f. Post Maintenance Testing:

Per Annual Maintenance procedures.

Completed Maintenance Reviewed:

Dated 10/19/2020

Chief Reactor Supervisor

200916 Mylar washer placement on SR1, SR2, CCR magnets

Temporary procedure.

Requires RSAC approval (see TS 6.5).

Requires 10 CFR 50.59 evaluation.

[signature] Chief Reactor Supervisor

Hayes, Hindera, Harmon, Knief ~~BY EMAIL~~ RSAC

________________ Reactor Administrator

10/12/2020-10/14/2020 Date(s) of use

Purpose: Attempt permanent solution to slow rod drop times in SR1 by replacing Scotch tape on armature of SR1 (and other rods) with permanent mylar washer. The Scotch tape is known to treat the problem. Leakage in the magnetic circuit created by placement of a non-ferromagnetic washer between armature and magnet core is proposed as a method of reducing rod resistance to dropping suspected to be caused by residual magnetization in the magnet core and / or armature.

To be completed by SRO and at least one other person.

For SR1:

1. CW Cut a mylar washer 2.0" ID and 3.5" OD from 0.002" thick stock. See attached drawing, "200908 CR Mylar Ring."
2. CW SRO: Remove SR1 from reactor and place on workbench.
3. CW SRO: Unscrew fuel tip from rod and place in a secure location.
4. CW Unscrew dashpot from rod bottom.
5. CW Using a ½-inch hex socket wrench, unscrew rod base from the magnetic armature, taking care not to unscrew rod base from rod. A ½-inch wrench may be used to hold the nut between the rod and rod base while loosening the rod base from the armature with the socket wrench.
6. CW Extract rod body (with rod base attached) through the bottom of the assembly.
7. CW Insert mylar washer (Step 1) between the magnet and the rod armature and hold it coaxially while reinserting the rod base to capture the washer.
8. CW Lubricate (using Loctite LB 8009) the large steel thread on the rod base that joins it with the magnetic armature.
9. CW Reinstall dashpot.
10. CW Reinstall fuel.
11. CW Complete section ~~2c~~ 3c CW on Annual Maintenance procedure, repeating rod scram time measurement at least three times. Record scram times.

For SR2:

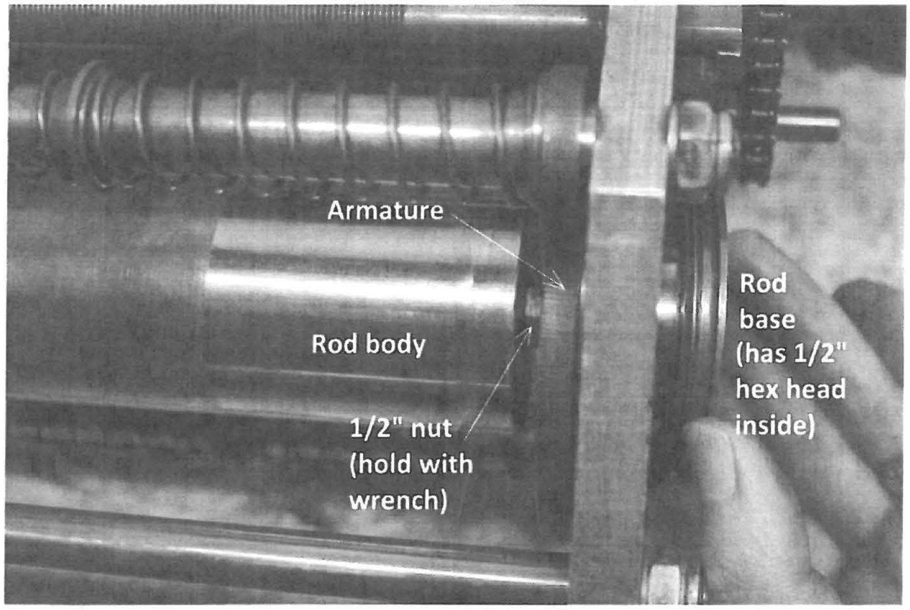
12. __CW__ Cut a mylar washer 2.0" ID and 3.5" OD from 0.002" thick stock. See attached drawing, "200908 CR Mylar Ring."
13. __CW__ SRO: Remove SR2 from reactor and place on workbench.
14. __CW__ SRO: Unscrew fuel tip from rod and place in a secure location.
15. __CW__ Unscrew dashpot from rod bottom.
16. __CW__ Using a ½-inch hex socket wrench, unscrew rod base from the magnetic armature, taking care not to unscrew rod base from rod. A ½-inch wrench may be used to hold the nut between the rod and rod base while loosening the rod base from the armature with the socket wrench.
17. __CW__ Extract rod body (with rod base attached) through the bottom of the assembly.
18. __CW__ Insert mylar washer (Step 1) between the magnet and the rod armature and hold it coaxially while reinserting the rod base to capture the washer.
19. __CW__ Lubricate (using Loctite LB 8009) the large steel thread on the rod base that joins it with the magnetic armature.
20. __CW__ Reinstall dashpot.
21. __CW__ Reinstall fuel.
22. __CW__ Complete section 2d on Annual Maintenance procedure, repeating rod scram time measurement at least three times. Record scram times.

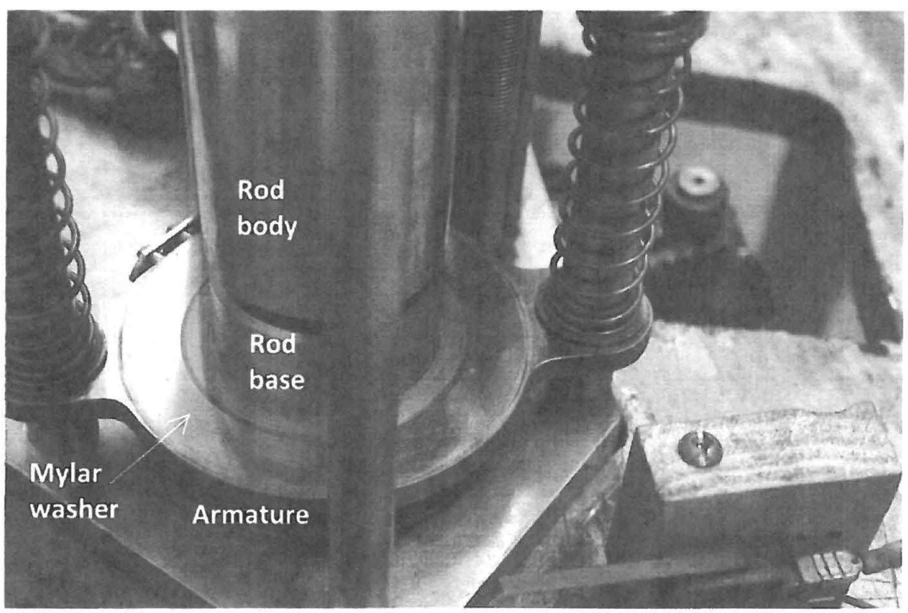
For the CCR:

23. __CW__ Cut a mylar washer 2.0" ID and 3.5" OD from 0.002" thick stock. See attached drawing, "200908 CR Mylar Ring."
24. __CW__ SRO: Remove CCR from reactor and place on workbench.
25. __CW__ SRO: Unscrew fuel tip from rod and place in a secure location.
26. __CW__ Unscrew dashpot from rod bottom.
27. __CW__ Using a ½-inch hex socket wrench, unscrew rod base from the magnetic armature, taking care not to unscrew rod base from rod. A ½-inch wrench may be used to hold the nut between the rod and rod base while loosening the rod base from the armature with the socket wrench.
28. __CW__ Extract rod body (with rod base attached) through the bottom of the assembly.
29. __CW__ Insert mylar washer (Step 1) between the magnet and the rod armature and hold it coaxially while reinserting the rod base to capture the washer.
30. __CW__ Lubricate (using Loctite LB 8009) the large steel thread on the rod base that joins it with the magnetic armature.
31. __CW__ Reinstall dashpot.
32. __CW__ Reinstall fuel.
33. __CW__ Complete section 2b on Annual Maintenance procedure, repeating rod scram time measurement at least three times. Record scram times.

Completion of work:

34. __CW__ Complete sections 4, 6(e-f), and 7 on Annual Maintenance procedure.
    5(f-g), then 5(a-e), then 8 using most recent Annual Maintenance procedure.


Armature
Rod body
1/2" nut (hold with wrench)
Rod base (has 1/2" hex head inside)


Rod body
Rod base
Mylar washer
Armature