LA-UR-94-595

Title: **Los Alamos Critical Experiment Facility Progress Report (Jan. 1- March 31, 1993)**

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Submitted to: NA

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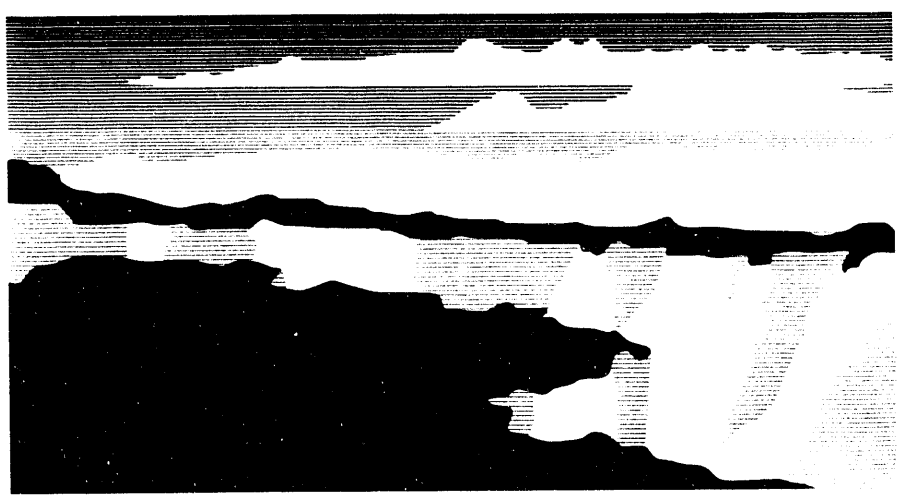


Los Alamos
NATIONAL LABORATORY

Los Alamos Critical Experiments Facility
Quarterly Progress Report

January 1 - March 31, 1993
Second Quarter FY93

1.0 Introduction (R.E.Anderson)

The Los Alamos Critical Experiments Facility (LACEF) is now operating after a lengthy period of shutdown that lasted from November 1989 until June 1991. Since June 1991, the efforts of the staff have concentrated on bringing the assemblies back to operational status. The facility is fully operational and performing experiments. This progress report nominally covers the second quarter of FY93 (first quarter of calendar year 1993). The previous progress report in this series is LA-UR-93-2138, issued June 1, 1993, covered the reporting period.

2.0. Nuclear Criticality Safety Classes [(R.E. Anderson, J.A. Bounds, K.B. Butterfield, C.C. Cappiello, R.E. Malenfant, T.P. McLaughlin (HS-6), R.R. Paternoster, A.A. Robba, D.A. Rutherford, R.G. Sanchez, and S. Vessard (HS-6)]

The Nuclear Criticality Safety Class has been offered at a frequency of slightly more than once a month since the facility restarted in June 1991. Listings of the personnel who have attended the training during the second quarter of FY93 are presented in Table I. This training is intended primarily for nuclear materials handlers and supervisory personnel in the DOE complex, with occasional participation by persons from outside the DOE. To maintain a high level of instructional quality, attendance is limited to an enrollment of ~15 people per class.

During the class, the students engage in hands-on manipulation of nuclear material and build a stack of uranium foils and Lucite® plates to achieve a multiplication of ~4. The students then continue to add to the stack, which is assembled by remote control, until a multiplication of ~125 is achieved. Finally, the students observe a critical assembly operation (currently this is done with the Flattop assembly) and are allowed to operate the assembly under direct supervision of LACEF personnel.

This training is a highly effective demonstration of the principles used to determine the safe handling procedures for nuclear materials in real-world situations.

Table I - Attendance at Nuclear Criticality Safety Courses During Second Quarter FY93

1993 Dates	LANL Attendees	Non-LANL Attendees
Jan. 11-15, 1993	3	12
Jan. 26-28	13	-
Feb. 2-4	-	9
Feb. 23-24	1	17
Mar. 16-17	13	2
TOTALS	30	40

3.0. SHEBA II Project (K.B. Butterfield, C.C. Cappiello, W.S. Murray, and R. Hastings)

Accomplishments for this crew period include the following:

- The plan for the software verification and validation for the Allen-Bradley Control System was completed, and the verification and validation review of the software was performed. The team included a representative from the Allen-Bradley Corporation. A revised version of the software which incorporates the results of the review has been written.

- A committee to perform the Operational Readiness Review (ORR) has been named, and the review has begun. The preliminary results of this review have been shared with representatives of the DOE Los Alamos Area Office and the Albuquerque Operations Office.

- Procedures have been written for loading fuel in the SHEBA assembly and for daily pre-operational checks.

- Nearing completion, is the as-built drawing package which consists of completed as–built drawings, and the final design document, which is now available in draft.

- The design of the source pig for the SHEBA building has been completed, and construction has begun. The certification process for the building crane has begun.

4.0. Godiva IV Activities (A.A. Robba, R.E.Anderson, K.B. Butterfield, and R.G. Sanchez)

Final control-rod-worth curves have been measured for each of the incremental control rods on the Godiva machine. These positive period measurements were made over the range of 1$ of reactivity between delayed critical and prompt critical. Although each of the incremental control rods is worth more than 1$ – approximately 1.5$ – the measurements covered the range from the rod fully inserted up to the position where it is withdrawn 1-$ worth. This is the important part of the rod because this is where the rod will be positioned for all burst operations. The integral worth curves for control rod 1 and control rod 2 are shown in Figs. 1 and 2, respectively.

As part of the final calibration of the incremental control rods, operations were conducted with the Godiva machine on positive periods up to prompt critical. In addition, we have conducted one burst above prompt critical that produced a temperature rise of 6 ^{o}C. From here, additional burst operations will gradually approach full-sized bursts (250 ^{o}C) incrementally.

The effort to put the Godiva electrical drawings on a CAD system was began this quarter. Most of this effort involves checking and updating existing drawings with the actual implementation. Existing configuration control procedures should prevent the reoccurrence of this situation where the drawings and the hardware were significantly discrepant.

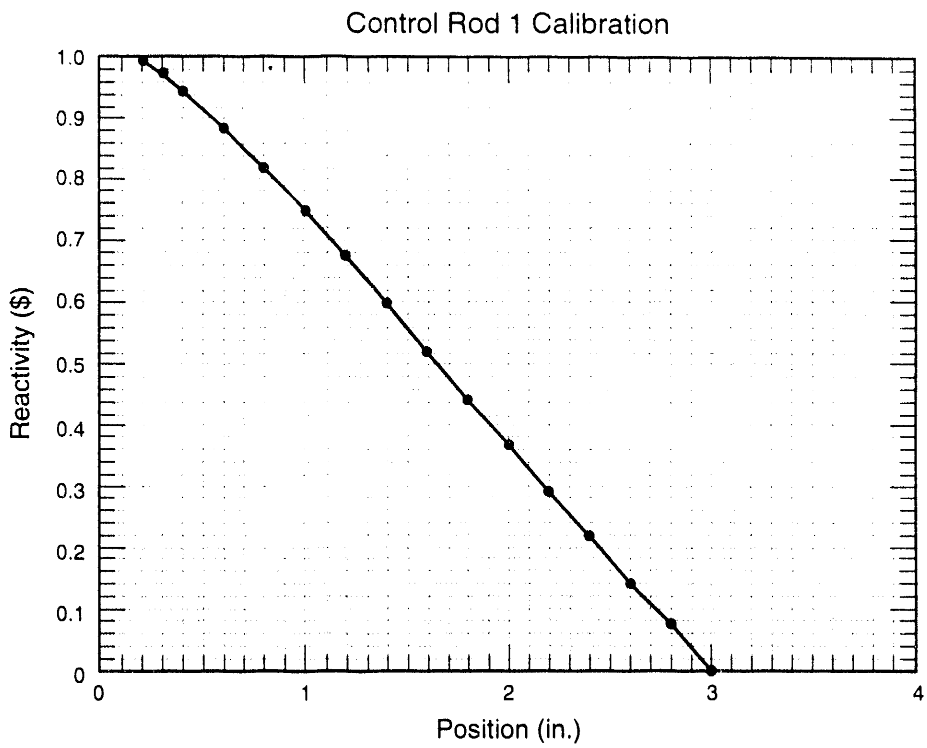

Control Rod 1 Calibration
Reactivity ($)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
1
2
3
4
Position (in.)

Fig. 1.

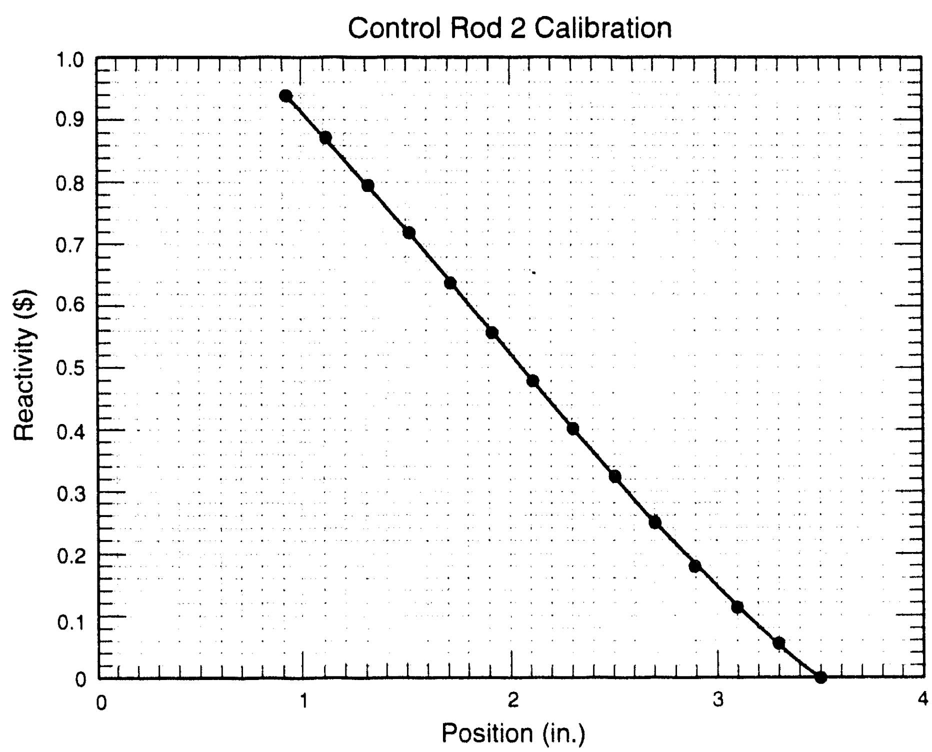

Control Rod 2 Calibration
Reactivity ($)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
1
2
3
4
Position (in.)

Fig. 2.

5.0. Skua Activities

5.1. Skua Burst-Mode Operations (R.R. Paternoster, R.E.Anderson, J.A. Bounds, and R.G. Sanchez)

Prior to beginning burst operations, a modification of the Skua hydraulic circuit was completed as per N2CEF-CMP-93.32, R01, Jan. 13, 1993. We noticed during checkout operations that only two of the three safety blocks retracted during a loss-of-power scram. The as-built drawings indicated that all three safeties should have retracted. Upon close inspection, it was noted that a check valve in safety block #3 was installed backwards in the original assembly. This also isolated the three hydraulic pressure switches so that all three were reading the pressure of SB-3 accumulator. Upon completing the modification, the machine was tested and scrammed several times prior to resumption of operations.

Skua burst-mode operations began this quarter as per the Test Plan for Skua Delayed Critical Experiments, N2CEF-TP-92.30 (Nov. 1992). The restriction limiting to longer than 5-s periods was lifted by the N-2 group office (N2-93:021REM, Burst Operation of Skua, N-2 memo, dated Feb. 12, 1993). The Test Plan specifies limiting reactivity steps to less than approximately 0.05 $ below 0.90 $ and approximately 0.02 $ between 0.90 $ and 1.00 $.

A summary of the burst-mode operations is shown in Table II. In Skua burst-mode operations, the delayed-critical (DC) fiducial is done with the burst drum (BD) inserted. The yield drum (YD) is set for the angle of the desired burst yield, and critical is achieved with the mass drum (MD). Following the DC measurement, the BD is withdrawn, and the YD is inserted to full-in position. Following a period of time to allow the delayed neutrons to decay, the burst is initiated by rapid insertion of the BD.

Reactivity ramps of up to 94.4 ¢ above delayed critical (158-ms. initial period) were completed during the quarter. The purpose of these operations is to give the crew experience in burst-mode operations and to compare the behavior of the machine with that in 1988-89 when the machine was briefly operated above prompt critical. A comparison of current behavior with 1989 data is shown in Fig. 3.

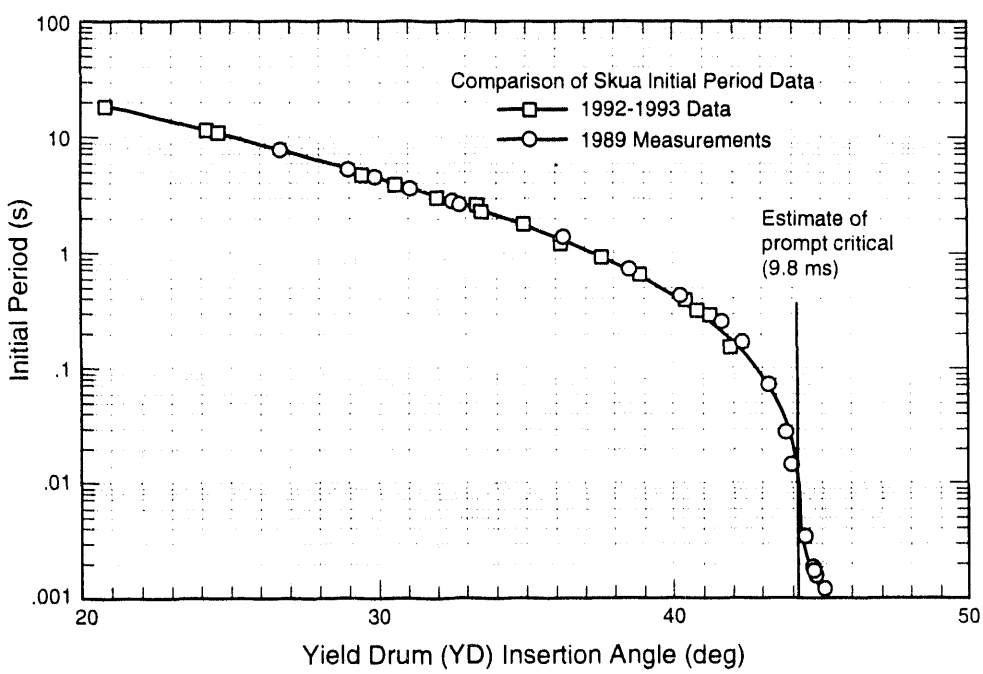


Fig. 3

Table II. Skua Burst-Mode Operations during Second Quarter, FY93

	Date	BD	YD Set Position	MD Crit. Position	Period (s)	React. (¢)	Temp-Ave (°C)
1	2-17-93	In	20.76	140.88	18.90	28.7	14.8
2	2-19-93	In	24.63	112.39	10.80	37.8	15.3
3	2-19-93	In	29.42	86.87	4.800	52.3	15.6
4	2-19-93	In	30.95	81.36	3.800	56.6	15.6
5	3- 8-93	In	24.25	114.52	11.20	37.3	17.0
6	3- 8-93	In	30.65	81.68	3.900	56.1	16.9
7	3- 8-93	In	32.04	77.45	3.020	60.5	17.0
8	3- 8-93	In	33.50	73.50	2.300	65.4	17.2
9	3-11-93	In	33.48	66.68	2.560	63.3	19.1
10	3-11-93	In	33.42	72.93	2.540	63.7	18.6
11	3-11-93	In	34.94	69.60	1.730	70.0	18.9
12	3-11-93	In	36.30	66.52	1.240	75.0	18.9
13	3-15-93	In	36.33	66.72	1.300	74.3	16.6
14	3-15-93	In	37.66	64.20	0.914	79.5	16.6
15	3-15-93	In	39.05	62.05	0.650	83.4	16.6
16	3-15-93	In	40.60	59.85	0.406	88.1	16.6
17	3-22-93	In	40.46	59.94	0.402	88.2	20.3
18	3-25-93	In	40.45	59.31	0.420	87.8	21.4
19	3-25-93	In	40.92	58.80	0.318	90.1	21.5
20	3-25-93	In	41.40	58.03	0.285	90.9	21.7
21	3-25-93	In	41.63	57.92	0.226	92.4	21.8
22	3-25-93	In	42.10	57.17	0.158	94.4	21.9

5.2. Skua MCNP Calculations (R.R. Paternoster, and D. Miko (GRA, Univ. of Florida))

In modeling SKUA, an attempt was made to include all components that may have a significant effect on reactivity. Besides the fuel and flux trap, the various copper reflectors will have the greatest effect on reactivity. Also included were major structural components: support blocks, support stand, base plate, top plate, and actuator deck.

Several approximations were made in this model. First, the outer edge of the radial reflectors (control drums, safety blocks, and reflectors) were approximated as circular. Than the gaps between the various material regions in the flux trap were accounted for by filling them in with the adjacent material and decreasing the corresponding densities. Also, the top plate was approximated as circular. Finally, the air was voided. None of these changes is expected to have a significant effect on the reactivity of the model.

For the top plate and reflector, only a small amount of material was displaced. This material was situated on the outer edge of the assembly and will likewise have a negligible effect on reactivity. By filling in the voids in the flux trap, there was no change in the amount of material; however, any neutron streaming is negated. In the actual assembly, this streaming effect is diminished by the top and bottom reflectors. Replacing the atmosphere with a void should have little effect on the reactivity. The fast neutron spectrum combined with the low air density (compared with the other materials) will result in relatively few neutron interactions with air.

Capabilities were included in the input file for rotating the control drums and sliding the safety blocks to any desired position. A top view of the MCNP model with the MD and YD at 50 deg is shown in Fig. 4. To vary any of these components, simply change the corresponding translation line (TR# X Y).

The results of criticality runs indicate that this mockup is within 0.10 $ of critical at several measured critical positions. Other runs were made to investigate the flux trap worth, the flux and fission peaking in the core for different drum configurations, and the reactivity effect of varying the top fuel ring. A summary of these results follows:

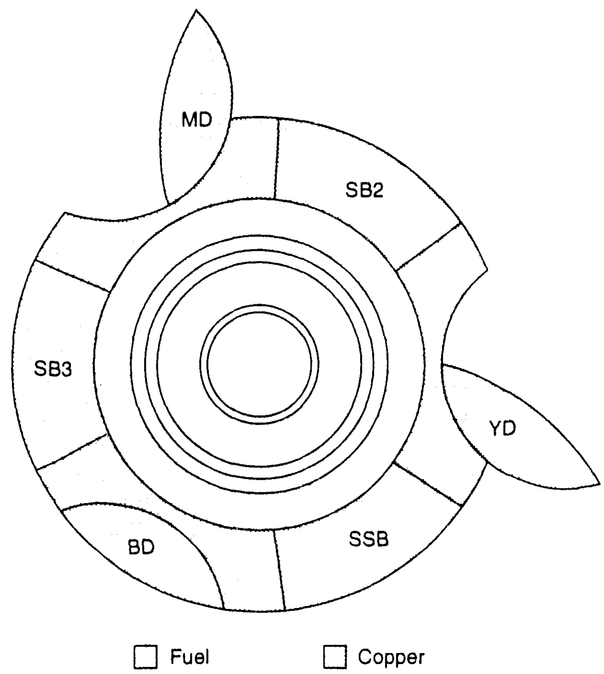


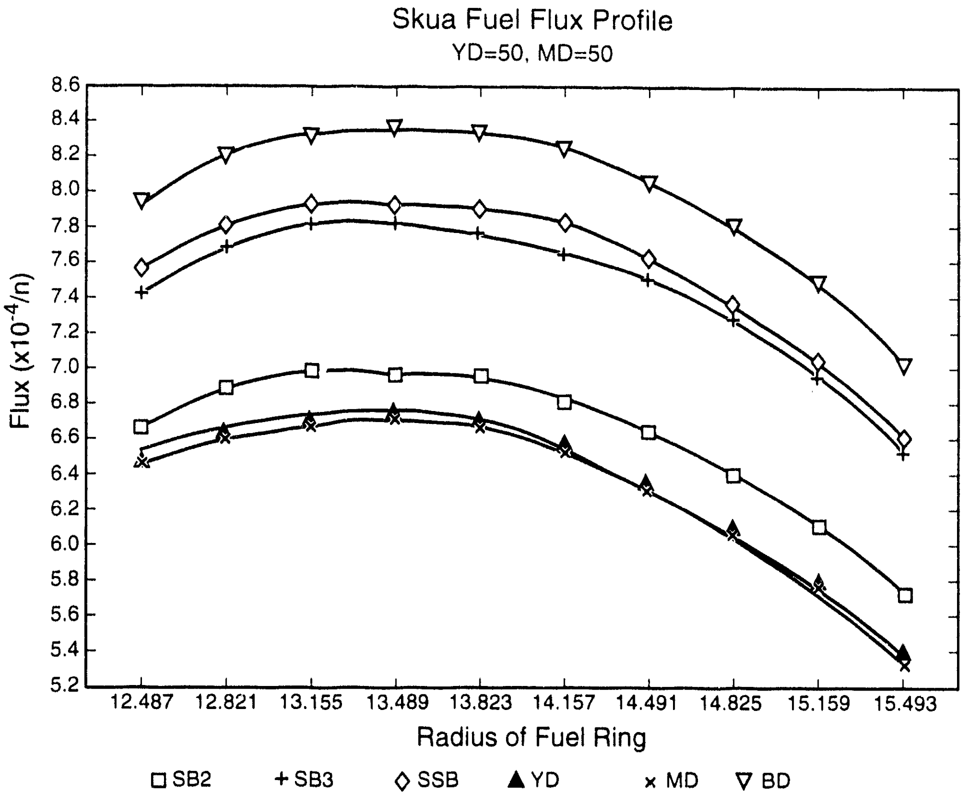
Fig. 4.

Flux Trap Worth

Several Runs were made at with the flux trap and with the flux trap materials voided. With the flux trap voided, the k_{eff} for the system was roughly 10.5 $ supercritical. With all the reflectors withdrawn and the flux trap voided, Skua is roughly 6.5 $ subcritical.

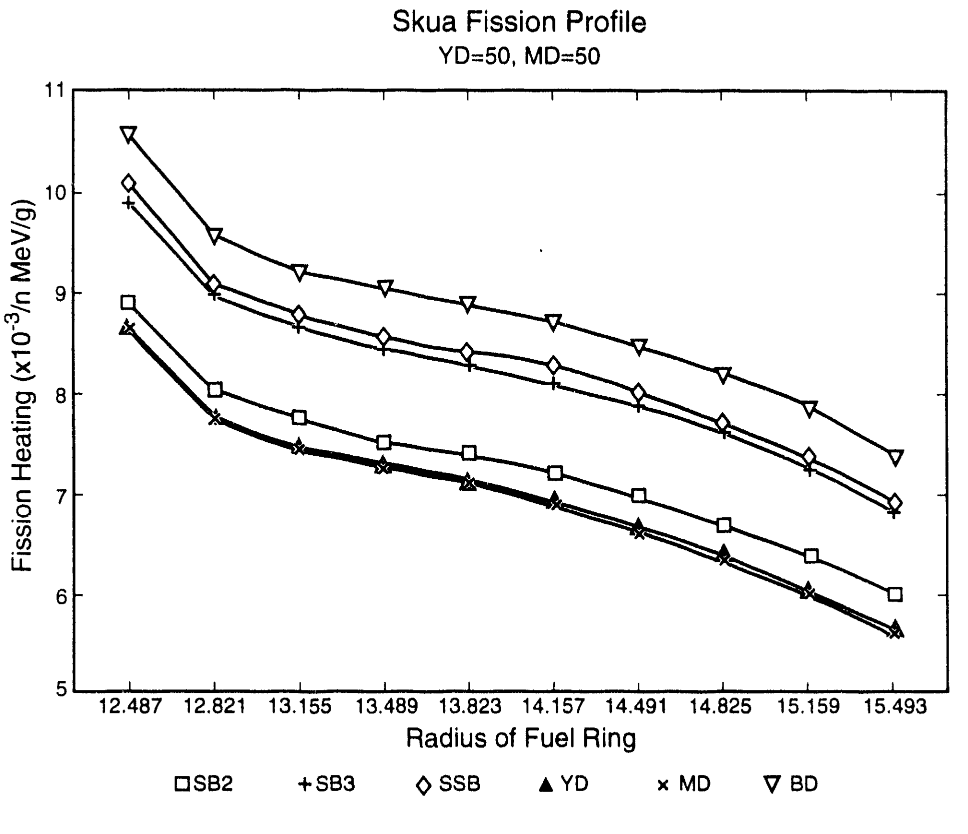
Fission Power Peaking

The fuel was first sectioned into six pieces corresponding to the six reflecting pieces. Therefore, 3 sections will subtend a 50 deg angle while 3 will subtend a 70-deg angle. Then the fuel was split radially and axially. into 10 pieces., and two runs were made for each configuration; each run had both had the fuel split up into 60 sections. Runs were made to determine the fission-power peaking for two different critical cases. The first is with the mass and yield drums at equivalent angles (50 deg). The fission heating and neutron flux radial profile for this case are shown in Figs. 5 and 6, respectively. The second case has the yield drum completely withdrawn and the mass drum at 17 deg. The fission heating and neutron flux radial profile for this case are shown in Figs. 7 and 8, respectively.



Skua Fuel Flux Profile
YD=50, MD=50
Flux (x10^-4/n)
8.6
8.4
8.2
8.0
7.8
7.6
7.4
7.2
7.0
6.8
6.6
6.4
6.2
6.0
5.8
5.6
5.4
5.2
12.487 12.821 13.155 13.489 13.823 14.157 14.491 14.825 15.159 15.493
Radius of Fuel Ring
SB2 SB3 SSB YD MD BD

Fig. 5.



Skua Fission Profile
YD=50, MD=50
Fission Heating (x10^-3/n MeV/g)
11
10
9
8
7
6
5
12.487 12.821 13.155 13.489 13.823 14.157 14.491 14.825 15.159 15.493
Radius of Fuel Ring
SB2 SB3 SSB YD MD BD

Fig. 6.

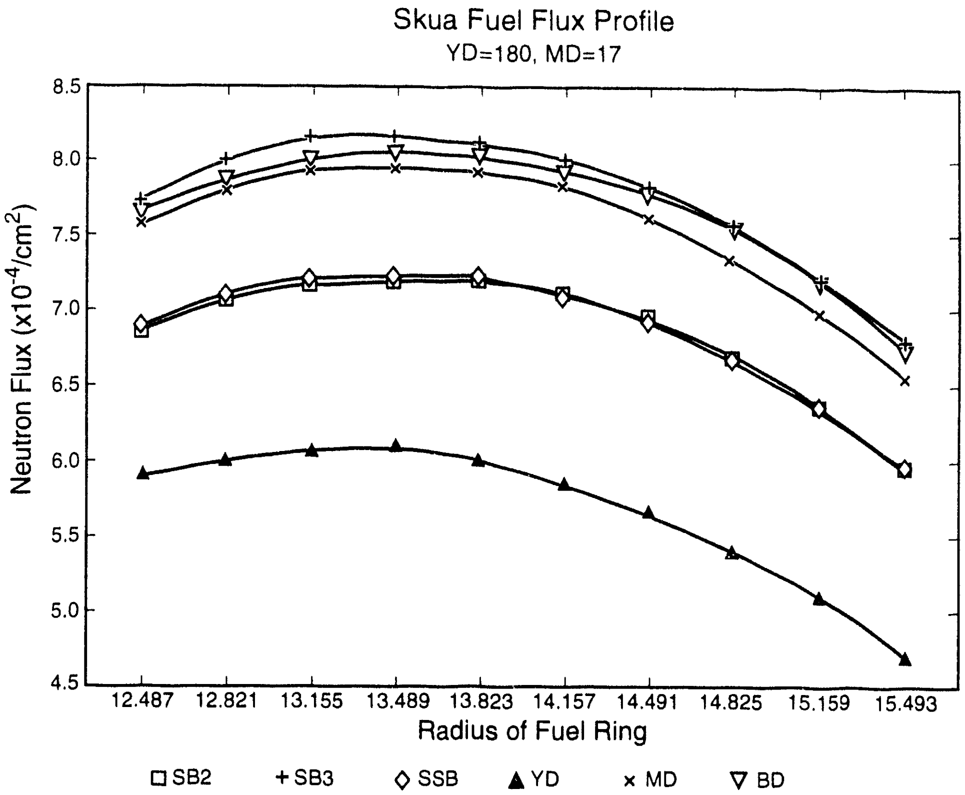

Skua Fuel Flux Profile
YD=180, MD=17
Neutron Flux (x10^-4/cm^2)
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
12.487
12.821
13.155
13.489
13.823
14.157
14.491
14.825
15.159
15.493
Radius of Fuel Ring
SB2
SB3
SSB
YD
MD
BD

Fig. 7.

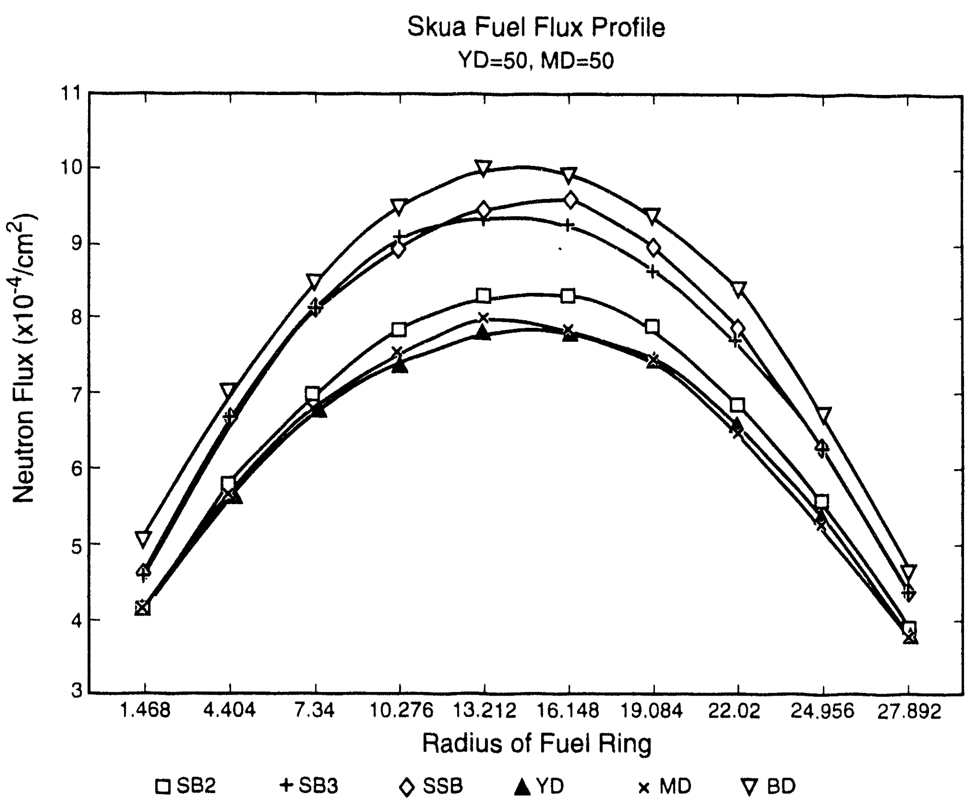

Skua Fuel Flux Profile
YD=50, MD=50
Neutron Flux (x10^-4/cm^2)
11
10
9
8
7
6
5
4
3
1.468
4.404
7.34
10.276
13.212
16.148
19.084
22.02
24.956
27.892
Radius of Fuel Ring
SB2
SB3
SSB
YD
MD
BD

Fig. 8.

The axial fission heating and neutron flux profile are shown in Figs. 9 and 10, respectively. The axial graphs for the YD = 180 deg and MD = 17 deg are not shown because their shape is very similar to the other case and would virtually duplicate them. For the axial graphs, the x-axis should read "fuel height."

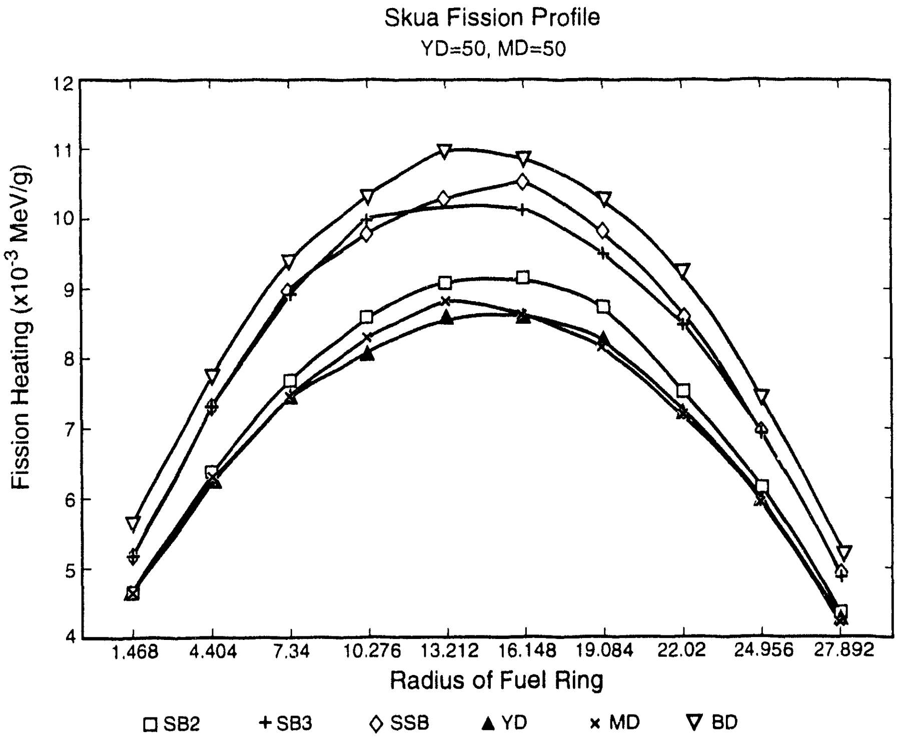


Fig. 9.

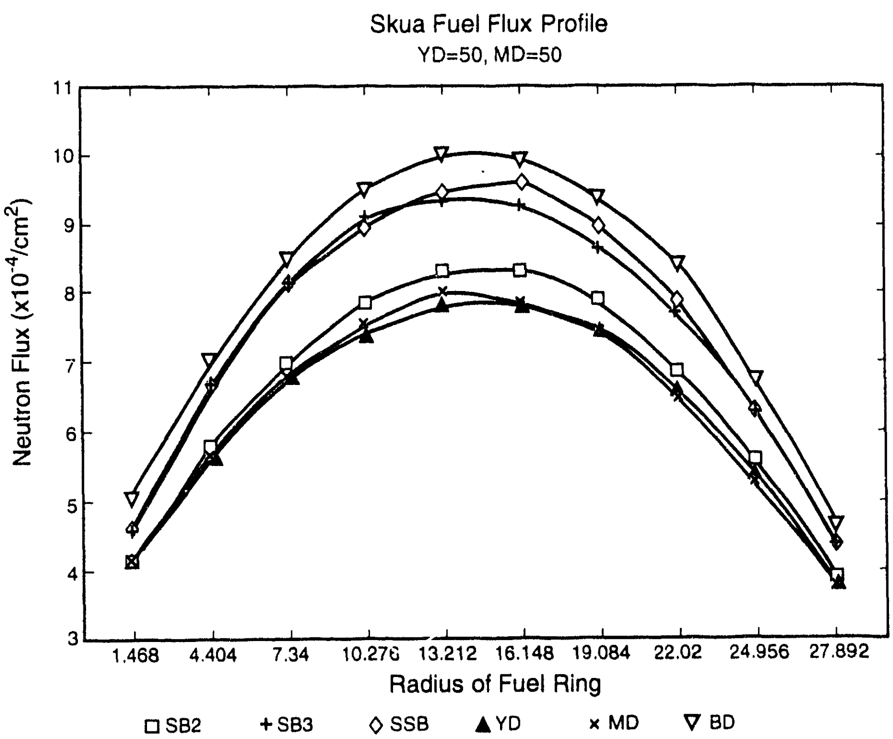


Fig. 10

The power peaking was determined by first taking the ratio of the highest axial fission heating segment to the average fission heating for the core. Then, this value was multiplied by the ratio of the highest-to-average radial fission heating for the segment that had the highest axial fission heating (eg the section inside the burst drum). The power peaking is as follows:

YD (deg)	MD (deg)	Peaking Factor
50	50	1.73
180	17	1.68

For the first case, the location of the peak is in the middle of the inner edge of the burst drum. For the second case, the location of the peak is in the middle of the edge between the burst drum and safety block #3.

Reactivity Effect of Changing the Top Fuel Ring Enrichment

The top ring of the Skua fuel stack received incomplete aluminum plating during the fabrication. A new plate has been fabricated at Y-12 and will be installed upon delivery. Although samples from the new ring have been analyzed, we must know the reactivity effect of varying enrichment in the new fuel.

The reactivity effect was determined by modeling the top fuel ring and changing its corresponding enrichment. After varying the enrichment over a wide range, the effect was shown to be consistently between 1.5 - 1.7 ¢ per 0.1 % of enrichment.

8.0. Basic Neutron Physics Measurements

8.1. Source Jerk Measurements (A.A. Robba, R.E. Anderson, and K.B. Butterfield)

Specifications for a source shuffler to be used with the source jerk measurements have been written for the engineering section. Fabrication of this piece of hardware will complete a fieldable system capable of taking and analyzing source jerk data and determining the reactivity of an unknown.

The source jerk (transient analysis) technique (data acquisition and analysis) has been completely implemented on a PC clone interfaced to a Camac crate. Data acquisition and analysis can be completely done on this system without a connecting to the LANL computer center, which was required in the previous implementation. As a result of this and the compact hardware, this new implementation should prove to be fairly portable and easily fieldable. The new implementation also permits fitting to be done for the lag time between the signal to jerk the source and the "effective" removal of the source. It will be possible to compare this fitted lag time with a measured lag time when the source drive hardware becomes operational. This lag time has been a source of concern for some time as the early time data (data taken immediately after the source had been removed) had to be discarded to produce a reasonable fit. This will no longer have to be done because indications are that all the measured source jerk data can be fit with residuals that are consistent with the counting statistics.

8.2. Minimum Critical Mass Experiment (R.G. Sanchez)

An analytical study has been completed to determine the minimum critical mass for uranium and plutonium systems. In this study, several quasi-homogeneous configurations were examined, using the MCNP-4X-C transport computer code and its continuous energy cross -section data.

The majority of the configurations studied consisted of stacked high-density 0.635-cm (0.25 in.)-

thick polyethylene plates and fissile foils made of 93% ^{235}U, 98% ^{233}U, and 95% alpha -hase ^{239}Pu (see Table III). Foils of the same isotopic composition were separated by one, two, or more layers of polyethylene plates. The hydrogenous core was then surrounded by a 33.02-cm (13-in.)-thick beryllium reflector (Fig. 11). Computer models were then developed using foils of different thicknesses and surface areas. For each case, a total of one-hundred-thousand source histories was run with the help of the MCNP computer code. Table IV shows the results of these studies.

Table III. Isotopic composition of foils.

Material	^{233}U	^{234}U	^{235}U	^{238}U	^{239}Pu	^{240}Pu
^{235}U Foils	------	1.000%	93.499%	5.501%	—	—
^{233}U Foils	98.45%	0.94%	0.02%	0.590%	—	—
^{239}Pu Foils					95.00%	5.00%

Table IV. Data for a hydrogenous core in a thick-beryllium reflector.

^{235}U Foil Dimensions (in.)				
Cubical Geometry	**Weight of Core Moderator Material (g)**	**Total ^{235}U Mass (g)**	**Atomic Ratio $H/^{235}U$**	**k_{eff}**
9 x 9 x 0.003	1439.87	278.9	173	0.878 ± 0.0033
9 x 9 x 0.003	1762.85	278.9	212	0.894 ± 0.0034
9 x 9 x 0.003	2408.81	278.9	289	0.913 ± 0.0038
9 x 9 x 0.003	4183.15	278.9	502	0.856 ± 0.0028
6 x 6 x 0.003	1418.33	278.9	170	0.942 ± 0.0037
6 x 6 x 0.003	1994.22	278.9	240	0.950 ± 0.0039
6 x 6 x 0.003	2495.72	278.9	300	0.964 ± 0.0036
6 x 6 x 0.003	2710.13	278.9	326	0.949 ± 0.0034
6 x 6.125 x 0.0012	2749.00	278.49	331	1.020 ± 0.0026
6 x 6.125 x 0.0012	2893.68	278.49	348	1.020 ± 0.0036
6 x 6.120 x 0.0012	2604.34	277.44	314	1.019 ± 0.0022
^{233}U Foil Dimensions (in.)				
Spherical Geometry Radius = 8.82 cm	2746.63	279.30	329	1.017 ± 0.0021
6 x 6.125 x 0.0012	1735.50	185.54	311	0.995 ± 0.0027
6 x 6.125 x 0.0012	1880.89	185.54	337	0.999 ± 0.0026
6 x 6.125 x 0.0012	1953.24	185.54	350	0.996 ± 0.0027
6 x 6.125 x 0.0012	2025.58	185.54	362	0.996 ± 0.0026
6 x 6.125 x 0.0012	2170.97	185.54	389	0.991 ± 0.0022
6 x 6.125 x 0.0012	2243.32	185.54	402	0.988 ± 0.0030
6 x 6.125 x 0.0012	2388.72	185.54	428	0.979 ± 0.0027
^{239}Pu Foil Dimensions (in.)				
Cubical Geometry	**Weight of Core Moderator Material (g)**	**Total ^{239}Pu Mass (g)**	**Atomic Ratio $H/^{239}Pu$**	**K_{eff}**
6 x 6.125 x 0.00123	1880.89	195.82	441	0.992 ± 0.0032
6 x 6.125 x 0.00123	2896.52	195.05	506	0.982 ± 0.0020
6 x 6.125 x 0.0012	3038.37	190.60	543	0.998 ± 0.0024
6 x 6.125 x 0.0012	3919.00	190.60	701	0.981 ± 0.0020

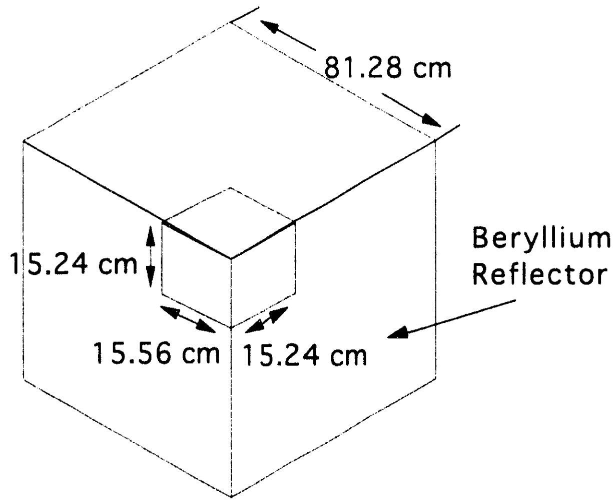


Fig. 11. Beryllium reflector and cubical fuel-cell cavity.

For the case of ^{235}U, the effect of a spherical geometry (Fig. 12) vs a cubical geometry was investigated. The results showed that for the same mass and $^{235}H/U$ ratio, the effective multiplication factor, k_{eff}, is about the same for both geometries. This effect can be explained when we consider that reflected neutrons will have a higher probability of interacting with the ^{235}U foils in a cubical geometry (larger area) as opposed to a spherical geometry. Results obtained (Table IV) confirm those published in Ref. 1.

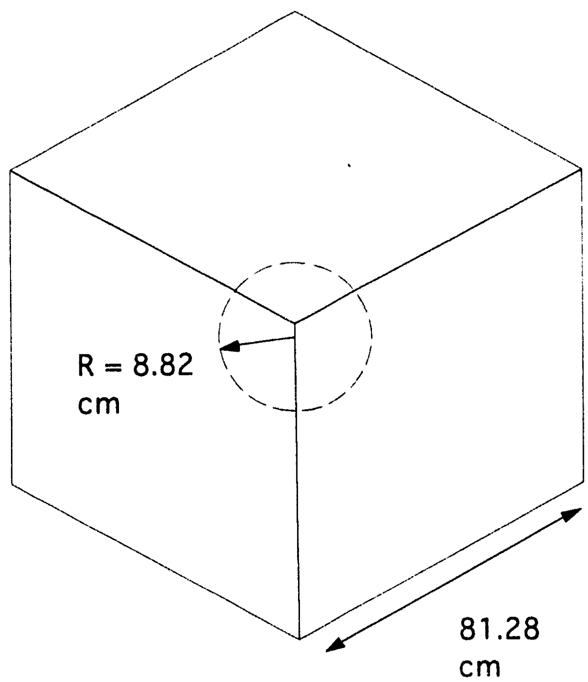


Fig. 12. Beryllium reflector and spherical fuel-cell cavity.

In conclusion, these analytical studies have confirmed that the minimum critical mass for ^{235}U in a hydrogenous core with a thick-beryllium reflector agrees with the experimental value of 250 to 300 g. The studies have also shown that the minimum critical mass for ^{233}U and alpha phase ^{239}Pu in a hydrogen moderated core with a thick-beryllium reflector is on the order of 185 g and 190 g, respectively.

Currently, we are in the process of planning a series of experiments that will benchmark the results of the calculations that were presented above. We have contacted several outside organizations (such as Nuclear Fuels Co..and Y-12 at Oak Ridge) as well as internal LANL groupsto explore the possibilities of fabricating the thin ^{233}U, ^{235}U, and ^{239} Pu foils for futurexperiments.

10.0. LACEF/TA-18 Safety Analysis Report Upgrade (R.R. Paternoster R.E. Anderson, K.B. Butterfield, C.C. Cappiello, R.E. Malenfant, B.Q. Partain, and D.A. Rutherford)

Comments from DOE/AL on the draft version of the new TA-18 / LACEF Safety Analysis Report were received on March 9, 1993, in the form of a memo from John Schinkle, DOE/AL/SPD, dated Feb. 10, 1993. The comments are organized by chapter and are in two forms: general comments concerning format, organization, and additional material; and specific comments concerning specific items in the document The number of each type of comment by chapter is summarized in Table V.

The comments have been transferred to spread sheets for resolution. One of these from Chapter 4 is shown in Table VI. Key persons to address the comments have been assigned as shown. After the comments are addressed the spread sheets will be completed and submitted to the Reactor Safety Committee and, ultimately, the DOE.

Table V. DOE/AL LACEF SAR Review Comments & Revisions.

Chap.	Title	General Comments	Specific Comments	Key Person(s)
1	Introduction	2	5	RRP
2	Site Characteristics	-	6	RRP
3	Design of Structure, Components,...	-	6	RRP
4	Benchmark Critical Assemblies	1	24	RRP,AAR
5	Solution-Fueled Assemblies	-	3	KBB
6	Site Safety Features	2	3	RRP
7	Instrumentation & Controls	1	36	---
8	Electric Power Systems	-	2	---
9	Auxiliary Systems	-	4	RRP
10	Critical Expt. Assembly Machines	-	2	RRP
11	Waste Management	-	4	RRP
12	Radiation Protection	-	6	DAR
13	Conduct of Operations	-	2	BQP
14	Operational Safety	-	-	RRP
15	Accident Analysis	2	50	---
16	Technical Specifications	No Changes		
17	Quality Assurance	No Changes		

11.0. Documentation, Reporting, Action Plans (B.Q. Partain, and D.A. Rutherford)

Waste Management

On January 26, 1993, a DOE representative performing an oversight assessment of our waste management practices and storage areas pointed out some problems. On February 10, 1993, a follow-up inspection to that visit was performed and found all issues resolved or planning for resolving them accomplished. N-2 waste management-handling-personnel have attended all of the training required for performing their job.

Procedures

All SOPs have been reviewed by their authors or the N-2 SOP Committee annually as required. There are two SOPs on hold for needed revisions until issues are resolved in accordance with the Laboratory RADCON Manual.

Self-Assessment

The quarterly ES&H Self-Assessment was performed for 1st Quarter FY 93 in June 1993. A formal report of that assessment is attached to this report. (see App. A)

Compliance

Two Tiger Team findings have been verified as completed and closed by DOE. They are OP.03-01, which had to do with closing and not locking the gates to the PIDAS for the Kivas, and OP.2-01, which required the revision of Assembly Operation Checklists to include the Technical Specification addressed by each check.

Action plans for the DOE Reactor Safety Assessment of Sept. 1992 and the LAO Environmental Audit of Oct. 1992, were generated in March, 1993, and those action requirements were added to the N-2 Compliance Database. There were 7 findings in the DOE assessment and 21 in the LAO audit.

External Assessments

Jan. 6 - Fire Suppression Needs Assessment

Jan. 12 - Radioactive Material Management Area Assessment

Jan. 26 - DOE Waste Management Assessment

Feb. 9 - DOE Waste Management Follow-Up

Maintenance

The N-2 Maintenance Implementation Plan was completed and approved on 1-28-93. Maintenance procedures for most of the operating critical assembly machines are approved and on file with the N-2 QA Files.

Training

Ray Leonard and Leslie Knowlton, contractors for N-Division, submitted a proposal to the Laboratory Training Office for funds to generate a computer-based and video-interactive training module for the site's Site Specific Training. The proposal was accepted and the pilot program is currently being designed. LACEF Operator Training does not yet have completed lesson plans and a validated test. Additionally, the LACEF operators will need to take Rad Worker II or test out of it. Operator certification expires in June 1993.

12.0. Publications, Presentations and Memos

A. Meeting to clarify 5480.24, "Nuclear Criticality Safety" (R. E. Malenfant, R. E. Anderson [NIS-6] and S.Vessard [HS-6]).

Under the auspices of the Nuclear Criticality Safety Project (NCSTP), a meeting was scheduled for several contractor and DOE representatives to address the concerns with the requirements in DOE Order 5480.24, "Nuclear Criticality Safety," that was signed on Aug. 12, 1992. The meeting was held in Augusta, Georgia, on Jan. 14 and 15, 1993. R. E. Malenfant, R. E. Anderson, and S. Vessard (HS-6) were in attendance from Los Alamos, and S. Payne represented DOE/AL. The meeting was completely successful and resulted in clarification of all issues and the development of the draft for an Implementation Plan that was distributed by Neal Goldenberg on Feb. 17, 1993.

B. "Graybeards" Meeting, DOE Germantown, March 9-10, 1993 (R. E. Malenfant).

For several years, DOE/NE has utilized the NCTSP to provide technical input on contemporary issues. Neal Goldenberg, DOE/NE-70, has often referred to the assembled technical experts as "graybeards." The primary purpose of this meeting was to consider the issues of certification of professionals and to follow up on action regarding the concerns raised about detectability of slow-criticality excursions. Burt Rothleder, DOE/NE, made it quite clear that this was a DOE meeting, and that only technical issues were to be addressed. The meeting was successfully concluded with the action left with Rothleder.

C. Visit and Presentation at Penn State University, March 22-23, 1993 (R. E. Malenfant).

The purpose of this trip was to present a seminar for the nuclear engineering students and to discuss possible collaboration between the DOE Laboratories (particularly Los Alamos) and the faculty and students at Penn State. The entire day of March 23 was spent visiting the faculty of Penn State and the Breazeale Nuclear Reactor (1-MW Triga). The technical presentation on the characteristics of slow excursions was attended by about 60 energetic students and faculty. The 11 faculty, 55 undergratuates, and 40 graduate students at Penn State are engaged in very impressive work on coupled radiation transport, health physics, shielding, waste management, materials science, coupled 2-D calculations, neutron imaging, and exotic activation analysis.

END

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