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June 7, 1955

U. S. Atomic Energy Commission
 Hanford Operations Office
 Richland, Washington

Attention: Mr. D. G. Sturges, Chief
 Operations Division

This Document consists of
 9 Pages

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Gentlemen:

SUBJECT. SAFETY EXPERIENCE - REACTOR AND CRITICAL FACILITIES

- References: 1. OC:DGS, Letter from D.G. Sturges to A.B. Granger, 4-13-55, "Safety Experience - Reactors and Critical Facilities".
2. RD:ILB:EAL, Memorandum from W.K. Davis, 2-23-55, "Safety Experience - Reactors and Critical Facilities".
3. HW-36573, O.H. Greager, 5-6-55, "Safety Experience - Reactors and Critical Facilities".

This document together with Reference 3 completes transmittal of pertinent available information requested in References 1 and 2.

With regard to the enclosed information the following should be noted:

1. The interpretation used for the word "scrams" is a rapid shutdown of the pile performed automatically by control instrumentation. Also are included those rapid manual shutdowns where row lights on panellit gages indicated a scram to be desirable and a manual scram was performed before the time delay activated the automatic scram circuit. There were very few of these scrams in the later classification.

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**SPECIAL RE-REVIEW
 FINAL DETERMINATION
 DECLASSIFICATION CONFIRMED**

BY SP-8 J. J. [illegible] DATE 6-30-81

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HW-37033

U. S. Atomic Energy Commission

-2-

June 7, 1955

Rapid shutdowns because of ruptured fuel elements were not included under "scrams" except in those cases where the ruptures were detected by one or more instruments which tripped the safety circuit.

2. The large number of scrams falling under the heading of "accidental activation of controls" in later years was caused primarily by panellit trips which occurred by accidental grounding of panellit gages during normal maintenance. Operating the piles at higher than designed tube powers necessitates operating close to the water flow limits. This in turn requires that much more attention be given to the trip settings on the gages and consequently much more gage changing and resetting of trips. Because the gage board contains 2004 gages it follows that an increase in general maintenance will result in more scrams.
3. The heading "Panellit - Unknown Cause" was added to include those instances where it is known that a panellit gage scrambled the pile but the exact cause of the trip was unknown.
4. The heading "Oscillating Panellit Gages" was added because it is particularly applicable. Each panellit gage receives a pressure signal from its process tube from a point where there is appreciable water turbulence. The average length of the gage line from the process tube to the panellit gage is about 70-75 feet. It is inevitable then that the gages will oscillate over a considerable range of pressure. When operating close to the trip points an occasional gage will swing pass its trip and scram the pile. It is believed that a very large number of the unknown panellit scrams were caused by oscillating gages.
5. The heading "Instrument Performed Its Designed Purpose" was added. Examples of its meaning may be clarifying. A fuel element ruptured thus reducing the water flow in a process tube below a pre-determined value. The panellit gage for the tube detected this decrease in flow and scrambled the pile. Or it may have been that the radiation monitor on the outlet water detected the resulting large increase in activity of the water and scrambled the pile. Dual areas (and D-DR) have an additional cause for this type of scram in that a scram at one pile (depending on the cause for the scram) may scram the other pile.
6. For a very short period in 1944 and 1945 the panellit gages were in the safety circuit. Since the panellits were causing a rather large number of scrams because of oscillating gages and mechanical failure, they were removed from safety circuit and were wired to give an alarm should one pass its trip-point. The low tube powers being developed at that time safely permitted this. Such a procedure enabled the operating personnel to examine the gage and if alarm was caused by malfunctioning of the gage, the pile was not scrambled. ly. The number of scrams occurring from early 1945 through roughly 1952 was

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HW-37053

U. S. Atomic Energy Commission

-3-

June 7, 1955

thus decreased significantly. As tube powers were increased it became necessary to eliminate the delay resulting from such an operating procedure and the panellits were wired into the safety circuit such that there was no time delay in initiating a scram signal after a panellit passed its trip. The increased number of scrams that resulted were accepted to provide additional safety.

7. The large number of scrams for 1953 and 1954 for the D and H Reactors was caused in part to in-pile experiments that were being conducted at these reactors. The scrams resulting from these tests are listed under the heading "Other".

Very truly yours,

Manager, Pile Technology
ENGINEERING DEPARTMENT

OH Greager:JFM:bam

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-4-

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SAFETY EXPERIENCE - REACTORS AND CRITICAL FACILITIES
to December 31, 1954

105-B

	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954
10. Number of Start-ups	35	62	14	0	26	42	39	46	68	76	72
11. Number of scrams -	23	38	5	0	4	5	14	10	18	27	21
Due to personnel failures:											
Inattention -	1	1			1		1		1	1	
Accidental Activation											
of controls -											
Other -		2								4	4
Due to equipment failures -											
Fluctuation or loss of											
power supply -											
Electronic Failures -	20	11	2		2	1	3	3		4	1
Mechanical Failures -	2	2	1		1	1	2	2	1	3	7
Other		2	1						3	2	2
Oscillating Panellet Gages		7									
Instrument performed its											
designed purpose		2					8	2	9	9	4
Unknown		1									
Panellet - Unknown Cause								2	2	4	3

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to 7-1-48

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HW-37033

-5-

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SAFETY EXPERIENCE - REACTORS AND CRITICAL FACILITIES
to December 31, 1954

105-C.

10. Number of start-ups -	1952	1953	1954
11. Number of scrams -	18	106	119
Due to personnel failures:			
Inattention -			
Accidental Activation		77	39
of controls			1
Other	2	4	4
Due to equipment failures -			
Fluctuation or loss of			
power supply -	8	11	1
Electronic failures -		6	3
Mechanical failures -		4	2
Other		12	1
Oscillating Panellet Gages		8	3
Instrument Performed Designed Purpose	1	2	
Unknown	1		
Panellet - Unknown	1	28	22

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SAFETY EXPERIENCE - REACTORS AND CRITICAL FACILITIES
to December 31, 1954

105-D

	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954
10. Number of start-ups -	5	55	52	47	60	36	35	51	56	70	87
11. Number of scrams -	3	29	9	6	8	4	9	12	4	34	54
Due to personnel failures:											
Inattention -	1	3	1	1		1	1				1
Accidental Activation											
of controls -		5	1							2	19
Other -										1	
Due to equipment failures -											
Fluctuation or loss of											
power supply -		8	4	2	8	1	3	6		4	1
Electronic failures -		1		1		2				1	
Mechanical failures -	2	5	2	2			1	1	1	2	9
Other		2	1					4	1	11	7
Oscillating panellit gages		3									
Instrument performed designed											
purpose											
Unknown		2					4	1	2	7	9
Panellit - Unknown cause										6	6

Note: 1. The large number of scrams for 1953 and 1954 was due in part to an in-pile experiment that was being conducted at this reactor. The scrams resulting from this test are listed under the heading "Other" in Equipment Failure Section.

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EW-37033

-7-

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SAFETY EXPERIENCE - REACTORS AND CRITICAL FACILITIES
to December 31, 1954

105-DR

	1950	1951	1952	1953	1954
10. Number of start-ups -	16	62	49	60	87
11. Number of scrams -	10	22	7	27	47
Due to personnel failures:	1	1		1	2
Inattention -				4	9
Accidental Activation of controls -			1	1	
Other -					
Due to equipment failures -					
Fluctuation or loss of power supply -	1	8	1	5	1
Electronic failures -	1	3	1	2	3
Mechanical failures -	1	1	2	1	3
Other				4	1
Oscillating Panellit Gages	6	3	1	2	9
Instrument performed designed purpose					
Unknown					
Panellit - Unknown cause		6	1	2	19

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HW-37033

-8-

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SAFETY EXPERIENCE - REACTORS AND CRITICAL FACILITIES
to December 31, 1954

105-F

	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954
10. Number of startups	30	52	50	58	52	46	42	80	45	107
11. Number of scrams -	12	6	13	6	18	18	13	11	12	43
Due to personnel failures:										
Inattention -	1	2							1	3
Accidental Activation										
of controls-	1									
Other-								3		5
Due to equipment failures:										
Fluctuation or loss of										
power supply -	8	1	3	4	10	6	5	1	1	3
Electronic failures -		1	6	2	8	5			1	7
Mechanical failures -		1	4			2	2		2	
Other		1							1	
Oscillating Panellit Gages										
Instrument Performed Designed	2					5	5	5	2	5
Purpose										
Unknown									4	20
Panellit - Unknown Cause							1	2		

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