UNCLASSIFIED **OAK RIDGE NATIONAL LABORATORY**

Operated By
UNION CARBIDE NUCLEAR COMPANY

POST OFFICE BOX P
OAK RIDGE, TENNESSEE

External Transmittal
Authorized

ORNL
CENTRAL FILES NUMBER

CF- 56-11-136

DATE: November 28, 1956

COPY NO. 85

SUBJECT: RUN SUMMARY OF RUN HRT-CP-3 AND 4

TO: W. D. Burch

FROM: R. H. Winget

DISTRIBUTION:

1. HRP Director's Office	27. B.H. Hamling	53. D.M. Richardson
2. G.M. Adamson	28. P.H. Harley	54. G.W. Rivenbark
3. W.L. Albrecht	29. P.N. Haubenreich	55. R.C. Robertson
4. H.F. Bauman	30. J.W. Hill	56. A.M. Rom
5. S.E. Beall	31. R.W. Horton	57. W.L. Ross
6. E.G. Bohlman	32. G.H. Jenks	58. H.C. Savage
7. N.C. Bradley	33. D.M. Johnson	59. H.K. Search
8. R.E. Brooksbank	34. R.W. Jurgensen	60. C.H. Secoy
9. N.A. Brown	35. S.I. Kaplan	61. C.L. Segaser
10. F.R. Bruce	36. P.R. Kasten	62. I. Spiewak
11. J.R. Buchanan	37. A.S. Kitzes	63. R.W. Stoughton
12. W.D. Burch	38. J.O. Kolb	64. J.T. Sutherland
13. R.D. Cheverton	39. R.B. Korsmeyer	65. J.A. Swartout
14. E.L. Compere	40. K.A. Kraus	66. E.H. Taylor
15. J.S. Culver	41. J.A. Lane	67. D.G. Thomas
16. N.W. Curtis	42. R.E. Leuze	68. T.H. Thomas
17. W.K. Eister	43. R.B. Lindauer	69. D.S. Toomb
18. J.R. Engel	44. M.I. Lundin	70. W.E. Unger
19. D.E. Ferguson	45. R.N. Lyon	71. R. Van Winkle
20. J.D. Flynn	46. J.P. McBride	72. H.O. Weeren
21. D.F. Frech	47. H.F. McDuffie	73. R.R. Wiethaup
22. C.H. Gabbard	48. H.M. McLeod	74. R.H. Winget
23. W. R. Gall	49. R.A. McNees	75. C.E. Winters
24. T.H. Gladney	50. E.C. Miller	76. F.C. Zapp
25. J.C. Griess	51. E.O. Nurmi	77. ORNL Doc.Ref.Lib., Y-12
26. R.H. Guymon	52. L.F. Parsley	78. CR Library
		79-80. REED Library
		81. ORNL-RC
		82-84. Lab. Records
		85-99. T.I.S.E.

NOTICE

This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report.

UNCLASSIFIED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

LEGAL NOTICE

This report was prepared as an account of Government sponsored work. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission

- A. Makes any warranty or representation, express or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or
- B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in this report.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission to the extent that such employee or contractor prepares, handles or distributes, or provides access to, any information pursuant to his employment or contract with the Commission.

SUMMARY OF RUN HRT-CP-3 AND 4

Purpose

To determine if solids charged to the new 400-A solids loop in Cell B of Bldg. 7500 would remain in the circulating stream.

Procedure

Prior to these runs, the system contained 31.6 liters of 8.69 mg/ml of UO_2SO_4 in 0.02M H_2SO_4 solution which had been circulated in both the shakedown loop and the chemical plant to passivate the new system (Runs HRT-CP-1 and 2). Flow through the chemical plant loop was stopped in order to keep the solids added circulating only in the 400-A loop. At noon on 10/27/56, 9.18 grams of solids were charged to the loop in a sample bomb. The loop was operated at an average temperature of 240°C , 1300-1400 psi and at the designed flow rate of 400 gpm. Samples were pulled at two-hour intervals for the first eight hours and then at four-hour intervals until 1030 on 10/30/56. At this time, a second addition of 9.18 grams of solids was made, beginning run HRT-CP-4. To keep the solution inventory constant, each sample bomb was charged with a volume of UO_2SO_4 equivalent to that removed as the sample. During HRT-CP-4, samples were pulled on a four-hour schedule except for the initial sample which was pulled two hours after the solids addition.

Discussion of Results

The concentrations of solids in mg/ml for HRT-CP-3 are shown in Table 1. The initial analysis gave 0.34 mg/ml of suspended solids compared to 0.29 mg/ml calculated. The remaining samples gave a range from 0.54 mg/ml to 0.003 mg/ml of solids with the concentration apparently leveling off at the latter value.

After modifying the sampling procedure to include a rinse of the sample bomb, HRT-CP-4 results were more consistent than in CP-3 as may be seen in Table 2. However, inconsistencies were observed in three samples. A value of 0.407 mg/ml of solids was found in the first sample compared to a calculated value of 0.29 mg/ml if it is assumed that the final value of 0.003 mg/ml in run CP-3 was valid. The fourteenth sample showed an increase by a factor of 3 over the previous three successive samples; this high result cannot be explained.

TABLE 1

Grams Solids Added	Conc. Solids (mg/ml)	Sample Code	Time Sample Pulled After Solids Added	Loop Temperature	Pressure in System (psi)
9.18	0.34	CFH-3-1	3	Averaged 240°C	Averaged 1300-1400 psi
None	.54	CFH-3-2	5		
None	.55	CFH-3-3	28		
None	.054	CFH-3-4	12		
None	.50	CFH-3-5	16-1/2		
None	.05	CFH-3-6	20-1/2		
None	.08	CFH-3-7	24-1/2		
None	.10	CFH-3-8	28-1/2		
None	.05	CFH-3-9	32-1/2		
None	.12	CFH-3-10	36-1/2		
None	.045	CFH-3-11	40-1/2		
None	.037	CFH-3-12	44-1/2		
None	.008	CFH-3-13	48-1/2		
None	.021	CFH-3-15	52-1/2		
None	.024	CFH-3-16	56-1/2		
None	.025	CFH-3-17	60-1/2		
None	.011	CFH-3-18	64-1/2		
None	.003	CFH-3-19	68-1/2		

TABLE 2

Time of Circulation After Addition	Conc. Solids (mg/ml)	Sample Code	Loop Temperature (°C)	Loop Pressure (psi)
2 hours	0.407	4-1	-	-
6 "	.177	4-3	-	-
10 "	.148	4-4	-	-
14 "	.104	4-5	256	1250
18 "	.094	4-7	248	1420
26 "	.094	4-10	255	1325
30 "	.058	4-11	252	1375
34 "	.088	4-12	240	1400
38 "	.072	4-13	241	1475
42 "	.055	4-14	241	1475
46 "	.033	4-15	235	1400
50 "	.031	4-16	236	1370
54 "	.031	4-17	240	1475
58 "	.085	4-18	239	1400
62 "	.033	4-19	239	1450
70 "	.164	4-20	< 70	1400

The final sample was pulled at a temperature of less than 70°C compared to a normal operating temperature of 240°C. This suggests that deposited solids may have flaked off of the stainless steel walls upon lowering the loop temperature; however, only one sample was pulled at this temperature.

The solids concentration in mg/ml vs. circulating time in the loop for HRT-CP-4 is plotted on semilog paper in Fig. 1. In general, a steady drop in solids concentration occurred throughout the run until a minimum value of 0.03 mg/ml was reached. From Fig. 1, it can be seen that the solids concentration dropped by a factor of 2 about every eight hours. During this half period when the hydroclone was in operation, the entire shakedown loop solution inventory (36 liters) would have been circulated about 40 times through the hydroclone. This should be ample for solids removal by the clone.

UNCLASSIFIED

- 5 -

FIG. 1. SOLIDS CONCENTRATION vs OPERATING TIME OF HYDROCLONE

UNCLASSIFIED