UNCLASSIFIED

X-822

OAK RIDGE NATIONAL LABORATORY

Operated By

UNION CARBIDE NUCLEAR COMPANY

UCC L

POST OFFICE BOX P
OAK RIDGE, TENNESSEE

External Transmittal
Authorized

ORNL
CENTRAL FILES NUMBER

CF 56-12-49

DATE: December 3, 1956

COPY NO. 85

SUBJECT: SUMMARY OF RUN HRT-CP-6

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. Parsly	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 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

686-1

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.

**DO NOT
PHOTOSTAT**

UNCLASSIFIED

- 2 -

SUMMARY OF RUN HRT-CP-6

Purpose

To determine how effectively the 400-mill hydroclone removes injected solids of low concentrations in the HRT Chemical Plant.

Procedure

After replacing the hollow O-ring thermal barrier gasket with a solid teflon gasket, the 400-A pump was reinstalled for the beginning of run No. HRT-CP-6. A total of 32.8 liters of UO_2SO_4 (containing 3.25 grams of solids) which had been drained from the system at the conclusion of run No. 5 was recharged for run No. 6. To bring the initial volume of the system to 40 liters, 7.2 liters of 8.5 mg/ml of uranium solution was also charged to the system. The plant was brought up to temperature and pressure by 0045 on 11/8/56. The first addition of 1.82 grams of solids was started into the loop by means of a sample bomb at 0915 on 11/8/56. Almost immediately freeze plug No. 12 (plug on line No. 106 connecting side exit of the underflow pot to the suction side of P-1) thawed and could not be refrozen. This freeze plug is located about two inches from the normally hot underflow pot and about 18" from P-1 suction. Considerable difficulty has always been experienced in keeping this plug frozen during operation of the chemical plant. The chemical plant was then drained and rinsed in order to examine freeze plug 12. When the insulating can covering the freeze plug was opened, the coil was found to be completely uncovered; the can was re-filled with Sant-o-Cel and temporarily resealed.

The chemical plant was then charged with 10.17 liters of solution previously drained for the examination of the freeze plug plus an additional 7.4 liters of new UO_2SO_4 solution. For the next two days, attempts to freeze F.P.-12 were unsuccessful, indicating that the lack of insulation had not been the primary cause of previous failures. It was found possible to keep this plug frozen as long as continuous flow was maintained, and the run was resumed. Normally, flow in the chemical plant had been stopped for fifteen minutes when solids were charged to the 400-A loop.

UNCLASSIFIED

68 C - 2

Samples were pulled twice per shift (each eight-hour period): the initial sample at increasing time intervals after each solids addition, and the second sample four hours later. It was thought that during the eight-hour period, the solids concentration would be lowered to some equilibrium value and each addition would have little effect on subsequent additions. By sampling at increasing time intervals after each addition, it was hoped to determine how rapidly the hydroclone was removing solids. The loop and the chemical plant inventory was kept constant by charging the sample bomb with a volume of UO_2SO_4 equivalent to that removed as the sample. A total of six solids additions was made during the run. The final sample to determine how low the solids concentration might drop was pulled after 13-1/2 hours of flow through the hydroclone following the final solids addition.

Results

The data for the run are shown in Table 1 and are plotted in Fig. 1. It can be seen that the solids concentration of samples pulled at increasing time intervals showed no consistent trend downward; however, concentrations following each addition decreased rather uniformly with a half life of about two and one-half hours. Solid additions two, four, and six appear to have the same slope, while the third and fifth solids addition have a different slope for which there is no plausible explanation. The final sample (not plotted) pulled 13-1/2 hours after the sixth solids addition showed a concentration of 0.013 mg/ml compared to 0.020 mg/ml five and one-half hours after that addition. Previous experiments in the Y-12 loop had resulted in minimum concentrations of around 0.004 to 0.006 mg/ml.

A total of 14.17 grams of solids was added for this run and 7.77 grams were recovered for an over-all solids recovery of 54.8%. The concentration factor was 35. A detailed material balance is tabulated below.

	<u>Grams</u>	<u>% of Total</u>
Solids charged to system	14.17	100.0
Solids found in chemical plant	6.25	44.1
Solids found in loop	0.87	6.1
Solids in samples	0.65	4.6
Total solids found	7.77	54.8

R. H. Winget
R. H. Winget

RHW:ms

UNCLASSIFIED

UNCLASSIFIED

4
TABLE 1

Grams Solids Added	Conc. Solids (mg/ml)	Sample Code	Time Sample Pulled After Each Solids Addition	Solution Temperature (%)	Pressure in System (psi)
None	0.0366	CFH-2 and 3	30 minutes	-	-
1.82 (1st add.)	.140	CFH-7 and 8	~54 hours*	260	970
1.82 (2nd add.)	.116	CFH-9 and 10	30 minutes	266	950
None	.033	CFH-11 and 12	4 hrs, 30 min.	272	1015
1.82 (3rd add.)	.057	CFH-6-13 and 14	45 minutes	264	1000
None	.030	CFH-6-15 and 16	4 hrs, 45 min.	266	1035
1.82 (4th add.)	.063	CFH-6-17 and 18	1 hour	262	1000
None	.019	CFH-6-19 and 20	5 hours	265	1050
1.82 (5th add.)	.036	CFH-6-21 and 22	1 hr, 15 min.	276	1110
None	.016	CFH-6-23	5 hrs, 15 min.	275	1100
1.82 (6th add.)	.070	CFH-6-24 and 25	1 hr, 30 min.	280	1150
None	.02	CFH-6-26 and 27	5 hrs, 30 min.	281	1200
None	.013	CFH-6-28 and 29	13 hrs, 30 min.	277	1100

*Intermittent flow through hydroclone while attempting to freeze plug No. 12, shutdown of system and restarting system after draining for inspection of freeze plug No. 12.

UNCLASSIFIED

Fig. 1 Run HRT-CP-6, Solids Concentration vs. Time of Hydroclone Operation

Note: 2nd solids addition, 1st sample pulled 30 minutes after addition of solids.

3rd solids addition, 1st sample pulled 45 minutes after addition of solids.

4th solids addition, 1st sample pulled 60 minutes after addition of solids.

5th solids addition, 1st sample pulled 75 minutes after addition of solids.

6th solids addition, 1st sample pulled 90 minutes after addition of solids.

△ Calculated solids in system, mg/ml

1-5