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INFORMATION REPORT ON
DOWNCOMER INSTRUMENTATION AND DATA

by

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October 5, 1964

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INFORMATION REPORT ON
DOWNCOMER INSTRUMENTATION AND DATA

With recent concern for downcomer capacity at most areas, it seems appropriate that a survey be made to determine what instrumentation and data are available. The following is a brief description of the available instrumentation¹ and data. For a more detailed description of the equipment, contact the Process Engineer in the area of concern.

KE and KW Reactors have one downcomer each with little instrumentation. There are three taps above the orifice plate at the bottom of the downcomer and one tap below the orifice plate. All other instrumentation which was used to obtain the data presented in HW-72366 has been removed or is inoperable. The tap locations are located roughly as shown on the sketch below.

H Reactor has two downcomers. The near has a dip tube located at the top tray and has been visually calibrated to give water level below the lid. No other pressure or level instrumentation exists in either downcomer. The following data were obtained.

H REACTOR DATA

<u>Date</u>	<u>TORP (psi)</u>	<u>Temp. (°C)</u>	<u>Clearance</u>	<u>Instrument Gauge (Inches H₂O)</u>	<u>Manometer (Inches H₂O)</u>
1/17/64	200	10	40"*	9	
	375	10	44"*	11.5	18
	515	10	36"*	16	19.5
	560	10	25"*	13	19

¹Personal contact with area Process Engineers.

*Visual calibration with downcomer lid removed.

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<u>Date</u>	<u>Flow (gpm)</u>	<u>Temp. (°C)</u>	<u>Instrument Gauge (Inches H₂O)</u>	<u>Manometer (Inches H₂O)</u>	<u>Time</u>
1/21/64	89,500	64.0	20+5	19+1	2215
1/22/64	89,532	71.6	20+5	20+1	0045
1/22/64	89,632	74.2	20+5	20+1	1530
1/22/64	89,532	78.0	20+5	20+1	2040
1/23/64	89,613	84.5	20+5	26+1	0700
1/23/64	89,615	88.9	20+5	24+1	1500
1/23/64	89,632	89.7	20+5	25+1	2000
1/24/64	89,919	89.5	20+5	25+1	0630
1/25/64	90,600	90.0	20+5	25+1	0315
1/25/64	89,649	90.6	20+5	23+1.5	1505
1/26/64	89,767	90.1	20+5	25+2.0	0730
1/26/64	89,849	90.0	23+5	22+2.5	1420
1/27/64	89,725	90.6	23+5	24+2.0	0100

F Reactor has a single downcomer with pressure taps at the bottom only.

DR Reactor has two downcomers with no instrumentation.

D Reactor has a single downcomer with no instrumentation.

C Reactor has two downcomers, the far needing repairs before general use is resumed. The far downcomer has five taps in the approach piping and a dip tube at the top tray and the bottom corner. The near downcomer has a single dip tube at the bottom.

C REACTOR DATA

<u>Date</u>	<u>Flow</u>	<u>Readings (Inches of H₂O)</u>	<u>Temp.</u>
9/4/64	59,000	-1.0	18 C
9/4/64	75,000	-1.1	18 C
9/4/64	88,000	0.0	18 C
9/4/64	97,000	+7.5	18 C
9/21/64	40,000	-1.4	17 C
9/21/64	76,000	-1.4	17 C
9/21/64	83,000	-1.4	17 C
9/21/64	90,500	-1.4	17 C
9/21/64	93,500	-1.5	17 C
9/21/64	95,500	-1.65	17 C
9/21/64	98,000	-1.77	17 C

B Reactor has a single downcomer. All pressure instrumentation is of the bubbler type. The locations are as follows:

Location #1 - The downcomer lid has three taps.

Location #2 - One tap on the inside radius of the approach elbow.

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- Location #3 - One tap on the outside radius of the approach elbow.
- Location #4 - One dip tube terminating four inches above the top tray.
- Location #5 - One dip tube terminating four inches above the second tray.
- Location #6 - One dip tube terminating six feet above the downcomer floor.
- Location #7 - One tap in the effluent line ten feet downstream from the downcomer.

The data listed on the following page was obtained at the various conditions listed for B Reactor.

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 Process Technology Subsection
 Research and Engineering Section
 IRRADIATION PROCESSING DEPARTMENT

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DOWNCOMER DATA - B REACTOR

Date	TORP (psi)		Flow (X 1000 gpm)	Bulk Temp. (°C)								Distance From D/C Lid to Water Level Measured (Ft.)*	
	A	B			Loc. #1	Loc. #2	Loc. #3	Loc. #4	Loc. #5	Loc. #6 (Ft. H ₂ O)	Loc. #7 (psi)		
4/3/64	100	100	33.0	10	0	0	5.0" H ₂ O	+2.0" H ₂ O	+3.0" H ₂ O	+0.5	+0.5	5	
	200	212	50.0	10	0	0	15.0" "	+5.0" "	+5.0" "	2.0	0.75	3.5	
	275	300	60.7	10	0	0	35.0" "	10.0" "	+7.0" "	3.3	1.12	3	
	345	400	71.3		0	-1.0 Hg	2.0 psi	12.0" "	+5.0" "	5.0	1.6	2.5	
	500	498	80.4		0	-1.5 Hg	2.7 psi	12.0" "	5.0" "	6.0	2.0	2.2	
	540	552	85.2		0	-11" Hg	-1.0" Hg	13.0" "	8.0" "	6.8	2.1	3.0	
	525	520	83.0		0	-11" Hg	-1.5" Hg	0.0	2.0" "	6.5	1.9	3.0	
	525	520	83.0		0	-1.5" Hg	+3.0 psi	0.0	8.0" "	6.5	1.9	1.5	
	545	550	85.2		0	-11" Hg	-1.5" Hg	0.0	8.0" "	6.8	2.1	3.0	
4/6/64	552	548	89.5	83.3	-0.5" Hg	-2.0" Hg	4.0 psi	0.0	10.0" "	3.0	1.0		
4/29/64	555	548	89.0	94.5	-3.0" H ₂ O	-20.5" H ₂ O	4.9 psi	16.0" "	16.0" "	3.0	1.0		
5/12/64	555	548	89.2	93.8	-5.0" "	- 5.0" "	5.0 psi	14.0" "	17.0" "	3.0	1.0		
	87		30.0	10.0	-10.0" "	- 4.0" "	-4.0" "	-5.0" "	-6.0" "	2.0	.25		
	200		48.0	10.0	-19.5" "	---	---	-12.5" "	-5.0" "	2.0	.50		
	402		74.0	10	-31.0" "	---	---	-23.0" "	-8.0" "	3.5	1.0		
	500		83.0	10	- 4" Hg	-5.0" Hg	+1.0" Hg	-2.5" Hg	-2.0" Hg	4.0	1.25		
	540		85.0	10	- 4.1" Hg	-5.5" Hg	+1.0" Hg	-3.0" Hg	-2.0" Hg	4.4	1.25		
5/16/64	526			10	- 4.0" Hg	-15" Hg	-5.0" Hg	-3.5" Hg	-2.5" Hg				
	533			20	- 4.0" Hg	-5.0" Hg	+1.0" Hg	-3.0" Hg	-2.0" Hg				
	537			25	- 4.0" Hg	-15" Hg	-5.0" Hg	-3.0" Hg	-2.0" Hg				
	546			35	- 3.5" Hg	-15" Hg	-4.0" Hg	-2.5" Hg	-2.0" Hg				
	549			45	- 3.0" Hg	-15" Hg	-3.0" Hg	-2.5	-1.5				
	554			56	-23.0" H ₂ O	-15" Hg	-2.0" Hg	-23.0" Hg	-11" H ₂ O				
	552			81	-10.5" "	-2.0" Hg	+5 psi	-5.0" H ₂ O	+11" "				
	551			90.5	- 5.0" "	-21" H ₂ O	+6 psi	+6.5" "	+7.0" "				
	551			93.8	- 5.0" "	-11.5	+5	+14.0	+17" "				

*Visually determined at cold flow with downcomer lid removed.

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