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OAK RIDGE NATIONAL LABORATORY

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Subject: HRT PROCESS FLOWSHEETS (Revision IV)

Revision IV

From: F. C. Zapp

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HRT PROCESS FLOWSHEETS

The first four process flowsheets were drawn to show the division between the high and low pressure fuel and blanket systems. This necessitated the repetition of certain equipment which fell at the dividing points, such as the letdown heat exchangers, the feed pumps, etc. They were also designed to make it possible to cut the sheets and join them to make one large flowsheet without repetition of equipment or lines.

In general the flowsheet line numbers on the fuel side are a 100 series and the corresponding lines on the blanket side are in a 200 series; i.e., lines 102 and 202 will have the same function in their respective systems.

The current series of HRT approved flowsheets (excluding Chemical Processing) is as follows:

Title	Drawing No.
Flowsheet Identification Code	D-18330 e
Low Pressure Fuel System	D-18295 f
High Pressure Fuel System	D-18296 e
High Pressure Blanket System	D-18297 e
Low Pressure Blanket System	D-18298 f
Cooling Water System (demineralized water)	D-18240-Ae
Cooling Water System (potable water)	D-18240-Be
Steam System	D-18267 e
Waste and Vent System	D-18309 e
Refrigeration and Cold Trap System	D-18333 e
Steam and Condensate Service System	D-22579 d
Leak Detector System	D-30696

An equipment schedule is also included. A new Flowsheet Line Schedule (Dwg. A-18329, Revision IV) will be issued in the near future.

Instrumentation references are as follows:

Title	Drawing No.
HRT Instrument Application Tabulation	A-20954
HRT Multipurpose Instruments	D-18360
Instrument Air-Line Schematic 1	D-21039
Instrument Air-Line Schematic 2	D-21040
Instrument Air-Line Schematic 3	D-21041
Instrument Air-Line Schematic 4	D-21042
Instrument Air-Line Schematic 5	D-20989
Instrument Air-Line Schematic 6	D-20981
Instrument Air-Line Schematic 7	D-20982
Instrument Air-Line Schematic 8	D-22625

HRT EQUIPMENT SCHEDULE

No.	Name	Code	Flowsheet
1	Core	K-39	V
2	Fuel Pressurizer	G-38	V
3	Fuel Gas Separator	H-35	V
4	Fuel Heat Exchanger	H-30	V
5	Fuel Circulating Pump	J-34	V
6	Fuel Dump Cooler	M-30	V
7a	Fuel Dump Tank and Evaporator	K-14	V
7b	Fuel Dump Tank and Evaporator	K-14	V
7c	Entrainment Separator	J-15	V
8	Fuel Recombiner Condenser	D-14	V
8a	Fuel Recombiner and Iodine Removal Bed	D-15	V
9a	Fuel Cold Trap	C-6	V
9b	Fuel Cold Trap	B-6	V
10a	Fission Product Adsorber	A-2	V
10b	Fission Product Adsorber	B-2	V
10c	Fission Product Adsorber	B-2	V
10d	Fission Product Adsorber	D-4	V
11	Off-Gas Vacuum Pump	E-1	V
12	Stack Filter	L-1	V
13	Stack	K-1	V
13a	Stack Fan	K-1	V
14	Fuel Condensate Tank	E-11	V
15	Reflux Condenser	H-6	V
16a	Fuel Storage Tank and Evaporator	L-7	V
16b	Fuel Storage Tank and Evaporator	L-7	V
17	Fuel Feed Cooler	M-18	V
18	Fuel Sample Station	E-9	V
19	Fuel Transfer Tank	F-8	V
20	Fuel Letdown Heat Exchanger	E-21	V
21	Fuel Feed Pump	L-21	V
22	Holdup Tank	C-39	V
23	Fuel Purge Pump	H-20	V
24	Fuel Sample Cooler	L-30	V
25	H. P. Fuel Sample Station	H-21	V
26			
27	Secondary Fuel Recombiner	D-11	V
28	Blanket Circulating Pump	H-45	V
29	Blanket Pressurizer	G-41	V
30	Blanket Gas Separator	H-43	V
31	Blanket Heat Exchanger	H-49	V
32	Pressure Vessel	K-39	V
33	Blanket Dump Cooler	M-49	V
34a	Blanket Dump Tank and Evaporator	K-65	V
34b	Blanket Dump Tank and Evaporator	K-65	V
34c	Entrainment Separator	J-63	V
35	Blanket Recombiner Condenser	D-65	V
35a	Blanket Recombiner	D-63	V
36a	Blanket Cold Trap	C-73	V
36b	Blanket Cold Trap	B-73	V

HRT Equipment Schedule

No.	Name	Code	Flowsheet
37	Blanket Condensate Tank	E-67	V
38	H. P. Blanket Sample Station	H-58	V
39	Blanket Reflux Condenser	H-73	V
40	Blanket Feed Cooler	M-61	V
41	Blanket Feed Pump	L-57	V
42	Blanket Transfer Tank	E-71	V
43	Blanket Sample Cooler	L-49	V
44	Blanket Sample Station	E-69	V
45	Blanket Letdown Heat Exchanger	E-57	V
46	Turbine Oil Filter	L-18	X
47	Future Compressor	B-3	V
48	Blanket Purge Pump Cooler	F-64	V
49a	Blanket Storage Tank and Evaporator	L-72	V
49b	Blanket Storage Tank and Evaporator	L-72	V
50	Storage Cold Trap	B-35	V
51	Building Steam Cond. Tank (existing)	O-14	X
52	Condensate Pit Sump Pump (existing)	O-17	X
53	Fuel Steam Drum	C-4	X
54	Blanket Steam Drum	C-6	X
55	Steam Calorimeter		
56	Package Warmup Boiler	G-11	X
57	Steam Turbine	F-16	X
58	Generator	F-18	X
59	Steam Condenser	H-17	X
60			
61	Cooling Tower	E-6	W
62a,b	Cooling Tower Pumps	E-9	W
63	Hotwell Pump	K-16	X
64	Deaerator and Surge Tank Vent Condenser	L-12	X
65a	Feedwater Pump	M-10	X
65b	Feedwater Pump	N-10	X
66	Packaged Boiler System - Steam Separator	F-15	X
67a	Gas Accumulator	L-10	V
67b	Gas Accumulator	L-11	V
68	Fuel Purge Pump Cooler	F-15	V
69	Refrigerant Compressor	N-18	Z
70	Oil Separator	M-14	Z
71	Chiller and Storage Tank	M-9	Z
72	Heater and Storage Tank	L-3	Z
73	Amsco Pump (cold)	O-8	Z
74	Amsco Pump (warm)	N-3	Z
75	Refrigerant Condenser	O-15	Z
76	H. P. Fuel Loop Piping		
77	H. P. Blanket Loop Piping		
78	H. P. Valves and Fittings		
79	L. P. Piping, Valves and Fittings		
80a	Waste Evaporator	B-21	Y
80b	Waste Evaporator Ent. Separator	B-22	Y
81	Decontamination System		
82a	Space Cooler	K-11	W

HRT Equipment Schedule

No.	Name	Code	Flowsheet
82b	Space Cooler	L-11	W
82c	Space Cooler	K-15	W
82d	Space Cooler	K-13	W
83	Freezer		
84	Corrosion Sample Retainers and Corrosion Study Facilities		
85	Source Tube and Thimble		
86	Handling Tools		
87	Leak Detector System		
88a	Feedwater Accumulator	M-9	X
88b	Feedwater Accumulator	N-9	X
89a	Chemical Vent Vacuum Pump	F-15	Y
89b	Reactor Vent Vacuum Pump	G-15	Y
90a	Waste Evaporator Condenser	D-20	Y
90b	Waste Evaporator Condenser	F-20	Y
91	Reactor Vessel Cooler	K-12	T
92	Thermal Shield Cooler	K-12	T
93	1000 Gallon Waste Condensate Tank	G-20	Y
94	12,000 Gallon Waste Tank	L-20	Y
95	Waste Pond	P-14	Y
96			
97	Thermal Insulation (in cell)		
98	Reactor Blast Shield		
99	Dewatering Pump	M-8	Y
100	Dump Tank Weighbeam Assembly		
101	Condensate Weighbeam Assembly		
102	Cell Air Monitor Blower	B-3	Y
103	Condensate Receiver Tank	B-7	U
104	Blanket Purge Pump	D-61	Y
105	Heat Exchanger Blast Shield		
106	Drier	L-2	Z
107	Drier	M-7	Z
108	Fuel Purge Pump	G-22	V
109	Blanket Purge Pump	D-59	V
110	F-22 Drier	N-10	Z
111	F-22 Receiver	O-12	Z
112	Thermal Shield Cooler Fill Tank	J-11	T
113	Secondary Blanket Recombiner	C-67	V
114	Replacement Core Vessel		
115	Replacement Pressure Vessel		
116	Replacement Pressure Vessel Blast Shield		
117	Fuel Storage Recombiner	F-5	V
118	Fuel Purge Flow Heat Exchanger	F-27	V
119	Blanket Purge Flow Heat Exchanger	G-53	V
120	Rupture Disc Assembly	F-40	V
121	Catch Tank	J-17	Z
122	Demineralized Water Surge Tank	C-5	T
123	Purge Pump Coolant Heat Exchanger	O-9	W
124a	Demineralized Water Circulating Pump	C-9	T
124b	Demineralized Water Circulating Pump	C-9	T
125	Demineralized Water Heat Exchanger	D-11	W

HRT Equipment Schedule

No.	Name	Code	Flowsheet
127	Demineralized Water Heater	M-3	T
128a,b	Filters	O-2	W
129a,b	Instrument Air Compressors		
130a,b	Condensate Tank	C-17	T
131	Fuel Feed Pump Oil Cooler	O-13	W
132	Blanket Feed Pump Oil Cooler	O-15	W
133	Steam Condenser	B-8	W
134	Turbine Oil Cooler	E-16	W
135	Liquid Subcooler	K-11	Z
136	Heat Exchanger	L-15	Z
137	Evaporator	L-12	Z
138a,b	Steam Treating Solution Storage Tanks	O-7	X
139	Lapp Pump		S
140	Cornelius Pump		S
141	General Purpose Mix Tank		
142	Fill Tank		S
143	Control Room Sump Jet	C-20	U
144	Control Room Sump Pump	C-20	U

FLWSHEET CODE REFERENCES

(Code gives location of equipment on following Flowsheets)

	<u>Abscissa Range</u>
V = Low Pressure Fuel System Flowsheet — D-18295f	1 thru 19
V = High Pressure Fuel System Flowsheet — D-18296e	20 thru 39
V = High Pressure Blanket System Flowsheet — D-18297e	40 thru 56
V = Low Pressure Blanket System Flowsheet — D-18298f	57 thru 78
Y = Waste and Vent System Flowsheet — D-18309e	
Z = Refrigeration and Cold Trap System Flowsheet — D-18333e	
U = Steam and Condensate Service Flowsheet — D-22579d	
X = Steam System Process Flowsheet — D-18267e	
W = Cooling Water Flowsheet (potable) — D-18240Be	
T = Cooling Water Flowsheet (demineralized) — D-18240Ae	
S = Leak Detector System Flowsheet	

NOTE: ALL PROCESS LINE INFORMATION IS FOR OPERATION AT AN
OVERALL GROSS POWER OF 5220 KW.

HRT FLOWSHEET IDENTIFICATION CODE

UNCLASSIFIED
DWG. NO. D-18330E

I. LINE NUMBER NOMENCLATURE

THE LINE SCHEDULE IS DIVIDED INTO FIVE SECTIONS AS FOLLOWS-

1. PROCESS PIPING

A) FUEL SYSTEM - LINES 100-199 INCLUSIVE

INCLUDES ALL LINES NORMALLY CARRYING FUEL SOLUTIONS;
OVERFLOW, VAPOR AND CONDENSATE, TRANSFER AND
SAMPLE LINES.

B) BLANKET SYSTEM - LINES 200-299 INCLUSIVE

INCLUDES ALL LINES NORMALLY CARRYING BLANKET
SOLUTION; OVERFLOW, VAPOR AND CONDENSATE, TRANSFER,
AND SAMPLE LINES.

2. STEAM PIPING

LINES 300-399 INCLUSIVE.

INCLUDES ALL LINES CARRYING STEAM OR CONDENSATE, AND
FEEDWATER SYSTEM.

3. SERVICE PIPING

LINES 400-574; 601-674; 701-949; INCLUSIVE.

INCLUDES ALL STEAM, WATER, VENT, COOLING WATER, AND
REFRIGERANT LINES.

4. PROCESS INSTRUMENT PIPING

LINES 575 - 599 INCLUSIVE
668 - 679 INCLUSIVE
691 - 699 INCLUSIVE
1000 - 1020 INCLUSIVE

SHOWN IN BOX
575

5. LEAK DETECTION SYSTEM

LINES 1 - 96 INCLUSIVE - FUEL SIDE
18 - 96B INCLUSIVE - BLANKET SIDE
950 - 974 INCLUSIVE - FUEL SIDE
975 - 999 INCLUSIVE - BLANKET SIDE

IA. INSTRUMENT NUMBERING CODE

1. INSTRUMENT PROCESS DIVISIONS

100-199 FUEL HIGH PRESSURE
200-299 BLANKET HIGH PRESSURE
300-399 FUEL LOW PRESSURE
400-499 BLANKET LOW PRESSURE
500-699 STEAM POWER
700-799 OFF GAS
800-899 UTILITIES
900-999 MISCELLANEOUS

2. 2nd AND 3rd DIGITS	FUNDAMENTAL VARIABLE	MULTIPURPOSE NUMBERS
00-04	ANALYSIS	0000-0400
05-14	ELECTRIC	0500-1400
15-34	FLOW	1500-3400
35-44	HAND	3500-4400
45-49	LEVEL	4500-4900
50-59	PRESSURE	5000-5900
60-64	RADIATION	6000-6400
65-94	TEMPERATURE	6500-9400
95-99	WEIGHT	9500-9900

II. LINE IDENTIFICATION

LINE NUMBERS 183

SHIELD LINE

PRIMARY PROCESS LIQUID LINE

SECONDARY PROCESS LIQUID LINE

PRIMARY PROCESS GAS OR VAPOR LINE

SECONDARY PROCESS GAS OR VAPOR LINE

STEAM LINE

AIR LINE

ELECTRICAL LINE

GAS

NITROGEN

III. PIPE LINE CODE

TYPICAL CODE ON LINE

1-1/2" SCH. 80 CARBON STEEL PIPE 1-1/2 C80

1" SCH. 40 STAINLESS STEEL PIPE 1 S40 OR 1-40

1/2" SCH. 40 WROUGHT IRON PIPE 1/2 W40

1" SCH. 80 GALVANIZED PIPE 1 G80

IV. GENERAL LEGEND

CONDENSATE DRAIN CD

COOLING WATER CW

COOLING WATER DRAIN CWD

(X - BELOW AIR OPERATED VALVE) - FAILS CLOSED - .

(O - BELOW AIR OPERATED VALVE) - FAILS OPEN - .

EXAMPLE:

PC-452

P C - 4 5 2

FUNDAMENTAL VARIABLE ALLOCATION NUMBERS

PROCESS DIVISION NUMBER

INSTRUMENT CLASSIFICATION LETTER(S)

FUNDAMENTAL VARIABLE CLASSIFICATION LETTER

V. VALVE AND FITTING SYMBOLS

SAFETY OR RELIEF VALVE

MANUALLY OPERATED VALVE

CHECK VALVE

AIR OPERATED VALVE (COMMERCIAL DIAPHRAGM)

AIR OPERATED VALVE (REMOTELY OPERATED IN RADIATION FIELD)

AIR OPERATED VALVE WITH POSITIONER

MANUALLY OPERATED EXTENSION HANDLE VALVE

GATE VALVE

GLOBE VALVE

VALVE NORMALLY CLOSED

VALVE NORMALLY OPEN

VALVE THROTTLING

SOLENOID VALVE

MECH. COUPLING

REDUCING COUPLING (SCREWED)

REDUCING COUPLING (WELDED)

FLOW RESTRICTOR

FLANGED JOINT

UNION (THREADED)

LOAD CELL

STRAINER

TRAP

FREEZER STATION

SUBSCRIPT LETTER { A-WELDED SS COIL - PERM. CONN.
B-SOLDERED Cu COIL - PERM. CONN.
C-SS OR Cu COIL - TEMP. CONN.
D-CLAMP-ON JACKET

RUPTURE DISC

CALORIMETER CONNECTION

VALVE (3-WAY) WITH NORMALLY
BLOCKED PORT

VALVE (3-WAY) WITH COMMON PORT

PURGE LINE

PRESSURE REGULATOR VALVE

VI. INSTRUMENTATION AND MISC. SYMBOLS

EQUIPMENT NO. 6

(WHEN SHOWN ON AIR OPERATED VALVES)

FIGURE TO LEFT INDICATES LOWER AIR OPER. PRESSURE

FIGURE TO RIGHT INDICATES UPPER AIR OPER. PRESSURE

INSTRUMENTS WITH SINGLE FUNCTION:

LOCALLY MOUNTED

TURBINE PANEL MOUNTED

INTERMEDIATE MOUNTED

CONTROL PANEL MOUNTED

AUXILIARY MOUNTED

TRANSMITTER

INSTRUMENTS WITH DUAL FUNCTIONS OR

INSTRUMENTS WITH CLOSE MECH. COUPLING

INSTRUMENT NOT COVERED IN CODE

LEADS TO ELECTRICAL CONTROL CIRCUIT ECC

LEADS TO ANNUNCIATOR ANN

LEADS TO VALVE POSITION INDICATOR VPI

INLINE INSTRUMENT

VII. INSTRUMENT CLASSIFICATION CODE

(MEANING OF LETTERS APPEARING IN INST. BALLOONS)

	FIRST LETTER	ANNUNCIATOR	PRIMARY ELEMENT	CONTROLLER	INDICATOR	AMPLIFIER, BOOSTER, RELAY – MODIFIER	RECORDE	TRANSMITTER – TRANSDUCER	SWITCH	RECORDE – CONTROLLER	INDICATOR – CONTROLLER	REMOTE OPERATED VALVE	SELF OR MANUAL OPERATED VALVE	SAFETY VALVE
2ND – 3RD LETTER	A	E	C	I	M	R	T	X	RC	IC	CV	V	SV	
ANALYSIS	A	AA	AE	AC	AI	AM	AR	AT	AX	ARC	AIC	ACV		ASV
ELECTRIC	E	EA	EE	EC	EI	EM	ER	ET	EX	ERC	EIC	ECV	EV	ESV
FLOW	F	FA	FE	FC	FI	FM	FR	FT	FX	FRC	FIC	FCV	FV	FSV
HAND	H	HA		HC		HM		HX		HIC	HCV		HV	
LEVEL	L	LA	LE	LC	LI	LM	LR	LT	LX	LRC	LIC	LCV	LV	LSV
PRESSURE	P	PA	PE	PC	PI	PM	PR	PT	PX	PRC	PIC	PCV	PV	PSV
RADIATION	R	RA	RE	RC	RI	RM	RR	RT	RX	RRC	RIC	RCV		
SPEED	S	SA	SE	SC	SI	SM	SR	ST	SX	SRC	SIC	SCV		
TEMPERATURE	T	TA	TE	TC	TI	TM	TR	TT	TX	TRC	TIC	TCV	TV	TSV
WEIGHT	W	WA	WE	WC	WI	WM	WR	WT	WX	WRC	WIC	WCV		
SPECIAL	X	XA	XE	XC	XI	XM	XR	XT	XX	XRC	XIC	XCV	XV	XSV

THE FOLLOWING SUBSCRIPTS MAY BE APPLIED TO THE FIRST LETTER.

a - AVERAGE i - CURRENT v - VOLTS

c - CONDUCTIVITY m - MOISTURE w - WATTS

d - DIFFERENTIAL pf - POWER FACTOR

f - FREQUENCY pH - CONCENTRATION

g - SPECIFIC GRAVITY t - TIME

MATERIALS LIST				
ITEM NO.	DWG. NO.	QTY.	NAME	SIZE

ALL LINES SHOWN TERMINATING WILL CONTINUE ON DWG. D-18296

ALL LINES TERMINATING WILL CONTINUE ON DWG. D-18298

Added Jumper Line on Pressurizer. Removed Lines 240 and Pressure Balancing System. Added Check Valve in Line 210. Added Line 251 - line 211 was 1/4. Added P&ID P&C 250 B.		F.C.Z.	W.R.B.	9/15/57
General		1-16-57 F.C.Z.	W.R.B.	
General		3-7-56 F.C.Z.	W.R.B.	
General		7-22-55 F.C.Z.	W.R.B.	
General		4-13-55 F.C.Z.	W.R.B.	
NO. REVISIONS		DATE	APPR.	APPR.
DRAWING NO. D-				
DRAWN	DATE	CHECKED	DATE	APPROVED
C.W. DAY				
DESIGNED	DATE	SUBMITTED	DATE	APPROVED
F.C. ZAPP	2-22-55		3-21-55	
HEALTH PHYSICS	MEDICAL	OPERATIONS	SAFETY	
FIRE PROTECTION	RESEARCH SHOP	MAINTENANCE		
HET Cooling Water Flowsheet		D-18240		
HET Multipurpose Instruments		D-18260		
HET Instr. Application Tabulation		A20043		
HET Flowsheet Identification Code		D-18330		
HET Flowsheet Line Schedule		A-18329		
Low Press. Blanket System Flowsheet		D-18293		
High Press. Fuel System Flowsheet		D-18296		
Low Press. Fuel System Flowsheet		D-18295		
Steam System Flowsheet		D-18267		
REFERENCE DWGS.		DWG. NO.		

N.R.T.

BLDG. 7500

FLWSHEET

HIGH PRESSURE BLANKET SYSTEM

OAK RIDGE NATIONAL LABORATORY

OPERATED BY

CARBIDE AND CARBON CHEMICALS COMPANY

A DIVISION OF UNION CARBIDE AND CARBON CORPORATION

OAK RIDGE, TENNESSEE

THIS DRAWING

CLASSIFIED

AS UNCLASSIFIED

PER F.C. ZAPP

SCALE:

SUBMITTED

2/15/57

ACCEPTED

2/15/57

APPROVED

2/15/57

D-18297

REV

6

MATERIALS LIST					
ITEM NO.	DWG. NO.	QTY.	NAME	SIZE	MATERIAL

REVISIONS					
NO.	REVISIONS	DATE	APPR.	APPR.	
1	General	1-15-57	F.C.Z.	W.P.S.	
2	General	3-7-56	F.C.Z.	W.P.S.	
3	General	7-22-55	F.C.Z.	W.P.S.	
4	General	5-2-55	F.C.Z.	W.P.S.	

DRAWING NO. D-18297					
DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
C.W. DAY	1-15-57	F.C.Z.	3-21-55	W.P.S.	3-21-55
DESIGNED	DATE	SUBMITTED	DATE	APPROVED	DATE
F.C.Z.	1-15-57	F.C.Z.	3-21-55	W.P.S.	3-21-55

HEALTH PHYSICS	MEDICAL	OPERATIONS	SAFETY
FIRE PROTECTION	RESEARCH SHOP	MAINTENANCE	

REVISION			
NO.	REVISION	DATE	APPR.
1	Removed Line 240		
2	Added W.C. 436		
3	Added Check Valve in Line 210		
4	Added Vent Line 261 (HCV 234 in Line)		
5	Line 244 was to Dump Tanks		
6	Line 272 was to Recomb. Cond.		
7	Line 223 was to Line 213		
8	Added Item 113 & Lines 217, 218		

THIS DRAWING
CLASSIFIED
AS UNCLASSIFIED
PER F.C.Z. APP

REFERENCE DRAWINGS		DWG. NO.
HET Cooling Water Flowsheet		D-18240
HET Multipurpose Instruments		D-18360
HET Instr. Application Tabulation		A209542
HET Flowsheet Identification Code		D-18330
HET Flowsheet Line Schedule		A-18329
High Press. Blanket System Flowsheet		D-18297
High Press. Fuel System Flowsheet		D-18296
Low Press. Fuel System Flowsheet		D-18295
Steam System Flowsheet		D-18267

OAK RIDGE NATIONAL LABORATORY		BLDG. 7500
OPERATED BY		
CARBIDE AND CARBON CHEMICALS COMPANY		
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION		
OAK RIDGE, TENNESSEE		
SUBMITTED	ACCEPTED	APPROVED
D-18298		REV

PARTS LIST				
PART NO.	DWG. NO.	NO REQD	DESCRIPTION (NAME, SIZE, ETC.)	MATERIAL

NOTE:
WATER PIPING
Inside Reactor Shield To Be Galvanized.
Screwed Piping - ASTM A53-54T Grade B.
Except Heads.
Outside Reactor Shield To Be Screwed or
Welded Piping - ASTM A53-54T Grade B

HRT Instrumentation Application Tabulation	A20954B
HRT Flowsheet Identification Code	D-18330
HRT Flowsheet Line Schedule	D-18329
REFERENCE DRAWINGS	DWG. NO.

HRT. BLDG. NO. 7500

COOLING WATER SYSTEM FLOWSHEET (DEMINERALIZED WATER)

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE NUCLEAR COMPANY
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION
OAK RIDGE, TENNESSEE

SUBMITTED	ACCEPTED	APPROVED
	S.E. BEALL	R.B. BRIGGS
D-18240-A		

REVISIONS		DATE	APPD	APPD
NO.	REVISIONS	DATE	APPD	APPD
1	Redrawn For Changes see CF-57-40-1	7-8-57		
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22

PARTS LIST				
PART NO.	DWG. NO.	NO REQ.	DESCRIPTION (NAME, SIZE, ETC.)	MATERIAL

NOTE:
Water Piping
Inside Reactor Shield To Be Galvanized.
Screwed Piping - ASTM A53-54T-Grade B. (Except Heads.
Outside Reactor Shield To Be screwed or
Welded Piping - ASTM A53-54T-Grade B.

Cooling Water Flowsheet - Demineralized Water	D-18240A
HRT Instrumentation Application Tabulation	A-209542
HRT Flowsheet Identification Code	D-18330
HRT Flowsheet Line Schedule	D-18329
REFERENCE DRAWINGS	DWG. NO.

THIS DRAWING
CLASSIFIED
AS UNCLASSIFIED
PER E.C. ZAPP
LIMITS ON DIMENSIONS UNLESS
OTHERWISE SPECIFIED
FRACTIONS: ±
DECIMALS: ±
ANGLES: ±
SCALE:

BLDG. NO.

COOLING WATER FLOWSHEET
(POTABLE WATER)

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE NUCLEAR COMPANY
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION
OAK RIDGE, TENNESSEE

SUBMITTEDACCEPTEDAPPROVED
S.E. BEALLR.B. BRIGGS.

D-18240B

Redrawn - For Changes see CF-57-10-17-21-57				
NO.	REVISIONS	DATE	APPD.	APPD.
DRAWING NO. D-				
DRAWN	DATE	CHECKED	DATE	APPROVED
ASL	7-5-57	(Signature)	7-11-57	(Signature)
DESIGNED	DATE	SUBMITTED	DATE	APPROVED
		E.C. ZAPP

MATERIALS LIST				
ITEM NO.	DWG. NO.	QTY.	NAME	MATERIAL

NOTES:
1. Carbon Steel Pipe in this System is to be Butt Welded Steel - ASTM-A53.
2. Steam Piping shall be in Accordance With HRT Specifications JS-1202-1.
3. All Carbon Steel Piping & Fittings Within the Reactor & Chemical Process Cells are to be Given a Protective Coating (to be Specified Later).
4. All Stainless Steel Piping in this System is to be in Accordance With ASTM-A312 (Seamless Type 347).

Gen. Piping Arr. Waste Evap. System	FB4310
HRT Instr. Application Tabulation	A20054a
HRT Flow Sheet Identification Code	D-18330
HRT Row Sheet Line Schedule	D-18329
REFERENCE DRAWINGS	DWG. NO.

HRT BLDG. 7500
WASTE & VENT SYSTEM
FLOWSHEET

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
CARBIDE AND CARBON CHEMICALS COMPANY
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION
OAK RIDGE, TENNESSEE

THIS DRAWING
CLASSIFIED
AS
PER E.C. ZAPP
SCALE:

SUBMITTED	ACCEPTED	APPROVED
3/20/55	3/20/55	3/20/55
W.P. Walker	W.P. Walker	W.P. Walker
D-18309		

REVISIONS		DATE	APPR.	APPR.
DRAWING NO. D-				
DESIGNED	DATE	CHECKED	DATE	APPROVED
DATE	DATE	DATE	DATE	DATE
HEALTH PHYSICS	MEDICAL	OPERATIONS	SAFETY	
FIRE PROTECTION	RESEARCH SHOP	MAINTENANCE		

d General	1-16-55	F.C.E.	W.P. Walker
c General	2-21-56	F.C.E.	W.P. Walker
b General	7-24-55	F.C.E.	W.P. Walker

FOR LIST OF CHANGES SEE OF 57-10-1
ADDED LINES 703-706, 707-708
ADDED VALVES & INSTRUMENTATION
ADDED FLAP ON LINE 629

PARTS LIST

PART NO.	DWG. NO.	NO REQD	DESCRIPTION (NAME, SIZE ETC.)	MATERIAL
718A	3/8"			
720A	3/8"			
722A	3/8"			
724A	3/8"			
726A	3/8"			
728A	3/8"			
730A	3/8"			
732A	3/8"			
734A	3/8"			
736A	3/8"			
738A	3/8"			
740A	3/8"			
742A	3/8"			
744A	3/8"			
746A	3/8"			
748A	3/8"			
750A	3/8"			
752A	3/8"			
754A	3/8"			
756A	3/8"			
758A	3/8"			
760A	3/8"			
762A	3/8"			
764A	3/8"			
766A	3/8"			
768A	3/8"			
770A	3/8"			
772A	3/8"			
774A	3/8"			
776A	3/8"			
778A	3/8"			
780A	3/8"			
782A	3/8"			
784A	3/8"			
786A	3/8"			
788A	3/8"			
790A	3/8"			
792A	3/8"			
794A	3/8"			
796A	3/8"			
798A	3/8"			
800A	3/8"			
802A	3/8"			
804A	3/8"			
806A	3/8"			
808A	3/8"			
810A	3/8"			
812A	3/8"			
814A	3/8"			
816A	3/8"			
818A	3/8"			
820A	3/8"			
822A	3/8"			
824A	3/8"			
826A	3/8"			
828A	3/8"			
830A	3/8"			
832A	3/8"			
834A	3/8"			
836A	3/8"			
838A	3/8"			
840A	3/8"			
842A	3/8"			
844A	3/8"			
846A	3/8"			
848A	3/8"			
850A	3/8"			
852A	3/8"			
854A	3/8"			
856A	3/8"			
858A	3/8"			
860A	3/8"			
862A	3/8"			
864A	3/8"			
866A	3/8"			
868A	3/8"			
870A	3/8"			
872A	3/8"			
874A	3/8"			
876A	3/8"			
878A	3/8"			
880A	3/8"			
882A	3/8"			
884A	3/8"			
886A	3/8"			
888A	3/8"			
890A	3/8"			
892A	3/8"			
894A	3/8"			
896A	3/8"			
898A	3/8"			
900A	3/8"			
902A	3/8"			
904A	3/8"			
906A	3/8"			
908A	3/8"			
910A	3/8"			
912A	3/8"			
914A	3/8"			
916A	3/8"			
918A	3/8"			
920A	3/8"			
922A	3/8"			
924A	3/8"			
926A	3/8"			
928A	3/8"			
930A	3/8"			
932A	3/8"			
934A	3/8"			
936A	3/8"			
938A	3/8"			
940A	3/8"			
942A	3/8"			
944A	3/8"			
946A	3/8"			
948A	3/8"			
950A	3/8"			
952A	3/8"			
954A	3/8"			
956A	3/8"			
958A	3/8"			
960A	3/8"			
962A	3/8"			
964A	3/8"			
966A	3/8"			
968A	3/8"			
970A	3/8"			
972A	3/8"			
974A	3/8"			
976A	3/8"			
978A	3/8"			
980A	3/8"			
982A	3/8"			
984A	3/8"			
986A	3/8"			
988A	3/8"			
990A	3/8"			
992A	3/8"			
994A	3/8"			
996A	3/8"			
998A	3/8"			
1000A	3/8"			

NOTES:

- In all cases refrigeration flow is counter current to process flow.
- All refrigerant lines to and from cold traps are 1/2 nominal (0.625 o.d. x 0.040 wall) copper tubing, Type L, specified.
- All refrigerant lines to and from freezer stations are 3/8 nominal (0.500 o.d. x 0.035 wall) copper tubing, Type L, specified.
- Lines 771 thru 781 are galvanized steel schedule 40 with standard pipe threads.
- Copper tubing to be hard drawn ASTM-B-88-54.
- Insulation: 1/2 lines inside shield shall be 1/2 thick cork or equivalent. 1/2 lines outside shield shall be 2" thick cork or equivalent. 1" & 3/4 lines shall be 3" thick cork or equivalent.
- Solenoid valves on cold traps supply and return lines are fitted with check valves to prevent back flow.
- C beside an ECV denotes flow to heater tank.

HRT Flowsheet Line Schedule	A-18329
HRT Flowsheet Identification Code	D-18330
HRT Instr Application Tabulation	A-209549
Low Press. Blanket System Flowsheet	D-18298
High Press. Blanket System Flowsheet	D-18297
High Pressure Fuel System Flowsheet	D-18296
Low Pressure Fuel System Flowsheet	D-18295
REFERENCE DRAWINGS	DWG. NO.

HRT BLDG. NO. 7500

REFRIGERATION & COLD TRAP SYSTEM FLOWSHEET

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE NUCLEAR COMPANY
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION
OAK RIDGE, TENNESSEESUBMITTED ACCEPTED APPROVED
S.E. BEALL R.B. BRIGGS

D-18333

REV

e

PARTS LIST				
PART NO.	DWG. NO.	NO. REQD.	DESCRIPTION (NAME, SIZE, ETC.)	MATERIAL

NO.	REVISIONS	DATE	APPD.	APPD.
DRAWING NO. D-				
DRAWN	DATE	CHECKED	DATE	APPROVED
A.S.L.	8-5-57	C.K.C.	9-11-57	F.E.Z.A.P.P.
DESIGNED	DATE	SUBMITTED	DATE	APPROVED
		R.E.S.	8-6-57	W.P.S.

THIS DRAWING
CLASSIFIED
AS NOT CLASSIFIED
PER _____
LIMITS ON DIMENSIONS UNLESS
OTHERWISE SPECIFIED
FRACTIONS: ± _____
DECIMALS: ± _____
ANGLES: ± _____
SCALE: _____

Leak Detector System - Control Room Piping	D-27029
L.D. System Control Room Cell Steam System Service	D-27856
Special Flange L.D. System Control Room Piping	D-27917
HRT Instrumentation Application Tabulation	A-20954
HRT Flowsheet Identification Code	D-18330
HRT Flowsheet Line Schedule	A-18329
REFERENCE DRAWINGS	
HRT	
BLDG. NO. 7500	
LEAK DETECTOR SYSTEM FLOWSHEET	
OAK RIDGE NATIONAL LABORATORY OPERATED BY UNION CARBIDE NUCLEAR COMPANY A DIVISION OF UNION CARBIDE AND CARBON CORPORATION OAK RIDGE, TENNESSEE	
SUBMITTED	ACCEPTED
APPROVED	
D-30696	
REV	