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OWNER-OPERATOR PROCESS AND FUNCTIONAL REQUIREMENTS INTERIM MODIFICATIONS FOR IMPROVED COOLANT BACKUP 100-B, C, D, DR, F and H REACTORS PROJECT CGI-905

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October 23, 1961

by

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OWNER-OPERATOR PROCESS AND FUNCTIONAL REQUIREMENTS
INTERIM MODIFICATIONS FOR IMPROVED COOLANT
BACKUP 100-B, C, D, DR, F and H REACTORS
PROJECT CGI-905

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Reactor Modification Design
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Reactor Modification Design
Facilities Engineering Section

Approved by: ______________________ Date 10-24-61
Reactor Modification Design
Facilities Engineering Section

Project Representatives Concurrence 10-24-61

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Reactor Modification Design
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Research and Engineering Section

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Manufacturing Section

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Project Engineering
Facilities Engineering Section

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Chemical Processing Department

Design Council Concurrence ______

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Facilities Engineering Section

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OWNER-OPERATOR PROCESS AND FUNCTIONAL REQUIREMENTS
INTERIM MODIFICATIONS FOR IMPROVED COOLANT
BACKUP 100-B, C, D, DR, F and H REACTORS
PROJECT CGI 905

I. INTRODUCTION

This document defines the user's process and functional requirements which shall be used as the basis for the preparation of the design for Project CGI-905, Interim Modifications for Improved Coolant Backup 100-B, C, D, DR, F, and H Reactors.

The objective in making these modifications is to provide improved reliability and adequacy in the last ditch reactor cooling systems for current and short-range forecast conditions. Performance requirements for the last ditch cooling system are based on the reactor cooling system criteria set forth in Document HW 66929. These performance criteria require that the last ditch cooling system be independent of both the primary and secondary cooling system, including piping to the reactor manifold, and that it must be capable of providing shutdown flow indefinitely, assuming instantaneous loss of power to the primary system and concurrent failure of the secondary system to provide its rated flow.

II. PURPOSE

The purpose of this document is to define the process requirements of the modifications and additions to the last ditch cooling systems and to outline the functional descriptions of the proposed equipment.

The objective in making these changes is to eliminate current deficiencies of the high tank and export raw water systems in order to assure conformance with the established safety criteria for reactor cooling systems.

The document is divided into four major sections. Section III defines the basic process requirements which must be fulfilled in the design of the system modifications. Section IV defines the functional requirements of the physical changes which must be made to the existing system in order to meet the basic process requirements. Section V contains codes and standards that must be observed in the design and the reference documents upon which these design requirements are based. Section VI contains technical supporting data and drawings to amplify the description of the requirements.

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III. BASIC PROCESS REQUIREMENTS

3.000 General Requirements and Considerations

The last ditch cooling system for each of the 100-B, C, D, DR F and H Areas consists of two 300,000 gallon capacity high tanks at each reactor and the export water system. Upon loss of both the primary (190 Building electrical driven pumps) and the secondary (190 Building steam driven pumps) coolant supplies, the last ditch system must automatically supply sufficient coolant flow to prevent reactor damage. Under this condition, the process water flow initially decays according to the characteristics of the primary system pump flywheels. At approximately 48 psi (55 psi at C) top of riser pressure the check valves in the high tank discharge piping open and the tanks supply filtered water to the reactor. Before depletion of the high tank storage, a parallel raw water supply is furnished to the reactor from the export system by the automatic opening of a control valve (Grove valve). Required reactor shutdown flow must be continuously available from the export system for an indefinite period. The existing export system arrangement is shown by Figure 2.

3.100 High Tank Requirements

3.110 High Tank Flow Rates

High tank flow rates obtainable with a clean system are adequate for the current and short-range forecast reactor operating conditions considered by this Project. Values for high tank flow rates shall be based on the latest available test data.

3.120 High Tank and Discharge Piping Corrosion

Rust accumulation in the high tanks, discharge piping and strainers could cause excessive pressure drop in the system and consequently reduce the high tank flow rates below the values indicated under Paragraph 3.110. Cleaning of high tank discharge lines will be completeddduring 1961 by plant maintenance forces. Under this project, rust and scale now present in the high tanks shall be removed and the tanks protected to retard further corrosion. Existing strainers in the high tank discharge piping shall be modified to reduce flow resistance particularly due to possible accumulation of rust scale in the strainer baskets.

3.130 High Tank Water Temperatures

The effectiveness of the high tank coolant supply depends on its temperature in addition to flow capacity. High tank temperatures vary with weather conditions and have been observed to be over 30 degrees centigrade during summer months. In order to obtain full effectiveness of the high tank coolant supplies the temperature of the stored water shall be controlled to not exceed 4 degrees centigrade above the process water temperature as measured at the reactor inlet.

3.200 Export System Requirements

3.210 Export System Flow Rates

The flow from the export system shall exceed the minimum required reactor flow rates at the time of depletion of the high tank supplies and shall be automatically available. The export system shall be adequate for an emergency condition of the following magnitude: a total electric power failure to all 100 Areas and a concurrent steam plant failure in one dual reactor area. The minimum required flow rate to each reactor shall be determined by use of the following equation:

$$Q_\theta = \frac{f_d \, P}{2.64 \times 10^{-4} \, (t_0 - t_i - f_t)}$$

Q_θ - required flow to the reactor θ minutes after power loss in gpm.

f_d - heat generation decay factor for θ minutes after power loss

P - reactor operating power level before power loss in MW.

t_0 - bulk outlet water temperature.

t_i - inlet water temperature.

f_t - Bulk temperature scale-up factor for low flow condition.

The maximum allowable bulk outlet temperature t_0, for shut down conditions shall be taken as 90 degrees centigrade and the minimum temperature of the inlet water, t_i, supplied from the export system shall be taken as 27 degrees centigrade. The heat generation decay factor, f_d, will be available from the results of the reactor heat decay tests which will be conducted in the near future under Production Test IP-338-A. The bulk temperature scale-up factor, f_t, shall be taken as listed in HW-68092.

The reactor operating power level, P, shall be taken as that corresponding to a bulk outlet temperature of 95 degrees centigrade, a process water inlet temperature of 22 degrees centigrade, and reactor water flows as tabulated on the next page.

[redacted]

Reactor	Flow, GPM
B	91,500
C	103,500
D	92,000
DR	89,500
F	92,000
H	94,000

3.220 **Export System Reliability**

To assure that the required flow capabilities of the export system are available with a high degree of reliability, certain existing deficiencies shall be corrected.

3.221 **Surge Suppressors**

Two Pelton surge suppressors are located at each of the 182 Building pumping stations which supply the export system. The surge suppressors open to bypass water to the 182 Building reservoir during a flow transient in order to prevent water hammer damage to the export system piping. At present, surge suppressor actuation may be initiated by loss of electrical power to the control solenoids. The opening of these surge suppressors during the time the export system is furnishing last ditch cooling water could reduce this supply below the minimum required. Thus, the surge suppressors shall be modified to be actuated directly by pipe line pressure surges which could result in structural damage rather than by electrical power failure. Hydropneumatic accumulators are also required at each modified surge suppressor to supply the necessary operating pressure to open the surge suppressors during low pressure portions of a flow transient.

3.222 **Starting of steam Driven Pumps**

H+K not changed to Diesel as requested

The four export system emergency steam driven pumps must now be started manually. Most of these pumps are in normally unmanned buildings and an excessive time delay could occur in their manual starting.

Control systems for these pumps shall be modified to provide automatic starting after an electrical power failure. Automatic starting of the steam driven pumps will permit the export system to augment the high tank flow rates during the initial period of emergency operation and will insure maximum export system capability at the time of high tank depletion.

3.223 200 Area Reservoir Control Valves

One function of the export system is to supply water to the 200 Area reservoirs. At present control of flow to the reservoirs is by manual setting of the 282 Building cone valves. If these valves happen to be open wide at the time of an emergency, considerable export flow may continue to the 200 Areas rather than be diverted to the last ditch cooling of a reactor. Automatic closure shall be provided for the 200 Area control valves to insure that sufficient water is available to a stricken area if only steam driven pumping is available in other areas to supply the export system. Provision shall be made to supply the minimum emergency flows of about 2700 gpm to 200-E and 850 gpm to 200-W Area.

3.224 Strainer at 105-C Reactor

The existing export system connection to the 105-C Reactor is equipped with a single strainer. During a period when the export system is the sole water source for C Reactor, plugging of the existing strainer could reduce the reactor coolant flow below the minimum required. There would be no way of restoring adequate flow without first removing all flow for a period long enough to clean the strainer. To assure a continuous shut down coolant flow from the export system, the single strainer at this reactor shall be replaced with a dual type strainer.

3.225 Testing of Export System

The export system shall be extensively tested under both transient and steady state conditions in order to demonstrate satisfactory operating characteristics after completion of the modifications covered by this project. Testing under transient conditions may indicate the need for installation of slow closing air admission valves at critical points along the export system piping.

IV. FUNCTIONAL REQUIREMENTS

This section defines the functional requirements of the modification which shall be made to the existing system in order to meet the basic process requirements.

4.100 High Tank Modifications

4.110 High Tank Corrosion Control

4.111 High Tank Cleaning

The interior of each high tank shall be thoroughly cleaned of existing rust and scale by sandblasting. At the same time the standpipe interior shall be cleaned, either by sand-blasting or by chemical cleaning. Consideration shall be given to applying a protective coating to the tank interior. However, such a coating must not require excessive time to apply, and on deterioration must not peel off in such a way that screen plugging could result.

4.112 Chemical Inhibitor Addition

A system shall be provided for the addition of chemical inhibitors to each high tank for the control of future corrosion in the tank and discharge piping. The selection of an inhibitor and the question as to whether or not the tank itself can be adequately protected by an inhibitor alone are still under study. Initial design shall proceed on the assumption that sodium silicate will be used, but that the system should be capable of handling any inhibitor in liquid form with only minor modifications.

The silicate addition system shall be designed to supply inhibitor at a rate continuously variable from zero to that required to maintain a sodium silicate concentration of 100 ppm (based on Na_2O:3.22 SiO_2) in the tank while filling an empty tank. Automatic control of inhibitor concentration is not required.

The inhibitor system should be designed to use commercially available sodium silicate solution with an alkali to silica ratio of 1:3.22 and with a density of approximately 41^{0} Baume. Sufficient storage capacity should be provided so that tank truck delivery can be utilized. A single delivery could be shared among several reactors. This storage will supply six to twelve months silicate requirements.

The silicate addition equipment shall be located so that it is readily accessible for operation and maintenance. Suggested locations are in the 105 valve pit at reactors where space is available, or in the 190 Building if 105 space is not available.

4.120 High Tank Strainers

Flow resistance of high tank strainers shall be reduced by use of new strainer baskets of increased surface area and lower pressure drop. Consideration shall be given to parallel operation of both sections of the twin type strainers.

[redacted]

4.130 High Tank Water Temperature Control

4.131 Temperature Sensing Elements

Water temperature sensing elements shall be installed in each high tank and connected to indicators mounted in the 105 Control Rooms. Typical arrangements for the installation of the temperature sensing elements are shown by Figures 3 and 4. Portions of the emergency temperature sensing instrumentation now in service in all areas are suitable for permanent use and shall be incorporated into the CGI-905 installation.

4.132 High Tank Water Cooling

Each high tank shall be provided with piping designed to bleed 100 gpm from the tank to control the temperature of water stored in the tank. The bleed line shall be connected to the tank discharge piping as far down stream as possible but upstream of the strainer, to draw inhibited water through the discharge piping. To prevent the waste of this volume of filtered water, the bleed piping shall be run to the 105 Storage Basin. No additional piping is required at areas where existing emergency bleed piping is satisfactory for permanent use.

4.200 Export System Modifications

The following modifications shall be made to the export system in order to increase its reliability and supply capacity to individual reactors as set forth in the basic process requirements, Paragraph 3.20. These modifications will result in improved last ditch coolant flow rates as typified by Figure 1.

4.210 Grove Valve Sensing Lines

The Grove Flex-Flow valve shall be opened to supply export water to the reactor in parallel with high tank flow approximately twelve (plus or minus one) minutes after the high tanks start to drain. This shall be accomplished by extending each Grove valve sensing line to a higher elevation in the tank. This change is required to permit the export system to augment and extend the high tank water supply until the export system can more adequately supply the required reactor coolant flow alone. The exact elevation to which the sensing line will be extended shall be the elevation of the water surface in the tank twelve minutes after draining starts. It shall be assumed that the water surface is three feet below full at the start of draining and high tank flow rates ahll be based on latest available test data.

4.220 Control Orifices at 105 Buildings

Larger flow control orifices shall be installed in the export System at each reactor as determined by detailed design analysis of required versus available export system flow rates at the time of depletion of high tank supplies. McIlroy analyzer data for emergency operation of the export system presented in HW-67631, may be of assistance in sizing these orifices.

4.230 Automatic Starting Steam Driven Pumps

To decrease the time required to bring the export system into service during an emergency, provision shall be made to start all four steam driven pumps* automatically approximately ten (plus or minus one) minutes after an electrical power failure. A ten minute delay in the starting of the steam driven pumps is required in order to conserve steam supplies for the acceleration of the secondary cooling systems at the instant of electrical power failure. Further information for these modifications is shown in Figure 5. Actuation of the pump starting circuit shall be by low export water pressure. Suitable annunciation of export pump status shall be provided in both 183 and 190 Building Control Rooms.

4.240 200 Area Reservoir Control Valves

Automatic closure shall be provided for the 12 inch cone valves in the export system supply to the 282-E and 282-W Reservoirs. This modification will insure that sufficient water is available to a stricken area if only steam driven pumping is available in other areas to supply the export system. The cone valves shall close slowly taking ten (plus or minus 1) minutes to prevent pressure surges. The valves shall start to close within one minute after loss of export flow. Normal positioning of the valve for control purposes shall be by manual operation as at present. The modification design should minimize the possibility of rapid cone valve closure on failure of any part of the valve control mechanism. An annunciator and indicating light shall be provided at the appropriate 200 Area control rooms to show valve position. The minimum emergency flows of about 2700 gpm to 200-E Area and 850 gpm to 200-W Area will be supplied through an orificed by-pass line around the cone valve. Actuation of the valve closing mechanism shall be by low export system flow. McIlroy analyzer data in HW-67621 may aid in sizing the bypass orifices. Further information for these modifications is shown by Figure 6.

4.250 Surge Suppressors

Export system reliability shall be improved by modification of surge protection equipment. In order to eliminate a possibility for unnecessary surge suppressor actuation, the electrically operated control solenoid on each surge suppressor shall be replaced with a pressure actuated hydraulic diaphragm device. The surge suppressor would then be opened only as a result of low or high

* It is assumed that only three pumps will start in an actual emergency because of loss of steam supply in one area.

[redacted]

pressure on the export system. This change would eliminate surge suppressor actuation by an electric power failure which would not affect export system pumping. Hydropneumatic accumulators are required at each modified surge suppressor to supply the necessary operating pressure to open the suppressors.

The modified surge suppressors shall be set to open when export system pressure drops to 80 psi. At the same time the existing surge suppressor high pressure trip should be adjusted to 300 psi and the suppressor closing time adjusted to 120 seconds. The suppressor settings shall be the same for all eight suppressors.

4.260 105-C Raw Water Strainer

The single strainer in the 105-C export line shall be replaced with a dual strainer so that export flow can be transferred from one strainer basket to the other without interrupting flow to the reactor.

The new strainer should be selected and installed to provide adequate seismic resistance according to the requirements of HW-65931. The strainer chest shall not be constructed of brittle material such as cast iron. Both the strainer and adjacent piping shall be anchored as necessary to prevent excessive stress caused by seismic induced motion.

4.270 Slow-Closing Air Admission Valves

Slow-closing air admission valves shall be installed on the export system as required. The tests described in Section 3.225 are expected to determine whether any such valves will be required, and if so, at what location. Test results will indicate that air admission valves are required if, following a total pump stoppage at maximum export flow, the water column in the export system breaks at any point, and if existing equipment does not admit sufficient air to cushion the shock resulting from the water column rejoining. Although it is probable that the surge suppressors at the 182 Pump House and the Simplex air valves installed at summits along the export piping will function adequately in this respect, it must be demonstrated that the degree of protection afforded the main export piping and the branch lines to the reactor is sufficient.

4.280 Functional Testing

Following completion of all modifications the last ditch coolant system shall be tested as necessary to establish that all elements function as intended.

V. REFERENCE CODES, STANDARDS, BIBLIOGRAPHY

Codes and Standards

Unless otherwise stated, the design, the material used, and the work to be performed shall adhere to the requirements set forth in the latest edition of the Hanford Works Standards and the applicable codes approved by these standards.

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13. HW-70186 Summary Report on Transient Performance, Hanford Export Water System, C. T. Main, Inc., June 16, 1961.

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16. HW-67631 Flow Distribution for Export System, C. C. Lomax, October 14, 1960.

17. HW-65931 Seismic Resistance Criteria, O. E. Adams and W. D. Gilbert, July 8, 1960.

VI. GRAPHS AND REFERENCE DRAWINGS

Figure 1 Typical High Tank - Export System Flow Rates.

Figure 2 Export Water Lines and Pump Arrangement.

Figure 3 Instrumentation, High Tank Water Temperature, Conduit Routing and Probe Installation.

Figure 4 Instrumentation, High Tank Water Temperature, Control Panel Modification.

Figure 5 Automatic Valve for Turbine Driven Export Water Pump.

Figure 6 Slow Closing Export Line Valve.

The drawings included as figures 3-6 are intended to illustrate the general nature of the modifications planned. They should not be interpreted as representing final design for the project.

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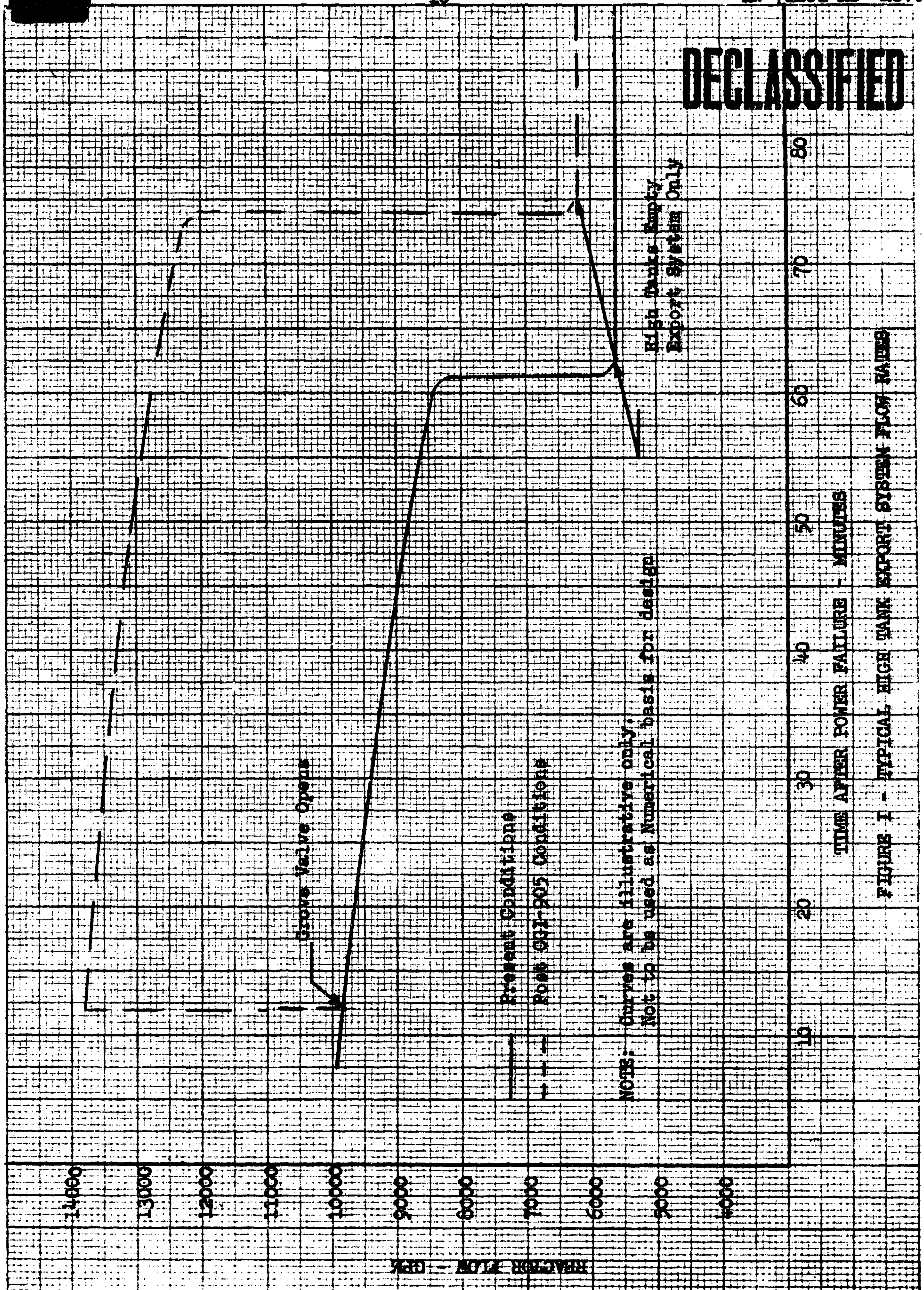
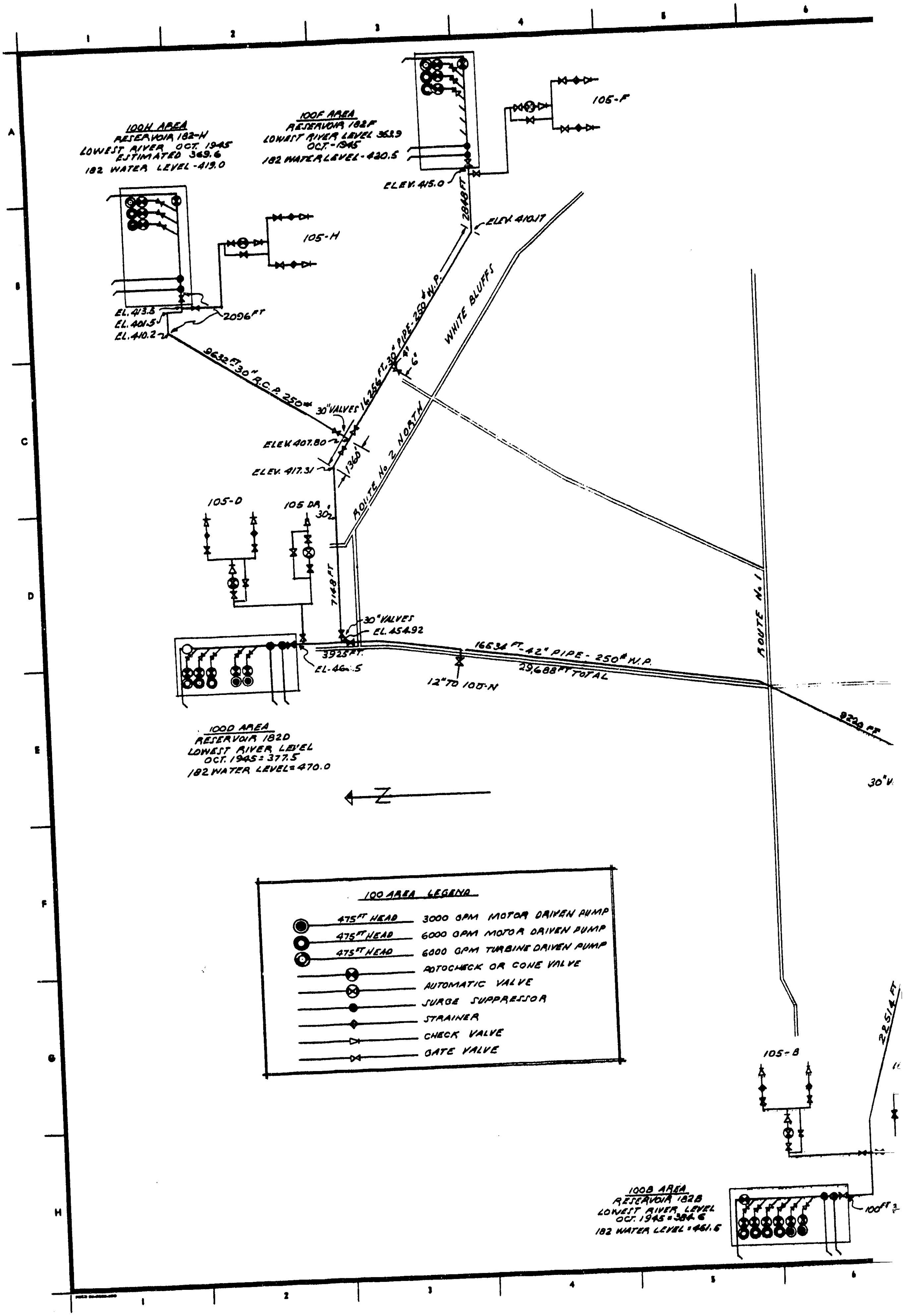


FIGURE I - TYPICAL HIGH TANK EXPORT SYSTEM FLOW RATES


100H AREA
RESERVOIR 182-H
LOWEST RIVER OCT. 1945
ESTIMATED 369.6
182 WATER LEVEL -419.0
100F AREA
RESERVOIR 182F
LOWEST RIVER LEVEL 363.9
OCT.-1945
182 WATER LEVEL-420.5
105-F
105-H
ELEV. 415.0
2848 FT
ELEV. 410.17
EL. 413.3
EL. 401.5
EL. 410.2
2096 FT
9632 FT 30" R.C.P. 250#
16,256 FT. 30" PIPE-250# W.P.
WHITE BLUFFS
30" VALVES
ELEV. 407.80
ELEV. 417.31
1360'
ROUTE No. 2 NORTH
105-D
105 DR
714.8 FT
30" VALVES
EL. 454.92
3925 FT.
16634 FT. 42" PIPE - 250# W.P.
29,688 FT TOTAL
12" TO 100-N
ROUTE No. 1
9209 FT
100D AREA
RESERVOIR 182D
LOWEST RIVER LEVEL
OCT. 1945 = 377.5
182 WATER LEVEL = 470.0
N
30" V.
100 AREA LEGEND
475 FT HEAD 3000 GPM MOTOR DRIVEN PUMP
475 FT HEAD 6000 GPM MOTOR DRIVEN PUMP
475 FT HEAD 6000 GPM TURBINE DRIVEN PUMP
ROTOCHECK OR CONE VALVE
AUTOMATIC VALVE
SURGE SUPPRESSOR
STRAINER
CHECK VALVE
GATE VALVE
105-B
22514 FT
100B AREA
RESERVOIR 182B
LOWEST RIVER LEVEL
OCT. 1945 = 384.6
182 WATER LEVEL = 461.6
100 FT

HW - 71201

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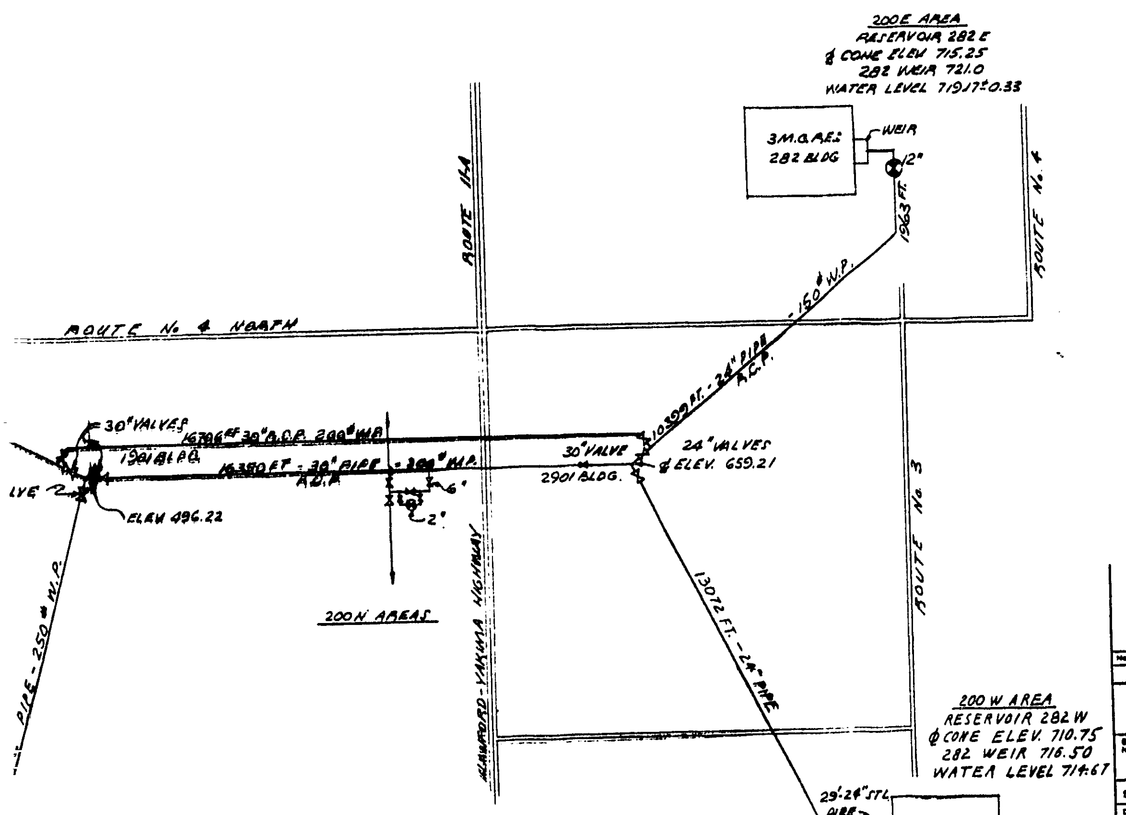
FIG. 2



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PROJECT NO.

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U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC

EXPORT WATER LINES & PUMP ARRANGEMENT

BLDG. NO. 2901 & 2901 | INDEX NUMBER 8500-01

DWG NO. SK-1-4397

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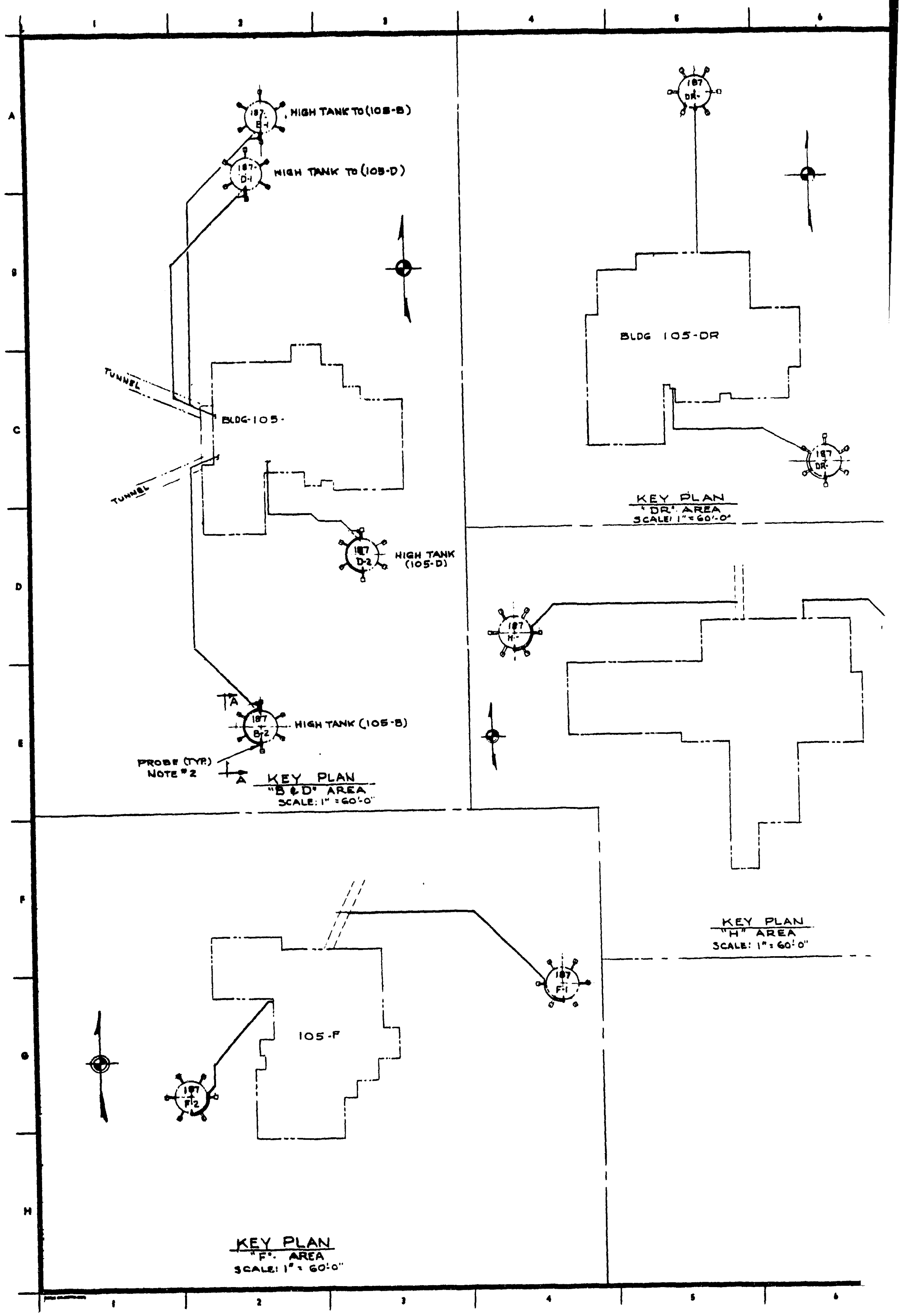

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HIGH TANK TO (105-B)
187 D-1
HIGH TANK TO (105-D)
TUNNEL
BLDG-105-
TUNNEL
187 D-2
HIGH TANK (105-D)
187 B-2
HIGH TANK (105-B)
PROBE (TYP.) NOTE #2
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"B & D" AREA
SCALE: 1" = 60'-0"
187 DR-
BLDG 105-DR
187 DR-
KEY PLAN
"DR" AREA
SCALE: 1" = 60'-0"
187 H-
KEY PLAN
"H" AREA
SCALE: 1" = 60'-0"
187 F-1
105-F
187 F-2
KEY PLAN
"F" AREA
SCALE: 1" = 60'-0"

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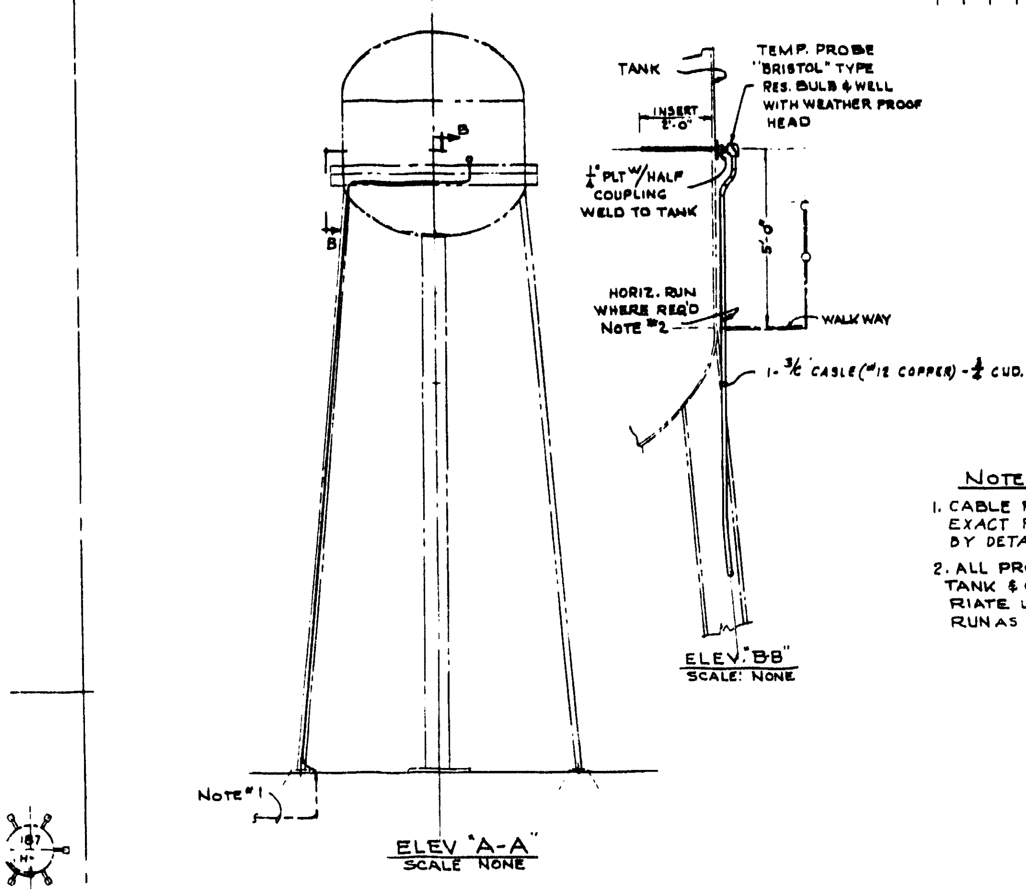
FIG. 3

QTY.	PT. NO.	DESCRIPTION

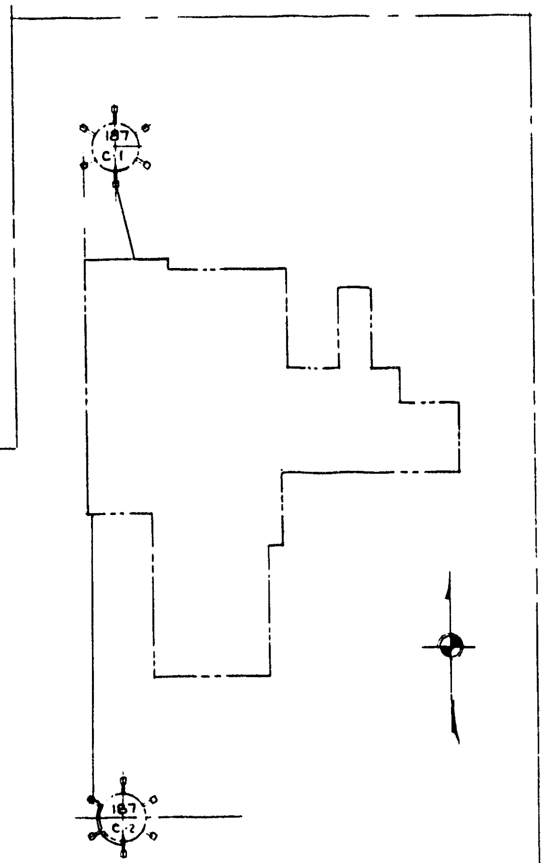


ELEV "A-A"
SCALE NONE

ELEV "BB"
SCALE: NONE

NOTES:

1. CABLE ROUTING: CONDUIT TO BE BURIED. EXACT ROUTING TO BE DETERMINED BY DETAIL DESIGN.
2. ALL PROBES TO BE INSTALLED IN SOUTH SIDE OF TANK & CONDUIT INSTALLED AROUND TANK TO APPROPRIATE LEG OF HIGH TANK FOR DESCENT TO UNDERGROUND RUN AS INDICATED FOR EACH TANK



KEY PLAN
"C" AREA
SCALE: 1" = 60'-0"

STUDY

FOR COMMENTS
NOT FOR CONSTRUCTION

NO.	DWG. NO.	DRAWING TITLE
5	SK-1-4246	UNDERGROUND PROC. WATER PIPING - 105-F
4	SK-1-4247	UNDERGROUND PROC. WATER PIPING - 105-H
3	SK-1-4245	UNDERGROUND PROC. WATER PIPING - 105-D
2	SK-1-4244	UNDERGROUND PROC. WATER PIPING - 105-B
1	SK-1-4264	CONTR. ROOM PANEL MODIFICATION

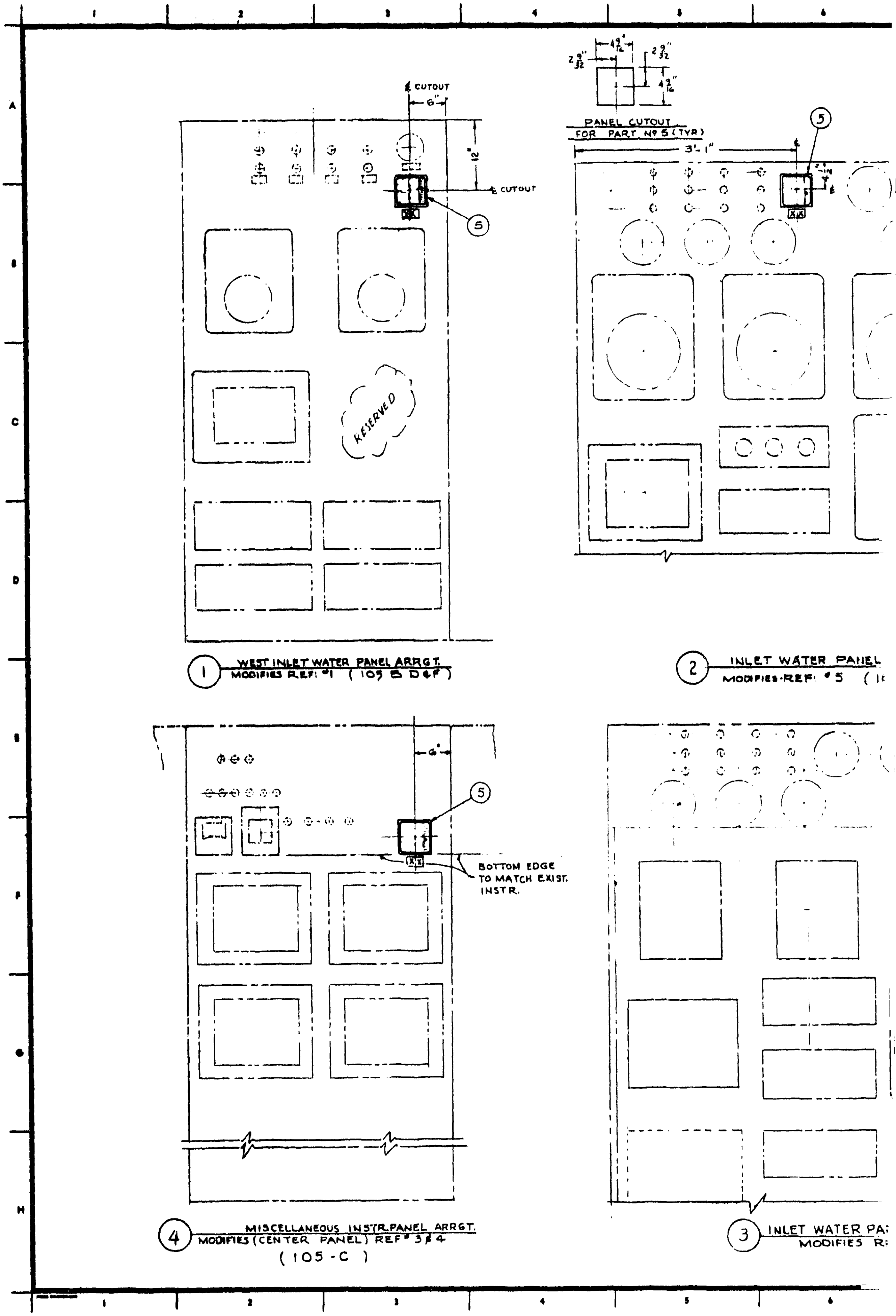
REFERENCE DRAWINGS
NEXT USED ON

REVISIONS
CLASSIFICATION: NONE
CLASSIFIED BY: [signature] DATE 6-24-60
DWG. NO. SK-1-4263
SCALE: AS NOTED
DRAWN: [signature] DATE 6-
CHECKED DATE
ISSUED DATE
DES. ENG. EHLERS UNIT I.D.O.
INST. NO. 7248
PROJECT NO. DO. 1266
APPROVALS BY FOR DATE

U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC

INSTRUMENTATION
HIGH TANK WATER TEMP
CONDUIT ROUTING & PROBE
INSTALLATION DET.
LAST DITCH COOLANT SYSTEM
BLDG. NO. 105-BDF DR H&C INDEX NUMBER 590011
DWG. NO. SK-1-4263

1st issue 7-6-60



℄ CUTOUT
6"
12"
℄ CUTOUT
5
RESERVED
PANEL CUTOUT
FOR PART Nº 5 (TYP)
3'-1"
WEST INLET WATER PANEL ARRGT.
MODIFIES REF: #1 (105 B D&F)
INLET WATER PANEL
MODIFIES-REF: #5
BOTTOM EDGE
TO MATCH EXIST.
INSTR.
MISCELLANEOUS INSTR. PANEL ARRGT.
MODIFIES (CENTER PANEL) REF# 3 & 4
(105-C)
INLET WATER PA
MODIFIES R

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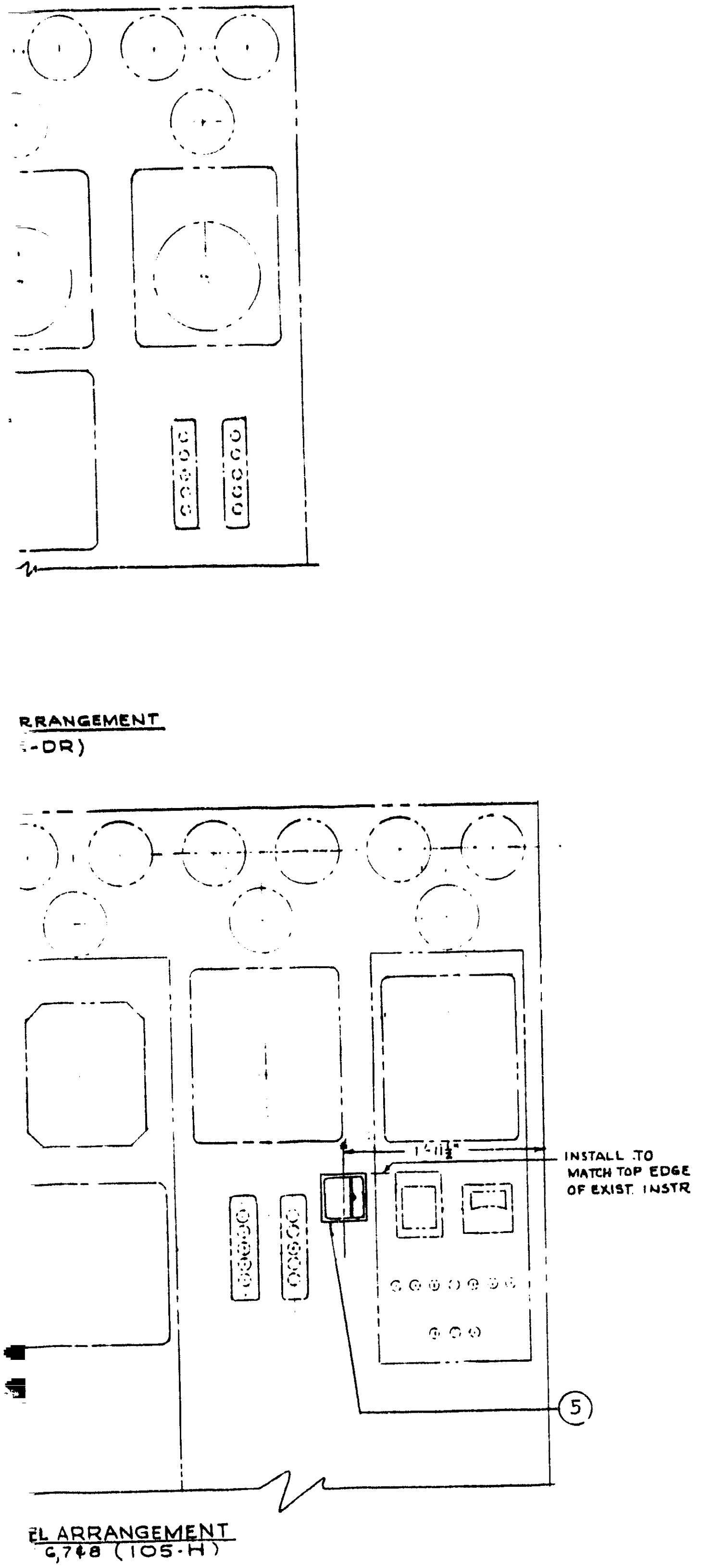
FIG. 4

QTY.				PT. NO.	DESCRIPTION	
			X	1	PANEL ARRGT.	105-B, D&F
		X		2	PANEL ARRGT.	105 DR
	X			3	PANEL ARRGT.	105 H
X				4	PANEL ARRGT.	105 C
1	1	1	3	5	RECORDER	
1	1	1	3	6	NAME PLATE ¼"x3" 3/16 LETTERS	REF: #9

NAME PLATE LEGEND

(6) X-X NEAR AND FAR HIGH TANK TEMP.



STUDY

FOR COMMENTS
NOT FOR CONSTRUCTION

No.	DESCRIPTION	REV. BY DATE	APP'D BY	FOR	DATE
	REVISIONS				

CLASSIFICATION: NONE — CLASSIFIED BY [signature] DATE 6-24-60

DWG. NO. SK-1-4264

SCALE: AS NOTED

DRAWN: [signature] DATE 6-

CHECKED / ISSUED

DES. ENG. EHLERS UNIT I.D.O.

INST. NO. 7248

PROJECT NO. D.O. 1266

U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC

INSTRUMENTATION
HIGH TANK WATER TEMP.
CONTROL ROOM PANEL
MODIFICATION

Ref. No.	DWG. NO.	DRAWING TITLE
9	J-2-7	HANFORD STANDARD (INSTR.)
8	H-1-19976	PANEL MODIFICATION (PROJ. 791)
7	P-4875	" " (PROJ. 598)
6	P-3156	INLET WATER PANEL ARRGT.
5	H-1-8038-DR	INLET WATER & MISC. INSTR. PANEL ARRGT.
4	P-8007	MISC. INSTR. PANEL ARRGT.
3	H-1-19977	" " " MODIFICATION
2	SK-1-4263	HIGH TANK PROBE INSTLN. INSTR.
1	H-1-11820	CONTR. ROOM PANEL ARRGT. 105 B (SH. 2)

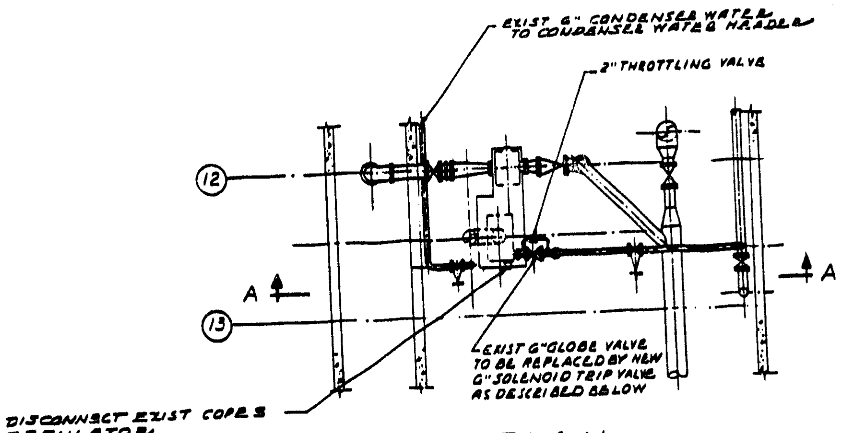
REFERENCE DRAWINGS

NEXT USED ON

BLDG. NO. 105 BDF, DR, H & C — INDEX NUMBER 590211

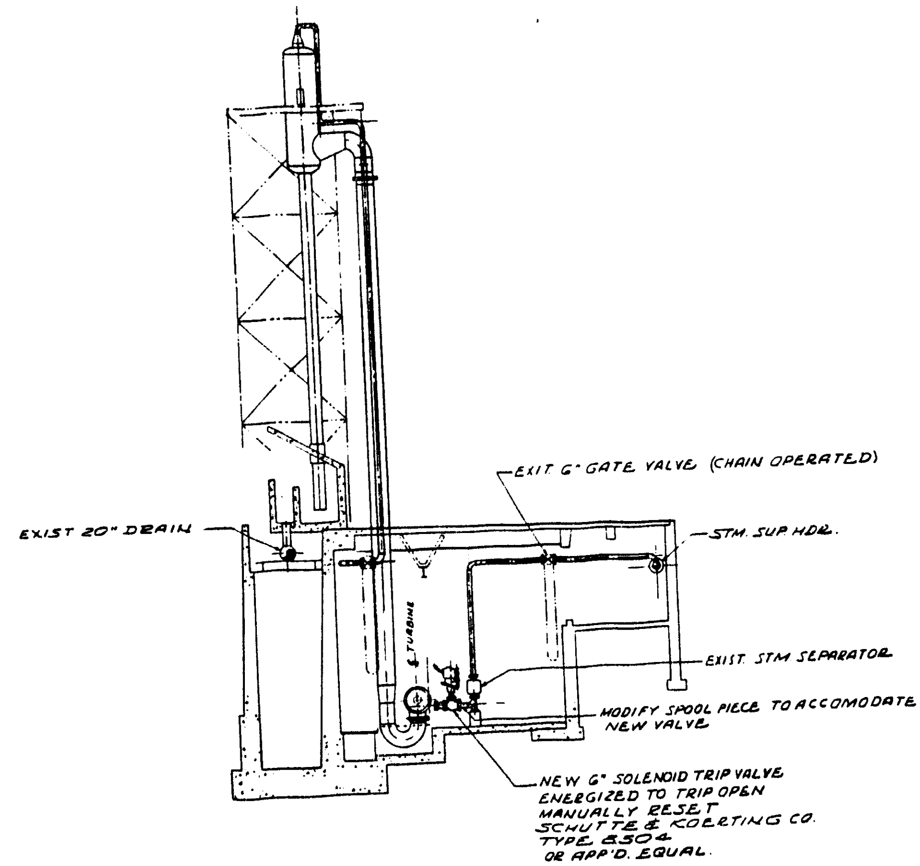
DWG. NO. SK-1-4264

1st issue
7-6-60

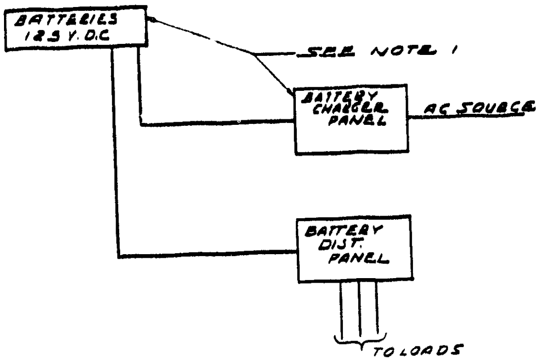


PLAN

0 8 16 FT.



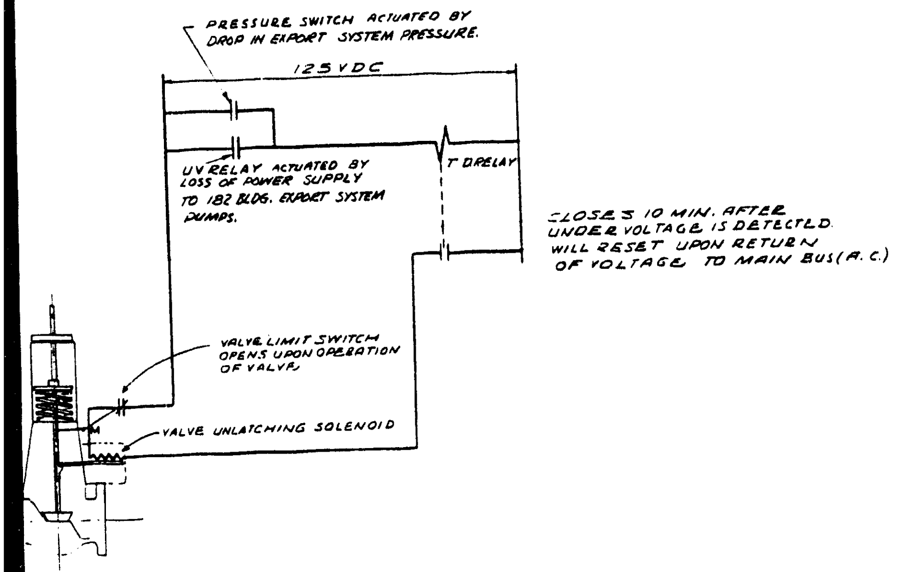
SECTION A-A



ONE LINE DIAGRAM
VALVE CONTROL POWER

NOTES

1. BATTERY SET & VENTILATED ENCLOSURE REQ. AT BLDGS. 182 B, D & F. EXISTING AT BLDG 182 H
2. ST'M DRIVEN PUMPS TO HAVE INDICATION OF IDLE & FULL SPEED OPERATION AT 183 BLDG. CONTROL PANEL.
3. LOW OIL PRESSURE FROM TURBINE OIL PUMP TO BE ANNUNCIATED AT 183 BLDG. CONTROL PANEL.



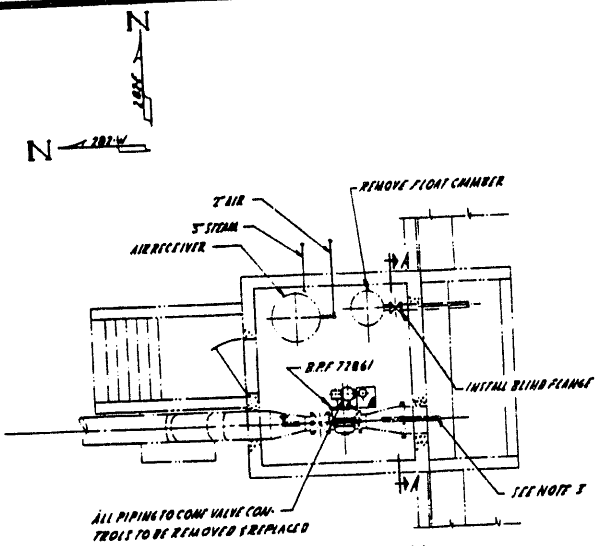
SK-1-4450

STUDY

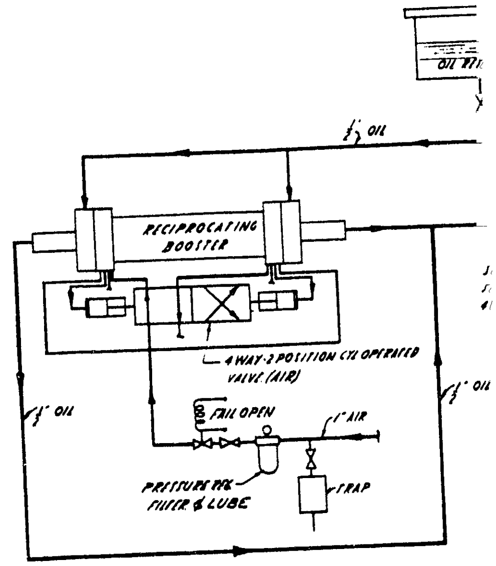
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC

AUTOMATIC VALVE FOR TURBINE DRIVEN EXPORT WATER PUMP

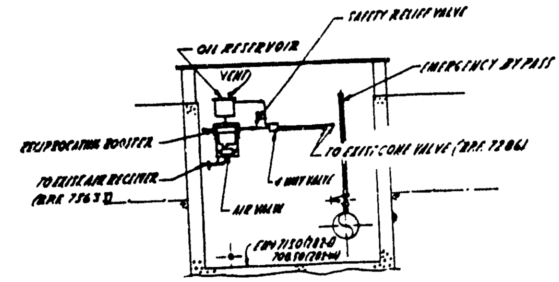
SCALE 1/8" = 1'-0"
PROJECT 10596
CLASSIFICATION NONE
BLDG. NO. 182 B.D.F. & H — INDEX NO. 8510
DWG. NO. SK-1-4450



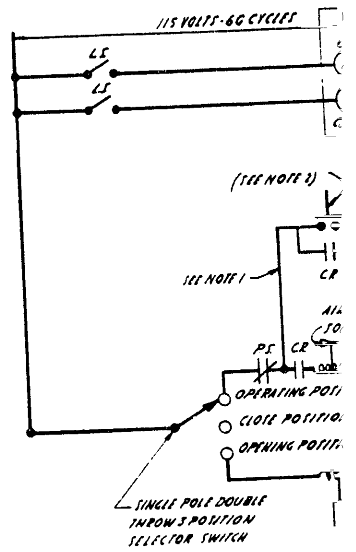
P L A N



ONE LINE DIA
HYDR



SECTION 'A-A'



ONE LINE DIAGRAM VALVE
ELECTRICAL SYST

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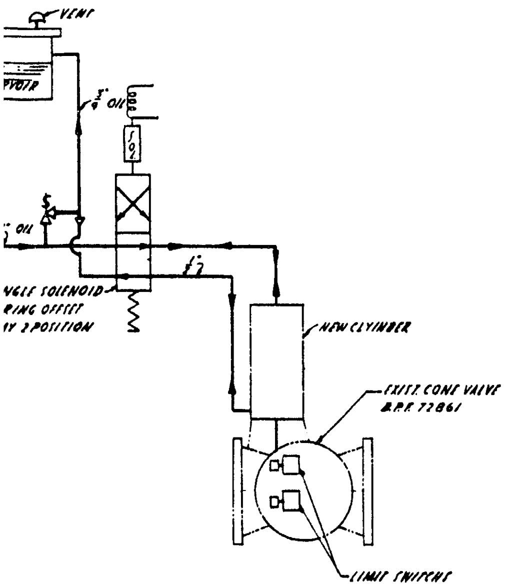
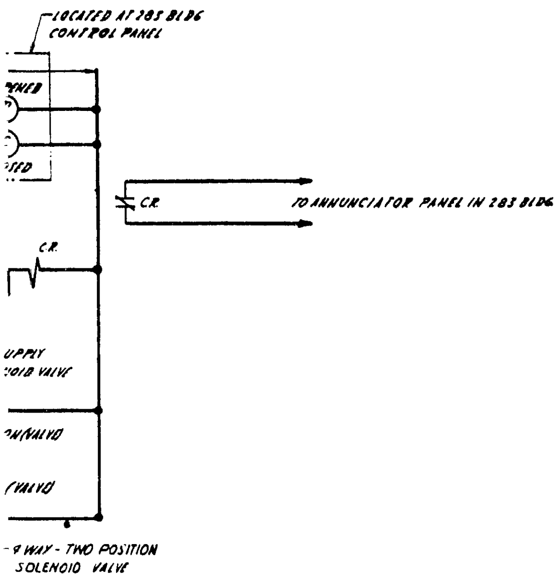
FIG. 6



?AM VALVE CONTROL
?LIC SYSTEM

GENERAL NOTES

1. PRESSURE SWITCH ACTUATED FROM SIGNAL POINT ADJACENT TO 200 WEST "Y" AND IS A MANUAL RESET TYPE CIRCUIT.
2. ANY ELECTRICAL FAILURE OR PRESSURE DROP SIGNAL WILL CLOSE THE CONE VALVE. THE BOOSTER PUMP WILL CONTINUE OPERATING AND PASS ON THROUGH THE RELIEF VALVE.
3. BY-PASS LINES TO BE SET FOR CONTINUOUS EMERGENCY FLOW AS FOLLOWS 200-E 2700 G.P.M. 200-W 850 G.P.M.
4. CONE VALVE TIMED TO CLOSE OR OPEN IN TEN MINUTES



CONTROL

SK2·3417

STUDY

U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC

SLOW CLOSING
EXPORT LINE VALVE

SCALE 1/8" = 1'-0"
DRAWN SHIPMAN
CHECKED
CK HARRISON
PROJECT DO-1390 10596
CLASSIFICATION NONE
BLDG. NO. 282 EW
INDEX NO. 7000
SK-2-3417