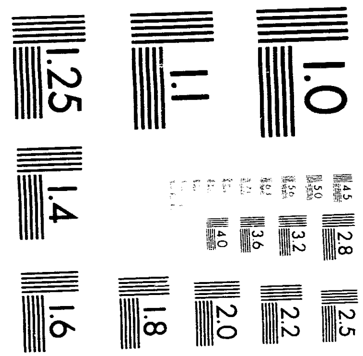

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PROJECT CGC-897 - TITLE I DESIGN FISSION PRODUCT STORAGE IN B-PLANT

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From: J. B. Fecht JBF

Document HW-69011, "Project CGC-897 - Title I Design, Fission Product Storage in B-Plant," by H. L. Caudill and L. L. Zahn, dated April 3, 1961, has been reviewed and is approved as the basis for Title II design by Chemical Processing Department design scope representatives noted below:

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PROJECT CGC-897 - TITLE I DESIGN
FISSION PRODUCT STORAGE IN B-PLANT

by

H. L. Caudill and
L. L. Zahn, Jr.

[redacted]

April 3, 1961

Extraction Design and Development
Facilities Engineering Operation
CHEMICAL PROCESSING DEPARTMENT

This document has been reviewed and approved as a basis for project action.

Submitted by:

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Manager — Date
Process Design and Development

Approved by:

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Manager — Date
Facilities Engineering
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PROJECT CGC-897 - TITLE I DESIGN
FISSION PRODUCT STORAGE IN B-PLANT

I. INTRODUCTION

A previous study, Reference 1, described proposed facilities at B-Plant which integrate future fission product and waste calcination activities. However, in the reactivation of B-Plant in accordance with this study, heavy expenditures, above budgeted funds, would be required at an early date for Phase I process changes coupled with general rehabilitation work and facilities for updating of radiological control. Since waste calcination activities in B-Plant are not scheduled until Fiscal Year 1966, the expense of B-Plant rehabilitation items would be borne solely by the Fission Product Program.

This report provides the Title I design of Phase I fission product facilities at B-Plant which can be provided with minimum capital expenditures. The facility described in this report accomplishes the overall processing objectives of the Reference 1 Facility, namely the recovery and storage of crude strontium-90 and rare-earth concentrates, although certain B-Plant improvements are deferred to later phases of the Fission Product and Waste Calcination Programs. This report is considered an addendum to the Reference 1 Engineering Study and the reader is referred to the former study for further information on the overall reactivation of B-Plant.

II. SUMMARY

Strontium-90 and rare-earth concentrates can be recovered from Purex IWW solution, processed and stored in B-Plant, using only 8 of the 40 cells in B-Plant to effect savings in Phase I construction costs.

The Title I design of the Phase I facilities presented in this report is based on an operating sequence which consists of: 1) performing initial recovery steps at Purex; 2) transferring the crude concentrate to B-Plant via the CR Vault, with use of both existing and new direct-buried lines; 3) further concentrating both strontium and rare-earths by precipitation and boildown; 4) storing the concentrates; 5) discharging liquid wastes to the B-Plant Waste Tank Farms; 6) discharging process off-gas through a new process vent system and through the existing sand filter to the stack.

Eight B-Plant cells would be reactivated. This work would comprise relocation and modification of existing vessels, construction of new jumpers, plus aqueous makeup and instrumentation revisions. Modifications would also be made to canyon ventilation and to the Hot Pipe Trench for Sections 3 through 8 inclusive. Other B-Plant improvements include new shielded deck-level sampling equipment, an SWP lobby, a locker room, maintenance shop, building telephone system and miscellaneous reactivation items.

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1. HW-67666 - "Engineering Study - Strontium-90 and Rare-Earth Processing In B-Plant," by HL Caudill, JR LaRiviere, and LR Michels, dated January 17, 1961.

[redacted]

The resulting Phase I facilities in the 221-B Building will have the capability to process the entire Purex IWW stream for isotope recovery. At a Purex 3.6 capacity factor, about 1 megacurie per month of strontium-90 and associated rare-earths containing about 4 megacuries promethium-147 per month can be recovered and stored in B-Plant with operations conducted on a 5-day, 3-shift basis. However, operability of the 221-B Building facilities as herein described is limited by the heat dissipation potential of the non-boiling tanks of the 241-B Waste Tank Farm complex, tentatively established at about 3 to 4 million BTU/hour. Since waste fission products discharged from the 221-B Building, including cerium-144 and other high heat producing isotopes, represent a heat input into the tank farm equivalent to about 620,000 BTU/hour during a one month operating period, the cerium rare-earth separation steps can only be performed in the 221-B Building for a total of about 3 months. During this 3-month period, however, about 10 megacuries of promethium-147 and 3 megacuries of strontium-90 can be recovered and stored separately. Beyond the above 3-month period, strontium-90 can be recovered at the Purex plant at a rate of approximately 0.6 megacuries per month and transferred to B-Plant for concentration and storage, with the cerium rare-earth fraction discharged to the boiling tanks of the Purex 241-A Tank Farm. On this basis, the 22,000 gallon storage capacity to be furnished in the 221-B Building will provide a total inventory of 12 megacuries of strontium-90 and a rare-earth fraction containing about 10 megacuries of prometium-147. Market requirements for promethium-147 beyond 11 megacuries would dictate the construction of new underground lines to route 221-B Building cerium wastes back to the Purex Tank Farm. These lines, described in Reference 1, are not presently incorporated into the Title I design.

The estimated project cost of Phase I facilities in accordance with this Title I design is $1,400,000. Beneficial use can be obtained in about 14 months after authorization.

Flexibility has been provided in the facilities herein described for future conversion to the ultimate "Phase I" facility of Reference 1 in which equipment is more stragetically located in the canyon with respect to future Phase II and III fission product operations and waste calcination.

Facilities described in this report make use of existing direct-buried lines between the Purex Tank Farm and 244-CR Vault, between the 241-C-151 Diversion Box and B-Plant and between B-Plant and B-Tank Farms for transfer of high-level fission product streams. These lines will be pressure-tested at the start of the Title II design and rechecked for line integrity at regular intervals during operation. Further, strict solution inventory control will be exercised in operation of transfer tanks at Purex, the CR Vault and B-Plant for added assurance of line integrity.

Major alternates to the Phase I facility described in this report are discussed in Reference 1.

III. PHASE I PROCESS DESCRIPTION AND DESIGN FLOW BASIS

The Phase I process is designed to recover strontium-90 and rare-earths from the Purex IWW stream and to provide segregated storage of both as crude fission product concentrates for aging. After an aging period to permit decay of the short half-life fission products, the concentrated solution will be processed in future Phase II and III facilities for the separation and purification of the desired products.

As mentioned previously, two separate processes are employed for operation of integrated Purex Head-End and 221-B Building facilities. Descriptions of these processes are as follows:

A. Process I - Strontium-90 and Rare Earth Recovery at B-Plant

During the aforementioned 3 month period during which about 3 megacuries of strontium-90 and megacuries of promethium-147 are recovered and stored in the 221-B Building, concurrent with buildup of a 2 million BTU/hour heat inventory in the B-Tank Farms, the following process is employed:

As shown in Flow Diagram SK-2-18549 and the Reference 2 Chemical Flowsheet, processing is performed in the following sequence: 1) Purex Plant processing; 2) transfer of Purex Plant concentrates to B-Plant; 3) precipitation steps in B-Plant - lead removal, strontium-rare-earth separation, and cerium removal; 4) concentration by evaporation and 5) storage of concentrated solution.

At Purex, lead nitrate and sodium sulfate solutions are added to the IWW stream, following pH adjustment, to "carry" the desired fission products. The resulting sulfate precipitate containing the fission products is separated by centrifugation and held in the centrifuge bowl. Supernatant waste is transferred to the 241-A Waste Storage Tank Farm. A metathesis of the sulfate precipitate is then made in the centrifuge bowl by the addition of sodium hydroxide and sodium carbonate. The resulting precipitate is dissolved and transferred to the 244-CR Vault. The 244-CR Vault functions as an intermediate storage area and pumping station to B-Plant.

A batch-type process, compatible with existing bismuth phosphate equipment, is used in B-Plant to recover, concentrate, and store the desired fission products. The precipitation operations are performed in a standard precipitation section (Section 6). Lead removal is accomplished by precipitating the desired fission products as carbonates, leaving most of the lead in solution. After centrifugation the supernatant is transferred to the Waste Receiver Tank. The carbonate cake containing most of the fission products is dissolved. The resulting solution is treated with oxalic acid for separation of strontium and iron from the rare-earths.

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2. HW-67728 - "B-Plant Fission Product Flowsheet - Part 1," by SJ Beard and BF Judson, dated January 12, 1961.

Rare-earths are precipitated as the oxalates. Most of the strontium and iron remain in solution. After centrifugation, the supernatant containing the crude strontium product is concentrated and stored. The rare-earths oxalate cake is dissolved and the resulting solution is treated with sodium acetate and hydrogen peroxide for separation of cerium, as a peroxyacetate precipitate from the rare-earths. After the removal of the peroxyacetate cake by centrifugation, the supernatant, containing the rare-earths, is concentrated and stored. The cerium cake is dissolved and transferred to the Waste Receiver Tank.

The process waste, collected in B-Plant, is sampled, neutralized if necessary, and transferred to the 241-B Tank Farm complex for storage.

Under Process I, both Purex and 221-B Plant facilities have sufficient capacity to process the entire quantity of IWW solution generated at Purex at the 3.6 capacity factor rate. Process I recoveries for strontium-90 and promethium-147 isotopes are estimated at 80 and 75 per cent, respectively. However, processing capabilities and recoveries are highly dependent on the ability to clean out tanks and samplers between succeeding process operations. Development work now in progress on the Interim Strontium-90 Program will provide improved technology for B-Plant operations.

Since large amounts of heat are generated by the process solutions, coils and agitators are provided in each tank where cooling is needed. The maximum cooling potential of coils can only be obtained by complete submergence of the coils. Since the coil surfaces are not completely covered during certain steps under the present flowsheet, close inventory control or greater dilution must be employed in certain critical tanks for safe heat dissipation.

For the 3-month period of operations under Process I, a flowsheet volume of 120,000 gallons of waste will be added to the B-Tank Farms. Requirements for flushing of process equipment between steps might increase this volume to about 250,000 gallons. This volume can easily be accommodated in the B-Farms since, for example, about 2,750,000 gallons capacity remains in the 241-B Farm alone. However, during the 3-month period, 221-B Building wastes must be distributed into waste tanks in a judicious manner to prevent boiling in the tanks.

B. <u>Process II - Strontium-90 Recovery at Purex with Concentration and Storage at B-Plant</u>

On completion of operations under Process I, B-Plant and Purex head-end equipment are operated under Process II for a 15-month period for recovery and storage of additional strontium-90. Process II is in essence the Interim Strontium-90 Process performed currently in Purex head-end equipment. In current operations, all steps shown in the Flow Diagram and the Reference 2 Flowsheet are performed at Purex, with the exception of the peroxyacetate precipitation step which separates cerium from rare-earths. In current Purex operations, the supernate from the oxalate step, which contains dilute strontium-90, is concentrated by chemical precipitation to permit storage in the CR Vault. Purex equipment limitations currently allow the processing of only 30 per cent of the total IWW stream for strontium-90 recovery with total rare-earths and cerium discharged to waste.

In Process II, the dilute strontium-90 supernate from the oxalate step is transferred to B-Plant for boildown concentration and storage. Under these conditions, Purex equipment can process about 60 per cent of the IWW stream, by virtue of elimination of the chemical precipitation step for strontium concentration.

During the 15-month period during which Process II operations are conducted, an estimated total volume of about 400,000 gallons of waste will be discharged to the 241-B Tank Farm complex. Since boildown concentration is the only step planned at B-Plant for Process II operations, the above 400,000 gallon waste batch will not add significantly to the Process I heat inventory at the B-Farms.

IV. REQUIRED PHASE I ADDITIONS AND MODIFICATIONS

The following additions and modifications are required for Phase I activities:

A. Underground Routings and Waste Disposal

Underground lines which serve for routing of high-level fission product streams between Purex and B-Plant facilities are described in the following drawings:

Drawing No.	Title
SK-2-18636	General Layout - Outside Lines
SK-2-18637	Plot Plan - Outside Lines
SK-2-18646	Hydraulic Flow Diagram, 202-A to 221-B

Briefly, fission product concentrates are transferred from Purex to B-Plant via the 244-CR Vault. The 244-CR Vault, which is the low-point in the system, serves as an intermediate pump station and gravity drain for about a mile of 3-inch line leading to B-Plant. In general, existing lines are used wherever possible to minimize capital expenditures.

Fission product concentrates are jetted from Purex head-end vessels through a 3-inch encased line to the 241-A-152 Diversion Box at the Purex Tank Farm. From the Purex Tank Farm, solution is routed to either the 002 or 003 Tanks in the 244-CR Vault, through an existing 3-inch direct-buried line and existing jumpers, as described in Drawing SK-2-18646. The 002 and 003 Tanks serve not only as pump tanks but as intermediate Phase I storage tanks for material processed through the carbonate metathesis step. These tanks, which have existing pumps, agitators, cooling coils, weight-factor instrumentation and sampling facilities, are currently being used for concentrate storage under the Interim Strontium-90 Program. The two tanks have a combined storage capacity of about 25,000 gallons.

From TK-002 or 003, solution is pumped through about 500 feet of new 3-inch direct buried line to the 241-C-151 Diversion Box. This new line is tied into the C-151 Box and the 003 Vault through existing stubs. From the 241-C-151 Box, solution is routed through about 4,000 feet of 3-inch direct-buried line to the 241-B-154 Box and then through 1,700 feet of 3-1/2-inch encased line to the 241-BX-154 Box. Fission product concentrates then enter the 221-B Building at Section 8.

Liquid wastes from B-Plant, which leave the canyon at Section 5, are jetted through direct-buried lines to the 241-B Tank Farm, via the 241-B-154, B-152 and B-153 Diversion Boxes. Wastes can also be routed to the BX and BY Tank Farms for added flexibility.

Spare nozzles have been retained in the 002 and 003 Tank Vaults for future tie-in of new encased lines between the Purex 241-A-152 Diversion Box and B-Plant, through use of the 241-ER-151 Diversion Box. These future routings are described in Drawings SK-2-3409 through SK-2-3413 of Reference 1.

The routings adopted in the present Title I design (SK-2-18637, 18636, and 18646) have several shortcomings:

1. The existing direct-buried line between the 241-A-152 Diversion Box and TK-003 in the CR Vault has several trapped sections. Following the jetting of concentrates from Purex, the jet should be allowed to gas (as in present operation) to remove concentrates from the line.

2. The 4,000 foot section of direct-buried line between the 241-C-151 Box and the 241-B-154 Box is 16 years old and was in the ground for about 2 years before cathodic protection was provided. This line and others involved in solution transfers will be hydrostatically tested before the start of Title II design and at regular intervals during operation. Further, during normal operation, solution inventory control will be invoked for Purex, CR Vault and B-Plant tanks involved in transfers, for early detection of possible line leakage.

3. Process wastes from B-Plant will normally discharge to the 241-B Tank Farm. Although about 3,250,000 gallons of various wastes are presently stored in B-Tank Farm, about 2,750,000 gallons net storage capacity is available for neutralized wastes from B-Plant fission product operations. As discussed earlier, prudence must be exercised in the distribution of fission product wastes in the tank farms for safe tank operation.

   The storage of B-Plant wastes in the B-Tank Farms is considered to be of a temporary nature and the Reference 1 underground routings should be provided when construction funds become available.

B. Receiving and Precipitation Equipment

The following drawings define B-Plant receiving and precipitation equipment and the required modifications:

Drawing No.	Title
SK-2-18633	Cell Arrangement, Section 4 and 5, Cells 8 and 9
SK-2-18632	Cell Arrangement, Section 6, Cells 11 and 12
SK-2-18614	Hot Pipe Trench Schematic
SK-2-18634	Typical Coil and Agitator Arrangement

The feed solution is received in an existing 5000 gallon tank, 5-TK-9, as shown on SK-2-18633. This tank, located in Cell 9, is used for receiving, sampling, feed adjustment, and storage. Approximately 4000 gallon feed batches are transferred from the 244-CR Vault, to eliminate the need for more frequent transfers and feed adjustment. Processing within B-Plant is confined to batch operations with feed batches of approximately 370 gallons per run.

To permit the use of the existing tank, 5-TK-9, for receiving and storage service, an agitator and cooling coil as shown on SK-2-18634, are provided. New jumpers and lines needed are shown on Drawings SK-2-18633 and 18614.

The equipment used for performing the three precipitation and separation steps is shown on SK-2-18633. One "standard section," Section 6, is used for the lead removal, the strontium rare-earth separation, and the cerium removal steps. A standard section is composed of two cells, one containing a precipitator and a solution tank and the other a centrifuge and a catch tank. The solution tank in Cell 11 and the centrifuge in Cell 12 are to be relocated from Cell 27 and Cell 28, Section 14.

As shown on the Process Flow Diagram SK-2-18549, a 370 gallon batch is routed to the precipitator for the lead removal step. A carbonate precipitate is formed by the addition of sodium hydroxide and sodium carbonate to the feed solution. The resulting carbonate precipitate contains the fission products and leaves most of the lead in solution. The mixture is transferred to the centrifuge at the rate of 7 gallon per minute. During centrifugation, the supernatant containing the lead flows by gravity to the catch tank and is subsequently jetted to the process waste collection tank. After separation, the cake is washed with sodium carbonate and water, dissolved with dilute nitric acid and jetted to the solution tank. The dissolved solution collected from three batch-runs is transferred back to the precipitator tank for a rare-earth precipitation. By the addition of oxalic acid to the accumulated solution from the lead removal step, the rare-earths are precipitated from solution as the oxalates. Strontium and iron remain in solution. After centrifugation and washing of the oxalate precipitate, the supernatant containing the strontium and iron is transferred to the concentrator in Cell 5. The oxalate precipitate containing the rare-earths is dissolved with HNO_3 in the centrifuge and transferred back to the precipitator tank. The foregoing oxalate precipitation step is performed primarily for the removal of iron which appears to interfere with the cerium removal step.

The dissolved oxalate cake solution is treated with sodium acetate and hydrogen peroxide in the precipitator to separate cerium as a peroxyacetate precipitate. Rare-earths are not precipitated under these conditions and remain in solution. After centrifugation the supernatant containing the rare-earths is transferred to the Cell 5 Concentrator and the cerium cake is dissolved and transferred to the Waste Receiver.

Since the process on which the flowsheet is based is currently under development, considerable flexibility has been provided in terms of alternate routings for recycling solutions between tanks. Such alternate routings must be employed with caution to avoid exceeding the heat transfer potential of vessel cooling coils.

C. Concentration and Storage of Fission Product Concentrates

Concentration of the dilute solution from the preceeding precipitation steps is necessary to provide a maximum inventory of strontium-90 and rare-earths in minimum storage volume. Concentration and storage equipment are depicted in the following drawings:

Drawing No.	Title
SK-2-18631	Cell Arrangement, Section 3, Cell 5
SK-2-18623	Cell Arrangement, Section 3, Cell 6
SK-2-18617	Cell Arrangement, Section 4, Cell 7
SK-2-18633	Cell Arrangement, Section 4, Cell 8

As shown on SK-2-18631, equipment consists of a concentrator, two condensers, and two condensate receiver tanks. An existing dissolver is modified for service as a concentrator. The coil in this dissolver has sufficient surface to permit the transfer of approximately 1 million BTU per hour with steam condensing at 29 psia.

Two existing 750 gallon tanks will be modified and relocated in Cell 5 - one for use as a process condensate receiver, the other as a steam condensate receiver. Existing dissolver columns will be modified for use as condensers by provision of new shells for the existing coil sections of the columns.

Supernatant is received from Section 6 on a batch basis. Approximately 1700 gallons of dilute solution is processed per batch-run for the desired eight-fold volume reduction. Since the volume of the concentrator is 1500 gallons, concentrator feed is added incrementally under controlled conditions from the precipitator section. Concentration equipment will not be time-controlling in the overall cycle and considerable flexibility is incorporated into Cell 5 facilities.

Non-condensable gas from Condenser (3-E-10-1) is discharged through the condensate receiver into the Vessel Vent Header. Since the pressure drop through the vapor line and condenser is negligible at the flow rates anticipated, vessel vent vacuum maintains the desired pressure differential between the concentrator and the condensate receiver tank. The process condensate collected in 3-TK-4-1 is transferred to the Waste Receiver Tank.

The steam condensate from the concentrator is routed to condenser 3-E-10-2 and collected in 3-TK-4-2 for sampling. The collection and sampling of steam condensate allows detection of any leak in the concentrator coil and provides containment in case of coil failure. The probability of coil failure in the concentrator is greater than for the other vessels. After sampling, the condensate is routed to waste via 3-TK-4-1.

Concentrates containing strontium-90 and the rare-earths are jetted from the concentrator to storage tanks.

Storage of concentrate is required for decay of the undesirable short-lived fission products. Approximately 18 months aging of concentrates is required from reactor discharge before final product specifications can be met. Aging requirements are a function of the final product designs, however, and may be subject to change with developments in this field.

Concentrate storage tanks are located in Cells 6, 7, and 8 of Sections 3 and 4. The storage tanks are located as follows: Two 4500 gallon tanks in Cell 6, as shown on SK-2-18623, one 4500 gallon tank in Cell 7 along with the vessel vent equipment, as shown on SK-2-18617, two 4500 gallon tanks in Cell 8 as shown on SK-2-18633. Three of these tanks are to be transferred from U-Plant. The two existing tanks in Cell 8 will remain in position. Coils and agitators shown on SK-2-18634 are to be installed in the tanks in Cell 7 and 8. Two of the tanks to be moved from U-Plant and relocated in Cell 6, have cooling coils of high capacity.

The fission product concentrates will be stored at a specific volume of 2 gallons per ton of uranium processed through the Purex Plant. With the Purex Plant operating at a 3.6 capacity factor, approximately 3 months will be required to fill one tank. Careful scheduling of concentrates through the storage tankage is necessary because of changing heat release with decay time and because of varying coil capacities. When a tank is full, its contents are transferred as a batch to the next tank, which has either equal or reduced cooling capacity. The series operation for filling the tanks permits the use of the two tanks having the highest cooling potential for the first 6 months storage and eliminates possibilities of cross contamination between various aged solutions. For an 80 per cent overall recovery of Purex - available strontium-90, each full storage tank will contain approximately 3.2 megacuries of strontium-90. After the initial 18 month period for filling and aging the initial material, 1 megacurie of strontium-90 per month would be available for purification.

Solutions are to be stored in the acid state at a bulk temperature of approximately 160° F. Cooling coils are instrumented to permit calculation of heat inventory in each tank, for purposes of scheduling batches through the system.

As shown on Drawings SK-2-18654, 18614, 18631, 18623, 18617, and 18633 alternate routings are provided for flexibility within the storage system and will allow segregated storage of the strontium-90 and rare-earth fractions if so desired. Alternate routings are also provided to allow the contents of the various tanks to be moved in case of a coil failure.

D. Waste Collection and Disposal

Phase I facilities are required in B-Plant for collection and disposal of the following type of waste: 1) process waste; 2) cell drainage; 3) steam condensate from process vessels; and 4) cooling water from process vessels. The process design is shown in the following drawings:

Drawing No.	Title
SK-2-18633	Cell Arrangement, Section 5, Cells 8 and 9
SK-2-18631	Cell Arrangement, Section 3, Cell 5
SK-2-18637	Plot Plan, Outside Lines

The process waste is collected in Cell 9, Section 5. As shown on Drawing SK-2-18633, the tank used for waste collection is an existing tank, 5-TK-6, retained in position. Although this tank was used for waste service under former B-Plant operations, it will require a new coil and agitator, as shown on SK-2-18634. The process waste is routed as follows: from Section 3 to Section 5, and from Section 6 to Section 5.

The cell drainage from all of the cells collects in Section 5, Cell 10, and is routed to 5-TK-6, Cell 9.

The steam condensate from the concentrator is routed to Condenser 3-E-10-2, collected in 3-TK-4-2 Section 3, and routed to 5-TK-6 Section 5, via 3-TK-4-1, Section 3.

The process waste is accumulated in Cell 9, Section 5, at an approximate flowsheet rate of 60 gallons per ton of uranium processed through the Purex Plant. Requirements for flushing precipitator section vessels between processing steps and for general decontamination might boost this value to 120 gallons per ton. The total accumulated waste is sampled, neutralized if necessary and routed to the 241-B Tank Farm complex. An alternate route is provided for rework of the waste if needed. Caution must be employed to prevent boiling of the waste solution within the B-Tank Farm storage tanks.

The water used for cooling the process vessels is discharged to the B-Plant Swamp via an existing 24-inch sewer line and retention basins. Discharged cooling water is monitored continuously for any activity which could be released through leaks in the process cooling coils.

[redacted]

E. Vessel Vent System

Installation of a process vent system in B-Plant will provide positive control of off-gas from all processing equipment. Process vent systems are provided both at Purex and Redox to prevent pressurization of processing equipment and to decontaminate process off-gases and vapors prior to disposal to the ventilation filter. Previous operations in B-Plant permitted direct-venting of hot vessels directly to the cells. The resulting off-gases were then swept into the air tunnel and to the stack via the sand filter. The proposed Cell 7 Vessel Vent System shown in the following drawings will eliminate any direct venting of hot process equipment to the cells, and will provide separate filtration of all off-gases and vapors prior to discharge to the Canyon Ventilation System.

Drawing No.	
SK-2-18529	Tank Modifications for Sealing Agitator Shafts
SK-2-18618	Vessel Vent System - Schematic Phase I
SK-2-18620	Vessel Vent Off-Gas Heater
SK-2-18619	Vessel Vent Off-Gas Filter
SK-2-18537	Modifications of Centrifuge Discharge and Supernatant Tank Inlet Piping
SK-2-18617	Cell Arrangement, Section 4, Cell 7
SK-2-18530	Vessel Vent Header - Schematic Phase I, II, and III

The new vessel vent system is shown schematically in Drawing SK-2-18618. A 6-inch vessel vent header is installed along the bottom of the Hot Pipe Trench to service all the process cells from Cell 5 through Cell 12. Existing lines from the cells to the Hot Pipe Trench are utilized for all cells except Cell 7 which has two new 4-inch lines cored through from the Hot Pipe Trench.

The new vessel vent equipment located in Cell 7 is shown on SK-2-18617 and consists of a heater to vaporize any liquid present; a fiber-glass filter for removal of particulate material; an air-operated jet to provide 20 inches water suction on the header while handling approximately 1200 lb/hr of off-gas and vapors at the temperature of 250° F. The motive fluid for the jet is air at 100 psia, with an emergency steam back-up.

As shown on Drawing SK-2-18620 a new off-gas heater (4-E-21) is required. The heater has six heating elements, each rated at 12 KW, as per Drawing H-2-3422, and is capable of heating the off-gas stream sufficiently to protect the fiber-glass filter medium from moisture. Heating capacity will be available to heat off-gas to 390° F for silver-reactor service, if needed in the future.

A new filter vessel (4-F-22) with approximately 20 square feet cross-sectional area, is shown on Drawing SK-2-18619. Packing for the vessel consists of three layers of 115K Fiber-glass, packed to densities of 1.5, 3.0, and 9.0 lbs/ft^3 and depths of 18, 14, and 12-inches, respectively.

[redacted]

A new vessel vent condensate tank (4-TK-23) of 300 gallons capacity collects drainage from the vent header. Any condensate collected is routed to waste.

Allowance will be made for future installation of a vessel vent silver-reactor, should iodine removal become necessary. The vessel vent equipment will be designed to allow remote removal and relocation to another cell if needed in the future.

To minimize air inleakage into the vessel vent system, unused tank nozzles are plugged and the agitator shafts are sealed in accordance with Drawing SK-2-18529. The centrifuge is vented via the supernatant tank by the addition of new nozzle connections and a new discharge line as shown on Drawing SK-2-18537.

F. Hot Pipe Trench Modifications

Phase I revisions to the Hot Pipe Trench are defined in the following drawings:

Drawing No.	
SK-2-18654	Cell Allocation and Primary Routings
SK-2-18614 Sheets 1 and 2	Hot Pipe Trench Schematic

In general, modifications to the Hot Pipe Trench are confined to Sections 3 through 6, inclusive, except that the feed line for concentrates enters the trench at Section 8. A shielding barrier is provided across the trench between Cells 12 and 13, to permit future trench construction activities beyond Phase I. Piping stubs extending through the barrier are intended to provide desired Phase II routings plus the eventual Phase I routings of Reference 1.

G. Aqueous Make-up

As shown on Drawing SK-2-18576, existing tanks and routings are utilized where possible for chemical make-up and addition to process vessels. All chemical additions are made through existing scale tanks located in the Operating Gallery.

The following chemicals are needed for Phase I processing: 1) nitric acid; 2) sodium hydroxide; 3) sodium carbonate; 4) oxalic acid; 5) sodium acetate; 6) hydrogen peroxide; and 7) chemicals for demineralizer - undefined.

A new water demineralizer system is required to limit the addition of ions detrimental to future Phase II purification processes. The tank formerly used at B-Plant for supplying sodium nitrate will be used for storage of demineralized water while the demineralizer is being regenerated.

A new system for handling hydrogen peroxide is needed. The system adopted consists of a new combined head and storage tank, water jet, and related piping. As shown on Drawing SK-2-18576, evacuation of the system transfers peroxide from the drum to the storage tank. After transfer to the evacuated tank, the peroxide flows by gravity to the chemical make-up tank. The maximum suction lift required for emptying the drum is approximately 10 feet.

Sufficient floor space is available for storage of bulk chemicals. However, material handling equipment, such as a fork-lift truck, etc., will be required for AMU service. As Phase I process development work continues, chemical requirements may be subject to change. Sufficient flexibility is incorporated into the existing tankage and header systems so that no major problems are anticipated for future aqueous make-up.

H. Instrumentation and Cold-Side Facilities

The primary instrument functions required for Phase I processing are defined on Drawings SK-2-18549, 18576, and 18618. Primary measuring elements and recording or indicating instruments presently installed will be tested and reconditioned where feasible. New services are needed for measurement of water flow to the cooling coils, steam flow to the concentrator and temperature of water discharged from the cooling coils. Provision will be made in Gallery Piping for alternate raw water, steam or air supply to process tank coils.

Jets to be used for transfer of process solutions in the Canyon Building are of standard 10, 30, and 75 gallon per minute capacity. The jets are controlled by means of existing gang-valves.

New jumpers required for instruments and jets are shown on Drawings SK-2-18617, 18631, 18623, 18633, and 18632. Cold-side piping and other requirements are also indicated on these drawings.

I. Sampling

Special equipment for the withdrawal of process samples and determination of solution pH at canyon deck-level is shown schematically in Drawing SK-2-18527. A description of this equipment is provided in Reference 1. Tentatively, it is planned to provide two portable Gilmont sampler units and one portable pH probe unit of the referenced design along with an electric fork-lift truck for Phase I operations. A special station will be required on the canyon deck for performance of maintenance and washdown functions on the above portable equipment.

J. Ventilation

Reference 1 provides information on the status of ventilation equipment in the 221-B and 291-B Facilities. As a result of recent tests performed on this equipment, and described in Reference 1, extensive modification of ventilation facilities will be required. Drawing SK-2-18655 shows the required modifications both for Phase I and Phase II. Phase I modifications are as follows:

1. New ventilation ports of 12 square feet cross sectional area will be provided into the ventilation tunnel for Cells 5 through 12, inclusive. Special temporary dust collection equipment may be required to control dust when the new holes are cored through.

2. Sheet metal or other restrictors will be attached to cell covers to limit air flow to each operating cell at 3700 CFM during normal operations. Cell covers for all non-operating cells in Phase I, except Cell 40, will be sealed for Phase I operations.

3. Repairs will be made to the roof of the sand filter to seal detectable leaks.

4. The present emergency steam engine and exhaust fan will be replaced prior to the start of Phase I operations with a new steam turbine unit designed for the new Phase II ventilation system. This new emergency blower which will handle 37,500 CFM at 12-inches static pressure, will be relocated eventually to the Phase II facility.

5. A new 6 ft. x 8 ft. concrete stub will be provided in the exhaust tunnel for the new Phase II exhaust filter and fans.

6. The 224-B Building exhaust duct leading into the 221-B ventilation tunnel will be blocked off at the 224-B Building.

7. An extensive overhaul of 5 of the Carrier air supply units will be performed.

8. Present exhaust fan dampers will be repaired or replaced with low pressure-drop dampers.

K. Emergency Raw Water Supply

An emergency raw water system shown on Drawing SK-2-18573 is provided to prevent boiling of solution in storage and process tanks in case of failure of raw water supply. Without cooling, full storage tanks would start to boil within one hour. Emergency repairs to existing underground lines between the 282-E Reservoir and B-Plant would, in general, require considerable in excess of one hour for restoration of service. On failure of the Export Water Line, Purex would have first call on available reservoir storage. Insufficient time would be available to jet full tanks at B-Plant to waste.

A new well is provided near the southwest corner of B-Plant for emergency raw water supply. A 200 gpm, 500 foot head, 25 brake horsepower pump, driven by a combustion engine would be required. Although a flow of 120 gallons per minute would suffice for Phase I emergency flow, the 200 gpm capacity should provide for emergency service for future Phase II and III operations, as

[redacted]

well as Phase I. The overall system includes a 4-inch tie-in, with check valves, into the 10-inch raw water line and a new 3-inch line, routed to the 24-inch sewer, for routine standby testing of the pump and combustion engine. Present data from Chemical Effluents Technology indicate activity less than 10^{-8} micro-curies per cubic centimeter in ground water at the site indicated for the new well.

L. Other Phase I Requirements

Other B-Plant modifications required for Phase I and not covered by scope drawings are listed as follows:

1. Mechanical Maintenance Shop
2. Instrument Maintenance Shop
3. Decontamination Room
4. SWP Lobby
5. SWP Locker Room
6. PAX Telephone System
7. Radiation Instruments
8. Fresh Air Supply
9. Essential Materials Handling Equipment
10. Area Barricades
11. Miscellaneous Requirements

The above modifications are described in Reference 1. However, the exact nature of these modifications will be established during Title II design.

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Facilities Engineering
CHEMICAL PROCESSING DEPARTMENT

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Facilities Engineering
CHEMICAL PROCESSING DEPARTMENT

HW-69011

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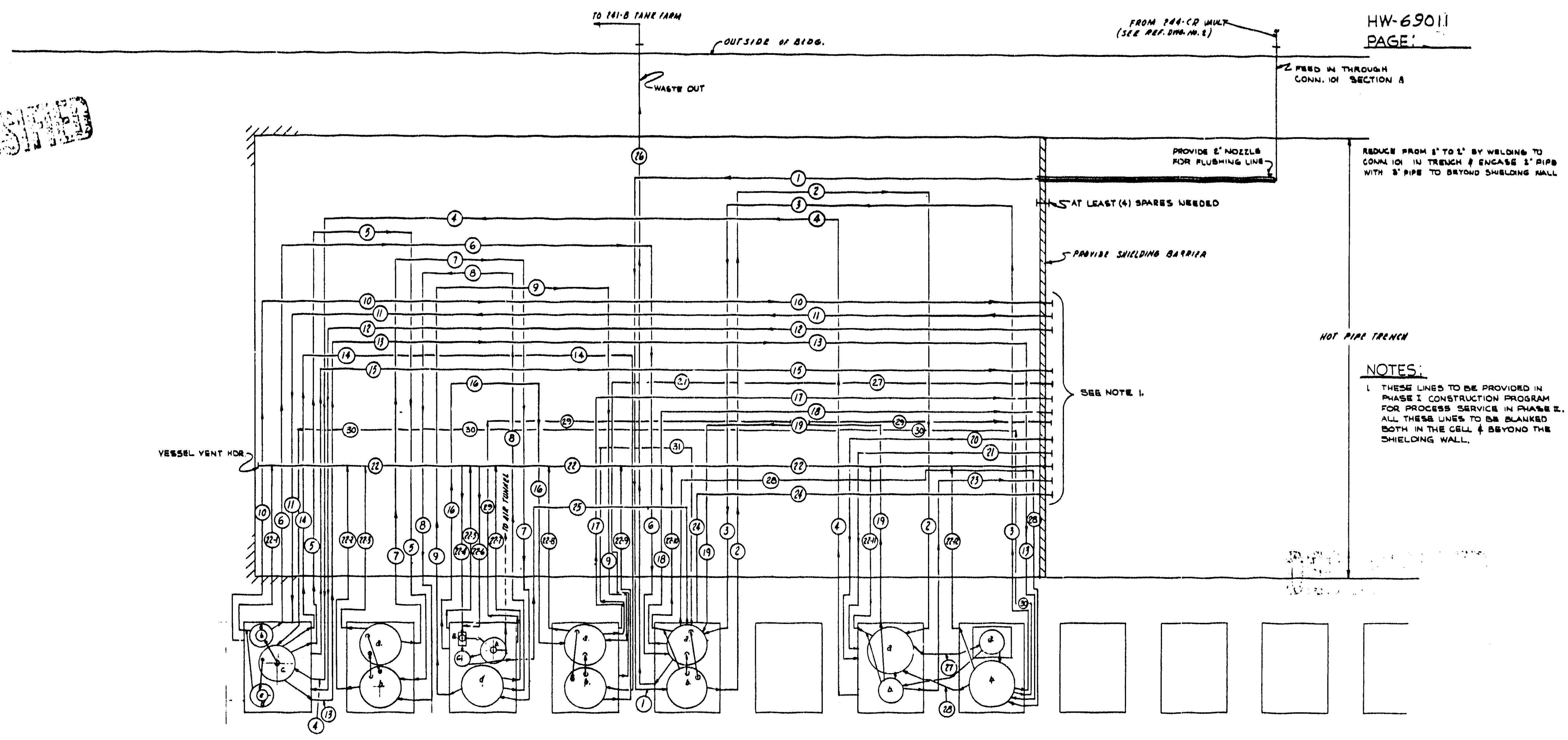

NOTES:

1. THESE LINES TO BE PROVIDED IN PHASE I CONSTRUCTION PROGRAM FOR PROCESS SERVICE IN PHASE II. ALL THESE LINES TO BE BLANKED BOTH IN THE CELL & BEYOND THE SHIELDING WALL.

CELL #	5	6	7	8	9	10	11	12	13	14	15
SECTION #	3		4		5		6		7		8
VESSEL #	a. 3-TK4-1 b. 3-E-10-1 c. 3-E-5-1 d. 3-TK4-2 e. 3-E-10-2	a. 3-TK11-1 b. 3-TK11-2	a. 4-E-21 b. 4-F-22 c. 4-F-23 d. 4-TK11-4	a. 4-TK7 b. 4-TK8	a. 5-TK6 b. 5-TK9		a. 6-TK1 b. 6-TK4 PRECIPITATION SECTION.	a. 6-G-2 b. 6-TK3			
FUNCTION	a.b. PROCESS CONDENSATE COLLECTION c. BOIL-DOWN CONCENTRATOR FOR FISSION PRODUCT d.e. STEAM CONDENSATE COLLECTION	STORAGE OF FISSION PRODUCT CONCENTRATES	a.b.c. VESSEL VENT EQUIPMENT d. STORAGE OF FISSION PRODUCT CONCENTRATES	STORAGE OF F.P. CONCENTRATES	a. WASTE COLLECTION WASTE ROUTING & MONITOR CELL DRAIN b. FEED RECEIVING	COLLECT CELL DRAINAGE	a. PRECIPITATOR b. SOLUTION TANK	a. CENTRIFUGE b. SUPERNATANT CATCH TANK			

SCOPE

SK-2-18654 -

REF. NO.	DWG. NO.	DRAWING TITLE
3	SK-2-18646	HYDRAULIC FLOW DIAGRAM
2	SK-2-18657	PLOT PLAN OUTSIDE LINES
1	SK-2-18650	HOT PIPE TRENCH - SCHEMATIC

REFERENCE DRAWINGS

NEXT USED ON

REVISIONS

APPROVED FOR CONST

APPROVED FOR PURCHASE

APPROVED FOR DESIGN

SCALE

DRAWN NOLAND

CGC-897 1837

CLASSIFICATION NONE

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GENERAL ELECTRIC

FISSION PRODUCT RECOVERY

CELL ALLOCATION & PRIMARY ROUTINGS

BLDG. 221-B INDEX 8404

DWG. NO. SK-2-18654 - -

HW-69011

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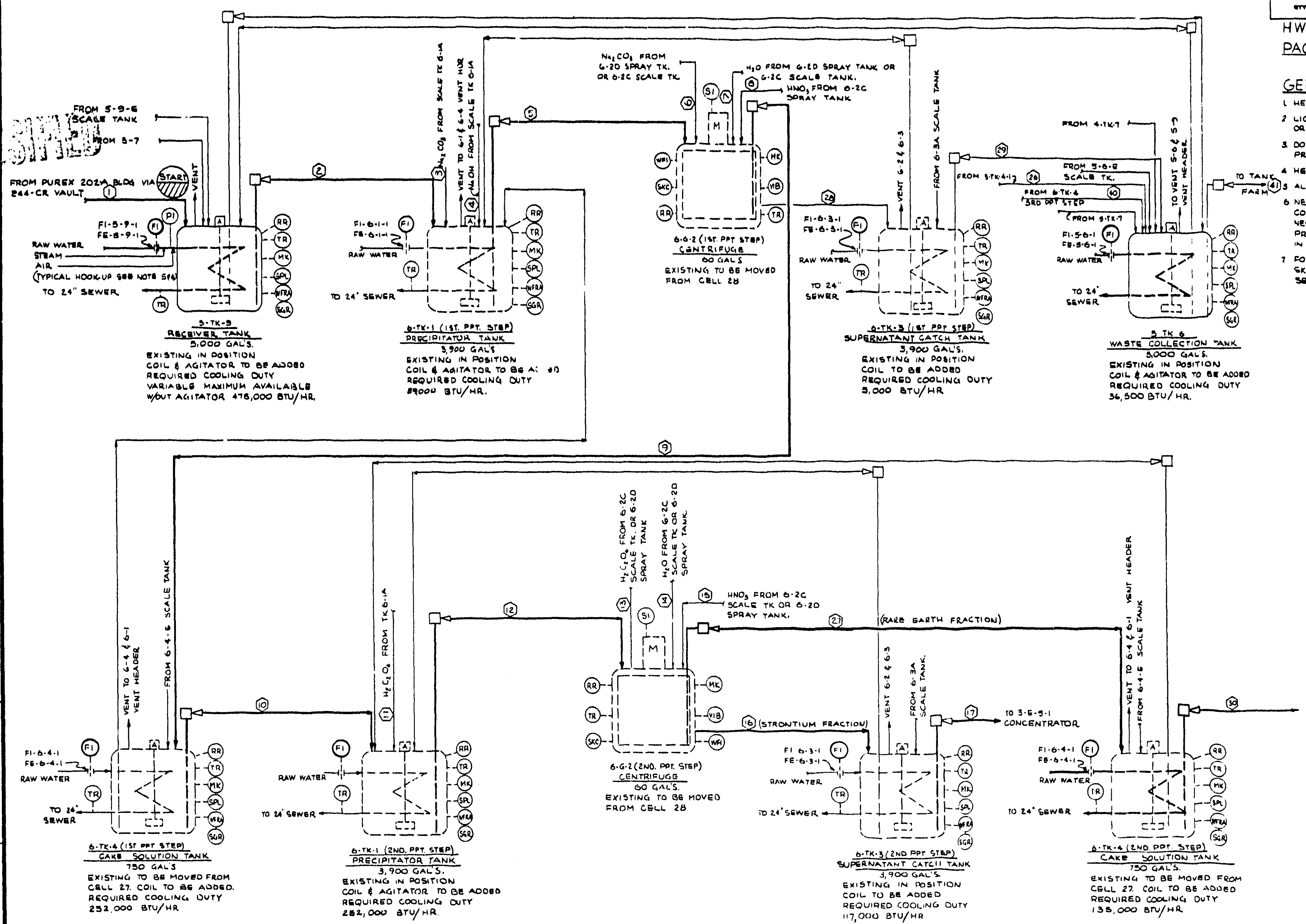

GENERAL NOTES:

1. HEAVY PROCESS LINES - INDICATE PRODUCT STREAM
2. LIGHT PROCESS LINES - INDICATE WASTE STREAM, CHEM. ADD. OR ALTERNATE ROUTING
3. DOTTED EQUIPMENT LINES - EQUIPMENT USED FOR TWO PRECIPITATION STEPS.
4. HEAVY EQUIPMENT LINES - NEW EQUIPMENT.
5. ALL TANK COILS TO HAVE WATER, STEAM, & AIR SUPPLY.
6. NEW WATER FLOW INDICATORS NEEDED FOR THE FOLLOWING COILS: 6TK1, 6TK3, 5TK9, 5TK6, 6TK4, 4TK8 & 4TK7. NEW STEAM FLOW INDICATOR NEEDED ON 3-5-5-1 CONC. PRESSURE INDICATORS & TEMPERATURE RECORDERS AVAILABLE IN 'B' PLANT
7. FOR NEW COILS & NEW JUMPERS REFER TO DWG'S SK-2-18623, SK-2-18682, SK-2-18635, SK-2-18617 FOR TYPICAL COILS SEE SK-2-18634

SCOPE

SK-2-18549 1/4 0

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FLOW DIAGRAM
PHASE-I

SCALE NONE

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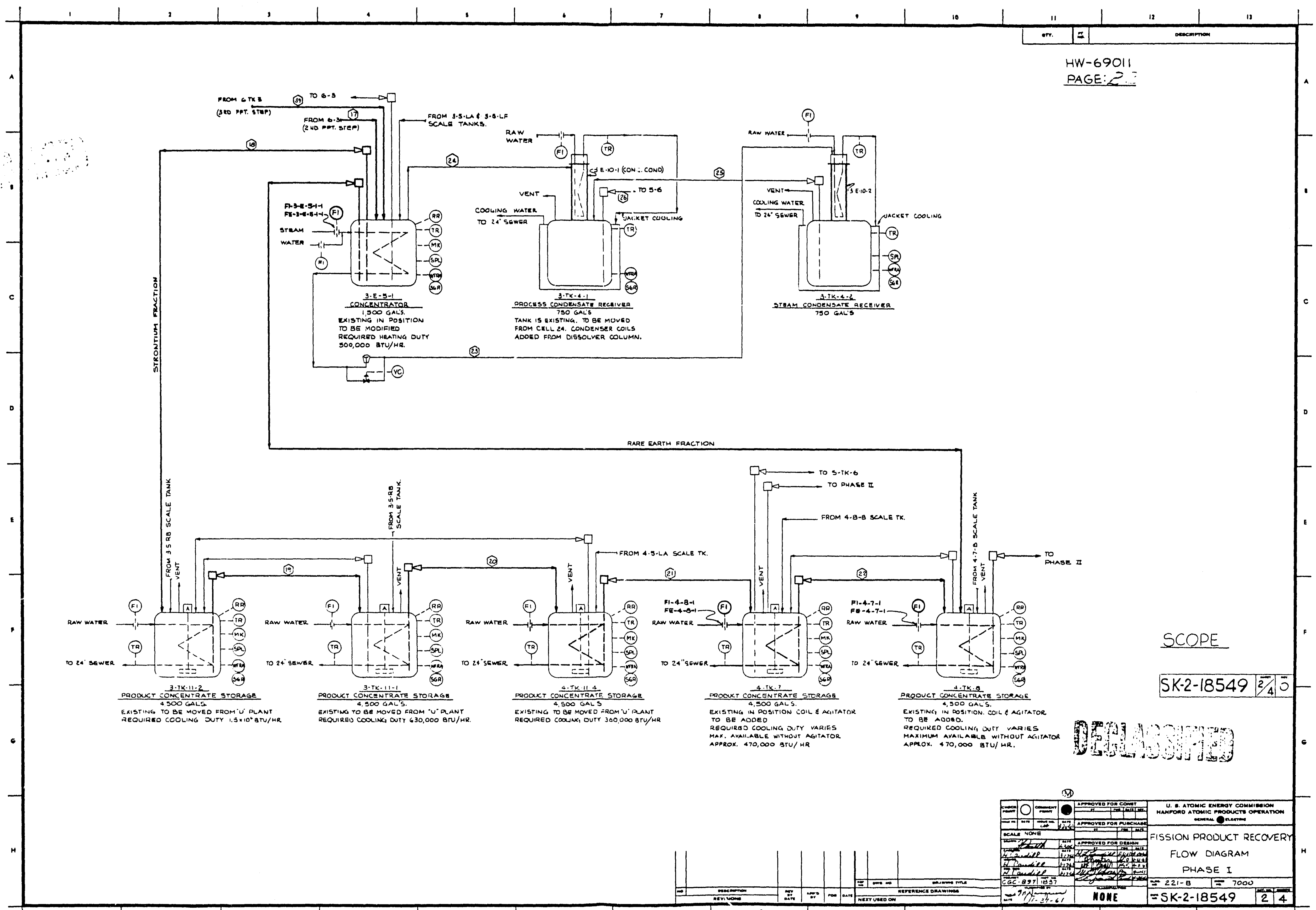
FROM 6 TKS (3RD PPT. STEP)
TO 6-3
FROM 6-3 (2ND PPT. STEP)
FROM 3-5-LA & 3-5-LF SCALE TANKS.
RAW WATER
STEAM
WATER
VENT
COOLING WATER TO 24" SEWER
TO 5-6
JACKET COOLING
E-10-1 (CONT. COND)
E-10-2
STRONTIUM FRACTION
RARE EARTH FRACTION
3-E-5-1
CONCENTRATOR
1,500 GAL'S.
EXISTING IN POSITION
TO BE MODIFIED
REQUIRED HEATING DUTY
500,000 BTU/HR.
3-TK-4-1
PROCESS CONDENSATE RECEIVER
750 GAL'S
TANK IS EXISTING. TO BE MOVED
FROM CELL 24. CONDENSER COILS
ADDED FROM DISSOLVER COLUMN.
3-TK-4-2
STEAM CONDENSATE RECEIVER
750 GAL'S
TO 5-TK-6
TO PHASE II
FROM 4-8-8 SCALE TK.
FROM 3-5-RB SCALE TANK.
FROM 4-5-LA SCALE TK.
FROM 4-7-8 SCALE TANK
TO 24" SEWER
3-TK-11-2
PRODUCT CONCENTRATE STORAGE
4,500 GALS.
EXISTING TO BE MOVED FROM "U" PLANT
REQUIRED COOLING DUTY 1.5×10⁶ BTU/HR
3-TK-11-1
PRODUCT CONCENTRATE STORAGE
4,500 GAL'S.
EXISTING TO BE MOVED FROM "U" PLANT
REQUIRED COOLING DUTY 630,000 BTU/HR.
4-TK-11-4
PRODUCT CONCENTRATE STORAGE
4,500 GALS
EXISTING TO BE MOVED FROM "U" PLANT
REQUIRED COOLING DUTY 360,000 BTU/HR
4-TK-7
PRODUCT CONCENTRATE STORAGE
4,500 GALS.
EXISTING IN POSITION COIL & AGITATOR
TO BE ADDED
REQUIRED COOLING DUTY VARIES
MAX. AVAILABLE WITHOUT AGITATOR
APPROX. 470,000 BTU/HR
4-TK-8
PRODUCT CONCENTRATE STORAGE
4,500 GALS.
EXISTING IN POSITION. COIL & AGITATOR
TO BE ADDED.
REQUIRED COOLING DUTY VARIES
MAXIMUM AVAILABLE WITHOUT AGITATOR
APPROX. 470,000 BTU/HR.
SCOPE
SK-2-18549 2/4
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GENERAL ELECTRIC
FISSION PRODUCT RECOVERY
FLOW DIAGRAM
PHASE I
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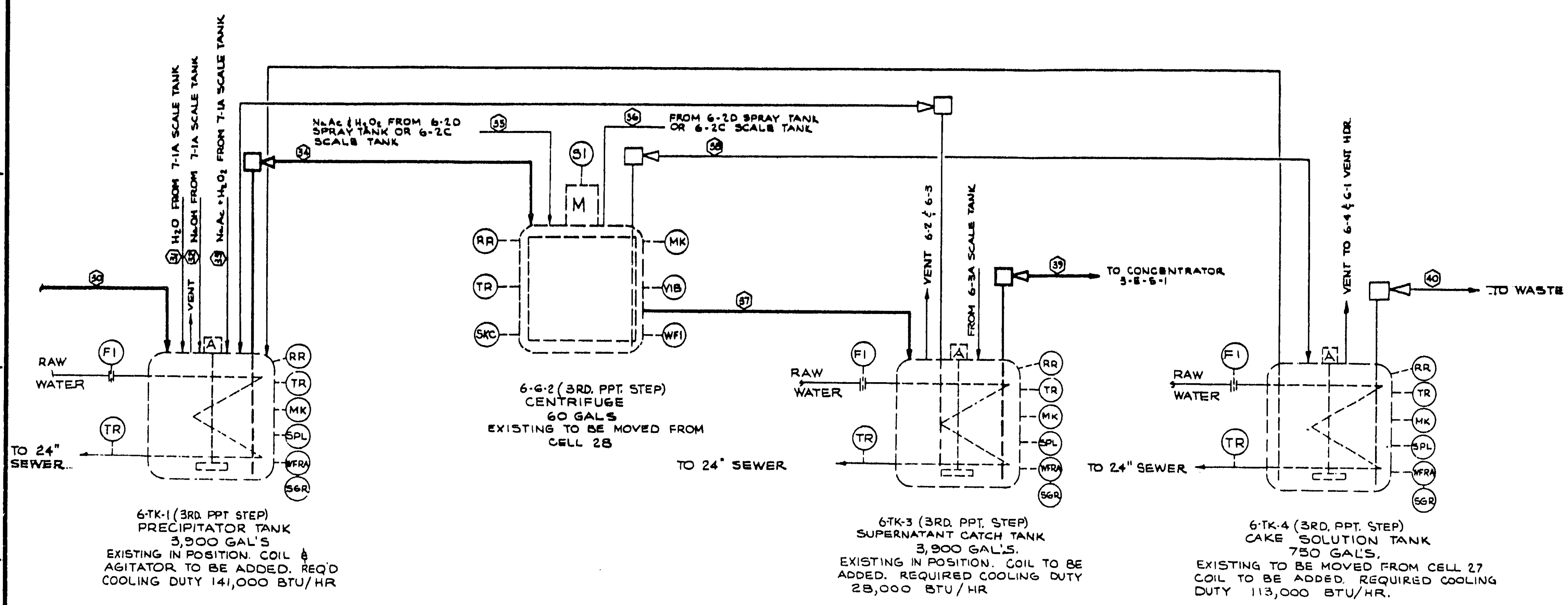

SCOPE

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FOR DESIGN
NOT FOR FABRICATION

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

CLASSIFICATION: NONE

SK-2-18549 | 3 | 4 | 0

SCALE: NONE

INST. NO. 1980

PROJECT NO. CGC-897

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

FISSION PRODUCT RECOVERY
FLOW DIAGRAM
PHASE I

BLDG. 221-B | 7000

SK-2-18549 | 3 | 4

REFERENCE DRAWINGS
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STREAM NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
VOLUME / BATCH - GAL.	VARIABLE	370	655	65	1090	60	60	100	200	600	180	790	50	270	20	870	870	225	4500	4500	4500
FLOW - GPM	VARIABLE	50			7				10	50		7				7	50	0.5	50	50	50
TEMPERATURE °F	122	122			122							72									
SPECIFIC GRAVITY	1.05	1.05	1.10	1.53	1.05	1.05	1.0	1.03	1.06	1.06	1.05	1.06	1.01	1.0	1.27	1.06	1.06	1.3	1.3	1.3	1.3
HEAT GEN. BTU/HR/GAL.	240	240			82				420	420		320				135	135	524	115	66	45
COMPOSITION M/L																					
HNO_3	1.0	1.0						4.4	1.3	1.3		1.0			90	0.91	0.91	3.5	3.5	3.5	3.5
Na	0.15	0.15							0.025	0.025		0.019				0.017	0.017	0.066	0.66	0.066	0.066
Fe	0.08	0.08			0.027				0.15	0.15		0.11				0.10	0.10	0.39	0.39	0.39	0.89
Pb	0.06	0.06			0.02				0.011	0.011		0.008				0.001	0.001	0.004	0.004	0.004	0.004
$SO_4^{=}$	<0.10	<0.10																			
Na_2CO_3			1.0		0.5	0.5															
NaOH				19.0	1.0																
H_2O														H_2O							
$H_2C_2O_4$											1.0		0.28								
C_2O_4												0.24									
Na As																					
H_2O_2																					
$C_2H_3O_2^-$																					
$NaNO_3$																					
FISSION PRODUCT YIELD																					
IN PER-CENT PUREX																					
WASTE AS REF. 100% (1)																					
Sr	85	85			85				80	80		80				75	75	80	80	80	80
Ce	90	90			90				85	85		85				8	8	10	10	10	10
Y	10	10			10				10	10		10				10	10	10	10	10	10
TRE (2)	85	85			85				80	80		80				5	5	75	75	75	75
Ru	<5	<5			<5																
Zr-Nb	10	10			10				9	9		9				3	3	6	6	6	6
CURIES Sr^{90}/BATCH (3)	VARIES	58,000			58,000				55,000	165,000		165,000				154,000	154,000	165,000	3.3×10^6	3.3×10^6	3.3×10^6
CURIES Sr^{90}/GAL	157	157			53				274	274		208				177	177	730	730	730	730
TIME - HR. PER BATCH RUN		0.12			2.6				0.33	0.2		1.9				2.08	0.3	8.0	4.6	4.6	4.6

STREAM NUMBER	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
VOLUME / BATCH - GAL.	4600	670	645	670	648	300	1100	100	300	217	8.0	175	700	120	400	820	400	820	400	4750	
FLOW - GPM	50	1.4	1.35	20	50	48	7	50	50				7			7	4	7	4	50	
TEMPERATURE °F													122		40						
SPECIFIC GRAVITY	1.3	1.0	1.0	1.0	1.0	1.03	1.05	1.05	1.03	1.0	1.53	.08	1.04	1.02	1.2	1.04	1.2	1.04	1.2	1.1	
HEAT GEN. BTU/HR/GAL.	35					470	4	4	470				200			35	275	35	275	6	
COMPOSITION M/L																					
HNO_3	3.5		0.01		0.01	0.5			0.8						6.0		6.0		6.0		
Na	0.066												0.58			0.58		0.58			
Fe	0.89					0.015			0.018				0.006			0.008		0.005			
Pb	0.004					0.001	0.018	0.018	0.02				0.009			0.007		0.007			
$SO_4^{=}$																					
Na_2CO_3							0.5	0.5			19.0										
NaOH							0.97	0.97		H_2O											
H_2O		H_2O		H_2O																	
$H_2C_2O_4$																					
C_2O_4																					
Na As												1.47		0.24							
H_2O_2												1.93		0.31							
$C_2H_3O_2^-$													0.37			0.35					
$NaNO_3$																				0.21	
FISSION PRODUCT YIELD																					
IN PER-CENT PUREX																					
WASTE AS REF. 100% (1)																					
Sr	80					5	5	5	5				5			5		5		5	
Ce	10					77							77			2	75	2	75	80	
Y	10																				
TRE (2)	75					75							75			70	5	70	5	10	
Ru																					
Zr-Nb	6					6							6			3		3		4	
CURIES Sr^{90}/BATCH (3)	3.3×10^6					11,000	3,000	3,000	11,000				11,000			11,000		11,000		11,000	
CURIES Sr^{90}/GAL	730					34	2.7	2.7	34				14			12		12		4.3	
TIME - HR. PER BATCH RUN	4.6						26	0.4	0.1				1.7			1.96	1.7	0.3	0.1	1.5	

1. BASED ON PUREX PROCESSING MATERIAL AGED 90 DAYS.
2. TRE - TRI-VALENT RARE EARTH.
3. BASED ON 600 $\frac{MWD}{TON}$ EXPOSURE MATERIAL PROCESSED THROUGH THE PUREX PLANT.
4. TOTAL WASTE ACCUMULATED PER BATCH DOES NOT INCLUDE CHEMICALS NEEDED FOR FLUSHING VESSELS

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SK-2-18549 4/4

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

FLOW DIAGRAM
FISSION PRODUCT
CONCENTRATES
PHASE-I

SCALE NONE

CGC 897 | 887

221-B | 7000

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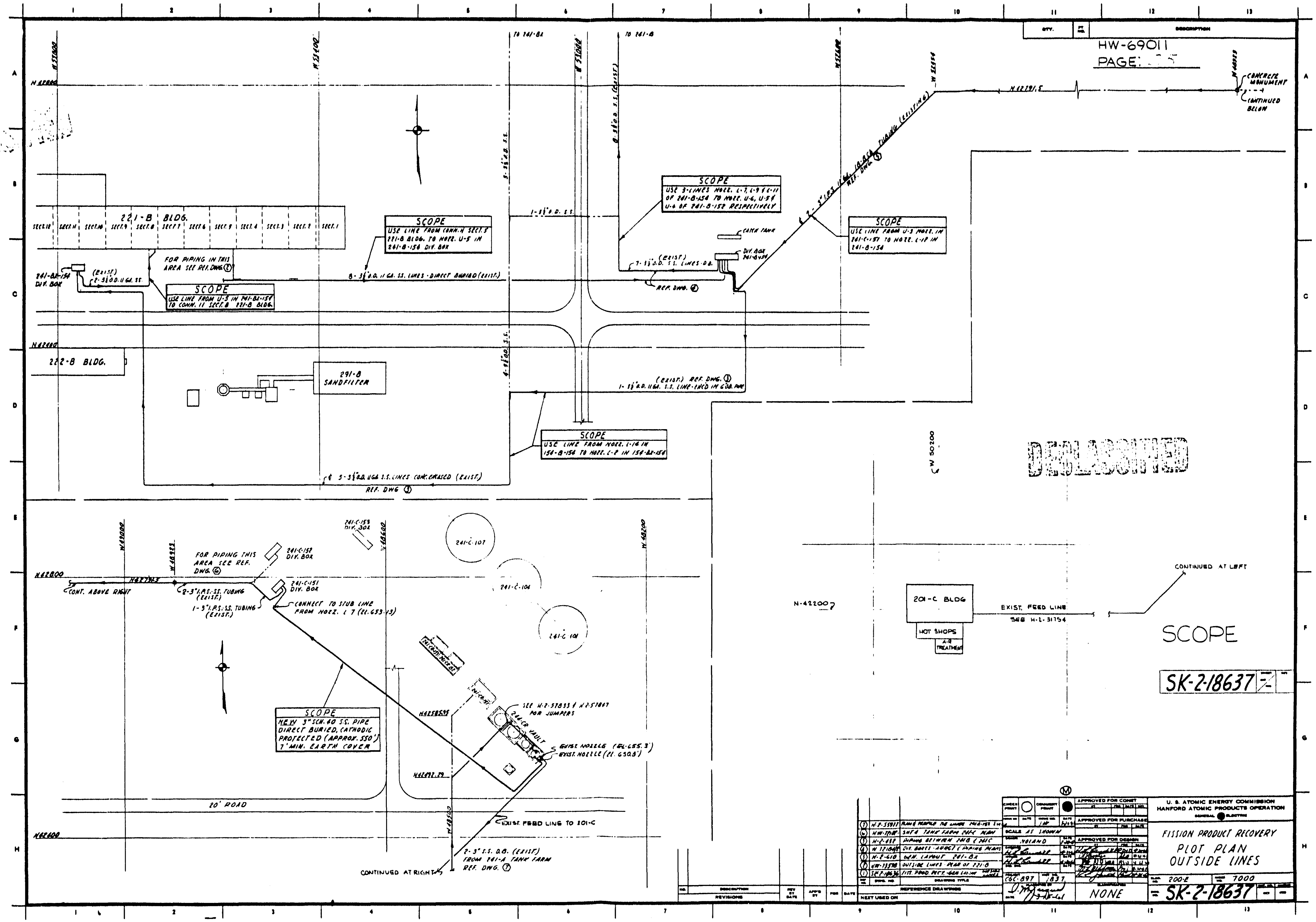
REVISIONS | REFERENCE DRAWINGS | NEXT USED ON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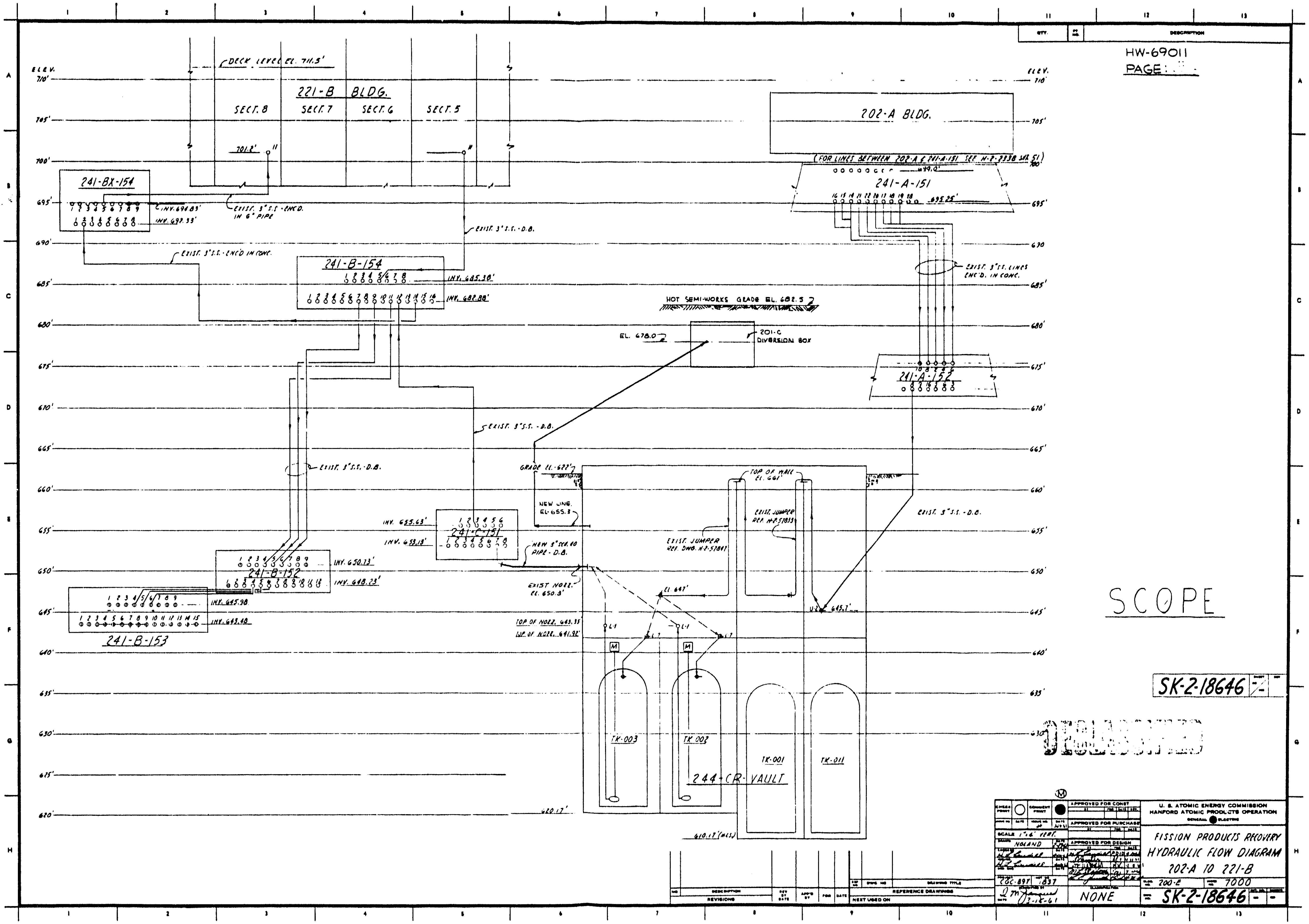
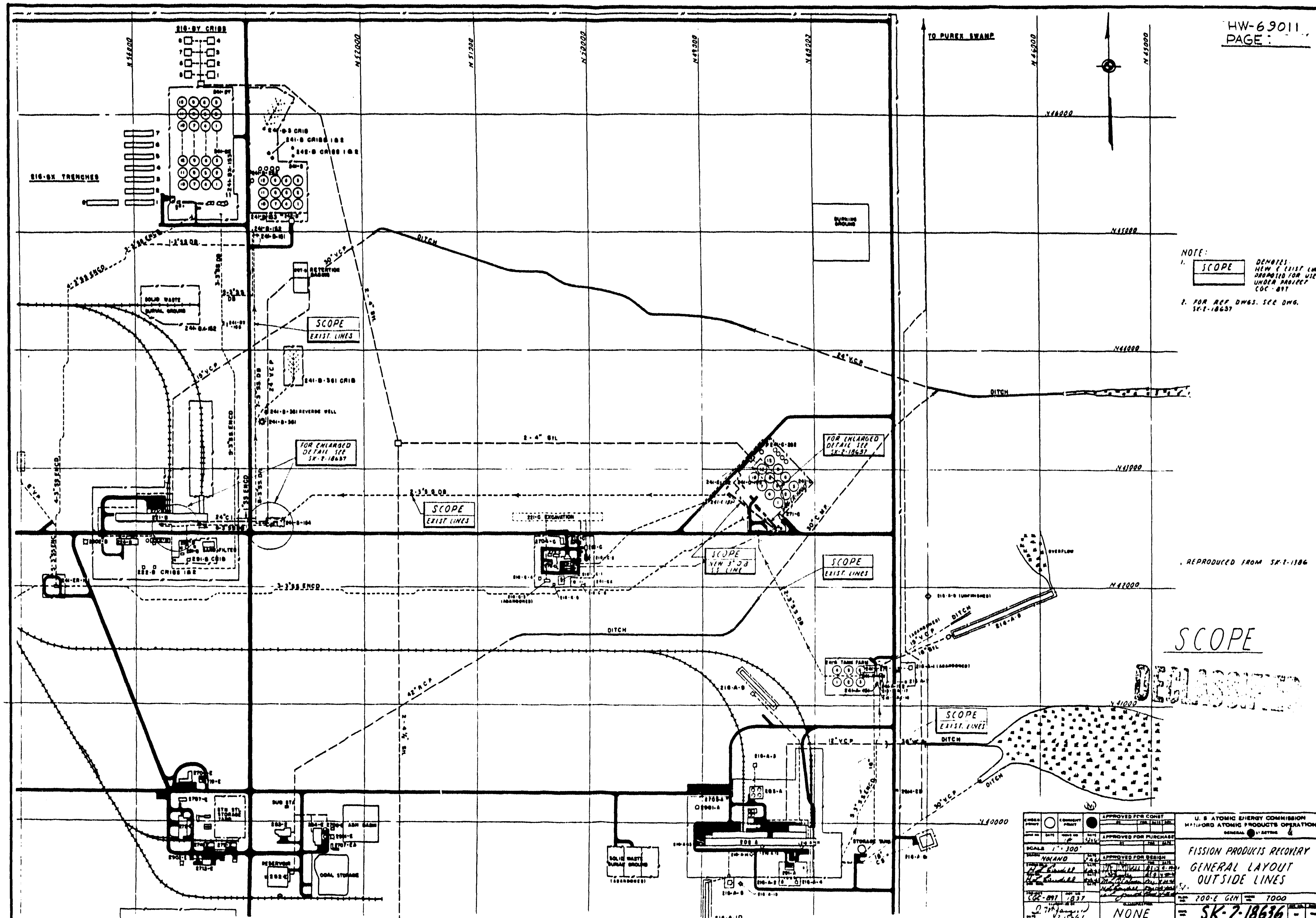
PAGE
DECLASSIFIED
221-B BLDG.
222-B BLDG.
291-B SANDFILTER
SCOPE
USE LINE FROM CONN. H SECT. 5 221-B BLDG. TO NOZZ. U-5 IN 241-B-154 DIV. BOX
SCOPE
USE LINE FROM U-5 IN 241-BX-154 TO CONN. 11 SECT. 8 221-B BLDG.
SCOPE
USE 3-LINES NOZZ. L-7, L-9 & L-11 OF 241-B-154 TO NOZZ. U-6, U-5 & U-6 OF 241-B-152 RESPECTIVELY
SCOPE
USE LINE FROM U-3 NOZZ. IN 241-C-151 TO NOZZ. L-11 IN 241-B-154
SCOPE
USE LINE FROM NOZZ. L-14 IN 154-B-154 TO NOZZ. L-8 IN 154-BX-154
FOR PIPING IN THIS AREA SEE REF. DWG. ⑦
8-3½" O.D. 11 GA. SS. LINES - DIRECT BURIED (EXIST.)
(EXIST.) REF. DWG. ③
1-3½" O.D. 11 GA. S.S. LINE - ENCD IN CONC PIPE
5-3½" O.D. 11GA S.S. LINES CONC. ENCASED (EXIST.)
REF. DWG ③
CONCRETE MONUMENT
CONTINUED BELOW
241-C-107
241-C-104
241-C-101
241-C-152 DIV. BOX
241-C-151 DIV. BOX
241-C-153 DIV. BOX
FOR PIPING THIS AREA SEE REF. DWG. ⑥
CONT. ABOVE RIGHT
2-3" I.P.S. SS. TUBING (EXIST.)
1-3" I.P.S. SS. TUBING (EXIST.)
CONNECT TO STUB LINE FROM NOZZ. L 7 (EL. 653.13)
SCOPE
NEW 3" SCH. 60 SS. PIPE DIRECT BURIED, CATHODIC PROTECTED (APPROX. 550') 7' MIN. EARTH COVER
SEE H-2-57833 & H-2-57867 FOR JUMPERS
244-CR VAULT
EXIST. NOZZLE (EL. 655.3')
EXIST. NOZZLE (EL. 650.5')
20' ROAD
EXIST. FEED LINE TO 201-C
2-3" S.S. O.D. (EXIST.) FROM 241-A TANK FARM REF. DWG. ⑦
CONTINUED AT RIGHT
201-C BLDG
HOT SHOPS
AIR TREATMENT
EXIST. FEED LINE
SEE H-2-31754
CONTINUED AT LEFT
N-422007
SCOPE
SK-2-18637
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
FISSION PRODUCT RECOVERY
PLOT PLAN
OUTSIDE LINES
SCALE AS SHOWN
NONE
200-E
7000
SK-2-18637
REFERENCE DRAWINGS
REVISIONS
NEXT USED ON



HW-69011
PAGE
DECK LEVEL EL. 711.5'
221-B BLDG.
SECT. 8
SECT. 7
SECT. 6
SECT. 5
202-A BLDG.
241-A-151
241-A-152
241-BX-154
241-B-154
241-B-152
241-B-153
241-C-151
EXIST. 3" S.S. - D.B.
EXIST. 3" S.S. LINES ENC'D. IN CONC.
HOT SEMI-WORKS GRADE EL. 682.5
EL. 678.0
201-C DIVERSION BOX
NEW LINE EL. 655.3
EXIST. JUMPER
NEW 3" SCH. 40 PIPE - D.B.
TOP OF WALL EL. 661'
TK-003
TK-002
TK-001
TK-011
244-CR VAULT
SCOPE
SK-2-18646
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
FISSION PRODUCTS RECOVERY
HYDRAULIC FLOW DIAGRAM
202-A TO 221-B
SCALE 1"=6' VERT.
NOLAND
NONE
200-E
7000
SK-2-18646


HW-69011
PAGE
TO PUREX SWAMP
216-BY CRIBS
216-BX TRENCHES
SOLID WASTE BURIAL GROUND
BURNING GROUND
SCOPE
EXIST. LINES
241-B-361 CRIB
FOR ENLARGED DETAIL SEE SK-2-18637
DITCH
24" V.C.P.
30" V.C.P.
42" R.C.P.
2 - 4" GIL
221-U EXCAVATION
SCOPE
NEW 3" DB
SS LINE
OVERFLOW
12" V.C.P.
STORAGE TANK
COAL STORAGE
RESERVOIR
ASH BASIN
SOLID WASTE BURIAL GROUND (ABANDONED)
202 A
NOTE:
1. SCOPE DENOTES: NEW & EXIST. LINES PROPOSED FOR USE UNDER PROJECT CGC-897
2. FOR REF. DWGS. SEE DWG. SK-2-18637
REPRODUCED FROM SK-2-1186
SCOPE
N 46000
N 45000
N 44000
N 43000
N 42000
N 41000
N 40000
U.S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
APPROVED FOR CONST
APPROVED FOR PURCHASE
APPROVED FOR DESIGN
SCALE 1" = 300'
FISSION PRODUCTS RECOVERY
GENERAL LAYOUT
OUTSIDE LINES
200-E GEN 7000
NONE
SK-2-18636

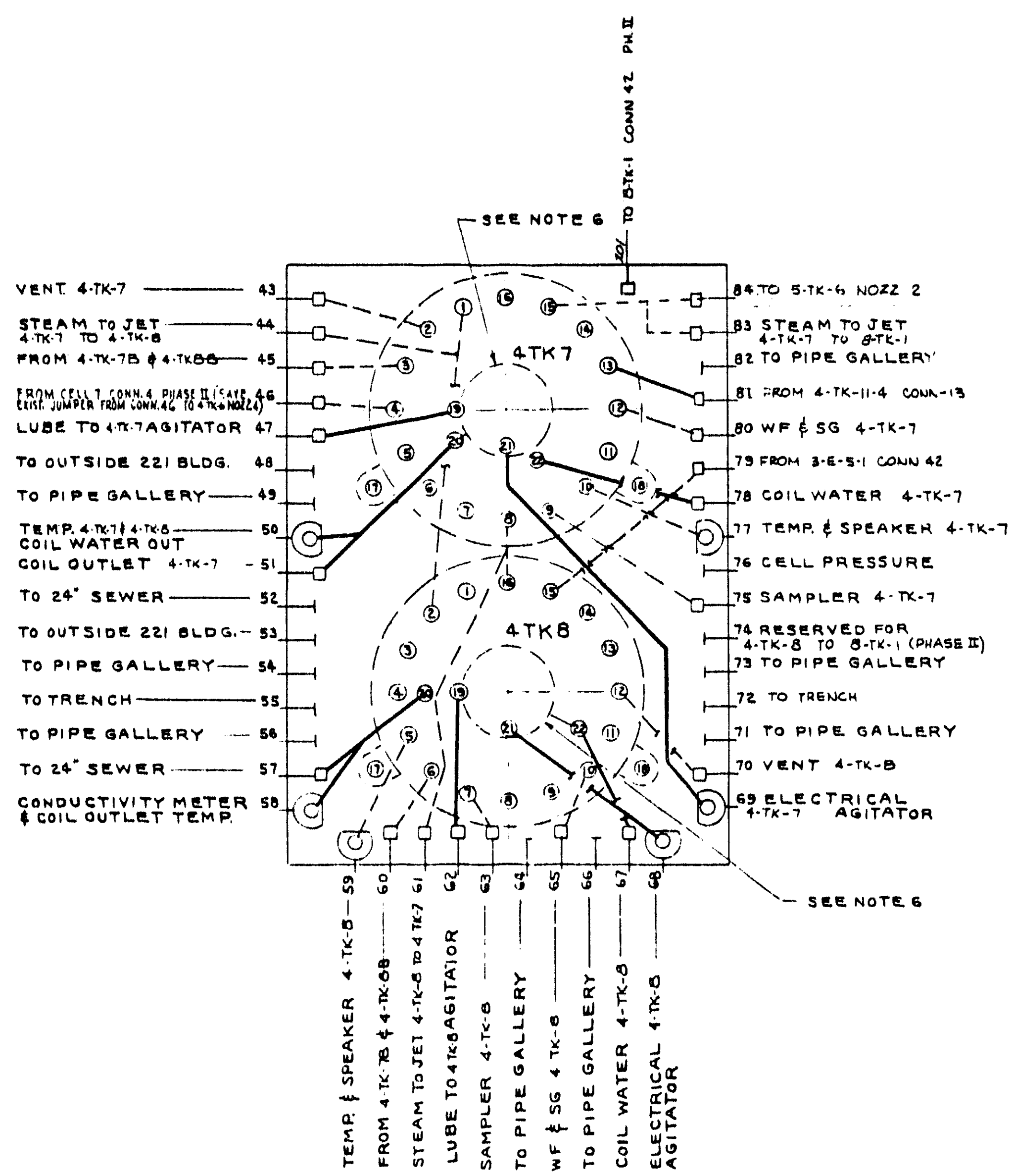
DECLASSIFIED

QTY.	IT. NO.	DESCRIPTION

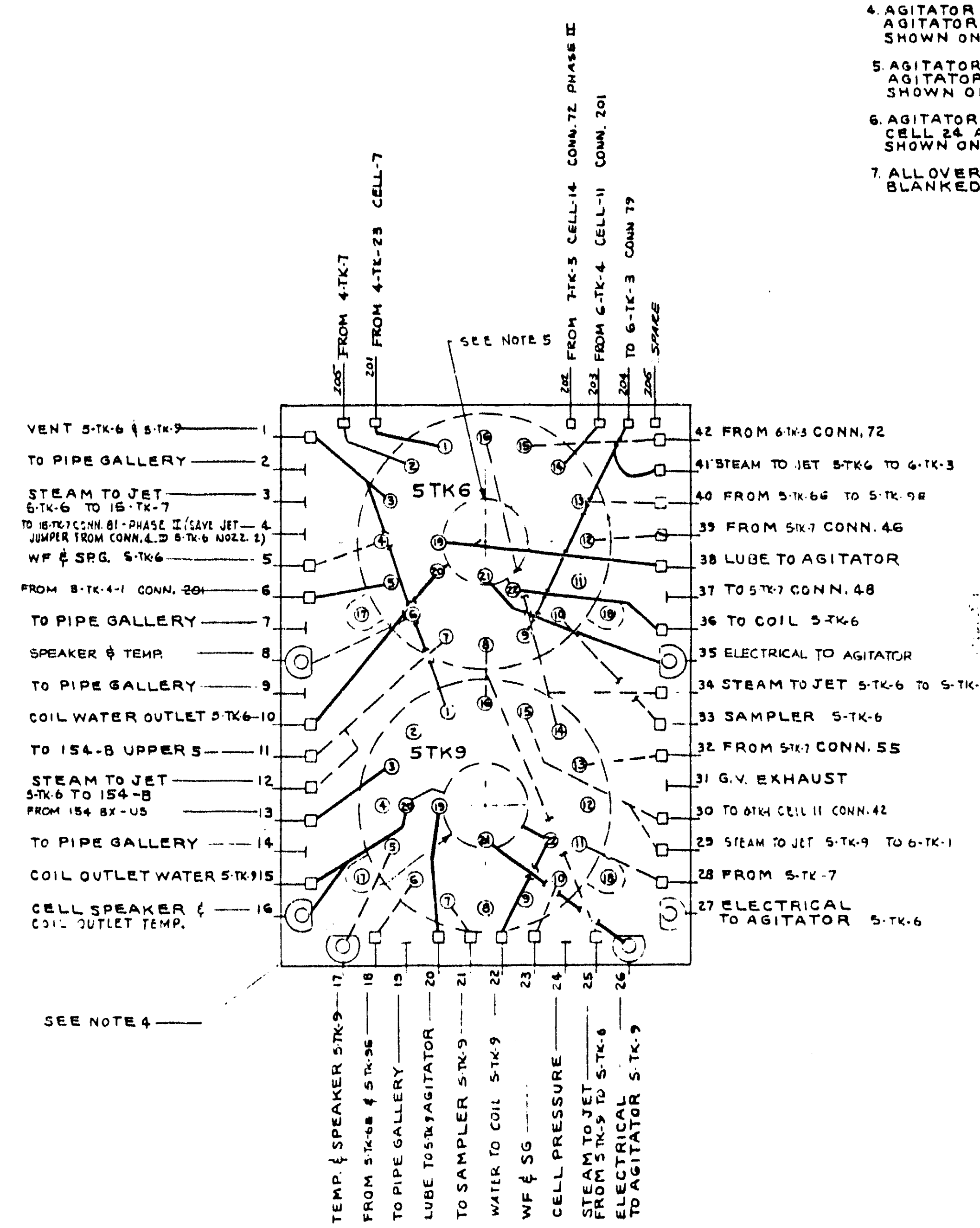
HW-69011
PAGE 32

NOTE

1. SOLID LINES INDICATE NEW EQUIPMENT.
2. DOTTED LINES INDICATE EXISTING EQUIPMENT TO BE USED.
3. ALL EXISTING JUMPERS NEEDED FOR FUTURE USE ARE TO BE REMOVED & STORED. UNUSED NOZZLES ON TANKS TO BE BLANKED FOR VENTILATION SEAL. LINES TO PIPE GALLERY NOT BEING USED TO BE BLANKED IN PIPE GALLERY. JUMPERS IN HOT PIPE TRENCH NOT BEING USED ARE TO BE RETAINED IN POSITION
4. AGITATOR TO BE MOVED FROM 16-TK-4 CELL 31. AGITATOR TO BE MODIFIED FOR COOLING COIL AS SHOWN ON ARRGT II DRAWING SK-2-18634
5. AGITATOR TO BE MOVED FROM 17-TK-4 CELL 33. AGITATOR TO BE MODIFIED FOR COOLING COIL AS SHOWN ON ARRGT. II DRAWING SK-2-18634
6. AGITATORS TO BE MOVED FROM 12-TK-7 & 12-TK-8 CELL 24 AND MODIFIED FOR COOLING COILS AS SHOWN ON ARRANGEMENT II DRAWING SK-2-18634
7. ALL OVERFLOW LINES ON EXISTING TANKS TO BE BLANKED FOR VENTILATION SEAL.



PLAN
SECTION 4 CELL 8



PLAN
SECTION 5 CELL 9

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

SCOPE

DWG. NO.	DRAWING TITLE
BPF 71555	AGITATOR
D-62070	8'-0" X 14'-0" HIGH TANK DETAIL
HW-72858	8'-0" X 14'-0" HIGH TANK ARRGT.

REFERENCE DRAWINGS

NO.	DESCRIPTION	REV BY DATE	APP'D BY	FOR	DATE

REVISIONS

CLASSIFICATION: NONE
CLASSIFIED BY: [signature] DATE 2-16-61

DWG. NO. SK-2-18633 | - | - | 0

SCALE:
DRAWN NOLAND DATE 2-15-61
CHECKED [signature] DATE 2-16-61
ISSUED [signature]
DES. ENG. [signature] UNIT FD & D
APPROVALS: [signatures]
SHOP NO. 1837
PROJECT NO. CG-0897

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

FISSION PRODUCTS RECOVERY
CELL ARRANGEMENT
ONE LINE DIAGRAM
SECTIONS 4 & 5 CELLS 8 & 9
PHASE I

BLDG. NO. 221-B
INDEX NUMBER 8404.01
DWG. NO. SK-2-18633 | - | -

NOTES CONT'D.

1. ALL OVERFLOW LINES ON EXISTING TANKS TO BE BLANKED FOR VENTILATION SEAL.

HW-69011
PAGE

DECLASSIFIED

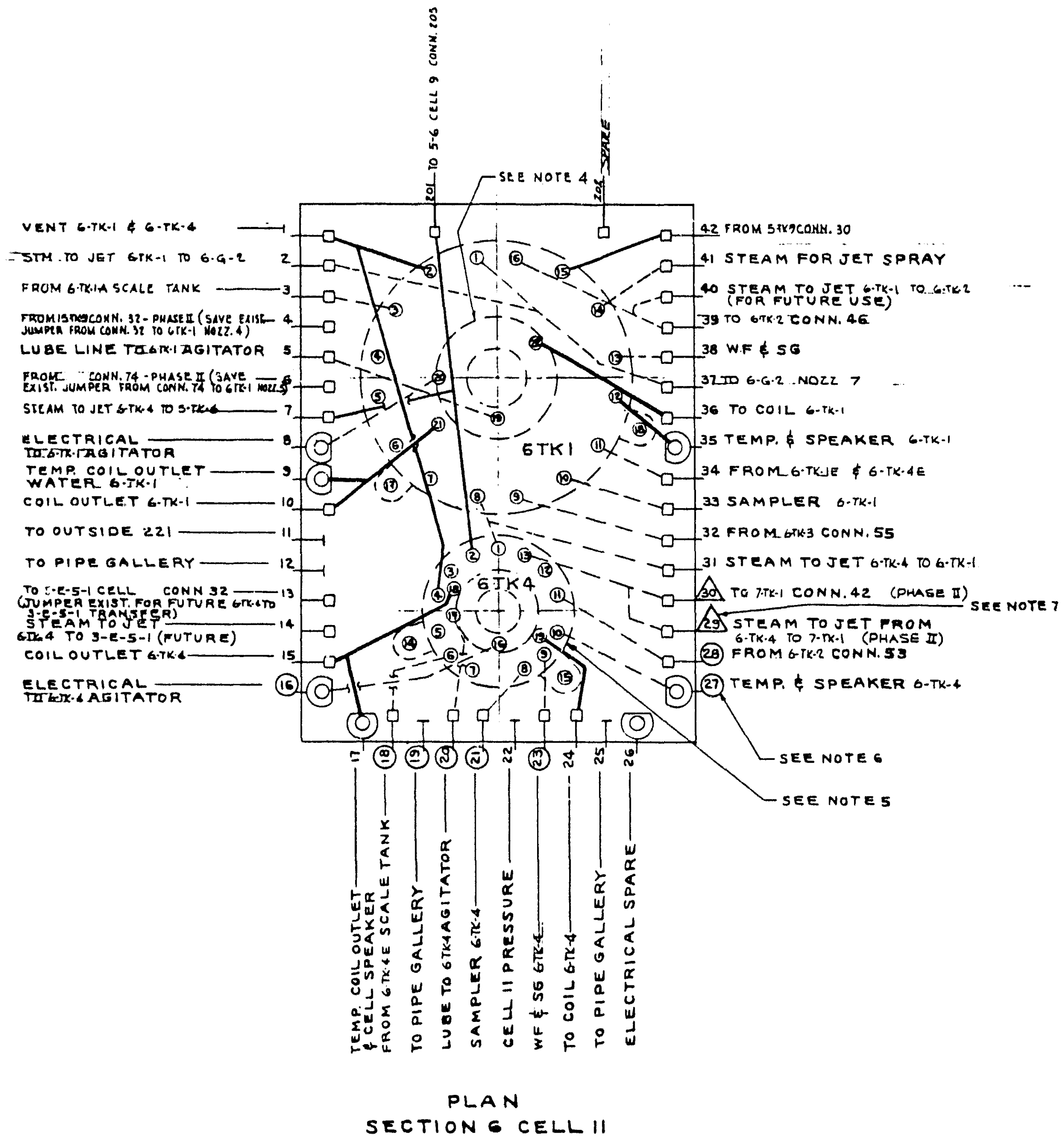
QTY.		DESCRIPTION

NOTES

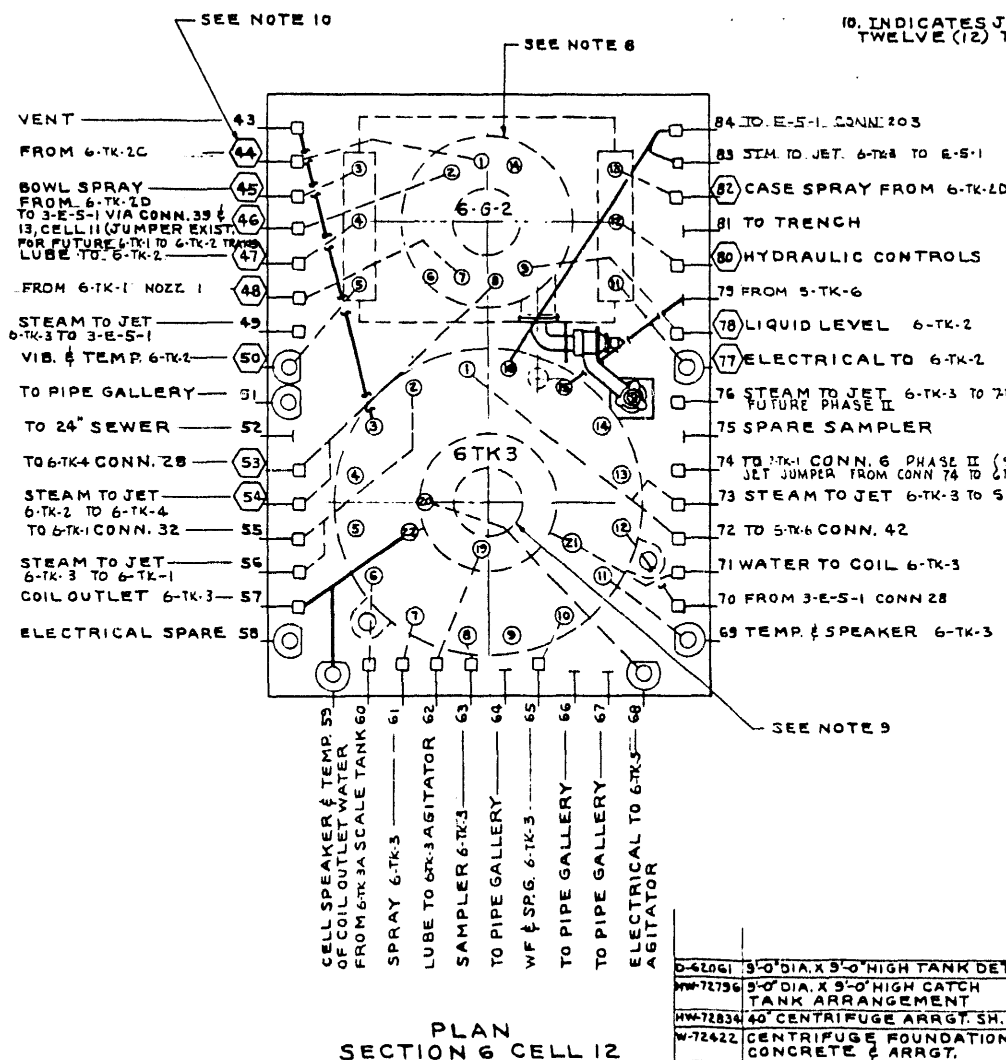
1. SOLID LINES INDICATE NEW EQUIPMENT.
2. DOTTED LINES INDICATE EXISTING EQUIPMENT TO BE USED.
3. ALL EXISTING JUMPERS NEEDED FOR FUTURE USE ARE TO BE REMOVED AND STORED. UNUSED NOZZLES ON TANKS TO BE BLANKED FOR VENTILATION SEAL. LINES TO PIPE GALLERY NOT BEING USED TO BE BLANKED IN PIPE GALLERY. JUMPERS IN HOT PIPE TRENCH NOT BEING USED ARE TO BE RETAINED IN POSITION.
4. AGITATOR TO BE MOVED FROM 10-TK-1 CELL 19 COOLING COIL TO BE REMOVED FROM 16-TK-3 CELL 32. AGITATOR AND COIL TO BE MODIFIED AS SHOWN ON ARRANGEMENT I DRAWING SK-2-18634.
5. 14-TK-4 WITH AGITATOR CELL 27 TO BE MOVED TO 6-TK-4 POSITION CELL 11. AGITATOR TO BE MODIFIED FOR COOLING COILS AS SHOWN ON ARRANGEMENT III DRAWING SK-2-18634.
6. INDICATES JUMPERS TO BE MOVED FROM CELL 27 SEVEN (7) TO BE MOVED.
7. INDICATES JUMPERS TO BE MOVED FROM CELL 19 ONE (1) TO BE MOVED.
8. CENTRIFUGE 14-G-2 CELL 28 TO BE MOVED TO 6-G-2 POSITION CELL 12.
9. AGITATOR EXISTING IN 6-TK-3 CELL 12. COOLING COILS TO BE REMOVED FROM 14-TK-3 CELL 28. AGITATOR AND COILS TO BE MODIFIED AS SHOWN ON ARRANGEMENT I DRAWING SK-2-18634.
10. INDICATES JUMPERS TO BE MOVED FROM CELL 28 TWELVE (12) TO BE MOVED.

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

SCOPE



PLAN
SECTION 6 CELL 11



PLAN
SECTION 6 CELL 12

DWG. NO.	REFERENCE DRAWINGS
D-42061	5'-0" DIA. X 5'-0" HIGH TANK DET.
HW-72796	5'-0" DIA. X 5'-0" HIGH CATCH TANK ARRANGEMENT
HW-72834	40" CENTRIFUGE ARRGT. SH. 1
HW-72422	CENTRIFUGE FOUNDATION CONCRETE & ARRGT.
HW-72888	40" CENTRIFUGE ARRANGEMENT
BPF-71595	AGITATORS
HW-72453	4'-6" DIA. X 7'-0" HIGH TANK ARRANGEMENT
HW-72493	5'-0" X 5'-0" HIGH PRECIPITATOR ARRANGEMENT

REVISIONS

CLASSIFICATION: NONE

DWG. NO. SK-2-18632 - - 0

PROJECT CG-0857

1837

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

FISSION PRODUCTS RECOVERY
CELL ARRANGEMENT
ONE LINE DIAGRAM
SECTION 6 CELLS 11 & 12
PHASE I

221-B 8404.01

SK-2-18632

54--6000--0(`2

CHEMICAL PROCESSING DEPARTMENT
GENERAL ELECTRIC
RICHLAND, WASHINGTON

August 8, 1961

To: Distribution

From: H. L. Caudill HLC

PROJECT CGC-897

References: (1) HW-69011, "Project CGC-897 - Title I Design Fission Product Storage in B-Plant," by HL Caudill and LL Zahn, dated April 3, 1961.

(2) HW-69959, "Process and Detail Design Criteria - Heat Transfer Coil Installation Chemical Processing Department," by JB Fecht, dated June 16, 1961.

A copy of revised scope drawing SK-2-18634 is attached. This drawing should replace Page 30 of Reference 1 and become a part thereof.

The typical coil and agitator arrangements II and III were revised as a result of the recently published coil design criteria, Reference 2, to provide a cooling system of greater integrity.

HL Caudill llm

Distribution: AT Gifford (3) AEC-HOO
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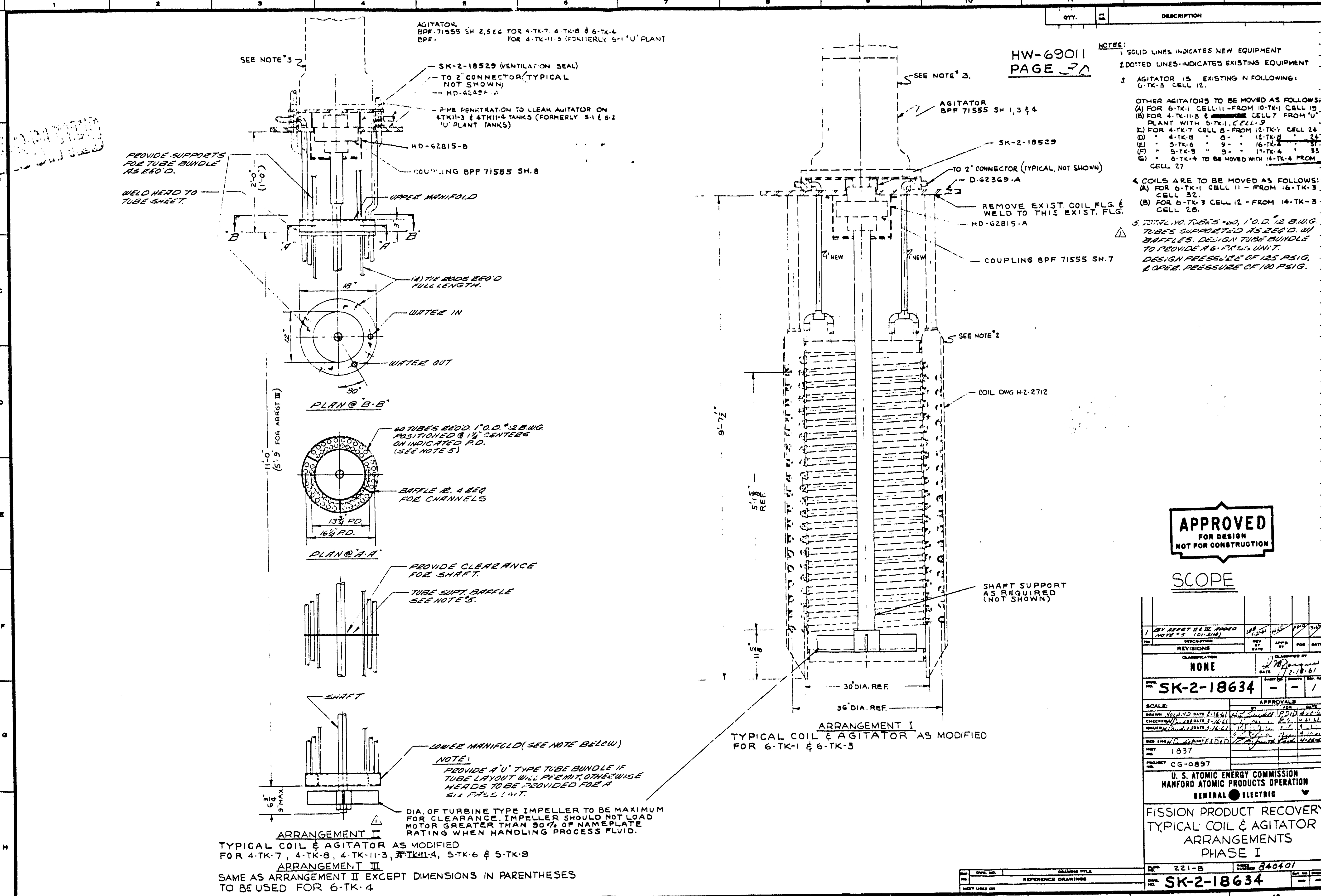
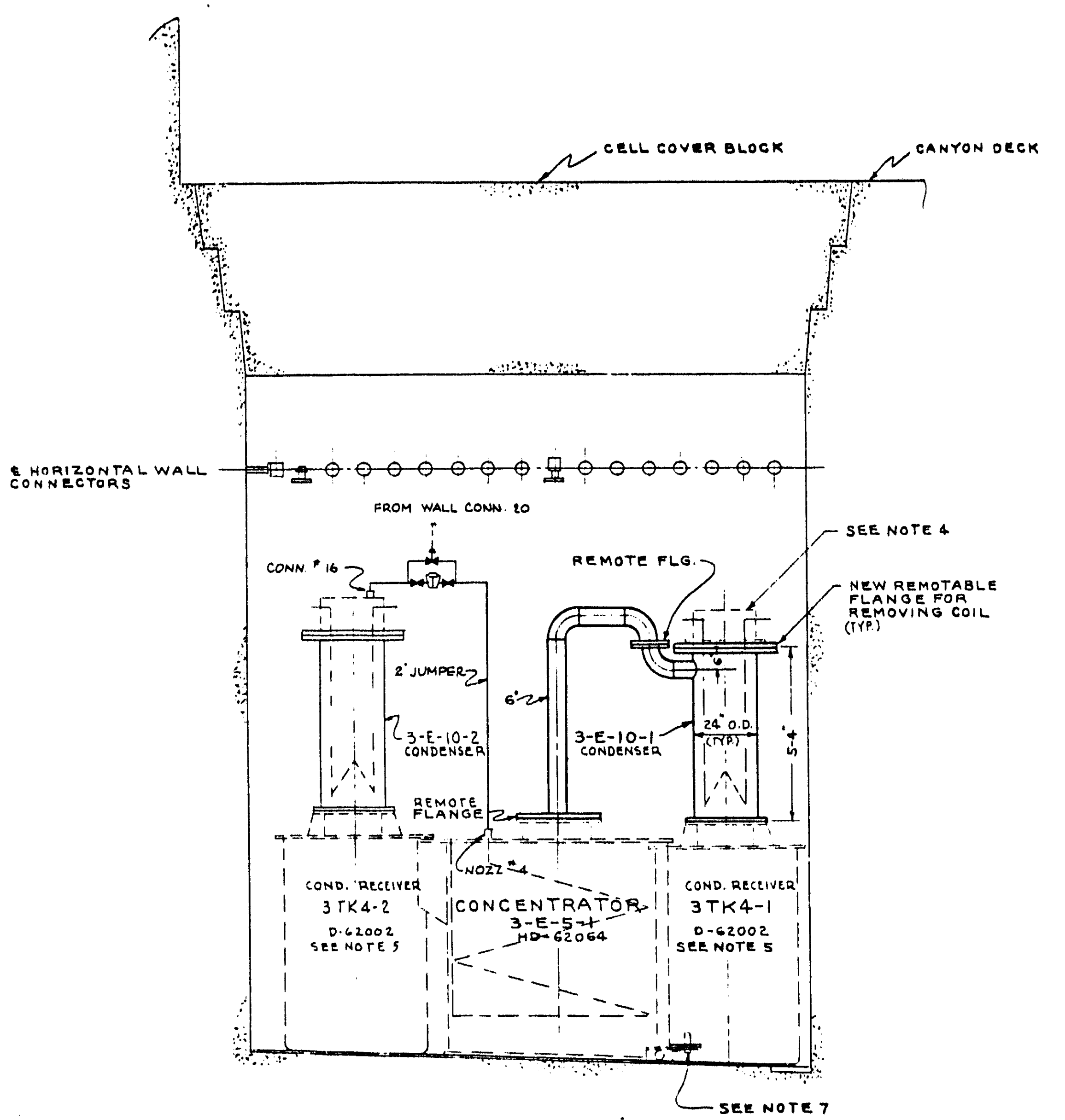
Extras (5)

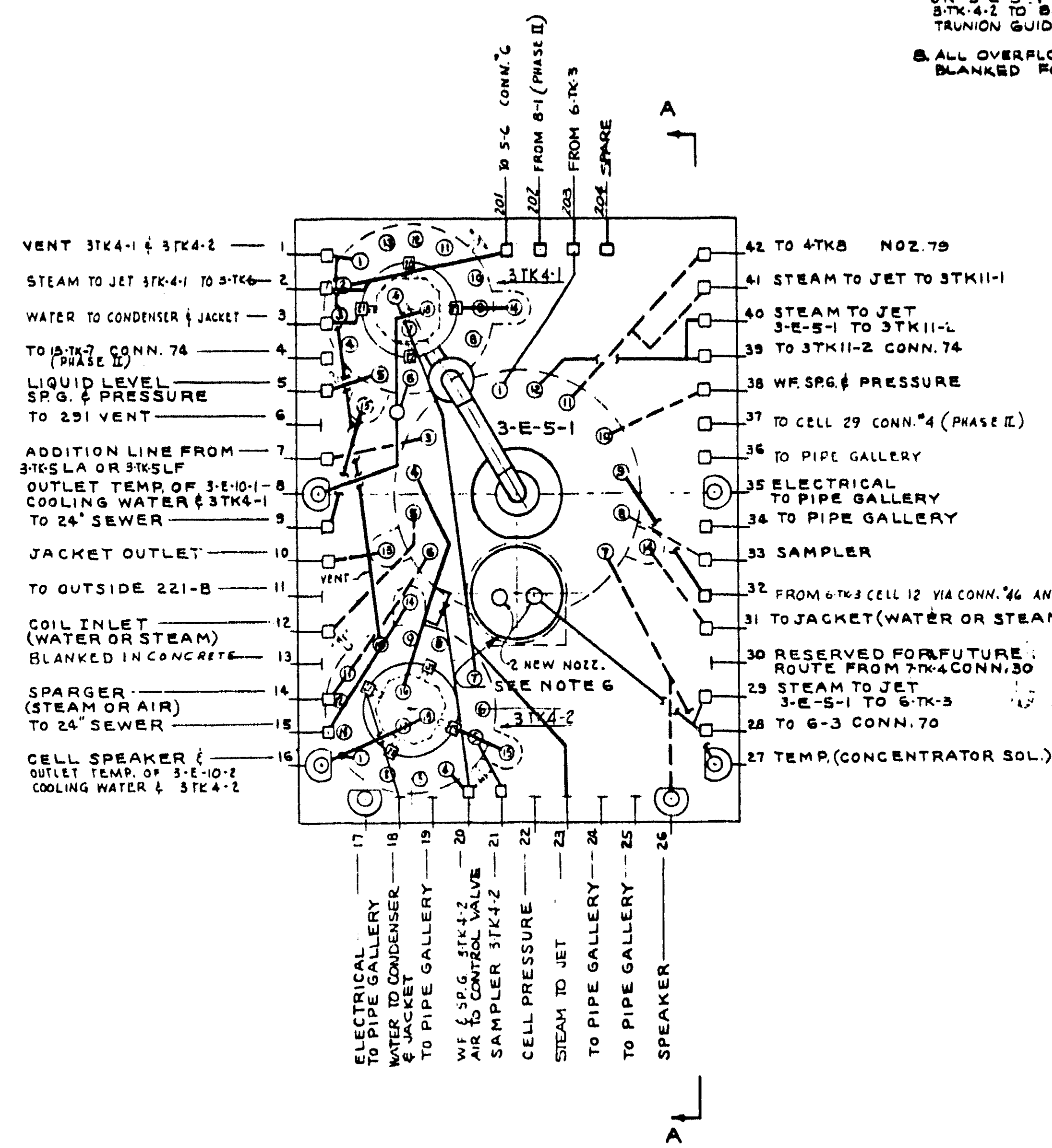

HW-69011
PAGE 35
AGITATOR
BPF-71555 SH 2,5 & 6 FOR 4-TK-7, 4-TK-8 & 6-TK-4
BPF- FOR 4-TK-11-3 (FORMERLY 5-1 "U" PLANT
SEE NOTE 3
SK-2-18529 (VENTILATION SEAL)
TO 2" CONNECTOR (TYPICAL NOT SHOWN)
HD-62491-A
PIPE PENETRATION TO CLEAR AGITATOR ON 4TKII-3 & 4TKII-4 TANKS (FORMERLY 5-1 & 5-2 'U' PLANT TANKS)
HD-62815-B
COUPLING BPF 71555 SH.8
PROVIDE SUPPORTS FOR TUBE BUNDLE AS REQ'D.
WELD HEAD TO TUBE SHEET.
UPPER MANIFOLD
(4) TIE RODS REQ'D FULL LENGTH.
WATER IN
WATER OUT
PLAN @ "B-B"
60 TUBES REQ'D. 1" O.D. #12 B.W.G. POSITIONED @ 1¼" CENTERS ON INDICATED P.D. (SEE NOTE 5)
BAFFLE PL. 4 REQ. FOR CHANNELS
13¾" P.D.
16¼" P.D.
PLAN @ "A-A"
11'-0" (5'-9" FOR ARRGT III)
PROVIDE CLEARANCE FOR SHAFT.
TUBE SUPT. BAFFLE SEE NOTE 5.
SHAFT
LOWER MANIFOLD (SEE NOTE BELOW)
NOTE: PROVIDE A 'U' TYPE TUBE BUNDLE IF TUBE LAYOUT WILL PERMIT, OTHERWISE HEADS TO BE PROVIDED FOR A SIX PASS UNIT.
DIA. OF TURBINE TYPE IMPELLER TO BE MAXIMUM FOR CLEARANCE. IMPELLER SHOULD NOT LOAD MOTOR GREATER THAN 90% OF NAMEPLATE RATING WHEN HANDLING PROCESS FLUID.
ARRANGEMENT II
TYPICAL COIL & AGITATOR AS MODIFIED FOR 4-TK-7, 4-TK-8, 4-TK-11-3, 4-TK-11-4, 5-TK-6 & 5-TK-9
ARRANGEMENT III
SAME AS ARRANGEMENT II EXCEPT DIMENSIONS IN PARENTHESES TO BE USED FOR 6-TK-4
SEE NOTE 3.
AGITATOR BPF 71555 SH 1,3 & 4
SK-2-18529
TO 2" CONNECTOR (TYPICAL, NOT SHOWN)
D-62369-A
REMOVE EXIST. COIL FLG. & WELD TO THIS EXIST. FLG.
HD-62815-A
COUPLING BPF 71555 SH.7
NEW
SEE NOTE 2
COIL DWG H-2-2712
9'-7½"
5'-1⅝" REF.
SHAFT SUPPORT AS REQUIRED (NOT SHOWN)
30" DIA. REF.
36" DIA. REF.
ARRANGEMENT I
TYPICAL COIL & AGITATOR AS MODIFIED FOR 6-TK-1 & 6-TK-3
NOTES:
1. SOLID LINES INDICATES NEW EQUIPMENT
2. DOTTED LINES-INDICATES EXISTING EQUIPMENT
3. AGITATOR IS EXISTING IN FOLLOWING: 6-TK-3 CELL 12.
OTHER AGITATORS TO BE MOVED AS FOLLOWS:
(A) FOR 6-TK-1 CELL-11 - FROM 10-TK-1 CELL 19
(B) FOR 4-TK-11-3 & [redacted] CELL 7 FROM "U" PLANT WITH 5-TK-1, CELL-9
(C) FOR 4-TK-7 CELL 8 - FROM 12-TK-7 CELL 24
(D) " 4-TK-8 " 8 - " 12-TK-8 " 24
(E) " 5-TK-6 " 9 - " 16-TK-4 " 31
(F) " 5-TK-9 " 9 - " 17-TK-4 " 33
(G) " 6-TK-4 TO BE MOVED WITH 14-TK-4 FROM CELL 27
4. COILS ARE TO BE MOVED AS FOLLOWS:
(A) FOR 6-TK-1 CELL 11 - FROM 16-TK-3 CELL 32.
(B) FOR 6-TK-3 CELL 12 - FROM 14-TK-3 CELL 28.
5. TOTAL NO. TUBES = 60, 1" O.D. 12 B.W.G. TUBES SUPPORTED AS REQ'D. W/ BAFFLES. DESIGN TUBE BUNDLE TO PROVIDE A 6-PASS UNIT. DESIGN PRESSURE OF 125 PSIG, & OPER. PRESSURE OF 100 PSIG.
APPROVED FOR DESIGN NOT FOR CONSTRUCTION
SCOPE
1 REV ARRGT II & III ADDED NOTE 5 (DI-2118)
REVISIONS
CLASSIFICATION NONE
DWG. NO. SK-2-18634
APPROVALS
INST. NO. 1837
PROJECT NO. CG-0897
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
FISSION PRODUCT RECOVERY TYPICAL COIL & AGITATOR ARRANGEMENTS PHASE I
BLDG. NO. 221-B
INDEX NUMBER 840401
DWG. NO. SK-2-18634
REFERENCE DRAWINGS

NOTES:

1. SOLID LINES INDICATE NEW EQUIPMENT.
2. DOTTED LINES INDICATE EXISTING EQUIPMENT TO BE USED.
3. ALL EXISTING JUMPERS NOT SHOWN IN CELL ARE TO BE REMOVED & STORED. UNUSED NOZZLES ON TANKS TO BE BLANKED FOR VENTILATION SEAL. LINES TO PIPE GALLERY NOT BEING USED TO BE BLANKED IN PIPE GALLERY. JUMPERS IN HOT PIPE TRENCH NOT BEING USED ARE TO BE RETAINED IN POSITION
4. COIL TO BE REMOVED FROM 3-E-5-1 DISSOLVER COLUMN. COIL & COLUMN SHOWN ON B PLANT DETAIL DRAWING D-62063.
5. 750 GAL. TANKS TO BE MOVED FROM CELL 24 & MODIFIED AS NEEDED TO FIT NEW POSITION. NEW NUMBERS GIVEN TANKS ARE 3-TK-4-1 & 3-TK-4-2
6. PRESENT DISSOLVER CHARGING OPENING TO BE SEALED COMPLETELY LEAKPROOF.
7. 3TK4-1 TO BE POSITIONED BY DOWELS MOUNTED ON 3-E-5-1 TRUNNION GUIDE FRAME. 3-TK-4-2 TO BE POSITIONED BY MODIFYING TO USE EXISTING TRUNION GUIDES.
8. ALL OVERFLOW LINES ON EXISTING TANKS TO BE BLANKED FOR VENTILATION SEAL.



ELEVATION A-A



PLAN

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

SCOPE

DWG. NO.	DRAWING TITLE
D-62063	CONDENSER TOWER
D-62064	DISSOLVER TANK
D-62002	4'-6" X 7'-0" TANK
HW-71184	DISSOLVER & COLUMN ARRANGEMENT BLDG. 221

REFERENCE DRAWINGS

NEXT USED ON

REVISIONS

CLASSIFICATION: NONE — CLASSIFIED BY: [signature] DATE 12-8-61

DWG. NO. SK-2-18631 — — 0

SCALE:
DRAWN NOLAND DATE 2-10-61
CHECKED [signature] DATE 3-16-61
ISSUED [signature] DATE 3-16-61
DES. ENG. [signature] DATE 3-16-61
DEPT. NO. 1857
PROJECT NO. CG-0897

APPROVALS: [signatures] PD&C 4-20-61; 4-11-61; 4-11-61; 4-11-61; 4-28-61

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

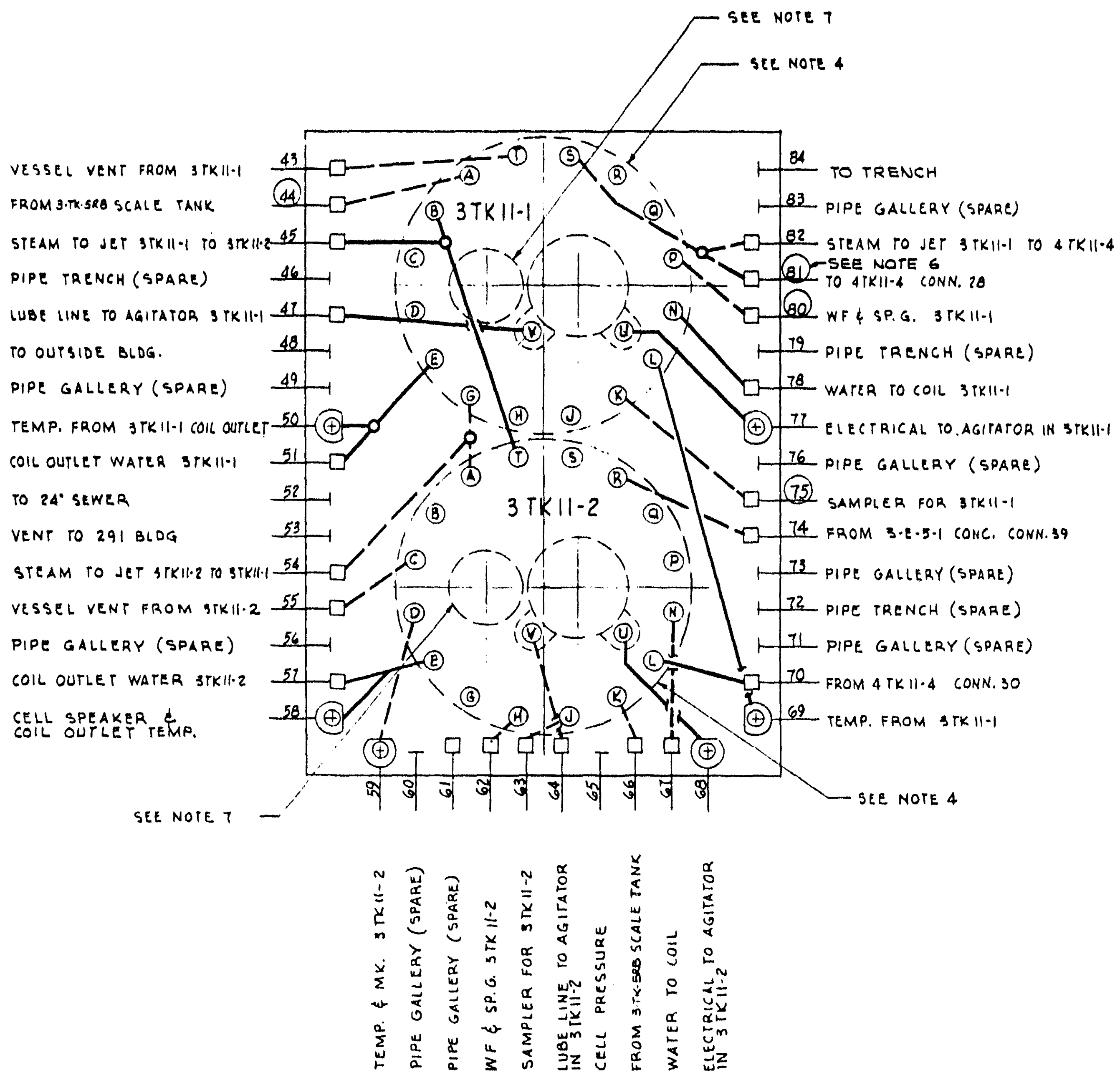
FISSION PRODUCTS RECOVERY
CELL ARRANGEMENT
ONE LINE DIAGRAM
SECTION 3 CELLS
PHASE I

BLDG. NO. 221-B — INDEX NUMBER 8404.01

DWG. NO. SK-2-18631 — —

DECLASSIFIED

HW-69011
PAGE ...



QTY.		DESCRIPTION

NOTES:

1. SOLID LINES INDICATE NEW EQUIPMENT.
2. DASHED LINES INDICATE EXISTING EQUIPMENT.
3. ALL EXISTING JUMPERS NEEDED FOR FUTURE USE ARE TO BE REMOVED AND STORED, UNUSED NOZZLES ON TANKS TO BE BLANKED FOR VENTILATION SEAL. LINES TO PIPE GALLERY NOT BEING USED TO BE BLANKED IN PIPE GALLERY. JUMPERS IN HOT PIPE TRENCH NOT BEING USED ARE TO BE RETAINED IN POSITION.
4. 5,000 GAL. "U" PLANT TANKS 6TK-7 & 7-TK-7 TO BE MOVED TO "B" PLANT AND ASSIGNED NEW NUMBERS 3TK11-1 & 3TK11-2 RESPECTIVELY. ALL JUMPERS SHOWN AS EXISTING AND AGITATORS ARE IN "U" PLANT AND ARE TO BE MOVED WITH TANKS.
5. AGITATORS TO BE MODIFIED FOR INSTALLATION OF COOLING COILS AS SHOWN ON ARRANGEMENT II DWG. SK-2-18634
6. INDICATES JUMPERS FROM "U" PLANT 7-TK-6 TANK. FOUR (4) TO BE MOVED.
7. PUMP OPENINGS TO BE SEALED.
8. ALL OVERFLOW LINES ON TANKS TO BE BLANKED FOR VENTILATION SEAL.

SCOPE

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

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

CLASSIFICATION: NONE — CLASSIFIED BY D.M. Jacques, DATE 6-15-61

DWG. NO. SK-2-18623 — SHEET NO. – — REV. NO. 0

SCALE:

		APPROVALS BY	FOR	DATE
DRAWN	NOLAND DATE 2-8-61		P.D.D.	4-21-61
CHECKED	H. Crandall DATE 3-16-61			4-21-61
ISSUED	H. Crandall DATE 3-16-61			4-21-61
DES. ENGR.	H. Crandall			4-21-61
				4-20-61

INST. NO. 1857

PROJECT NO. CGC-897

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

FISSION PRODUCTS RECOVERY
CELL ARRANGEMENT
ONE LINE DIAGRAM
SECTION 3 CELL 6
(PHASE I)

DWG. NO.	DRAWING TITLE
SK-2-18614	HOT PIPE TRENCH - SCHEMATIC PHASE I

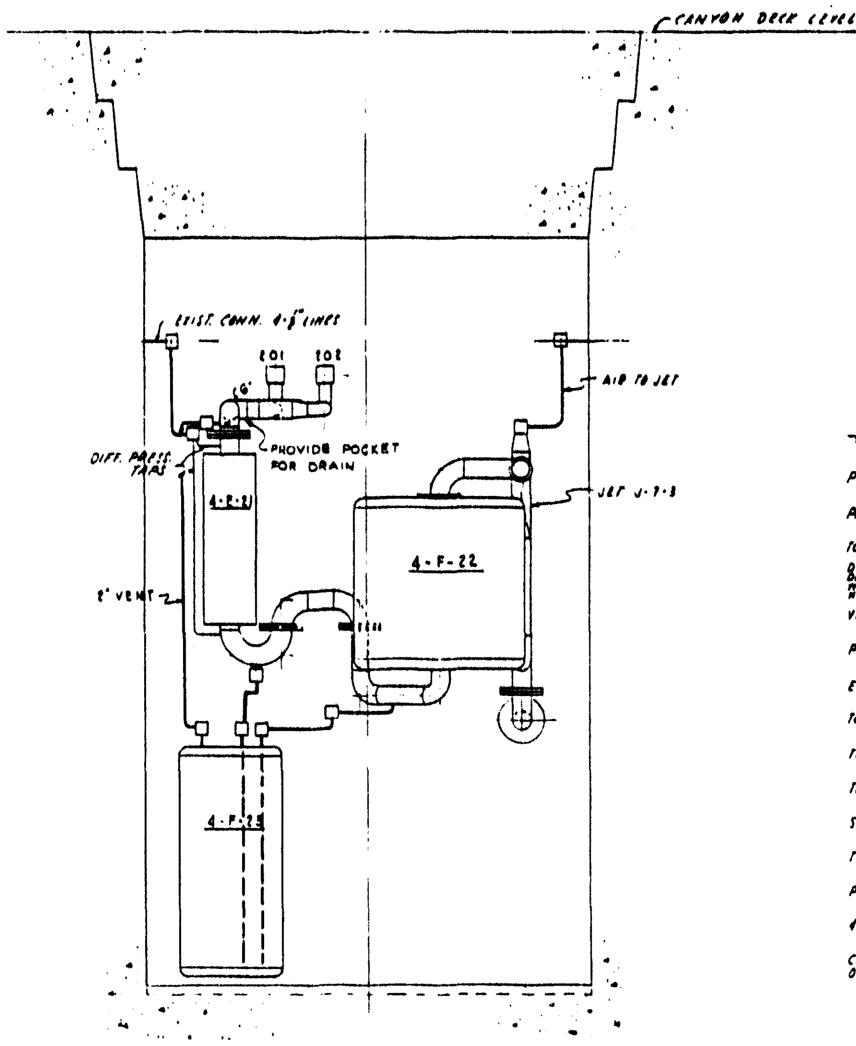
REFERENCE DRAWINGS

NEXT USED ON

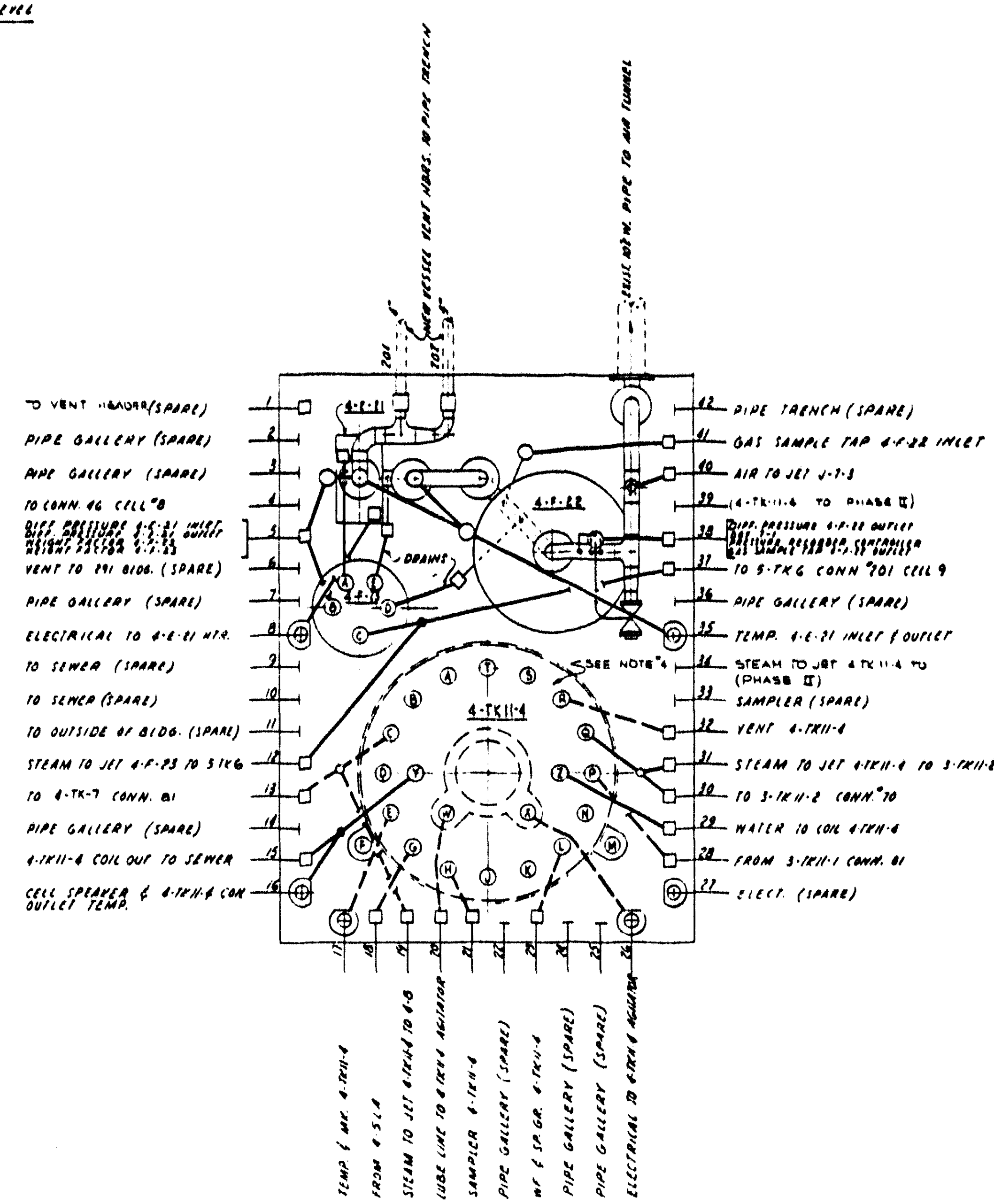
BLDG. 221-B — 8404.01

DWG. NO. SK-2-18623

HW-69011
PAGE:



VESSEL VENT SYSTEM DRAIN



PLAN
SECTION 4 CELL 7

NOTES:
1. SOLID LINES INDICATE NEW JUMPERS & EQUIPMENT.
2. DOTTED LINES INDICATE EXISTING OR FUTURE JUMPERS & EQUIP.
3. ALL EXIST. JUMPERS NEEDED FOR FUTURE USE ARE TO BE REMOVED AND STORED. NOZZLES ON TANKS TO BE BLANKED FOR VENTILATION SEAL. LINES TO PIPE GALLERY NOT BEING USED, ARE TO BE BLANKED IN PIPE GALLERY.
4. 5,000 GAL. 'U' PLANT TANK G-7, TO BE MOVED TO 'B' PLANT. ALL JUMPERS SHOWN AS EXISTING ARE IN 'U' PLANT & ARE TO BE MOVED WITH TANKS. AGITATORS ARE ALSO TO BE MOVED WITH TANKS.
5. AGITATORS TO BE MODIFIED FOR INSTALLATION OF COOLING COILS AS SHOWN ON ARRANGEMENT II DWG. SK-2-18634
6. PUMP OPENINGS TO BE SEALED.
7. ALL OVERFLOW LINES ON EXIST. TANKS TO BE BLANKED FOR VENTILATION SEAL.

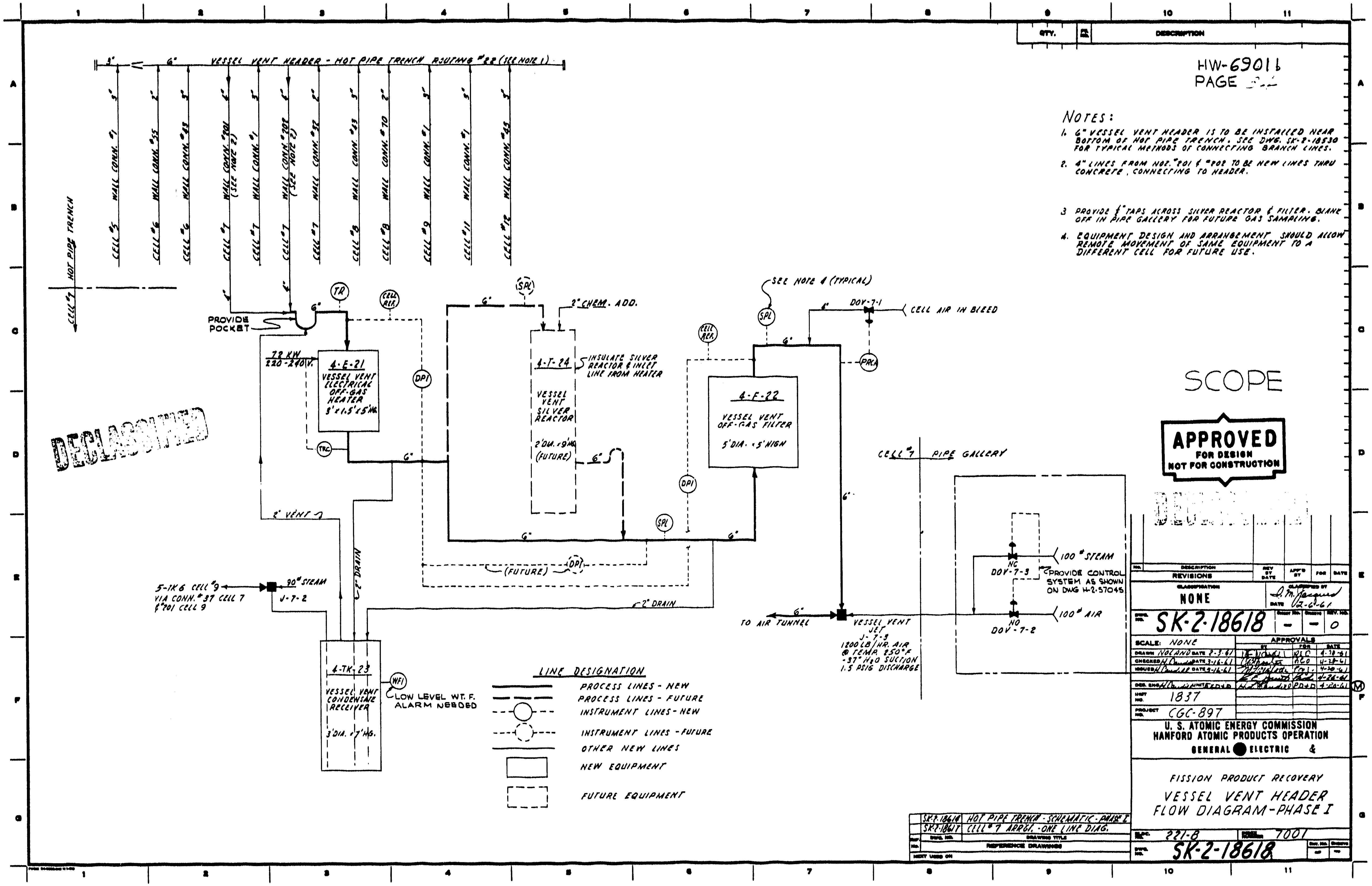
SCOPE

SK-2-18617

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

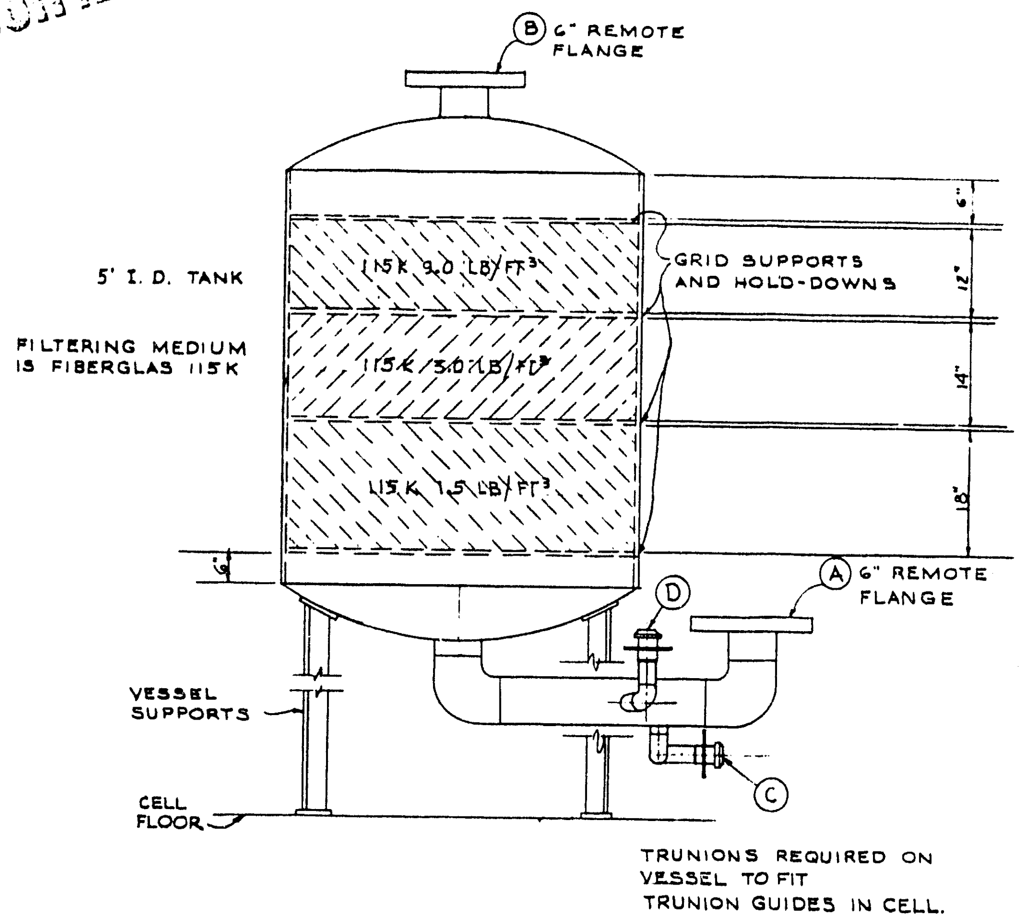
FISSION PRODUCTS RECOVERY
CELL ARRANGMENT
ONE LINE DIAGRAM
SECTION 4 CELL 7 - PHASE I

SCALE NONE
NOLAND
CGC-897 | 897
CLASSIFICATION NONE
221-B | 8404-01
SK-2-18617 - -


HW-69016
PAGE
VESSEL VENT HEADER - HOT PIPE TRENCH ROUTING #22 (SEE NOTE 1)
NOTES:
1. 6" VESSEL VENT HEADER IS TO BE INSTALLED NEAR BOTTOM OF HOT PIPE TRENCH. SEE DWG. SK-2-18530 FOR TYPICAL METHODS OF CONNECTING BRANCH LINES.
2. 4" LINES FROM NOZ. #201 & #202 TO BE NEW LINES THRU CONCRETE, CONNECTING TO HEADER.
3. PROVIDE ½" TAPS ACROSS SILVER REACTOR & FILTER. BLANK OFF IN PIPE GALLERY FOR FUTURE GAS SAMPLING.
4. EQUIPMENT DESIGN AND ARRANGEMENT SHOULD ALLOW REMOTE MOVEMENT OF SAME EQUIPMENT TO A DIFFERENT CELL FOR FUTURE USE.
CELL #5 WALL CONN. #1
CELL #6 WALL CONN. #55
CELL #6 WALL CONN. #43
CELL #7 WALL CONN. #201 (SEE NOTE 2)
CELL #7 WALL CONN. #1
CELL #7 WALL CONN. #202 (SEE NOTE 2)
CELL #7 WALL CONN. #37
CELL #8 WALL CONN. #23
CELL #8 WALL CONN. #70
CELL #9 WALL CONN. #1
CELL #11 WALL CONN. #1
CELL #12 WALL CONN. #43
CELL #7 HOT PIPE TRENCH
PROVIDE POCKET
TR
CELL REF.
72 KW 220-240 V.
4-E-21 VESSEL VENT ELECTRICAL OFF-GAS HEATER 3'x1.5'x5'HG.
TRC
DPI
SPL
2" CHEM. ADD.
4-T-24 VESSEL VENT SILVER REACTOR 2'DIA. x 9'HG. (FUTURE)
INSULATE SILVER REACTOR & INLET LINE FROM HEATER
SEE NOTE 4 (TYPICAL)
DOV-7-1
CELL AIR IN BLEED
PRCA
4-F-22 VESSEL VENT OFF-GAS FILTER 5'DIA. x 5'HIGH
SCOPE
APPROVED FOR DESIGN NOT FOR CONSTRUCTION
DECLASSIFIED
CELL #7 PIPE GALLERY
(FUTURE)
2" VENT
2" DRAIN
5-1K6 CELL #9 VIA CONN. #37 CELL 7 & #201 CELL 9
90# STEAM
J-7-2
100# STEAM
NC DOV-7-3
PROVIDE CONTROL SYSTEM AS SHOWN ON DWG H-2-57045
100# AIR
NO DOV-7-2
TO AIR TUNNEL
VESSEL VENT JET J-7-3 1200 LB/HR. AIR @ TEMP. 250°F -37" H2O SUCTION 1.5 PSIG DISCHARGE
4-TK-23 VESSEL VENT CONDENSATE RECEIVER 3'DIA. x 7'HG.
WFI
LOW LEVEL WT. F. ALARM NEEDED
LINE DESIGNATION
PROCESS LINES - NEW
PROCESS LINES - FUTURE
INSTRUMENT LINES - NEW
INSTRUMENT LINES - FUTURE
OTHER NEW LINES
NEW EQUIPMENT
FUTURE EQUIPMENT
REVISIONS
CLASSIFICATION NONE
SK-2-18618 - - 0
SCALE: NONE
DRAWN NOLAND 2-3-61
1837
PROJECT CGC-897
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
FISSION PRODUCT RECOVERY
VESSEL VENT HEADER FLOW DIAGRAM-PHASE I
SK-2-18616 HOT PIPE TRENCH - SCHEMATIC - PHASE I
SK-2-18617 CELL #7 ARRGT. - ONE LINE DIAG.
REFERENCE DRAWINGS
221-B
7001
SK-2-18618

QTY.	PT. NO.	DESCRIPTION

HW-69011
PAGE ___



SCOPE

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

NOZZLE SCHEDULE

NOZ.	SIZE	FUNCTION
A.	6"	AIR INLET
B.	6"	AIR OUTLET
C.	2"	DRAIN
D.	2"	GAS SAMPLE TAP

DESIGN DATA

OPERATING PRESSURE	13.5 PSIA
DESIGN PRESSURE	2.5 PSIG
OPERATING TEMPERATURE	250° F
DESIGN TEMPERATURE	380° F
FLUID	AIR

NOTES:-
1. MATERIALS OF CONSTRUCTION TO BE SS 304-L
2. FABRICATION TO BE PER HWS-5796 REV. 6
3. NO CORROSION ALLOWANCE.

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

CLASSIFICATION: NONE — CLASSIFIED BY: J. M. Jacques, DATE 2-18-61

DWG. NO. SK-2-18619 — — 0

SCALE: 0 — 1 FT.

		APPROVALS BY	FOR	DATE
DRAWN	HOLAND DATE 2-6-61	H. J. Lauditz	PPD	4-20-61
CHECKED	H. Cauditz DATE 3-16-61		FPD	4-21-61
ISSUED	H. Cauditz DATE 3-16-61		RSO	4-21-61
DES. ENG.	H. Cauditz UNIT F.D.D.		Proj.	4-21-61
INST. NO.	1837			4-26-61
PROJECT NO.	CGC-897			

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

FISSION PRODUCT RECOVERY
VESSEL VENT
OFF-GAS FILTER 4-F-22
(PHASE I)

	DWG. NO.	DRAWING TITLE
1	H-2-7366	UPPER & LOWER FLANGES FOR 6" & 8" NOZ.

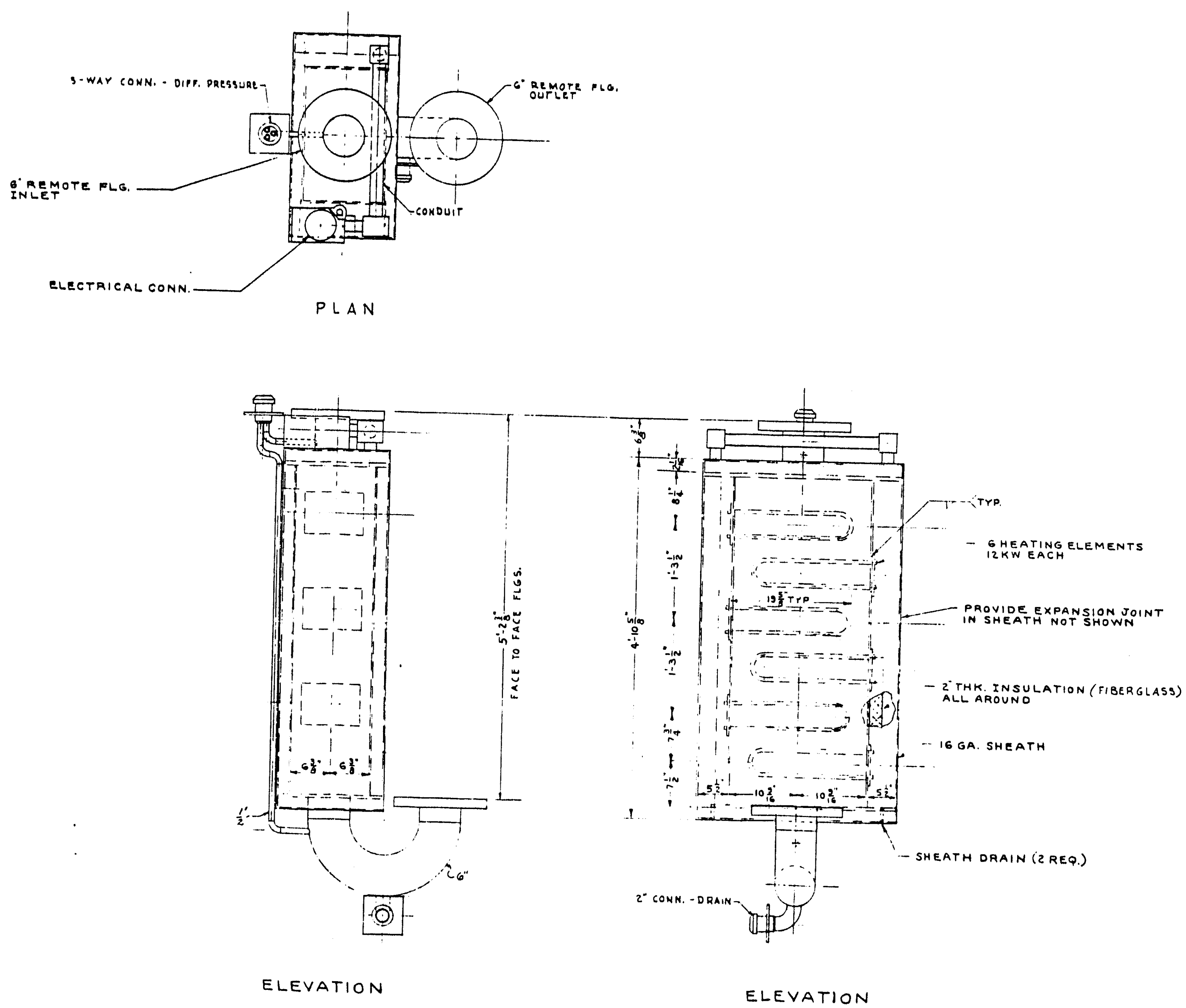
REFERENCE DRAWINGS
NEXT USED ON

BLDG. NO. 221-B — AREA 2500

DWG. NO. SK-2-18619

HW-69011
PAGE

DECLASSIFIED



GENERAL NOTES

1. MATERIAL TO BE 304-L S.ST. EXCEPT CONDUITS.
2. FABRICATION TO BE IN ACCORDANCE WITH SPEC. HWS-5796 REV. 6
3. DESIGN DATA
   - WORKING PRESSURE 1.0 PSIG NEGATIVE
   - WORKING TEMP. 450°F
   - TEST PRESSURE 2.5 P.S.I.G. PNEUMATIC
4. HEATER ELEMENTS TO BE AS SHOWN ON H-2-3422
5. PROCESS DESIGN DATA
   - OPERATING HEAT LOAD 22 KW
   - DESIGN HEAT LOAD 72 KW
   - MAXIMUM VELOCITY GAS 150 FPM
6. ALL ELECTRICAL CONDUIT CONNECTIONS TO BE SEALED. THREADED CONNECTIONS TO BE SEALED WITH GLYPTOL.
7. CONDUITS AND CONDUIT CONNECTIONS MAY BE OF STANDARD MATERIALS COATED WITH AMERCOAT PER MANUFACTURER'S INSTRUCTIONS.

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

SCOPE

REVISIONS

CLASSIFICATION: NONE

DWG. NO. SK-2-18[redacted] REV. NO. 0

SCALE:

DRAWN: NOLAND DATE 3-6-61
CHECKED DATE 3-16-61
ISSUED DATE 3-16-61
DES. ENG. UNIT FID AD
INST. NO. 1837
PROJECT NO. CGC-0897

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

FISSION PRODUCTS RECOVERY
VESSEL VENT
OFF-GAS HEATER 4-E-21
(PHASE I)

REFERENCE DRAWINGS: H-2-3422 DISSOLVER GAS HEATER ELEMENT

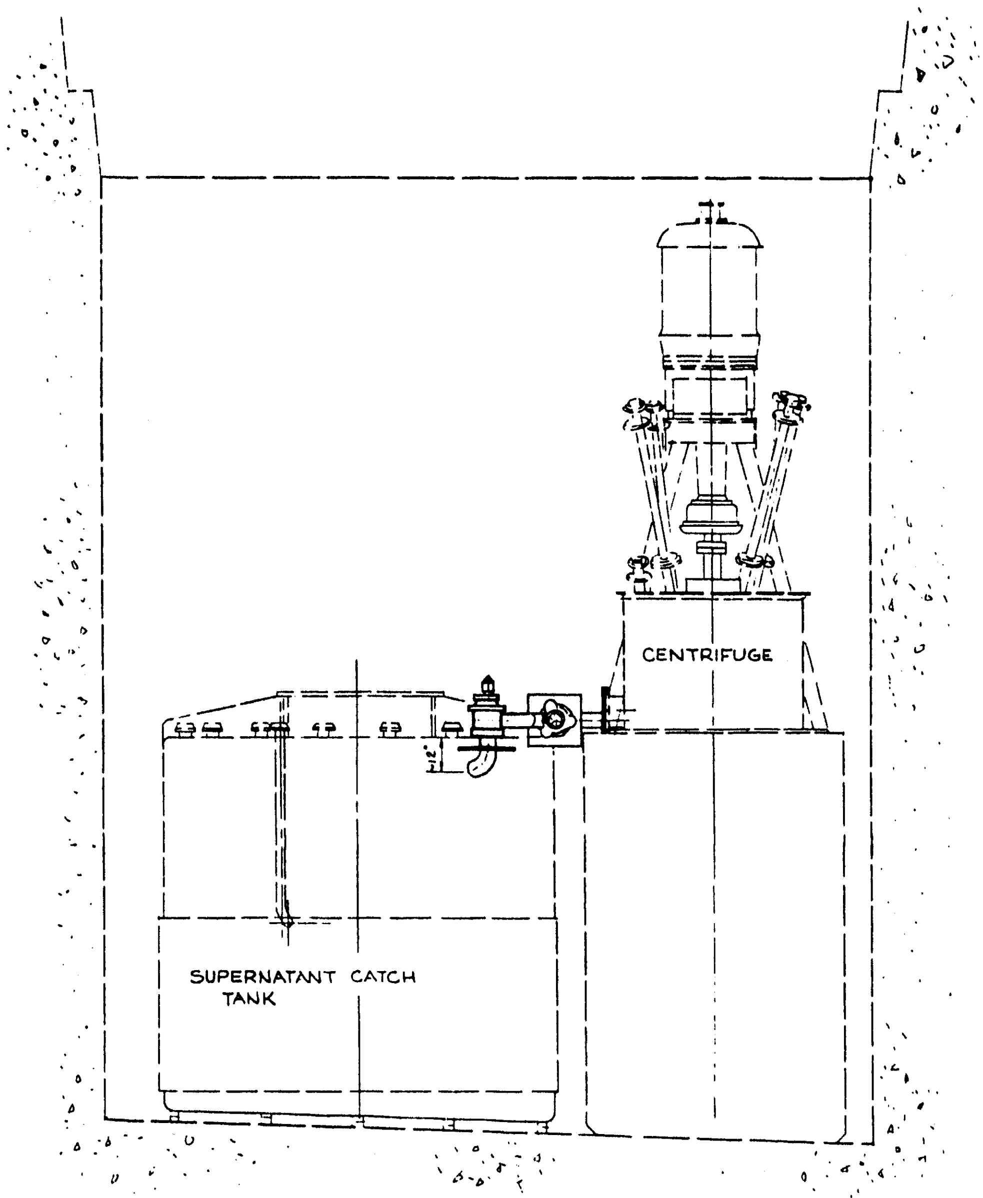
BLDG. NO. 221-B INDEX NUMBER 2500.01

DWG. NO. SK-2-18[redacted]

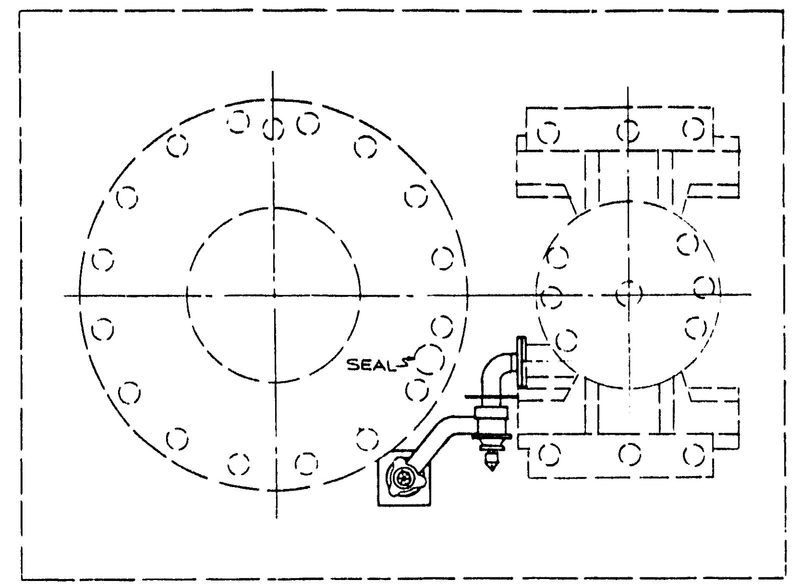
QTY.	PT NO.	DESCRIPTION

DECLASSIFIED

HW-69011
PAGE: 37



ELEVATION



PLAN

TYPICAL PIPING REQUIRED CENTRIFUGE CELLS

APPROVED FOR DES GN NOT FOR CONS' RUCTION

NOTES:

1. REMOVE EXISTING PIPING FROM 8" FLANGED NOZZLE ON CENTRIFUGE TO 7" OPENING ON SUPERNATE TANK. SEAL 7" DIA. OPENING.
2. CONNECTION OF 8" FLANGE WITH NOZZLE TO CENTRIFUGE TO BE TIGHT WITH PERMANENT GASKET
3. JUMPER FABRICATION TO BE PER HWS 5786 REV. 1.
4. AS-BUILT TOLERANCES ON EACH NEW NOZZLE TO BE RECORDED $\pm\frac{1}{32}$"

NO	DESCRIPTION	REV BY DATE	APP'D BY	FOR	DATE
	REVISIONS				

DWG. NO. SK-2-18537 — SHEET NO. — SHEETS — REV. NO. 0

CLASSIFICATION: NONE — CLASSIFIED BY: L. M. Jacquemin — DATE 12-19-60

SCALE: NONE

		APPROVALS BY	FOR	DATE
DRAWN [signature]	DATE 12-19-60	J.P. LaRiviere	EX.DEO	12-20-60
CHECKED TRL	DATE 12-19-60	M. L. Oldfield	Proj.	12-20-60
ISSUED TRL	DATE 12-19-60	[signature]	RDE	12-21-60
		[signature]	RE & U	12-21-60
DES. ENG. TR LaRiviere UNIT Ex.D.E.D.		[signature]	[illegible]	[illegible]
INST. NO. 1837				
PROJECT NO		[signature]	FOSD	12-20-60

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

FISSION PRODUCTS RECOVERY
MODIFICATION OF CENTRIFUGE
DISCHARGE & SUPERNATANT TANK
INLET PIPING.

1001

BLDG. NO. 221-B — DWG. NO. SK-2-18537 — SHT. NO. — SHEETS —

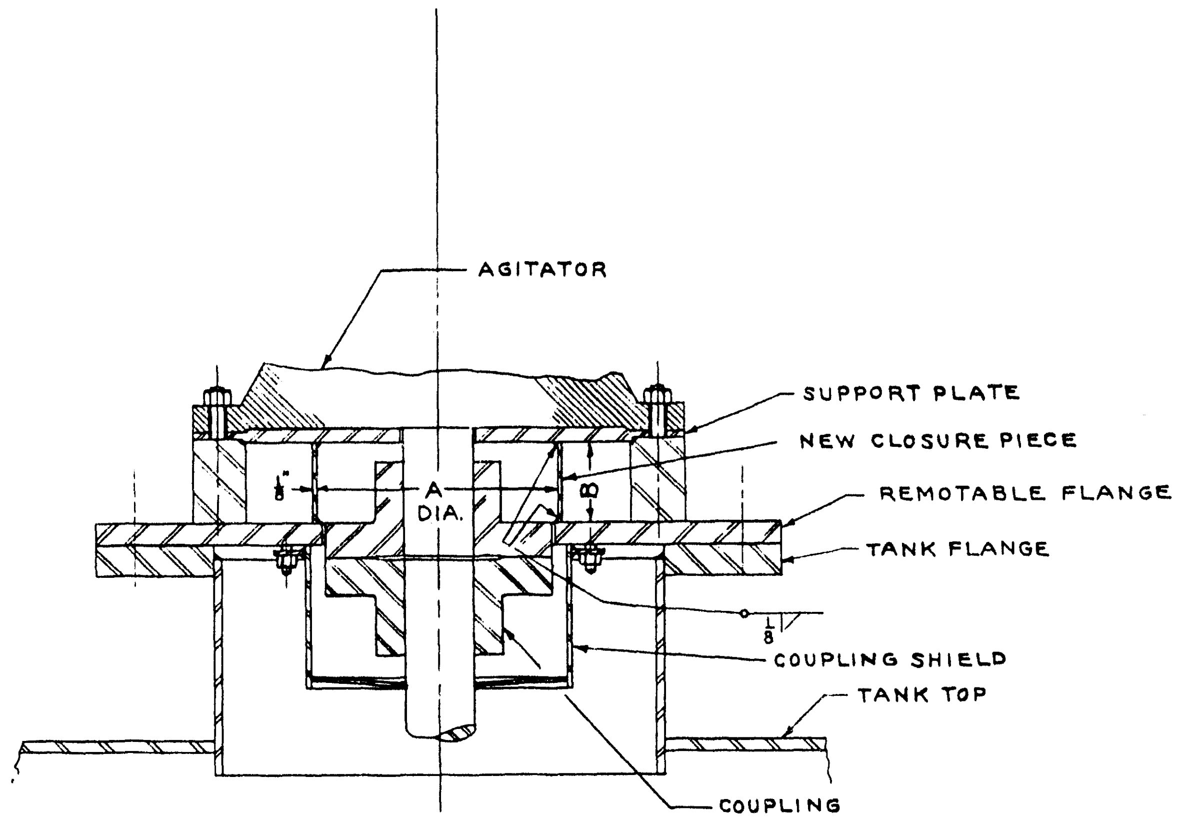
REF NO.	DWG. NO.	DRAWING TITLE
6	HW-72834	CENTRIFUGE.
5	H-2-2655	PRECIPITATOR TANK
4	H-2-52949	4" FEMALE VERTICAL CONN.
3	H-2-52917	4" FEMALE HORIZONTAL CONN.
2	H-2-52814	4" MALE CONNECTOR NOZZLE (VERT & HORIZ)
1	H-2-30600	4" KICK PLATE

REFERENCE DRAWINGS

NEXT USED ON

HW-69011
PAGE

DECLASSIFIED



TYPICAL CROSS SECTION AT TANK TOP
ALL PIECES SHOWN ARE EXISTING EXCEPT CLOSURE PIECE

	DIM. A	DIM. B	REFERENCE DWG'S.
CASE I	11 1/16"	3 3/4"	HW-72453, D-62002, HD-62498, HD-62815-B & BPF-71555 SH. 2, 5 & 6
CASE II	7 1/2"	2 5/8"	HW-72776, D-62069, HD-62369, HD-62815-A & BPF-71555 SH. 1, 3 & 4

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

QTY.	PT. NO.	DESCRIPTION

REVISIONS

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

DWG. NO. SK-2-18529 — SHEET NO. — SHEETS — REV. NO. 0

CLASSIFICATION: NONE
CLASSIFIED BY: [signature] DATE 10/24/60

SCALE:

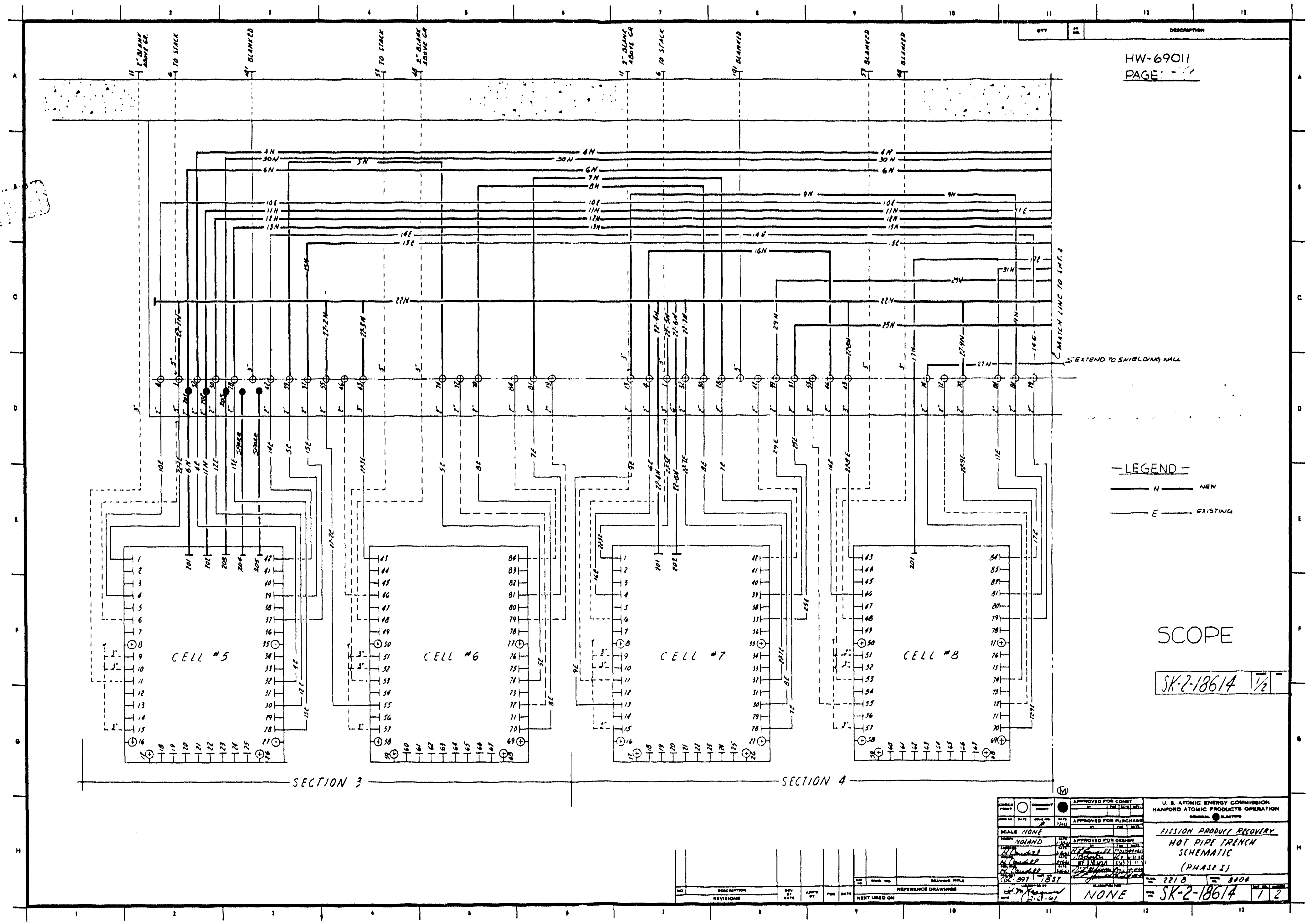
		DATE	APPROVALS BY	FOR	DATE
DRAWN [signature]		10-24-60	J R LaRiviere	0.010	12-16-60
CHECKED JRL		12-16-60	[signature]		12-16-60
ISSUED JRL		12-16-60	[signature]		12-16-60
			[signature]		12-16-60
DES. ENG. J R LaRiviere	UNIT 0.010		[signature]		4-26-61
INST. NO. 1692					
PROJECT NO.			[signature]		

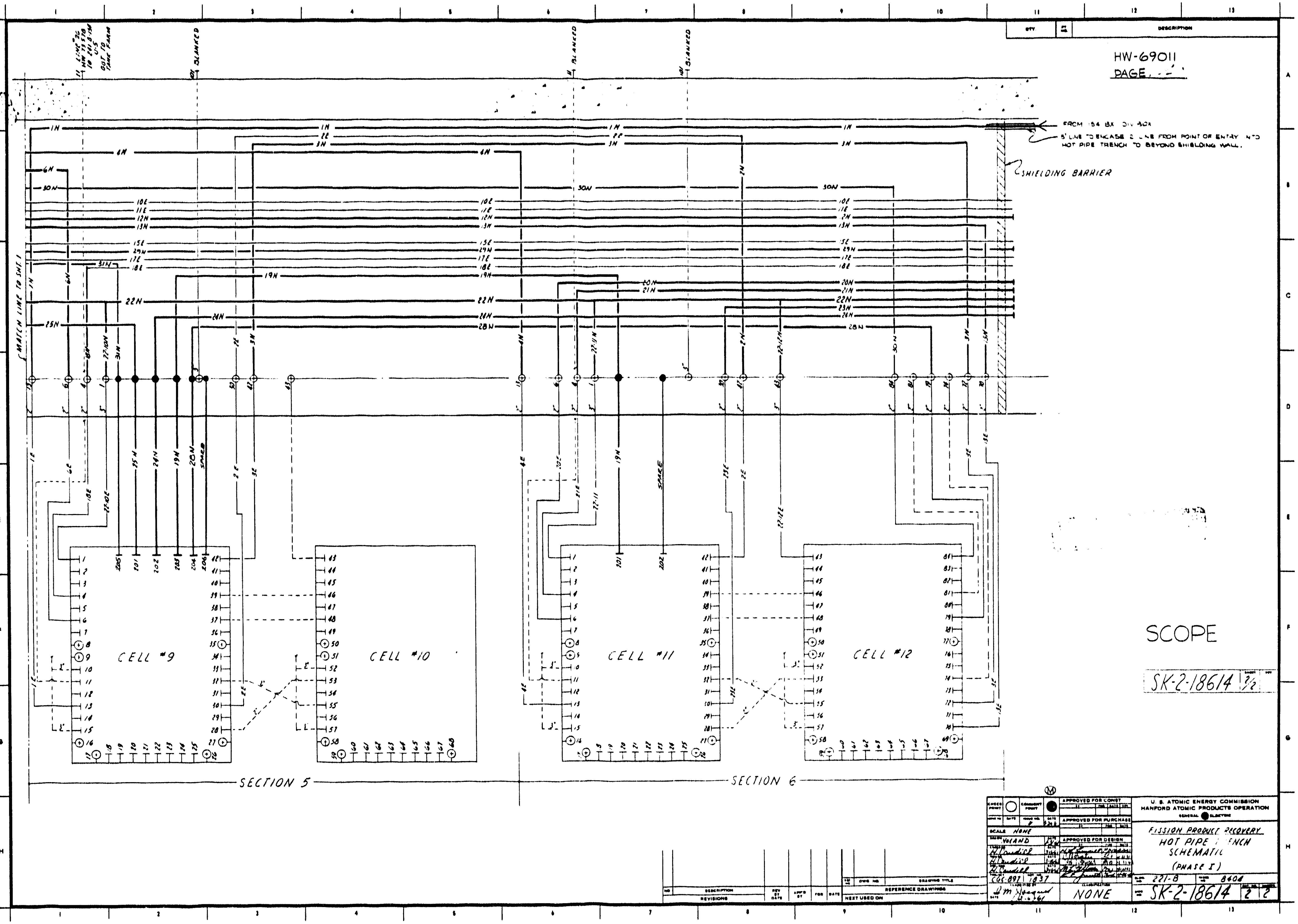
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
2.500 GENERAL ELECTRIC

TANK MODIFICATIONS FOR SEALING AROUND AGITATOR SHAFTS

BLDG. NO. 221-B DWG. NO. SK-2-18529

DWG. NO.	DRAWING TITLE
	REFERENCE DRAWINGS
NEXT USED ON	


CELL #5
CELL #6
CELL #7
CELL #8
SECTION 3
SECTION 4
LEGEND
N NEW
E EXISTING
MATCH LINE TO SHT. 2
EXTEND TO SHIELDING WALL
TO STACK
BLANKED
SCOPE
SK-2-18614 1/2
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
APPROVED FOR CONST
APPROVED FOR PURCHASE
APPROVED FOR DESIGN
SCALE NONE
NOLAND
CGC-897 1837
FISSION PRODUCT RECOVERY
HOT PIPE TRENCH
SCHEMATIC
(PHASE I)
221 B 8404
NONE
SK-2-18614 1 2
REVISIONS
REFERENCE DRAWINGS
NEXT USED ON


HW-69011
PAGE
FROM 154 BX DIV BOX
5' LINE TO ENCASE 2 LINE FROM POINT OF ENTRY INTO HOT PIPE TRENCH TO BEYOND SHIELDING WALL.
SHIELDING BARRIER
MATCH LINE TO SH 1
BLANKED
CELL #9
CELL #10
CELL #11
CELL #12
SECTION 5
SECTION 6
SPARE
SCOPE
SK-2-18614
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
APPROVED FOR CONST
APPROVED FOR PURCHASE
APPROVED FOR DESIGN
SCALE NONE
FISSION PRODUCT RECOVERY
HOT PIPE TRENCH
SCHEMATIC
(PHASE I)
CGC-897
1837
221-B
8404
CLASSIFICATION
NONE
SK-2-18614
2
2
REVISIONS
REFERENCE DRAWINGS
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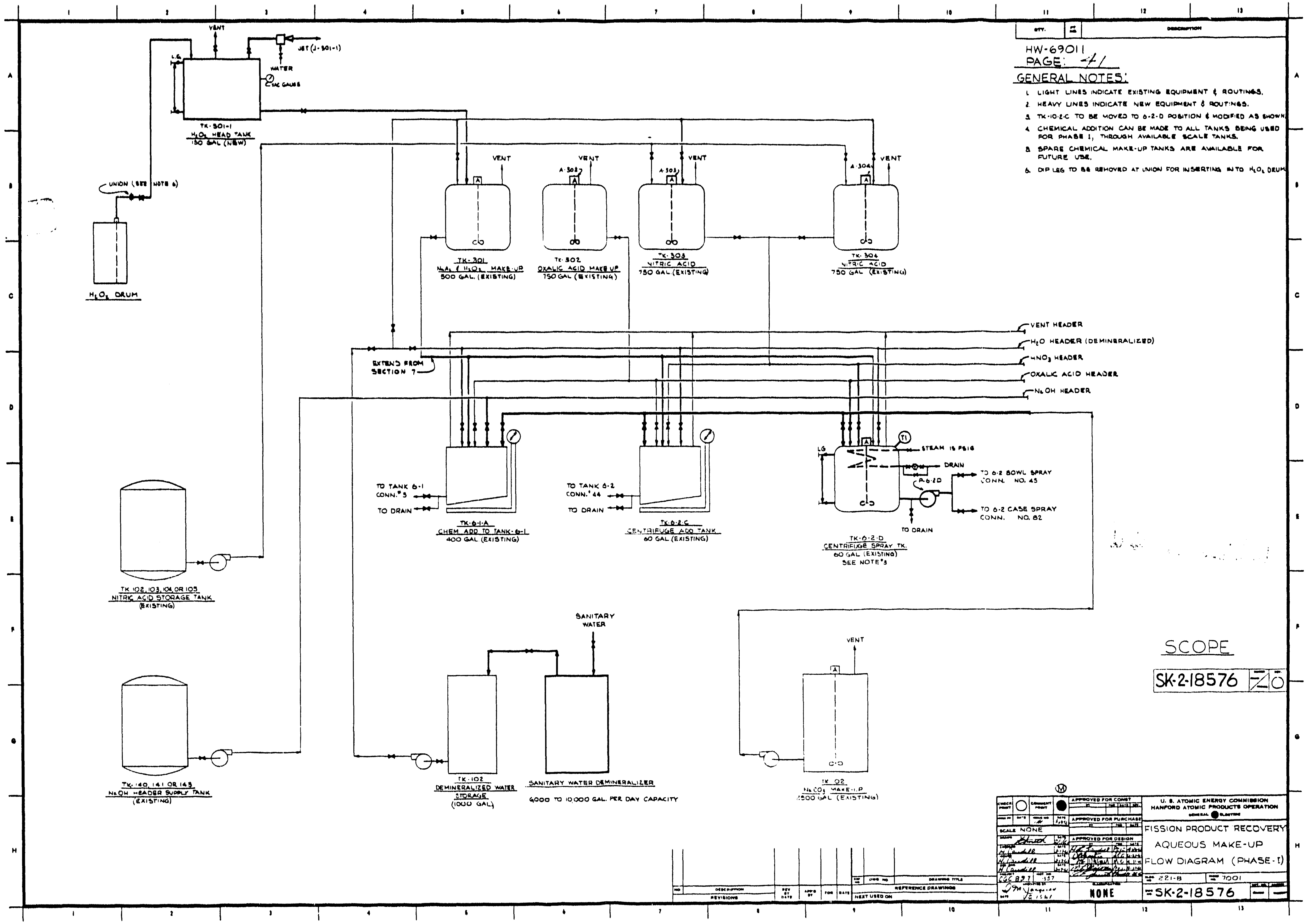
HW-69011
PAGE: 41
GENERAL NOTES:
1. LIGHT LINES INDICATE EXISTING EQUIPMENT & ROUTINGS.
2. HEAVY LINES INDICATE NEW EQUIPMENT & ROUTINGS.
3. TK-10-2-C TO BE MOVED TO 6-2-D POSITION & MODIFIED AS SHOWN.
4. CHEMICAL ADDITION CAN BE MADE TO ALL TANKS BEING USED FOR PHASE I, THROUGH AVAILABLE SCALE TANKS.
5. SPARE CHEMICAL MAKE-UP TANKS ARE AVAILABLE FOR FUTURE USE.
6. DIP LEG TO BE REMOVED AT UNION FOR INSERTING INTO H2O2 DRUM.
VENT
JET (J-301-1)
WATER
L.G.
TK-301-1
H2O2 HEAD TANK
150 GAL (NEW)
UNION (SEE NOTE 6)
H2O2 DRUM
TK-301
NaAl & H2O2 MAKE-UP
500 GAL. (EXISTING)
TK-302
OXALIC ACID MAKE UP
750 GAL (EXISTING)
TK-303
NITRIC ACID
750 GAL. (EXISTING)
TK-304
NITRIC ACID
750 GAL (EXISTING)
A-302
A-303
A-304
VENT HEADER
H2O HEADER (DEMINERALIZED)
HNO3 HEADER
OXALIC ACID HEADER
NaOH HEADER
EXTEND FROM SECTION 7
TO TANK 6-1 CONN. #5
TO DRAIN
TK-6-1-A
CHEM ADD TO TANK-6-1
400 GAL (EXISTING)
TO TANK 6-2 CONN. #44
TO DRAIN
TK-6-2-C
CENTRIFUGE ADD TANK
60 GAL (EXISTING)
LG
STEAM 15 PSIG
DRAIN
P-6-2D
TO 6-2 BOWL SPRAY CONN. NO. 45
TO 6-2 CASE SPRAY CONN. NO. 82
TO DRAIN
TK-6-2-D
CENTRIFUGE SPRAY TK.
60 GAL (EXISTING)
SEE NOTE #3
TK 102, 103, 104, OR 105
NITRIC ACID STORAGE TANK
(EXISTING)
SANITARY WATER
TK-140, 141 OR 143
NaOH HEADER SUPPLY TANK
(EXISTING)
TK-102
DEMINERALIZED WATER STORAGE
(1000 GAL)
SANITARY WATER DEMINERALIZER
4000 TO 10,000 GAL. PER DAY CAPACITY
TK 02
Na2CO3 MAKE-UP
1500 GAL (EXISTING)
SCOPE
SK-2-18576
U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
GENERAL ELECTRIC
SCALE NONE
FISSION PRODUCT RECOVERY
AQUEOUS MAKE-UP
FLOW DIAGRAM (PHASE-I)
221-B
7001
NONE
SK-2-18576
REFERENCE DRAWINGS
NEXT USED ON
REVISIONS

HW-69011
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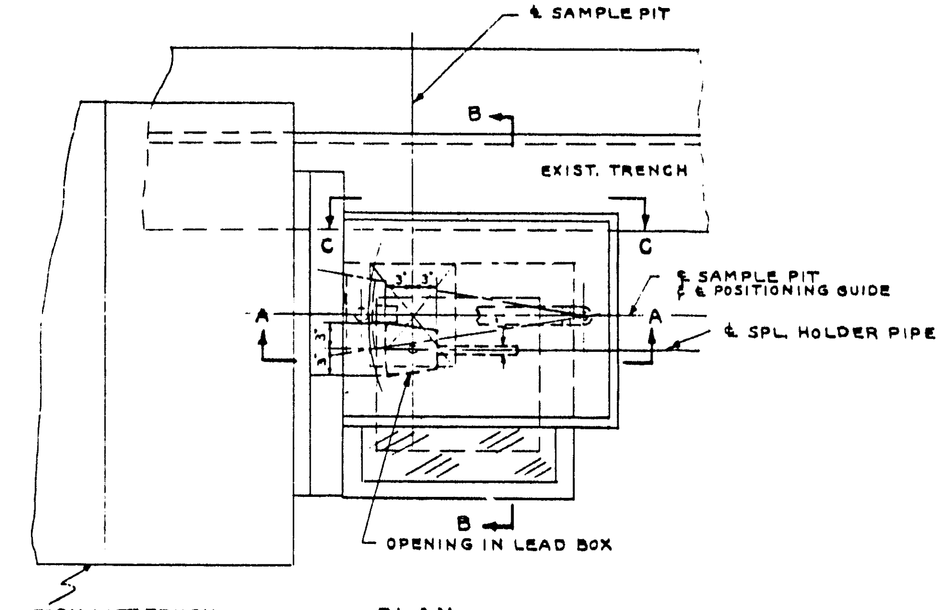
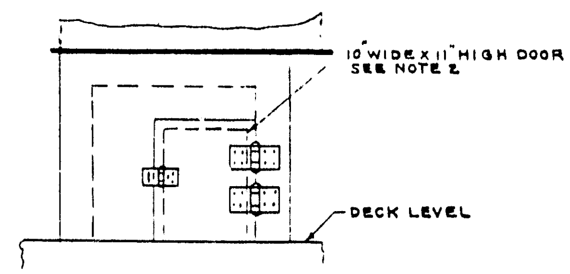
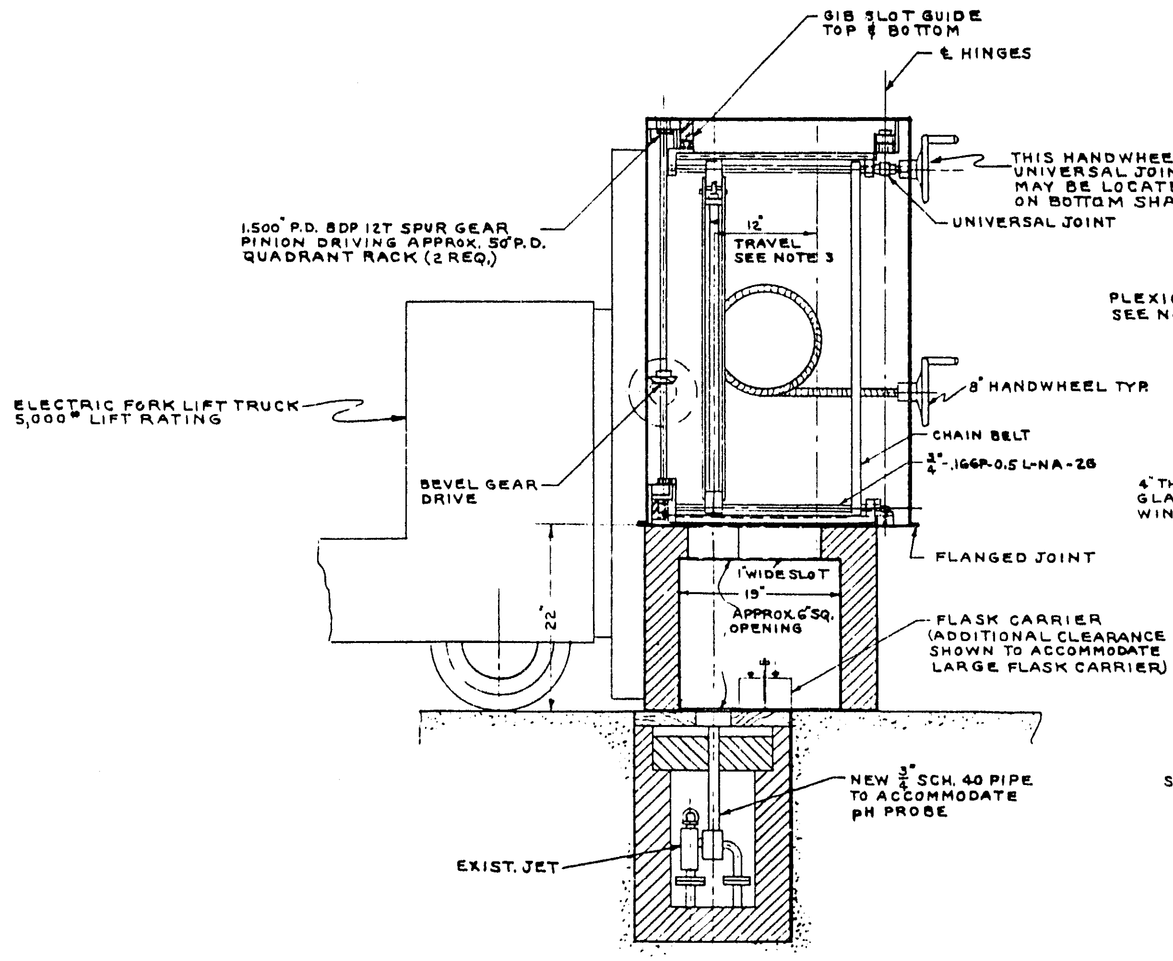


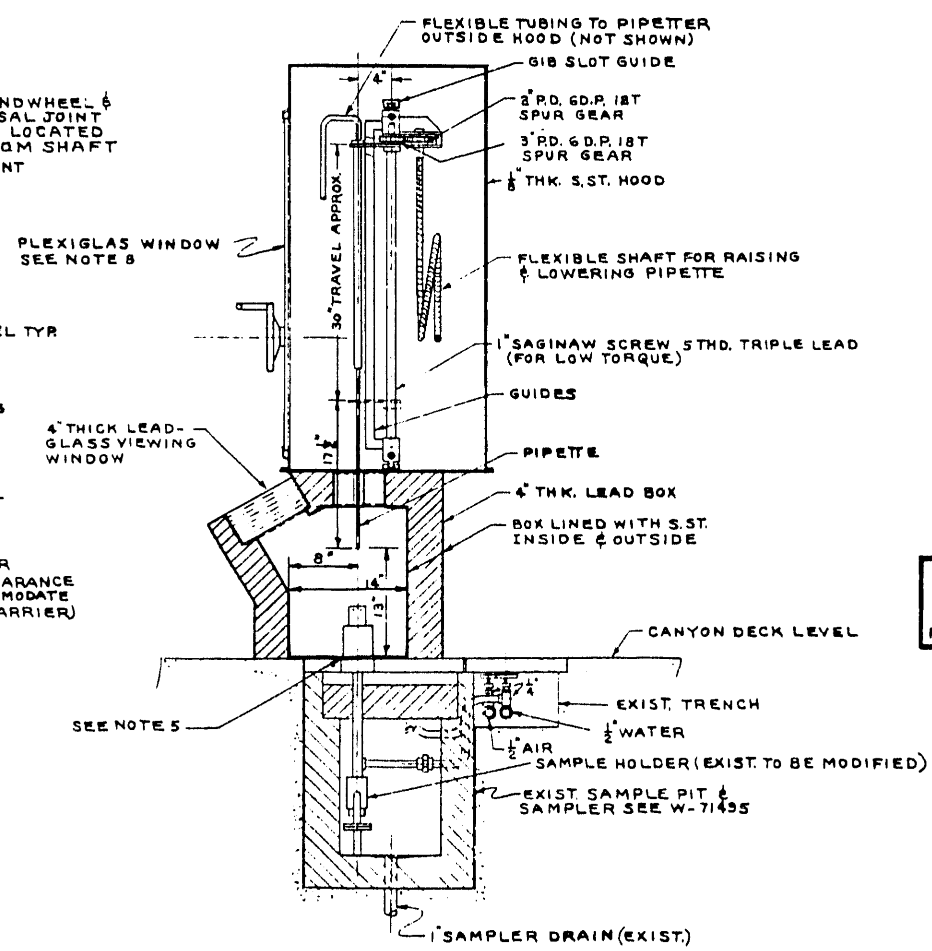
PLAN



SECTION C-C



SECTION A-A



SECTION B-B

GENERAL NOTES

1. FLASK CARRIER SIZES WILL DETERMINE FINAL DESIGN DIMENSIONS.
2. POSITIONING HANDWHEELS WILL COMPENSATE FOR ERROR IN POSITIONING OF ± 3" IN EACH DIRECTION.
3. PLEXIGLAS WINDOWS IN TOP SECTION TO BE PROVIDED TO GIVE MAXIMUM VISIBILITY OF INTERIOR.
4. FLUSHING SPRAY NOZZLE TO BE PROVIDED IN LEAD BOX, TANK & PUMP ON FORK LIFT TRUCK.
5. PROVIDE A SLIDING DOOR IN BOTTOM OF BOX TO PREVENT SPREADING OF CONTAMINATION DURING MOVEMENT OF BOX.
6. PROVIDE STORAGE SHELF ON FORK LIFT TRUCK FOR SPARE FLASKS, TONGS, ACID TANK, RAGS, SAMPLER CUP INSERTS & WASTE CARTONS.
7. LIFTING BAILS TO BE PROVIDED FOR ALTERNATE HANDLING OF SAMPLER BY CANYON CRANE.
8. ADEQUATE LIGHTING TO BE PROVIDED IN LEAD BOX & TOP SECTION.
9. PROVIDE POSITIONING STOPS FOR FLASKS AS REQ'D.
10. ALL MECHANICAL EQUIPMENT TO BE DESIGNED TO RUN DRY (NO LUBRICATION) & TO BE RESISTANT TO NITRIC ACID CORROSION.
11. ALL LIGHTS INSIDE LEAD BOX OR UPPER SECTION TO BE ACID RESISTANT OR PROTECTED AGAINST ACID WASHDOWN OR FUMES.
12. PROVIDE A STORAGE STATION IN ONE END OF CANYON FOR SAMPLERS WITH FACILITIES FOR DECONTAMINATION.
13. PAINT LINES ON CANYON DECK FOR GUIDING LIFT TRUCK OPERATOR IN APPROXIMATE POSITIONING OF ~~SAMPLERS OVER~~ SAMPLE PITS.

pH PROBE

PROVIDE AN ADDITIONAL UNIT SIMILAR TO THE SAMPLER FOR OBTAINING pH. THE UNIT WOULD DIFFER AS FOLLOWS: THE PIPETTE WOULD BE REPLACED BY AN ELECTRODE BUNDLE CONSISTING OF A BECKMAN 270 REFERENCE ELECTRODE & A BECKMAN 290 GLASS ELECTRODE. THE 2 WIRES WOULD BE BROUGHT THRU THE HOOD IN A SIMILAR MANNER AS SHOWN FOR PIPETTER TUBING. CONTAINERS OF BUFFER AND WASH SOLUTIONS WILL BE PROVIDED IN PLACE OF SAMPLE FLASKS FOR STANDARDIZING AND PROTECTING ELECTRODES.

SCOPE

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

QTY.	ITEM NO.	DESCRIPTION

REVISIONS

CLASSIFICATION: NONE

DWG. NO. SK-2-18527 — REV. 0

SCALE:
DRAWN 12-1-60
PROJECT 1692
CG-0897

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

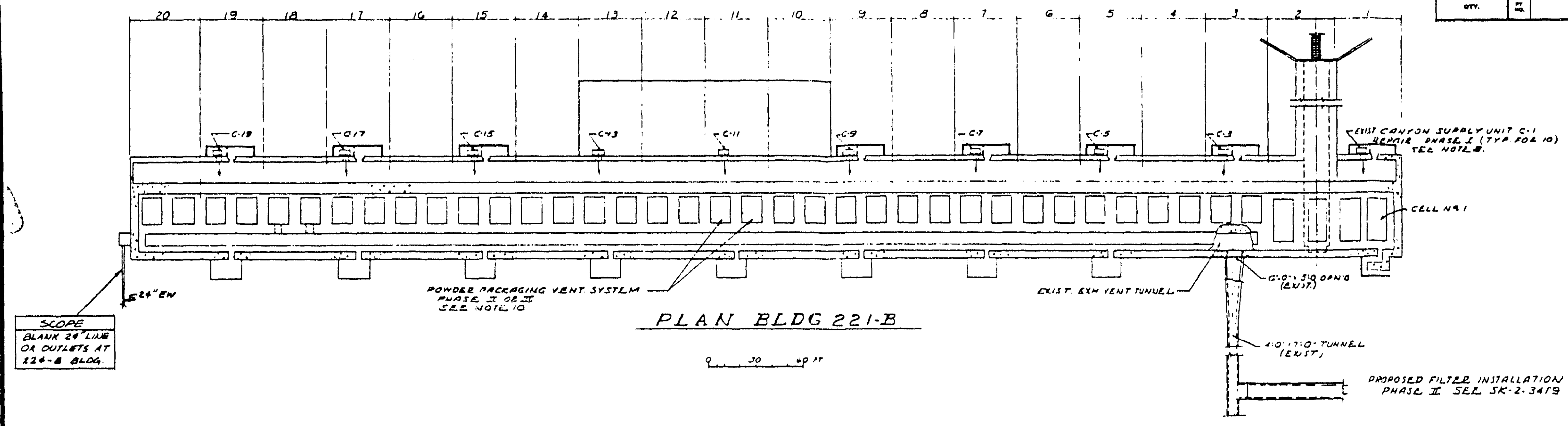
FISSION PRODUCTS RECOVERY
PORTABLE DECK LEVEL
SAMPLER & pH PROBE

BLDG. 221-B — 2500.01

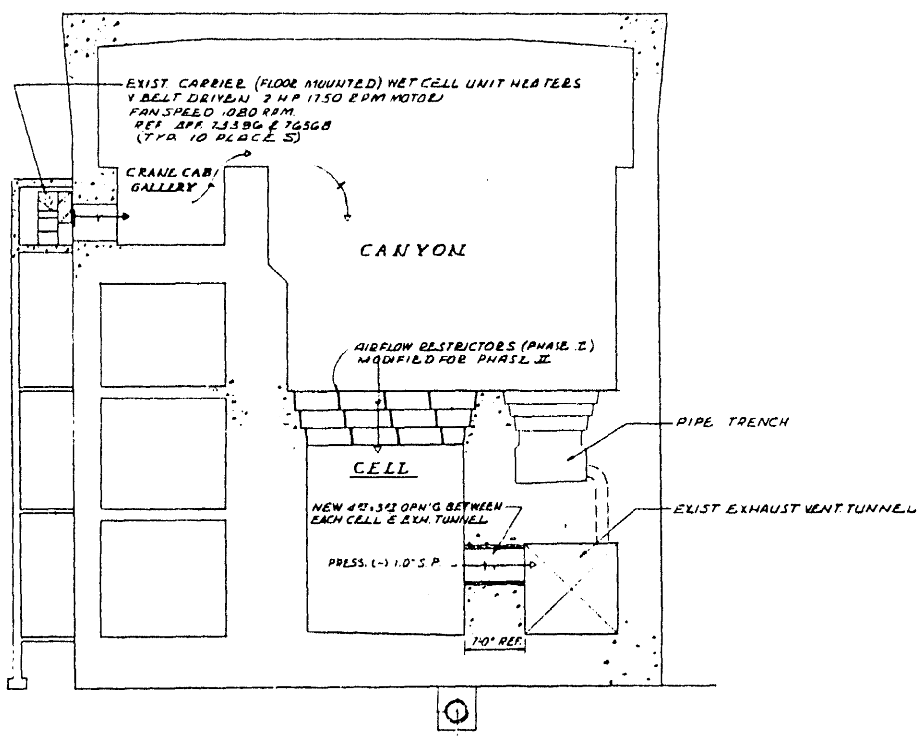
DWG. NO. SK-2-18527

REFERENCE DRAWINGS

HW-69011
PAGE [illegible]



PLAN BLDG 221-B



TYPICAL SECTION

SCALE 1/8" = 1'-0"

GENERAL NOTES

PROPOSED VENTILATION SYSTEM MODIFICATIONS FOR FISSION PRODUCT RECOVERY ARE TO BE ACCOMPLISHED IN TWO PHASES. PROPOSED WORK IN EACH PHASE IS AS OUTLINED BELOW:

PHASE I

1. ENLARGE CELL EXHAUST VENTILATION OPENINGS TO 12 SQ.FT FOR CELLS 5 THROUGH 12
2. PROVIDE CELL COVER BLOCK RESTRICTIONS FOR AIRFLOW BALANCE (SEAL OFF ALL CELLS, EXCEPT CELL 40, NOT USED FOR PHASE I.)
3. REPAIR EXIST. SAND FILTER AND SEAL ALL DETECTABLE LEAKS.
4. OVERHAUL ELECTRIC DRIVEN EXHAUST FANS REPAIR OR REPLACE FAN DISCHARGE DAMPERS FOR MIN. PRESS. DROP.
5. REPLACE EXIST. STEAM DRIVEN TURBINE EXHAUST FAN WITH NEW PHASE II STEAM DRIVEN EXHAUST FAN AND VERIFY ADEQUACY OF EXIST. STEAM PIPING (100 HP TURBINE)
6. PROVIDE 6E1 x 8F1 CONCRETE STUB CONNECTION ON EXIST. EXHAUST TUNNEL FOR CONNECTION TO NEW PHASE II FILTER BLDG. SEE SK-2-3419.
7. VERIFY THAT EXHAUST SYSTEM CONNECTIONS AT 224-B BLDG ARE BLANKED.
8. REPAIR EXIST. CANYON SUPPLY UNITS (5 TOTAL) WITH CLASS "A" OVERHAUL REPLACE EXIST. HEATING COILS, SPRAY CELLS, AND INTAKE FILTER MEDIA.

PHASE II

9. PROVIDE NEW EXHAUST FILTER, FANS & STACK, RELOCATING STEAM DRIVEN EXHAUST FAN TEMPORARILY USED FOR PHASE I TO PERMANENT POSITION. (APPROX. 75000 CFM.)
10. PROVIDE POWDER PACKAGING EXHAUST SYSTEM FOR SECTION 11 (CELLS 21 & 22) TO BE REMOTLEY REMOVABLE CONSISTING OF STN STL DUCTWORK, FILTER & FAN FOR DUST CONTROL. SYSTEM IS PROPOSED TO RECIRCULATE AIR WITHIN THE CELL - ESTIMATED 1000 CFM CAPACITY PHASE II OR III.
11. BLANK EXIST EXHAUST TUNNEL TO SAND FILTER AND FANS (AT FAN PLENUM AND DEACTIVATE ENTIRE EXIST. SYSTEM RETAIN SYSTEM FOR POSSIBLE FUTURE USE.
12. ENLARGE CELL EXHAUST VENTILATION OPENINGS TO 12 SQ. FT. FOR CELLS 13 THRU 30

ESTIMATED CANYON AIR FLOW CONDITIONS

	PHASE I NORMAL	PHASE I MAINTENANCE	PHASE II NORMAL	PHASE II MAINTENANCE
SUPPLY (CFM)	15,000 (5 UNITS)*	15,000	35,000 (7 UNITS)*	50,000 (10 UNITS)
EXHAUST (CFM)	30,000	30,000	40,000	75,000
CANYON PRESS	(-) .08" S.P	(-) .08"	(-) 0.10" S.P	—
AIRFLOW/CELL (CFM)	3,700	30,000 **	1,000	35,000
VELOCITY INTO OPEN CELL (FPM)	—	120 **	—	150

* NUMBER OF SUPPLY UNITS TO BE OPERATED WILL BE DETERMINED BY THE CANYON PRESSURE.

** AIRFLOW FIGURES APPLY IF ENLARGED CELL TO TUNNEL OPENING IS NOT ORIFICED FOR PHASE I. CLOSED CELLS WILL BE ESSENTIALLY WITHOUT AIRFLOW DURING THE TIME WHEN A CELL (ONE ASSUMED) IS OPEN.

—SCOPE—

SK-2-18655 / 0

U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION

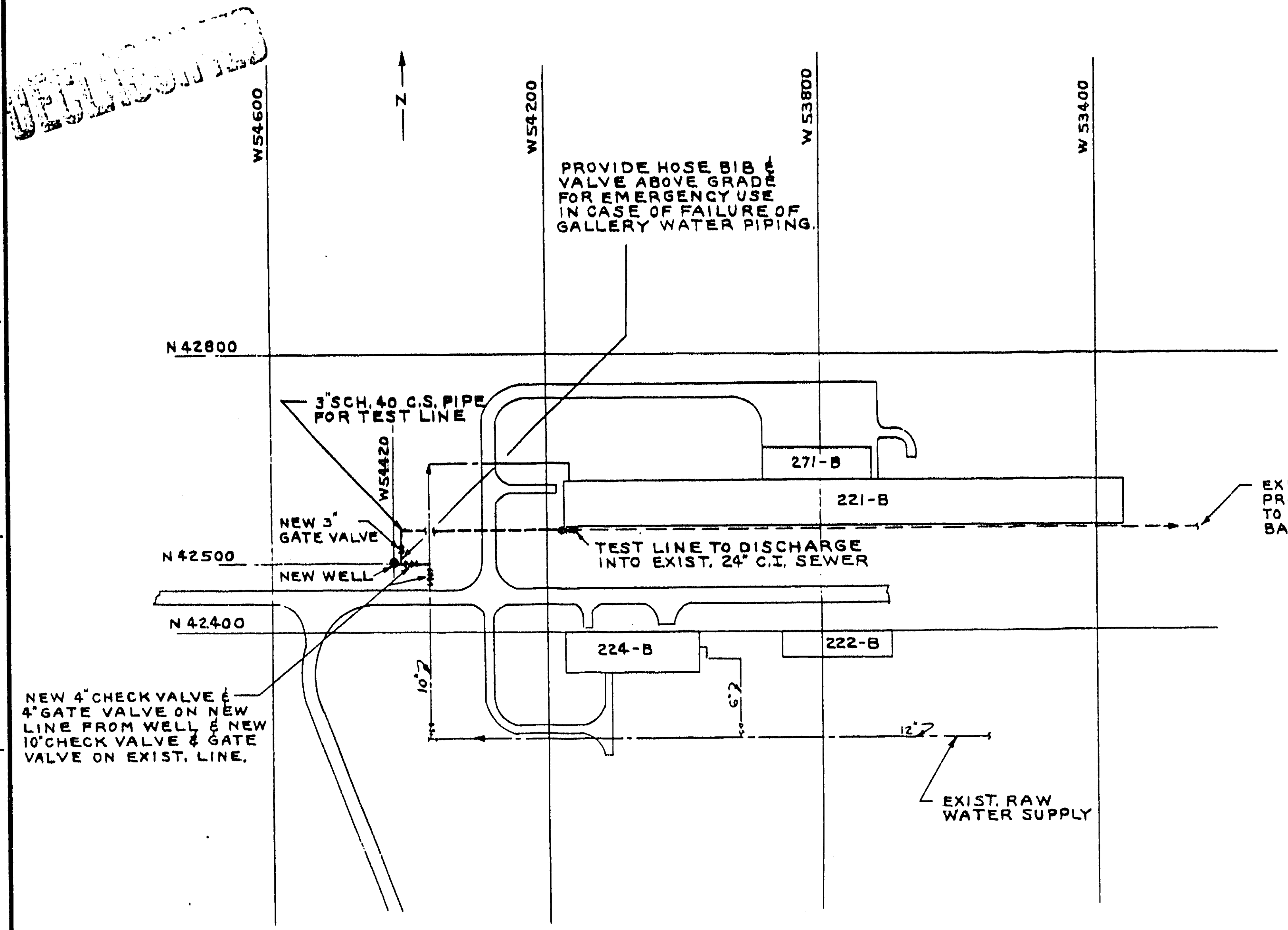
FISSION PRODUCT RECOVERY
VENTILATION
PROPOSED BUILDING
MODIFICATIONS PHASE I & II

221-B 8900

SCALE NONE

SK-2-18655

HW-69011
PAGE 47



PLOT PLAN

NOTE

PROVIDE EMERGENCY RAW WATER WELL WITH PUMP & CONNECTIONS TO EXISTING RAW WATER LINE AS SHOWN.
PUMP SHALL DELIVER 200 G.P.M. AT 100 P.S.I.G. AT GRADE LEVEL. PUMP TO BE VERTICAL TURBINE TYPE. APPROX. 500 FT. HD. & 25 THEORETICAL B.H.P. 8" DIA. WELL CASING REQUIRED.
⚠1 PUMP TO BE DRIVEN BY A COMBUSTION ENGINE AND TESTED AT ROUTINE INTERVALS TO ASSURE ITS OPERABILITY.

APPROVED
FOR DESIGN
NOT FOR CONSTRUCTION

QTY.	PT. NO.	DESCRIPTION

REVISIONS

No.	DESCRIPTION	REV. BY DATE	APP'D BY	FOR	DATE
1	NOTE ZONE 9C ADDED TO EXIST.	L.O. 4-13-61	RRM	POD	4-13-61

DWG. NO. SK-2-18573 — SHEET No. — SHEETS — REV. NO. 1

CLASSIFICATION: NONE — CLASSIFIED BY: [signature] DATE 12/20/60

SCALE: 1" = 100'-0"
DRAWN L. [signature] DATE 12-20-60
CHECKED DATE
ISSUED DATE
DES. ENG. [signature] UNIT KP611
INST. NO. 1837
PROJECT NO.

APPROVALS

BY	FOR	DATE
[signature]	[illegible]	12-20-60
[signature]	RBE	12-20-60
[signature]	FCO	12-21-60
[signature]	[illegible]	4-26-61
[signature]	[illegible]	12-20-60

U. S. ATOMIC ENERGY COMMISSION
HANFORD ATOMIC PRODUCTS OPERATION
8500 GENERAL ELECTRIC

FISSION PRODUCTS RECOVERY
EMERGENCY RAW WATER
SUPPLY FOR "B" PLANT

BLDG. NO. 221-B — DWG. NO. SK-2-18573 — SHT. NO. — SHEETS

DWG. NO.	DRAWING TITLE

REFERENCE DRAWINGS
NEXT USED ON