West Valley Demonstration Project

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SYSTEM DESCRIPTION

COLD CHEMICAL SYSTEM (65)

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WVNS RECORD OF REVISION

DOCUMENT

If there are changes to the controlled document, the revision number increases by one. Indicate changes by one of the following:

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WVNS RECORD OF REVISION CONTINUATION FORM

Rev. No.	Description of Changes	Revision On Page(s)	Dated

COLD CHEMICAL SYSTEM (65)

SYSTEM DESCRIPTION

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

NOTE

This revision of the System Description is based on released P&IDs as of March 4, 1994.

An attempt has been made to flag "soft" information in grey in this document. (Examples of soft information are, design changes which have not been incorporated in the drawings to date, TBD information, etc.)

SUMMARY

The Cold Chemical System is a batching plant for preparation and transfer of non-radioactive slurries, decontamination solutions, and water to the vitrification hot cell during the Integrated Testing and Hot Operations phases of the vitrification campaign.

1.0 FUNCTIONS AND DESIGN CRITERIA

1.1 Functions

The Cold Chemical System serves the following functions:

1.1.1 Batch preparation of glass formers and shim waste simulants. The slurries/solutions are mixed and transferred to the hot cell during hot operations.

1.1.2 Batch preparation of glass formers, zeolite and waste simulant melter feeds. The slurries/solutions are mixed and transferred to the hot cell during cold operations and Product/Process Qualification testing period.

1.1.3 Batch preparation of decontamination solutions. The solutions are prepared for hot and post hot operational periods.

1.1.4 Supply of metered quantities of demineralized water to certain components in the vitrification hot cell.

1.2 Design Criteria (Refer to WVNS-DC-045)

1.2.1 Process Requirements

The following criteria are reproduced from WVNS-DC-045 for information only. WVNS-DC-045 criteria supercedes in any conflict with the following:

1.2.1.A System shall be capable of preparing, and transferring to the hot cell one batch of cold chemical feed within a period of twelve (12) hours, once every 100 hours.

1.2.1.B The system shall have a maximum single batch slurry working volume of 5,000 gallons.

1.2.1.C The system shall be designed to handle effectively, without plugging, slurries containing up to 60 weight percent total solids.

1.2.1.D Transfer of cold chemical feed slurry to the hot cell shall be accomplished by a single transfer operation followed by a demineralized water line flush and air purge.

1.2.1.E Transfer of cold chemical materials into and out of mix tanks shall be complete (i.e., essentially zero tank heel and residual material). A tank heel volume consisting of demineralized flush water is permissible.

1.2.1.F The feed rate for transfer of cold chemicals to the hot cell shall be selected such that the overall preparation, transfer and batch cycle time are maintained and line plugging and solids settling is precluded.

1.2.1.G A grinder will be used during transfer to the hot cell. Since solid ingredient chemicals will be procured as powders having a specified particle size, the grinder will function predominantly as a delumper to ensure cold chemical feed particle size in the 50 microns range.

1.2.1.H The Cold Chemical System facilities and ancillary components shall be designed of such material to assure performance, reliability and compatibility of all component parts and process for a design plant life of 10 years.

1.2.1.I Chemicals used for preparation of Melter Feed Slurries in the Cold Chemical System are specified in WVNS-EQ-295.

1.2.2 Structural Requirements

The facility shall be designed such that general environmental and facility specific requirements per WVNS-DC-022 are maintained.

1.2.3 System Configuration and Essential Features

1.2.3.A Site location and configuration of the facility shall not disrupt operation major construction projects and equipment access to the Vitrification Facility.

1.2.3.B The facility shall be free standing and independent of the existing Vitrification Facility Building.

1.2.3.C Cold Chemical Facility HVAC System shall be independent of the Vitrification Facility HVAC System.

1.2.3.D Inside walls, floors and ceiling shall be chemical resistant and washable.

1.2.3.E General drains on all levels.

1.2.3.F Chemical spills, discharge solids catch basin and transfer drains.

1.2.3.G Outside sheet metal building to match Vitrification Facility sheet metal building style at color.

1.2.3.H Material receipt and unload area.

1.2.3.I Communication Line - to/from main control room.

1.2.4 Maintenance

TBD

1.2.5 Surveillance and ISI

TBD

1.2.6 Instrument and Control

1.2.6.A To and from the Vitrification Process Computer **(TBD)**.

1.2.6.B Trouble signals from local panel to Vitrification DCS.

1.2.7 System Interfaces

1.2.7.A Process

1. From slurry main mix tank to hot cell Tank 63-V-001.
2. From slurry shim mix tank to Hot Cell Tank 63-V-001.
3. From slurry main mix tank to hot cell tank 63-V-011.
4. From slurry shim mix tank to hot cell tank 63-V-011.
5. From main mix tank and shim mix tank to analytical lab (sampling).
6. From process computer via personnel to cold chemical system.
7. From cold chemical system via personnel to process computer.
8. From the decon tanks 65-D-07, 08, 09 to any of the following locations (see dwg. 905D-016 [K6]):

   Vessel Vent Condenser (63-E-015)
   Vessel Mist Eliminator (63-C-032)
   HEME #1 (63-T-033)
   HEME #2 (63-T-036)
   CFMUT Demister (63-V-001)
   CFMUT Decon Fill (63-V-001)
   Vessel Vent Header Flush
   SBS Scrubber Vessel (63-V-031)
   SBS Receiver Vessel (63-V-031)
   MFHT Decon Fill (63-V-011)
   Waste Header North Branch Flush
   Waste Header East Branch Flush
   Transfer Tunnel Spray Nozzles
   CMR Decon Area Hose Connection

EDR Decon Area Hose Connection
Decon Mix Tank Connection (63-V-048)
Drain Tank Fill (65-D-01)
Analytical lab (sampling).

1.2.7.B Plant Utilities and Services

1. Nitric Acid (nominal 65 percent solution)
2. Sodium hydroxide (caustic) (nominal 50 percent solution)
3. Steam
4. Tower Cooling Water
5. Utility Air
6. Instrument Air
7. Dry Utility Air
8. Electrical Power
9. Demineralized Water
10. Potable Water
11. Fire Protection and Detection
12. Drains
13. Communications (telephones, paging, etc.)

1.2.7.C Building Interfaces

1. HVAC
2. Hoisting Equipment

1.2.8 Quality Assurance

1.2.8.A The Cold Chemical System shall in general be regarded as a "Safety Class N" System. Specific assignment of safety class for each subsystem, major component or structure shall be made in their respective criteria.

1.2.8.B The Cold Chemical System shall in general be regarded as a "Quality Level C" System. Specific assignment of quality Level for each subsystem, major component or structure shall be made in their respective criteria.

1.2.9 Codes and Standards

The Cold Chemical System equipment, component and facility shall be designed per the applicable codes and standards as delineated in Section 4.0, 6.1, 7.0 of WVNS-DC-022, "Vitrification of High Level Wastes".

1.2.10 Reliability Assurance

The Cold Chemical Systems facilities and ancillary components shall be designed of such material to assure performance, reliability and compatibility of all component parts and process for a design plant life of 10 years.

2.0 DESIGN DESCRIPTION

2.1 Summary

The Cold Chemical System performs the functions as listed in paragraph 1.1. The equipment and facilities which make up the system include three slurry mix tanks, three solution preparation tanks, two day tanks (nitric and caustic), one drain tank for waste collection, two material delivery subsystems (solid and liquid) and the tanks' ventilation subsystem.

The Cold Chemical System is independently housed in a 56'-6" x 34' building located on the west side of the Vitrification Facility (see dwg. 905D-041).

2.2 Detailed System Description

NOTE: The following documents will provide further details:

Cold Chemical System Design Criteria (WVNS-DC-045).

Cold Chemical Logic and Control Summary.

2.2.1 Peculiarities of System Design

2.2.1.A The Cold Chemical System will be run in an unsupervised and unmanned mode during certain periods of time (i.e., while awaiting results of sample analysis, etc.). Should an alarm condition develop at the Cold Chemical System Control Panel 65-CP-01, it will be relayed to the vitrification control room via a common Cold Chemical System alarm. This alarm will sound if the local alarm at the Cold Chemical System control panel is left unacknowledged for more than a preset period of time.

2.2.1.B To preclude the possibility of NOx evolution in the Cold Chemical System, nitric acid and sugar will be added to the Concentrator Feed Make-Up Tank (63-V-001) or the Melter Feed Hold Tank (63-V-011) via separate Cold Chemical Slurries. The above tanks are equipped to handle NOx evolution as they are piped to the NOx Abatement Plant (System No. 64).

2.2.1.C Except for acid and caustic addition, there is no tank overfill protection for slurry, decon and drain tanks from slurry, DW or liquid and dry chemicals transfer into these tanks. Tight administrative control will need to be exercised during transfer operations, especially during transfer into small capacity tanks such as 65-D-04, 65-D-08, and 65-D-09.

2.2.1.D Common pump cutoff prevents addition of either acid or caustic to anywhere upon high level in any tank. (A work order may be required to recover from this situation.)

2.2.1.E Cold Chemical Slurry transfer from tanks 65-D-02, 03, 04 to the Concentrator Feed Makeup Tank (CFMUT) and/or the Melter Feed Hold Tank (MFHT) will be automatically shut-off if either the CFMUT or the MFHT reach high level. This interlock prevents overflow of the in-cell receiving tanks.

2.2.2 Slurry Makeup and Transfer:

NOTE: The following documents will provide further details:

- Drawings 905D-015; 017; 018; 900D-1896; 1897; 1867
- Tank Specification WVNS-EQ-275
- "As-built" Vendor Dwgs. E-1490, E-1492

Three types of slurries (i.e. glass formers, waste simulant, and shim) may be prepared in the Cold Chemical System, utilizing the slurry tanks 65-D-02, 65-D-03, and 65-D-04. Slurries are prepared per recipe obtained from the Vitrification Facility (VF). Solid and liquid ingredients are weighed and transferred into the mix tanks via a pneumatic transfer and a steam jet transfer system respectively. Concentrated nitric acid and caustic soda solutions are separately metered into the mix tanks from Day tanks 65-D-05 and 65-D-06 respectively. Demineralized water (for flush and fill purposes) is metered in via meters 65-FQIS-027 and -028.

Utilizing a pump (nos. 65-G-02, 03, 04), the slurry may be pumped into a recirculation loop fitted with a sample valve (nos. 65-LS-550, 551, 552), or transferred elsewhere via the use of a diverter valve (nos. 65-DV-032, 033, 034). Each slurry tank is equipped with a grinder (nos. 65-T-02,03,04) for slurry particle size reduction. The grinder may be used in both recirculation and transfer modes. At the end of each transfer, metered flush water (via FQIS-027) is used to completely clear the slurry tank, recirculation, and transfer piping. This ensures transfer of complete inventory of material, and is particularly important for transfers into the hot cell.

The system is configured for maximum flexibility in slurry transfer, and utilizes a system of valve and hose connections. Valves 65-H-526, 530, 532 are used to transfer slurry out of the three slurry tanks. Valves H-525, 531, 533 are used to transfer slurry into the three slurry tanks. Valves H-527, 528, 529 are used to transfer slurry into the two hot cell locations - Concentrator Feed Makeup Tank (63-V-001) and Melter Feed Hold Tank (63-V-011), and to the Cold Chemical System waste tank 65-D-01.

Upon completion of slurry preparation, a sample is first analyzed for verification of composition and the batch is then transferred into the Concentrator Feed Makeup Tank (CFMT) or Melter Feed Hold Tank (MFHT). The transfer operation into the hot cell involves notification to and coordination with the vitrification control room.

The primary functions of the three slurry preparation tanks are as follows:

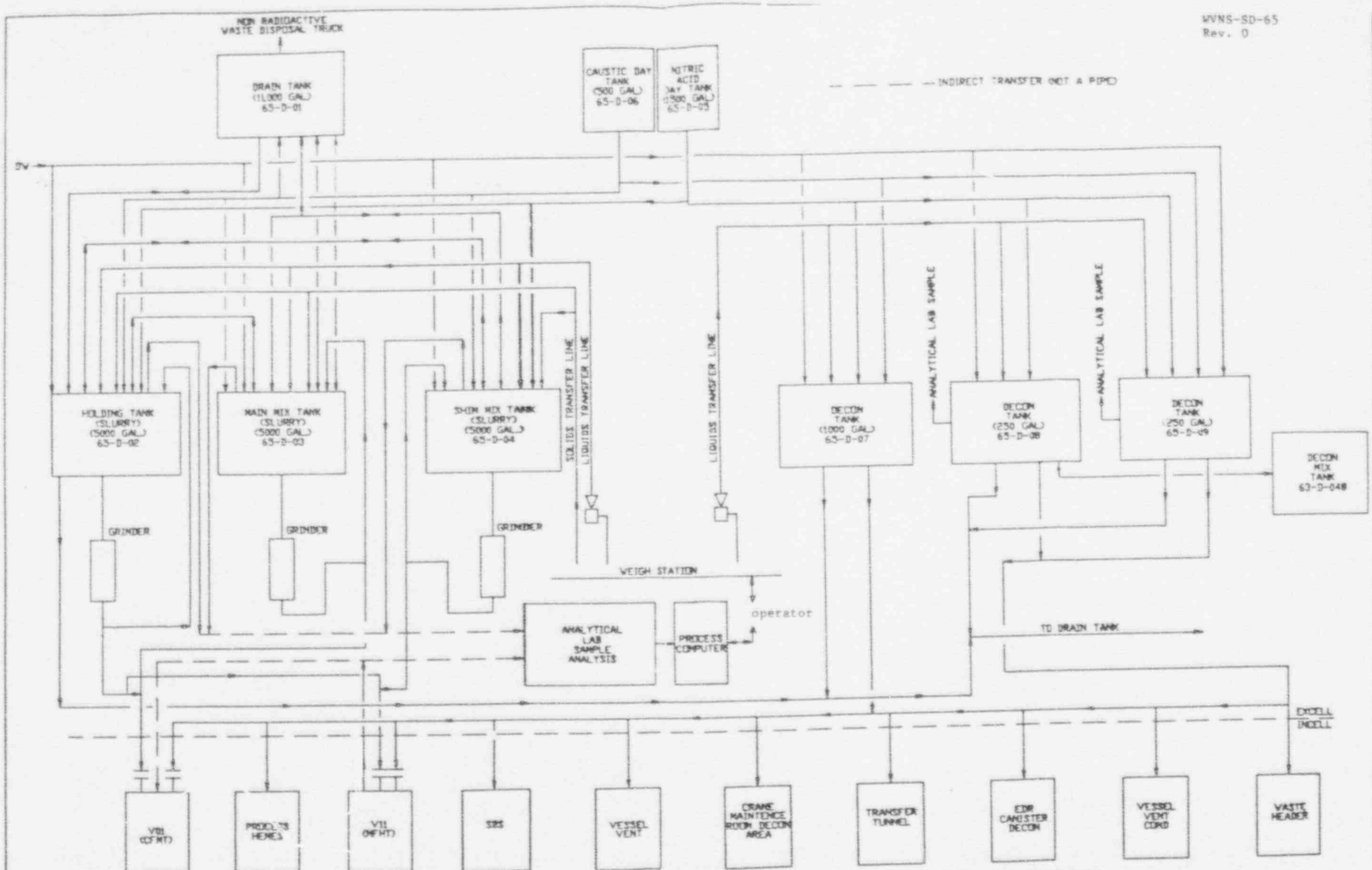
65-D-03 Preparation of feed slurries for the CFMT (63-V-001) and MFHT (63-V-011).

65-D-04 Addition of shim chemicals to the CFMT and MFHT.

65-D-02 Hold tank for off-spec. batches produced in 65-D-03.

However, the system is designed for maximum flexibility so that these functions are interchangeable if so desired.

All three slurry tanks are maintained at a slightly negative pressure (nominally -2 inches water column) via connections to the vessel vent subsystem. The tanks are also jacketed, and kept cool (< 100° F) during operation.



NOTE: THIS DIAGRAM IS A SCHEMATIC REPRESENTATION OF THE MAJOR FLOWS. FOR ACCURACY AND DETAIL SEE COLD CHEMICAL SYSTEM P & ID'S
NOS: 905D-015, 905D-016, 905D-017, 905D-018.

Figure 2.2.2-1
Cold Chemical System Flow Diagram

2.2.3 Nitric Acid Tank Operation:

NOTE: The following documents will provide further details:

- Drawings 905-D-017; 016; 015; 900D-1899; 905B-303 Sh. 17, 34, 35, 36.
- Tank Specification WVNS-EQ-275

The Nitric Acid Day Tank 65-D-05 with a nominal working volume of 5678 liters (1500 gallons) is used for storage of concentrated nitric acid (nominally 65 wt. %). The acid is brought on site by tank truck and batch fed into the tank. Overfill protection is provided via a high level alarm LAH-204 (mounted on the Cold Chemical Preparation and Feed Control Panel 65-CP-01) coupled with shutoff of the acid feed valve FCV-204, at High High level in the tank. The tank is vented via the Cold Chemical System vessel vent system and is maintained at a nominally negative pressure of -2 inches water column, primarily to prevent the out leakage of acid vapors. The tank is also equipped with a sample port and instrumentation for level, pressure, and temperature measurement.

Acid transfer out of the day tank is effected via the Nitric Acid Transfer Pump 65-G-05. A pulsation damper (65-PD-938) and a back pressure valve (PCV- 227) are provided in the discharge piping of this positive displacement pump to help minimize flow pulsations and eliminate coasting of the pump upon motor shutoff. Accurate volumetric transfer of the nitric acid is measured and controlled via the Krohne flowmeter 65-FE-227 which is coupled with a flow totalizer 65-FQT-227 and a flow controller 65-FQIC-227. Under the normal operating mode FQIC-227 (located in control panel 65-CP-01) is used to dial in the desired transfer volume, initiate the transfer, and automatically shutoff the pump upon reaching the required transfer volume.

Using the appropriate transfer valves, the nitric acid may be transferred from the day tank to any the following tanks:

VALVE	TANK
65-X-733	Common to shim & decon mix tanks
65-X-603	Decon Tank 65-D-07
65-X-613	Decon Tank 65-D-08
65-X-620	Decon Tank 65-D-09
65-X-681	Shim Mix Tank 65-D-04
65-X-734	Drain Tank 65-D-01

65-X-731 Holding Tank 65-D-02

65-X-732 Main Mix Tank 65-D-03

The nitric acid transfer system has interlocks which prevent:

a) Transfer of acid to more than one tank at a time.

b) Transfer of acid into a full tank.

c) Simultaneous transfer of acid and caustic soda.

d) Deadheading the pump 65-G-05.

2.2.4 Caustic Soda Tank Operation

NOTE: The following documents will provide further details:

- Drawings 905-D-015; 016; 017; 900D-1899; 905B-303 Sh 17, 28, 31, 32.
- Tank Specification WVNS-EQ-275.
- As-built vender drawings: E-1500.

The Caustic Day Tank 65-D-06 with a nominal working volume of 1893 liters (500 gallons) is used for storage of concentrated sodium hydroxide (50 wt. %). The caustic is brought on site by tank truck and batch fed into the tank. Overfill protection is provided via a panel mounted high level alarm LAH-203 (mounted in the Cold Chemical Preparation and Feed Control Panel 65-CP-01) coupled with shutoff of the caustic feed valve FCV-203, at High High level in the tank. The tank is vented via the Cold Chemical System vessel vent system and is maintained at a nominally negative pressure of -2 inches water column, primarily to prevent the out leakage of vapors. The tank is also equipped with a sample port and instrumentation for level, pressure, and temperature measurement.

Caustic transfer out of the day tank is effected via the Caustic Transfer Pump 65-G-06. A pulsation damper (65-PD-939) and a back pressure valve (PCV-221) are provided in the discharge piping of this positive displacement pump to help minimize flow pulsations and eliminate coasting of the pump upon motor shutoff. Accurate volumetric transfer of the caustic is measured and controlled via the Krohne flowmeter 65-FE-221 which is coupled with a flow totalizer 65-FQT-221 and a flow controller 65-FQIC-221. Under the normal operating mode FQIC-221 (located in control panel 65-CP-01) is used to set the desired transfer volume, initiate the transfer, and automatically shutoff the pump upon reaching the required transfer volume.

Using the appropriate transfer valves, the caustic may be transferred from the day tank to any the following tanks:

VALVE	TANK
65-X-727	Common to shim & decon mix tanks
65-X-604	Decon Tank 65-D-07 (locked and tagged)
65-X-621	Decon Tank 65-D-09
65-X-680	Shim Mix Tank 65-D-04
65-X-728	Drain Tank 65-D-01
65-X-725	Holding Tank 65-D-02
65-X-726	Main Mix Tank 65-D-03

The caustic transfer system has interlocks which prevent:

a) Transfer of caustic to more than one tank at a time.

b) Transfer of caustic into a full tank.

c) Simultaneous transfer of acid and caustic soda.

d) Deadheading the pump 65-G-06.

2.2.5 Decon Makeup and Transfer:

NOTE: The following documents will provide further details:

- Drawings 905D-015; 016; 017; 018; 900D-1900; 1901; 1902
- Tank Specification WVNS-EQ-275
- "As-built" vendor drawings: E-1498; E-1495; E-1496

Three cold chemical tanks (65-D-07, 08, and 09) are used to prepare decontamination solutions for the Vitrification Facility. The decontamination solutions projected to be used are demineralized water, dilute nitric acid, dilute sodium hydroxide, mild detergent solutions, dilute oxalic acid, dilute potassium permanganate, or dilute potassium dichromate.

The functions of each of the three decon preparation tanks are as follows:

65-D-07 Storage and transfer of demineralized water for various Vitrification Facility (VF) use.

65-D-08 Preparation and transfer of dilute nitric acid for the Decon Mix Tank (63-D-048) and other VF uses.

65-D-09 Preparation and transfer of miscellaneous decon solutions for various VF use.

The following systems have been disabled due to the service designations listed above:

<u>65-D-07</u>: Nitric acid fill, Caustic fill, Liquid eductor fill, Cooling water supply and return, Steam supply and condensate return, and agitator motor (Lock and tag). The density instrument has been removed.

<u>65-D-08</u>: Condensate return and Liquid eductor fill (lock and tag). The steam supply, caustic fill, and the density instrument have been removed.

However, the system is designed for maximum flexibility so that these functions can be reinstalled if the need arises.

The dilute nitric acid is prepared per acid dilution tables included in section 3.7. The miscellaneous decon solutions are prepared per recipes. Demineralized water (for flush or fill) can be metered into the tanks via meters 65-FQIS-027 and 028. Concentrated nitric acid and sodium hydroxide can be separately metered into the tanks from Day tanks 65-D-05 and 65-D-06, respectively. Miscellaneous liquid chemicals can be weighed and transferred into the tanks via a steam jet transfer system.

After preparation the solution is sampled via sample valves (6-65-GL-685, 686, or 687). The solution is then transferred via a pump (65-G-07, or 08) and flexible transfer hoses to one of the following locations:

Vessel Vent Condenser (63-E-015)

Vessel Mist Eliminator (63-C-032)

HEME #1 (63-T-033)

HEME #2 (63-T-036)

CFMUT Demister (63-V-001)

CFMUT Decon Fill (63-V-001)

Vessel Vent Header Flush

SBS Scrubber Vessel (63-V-031)

SBS Receiver Vessel (63-V-031)

MFHT Decon Fill (63-V-011)

Waste Header North Branch Flush

Waste Header East Branch Flush

Transfer Tunnel Spray Nozzles

CMR Decon Area Hose Connection

EDR Decon Area Hose Connection

Decon Mix Tank Hose Connection

Drain Tank Fill (65-D-01)

Tank 65-D-08 is "hard-piped" to the Decon Mix Tank (63-D-048) via pump 65-G-08. This is necessary because transfer of nitric acid solution will occur frequently. The dilute HNO_3 pumped to 63-D-048 is used for glass canister decontamination using $Ce^{+4}(NO_3)_3$ solution. This is immediately followed by a second batch of dilute nitric acid for flushing the canister. Therefore, two batches of dilute nitric acid need to be prepared approximately every 65 hours. Flexibility has been maintained by using valved hose connections on pump 65-G-08 suction and discharge piping. During normal operation tank 65-D-07 will transfer DW to the VF via pump 65-G-07 and the flexible transfer hose at the pump suction will remain connected. Tank 65-D-08 will transfer dilute nitric acid to the Decon Mix Tank (63-D-048) via pump 65-G-08. Tank 65-D-09 will only be connected to a pump if a different decon solution is required (This is not a planned evolution during VF operation). The transfer pumps will require flushing with DW after usage with other than the normal solution to prevent unwanted chemical reactions within the pump and piping. Per present design, pump 65-G-07 will be piped to a 3 inch diameter section hose with a flowrate limit of TBD gpm. Therefore, for DW transfers requiring larger flowrates (see Table D-07-2, Section 3.6), pump 65-G-08 will have to be utilized.

For all transfers, notification of and coordination with the vitrification control room will be required to set the required conditions for and to monitor the status of the transfer.

All three tanks are maintained at a slightly negative pressure (nominally -2 inches water column) via connections to the vessel vent subsystem. The tanks can be cooled by an attached tank jacket to maintain temperature less than 100°F. Steam heating of tanks 65-D-07 and 09 is also possible but will not normally be in use during VF operation. Each tank has an agitator to ensure proper tank mixing but the tank 65-D-07 agitator will not normally be used during VF operation.

2.2.6 Drain Tank Operation:

NOTE: The following documents will provide further details:

Drawings 905D-017

The Drain Tank 65-D-01 with a nominal working volume of 41,640 liters (11,000 gallons) is used for the collection and disposal of all drainage and wastes within the Cold Chemical Building. The Cold Chemical sump automatically discharges waste solutions such as wash water, leakage, and spillage to the tank. Excess water/chemicals from the scrub solution tank (65-D-10) are also automatically pumped into the tank. A hose connection allows the transfer of waste and flush solutions from the decon tanks 65-D-07, 08, 09 to be transferred to the tank. In addition, the drain tank may be required to receive an unusable batch of slurry or decon solution, or the entire contents of any tank in the cold chemical building, if deemed necessary. Connections to the acid and caustic delivery systems allow direct addition of concentrated caustic soda and nitric acid. Utility water can also be added to the tank for flush purposes. The tank is provided with a cooling water jacket and agitator. The tank temperature is maintained below 100 deg. F. The tank agitator is expected to be operating continuously under normal operations, and a heel of approximately **13,250 liters (3,500 gallons)** will be maintained in the tank to keep the agitator blades submerged. Under normal operations, the tank contents will be periodically transferred to a tank truck for off site disposal. Pump 65-G-01 will be used to transfer slurry out of the tank. The tank is vented via the Cold Chemical System vessel vent subsystem and is maintained at a nominally negative pressure of -2 inches water column, primarily to prevent the outleakage of vapors. The tank is also equipped with a sample port and instrumentation for level (bubblers), pressure* and temperature measurement. Overfill protection is provided via a High level alarm LAH-200 mounted on control panel 65-CP-01, coupled with shut-off of nitric and caustic transfer pumps (65-G-05, 06) at a preset High High level in the tank. Finally, there is an agitator motor trip setpoint at low level in the tank (to prevent agitator from functioning without proper submersion of the blades).

* Pressure measurement has not been incorporated to date.

2.2.7 Pneumatic Subsystem for Solids Transfer:

NOTE: The following documents will provide further details:

Drawings 905D-018; 905D-015; 905D-020

WVNS-CS-139

The "Vac-U-Max" pneumatic transfer system is employed for the transfer of ingredient powders into the slurry mix tanks (65-D-02; 03; or 04). Drums containing the slurry ingredient powders are staged in the Cold Chemical Scale Room on the west end of the Cold Chemical building. The drums are placed on weigh scales and their contents transferred into the slurry mix tanks per recipe requirements using the above mentioned transfer system.

The pneumatic transfer system consists of a common blower (65-H-01) for supply of the motive vacuum to three transfer sub-systems, one for each tank. Each transfer sub-system consists of a pickup wand, transfer tubing and a receiving hopper from which the powder is fed directly into the slurry tank by means of a dump and isolation valve (see Drawing 905D-018 and **Appendix** 3). The system is operated from the Vac-U-Max control panel also located in the Cold Chemical Scale Room. The sub-systems can only be operated sequentially, so that slurry preparation occurs in one tank at a time.

Undesirable back flow of moisture and dust from the tank to the hoppers (due to vacuum in the hoppers) is prevented by the use of a double valve hopper discharge design with air purge, as shown in Drawing 905D-018 Sh. 2.

A "Broken Bag Detector" device is employed for early detection of a break in the primary filters (located in each receiver assembly). On detecting a break, the device will sound a horn in the Vac-U-Max control panel and will suspend transfer operations after discharge of the contents of the receiver.

Sequence of Operation:

The Vac-U-Max System is designed to operate in a cyclical fashion. Each material transfer cycle is comprised of three sequential steps or modes:

Normal Status: (Before start-up of cycling sequence)

- Vacuum pump running

NOTE: The vacuum pump motor runs continuously when the system is in operation. The vacuum pump vent valve allows it to run on air inbleed during the receiver discharge mode.

- Wand is placed in a drum of material to be transferred.
- Vacuum pump vent valve in vent mode
- Receiver vent valve in vent mode
- Line vent valve in transfer mode
- Isolation valve closed
- Discharge valve closed

Turning one of the three switches labeled "Receiver #1, 2, or 3", on the Vac-U-Max control panel to the ON position starts the three-step sequence.

<u>Cycle Step 1</u>: Receiver Discharge to Tank (First 45 seconds)

- Knifegate Isolation Valve (at conical adapter on tank inlet) opens, and aeration unit is switched on.
- Discharge Valve opens and empties the content of the receiver into the tank.
- Both vibrators are turned on to help dislodge material hung up in receiver and conical adapter section.
- Pulse jet is activated to backflush filter in receiver.
- Discharge Valve closes and vibrators are turned off.
- Isolation Valve closes and aeration unit is shut off.

<u>Cycle Step 2</u>: Material Transfer from drums to receiver (next 40 seconds)

- Vacuum Pump Vent Valve and Receiver Vent Valve switch to vacuum mode to restore vacuum to receiver.
- Material is pneumatically transferred from its supply drums to the receiver.

<u>Cycle Step 3</u>: Line Flush (next 10 seconds)

- Line Vent Valve switches to vent mode, terminating the transfer of material from the drums and causing an air flush of residual material from the transfer line into the receiver.
- Vacuum Pump Vent Valve returns to vent mode, terminating the line flush.

- Receiver Vent Valve returns to vent mode, and Line Vent Valve returns to transfer mode (i.e., normal status positions for start-up of next cycle).

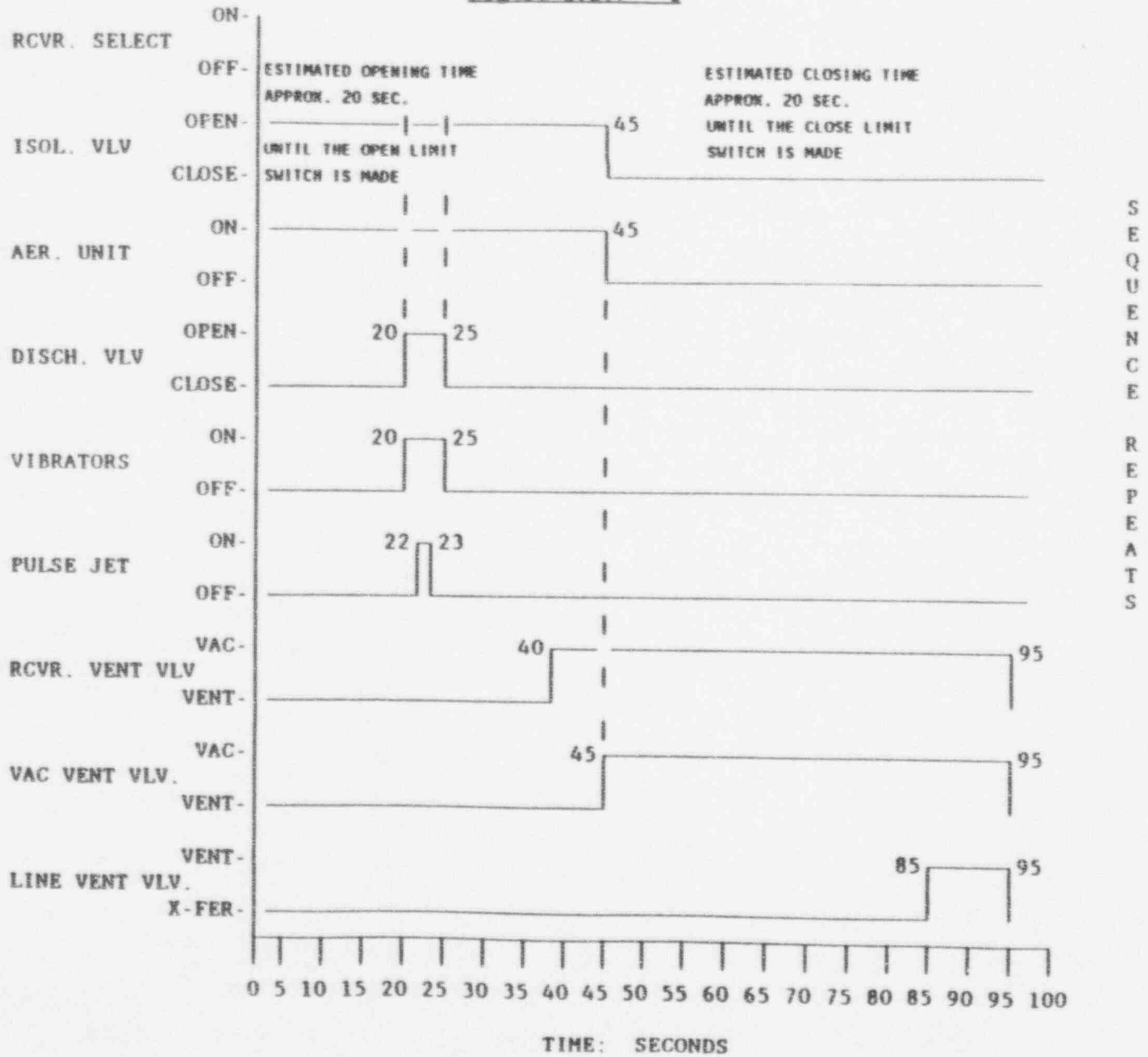
The cycle then starts again.

If transfer operations are interrupted in mid-cycle (i.e., sudden loss of power, etc.), the cycle will resume with Cycle Step 1 when next started up.

Figure 2.2.7-1 shows the proposed cycle sequence and times.

The time durations will be further optimized after on-site testing.

Figure 2.2.7 - 1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ON-
OFF-
ESTIMATED OPENING TIME
APPROX. 20 SEC.
UNTIL THE OPEN LIMIT
SWITCH IS MADE
ESTIMATED CLOSING TIME
APPROX. 20 SEC.
UNTIL THE CLOSE LIMIT
SWITCH IS MADE
ISOL. VLV
OPEN-
CLOSE-
45
AER. UNIT
ON-
OFF-
45
DISCH. VLV
OPEN-
CLOSE-
20
25
VIBRATORS
ON-
OFF-
20
25
PULSE JET
ON-
OFF-
22
23
RCVR. VENT VLV
VAC-
VENT-
40
95
VAC VENT VLV.
VAC-
VENT-
45
95
LINE VENT VLV.
VENT-
X-FER-
85
95
SEQUENCE REPEATS
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
TIME: SECONDS

2.2.8 Steam Jet Subsystem for Liquids Transfer:

NOTE: The following documents will provide further details:

- Drawings 905D-018; 905D-015, 905D-016; 905D-019; 905D-020
- WVNS-CS-139

The Steam Jet Subsystem for Liquids Transfer is employed for transfer of ingredient liquid chemicals to the slurry tanks (65-D-02, -03, -04), and the decon tanks (65-D-07, -08, 09). The configuration consists of two identical subsystems, one for servicing the slurry tanks and the other for the decon tanks. Each subsystem consists of a liquid eductor and associated pick-up wand connected to a motive steam supply, instrument air supply for line flush, and connecting piping to the serviced tanks. Both subsystems are not to be operated simultaneously.

The system is located in the Cold Chemical Scale Room on the west end of the Cold Chemical Building. Drums containing the liquid ingredient chemicals are staged here, placed on weigh scales, and their contents transferred to the chosen receiving tank per recipe requirements using the liquid eductor material pick-up wand.

2.2.9 Vessel Ventilation Subsystem (Venturi Scrubber)

NOTE: The following documents will provide further details:

- Drawing 905D-018 Sh 1
- WVNS-CS-139
- WVNS-EQ-295

The Vessel Ventilation Subsystem is used to maintain the nine Cold Chemical System tanks (Nos. 65-D-01 through 65-D-09) at a nominally negative pressure of up to -7 inches of water (IW) to prevent outleakage of dust and vapors into the Cold Chemical System building.

The subsystem consists of two venturi scrubbers in series with associated scrub solution tank and pumps to provide the motive force for creation of the vacuum. Liquid level in the tank is maintained within an operating band by automatic bleed off of scrub solution at high level and automatic addition of demin water at low level. A heat exchanger in the pumping loop utilizes plant cooling water to maintain the scrub water temperature. The system is on continuously during normal plant operation (a second scrub solution pump is employed in automatic standby mode to ensure this mode of operation). To ensure scrubbing efficiency, the total solids and pH of the scrub solution are monitored on a periodic basis, and maintained within operating range by bleed off and addition of fresh demin water.

2.2.10 Demin Water Fill and Flush:

NOTE: The following documents will provide further details:

- Drawings 905D-015; 016; 018; 021; 905D-048 SH 2;

Demineralized Water (DW) is used in the vitrification process for the preparation of process fluids (i.e. slurries and decon. solutions) and for the internal flushing of process lines and equipment. Accountability of water introduced in the process is important, and is accomplished via the use of water meters 65-FQIS-027 and 65-FQIS-028 in the flush and fill headers. A typical operational sequence for the addition of fill or flush water to a process component is as follows: Dial in the required volume of water to be used at the appropriate header meter; perform a valve lineup to ensure delivery to the desired location; initiate water flow at the meter. A safety feature in the meter will automatically shut it off if it senses "no flow" within a few seconds of pressing the start button.

Flush and fill water is added to in-cell components via the decon tank 65-D-07.

The interface point for the DW subsystem is at the inlet of header valve 6-DW-GT-401.

2.3 System Arrangement

The Cold Chemical System physical arrangement is illustrated by the general arrangement drawings 905-D-041, 042, 043.

2.4 Equipment Requirements

2.4.1 Main Mix Tank - 65-D-03

NOTE: The following documents will provide further details:

- Drawing No. E-1490
- Equipment Specification WVNS-EQ-275

2.4.1.A Function:

To receive all essential nonradioactive chemicals, glass formers, and waste simulants as determined by the process computer and mix to obtain a homogenous cold chemical slurry feed for transfer to the hot cell.

2.4.1.B Description:

Stainless steel 304L vertical cone bottom tank with an integral exterior dimpled cooling jacket. Nominal cooling capacity is 200,000 BTU/hr with a cooling water flow rate of 40 gpm at 85° F. The design cooling water pressure drop across the cooling jacket is 4 psi. Mixing is accomplished by a vertical top entering agitator as well as recirculation loop. Tank intrasystem supply interfaces include:

1. Nitric Acid (nominally 65 weight percent solution)
2. Sodium Hydroxide (caustic) (nominally 50 weight percent solution)
3. Tower Cooling Water
4. Utility Air
5. Instrument Air
6. Dry Utility Air
7. Demineralized Water
8. Dry Solids Chemical Feed
9. Liquid Chemical Feed
10. Vessel Ventilation Subsystem
11. Power to run the agitator

The tank is instrumented to allow for monitoring of:

1. Fluid Level
2. Temperature
3. Pressure

2.4.1.C Capacity:

Working volume is 18,925 liters (5,000 gallons) nominal.

2.4.1.D Special Environmental and Facility Constraints:

Main Mix Tank is vented to the Cold Chemical Vessel Ventilation Subsystem Venturi scrubber. Main mix tank is situated within the Cold Chemical System Building common floor berm area.

2.4.1.E Operational Parameters:

The tank will be filled per the recipe of the process computer.

Agitation utilizing a mixer and recirculation loop will assure a homogenous cold chemical feed at all tank levels.

The pressure in the freeboard area of the tank is maintained positive with respect to the hot cell (to prevent back flow from hot cell). Tank vacuum is maintained at minus 2 inches water column or lower.

Transfer of cold chemicals from the tank to the hot cell will be through a bottom discharge nozzle.

2.4.1.F Codes and Standards

The Main Mix Tank was designed and fabricated in accordance with the methods and practices of the ASME B/PV Code Section VIII, Division I; and provided with a "U" stamp.

2.4.2 Shim Mix Tank - 65-D-04

NOTE: The following documents will provide further details:

Drawing No. E-1492

Equipment Specification WVNS-EQ-275

2.4.2.A Function:

To receive, mix a transfer to the hot cell, sugar solutions, and the analytically determined minor additions of nonradioactive chemicals including glass formers and waste simulants so as to arrive at the final cold chemical feed.

2.4.2.B Description:

Stainless steel 304L vertical cone bottom tank with an integral exterior dimpled cooling jacket. Nominal cooling capacity is 170,000 BTU/hr with a cooling water flow rate of 34 gpm at 85° F. The design cooling water pressure drop across the cooling jacket is 3.3 psi. Mixing is accomplished by a vertical top entering agitator as well as recirculation loop. Tank intrasystem supply interfaces include:

1. Nitric Acid (nominally 65 weight percent solution)

2. Sodium Hydroxide (caustic) (nominally 50 weight percent solution)

3. Tower Cooling Water
4. Utility Air
5. Instrument Air
6. Dry Utility Air
7. Demineralized Water
8. Dry Solids Chemical Feed
9. Liquid Chemical Feed
10. Vessel Ventilation Subsystem
11. Power to run the agitator

The tank is instrumented to allow for monitoring of:

1. Fluid Level
2. Temperature
3. Pressure

2.4.2.C Capacity:

The nominal working volume is 1,893 liters (500 gallons).

2.4.2.D Special Environmental and Facility Constraints:

The Shim Mix Tank is vented to the Cold Chemical Ventilation Subsystem Venturi scrubber.

The Shim Mix Tank is situated within the common floor berm area of the Cold Chemical System Building.

2.4.2.E Operational Parameters:

Preparation of sugar solution for feed to in-cell tanks 63-V-001, and 63-V-011 is accomplished in the Shim Mix Tank.

Following transfer of the Main Mix Tank contents to the hot cell and sample analysis, feed adjustments are also accomplished in the Shim Mix Tank.

The tank will be filled per the recipe of the process computer.

Agitation utilizing a mixer and recirculation loop will assure a homogenous cold chemical feed at all tank levels.

The interior vapor pressure is maintained positive with respect to the hot cell (after head losses). Tank vacuum is maintained at minus 2 inches water column or lower.

Transfer of cold chemicals from the tank to the hot cell will be through a bottom discharge nozzle.

2.4.2.F Codes and Standards

The Shim Mix Tank was designed and fabricated in accordance with the methods and practices of ASME B/PV Code Section VIII, Division I; and provided with a "U" stamp.

2.4.3 Holding Tank - 65-D-02

NOTE: The following documents will provide further details:

Equipment Specification WVNS-EQ-275

2.4.3.A Function:

To receive off spec. cold chemical feed slurry batches from the main mix tank or the shim mix tank thus allowing for uninterrupted functioning of the Vitrification process.

To receive nonradioactive chemicals as determined by the process computer and mix to obtain homogenous waste simulant and glass former shims for transfer to the hot cell.

2.4.3.B Description:

Stainless steel 304L vertical cone bottom tank with an integral exterior dimpled cooling jacket. Nominal cooling capacity is 200,000 BTU/hr with a cooling water flow rate of 40 gpm at 85° F. The design cooling water pressure drop across the cooling jacket is 4 psi. Mixing is accomplished by a vertical top entering agitator as well as recirculation loop. Tank intrasystem supply interfaces include:

1. Nitric Acid (nominally 62 weight percent solution)
2. Sodium Hydroxide (caustic) (nominally 50 weight percent solution)
3. Tower Cooling Water

4. Utility Air

5. Instrument Air

6. Dry Utility Air

7. Demineralized Water

8. Dry Solids Chemical Feed

9. Liquid Chemical Feed

10. Vessel Ventilation Subsystem

11. Power to run the agitator

The tank is instrumented to allow for monitoring of:

1. Fluid Level

2. Temperature

3. Pressure

2.4.3.C Capacity:

The nominal working volume shall be 18,925 liters (5,000 gallons).

2.4.3.D Special Environmental and Facility Constraints:

The Holding Tank is vented to the Cold Chemical Vessel Ventilation Subsystem Venturi scrubber.

The Holding Tank is situated within the common floor berm area of the Cold Chemical System Building.

2.4.3.E Operational Parameters:

The pressure in the free board area of the cell is maintained positive with respect to the hot cell (to prevent back flow from hot cell). Tank vacuum is maintained at minus 2 inches water column or lower.

Transfer of cold chemicals from the tank to the hot cell will be through a bottom discharge nozzle.

Following analytical analysis of the Main or Shim Mix Tank and a determination that the batch is off specification, batch transfer of off-specification cold chemical feed into the Holding Tank is affected.

Further analysis is conducted and adjustments to the off-specification feed are made.

The readjusted cold chemical feed may be transferred back to the main mix tank, or transferred directly to the hot cell.

Under an alternate mode of operation, the holding tank is used for preparation of feed slurries to the hot cell. In this case, the Holding Tank will be filled per recipe from the process computer, and the resultant slurries transferred to the hot cell.

Agitation, utilizing a mixer with three impellers will assure a homogenous cold chemical feed at all tank levels.

2.4.3.F Codes and Standards

The Holding Tank is designed and fabricated in accordance with the methods and practices of ASME B/PV Code Section VIII, Division I, and provided with a "U" stamp.

2.4.4 Nitric Acid Day Tank - 65-D-05

2.4.4.A Function:

To receive, hold and provide a source of nitric acid for the Cold Chemical System.

2.4.4.B Description:

The Nitric Acid Day Tank is a vertically situated cylindrical tank with ASME flanged and dished top and bottom heads. It is constructed of stainless steel type 304L. The tank is provided with provisions for the following supply interfaces:

1. Nitric Acid Fill

It is instrumented to provide for measuring the following parameters:

1. Level
2. Pressure
3. Temperature

2.4.4.C Capacity:

Nominal working capacity is 5,677 liters (1,500 gallons).

2.4.4.D Special Environmental and Facility Constraints:

The Nitric Acid Day Tank is vented to the Cold Chemical Ventilation Subsystem.

The Nitric Acid Day Tank is situated in a separate and independent bermed area.

2.4.4.E Operational Parameters:

As required during slurry feed decon preparation, nitric acid is transferred through a bottom discharge valve and metered (pumped) to a slurry or decon tank. It may also be transferred to the drain tank.

2.4.4.F Codes and Standards:

The Nitric Acid Day Tank was designed and fabricated in accordance with the methods and practices of ASME B/PV Code, Section VIII, Division I, and provided with a "U" stamp.

2.4.5 Nitric Acid Delivery Subsystem

2.4.5.A Function:

The function is to accurately deliver nitric acid to any one of the Cold Chemical System slurry (drain tank included) or decon tanks. In the slurry tanks nitric acid is used for pH control and not for attaining an accurate nitrate ion concentration. In the decon tanks the nitric acids' role is still to be determined.

2.4.5.B Description:

The nitric acid delivery subsystem consists of the following components arranged as shown in P&ID 905-D-017. Components include:

- Nitric acid day tank 65-D-05
- Nitric acid metering pump 65-G-05
- Flowmeter FQIS-227
- Isolation valves
- Pulsation dampers
- Level element LE-204

2.4.5.C Capacity:

The maximum flow rate that the system is capable of delivering is 500 gph at 100 psig.

The accuracy of individual subsystem components per manufacturer's literature is:

Level Element	:	LE-204	+/- 1%
Metering Pump	:	65-G-05	+/- 1%
Flow Meter	:	FQIS-227	+/- 0.5%

Total system accuracy is to be determined during testing.

2.4.5.D Special Environmental and Facility Constraints:

There are none.

2.4.5.E Operational Parameters:

Temperature	:	(Environmental)	60°F - 95°F
		(Fluid)	60°F - 95°F
Pressure	:	(Tank 65-D-05)	-2 inches WCG
		(Pump Head Max)	231 feet
Fluid	:	65 wt% nitric acid (nominal)	

2.4.5.F Codes and Standards:

The codes and standards utilized for individual subsystem components are found in WVNS-CS-139.

2.4.6 Sodium Hydroxide (Caustic) Day Tank - 65-D-06

2.4.6.A Function:

To receive, hold and provide a source of sodium hydroxide for the Cold Chemical System.

2.4.6.B Description:

The Sodium Hydroxide Day Tank is a vertically situated cylindrical tank with ASME flanged and dished top and bottom heads. It is constructed of stainless steel type 316L. The tank is provided with provisions for the following supply interface.

1. Sodium Hydroxide Fill

It is instrumented to provide for measuring the following parameters:

1. Level

2. Pressure

3. Temperature

2.4.6.C Capacity:

Nominal working capacity is 1,892 liters (500 gallons).

2.4.6.D Special Environmental and Facility Constraints:

The Caustic Day Tank is vented to the Cold Chemical Ventilation Subsystem.

The Caustic Day Tank is situated in a separate and independent bermed area.

2.4.6.E Operational Parameters:

As required during slurry feed or decon preparation, caustic is transferred through a bottom discharge valve and pumped (metered) to a slurry decon tank.

It may also be transferred to the drain tank.

2.4.6.F Codes and Standards:

The Caustic Day Tank was designed and fabricated in accordance with the methods and practices of ASME B/PV Code, Section VIII, Division I, and provided with a "U" stamp.

2.4.7 Sodium Hydroxide Delivery Subsystem

2.4.7.A Function:

The function is to accurately deliver sodium hydroxide (caustic) to any one of the Cold Chemical System slurry or decon tanks in the slurry tanks addition of caustic represents a means for providing sodium to the glass. The precise amount of sodium will vary with each batch depending on the amount of Borax other sodium bearing melter feed constituents. Regardless of the amount to be added, the accuracy of addition is critical. Regarding the addition of caustic to the decon tanks, its role has not yet been determined.

2.4.7.B Description:

The sodium hydroxide delivery subsystem consists of the following components arranged as shown in P&ID 905-D-017. Components include:

- Sodium Hydroxide Day Tank; 65-D-06
- Sodium Hydroxide Metering Pump; 65-G-06
- Flowmeter FQIS-221
- Isolation Valves
- Pulsation Dampers
- Level Element; LE-203

2.4.7.C Capacity:

The maximum flow rate that the system is capable of delivering is 330 gph at 100 psig.

The accuracy of the individual subsystem components per manufacturer's literature is:

Level Element	:	LE-203; +/- 1%
Metering Pump	:	65-G-06; +/- 1%
Flowmeter	:	FQIS-221; +/- 0.5%

Total system accuracy is to be determined during testing.

2.4.7.D Special Environmental and Facility Constraints:

Care should be taken to assure that the fluid (sodium hydroxide) is kept above 50°F to avoid solidification.

2.4.7.E Operational Parameters:

Temperature	:	(Environmental)	60°F - 90°F
		(Fluid)	60°F - 90°F
Pressure	:	(Tank 65-D-06)	-2 inches WCG
		(Pump Head Max)	231 feet
Fluid	:	50 WT% sodium hydroxide	

2.4.7.F Codes and Standards:

The codes and standards utilized for individual subsystem components are found in WVNS-CS-139.

2.4.8 Decon Tanks (Chemical Addition Tanks)

2.4.8.A Function:

To receive, prepare, and store all constituents of decontamination solutions for such items as the hot cell equipment decon, Cranes, Crane Maintenance Room, and General decon solution supply for canister decon. The tanks have special designated services. See **section 2.2.5** for details.

NOTE: That this decon. solution supply does not include cerium.

2.4.8.B Description:

The Chemical Addition Tanks (three total) also known generally as the Decon Tanks are constructed of stainless steel type 304L. They are cylindrical in shape with their top and bottom heads being ASME flanged and dished. Situated in the vertical position they are equipped with vertical top entering agitators. Process temperatures are controlled utilizing "strap on" heating/cooling jackets. The heating capacity of these jackets is 200,000 BTU/hr with a saturated steam flow rate of 215 lbm/hr at 25 psig. The ability to heat tank 65-D-08 has been disabled by removal of the steam supply. The cooling capacity is 85,000 BTU/hr with a cooling water flow rate of 17 gpm at 85° F for Tank 65-D-07 and 45,000 BTU/hr with a cooling water flow rate of 9 gpm at 85° F for Tanks 65-D-08 and 65-D-09. The design maximum pressure drop for cooling water across each cooling jacket is 5 psi. Each tank is equipped with the following supply interfaces:

1. Nitric Acid Supply (nominal 65% solution)
2. Sodium Hydroxide (caustic) (nominal 50% solution)*
3. Tower Cooling Water
4. Steam for heating (N/A 65-D-08)
5. Demineralized Water
6. Liquid Chemical Feed
7. Vessel Ventilation

3. Power to run the agitator

*Connection to tank 65-D-08 has been removed

Each tank contains instrumentation for monitoring:

1. Fluid level

2. Temperature

3. Pressure **

** Pressure instrumentation has not been incorporated to date

2.4.8.C Capacities:

1. Tank 65-D-07

Nominal working volume is 3,785 liters (1,000 gal).

2. Tanks 65-D-08 and 65-D-09

Nominal working volume is 946 liters (250 gal).

2.4.8.D Special Environmental and Facility Constraints:

The decon tanks are vented to the Cold Chemical Ventilation Subsystem Venturi scrubber.

The decon tanks are situated within the common floor berm area of the Cold Chemical System Building.

2.4.8.E Operational Parameters:

Metered demineralized water is added via meters FQIS-027 and -028.

Acid and caustic are metered and added from utility supply via a local "Day" Tank.

Transfer of decon. chemicals is affected as needed in the Vitrification Facility. Chemical solutions can be added to the tanks via weigh stations and transferred using the liquid chemical transfer system.

2.4.8.F Codes and Standards

The Chemical Addition Tanks are designed and fabricated in accordance with the methods and practices of ASME B/PV code Section VIII, Division 1; latest edition, and provided with a "U" stamp.

2.4.9 Drain Tank

TBD

2.4.10 Pneumatic Subsystem for Solids Transfer (Vac-U-Max)

NOTE: See Appendix 3 for vendor sketches.

2.4.10.A Function:

To provide for the efficient transfer of the various dry (powdered) slurry/glass former chemicals from plastic lined drums located at the Cold Chemical Scale Room in the west end of the Cold Chemical Building to the slurry tanks; 65-D-02, 65-D-03, and 65-D-04.

2.4.10.B Description:

This system consists of a number of components distributed throughout the Cold Chemical Building as shown physically on the general arrangement drawings and schematically on the P&ID No. 905D-018. Also attached are vendor sketch 2B31039 with bill of materials and PID sketch nos. 2B31532, pages 1-4. The various subcomponents and their descriptions are as follows:

1. Material Pick-up Wand (Item 1 on vendor sketch ZB31039)

   The wand is used for transfer of ingredient chemical powders out of their supply drums. It is 3 inches in diameter by 48 inches long, and is fitted with a bag guard at its tip. An adjustable air inbleed collar allows for control of the material transfer rate. The powder to be transferred is fluidized at the wand tip and pneumatically transferred to the selected slurry tank. There are three wands, one for each tank.

2. Line Vent Valve - Mounted on the Material Line (Item 4 on vendor sketch ZB31039)

   The line vent valve is used to introduce atmospheric air to the vacuum line to clear it of product. A dual acting cylinder shifts the valve by a pilot signal from a 4-way solenoid mounted in the junction box. When the 4-way solenoid is deenergized, the line vent valve will be closed allowing only product to transfer. When the 4-way solenoid is energized, the line vent valve will open allowing atmospheric air to enter the material line.

3. Receiver with Filter Assembly (Items 65-V-02, 03, 04 on vendor sketch ZB31039 and ZB31532)

   The receiver includes the filter assembly mounted on top of the receiver. The receiver contains a filter pulse jet cleaning unit, a 12" discharge valve, an isolation valve, two vibrators, and an aeration unit.

4. Pulse Jet Filter Cleaning - Mounted on the Multifilter Receiver

   The receiver is supplied with a multifilter assembly. The filters are cleaned during each discharge cycle by a one second blast of high pressure air. A high pressure vessel (bottle) mounted on the receiver holds a reservoir of air needed for the cleaning function. The 3-way valve mounted on the pulse bottle allows the bottle to pulse onto the filters when it is actuated. The 3-way air valve is actuated by a 3-way solenoid mounted in the junction box.

5. 12" Discharge Valve - Mounted on the Receiver

   The discharge valve is mounted at the bottom of the receiver. The valve opens and closes by the actuation of a double acting air cylinder piloted by the 4-way solenoid valve in the junction box. The discharge valve will remain closed when the product is being transferred and open when ready to discharge.

   Energizing the solenoid opens the discharge valve,while deenergizing it allows the discharge valve to close.

6. Isolation Valve - Mounted on the Conical Adapter (Knife Gate Valve on vendor sketch ZB31532)

   The isolation valve is used to cut off steam or gases from entering the bottom of the receiver. The valve is usually closed unless the receiver is chosen to operate. A dual acting cylinder shifts the valve by a pilot signal from a 4-way solenoid mounted in the junction box. When the 4-way solenoid is deenergized, the isolation valve will be closed allowing no gases to enter the receiver. When the 4-way solenoid is energized, the isolation valve will open along with the actuation of the aeration unit allowing normal operation of the receiver.

7. Aeration Unit - Mounted on the Conical Adapter

The aeration unit is used to provide a clean volume of air cushion in the conical adapter. The purpose of this device is to not allow any steam or gases from the process below to enter the receiver through the discharge valve. By having such a device, it will eliminate any material build-up in the receiver. The aeration unit is actuated continuously when the isolation valve is open. The unit is piloted from a 2-way solenoid mounted on the aeration unit.

8. Vibrator - Mounted on the Receiver and Conical Adapter

The vibrator is a device used to aid in material flow out of the receiver during the discharge cycle. Two vibrators are employed simultaneously. They produce a quivering effect to the receiver and the conical adaptor piece respectively, and are controlled by two high pressure manifolds. Three-way solenoids mounted in the junction box actuate the vibrators. The vibrators are controlled to actuate during the entire discharge period. This procedure is repeated continuously during each discharge cycle.

9. Broken Bag Detector - Mounted In-Line on the Vacuum Side (Item 17 on vendor sketch ZB31039)

The broken bag detector is a device that will sense any differential pressure due to a damaged primary filter bag. The broken bag detector will detect any material that may pass through the damaged filter bags in the system. The unit contains a pressure switch that actuates at a preset differential. When the high differential pressure is reached, it will start the line vent cycle. Next the vacuum receiver will discharge the material, and after a preset time close the discharge valve and isolation valve. A red light will come on the main control panel and blink until the condition is corrected. A horn will sound on the control panel for 15 seconds.

10. Receiver Vent Valve - Mounted on Receiver Frame (Items W-834, 835, 836 on vendor sketch ZB31039 and ZB31532)

The receiver vent valve is designed to vent the receiver when no vacuum is present. The valve is designed with vent openings in the cylinder end plate. Normal use is as a vacuum select valve in the tri-receiver system. As the valve closes at the completion of a convey cycle, the line to the vacuum pump is sealed off, and the vacuum receiver is vented to atmospheric air. This aids in filter cleaning in that it provides a slight atmospheric blowback and relaxes the filter resulting in more effective filter cleaning. Material discharge is aided as the vacuum is relieved quickly allowing the discharge valve to open without overcoming force. A dual acting cylinder shifts the valve by a pilot signal from a 4-way solenoid mounted in the junction box. When the 4-way solenoid is deenergized, the receiver vent valve will be closed allowing no vacuum to enter the receiver. When the 4-way solenoid is energized, the receiver vent valve will open allowing the vacuum to enter and place the receiver under the vacuum.

11. Vacuum Pump Vent Valve - Mounted on Vacuum Pump (Item W-816 on vendor sketch ZB31039)

    The vacuum pump vent valve is used to divert vacuum from the receiver. This is accomplished by providing atmospheric air to the vacuum pump suction. A double acting cylinder shifts the valve by a pilot signal from the 4-way solenoid mounted in the junction box. When the 4-way solenoid is deenergized, the vacuum pump will vent to the atmosphere. When the 4-way solenoid is energized, the vacuum pump vent valve will shift, and the receiver will be under the vacuum.

12. The Secondary Filter - Mounted on the Vacuum Pump Skid

    The Secondary Filter is located immediately upstream of the vacuum pump and is used as a backup to the primary filters (located in each of the three receiver hoppers), thus ensuring clean exhaust even upon primary filter failure.

13. Vacuum Pump/Blower (65-H-01) - Skid Mounted

    The motive vacuum for the pneumatic material transfer system is provided by a skid mounted dual lobe positive displacement blower located on the second floor (115 ft. elevation) of the Cold Chemical Building. The skid also contains the secondary filter, the pump exhaust muffler, and pressure relief and vent valves (see vendor sketch ZB31532, Sh. 4). The pump is normally operated from the Vac-U-Max main control panel located in the drum staging and weighing bay. However, it may also be operated via a switch local to the skid. The pump is operated continuously, however, motive vacuum to the receiver is shut off during the material dump mode by the vent valve W-816 which allows inbleed of room air to the pump suction.

14. Main Control Panel

The Main Control Panel for the Vac-U-Max pneumatic material transfer system is located in the ingredient drum staging and weigh out bay at the west end of the Cold Chemical Building. It is used to start and stop the vacuum pump and the broken bag detector, to select the tank receiver to be placed in operation, and to monitor and alarm various functions (see vendor sketch ZB30957).

2.4.10.C Capacity:

The conveying rate to Tanks 65-D-02 and 65-D-03 and 65-D-04 is in the 4,500 lb/hr range. Chemicals are transported by vacuum with any one of three independent pick-up wands, one for each tank. Pickup wands are not capable of operating simultaneously.

2.4.10.D Special Environmental and Facility Constraints

The conveying system was designed to operate under vacuum so as to minimize dispersion into environment of chemicals as might occur under upset condition in a positive displacement system.

2.4.10.E Operational Parameters

Equipment must be capable of handling materials with the following characteristics:

Bulk density of conveyed material, lbs/cu. ft. - 18.7 to 284

Major characteristics of material: powder, hygroscopic, abrasive

Particle size range: -12 to -325 MESH

Conveying distance: ≈20 ft. horizontal, 25 ft. vertical

2.4.10.F Codes and Standards: The codes and standards to which this system is designed and fabricated may be found in Section 15660 of WVNS-CS-139.

2.4.11 Steam Jet Subsystem for Liquids Transfer

2.4.11.A Function:

To efficiently convey chemicals in the form of a liquid from 55 gallon drums to the slurry or decon tanks.

2.4.11.B Description:

The liquid conveying system consists of two sets of identical subcomponents, dedicated to conveying liquid to the slurry tanks and the decon tanks, respectively. The conveying system consists of the following major components and is configured as shown on P&ID drawing no. 905-D-018.

- a wand

- check valves

- flexible hose

- steam supply/shut-off valve

- a steam jet syphon

Fluid is conveyed by opening the steam supply valve and using the wand to 'sip' the liquid from the surface of the liquid filled drum. Steam flowing through the steam jet creates a vacuum in the wand causing liquid to be drawn from the drum.

Upon completion of the liquid transfer operation, a shot of utility air is introduced (via valve GT-737) to displace any residual steam within the system. This prevents the creation of vacuum by condensed steam upon shut down of the operation.

2.4.11.C Capacity:

The capacity of the conveying system is based upon the steam jets suction head, discharge head, steam pressure, and size and configuration of the jet syphon itself.

As currently configured the system is capable of conveying at a rate of approximately 31 gpm for water and 21 gpm for liquid having a specific gravity (ρ) of 1.5.

2.4.11.D Special Environmental and Facility Constraints:

Care shall be taken to provide proper maintenance If the check valve as it prevents backflow of steam through the wand in the event of a down stream plug.

2.4.11.E Operational Parameters:

Operating Steam

Pressure : 100 psig, saturated

Suction Lift : 13 feet for water; 20 feet for liquid of specific gravity = 1.5.

Suction Temperature: 80°F

Discharge Head: 13 feet for water, 20 feet for liquid of specific gravity = 1.5.

2.4.11.F Codes and Standards:

The codes and standards utilized in construction of this subsystem may be found in WVNS-CS-139.

2.4.12 Grinders

2.4.12.A Function:

Assures uniformity of particle size in the 50 microns range, for slurry transfer to hot cell.

2.4.12.B Capacity:

Sized to handle process flow rates. 100 gpm nominal with water. Actual flow rate will vary with the slurry solid concentration.

2.4.12.C Operational Parameters:

There are three grinders for servicing the three slurry tanks.

The grinders are nonremotely maintained equipment, and piping design allows for inclusion or removal of a grinder from the slurry processing loop, as required.

The grinders can process slurry to 50 micron particle size range.

2.4.12.D Codes and Standards

Grinders are designed and fabricated per manufacturer's standards.

2.4.13 Weigh Scales

2.4.13.A Function:

To weigh cold chemical constituents prior to their addition in the slurry and decon tanks (nos. 65-D-02, 03, 04, 07, 08, 09).

2.4.13.B Capacity:

The capacities of the scales shall be such that the desired weighing accuracies are attained over the range of weights to be measured. (See Tables I in WVNS-EQ-295 for constituent weights.)

2.4.13.C Accuracy and Precision:

Accuracy = 1×10^{-3}

Precision = Per NIST Handbook 44

2.4.13.D Special Environmental and Facility Constraints:

There are no special environmental and/or facility constraints.

2.4.13.E Operational Parameters:

Capable of measuring weights of chemicals from 1 kg. to 1000 kg. with an accuracy of 0.1% or better.

Capable of withstanding chemical environment and washdown.

Capable of simultaneously handling as great as four (4) 55 gallon drums or as little as fractions of a kilogram (i.e., using multiple scales).

2.4.14 Vessel Ventilation Subsystem (Venturi Scrubber)

2.4.14.A Function:

To provide for efficient removal of particulate moisture and nitric acid fumes from the Cold Chemical System process tanks and maintain tank pressure negative with respect to the atmosphere.

2.4.14.B Description:

The venturi scrubber is a skid mounted, self-contained scrubbing system consisting of the following components.

1. One (1) two-stage vacuum system including two (2) venturi ejector scrubbers equipped with spray nozzles.

2. One (1) scrub solution tank with baffle type design for mist elimination and heat exchanger (external to tank) for cooling of scrub solution.

3. Two (2) centrifugal pumps (one redundant) complete with mechanical seal, coupling, coupling guard, baseplate and motor.

4. Scrub solution tank designed, fabricated, tested and code stamped under the provisions stated in the ASME B&PV Code for Unfired Pressure Vessels (Section VIII, Division I). Tank design pressure - 15 psi/full vacuum.

5. Locally mounted temperature indicator and well for scrub solution.

6. Locally mounted level switches for the scrub solution tank with alarm contacts for alarm on Hi-Hi and Lo-level at the cold chemical control panel.

7. Pneumatically operated flow control valve in the scrub solution drain line interlocked with Hi-Hi level switch.

8. Locally mounted pressure indicator with diaphragm seal for scrub solution tank pump's discharge.

9. Two locally mounted temperature indicators, for the scrub solution tank and for the heat exchanger cooling water return.

10. Control switches for pumps and valves.

2.4.14.C Capacity:

The venturi scrubber system is capable of ejecting vent outlets from nine (9) tanks located in the Cold Chemical Building efficiently removing particulates, moisture and fumes of nitric acid, and providing exhaust of the clean air to the atmosphere.

The venturi scrubber system is designed to handle a nominal 65 ACFM of corrosive fluid containing approximately 1.3 lb/min of water vapor and 0.69 gram/min HNO_3 vapors. The fluid also contains particulate matter carried over from a vacuum transporting system of chemical feed composition listed in WVNS-EQ-295. The carryover particle size may range from 12 to 400 mesh. The system is designed for a minimum of 8 inches W.C. differential across the venturi ejector(s).

In an off-normal mode the ejector(s) is capable of accepting 300 lb/hr. (133 ACFM) of steam from a liquid eductor system while maintaining a negative pressure on the tankage served.

The system is designed with a sufficient draft to overcome the pressure drop and to provide a negative pressure at the outlet of each tank (minus 2 inches W.C. as a minimum).

2.4.14.D Special Environmental and Facility Constraints:

Care should be taken to assure that an adequate water level be maintained in the sump and/or sump seal leg portion of the vent header.

2.4.14.E Operational Parameters:

The venturi scrubber system is designed for the following operating conditions:

1.	Temperature (tank vent gases)	• up to 100°F
2.	Pressure (tank vent gases at scrubber suction port)	• -7.5 inches of water
3.	Pressure (tank vent gases at scrubber discharge port)	• +0.5 inches of water
4.	Scrubbing liquid	• Water
5.	Minimum differential pressure (between gas suction port and discharge port of venturi)	• 8 inches W.C.
6.	Removal of particulates and chemical vapors (12 to 325 mesh particles) Site Conditions and Environment	• 99 percent minimum

1)	Elevation above mean sea level - plant elev.	• 1410 ft - 100 ft
2)	Outdoor temperature range	• -20°F to 90°F
3)	Indoor temperature range	• 60°F to 95°F

4) Indoor relative humidity range • 5% to 80%

Design for Seismic Loads • No

Design Life of Equipment • 10 years

Operating Cycle - Continuous Operation

2.4.14.F Codes and Standards:

The codes and standards to which this system is designed and fabricated may be found in Section 15650 of WVNS-CS-139.

2.4.15 Piping Criteria

2.4.15.A Codes and Standards

All process and utility piping shall be designed, fabricated and installed per the methods of ANSI/ASME B31.3, Category M. Process pipe joint welds shall be restricted to only seamless butt welds.

2.4.15.B Safety Class

Process Piping: Safety Class N

Utility Piping: Safety Class N

2.4.15.C Quality Level

Process Piping: Quality Level C

2.4.15.D Utility Piping: Quality Level C

2.5 Instrumentation and Control

A full detailed description of system instrumentation controls and interlocks is found in "Cold Chemical Logic and Control Summary," by R. Mahany.

2.6 System Interfaces:

- See Appendix 2 for system interface points.

3.0 OPERATION

3.0.1 System Operational Sequence

3.0.1.A Determination of Slurry Recipe Requirements

1. Sludge/zeolite waste is transferred from the Tank Farm to the concentrator Tank 63-V-001 in the Vitrification Facility, mixed, sampled, analyzed and results sent to the process computer.

2. The process computer compares waste composition with process/product recipes, and computes the required cold chemical quantities. This recipe is then delivered to Cold Chemical System operations personnel.

3.0.1.B Cold Chemical Make-Up Phase

1. Operator readies the Main Mix Tank (65-D-03) for preparation of cold chemical slurry.

2. Demineralized water is metered directly into the Main Mix Tank via meter FQIC-028, per recipe requirements.

3. Operator identifies and gathers drums of the appropriate cold chemicals per recipe.

4. Drum identification and weight are logged.

5. Transfer of the cold chemical is initiated and completed by the operator and the weight of transferred material is logged.

6. Concentrated nitric acid and sodium hydroxide solutions are also metered directly into the Main Mix Tank from Nitric and Caustic Day Tanks 65-D-05 and 65-D-06 respectively, per recipe requirements.

7. The operator repeats the operations delineated above until the recipe is completed.

8. A sample is taken from the cold chemical mix tank, analyzed and input into the process computer.

9. The process computer compares the chemical inputs logged per Sections 2.3.2.C through 2.3.2.F and the chemical analysis to compute the error and the required shim weights for further chemical additions. The results of this computation are output in the form of a shim recipe.

10. The shim weight of the specific chemicals are added to the system in a manner consistent with the above until the appropriate chemical composition is obtained.

11. A separate slurry consisting of ingredient sugar and demineralized water is similarly prepared and sampled in the Shim Mix Tank 65-D-04 per recipe requirements (see **Section** 2.2.1.B).

12. Additional batches of shim slurries/solutions may be prepared on an "as required" basis to correct deficiencies in the Concentrator Feed Make Up Tank and Melter Feed Hold Tank slurries.

3.0.1.C Post-Cold Chemical Make-Up Phase; Transfer Phase

1. Operator completes all process and operational equipment checks (pumps OK?, etc.) per SOP.

2. Transfer of cold chemical to 63-V-001 is initiated and completed.

3. Slurry tank washdowns are initiated and completed.

4. Washdown solution is transferred to 63-V-001 and transfer lines are flushed.

3.0.1.D Decontamination Tanks

1. <u>Determining the Chemical Requirements</u>

    a. Tank 65-D-07 will be used for DW only so no decon chemical solution recipe is required.

    b. Tank 65-D-08 will be used to prepare dilute nitric acid. Normally the acid will be sent to the canister decon system. For this end use the required concentration is a constant 0.5 molar minimum. Acid dilution tables (D-08-1, 2, and 3) have been provided (see **Section** 3.7) to allow preparation of this solution (0.64 molar). If acid of a different concentration is required then a solution recipe will be provided.

    c. Tank 65-D-09 will be used to prepare miscellaneous decontamination solutions. A decon solution recipe will be provide for preparing the solution.

2. Solution Preparation

a. Tank 65-D-07: The tank will be refilled with demineralized water when required.

b. ▲ Tank 65-D08: Cooling of the tank is established to remove the heat of dilution resulting from preparing the dilute nitric acid.

▲ DW is metered into the tank. The volume of DW is determined from the acid dilution table or solution recipe. When tank level is sufficient the tank agitator is started.

▲ Concentrated nitric acid is metered into the tank from the acid day tank (65-D-05). The volume of acid is determined from the acid dilution tables or the solution recipe.

▲ The solution is then agitated for at least 5 minutes. A sample is then taken and analyzed to verify the concentration.

▲ After preparation of the initial batch, tank 65-D-08 will normally contain a "heel" of 0.7 molar acid that was left in the tank following the last transfer to the canister decontamination system. This heel will maintain the use of the agitator during the preparation of a fresh batch of nitric acid.

c. ▲ Tank 65-D-09: The tank will first have cooling established to remove any heat of reaction or dilution.

▲ DW will be metered into the tank per the solution recipe. The tank agitator will be started when level is sufficient to allow starting it.

▲ Then Concentrated nitric acid, concentrated sodium hydroxide, and/or liquid chemical will be added to the tank per the solution recipe.

▲ Using steam in the tank jacket, the solution may be heated if required.

3. Solution Transfer

a. ▴ Water will be transferred from tank 65-D-07 by pump 65-G-07 normally. Flexible transfer hoses connect the tank to the pump and the pump to the transfer line. The flow rate of the water can be controlled at the pump. The status of the transfer is determined from the level changes of tanks 65-D-07 and the receiving component. When the transfer has been completed the pump discharge hose is drained and removed. The pump suction hose will normally remain installed.

▴ Water can be transferred via pump 65-G-08 if pump 65-G-07 is unavailable.

b. ▴ Dilute nitric acid will normally be transferred from tank 65-D-08 to the canister decon station via pump 65-G-08. The pump is hard-piped between the tank and canister decon system*. The status of the transfer is determined from the tank levels. The transfers will leave an acid heel in the tank to maintain operational capability of the agitator.

▴ Acid can be sent to other VF location from tank 65-D-08 via pump 65-G-08 using a transfer hose. When the transfer is complete the hose is drained and removed.

▴ Acid can be transferred via pump 65-G-07 if pump 65-G-08 is unavailable.

c. ▴ Decon solution may be transferred to the VF using pump 65-G-08. The pump is first drained and flushed to remove the residual nitric acid which may react with the decon chemicals. The entire volume of decon solution will be transferred to leave the tank empty.

▴ The pump and tank are then flushed with DW to the drain tank (65-D-01). Finally the transfer hoses are removed.

▴ Decon solution may be transferred via pump 65-G-07 if pump 65-G-08 is unavailable.

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* This has not been incorporated to date.

3.1 Tank 65-D-03; The Main Mix Tank

NOTE 1 Middle and Top Agitator blades need to be lowered to the lowest position on their respective key ways (i.e., for maximum submergence). This has not been incorporated in the field to date.

NOTE 2 Throttle valves for control of individual tank pressure's have not been incorporated into the vessel vent subsystem piping design to date.

NOTE 3 Interlock of the Cold Chemical slurry transfer valve HV-0125 with pressure in the Concentrator Feed Make Up Tank (to reduce the possibility of back migration of radioactivity from the CFMUT) has not been incorporated to date.

A. GENERAL PRECAUTIONS

1. To ensure proper operation and prevent tank overflow, monitor the tank level at 65-LIS-002 during transfers of ingredients and slurry to the tank, and transfer of slurry out of the tank.

2. Ensure transfer is progressing well by monitoring both the decrease and the corresponding increase in levels in the supply and the receiving tanks.

3. When filling tank 65-D-03, do not fill the tank to a level greater than 17,800 liters (~ 4700 gallons).

4. Prior to starting any transfer, ensure that the receiving vessel has sufficient volume to receive the slurry to be transferred plus the planned demineralized water line flushes.

5. Make sure the agitator is on at all times when tank contains slurry. (There is a minimum liquid level requirement of ~1990 liters for the tank agitator to be on).

6. During addition of ingredient chemicals, especially strong acids and bases, closely monitor tank temperature at 65-TI-005, and interrupt or reduce the rate of transfer to maintain the tank temperature at below 100 degrees F.

7. When controlling tank temperature per this procedure, thermal shock to the tank jacket is to be avoided. If temperature difference between the cooling water supply temperature and the tank temperature (at 65-TI-005) is greater than 20 degrees F, then throttle the flow to the jacket. Once the temperature flow has equalized, full flow may be established.

Tank 65-D-03; The Main Mix Tank (cont.)

8. A permissive must be obtained from the Vitrification Control Room to allow diverter valve 65-DV-033 to switch to the transfer mode for transfer of slurry to the Vitrification Facility or to other tanks in the Cold Chemical System (CCS).

9. Continuous communication must be maintained with the Vitrification Control Room while transferring slurry to the Vitrification Facility to allow securing the transfer if any anomalies are experienced in the Vitrification system.

10. In order to prevent backflow of air from the Concentrator Feed Make Up Tank (CFMUT) to the Cold Chemical System, it is important to maintain fluid flow in the direction of the CFMUT at all times during transfer operations. During startup and shut down of the transfer, pump 65-G-03 is started immediately after opening the automatic isolation valve 65-HV-0125 and the valve is shut immediately after stopping the pump.

11. To ensure proper functioning of grinder seals, the seal water loop is to be maintained at a pressure of around 30 psi. greater than that of the process fluid in the grinder.

12. Maximum allowable temperature for slurry transfer operations is 145 degrees F (due to temperature limitations of "FABCHEM" hose).

13. Personnel protection equipment is to be utilized (per regulations) during material handling operations.

14. Agitator Blade Submersion Requirements for Long Term Operation: (i.e., > 1 hour/day)

    - The top of the bottom agitator blade must be at least 36 inches (~ one diameter) under the liquid level.

    - The top of the other two agitator blades need to be at least 25 inches (i.e., ~ half diameter) under the liquid level.

15. - Flush water used for tank and line clean-out is to be carefully monitored and minimized whenever possible. This will ensure that costly time loss due to excessive boil-down of slurry in the CFMUT is avoided.

Tank 65-D-03; The Main Mix Tank (cont.)

3.1.1 NORMAL OPERATION

Normal operations for tank 65-D-03 consist of Cold Chemical Mix Preparation, Sampling of the Cold Chemical Mix, and Cold Chemical Mix Transfer to the CFMUT.

Figures D-03-1 and D-03-2 show schematic details for the preparation, sampling, and transfer operations for Tank 65-D-03.

3.1.1.A Cold Chemical Mix Preparation

1. Initial Conditions

a. Required chemicals are present and available at the Cold Chemical Building staging area.

b. Tanks 65-D-05 and 65-D-06 contain a sufficient supply of nitric acid and caustic soda.

c. All tanks and pipe are clean and/or have been flushed.

d. A recipe has been received by the Cold Chemical System operators.

e. Initial Valve Line-up:

Verify the following valves are <u>closed</u>:

Demineralized Water Flush:
6-DW-GL-167; 6-DW-GL-168; 6-65-H-151;
6-DW-H-140; 6-65-H-154; **6-DA-GL-189**
All other demineralized water Flush valves in the Cold Chemical System (see **section** 3.13).

Demineralized Water Fill:
6-DW-GL-109;
All other demineralized water valves Fill valves in the Cold Chemical System (see **section** 3.13).

Cooling Water:
6-CW-GT-414; 6-CW-GL-415; 6-CW-GT-416;
Cooling water to all other Cold Chemical System tanks which are not currently in service.

Tank 65-D-03; The Main Mix Tank (cont.)

Slurry/Chemical:
6-65-RA-570; 6-65-LS-551; 6-65-H-531;
6-65-H-530; 6-65-X-511; 6-65-X-732;
6-65-X-726.

Utility Air/Dry Air:
6-DW-GT-413; 6-DA-GL-460; 6-DA-GL-486; 6-DA-GL-409A.

Miscellaneous:
6-65-GL-912A.

Verify the following subsystems are shut down:

Vac-U-Max pneumatic transfer system for powders.

Steam jet transfer system for liquids.

Nitric acid transfer system.

Caustic soda transfer system.

Next verify the following valves are <u>opened:</u>

Utility Air/Dry Air:
6-DA-GL-409; 6-DA-GT-437; 6-DA-L-002;
6-DA-GL-486; 6-DA-GL-492; (Agitator seal air TBD)

Demineralized Water:
65-GT-545.

Miscellaneous:
65-GL-912.

Instrument Air:
Instrument Air supply to solenoids and instrumentation associated with tank 65-D-03.

Verify the following subsystems are in operation:

Dryer subsystem for generation of dry air (from utility air) for use in the Cold Chemical System.

Vessel vent scrubber subsystem for maintaining a slightly negative pressure (~2 inches of water) in the tank freeboard space.

Tank 65-D-03; The Main Mix Tank (cont.)

2. Initial Tank and Equipment Preparation (65-D-03)

NOTE: To ensure proper operation, it is prudent to keep a close watch on tank level and pressure during major additions/transfers to and from the tanks.

a. Adjust tank pressure to -2 inches of water at 65-PI-013 by throttling valve TBD in the vessel vent line leaving the tank.

b. Place tank level indicator 65-LIS-002 in operation.

c. Per **section 3.13**, open the tank demineralized water (DW) Fill valve 65-GL-109, set the required quantity of DW to be added (per recipe requirements) at the DW Fill meter 65-FQIS-028, and add water to the tank. Record the quantity added.

NOTE 1 Water addition needs to be greater than 1990 liters to ensure the lowest impeller in the tank and the tip of the tank level probe (bubbler type with density correction capability) are sufficiently submerged for proper operation.

NOTE 2 While in the past, DW header pressure was furnished by the main plant utility room operator only upon request, this is not expected to be the case during operation of the Vitrification Facility.

d. Turn on agitator 65-K-03. Use switch 65-HS-010 at control panel 65-CP-01.

e. Turn on jacket cooling water by opening valves 6-CW-GL-415, 65-CW-GT-404, and 6-CW-GT-414.

3. Preparation of Recipe

a. Add chemicals per recipe and sequence requirements.

(1) Addition of Nitric Acid:

See **section 3.4** for operating outline for addition of nitric acid from tank 65-D-05.

Tank 65-D-03; The Main Mix Tank (cont.)

(2) Addition of Sodium Hydroxide (caustic soda)

See section 3.5 for operating outline for addition of caustic soda from tank 65-D-06.

(3) Transfer of miscellaneous liquid chemicals

NOTE: The method detailed below was used during FACTS testing, and resulted in consistently accurate weighments.

(a) Set up a stainless steel rinse drum filled with a measured volume of demineralized water in the Cold Chemical Scale Room (CCSR) of the Cold Chemical Building.

(b) Gather the drums containing the desired chemicals (per recipe) and stage them in the CCSR. Remove snow and debris, and place the drums on the appropriate weigh scale; 1-drum scale (WI-321) or 4-drum scale (WI-320). Small capacity bench scales provided may also be used where appropriate.

NOTE: Fume hood needs to be in operation, and personnel protection equipment needs to be utilized (per procedures) during material handling operations.

(c) Remove the lids from the drums and then record the gross weight and chemical species. Arrange for independent verification of the recorded information.

(d) Determine the Target Weight (i.e., Gross weight minus the weight of the empty or partially filled drums) from the recipe and independently verify this number.

Tank 65-D-03; The Main Mix Tank (cont.)

(e) Operate the Steam Jet System for Liquids Transfer per section 3.11, and the "sip" the liquid chemical from the surface of the drum. This minimizes contact of chemical with the outside of the wand. Stop short of the target by a reasonable amount (determined during initial "sipping"). Using a clean dry chemical ladle carefully scoop chemical from the drum until the precise target weight reached in the drum on the scales. Independently verify that the target weight has been reached on the scale. Using the wand, steam jet transfer the contents of the ladle to the tank. Rinse the ladle in the rinse drum. (step "a" above).

NOTE: See caution statement under section 3.11.A.5

(f) Upon completion of transfer of a liquid ingredient chemical, flush the empty drums with demineralized water and steam jet transfer the flush water into the tank. Finally, purge the flush water from the transfer lines using atmospheric air in bleed through the wand.

NOTE: See Caution statement under section 3.11.A.5.

(g) Maintain accurate records of weights of material and flush water transferred.

(h) In case of transfer of partial drums or minor ingredients, accurately transfer the desired weight of liquid into a separate container before steam jet transfer of the ingredient into the Main Mix Tank 65-D-03. This method will avoid accidental transfer of excess ingredient to a batch.

(4) Transfer of Solid (powdered) Chemicals

NOTE: The method detailed below was used during FACTS testing, and resulted in consistently accurate weighments.

Tank 65-D-03; The Main Mix Tank (cont.)

(a) Set up a stainless steel rinse drum filled with a measured volume of demineralized water in the Cold Chemical Scale Room (CCSR) of the Cold Chemical Building.

(b) Gather the drums containing the desired chemicals (per recipe) and stage them in the CCSR. Remove snow and debris, and place the drums on the appropriate weigh scale; 1-drum scale (WI-321) or 4-drum scale (WI-320). Small capacity bench scales provided may also be used where appropriate.

NOTE: Fume hood needs to be in operation, and personnel protection equipment needs to be utilized (per procedures) during material handling operations.

(c) Remove the lids from the drums and then record the gross weight and chemical species. Arrange for independent verification of the recorded information.

(d) Determine the Target Weight (i.e., Gross weight minus the weight of the empty or partially filled drums) from the recipe and independently verify this number.

(e) Operate the Vac-U-Max pneumatic system per **section 3.10**, and convey material from the drum(s) to the tank. Stop transfer 1 to 5 kg. short of target. Using a clean, dry stainless steel pan and scoop, remove chemical from the drum to the pan until the precise target is reached in the drum on the scales. Independently verify that the target weight has been reached on the scale. Using the Vac-U-Max, transfer the contents of the pan to the tank. Rinse the pan and scoop in the rinse drum (step "a" above).

NOTE 1 See **Appendix 3** for schematic details on the Vac-U-Max pneumatic transfer sub-system.

Tank 65-D-03; The Main Mix Tank (cont.)

NOTE 2 In case of transfer of partial drums or minor ingredients, accurately transfer the desired weight of ingredient chemical into a separate container (bench scales provided may be used where appropriate) before pneumatic transfer of the ingredient into tank 65-D-03. This method will avoid accidental transfer of excess ingredient to a batch.

NOTE 3 The container used for weighout of minor ingredients (usually a stainless steel pan) is to be rinsed after transfer in a drum of premeasured rinse water. The rinse water is to be finally steam jet transferred into the tank at the end of batch makeup. This will assure complete transfer of minor ingredients.

CAUTION: Since certain chemicals may react violently with water, extreme caution needs to be exercised during rinse operations involving such chemicals. Details of operation need to be fully addressed (for such chemicals) in the work order or SOP.

NOTE 4 Ingredient supply drums are to be emptied out as much as possible using the transfer wand. Residue from one drum can be transferred to the next (same chemical) by lifting plastic liner out and emptying.

Tank 65-D-03; The Main Mix Tank (cont.)

NOTE 5 Minor ingredients may also be added directly into the tank via the manhole, or may be mixed in with a measured weight of a major ingredient to facilitate complete transfer via the Vac-U-Max system. 10 mole borax ($Na_2B_4O_7 \cdot 10H_2O$) or zeolite are the preferred major ingredients due to their scouring action in the Vac-U-Max system. Further, highly hygroscopic materials (i.e. cesium hydroxide, etc.) may be purchased as a solution if deemed necessary, and transferred via the steam jet subsystem.

NOTE 6 Whenever 10 mole Borax or Zeolite are ingredient chemicals in the batch recipe, drums of these chemicals may be used intermittently to scour the system and minimize material losses.

b. Add additional demineralized water per recipe via valve 6-DW-GL-109. (see **section 3.1.1.A.2 above**)

3.1.1.B Sampling of the Cold Chemical Mix

1. Initial Conditions

a. Cold Chemical mix preparation activities are completed.

b. Instructions have been received from the vitrification control room to commence preparations for slurry sampling.

c. Chemicals have been continuously agitated.

2. Sampling Tank Contents

a. Ensure that the three-way valve (65-D-033) is set to the recirculation mode.

Tank 65-D-03; The Main Mix Tank (cont.)

b. Place grinder 65-T-03 in-line by connecting 65-I-803 to grinder inlet nozzle and 65-I-804 to the grinder discharge nozzle.

c. Verify there is adequate water in grinder seal water tank 65-D-15. Pressurize the tank (~100 psig) by opening dry air valve 6-DA-GL-486.

NOTE: The seal pressure must be at least 30 psig greater than the pressure of the process fluid in the grinder.

d. Verify there is adequate oil in the grinder by checking the oil level in the glass in the grinder bearing housing.

e. Turn on grinder using HS-016B located in the vicinity of the grinder.

f. Immediately open the tank bottom ram valve 6-65-RA-570.

g. Throttle the pump valve 65-PCV-036 to around 75% closed. Start pump 65-G-03 by opening valve 6-DA-GL-460. Adjust pressure at 65-PCV-036 such that 65-PI-030 reads 55 psig. Once the pressure is set at PCV-036, use 6-DA-GL-460 to adjust pump throughput. Valves in the pump oiler assembly 6-DA-L-002 are to be left fully open.

h. Using 6-DA-GL-460 adjust pump speed to about 40 strokes per minute (corresponds to a throughput of about 273 lpm or 72 gpm).

i. Recirculate slurry via the grinder for at least 3 batch volumes to ensure collection of acceptable samples.

NOTE: Observe the grinder motor amperage reading while bringing the pump up to speed, and stop short of overloading the grinder motor (at ~47 amps). Record the final pump speed achieved if it is less than or over the initial target value of 40 strokes per minute.

Tank 65-D-03; The Main Mix Tank (cont.)

The initial target 40 strokes per minute is required to ensure adequate velocity for slurry suspension in the lines. Higher strokes per minute are acceptable.

j. Obtain approved sample containers (bottles).

Mark Sample Name (i.e. Glass Former, etc.), Time, Date, and the Operator's Initials on each of the bottles.

Prepare Analytical Request (AR) Forms.

NOTE: Three samples and three separate readings of the liquid level in the tank are required per present estimate from system 63P.

k. Upon receiving instructions to proceed with obtaining slurry samples, open sample valve 6-65-LS-551 and gather samples at 6-65-1/2-435. The samples are to be taken at least one minute apart to ensure complete line flush and a fresh sample from the tank each time. The first ~ 20 ml. of each sample are to be discarded into a catch basin as this volume represents the dead leg in the tee.

l. Ensure sample valve 65-LS-551 is fully closed.

m. Take three readings of the liquid level in tank 65-D-03 at 65-LIS-002. The tank agitator is to be shut off before obtaining each reading. Readings are to be obtained ~ TBD seconds after agitator shutoff (this prevents errors due to slurry settling associated with longer waiting periods, and errors due to slurry swirl past the probe tip associated with shorter waiting periods). The agitator is to be restarted and slurry homogenized between readings.

n. Hand deliver samples and forms to the Analytical and Process Chemistry (A/PC) laboratory.

o. Obtain and record the Analytical Request (AR) numbers from the A/PC lab. Maintain a log of tank levels and samples taken.

p. Shut off the slurry pump by closing the valve 6-DA-GL-460.

Tank 65-D-03; The Main Mix Tank (cont.)

q. Close the tank ram valve 6-65-RA-570.

r. Make sure the demineralized water flush valve 6-DW-GT-145 is shut. Open the common slurry line flush valve 6-65-H-151 and turn on the Utility Air (UA) purge at 6-DW-GT-413. Send a slug (~30 seconds) of UA to empty most of the slurry from the recirculation loop.

NOTE: The UA line is equipped with a restricting orifice to ensure that the tank ventilation in the receiving tank is not overwhelmed, thereby pressurizing the tank.

Make sure the UA purge supply is throttled to maintain the required pressure differential at the grinder seals.

s. Shut the UA purge at 6-DW-GT-413.

t. Immediately turn on the demineralized water flush at 6-DW-GT-145 and flush the recirculation loop with TBD liter of DW.

NOTE: Set up to flush the line at 65-FQIS-027 prior to performing this step.

Jog the pump to ensure both chambers are flushed.

u. Shut 6-DW-GT-145 and immediately follow up with a UA purge via 6-DW-GT-413. (see Note on step "r" above).

v. Shut 6-DW-GT-413 and 6-65-H-151.

w. Shut off the grinder motor using the local switch HS-016B.

3.1.1.C Cold Chemical Mix Transfer to the Concentrator Feed Make Up Tank (CFMUT)

1. Initial Conditions

a. Cold Chemical mix preparation activities are completed.

b. Sampling activities are completed.

Tank 65-D-03; The Main Mix Tank (cont.)

c. Cold Chemical operator received the order to begin preparation for transfer to CFMUT.

NOTE: Check liquid level in CFMUT to ensure there is sufficient capacity in this tank to accommodate complete Cold Chemical mix batch with its associated water flushes.

2. Transfer to CFMUT

NOTE: In order to prevent backflow of air from the CFMUT to the Cold Chemical System, it is important to maintain fluid flow in the direction of the CFMUT at all times during transfer operations. During startup and shut down of the transfer, the pump 65-G-03 is started immediately after opening the automatic isolation valve 65-HV-0125 and the valve is shut immediately after stopping the pump.

a. Place grinder 65-T-03 in-line by connecting 65-I-803 to grinder inlet nozzle and 65-I-804 to the grinder discharge nozzle.

b. Verify there is adequate water in grinder seal water tank 65-D-15. Pressurize the tank (~100 psig) by opening dry air valve 6-DA-GL-486.

c. Verify there is adequate oil in the grinder by checking the oil level in the glass in the grinder bearing housing.

d. Using flexhose connect line 6-65-2-1/2-009 to 6-65-2-018 and open hose valves 65-H-530 and 65-H-528.

e. Open hand valves 6-CH-H-964 and 6-CH-H-965 located in the middle west operating aisle.

NOTE:
- Hand valve 6-CH-H-964 is about 10 feet above the aisle floor and is therefore normally to be left open.
- Hand valve 6-CH-H-965 is the cell wall block valve, and is expected to be locked and tagged except during transfer operations.

Tank 65-D-03; The Main Mix Tank (cont.)

f. Obtain permissive from the Vitrification Control Room, and then place slurry diverter valve 65-DV-033 in the transfer mode using 65-HS-033 located in Cold Chemical System control panel 65-CP-01.

NOTE: Interlock prevents switchover of this valve to the transfer mode without obtaining permissive from Vitrification Control Room.

g. Turn on grinder motor using 65-HS-016B located in the vicinity of the grinder.

h. Open the tank bottom ram valve 65-RA-570.

i. Open transfer line valve 65-HV-0125 (located near cell wall penetrations) using 65-HS-0125 located on 65-CP-02.

j. Immediately start pump 65-G-03 by gradually opening valve 6-DA-GL-460, and adjust pump speed to about 40 strokes per minute (corresponds to a throughput of about 273 lpm or 72 gpm).

This step initiates transfer of slurry from the Main Mix Tank in the Cold Chemical System to the CFMUT.

NOTE 1 Observe the grinder motor amperage reading while bringing the pump up to speed, and stop short of overloading the grinder (at ~47 amps). Record the final pump speed achieved if it is less than or over the 40 strokes per minute initial target.

The initial target 40 strokes per minute is required to ensure adequate velocity for slurry suspension in the lines. Higher strokes per minute are acceptable.

NOTE 2 It is assumed that Valve 65-PCV-036 has already been set at 55 psig. per section 3.1.1.B.2, item g.

k. Ensure transfer is proceeding well by monitoring the decrease of level in the Main Mix Tank 65-D-03 at the Cold Chemical System level station no 1, and the corresponding increase in level of the CFMUT at the Vitrification Control Room.

Tank 65-D-03; The Main Mix Tank (cont.)

l. Set up to provide demineralized water flush supply of TBD liters to the Main Mix Tank via DW Flush meter 65-FQIS-027 and tank flush valves 6-DW-GL-167, 6-DW-GL-168. (see section 3.13)

m. Monitor tank level in preparation of commencing tank flush. The agitator will trip off once the liquid level in the tank falls below 1990 liters liquid volume. Shortly after that there will be a marked change in the sound and piston action of the double diaphragm pump as the tank goes completely empty. Immediately initiate tank flush at this point by pressing the start button on the meter 65-FQIS-027.

n. Visually inspect the tank to ensure adequate cleaning of inside surfaces by flush water. Meter in additional flush water if deemed necessary.

NOTE: As a precaution, before visual inspection monitor pressures in Main Mix Tank 65-D-03 and the CFMUT, and adjust if needed to ensure the CFMUT is at a greater vacuum. Vessel vent subsystem must be on.

o. Make sure the demineralized water flush valve 6-DW-GT-145 is shut. Open the common slurry line flush valve 6-65-H-151 and turn on the Utility Air (UA) purge at 6-DW-GT-413.

NOTE: The UA line equipped with a restricting orifice to ensure that the tank ventilation in the receiving tank is not overwhelmed, thereby pressurizing the tank.

Make sure the UA purge supply is throttled to maintain the required pressure differential at the grinder seals.

p. Close the tank ram valve 6-65-RA-570 and send a slug (~ 30 seconds) of Utility Air to empty most of the tank flush water from the transfer line.

NOTE: Some adjustment of pump speed may become necessary to avoid cavitating the pump at its suction.

Tank 65-D-03; The Main Mix Tank (cont.)

q. Shut off the slurry pump by closing the valve 6-DA-GL-460.

r. Shut the UA purge at 6-DW-GT-413.

s. Immediately turn on the demineralized water flush at 6-DW-GT-145 and flush the transfer route with TBD liters of DW.

NOTE: Set up to flush the line at 65-FQIS-027 prior to performing this step.

t. Shut 6-DW-GT-145 and immediately follow up with a UA purge via 6-DW-GT-413. (see Note on step "o" above).

u. Shut 6-DW-GT-413 and immediately shut automated valve 65-HV-0125 (located in the middle west operating aisle) using 65-HS-0125 at Cold Chemical control panel 65-CP-02.

v. Shut off the grinder motor using the local switch HS-016B.

w. Close the hand valves 6-65-H-528, 6-65-H-530, and 6-CH-H-965.

x. Using 65-HS-033 located at 65-CP-01, return the diverter valve 65-D-033 to the recirculation mode, and call the vitrification control room to cancel the permissive.

y. Carefully disconnect the slurry hose, at both ends taking care to contain the drips. Remove the hose to a storage rack.

NOTE: Personnel protection equipment to be used per procedures while executing step 'y'.

Figure D-03-01

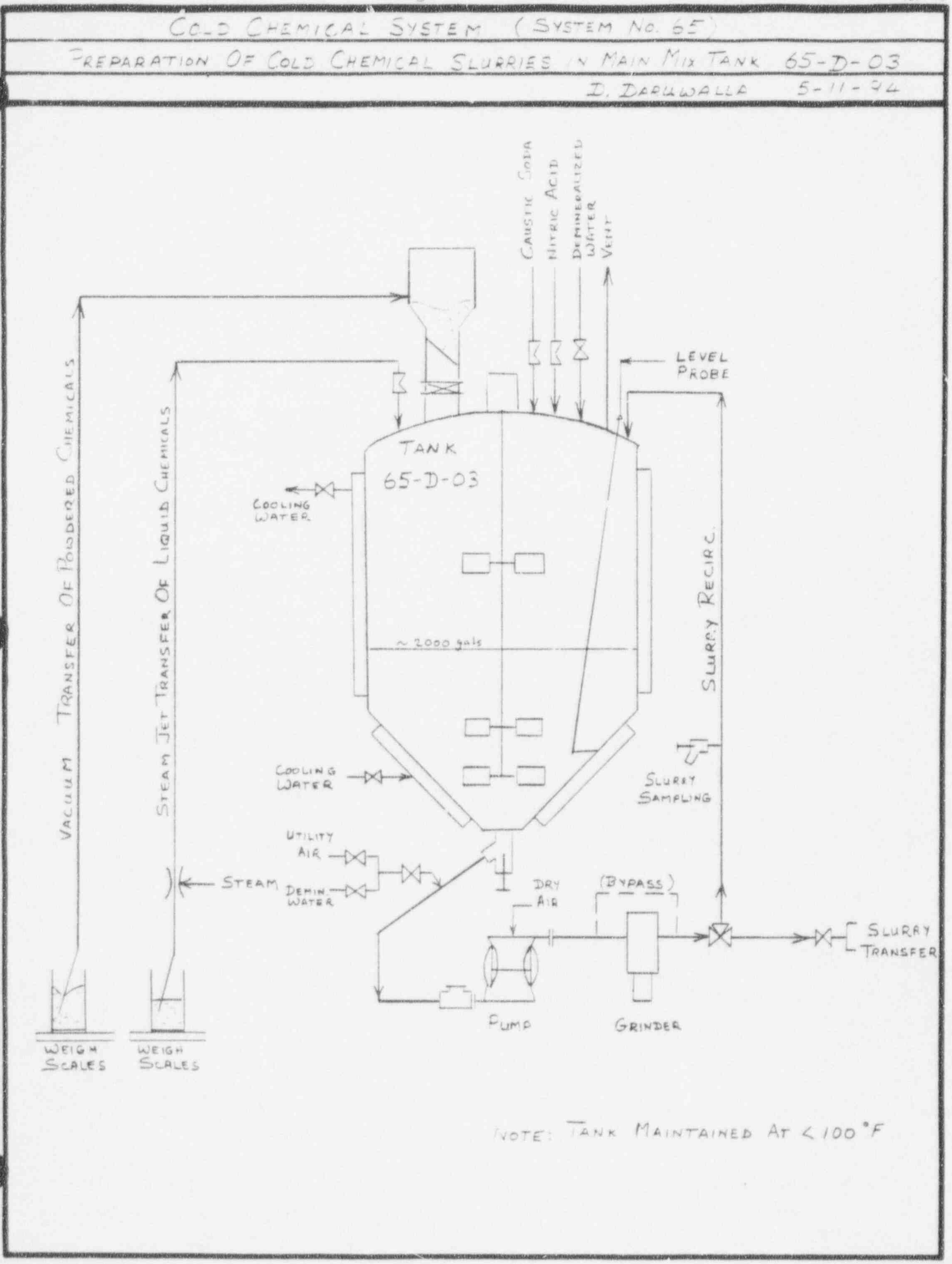
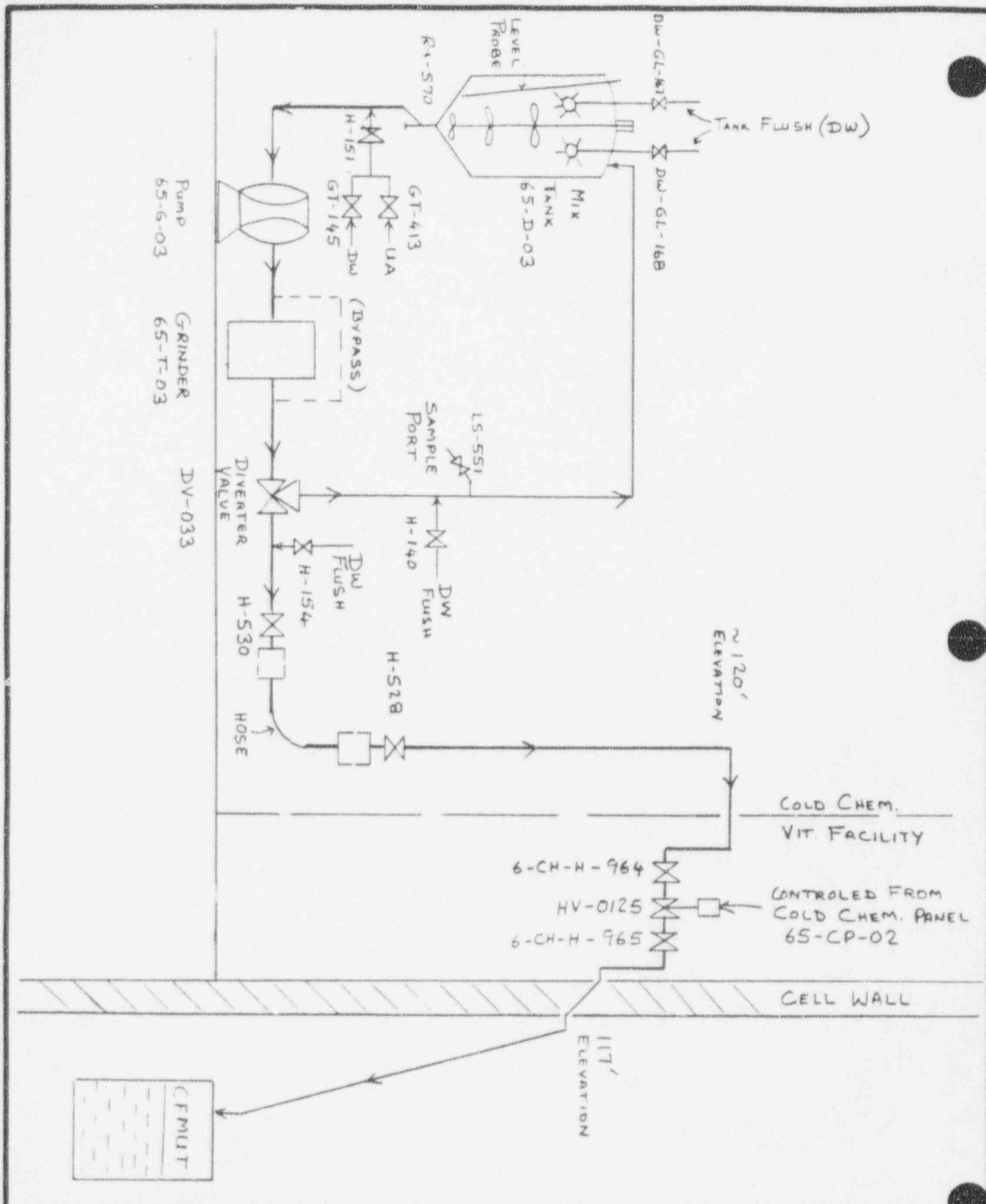


Figure D-03-02



SUBJECT COLD CHEMICAL SYSTEM	NUMBER	PAGE	OF
SAMPLE & TRANSFER OF MIX	PREPARED BY S. S. Samwalla	DATE 5/1/94	
	CHECKED BY	DATE	

3.2 TANK 65-D-04; THE SHIM MIX TANK

NOTE 1 Agitator blades need to be raised to the highest position on the shaft key way. This has not been incorporated in the field to date.

NOTE 2 Throttle valves for control of individual tank pressure's have not been incorporated into the vessel vent subsystem piping design to date.

NOTE 3 Interlock of the Cold Chemical Slurry transfer valve HV-0125 with pressure in the CFMUT (to reduce the possibility of back migration of radioactivity from the CFMUT) has not been incorporated to date.

A. GENERAL PRECAUTIONS

1. To ensure proper operation and prevent tank overflow, monitor the tank level at 65-LIS-003 during transfers of ingredients and slurry to the tank, and transfer of slurry out of the tank.

2. Ensure transfer is progressing well by monitoring both the decrease and the corresponding increase in levels in the supply and the receiving tanks.

3. When filling tank 65-D-04, do not fill the tank to a level greater than 1,700 liters (~ 450 gallons).

4. Prior to starting any transfer, ensure that the receiving vessel has sufficient volume to receive the slurry to be transferred plus the associated demineralized water line flushes.

5. Make sure the agitator is on at all times when tank contains slurry. (There is a minimum liquid level requirement of ~630 liters for the tank agitator to be on).

6. During addition of ingredient chemicals, especially strong acids and bases, closely monitor tank temperature at 65-TI-006, and interrupt or reduce the rate of transfer to maintain the tank temperature at below 100 degrees F.

7. When controlling tank temperature per this procedure, thermal shock to the tank jacket is to be avoided. If temperature difference between the cooling water supply temperature and the tank temperature (at 65-TI-006) is greater than 20 degrees F, then throttle the flow to the jacket. Once the temperature flow has equalized, full flow may be established.

Tank 65-D-04; The Shim Mix Tank (cont.)

8. A permissive must be obtained from the Vitrification Control Room to allow diverter valve 65-DV-034 to switch to the transfer mode for transfer of slurry to the Vitrification Facility or to other tanks in the Cold Chemical System (CCS).

9. Continuous communication must be maintained with the Vitrification Control Room while transferring slurry to the Vitrification Facility to allow securing the transfer if any anomalies are experienced in the Vitrification system.

10. In order to prevent backflow of air from the Concentrator Feed Make Up Tank (CFMUT) to the Cold Chemical System, it is important to maintain fluid flow in the direction of the CFMUT at all times during transfer operations. During startup and shut down of the transfer, pump 65-G-04 is started immediately after opening the automatic isolation valve 65-HV-0125 and the valve is shut immediately after stopping the pump.

11. To ensure proper functioning of grinder seals, the seal water loop is to be maintained at a pressure of around 30 psi. greater than that of the process fluid in the grinder.

12. Maximum allowable temperature for slurry transfer operations is 145 degrees F (due to temperature limitations of "FABCHEM" hose).

13. Agitator Blade Submersion Requirements for Long Term Operation: (i.e., > 1 hour/day)

    - The top of the bottom agitator blade must be at least 24 inches (~ one diameter) under the liquid level.

    - The top of the top agitator blade need to be at least 12 inches (i.e., ~ half diameter) under the liquid level.

14. Personnel protection equipment is to be utilized (per regulations) during material handling operations.

15. Lock and Tag the nitric acid feed value 6-65-X-681 to this tank (to preclude the possibility of producing NO_x via reaction between the acid and sugar).

16. Do not discharge waste sugar solution into the Drain Tank 65-D-01 (to preclude the possibility of generating NO_x via reaction with waste nitric acid in this tank). Waste sugar solutions to be handled as special case per work order.

Tank 65-D-04; The Shim Mix Tank (cont.)

17. Flush water used for tank and line clean-out is to be carefully monitored and minimized whenever possible. This will ensure that costly time loss due to excessive boil-down of slurry in CFMUT is avoided.

Tank 65-D-04; The Shim Mix Tank (cont.)

3.2.1 NORMAL OPERATION

The Shim Mix tank will be used predominantly for preparation of ~60 wt. % sugar solution for transfer to the CFMUT. It will also be used for preparation of "Shim" slurry batches to make minor adjustments to CFMUT batches on an "as required" basis (infrequent use).

Normal operations for tank 65-D-04 consist of Sugar Solution and Shim Slurry Preparation, Sampling of the mix, transfer of the mix to the CFMUT.

3.2.1.A Sugar Solution & Shim Slurry

1. Initial Conditions

a. Required chemicals are present and available at the Cold Chemical Building staging area.

b. Tanks 65-D-05 and 65-D-06 contain a sufficient supply of nitric acid and caustic soda.

c. All tanks and pipe are clean and/or have been flushed.

d. A recipe has been received by the Cold Chemical System operators.

e. Initial Valve Line-up:

Verify the following valves are <u>closed:</u>

Demineralized Water Flush:
6-DW-GL-118; 6-DW-GL-168; 6-65-H-152;
6-DW-H-141; 6-65-H-153; 6-DW-GL-190
All other demineralized water Flush valves in the Cold Chemical System (see **section 3.13**).

Demineralized Water Fill:
6-DW-GL-117;
All other demineralized water valves Fill valves in the Cold Chemical System (see **section 3.13**).

Cooling Water:
6-CW-GT-422; 6-CW-GL-423; 6-CW-GT-424;
Cooling water to all other Cold Chemical System tanks which are not currently in service.

Tank 65-D-04; The Shim Mix Tank (cont.)

Slurry/Chemical:
6-65-RA-569; 6-65-LS-552; 6-65-H-533;
6-65-H-532; 6-65-X-519; 6-65-X-681;
6-65-X-680.

Utility Air/Dry Air:
6-DW-GT-121; 6-DA-GL-461; 6-DA-GL-485; 6-DA-GL-410A.

Miscellaneous:
6-65-GL-913A.

Verify the following subsystems are shut down:

Vac-U-Max pneumatic transfer system for powders.

Steam jet transfer system for liquids.

Nitric acid transfer system.

Caustic soda transfer system.

Next verify the following valves are opened:

Utility Air/Dry Air:
6-DA-GL-410; 6-DA-GT-438; 6-DA-L-003;
6-DA-GL-485; 6-DA-GL-493; (Agitator seal air TBD)

Demineralized Water:
65-GT-146.

Miscellaneous:
65-GL-912.

Instrument Air;
Instrument air supply to solenoids and instrumentation associated with tank 65-D-04.

Verify the following subsystems are in operation:

Dryer subsystem for generation of dry air (from utility air) for use in the Cold Chemical System.

Vessel vent scrubber subsystem for maintaining a slightly negative pressure (~2 inches of water) in the tank freeboard space.

Tank 65-D-04; The Shim Mix Tank (cont.)

2. Initial Tank and Equipment Preparation (65-D-04)

NOTE: To ensure proper operation, it is prudent to keep a close watch on tank level and pressure during major additions/transfers to and from the tanks.

a. Adjust tank pressure to -2 inches of water at 65-PI-014 by throttling valve **TBD** in the vessel vent line leaving the tank.

b. Place tank level indicator 65-LIS-003 in operation.

c. Per section 3.13, open the tank demineralized water (DW) Fill valve 65-GL-117, set the required quantity of DW to be added (per recipe requirements) at the DW Fill meter 65-FQIS-028, and add water to the tank. Record the quantity added.

NOTE 1 Water addition needs to be greater than 630 liters to ensure the lowest impeller in the tank and the tip of the tank level probe (bubbler type with density correction capability) are sufficiently submerged for proper operation.

NOTE 2 While in the past, DW header pressure was furnished by the main plant utility room operator only upon request, this is not expected to be the case during operation of the Vitrification Facility.

d. Turn on agitator 65-K-04. Use switch 65-HS-011 at control panel 65-CP-01.

e. Turn on jacket cooling water by opening valves 6-CW-GL-415, 65-CW-GT-404, and 6-CW-GT-414.

3. Preparation of Recipe

a. Add chemicals per recipe and sequence requirements.

CAUTION: Ensure tank and piping do not contain sugar solutions (see PRECAUTIONS section above).

Tank 65-D-04; The Shim Mix Tank (cont.)

(1) Addition of Nitric Acid:

See section 3.4 for operating outline for addition of nitric acid from tank 65-D-05.

(2) Addition of Sodium Hydroxide (caustic soda)

See section 3.5 for operating outline for addition of caustic soda from tank 65-D-06.

(3) Transfer of Miscellaneous Liquid Chemicals

NOTE: The method detailed below was used during FACTS testing, and resulted in consistently accurate weighments.

(a) Set up a stainless steel rinse drum filled with a measured volume of demineralized water in the Cold Chemical Scale Room (CCSR) of the Cold Chemical Building.

(b) Gather the drums containing the desired chemicals (per recipe) and stage them in the CCSR. Remove snow and debris, and place the drums on the appropriate weigh scale; 1-drum scale (WI-321) or 4-drum scale (WI-320). Small capacity bench scales provided may also be used where appropriate.

NOTE: Fume hood needs to be in operation, and personnel protection equipment needs to be utilized (per procedures) during material handling operations.

(c) Remove the lids from the drums and then record the gross weight and chemical species. Arrange for independent verification of the recorded information.

(d) Determine the Target Weight (i.e., Gross weight minus the weight of the empty or partially filled drums) from the recipe and independently verify this number.

Tank 65-D-04; The Shim Mix Tank (cont.)

(e) Operate the Steam Jet System for Liquids Transfer per section 3.11, and "sip" the liquid chemical from the surface of the drum. This minimizes contact of chemical with the outside of the wand. Stop short of the target by a reasonable amount (determined during initial "sipping"). Using a clean dry chemical ladle carefully scoop chemical from the drum until the precise target weight reached in the drum on the scales. Independently verify that the target weight has been reached on the scale. Using the wand, steam jet transfer the contents of the ladle to the tank. Rinse the ladle in the rinse drum (step "a" above).

NOTE: See caution statement under section 3.11.A.5

(f) Upon completion of transfer of a liquid ingredient chemical, flush the empty drums with demineralized water and steam jet transfer the flush water into the tank. Finally, purge the flush water from the transfer lines using atmospheric air in bleed through the wand.

NOTE: See Caution statement under section 3.11.A.5.

(g) Maintain accurate records of weights of material and flush water transferred.

(h) In case of transfer of partial drums or minor ingredients, accurately transfer the desired weight of liquid into a separate container before steam jet transfer of the ingredient into the Shim Mix Tank 65-D-04. This method will avoid accidental transfer of excess ingredient to a batch.

(4) <u>Transfer of Solid (powdered) Chemicals</u>

NOTE: The method detailed below was used during FACTS testing, and resulted in consistently accurate weighments.

Tank 65-D-04; The Shim Mix Tank (cont.)

(a) Set up a stainless steel rinse drum filled with a measured volume of demineralized water in the Cold Chemical Scale Room (CCSR) of the Cold Chemical Building.

(b) Gather the drums containing the desired chemicals (per recipe) and stage them in the CCSR. Remove snow and debris, and place the drums on the appropriate weigh scale; 1-drum scale (WI-321) or 4-drum scale (WI-320). Small capacity bench scales provided may also be used where appropriate.

NOTE: Fume hood needs to be in operation, and personnel protection equipment needs to be utilized (per procedures) during material handling operations.

(c) Remove the lids from the drums and then record the gross weight and chemical species. Arrange for independent verification of the recorded information.

(d) Determine the Target Weight (i.e., Gross weight minus the weight of the empty or partially filled drums) from the recipe and independently verify this number.

(e) Operate the Vac-U-Max pneumatic system per section 3.10, and convey material from the drum(s) to the tank. Stop transfer 1 to 5 kg. short of target. Using a clean, dry stainless steel pan and scoop remove chemical from the drum to the pan until precise target weight is reached in the drum on the scales. Independently verify that the target weight has been reached on the scale. Using the Vac-U-Max, transfer the contents of the pan to the tank. Rinse the pan and scoop in the rinse drum (step "a" above).

NOTE 1 See **Appendix** 3 for schematic details on the Vac-U-Max pneumatic transfer subsystem.

Tank 65-D-04; The Shim Mix Tank (cont.)

NOTE 2 In case of transfer of partial drums or minor ingredients, accurately transfer the desired weight of ingredient chemical into a separate container (bench scales provided may be used where appropriate) before pneumatic transfer of the ingredient into tank 65-D-04. This method will avoid accidental transfer of excess ingredient to a batch.

NOTE 3 The container used for weighout of minor ingredients (usually a stainless steel pan) is to be rinsed after transfer in a drum of premeasured rinse water. The rinse water is to be finally steam jet transferred into the tank at the end of batch makeup. This will assure complete transfer of minor ingredients.

CAUTION: Since certain chemicals may react violently with water, extreme caution needs to be exercised during rinse operations involving such chemicals. Details of operation need to be fully addressed (for such chemicals) in the work order or SOP.

NOTE 4 Ingredient supply drums are to be emptied out as much as possible using the transfer wand. Residue from one drum can be transferred to the next (must be same chemical) by lifting plastic liner out and emptying.

Tank 65-D-04; The Shim Mix Tank (cont.)

NOTE 5 Minor ingredients may also be added directly into the tank via the manhole, or may be mixed in with a measured weight of a major ingredient to facilitate complete transfer via the Vac-U-Max system. 10 mole borax ($Na_2B_4O_7 \cdot 10H_2O$) or zeolite are the preferred major ingredients due to their scouring action in the Vac-U-Max system. Further, highly hygroscopic materials (i.e. cesium hydroxide, etc.) may be purchased as a solution if deemed necessary, and transferred via the steam jet subsystem.

NOTE 6 Whenever 10 mole Borax or Zeolite are ingredient chemicals in the batch recipe, drums of these chemicals may be used intermittently to scour the system and minimize material losses.

b. Add additional demineralized water per recipe via valve 6-DW-GL-117. (see section 3.2.1.A.2 above)

3.2.1.B Sampling of the Sugar or Shim Slurry

1. Initial Conditions

a. Sugar Solution or Shim Slurry mix preparation activities are completed.

b. Instructions have been received from the vitrification control room to commence preparations for slurry sampling.

c. Chemicals have been continuously agitated.

2. Sampling Tank Contents

a. Ensure that the three-way valve (65-D-034) is set to the recirculation mode.

Tank 65-D-04; The Shim Mix Tank (cont.)

b. Place grinder 65-T-04 in-line by connecting 65-I-806 to grinder inlet nozzle and 65-I-807 to the grinder discharge nozzle.

c. Verify there is adequate water in grinder seal water tank 65-D-16. Pressurize the tank (~100 psig) by opening dry air valve 6-DA-GL-485.

NOTE: The seal pressure must be at least 30 psig greater than the pressure of the process fluid in the grinder.

d. Verify there is adequate oil in the grinder by checking the oil level in the glass in the grinder bearing housing.

e. Turn on grinder using HS-017B located in the vicinity of the grinder.

f. Immediately open the tank bottom ram valve 6-65-RA-569.

g. Throttle the pump valve 65-PCV-035 to around 75% closed. Start pump 65-G-04 by opening valve 6-DA-GL-461. Adjust pressure at 65-PCV-035 such that 65-PI-031 reads 55 psig. Once the pressure is set at PCV-035, use 6-DA-GL-461 to adjust pump throughput. Valves in the pump oiler assembly 6-DA-L-003 are to be left fully open.

h. Using 6-DA-GL-461 adjust pump speed to about 40 strokes per minute (corresponds to a throughput of about 273 lpm or 72 gpm).

i. Recirculate slurry via the grinder for at least 3 batch volumes to ensure collection of acceptable samples.

NOTE: Observe the grinder motor amperage reading while bringing the pump up to speed, and stop short of overloading the grinder motor (at ~ 47 amps.). Record the final pump speed achieved if it is less than or over the initial target value of 40 strokes per minute (SPM).

Tank 65-D-04; The Shim Mix Tank (cont.)

The initial target 40 SPM is required to ensure adequate velocity for slurry suspension in the lines. Higher SPM are acceptable.

j. Obtain approved sample containers (bottles).

Mark Sample Name (i.e. Glass Former, etc.), Time, Date, and the Operator's Initials on each of the bottles.

Prepare Analytical Request (AR) Forms.

NOTE: One to three samples and three separate readings of the liquid level in the tank are required per present estimate from system 63P.

k. Upon receiving instructions to proceed with obtaining slurry samples, open sample valve 6-65-LS-552 and gather samples at 6-65-1/2-436. The samples are to be taken at least one minute apart to ensure complete line flush and a fresh sample from the tank each time. The first ~ 20 ml. of each sample are to be discarded into a catch basin as this volume represents the dead leg in the tee.

l. Ensure sample valve 65-LS-552 is fully closed.

m. Take three readings of the liquid level in tank 65-D-04 at 65-LIS-003. The tank agitator is to be shut off before obtaining each reading. Readings are to be obtained ~ **TBD seconds** after agitator shutoff (this prevents errors due to slurry settling associated with longer waiting periods, and errors due to slurry swirl past the probe tip associated with shorter waiting periods). The agitator is to be restarted and slurry homogenized between readings.

n. Hand deliver samples and forms to the Analytical and Process Chemistry (A/PC) laboratory.

o. Obtain and record the Analytical Request (AR) numbers from the A/PC lab. Maintain a log of tank levels and samples taken.

p. Shut off the slurry pump by closing the valve 6-DA-GL-461.

Tank 65-D-04; The Shim Mix Tank (cont.)

q. Close the tank ram valve 6-65-RA-569.

r. Make sure the demineralized water flush valve 6-DW-GT-146 is shut. Open the common slurry line flush valve 6-65-H-152 and turn on the Utility Air (UA) purge at 6-DW-GT-121. Send a slug (~ 30 seconds) of UA to empty most of the slurry from the recirculation loop.

NOTE: The UA line is equipped with a restricting orifice to ensure that the tank ventilation in the receiving tank is not overwhelmed, thereby pressurizing the tank.

Make sure the UA purge supply is throttled to maintain the required pressure differential at the grinder seals.

s. Shut the UA purge at 6-DW-GT-121.

t. Immediately turn on the demineralized water flush at 6-DW-GT-146 and flush the recirculation loop with TBD liters of DW.

NOTE: Set up to flush the line at 65-FQIS-027 prior to performing this step.

Jog the pump to ensure both chambers are flushed.

u. Shut 6-DW-GT-146 and immediately follow up with the UA purge via 6-DW-GT-121. (see Note on step "r" above).

v. Shut 6-DW-GT-121 and 6-65-H-152.

w. Shut off the grinder motor using the local switch HS-017B.

3.2.1.C Cold Chemical Mix Transfer to the Concentrator Feed Make Up Tank (CFMUT)

1. Initial Conditions

a. Sugar Solution or Shim Slurry preparation activities are completed.

Tank 65-D-04; The Shim Mix Tank (cont.)

b. Sampling activities are completed.

c. Cold Chemical operator received the order to begin preparation for transfer to CFMUT.

NOTE: Check liquid level in CFMUT to ensure there is sufficient capacity in this tank to accommodate complete Shim Mix Tank batch with its associated water flushes.

2. Transfer to CFMUT

NOTE: In order to prevent backflow of air from the CFMUT to the Cold Chemical System, it is important to maintain fluid flow in the direction of the CFMUT at all times during transfer operations. During startup and shut down of the transfer, the pump 65-G-03 is started immediately after opening the automatic isolation valve 65-HV-0125 and the valve is shut immediately after stopping the pump.

a. Place grinder 65-T-04 in-line by connecting 65-I-806 to grinder inlet nozzle and 65-I-807 to the grinder discharge nozzle.

b. Verify there is adequate water in grinder seal water tank 65-D-16. Pressurize the tank (~100 psig) by opening dry air valve 6-DA-GL-485.

c. Verify there is adequate oil in the grinder by checking the oil level in the glass in the grinder bearing housing.

d. Using flexhose connect line 6-65-2-1/2-012 to 6-65-2-018 and open hose valves 65-H-532 and 65-H-528.

e. Open hand valves 6-CH-H-964 and 6-CH-H-965 (both located in the Vitrification Facility (VF) west valve aisle).

NOTE: • Hand valve 6-CH-H-964 is about 10 feet above the aisle floor and is therefore normally to be left open.

Tank 65-D-04; The Shim Mix Tank (cont.)

- Hand valve 6-CH-H-965 is the cell wall block valve and is expected to be locked and tagged except during transfer operations.

f. Obtain permissive from the Vitrification Control Room, and then place slurry diverter valve 65-DV-034 in the transfer mode using 65-HS-034 located in Cold Chemical System control panel 65-CP-01.

NOTE: Interlock prevents switchover of this valve to the transfer mode without obtaining permissive from Vitrification Control Room.

g. Turn on grinder motor using 65-HS-017B located in the vicinity of the grinder.

h. Open the tank bottom ram valve 65-RA-569.

i. Open transfer line valve 65-HV-0125 (located near cell wall penetrations) using 65-HS-0125 located on 65-CP-02.

j. Immediately start pump 65-G-04 by gradually opening valve 6-DA-GL-461, and adjust pump speed to about 40 strokes per minute (corresponds to a throughput of about 273 lpm or 72 gpm).

This step initiates transfer of slurry from the Shim Mix Tank in the Cold Chemical System to the CFMUT.

NOTE 1 Observe the grinder motor amperage reading while bringing the pump up to speed, and stop short of overloading the grinder motor (at ~ 47 amps.). Record the final pump speed achieved if it is less than or over the initial target value of 40 strokes per minute (SPM).

The initial target 40 SPM is required to ensure adequate velocity for slurry suspension in the lines. Higher SPM are acceptable.

NOTE 2 It is assumed that Valve 65-PCV-035 has already been set at 55 psig. per section 3.2.1.B.2, item g.

Tank 65-D-04; The Shim Mix Tank (cont.)

k. Ensure transfer is proceeding well by monitoring the decrease of level in the Shim Mix Tank 65-D-04 at the Cold Chemical System level station no. 2, and the corresponding increase in level of the CFMUT at the Vitrification Control Room.

l. Set up to provide demineralized water flush supply of TBD liters to the Shim Mix Tank via DW Flush meter 65-FQIS-027 and tank flush valve 6-DW-GL-118. (**see section** 3.13)

m. Monitor tank level in preparation of commencing tank flush. The agitator will trip once the liquid level in the tank falls below 630 liters liquid volume. Shortly after that there will be a marked change in the sound and piston action of the double diaphragm pump as the tank goes completely empty. Immediately initiate tank flush at this point by pressing the start button on the meter 65-FQIS-027.

n. Visually inspect the tank to ensure adequate cleaning of inside surfaces by flush water. Meter in additional flush water if deemed necessary.

NOTE: As a precaution, before visual inspection monitor pressures in Shim Mix Tank 65-D-04 and the CFMUT, and adjust if needed to ensure the CFMUT is at a greater vacuum. Vessel vent subsystem must be on.

For Shim Slurry Transfer, Skip to step "w" below.

For Sugar Solution Transfer: Follow steps "o" through "v" below.

o. Make sure the demineralized water flush valve 6-DW-GT-146 is shut. Open the common slurry line flush valve 6-65-H-152 and turn on the Utility Air (UA) purge at 6-DW-GT-121.

NOTE: The UA line is equipped with a restricting orifice to ensure that the tank ventilation in the receiving tank is not overwhelmed, thereby pressurizing the tank.

Tank 65-D-04; The Shim Mix Tank (cont.)

Make sure the UA purge supply is throttled to maintain the required pressure differential at the grinder seals.

p. Close the tank ram valve 6-65-RA-569 and send a slug (~ 30 seconds) of Utility Air to empty the tank flush water from the transfer line.

q. Shut off the slurry pump by closing the valve 6-DA-GL-461 and immediately shut automated valve 65-HV-0125 (located in the middle west operating aisle) using 65-HS-0125 at Cold Chemical control panel 65-CP-02.

r. Shut off the grinder motor using the local switch HS-017B.

s. Close the hand valves 6-65-H-528, 6-65-H-532, and 6-CH-H-965.

t. Using 65-HS-034 located at 65-CP-01, return the diverter valve 65-D-034 to the recirculation mode, and call the vitrification control room to cancel the permissive.

u. Carefully disconnect the slurry hose, at both ends taking care to contain the drips. Remove the hose to a storage rack.

NOTE: Personnel protection equipment to be used per procedures while executing this step.

<u>For Shim Slurry Transfer, Follow Steps Given Below:</u>

v. Make sure the demineralized water flush valve 6-DW-GT-146 is shut. Open the common slurry line flush valve 6-65-H-152 and turn on the Utility Air (UA) purge at 6-DW-GT-121.

NOTE: The UA line is equipped with a restricting orifice to ensure that the tank ventilation in the receiving tank is not overwhelmed, thereby pressurizing the tank.

Tank 65-D-04; The Shim Mix Tank (cont.)

Make sure the UA purge supply is throttled to maintain the required pressure differential at the grinder seals.

w. Close the tank ram valve 6-65-RA-569 and send a slug (~ 30 seconds) of Utility Air to empty most of the tank flush water from the transfer line.

x. Shut off the slurry pump by closing the valve 6-DA-GL-461.

y. Shut the UA purge at 6-DW-GT-121.

z. Immediately turn on the demineralized water flush at 6-DW-GT-146 and flush the transfer route with TBD liters of DW.

aa. Immediately turn on the demineralized water flush at 6-DW-GT-146 and flush the transfer route with TBD liters of DW.

NOTE: Set up to flush the line at 65-FQIS-027 prior to performing this step.

ab. Shut 6-DW-GT-146 and immediately follow up with a UA purge via 6-DW-GT-121. (see NOTE on step "w" above).

ac. Shut 6-DW-GT-121 and immediately shut automated valve 65-HV-0125 (located in the middle west operating aisle) using 65-HS-0125 at Cold Chemical control panel 65-CP-02.

ad. Shut off the grinder motor using the local switch HS-017B.

ae. Close the hand valves 6-65-H-528, 6-65-H-532, and 6-CH-H-965.

af. Using 65-HS-034 located at 65-CP-01, return the diverter valve 65-D-034 to the recirculation mode, and call the vitrification control room to cancel the permissive.

ag. Carefully disconnect the slurry hose, at both ends taking care to contain the drips. Remove the hose to a storage rack.

Tank 65-D-04; The Shim Mix Tank (cont.)

NOTE: Personnel protection equipment to be used per procedures while executing step "ag".

3.3 Tank 65-D-02; The Holding Tank

NOTE 1 Middle of top agitator blades need to be lowered to the lowest position in their respective key ways (i.e., for maximum submergence). This has not been incorporated in the field to date.

NOTE 2 Throttle valves for control of individual tank pressures have not been incorporated into the vessel vent subsystem piping design to date.

NOTE 3 Interlock of the Cold Chemical Slurry transfer valve HV-0125 with pressure in the Concentrator Feed Make Up Tank (to reduce the possibility of back migration of radioactivity from the CFMUT) has not been incorporated to date.

A) GENERAL PRECAUTIONS

1. To ensure proper operation and prevent tank overflow, monitor the tank level at 65-LIS-001 during transfers of ingredients and slurry to the tank, and transfer of slurry out of the tank.

2. Ensure transfer is progressing well by monitoring both the decrease and the corresponding increase in levels in the supply and the receiving tanks.

3. When filling the tank 65-D-02, do not fill the tank to a level greater than 17,800 liters (~ 4700 gallons).

4. Prior to any transfer, ensure that the receiving vessel has sufficient volume to receive the slurry to be transferred plus the associated demineralized water line flushes.

5. Make sure agitator is on at all times when tank contains slurry. (There is a minimum liquid level requirement of ~1990 liters for the tank agitator to be on).

6. During addition of ingredient chemicals, especially strong acids and bases, closely monitor tank temperature at 65-TI-004, and interrupt or reduce the rate of transfer to maintain the tank temperature at below 100 degrees F.

7. When controlling tank temperature per this procedure, thermal shock to the tank jacket is to be avoided. If temperature difference between the cooling water supply temperature and the tank temperature (at 65-TI-004) is greater than 20 degrees F, then throttle the flow to the jacket. Once the temperature flow has equalized, full flow may be established.

Tank 65-D-02; The Holding Tank (cont.)

8. A permissive must be obtained from the vitrification control room to allow diverter valve 65-DV-032 to switch to the transfer mode for transfer of slurry to the Vitrification Facility or to other tanks in the Cold Chemical System (CCS).

9. Continuous communication must be maintained with the vitrification control room while transferring slurry to the Vitrification Facility, to allow securing the transfer if any anomalies are experienced in the Vitrification system.

10. In order to prevent backflow of air from the Concentrator Feed Make Up Tank (CFMUT) to the Cold Chemical System, it is important to maintain fluid flow in the direction of the CFMUT at all times during transfer operations. During startup and shut down of the transfer, the pump 65-G-02 is started immediately after opening the automatic isolation valve 65-HV-0125 and the valve is shut immediately after stopping the pump.

11. To ensure proper functioning of grinder seals, the seal water loop is to be maintained at a pressure of around 30 psi. greater than that of the process fluid in the grinder.

12. Maximum allowable temperature for slurry transfer operations is 145 degrees F (due to temperature limitations of "FABCHEM" hose).

13. Personnel protection equipment is to be utilized (per regulations) during material handling operations.

14. Agitator Blade Submersion Requirements for Long Term Operation: (i.e., > 1 hour/day)

    - The top of the bottom agitator blade must be at least 36 inches (~ one diameter) under the liquid level.

    - The top of the other two agitator blades need to be at least 25 inches (i.e., ~ half diameter) under the liquid level.

15. Flush water used for tank and line clean-out is to be carefully monitored and minimized whenever possible. This will ensure that costly time loss due to excessive boil-down of slurry in CFMUT is avoided.

Tank 65-D-02; The Holding Tank (cont.)

3.3.1 NORMAL OPERATION

Normal operations for Tank 65-D-02 consist of Cold Chemical Mix Preparation, Sampling of the Cold Chemical Mix, and Cold Chemical Transfer to the CF

3.3.1.A Cold C... ...cal Mix Preparation

1. Initial Conditions

a. Required chemicals are present and available at the Cold Chemic... ...ilding staging area.

b. Tanks 65-D-... ...d 65-D-06 contain a sufficient supply of nitric acid and caustic soda.

c. All tanks and pipe are clean and/or have been flushed.

d. A recipe has been received by the Cold Chemical System operators.

e. Initial Va... Line-up:

Verify the following valves are <u>closed:</u>

Demineralized Water Flush:
6-DW-GL-165; 6-DW-GL-166; 6-65-H-150;
6-DW-H-139; 6-65-H-155; 6-DW-GL-488;
All other demineralized water Flush valves in the Cold Chemical System.

Demineralized Water Fill:
6-DW-GL-101;
All other demineralized water Fill valves in the Cold Chemical System.

Cooling Water:
6-CW-GT-412; 6-CW-GL-417; 6-CW-GT-413;
Cooling water to all other Cold Chemical System tanks which are not currently in service.

Slurry/Chemical:
6-65-RA-571; 6-65-LS-550; 6-65-H-525;
6-65-H-526; 6-65-X-503; 6-65-X-731;
6-65-X-725.

Tank 65-D-02; The Holding Tank (cont.)

Utility Air/Dry Air:
6-DW-GT-112; 6-DA-GL-459; 65-GL-587; 6-DA-GL-408A.

Miscellaneous:
6-65-GL-911A

Verify the following subsystems are shut down:

Vac-U-Max pneumatic transfer subsystem for powders.

Steam jet transfer subsystem for liquids.

Nitric acid transfer subsystem.

Caustic soda transfer subsystem.

Next verify the following valves are <u>opened:</u>

Utility Air/Dry Air:
6-65-GL-408; 6-DA-GT-436; 6-DA-L-001;
6-65-GL-587; 6-DA-GL-491; (Agitator seal air TBD)

Demineralized Water:
6-CW-GT-144.

Miscellaneous:
65-GL-911.

Instrument Air;
Instrument air supply to solenoids and instrumentation associated with tank 65-D-02.

Verify the following subsystems are in operation:

Dryer subsystem for generation of dry air (from utility air) for use in the Cold Chemical System.

Vessel vent scrubber subsystem for maintaining a slightly negative pressure (~2 inches of water) in the tank freeboard space.

2. Initial Tank and Equipment Preparation (65-D-02)

NOTE: To ensure proper operation, it is prudent to keep a close watch on tank level and pressure during major additions/transfers to and from the tanks.

Tank 65-D-02; The Holding Tank (cont.)

a. Adjust tank pressure to -2 inches of water at 65-PI-012 by throttling valve TBD in the vessel vent line leaving the tank.

b. Place tank level indicator 65-LIS-001 in operation.

c. Per section 3.13, open the tank demineralized water (DW) Fill valve 6-65-GL-501, set the required quantity of DW to be added (per recipe requirements) at the DW Fill meter 65-FQIS-028, and add water to the tank. Record the quantity added.

NOTE 1 Water addition needs to be greater than 1990 liters to ensure the lowest impeller in the tank and the tip of the tank level probe (bubbler type with density correction capability) are sufficiently submerged for proper operation.

NOTE 2 While in the past, DW header pressure was furnished by the main plant utility room operator only upon request, this is not expected to be the case during operation of the Vitrification Facility.

d. Turn on agitator 65-K-02. Use switch HS-009 at control panel 65-CP-01.

NOTE: Agitator will not switch on if the liquid level in the tank is below the density measuring leg of the bubbler type level probe.

e. Turn on jacket cooling water by opening valves 6-CW-GL-417, 6-65-CW-GT-403, and 6-CW-GT-412.

3. Preparation of Recipe

a. Add chemicals per recipe and sequence requirements.

(1) Addition of Nitric Acid:

See section 3.4 for operating outline for addition of nitric acid from tank 65-D-05.

Tank 65-D-02; The Holding Tank (cont.)

(2) Addition of Sodium Hydroxide (caustic soda)

See section 3.5 for operating outline for addition of caustic soda from tank 65-D-06.

(3) Transfer of Miscellaneous Liquid Chemicals

NOTE: The method detailed below was used during FACTS testing, and resulted in consistently accurate weighments.

(a) Set up a stainless steel rinse drum filled with a measured volume of demineralized water in the Cold Chemical Scale Room (CCSR) of the Cold Chemical Building.

(b) Gather the drums containing the desired chemicals (per recipe) and stage them in the CCSR. Remove snow and debris, and place the drums on the appropriate weigh scale; 1-drum scale (WI-321) or 4-drum scale (WI-320). Small capacity bench scales provided may also be used where appropriate.

NOTE: Fume hood needs to be in operation, and personnel protection equipment needs to be utilized (per procedures) during material handling operations.

(c) Remove the lids from the drums and then record the gross weight and chemical species. Arrange for independent verification of the recorded information.

(d) Determine the Target Weight (i.e., Gross weight minus the weight of the empty or partially filled drums) from the recipe and independently verify this number.

(e) Operate the Steam Jet System for Liquids Transfer per section 3.11, and "sip" the liquid chemical from the surface of the drum. This minimizes contact of chemical with the outside of the wand. Stop short of the target by a reasonable amount (determined during initial "sipping").

Tank 65-D-02; The Holding Tank (cont.)

Using a clean dry chemical ladle carefully scoop chemical from the drum until the precise target weight is reached in the drum on the scales. Independently verify that the target weight has been reached on the scale. Using the wand, steam jet transfer the contents of the ladle to the tank. Rinse the ladle in the rinse drum (step "a" above).

NOTE: See caution statement under **section 3.11.A.5**

(f) Upon completion of transfer of a liquid ingredient chemical, flush the empty drums and transfer piping with demineralized water and steam jet transfer the flush water into tank. Finally, purge the flush water from the transfer lines using atmospheric air in bleed through the wand.

NOTE: See Caution Statement under **section 3.11.A.5**

(g) Maintain accurate records of weights of material and flush water transferred.

(h) In case of transfer of partial drums or minor ingredients, accurately transfer the desired weight of liquid into a separate container before steam jet transfer of the ingredient into the Holding Tank 65-D-02. This method will avoid accidental transfer of excess ingredient to a batch.

(4) <u>Transfer of Solid (powdered) Chemicals</u>

NOTE: The method detailed below was used during FACTS testings, and resulted in consistently accurate weighments.

(a) Set up a stainless steel rinse drum filled with a measured volume of demineralized water in the Cold Chemical Scale Room (CCSR) of the Cold Chemical Building.

Tank 65-D-02; The Holding Tank (cont.)

(b) Gather the drums containing the desired chemicals (per recipe) and stage them in the CCSR. Remove snow and debris, and place the drums on the appropriate weigh scale; 1-drum scale (WI-321) or 4-drum scale (WI-320). Small capacity bench scales provided may also be used where appropriate.

NOTE: Fume hood needs to be in operation, and personnel protection equipment needs to be utilized (per procedures) during material handling operations.

(c) Remove the lids from the drums and then record the gross weight and chemical species. Arrange for independent verification of the recorded information.

(d) Determine the Target Weight (i.e., Gross weight minus the weight of the empty or partially filled drums) from the recipe and independently verify this number.

(e) Operate the Vac-U-Max pneumatic system per **section 3.10**, and convey material from the drum(s) to the tank. Stop transfer 1 to 5 kg. short of target. Using a clean, dry stainless steel pan and scoop, remove chemical from the drum to the pan until the precise target weight is reached in the drum on the scales. Independently verify that the target weight has been reached on the scale. Using the Vac-U-Max, transfer the contents of the pan to the tank. Rinse the pan and scoop in the rinse drum (step "a" above).

NOTE 1 See **Appendix 3** for schematic details on the Vac-U-Max pneumatic transfer subsystem.

Tank 65-D-02; The Holding Tank (cont.)

NOTE 2 In case of transfer of partial drums or minor ingredients, accurately transfer the desired weight of ingredient chemical into a separate container (bench scales provided may be used for where appropriate) before pneumatic transfer of the ingredient into tank 65-D-02. This method will avoid accidental transfer of excess ingredient to a batch.

NOTE 3 The container used for weighout of minor ingredients (usually a stainless steel pan) is to be rinsed after transfer in a drum of premeasured rinse water. The rinse water is to be finally steam jet transferred into the tank at the end of batch makeup. This will assure complete transfer of minor ingredients.

CAUTION: Since certain chemicals may react violently with water, extreme caution needs to be exercised during rinse operations involving such chemicals. Details of operation need to be fully addressed (for such chemicals) in the work order or SOP.

NOTE 4 Ingredient supply drums are to be emptied out as much as possible using the transfer wand. Residue from one drum can be transferred to the next (must be same chemical) by lifting plastic liner out and emptying.

Tank 65-D-02; The Holding Tank (cont.)

NOTE 5 Minor ingredients may also be added directly into the tank via the manhole, or may be mixed in with a measured weight of a major ingredient to facilitate complete transfer via the Vac-U-Max subsystem. 10 mole borax ($Na_2B_4O_7 \cdot 10H_2O$) or zeolite are the preferred major ingredients due to their scouring action in the Vac-U-Max subsystem. Further, highly hygroscopic materials (i.e. cesium hydroxide, etc.) may be purchased as a solution if deemed necessary, and transferred via the steam jet subsystem.

NOTE 6 Whenever 10 mole Borax or Zeolite are ingredient chemicals in the batch recipe, drums of these chemicals may be used intermittently to scour the system and minimize material losses.

b. Add additional demineralized water per recipe via valve 6-DW-GL-101. (see section 3.3.1.A.2 above)

3.3.1.B Sampling of the Cold Chemical Mix

1. Initial Conditions

a. Cold Chemical mix preparation activities are completed.

b. Instructions have been received from the vitrification control room to commence preparations for slurry sampling.

c. Chemicals have been continuously agitated.

2. Sampling Tank Contents

a. Ensure that the three-way valve (65-D-032) is set to the recirculation mode.

Tank 65-D-02; The Holding Tank (cont.)

b. Place grinder 65-T-02 in-line by connecting 65-I-800 to grinder inlet nozzle and 65-I-801 to the grinder discharge nozzle.

c. Verify there is adequate water in grinder seal water tank 65-D-14. Pressurize the tank (~100 psig) by opening dry air valve 65-GL-587.

NOTE: The seal pressure must be at least 30 psig greater than the pressure of the process fluid in the grinder.

d. Verify there is adequate oil in the grinder by checking the oil level in the glass in the grinder bearing housing.

e. Turn on grinder using HS-015B located in the vicinity of the grinder.

f. Open the tank bottom ram valve 6-65-RA-571.

g. Throttle the pump valve 65-PCV-037 to around 75% closed. Start pump 65-G-02 by opening valve 6-DA-GL-459. Adjust pressure at 65-PCV-037 such that 65-PI-029 reads 55 psig. Once the pressure is set at PCV-037, use 6-DA-GL-459 to adjust pump throughput. Slurry valves in the pump oiler assembly 6-DA-L-001 are to be left fully open.

h. Using 6-DA-GL-459 adjust pump speed to about 40 strokes per minute (corresponds to a throughput of about 273 lpm or 72 gpm).

i. Recirculate slurry via the grinder for at least 3 batch volumes to ensure collection of acceptable samples.

NOTE: Observe the grinder motor amperage reading while bringing the pump up to speed, and stop short of overloading the grinder motor (at ~ 47 amps.). Record the final pump speed achieved if it is less than or over the initial target value of 40 strokes per minute (SPM).

Tank 65-D-02; The Holding Tank (cont.)

The initial target 40 SPM is required to ensure adequate velocity for slurry suspension in the lines. Higher SPM are acceptable.

j. Obtain approved sample containers (bottles).

Mark Sample Name (i.e. Glass Former, etc.), Time, Date, and the Operator's Initials on each of the bottles.

Prepare Analytical Request (AR) Forms.

NOTE: Three samples and three separate readings of the liquid level in the tank are required per present estimate from system 63P.

k. Upon receiving instructions to proceed with obtaining slurry samples, open sample valve 65-LS-550 and gather samples at 6-65-1/2-434. The samples are to be taken at least one minute apart to ensure complete line flush and a fresh sample from the tank each time. The first ~ 20 ml. of each sample are to be discarded into a catch basin as this volume represents the dead leg in the tee.

l. Ensure sample valve 65-LS-550 is fully closed.

m. Take three readings of the liquid level in tank 65-D-02 at 65-LIS-001. The tank agitator is to be shut off before obtaining each reading. Readings are to be obtained ~ **TBD seconds** after agitator shutoff (this prevents errors due to slurry settling associated with longer waiting periods, and errors due to slurry swirl past the probe tip associated with shorter waiting periods). The agitator is to be restarted and slurry homogenized between readings.

n. Hand deliver samples and forms to the Analytical and Process Chemistry (A/PC) laboratory.

o. Obtain and record the Analytical Request (AR) numbers from the A/PC lab. Maintain a log of tank levels and samples taken.

p. Shut off the slurry pump by closing the valve 6-DA-GL-459.

Tank 65-D-02; The Holding Tank (cont.)

q. Close the tank ram valve 6-65-RA-571.

r. Make sure the demineralized water flush valve 6-DW-GT-144 is shut. Open the common slurry line flush valve 6-65-H-150 and turn on the Utility Air (UA) purge at 6-DW-GT-112. Send a slug (~ 30 seconds) of UA to empty most of the slurry from the recirculation loop.

NOTE: The UA line is equipped with a restricting orifice to ensure that the tank ventilation in the receiving tank is not overwhelmed, thereby pressurizing the tank.

Make sure the UA purge supply is throttled to maintain the required pressure differential at the grinder seals.

s. Shut the UA purge at 6-DW-GT-112.

t. Immediately turn on the demineralized water flush at 6-DW-GT-144 and flush the recirculation loop with TBD liters of DW.

NOTE: Set up to flush the line at 65-FQIS-027 prior to performing this step.

Jog the pump to ensure both chambers are flushed.

u. Shut 6-DW-GT-144 and immediately follow up with a UA purge via 6-DW-GT-112. (see NOTE on step "r" above).

v. Shut 6-DW-GT-112 and 6-65-H-150.

w. Shut off the grinder motor using the local switch HS-015B.

3.3.1.C Cold Chemical Mix Transfer to the Concentrator Feed Make Up Tank (CFMUT)

1. Initial Conditions

a. Cold Chemical mix preparation activities are completed.

Tank 65-D-02; The Holding Tank (cont.)

b. Sampling activities are completed.

c. Cold Chemical operator received the order to begin preparation for transfer to CFMUT.

NOTE: Check liquid level in CFMUT to ensure there is sufficient capacity in this tank to accommodate complete Cold Chemical mix batch with its associated water flushes.

2. Transfer to CFMUT

NOTE: In order to prevent backflow of air from the CFMUT to the Cold Chemical System, it is important to maintain fluid flow in the direction of the CFMUT at all times during transfer operations. During startup and shut down of the transfer, the pump 65-G-02 is started immediately after opening the automatic isolation valve 65-HV-0125 and the valve is shut immediately after stopping the pump.

a. Place grinder 65-T-02 in-line by connecting 65-I-800 to grinder inlet nozzle and 65-I-801 to the grinder discharge nozzle.

b. Verify there is adequate water in grinder seal water tank 65-D-14. Pressurize the tank (~100 psig) by opening dry air valve **65-GL-587**.

c. Verify there is adequate oil in the grinder by checking the oil level in the glass in the grinder bearing housing.

d. Using flexhose connect line 6-65-2-1/2-003 to 6-65-2-018 and open hose valves 65-H-526 and 65-H-528.

e. Open hand valves 6-CH-H-964 and 6-CH-H-965 located in the middle west operating aisle.

NOTE:
- Hand valve 6-CH-H-964 is about 10 feet above the aisle floor and is therefore normally to be left open.
- Hand valve 6-CH-H-965 is the cell wall block valve, and is expected to be locked and tagged except during transfer operations.

Tank 65-D-02; The Holding Tank (cont.)

f. Obtain permissive from the Vitrification Control Room, and then place slurry diverter valve 65-DV-032 in the transfer mode using 65-HS-032 located in Cold Chemical System control panel 65-CP-01.

NOTE: Interlock prevents switchover of this valve to the transfer mode without obtaining permissive from Vitrification Control Room.

g. Turn on grinder motor using 65-HS-015B located in the vicinity of the grinder.

h. Open the tank bottom ram valve 6-65-RA-571.

i. Open transfer line valve 65-HV-0125 (located near cell wall penetrations) using 65-HS-0125 located on 65-CP-02.

j. Immediately start pump 65-G-02 by gradually opening valve 6-DA-GL-459, and adjust pump speed to about 40 strokes per minute (corresponds to a throughput of about 273 lpm or 72 gpm).

This step initiates transfer of slurry from the Holding Tank in the Cold Chemical System to the CFMUT.

NOTE 1 Observe the grinder motor amperage reading while bringing the pump up to speed, and stop short of overloading the grinder (at ~ 47 amps.). Record the final pump speed achieved if it is less than or over the 40 strokes per minute (SPM) initial target.

The initial target 40 SPM is required to ensure adequate velocity of slurry susension in the lines. Higher SPM are acceptable.

NOTE 2 It is assumed that Valve 65-PCV-037 has already been set at 55 psig. per section 3.3.1.B.2, item g.

Tank 65-D-02; The Holding Tank (cont.)

k. Ensure transfer is proceeding well by monitoring the decrease of level in the Holding Tank 65-D-02 at the Cold Chemical System level station no 1, and the corresponding increase in level of the CFMUT at the Vitrification Control Room.

l. Set up to provide demineralized water flush supply of **TBD** liters to the Holding Tank via DW Flush meter 65-FQIS-027 and tank flush valves 6-DW-GL-165 and 6-DW-GL-166. (see **section** 3.13)

m. Monitor tank level in preparation of commencing tank flush. The agitator will trip off once the liquid level in the tank falls below 1990 liters liquid volume. Shortly after that there will be a marked change in the sound and piston action of the double diaphragm pump as the tank goes completely empty. Immediately initiate tank flush at this point pressing the start button on the meter 65-FQIS-027.

n. Visually inspect the tank to ensure adequate cleaning of inside surfaces by flush water. Meter in additional flush water if deemed necessary.

NOTE: As a precaution, before visual inspection monitor pressures in Holding Tank 65-D-02 and the CFMUT, and adjust if needed to ensure the CFMUT is at a greater vacuum. Vessel vent subsystem must be on.

o. Make sure the demineralized water flush valve **6-DW-GT-144** is shut. Open the common slurry line flush valve 6-65-H-150 and turn on the Utility Air (UA) purge at 6-DW-GT-112.

NOTE: The UA line is equipped with a restricting orifice to ensure that the tank ventilation in the receiving tank is not overwhelmed, thereby pressurizing the tank.

Make sure the UA purge supply is throttled to maintain the required pressure differential at the grinder seals.

p. Close the tank ram valve 6-65-RA-571 and send a slug (~ 30 seconds) of Utility Air to empty most of the tank flush water from the transfer line.

Tank 65-D-02; The Holding Tank (cont.)

NOTE: Some adjustment of pump speed may become necessary to avoid cavitating the pump at its suction.

q. Shut off the slurry pump by closing the valve 6-DA-GL-459.

r. Shut the UA purge at 6-DW-GT-112.

s. Immediately turn on the demineralized water flush at 65-DW-GT-144 and flush the transfer route with TBD liters of DW.

NOTE: Set up to flush the line at 65-FQIS-027 prior to performing this step.

t. Shut 65-DW-GT-144 and immediately follow up with UA purge via 6-DW-GT-112. (see NOTE on step "o" above).

u. Shut 6-DW-GT-112 and immediately shut automated valve 65-HV-0125 (located in the middle west operating aisle) using 65-HS-0125 at Cold Chemical control panel 65-CP-02.

v. Shut off the grinder motor using the local switch HS-015B.

w. Close the hand valves 65-H-528, 65-H-526, and 6-CH-H-965.

x. Using 65-HS-032 located at 65-CP-01, return the diverter valve 65-D-032 to the recirculation mode and call the vitrification control room to cancel the permissive.

y. Carefully disconnect the slurry hose at both ends taking care to contain drips. Remove the hose to a storage rack.

NOTE: Personnel protection equipment to be used per procedures while executing step 'y'.

3.4 TANK 65-D-05; NITRIC ACID DAY TANK

A) GENERAL PRECAUTIONS

1. To ensure proper operation and prevent tank overflow, monitor the tank level using 65-LIS-202 during transfers to and from the tank.

2. While lowering tank level, indicated tank level may lag actual tank level. This is due to a liquid film adhering to the level probe. The level indication system will not present this problem while filling the tank.

3. When filling tank 65-D-05 do not fill the tank to a level greater than 5299 liters (1400 gal). This is to prevent initiating automatic cutoff of tank fill at 5678 liters (1500 gal).

4. While pumping from tank 65-D-05 do not normally lower tank level below 889 liters (235 gal). This is to prevent the loss of indicated tank level and subsequent lifting of pump 65-G-05 relief valve due to a hydraulic imbalance.

5. Prior to any transfer, ensure that the receiving vessel has sufficient volume to receive the acid to be transferred. This will limit the possibility of overflowing the receiving tank.

6. Tank 65-D-07 will be used exclusively for demineralized water service. Therefore its nitric acid fill valve 6-65-X-603 will remain locked and tagged per SOP 00-04.

7. Do not fill tank 65-D-0 while transferring acid from the tank.

8. The nitric acid metering system has interlocks to prevent: transfer of acid to more than one tank at a time; transfer of acid to a tank while any tank has a high level alarm actuated; transfer of acid and caustic at the same time; and dead-heading the pump.

9. To preclude the formation of NO_x in the Cold Chemical System, make sure nitric acid does not come into contact with sugar solutions in any of the cold chemical tanks (i.e., 65-D-04, etc).

Tank 65-D-05; Nitric Acid Day Tank (cont.)

B) **INITIAL CONDITIONS** (Applicable to all operations of section 3.4. Additional initial conditions, if any, are provided in each section)

1. All tanks, pipe, and hoses associated with this operation are clean and/or have been flushed.

2. **Initial Valve Line-up:**

   Verify the following valves are shut:

   ▴ Chemical: 6-65-X-715, 6-CH-X-404, 6-65-X-729, 6-65-X-734, 6-65-X-733, 6-65-X-732, and 6-65-X-731.

   ▴ Calibration/flush connection valves: 6-65-X-932, 6-65-X-934, 6-65-X-940, 6-65-GL-920A, 6-65-GL-919A.

   Verify the following valves are open:

   ▴ Instrument Air: 6-IA-GT-427

   ▴ Chemical: 6-65-X-933, 6-65-GL-920, and 6-65-GL-919.

3. **Initial System Line-up:**

   Verify the following subsystems are in the specified condition:

   ▴ The instrument air subsystem is lined-up to supply air to the nitric acid day tank in accordance with the system operating procedures.

   ▴ The vessel vent scrubber subsystem is operating per the system operating procedure.

4. Ensure the tank level indication systems (65-LIS-202 and 65-LE-204) are operating in accordance with the manufacturers operating instructions.

5. Ensure the tank temperature monitoring system (65-TI-224) is operating per the manufacturers operating instructions.

Tank 65-D-05; Nitric Acid Day Tank (cont.)

3.4.1 NORMAL OPERATION

3.4.1.A Transferring Concentrated Acid to the Cold Chemical Tanks

1. Initial Conditions

a. The tank to receive the acid transfer has cooling water established per its operating instructions.

b. The receiving tank has its agitator operating in accordance with its operating procedures (unless specified in the procedures).

2. Transfer to tanks

NOTE: Personnel protective equipment shall be used while performing step 2.

a. Set pump 65-G-05 for the required flow rate per the manufacturers instructions. The required flow rate is provided in the receiving component operating instructions.

b. Perform the valve line-up of table D-05-1 for the tank receiving the acid transfer.

c. Set the nitric acid flow controller, 65-FQIC-227 (located on cold chemical control panel 65-CP-01), to transfer the required volume of acid to the tank per the manufacturers instructions. The volume is determined from either the slurry or decon recipe or from the acid dilution tables.

d. NOTE 1 This step initiates the transfer of concentrated nitric acid to the receiving tank.

NOTE 2 Closely monitor the receiving tank temperature. If the tank temperature rises above 38°C (100°F) or increases at greater than 0.6°C (1°F) per minute then interrupt the transfer by securing the pump, reduce the flowrate and complete the transfer.

Tank 65-D-05; Nitric Acid Day Tank (cont.)

NOTE 3 Monitor the status of the transfer to ensure the acid pump stops after the required volume has been transferred.

NOTE 4 Start the transfer at 65-FQIC-227.

e. Upon completion of the transfer the flow controller 65-FQIC-227 will stop the transfer pump automatically.

3. Tank Shutdown Line-up

a. Shut the valves previously opened per table D-05-1 and secure the acid transfer system.

3.4.1.B Filling Tank 65-D-05

1. Initial Conditions

NOTE: Vessel Ventilation Subsystem must be operational.

a. Verify that no transfers of nitric acid are on-going from tank 65-D-05.

2. Concentrated Acid Fill

NOTE: Personnel protective equipment must be used per procedures.

CAUTION: **Extra precautions to verify correct connections are appropriate to ensure that nitric acid is not pumped to the caustic tank (connections are side by side and identical).**

a. Notify the Vitrification operations supervisor and direct the truck driver to connect the tanker hose to the hose connection at 6-CH-1 1/2-402 (located on the North side of the cold chem building).

b. Open 6-CH-X-404 and 6-65-X-715.

c. Open 6-65-FCV-204 using hand switch HS-204 which is located on cold chemical control panel 65-CP-01.

d. ▴ Fill the tank to a level of less than 5299 liters (1400 gal).

Tank 65-D-05; Nitric Acid Day Tank (cont.)

- Monitor tank level using 65-LIS-202 during the transfer.

NOTE: Transfer valve 6-65-FCV-204 will trip shut to stop the transfer at a level of 5678 liters (1500 gal). The tank high level alarm will sound at 5375 liters (1420 gal).

- The transfer rate should be limited to less than 190 liters per minute (50 gpm).

e. After the transfer is complete blow the residual acid from the transfer line using the transfer truck air blow-out system.

f. Shut 6-65-FCV-204 using handswitch HS-204.

g. Shut 6-CH-X-404 and 6-65-X-715.

h. Direct the truck driver to disconnect the acid transfer hose.

Tank 65-D-05; Nitric Acid Day Tank (cont.)

TABLE D-05-1

Transfer valve line-up for transfer of Concentrated Nitric Acid from 65-D-05

Tank to receive the transfer	Valves to be SHUT 6-65-	Valves to be OPEN 6-65-	Tank Temperature Indicator	Remarks
65-D-01	X-731 X-732 X-733 X-613 X-620 X-681	X-729 X-734	65-TI-001	Infrequent Operation
65-D-02	X-732 X-733 X-734 X-613 X-620 X-681	X-729 X-731	65-TI-004	Infrequent Operation
65-D-03	X-731 X-733 X-734 X-613 X-620 X-681	X-729 X-732	65-TI-005	Normal Operation
65-D-04	X-731 X-732 X-734 X-613 X-620	X-729 X-733 X-681	65-TI-006	Infrequent Operation See Precaution 9.
65-D-07	N/A	N/A	N/A	See note below
65-D-08	X-731 X-732 X-734 X-620 X-681	X-729 X-733 X-613	65-TIS-111	Normal Operation
65-D-09	X-731 X-732 X-734 X-613 X-681	X-729 X-733 X-620	65-TIS-112	Infrequent Operation

NOTE: Tank 65-D-07 has been designated as the DW service tank. Therefore nitric acid should not be transferred to this tank and 6-65-X-603 will remain locked shut.

3.5 TANK 65-D-06; CAUSTIC SODA DAY TANK

A) GENERAL PRECAUTIONS

1. To ensure proper operation and prevent tank overflow, monitor the tank level using 65-LIS-201 during transfers to and from the tank.

2. While lowering tank level, indicated tank level may lag actual tank level. This is due to a liquid film adhering to the level probe. The level indication system will not present this problem while filling the tank.

3. When filling tank 65-D-06 do not fill the tank to a level greater than 1893 liters (500 gal). This is to prevent initiating automatic cutoff of tank fill at 2157 liters (570 gal).

4. While pumping from tank 65-D-05 do not lower tank level below 227 liters (60 gal). This is to prevent the loss of indicated tank level and subsequent lifting of the pump relief valve due to a hydraulic imbalance.

5. Prior to any transfer, ensure that the receiving vessel has sufficient volume to receive the caustic to be transferred. This will limit the possibility of overflowing the receiving tank.

6. Tank 65-D-07 will be used exclusively for demineralized water service and the caustic fill valve 6-65-X-604 will remain locked and tagged per SOP 00-04. Tank 65-D-08 will be used exclusively for acid service, and the caustic line connection to this tank has been removed.

7. Do not fill tank 65-D-06 while transferring caustic from the tank.

8. The caustic metering system has interlocks to prevent: transfer of caustic to more than one tank at a time; transfer of caustic to a tank while any tank has a high level alarm actuated; transfer of caustic and acid at the same time; and dead-heading the pump.

B) INITIAL CONDITIONS (Applicable to all operations of section 3.5. Additional initial conditions, if any, are provided in each section)

1. All tanks, pipe, and hoses associated with this operation are clean and/or have been flushed.

2. **Initial Valve Line-up:**

<u>Verify the following valves are shut:</u>

- Chemical: 6-65-X-721, 6-CH-X-402, 6-65-X-722, 6-65-X-723, 6-65-X-728, 6-65-X-727, 6-65-X-726, and 6-65-X-725.

Tank 65-D-06; Caustic Soda Day Tank (cont)

- Calibration/flush connection valves: 6-65-X-935, 6-65-X-937, 6-65-X-941, 6-65-GL-921A, 6-65-GL-899A.

Verify the following valves are open:

- Instrument Air: 6-IA-GT-426.

- Chemical: 6-65-X-936, 6-65-GL-921, and 6-65-GL-899.

3. Initial System Line-up:

Verify the following subsystems are in the specified condition:

- The instrument air subsystem is lined-up to supply air to the caustic soda day tank in accordance with the system operating procedures.

- The vessel vent scrubber subsystem is operating per the system operating procedure.

4. Ensure the tank level indication systems (65-LIS-201 and 65-LE-203) are operating in accordance with the manufacturers operating instructions.

5. Ensure the tank temperature monitoring system (65-TIS-215) is operating per the manufacturers operating instructions.

Tank 65-D-06; Caustic Soda Day Tank (cont)

3.5.1 NORMAL OPERATION

3.5.1.A Transferring Concentrated Caustic to Cold Chemical Tanks

1. Initial Conditions

a. The tank to receive the caustic transfer has cooling water established per its operating instructions.

NOTE: Since 50 percent caustic has a freezing point of 50°F. Do no preestablish cooling water to tank jacket if the cooling water temp is < 60°F. In this case wait till caustic addition has risen the tank process liquid temperature to > 60°F before starting cooling operations. Monitor process by temperatures to keep it between 60°F and 100°F.

b. The receiving tank has its agitator operating in accordance with its operating procedures (unless specified in the procedures).

2. Transfer to tanks

NOTE: Personnel protective equipment shall be used while performing step 2.

a. Set pump 65-G-06 for the required flow rate per the manufacturers instructions. The required flow rate is provided in the receiving component operating instructions.

b. Perform the valve line-up of table D-06-1 for the tank receiving the caustic transfer.

c. Set the caustic flow controller, 65-FQIC-221 (located on cold chemical control panel 65-CP-01), to transfer the required volume of caustic to the tank per the manufacturers instructions. The volume is determined from either the slurry or decon recipe.

d. NOTE: This step initiates the transfer of concentrated caustic to the receiving tank.

Tank 65-D-06; Caustic Soda Day Tank (cont)

Closely monitor the receiving tank temperature. If the tank temperature rises above 38°C (100°F) or increases at greater than 0.6°C (1°F) per minute then interrupt the transfer by stopping the pump, reducing the flow rate, and complete the transfer.

Monitor the status of the transfer to ensure the caustic pump stops after the required volume has been transferred.

Start the transfer at 65-FQIC-221.

e. Upon completion of the transfer the flow controller 65-FQIC-221 will stop the transfer pump automatically.

3. Tank Shutdown Line-up

a. Shut the valves previously opened per table D-06-1 and secure the caustic transfer system.

3.5.1.B Filling Tank 65-D-06

1. Initial Conditions

NOTE: Vessel Ventilation Subsystem must be in operation.

(1) Verify that no transfers of caustic are on-going from tank 65-D-06.

(2) Verify the heat trace on the caustic fill line is in operation

2. Concentrated Caustic Fill

NOTE: Personnel protective equipment must be used per procedures.

CAUTION: **Extra precautions to verify correct connections are appropriate to ensure that caustic soda is not pumped to the nitric acid tank (connections are side by side and identical).**

Tank 65-D-06; Caustic Soda Day Tank (cont)

a. Notify the Vitrification Operations supervisor and direct the truck driver to connect the tanker hose to the hose connection at 6-CH-1/2-401 (located on the North sided of the cold chem building).

b. Open 6-CH-X-402 and 6-65-X-721.

c. Open 6-65-FCV-203 using hand switch HS-203 which is located on cold chemical control panel 65-CP-01.

d. ▴ Fill the tank to a level of less than 1893 liters (500 gal).

▴ Monitor tank level using 65-LIS-201 during the transfer.

NOTE: Transfer valve 6-65-FCV-203 will trip shut to stop the transfer at a level of 2157 liters (570 gal). The tank high level alarm will sound at 1968 liters (520 gal).

▴ The transfer rate should be limited to less than 190 liters per minute (50 gpm).

e. After the transfer is complete blow the residual caustic from the transfer line using the transfer truck air blow-out system.

f. Shut 6-65-FCV-203 using handswitch HS-203.

g. Shut 6-CH-X-402 and 6-65-X-721.

h. Direct the truck driver to disconnect the caustic transfer hose.

Tank 65-D-06; Caust. c Soda Day Tank (cont)

TABLE D-06-1

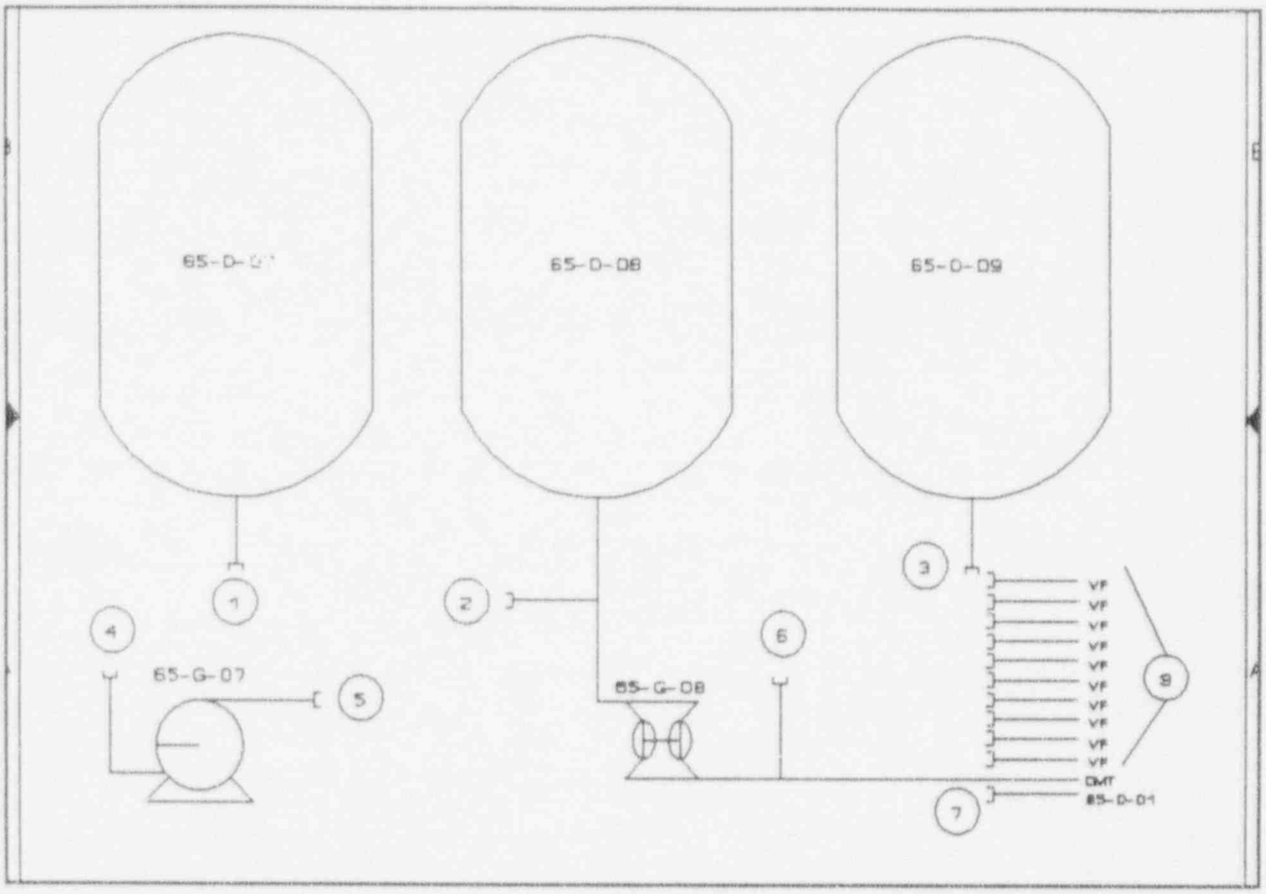
Transfer valve line-up for transfer of Concentrated Caustic from 65-D-06

Tank to receive the transfer	Valves to be SHUT 6-65-	Valves to be OPEN 6-65-	Tank Temperature Indicator	Remarks
65-D-01	X-727 X-726 X-725 X-621 X-680	X-723 X-728	65-TI-001	Infrequent Operation
65-D-02	X-726 X-727 X-728 X-621 X-680	X-723 X-725	65-TI-004	Infrequent Operation
65-D-03	X-725 X-727 X-728 X-621 X-680	X-723 X-726	65-TI-005	Normal Operation
65-D-04	X-725 X-726 X-728 X-621	X-723 X-727 X-680	65-TI-006	Infrequent Operation
65-D-07	N/A	N/A	N/A	See note below
65-D-08	N/A	N/A	N/A	See note below
65-D-09	X-725 X-726 X-728 X-680	X-723 X-727 X-621	65-TIS-112	Infrequent Operation

NOTE: Tank 65-D-07 has been designated as the DW service tank and tank 65-D-08 as the nitric acid tank. Therefore, caustic should not be transferred to tank 65-D-07, and 6-65-X-604 will remain locked shut.

In addition, caustic supply pipe to Tank 65-D-08 has been cut and capped.

3.6 DECON TANK 65-D-07



Type of Operation	Supply Tank	Destination	Suction Hose #	Pump #	Discharge Hose #	Section Number
Normal Operation	DW FILL	D-07	N/A	N/A	N/A	3.6.1.A
Normal Operation	D-07	VF	1,4	G-07	5,8	3.6.1.B
Infrequent Operation	D-07	DMT	1,4	G-07	5,6	3.6.2.A
Infrequent Operation	D-07	VF	1,2	G-08	6,8	3.6.2.B.2
Infrequent Operation	D-07	DMT	1,2	G-08	N/A	3.6.2.B.3
Infrequent Operation	D-07	D-01	1,4	G-07	5,7	3.6.2.C

NOTE: DMT - Tank No. 63-D-048

Tank 65-D-07; Decon Tank (cont)

NOTE 1 Table D-07-1 is based on the rack P&IDs. These drawings differ from the "as-built" drawings.

A) GENERAL PRECAUTIONS

1. To ensure proper operation and prevent tank overflow monitor the tank level on 65-LIS-104 during transfers to and from the tank.

2. When filling tank 65-D-07 do not fill the tank to a level greater than 3028 liters (800 gal).

3. While pumping from tank 65-D-07 secure pumping prior to level decreasing below 379 liters (100 gal) except as noted in section 3.6.2.C. This will ensure level indication is maintained in the tank.

4. Prior to any transfer, ensure that the receiving vessel has sufficient volume to receive the water to be transferred. This will limit the possibility of overflowing the receiving tank.

5. The decontamination transfer lines all contain check valves to prevent backflow from the vitrification facility. However, to minimize the potential for backflow the pump is started immediately after opening the automatic isolation valve and the valve is shut immediately after stopping the pump.

6. Heating and cooling of the demineralized water in tank 65-D-07 is normally not required. Therefore the isolation valves for the supply and return of the steam and cooling water are normally locked and tagged. However, if necessary control temperature per section 3.6.2.D.

7. The maximum allowed temperature in tank 65-D-07 is 63°C (145°F).

8. When controlling tank temperature per this procedure special precautions must be taken to prevent thermally shocking the tank jacket. If the temperature difference between the cooling water supply temperature and the tank temperature (65-TIS-114) is greater than 11°C (20°F) then throttle the flow to the jacket.

   Once the temperature difference has equalized full flow may be established.

Tank 65-D-07; Decon Tank (cont)

9. While transferring per this procedure continuous communications with the Vitrification Control Room must be maintained.

B) INITIAL CONDITIONS (Applicable to all operations of section 3.6. Additional initial conditions, if any, are provided in each section)

1. All tanks, pipe, and hoses associated with this operation are clean and/or have been flushed.

2. Initial Valve Line-up:

Verify the following valves are shut:

- Demineralized Water Fill: 6-DW-GL-102.
- Demineralized Water Flush: 6-DW-GL-108 and 6-DW-H-107.
- Slurry/Chemical: **6-DW-H-106**, 6-65-GL-685, 6-65-H-608, and 6-65-H-609.
- Condensate Return: 6-SC-GT-402.

Verify the following are locked and tagged in accordance with SOP 00-04:

- Shut valves: 6-65-X-605, 6-65-X-604, 6-SL-GT-452, 6-65-X-603, 65-FCV-110, 6-SL-GT-410, 6-CW-GL-456, **6-SL-GT-451**, and 6-IA-GT-454, 6-DW-GL-108.
- Tank agitator 65-K-07 manual disconnect switch DS-65-K-07 and isolation breaker at the main distribution board.

Verify the following valves are open:

- Cooling water: 6-65-GT-689 (cooling jacket drain valve).
- Slurry/Chemicals: 6-65-GL-916.

3. Initial system line-up:

Verify the following subsystems are in the specified condition:

- The demineralized water fill subsystem is lined-up to supply fill water to 65-D-07 in accordance with the system operating procedure.

Tank 65-D-07; Decon Tank (cont)

• The vessel vent scrubber subsystem is operating per the system operating procedure.

4. Ensure the tank level indication systems (65-LIS-104 and 65-LE-101) are operating per the manufacturers operating instructions.

5. Connect or verify connected a flexible transfer hose between 6-DW-H-106 (tank 65-D-07 drain) and 6-65-H-608 (decon metering pump 65-G-07 suction). This hose will normally remain installed.

6. Ensure the tank temperature monitoring system (65-TIS-110) is operating per the manufacturers operating instructions. Set the temperature "setpoint" of 65-TIS-110 to less than 10°C (50°F) to shut 6-65-FCV-110.

C) GENERAL INSTRUCTIONS

NOTE: Upon completion of transfer, the transfer routes to the various VF locations need to be purged with Instrument Air. This eliminates dilution of chemicals used in future transfers, and prevents suck-back from the in-cell end of line when the rack valve in the Cold Chemical Building is opened next. (i.e., The hydraulic configuration of the lines makes this a possibility. There is a ~20 foot height of vertical line after the rack valve. Any liquid in this line will tend to flow back into the freshly connected transfer hose, creating suck-back at the other end of the line.).

The hardpiped line from valve 6-65-H-634 to the **Decon Mix Tank** (63-D-048) does not need to be flushed with demineralized water and Instrument Air after use. It can remain full of dilute nitric acid.

The steps given below are only to be preformed when referenced in the body of the procedure.

1. When required to remove a transfer hose, make sure the transfer line has been purged with a slug of Instrument Air and valved shut as described in the body of this procedure. Carefully uncouple the hose quick connect at the pump end first and bleed off any residual pressurized air. Remove the hose and store in its storage rack.

Tank 65-D-07; Decon Tank (cont)

2. Operation pump 65-G-08

a. Start pump 65-G-08 by gradually opening 6-DA-GL-443. Adjust pressure at 6-65-PCV-127 such that 65-PI-127 reads 55 psig. Once the pressure is set at PCV-127, use 6-DA-GL-443 to adjust pump speed or air flow rate on 65-FI-127 per table D-07-2 to achieve the desired component flow rate.

b. Monitor the level in the receiving tank (if available) and in tank 65-D-07 to determine the status of the transfer.

c. ▲ As the transfer nears completion slow the pump speed by throttling shut 6-DA-GL-443. This will slow the transfer rate and make it easier to transfer the correct volume.

▲ When the transfer is complete, shut 6-DA-GL-443 to stop the pump and immediately shut the component automatic isolation valve to isolate the VF cell from the Cold Chemical System.

Tank 65-D-07; Decon Tank (cont)

3.6.1 NORMAL OPERATION

Tank 65-D-07 will be used for the storage and transfer of demineralized water. Normally the demineralized water will be transferred via pump 65-G-07. See section 2.2.5.

3.6.1.A Tank Fill

1. Open 6-DW-GL-102 (demineralized water fill valve) and 6-DW-GT-403 (DW fill header isolation valve). Set 65-FQIS-028 (DW fill flow controller), per section 3.13, to add the required quantity of DW. Add the water to the tank.

2. When the DW addition is complete, shut 6-DW-GL-102 and 6-DW-GT-403. Restore the DW fill system to it's standby line-up per section 3.13.

3.6.1.B Transfer of Demineralized Water to VF Locations

1. Initial Conditions

a. The order to transfer DW to the VF has been received by the Cold Chem operators.

b. The decon metering pump 65-G-07 has been set for the required transfer rate per the manufacturers instructions. The required flow rate for the receiving component is determined from table D-07-2. If the required component flow rate is greater than 20 gpm then set the pump for 20 gpm.

2. DW Transfer (Except transfers to the decon mix tank) [See page one of section 3.6]

The VF operators will line up the transfer piping outside the Cold Chemical System per the VF component operating procedures. Table D-07-1 lists the valves in the transfer path. When this procedure requires valves to be operated it is understood to mean only the valve associated with the receiving component.

a. Check shut 6-65-H-609, 6-DW-H-107, and the component isolation valve listed in table D-07-1.

b. Connect a flexible transfer hose between the connection at 6-65-H-609 and the component isolation valve connection.

Tank 65-D-07; Decon Tank (cont)

c. Open 6-DW-H-106, 6-65-H-608, 6-65-H-609, and the valves listed in table D-07-1.

d. NOTE: This step initiates transfer of DW from 65-D-07 to the VF component. The automatic isolation valve must not remain open without the pump operating to prevent back flow from the VF component.

Open the component automatic valve (listed in table D-07-1) and immediately start pump 65-G-07 using hand switch 65-HS-125B on local control panel 65-LCS-125.

e. Monitor the level in the receiving tank (if available) and in tank 65-D-07 to determine the status of the transfer.

f. When the required volume of DW has been transferred, stop the metering pump (65-G-07) using hand switch 65-HS-125B and immediately shut the component automatic isolation valve to isolate the VF component from the Cold Chem system.

g. Shut valve 6-DW-H-106 and use a 30 second slug of air via TBD to air dry the transfer line.

NOTE: There is an orifice in the air supply line to ensure CFMUT vessel vent systems is not overwhelmed by the air flush.

h. Shut 6-65-H-608, 6-65-H-609, and the valves of table D-07-1 opened in step c.

i. Drain and remove the pump discharge hose per General Instruction #1 (section 3.6.C.1).

3.6.2 INFREQUENT OPERATIONS

3.6.2.A DW transfer to the Decon Mix Tank (63-D-048)

[See page number 1 of section 3.6]

1. The VF operators will line up the transfer piping outside the Cold Chemical System per the VF component operating procedures. Table D-07-1 lists the valves in the transfer path. When this procedure requires valves to be operated it is understood to mean only the valve associated with the receiving component.

Tank 65-D-07; Decon Tank (cont)

a. Check shut 6-65-H-609, 6-DW-H-107, 6-65-H-625 and TBD-003.

b. Connect the backup "decon pump suction" flexible transfer hose between the connection at 6-65-H-609 and TBD-003.

c. Open 6-DW-H-106, 6-65-H-608, 6-65-H-609, 6-65-H-634, and TBD-003.

d. NOTE: This step initiates transfer of DW from 65-D-07 to the Decon Mix Tank. The automatic isolation valve must not remain open without the pump operating to prevent back flow.

   Open the component automatic valve (listed in table D-07-1) and immediately start pump 65-G-07 using hand switch 65-HS-125B on local control panel 65-LCS-125.

e. Monitor the level in the Decon Mix Tank and in tank 65-D-07 to determine the status of the transfer.

f. When the required volume of DW has been transferred, stop the metering pump (65-G-07) using hand switch 65-HS-125B and immediately shut the component automatic isolation valve.

g. Shut valve 6-DW-H-106 and use a 30 second slug of air via TBD to air dry the transfer line.

h. Shut 6-65-H-608, 6-65-H-606, 6-65-H-609, 6-65-H-634, and TBD-003.

i. Drain and remove the pump discharge hose per General Instruction #1. [**section 3.6.C.1**]

3.6.2.B DW Transfer Using Pump 65-G-08
[See page number 1 of **section 3.6**]

1. Initial conditions

a. Vent, drain, and remove pump 65-G-07 suction hose per General Instruction #1 (**section 3.6.C.1**).

b. Verify that pump 65-G-08 has been flushed per section 3.7.2.1.

Tank 65-D-07; Decon Tank (cont)

c. Check shut 6-DA-GL-443. Check open 6-DA-GT-488 and 6-DA-GL-428A. Check that the pressure regulator on 6-DA-L-004 is fully open. Verify the dryer subsystem for the generation of dry air (from utility air) for the Cold Chemical System is operating and is lined up to supply air to the decon transfer pump (65-G-08) in accordance with the system operating procedures.

d. Verify that transfers of others solutions from the decon system are not required because no other transfers will be possible while pump 65-G-08 is cross-connected.

2. **Transferring DW** (Except transfers to the Decon Mix Tank)

a. Check shut 6-DW-H-106, 6-DW-H-107, 6-65-H-634, 6-DW-H-103, 6-DW-H-116, TBD-001, TBD-003, and the valves listed in table D-07-1.

b. Connect flexible transfer hoses between 6-DW-H-106 and TBD-001 and between TBD-003 and the component isolation valve.

c. Open 6-DW-H-106, TBD-001, 6-65-H-624, 6-65-H-625, TBD-003, and the valves listed in table D-07-1.

d. Throttle pump 65-G-08 valve 6-PCV-127 to approximately 75% shut.

e. NOTE: This step initiates transfer of demineralized water from Tank 65-D-07 to the VF component.

Open the component automatic valve (listed in table D-07-1) and immediately start pump 65-G-08 per General Instruction #2 (section 3.6.C.2).

f. Shut valves 6-DW-H-106 and use a 30 second slug of air via TBD to air dry the transfer line.

NOTE: There is an orifice in the air supply line to ensure CFMUT vessel vent systems is not overwhelmed by the air flush.

g. Shut TBD-001, 6-65-H-624, 6-65-H-625, TBD-003, and the valves listed in table D-07-1 that were opened in step c.

Tank 65-D-07; Decon Tank (cont)

h. Drain and remove the pump suction and discharge hoses per General Instruction #1 (**section 3.6.C.1**).

i. Reconnect the metering pump suction hose by connecting a flexible transfer hose between 6-DW-H-106 and 6-65-H-608.

3. **Transferring DW to the Decon Mix Tank (63-D-048)**
[See page number 1 of this section]

a. Check shut 6-DW-H-106, 6-DW-H-107, 6-DW-H-103, 6-DW-H-116, and TBD-001.

b. Connect a flexible transfer hose between 6-DW-H-106 to TBD-001.

c. Open 6-DW-H-106, TBD-001, 6-65-H-624, 6-65-H-634, and 6-65-H-625.

d. Throttle pump 65-G-08 valve 6-PCV-127 to approximately 75% shut.

e. NOTE: This step initiates transfer of demineralized water from Tank 65-D-07 to the Decon Mix Tank.

Open the component automatic valve (listed in table D-07-1) and immediately start pump 65-G-08 per General Instruction #2 (**section 3.6.C.2**).

f. Shut valves 6-DW-H-106 and use a 30 second slug of air via TBD to air dry the transfer line.

NOTE: There is an orifice in the air supply line to ensure CFMUT vessel vent systems is not overwhelmed by the air flush.

g. Shut TBD-001, 6-65-H-624, 6-65-H-625, and 6-65-H-634.

h. Drain and remove the pump suction hose per General Instruction #1 (**section 3.6.C.1**).

i. Reconnect the metering pump suction hose by connecting a flexible transfer hose between 6-65-H-606 and 6-65-H-608.

Tank 65-D-07; Decon Tank (cont)

3.6.2.C Draining Tank 65-D-07

[See page number 1 of section 3.6]

1. Initial Conditions

a. Ensure that tank 65-D-07 will not be required for VF operations during this period. Water for VF support may be supplied from tank 65-D-09 if required.

b. Ensure that the drain tank (65-D-01) can accept the remaining volume of water in the tank.

2. Draining the tank

a. Check shut 6-65-H-529 and 6-65-H-609.

b. Connect the special hose adapter (1-1/2" to 2-1/2") to the connection downstream of 6-65-H-609.

c. Connect the "Infrequent Use" slurry transfer hose between the adapter and the drain tank fill connection (6-65-2 1/2-019).

d. Start the drain tank agitator, 65-K-01, per **section 3.9**.

e. Initiate the flow of cooling water to tank 65-D-01 cooling jacket per **section 3.9**.

f. **NOTE:** Increasing temperature in the drain tank indicates a reaction is taking place. The transfer shall be stopped if temperature increases dramatically to limit the reaction.

During transfer closely monitor the temperature (65-TI-001) of the tank. Stop the transfer per step 8 below if the temperature rises above 38°C (100°F) or if starts to increase at greater than 0.6°C (1°F) per minute. Allow the tank temperature to stabilize and decrease before resuming the transfer.

g. Open 6-DW-H-106, 6-65-H-608, 6-65-H-609, and 6-65-H-529.

Tank 65-D-07; Decon Tank (cont)

h. Pump the decon tank to the minimum indicated level as follows:

- Start the decon metering pump (65-G-07) using hand switch 65-H-125B which is located on control panel 65-LCS-125.

- When the minimum tank level is reached stop the pump using the hand switch.

i. Drain the pump suction and discharge hoses per general instruction 1.a.

j.
- Disconnect the pump suction hose at 6-65-H-608 and direct it to the sump.

- Throttle open 6-65-H-608 to drain the remaining water to the sump. Pump the sump to the drain tank per the applicable instructions. Throttle 6-65-H-608 as required to prevent splashing or sump overflow.

- When draining is complete shut 6-DW-H-106. Disconnect the hoses and the special hose adapter and store them.

3.6.2.D Control of Tank Temperature

NOTE: The tank heating and cooling jacket is normally maintained drained with the vent valve open (6-IA-GL-092).

1. Initial Conditions

a. If tank cooling is to be established:

(1) Verify the cooling water subsystem is lined-up to provide cooling water flow to the jacket of tank 65-D-07 per the applicable operating instructions.

(2) Shut the tank jacket drain valves 6-65-GT-689.

(3) Remove the locks and tags from 6-CW-GL-456 and 6-SL-GT-451.

(4) Check open the tank jacket vent 6-IA-GL-092.

Tank 65-D-07; Decon Tank (cont)

b. If tank heating is to be established:

(1) Verify the steam and condensate subsystem is lined-up to provide steam and condensate service for the jacket of tank 65-D-07 per the applicable operating instructions.

(2) Verify the instrument air subsystem is lined-up to supply instrument air to the solenoid valves associated with tank 65-D-07 in accordance with the applicable operating instructions.

(3) Shut the tank jacket vent valve 6-IA-GL-092.

(4) Remove the locks and tags from 6-SL-GT-452 and 6-SL-GT-410.

(5) Check open 6-SC-GT-402 and the tank jacket drain 6-65-GT-689.

2. Tank Cooling

a. Notify the control room that approximately 12 gallons of water will be purged from the CW system.

b. **NOTE**: Take the necessary precautions to prevent wetting equipment while filling the tank jacket.

- Open 6-SL-GT-451 approximately 1/2 turn (just enough to start flow for filling the jacket).

- When a solid stream of air free water issues from the vent valve shut 6-IA-GL-092 (jacket vent). Fully open 6-SL-GT-451.

c. Initiate tank cooling by opening 6-CW-GL-456. Ensure the proper cooling water flow exists as indicated on 65-FI-114. It should read approximately 75 gpm.

d. Monitor the temperature on 65-TIS-110. Throttle 6-CW-GL-456 (CW return isolation) as necessary to control temperature.

e. When cooling is no longer required shut 6-CW-GL-456. Then shut 6-SL-GT-451.

Tank 65-D-07; Decon Tank (cont)

f. Lock and tag 6-SL-GT-451 and 6-CW-GL-456 in accordance with SOP 00-04. This may be performed in parallel with the remainder of this section.

g. Draining the tank jacket:

NOTE: Take the necessary precautions to prevent wetting equipment while draining the tank jacket.

- Slowly open the jacket vent valve 6-IA-GL-092 to depressurize the jacket.

- Open 6-65-GT-689, (jacket drain) to drain the jacket.

- Since the jacket and piping contains more than one low point, use instrument air hosed over to the vent and air purge connection (next to valve 6-IA-GL-092) to completely drain the jacket.

- When draining is complete disconnect the IA purge hose and shut 6-IA-GL-092, and 6-65-GT-689.

3. Tank Heating

a. Notify the Vitrification Control Room that steam heating of tank 65-D-07 will be performed.

b. Remove lock and tag on agitator motor and start tank agitator 65-K-07 using hand switch 65-HS-122 located on cold chemical control panel 65-CP-01.

NOTE: The tank agitator will not start if level is less than 1446 liters (382 gal) since there is an agitator trip at low level in tank.

c. NOTE: Take the necessary precautions to prevent wetting of equipment while venting/draining the jacket.

Ensure tank jacket has been previously drained and air purged by first checking to see that the steam and cooling water supply valves 6-SL-GT-410 and 6-SL-GT-451 are shut, and then checking the jacket drain valve 6-65-GT-689 open. No water should flow out of the drain.

Tank 65-D-07; Decon Tank (cont)

Live steam will issue from the tank jacket drain if the steam supply valve is open too far.

Draining of the air from the tank jacket is necessary to reduce and minimize the effect on boiler water chemistry from placing the jacket on service and to minimize corrosion.

Steam must be slowly introduced into the jacket to prevent thermal shock.

Steam flow to the tank jacket cannot be established unless the tank agitator is operating due to an interlock with 6-65-FCV-110.

▴ Open 6-SL-GT-452 and 6-SC-GT-402. Open 6-SL-GT-410 approximately 1/2 turn.

▴ Adjust the "setpoint" temperature of 65-TIS-110 to the required temperature.

▴ When steam begins to issue from the jacket drain valve, shut the jacket drain valve 6-65-GT-689.

d. Fully open 6-SL-GT-410 when tank temperature has increased at least 3°C (5°F).

e. Monitor the tank temperature on 65-TIS-110. Adjust the temperature "setpoint" as necessary.

f. When tank heating is no longer required, adjust the temperature "setpoint" of 65-TIS-110 to approximately 10°C (50°F).

g. Shut 6-SL-GT-410, and then shut valves 6-SL-GT-452 and 6-SC-GT-402.

h. Slowly open 6-65-GT-689 (jacket drain) to drain the remaining steam from the jacket.

Tank 65-D-07; Decon Tank (cont)

TABLE D-07-1

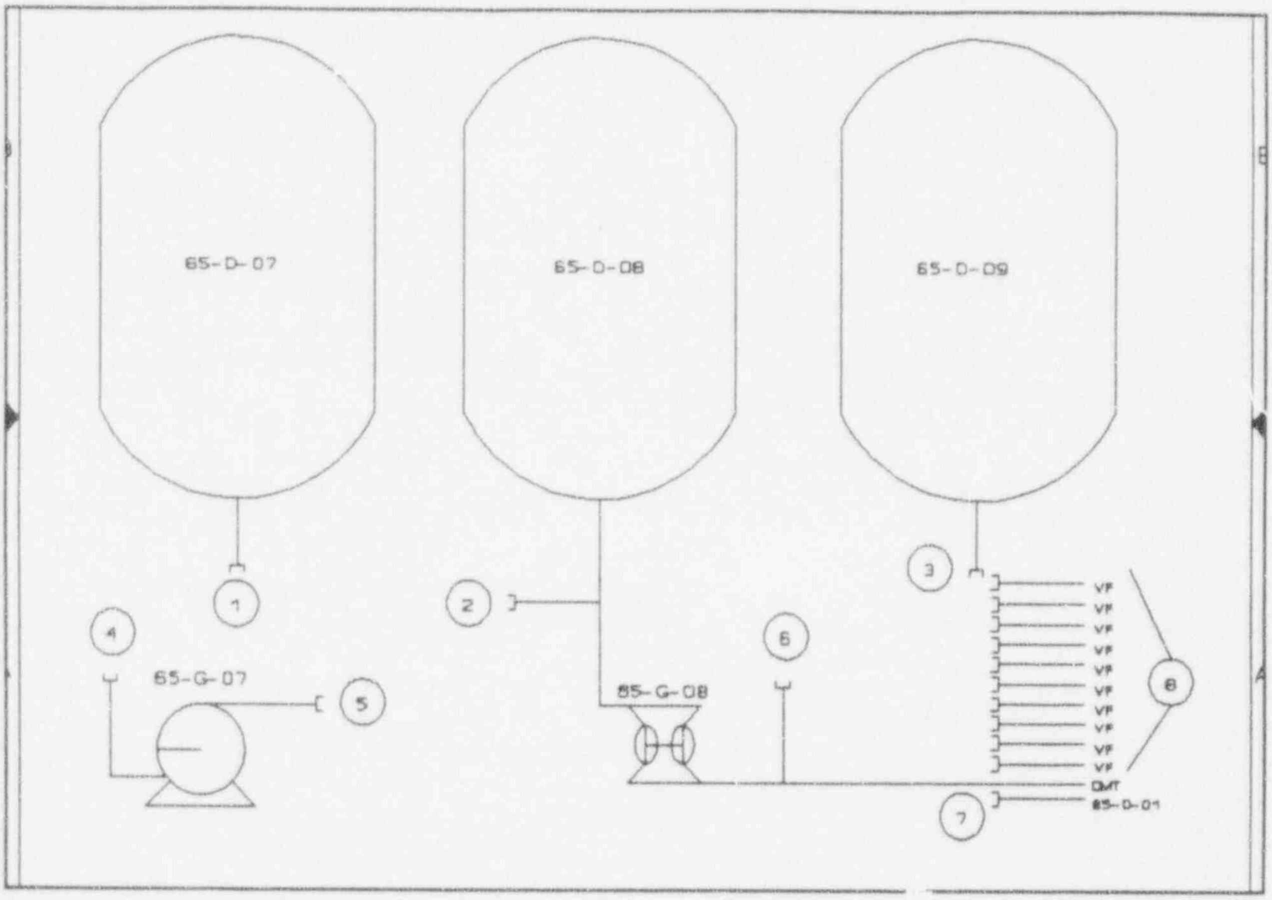
Component	Component Isolation Valve	Other Manual Valves	VF Manual Valves	Automatic Valves (Switches)	Hose Connection Size
Vessel Vent Condenser (63-E-015)	6-65-H-684	6-CH-X-954 6-CH-X-955	6-CH-H-956	HV-1507 (HSS-1507)	0.5"
Vessel Mist Eliminator (63-C-032)	6-65-H-684	6-CH-X-954 6-CH-X-958	6-CH-H-959	HV-3210 (HSS-1507)	0.5"
HEME #1 (63-T-033)	6-65-H-635	6-CH-X-948 6-CH-X-952	6-CH-H-953	HV-3313 (HSS-3624)	2.0"
HEME #2 (63-T-036)	6-65-H-635	6-CH-X-948 6-CH-X-949	6-CH-H-950	HV-3624 (HSS-3624)	2.0"
CFMUT Demister (63-V-001)	6-65-H-626	6-CH-X-939 6-CH-X-940	6-CH-H-941	HV-0122 (HSS-0122)	0.5"
CFMUT Decon Fill (63-V-001)	6-65-H-626	6-CH-X-939 6-CH-X-943	6-CH-H-944	HV-0119 (HSS-0122)	0.5"
Vessel Vent Header	6-65-H-632	6-CH-X-945 6-CH-X-946	6-CH-H-947	HV-1511 (HSS-1511)	2.0"
SBS Scrubber Vessel (63-V-031)	6-65-H-631	6-CH-X-928 6-CH-X-929	6-CH-H-930	HV-3106 (HSS-3115)	0.5"
SBS Receiver Vessel (63-V-031)	6-65-X-631	6-CH-X-925 6-CH-X-926	6-CH-H-927	HV-3115 (HSS-3115)	0.5"
MFHT Decon Fill (63-V-011)	6-65-H-629	6-CH-X-962	6-CH-H-963	HV-1106 (HIC-1106)	0.5"
Waste Header North	6-65-H-633	6-CH-X-966	6-CH-H-967	HV-4502 (HSS-4502)	2.0"
Waste Header East	6-65-H-633	6-CH-X-966	6-CH-H-968	HV-4503 (HSS-4502)	2.0"
Transfer Tunnel	6-65-H-639	6-65-GL-904	N/A	N/A	2.0"
CMR Decon Area	6-65-H-640	6-65-GL-901 6-65-HC-910	N/A	N/A	2.0"
EDR Decon Area	6-65-H-641	6-65-GL-903	N/A	N/A	2.0"
Decon Mix Tank (63-D-048)	6-65-H-634	N/A	N/A	HV-4803 (HSS-4803)	2.0"
Drain Tank (65-D-01)	6-65-H-529	N/A	N/A	N/A	2.5"

Tank 65-D-07; Decon Tank (cont)

Table D-07-2

Component	Required Component Flow rate	65-FI-127 Air flow-rate (%)	65-G-08 stroke rate (spm)
Vessel Vent Condenser 63-E-015	50 gpm(50#)	60-70	167
Vessel Mist Eliminator 63-C-032	5 gpm(50#)	23-25	17
HEME #1 63-T-033	50 gpm(40#)	60-70	167
HEME #2 63-T-036	50 gpm(40#)	60-70	167
CFMUT Demister	2 gpm(20#)	15-20	7
CFMUT Decon Fill	50 gpm(30#)	60-70	167
Vessel Vent Header	50 gpm(50#)	60-70	167
SBS Scrubber Vessel	50 gpm(40#)	60-70	167
SBS Receiver Vessel	50 gpm(40#)	60-70	167
MFHT Decon Fill	50 gpm(50#)	60-70	167
Waste Header North	50 gpm(50#)	60-70	167
Waste Header East	50 gpm(50#)	60-70	167
Transfer Tunnel	50 gpm	60-70	167
CMR Decon Area	25 gpm	42-46	83
EDR Decon Area	25 gpm	42-46	83
Decon Mix Tank	25 gpm	42-46	83

3.7 DECON TANK 65-D-08; NITRIC ACID SERVICE DECON TANK



Type of Operation	Supply Tank	Destination	Suction Hose #	Pump #	Discharge Hose #	Section Number
Normal Operation	D-05	D-08	N/A	G-05	N/A	3.7.1.A 3.7.2.D
Normal Operation	D-08	DMT	N/A	G-08	N/A	3.7.1.C
Normal Operation	D-08	VF	N/A	G-08	6,8	3.7.1.D
Infrequent Operation	D-08	VF	2,4	G-07	5,8	3.7.2.B.2
Infrequent Operation	D-08	DMT	2,4	G-07	5,6	3.7.2.B.3
Infrequent Operation	D-08	D-01	N/A	G-08	6,7	3.7.2.C

DMT - Tank No. 63-D-048

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

NOTE 1 The effect of tank agitation of indicated level has not yet been determined.

A) GENERAL PRECAUTIONS

1. To ensure proper operation and prevent tank overflow, monitor the tank level using 65-LIS-105 during transfers to and from the tank.

2. When adding water or acid to the tank ensure the agitator is operating to provide adequate mixing and that tank cooling is being supplied by CW flow through the cooling jacket. If the agitator can not be operated, then the water addition rate must be limited to less than 19 lpm (5 gpm) and the acid addition rate must be limited to less than 2 lpm (0.5 gpm). This will reduce the heat generation rate.

3. When filling tank 65-D-08 do not fill the tank to a level greater than 908 liters (240 gal). This is to prevent initiating automatic cutoff of tank acid fill at 1020 liters (269 gal).

4. While pumping from tank 65-D-08 the tank agitator will automatically shutdown at 757 liters (200 gal) liquid level. This is to prevent automatic shutoff of the tank agitator at 719 liters (190 gal).

5. Prior to any transfer, ensure that the receiving vessel has sufficient volume to receive the acid to be transferred. This will limit the possibility of overflowing the receiving tank.

6. The decontamination transfer lines all contain check valves to prevent backflow from the vitrification facility. However, to minimize the potential for backflow the pump is started immediately after opening the automatic isolation valve and the valve is shut immediately after stopping the pump.

7. **While transferring per this procedure continuous communications with the Vitrification Control Room must be maintained.**

8. When transferring to the decon mix tank (63-D-048), high level in this tank, 650 liters (172 gal), will automatic stop the transfer by shutting HV-4803 in the transfer line and it will sound an alarm in the vitrification control room. No alarm will sound in the Cold Chemical building.

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

9. Caustic addition to this tank has been disabled (supply piping cut and capped).

10. Agitator Blade Submersion Requirement for Long Term Operation: (i.e., > 1 hour/day)

    Top of the blade must be at least 11 inches (~One diameter) under the liquid level.

B) **INITIAL CONDITIONS** (Applicable to all operations of **section** 3.7. Additional initial conditions, if any, are provided in each section)

1. Tank 65-D-05 contains a sufficient supply of nitric acid to make the required amount of dilute acid.

2. All tanks, pipe, and hoses associated with this operation are clean and/or have been flushed.

3. A request for the preparation of a batch of dilute nitric acid has been received by the Cold Chemical system operators.

4. **Initial Valve Line-up:**

    Verify the following valves are shut:

    - Demineralized Water Flush: 6-DW-GL-104 and 6-DW-H-116.
    - Demineralized Water Fill: 6-DW-GL-111.
    - Cooling Water 6-CW-GL-443.
    - Slurry/Chemical: **6-DW-H-103**, 6-65-GL-686, 6-65-H-624, **TBD-001**, **TBD-002**, **TBD-003**, 6-65-X-613, 6-65-H-625 and 6-65-H-634.
    - Utility Air/Dry Air: 6-DA-GL-443.

    Verify the following valves are shut and locked and tagged per SOP 00-04: 6-65-X-610, 6-SL-GT-460

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

Verify the following valves are open:

- Utility Air/Dry Air: 6-DA-GT-488, 6-DA-GL-428, pressure regulator on 6-DA-L-004.

- Cooling water: 6-CW-GT-458.

5. **Initial System Line-up:**

Verify the following subsystems are in the specified condition:

- The nitric acid transfer subsystem is in the standby line-up per section 3.4.

- The demineralized water flush subsystem is lined-up to supply flush water to 65-D-08 per the system operating procedure.

- The demineralized water fill subsystem is lined-up to supply fill water to 65-D-08 per the system operating procedure.

- The cooling water subsystem is lined-up to provide cooling water to the jacket of decon tank 65-D-08 per the system operating procedure.

- The dryer subsystem for the generation of dry air (from utility air) for the Cold Chemical system is operating and is lined-up to supply air to the decon transfer pump (65-G-08) per the system operating procedures.

- The vessel vent scrubber subsystem is operating per the system operating procedure.

6. Ensure the tank level indication systems (65-LIS-105 and 65-LE-102) are operating per the manufacturers operating instructions.

7. Open 6-CW-GL-443 (65-D-08 CW return isolation valve) to establish cooling water flow to the tank jacket. Verify that sufficient cooling water flow is occurring as indicated by flow meter 65-FI-117 (approximately 95 lpm (25 gpm)).

8. Ensure the tank temperature monitoring system (65-TIS-111) is operating per the manufacturers operating instructions.

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

C) GENERAL INSTRUCTIONS

NOTE: The hardpiped line from valve 6-65-H-634 to the **Decon Mix Tank** (63-D-048) does not need to be flushed with demineralized water and Instrument Air after use. It can remain full of dilute nitric acid.

Upon completion of transfer, the transfer routes to the various VF locations need to be flushed with Demineralized Water and then purged with Instrument Air. This eliminates the danger of cross contamination of chemicals with future transfers. It also prevents suck-back from the in-cell end of the line when the rack valve in the Cold Chemical Building is opened next. (i.e., The hydraulic configuration of the lines makes this a possibility. There is a ~20 foot height of vertical line after the rack valve. Any liquid in this line will tend to flow back into the freshly connected transfer hose, creating suck-back at the other end of the line.)

The steps given below are only to be performed when referenced in the body of the procedure.

1. When required to remove a transfer hose, make sure the transfer line has been purged with a slug of Instrument Air and valved shut as described in the body of this procedure. Carefully uncouple the hose quick connect at the pump end first and bleed off any residual pressurized air. Remove the hose and store in its storage rack.

2. Operation pump 65-G-08

   a. Start pump 65-G-08 by gradually opening 6-DA-GL-443. Adjust pressure at 6-65-PCV-127 such that 65-PI-127 reads 55 psig. Once the pressure is set at PCV-127, use 6-DA-GL-443 to adjust pump speed or air flow rate on 65-FI-127 per table D-07-2 to achieve the desired component flow rate.

   b. Monitor the level in the receiving component (if available) and in tank 65-D-08 to determine the status of the transfer.

   c. ▲ As the transfer nears completion slow the pump speed by throttling shut 6-DA-GL-443. This will slow the transfer rate and make it easier to transfer the correct volume.

      ▲ When the transfer is complete, shut 6-DA-GL-443 to stop the pump and immediately shut the component automatic isolation valve to isolate the VF cell from the Cold Chemical System.

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

3.7.1 NORMAL OPERATION

Tank 65-D-08 will be used exclusively for the preparation and transfer of dilute nitric acid. Pump 65-G-08 will be the dedicated acid pump and is hard piped to the decon mix tank fill piping (63-D-048). The present plans are for the preparation of 2 batches of dilute nitric acid approximately every 65 hours for transfer to tank 63-D-048. See section 2.2.5 for additional details.

3.7.1.A NITRIC ACID SOLUTION PREPARATION

[See page number 1 of section 3.7]

1. Preparing a Batch of Diluted Nitric Acid

a. If the tank is empty, prepare the acid solution per section 3.7.2.D and do not use this section (3.7.1.A.1).

b. Addition of DW:

• Throttle 6-DW-GL-111 (demineralized water fill valve) open 1/2 turn and open 6-DW-GT-403 (DW fill header isolation valve). Set 6-65-FQIS-028 (DW fill flow controller), per section 3.13, to add the required quantity of DW (determined from acid dilution table D-08-1). Add the water to the tank. When the tank level reaches 719 liters (190 gal) start the tank agitator, 65-K-08, using hand switch 65-HS-123 (located on cold chem control panel 65-CP-01) and fully open 6-DW-GL-111.

NOTE: During the transfer, closely monitor the temperature of the decon tank on 65-TIS-111 (located at the cold chem control panel 65-CP-01). If temperature rises above 38°C (100°F), the transfer shall be stopped by shutting 6-DW-GL-111. Addition of water to the tank will then proceed in a step wise manner (by opening and shutting 6-DW-GL-111) to reduce the heat generation rate.

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

The water level in the tank needs to be raised to a level greater than 719 liters (190 gal) to ensure the agitator impeller is submerged to a sufficient depth for proper operation. An interlock with level indicating switch 65-LIS-105 prevents agitator operation when level is less than 719 liters (190 gal).

▴ When the DW addition is complete, shut 6-DW-GT-403 and 6-DW-GL-111. Record the volume of water added to the tank and the tank level.

c. Addition of Nitric Acid:

Transfer the required amount of acid to the tank per section 3.4. The volume of acid to be added is determined from acid dilution table D-08-1. The acid addition rate required is 3.8 lpm (1 gpm). Prior to adding the acid ensure that it can be added without indicated tank level exceeding 908 liters (240 gal). When the transfer is complete record the volume of acid transferred and the level of the tank.

During the transfer monitor tank temperature on 65-TIS-111 (located on control panel 65-CP-01). If the temperature rises above 38°C (100°F) stop the transfer and decrease the transfer rate.

d. ▴ Secure the tank cooling water flow by shutting 6-CW-GL-443 (CW return isolation).

▴ Place the acid transfer system in its standby line-up per section 3.4.

▴ Place the DW fill system in its standby line-up per section 3.13.

3.7.1.B Sampling of the Dilute Nitric Acid
[See page number 1 of section 3.7]

1. Initial Conditions

a. Preparation of the dilute nitric acid is complete.

b. The tank contents have been agitated for at least 5 minutes.

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

c. The Analytical and Process chemistry lab (A/PC) has been notified of the impending acid analysis.

2. Sampling Operations

NOTE: Personnel protection equipment is required to be used per regulations while executing steps b and c.

a. ▲ Obtain approved sample containers (bottles).

▲ Mark the name of the sample (i.e. 65-D-08: dilute nitric acid) time, date, and the operator's initials on each of the bottles.

▲ Prepare the Analysis request (AR) form.

b. Open sample valve 6-65-GL-686 and flush the sample line with approximately 1 liter (1 quart) of solution (flushing is required to ensure the sample is representative). The flush volume is to be disposed of per Safety and SOP/DVP requirements. Shut 6-65-GL-686 and place the sample bottle on the sample stand.

c. Open 6-65-GL-686. Obtain the acid sample and then shut valve 6-65-GL-686.

d. **Hand deliver the sample and AR form to the A/PC laboratory.**

e. Obtain and record the AR numbers from the A/PC lab. Maintain a log of samples taken and the sample results. These numbers will be used to evaluate the acid dilution tables.

3.7.1.C Transferring Dilute Nitric Acid to the Decon Mix Tank (63-D-048) [See page number 1 of section 3.7]

1. Initial Conditions

a. Preparation and sampling of the acid batch has been completed.

b. The Cold Chemical operators have received the order from the VF operators to transfer the dilute nitric acid batch to the Decon Mix Tank (DMT).

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

2. Transfer of Solution for Canister Decontamination

a. Verify the VF operators have lined up the Decon Mix Tank to receive the transfer per the canister decon system operating procedures.

b. Open 6-DW-H-103, 6-65-H-624, 6-65-H-625 and 6-65-H-634.

c. Secure the decon tank agitator, 65-K-08, using hand switch 65-H-123 (located on Cold Chem control panel 65-CP-01). Throttle pump 65-G-08 valve 6-65-PCV-127 to approximately 75% shut.

d. NOTE: This step initiates transfer of dilute nitric acid from Tank 65-D-08 to the Decon Mix Tank.

Open 6-CH-HV-4803 (decon mix tank fill line automatic isolation valve) using the control switch located on Cold Chemical System control panel 65-CP-02 and then immediately start pump 65-G-08 per General Instruction #2 (**section** 3.7.C.2). Transfer 590-610 liters (157-161 gal).

NOTE: Transfer control valve 6-CH-HV-4803 will trip shut to stop the transfer if level in the DMT reaches 650 liters (170 gal). If this occurs the pump will be dead headed and will stop. Immediately secure the transfer pump.

e. Shut 6-65-H-624, 6-DW-H-103, 6-65-H-634 and 6-65-H-625.

3. Preparation of Canister Acid Wash Solution

Perform this step if a dilute nitric acid solution is to be prepared for use in canister acid washing.

a. Reperform step 3.7.B.7 to establish tank cooling.

b. Add Water to the tank per step 3.7.1.A.1.b above except determine the amount of water required from acid dilution table D-08-2.

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

c. Add Nitric Acid to the tank per **step 3.7.1.A.1.C** above except determine the amount of acid required from acid dilution table D-08-2.

d. Resample the tank per **section 3.7.1.B** above.

4. Transfer of Acid Wash Solution

Transfer the acid wash solution per **step 3.7.1.C.1 and 2** above except only transfer 456 liters (120 gal).

3.7.1.D Transfer of Dilute Nitric Acid to Other VF Locations[See page 1 of **section 3.7**]

1. Initial Conditions

a. Ensure that transfer of dilute nitric acid to the Decon Mix Tank will not be required during this operation.

b. The order to transfer dilute nitric acid to the VF has been received by the Cold Chem operators.

2. Preparation of acid solution

Prepare and sample a batch of dilute nitric acid solution per steps 3.7.1.A and 3.7.1.B. If the desired acid concentration is other than 0.7 molar then calculate the required volumes of acid and water required.

3. Acid transfer

NOTE: Personnel protection equipment is to be used as applicable per procedures while executing steps given below.

The VF operators will line up the transfer piping outside the Cold Chem system per the VF component operating procedures. Table D-07-1 lists the valves in the transfer path. When this procedure requires valves to be operated it is understood to mean only the valve associated with the receiving component.

a. Check shut 6-65-H-634, **TBD-003** and the component isolation valve listed in table D-07-1.

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

b. Connect the flexible hose between the connection at TBD-003 and the component isolation valve connection.

c. Open 6-DW-H-103, 6-65-H-624, 6-65-H-625, TBD-003, and the valves listed in table D-07-1.

d. Secure the tank agitator, 65-K-08, using hand switch 65-H-123 (located on control panel 65-CP-01). Ensure that pump valve 6-65-PCV-127 is throttled approximately 75% shut.

e. NOTE: This step initiates transfer of dilute nitric acid from 65-D-08 to the VF component. The automatic isolation valve must not remain open without the pump operating to prevent back flow from the VF component.

Open the component automatic valve (listed in table D-07-1) and immediately start pump 65-G-08 per General Instruction #2 (**section** 3.7.C.2).

f. Shut valve 6-DW-H-103 and flush the transfer line with demineralized water (~ 3 line and pump volumes) via valve 6-DW-H-116.

NOTE: Demineralized water supply needs to be set up at 65-FQIS-027 [see **section** 3.13]

g. Next purge the transfer route using 30 second slug of Instrument Air via 6-IA-H-113.

h. Shut 6-65-H-625, 6-65-H-624, 6-DW-H-103, TBD-003, and the valves listed in table D-07-1 that were opened in step 3.

i. Remove the pump discharge hose per General Instruction #1 (**section** 3.7.C.1).

3.7.2 INFREQUENT OPERATIONS

3.7.2.A Use of Pump 65-G-08 for Other Transfers

[See page 1 of section 3.7]

1. Initial conditions

a. Transfer of nitric acid to the Decon Mix Tank will not be required during this procedure.

b. The cold chemical sump has been pumped to the drain tank per the applicable procedure.

2. Flush of pump 65-G-08 with DW

NOTE: It is necessary to flush the residual acid from pump 65-D-08 to prevent possible reactions with the other chemicals to be pumped and the addition of acid to unwanted locations.

Personnel protection equipment to be used per regulations while executing steps a, d, e, and g.

a. Connect a transfer hose to the quick connections downstream of **TBD-03** and direct it to the sump. Make arrangements to direct flush water from **TBD-002** to the sump also.

b. Check shut **6-DW-H-103** and 6-65-H-634.

c. Open 6-65-H-624, 6-DW-H-116, **TBD-002**, 6-65-H-625, **TBD-003**, and 6-DW-GT-402.

d. ▲ Set the DW Flush meter 65-FQIS-027 for a flush volume of 57 liters (15 gallons) per **section 3.13** and start the flush.

NOTE: If liquid splashes from the sump during the flush then stop the flush as directed below and take actions to stop the splashing (i.e., pump the sump, slow the flush rate, etc.)

▲ If required, stop the flush by shutting 6-DW-H-116. Recommence the flush by reopening 6-DW-H-116. Pump the sump as required to prevent overflowing per the applicable instructions.

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

* Jog pump 65-G-08 by throttling open 6-DA-GL-443. This is necessary to flush both pump diaphragms. Shut 6-DA-GL-443.

e. After flushing approximately 19 liters (5 gallons) from TBD-002 shut TBD-002 and continue flushing from TBD-003.

f. When the flush of the pump is complete, shut 6-DW-H-116, 6-65-H-624, 6-65-H-625, TBD-003, and 6-DW-GT-402.

g. Drain and remove the hose from TBD-003 per General Instruction #1 (**section 3.7.C.1**).

h. Pump the contents of the cold chemical sump to the drain tank per the applicable instructions.

3. Transfer with pump 65-G-08

a. Perform the transfer per the instructions of the applicable decon tank: 65-D-07 or 65-D-09.

4. Tank Standby Line-up

a. Place the DW flush subsystem in it's standby line-up per section 3.13.

3.7.2.B Transferring Acid Using 65-G-07 (Metering Pump)
[See page 1 of **section 3.7**]

NOTE: This procedure is only to be used if pump 65-D-08 is unavailable.

1. Initial Conditions:

a. Vent, drain, and remove pump 65-G-07 suction hose per General Instruction #1 (**section 3.7.C.1**).

b. Verify that transfers of other solutions from the decon system are not required because no other transfers will be possible while pump 65-G-07 is cross-connected.

c. The order to transfer the acid to the VF has been received by the cold chemical operators.

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

d. Verify that the drain tank has sufficient volume to receive approximately 95 liters (25 gallons) of acid/flush water.

e. The decon metering pump 65-G-07 has been set to the required flow rate per the manufactures instructions. The required flow rate for the receiving component is determined from table D-07-1. If the required flow rate is greater than 20 gpm then set the pump for 20 gpm.

2. **Transfer** (Except transfer to the Decon Mix Tank which is detailed in section 3.7.2.B.3 below)

NOTE: Personnel protective equipment will be used per regulation while performing steps b, h, j, k, and r.

a. Check shut TBD-001, 6-65-H-624, 6-65-H-608, 6-65-H-609, and the component isolation valve listed in table D-07-1.

b. Connect a flexible transfer hose between TBD-001 and 6-65-H-608 and between 6-65-H-609 and the component isolation valve.

c. Open 6-DW-H-103, TBD-001, 6-65-H-608, 6-65-H-609, and the valves listed in table D-07-1.

d. NOTE: This step initiates transfer from 65-D-08 to the VF component. The automatic isolation valve must not remain open without the pump operating to prevent back flow.

Open the component automatic valve (listed in table D-07-1) and immediately start pump 65-G-07 using hand switch 65-HS-125B on local control panel 65-LCS-125.

e. Monitor the level in the receiving tank (if available) and in tank 65-D-08 to determine the status of the transfer.

f. When the transfer is complete, stop the metering pump (65-G-07) using hand switch 65-HS-125B and immediately shut the component automatic isolation valve.

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

g. Shut 6-DW-H-103, 6-65-H-609, and the valves from table D-07-1 that were opened in step c.

h. Drain and remove the pump discharge hose per General Instruction #1 (section 3.7.C.1).

i. Check shut 6-65-H-529 (drain tank fill connection).

j. Connect the special hose adapter (1/2" to 2 1/2") to the connection downstream of 6-65-H-609.

k. Connect the "Infrequent Use" slurry transfer hose between the adapter and the drain tank fill connection (6-65-2 1/2-019).

l. Start the drain tank agitator, 65-K-01, per the applicable instructions.

m. Initiate the flow of cooling water to tank 65-D-01 cooling jacket per the applicable instructions.

n. NOTE: Increasing temperature in the drain tank indicates a reaction between the acid and tanks contents is taking place. The transfer of acid shall be stopped if temperature increases dramatically to limit the reaction taking place.

During transfer, closely monitor the temperature (65-TI-001) of the tank. Stop the transfer if the temperature rises above 38°C (100°F) or if starts to increase rapidly (i.e., >0.6°C (1°F) per minute). Allow the tank temperature to stabilize and decrease before resuming the transfer.

o. Open 6-65-H-529, 6-65-H-609, 6-DW-H-116, and 6-DW-GT-402.

p. ▲ Set the DW Flush meter 65-FQIS-027 for a flush volume of 57 liters (15 gallons) per section 3.13 and start the flush.

▲ If required, stop the flush by shutting 6-DW-H-116. Recommence the flush by reopening 6-DW-H-116.

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

q. When the flush is complete shut 6-65-H-116, TBD-001, 6-65-H-608, 6-65-H-609, 6-65-H-529, and 6-DW-GT-402.

r. Drain and remove the pump suction and discharge hoses per General Instruction #1 (section 3.7.C.1).

s. Reconnect the metering pump suction hose by connecting a flexible transfer hose between 6-DW-H-106 and 6-65-H-608.

3. Transfer to the Decon Mix Tank (63-D-048)

NOTE: Personnel protective equipment will be used per regulation while performing steps b, h, and i.

a. Check shut TBD-001, 6-65-H-608, 6-65-H-609, 6-65-H-625, and TBD-003.

b. Connect a flexible transfer hose between TBD-001 and 6-65-H-608 and between 6-65-H-609 and TBD-003.

c. Open 6-DW-H-103, TBD-001, 6-65-H-608, 6-65-H-609, TBD-003, and 6-65-H-634.

d. **NOTE:** This step initiates transfer from 65-D-08 to the Decon Mix Tank. The automatic isolation valve must not remain open without the pump operating to prevent back flow.

Open 65-HV-4803 and immediately start pump 65-G-07 using hand switch 65-HS-125B on the local control panel 65-LCS-125.

e. Monitor the level in the Decon Mix Tank and in tank 65-D-08 to determine the status of the transfer.

f. When the transfer is complete, stop the metering pump (65-G-07) using hand switch 65-HS-125B and immediately shut the component automatic isolation valve.

g. Shut 6-DW-H-103, 6-65-H-609, 6-65-H-634, and TBD-003.

h. Drain and remove the pump discharge hose per General Instruction #1 (section 3.7.C.1).

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

i. Perform steps i through s of section 3.7.2.B.2 to flush the pump and restore the system.

3.7.2.C Draining Tank 65-D-08

[See page 1 of section 3.7]

1. Initial Conditions

a. Ensure that tank 65-D-08 will not be required for VF operation support during this period. Acid for VF support may be prepared in tank 65-D-09 if required.

b. Ensure that the drain tank (65-D-01) can accept approximately 380 liters (100 gallons) of dilute nitric acid and 380 liters (100 gallons) of flush water.

2. Draining the tank

NOTE: Personnel protection equipment to be used per regulations while executing steps b, c, and k.

a. Check shut 6-65-H-529, 6-65-H-634, and **TBD-003**.

b. Connect the special hose adapter (1-1/2" to 2 1/2") to the connection downstream of **TBD-003**.

c. Connect the "Infrequent Use" slurry transfer hose between the adapter and the drain tank fill connection (6-65-2 1/2-019).

d. Start the drain tank agitator, 65-K-01, per the applicable instructions.

e. Initiate the flow of cooling water to tank 65-D-01 cooling jacket per the applicable instructions.

f. NOTE: Increasing temperature in the drain tank indicates a reaction between the acid and the tanks contents is taking place. The transfer of acid shall be stopped if temperature increases dramatically to limit the reaction taking place.

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

During transfer, closely monitor the temperature (65-TI-001) of the tank. Stop the transfer per step h below if the temperature rises above 38°C (100°F) or if starts to increase rapidly (i.e., >0.6°C (1°F) per minute). Allow the tank temperature to stabilize and decrease before resuming the transfer.

g. Open 6-DW-H-103, 6-65-H-624, 6-65-H-625, TBD-003, and 6-65-H-529.

h. Pump the decon tank dry as follows:

- Throttle pump valve 6-65-PCV-127 to approximately 75% shut. Start pump 65-G-08 by gradually opening valve 6-DA-GL-443. Adjust the pressure at 6-65-PCV-127 such that 65-PI-127 reads 55 psig. Once the pressure is set at PCV-127, use 6-DA-GL-443 to adjust pump throughput to approximately 83 strokes per minute which corresponds to 25 gpm.

- Shut 6-DW-GL-443 to secure the pump when the tank is empty as indicated by the tank level indicator <u>and</u> the sudden change in pump speed and noise which indicates it is operating dry. Shut 6-DW-H-103.

i. Flush the tank as follows:

- Open 6-DW-GL-104 and 6-DW-GT-402.

- Set the DW flush meter 65-FQIS-027 to flush approximately 189 liters (50 gallons) and start the flush.

- When the flush is complete shut 6-DW-GL-104.

- Open 6-DW-H-103 and repeat step h.

j. Flush the residual acid from the transfer hose and fill line as follows:

- Open 6-DW-H-116.

- Set the DW Flush meter (65-FQIS-027) to flush 39 liters (10 gallons) per section 3.13 and start the flush to the drain tank.

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

- When the flush is complete shut 6-DW-H-116, 6-65-H-624, 6-65-H-625, TBD-003, and 6-DW-GT-402.

k. Drain and remove the pump discharge hose per general instruction #1 (section 3.7.C.1).

3. Tank Standby line-up

a. Place the DW flush system in its standby lineup per section 3.13.

b. Place tank 65-D-01 in its standby lineup per section 3.9.

3.7.2.D Initial Fill/Refill Dilute Acid
[See page 1 of section 3.7]

This section is to be used only when the tank is initially completely empty.

1. Initial Conditions

a. Tank 65-D-08 has been completely drained.

b. Initiate tank cooling by performing step 3.7.B.7.

2. Preparation of dilute acid solution

a. Open the tank demineralized water (DW) Fill valve 6-DW-GL-111 and the header valve 6-DW-GT-403. Set the fill meter, 65-FQIS-028, per section 3.13 to add the required amount of water as determined from acid dilution table D-08-3. Add the water to the tank.

NOTE: The level indicator of tank 65-D-08 (65-LIS-105) will only indicate approximately 30%-40% of the actual level when immersed in demineralized water because the detector is calibrated for dilute nitric acid. This means that level indication can not be relied upon and the tank agitator cannot be started until solution conductivity reaches approximately 20 micromhos/cm (necessary for accurate indication).

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

b. Addition of Nitric Acid for level indication:

(1) Transfer the required amount of acid to the tank per section 3.4. The volume of acid required is 18.9 liters (5 gallons). The acid addition rate required is 2 lpm (0.5 gpm).

NOTE: The addition rate of nitric acid needs to be very low because agitation of the tank is not yet available.

c. Allow the contents of the tank to mix statically until the level indication is sufficient to allow starting the tank agitator.

d. Start the tank agitator, 65-K-08, using switch 65-HS-123 located on control panel 65-CP-01.

e. Addition of Remaining Nitric Acid:

(1) Transfer the remaining amount of acid to the tank per section 3.4. The volume of acid required is determined from acid dilution table D-08-3 minus the 18.9 liters (5 gallons) already added. The acid addition rate required is 4 lpm (1.0 gpm).

3. Sample the tank contents per section 3.7.1.B and then continue with Tank Operations Per 3.7.

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

TABLE D-08-1: ACID DILUTION TABLE for Cerium IV decon

This table is to be used to determine the acid and water additions necessary to prepare the acid solutions required for canister Cerium IV decontamination. The dilutions are based on an acid heel of 449 L of 0.7 molar acid.

Equations:

Va=Cf*Df*(Vf-Vh)/(Ca*Da)

Vw=Vf-Vh-Va

Terms:

Va=Volume of acid to be transferred (L)

Vw=Volume of demineralized water to be transferred (L)

Vf=Final volume of dilute acid in the tank (L)

Vh=Volume of dilute acid in tank prior to additions (L)

Ca=65-D-05 acid concentration (mass fraction)

Cf=final dilute acid concentration (mass fraction)

Da=Density of the acid in 65-D-05 (Kg/L)

Df=Density of the final acid solution (Kg/L)

Values:

Vf=905 L

Vh=449 L

Cf=0.043 (0.7 molar)

Df=1.022 (4.32% nitric acid)

Da=1.41 (68% nitric acid)

Ca	Va(L)	Va(gal)	Vw(L)	Vw(gal)
0.60	23.69	6.26	432.31	114.22
0.61	23.30	6.16	432.70	114.32
0.62	22.92	6.06	433.08	114.42
0.63	22.56	5.96	433.44	114.52
0.64	22.21	5.87	433.79	114.61
0.65	21.87	5.78	434.13	114.70
0.66	21.53	5.69	434.47	114.79
0.67	21.21	5.60	434.79	114.87
0.68	20.90	5.52	435.10	114.95
0.69	20.60	5.44	435.40	115.03
0.70	20.30	5.36	435.70	115.11

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

TABLE D-08-2: ACID DILUTION TABLE for acid wash solution

This table is to be used to determine the acid and water additions necessary to prepare the acid solutions required for canister acid wash following decon. The dilutions are based on an acid heel of 305 L of 0.7 molar acid.

Equations:

Va=Cf*Df*(Vf-Vh)/(Ca*Da)

Vw=Vf-Vh-Va

Terms:

Va=Volume of acid to be transferred (L)

Vw=Volume of demineralized water to be transferred (L)

Vf=Final volume of dilute acid in the tank (L)

Vh=Volume of dilute acid in tank prior to additions (L)

Ca=65-D-05 acid concentration (mass fraction)

Cf=final dilute acid concentration (mass fraction)

Da=Density of the acid in 65-D-05 (Kg/L)

Df=Density of the final acid solution (Kg/L)

Values:

Vf=905 L

Vh=305 L

Cf=0.043 (0.7 molar)

Df=1.022 (4.32% nitric acid)

Da=1.41 (68% nitric acid)

Ca	Va(L)	Va(gal)	Vw(L)	Vw(gal)
0.60	31.17	8.24	568.83	150.29
0.61	30.66	8.10	569.34	150.42
0.62	30.16	7.97	569.84	150.55
0.63	29.68	7.84	570.32	150.68
0.64	29.22	7.72	570.78	150.80
0.65	28.77	7.60	571.23	150.92
0.66	28.33	7.48	571.67	151.04
0.67	27.91	7.37	572.09	151.15
0.68	27.50	7.27	572.50	151.26
0.69	27.10	7.16	572.90	151.36
0.70	26.71	7.06	573.29	151.46

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

TABLE D-08-3: ACID DILUTION TABLE for initial fill

This table is to be used to determine the acid and water additions necessary to prepare the acid solutions required following complete draining of the tank. The dilutions are based on no acid heel.

Equations:

Va=Cf*Df*(Vf-Vh)/(Ca*Da)

Vw=Vf-Vh-Va

Terms:

Va=Volume of acid to be transferred (L)
Vw=Volume of demineralized water to be transferred (L)
Vf=Final volume of dilute acid in the tank (L)
Vh=Volume of dilute acid in tank prior to additions (L)
Ca=65-D-05 acid concentration (mass fraction)
Cf=final dilute acid concentration (mass fraction)
Da=Density of the acid in 65-D-05 (Kg/L)
Df=Density of the final acid solution (Kg/L)

Values:

Vf=905 L
Vh=0 L
Cf=0.043 (0.7 molar)
Df=1.022 (4.32% nitric acid)
Da=1.41 (68% nitric acid)

Ca	Va(L)	Va(gal)	Vw(L)	Vw(gal)
0.60	47.01	12.42	857.99	226.68
0.61	46.24	12.22	858.76	226.89
0.62	45.49	12.02	859.51	227.08
0.63	44.77	11.83	860.23	227.27
0.64	44.07	11.64	860.93	227.46
0.65	43.39	11.46	861.61	227.64
0.66	42.74	11.29	862.26	227.81
0.67	42.10	11.12	862.90	227.98
0.68	41.48	10.96	863.52	228.14
0.69	40.88	10.80	864.12	228.30
0.70	40.29	10.64	864.71	228.46

Tank 65-D-08; Nitric Acid Service Decon Tank (cont.)

ACID DILUTION - Calculation Method

(General method for calculating Demin. Water (DW) and concentrated nitric acid additions, for final dilute acid concentrations not included in the Tables D-08-1, 2, 3)

Terms:

Ma (gm. moles/liter)	= Molarity of conc. acid in 65-D-05
Mh (gm. moles/liter)	= Molarity of acid heel in 65-D-08
Vh (liters)	= Volume of acid heel in 65-D-08
Mf (gm. moles/liter)	= Molarity of final dilute acid in 65-D-08
Vf (liters)	= Volume of final dilute acid in 65-D-08

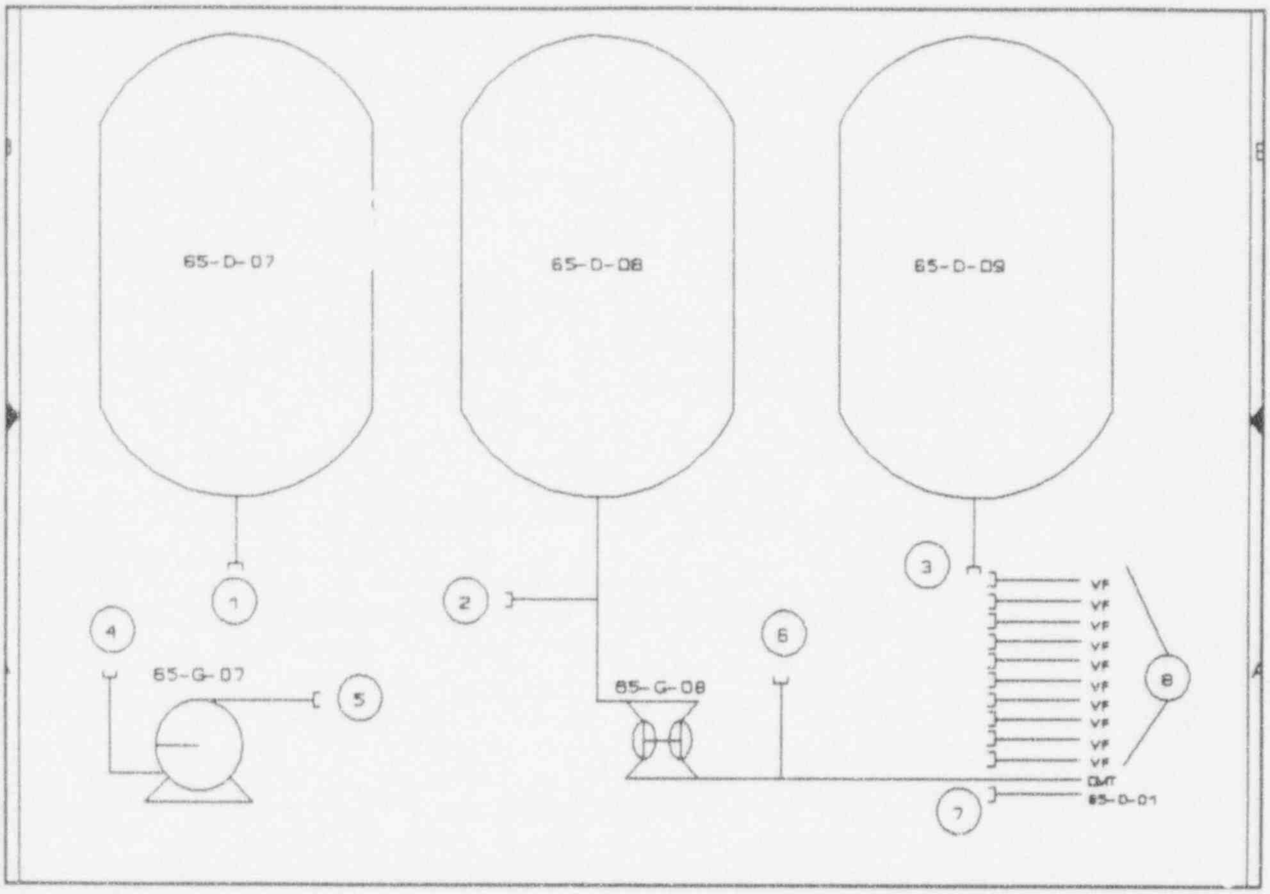
Calculations:

Moles of acid in final batch	= (Vf * Mf)	gm. moles
Moles of acid in heel	= (Vh * Mh)	gm. moles
Moles of conc. acid to be added	= (Vf * Mf)-(Vh * Mh)	gm. moles
Volume of conc. acid to be added	= ((Vf * Mf)-(Vh * Mh))/Ma	liters
Volume of DW to be added	= Vf-((Vf * Mf)-(Vh * Mh))/Ma	liters

Sequence of Addition:

1) Add the bulk of the DW needed to the heel in 65-D-08.
2) Meter in the conc. nitric acid needed.
3) Meter in the balance of DW needed to complete the batch.

3.8 DECON TANK 65-D-09; MISCELLANEOUS SERVICE DECON TANK



Type of Operation	Supply Tank	Destination	Suction Hose #	Pump #	Discharge Hose #	Section Number
Normal Operation	D-05, D-06, Steam Jet	D-09	N/A	G-05 G-06	N/A	3.8.1.A
Normal Operation	D-09	VF	3,2	G-08	6,8	3.8.1.C.2
Infrequent Operation	D-09	DMT	3,2	G-08	N/A	3.8.1.C.3
Infrequent Operation	D-09	VF	3,4	G-07	5,8	3.8.2.A.2
Infrequent Operation	D-09	DMT	3,4	G-07	5,6	3.8.2.A.3
Infrequent Operation	D-09	D-01	3,2	G-08	6,7	3.8.2.B

NOTE: DMT = Tank No. 63-D-048

65-D-09; Miscellaneous Service Decon Tank (cont.)

NOTE 1 The effect of tank agitation of indicated level has not yet been determined.

A) GENERAL PRECAUTIONS

1. To ensure proper operation, monitor the tank level using 65-LIS-106 during transfers to and from the tank.

2. While lowering tank level, indicated tank level may lag actual tank level. This is due to a liquid film adhering to the level probe. The level indication system will not present this problem while filling the tank.

3. When adding water or acid/caustic to the tank:

   a. Ensure the agitator is operating to provide adequate mixing. If the agitator can not be operated then the addition rate must be limited to less than 19 lpm for water and 2 lpm for chemicals (5 and 0.5 gpm respectively). This will reduce the heat generation rate.

   b. Establish CW flow to cool the tank per this procedure.

4. When filling tank 65-D-09 do not fill the tank to a level greater than 908 L (240 gal). This is to prevent initiating automatic cutoff of acid or caustic fill at 1020 L (269 gal).

5. While pumping from tank 65-D-09 secure the tank agitator prior to level decreasing below 757 L (200 gal). This is to prevent automatic shutoff of the tank agitator at 719 L (190 gal).

6. Prior to any transfer, ensure that the receiving vessel has sufficient volume to receive the solution to be transferred. This will limit the possibility of overflowing the receiving tank.

7. The decontamination transfer lines all contain check valves to prevent backflow from the vitrification facility. However, to minimize the potential for backflow the pump is start immediately after opening the automatic isolation valve and the valve is shut immediately after stopping the pump.

8. The maximum allowed temperature in tank 65-D-09 is 63°C (145°F).

65-D-09; Miscellaneous Service Decon Tank (cont.)

9. When controlling tank temperature per this procedure special precautions must be taken to prevent thermally shocking the tank jacket. If the temperature difference between the cooling water supply temperature and the tank temperature (65-TIS-112) is greater then 11°C (20°F) then throttle the flow to the jacket. Once the temperature difference has equalized full flow may be established.

10. **While transferring per this procedure continuous communications with the Vitrification Control Room must be maintained.**

B) **INITIAL CONDITIONS** (Applicable to all operations of **section** 3.8. Additional initial conditions, if any, are provided in each section)

1. Tank 65-D-05 contains a sufficient supply of nitric acid to make the decontamination solution.

2. The required chemicals are available at the Cold Chemical Building staging area.

3. Tank 65-D-06 contains a sufficient supply of sodium hydroxide to make the decontamination solution.

4. All tanks, pipe, and hoses associated with this operation are clean and/or have been flushed.

5. **Initial Valve Line-up:**

<u>Verify the following valves are shut:</u>

- Demineralized Water Flush: 6-DW-GL-119, 6-DW-H-123.
- Demineralized Water Fill: 6-DW-GL-105.
- Cooling Water 6-CW-GL-470, 6-IA-GL-093, 6-65-GT-690 (jacket vent and drain valves).
- Chemical: **6-DW-H-122**, 6-65-GL-687, 6-65-X-620, 6-65-X-617, 6-65-X-621.
- Steam and condensate: 6-SL-GT-412, and 6-SC-GT-404.

<u>Verify the following valves are open:</u>

- Cooling water: 6-CW-GT-465.
- Utility/dry air: pressure regulator on 6-65-L-004.

65-D-09; Miscellaneous Service Decon Tank (cont.)

6. Initial System Line-up:

Verify the following subsystems are in the specified condition (for those systems to be used):

- The nitric acid transfer subsystem is in the standby line-up per section 3.4.

- The caustic acid transfer subsystem is in the standby line-up per section 3.5.

- The instrument air subsystem is lined-up to supply air to the solenoids and instrumentation associated with tank 65-D-09 per the instrument operating instructions.

- The demineralized water flush subsystem is lined-up to supply flush water to 65-D-09 per the system operating procedure.

- The demineralized water fill subsystem is lined-up to supply fill water to 65-D-09 per the system operating procedure.

- The cooling water subsystem is lined-up to provide cooling water to the jacket of decon tank 65-D-09 per the system operating procedure.

- The dryer subsystem for the generation of dry air (from utility air) for the Cold Chemical system is operating and is lined up to supply air to the decon transfer pump (65-G-08) per the system operating procedures.

- The steam and condensate systems are lined-up to provide steam and condensate service to the tank 65-D-09 jacket and the liquid eductor per the system operating procedures.

- The vessel vent scrubber subsystem is operating per the system operating procedure.

7. Ensure the tank level indication systems (65-LIS-106 and 65-LE-103) are operating per the manufacturers operating instructions.

8. Ensure the tank temperature monitoring system (65-TIS-112) is operating per the manufacturers operating instructions. Verify the temperature "setpoint" of 65-TIS-112 is set to < 10°C (50°F) to shut 6-65-FCV-112.

9. Verify the tank density instrumentation is operating per the manufacturers instructions.

65-D-09; Miscellaneous Service Decon Tank (cont.)

C) GENERAL INSTRUCTIONS

NOTE: Upon completion of transfer, the transfer routes to the various VF locations need to be flushed with Demineralized Water and then purged with Instrument Air. This eliminates the danger of cross contamination of chemicals with future transfers. It also prevents suck-back from the in-cell end of line when the rack valve in the Cold Chemical Building is opened next. (i.e., The hydraulic configuration of the lines makes this a possibility. There is a ~20 foot height of vertical line after the rack valve. Any liquid in this line will tend to flow back into the freshly connected transfer hose, creating suck-back at the other end of the line.)

The hardpiped line from valve 6-65-H-634 to the **Decon Mix Tank** (63-D-048) does not need to be flushed with demineralized water and Instrument Air after use. It can remain full of dilute nitric acid.

The steps given below are only to be performed when referenced in the body of the procedure.

1. When required to remove a transfer hose, make sure the transfer line has been purged with a slug of Instrument Air and valved shut as described in the body of this procedure. Carefully uncouple the hose quick connect at the pump end first and bleed off any residual pressurized air. Remove the hose and store in its storage rack.

2. Operation pump 65-G-08

a. Start pump 65-G-08 by gradually opening 6-DA-GL-443. Adjust pressure at 6-65-PCV-127 such that 65-PI-127 reads 55 psig. Once the pressure is set at PCV-127, use 6-DA-GL-443 to adjust pump speed or air flow rate on 65-FI-127 per table D-07-2 to achieve the desired component flow rate.

b. Monitor the level in the receiving component (if available) and in tank 65-D-09 to determine the status of the transfer.

c. • As the transfer nears completion slow the pump speed by throttling shut 6-DA-GL-443. This will slow the transfer rate and make it easier to transfer the correct volume.

• When the transfer is complete, shut 6-DA-GL-443 to stop the pump and immediately shut the component automatic isolation valve to isolate the VF cell from the Cold Chemical System.

65-D-09; Miscellaneous Service Decon Tank (cont.)

3.8.1 NORMAL OPERATION

Tank 65-D-09 will be used for the preparation and transfer of miscellaneous decon solutions. These solutions will normally be transferred via pump 65-G-08. See section 2.2.5.

3.8.1.A DECON SOLUTION PREPARATION

1. Initial Conditions

a. A request and a recipe for the preparation of the decontamination solution has been received by the Cold Chemical System operators.

2. Preparing a Batch of Decontamination Solution

NOTE 1 When the tank indicated level reaches 719 liters (190 gal) start the tank agitator, 65-K-09, using hand switch 65-HS-124 (located on cold chem control panel 65-CP-01).

NOTE 2 The liquid level in the tank needs to be raised to a level greater than 719 liters (190 gal) to ensure the agitator impeller is submerged to sufficient depth for proper operation. An interlock with level indicating switch 65-LIS-106 prevents agitator operation when level is less than 719 liters (190 gal).

NOTE 3 The level indicator of tank 65-D-09 (65-LIS-106) will only indicate approximately 30%-40% of the actual level when immersed in demineralized water because the detector is calibrated for liquids having a conductivity of >20 micromhos/cm. This means that level indication can not be relied upon and the tank agitator cannot be started until the solution conductivity reaches approximately 20 micromhos/cm (necessary for proper indication).

a. Addition of DW:

- Open 6-DW-GL-105 (demineralized water fill valve) and 6-DW-GT-403 (DW fill header isolation valve). Set 65-FQIS-028 (DW fill flow controller), per section 3.13, to add the required quantity of DW (determined from the decon solution recipe). Add the water to the tank.

65-D-09; Miscellaneous Service Decon Tank (cont.)

- When the DW addition is complete, shut 6-DW-GL-105 and 6-DW-GT-403. Record the volume of water added to the tank.

b. Addition of Nitric Acid:

NOTE: N/A this step if nitric acid is not to be added.

- Initiate tank cooling per **section 3.8.2.B**.

- Transfer the required amount of acid to the tank per **section** 3.4. The volume of acid to be added is determined from the decon solution recipe. The acid addition rate required is 3.8 lpm (1 gpm). See Precaution 3 (**section 3.8.A**.3). Prior to adding the acid ensure that it can be added without tank level exceeding 908 L (240 gal). When the transfer is complete record the volume of acid transferred and the level of the tank.

c. Addition of Caustic:

NOTE: N/A this step if caustic is not to be added.

- Initiate tank cooling water per **section 3.8.2.B** if not already established.

- Transfer the required amount of caustic to the tank per **section 3.5**. The volume of caustic to be added is determined from the decon solution recipe. The caustic addition rate required is 3.8 lpm (1 gpm). See Precaution 3 (**section 3.8.A**.3). Prior to adding the caustic ensure that it can be added without tank level exceeding 908 L (240 gal). When the transfer is complete record the volume of caustic transferred and the level of the tank.

d. Addition of Liquid Chemicals:

NOTE: N/A this step if liquid chemicals are not to be added.

- Initiate tank cooling per **section 3.8.2.B** if not already established.

65-D-09; Miscellaneous Service Decon Tank (cont.)

• Transfer the required amount of liquid chemical to the tank per section 3.11. The volume of liquid chemicals to be added is determined from the decon solution recipe. Prior to adding the liquid chemicals ensure that it can be added without tank level exceeding 908 L (240 gal). When the transfer is complete record the weight of chemical transferred and the level of the tank.

e. Tank Standby Line-up

(1) Place the DW fill subsystem in its standby line-up per **section 3.13**.

(2) Place the acid fill subsystem in its standby line-up per **section 3.4**, if operated.

(3) Place the caustic fill subsystem in its standby line-up per **section 3.5**, if operated.

(4) Secure tank cooling per **section 3.8.2.B**.

3.8.1.B Sampling the Decontamination Solution

[See page 1 of **section 3.8**]

1. Initial Conditions

a. Preparation of the decon solution is complete.

b. The decon tank contents have been agitated as required by the decon solution recipe.

c. The Analytical and Process Chemistry (A/PC) lab has been notified of the impending sample analysis.

2. Sampling Operations

NOTE: Personnel protective equipment shall be used while performing steps b and c.

a. • Obtain approved sample containers (bottles).

• Mark the name of the sample (i.e. 65-D-09: decon solution name) time, date, and the operator's initials on each of the bottles.

• Prepare the Analytical Request (AR) Form.

65-D-09; Miscellaneous Service Decon Tank (cont.)

b. Open sample valve 6-65-GL-687 and flush the sample line with approximately 1 liter (1 quart) of solution (flushing is required to ensure the sample is representative). Shut 6-65-GL-687 and place the sample bottle on the sample stand.

c. Open 6-65-GL-687. Obtain the sample and then shut valve 6-65-GL-687.

d. Hand deliver the sample and AR form to the A/PC laboratory.

e. Obtain and record the AR numbers from the A/PC lab. Maintain a log of samples taken and the sample results. These numbers will be used to evaluate the decon solution recipe.

3.8.1.C Transfer of Decontamination Solution of VF Locations

[See page 1 of section 3.8]

1. Initial conditions

a. Verify that pump 65-G-08 has been flushed per section 3.7.

b. Check shut 6-DA-GL-443. Check open 6-DA-GT-488 and 6-DA-GL-428.

c. Pump the cold chemical sump to the drain tank per the applicable operating instructions.

2. Transfer (Except to the Decon Mix Tank)

NOTE: Personnel protective equipment shall be used as applicable per procedures while performing steps given below.

a. Check shut **6-DW-H-122**, 6-DW-H-123, 6-65-H-634, **6-DW-H-103**, 6-DW-H-116, **TBD-001**, **TBD-003**, and the component isolation valve listed in table D-07-1.

b. Connect flexible transfer hoses between **6-DW-H-122** and **TBD-001** and between **TBD-003** and the component isolation valve.

c. Open **6-DW-H-122**, **TBD-001**, 6-65-H-624, 6-65-H-625, **TBD-003**, and the valves listed in table D-07-1.

65-D-09; Miscellaneous Service Decon Tank (cont.)

d. Throttle pump 65-G-08 valve 6-65-PCV-127 to approximately 75% shut.

e. NOTE: This step initiates transfer of decon solution from Tank 65-D-09 to the VF component.

Open the component automatic valve (listed in table D-07-1) and immediately start pump 65-G-08 per General Instruction #2 (**section** 3.8.C.2). Continue pumping until tank 65-D-09 is empty as indicated by level <u>and</u> a sudden change in pump noise and speed which indicates that it is running dry.

f. Shut valve **6-DW-H-122** and flush the transfer route with demineralized water (~ 3 line + pump volumes) via valve 6-DW-H-123.

NOTE: Demineralized water supply needs to be set up at 65-FQIS-027 **(see section 3.13)**

g. Next purge the transfer route using a 30 second slug of Instrument Air via **6-IA-H-114**.

h. ▴ If additional decon solution transfers are required immediately prepare and sample the solution per 3.8.1.A.2 and 3.8.1.B, and then repeat steps 3.8.1.C.2.e, f, g.

▴ Shut **TBD-003**, and the valves listed in table D-07-1 that were opened in step c.

i. Drain and remove the pump discharge hose per General Instruction #1 (**section** 3.8.C.1).

j. ▴ Check shut 6-65-H-529 (Drain tanks fill connection).

▴ Connect the special hose adapter (1 1/2" to 2-1/2") to the connection downstream of ?????-003.

▴ Connect the "Infrequent Use" slurry transfer hose between the adapter and the drain tank fill connection (6-65-2 1/2-019).

k. Start the drain tank agitator and initiate the flow of cooling water to the tank 65-D-01 cooling jacket per the applicable procedure.

65-D-09; Miscellaneous Service Decon Tank (cont.)

l. NOTE: Increasing temperature in the drain tank indicates a reaction between the decon solution and the tank contents is taking place. The transfer shall be stopped if temperature increases dramatically to limit the reaction taking place.

During transfer, closely monitor the temperature (65-TI-001) of the tank. Stop the transfer if the temperature rises above 38°C (100°F) or if starts to increase rapidly (i.e., >0.6°C (1°F) per minute). Allow the tank temperature to stabilize and decrease before resuming the transfer.

m. Flush the tank as follows:

- Open 6-DW-GT-402 and 6-DW-GL-119.

- Set the DW flush meter 65-FQIS-027 for a flush of 190 liters (50 gallons) per **section 3.13** and start the flush.

- When the flush is complete shut 6-DW-GL-119.

n. Pump the flush solution from the tank to the drain tank as follows:

- Open TBD-003 and 6-65-H-529.

- Throttle 6-65-PCV-127 approximately 75% shut.

- Start pump 65-G-08 per General Instruction #2.a (**section 3.8.C.2.a**).

- When the tank is empty as indicated by a sudden change in pump speed and noise and by tank level stop the pump by shutting 6-DA-GL-443.

o. Flush pump 65-G-08 as follows:

- Open 6-DW-H-116 and shut 6-DW-H-122.

- Set the DW flush meter 65-FQIS-028 for a flush of 57 liters (15 gallons) per **section 3.13** and start the flush.

65-D-09; Miscellaneous Service Decon Tank (cont.)

- Jog the pump by opening 6-DA-GL-443. This is necessary to flush both diaphragms of the pump. Shut 6-DA-GL-443.

- When the flush is complete shut 6-DW-GT-402, 6-DW-H-116, TBD-001, 6-65-H-624, 6-65-H-625, TBD-C03 and 6-65-H-529.

p. Drain and remove the pump suction and discharge hose per General Instruction #1 (section 3.8.C.1).

q. Tank standby line-up:

(1) Place the drain tank in it's standby line-up per section 3.9.

(2) Place the DW flush subsystem in its standby line-up per section 3.13.

3. Transfer to the Decon Mix Tank

NOTE: Personnel protective equipment to be used per SOP requirements.

a. Check shut 6-DW-H-122, 6-DW-H-123, 6-DW-H-103, 6-DW-H-116, and TBD-001.

b. Connect flexible transfer hoses between 6-DW-H-122 and TBD-001.

c. Open 6-DW-H-122, TBD-001, 6-65-H-624, 6-65-H-625, and 6-65-H-634.

d. Throttle pump 65-G-08 valve 6-65-PCV-127 to approximately 75% shut.

e. NOTE: This step initiates transfer of decon solution from Tank 65-D-09 to the Decon Mix Tank.

Open the component automatic valve (listed in table D-07-1) and immediately start pump 65-G-08 per General Instruction #2. Continue pumping until tank 65-D-09 is empty as indicated by level <u>and</u> a sudden change in pump noise and speed which indicates that it is running dry.

f. Shut 6-DW-H-122 and 6-65-H-634.

65-D-09; Miscellaneous Service Decon Tank (cont.)

g. Complete restoration by performing **sections 3.8.1.C.2** steps h through o.

3.8.2 INFREQUENT OPERATIONS

3.8.2.A Transfer Using Pump 65-G-07.

[See page 1 of section 3.8]

1. Initial Conditions

a. The order to transfer decon solution to the VF has been received by the Cold Chem operators.

b. The decon metering pump 65-G-07 has been set for the required transfer rate per the manufactures instructions. The required transfer rate is listed in table D-07-2. If the required flow rate is > 20 gpm then set the pump to 20 gpm.

c. Verify that DW transfer from 65-D-07 will not be required during this operation.

d. Vent, drain, and remove pump 65-G-07 suction hose per General Instruction #1 (**section 3.8.C.1**).

e. Verify the drain tank has sufficient capacity to accept approximately 200 gallons of flush water.

f. Pump the cold chem sump to the drain tank per the applicable instructions.

2. Transfer to the VF (Except to the Decon Mix Tank)

NOTE: Personnel protective equipment to be used per SOP requirements.

The VF operators will line up the transfer piping outside the Cold Chemical System per the VF component operating procedures. Table D-07-1 lists the valves in the transfer path. When this procedure requires valves to be operated it is understood to mean only the valve associated with the receiving component.

a. Check shut 6-65-H-609, **6-DW-H-122**, 6-DW-H-123, and the component isolation valve listed in table D-07-1.

65-D-09; Miscellaneous Service Decon Tank (cont.)

b. Connect flexible transfer hoses between the connections at 6-65-H-609 and the component isolation valve and between 6-65-H-608 and 6-DW-H-122.

c. Open 6-DW-H-122, 6-65-H-608, 6-65-H-609, and the valves listed in table D-07-1.

d. NOTE: This step initiates transfer of decon solution from 65-D-09 to the VF component. The automatic isolation valve must not remain open without the pump operating to prevent back flow from the VF component.

Open the component automatic valve (listed in table D-07-1) and immediately start pump 65-G-07 using hand switch 65-HS-125B on local control panel 65-LCS-125.

e. Monitor the level in the receiving tank (if available) and in tank 65-D-09 to determine the status of the transfer.

f. When the transfer is complete, stop the metering pump (65-G-07) using hand switch 65-HS-125B and immediately shut the component automatic isolation valve to isolate the VF cell from the Cold Chemical System.

g. Shut valve 6-DW-H-122 and flush the transfer route with demineralized water (~ 3 line + pump volumes) via valve 6-DW-H-123.

NOTE: DW supply needs to be set up at 65-FQ13-027 (see section 3.13)

h. Next purge the transfer route using a 30 second slug of Instrument Air via 6-IA-H-114

i. • If additional decon solution transfers are immediately required prepare and sample the solution per 3.8.1.A.2 and 3.8.1.B, and then repeat steps 3.8.2.A.2.d, e, and f.

• Shut 6-65-H-609, and the component isolation valve.

j. Check shut 6-65-H-529 (drain tank fill line).

65-D-09; Miscellaneous Service Decon Tank (cont.)

k. ▴ Drain and remove the pump discharge hose per General Instruction #1 (**section** 3.8.C.1).

l. ▴ Connect the special hose adapter (1-1/2" to 2-1/2") to the connection downstream of 6-65-H-609.

▴ Connect the "Infrequent Use" slurry transfer hose between the adapter and the drain tank fill connection (6-65-2 1/2-019).

m. Start the drain tank agitator, 65-K-01, per **section 3.9**.

n. Initiate the flow of cooling water to the tank 65-D-01 cooling jacket.

o. **NOTE**: Increasing temperature in the drain tank indicates a reaction between the decon solution and the tank contents is taking place. The transfer shall be stopped if temperature increases dramatically to limit the reaction taking place.

During transfer, closely monitor the temperature (65-TI-001) of the tank. Stop the transfer if the temperature rises above 38°C (100°F) or if starts to increase rapidly (i.e., >0.6°C (1°F) per minute). Allow the tank temperature to stabilize and decrease before resuming the transfer.

p. Pump the remaining contents of the tank to the drain tank as follows (do not lower level below the minimum indicated level):

▴ Open 6-65-H-609 and 6-65-H-529.

▴ Start pump 65-G-07 using hand switch 65-HS-125B (on 65-LCS-125).

▴ When the minimum indicated tank level is reached stop the pump using hand switch 65-HS-125B.

q. Flush of tank 65-D-09:

▴ Open 6-DW-GT-402 and 6-DW-GL-119.

▴ Set the DW flush meter 65-FQIS-027 for a flush of 190 liters (50 gallons) per **section 3.13** and start the flush.

65-D-09; Miscellaneous Service Decon Tank (cont.)

- When the flush is compete shut 6-DW-GL-119.

- Start pump 65-G-07 using hand switch 65-HS-125B (on 65-LCS-125).

- When the minimum indicated tank level is reached stop the pump using hand switch 65-HS-125B.

r. Flush of the pump:

(1) Shut 6-DW-H-122. Open 6-DW-H-123.

(2) Set the DW flush meter 65-FQIS-027 for a flush volume of 56.8 liters (15 gallons) per **section** 3.13 and start the flush.

(3) When the flush is complete shut 6-DW-GT-402, 6-DW-H-123, 6-65-H-608, 6-65-H-609, and 6-65-H-529.

s. Drain the pump suction and discharge hoses per General Instruction #1.a (**section 3.8.C.1.a**).

t. Drain the Tank

(1) Disconnect the pump discharge hose and special hose adapter and store them. Disconnect the suction hose at 6-65-H-608 and direct it to the sump.

(2) Drain the tank by throttling open 6-DW-H-122. Shut 6-DW-H-122 as necessary to prevent overflowing the sump. Pump the sump as necessary per the applicable instructions then continue draining by opening 6-DW-H-122.

(3) When draining is complete shut 6-DW-H-122. Drain and remove the hose per General Instruction #1 (**section** 3.8.C.1).

3. Transfer to the Decon Mix Tank (63-D-048)

NOTE: Personnel protective equipment to be used per SOP requirements.

No other transfers can be made from the decon system while performing this operation because pump 65-G-08 will be unavailable.

65-D-09; Miscellaneous Service Decon Tank (cont.)

The VF operators will line up the transfer piping outside the Cold Chemical System per the VF component operating procedures. Table D-07-1 lists the valves in the transfer path. When this procedure requires valves to be operated it is understood to mean only the valve associated with the receiving component.

a. Check shut 6-65-H-609, 6-65-H-608, 6-DW-H-122, 6-DW-H-123, TBD-003 and 6-65-H-625.

b. Connect flexible transfer hoses between the connections at 6-65-H-609 and TBD-003 and between 6-DW-H-122 and 6-65-H-608.

c. Open 6-DW-H-122, 6-65-H-608, 6-65-H-609, TBD-003 and 6-65-H-634.

d. NOTE: This step initiates transfer of decon solution from 65-D-09 to the Decon Mix Tank. The automatic isolation valve must not remain open without the pump operating to prevent back flow from the tank.

   Open 65-HV-4803 and immediately start pump 65-G-07 using hand switch 65-HS-125B on the local control panel 65-LCS-125.

e. Monitor the level in the Decon Mix Tank and in tank 65-D-07 to determine the status of the transfer.

f. When the transfer is complete, stop the metering pump (65-G-07) using hand switch 65-HS-125B and immediately shut the component automatic isolation valve to isolate the tank from the Cold Chemical System.

g. ▴ If additional decon solution transfers are required immediately prepare and sample the solution per 3.8.1.A.2 and 3.8.1 B, and then repeat steps 3.8.2.A.2.d, e, and f.

   ▴ Shut 6-65-H-609, TBD-003 and 6-65-H-634.

h. Perform section 3.8.2.A.2 steps h through o.

65-D-09; Miscellaneous Service Decon Tank (cont.)

3.8.2.B Control of Tank Temperature

The cooling jacket is normally kept full of CW with the supply valve open and the return valve shut.

1. Tank Cooling

a. Initiate tank cooling by opening 6-CW-GL-470. Ensure the proper cooling water flow exists as indicated on 65-FI-120. It should read approximately 95 lpm (25 gpm).

b. Monitor the temperature on 65-TIS-112. Throttle 6-CW-GL-470 (CW return isolation) as necessary to control temperature.

c. When cooling is no longer required shut 6-CW-GL-470.

2. Tank Heating

a. Coil Preparation

(1) Shut 6-CW-GT-465. Check shut 6-CW-GL-470, 6-SL-GT-467, 6-SL-GT-412, and 6-SC-GT-404.

(2) **NOTE:** Take the necessary precautions to prevent wetting equipment while draining the tank jacket.

- Slowly open the jacket vent valve 6-IA-GL-093 to depressurize the jacket.
- Open 6-65-GT-690 to drain the jacket.
- Since the jacket and piping contains more than one low point, use instrument air hosed over to the vent and air purge connection (next to valve 6-IA-GL-093) to completely drain the jacket.
- When draining is complete disconnect the IA purge hose and shut 6-IA-GL-093 and 6-65-GT-690.

b. Notify the Vitrification Control Room that steam heating of tank 65-D-09 will be performed.

65-D-09; Miscellaneous Service Decon Tank (cont.)

c. Start tank agitator 65-K-09 using hand switch 65-HS-124 located on cold chemical control panel 65-CP-01.

NOTE: The tank agitator will not start if level is less than the agitator trip at 717 liters (190 gal).

d. NOTE: Live steam will issue from the tank jacket vent if the steam supply valve is open too far.

Venting of the air from the tank jacket is necessary to minimize the effect on boiler water chemistry from placing the jacket on service and to minimize corrosion.

Steam must be slowly introduced into the jacket to prevent thermal shock.

Steam flow to the tank jacket cannot be established unless the tank agitator is operating due to an interlock with 6-65-FCV-112.

- Open 6-SL-GT-467 and 6-SC-GT-404. Open 6-SL-GT-412 approximately 1/2 turn.

- Adjust the "setpoint" temperature of 65-TIS-112 to the required temperature.

- When steam begins to issue from the jacket drain valve, shut the jacket drain valve 6-65-GT-690.

e. Fully open 6-SL-GT-412 when tank temperature has increased at least 3°C (5°F).

f. Monitor the tank temperature on 65-TIS-112. Adjust the temperature "setpoint" as necessary.

g. When tank heating is no longer required, adjust the temperature "setpoint" of 65-TIS-112 to approximately 10°C (50°F).

h. Shut 6-SL-GT-412 and then shut valves 6-SL-GT-467 and 6-SC-GT-404.

65-D-09; Miscellaneous Service Decon Tank (cont.)

i. Slowly open 6-65-GT-690 (jacket drain) to drain the remaining steam from the jacket.

<u>CAUTION:</u> Because the tank jacket was just pressurized with steam the residual steam will vent from this valve when opened.

j. When steam and condensate no longer issue from the tank jacket drain valve, shut the valve. Open the tank jacket vent valve 61-IA-GL-093. Next open CW supply valve 6-CW-GT-465 one quarter turn (just enough to establish flow).

<u>CAUTION:</u> The CW supply must be slowly opened to prevent thermally shocking the jacket.

k. When air free water issues from the tank vent valve 6-IA-GL-093 shut this valve and fully open cooling water return valve 6-CW-GL-470.

3.9 TANK 65-D-01; DRAIN TANK

TBD

3.10 PNEUMATIC SUBSYSTEM FOR SOLIDS TRANSFER

A) GENERAL PRECAUTIONS

1. Fume hood needs to be operational, and personnel protection equipment is to be utilized (per regulations) during material handling operations.

2. Vessel Ventilation Subsystem needs to be operational during material handling operations.

3. Batch preparation accuracy is highly dependent upon accurate weighout and transfer of each ingredient chemical. It is therefore recommended that each step of the material handling operation require an independent checkoff by supervisor.

3.10.1 Pneumatic Transfer of Powders to Slurry Tanks

3.10.1.A Turn on the PLC for the Vac-U-Max pneumatic transfer system by turning on the "Power" switch on the main control panel for this sub-system. This panel is located in the drum staging bay of the Cold Chemical Building.

3.10.1.B Turn on the vacuum blower 65-H-01 by pressing the "Start" button on the main control panel.

3.10.1.C Select the wand for transfer of material to the chosen receiving tank (per Table 1 - Vac-U-Max), and position it in the drum of material to be transferred.

3.10.1.D Initiate transfer to the tank by turning on the appropriate switch labeled "Receiver # 1, 2, or 3" on the main control panel. (see Table 1 - Vac-U-Max).

3.10.1.E After completion of the pneumatic transfer operations for a slurry batch, turn off the system by placing the "Receiver" switch in the Off position, pressing the vacuum pump Stop button, and finally switching off the Power switch on the main control panel for this sub-system.

NOTE 1 See **Appendix** 3 for vendor diagrams on the Vac-U-Max pneumatic transfer subsystem.

Pneumatic Subsystem for Solids Transfer (cont.)

TABLE 1 - VAC-U-MAX

RECEIVING TANK	WAND NUMBER	RECEIVER NUMBER	REMARKS
65-D-02	6-65-WD-002	1	
65-D-03	6-65-WD-003	2	
65-D-04	6-65-WD-004	3	

3.11 Steam Jet Subsystem For Liquids Transfer

NOTE: P&ID's (Nos. 905-D-015; -016; -018) refer to the steam jets as liquid educators.

A) GENERAL PRECAUTIONS

1. Fume hood needs to be operational, and personnel protection equipment is to be utilized (per procedures) during material handling operations.

2. Vessel Ventilation Subsystem needs to be operational during material handling operations.

3. Batch preparation accuracy is highly dependent upon accurate weighout and transfer of each ingredient chemical. It is therefore recommended that each step of the material handling operation require an independent checkoff by supervisor.

4. In case of system malfunction there exists the possibility of live steam leaking through the wand check valves 65-FV-930/ 931 and the wand flex hose connections. Therefore caution should be exercised when performing this operation.

5. It is important to thoroughly flush lines with DW at the end of transfer of each ingredient chemical (minimum flush 5 line volumes). This precludes the possibility of chemical reaction within transfer piping between two successive ingredient liquid chemicals.

   CAUTION: Since strong alkalis and acids may react violently with water, extreme caution needs to be exercised during drum and transfer line flush operations. Details of operation need to be fully addressed on a chemical by chemical basis on the work order or SOP.

3.11.1 Steam Jet Transfer of Liquids

3.11.1.A Initial conditions

1. Verify the steam header valve 65-SH-GT-759 is closed.

2. Verify the utility air supply valve 6-UA-GT-437 is closed.

3. Verify the following steam jet transfer system valves are closed: 65-X-503, 65-X-511; 65-X-519; 65-X-605; 65-X-605; 65-X-610; 65-X-617; SH-GL-417; SH-GL-414; G-SH-GL-416A; 65-GL-898A; 65-GL-923A.

4. Next verify the steam supply header valves SH-GT-402 and 65-SH-GT-802 are open.

Steam Jet Subsystem for Liquids Transfer (cont.)

5. Slowly open steam header valve 6-SH-GT-759, and pressure gauge isolation valve 65-GL-416 to check steam pressure on 65-PI-336. It should read ~100 psig.

6. Verify steam trap valves 6-SH-GL-415 and 6-SC-GL-414 are open and trap SC-T-425 is functioning.

3.11.1.B Steam Jet Transfer of Liquids

1. Open the valves per steps 1 and 2 in Table 1 - Liquids Transfer, in preparation for transfer of chemicals to the chosen receiving tank.

   NOTE: Per Drawing No. 905D-018, the liquids transfer system consists of twin systems in parallel for servicing the slurry tanks (65-D-02; -03; -04) and the decon tanks (65-D-07; -08; -09). Liquids transfer will occur to only one tank at a time.

2. Slowly turn on the steam supply to the chosen steam jet wand by opening appropriate valve per step 3 of Table 1 - Liquids Transfer.

   CAUTION: In case of system malfunction there exists the possibility of live steam leaking through the wand check valves 65-FV-930/ 931 and the wand flex hose connections. Therefore caution should be exercised when performing this operation.

3. Choose the correct steam jet wand per Table 1 - Liquids Transfer, and place into drum to begin liquid transfer to the receiving tank.

4. Check the appropriate pressure indicator per Table 1 - Liquids Transfer and record the reading for each ingredient chemical. (Reading is expected to vary with the specific gravity of liquid being transferred)

5. Upon completion of transfer of each liquid ingredient chemical, flush the transfer line with a minimum of 5 line volumes of DW to preclude possibility of chemical reaction with next chemical. See caution statement under General Precautions 3.11.

Steam Jet Subsystem for Liquids Transfer (cont.)

6. After the transfer and water flush operations are completed. Turn off the steam supply to the jet by closing valve 6-SH-GT-759.

   Suck atmospheric air through the wand to empty out the flush DW from the transfer piping.

7. Purge the transfer line of steam by momentarily opening utility air valve 6-UA-GT-437.

8. Close valve 6-SH-GL-416.

9. Secure the system by closing valves opened per Table 1 - Liquids Transfer.

10. Maintain accurate records of weights of material and flush water transferred.

Steam Jet Subsystem for Liquids Transfer (cont.)

TABLE 1 - LIQUIDS TRANSFER

STEAM JET SUBSYSTEM FOR LIQUIDS TRANSFER

RECEIVING TANK	STEAM JET WAND NO.	STEP 1 OPEN VALVES	PRESSURE INDICATOR	STEP 2 OPEN VALVES	STEP 3 OPEN VALVES	REMARKS
65-D-02	6-65-FV-930 6-65-WD-001	6-65-GL-898	PI-327	6-65-X-503	6-SH-GL-414	
65-D-03	6-65-FV-930 6-65-WD-001	6-65-GL-898	PI-327	6-65-X-511	6-SH-GL-414	
65-D-04	6-65-FV-930 6-65-WD-001	6-65-GL-898	PI-327	6-65-X-519	65-SH-GL-414	
65-D-07	N/A	N/A	N/A	6-65-X-605 LOCK & TAG CLOSED	N/A	This tank to be used exclusively for DW service.
65-D-08	N/A	N/A	N/A	6-65-X-610 LOCK & TAG CLOSED	N/A	This tank to be used exclusively for Dilute Nitric Acid service.
65-D-09	6-65-FV-931 6-65-WD-005	6-65-GL-923	PI-328	6-65-X-617	6-SH-GL-417	

3.12 VESSEL VENTILATION SUBSYSTEM (Venturi Scrubber)

NOTE 1 Pressure Indicators on tanks 65-D-01, 07, 08, 09 have not been incorporated to date.

NOTE 2 Throttle valves on individual tank vent lines have not been incorporated to date.

The Venturi Scrubber Subsystem is designed to treat and vent powders and gases from the tanks 65-D-01 through and including tank 65-D-09. It is designed to be on continuously, and needs to be properly connected to each Cold Chemical tank before the tank is put into use.

The Venturi Scrubber Subsystem is equipped with two scrub solution recirculation pumps which provide the motive force for operation of the venturis. Pump 65-G-10 is connected as the primary pump and pump 65-G-11 is installed as a back-up. The pumps are wired for automatic start-up of the back-up pump upon primary pump failure. The circuitry does not allow for automatic start-up of the primary pump upon back-up pump failure. **Cold Chemical operations therefore need to be suspended and brought to a Safe condition upon failure of the primary pump. Normal operations are to be resumed only after fixing the primary pump.**

3.12.1 Prior to start up of the Venturi Scrubber Subsystem, perform a valve line-up of tank vent valves to ensure that the system will service all tanks intended to be put into operation.

3.12.2 Make sure automatic tank drain and fill valves 65-FCV-341 and 65-SD-337 are operational.

3.12.3 Ensure the Demineralized Water (DW) header valve 6-DW-GL-115 is open and DW is not being used elsewhere in the Cold Chemical System. Open the scrubber DW valve **6-65-H-312** and charge the scrub solution tank 65-D-10 (see **section 3.13** for details on operation of the DW supply system). The automatic fill control valve 65-SD-337 will shut off DW addition when liquid level reaches the switch 65-LSH-326. Local indicator 65-LI-342 will provide an independent confirmation on the liquid level in the tank. Record the reading on 65-LI-342 at DW shut off.

3.12.4 In preparation for start-up of the primary scrub solution pump 65-G-10, perform the following operations:

3.12.4.A Ensure that the suction and discharge valves (6-65-H-820, 823 and 6-65-H-22, 23) on the primary and back-up scrub solution pumps 65-G-10 and 65-G-11 are open.

3.12.4.B Open valve 6-65-H-924 to bring the pressure indicator 65-PI-315 on-line.

Vessel Ventilation Subsystem (cont.)

3.12.4.C At control panel 65-CP-01 place the "STOP/NORMAL/START" switch for both pumps 65-G-10 and 65-G-11 in the STOP position.

3.12.5 Start the Vessel Ventilation Subsystem as follows:

3.12.5.A Turn on power to the pumps at the MCC.

3.12.5.B Place the back-up pump switch in the NORMAL position.

3.12.5.C Place the primary pump (65-G-10) switch in the START position.

3.12.6 Read and record the scrub solution pressure on 65-PI-315. It should read around 49 psig.

3.12.7 Read and record the system vacuum at 65-PIS-308. It should read TBD inches of water.

3.12.8 Open Cooling Water (CW) return valve 6-CW-H-425 and throttle the supply valve 6-CW-H-829 to establish a minimal cooling water supply to heat exchanger 65-E-1 to maintain scrub solution temperature at 65-TI-312 at < 100 deg. F.

3.12.9 Periodically sample the scrub solution via 6-65-H-826 for nitric acid and solids concentrations. Deliver samples taken to the Analytical and Process Chemistry Laboratory for analysis.

Maintain a record of the sample number, date, analysis results, and visual observations of the samples taken.

3.12.10 To maintain the nitric acid and solids content of the scrub solution within the limits defined below, bleed scrub solution to drain tank 65-D-01 until the liquid falls to the level of the switch 65-LSL-326. At this point fresh DW will be automatically added to the tank till the level rises to level of switch 65-LSH-326 per the automatic fill mechanism.

Under the guidelines given by the system manufacturer, the scrub solution in tank 65-D-10 is to be maintained within the limits given below :

- Maintain nitric acid at < 2 wt. %
- Maintain dissolved solids at 1 to 2 wt. %
- Maintain undissolved solids at 1/2 to 1 wt. %

If the slurry has a tendency to settle out and/or is found to be abrasive (i.e. significant SiO2 or Al2O3 content, etc.), the above limits may be decreased to keep tank 65-D-10 clean and minimize wear on the pumps.

3.13 Demineralized Water (DW) Delivery Subsystem

NOTE: It is uncertain at this time whether DW will be available at the required 70 gpm for flush out of 2 1/2 inch slurry lines. Memo to K. B. 6-24-93.

1. "Flush" and "fill" water is added to the in-cell components of the vitrification facility via the decon tank 65-D-07. Operation of tank 65-D-07 is detailed in section 3.6.

2. The DW requirements for flushing of slurry line is 265 lpm (70 gpm) at ~55-psig.

3. The DW requirements for filling of tank is 151 lpm (40 gpm) at ~55 psig.

** However, for the smaller tanks, (i.e., 65-D-04, 08, 09) throttle down at the tank to a flowrate of around 76 lpm (20 gpm) to decrease the possibility of tank overfill (i.e., There is a "Level Alarm High" but no automatic shut off of DW at high level in the tanks).

4. Flush water for ingredient chemical drum cleanout (via valve 6-DW-GL-25) is not metered (see drawings 905-D-015, 018, sh 1). Record of flush water used is therefore obtained via the increase in weight of the drum being flushed.

5. DW added to the scrub solution tank 65-D-10 is also not metered (see drawings 905-D-015, 018 sh 1).

6. DW header valve 6-DW-GL-115 is a "normally open" valve to accommodate operation per items 4 and 5 above.

A) GENERAL PRECAUTIONS

1. Since accurate addition of DW to the vitrification process is an important parameter, independent verification of the DW valve line-up and meter setting and DW valve shut off upon completion of operation are recommended in order to decrease the possibility of error in these totally manual operations.

3.13.1 Demineralized Water Flush and Fill Operations

3.13.1.A Initial Conditions

1. Site DW supply system is operational and adequate quantities of DW are available at or above the required flowrates and pressure.

3.13.1.B Initial DW Header Set-up

NOTE 1 During system checkout and testing, the DW flush and fill line header valves 6-DW--GT-402 and 6-DW-GT-403 were preset to flowrates of 70 gpm and 40 gpm respectively. The corresponding header pressures at 65-PI-047 and 65-PI-048 were recorded at **TBD** psig. and **TBD** psig. respectively.

NOTE 2 The header pressures under no-flow condition were also measured and recorded at **TBD** psig. and **TBD** psig.

1. Make sure DW flush and fill meters 65-FQIS-027 and 65-FQIS-028 are in the shut position. (i.e. they will not permit flow of water)

2. Open DW header valve 6-DW-GT-401 to initiate flow to the Cold Chemical Building.

3. Record the pressure readings at PI-047 and PI-048 under no-flow conditions, and compare with readings previously recorded as detailed above to ensure sufficient supply and pressure of DW to satisfy flush and fill water requirements.

4. If readings on 65-PI-047 and 65-PI-048 are appreciably (> 5%) different from those recorded at no-flow during system checkout and testing, flushing operations may have to be delayed or repeated later to ensure good flushing. (NOTE: Flowrate and pressure requirements are more critical for flushing operations)

3.13.1.C "Flush" and "Fill" Operations

1. Dial in the required volume of DW to be used at the appropriate header meter. (65-FQIS-027 for flush, and 65-FQIS-028 for fill needs)

2. Perform a valve lineup to verify that all DW valves downstream of the appropriate meter are closed. (see General Precautions section)

3. Open the appropriate valve(s) to ensure flow <u>exclusively</u> to the desired location.

4. Initiate water flow at the appropriate DW meter. The meter will automatically shut off DW upon transfer of the preset volume. (see General Precautions section)

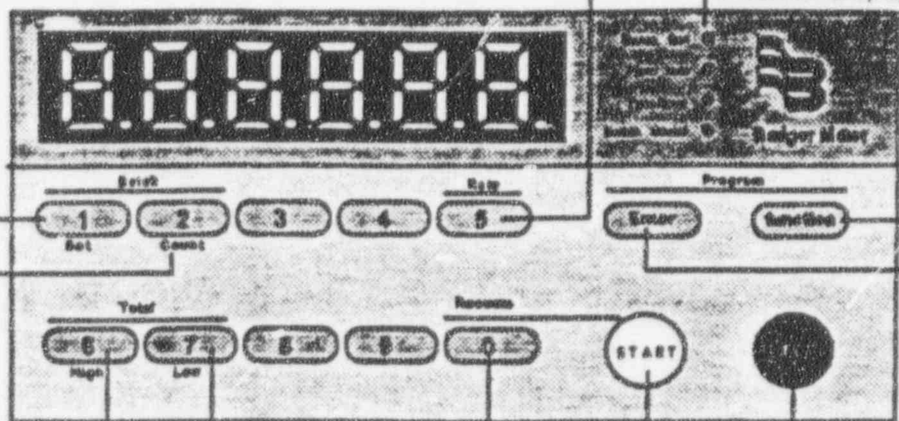
5. Return the DW system to its standby position by closing the valves opened in step 3 above.

HOW TO OPERATE THE PC 100 FRONT PANEL

Operation The PC 100 front panel consists of a display of six 7 segment LEDs, four yellow LED indicators, and a numeric/command keypad. Some of the number keys have dual function operation. The panel provides water tight protection to the internal components and can easily be replaced in case of damage (order part number 48720-24400). A protective clear plastic cover is also available to protect the label from dirt, paint, puncture or scratches (order part number 58689-001).

To view counters or control operation: Using the front panel you can view rate of flow, total and batch count, or start, stop and resume operation by simply pressing the keys so labeled.

To program functions: press the Function key, enter the function number, press the Enter key to view the present value, change value and press the Enter key again to store the new value in memory (see next page on programming sequence).



DUAL PURPOSE FUNCTION KEYS:
In addition to serving as numerical keys to program batch or other values, these keys can be used to program or display batch values, totals and rate of flow.

1 Set — The 1 key is used to program a new batch. Press once, key in the number and press ENTER

2 Count — The 2 key is used to return the display to batch count.

Rate 5 — The 5 key is used to display the instantaneous flow rate in GPM, LPM, etc.

0 Resume — The 0 key is used to RESUME operation from the point where a STOP command was received.

START — START will reset the batch counter and energize both relays to begin batch operation.

STOP — Press STOP to de-energize the relays and stop operation

Function — Press FUNCTION to start a program operation or to start over if a mistake is made.

6 High — Press to read the four upper digits

10 DIGIT TOTALIZER

7 Low — Press to read the six lower digits

APPENDIX 1

REFERENCES

Drawings:

General Arrangements - Cold Chemical Building

905-D-041 - General Arrangement Cold Chemical Building Plan El. 98.50' & 100.00'

905-D-042 - General Arrangement Cold Chemical Building Plan El. 115.00' & Above

905-D-043 - General Arrangement Cold Chemical Building Sections

P&IDs

905-D-015, Sh 1,2	P&ID Cold Chemical Preparation and Feed System
905-D-016, Sh 1,	P&ID Cold Chemical Preparation and Feed System
905-D-017, Sh 1,2	P&ID Cold Chemical Preparation and Feed System
905-D-018, Sh 1,2	P&ID Cold Chemical Preparation and Feed System
905-D-019, Sh 1,2,3	P&ID Cold Chemical Steam and Condensate System
905-D-020, Sh 1,	P&ID Cold Chemical Utility and Instrument Air
905-D-021, Sh 1,	P&ID Cold Chemical Water Systems
905-D-022, Sh 1,	P&ID Cold Chemical System Acid & Caustic System
905-D-027, Sh 1,	P&ID Vitrification Facility Decon System
905-D-045, Sh 7,	P&ID Vitrification Facility Instrument Rack 2W3-2
905-D-045, Sh 11,	P&ID Vitrification Facility Instrument Rack 3W4
905-D-053, Sh 1,	P&ID Vitrification Facility Non-Rack Cold Chemical Decon & Slurry System
905-D-053, Sh 2,	P&ID Vitrification Facility Non-Rack Cold Chemical Decon & Slurry System

REFERENCES

(Continued)

Electrical Control

905D-201	Power Distribution and Motor Data Sheet, 480 Volt Cold Chemical MCC
905D-235	Lighting Notes, Details and Panel Schedule Cold Chemical Building
900D-2803	Cold Chemical Building H&V Air Flow Diagram and P&ID
900D-2851	Cold Chemical System HVAC Control Panel 65-CP-03
900D-2858	Cold Chemical Preparation and Feed System Control Panel 65-CP-01
905D-024	P&ID Cold Chemical System Fire Protection
905B-306, Sh 124	Ladder Diagram, Cold Chemical System Drawing Index
905B-302, Sh 1,2	Control Wiring Diagram, Cold Chemical Preparation and Feed System, Index

Documents

1. WVNS DC-022, Rev. 3, 1/20/92, Design Criteria Vitrification of High-Level Wastes.
2. DOE Order 6430.1A, 4/6/89, United States Department of Energy General Design Criteria.
3. WVNS-CS-139, Rev. 3, 5/18/92, Vitrification Mechanical I&C and Electrical Installation.
4. WVNS-DC-045, Rev. 1, Cold Chemical System Design Criteria.
5. WVNS-EQ-275, Rev. 1, 2/19/88, Equipment Specification, Cold Chemical System: Slurry Holding Tank, Main Slurry Mix Tank, Slurry Shim Tank, Nitric Acid Day Tank, Caustic (NaOH) Day Tank, Decon Tanks.
6. Piping Line List, WVNS-UPLL-009
7. Valve and Specialty List, WVNS-VSL-008.
8. Equipment List, WVNS-EQL-005, Data Sheet Hubers 042 through 057.
9. Instrument List, WVNS-IL-08
10. Instrument Specification, WVNS-IS-154

REFERENCES

(Continued)

11. WVNS-EQ-295

12. Operating and Maintenance Manual for Venturi Scrubber Subsystem

13. Operating and Maintenance Manual for Pneumatic Subsystem for Solids Transfer (Vac-U-Max)

APPENDIX 2
Interface Location List

System 65

For interface locations of utilities with the Cold Chemical System, see the System Descriptions given below:

WVNS-SD-63IA
WVNS-SD-63UA
WVNS-SD-63CW
WVNS-SD-63UW
WVNS-SD-63PW
WVNS-SD-63SC
WVNS-SD-63SL
WVNS-SD-63ED

Interface location with VF Instrumentation and Control, Hardware (System #200A) is at the instrument or control valve.

Interface locations with other systems are tabulated on the following pages.

See section 3.6 Tables D-07-1, 2 for details on valve line-ups and flowrates for slurry, decon solution, and demineralized water transfers out of the Cold Chemical System.

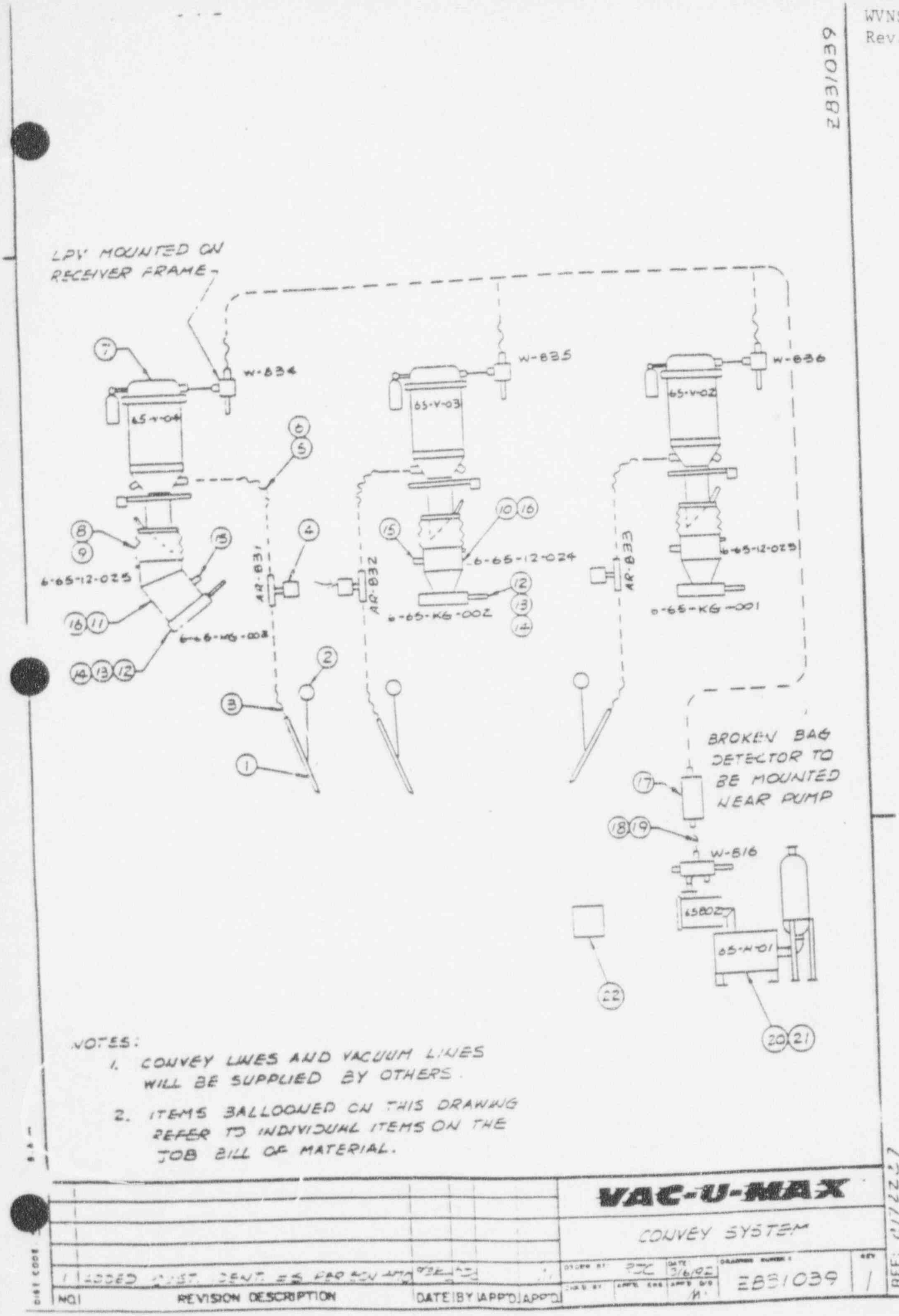
Interface Location List

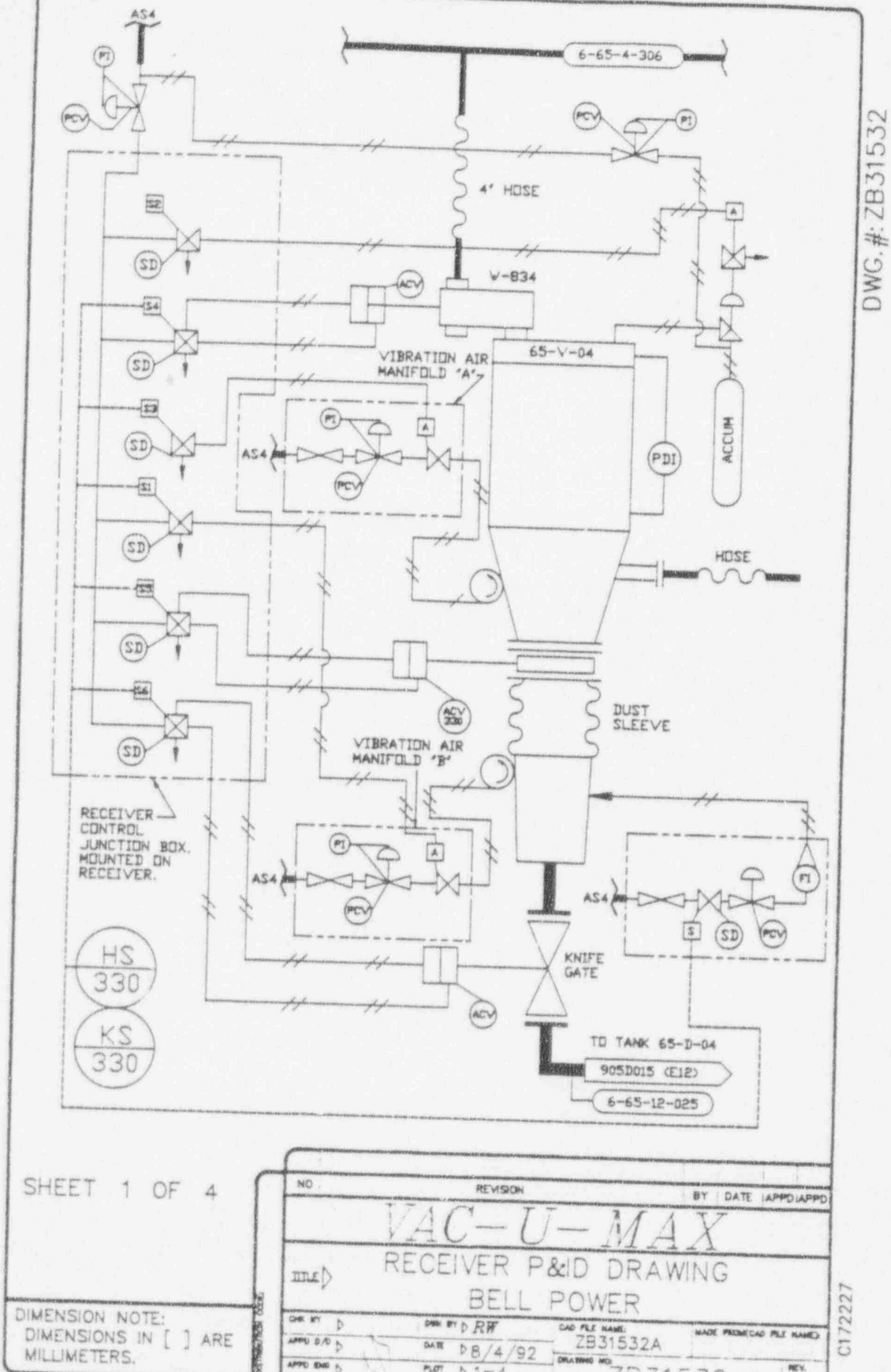
System 65 Interfaces

Other System	Serial	Description	P&ID	Sht
63DW	4	DW SUPPLY TO COLD CHEMICAL BUILDING AT VALVE 6-DW-GT-401	905-D-021	1
63G	1	DECON SOLUTION TO WASTE HEADER EAST @ 6-CH-H-967	905-D-053	1
63G	2	DECON SOLUTION TO WASTE HEADER WEST @ 6-CH-H-968	905-D-053	1
63H	1	DECON SOLUTION TO VESSEL VENT HEADER @ 6-CH-H-947	905-D-045	11
63H	2	DECON SOLUTION TO HEME 2 63-T-036 @ 6-CH-H-950	905-D-045	11
63H	3	DECON SOLUTION TO HEME 1 63-T-033 @ 6-CH-H-953	905-D-045	11
63H	4	DECON SOLUTION TO VESSEL VENT CONDENSER 63-E-015 @ 6-CH-H-956	905-D-045	11
63H	5	DECON SOLUTION TO MIST ELIMINATOR @ 6-CH-H-959	905-D-045	11
63H	6	DECON SOLUTION TO SBS 63-V-31 @ 6-CH-H-927	905-D-045	7
63H	7	DECON STATION TO SBS 63-V-31 @ 6-CH-H-930	905-D-045	7
63I	1	COLD CHEM ADDITION TO CFMUT AT INLET TO 6-CH-X-939	905-D-045	11
63I	2	SLURRY ADD TO CFMUT 63-V-001 @ EXIT FROM 6-CH-H-964	905-D-053	1
63I	3	SLURRY ADD TO MFHT 63-V-011 @ INLET TO 6-CH-H-960	905-D-053	1
63I	4	MFHT (P) CHEMICAL ADDITION PENN 1213 @ EXIT FROM 6-CH-X-962	905-D-053	1
63I	5	CHEMICAL CONTROL - APPROVAL OF CHEMICALS (ADMINISTRATIVE INTERFACE)		
63IA	1	IA SUPPLY TO VESSEL VENT HEADER @ 6-IA-H-628	905-D-045	11

Other System	Serial	Description	P&ID	Sht
63J	1	DECON SOLUTION TO DECON MIX TANK 63-D-048 @ 63-HV-4803	905-D-053	2
63K	1	DECON SOLUTION TO TRANSFER TUNNEL SPRAY @ 6-65-GL-904	905-D-027	1
63K	2	DECON SOLUTION TO EDR @ 6-65-GL-903	905-D-027	1
63K	3	DECON SOLUTION TO CMR @ 6-65-GL-901	905-D-027	1
63VH	1	UA SUPPLY TO PRESSURE POT 6-CH-6-3126 @ 6-VA-H-683	905-D-045	7
63WW	1	WW TO 65-D-01 @ 6-WW-H-402	905-D-022	1
63WW	2	FROM VENT HEADER TO SUMP @ SUMP COVER	905-D-022	1

SECTION III


E831039
LPV MOUNTED ON RECEIVER FRAME
W-834
W-835
W-836
65-V-04
65-V-03
65-V-02
AR-831
AR-832
AR-833
6-65-12-025
6-65-12-024
6-65-KG-002
6-65-KG-001
6-65-KG-003
BROKEN BAG DETECTOR TO BE MOUNTED NEAR PUMP
W-516
65B02
65-H-01
NOTES:
1. CONVEY LINES AND VACUUM LINES WILL BE SUPPLIED BY OTHERS.
2. ITEMS BALLOONED ON THIS DRAWING REFER TO INDIVIDUAL ITEMS ON THE JOB BILL OF MATERIAL.
VAC-U-MAX
CONVEY SYSTEM
NO. | REVISION DESCRIPTION | DATE | BY | APP'D | APP'D
E831039
REF:


AS4
6-65-4-306
PI
PCV
4' HOSE
S2
SD
S4
ACV
W-834
65-V-04
VIBRATION AIR MANIFOLD 'A'
S3
S1
S5
S6
A
PDI
ACCUM
HOSE
DUST SLEEVE
ACV 330
VIBRATION AIR MANIFOLD 'B'
RECEIVER CONTROL JUNCTION BOX. MOUNTED ON RECEIVER.
FI
S
KNIFE GATE
HS 330
KS 330
TO TANK 65-D-04
905D015 (E12)
6-65-12-025
DWG.#: ZB31532
SHEET 1 OF 4
NO.
REVISION
BY
DATE
APPD
APPD
VAC-U-MAX
TITLE RECEIVER P&ID DRAWING
BELL POWER
DIMENSION NOTE:
DIMENSIONS IN [ ] ARE MILLIMETERS.
CHK BY
APPD D/D
APPD ENG
DWN BY RW
DATE 8/4/92
PLOT SIZE 1=4
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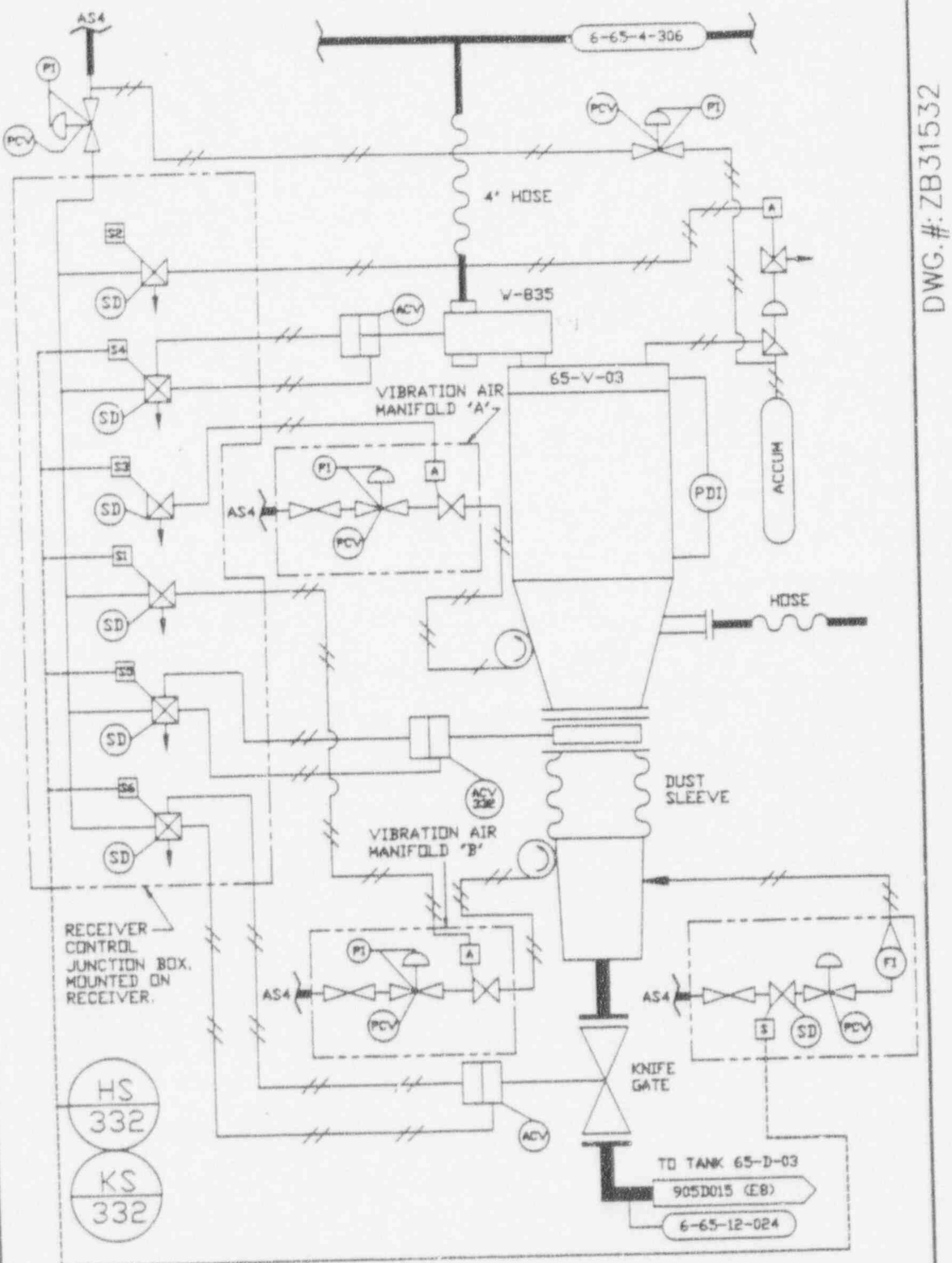
MADE FROM (CAD FILE NAME)
DRAWING NO. ZB31532
REV.
C172227



SHEET 2 OF 4

NO	REVISION	BY	DATE	APPD	APPD

VAC—U—MAX

TITLE RECEIVER P&ID DRAWING
BELL POWER

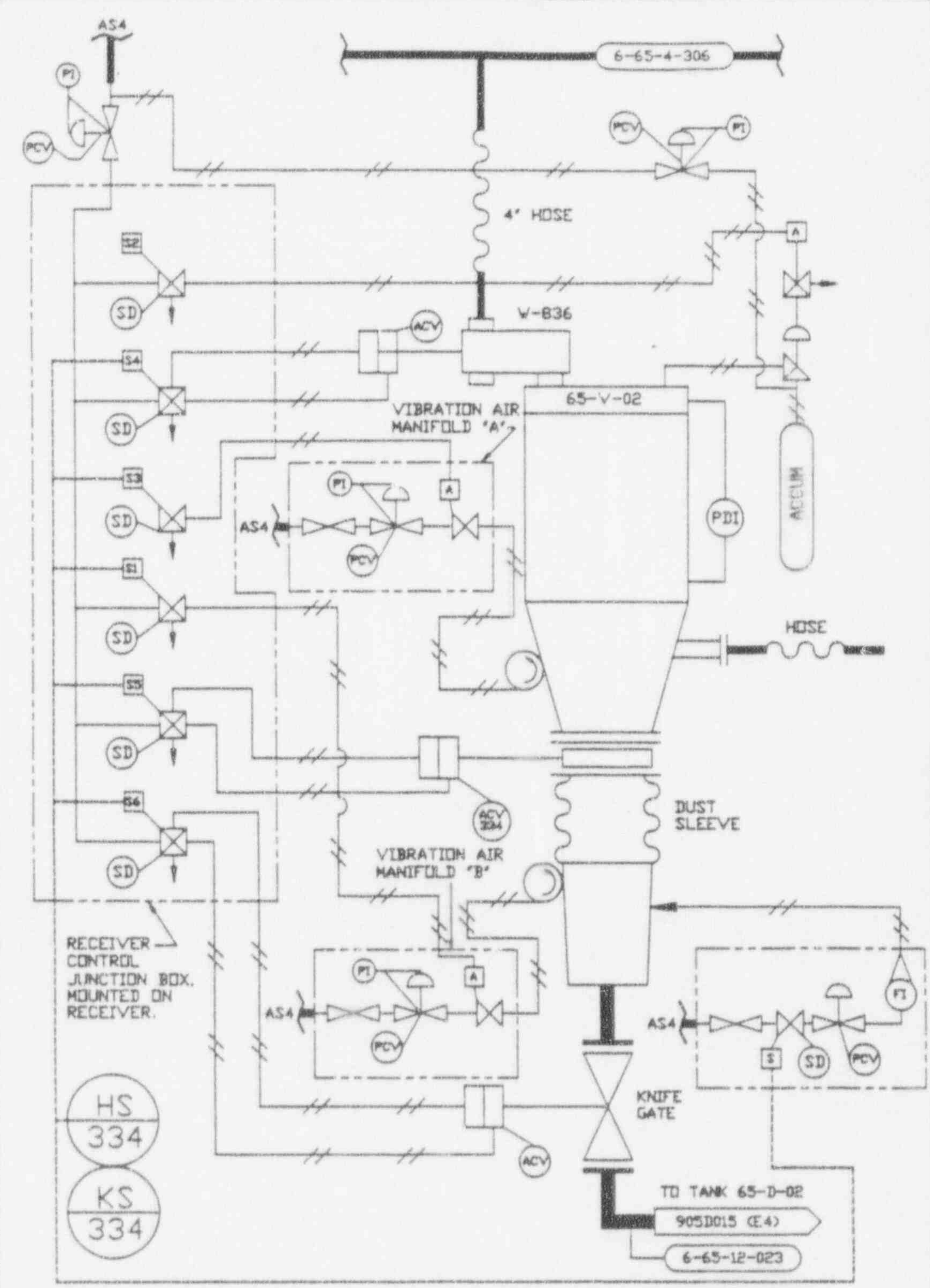
CHK BY	DWN BY RW	CAD FILE NAME: ZB31532B	MADE FROM(CAD FILE NAME)
APPD D/D	DATE 8/4/92	DRAWING NO. ZB31532	REV.
APPD ENG	PLOT SIZE 1=4		

DIMENSION NOTE:
DIMENSIONS IN [ ] ARE
MILLIMETERS.

C172227

SECTION IV

SECTION V



DWG.#: ZB31532

SHEET 3 OF 4

NO	REVISION	BY	DATE	APPD	APPD

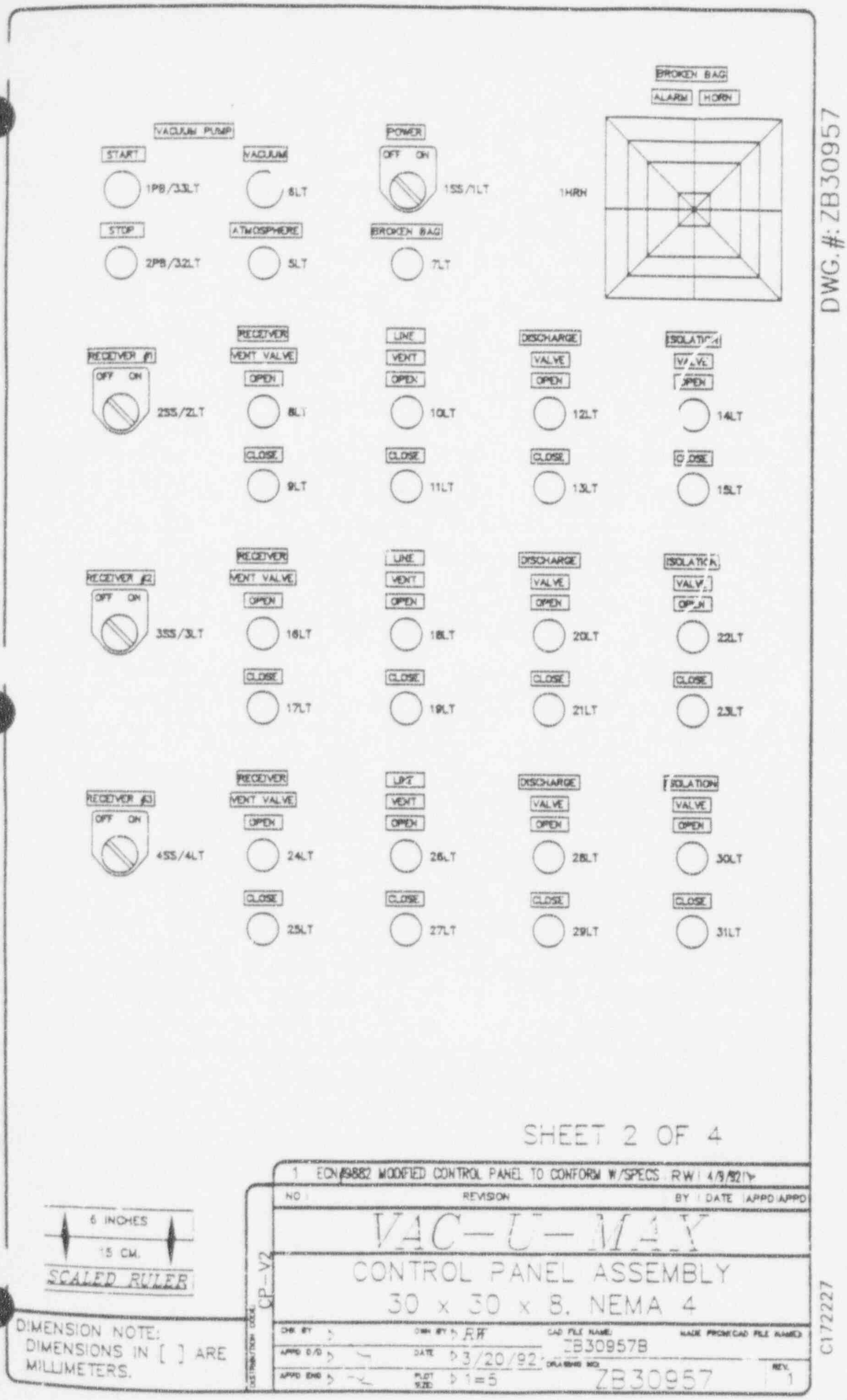
VAC–U–MAX

TITLE: RECEIVER P&ID DRAWING
BELL POWER

CHK BY	DWN BY RW	CAD FILE NAME: ZB31532C	MADE FROM(CAD FILE NAME)
APPD D/O	DATE 8/4/92	DRAWING NO. ZB31532	REV.
APPD ENG	PLOT SIZE 1=4		

DIMENSION NOTE:
DIMENSIONS IN [ ] ARE MILLIMETERS.

C172227



SECTION III

SECTION IV

APPENDIX 4

COLD CHEMICAL SYSTEM (SYSTEM 65)

Set Points, Accuracies and Operating Ranges

March 25, 1993

Attached is an update on the estimated values for the above parameters.

Set points associated with tank level probes are based on theoretical calculations and will be refined after tank calibration data has been released.

Repositioning of agitator blades along the shaft keyways (as shown in this appendix) have not been incorporated to date. The repositioning is necessary to satisfy manufacturer requirements on minimum submersion depth at normal batch volumes.

TANKS 65-D-02; 65-D-03

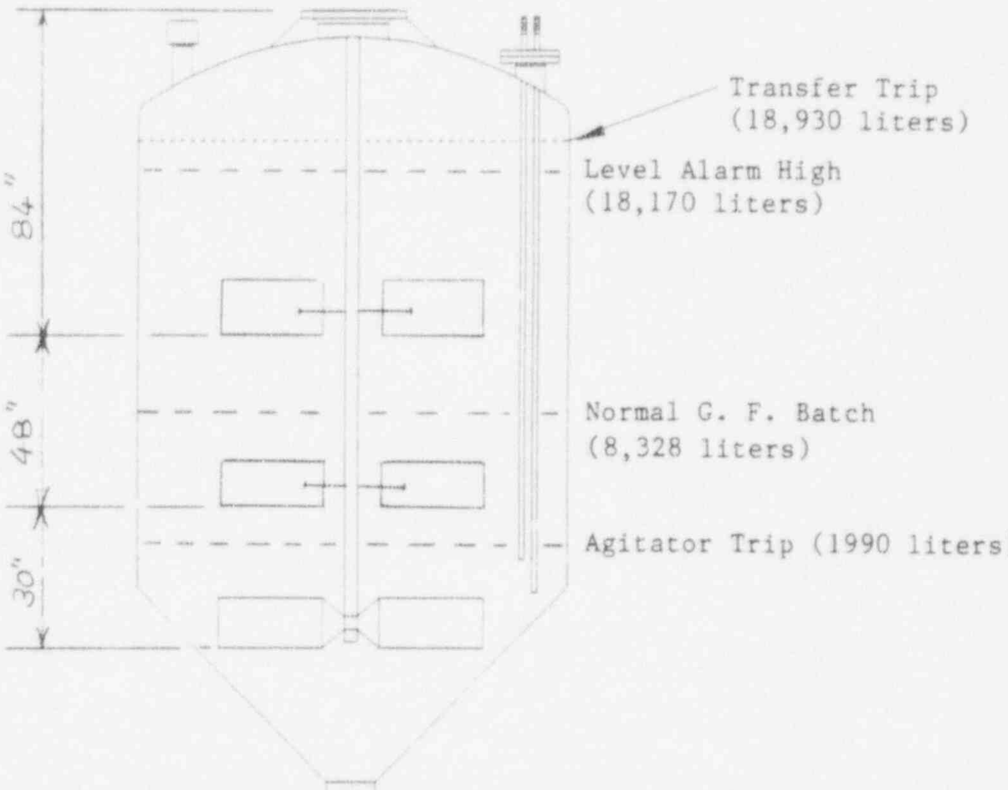


Figure 4: Tanks 65-D-02 and 65-D-03 (Slurry Hold and Mix)

Set Point for Agitator Trip at low level = 1,990 liters (525 gallons)

Set Point for LAH = 18,170 liters (4,800 gallons)

Set Point for Nitric/Caustic Transfer Trip = 18,930 liters (5,000 gallons)

Acceptable Accuracy for Level Probe (Bubbler Type) ≤ +/- 4% in Slurry Service

TANK 65-D-04

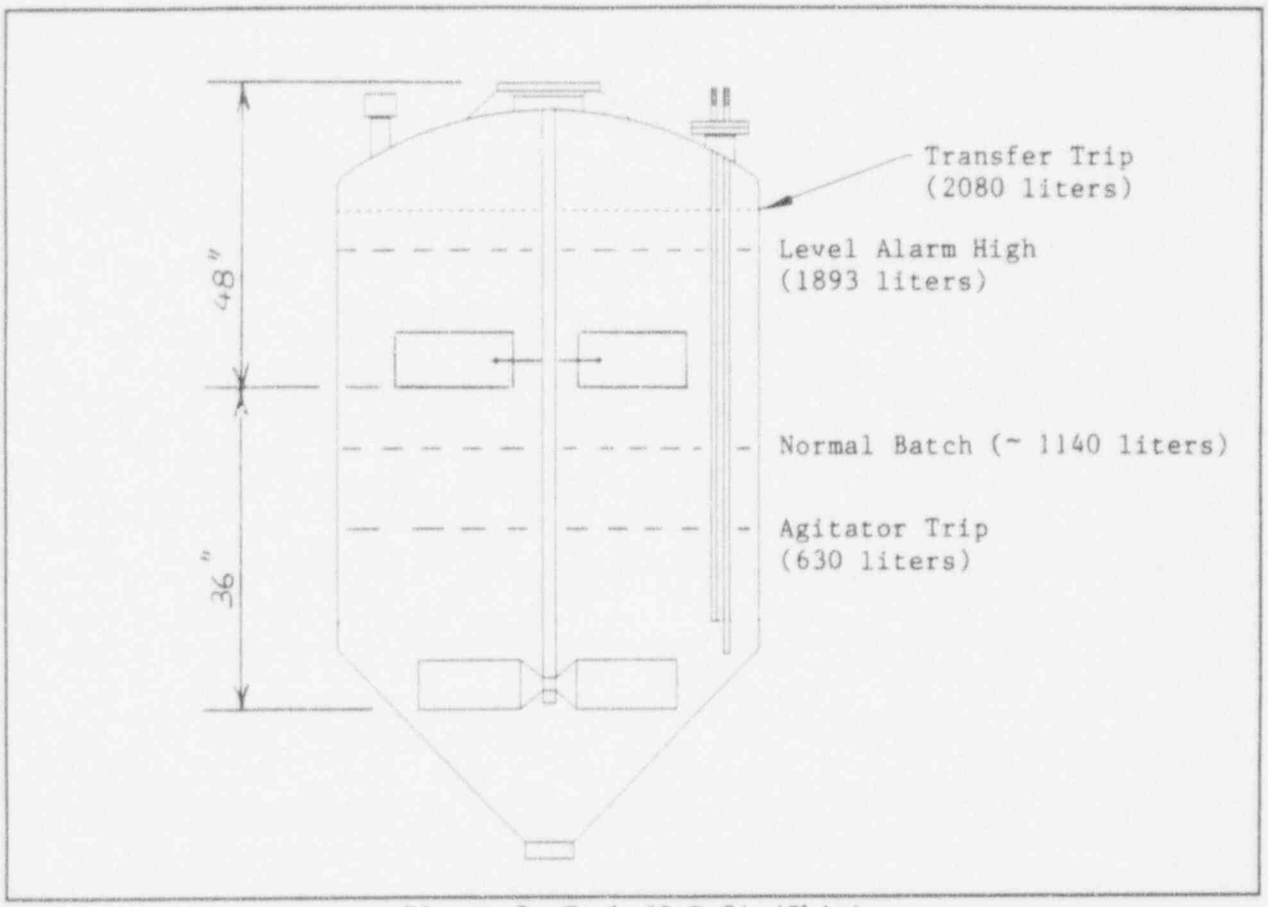


Figure 5: Tank 65-D-04 (Shim)

Set Point for Agitator Trip at Low Level = 630 liters (167 gallons)

Set Point for Level Alarm High (LAH) = 1,893 liters (500 gallons)

Set Point for Nitric/Caustic Transfer Trip = 2,080 liters (550 gallons)

Acceptable Accuracy of Level Probe (LE-003) in Slurry Service (Bubbler Type Probe) = +/- 4%

Slurry Recirculation and Transfer Loop

Pumps: 65-G-02; 65-G-03; 65-G-04

Grinders: 65-T-02; 65-T-03; 65-T-04

- Operate Slurry Pumps with 55 psig motive air.

  65-PCV-035; 036; 037 to be set at 55 psig.

- Operate Grinder Seal Pot at 85 to 100 psig air pressure.

- Operate Slurry pumps at 70 gpm flowrate of slurry (i.e., approx. 42 strokes per minute)

  Some throttling may be necessary if grinders are found to be incapable of handling this flowrate.

- Operate UA and DW Flush to slurry lines at 55 psig.

- Operate DW Flush to slurry lines at 70 gpm (at FQIS-027).

- Operate slurry tanks at ≤ 100°F
  65-TI-004, 005, 006

- Operate slurry tanks at -2 Inches of Water (nominal set point).

- Set points for pressure relief valves on tank jackets to be per code requirements - PRV-038; -039; -040.

- Operate DW Fill to Slurry Tanks at 40 gpm (at FQIS-028).

65-D-01

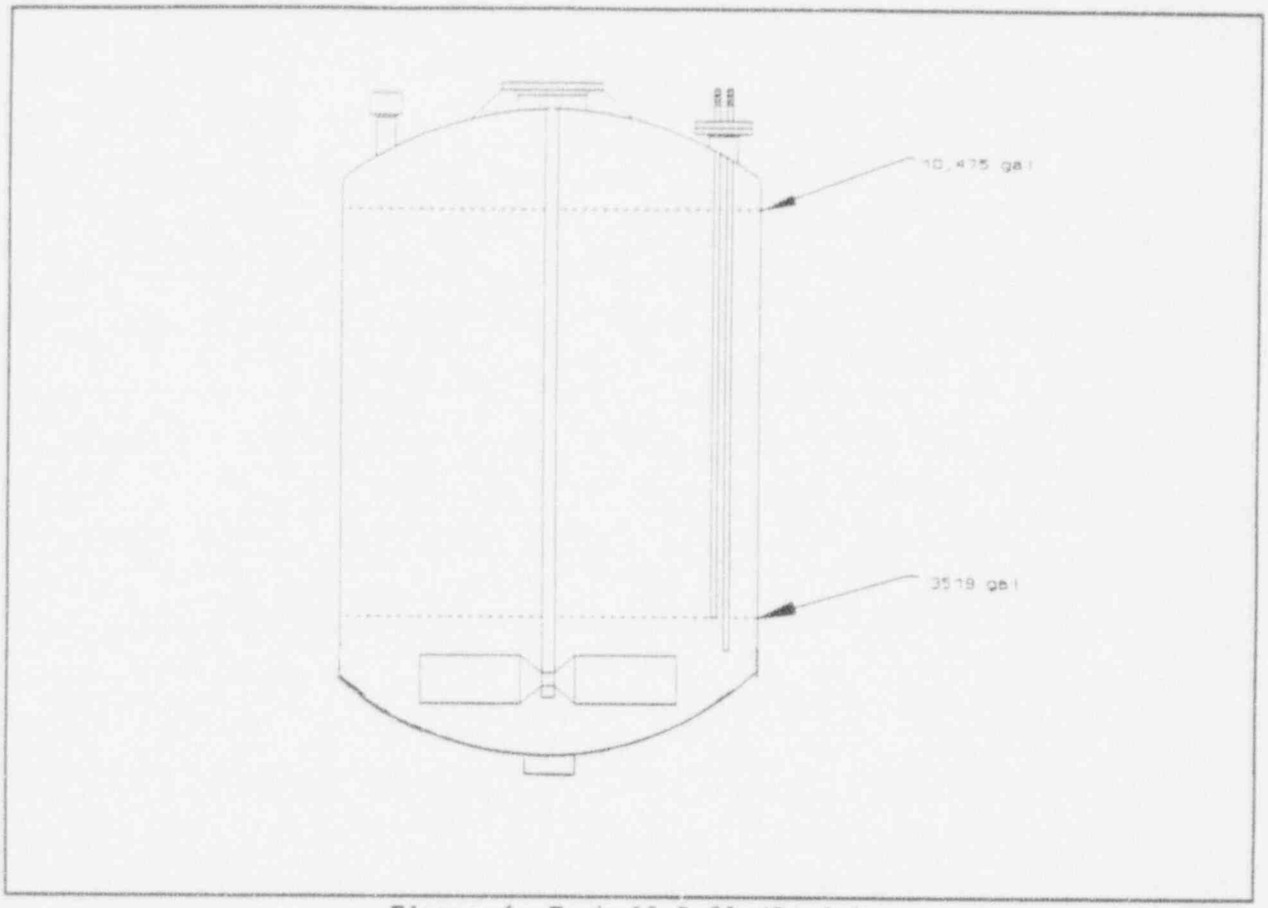


Figure 6: Tank 65-D-01 (Drain)

Set Point for Agitator Trip at Low Level = 29 3/4 " above bottom of tank
= 3,518.5 gallons

Set Point LAH 200 = 13'-0" above the bottom of the probe
= 10,476 gallons

Acceptable accuracy for Level Probe (Bubbler Type) ≤ +/- 4% in slurry service

Slurry Tank Transfer Pump

65-G-01

- Operate Slurry pump with 55 psig Motive Air 65-PCV-211 to be set at 55 psig.
- Operate slurry pump at 50 gpm flowrate of slurry (i.e., approx. 116 strokes per minute).
- Operate slurry tank at ≤ 100°F (TW-001).
- Operate slurry tanks at -2 Inches of Water (Nominal).
- Set points for pressure relief valves at the tank jacket is per code requirements.

NITRIC TANK 65-D-05

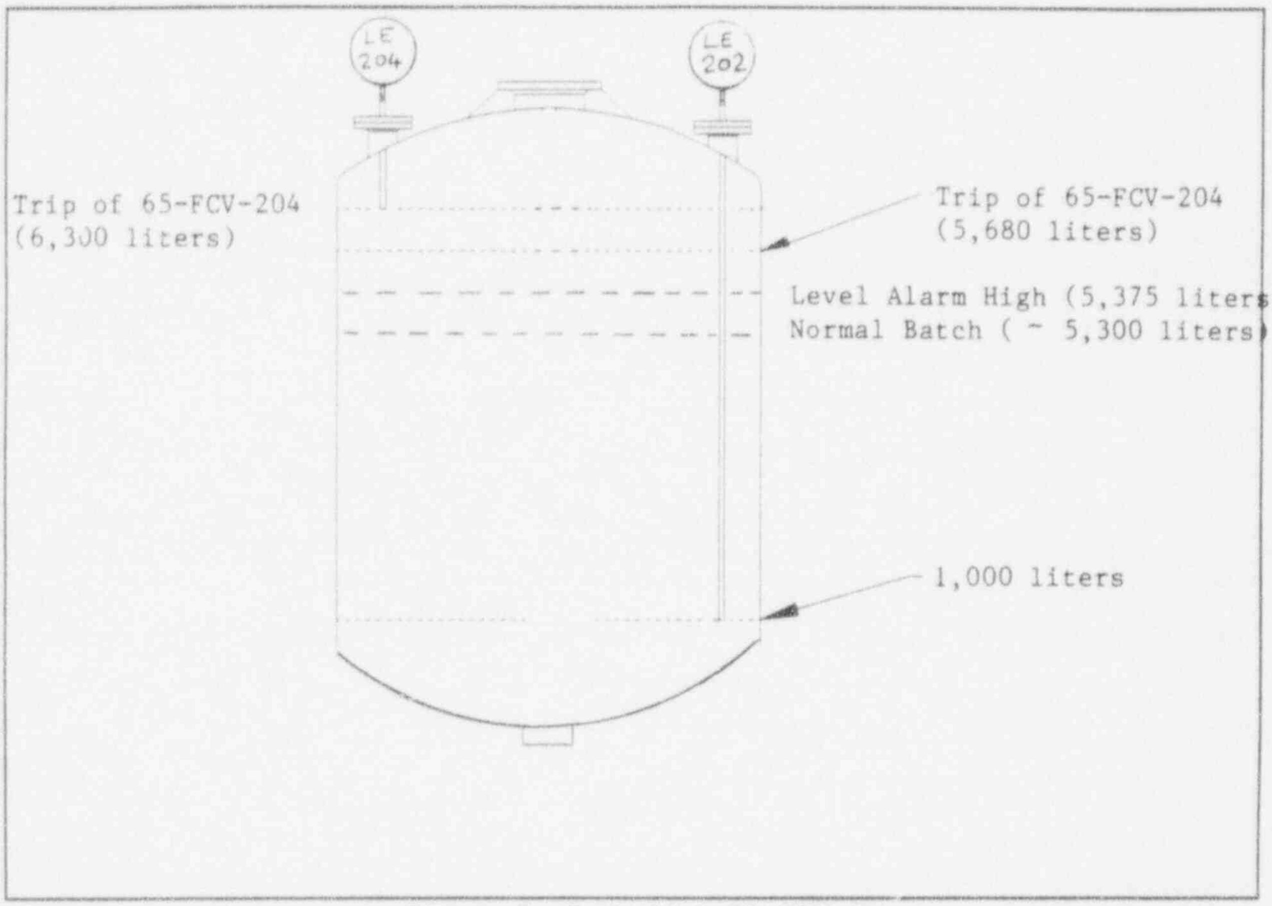


Figure 7: Tank 65-D-05 (HNO_3)

Set Point for Level Alarm High = 5,375 liters (1,420 gallons)
(using LE-202)

Set Point for Acid Supply Trip at 65-FCV-204 = 5,680 liters (1,500 gallons)
(using LE-202)

Set Point for Acid Supply Trip at 65-FVC-204 = 6,300 liters (1,664 gallons)
(using LE-204)

Set Point for Nitric Acid Batch Size = 5,300 liters (1,400 gallons)

Set Point for intake of Nitric Acid from supplier (administrative) = $\leq$ 50 gpm @ $\leq$ 100 psig.

Acceptable Accuracy of Level Measurement via probes $\leq$ +/- 1%

<u>Nitric Acid Metering and Transfer Loop</u>

(Pump 65-G-05)

- Acceptable Accuracy for transfer of concentrated nitric acid via metering pump and flowmeter system ≤ +/- 1% (+/- 0.5% would be better, but may not be practical).
- Acceptable Accuracy for transfer rate of nitric acid ≤ +/- 2%.
- There is no transfer rate set point as rate will vary up to 8.3 gpm max. pump capacity, depending on the tank the acid is being transferred to and its cooling capacity.
- Set point for 65-PCV-227 = 80 psig.
- Acceptable accuracy for 65-PCV-227 set point ≤ +/- 2%.
- Set point for internal relief valve within pump 65-G-05 = 115 psig.
- Acceptable accuracy of internal relief valve set point = +/- 10%.

Caustic Tank 65-D-06

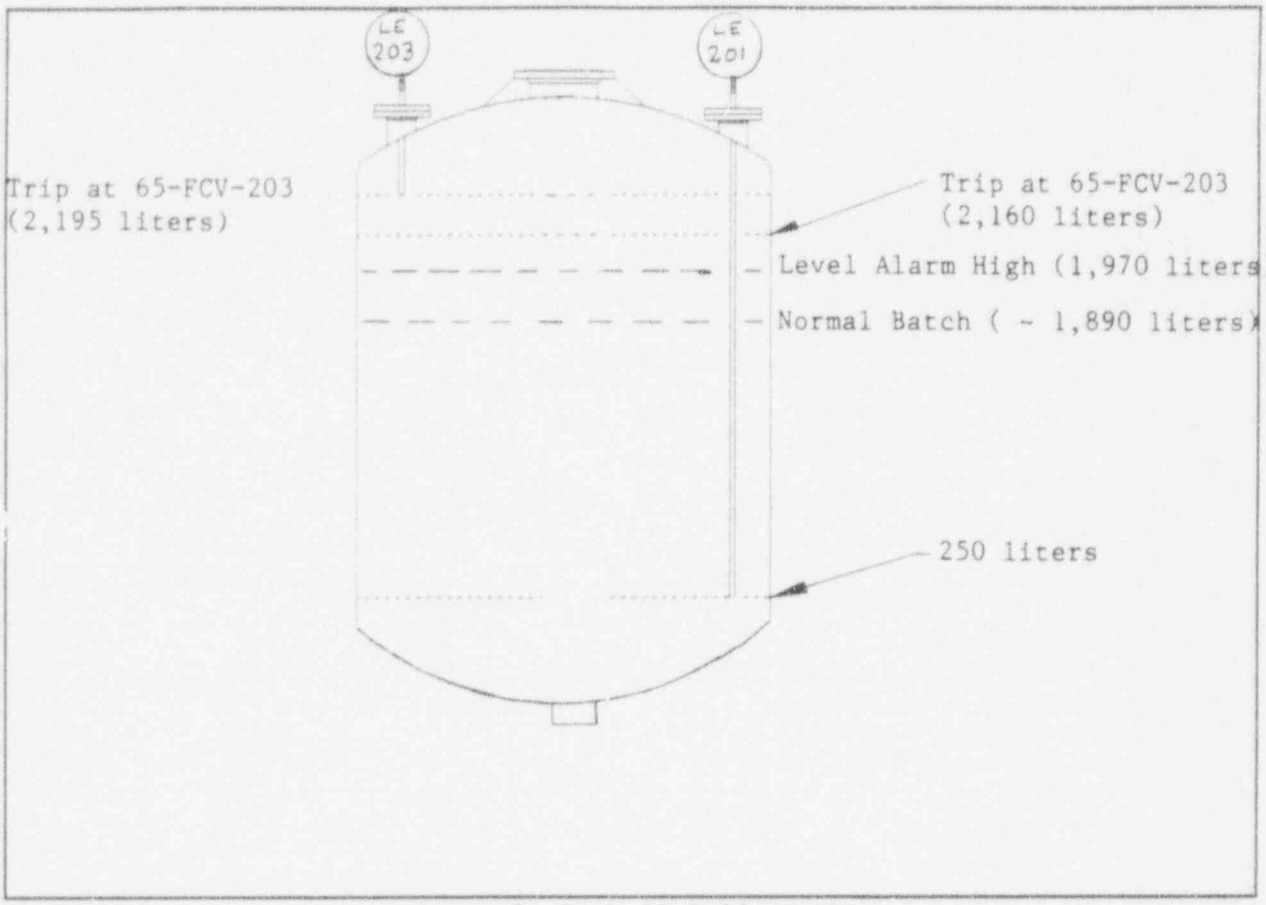


Figure 8: Tank 65-D-06 (NaOH)

Set Point for Level Alarm High ~ 1,970 liters (520 gallons) (using LE-201)

Set Point for Caustic Supply Trip at ~ 2,160 liters (570 gallons) 65-FCV-203 (using LE-201)

Set Point for Caustic Supply Trip at ~ 2,195 liters (580 gallons) 65-FCV-203 (using LE-203)

Set Point for Caustic Soda Batch Size ~ 1,890 liters (500 gallons)

Set point for intake of caustic soda from supplier (administrative) ≤ 50 gpm @ ≤ 100 psig.

Acceptable accuracy of level measurement via probes ≤ +/- 1%.

Caustic Soda Metering and Transfer Loop

- Acceptable accuracy for transfer of concentrated caustic soda via metering pump and flowmeter system ≤ +/- 1% (+/- 0.5% would be better, but may not be practical).

- Acceptable accuracy for transfer rate of caustic soda ≤ +/- 2%.

- There is no transfer rate set point as rate will vary up to 5.5 gpm max. pump capacity, depending on the receiving tank and its cooling capacity.

- Set point for 65-PCV-221 = 80 psig.

- Acceptable accuracy for 65-PCV-221 set point ≤ +/- 2%.

- Set point for internal relief valve within pump 65-G-06 = 115 psig.

- Acceptable accuracy of internal relief valve set point ≤ +/- 10%.

- Set point for low temperature alarm in Caustic Tank (TAL-215) = 60°F (approx. 50% NaOH solution freezes at approx. 50°F).

Tanks 65-D-07, -08, -09

- The present intent is to operate tank 65-D-07 (approx. 1000 gal. capacity) exclusively for supply of demineralized water to fill and flush various in-cell and other equipment. The jacket cooling and heating capability will be retained. The density meter and associated piping will be removed. Nitric acid, caustic soda, and steam jet transfer valves will be locked and tagged.

- The present intent is to operate tank 65-D-08 (approx. 250 gal. capacity) exclusively for make-up and supply of dilute nitric acid. The predominant use of this acid will be for preparation of Cerium +4 solutions via tank 63-D-048. The density meter and associated piping will be removed. Steam supply piping to this tank will be removed. An indirect benefit of these changes will be a marked decrease in the present congestion in this area, and therefore easier, safer operability, and access to steam and utility header valves. The Caustic soda connection has been removed. Steam jet transfer valve will be locked and tagged.

- There is no change in the intended use of tank 65-D-09 as an all purpose decon. solution preparation and supply tank.

Pumps 65-G-07, 65-G-08

- The present intent is to utilize the metering pump 65-G-07 for tra‑ fer of demineralized water from tank 65-D-07.

- The present intent is to utilize the air operated double diaphragm pump 65-G-08 for transfer of dilute nitric acid prepared in tank 65-D-08. This pump is hardpiped to the supply line (6-65-1-109) for the Cerium +4 tank 63-D-048.

  See section 2.2.5 of the system description for further details regarding pump usage.

65-D-07

This tank is dedicated to demineralized water service.

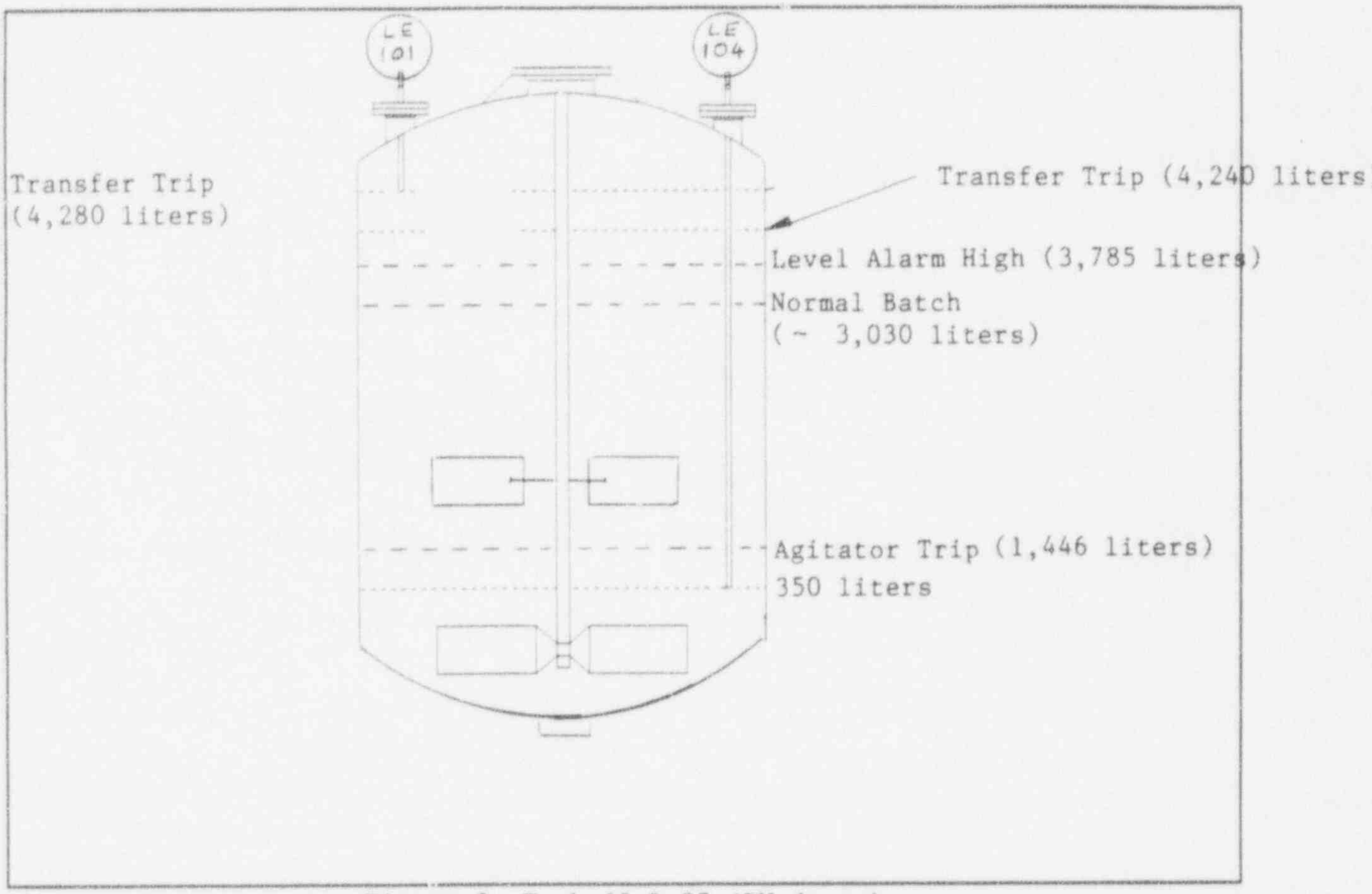


Figure 9: Tank 65-D-07 (DW decon)

Set Point for Agitator Trip at Low Level	= 1,446 liters (382 gallons)
Set Point for Normal Batch	= 3,030 liters (800 gallons)
Set Point for Level Alarm High (using LE-104)	= 3,785 liters (1,000 gallons)
Set Point for Nitric/Caustic Transfer Trip (using LE-104)	= 4,240 liters (1,120 gallons)
Set Point for Nitric/Caustic Transfer Trip (using LE-101)	= 4,280 liters (1,130 gallons)

Set point for high temperature cutoff of steam to tank jacket via TIS-110 = 200°F.

<u>NOTE:</u> Agitator locked and tagged.

65-D-08

This tank is to be dedicated for use as a nitric acid supply to the Cerium -4 and other dilute nitric acid uses.

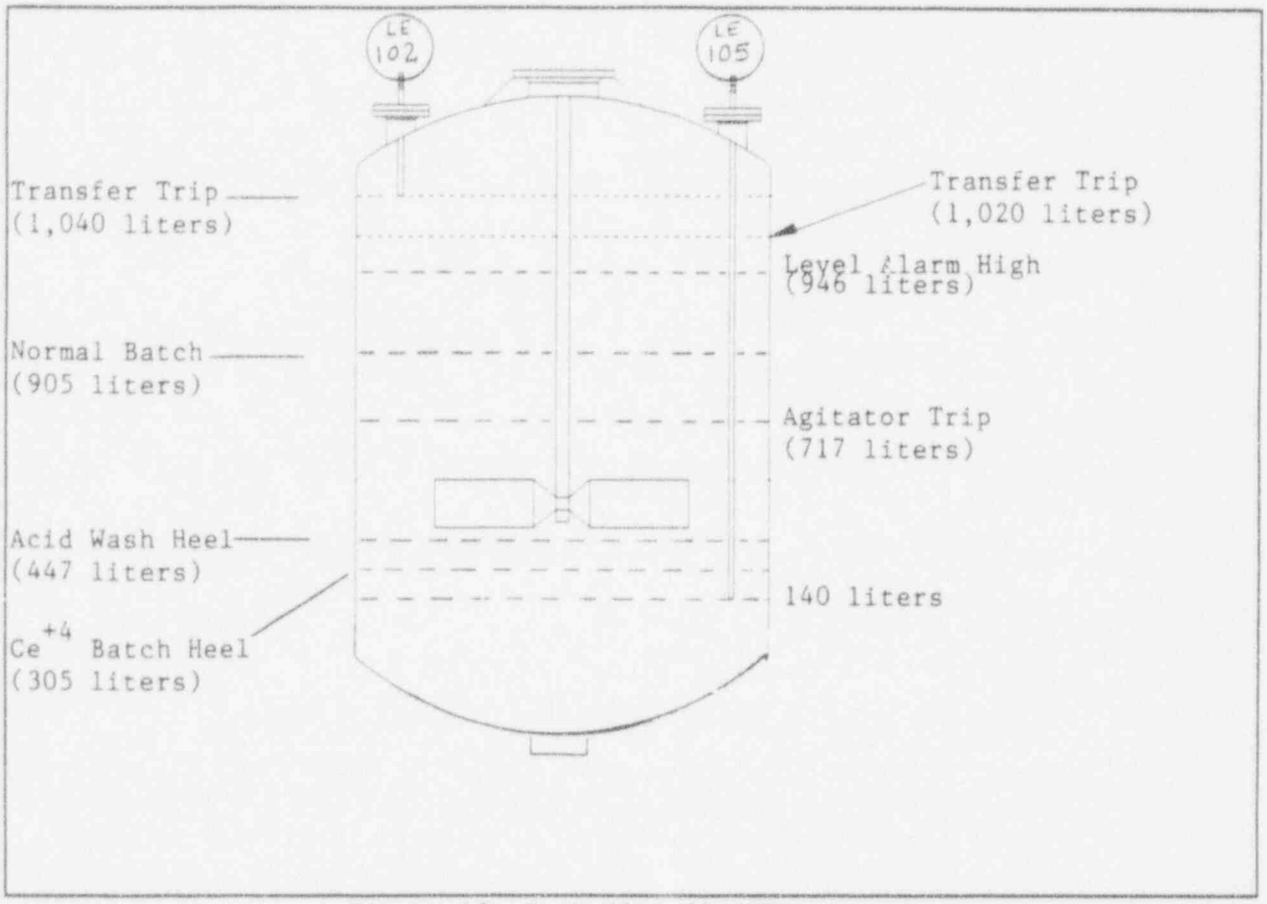


Figure 10: Tank 65-D-08 (HNO_3 decon)

Set Point for Cerium +4 Batch Heel	= 305 liters (80.5 gallons)
Set Point for Acid Wash Heel	= 447 liters (118 gallons)
Set Point for Agitator Trip at Low Level	= 717 liters (190 gallons)
Set Point for Normal Batch	= 905 liters (239 gallons)
Set Point for Level Alarm High (using LE-105)	= 946 liters (250 gallons)
Set Point for Nitric Transfer Trip (using LE-105)	= 1020 liters (269 gallons)
Set Point for Nitric Transfer Trip (using LE-102)	= 1040 liters (274 gallons)

65-D-09

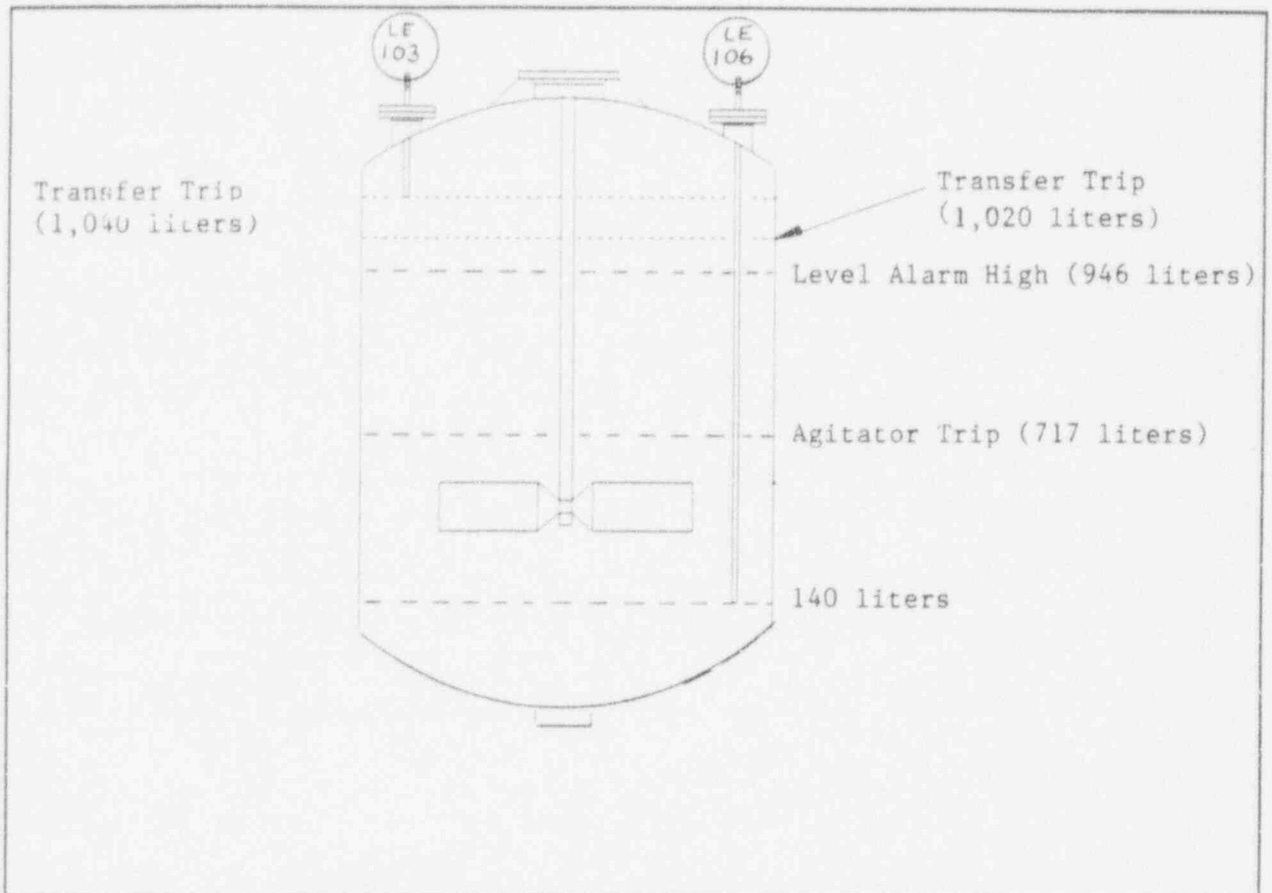


Figure 11: Tank 65-D-09 (Misc. decon)

Set Point for Agitator Trip at Low Level = 717 liters (190 gallons)

Set Point for Level Alarm High (using LE-106) = 946 liters (250 gallons)

Set Point for Nitric/Caustic Transfer Trip (using LE-106) = 1,020 liters (269 gallons)

Set Point for Nitric/Caustic Transfer Trip (using LE-103) = 1,040 liters (274 gallons)

Set point for high temperature cutoff of steam to tank jacket via TIS-112 = 200°F

65-G-07

Decon/DW Metering Pump

- This pump will be used for transfer for demineralized water out of tank 65-D-07 and decon solutions out of tank 65-D-09.
- Acceptable accuracy for transfer using this pump ≤ +/- 1%.
- Acceptable accuracy for transfer rate using this pump ≤ +/- 2%.
- There is no transfer rate set point as rate will vary up to 20 gpm max. pump capacity, depending on the equipment receiving the transfer fluid.
- Set point for internal relief valve within pump 65-G-07 = 115 psig.
- Acceptable accuracy of internal relief valve set point = +/- 10%.

65-G-08

Dilute Nitric Acid Transfer Pump

- This pump will be used for transfer of dilute nitric acid from 65-D-08 tank to the Cerium +4 tank (63-D-048).
- Set point for motive air to pump = 55 psig (set at PCV-127).
- Set point for transfer of dilute nitric acid to Cerium +4 tank 63-D-048 $\leq$ 10 gpm.
- The transfer line will be a hardpiped connection and not a hose.

FUNCTIONAL PERFORMANCE TEST REQUIREMENTS

COLD CHEMICAL SYSTEM

FUNCTIONAL PERFORMANCE TEST REQUIREMENTS

Cold Chemical System Tests

INTRODUCTION

This document is a compilation of the Functional Performance Test Requirements and Outlines for the Cold Chemical System (CCS).

The Test Outlines represent additional tests required to fully characterize the CCS. They fulfill the requirements of the following documents, as applicable:

1. WVNS-DC-022
2. WVNS-DC-045
3. WVNS-TPL-63-001
4. NYSDEC Permits to Construct for the Cold Chemical System. (i.e. for air emission sources)
5. RCRA Part A Permit Application.

This document is appended to the System Description for System 65.

FUNCTIONAL PERFORMANCE TEST REQUIREMENTS

Cold Chemical System Tests

Slurry Tanks

Objectives

Demonstrate performance and obtain operating data for slurry preparation, sampling, and transfer operations for the Main Mix Tank (65-D-03), the Shim Mix Tank (65-D-04), and the Holding Tank (65-D-02).

Prerequisites

All equipment has been calibrated (where applicable) and commissioned.

All previously planned Water Tests have been completed, including the following:

1) Tank level alarms and interlocks.
(Using bubbler, determine accuracy of interlocks and alarm points with tank agitator running).

2) Tank Volume calibration.
(Using bubbler, calibrate volumes under following operating conditions: Turn off agitation, wait for swirl effect to subside, measure level)

3) Flush Air Requirements.
(Determine flush air requirements for flushing demineralized water from tank recirculation loop, and tank transfer line to CFMUT)

4) Limiting Flowrate Through Grinder.
(Determine the maximum water flowrate through the grinder at grinder motor maximum operating amps. (~47 amps.)).

5) Vacuum Control in Slurry Tanks during Transfer Operations.
(Simulate slurry transfer operations with water (i.e. tank pumpdown followed by manual tank flush through manhole). Obtain operating data on tank vacuum control at a set point of -2 inches of water)

6) Tank Cooling and Heating Capability.
Verify the cooling capabilities specified in WVNS-EQ-275 (and reproduced below for tank designated services detailed above), are achievable.

Tank No.	Required Cooling Btu/Hr	Required Heating Btu/Hr	Cooling Water (GPM) Max. Design	Cooling Water (GPM) Normal Operating	Max. Cooling Water Pressure Drop (psig)
65-D-02	200,000	N/A	100	40	<30
65-D-03	200,000	N/A	100	40	<30
65-D-04	170,000	N/A	80	34	<10

NOTE: Max. allowable temperature for tanks is 63 deg. C (145 deg. F).

Thermal shock to tank jacket is to be avoided (see SD).

General

* To optimize the batch preparation process and determine average times for the major phases of the preparation cycle, data needs to be compiled on batch preparation cycle time.

  For each slurry or shim batch prepared, measure and record time taken for each major phase of batch preparation. (i.e. Transfer and Staging of chemicals; Addition of Demin Water; Addition of Nitric Acid; Addition of Caustic Soda; Vacuum Transfer of Solids; Steam Jet Transfer of Liquids)

* Data also needs to be compiled on the impact of slurry preparation operations on the vessel vent system (i.e. vent line plugging due to powder carryover; tank vacuum control; etc.).

  Set tank vacuum at a minimum reading of -2 inches of water before start up of slurry preparation activities. Monitor tank pressure during operation of the Vac-U-Max and steam jet transfer systems, and record all observations.

* Obtain and record DW pressure and flowrate data during tank fill and tank/line flush operations. (Need to compile operating data to determine adequacy of DW supply)

Main Mix Tank (65-D-03) Performance Test Outlines

General

Use the latest glass former recipe, the procedures detailed in the System Description, and the SOP's/DVP's, to perform the tests outlined below.

CAUTION For the tests outlined below, personal protection equipment is to be used per Safety and SOP/DVP requirements.

Test 1.1 Tank Volume Calibration using Slurry

Accuracy of slurry level measurement using bubblers is dependent upon both the swirl effect caused by the tank agitator and the variations in density created by slurry settling after agitator switch off.

Calibration for tanks 65-D-02 and 65-D-03 will therefore need to be performed with Waste Simulant and Glass Former Slurries. Spot calibration at a series of decreasing slurry levels in the tank should suffice.

The test described below will obtain data for accurate determination of Glass Former and Waste Simulant slurry volumes in the tank.

Acceptance Criteria: None.

Test:

1.1.1 Prepare a glass former slurry batch of 18927 liters (5,000 gallons) in the Main Mix Tank.

Measure and record time taken for each major phase of batch preparation -- (Need to collect data for determination of average batch prep. cycle time).

1.1.2 Hook up a recorder to the bubbler instrumentation for continuous charting of tank level over periods of up to 20 minutes for each reading.

1.1.3 Set up for obtaining an independent measurement of slurry level in the tank via a tape measure lowered down through a spare nozzle in the tank.

1.1.4 Switch on the level recorder and chart the bubbler level readings with agitator on for 5 minutes.

1.1.5 Switch off the tank agitator (with recorder still on) and continue charting the level readings for a further period of 20 minutes.

1.1.6 Obtain and record an independent tank level reading using the level tape.

1.1.7 Observe the surface of the slurry in the tank to visually determine the time taken for the surface turbulence to subside after agitator shut off. Record all other visual observations.

1.1.8 Turn agitator on for 10 minutes to reestablish homogeneity and repeat steps 1.1.5 through 1.1.7 four times to obtain five sets of data at this maximum level setting.

1.1.9 Reduce the slurry level to the Nitric/Caustic Trip and Level Alarm High set point level on 65-LIS-002 (~ 4,800 gallons).

1.1.10 Repeat steps 1.1.5 through 1.1.8.

NOTE: The 20 minute charting time interval (per step 1.1.5) may be reduced after review of the initial data set by the System Engineer.

1.1.11 Reduce the slurry level in one foot increments along the straight side of the tank and obtain a full set of data (steps 1.1.5 through 1.1.8) for each level setting.

1.1.12 Similarly obtain data sets at the level where the conical portion of the tank meets the straight side, and at the agitator trip set point.

1.1.13 Repeat the above tests (steps 1.1.1 through 1.1.12) for a Waste Simulant slurry.

Test 1.2 Grinder Performance, and Representativeness of Samples

This test will obtain data for determination of number of samples needed to get consistent results from analysis. It will also obtain data on typical initial particle size distribution to be expected from the grinder, and on the maximum slurry flowrate through the grinder.

Acceptance Criteria: Maximum slurry flowrate through grinder > 70 gpm. (per present estimate)

Test:

1.2.1 Prepare a typical glass former slurry batch in the Main Mix Tank.

Measure and record time taken for each major phase of batch preparation -- (Need to collect data for determination of average batch prep. cycle time).

1.2.2 Establish slurry recirculation (via the pump, grinder and diverter valve), and recirculate slurry via the grinder for at least three batch volumes to ensure collection of acceptable samples. Also ensure that the flowrate acceptance criteria through the grinder is met.

1.2.3 Obtain five slurry samples for analysis. The samples are to be taken 1 minute apart to ensure complete line flush and a fresh sample from the tank each time. Perform a complete analysis of each sample and report the results.

1.2.4 Obtain a set of five slurry level measurements per steps 1.1.2 through 1.1.8.

1.2.5 Make a composite sample using a portion of the five slurry samples obtained above. Measure and record the particle size distribution of this composite sample.

1.2.6 Obtain 5 slurry samples from the final batch of "Integrated Testing" phase, and make a composite sample. Measure and record the particle size distribution of this final sample. Also record the total number of slurry batches processed through the grinder since it was placed in service.

1.2.7 Compare the particle size distributions from 1.2.5 and 1.2.6 to gain an insight into grinder wear.

Test 1.3 <u>Control of Freeboard Pressure in Tank During Slurry Transfer</u>

<u>NOTE</u>

Water test data collected on vacuum control in slurry tanks during transfer operations (per prerequisite # 5) should satisfy the requirements of this test.

No additional tests are planned.

Test: 1.4 <u>Demin. Water Requirements for Slurry Recirculation Loop Flush.</u>

This test will obtain data for determination of volume of flush water required for flushing the recirculation loop upon completion of slurry sampling.

Acceptance Criteria: None.

Present estimate is 265 liters (70 gallons)

Test:

1.4.1 Upon completion of the slurry sampling operation, commence demin. water flush of the recirculation loop with an initial flush volume of 132 liters (~35 gallons) set at the meter FQIS-027. - This step assumes the ram valve at the bottom of the tank is closed, the slurry pump and grinder are in-line, and the diverter valve is in the "recirculation" mode. (see System Description for details)

1.4.2 Move the diverter valve to the "transfer" position and create a break in the transfer line piping at the upstream hose connection point. Make arrangements to collect a second slug of demin. flush water into a suitable 55 gallon drum for visual inspection.

1.4.3 Reset the flush water meter FQIS-027 and perform a second 132.5 liter (35 gallon) flush, this time through the open loop and into the collection drum.

1.4.4 Inspect the contents of the drum for traces of slurry. Record all observations and flush volumes.

1.4.5 If the inspection indicates further cleaning of the slurry loop is needed (i.e. greater than 200 grams (one half cupfull) of slurry), air dry the open loop (using utility air), then return the diverter valve to the "recirculation" mode and recirculate slurry through the loop for one minute.

1.4.6 Close the tank ram valve and perform a 265 liter (70 gallon) initial demin. water flush of the recirculation loop.

1.4.7 Repeat steps 1.4.2 through 1.4.4.

1.4.8 If the inspection still indicates a need for more thorough cleaning, repeat steps 1.4.5 through 1.4.7 using 397.5, 530, 662 liter (105, 140, and 175 gallon) initial flushes in step 1.4.6.

1.4.9 Record observations from each flush cycle and determine the **true** flush water requirements for the recirculation loop.

Test 1.5 Demin Water Requirements for Tank Flush

This test will obtain data for determination of volume of flush water required for tank flush upon completion of slurry transfer.

To provide information on flush water requirements under "worse case" conditions with respect to solids buildup, this test is to be performed after several batches of slurry have been prepared.

Acceptance Criteria: None.

Present estimate is 568 liters (150 gallons)

Test:

1.5.1 Upon completion of transfer of slurry from the tank, comme e tank flush in stages. Use 378.5 liter (100 gallons) of d..in. water (via flow meter FQIS-027) for the initial flush. Visually inspect the inside surface of the tank via the tank manhole (CAUTION: Vessel ventilation subsystem to be in operation with tank in-line during this test. Personal protection gear to be used per the SOP).

1.5.2 If required, repeat the flush and inspect steps using 189.3 liter (50 gallon) flushes until the inside surface of the tank is clean (~ half a bucketfull of residue is deemed to be acceptable).

1.5.3 Calculate and record the total demin. water required to adequately clean the tank.

Test: 1.6 Demin. Water Requirements for Slurry Transfer Line Flush.

This test will obtain data for determination of volume of flush water required for flushing the slurry transfer line. - During normal operations, this flush occurs after completion of slurry transfer to the Concentrator Feed Make Up Tank (CFMUT) and the subsequent demin. water flush of the Cold Chemical System tank. The demin. water requirement for this operation is therefore expected to be minimal.

Acceptance Criteria: None.

Present estimate is 265 liters (70 gallons)

Test:

1.6.1 Upon completion of the slurry tank flush operation, commence demin. water flush of the transfer line with an initial flush volume of 132.5 liters (35 gallons) set at the meter FQIS-027. - This step assumes the ram valve at the bottom of the tank is closed, the slurry pump and grinder are in-line, the diverter valve is in the "transfer" mode, and the transfer line is hose connected to the CFMUT.

1.6.2 Upon completion of the line flush operation break the line at the upstream hose connection. Open the valve 6-65-H-528 and drain the contents of the transfer line and hose into a suitable 55 gallon collection drum for visual inspection.

1.6.3 Inspect the contents of the drum for traces of slurry. Record all observations and flush volume used.

1.6.4 If the inspection indicates further cleaning of the slurry line is needed (i.e. greater than one half cupfull of slurry), repeat the flush test (per steps 1.6.1 through 1.6.3) using successive flush volumes of 265 and 397.5 liters (70 and 105 gallons) respectively. NOTE: Since each flush test will require preparation of a fresh batch of slurry, these tests are to be performed in conjunction with the next two scheduled slurry batch preparations.

1.6.5 Record all observations from each flush test and determine the **true** flush water requirements for the slurry transfer line to the CFMUT.

Test 1.7 Tank Cooling Capability

NOTE

This test will obtain data on the cooling capability of the tank jacket for worse case conditions during Glass Former and Waste Simulant slurry preparation. It will also provide a profile of the varying cooling requirements during the slurry preparation operation. The intent is to determine the adequacy of the tank cooling jacket and to characterize the cooling demands.

Acceptance Criteria: None

Test:

1.7.1 For the purposes of this test, install instrumentation for continuous monitoring and charting of tank slurry, cooling water supply (CWS), and cooling water return (CWR).

1.7.2 During preparation of a Glass Former slurry batch, maintain a log showing the time of addition of ingredients so that one can determine a correlation between tank slurry temperature changes and the corresponding slurry preparation activity causing the change.

1.7.3 Add the concentrated nitric acid and caustic soda at the maximum delivery rates (i.e. ~ 8 gpm and ~ 5 gpm respectively) to simulate worse case conditions.

1.7.4 Adjust cooling water flowrate to maintain slurry temperature at below 100 deg. F throughout the slurry preparation procedure. Record all changes in the cooling water flowrate and the time the adjustment was made.

1.7.5 Repeat steps 1.7.2 through 1.7.4 for a Waste Simulant batch.

Shim Mix Tank (65-D-04) Performance Test

General

Use the latest glass former recipe, the procedures detailed in the System Description, and the SOP's/DVP's, to perform the tests outlined below.

The Shim Mix Tank will be used predominantly for preparation of 60 wt. % sugar solution for transfer to the CFMUT.

It will also be used for preparation of "Shim" slurry batches, as required (infrequent use). Shim batches cannot be well defined at this point. They will most probably be one or two ingredient slurries or solutions.

CAUTION For the tests outlined below, personal protection equipment is to be used per Safety and SOP/DVP requirements.

Test 2.1 Tank Volume Calibration

NOTE

Since the predominant and only well defined use for this tank is for the preparation of sugar solutions, density variations due to slurry settling are not a contributing factor in tank level measurement. Tank volume calibration using water (per prerequisite # 2) should therefore satisfy the requirements of this test, and no additional tests are planned.

Test 2.2 Grinder Performance and Representativeness of Samples

Grinder performance test results obtained from Test 1.2 will also be applicable for the Shim Tank.

Since Shim slurries are not well defined at this point, sample representativeness will be ensured by obtaining the maximum number of samples whenever the tank is used for this infrequent application.

The test described below will obtain data on sample representativeness for sugar solutions prepared in the Shim Tank.

Acceptance Criteria: Maximum sugar solution flowrate through grinder > 70 gpm. (per present estimate)

Test:

2.2.1 Prepare a typical sugar solution batch in the Shim Tank.

Measure and record time taken for each major phase of batch preparation -- (Need to collect data for determination of average batch preparation cycle time).

2.2.2 Establish recirculation (via the pump, grinder and diverter valve), and recirculate the sugar solution via the grinder for at least three batch volumes to ensure collection of acceptable samples. Also ensure that the flowrate acceptance criteria through the grinder is met.

2.2.3 Obtain five samples for analysis. The samples are to be taken 1 minute apart to ensure complete line flush and a fresh sample from the tank each time. Perform a complete analysis of each sample and report the results.

2.2.4 Obtain a set of five tank level measurements per steps 1.1.2 through 1.1.8.

Test 2.3 Control of Freeboard Pressure in Tank During Slurry Transfer

NOTE

Water test data collected on vacuum control in slurry tanks during transfer operations (per prerequisite # 5) should satisfy the requirements of this test.

No additional tests are planned.

Test: 2.4 Demin. Water Requirements for Slurry Recirculation Loop Flush.

NOTE

A standard three volume flush will be used for cleaning the recirculation loop in the case of sugar solutions.

The results from Test 1.4 will adequately define recirculation loop flush volume in the case of shim slurries.

No additional tests are planned.

Test 2.5 Demin Water Requirements for Tank Flush

This test will obtain data for determination of volume of flush water required for tank flush upon completion of slurry/sugar solution transfer.

Acceptance Criteria: None.

Present estimate is 568 liters (150 gallons)

Test:

2.5.1 Upon completion of transfer of sugar solution from the tank, commence tank flush in stages. Use 284 liters (75 gallons) of demin. water (via flow meter FQIS-027) for the initial flush. Visually inspect the inside surface of the tank via the tank manhole.

2.5.2 If required, repeat the flush and inspect steps using 189.3 liter (50 gallon) flushes until the inside surface of the tank is clean.

2.5.3 Calculate and record the total demin. water required to adequately clean the tank.

Test: 2.6 Demin. Water Requirements for Slurry Transfer Line Flush.

NOTE

A standard three volume flush will be used for cleaning the transfer line in the case of sugar solutions.

The results from Test 1.6 will adequately define transfer line flush volume in the case of shim slurries.

No additional tests are planned.

Holding Tank (65-D-02) Performance Test

General

Use the latest glass former recipe, the procedures detailed in the System Description, and the SOP's/DVP's, to perform the tests outlined below.

Since the Holding Tank is identical to the Main Mix Tank and very similar in piping configuration, slurry service testing will be kept to a minimum.

CAUTION For the tests outlined below, personal protection equipment is to be used per Safety and SOP/DVP requirements.

Test 3.1 Tank Volume Calibration using Slurry

To obtain tank volume calibration data in slurry service repeat Test 1.1 using tank 65-D-02 and its associated piping, equipment, and instrumentation.

Test 3.2 Grinder Performance, and Representativeness of Samples

This test will obtain data for determination of number of samples needed to get consistent results from analysis. It will also obtain data on the maximum slurry flowrate through the grinder.

Acceptance Criteria: Maximum slurry flowrate through grinder > 70 gpm. (per present estimate)

Test:

3.2.1 Prepare a typical glass former slurry batch in the Holding Tank.

Measure and record time taken for each major phase of batch preparation -- (Need to collect data for determination of average batch preparation cycle time).

3.2.2 Establish slurry recirculation (via the pump, grinder and diverter valve), and recirculate slurry via the grinder for at least three batch volumes to ensure collection of acceptable samples. Also ensure that the flowrate acceptance criteria through the grinder is met.

3.2.3 Obtain five slurry samples for analysis. The samples are to be taken 1 minute apart to ensure complete line flush and a fresh sample from the tank each time. Perform a complete analysis of each sample and report the results.

3.2.4 Obtain a set of five slurry level measurements per steps 1.1.2 through 1.1.8.

Test 3.3 Control of Freeboard Pressure in Tank During Slurry Transfer

NOTE

Water test data collected on vacuum control in slurry tanks during transfer operations (per prerequisite # 5) should satisfy the requirements of this test.

No additional tests are planned.

Test: 3.4 Demin. Water Requirements for Slurry Recirculation Loop Flush.

NOTE

The results from Test 1.4 will adequately define recirculation loop flush volume in the case of the Holding Tank.

No additional tests are planned.

Test 3.5 Demin Water Requirements for Tank Flush

NOTE

The results from Test 1.5 will adequately define tank flush volume in the case of the Holding Tank.

No additional tests are planned.

Test: 3.6 Demin. Water Requirements for Slurry Transfer Line Flush.

NOTE

The results from Test 1.6 will adequately define slurry transfer line flush volume in the case of the Holding Tank.

No additional tests are planned.

FUNCTIONAL PERFORMANCE TEST REQUIREMENTS

Cold Chemical System Tests

Nitric & Caustic Tanks

Objectives

Demonstrate performance and obtain operating data for the Nitric Acid and Sodium Hydroxide (Caustic Soda) Fill and Transfer Systems.

Prerequisites

All equipment has been calibrated (where applicable) and commissioned.

All previously planned Water Tests have been completed, including the following:

1) System alarms and interlocks.
   (Includes all alarms and interlocks shown on dwg. 905-D-017)

2) Tank volume calibration.
   (For Nitric and Caustic Day Tanks 65-D-05 and 65-D-06)

3) Accuracy of transfer.
   (Using utility water, determine the accuracy of transfer for a full range of flowrates and batch volumes via the nitric and caustic flowmeter/metering pump setups. Tests are to be per the Nitric/Caustic Tests 1.1 and 1.2 in the 12-20-93 draft of this document -- Memo # CC:93:0116)

Nitric Acid Transfer System Performance Test Outlines

General

Accurate transfer of concentrated nitric acid is critical to melter feed slurry pH control (per Process Development Dept.). Further tests are planned at PNL to study this in detail.

In the current operating scheme, nitric acid (nominal 65 weight % concentration) needed per a nominal 11,356 liter (3,000 gallon) CFMUT batch is around 1,060 liters (280 gallons). The acid will be used for pH control in the CFMUT and not for attaining accurate nitrate ion concentration (as in the past). In addition, smaller batches (~5 gallons) of the acid will be used to prepare dilute solutions (~0.7 molar HNO3) in tank 65-D-08 for canister decon operations.

Test 1.1 Accuracy of Nitric Transfer

NOTE

It is not necessary to perform accuracy of transfer tests using concentrated nitric acid. Tests performed using Utility Water (see prerequisite # 3), followed by zero reset of the Krohne flowmeter system with concentrated nitric acid will suffice -- i.e. will not sacrifice accuracy. (per president of Krohne America).

The acceptance criteria for the above water tests is:
+/- 1 % for volume transferred, and +/- 2% for flowrate.

The acceptable accuracy for individual instruments and equipment per the manufacturer's published literature is:

The accuracy of the Krohne flowmeter system is in the +/- 0.5% range. The accuracy of the Milton Roy positive displacement pump is in the +/- 1% range (from 10% to 100% of the flowrate). The accuracy of LE-202 is +/- 1%, which is +/- 49.21 liters (13 gallons) or +/- 0.75 inches of tank height for the nitric tank.

Nitric acid transfer from tank 65-D-05 using level probe LE-202 will be used as a means of gross verification as the accuracy of the probe is not high (+/- 13 gallons). Calibration of this probe using nitric acid is therefore not necessary. Calibration with Utility Water (per prerequisite # 2) will be adequate.

Caustic Soda Transfer System Performance Test Outlines

General

Since sodium is a glass constituent, the accurate addition of caustic soda is critical. Caustic addition needed per a nominal 11,356 liter (3,000 gallon) CFMUT batch will be from 41.6 to 378.5 liters (11 to 100 gallons), depending on the fraction of sodium introduced as caustic versus borax.

Test 2.1 Accuracy of Caustic Transfer

NOTE

It is not necessary to perform accuracy of transfer tests using concentrated caustic soda. Tests performed using Utility Water (see prerequisite # 3) times a correction factor of +1.25%, followed by zero reset of the Krohne flowmeter system with concentrated caustic soda will suffice -- will not sacrifice accuracy. (per president of Krohne America)

The acceptance criteria for the above water tests is:
+/- 1 % for volume transferred, and +/- 2% for flowrate.

The acceptable accuracy for individual instruments and equipment per the manufacturer's published literature is:

The accuracy of the Krohne flowmeter system is in the +/- 0.5% range. The accuracy of the Milton Roy positive displacement pump is in the +/- 1% range (from 10% to 100% of the flowrate). The accuracy of LE-201 is +/- 1%, which is +/- 49.21 liters (5 gallons) or +/- 0.7 inches of tank height for the nitric tank.

Caustic transfer from tank 65-D-06 using level probe LE-201 will be used as a means of gross verification as the accuracy of the probe is not high (+/- 5 gallons). Calibration of this probe using caustic soda is therefore not necessary. Calibration with Utility Water (per prerequisite # 2) will be adequate.

FUNCTIONAL PERFORMANCE TEST REQUIREMENTS

Cold Chemical System Tests

Decon. Tanks

Objectives

Demonstrate performance and obtain operating data for decontamination solution preparation, sampling, and transfer operations for the Decon. Tanks 65-D-07, 65-D-08, and 65-D-09.

General

Decontamination solutions projected to be used are demineralized water, dilute nitric acid, dilute caustic soda (sodium hydroxide), mild detergent solutions, dilute oxalic acid, dilute potassium permanganate, dilute potassium dichromate.

* Tank 65-D-07 has been designated for demineralized water (DW) service. (i.e. Agitator motor has been locked and tagged. Nitric acid, caustic soda, and liquid eductor fill valves have been locked and tagged. Tank jacket cooling water supply and return valves have been locked and tagged. Steam supply and return valves have been locked and tagged. Density instrument has been removed).

* Tank 65-D-08 has been designated for dilute nitric acid service. (i.e. Tank has been "hard piped" to tank 63-D-048 via the transfer pump 65-D-08. Liquid eductor fill valve has been locked and tagged. Steam condensate valve has been locked and tagged. Caustic soda fill line and valve have been removed. Steam supply to tank jacket has been removed. Density instrument has been removed).

* Tank 65-D-09 retains its original function as a general purpose decon. solution prep. tank.

Prerequisites

All equipment has been calibrated (where applicable) and commissioned.

All previously planned Water Tests have been completed, including the following:

1) Tank Level Alarms and Interlocks.
   (Determine accuracy of interlocks and alarm points. Tank agitator to be on for tanks 65-D-08 and 65-D-09).

2) Tank Volume Calibration.
(Use DW for calibration of tank 65-D-07. Use utility water (UW) for calibration of tanks 65-D-08 and 65-D-09. Measure and record the conductivities of the DW and the UW used in each case. Calibrate with agitation turned off. Obtain independent verification of liquid level measurement using a tape measure lowered down through a spare nozzle in the tank. Also hook up a recorder to the level probe signal transmitter to obtain an imprint of decay in fluctuations after agitator switch off -- to help characterize the swirl effect.)

3) Tank Sampling.
Using utility water, develop technique for safely obtaining tank samples from tanks 65-D-08 and 65-D-09.

4) Flush Air Requirements.
(Determine flush air requirements for flushing demineralized water from tank discharge piping - see dwg. 905-D-016 and SD-65 for list of transfer lines).

5) Vacuum Control in Slurry Tanks during Transfer Operations.
(Simulate decon solution transfer operations with water (i.e. tank pumpdown followed by tank flush). Obtain operating data on tank vacuum control at a set point of -2 inches of water).

6) Tank Cooling and Heating Capability.
Verify the cooling and heating capabilities specified in WVNS-EQ-275 (and reproduced below for tank designated services detailed above), are achievable.

Tank No.	Required Cooling Btu/Hr	Required Heating But/Hr	Cooling Water (GPM) Max. Design	Cooling Water (GPM) Normal Operating	Max. Cooling Water Pressure Drop (psig)
65-D-07	N/A	200,000	N/A	N/A	N/A
65-D-08	45,000	N/A	35	10	<5
65-D-09	45,000	200,000	35	10	<5

NOTE: Max. allowable temperature for tanks is 63 deg. C (145 deg. F).

Thermal shock to tank jacket is to be avoided (see SD).

Demonstrate switchover from heating to cooling and vice versa for tank 65-D-09.

7) Tank Transfer Operations using Pumps 65-G-07 and 65-G-08 in their "normai" and off-normal or "infrequent" modes. (Demonstrate operation in the various configurations detailed in the SD. This will surface problems associated with hose handling, valve line-up, flush and air blow dry of lines, spillage during coupling and uncoupling of hoses, etc. Obtain operating data on pump 65-G-07 fitted with a 3 inch diameter suction line.)

Demin. Water Service Decon. Tank (65-D-07) Performance Test Outlines

General

Use the procedures detailed in the System Description, and the SOP's/DVP's, to perform the tests outlined.

This Decon. Tank will be used for storage and transfer of demineralized water (DW) for various VF use as shown on dwg. 905-D-016 and detailed in the SD. Normal transfer will occur via pump 65-G-07. However, for transfers requiring flowrates in excess of ~10 gpm. (exact number to be determined via operation after installation of 3 inch dia. pump suction piping), pump 65-D-08 will be used.

Since this tank is designated for DW service, water tests with DW, as listed under the "Prerequisites" section of this chapter, should suffice as Performance Tests.

No additional tests are planned.

Nitric Acid Service Decon. Tank (65-D-08) Performance Test

General

Use the procedures detailed in the System Description, and the SOP's/DVP's, to perform the tests outlined below.

This Decon. Tank will be used for the preparation and transfer of dilute nitric acid (~0.7 molar) via pump 65-G-08 to tank 63-D-048, and is hard piped to the receiving tank. The present plans are for the preparation of two batches of dilute nitric acid (~600 L and ~456 L) per radioactive glass canister produced (i.e. ~ every 65 hrs.). Unlike other decon transfers, the transfer pump and piping to tank 63-D-048 will not be flushed with DW and air dried after the transfer.

CAUTION For the tests outlined below, personal protection equipment is to be used per Safety and SOP/DVP requirements.

Test 1.1 Representativeness of Samples, Tank Level Measurement, and Cooling Capacity

This test will obtain data for determination of the number of samples needed to get consistent results from analysis and the number of tank level readings needed for acceptable level measurement using the tank level probe (LE-105). The test will also demonstrate adequacy of the tank cooling system under worse case conditions.

Acceptance Criteria: None.

Test:

1.1.1 Prepare a typical dilute nitric acid batch in the Decon. Tank 65-D-08.

Measure and record time taken for each major step in the batch preparation process. (Need to collect data for determination of average batch preparation cycle time)

Also test the tank jacket cooling capability by adding the concentrated nitric acid at the maximum delivery rate afforded by the pump 65-G-05, and determine whether the cooling jacket is able to cope. Record cooling water supply, return, and tank solution temperatures at frequent intervals (once per minute) during acid addition. Also record tank level before addition of acid and volume of acid added.

1.1.2 Agitate the batch for at least 10 minutes to ensure homogeneity through total mixing. Obtain five dilute nitric acid samples for analysis. The samples are to be taken 1 minute apart to ensure adequate agitation between samples and a fresh sample from the tank each time. Perform an analysis of each sample and report the results.

1.1.3 Obtain a set of five tank level measurements per steps 1.1.2 through 1.1.8 in the chapter on Slurry Tanks in this document.

1.1.4 Transfer out the dilute nitric acid to a heel volume of 449 liters. Obtain a set of five tank liquid level measurements taken one minute apart. Next pump down to a tank volume of 305 liters and repeat the level measurement procedure.

Decon. Tank (65-D-09)
Performance Test Outline

General

Use the procedures detailed in the System Description, and the SOP's/DVP's, to perform the tests outlined below.

This Decon. Tank will be used as a general purpose tank for preparation of decon. solutions other than dilute nitric acid and DW on an "as required" basis.

Since this involves infrequent batch preparation, of a large number of different solutions, five samples will be obtained and five liquid level readings will be taken for each batch to assure representativeness and accuracy.

In addition, since the agitator cutoff at low level is set at 711.7 liters (188 gallons) in a 946 liter (250 gallon) nominal capacity tank, it may be necessary to assemble a temporary recirculation loop (via pump 65-G-08 and recirc to a spare tank nozzle) for agitation in small (< 711.7 liter) batches.

CAUTION For the tests outlined below, personal protection equipment is to be used per Safety and SOP/DVP requirements.

Test: 2.1 Demin. Water Requirements for Decon.Solution Tank and Transfer Line Flushes.

Due to the infrequent use of tank 65-D-09, the many decon solutions, and the many pump and line combinations which may be employed, it was decided not to optimize DW flush requirements via extensive testing. Instead a conservative estimated volume of 379 liters (100 gallons) for tank flush, and (15 gallons) for pump plus transfer line flush will be used.

No additional tests are planned.

FUNCTIONAL PERFORMANCE TEST REQUIREMENTS

Cold Chemical System Tests

Drain Tank

Objectives

Demonstrate performance and obtain operating data for the Drain Tank 65-D-01.

Prerequisites

All equipment has been calibrated (where applicable) and commissioned.

All previously planned Water Tests have been completed, including the following:

1) Tank level alarms and interlocks.
   (Using bubbler, determine accuracy of interlocks and alarm points with tank agitator running).

2) Tank Volume calibration.
   (Using bubbler, calibrate volumes under following operating conditions: Turn off agitation, wait for swirl effect to subside, measure level)

3) Flush Air Requirements.
   (Determine flush air requirements for flushing utility water from tank transfer lines)

4) Tank Vacuum Control during Transfer Operations.
   (Simulate transfer operations with water (i.e. tank pumpdown). Obtain operating data on tank vacuum control at a set point of -2 inches of water)

5) Tank Cooling Capability.
   Using controlled addition of steam to a water batch or other suitable method, measure and record the cooling capabilities of the tank.

   NOTE: Batch temperature for the tank is to be kept below 100 deg. F.

   Thermal shock to tank jacket is to be avoided (see SD).

Drain Tank (65-D-01)
Performance Test Outline

General

Use the procedures detailed in the System Description, and the SOP's/DVP's, to perform the tests outlined below.

Tank 65-D-01 is to be used for holding waste slurries and solutions prior to off site disposal via tank truck. (i.e will be used in dilute slurry service).

CAUTION For the tests outlined below, personal protection equipment is to be used per Safety and SOP/DVP requirements.

Test: 1.1 Tank Slurry Sampling.

This test will compare tank slurry samples obtained from the sample port with a set of samples taken from a temporarily constructed recirculation loop to determine if a recirculation loop is necessary to obtain representative samples for this slurry service.

Acceptance Criteria: None

Tests:

Perform this test the first time the drain tank is full of 26,500 liters (~7000 gallons) of waste slurries and solutions from operation of the Cold Chemical Plant.

1.1.1 Ensure tank agitator is on and tank contents have had time to be well mixed. Using the tank sample port valves 6-65-H-925 and 6-65-H-926 obtain five samples of tank slurry for analysis. The samples are to be drawn 1 minute apart to ensure a fresh tank sample each time.

1.1.2 Using hose, construct a temporary piping loop to recirculate tank slurry via the pump 65-G-01 and back into the tank. The loop is to be fitted with sampling capabilities for extraction of slurry samples.

1.1.3 With the tank agitator on, recirculate slurry through the above loop and draw five samples for analysis. The samples are to be drawn 1 minute apart to ensure a fresh tank sample each time.

FUNCTIONAL PERFORMANCE TEST REQUIREMENTS

Cold Chemical System Tests

Pneumatic Subsystem for Solids Transfer

Objectives

Demonstrate performance and obtain operating data for the Pneumatic Transfer (Vac-U-Max) Subsystem.

Prerequisites None. (i.e. No prerequisites in addition to those listed in the appropriate SD and SOP's/DVP's).

Performance Test Outlines

General

Use the procedures detailed in the System Description, and the SOP's/DVP's, to perform the tests outlined below.

As part of the subcontractor (Bell) turnover package this subsystem was tested after installation on site using silicon dioxide (SiO_2) powder per approved AR# 1187B in early July 1993.

The tests described below are additional tests to be carried out to complete the performance testing for this subsystem.

CAUTION **For the tests outlined below, personal protection equipment is to be used per Safety and SOP/DVP requirements.**

Test 1.1 Inspection and Cleanout of Piping, Hopper and Discharge Valve

This procedure will help characterize SiO_2 buildup in the subsystem (due to the Bell tests referenced above).

Acceptance Criteria: None.

Test:

1.1.1 Inspect and photograph the inside surfaces of the Vac-U-Max piping, hopper, and discharge valve for the Main Mix Tank 65-D-03.

1.1.2 Clean the inside surfaces, collect and weigh the SiO_2 residue.

Test 1.2 Rate of Transfer Test

Tests carried out on site with SiO_2 (per the Bell tests referenced above) indicated that the average rate of transfer for a new drum of SiO_2 from the vendor was about 4,500 lbs/hr. This is an acceptable rate (i.e. will have a negligible impact on batch prep. cycle time). However, to achieve this rate, the convey portion of the Vac-U-Max cycle was increased from 30 seconds to 40 seconds (to increase the amount of material transferred each cycle). This resulted in an almost full hopper with the SiO_2. The convey duration may have to be decreased considerably to avoid overfilling the hopper with ingredients having a higher rate of transfer (i.e. overfilling will result in dropout of material and may lead to gradual choking of the piping). Some limited testing will be necessary with a more easily transferable major ingredient such as borax to determine the optimal convey duration to avoid hopper overfill as a regular mode of operation. Based on the results of the above tests, further adjustments and or design modifications to the system may become necessary.

The multiple objectives of this test therefore are to:

a) Determine the optimal time duration for the "convey" portion of the Vac-U-Max cycle.

b) Obtain transfer rate data with borax for the above optimal setting.

c) Obtain transfer rate data with SiO2 for the above optimal setting.

Acceptance Criteria: None

Test:

1.2.1 For the Main Mix Tank Receiver (65-V-03), set up a test configuration similar to that used for the Bell tests. (i.e. Use a cloth chute connected just downstream of the discharge valve 65-HV-378 to enable transfer of material from a "supply" drum placed on the 4 drum scale to a "receiving" drum placed under the cloth chute at the 115 ft. elevation platform and just beside the Main Mix Tank)

1.2.2 Place a 55 gallon drum of Borax on the drum scale and start vacuum transfer of the material to the receiving drum using wand 65-WD-003 (air inbleed valve at wand to be set at ~25% open position to prevent the vacuum blower pressure relief valve 65-PRV-350 from opening).

Stop the transfer in mid cycle just after the "convey" portion so that the hopper has a full load of powder ready for discharge.

1.2.3 Disassemble the receiver by opening the four clasps at the point where the cylindrical portion meets the conical hopper, and visually confirm that the fill level of powder in the hopper is above the inlet pipe, thus "choking" the inlet to the hopper.

1.2.4 If 1.2.3 is not confirmed skip to section 1.2.7.

1.2.5 If the above is confirmed, decrease the duration of the "convey" portion of the transfer cycle from its present 40 seconds setting in successive intervals of 10 seconds and repeat steps 1.1.2, 1.1.3 for each setting. Determine the convey duration which results in maximum hopper fill without encountering choking of the inlet to the hopper.

1.2.6 Based on the results of the above tests, further adjustments and or design modifications to the system may become necessary, and further testing may also be required.

1.2.7 Obtain a set of data on average transfer rate with borax at the new setting, as described below:

Using the set up described in 1.2.1 and 1.2.2, transfer borax from a supply drum located on the scales to a receiving drum on the 115 ft. level platform. Measure and record the weights of the supply and receiving drums before and after the transfer (make sure there is no hang up of residual material in the corrugations of the cloth chute. This was the major cause of errors during the Bell tests and needs special attention). Also measure and record the time and number of convey cycles required to effect the transfer.

1.2.8 Finally, additional data on the rate of transfer of SiO_2 will be compiled during the course of the "Loss of Weight in Transfer" test described below.

<u>NOTE</u> Adjustments to the system with respect to test 1.2 above need to have been completed before proceeding with further testing.

Test 1.3 <u>Loss of Weight in Transfer</u>

Tests carried out by Bell were inconclusive with regards to loss of weight in transfer. Further tests therefore need to be performed to determine if the loss of weight would lead to choking of the piping and the system.

Acceptance Criteria: Loss of weight for SiO_2 per drum $< 1\%$

Test:

1.3.1 Set up a test configuration per section 1.2.1.

1.3.2 Place a 55 gallon drum of SiO_2 on the drum scale and vacuum transfer the material to the receiving drum using wand 65-WD-003 (air inbleed valve at wand to be set at ~25% open position to prevent the vacuum blower pressure relief valve 65-PRV-350 from opening). Measure and record the weights of the supply and receiving drums before and after the transfer (make sure there is no hang up of residual material in the corrugations of the cloth chute. This was the major cause of errors during the Bell tests and needs special attention). Also measure and record the time and number of convey cycles required to effect the transfer. This will give data on average transfer rates.

1.3.3 Repeat the transfer operation per steps 1.2.1 and 1.2.2 with the drums switched so that the same material is reused (i.e. the "receiving" drum from the previous steps now becomes the "supply" drum and vice versa).

1.3.4 The transfer operation is to be repeated 20 times as described above to simulate transfer of one batch of glass formers to the Main Mix Tank.

1.3.5 From the weights recorded for each transfer, calculate the total loss of weight of material in the Vac-U-Max subsystem per batch.

1.3.6 Next disassemble and inspect the transfer piping and hopper for powder deposition points.

1.3.7 Clean the inside surfaces, collect and weigh the SiO_2 residue.

1.3.8 If the loss in weight per batch is found to be greater than the acceptance criteria, and more importantly, if the loss is found to be cumulative (i.e. increases with number of transfers, indicating a trend towards choking of the transfer system due to buildup of the residual material), then the piping routes etc. will need to be modified to alleviate the problem.

Test 1.4 <u>Testing of Sugar Transfers to Tank 65-D-04</u>

Due to the piping configuration, there exists the possibility of malfunction of isolation valve 65-HV-392 in sugar service. Operation of this valve therefore needs to be tested.

Acceptance Criteria: No indications of valve malfunction after transfer of one batch (6 drums) of sugar.

Test:

1.4.1 Carry out the pneumatic transfer of 6 drums of sugar into tank 65-D-04 per the SOP/VDP and SD requirements.

1.4.2 Observe the functioning of isolation valve 65-HV-392 for signs of malfunction due to sugar accumulation in the seals, seats, etc.

1.4.3 Disassemble and visually inspect valve 65-HV-392 and the piping around the valve for accumulation of sugar particles in the seal, seat and ducting.

1.4.4 Based on the results of the above tests, further adjustments and or design modifications to the system may become necessary.

Test 1.5 Back Migration of Moisture from Tank to Receiver

Back migration of moisture from the tank to the receiver was found to create operational problems during FACTS testing. Air purge and isolation valves were subsequently added to the present design to eliminate this problem. Performance of this test will determine the effectiveness of these modifications, and determine the optimal mode of operation.

NOTE To minimize the contamination of water in the tank by chemicals used in the previous tests, make sure the Vac-U-Max system has been cleaned from the inside per step 1.3.7 above.

Acceptance Criteria: No visible signs of moisture upstream of the isolation valve.

Test:

1.5.1 Fill tank 65-D-03 with approximately 7,600 liters (2,000 gallons) of water to simulate a glass former slurry batch.

1.5.2 Heat and maintain the simulated batch at 100 deg. F. (Any acceptable method may be used. One suggested method is the controlled addition of steam below the surface of the water)

1.5.3 Operate the vacuum transfer system for tank 65-D-03 with air (i.e. no material transferred) for 8 hours to simulate batch preparation.

1.5.4 Stop batch heating.

1.5.5 With the tank isolation valve in the shut position, disassemble and visually inspect the receiver/ductwork assembly upstream of the isolation valve (i.e. upstream face of the shut isolation valve, discharge valve, ductwork, hopper, and filters) for signs of back migration of moisture from the tank. Take photographs.

1.5.6 If the results of the inspection show no visible signs of moisture, change the Vac-U-Max operating sequence to allow the isolation valve to remain continuously open as long as the Vac-U-Max is on, and repeat steps 1.5.2, through 1.5.5.

1.5.7 If the results of the inspection show visible signs of moisture, return the Vac-U-Max operating sequence to its original configuration (i.e. isolation valve to be closed after each discharge).

1.5.8 Empty the tank.

Test 1.6 Inspection of Filters

The Vac-U-Max subsystem has three filters in series. The middle filter is equipped with a broken bag detector which alarms if the primary filter is breached.

The filter tests described in this section are to be carried out after completion of all the other performance tests involving the Vac-U-Max subsystem. This assures that the filters are intact and operational at the end of the testing phase.

The multiple objectives of this test are to:

a) Visually inspect the primary filter for breakthrough and for uniform coating of filter.

b) Test the operation and set point of the broken bag detector.

c) Visually inspect the final filter for breakthrough.

Acceptance Criteria:

a) Primary filter to be evenly coated with powder (layer thickness is expected to be 0.1 to 0.25 inches).
No trace of powder on the downstream side of the filter support plate.

b) Broken bag detector to sound alarm at 3 inches of water_ delta P.

c) No trace of powder on final filter and on the downstream side of the filter housing.

Test:

1.6.1 Unclasp the lid for receiver 65-V-03 and lift it up to enable visual inspection of the upstream side of the filter support plate. The absence of any trace of powder on the lid and support plate surfaces, will indicate that the filters are intact.

1.6.2 Next lift the filter support plate assembly to enable visual inspection of the outer surface of the cylindrical filter elements. Each filter element should be evenly coated with powder.

1.6.3 Repeat steps 1.6.1 and 1.6.2 for receivers 65-V-02 and 65-V-04.

1.6.4 Visually examine the middle filter and housing for traces of powder. The absence of powder will indicate that the filter is intact.

1.6.5 Test the alarm setpoint on the broken bag detector by simulating the trip delta P.

1.6.6 Open the cover plate of the final filter and visually inspect the filter element and inside surfaces of the housing for traces of powder. The absence of powder will indicate that this filter is intact.

FUNCTIONAL PERFORMANCE TEST REQUIREMENTS

Cold Chemical System Tests

Steam Jet Subsystem for Liquids Transfer

Objectives

Demonstrate performance and obtain operating data for the Steam Jet Subsystem.

Prerequisites

All equipment has been calibrated (where applicable) and commissioned.

All previously planned Water Tests have been completed, including the following:

1) Transfer Rate.
(Measure and record water transfer rate for both eductors and six receiving tanks. Also measure Steam and Utility Air pressures upstream (at PI-336) and downstream (at PI-327 & 328) of eductors).

2) Air Flush Requirements.
(Using atmospheric air inbleed at wand, determine optimal operating procedure for removal of flush water from transfer subsystem piping.
Determine Utility Air requirements for purging residual steam from transfer lines at end of a transfer and DW flush sequence).

3) Steam Trap/Drain Operation.

Performance Test Outlines

General

Use the procedures detailed in the System Description, and the SOP's/DVP's, to perform the tests outlined below.

CAUTION For the tests outlined below, personal protection equipment is to be used per Safety and SOP/DVP requirements.

Test 1.1 Ferric Hydroxide Transfer Test

This test will obtain data and demonstrate the feasibility of transferring ferric hydroxide slurry via the steam jet subsystem. (Ferric hydroxide slurry was previously pumped into the main mix tank using an air operated double diaphragm pump during FACTS testing. Therefore steam jet transfer of this thick puddinglike ingredient chemical has not been demonstrated in the past).

Acceptance criteria: None.

Expected transfer rate	~ 113 lpm (30 gpm)
Expected volume of flush DW	~ 19 liters (5 gals)
Expected air inbleed duration	~ 10 secs.
Expected UA purge duration	~ 10 secs.

Expected values for the parameters will be further refined after obtaining results from the water tests as described above.

Test:

1.1.1 Using steam jet 65-ED-06, set up and transfer one 55 gallon drum of ferric hydroxide slurry to any one of the slurry tanks (65-D-02, or 65-D-03, or 65-D-04).

1.1.2 Obtain and record data on transfer rates, steam pressures at PI-336 and PI-327, volume of DW required to adequately flush the drum upon completion of transfer, duration of air inbleed through wand needed to clear the piping of flush water, duration of utility air purge needed to clear transfer line of residual steam.

Test: 1.2 Demin. Water Requirements for Transfer Line Flush.

During normal operations, this flush occurs after completion of transfer of each liquid ingredient. Since it occurs subsequent to the ingredient drum flush, the demin. water requirement for this operation is expected to be minimal, and it was decided not to optimize this flush requirement via extensive testing. Instead a conservative estimated volume of 5 times the wand plus line volume will be used for transfer line flush purposes.

FUNCTIONAL PERFORMANCE TEST REQUIREMENTS

Cold Chemical System Tests

Vessel Vent Subsystem

Objectives

Demonstrate performance and obtain operating data for the Vessel Vent Subsystem.

Prerequisites

All equipment has been calibrated (where applicable) and commissioned.

All previously planned Water Tests have been completed, including the following:

1) System level/pressure alarms and interlocks.
   (Checkout tank fill, drain, and alarms; system pressure alarm; and automatic pump switchover)

2) Tank Volume calibration.
   (Determine exact tank volume at tank fill and drain set points)

The Performance Test Outlines detailed below assume that:

1) The large agitator shaft opening on the Drain Tank 65-D-01 has been reduced to enable establishment of vacuum in the tank.

2) Throttle valves have been added to the tank vent lines to enable independent control of vacuum in each tank serviced by the vessel vent subsystem.

Functional Requirements

1. Maintain the vapor and particulate removal efficiency of the venturi scrubbers to > 99.2 %.

2. Maintain a positive pressure differential between the CCS and its connected hot cell component during transfer/flush operations (to prevent possibility of back migration of radioactivity from hot cell to the CCS).

3. Maintain low vent air flowrate in slurry tank during powder addition (to minimize tank vent line pluggage)

Performance Test Outlines

General

Use the procedures detailed in the System Description, and the SOP's/DVP's, to perform the tests outlined below.

As part of the subcontractor (Bell) turnover package this subsystem was tested after installation on site per AR# 1391A on 9-3-1993 (Test results are recorded on AR# 1497).

The tests described below are additional tests to be carried out to complete the performance testing for this subsystem.

CAUTION For the tests outlined below, personal protection equipment is to be used per Safety and SOP/DVP requirements.

Data Set:

Measure and record the following parameters for the tests described below:

The ACFM, Temperature, and Pressure of gas at system discharge. (NOTE: Use a KURZ type velocity measurement meter. Do not use a pitot tube).

Tank pressures in all the tanks serviced by the subsystem.

Vacuum pulled at the venturi (at PIS-308).

Pressure generated by pump at PI-315.

The pump Horse Power.

Initial and final cooling water temperatures at TI-316 (heat exchanger outlet).

Initial and final scrub water temperatures at TI-312.

Test 1.1 Operation at Maximum Vacuum Conditions

This test will obtain a full set of operating data at maximum vacuum conditions.

Acceptance Criteria: Minimum vacuum requirement of - 2 inches of water (IW) to be met in all tanks serviced by this subsystem.

Test:

1.1.1 With all tank nozzle connections secured to minimize air in leakage, run the venturi scrubber subsystem with the scrubber pump discharge valve and the throttle valves in the tank vent lines fully open. Measure and record the data set detailed above. NOTE Make sure the agitator shaft opening in tank 65-D-01 has been closed.

1.1.2 Repeat the above test using the second pump.

Test 1.2 Operation During Transfer to Hot Cell

This test will obtain a full set of data at operating conditions during transfer to hot cell, and will determine the degree of operational control afforded by the throttle valves.

Acceptance Criteria: Able to maintain tank pressure within +/- 0.5 IW from the set point.

Test:

1.2.1 Simulate, or perform the actual tank transfer operation for the Main Mix Tank 65-D-03 at its design transfer rate (265 lpm or 70 gpm). During the transfer, throttle the valve in the vent line for this tank to achieve and maintain vacuums of -2 IW, -1 IW, and -0.5 IW in the tank. Record the data set detailed above for each pressure set point. Record observations regarding the degree of operational control afforded by the throttle valve.

1.2.2 After completion of above test and with the transfer operations still in progress, open the manhole on the tank and immediately adjust the vent valve to the fully open position. Record all observations regarding the tank pressure.

1.2.3. If the data obtained from steps 1.1.1 and 1.1.2 displays a variation of greater than 10 %, repeat steps 1.2.1 and 1.2.2 using the second scrubber pump.

1.2.4. Repeat steps 1.2.1, 1.2.2, and 1.2.3 for tanks 65-D-02; 65-D-04.

1.2.5 Using pump 65-G-08 at 189.3 lpm (50 gpm) for effecting tank liquid pumpdown, repeat step 1.2.1, for tank 65-D-07; 65-D-08; 65-D-09.

1.2.6. If the data obtained from steps 1.1.1 and 1.1.2 displays a variation of greater than 10 %, repeat step 1.2.1 for tanks 65-D-07, 65-D-08, and 65-D-09, using the second scrubber pump.

Test 1.3 Obtain Operating Data on The Heat Exchanger

This test will obtain operating data on the capabilities of the heat exchanger.

Acceptance Criteria: Scrubber Tank temperature (TI-312) to stabilize at < 110 deg. F. within the duration of the test.

Test:

1.3.1 Run the venturi scrubber system for four hours per step 1.2.1, with tank 65-D-03 at -2 IW. Record temperatures at TI-312 and TI-316 at 15 minute intervals. Also record the cooling water flowrate through the heat exchanger and the scrubber solution pump pressure at 65-PI-315.

Test 1.4 Obtain Data on Manual Opening of Tank Manhole at Various Tank Vacuums

This test will obtain operating data on tank manhole operation at various tank vacuums.

Acceptance Criteria: None.

Test:

1.4.1 By throttling and/or closing tank vent valves establish vacuums of -2 IW, -5 IW, and -7 IW for the Main Mix Tank 65-D-03. Manually open the tank manhole at each of the above pressure settings. Record ease of operation and all other observations in performing this task.

Test 1.5 Obtain Data on Tank Vent Line Pluggage due to Powder Carryover

Acceptance Criteria: None.

After completion of ten slurry batches during the "Integrated Testing" phase of the vitrification project, disassemble and inspect the vessel vent line leaving tank 65-D-03 for evidence of powder carryover and plugging. Photograph and record all observations. Clean the line before reassembly. Based on the results of the inspection, cognizant test engineer to recommend an appropriate line cleanout schedule. (i.e. future line inspection and cleanouts to be performed after preparation of ____ number of slurry batches)

Test 1.6 Obtain Data on Scrub Solution Changout Frequency

Acceptance Criteria:

- Maintain nitric acid concentration at below 2 wt.%
- Maintain soluble solids concentration in the 1 to 2 wt.% range
- Maintain undissolved solids concentration in the 1/2 to 1 wt.% range

Observe the settling characteristics and abrasiveness of slurry. Accordingly adjust above limits to ensure minimal settling in tank 65-D-10, and minimal wear on scrub solution recirculation pump.

Test 1.7 Obtain Operating Data on Tank Demister Mesh Pad Fouling:

Acceptance Criteria: - TBD

At the end of the Integrated Testing phase, remove the 8 inch diameter system exhaust pipe and visually inspect tank mesh pad for fouling. Also visually inspect the inside surface of the exhaust pipe for powder and liquid deposits. Take pictures and record all observations.

FUNCTIONAL PERFORMANCE TEST REQUIREMENTS

Cold Chemical System Tests

Demin. Water

Objectives

Demonstrate performance and obtain operating data for the Demineralized Water (DW) Subsystem.

General

The DW requirements for flushing of slurry lines is 265 lpm (70 gpm) at ~55 psig.

The DW requirements for filling of tanks is 151.5 lpm (40 gpm) at ~55 psig.

Prerequisites

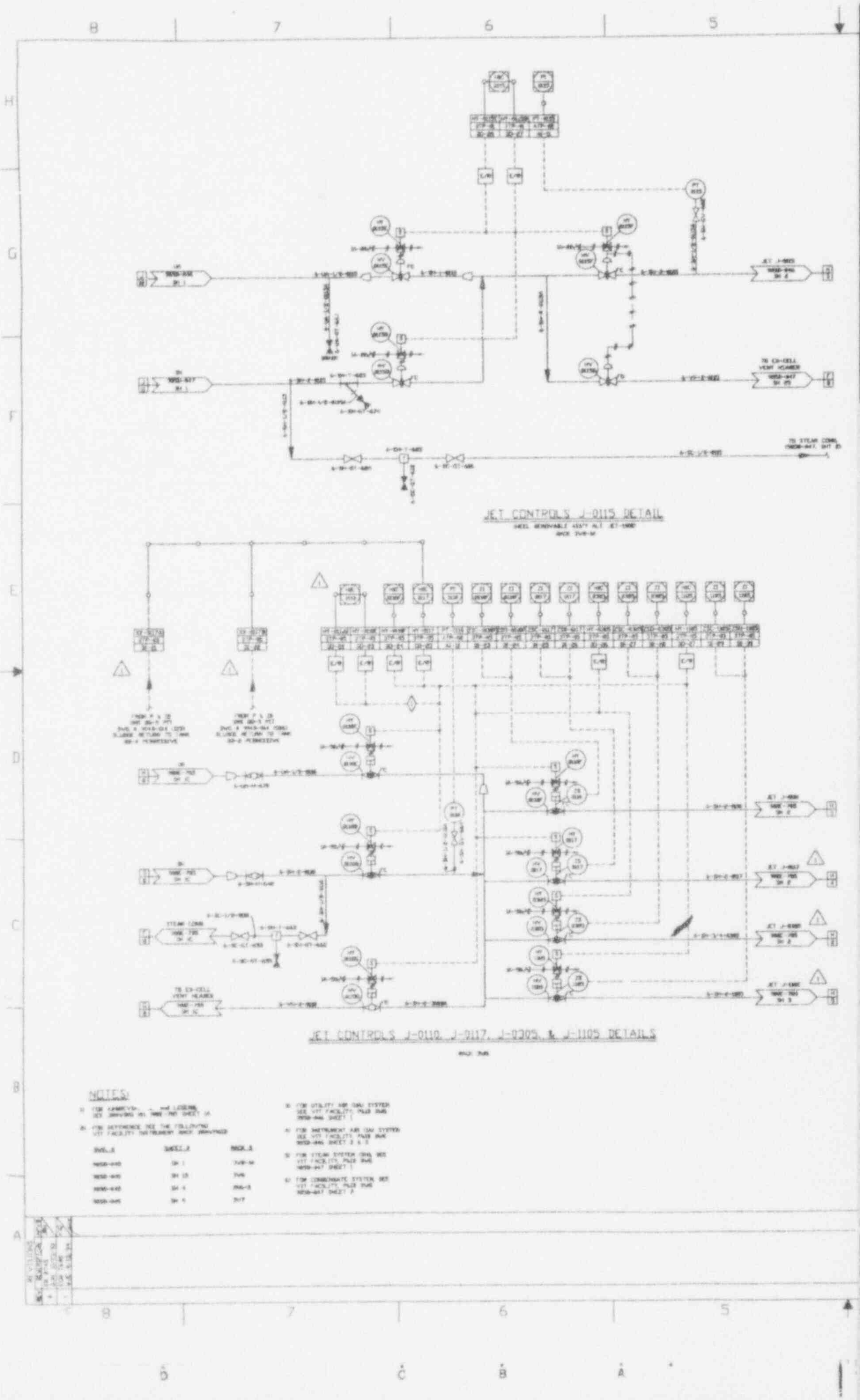
All equipment has been calibrated (where applicable) and commissioned.

All previously planned Water Tests have been completed.

Tests

Water tests with DW as listed above should suffice as Performance Tests.

No additional tests are planned.



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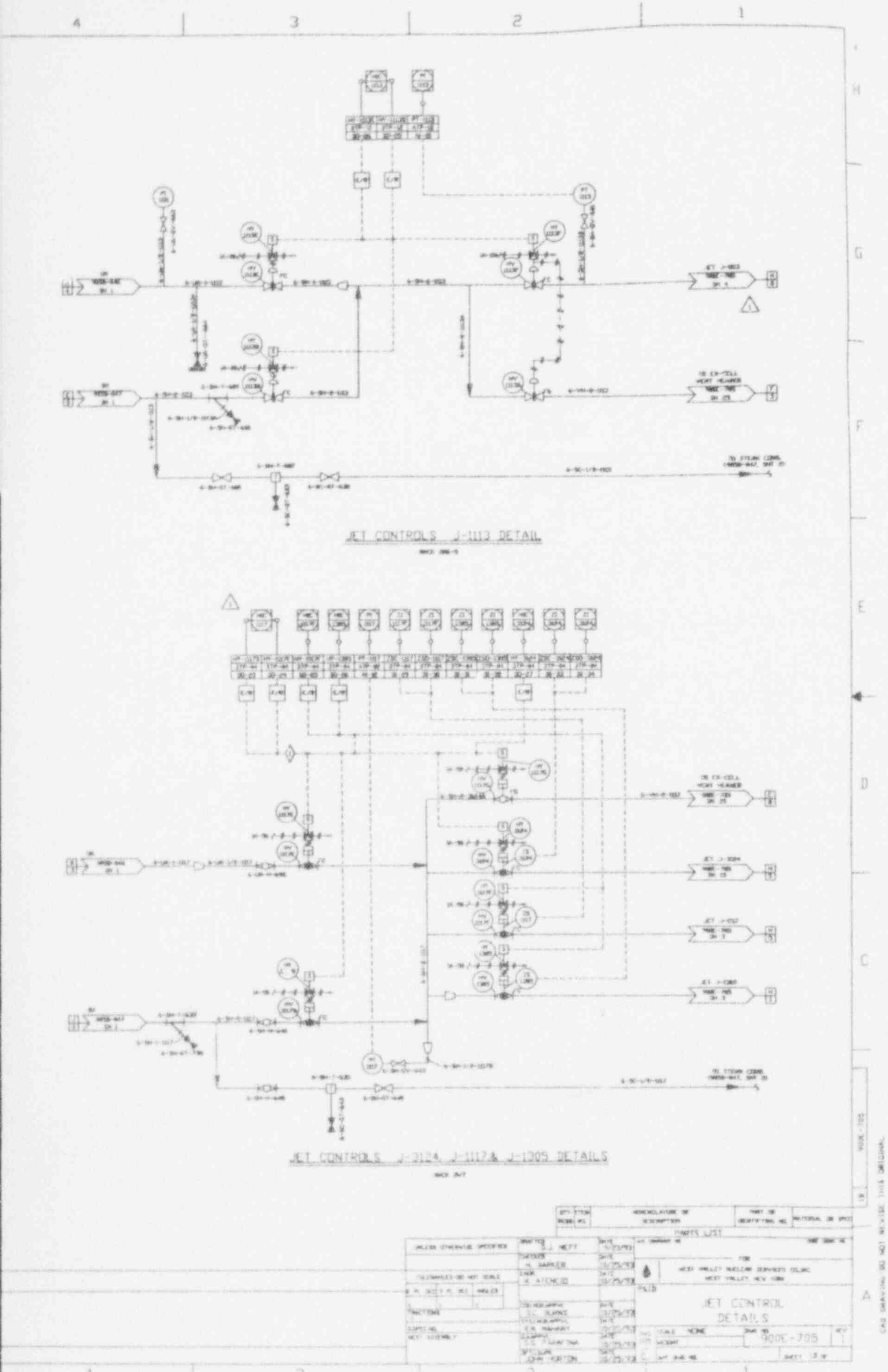
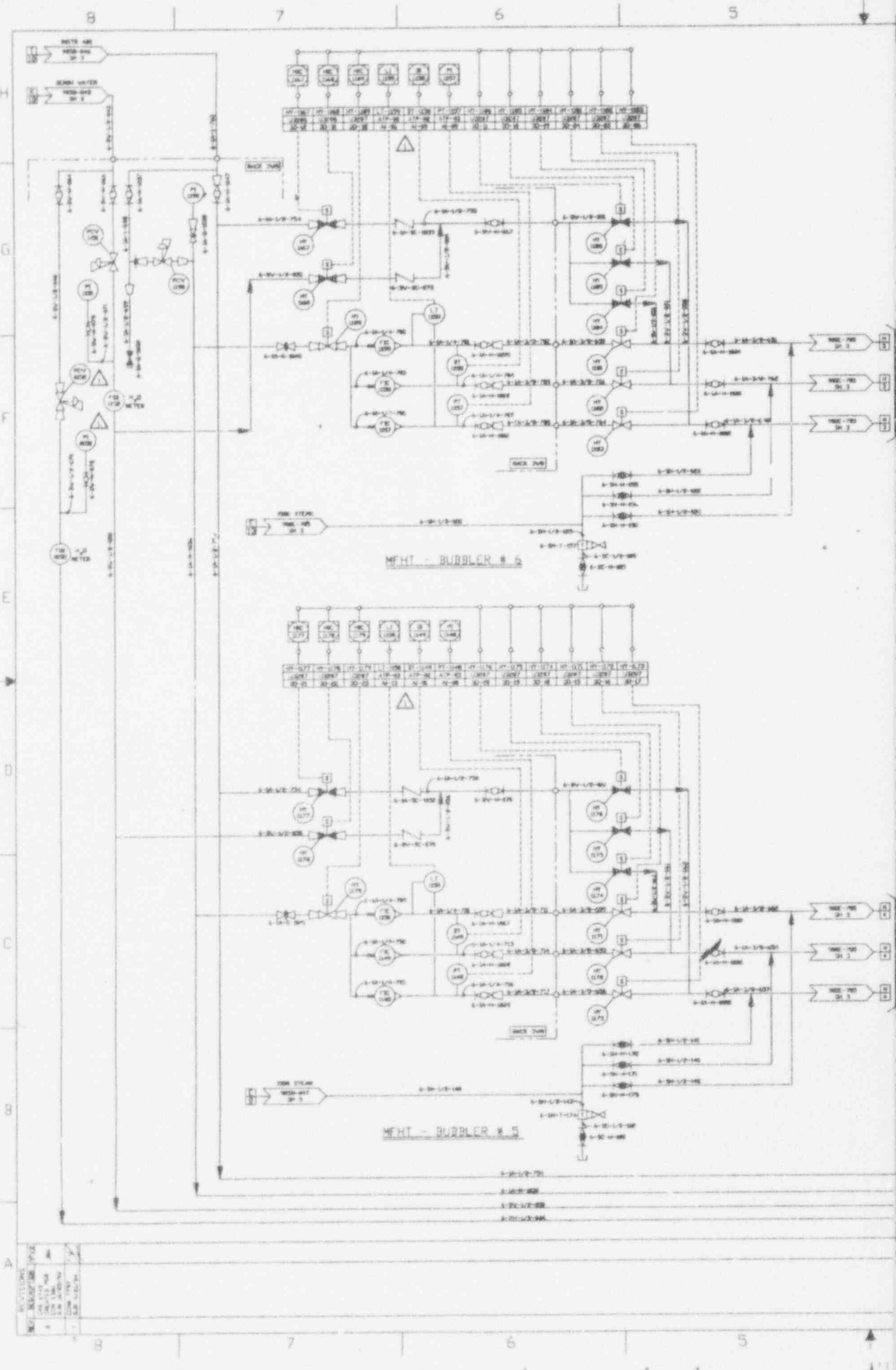
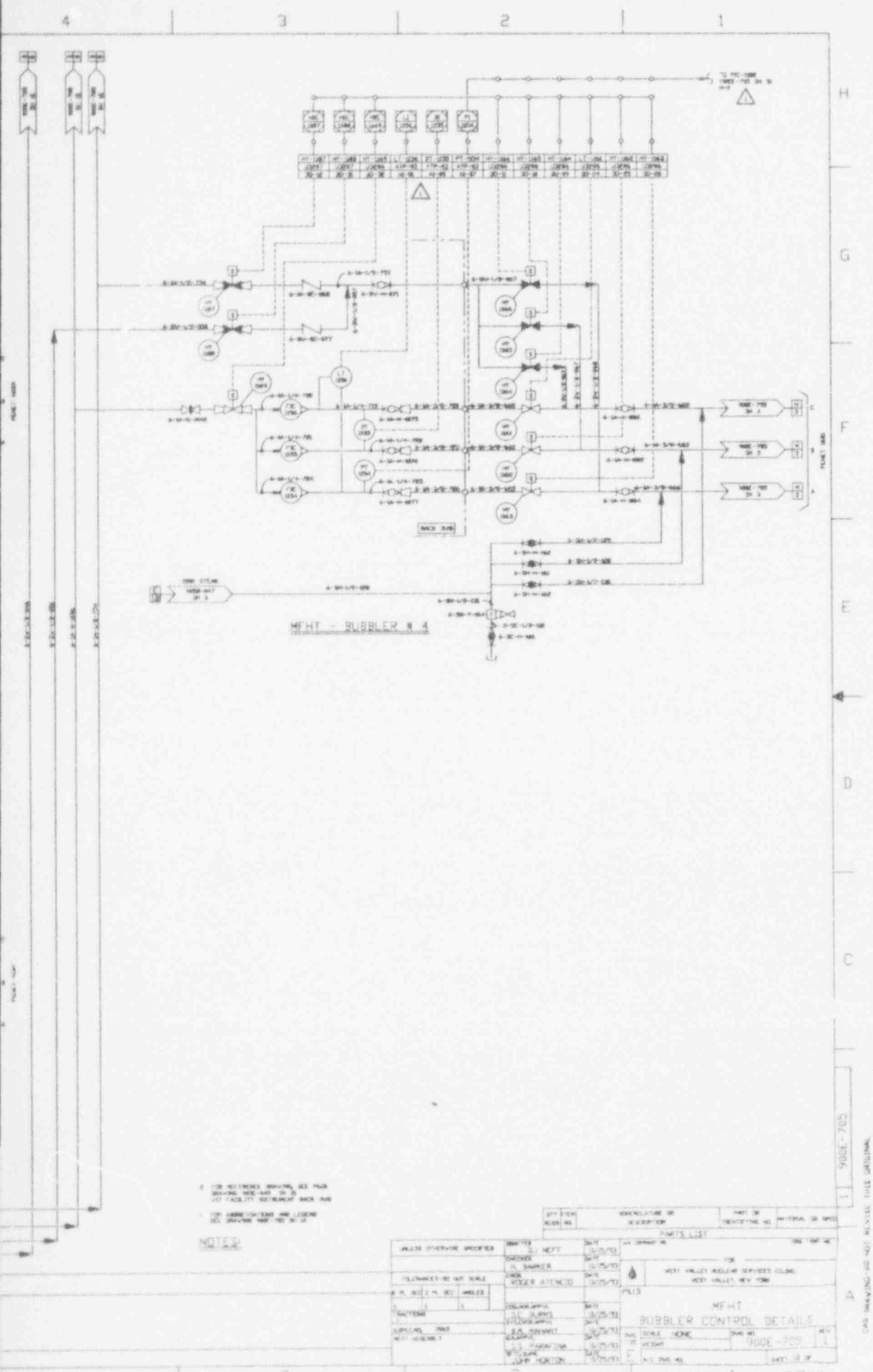
B
A
JET CONTROLS J-0115 DETAIL
JET CONTROLS J-0110, J-0117, J-0305, & J-1105 DETAILS
NOTES:



9406240136 -01

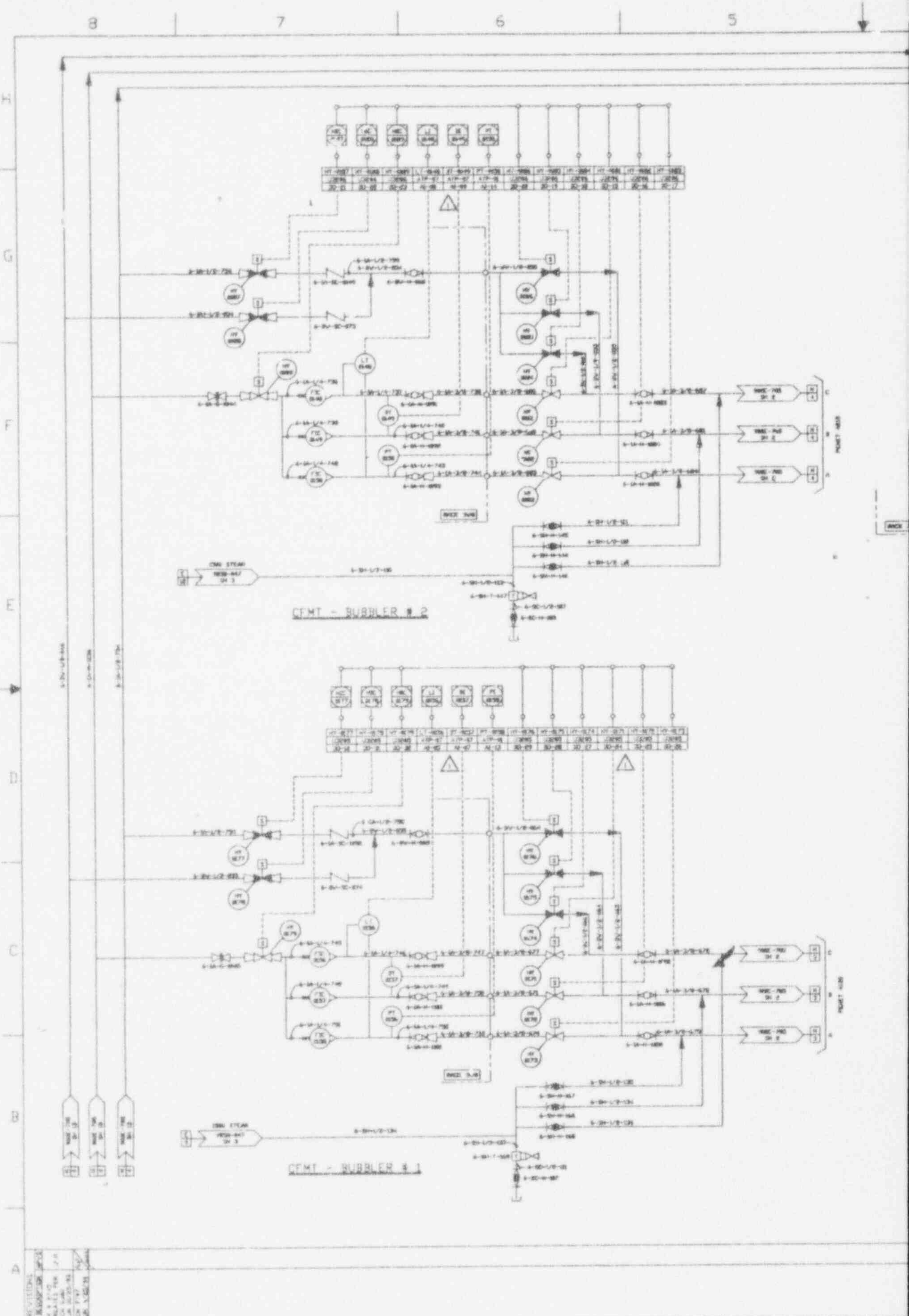

MFHT - BUBBLER # 6
MFHT - BUBBLER # 5



ANSTEC
APERTURE
CARD

Also Available on
Aperture Card

9406240136 -02



8
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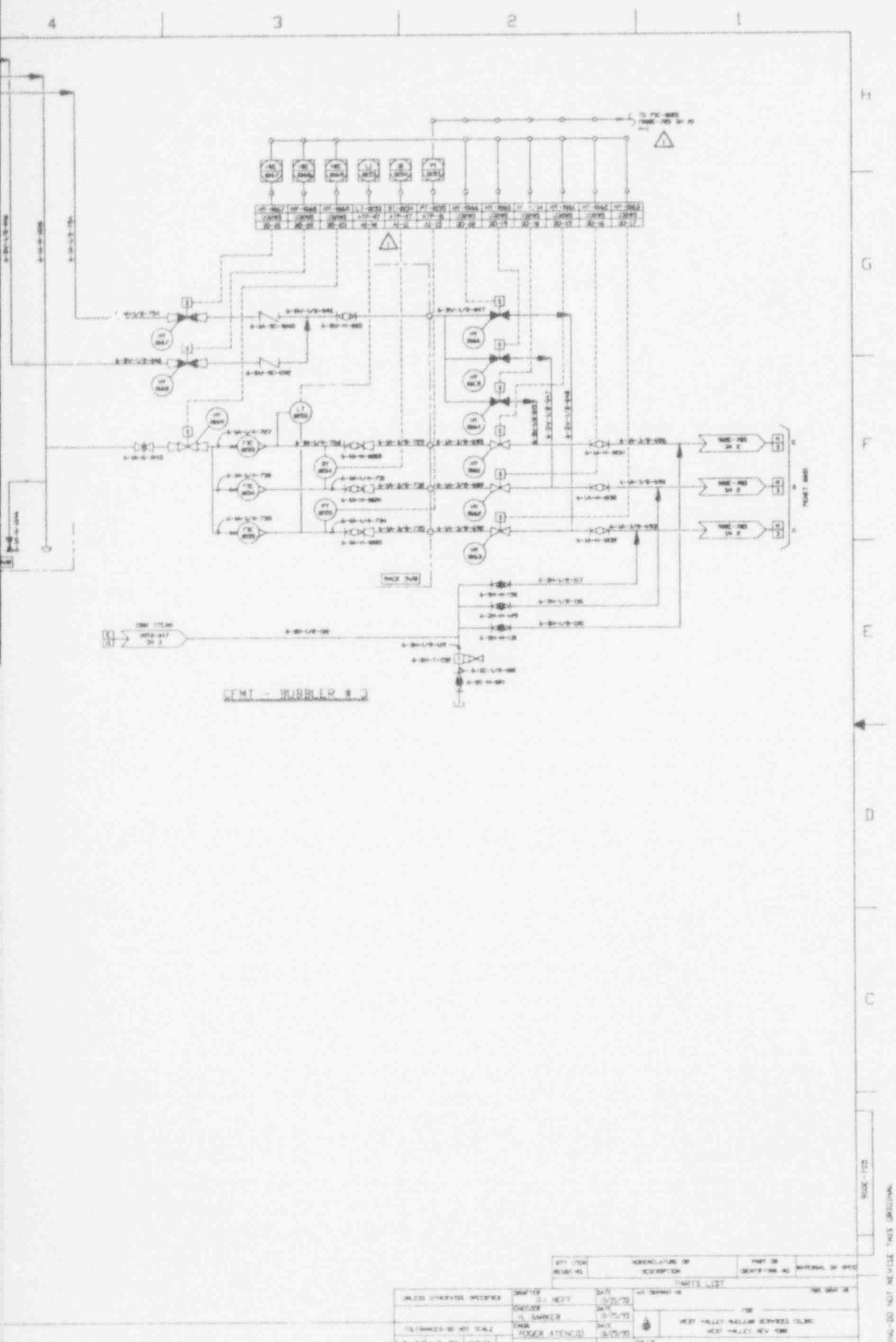
CFMT - BUBBLER # 2
CFMT - BUBBLER # 1



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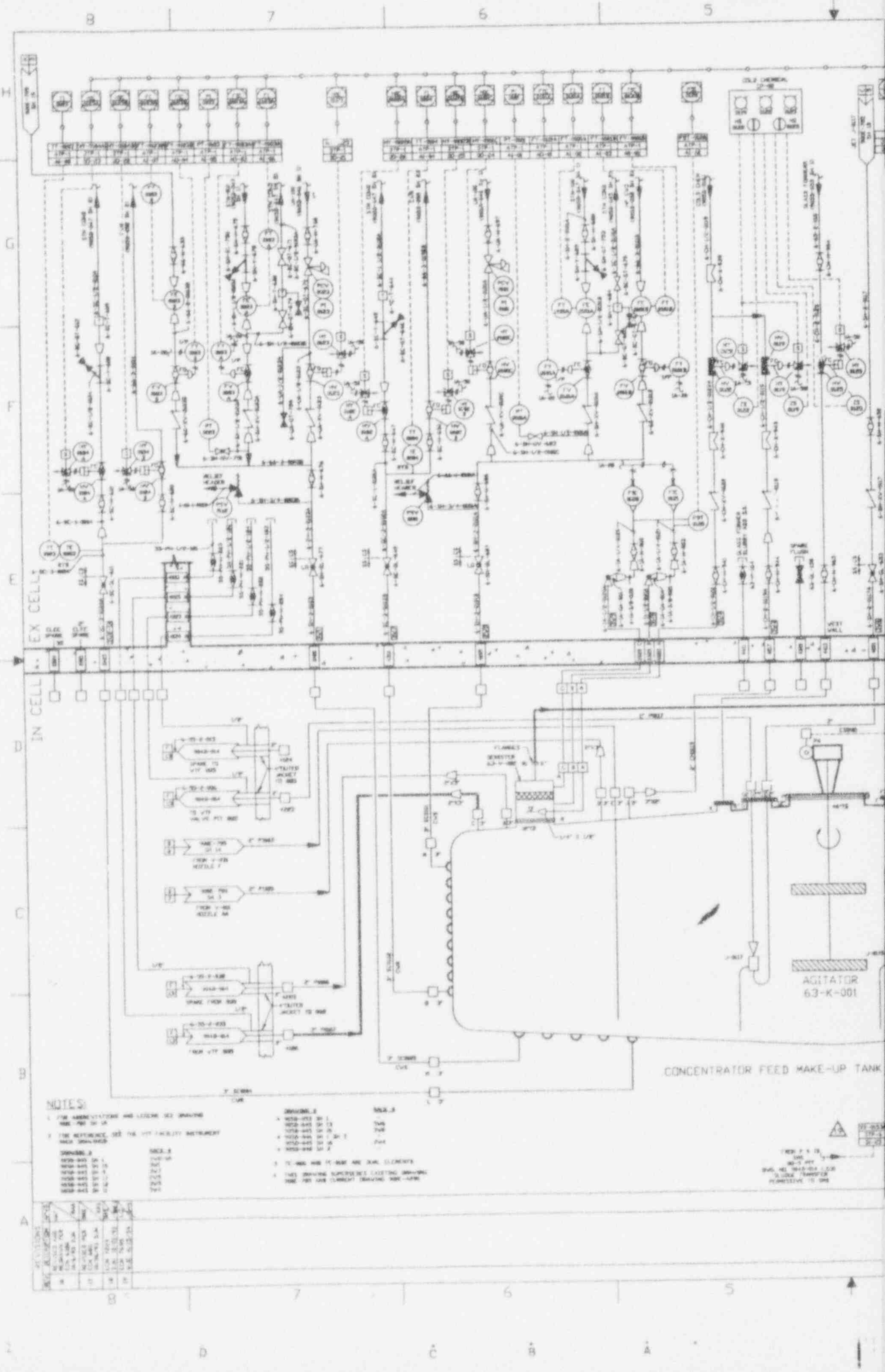
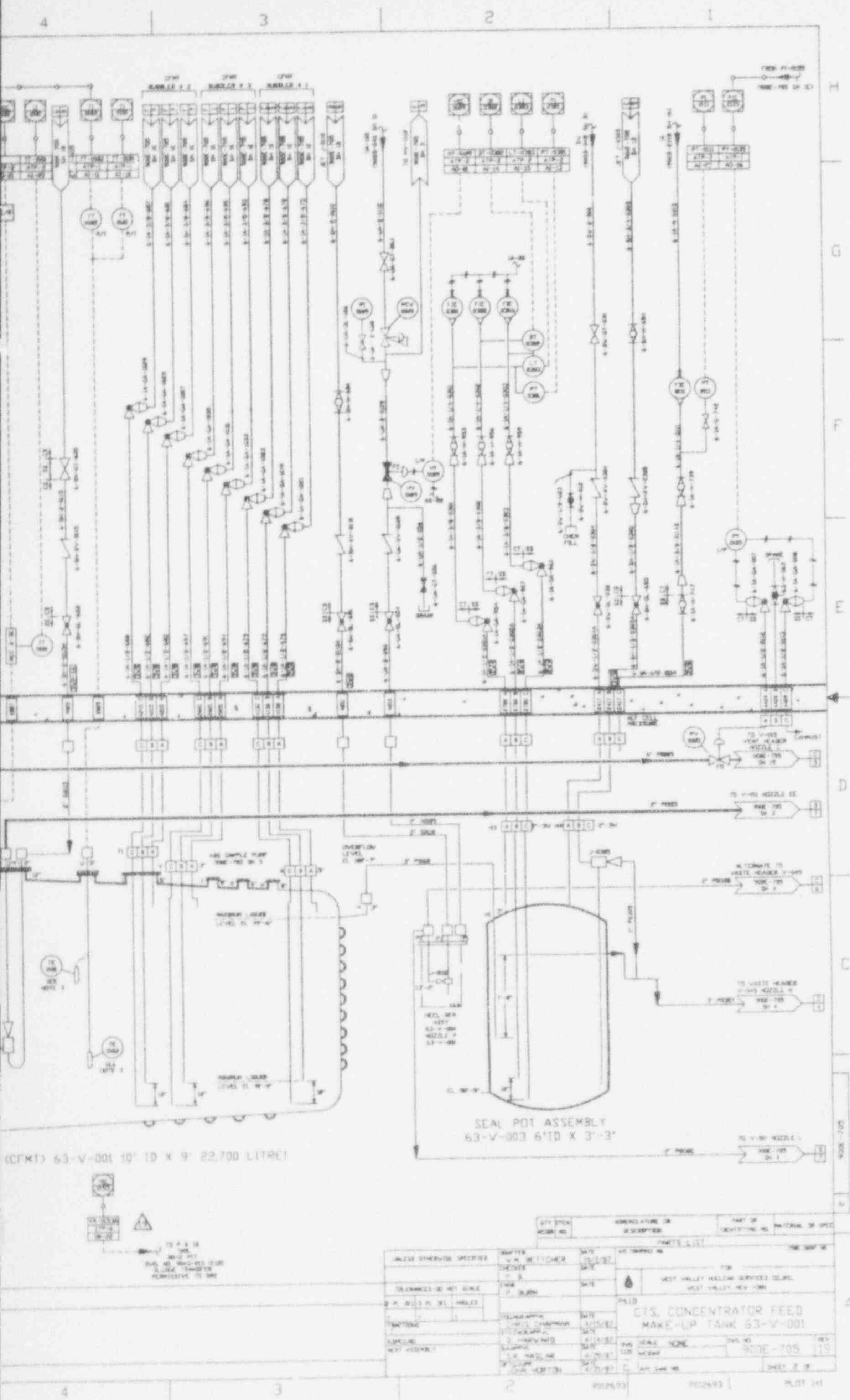


EX CELL
IN CELL
AGITATOR
63-K-001
CONCENTRATOR FEED MAKE-UP TANK
NOTES:



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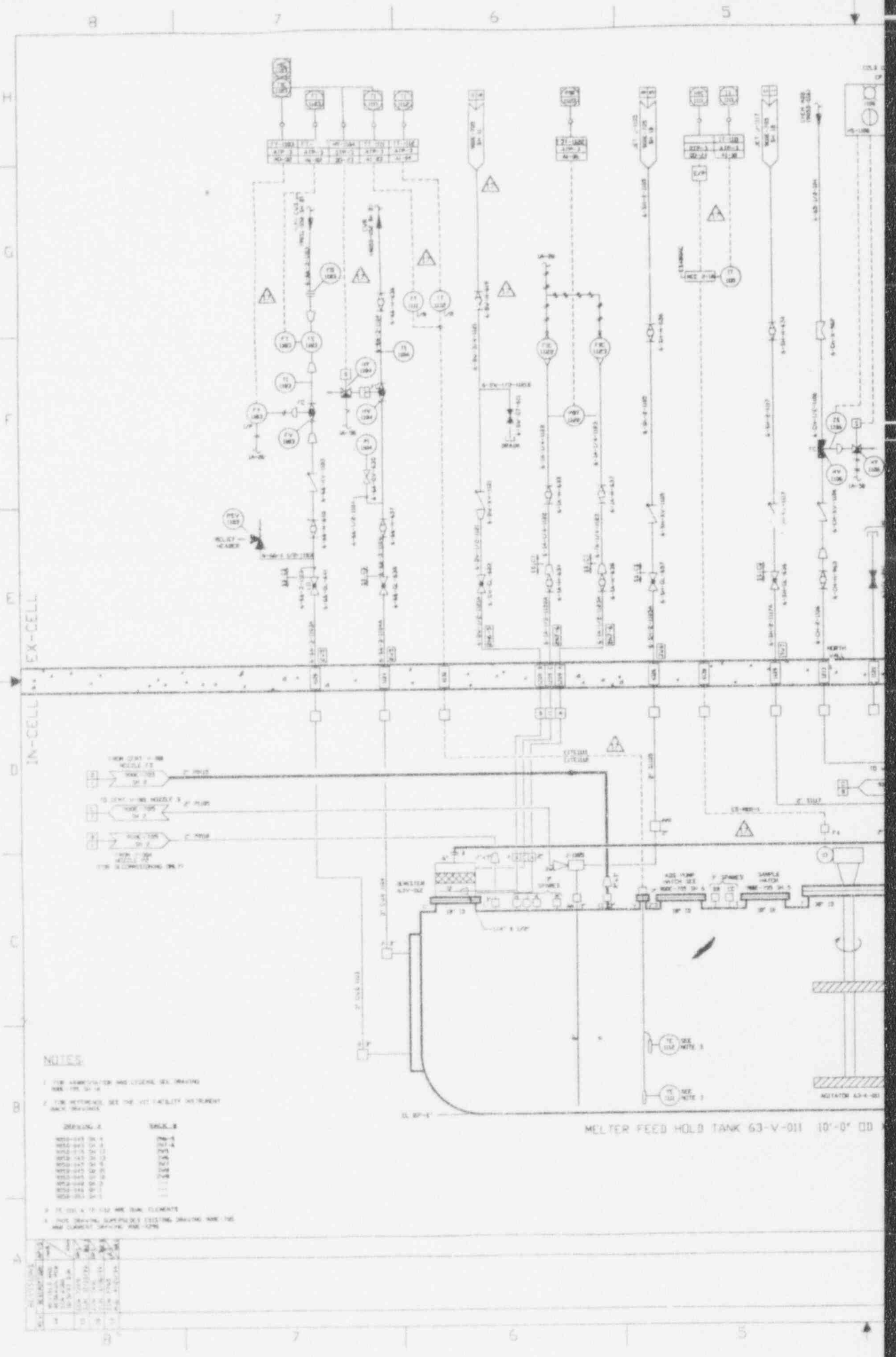
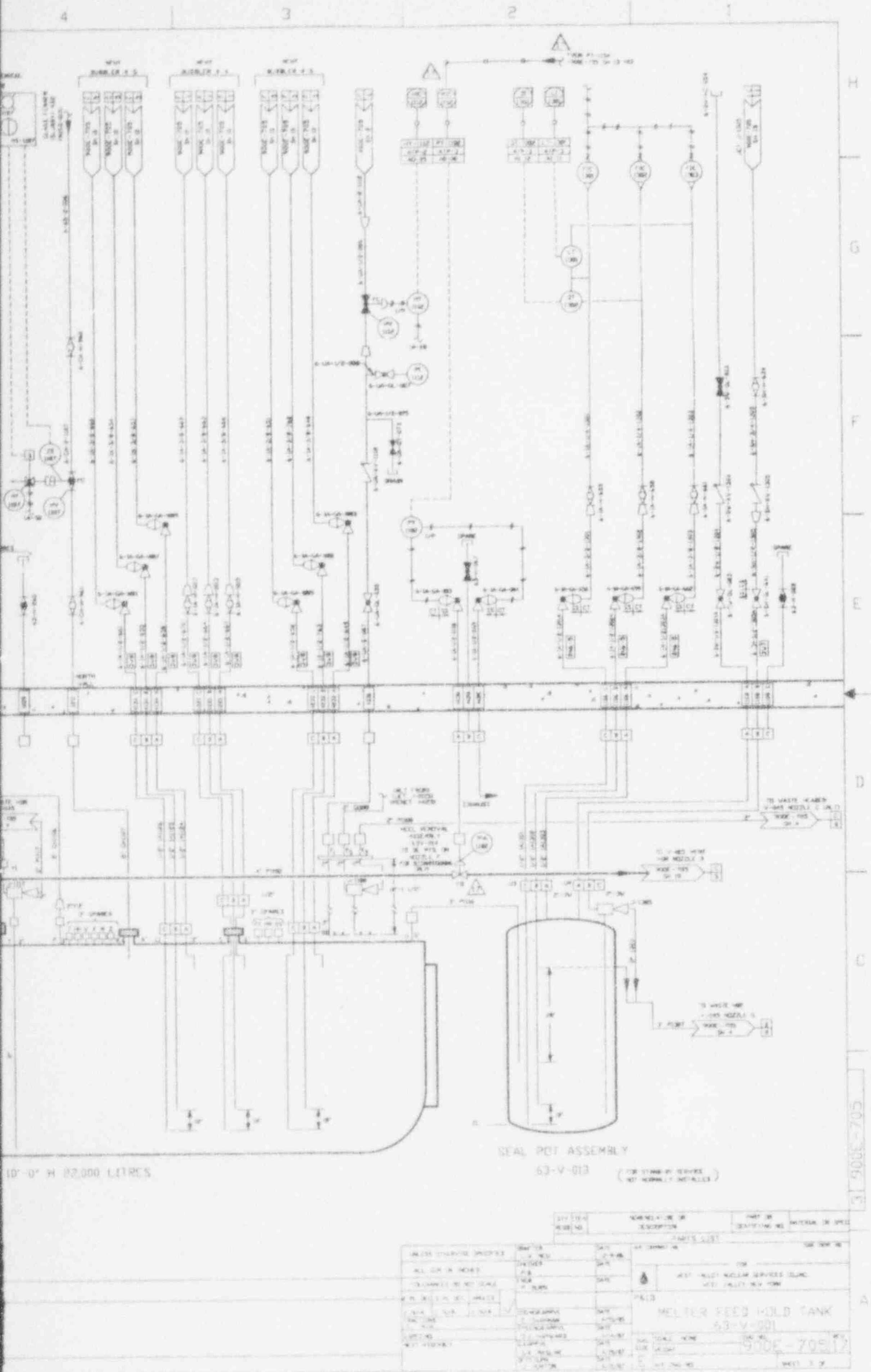
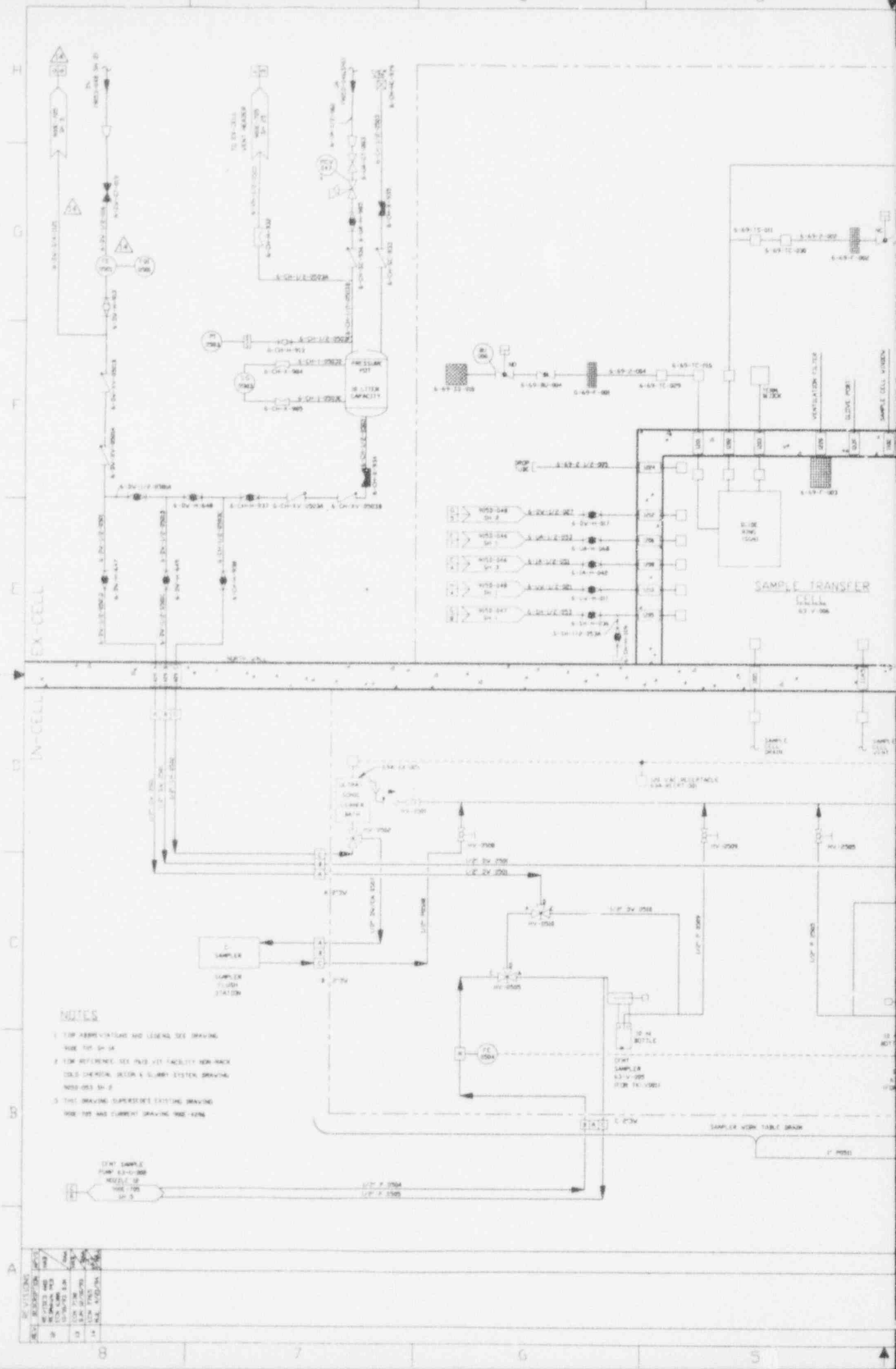
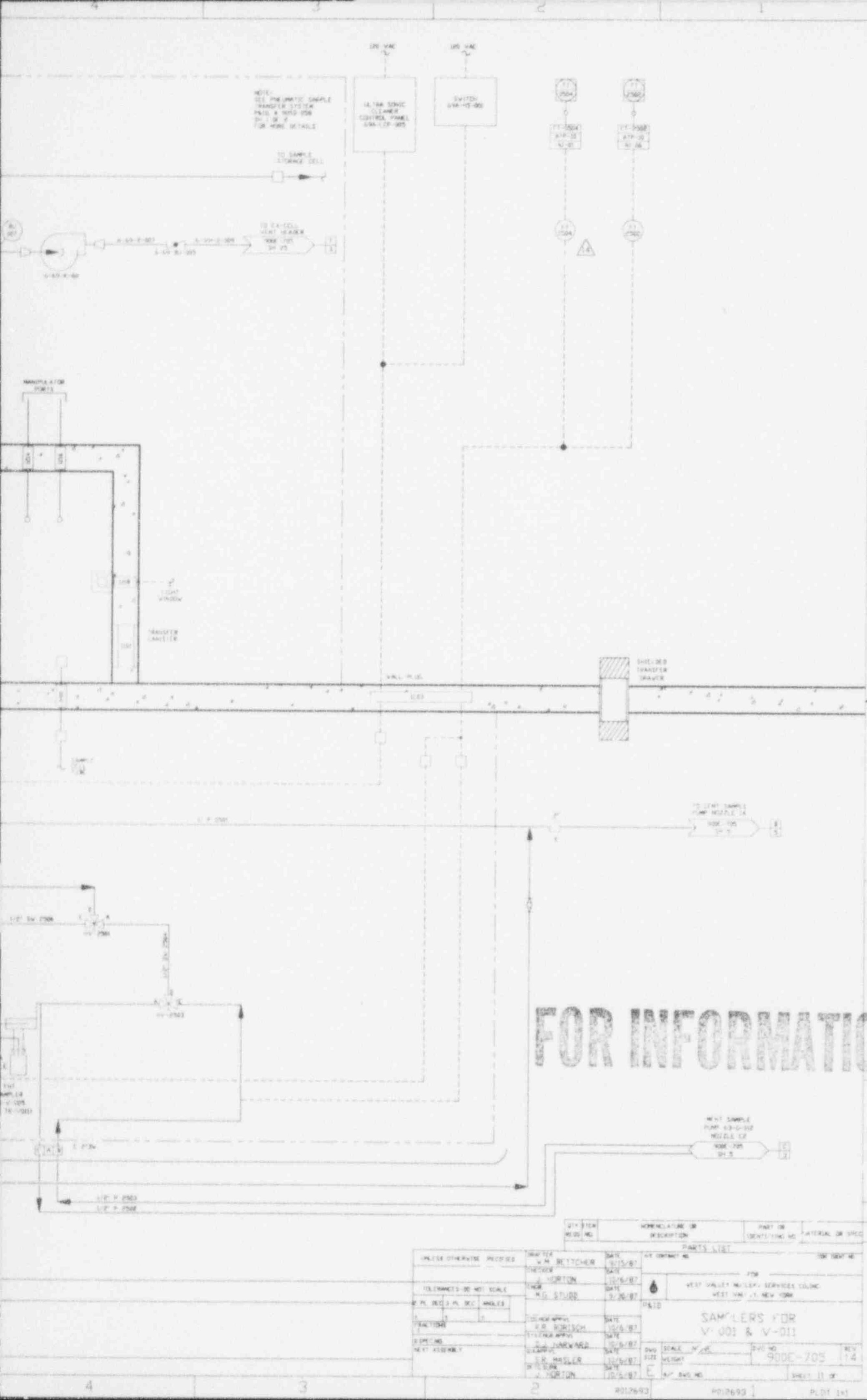

EX-CELL
IN-CELL
NOTES
MELTER FEED HOLD TANK 63-V-011 10'-0" OD



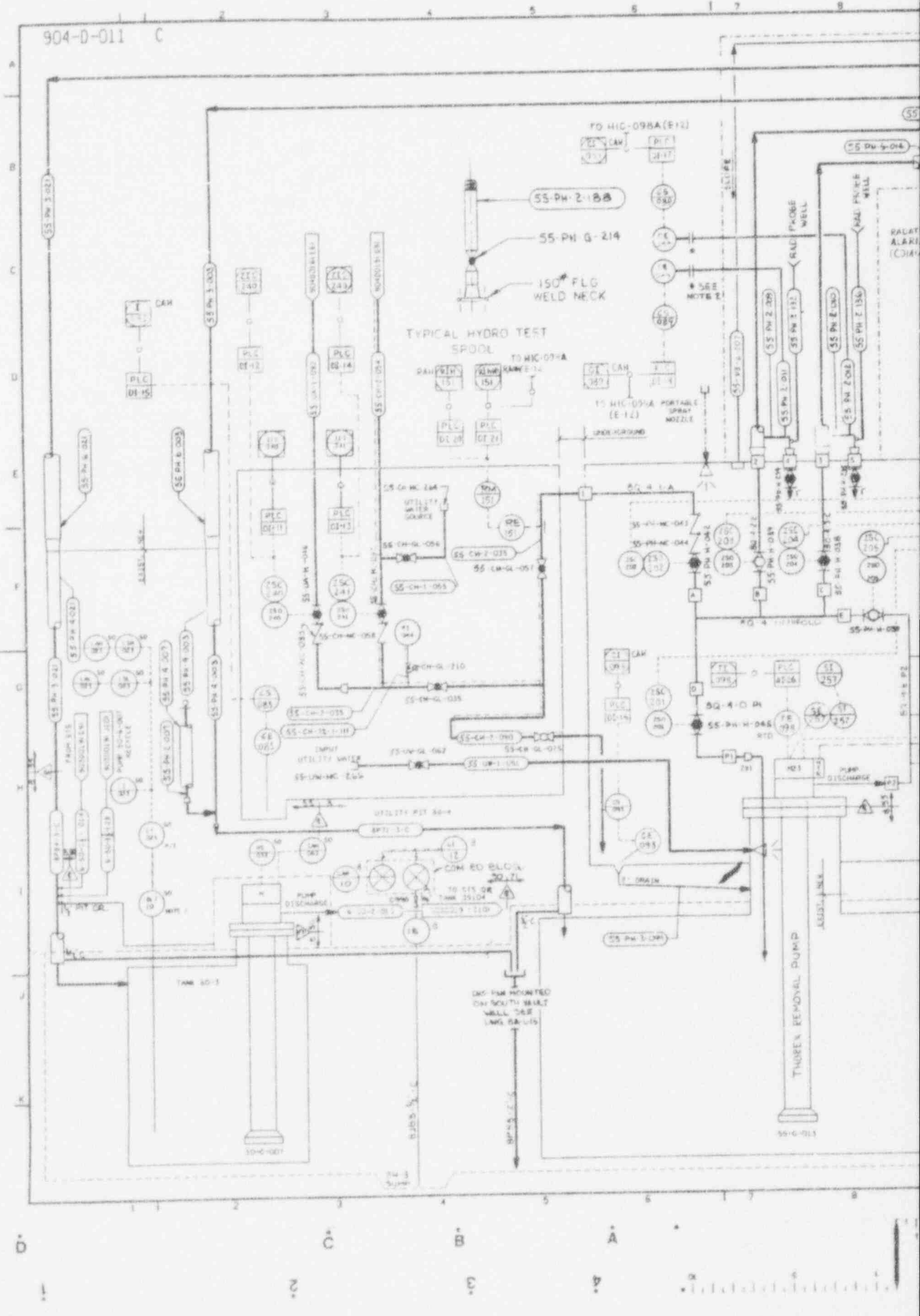
9406240136 -05



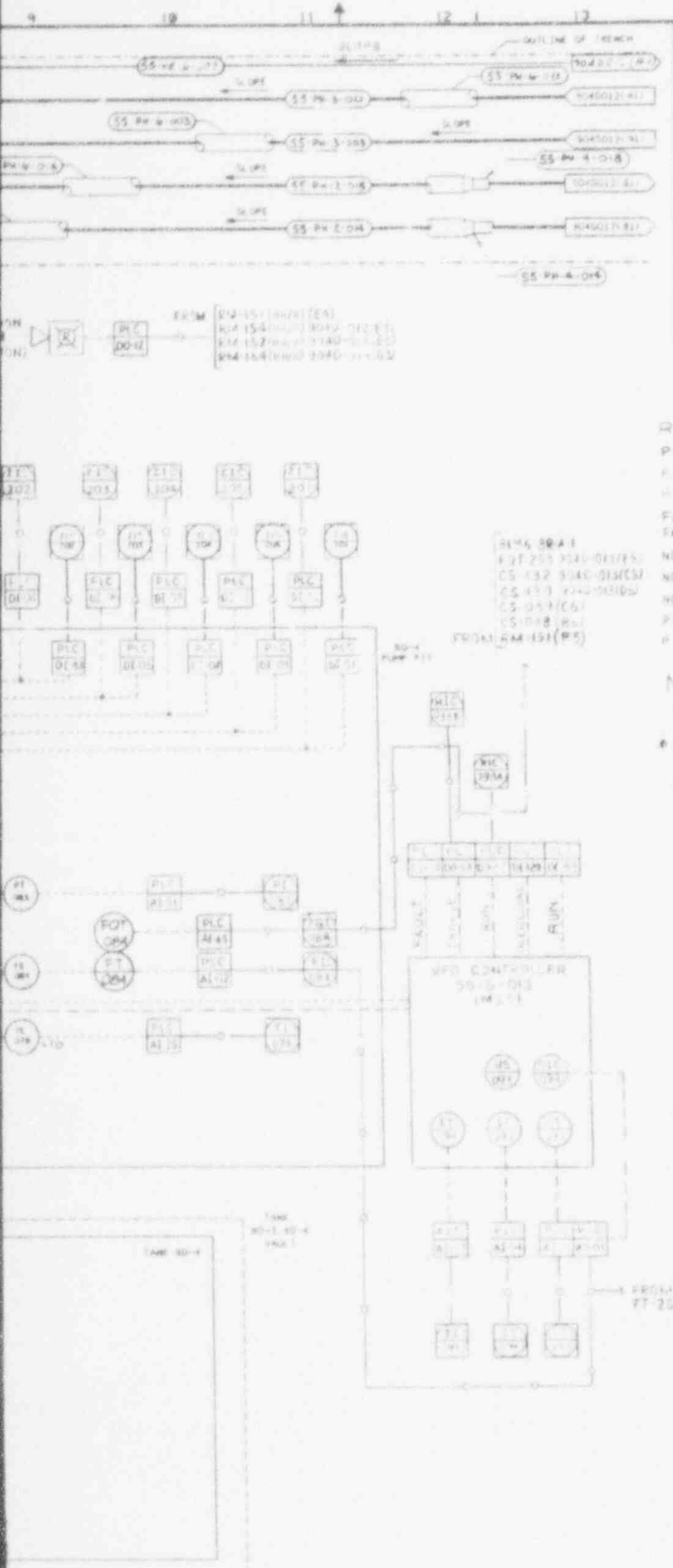
EX-CELL
IN-CELL
PRESSURE POT
SAMPLE TRANSFER CELL
VENTILATION FILTER
GLOVE PORT
SAMPLER
SAMPLER FLUSH STATION
NOTES



9406240136-06


904-D-011 C
TO HIC-098A(E12)
55-PH-2-188
55-PH-G-214
150# FLG
WELD NECK
TYPICAL HYDRO TEST
SPOOL
TO HIC-098A
PORTABLE SPRAY NOZZLE
UNDERGROUND
RAD PROBE WELL
8Q-4-1-A
8Q-4-D P1
INPUT UTILITY WATER
UTILITY PIT 8Q-4
COM ED BLDG.
TANK 8D-3
PUMP DISCHARGE
THOREX REMOVAL PUMP
D
C
B
A

904-D-011



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		GENERAL REVISION					
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1	4-3-90	REV PER ECN 3510					
2	10-22-90	REV/ECN					
3	12-6-91	GEN. REV PER ECN 4639	GW				
4	7-6-92	REV PER ECN					
5	7-21-92	REV PER ECN 5229	JM				
6	8-3-92	REV/ECN					
7	10-21-92	REV PER ECN 5588	GW				
8		PER ECN 5665	PD				
9		GEN REV/ECN 75	PD				

REF DWGS

P&ID SMS 8D-1 PIT	904D-010
P&ID SMS CHSM UTILITY WTR & SEAL WTR SYS	904D-015
P&ID SMS UTILITY AIR SYSTEM	904D-014
FLOW PROCESS & INST DIAGRAM WASTE TANK FARM VENT FOR HYDRO PLANT	8R-A-1
NOTES, SYMBOLS & LEGEND	900-D-1306
NOTES, SYMBOLS & LEGEND	900-D-1307
NOTES, SYMBOLS & LEGEND	900-D-1308
PIPING & INST. DIAG. CON ED WASTE	8R-A-4
P & ID STS FINAL FILTRATION & STORAGE	903-D-019

NOTES:

1. FOR EXISTING TANK EQUIPMENT SEE DWG. 8R-A-4 P & ID DIAGRAM (CON ED WASTE STORAGE).
2. USE LEAK DETECTION LINE FOR HYDRO TESTING, SEE TYPICAL HYDRO TEST SPOOL.
3. THE SYSTEM DESIGNATION FOR THE SMS IS SS. ALL INSTRUMENT LOOP NUMBERS ARE PRECEDED BY A SS- UNLESS OTHERWISE NOTED.
4. ELECTRICAL HEAT TRACE
5. SOFTWARE OR DATA LINK SIGNAL

WVNS APPROVAL

COG. MGR
COG. ENGR
DRFT SUPR
Q.A. MGR
R & S MGR
PROJ MGR

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED

A/E O.F.S. NO. 2388 TASK ORDER 015

FOR

WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

P & ID
SLUDGE MOBILIZATION SYSTEM
8D-4 PIT

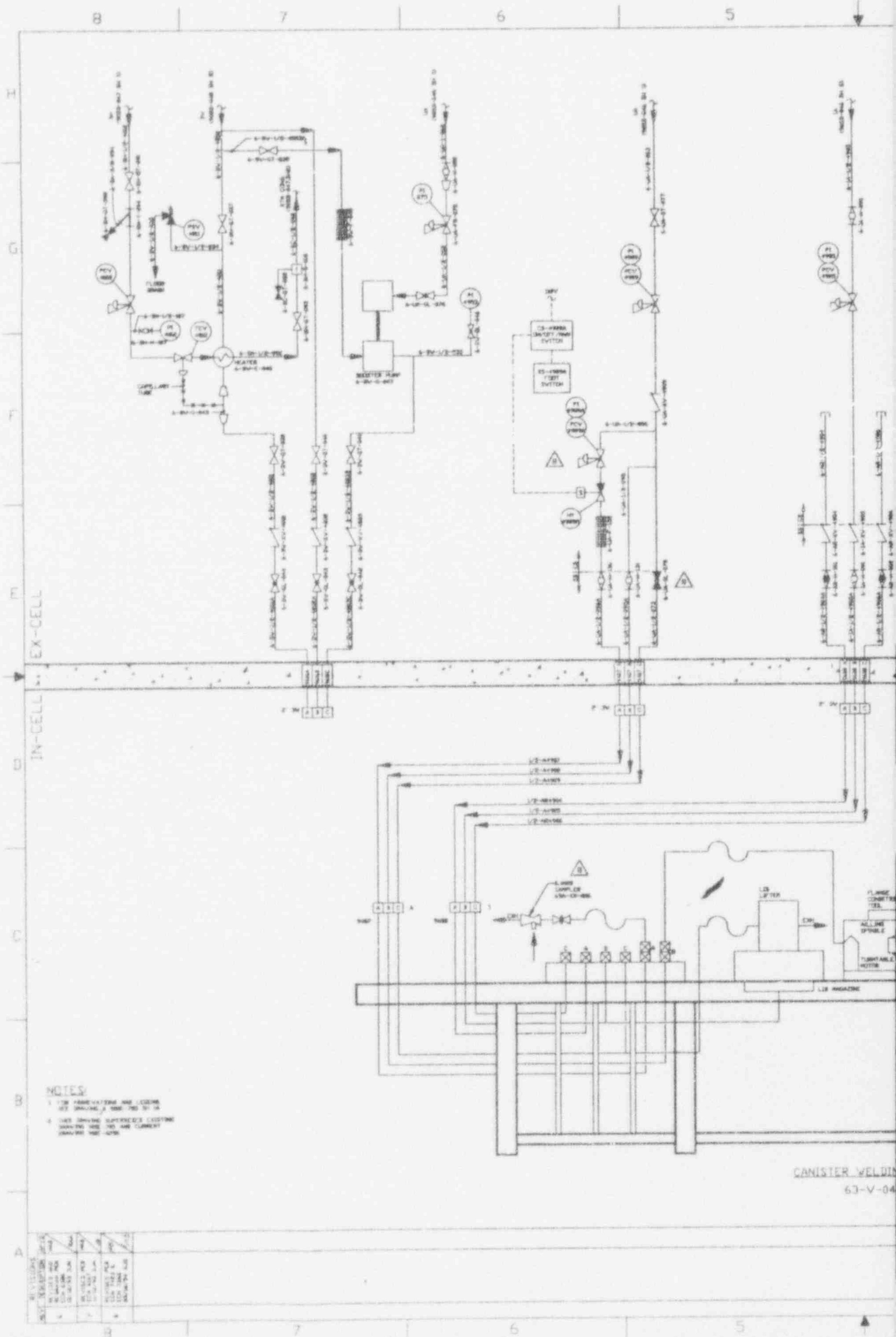
SIZE D
DRAWING NO. 904D-011
REV. 9

13-CWN-02275
SUBCONTRACT NO.

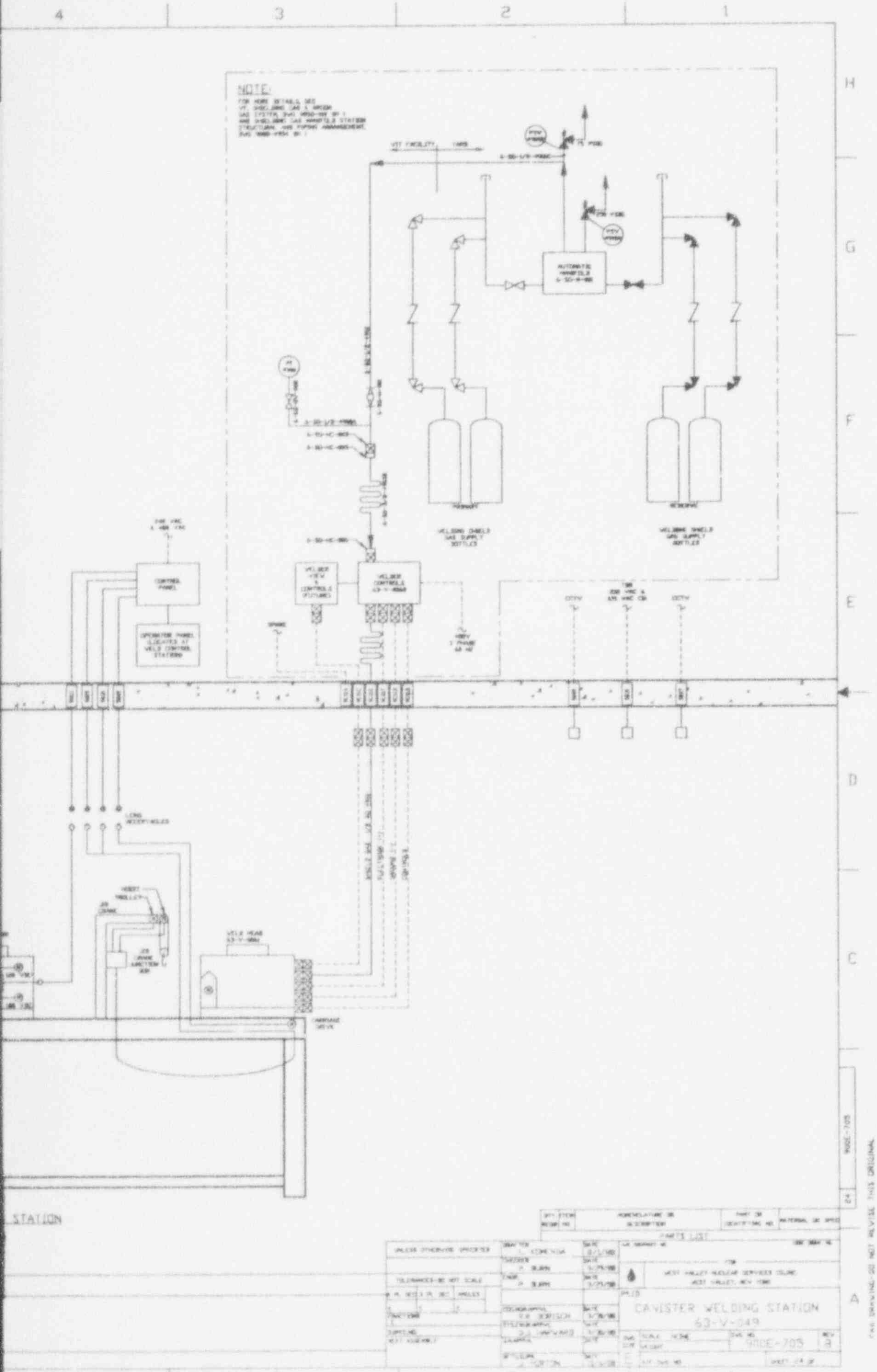
ISSUED FOR CONSTRUCTION

904-D-011

9406240136-07



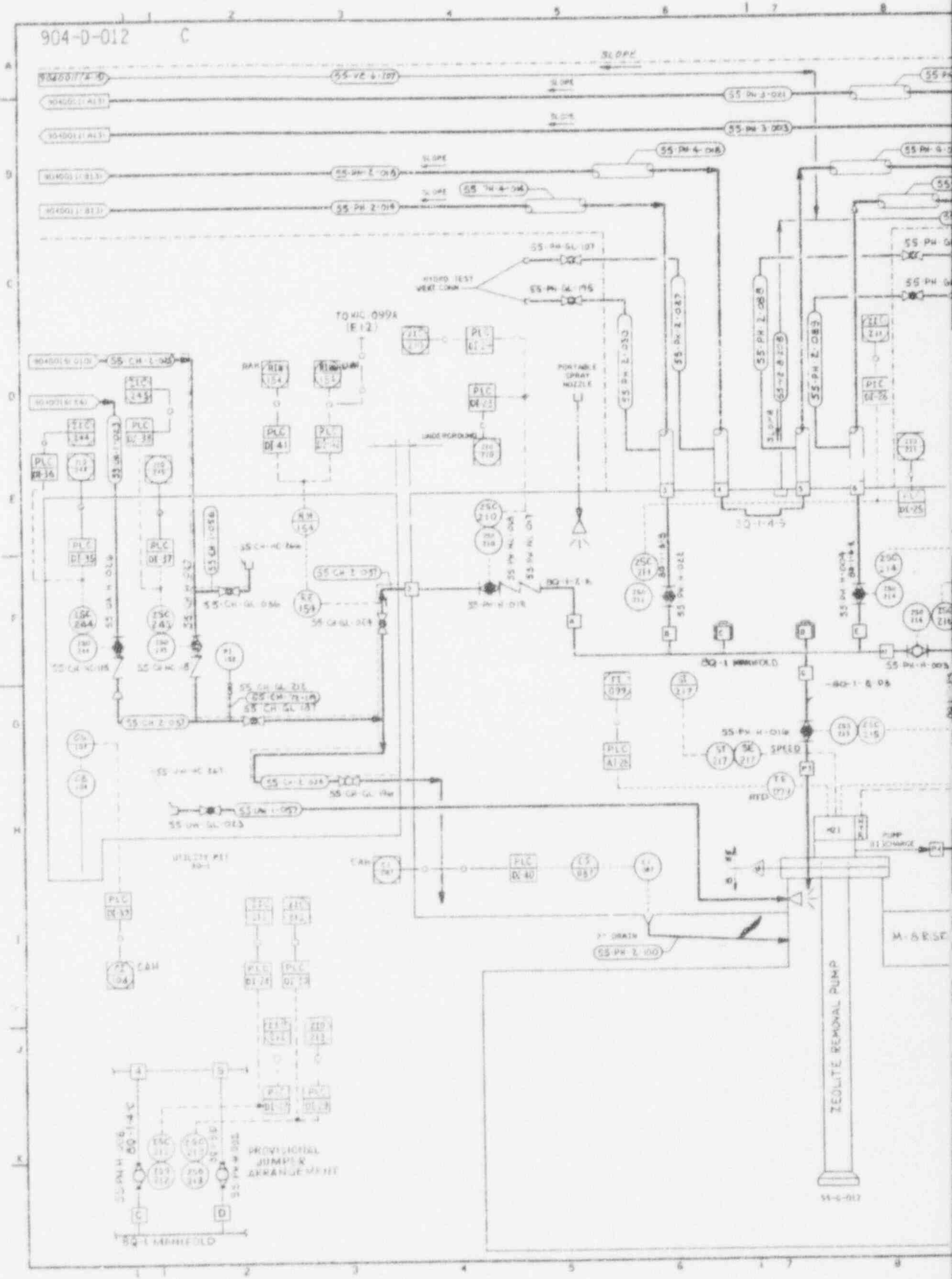
EX-CELL
IN-CELL
HEATER
BOOSTER PUMP
CAPILLARY TUBE
NOTES:
CANISTER WELDIN
63-V-04



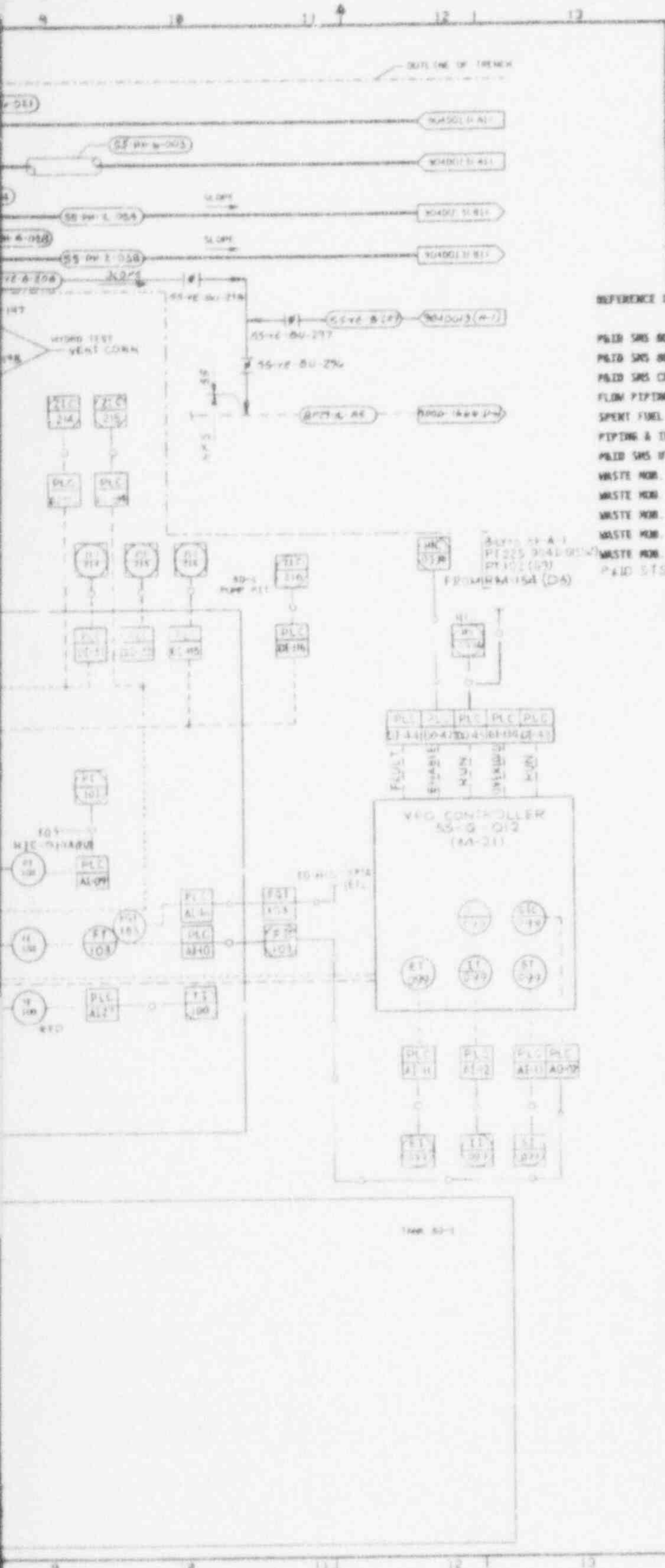
ANSTEC
APERTURE
CARD

Also Available on
Aperture Card

9406240136-08


904-D-012
C
SLOPE
HYDRO TEST VENT CONN
PORTABLE SPRAY NOZZLE
UNDERGROUND
SPEED
UTILITY PIT
2" DRAIN
ZEOLITE REMOVAL PUMP
PROVISIONAL JUMPER ARRANGEMENT
BQ-1 MANIFOLD

904-D-012



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		GENERAL REVISION					
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8	12-2-93	REV PER ECN 7099	PD				
9	4-14-94	GEN REV/ECN 7696	PD				
4	7-21-92	REV PER ECN 5229	JH				
5	8-18-92	REV/ECN 5234					
6	10-21-92	REV PER ECN 5589	CW				

REFERENCE DRAWINGS:

P&ID SMS 8D-4 PIT	904D-011
P&ID SMS 8D-2 PIT	904D-013
P&ID SMS CNDR. D.W. & SEAL WTR. SYS.	904D-015
FLOW PIPING & INST. DIAG. WASTE TANK FARM	
SPENT FUEL REPROCESSING PLANT	8B-A-1
PIPING & INST. DIA. CON. ED. WASTE	8B-A-4
P&ID SMS UTILITY AIR SYSTEM	904D-016
WASTE MOB. PUMP PROCESS & INSTR. DIA. 8D-1-M5	900D-2318, SH 1
WASTE MOB. PUMP PROCESS & INSTR. DIA. 8D-1-M4	900D-2318, SH 2
WASTE MOB. PUMP PROCESS & INSTR. DIA. 8D-1-M3	900D-2318, SH 3
WASTE MOB. PUMP PROCESS & INSTR. DIA. 8D-1-M2	900D-2318, SH 4
WASTE MOB. PUMP PROCESS & INSTR. DIA. 8D-1-M1	900D-2318, SH 5
P&ID STS PERMANENT VENTILATION SYSTEM	900D-1666

NOTES:

1. FOR NOTES SEE DWG. 904D-011
2. FOR EXISTING TANK 8D-1 EQUIPMENT SEE DWG. 8B-A-1 P&ID
3. —o—o— SOFTWARE OR DATA LINK SIGNAL
4. BLANK CONNECTOR

WVNS APPROVAL

COG. MGR. ____
COG. ENGR. ____
DRFT SUPR. ____
Q.A. MGR. ____
R&S MGR. ____
PROJ. MGR. ____

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED

FOR

WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

P & ID
SLUDGE MOBILIZATION SYSTEM
8D-1 PIT

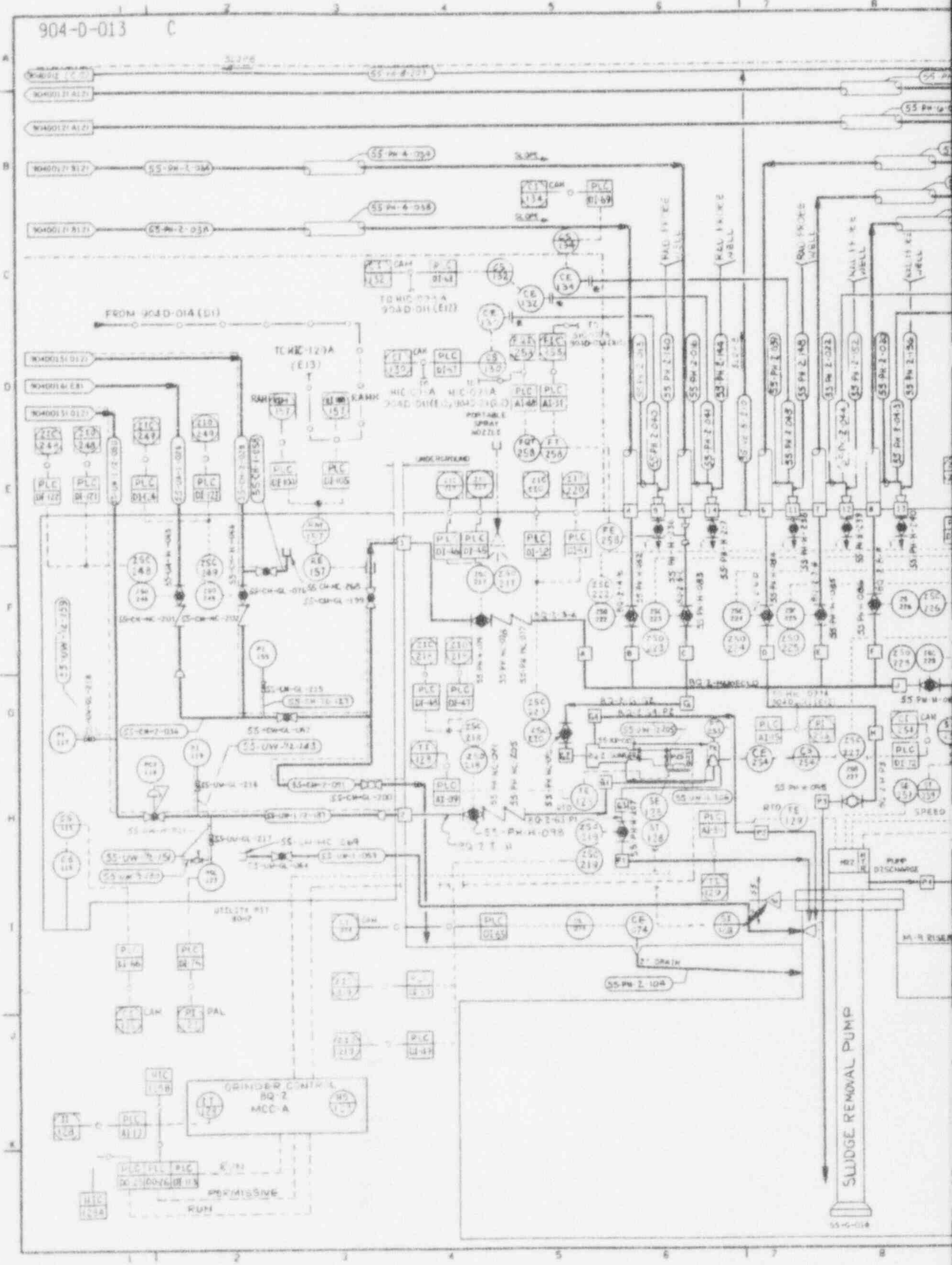
DRAWING NO. 904D-012 REV. 9

ISSUED FOR CONSTRUCTION

ANSTEC APERTURE CARD

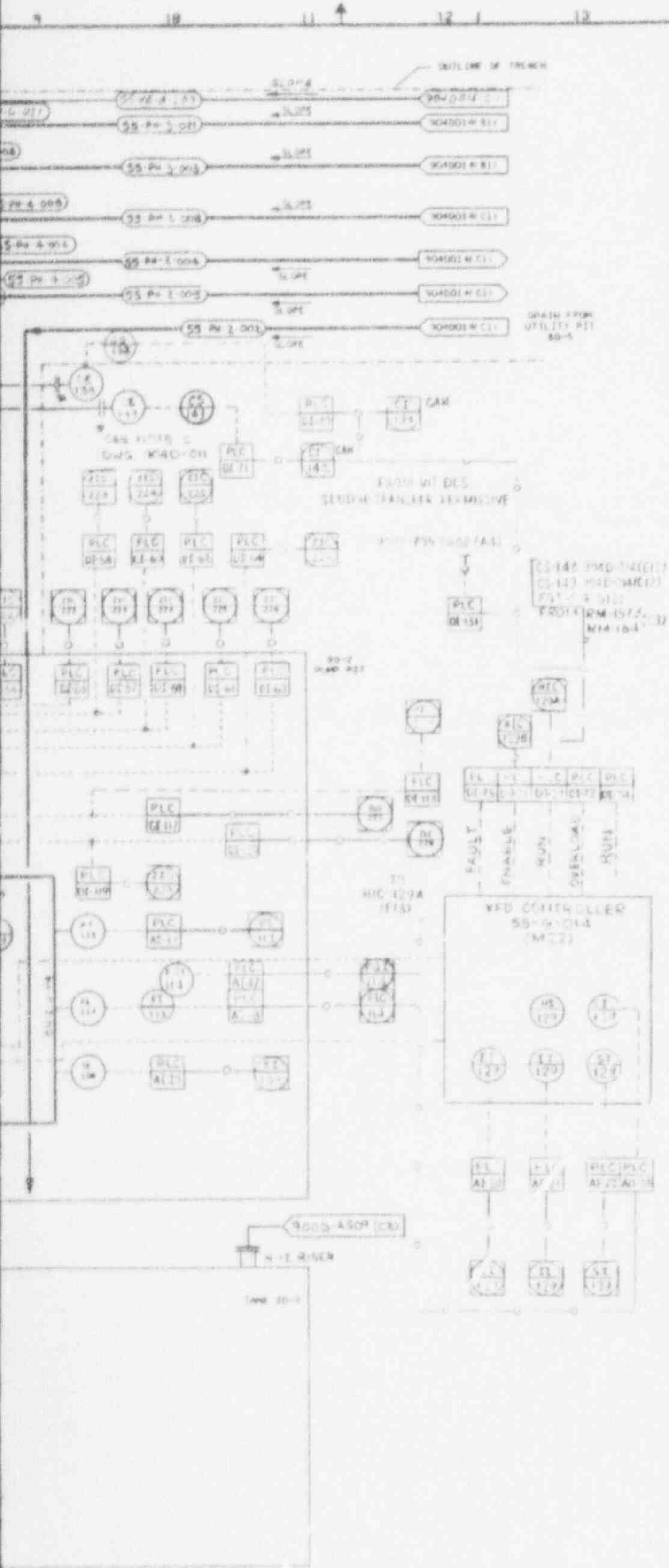
Also Available on Aperture Card

9406240136-09



904-D-013 C
FROM 904D-014 (D1)
UNDERGROUND
PORTABLE SPRAY NOZZLE
GRINDER CONTROL
BQ-Z
MCC-A
PERMISSIVE
RUN
SPEED
PUMP DISCHARGE
SLUDGE REMOVAL PUMP

904-D-013



NO.	DATE	REVISION	DR	CH	APPROVED
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	2-21-90	GENERAL REVISION			
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1		GEN REV PER ECN 3570	CGR		
2	12-9-91	GEN REV PER ECN 4639	CW	HAB	
3	7-6-92	REV PER ECN 5215		HB	
4	7-21-92	REV PER ECN 5229	JH	HB	
5	8-5-92	REV/ECN 5234			
6	10-21-92	REV PER ECN 5508	CW		
7		REV PER ECN	CW		
8	12-15-92	GEN REV/ECN 56	PD		
9	8-3-93	REV PER ECN 6605	CW		
10	2-18-94	REV/ECN 7450			
11	4-15-94	GEN REV/ECN 7696	PD		

NOTES:

1. FOR NOTES SEE DWG 904D-011
2. SOFTWARE DATA LINK

REF DWGS

P&ID SMS 8D-1 PIT 904D-012
P&ID SMS 8D-3 PIT 904D-014
P&ID SMS CHEM, UTILITY WTR & SEAL WTR SYS 904D-015
P&ID SMS UTILITY AIR SYSTEM 904D-016
WASTE MOB PUMP PROCESS & INSTR DWG 8D-2-M6 904D-238 SH 6
WASTE MOB PUMP PROCESS & INSTR DWG 8D-2-M5 904D-238 SH 7
WASTE MOB PUMP PROCESS & INSTR DWG 8D-2-M3 904D-238 SH 8
WASTE MOB PUMP PROCESS & INSTR DWG 8D-2-M2 904D-238 SH 9
WASTE MOB PUMP PROCESS & INSTR DWG 8D-2-M1 904D-238 SH 10

WVNS APPROVAL

COG. MGR.
COG. ENGR.
DRFT SUPR.
Q.A. MGR.
R & S MGR.
PROJ. MGR.

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED

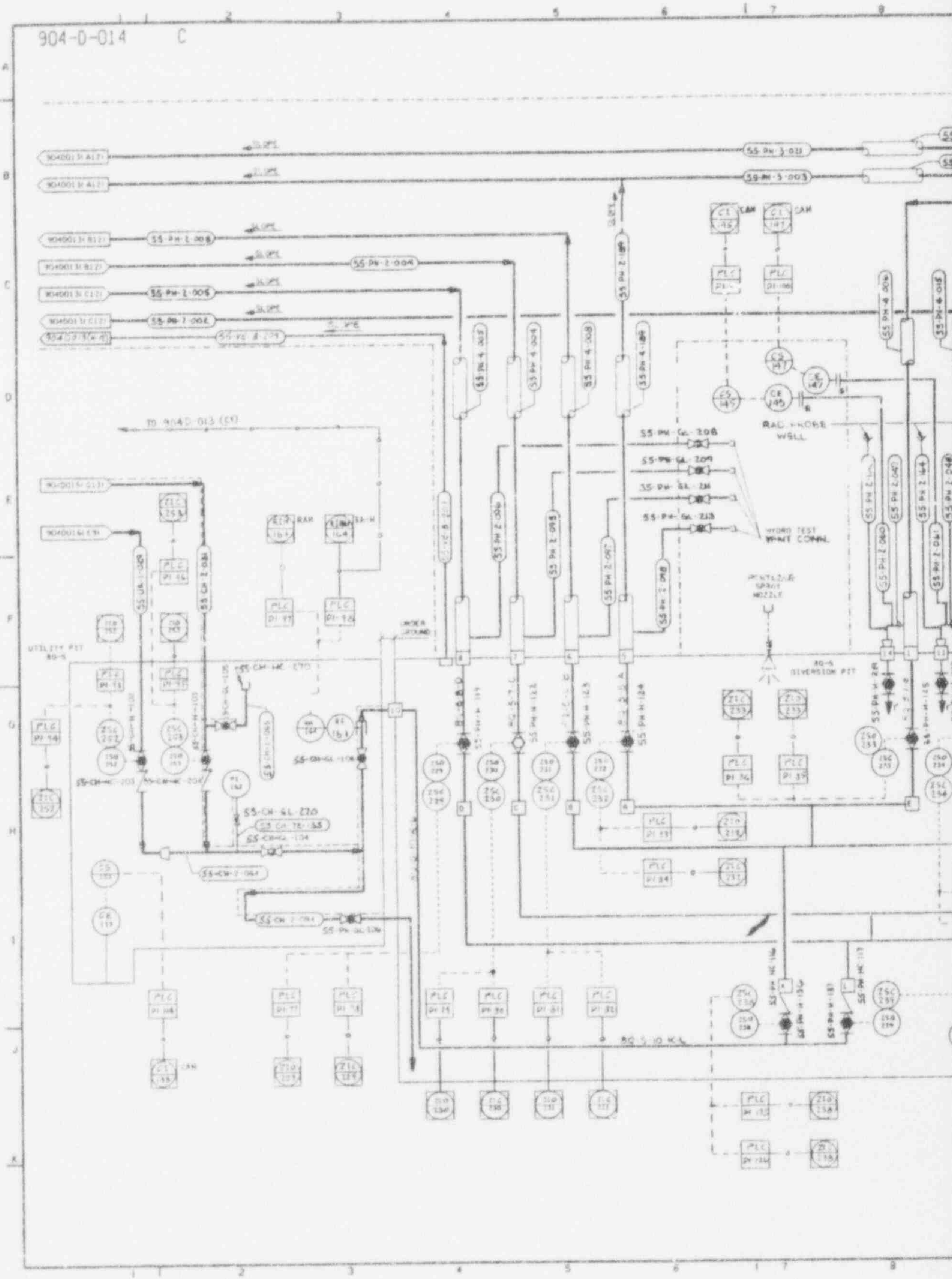
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

P & ID
SLUDGE MOBILIZATION SYSTEM
8D-2 PIT

SIZE D — DRAWING NO. 904D-013 — REV. 11

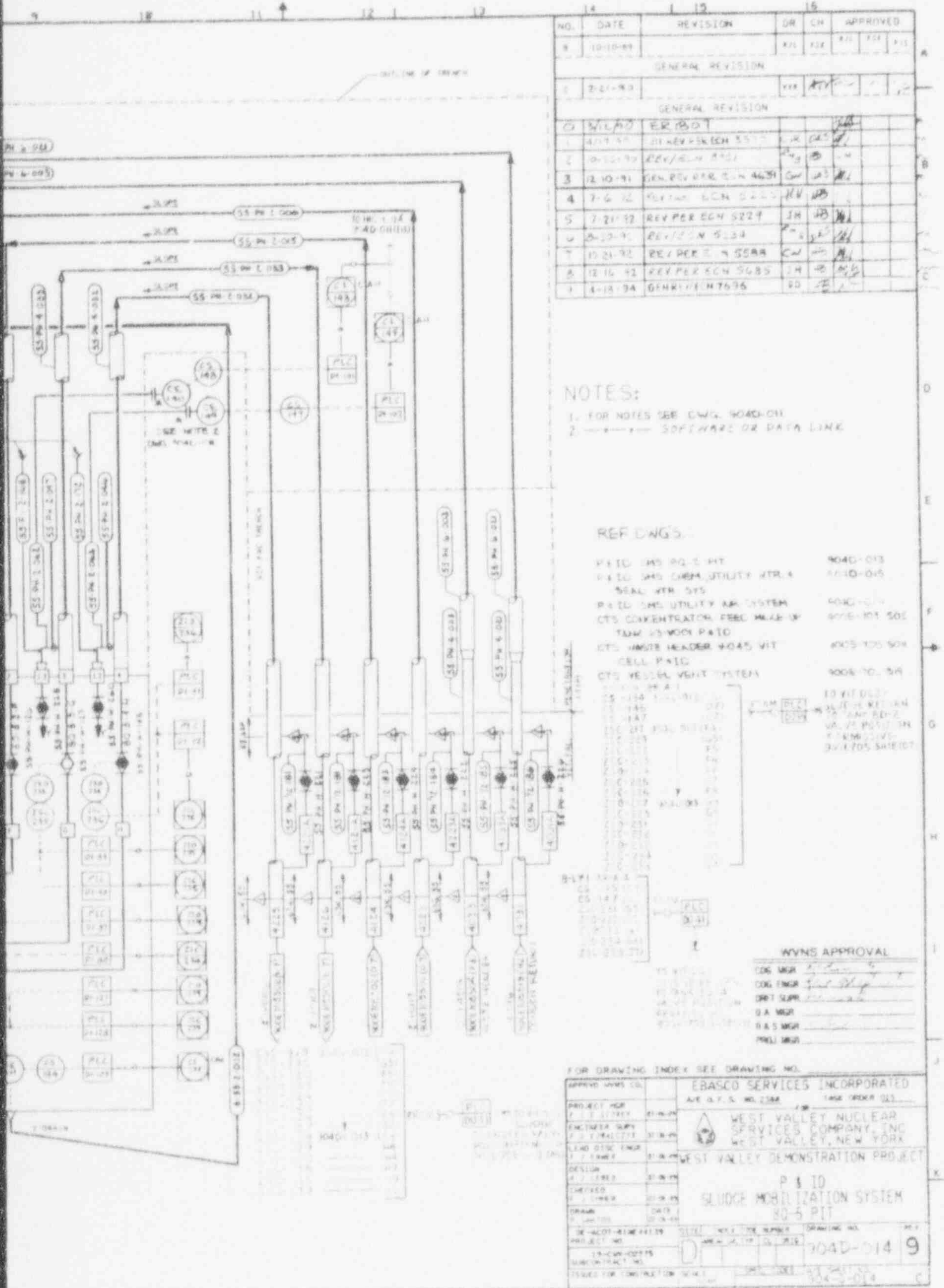
9406240136 -10


904-D-014
C
SLOPE
SS-PH-3-003
SS-PH-2-008
SS-PH-2-009
SS-PH-2-005
TO 904D-013 (E9)
RAD. PROBE WELL
HYDRO TEST VENT CONN.
UTILITY PIT BO-5
BO-5 DIVERSION PIT
UNDER GROUND

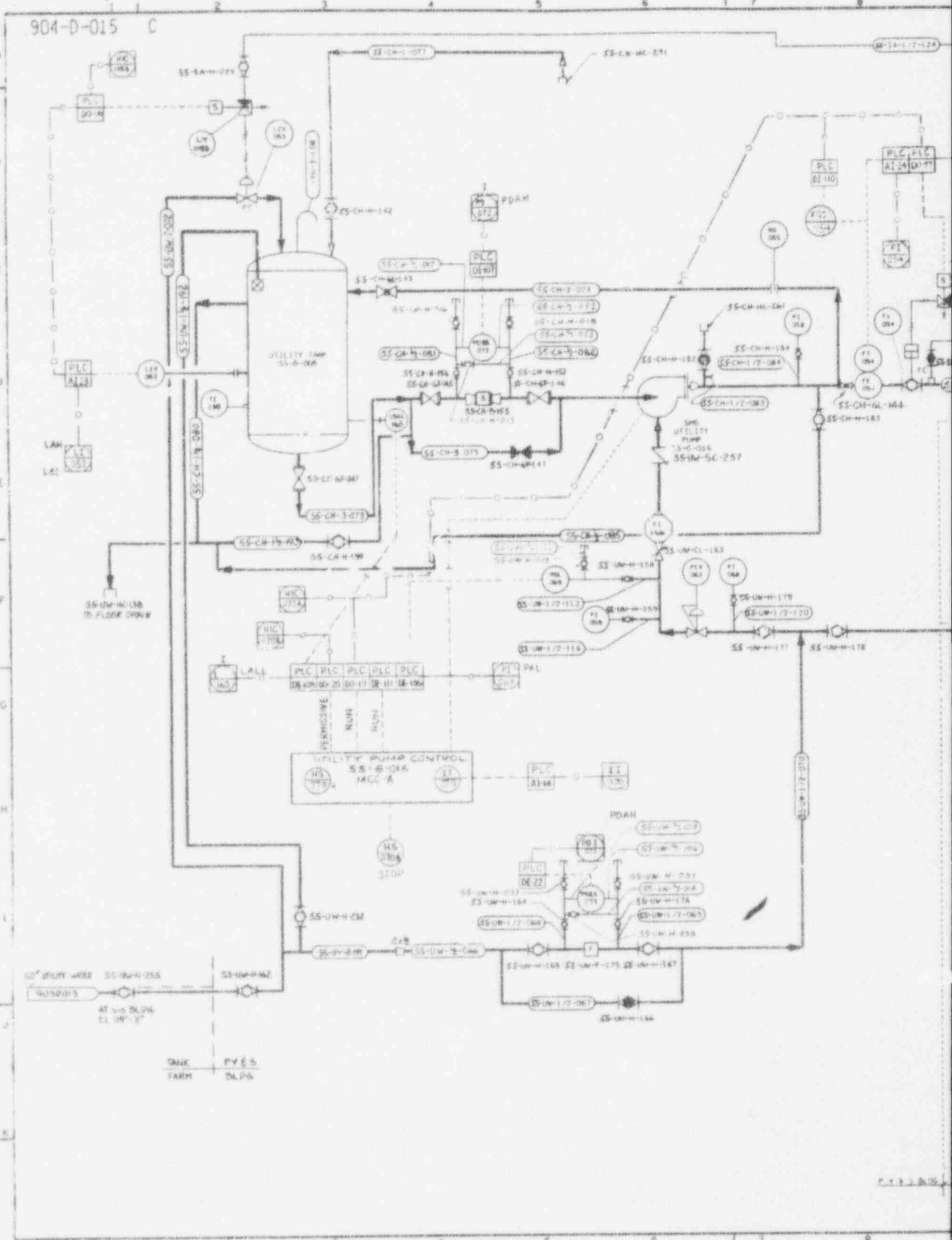
D C B A

1 2 3 4

904-D-014

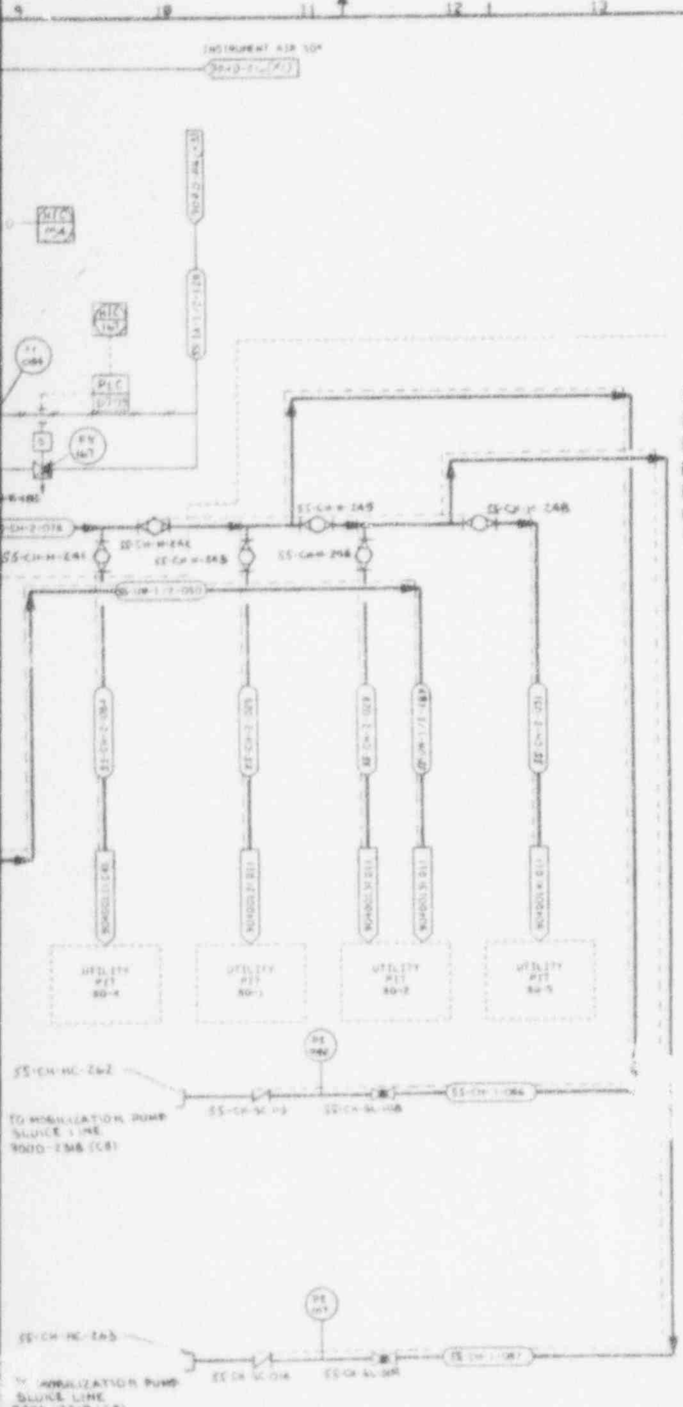


9406240136 - 11



904-D-015 C
UTILITY PUMP CONTROL
MCC-A
PDAH
PERMISSIVE
RUN
RUN
STOP
LALL
PAL
TANK
FARM
PYES
BLDG

904-D-015



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0	3/12/90	EZ 1807			KB		
9	2-21-94	REV/ECN 7430			PA		
10	3-4-94	REV PER ECN 7543					
11	4-18-94	GEN REV PER ECN 7696	PD				
4	7-7-92	REV PER ECN 5225					
5	9-29-92	REV PER ECN 5523					
6	11-6-92	REV/ECN 5627					
7	12-15-92	GEN REV ECN 5688	PD				
8	12-2-92	REV/ECN 7099	PD				

REFERENCE DRAWINGS:

P&ID SMS 8D-4-PIT	904D-011
P&ID SMS 8D-1-PIT	904D-012
P&ID SMS 8D-2-PIT	904D-013
P&ID SMS 8D-5-PIT	904D-014
P&ID SMS UTILITY AIR SYSTEM	904D-016
WASTE MOBILIZATION PUMP PROCESS & INSTRUMENT DIAGRAM	9000-2318

NOTES:

1. FOR NOTES SEE DWG 904D-011
2. —o—o— SOFTWARE OR DATA LINKS

WVNS APPROVAL

COG. MGR.
COG. ENGR.
DRFT SUPR.
Q.A. MGR.
R & S MGR.
PROJ. MGR.

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED

WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

P & ID

SLUDGE MOBILIZATION SYSTEM CHEMICAL, UTILITY WATER & SEAL WATER SYSTEMS

PROJECT MGR
ENGINEER SUPV
LEAD DISC ENGR
DESIGN
CHECKED
DRAWN

ISSUED FOR CONSTRUCTION

SIZE D

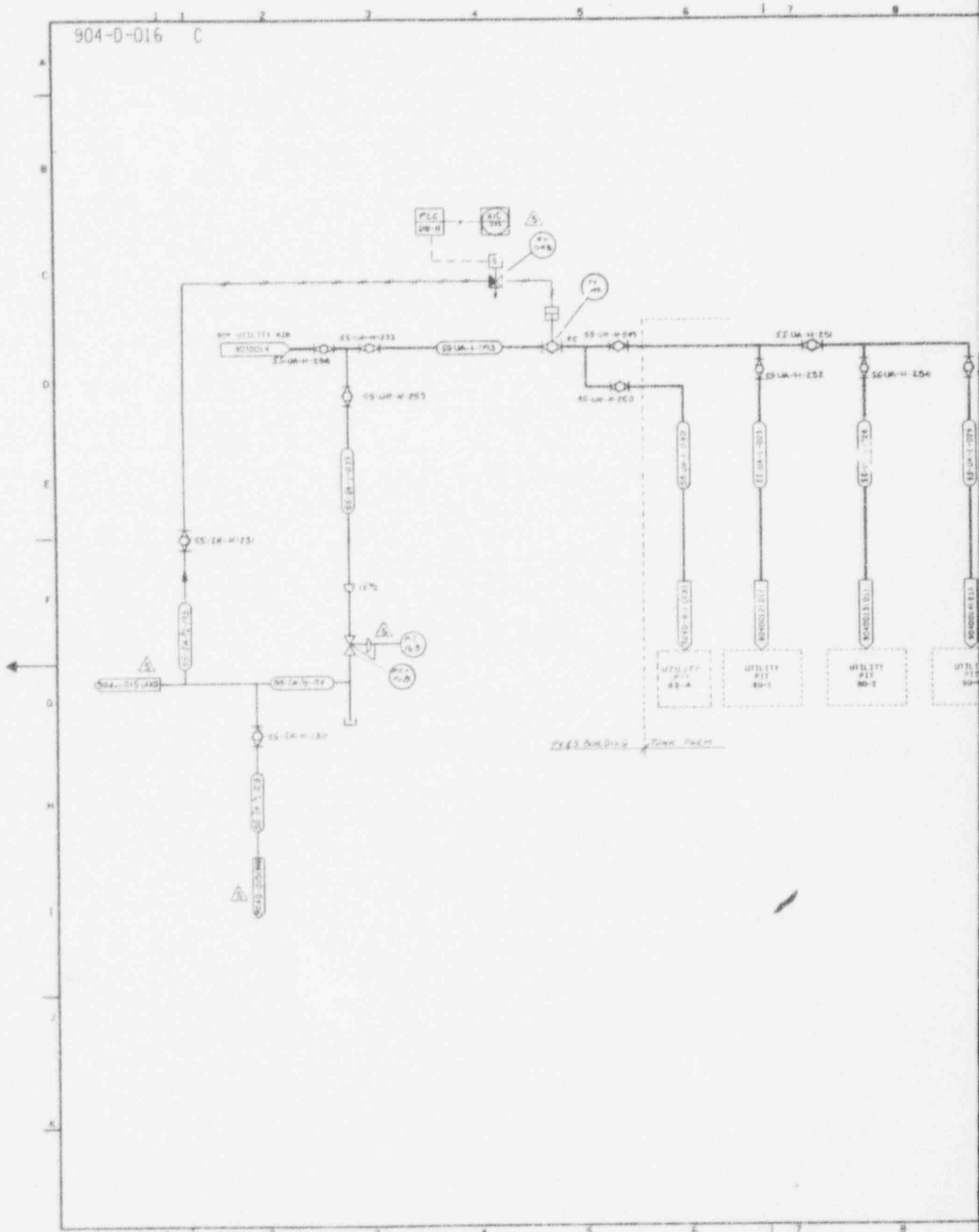
DRAWING NO. 904 D-015 REV. 11

A/E SHEET NO. 904-D-015

ANSTEC APERTURE CARD

Also Available on Aperture Card

9406240136 -12



904-D-016 C
SS-UA-H-251
SS-UA-H-252
UTILITY PIT
TANK FARM

904-D-016

NO.	DATE	REVISION	DR	CH	APPROVED		
~~B~~	~~[illegible]~~		~~A/L~~	~~FSR~~	~~A/L~~	~~FSE~~	~~F/G~~
~~GENERAL REVISION~~							
~~C~~	~~2-21-90~~		~~AKA~~	~~MY~~			
~~GENERAL REVISION~~							
0	3/12/90	ER1807					
1	6/19/90	GEN REV PER ECN 3570	CQR				
2	12-10-91	GEN. REV PER ECN 4639	CW				
3	10-29-92	GEN REV/ECN 5467					
4	12-14-92	REV PER ECN 5685	JH				
5	4-15-94	REV/ECN 7696	PD				

NOTES:
1. FOR NOTES SEE DRAWING 904D-011
2. —•—•— SOFTWARE OR DATA LINK

REF DWGS:

P&ID SMS 8Q-4 PIT	904D-011
P&ID SMS 8Q-1 PIT	904D-012
P&ID SMS 8Q-2 PIT	904D-013
P&ID SMS 8Q-5 PIT	904D-014

WVNS APPROVAL
COG MGR
COG ENGR
DRFT SUPR
Q.A MGR
R & S MGR
PROJ MGR

FOR DRAWING INDEX SEE DRAWING NO.

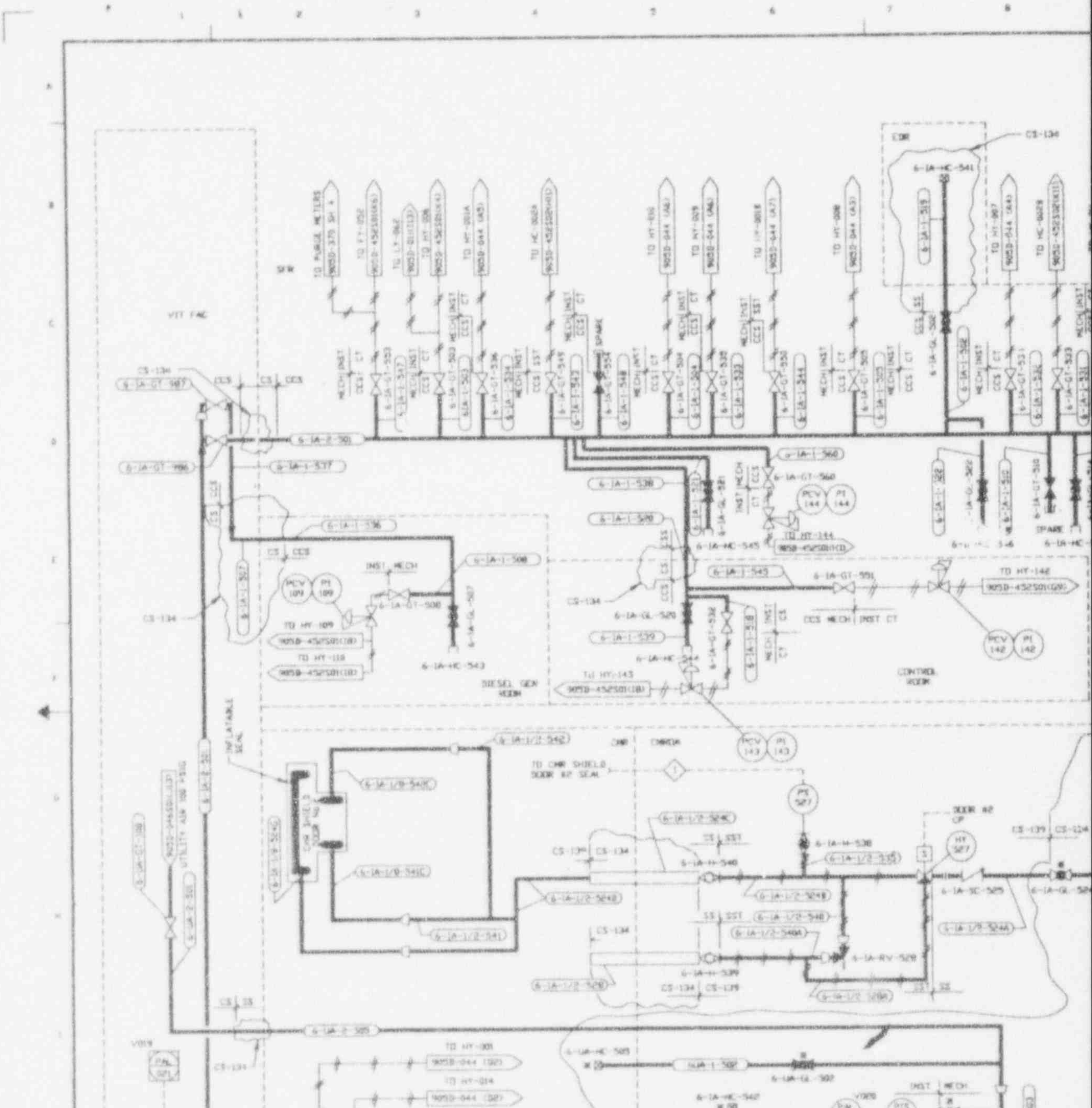
EBASCO SERVICES INCORPORATED
A/E O.F.S. NO. 2388 TASK ORDER 013
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

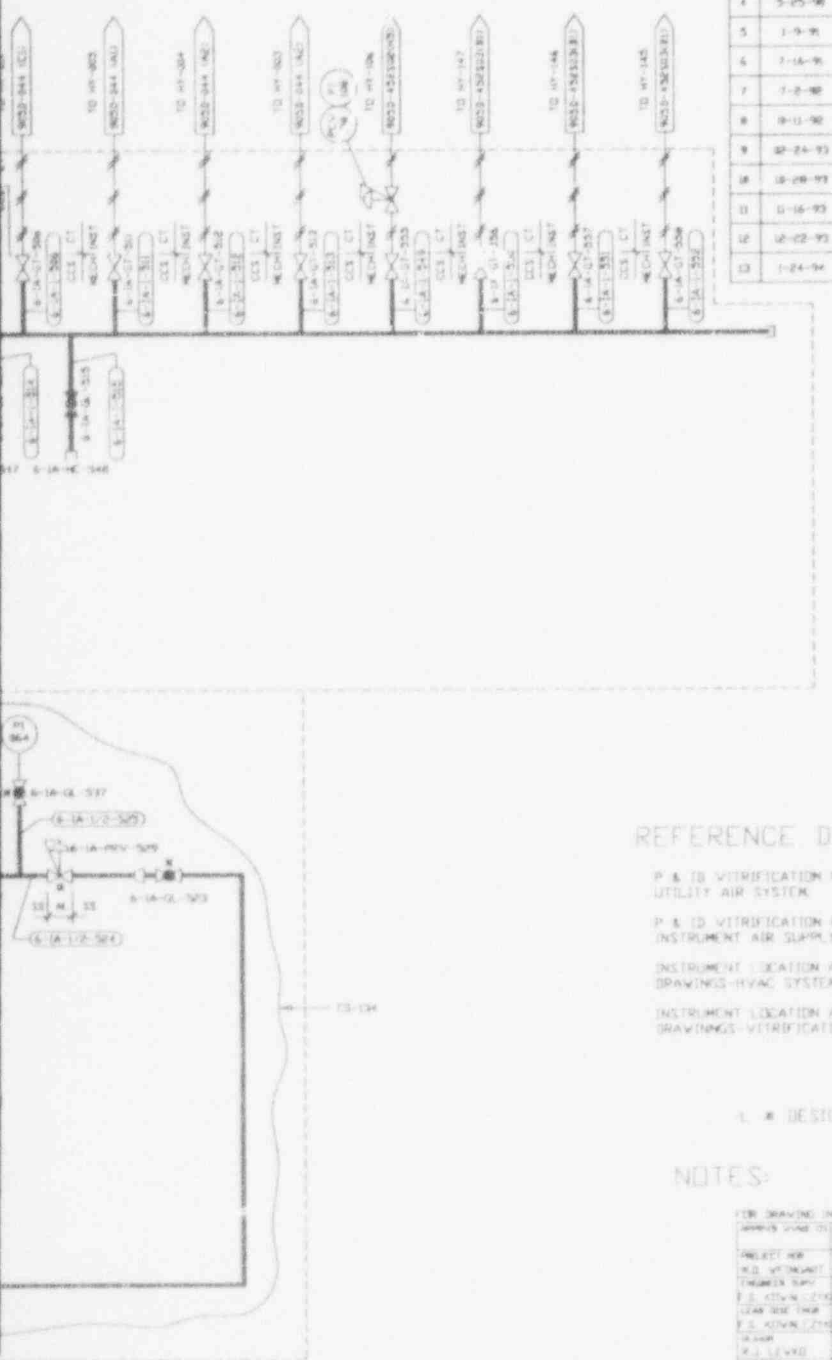
P & ID
SLUDGE MOBILIZATION SYSTEM
UTILITY AIR SYSTEM

SIZE: D
DRAWING NO. 904D-016
REV. 5
ISSUED FOR CONSTRUCTION
SCALE NONE
E SHEET NO. 904-D-016 C

9406240136 -13



VIT FAC
SFR
EDR
CS-134
TO PURGE METERS
DIESEL GEN ROOM
CONTROL ROOM
INFLATABLE SEAL
TO CHR SHIELD DOOR #2 SEAL
DOOR #2
SPARE
INSTRUMENT AIR
UTILITY AIR 100 PSIG
6-IA-2-501
6-IA-2-505
6-IA-1-516
6-IA-1-537
6-IA-1-536
6-IA-RV-529
PCV 109
PCV 142
PCV 143
PCV 144



NO.	DATE	REVISION	DR	CH	APPROVED
0	7-19-89	CR 1649			JRH
14	4-19-94	REV'D PER ECN 7798	KGZ	[illegible]	[illegible]
2	3-15-90	REV'D PER ECN 3383	PES	DRS	DJR
3	4-25-90	REV'D PER ECN 3585	PES	DRS	DJR
4	5-25-90	REV'D PER ECN 3669	CTC	DRS	DJR
5	1-9-91	REV'D PER ECN 4871	AVN	HAR	DJR
6	7-16-91	REV'D PER ECN 4398	AVN	HAR	DJR
7	7-2-92	REV'D PER ECN 4896	DAK	HAR	DJR
8	9-11-92	REV'D PER ECN 5205	WCK	HAR	DJR
9	02-24-93	REV'D PER ECN 5635	SRC	DRS	PAM
10	10-28-93	REV'D PER ECN 7017	KGZ	DRS	JRT
11	11-16-93	REV'D PER ECN 7082	HJL	DRS	JRT
12	12-22-93	REV'D PER ECN 7161	PAM	HAR	GGT
13	1-24-94	REV'D PER ECN 7444	LRK	DRS	DJR

REFERENCE DRAWINGS:

P & ID VITRIFICATION FACILITY UTILITY AIR SYSTEM	905-D-046 S01
P & ID VITRIFICATION FACILITY INSTRUMENT AIR SUPPLY	905-D-046 S03
INSTRUMENT LOCATION ARRANGMENT DRAWINGS-HVAC SYSTEM	905-D-370 SH. 1-7
INSTRUMENT LOCATION ARRANGEMENT DRAWINNGS-VITRIFICATION FACILITY	905-D-378 SH. 1-4

1. * DESIGNATES EXISTING COMPONENT

ECN(S) PENDING

7470

NOTES:

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED

A/E SYS. NO. C306 FOR TASK ORDER 323

WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

P & ID
VITRIFICATION FACILITY
INSTRUMENT & UTILITY AIR SYS

PROJECT MGR: M.D. WITMOHAMT 6/30/87
ENGINEER SUPV: F.S. KOWIN 6/30/87
LEAD DESE ENGR: F.S. KOWIN 6/30/87
DESIGNER: R.J. LEVKO 6/30/87
CHECKER: R.J. LEVKO 6/30/87
DRAWN: T.J. KITZ 6/30/87

DE-AC07-81NE44139
PROJECT NO. 19-CWY-52875

SIZE: D | DRAWING NO. 9050-029 | REV. 14

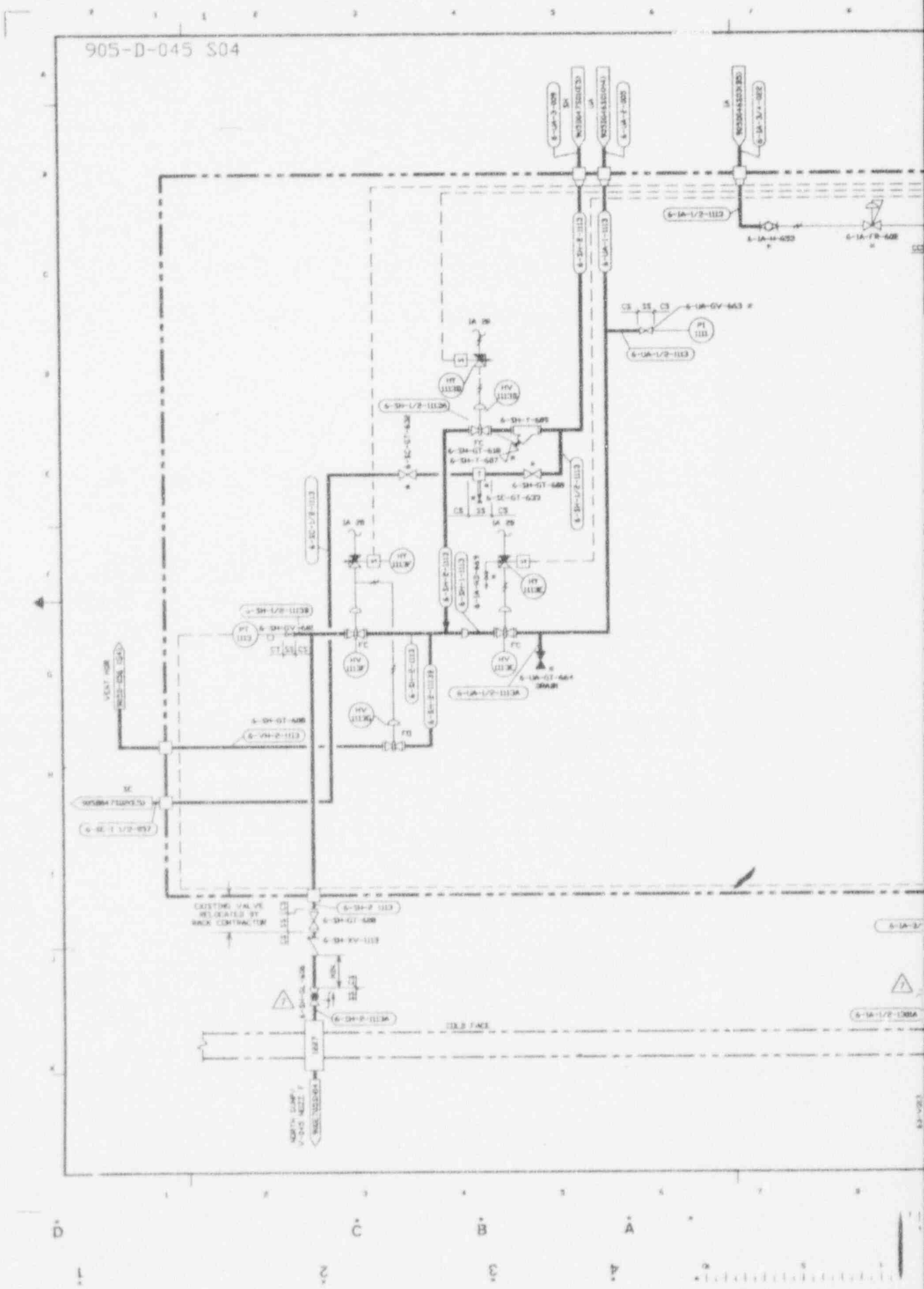
SCALE: NONE | A/E SHEET NO. S01

CAD DRAWING-DO NOT REVISE THIS ORIGINAL

ANSTEC
APERTURE
CARD

Also Available on
Aperture Card

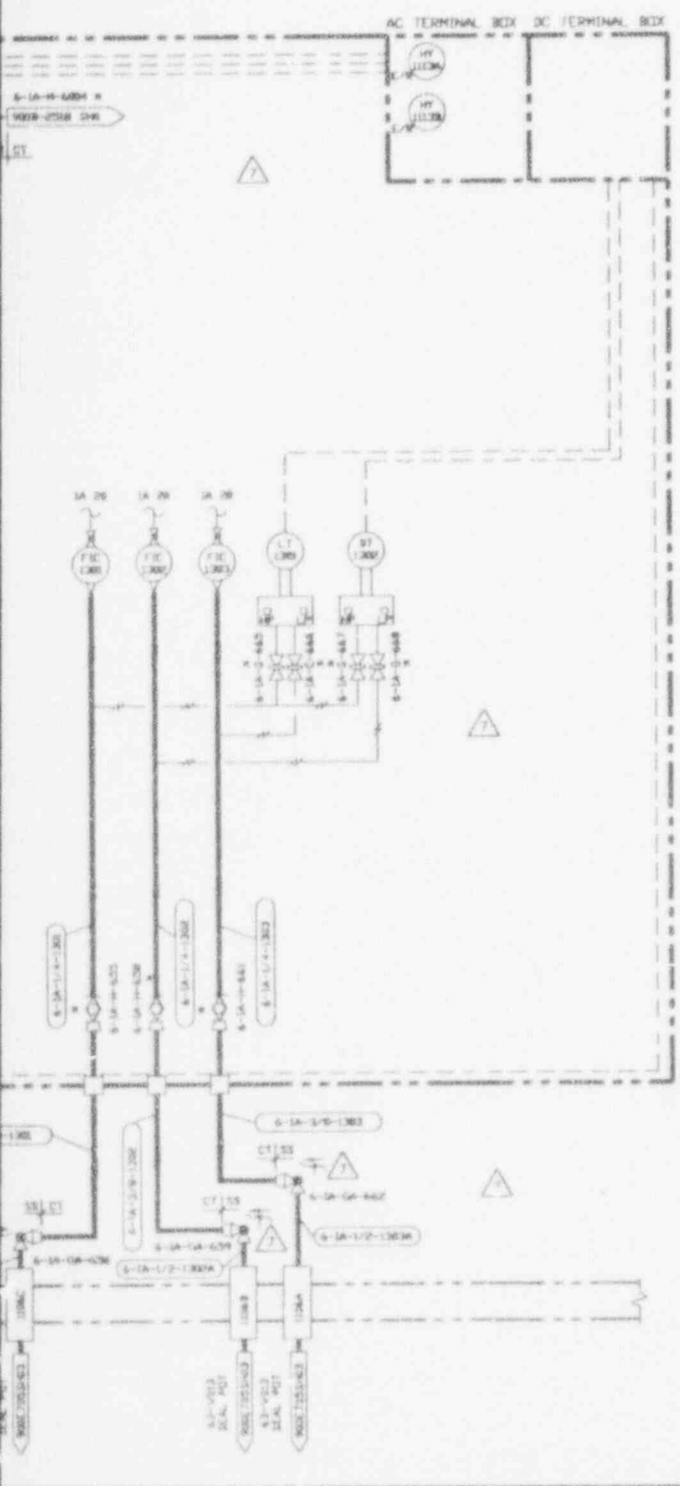
9406240136 -14


905-D-045 S04
EXISTING VALVE RELOCATED BY RACK CONTRACTOR
COLD FACE
DRAIN
VENT HDR
D
C
B
A
1
2
3
4

NO.	DATE	REVISION	DR	CH	APPROVED		
9	02-02-98		T.JK	R.A.	MSK / JB	A.J.D	MBV
		REVISION PER CNWR 36754					
C	06-15-98		T.JK	R.A.	R.A. / SH	A.J.D	MBV
		GENERAL REVISION INCLUDING IA 767					
B	10/31/88		P.JS	R.A.	R.A.	F.JE / FSK	F.JCS
		GENERAL REVISION					
E	4/13/89		R.A.	JJV	R.A.	F.JE / FSK	F.JCS
		GENERAL REVISION					
0	6/12/89	CR 1628			JRH		
1	1/22/90	ECN 3359	DRV	PAH	NEC		
2	3/9/90	REV PER ECN 3630	AWH	PAH	NEC		
3	7/9/91	REV PER ECN 4341	AWH	HAB	DJR		
4	11/18/91	REV PER ECN 4560	AWH	HAB	DJR		
5	12/30/93	REV PER ECN 7324	DRB	KQ	PAH		
6	2/15/94	REV PER ECN 7398	DJH	HAB	DJR		
7	4/21/94	REV PER ECN 7765	R.A.		HAJ		

NOTES:

1. NEW INSTRUMENTS & VALVES TO BE INSTALLED ON THIS EXISTING RACK ARE MARKED WITH A SINGLE ASTERISK (*).
2. IA 20 AIR SERVICE FROM MANIFOLD 6-IA-M-6004. SEE DWG. 900B-2518 SH6.



FOR DRAWING INDEX SEE DRAWING NO.

APPROVED	EBASCO SERVICES INCORPORATED	
PROJECT MGR. R.D. WEINGART	A/E SPEC. NO. 2306	TASK ORDER 922
ENGINEER SUPV. A.J. DIFILIPPO	FOR WEST VALLEY NUCLEAR SERVICES COMPANY, INC. WEST VALLEY, NEW YORK	
LEAD DISC. ENGR. S. SMITH	WEST VALLEY DEMONSTRATION PROJECT	
DESIGN R. KHUSHALANI	P & ID	
CHECKED A. ZILG	VITRIFICATION FACILITY	
DRAWN T.J. KITZ	INSTRUMENT RACK 2N6-5	
PROJECT NO. 19-CWV-32275	SIZE D	DRAWING NO. 905D-045 REV 7
SUBCONTRACT NO.	SCALE NONE	A/E SHEET NO. 905-D-045 SH. 1

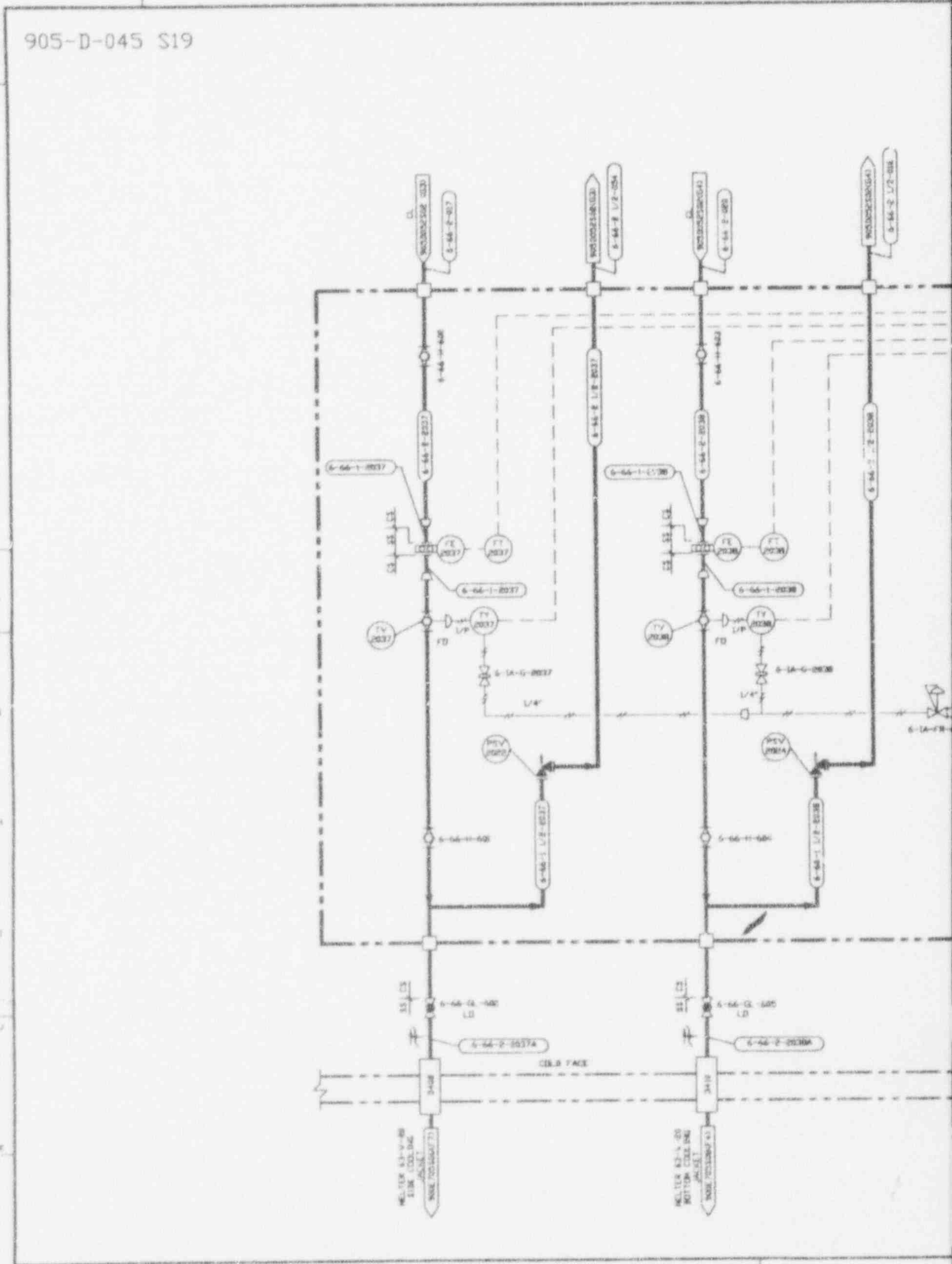
CAD DRAWING - Do not revise this original

ANSTEC APERTURE CARD

Also Available on Aperture Card

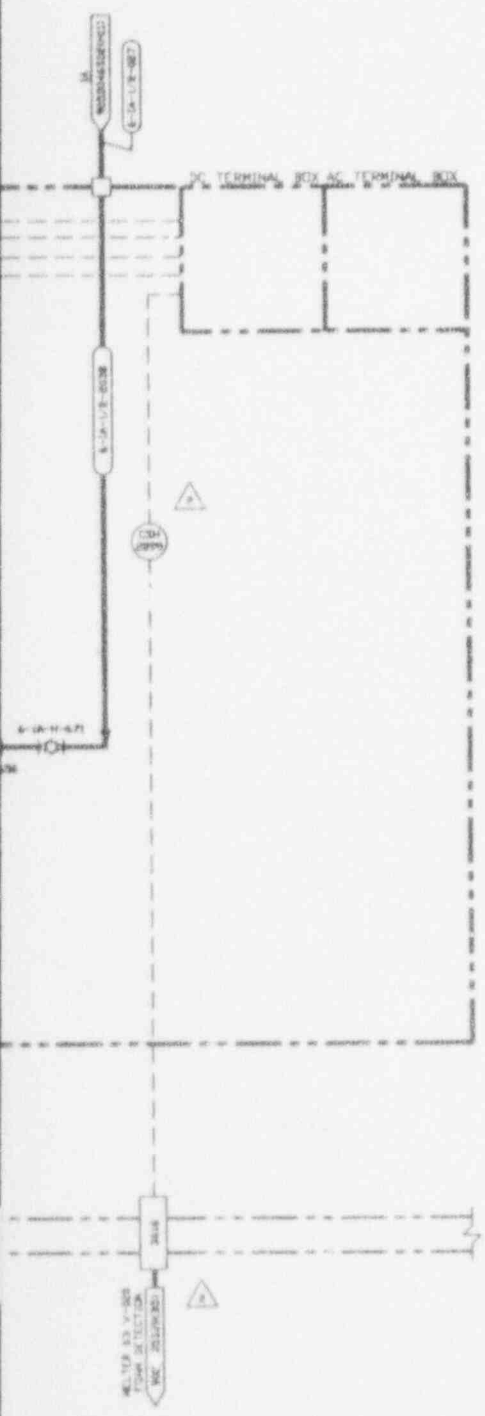
9400240136 -15

905-D-045 S19



COLD FACE
FE 2037
FT 2037
TY 2037
TV 2037
FE 2038
FT 2038
TY 2038
TV 2038
PSV
FO
I/P
1/4"

NO.	DATE	REVISIONS	DR	CH	APPROVED		
B	7-00-88		BFR	R.L.	R.L. HZ	AJB	MBW
GENERAL REVISIONS INCLUDING TA 767							
C	2-16-89		A.JS	JJV	R.L.	F.E. CRL	F.JES
GENERAL REVISIONS							
0	6-12-89	CR 1631			JRH		
1	12-15-95	CCN 3255	DRV	PAM	MCC		
2	4-14-96	CCN 7198	V.JC	[illegible]	[illegible]		



FOR DRAWING INDEX SEE DRAWING NO.

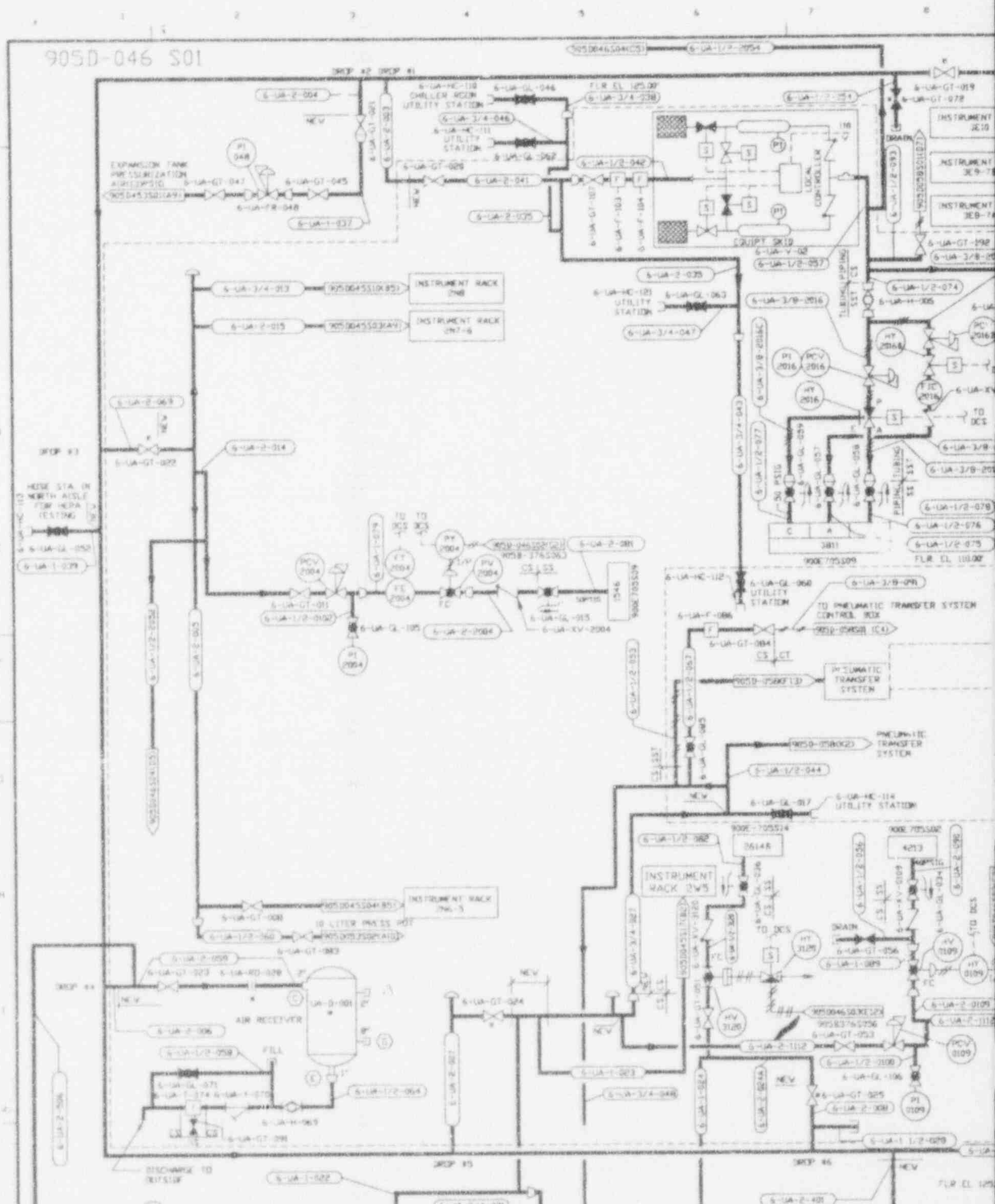
APPROVE VVNE CO.		EBASCO SERVICES INCORPORATED
PROJECT MGR M.D. WEINGART	05-31-88	A/E SER. NO. 2388 FOR TASK ORDER 009
ENGINEER SUPV A.J. DIFILIPPO	05-31-88	WEST VALLEY NUCLEAR SERVICES COMPANY, INC WEST VALLEY, NEW YORK
LEAD DISC ENGR S. NATH	05-31-88	WEST VALLEY DEMONSTRATION PROJECT
DESIGN R.J. LEVKO	05-31-88	P & ID
CHECKED R.J. LEVKO	05-31-88	VITRIFICATION FACILITY
DRAWN B.F. REYNOLDS	DATE 05-31-88	INSTRUMENT RACK 2E10
DE-AC07-81NE44139		SIZE D
PROJECT NO. 19-CVV-92875		DRAWING NO. 905D-045 REV 2
SUBCONTRACT NO.		
ISSUED FOR CONSTRUCTION		SCALE NONE
		A/E SHEET NO. 905-D-045 SH C

CAD DRAWING - DO NOT REVISE THIS ORIGINAL

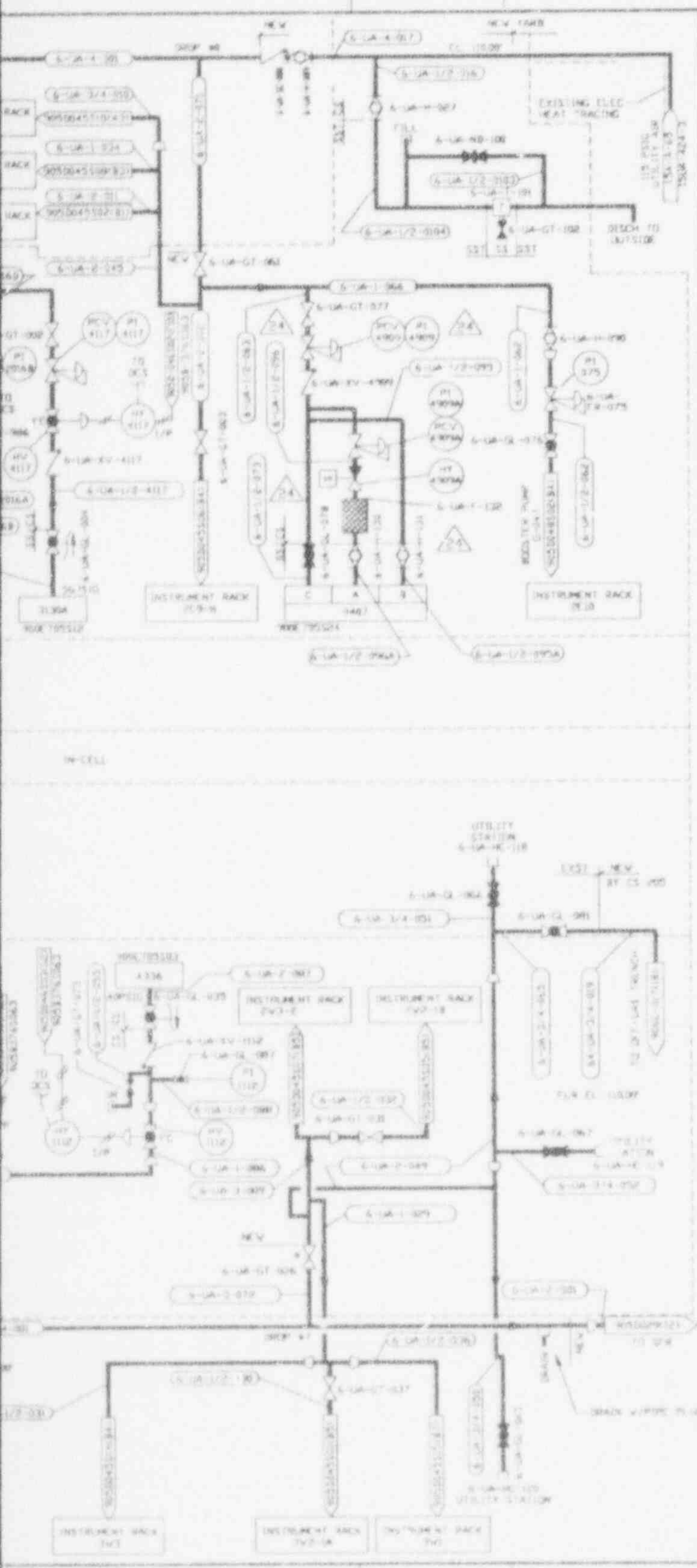
ANSTEC APERTURE CARD

Also Available on Aperture Card

9406240136-16


905D-046 S01
DROP #2
DROP #1
CHILLER ROOM UTILITY STATION
UTILITY STATION
EXPANSION TANK PRESSURIZATION
EQUIPT SKID
LOCAL CONTROLLER
DRAIN
INSTRUMENT RACK 2N8
INSTRUMENT RACK 2N7-6
UTILITY STATION
DROP #3
HOSE STA. IN NORTH AISLE FOR HEPA TESTING
FLR. EL. 101.00'
TO PNEUMATIC TRANSFER SYSTEM CONTROL BOX
PNEUMATIC TRANSFER SYSTEM
INSTRUMENT RACK 2W6-3
10 LITER PRESS POT
DROP #4
AIR RECEIVER
FILL
INSTRUMENT RACK 2W5
TO DCS
DISCHARGE TO OUTSIDE
DROP #5
DROP #6
INSTRUMENT RACK 3W7
INSTRUMENT RACK 3W6
INSTRUMENT RACK 3W9
UTILITY STATION
NEW

D
C
B
A



NO.	DATE	REVISIONS	DR	CH	APPROVED		
9	8/23/88		BFH	R.L.	R.L.	AC FSK	MJW
GENERAL REVISION							
C	6-28-89		R.L.	AC	R.L.	AC	FJES
GENERAL REVISION							
0	7-13-89	CR1646			JRH		
1	3-15-90	REVISED PER CCN 3383	PES	DRS	DJR		
2	5-11-90	REVISED PER CCN 3633	PES	DRS	DJR		
3	6-1-90	REVISED PER CCN 3669	CTC				
4	7-11-90	REVISED PER CCN 3780	BP	HAB	VAB		
5	10-22-90	REVISED PER CCN 3979	JHS	HAB	DJR		
6	01-29-91	REVISED PER CCN 4192	RJR	HAB	DJR		
7	03/28/91	REVISED PER CCN 4197	SAW	HAB	DJR		
8	11/25/91	REVISED PER CCN 4376	DAK	HAB	DJR		
9	3/30/92	REVISED PER CCN 4937	LRK	HAB	DJR		
10	5/8/92	REVISED PER CCN 5044 REVISED PER CCN 5081	TCR	DRS	DJR		
11	6/29/92	REVISED PER CCN 5190	JLH	HAB	DJR		
12	09/21/92	GEN REV PER CCN 5250	SRC	HAB	PAN		
13	10/16/92	REVISED PER CCN 5259	SRB	DRS	JR		
14	1/4/93	REVISED PER CCN 5331	SM	DRS	RWM		
15	1/21/93	REVISED PER CCN 5381	SM	DRS	DJR		
16	1/25/93	REVISED PER CCN 5445	SRB	DRS	PAN		
17	03/09/93	REVISED PER CCN 5986	SRC	HAB	PAN		
18	03/02/93	REVISED PER CCN 6054	SRC	HAB	PAN		
19	10/7/93	REVISED PER CCN 6830	AAJ	HAB	PAN		
20	10/14/93	REVISED PER CCN 6250	SAK	DRS	RWM		
21	11/02/93	REVISED PER CCN 6981	AJD	HAB	PAN		
22	2/18/94	REV PER ECN 7530 & 7525	KJC	HAB	PAN		
23	3/5/94	REV PER ECN 7626	KJC	HAB	PAN		
24	3/16/94	REV PER ECN 7423	AJB	[illegible]	DTB		

REFERENCE DRAWINGS:

SYMBOLS, NOTES & LEGEND 900-D-1306
SYMBOLS, NOTES & LEGEND 900-D-1307
SYMBOLS, NOTES & LEGEND 900-D-1308
P & ID VITRIFICATION FACILITY UTILITY & INSTRUMENT AIR SYS 905-D-089
P &ID COLD CHEMICAL UTILITY & INSTRUMENT AIR SYS 905-D-020
INSTRUMENT INSTALLATION DETAILS 905-B-376

NOTES:

1. A SINGLE ASTERISK (*) INDICATES EXISTING VALVES AND EQUIPMENT TO BE RETAINED.

CAD DRAWING-DO NOT REVISE THIS ORIGINAL

EBASCO SERVICES INCORPORATED

WEST VALLEY NUCLEAR SERVICES COMPANY, INC.
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

905-D-046

ANSTEC APERTURE CARD

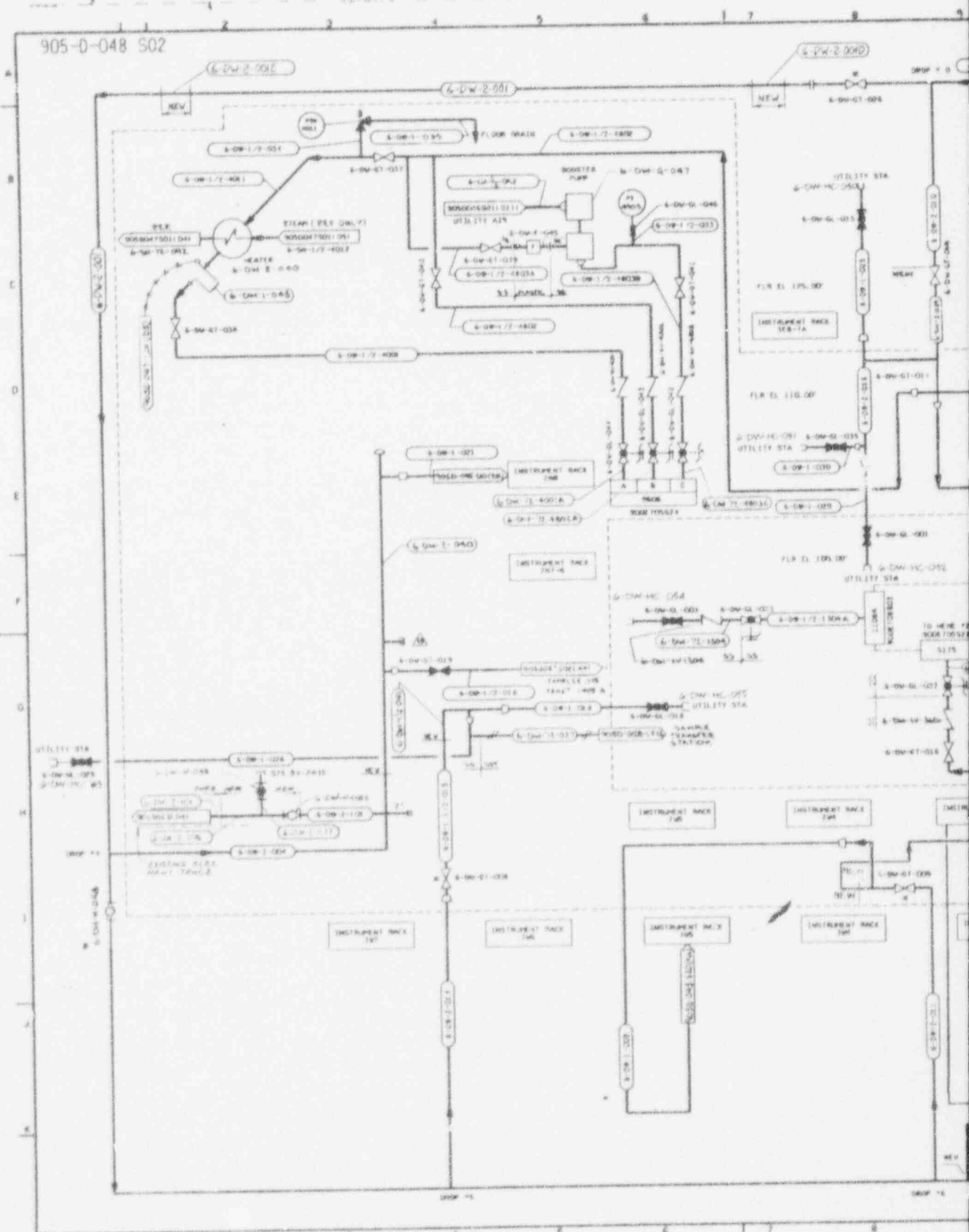
Also Available on Aperture Card

9406240136 - 17

NUMBER

DRAWING NUMBER

DRAWING NUMBER

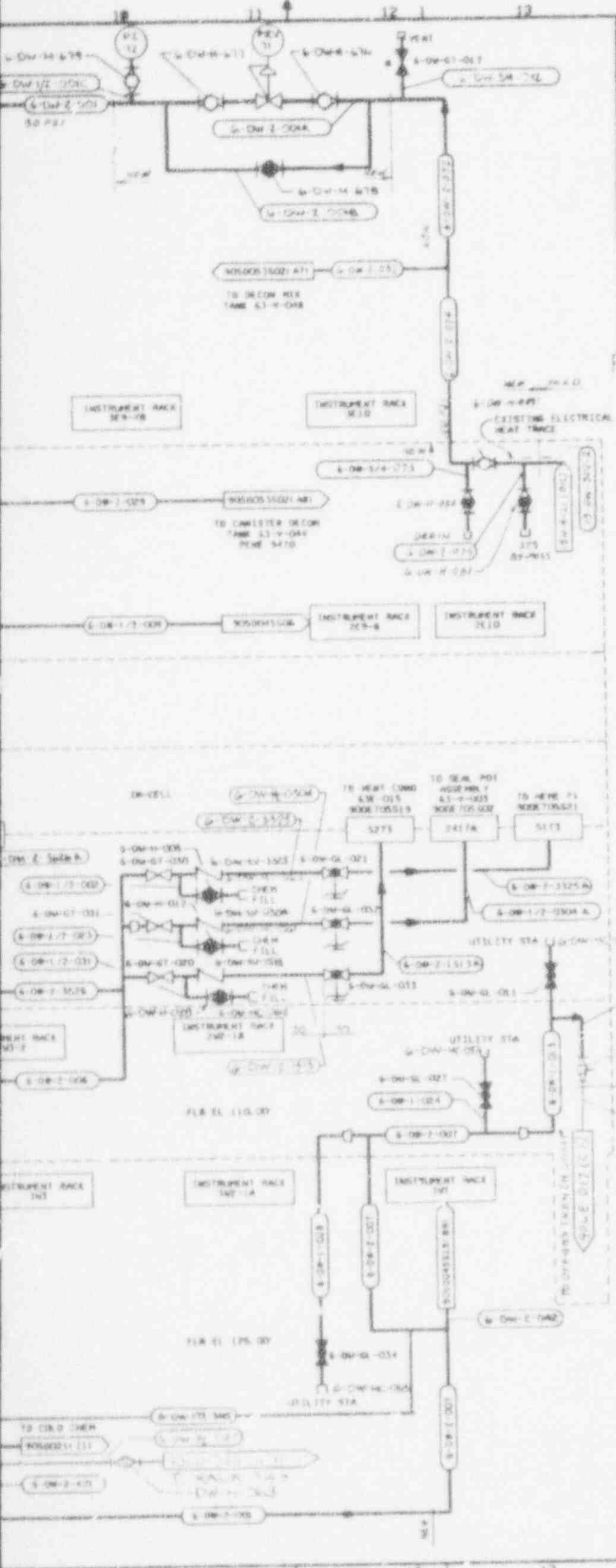


D C B A

1 2 3 4

DRAWING NUMBER

905D-048 SH. 2



NO.	DATE	REVISION	DR	CH	APPROVED
0	7/1/92	ER DAW			
9	3-9-93	REV PER ECN			
10	7-21-93	REV PER ECN 6516			
11	12-10-93	REV PER ECN 7157	JH		
12	2-7-93	REV PER ECN 7122 & 7289	BP		
13	4-11-94	REV PER ECN 7765			
6		PER ECN 4171			
7	9-24-92	REV PER ECN 5251			
8	1-8-93	REV PER ECN 5331			

GENERAL REVISION

GENERAL REVISION

REFERENCE DRAWINGS:

SYMBOLS, NOTES & LEGEND	900-0-1306
SYMBOLS, NOTES & LEGEND	900-0-1307
SYMBOLS, NOTES & LEGEND	900-0-1308

NOTES:

1. THIS DWG. SUPERSEDES 900-0-1106.
2. A SINGLE ASTERISK (*) INDICATES EXISTING VALVES AND EQUIPMENT TO BE RETAINED.

ECN(S) PENDING

VF-2B-2227

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED

WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

P & ID
VITRIFICATION FACILITY
DEMINERALIZED WATER SYSTEM

DRAWING NO. 905D-048 REV. 13

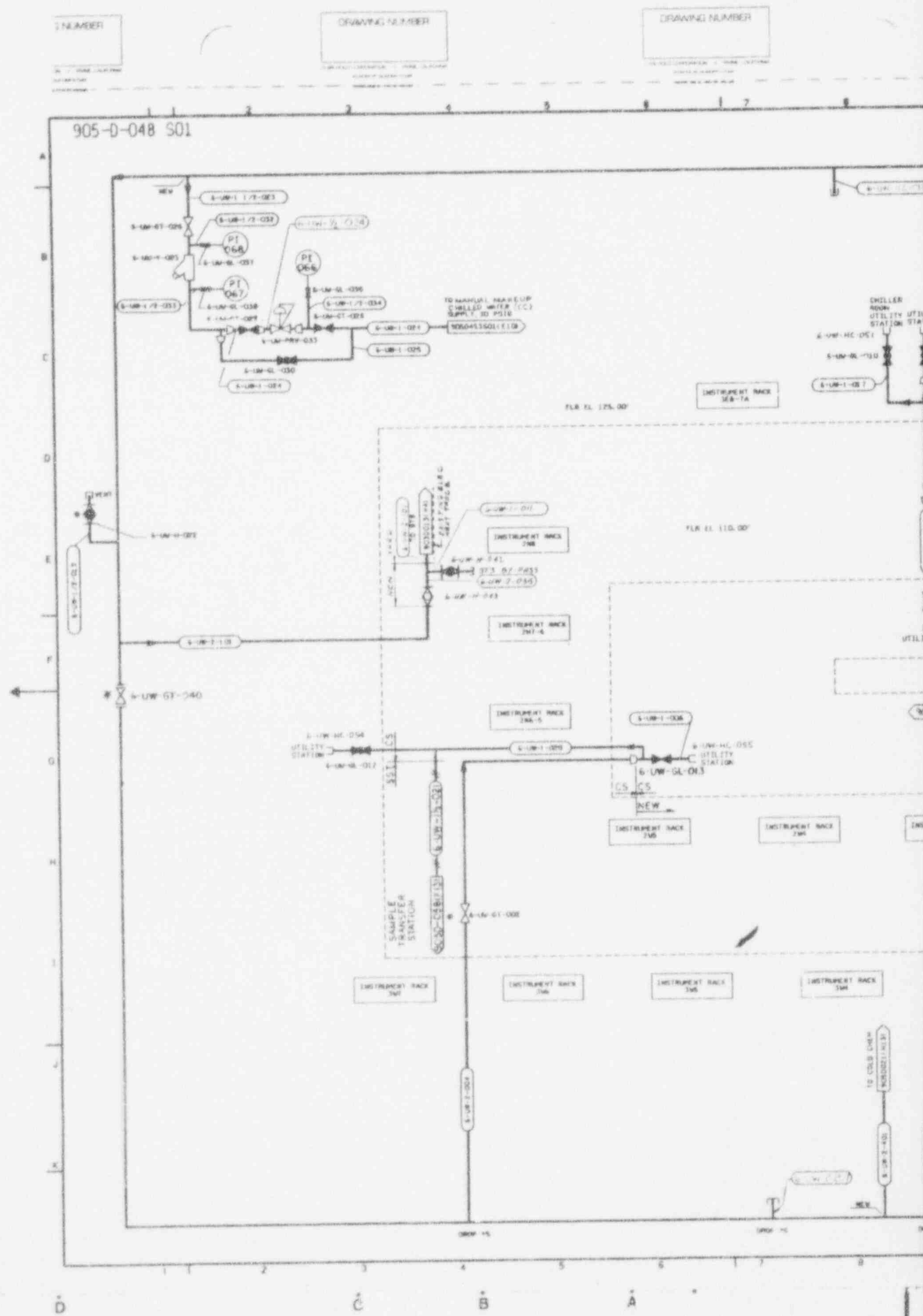
SIZE D

ISSUED FOR CONSTRUCTION

SCALE NONE

A/E SHEET NO. 905-0-048 S02 C

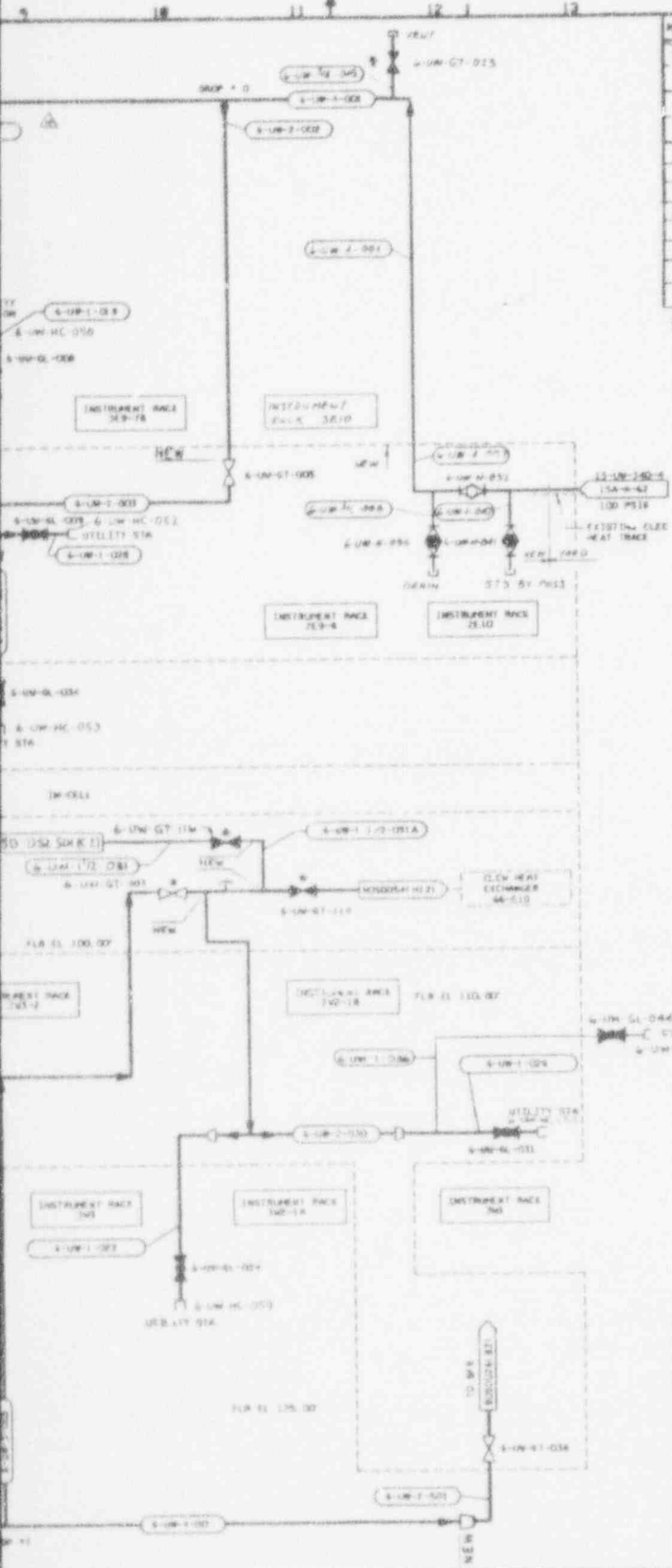
9406240138-18



DRAWING NUMBER
DRAWING NUMBER
905-D-048 S01
INSTRUMENT RACK
FLR EL 125.00'
FLR EL 110.00'
6-UW-GT-040
6-UW-GL-013
NEW
UTILITY STATION
SAMPLE TRANSFER STATION

DRAWING NUMBER

9050-048 SH. 1



NO.	DATE	REVISION	DR	CH	APPROVED		
B	[illegible]		BFR	RJL	RJL FJE	FJE	BHM
		GENERAL REVISION					
C	6-15-89		RJZ	JC	RJL		
		GENERAL REVISION					
0	7-18-[illegible]	[illegible]					
8	9-3-93	REV PER ECN 6683	GW				
9	2-8-94	REV PER ECN [illegible]		KQ	HAJ		
10	4-15-94	ECN [illegible]		KQ	DJR		
4	3-5-91	[illegible]					
5	6-24-91	REV PER ECN 4302	GW		DJR		
6	9-24-92	REV PER ECN 5759					
7	8-31-93	REV PER ECN 6599	PD	KQ			

REFERENCE DRAWINGS:

SYMBOLS, NOTES & LEGEND	900-0-1306
SYMBOLS, NOTES & LEGEND	900-0-1307
SYMBOLS, NOTES & LEGEND	900-0-1308
P & ID VITRIFICATION FACILITY UTILITY WATER SYSTEM	905-0-026

NOTES:

1. A SINGLE ASTERISK (*) INDICATES EXISTING VALVES AND EQUIPMENT TO BE RETAINED.

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED

A/E & F.S. NO. 1388 TASK ORDER 029

FOR

WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

P & ID
VITRIFICATION FACILITY
UTILITY WATER SYSTEM

PROJECT MGR — 8-12-88
ENGINEER SUPV — 8-12-88
LEAD DISC ENGR — 8-12-88
DESIGN — 8-12-88
CHECKED — 8-11-88
DRAWN — DATE 8-11-88

DE-AC07-81NE44139 PROJECT NO.
19-CWW-20775 SUBCONTRACT NO.
ISSUED FOR CONSTRUCTION

SIZE D | INDEX CODE NUMBER: AREA SYS. TYP. CL. 3RD | DRAWING NO. 905D048 | REV. 1C

SCALE NONE | A/E SHEET NO. 905-0-048 S01 C

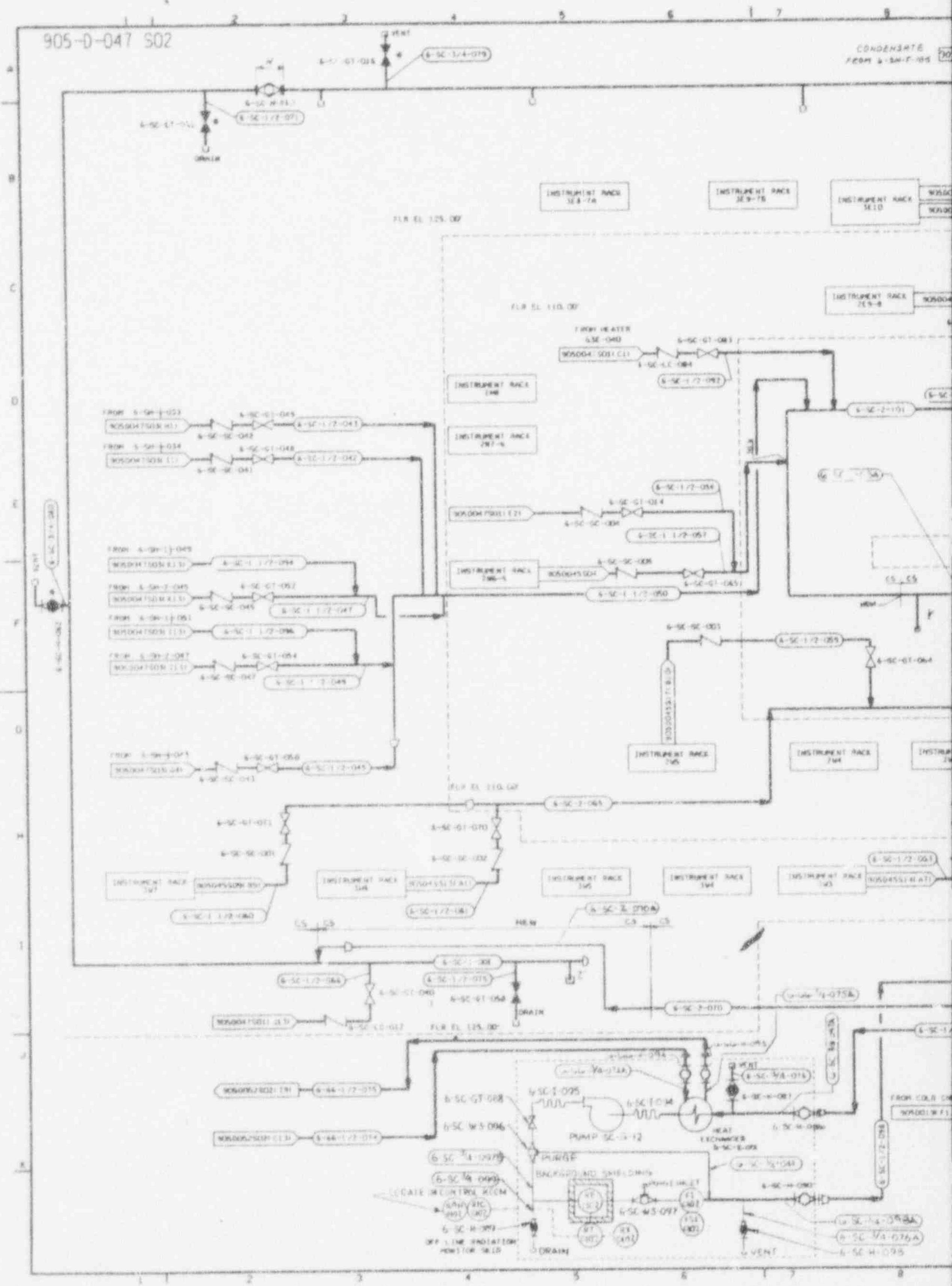
ANSTEC APERTURE CARD

Also Available on Aperture Card

9406240136 -19

DRAWING NUMBER

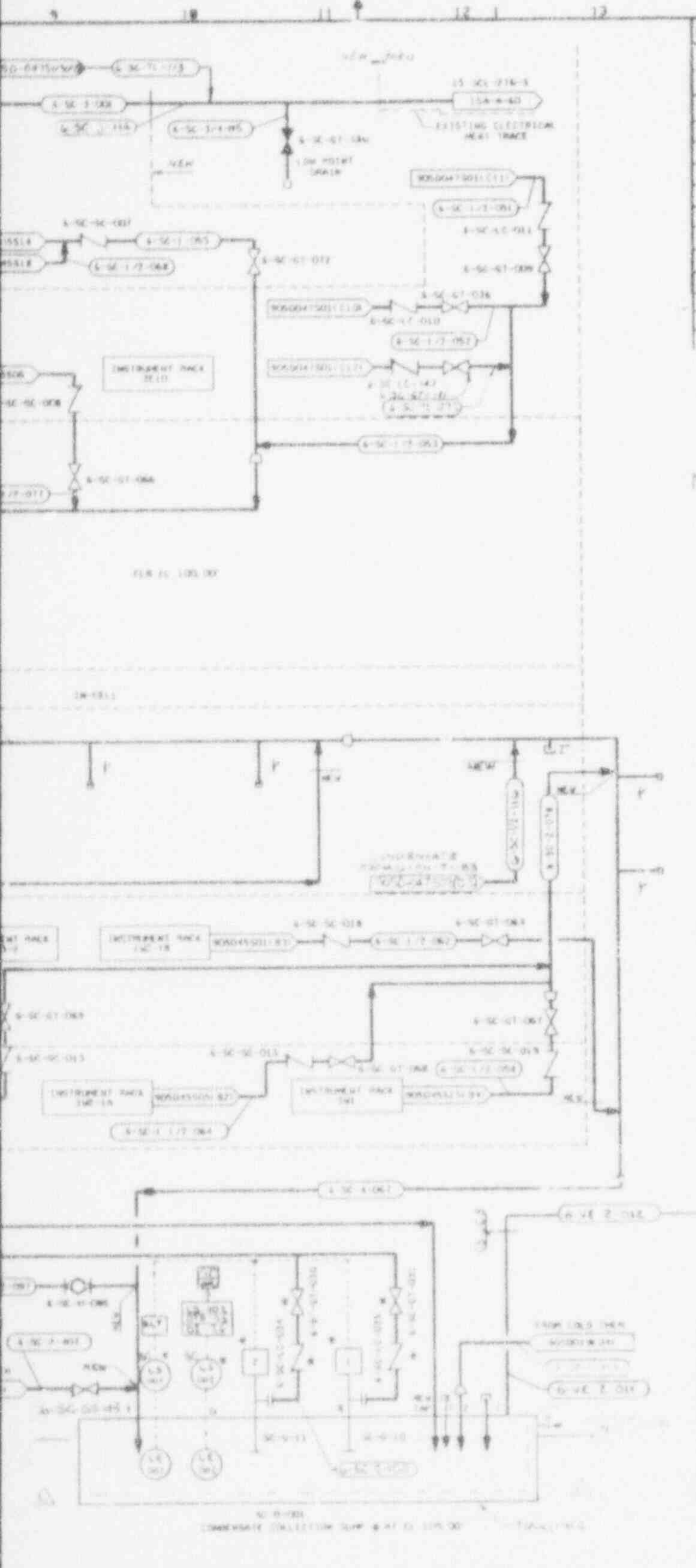
DRAWING NUMBER



D C B A

1 2 3 4

DRAWING NUMBER 905D-047 SH. 2



NO.	DATE	REVISION	DR	CH	APPROVED
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C	[illegible]	GENERAL REVISION	[illegible]	[illegible]	[illegible]
0	[illegible]	[illegible]			[illegible]
10	2-23-93	REV PER ECN 5967	[illegible]	[illegible]	[illegible]
11	11-10-93	REV PER ECN 6161	[illegible]	HTS	[illegible]
12	[illegible]	REVD PER ECN 7162	[illegible]	[illegible]	[illegible]
13	2-30-93	REV PER ECN 7347	BP	[illegible]	HAJ
14	1-14-94	[illegible] ECN 7357 & 7380	BP	[illegible]	[illegible]
15	[illegible]	REV PER ECN 7651	[illegible]	[illegible]	HAJ
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	6-24-91	REV PER ECN 1540	[illegible]	[illegible]	[illegible]
9	9-25-92	REV/ECN 5283	[illegible]	[illegible]	[illegible]

NOTES, SYMBOLS & LEGEND 900-D-1306
NOTES, SYMBOLS & LEGEND 900-D-1307
NOTES, SYMBOLS & LEGEND 900-D-1308

REFERENCE DRAWINGS:

NOTES:

1. A SINGLE ASTERISK (*) INDICATES EXISTING VALVES AND EQUIPMENT TO BE RETAINED.
2. FOR COND. SUMP PUMP CWD, SEE DRAWING 905B-305 SH 36

6-VE-2-018

6-VE-2-018 VENT TO ATMOSPHERE

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED

WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

P & ID
VITRIFICATION FACILITY
CONDENSATE SYSTEM

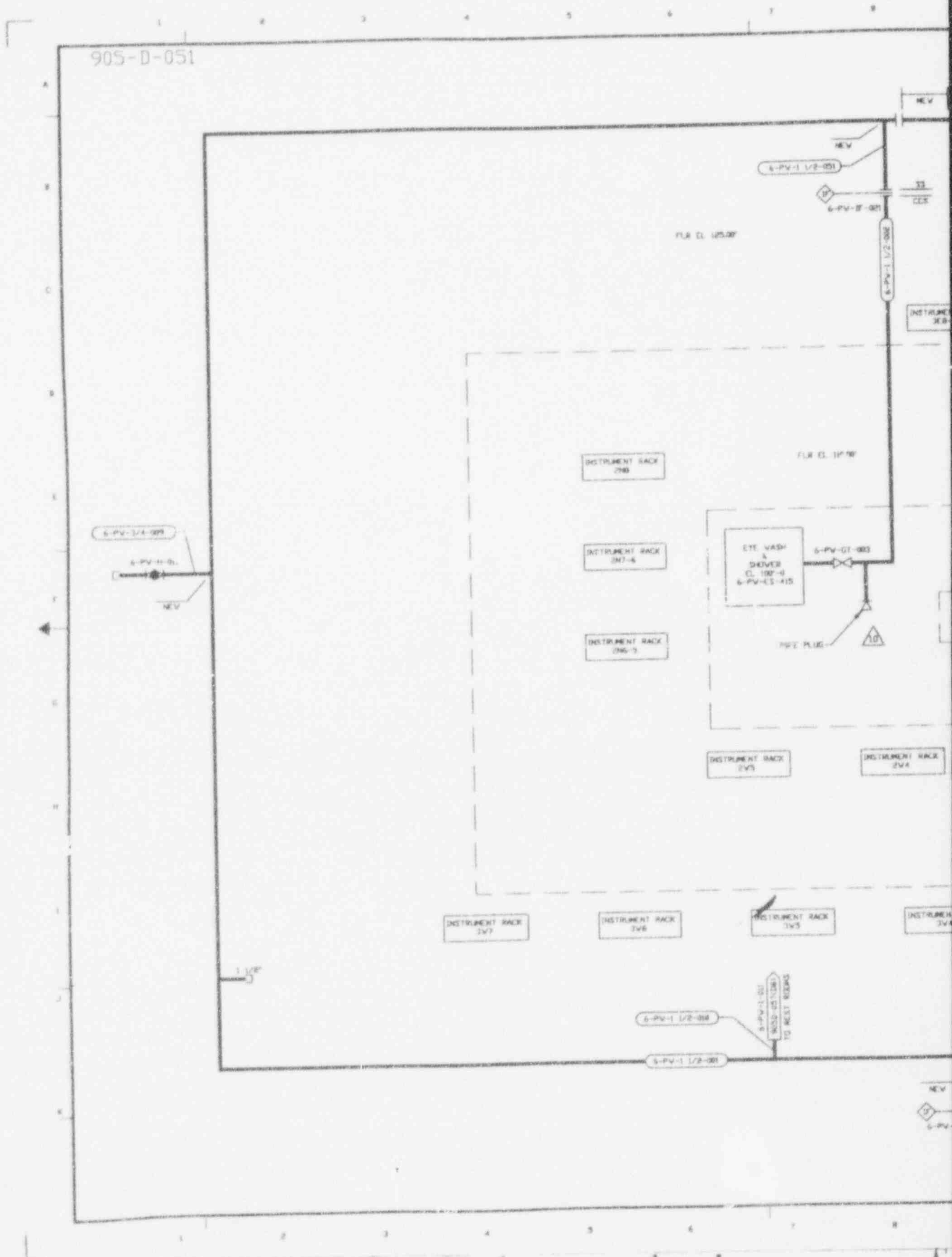
DRAWING NO. 905D047

A/E SHEET NO. 905-D-047 S02

ANSTEC APERTURE CARD

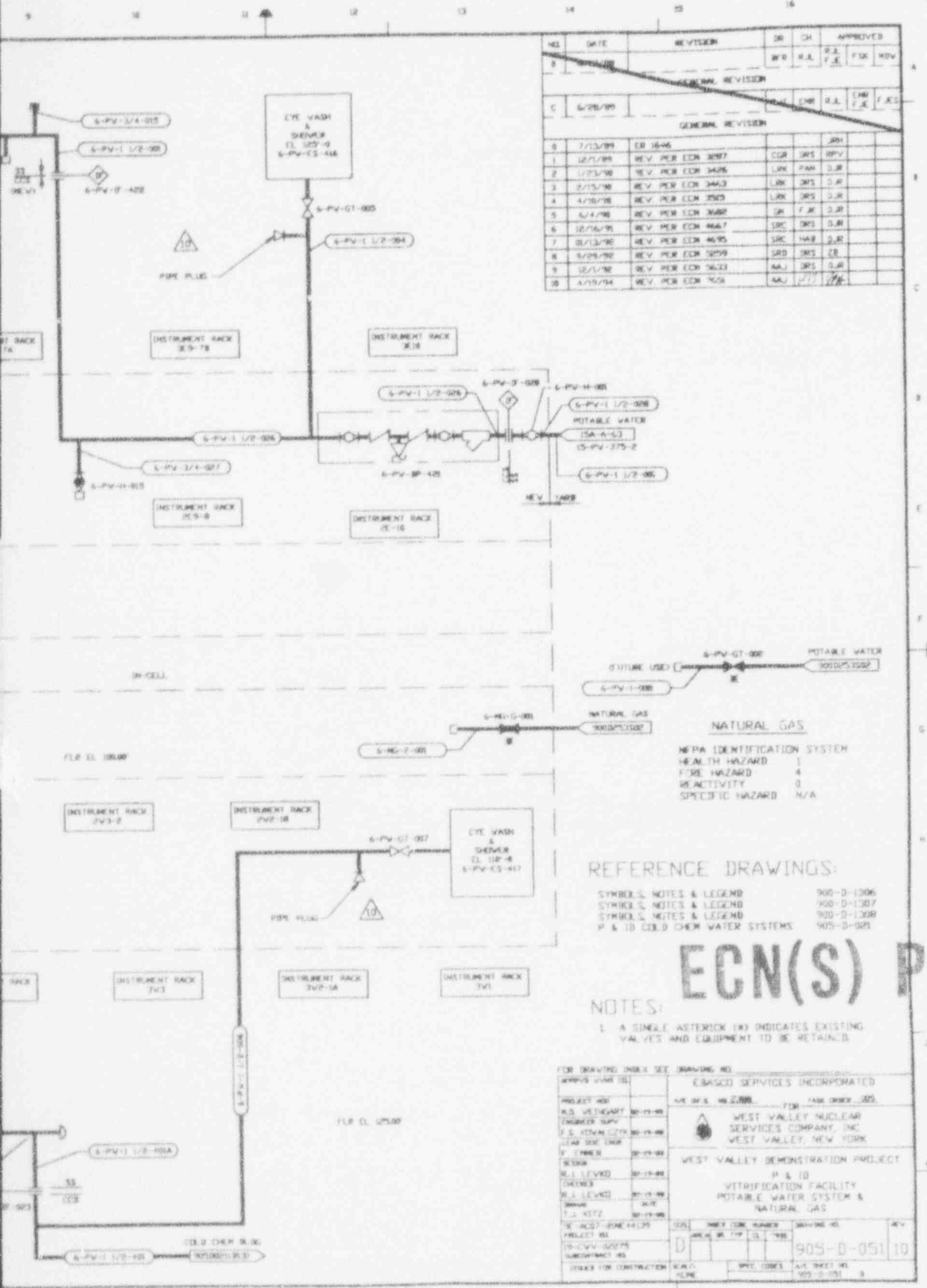
Also Available on Aperture Card

9406240136-20



90S-D-051
NEW
6-PV-1 1/2-051
INSTRUMENT RACK 2N8
INSTRUMENT RACK 2N7-6
INSTRUMENT RACK 2N6-5
EYE WASH & SHOWER
6-PV-ES-415
6-PV-GT-003
PIPE PLUG
INSTRUMENT RACK 2V5
INSTRUMENT RACK 2V4
INSTRUMENT RACK 3V7
INSTRUMENT RACK 3V6
INSTRUMENT RACK 3V5
1 1/2"
6-PV-1 1/2-010
6-PV-1 1/2-001
TO NEXT ROOMS

D C B A
1 2 3 4



NO.	DATE	REVISION	DR	CH	APPROVED		
B		GENERAL REVISION	WFR	R.J.	R.J. F.JE	FSK	WDV
C	6/28/89	GENERAL REVISION		CHR	R.J.	CHR F.JE	F.JES
0	7/13/89	ER 1646			JRH		
1	12/1/89	REV. PER ECN 3287	CGR	DRS	RPV		
2	1/23/90	REV. PER ECN 3426	LRK	PAH	D.JR		
3	2/15/90	REV. PER ECN 3463	LRK	DRS	D.JR		
4	4/10/90	REV. PER ECN 3525	LRK	DRS	D.JR		
5	6/4/90	REV. PER ECN 3682	GH	F.JE	D.JR		
6	12/16/91	REV. PER ECN 4667	SRC	DRS	D.JR		
7	01/13/92	REV. PER ECN 4695	SRC	HAB	D.JR		
8	9/29/92	REV. PER ECN 5259	SRD	DRS	ZB		
9	12/1/92	REV. PER ECN 5633	AAJ	DRS	D.JR		
10	4/19/94	REV. PER ECN 7551	AAJ				

NATURAL GAS

NFPA IDENTIFICATION SYSTEM
HEALTH HAZARD 1
FIRE HAZARD 4
REACTIVITY 0
SPECIFIC HAZARD N/A

REFERENCE DRAWINGS:

SYMBOLS, NOTES & LEGEND	900-D-1306
SYMBOLS, NOTES & LEGEND	900-D-1307
SYMBOLS, NOTES & LEGEND	900-D-1308
P & ID COLD CHEM WATER SYSTEMS	905-D-021

ECN(S) PENDING
7225

NOTES:

1. A SINGLE ASTERICK (*) INDICATES EXISTING VALVES AND EQUIPMENT TO BE RETAINED.

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED
A/E DFS. NO. 2,000 TASK ORDER 305
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT
P & ID
VITRIFICATION FACILITY
POTABLE WATER SYSTEM &
NATURAL GAS

PROJECT MGR K.S. WEINGART
ENGINEER SUPV F.S. KOWALCZYK
LEAD DISC ENGR F. CHMIEL
DESIGN R.J. LEVKO
CHECKED R.J. LEVKO
DRAWN T.J. KITZ

PROJECT NO. 19-CVV-02275
ISSUED FOR CONSTRUCTION
SCALE: NONE
SIZE D
DRAWING NO. 905-D-051
REV. 10
A/E SHEET NO. 905-D-051

CAD DRAWING-DO NOT REVISE THIS ORIGINAL

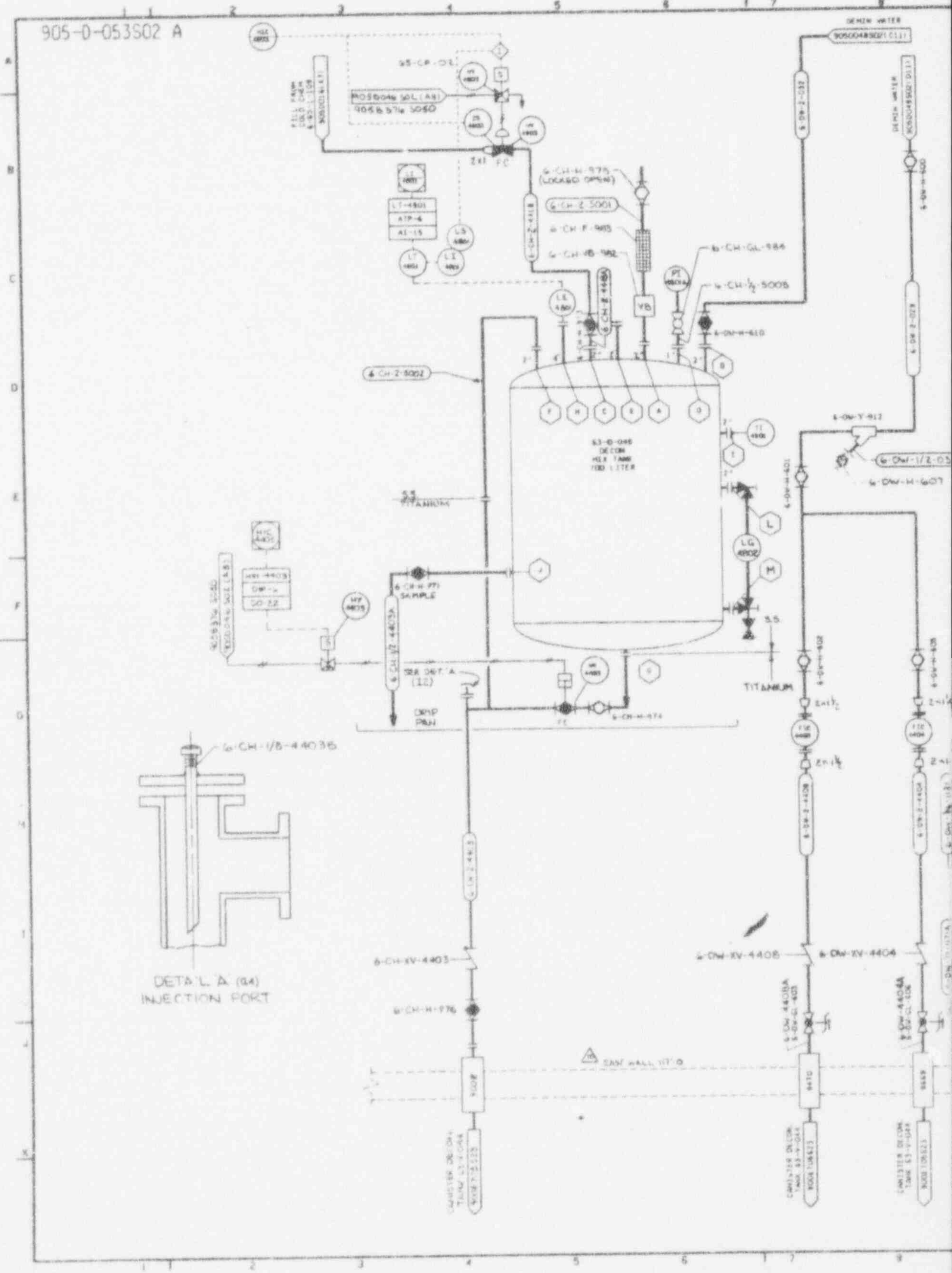
ANSTEC
APERTURE
CARD

Also Available on
Aperture Card

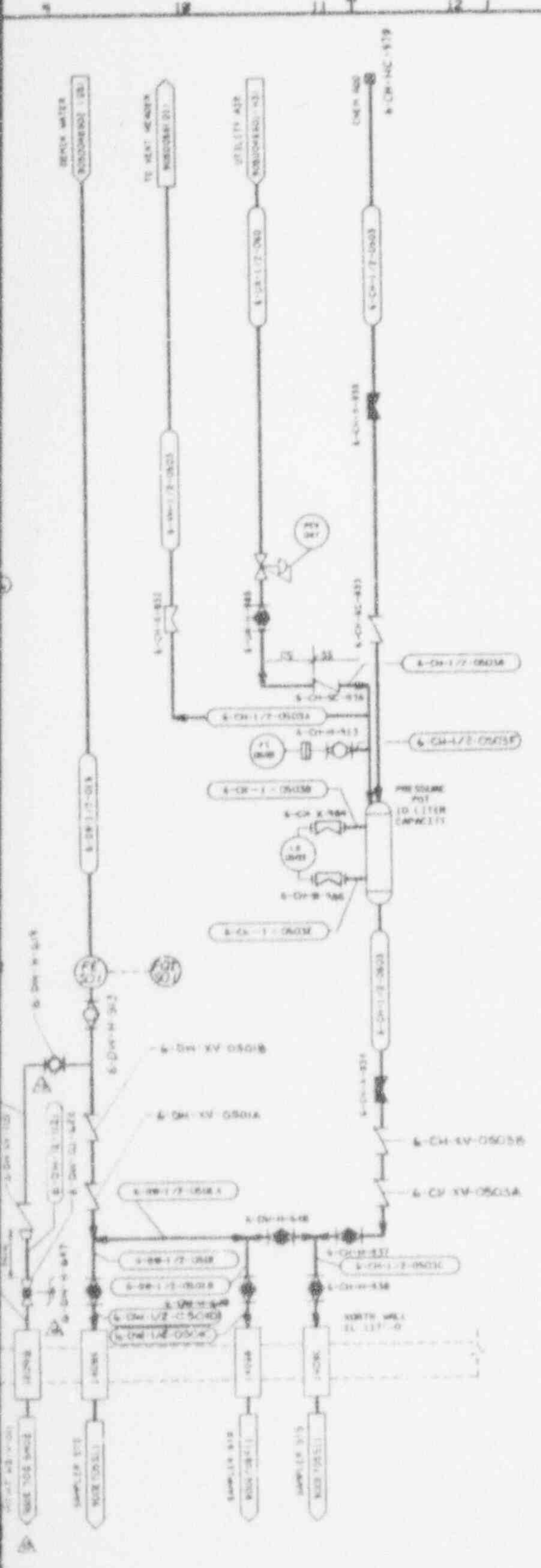
9406240136 -21

DRAWING NUMBER

DRAWING NUMBER



905D-053 SH. 2



NO.	DATE	REVISION	DR	CH	APPROVED
0	[illegible]	[illegible]			[illegible]
1	1/8/90	GEN. REV PER ECN 3362	CGR	[illegible]	[illegible]
2	3-19-90	REV PER ECN 3618	GW	[illegible]	DJR
3	5-9-90	REV PER ECN 3633	CGR		DJR
4	7-12-90	REV PER ECN 3777	GW	[illegible]	DJR
5	8-20-91	REV PER ECN 4169	GM	[illegible]	DJR
6	10-13-92	REV PER ECN 5419	[illegible]	[illegible]	HAJ
7	11-12-92	REV PER ECN 5326	GW	[illegible]	RWA
8	12-10-93	REV PER ECN 7110	GW	[illegible]	[illegible]
9	3-7-94	REV/ECN 7545	MJC	[illegible]	[illegible]
10	4-26-94	REV PER ECN 7765	GW	[illegible]	HAJ

NOTES:

1. SEE NOTES ON DRAWING NO. 905-D-053S01.

REFERENCE DRAWINGS:

P & ID VITRIFICATION FACILITY NON-RACK COLD CHEMICAL DECON SYS	905-D-027
INSTRUMENT INSTALLATION DETAILS	905-B-376

ECN(S) PENDING

7214

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED

FOR

WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

P & ID VITRIFICATION FACILITY
NON-RACK COLD CHEMICAL
DECON & SLURRY SYSTEM

DRAWN P. SANTOS

DE-AC07-81NE44139 PROJECT NO.

19-CWN-02275 SUBCONTRACT NO.

ISSUED FOR CONSTRUCTION

SIZE D

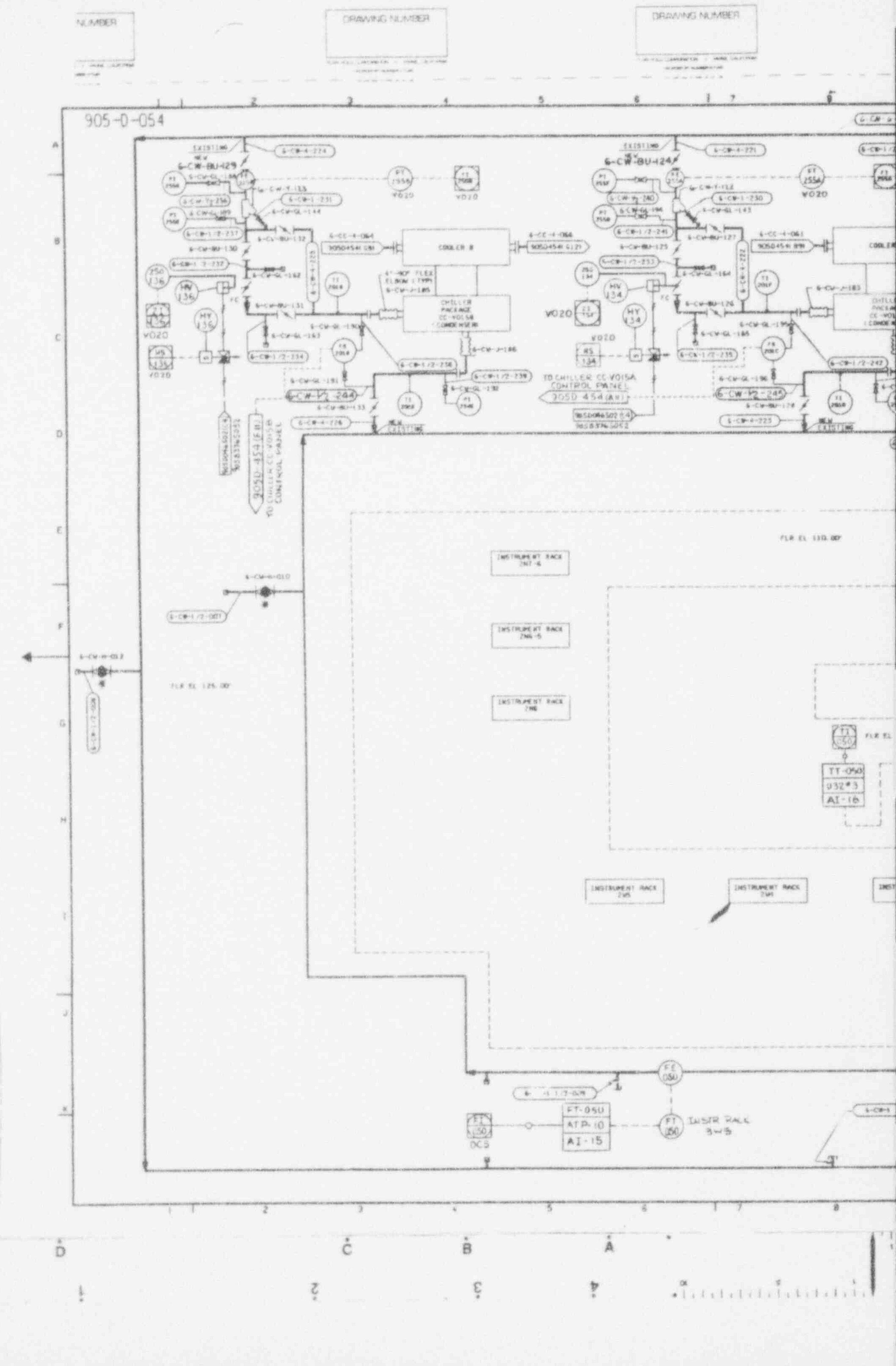
DRAWING NO. 905D-053 REV. 10

A/E SHEET NO. 905-D-053S02 A

ANSTEC APERTURE CARD

Also Available on Aperture Card

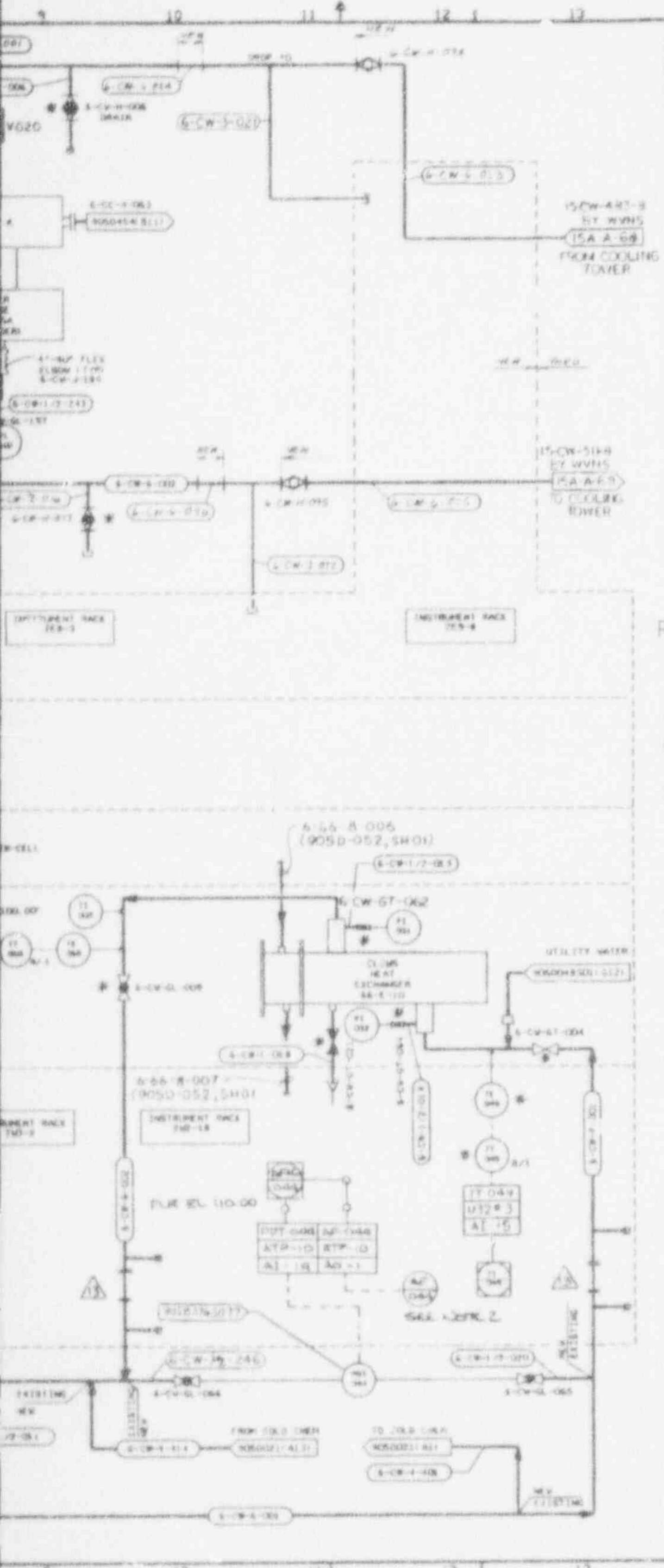
9406240136-22



DRAWING NUMBER
DRAWING NUMBER
905-D-054
EXISTING
NEW
6-CW-BU-129
6-CW-4-224
VO20
COOLER B
CHILLER PACKAGE CC-V015B (CONDENSER)
6-CW-BU-124
6-CW-4-221
CHILLER PACKAGE
TO CHILLER CC-V015A CONTROL PANEL
9050-454(A11)
9050-454(E11)
TO CHILLER CC-V015B CONTROL PANEL
6-CW-1/2-244
6-CW-1/2-248
6-CW-4-226
6-CW-4-225
FLR EL 125.00'
FLR EL 110.00'
INSTRUMENT RACK 2N7-6
INSTRUMENT RACK 2N6-5
INSTRUMENT RACK 2N6
INSTRUMENT RACK 2W5
INSTRUMENT RACK 2W4
TT-050
U32#3
AI-16
FT-050
ATP-10
AI-15
DCS
INSTR RACK 3W3
6-CW-1/2-001
6-CW-4-012
6-CW-4-010

DRAWING NUMBER

905D-054



NO.	DATE	REVISION	DR	CH	APPROVED
8	11-26-89		RJL	FJR	RJL
		GENERAL REVISION			
C	6-28-89		RJL		
		GENERAL REVISION			
0	7/1/90				
1	3-19-90	GEN REV PER ECM 3592	LR		
2	5-29-90	GEN REV PER ECM 3670	AWH		
3	7-12-90	REV PER ECM 3777	GW		GR
4	9-10-90	REV PER ECM 3907	AWH		
5	1-30-91	REV'D PER ECN 4012	REH		
6	3/27/91	PER ECN 4117			
7	6-24-92	ECN 5028	PD		
8	9-25-92	REV PER ECN 5259			
9	8-3-93	REV PER ECN 6599	PD		
10	11-29-93	REV PER ECN 7087	GW		
11	2-16-94	REV/ECN 7262	PD		
12	3-8-94	REV PER ECN 7216	AAJ		
13	4-20-94	REV PER ECN 7451	AAJ		

NOTES:

1. A SINGLE ASTERISK (*) INDICATES EXISTING VALVES AND/OR EQUIPMENT TO BE RETAINED.
2. ADJUSTABLE FREQUENCY DRIVE LOCATED IN MAIN PLANT CHEMICAL OPERATING AISLE

REFERENCE DRAWINGS:

VITRIFICATION FACILITY HVAC CHILLED WATER SYSTEM P & ID SHEET 2	905-0-454
P & ID COLD CHEMICAL WATER SYSTEMS	905-0-021
INSTRUMENT INSTALLATION DETAILS	905-B-376
COOLING WATER BOOSTER PUMP ELECTRICAL DIAGRAMS	900-D-1298
CONTROL WIRING DIAGRAMS	905-B-305

ECN(S) PENDING
7470

WVNS APPROVAL

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED

FOR

WEST VALLEY NUCLEAR SERVICES COMPANY, INC
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

P & ID
VITRIFICATION FACILITY
COOLING TOWER WATER SYSTEM

SIZE: D
DRAWING NO. 905 D 054
REV 13
905-D-054

ISSUED FOR CONSTRUCTION
SCALE NONE

9406240136 -23

1

IMAGE EVALUATION TEST TARGET (MT-3)

150mm

6"

1

IMAGE EVALUATION TEST TARGET (MT-3)

150mm

6"

1

IMAGE EVALUATION TEST TARGET (MT-3)

150mm

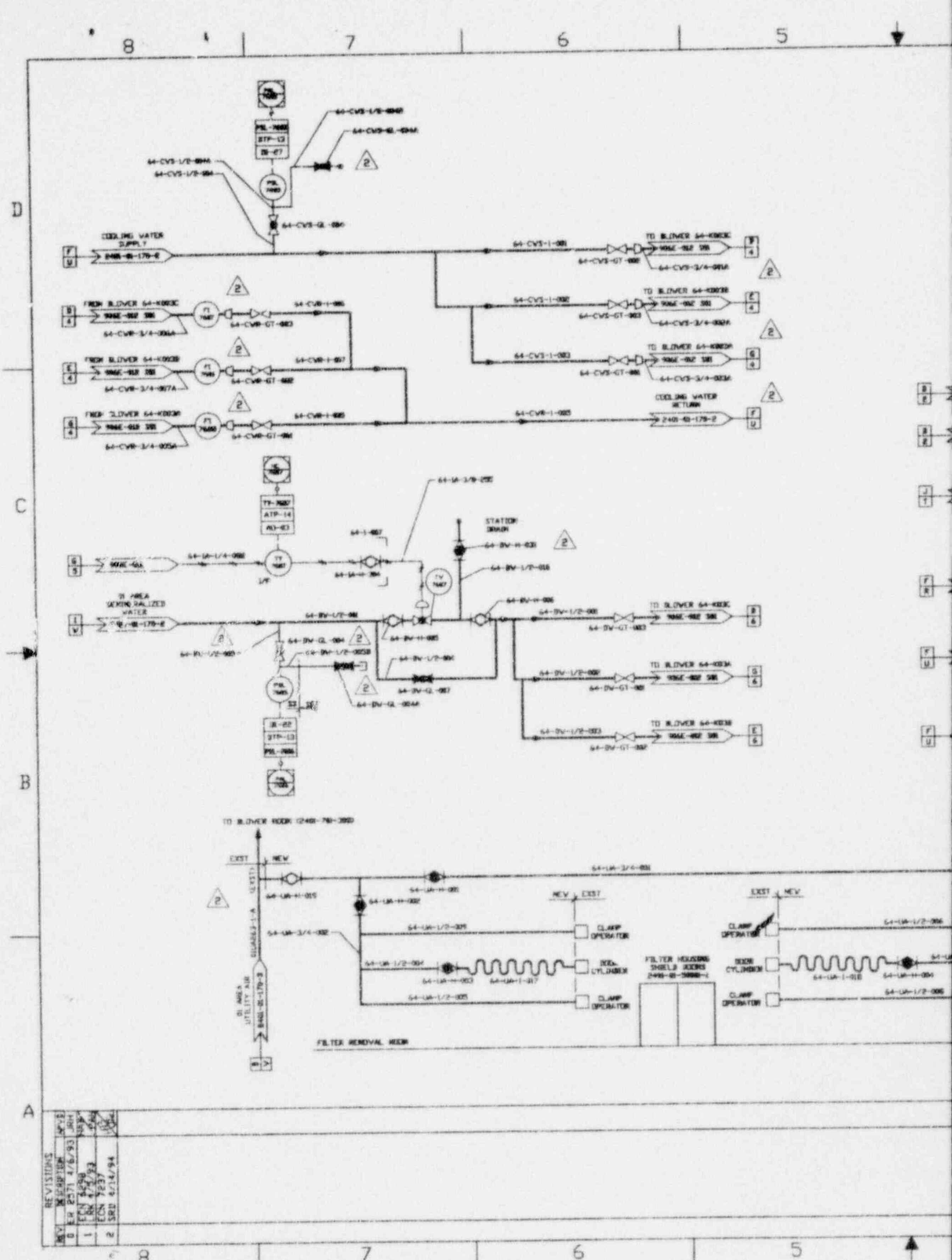
6"

1

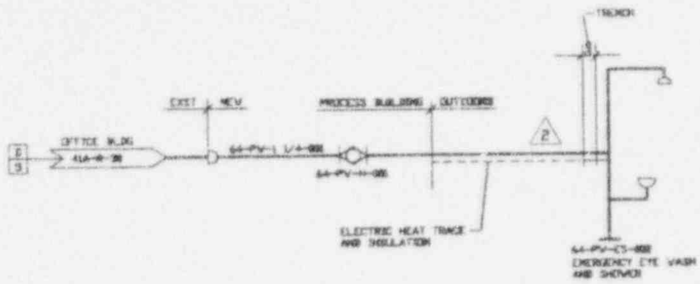
IMAGE EVALUATION TEST TARGET (MT-3)

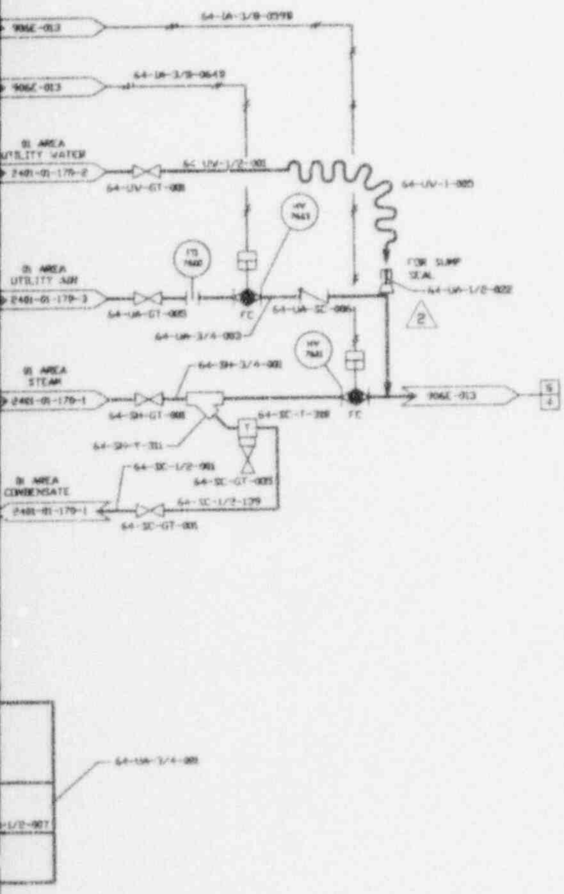
150mm

6"



8
7
6
5
D
C
B
A
COOLING WATER SUPPLY
COOLING WATER RETURN
STATION DRAIN
TO BLOWER ROOM
EXIST
NEW
CLAMP OPERATOR
DOOR CYLINDER
FILTER HOUSING SHIELD DOORS
FILTER REMOVAL ROOM
REVISIONS





NOTES:

1. ALL INSTRUMENT NUMBERS PREFIXED BY SYSTEM NO "64"

REFERENCE DRAWINGS:

UTILITY ROUTING FLOW DIAGRAM STEAM,CONDENSATE,& DIESEL OIL	2401-01-170-1
UTILITY ROUTING DIAGRAM WATER SYSTEMS	2401-01-170-2
VF MELTER OFF-GAS SYSTEM P&ID	906E-011
VF MELTER OFF-GAS SYSTEM P&ID	906E-012
VF MELTER OFF-GAS SYSTEM P&ID	906E-013
VF MELTER OFF-GAS SYSTEM P&ID	906D-014
VF MELTER OFF-GAS SYSTEM P&ID	906D-015
INSTRUMENT AIR SYSTEM P&ID	906E-016
UTILITY FLOW DIAGRAM PLANT AIR, INSTRUMENT AIR	2401-01-170-3
FIRST FLOOR PLUMBING PLAN OFFICE BUILDING	41A-R-30
SYMBOLS NOTES AND LEGENDS	900D-1306
SYMBOLS NOTES AND LEGENDS	900D-1307
SYMBOLS NOTES AND LEGENDS	900D-1308

QTY REQD	ITEM NO.	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	MATERIAL OR SPEC

PARTS LIST

UNLESS OTHERWISE SPECIFIED
ALL DIMS. IN INCHES
TOLERANCES-DO NOT SCALE
2 PL DEC: N/A | 3 PL DEC: N/A | ANGLES: N/A
FRACTIONS: N/A
DISPOSAL 2071
NEXT ASSEMBLY

DRAFTER	C.GOBLE	DATE 10/12/92
CHECKER	DONALD R. SHAFFER	DATE 3/25/93
ENGR.	RICHARD W. MARTIN	DATE 3/25/93
COGNIZANT	T.E. COTTRELL	DATE 3/25/93
SYSTEM ENGR.	R.F. VANCE	DATE 4/6/93
QA	R.N. KRAFT	DATE 4/5/93
APPROVED	JOHN HORTON	DATE 4/6/93

A/E CONTRACT NO.

FOR

WEST VALLEY NUCLEAR SERVICES CO., INC.
WEST VALLEY, NEW YORK

VF
EX-CELL OFF-GAS P&ID
MISCELLANEOUS UTILITIES

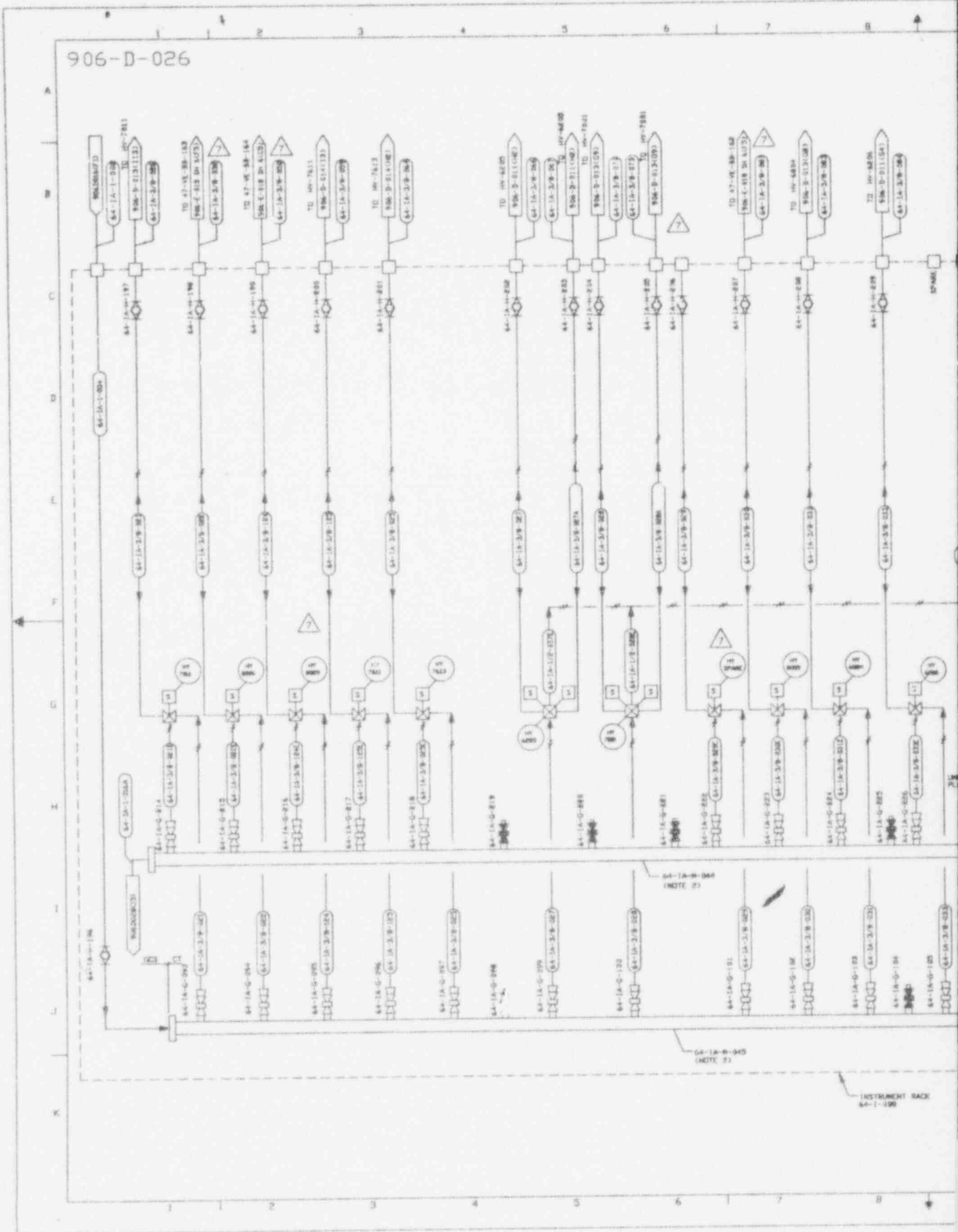
DWG SIZE D | SCALE NONE | DWG NO. 906D-009 | REV 2
WEIGHT
A/E DWG NO. | SHEET 1 OF 1

CAD DRAWING-DO NOT REVISE THIS ORIGINAL

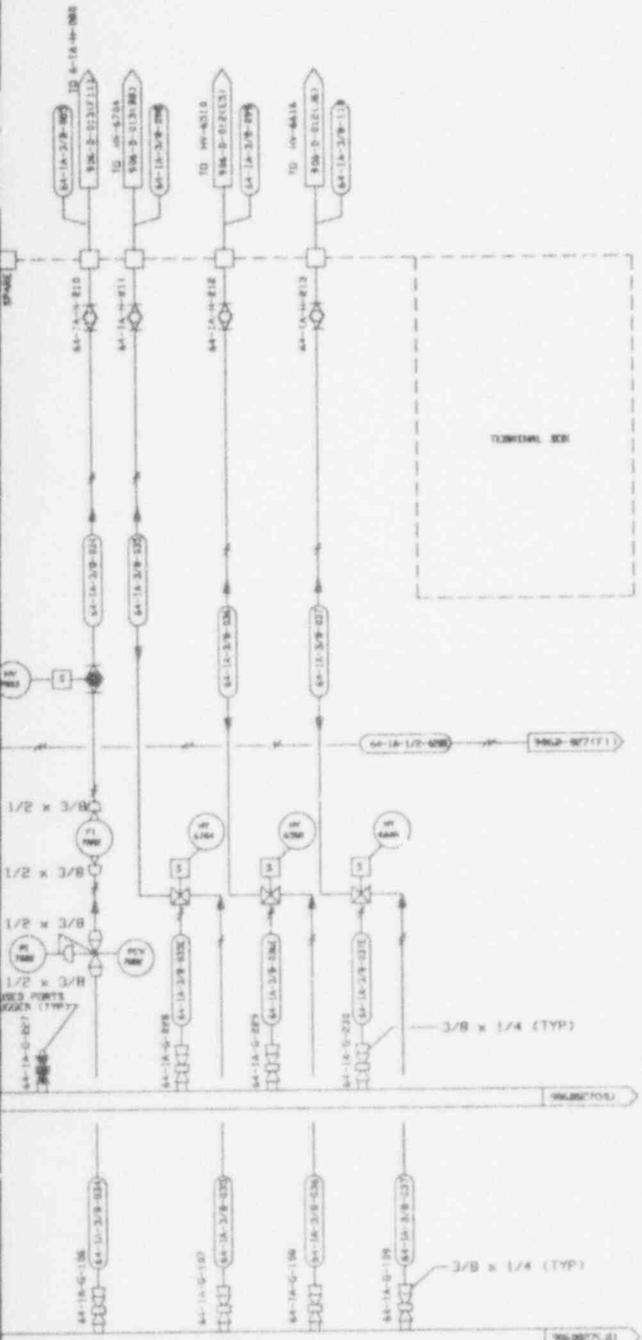
ANSTEC APERTURE CARD

Also Available on Aperture Card

9406240136-24


906-D-026
(NOTE 2)
INSTRUMENT RACK

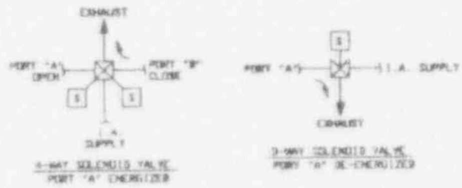
NO.	DATE	REVISION	DR	CH	APPROVED
0	9/24/91	ER 2193			JRH
1	10/3/91	GEN REV PER ECN 4553	LRK	HAB	B.L. GERMOND
2	4/15/92	REV PER ECN 5095	CGR	HAB	B.L. GERMOND
3	06/16/92	REV PER ECN 5251 & 5252	SRC	HAB	B.L. GERMOND
4	12/8/92	GEN REV PER ECN 5698	SRD	HAB	LED B.L.G.
5	03/15/93	REV PER ECN 5997	DAK	HAB	JHK
6	9/2/93	REV PER ECN 6598	AAJ	HAB	BLG
7	4/19/94	REV PER ECN 7384	KGZ	WB	JHK



NOTES:

1. FOR NOTES AND REFERENCE DRAWINGS SEE 906-D-025
2. ACTUAL LOCATION OF MANIFOLD VALVES, SEE DWGS 900D-4842 AND 906D-872.

LEGEND:



FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED

FOR

WEST VALLEY NUCLEAR SERVICES COMPANY, INC.
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

VITRIFICATION FACILITY
EX-CELL OFF-GAS P & ID
INSTRUMENT RACK 1-008 (SHEET 1)

PROJECT MGR F J E STOREY
ENGINEER SUPV
LEAD DISC ENGR
DESIGN R J LEVKO
CHECKED
DRAWN R J LEVKO

19-CWV-92275
SUBCONTRACT NO.

ISSUED FOR CONSTRUCTION

SIZE D

SCALE NONE

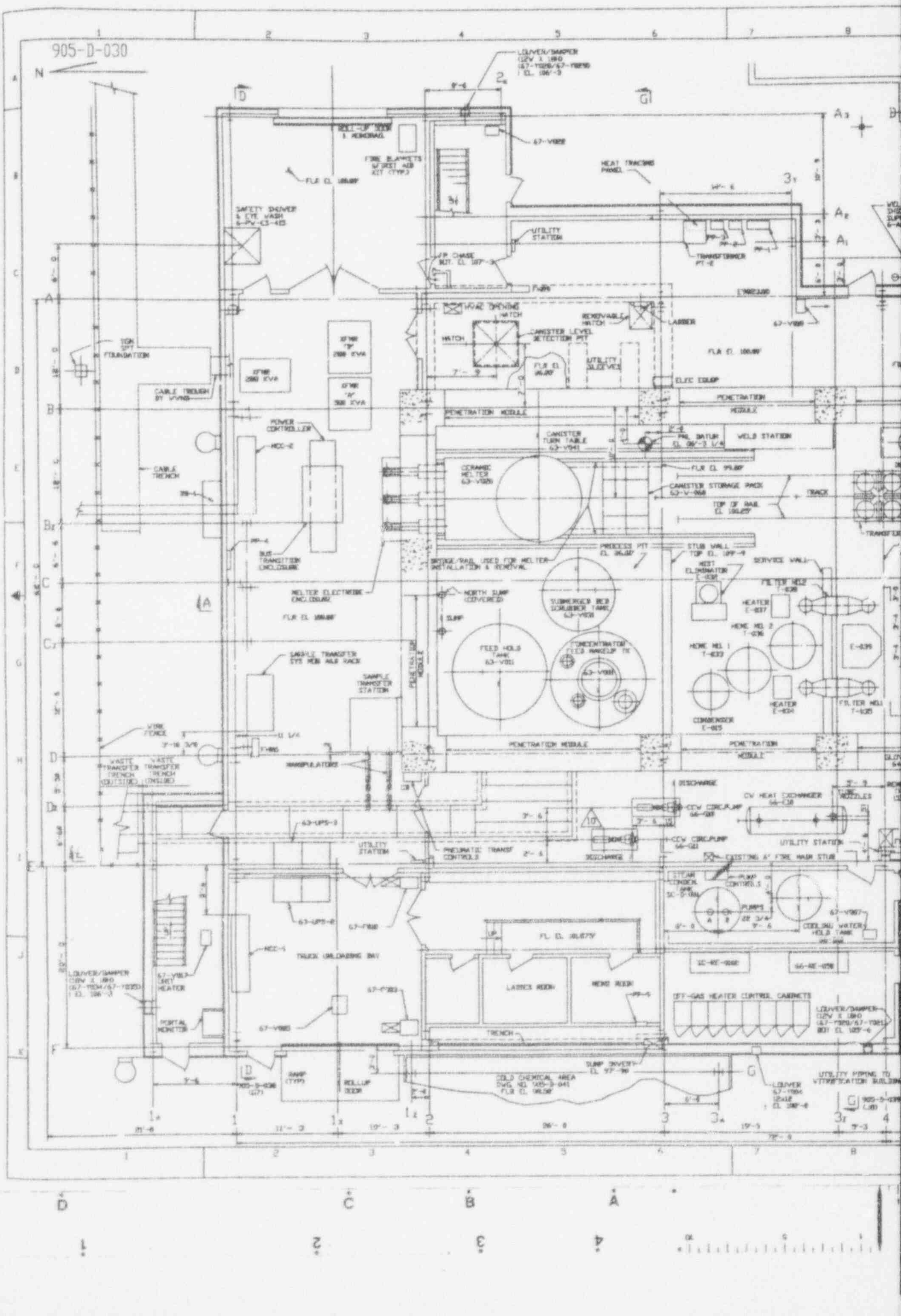
DRAWING NO. 906D-026

REV. 7

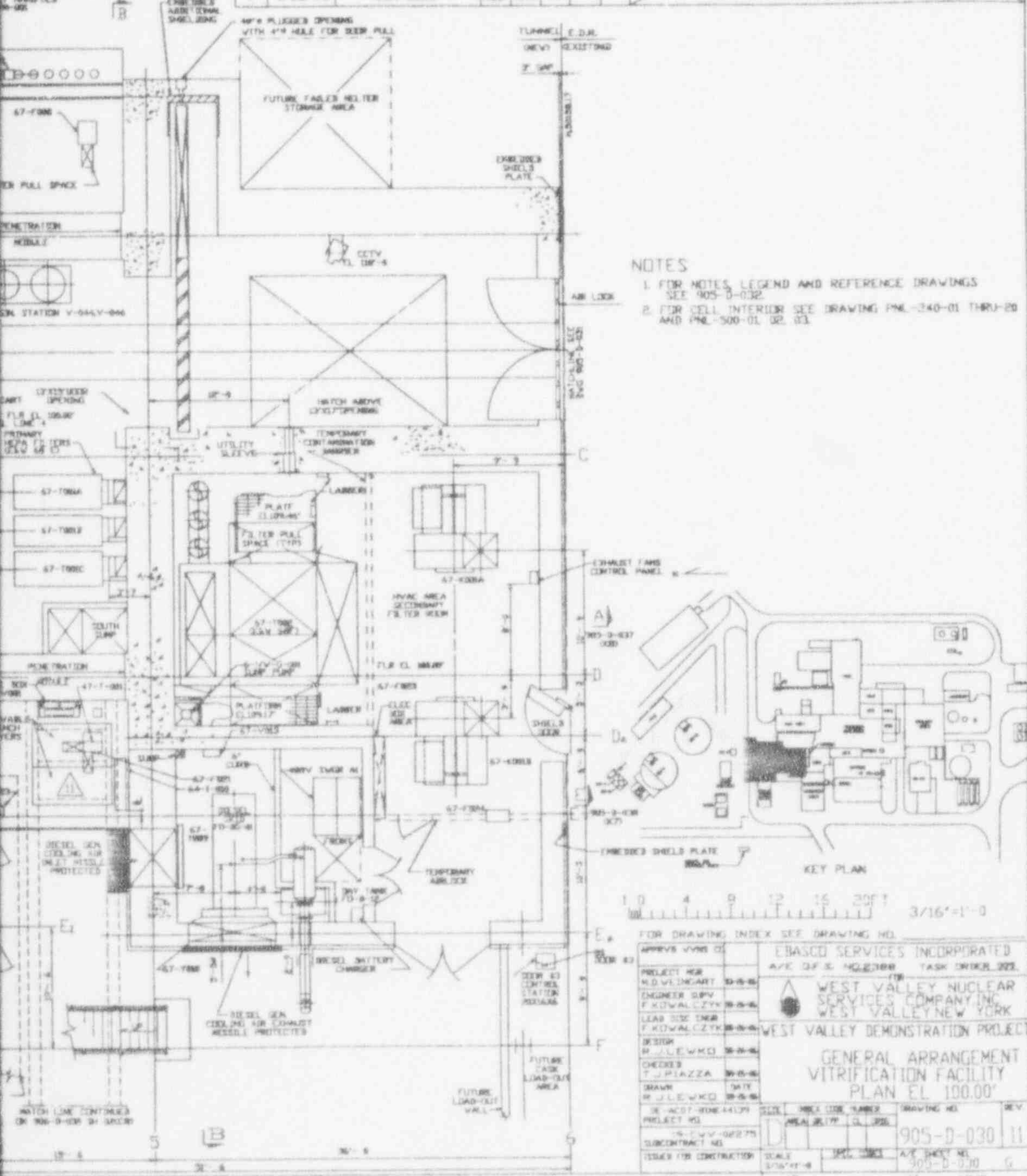
A/E SHEET NO. 906-D-026 A

CAD DRAWING - DO NOT REVISE THIS ORIGINAL

9406240136-25



905-D-030
N
HEAT TRACING PANEL
UTILITY STATION
TRANSFORMER
SAFETY SHOWER & EYE WASH
FIRE BLANKETS
HVAC OPENING
HATCH
REMOVABLE HATCH
CANISTER LEVEL DETECTION PIT
LADDER
UTILITY SILEEVES
ELEC EQUIP
PENETRATION MODULE
CANISTER TURN TABLE
WELD STATION
CERAMIC MELTER
CANISTER STORAGE RACK
TRACK
TOP OF RAIL
CABLE TROUGH
CABLE TRENCH
POWER CONTROLLER
BUS TRANSITION ENCLOSURE
PROCESS PIT
STUB WALL
SERVICE WALL
MIST ELIMINATOR
BRIDGE/RAIL USED FOR MELTER INSTALLATION & REMOVAL
MELTER ELECTRODE ENCLOSURE
NORTH SUMP (COVERED)
SUMP
SUBMERGED BED SCRUBBER TANK
FEED HOLD TANK
CONCENTRATOR FEED MAKEUP TK
HEATER
CONDENSER
SAMPLE TRANSFER STATION
WIRE FENCE
WASTE TRANSFER TRENCH (OUTSIDE)
WASTE TRANSFER TRENCH (INSIDE)
MANIPULATORS
DISCHARGE
CCW CIRC.PUMP
CV HEAT EXCHANGER
UTILITY STATION
PNEUMATIC TRANSF CONTROLS
EXISTING A' FIRE MAIN STUB
PUMP CONTROLS
PUMPS
COOLING WATER HOLD TANK
TRUCK UNLOADING BAY
LAB/CS ROOM
HEMS ROOM
OFF-GAS HEATER CONTROL CABINETS
TRENCH
PORTAL MONITOR
UNIT HEATER
LOUVER/DAMPER
RAMP (TYP)
ROLLUP DOOR
SUMP INVERT
COLD CHEMICAL AREA
LOUVER
UTILITY PIPING TO VITRIFICATION BUILDING



NO.	DATE	REVISION	DR	CH	APPROVED			NO.	DATE	REVISION	DR	CH	APPROVED		
G	06-30-89	GENERAL REVISION	R.R.	S.K.	R.A.	F.K. FSK	F.K.T.	F	11-11-86	GENERAL REVISION	R.A.	FSK	R.A.	FSK	RBV
9	7-13-89	ER 1646			JRH			C	04-05-87	GENERAL REVISION PER EBAR 851A DATED 3-19-87	T.K.	T.P.	R.A.	FSK	RBV
8	9/03/93	ECN 6468	JLH	HAB	BMD			D	11-04-87	GENERAL REVISION PER TA-612	T.K.	S.K.	R.A.	FSK	RBV
9	11/8/93	ECN 6788	JLH	HAB	D.JR			E	04-05-88	GENERAL REVISION PER TA-688 & 724	T.K.	K.B.	R.A.	FSK	RBV
10	12/17/93	ECN 7122 & 7357	BP	KQ	RMB	DLG		F	11-08-88	GENERAL REVISION PER EBAR NO. 1147	BFR	C.A.	R.A.	FSK / T.K.	F.K.T.
11	3/25/94	ECN 7652	VJC		JW										
5	12/15/92	ECN 5768, 5777	LRK	HAB	PAM S.R.										
6	1/13/93	ECN 5798	HJL	DRS	SP										
7	1/25/93	ECN 5325	HJL	DRS	PAM										

NOTES

1. FOR NOTES, LEGEND AND REFERENCE DRAWINGS SEE 905-D-032.
2. FOR CELL INTERIOR SEE DRAWING PNL-240-01 THRU-28 AND PNL-500-01, 02, 03.

KEY PLAN

3/16"=1'-0

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED
A/E O.F.S. NO. 2300 TASK ORDER 323

FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC.
WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT

GENERAL ARRANGEMENT
VITRIFICATION FACILITY
PLAN EL 100.00'

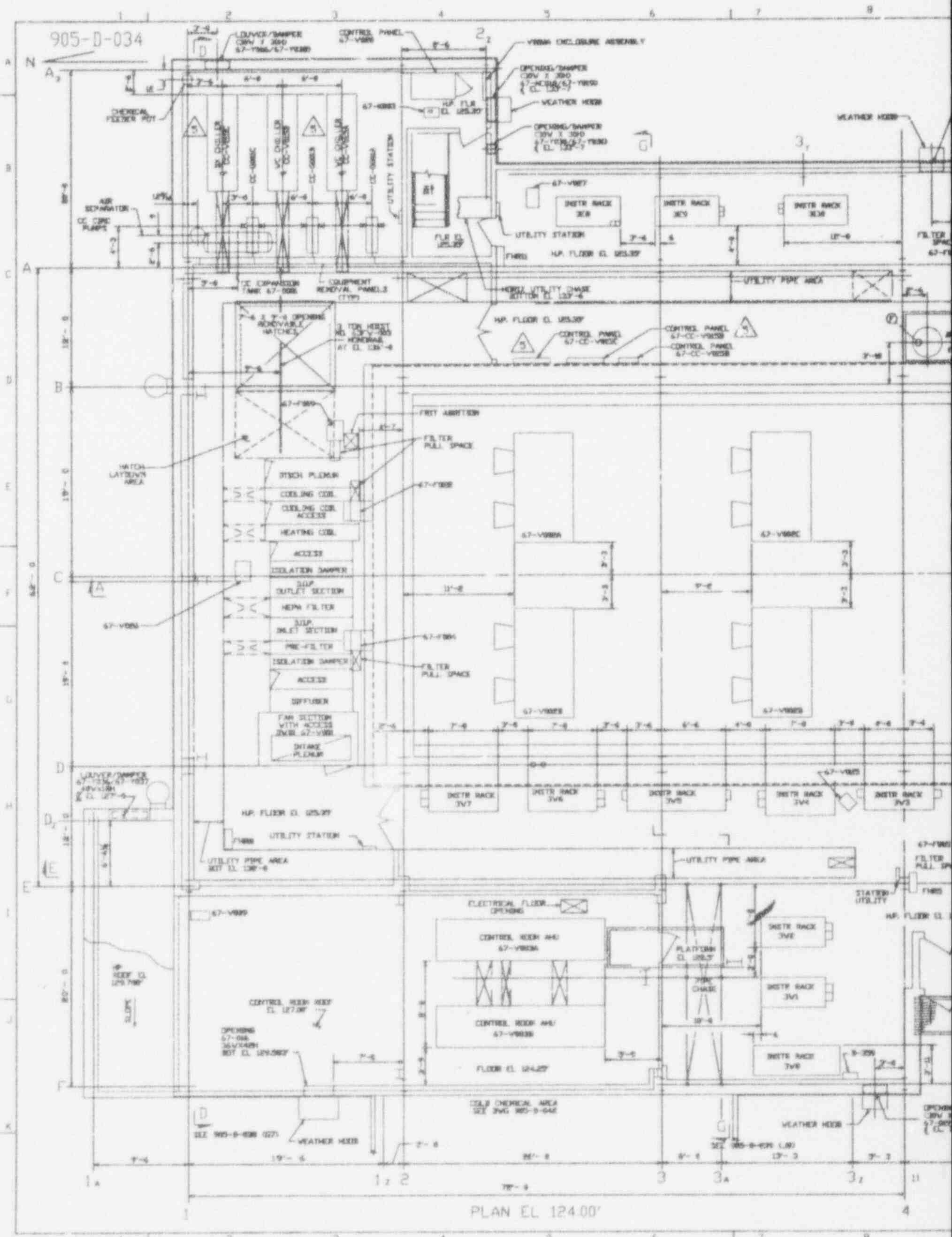
PROJECT MGR	M.D. WEINGART
ENGINEER SUPV	F. KOWALCZYK
LEAD DISC ENGR	F. KOWALCZYK
DESIGN	R.J. LEWKO
CHECKED	T.J. PIAZZA
DRAWN	R.J. LEWKO
PROJECT NO.	DE-AC07-81NE44139
SUBCONTRACT NO.	15-CWV-02275
SIZE	D
DRAWING NO.	905-D-030
REV	11
SCALE	3/16"=1'-0
A/E SHEET NO.	905-D-030 G

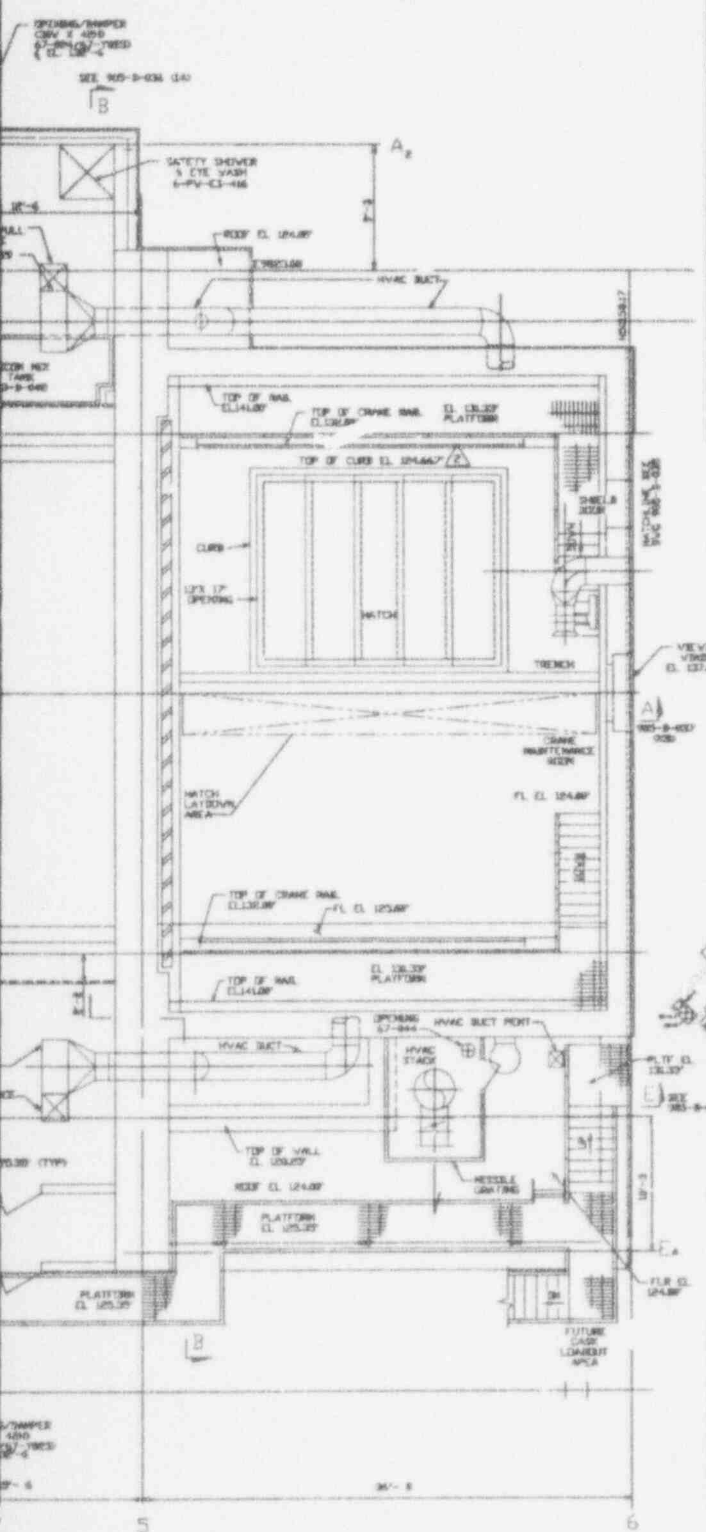
ISSUED FOR CONSTRUCTION

ANSTEC APERTURE CARD

Also Available on Aperture Card

9406240136-26

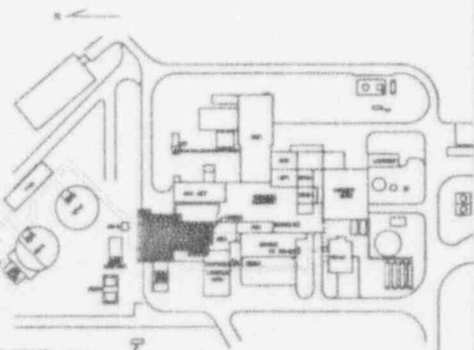

905-D-034
PLAN EL 124.00'
CHEMICAL FEEDER POT
AIR SEPARATOR
HATCH LAYDOWN AREA
UTILITY STATION
H.P. FLOOR EL 125.35'
INSTR RACK
FILTER PULL SPACE
COOLING COIL
HEATING COIL
ACCESS
ISOLATION DAMPER
HEPA FILTER
PRE-FILTER
DIFFUSER
INTAKE PLENUM
UTILITY PIPE AREA
CONTROL ROOM AHU
CONTROL ROOM ROOF
FLOOR EL 124.25'
PIPE CHASE
WEATHER HOOD
ELECTRICAL FLOOR OPENING



NO.	DATE	REVISION	DR	CH	APPROVED		
B	[illegible]-11-86	GENERAL REVISION	R.L.	FSK	R.A. DD	FSK	MDV
	04-21-87	GENERAL REVISION PER EBAR 851A DATED 3-19-87.	T.JK	T.J	R.A.	FSK	MDV
D	11-04-87	GENERAL REVISION PER TA-612	T.JK	S.JE	R.A.	FSK	MDV
E	04-21-88	GENERAL REVISION PER TA-688 & 724.	T.JK	RJS	R.A.	FSK	MDV
F	11-03-88	GENERAL REVISION PER EBAR NO. 1147	BFR	CW	R.A.	FSK F.JE	F.JES
G	[illegible]-30-89	GENERAL REVISION	P.JS	SE	R.A.	F.JE FSK	F.JES
0	07-13-89	ER 1646			JRH		
01		ECN 3387	MP	ATV			
2	5/24/91	ECN 4375	BAK	DRS	[illegible]		
3	5/26/92	ECN 5518	CGR	HAB	CVS		
4	4/5/93	ECN 5196	LRK	DRS	DJR		
5	2/8/94	ECN 7253	MJL	KQ	[illegible]		

NOTES

1. FOR NOTES, LEGEND AND REFERENCE DRAWINGS SEE 905-D-032.



KEY PLAN

1 0 4 8 12 16 20FT 3/16"=1'-0

FOR DRAWING INDEX SEE DRAWING NO. ____

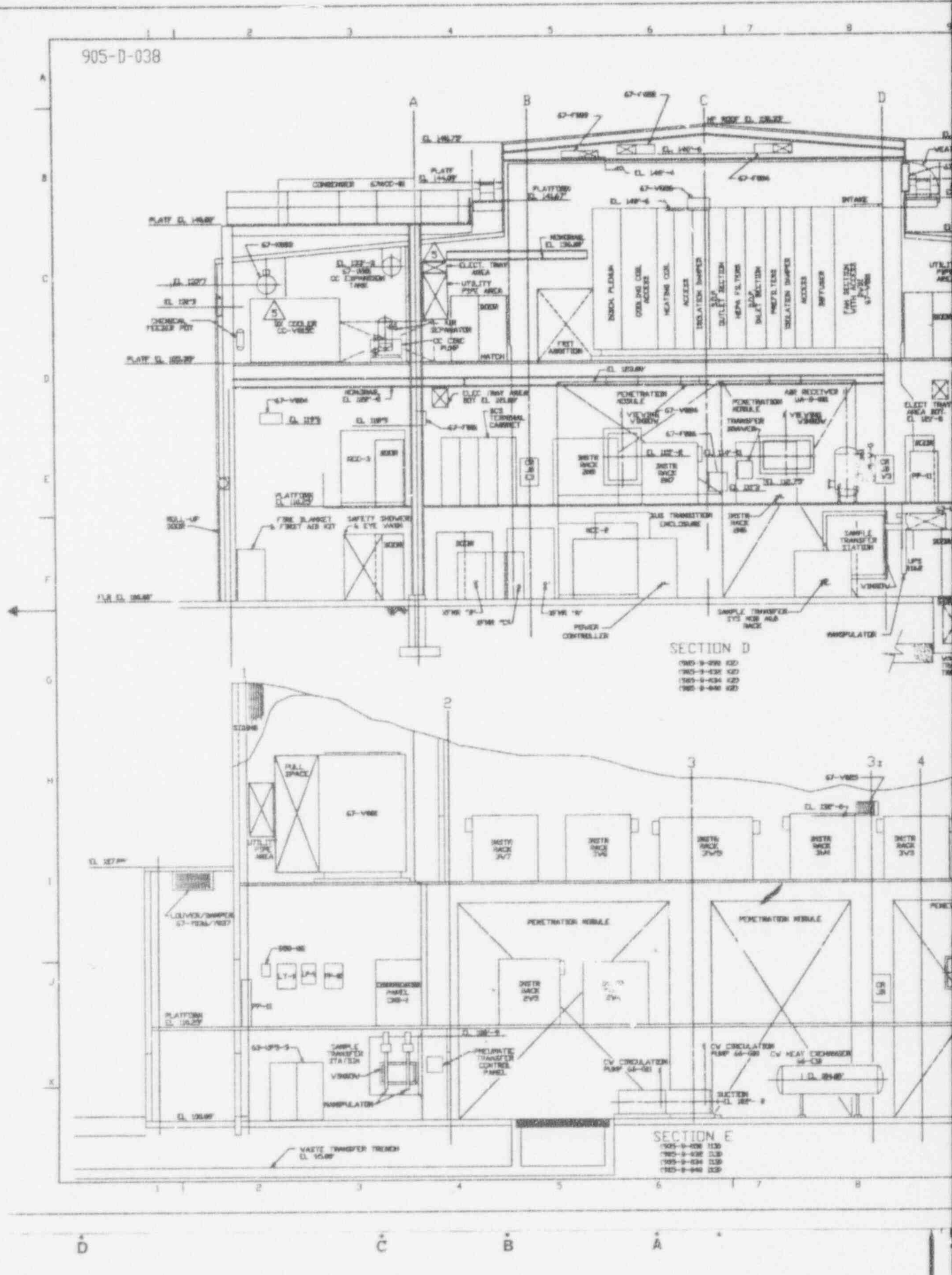
APPRVD WVNS QA	
PROJECT MGR M.D. WEINGART	
ENGINEER SUPV F. KOWALCZYK	
LEAD DISC ENGR F. KOWALCZYK	
DESIGN R.J. LEWKO	
CHECKED T.J. PIAZZA	
DRAWN R.J. LEWKO	DATE
DE-AC07-81NE44139 PROJECT NO.	
19-CWV-02275 SUBCONTRACT NO.	
ISSUED FOR CONSTRUCTION	

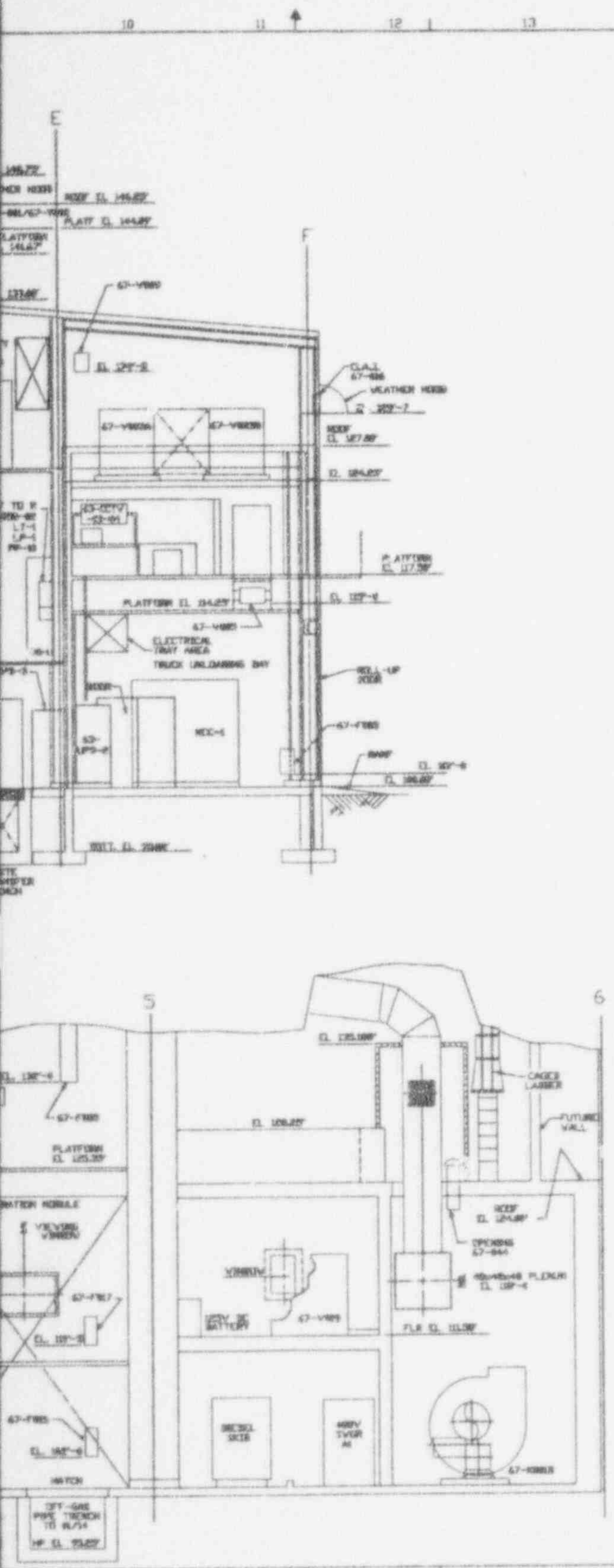
EBASCO SERVICES INCORPORATED
A/E O.F.S. NO.2398M TASK ORDER 005
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC.
WEST VALLEY, NEW YORK
WEST VALLEY DEMONSTRATION PROJECT

GENERAL ARRANGEMENT
VITRIFICATION FACILITY
PLAN EL 124.00' AND ABOVE

SIZE: D | DRAWING NO.: 905-D-034 | REV: 5
SCALE: 3/16"=1'-0 | A/E SHEET NO.: 905-D-034 | G

9406240136 - 27


905-D-038
SECTION D
SECTION E
PENETRATION MODULE
CONDENSER
INTAKE
SAMPLE TRANSFER STATION
MANIPULATOR
POWER CONTROLLER
WASTE TRANSFER TRENCH



NO.	DATE	REVISION	DR	CH	APPROVED		
B	[illegible]		TJK	[illegible]	R.L.	FSK	[illegible]
GENERAL REVISION PER TA-[illegible]/24 & 736.							
C	11-03-[illegible]		[illegible]	CA	R.L.	FSK F.K.	F.KS
GENERAL REVISION PER EDAR NO. 1147							
D	[illegible]		P.S.	SE	[illegible]	F.K. FSK	F.KS
GENERAL REVISION							
0	07-13-[illegible]	ER 1646			[illegible]		
01	[illegible]	ECN 3387	[illegible]	ATV			
2	[illegible]	ECN 4375	[illegible]	[illegible]	[illegible]		
3	[illegible]	ECN 5798	[illegible]	[illegible]	[illegible]		
4	4/5/93	ECN 5196	[illegible]	[illegible]	[illegible]		
5	[illegible]	ECN 7253	[illegible]	KR	[illegible]		

NOTE

FOR NOTES, LEGEND AND REFERENCE DRAWINGS SEE DRAWING 905-D-032.

1 0 4 8 12 16 20FT 3/16"=1'-0

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED
A/E O.F.S. NO.2388 TASK ORDER 329
FOR
WEST VALLEY NUCLEAR SERVICES COMPANY, INC.
WEST VALLEY, NEW YORK
WEST VALLEY DEMONSTRATION PROJECT

GENERAL ARRANGEMENT
VITRIFICATION FACILITY
SECTIONS

APPRVD WVNS CO.	
PROJECT MGR M.D. WEINGART	[illegible]
ENGINEER SUPV F.S.KOWALCZYK	[illegible]
LEAD DISC ENGR F.S.KOWALCZYK	[illegible]
DESIGN R.J.LEWKO	[illegible]
CHECKED S.J.ELIA	[illegible]
DRAWN T.J.KITZ	DATE [illegible]
DE-AC07-81NE44139 PROJECT NO.	
13-CWV-32275 SUBCONTRACT NO.	
ISSUED FOR CONSTRUCTION	

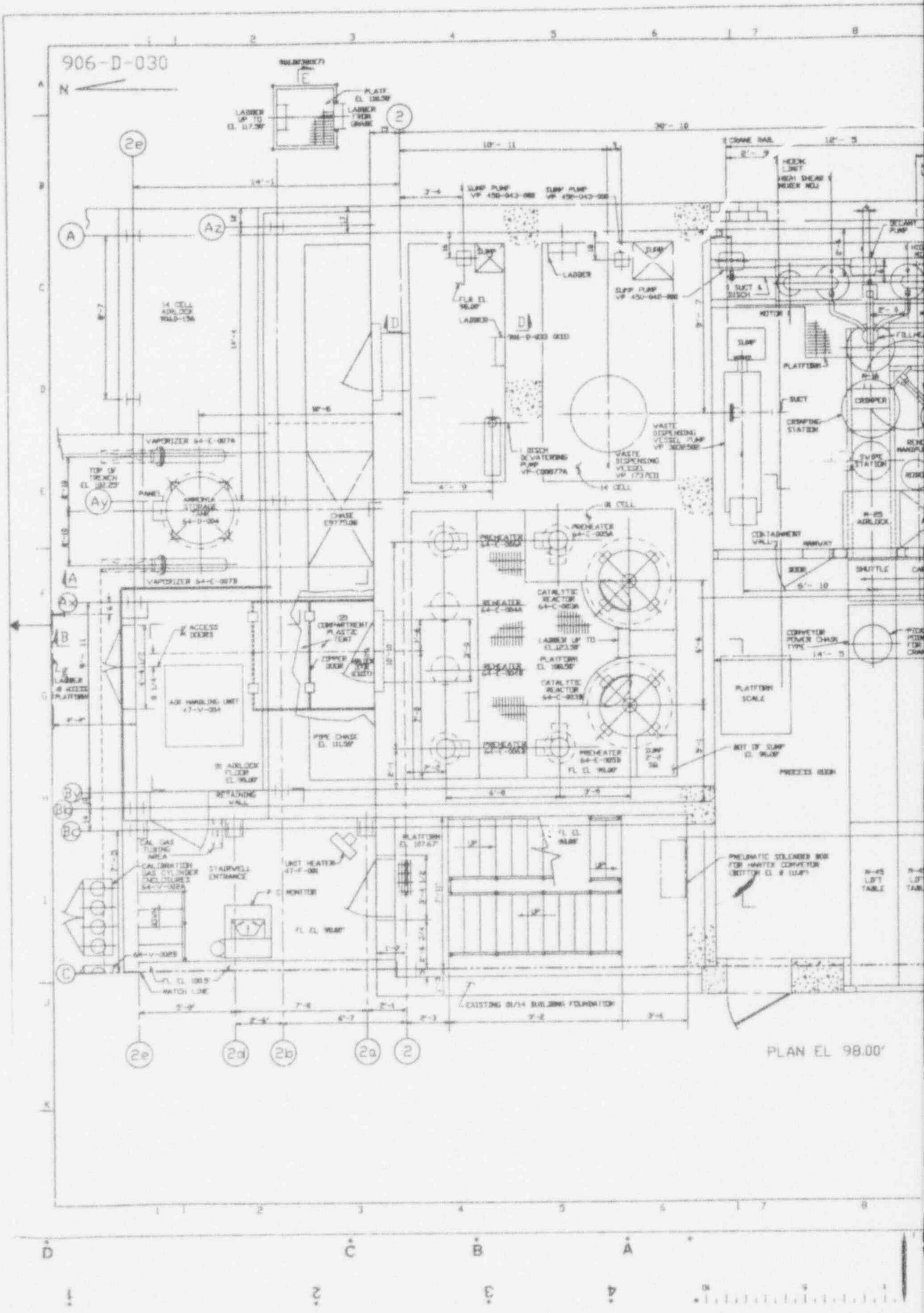
SIZE D | INDEX CODE NUMBER: AREA, BKTYP, CL, DWG | DRAWING NO. 905-D-038 | REV. 5

SCALE 3/16"=1'-0 | SPEC CODE | A/E SHEET NO. 905-D-038 | D

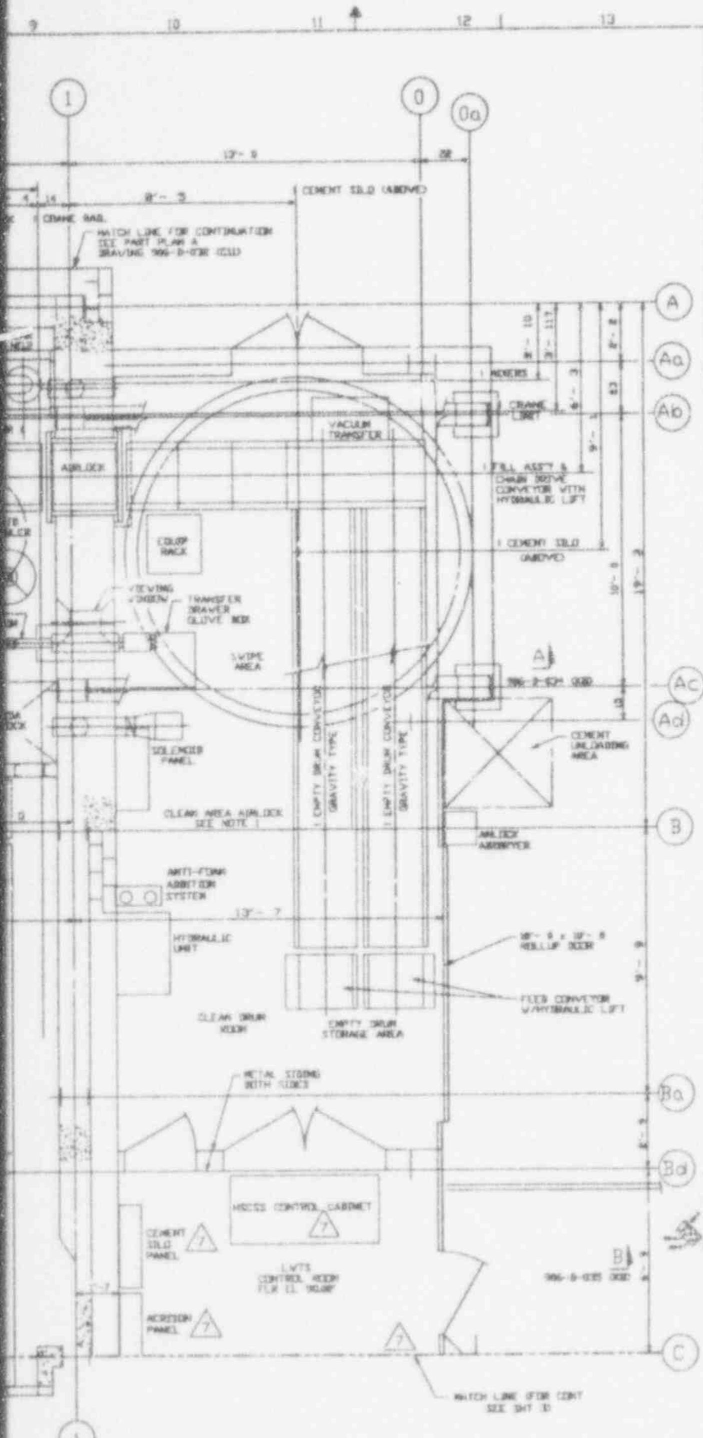
ANSTEC APERTURE CARD

Also Available on Aperture Card

9406240136-28



906-D-030
N
14 CELL AIRLOCK
VAPORIZER 64-E-007A
VAPORIZER 64-E-007B
AMMONIA STORAGE TANK 64-D-004
AIR HANDLING UNIT 47-V-004
CHASE
PIPE CHASE
PREHEATER
CATALYTIC REACTOR
WASTE DISPENSING VESSEL
SUMP PUMP
LADDER
PLATFORM
CRIMPER
SWIPE STATION
PLATFORM SCALE
PROCESS ROOM
STAIRWELL ENTRANCE
UNIT HEATER 47-F-001
RETAINING WALL
EXISTING 01/14 BUILDING FOUNDATION
MATCH LINE
PNEUMATIC SOLENOID BOX FOR HARTEX CONVEYOR
LIFT TABLE
SHUTTLE
PLAN EL 98.00'



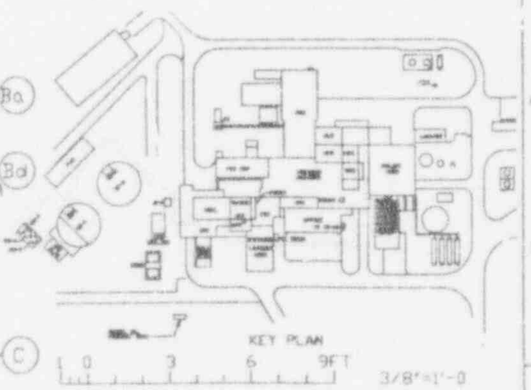
NO.	DATE	REVISION	DR	CH	APPROVED		
D	09-27-90	GENERAL REVISION	YB	GMG	R.A.	FSK	FJES
C	12-07-90	GENERAL REVISION	YB	JMG	R.A.	FSK	FJES
0	9-24-91	ER 2193			JRH		
7	04/12/94	ECN 7615	BP				
2	03-02-93	ECN 5996	SRC	KMO	RM		
3	03-22-93	ECN 6104	DAK	HAB	JHK		
4	05-06-93	GEN REV/ECN 6323	JLH	DRS	JHK		
5	05-14-93	ECN 6290	HJL	HAB	DJR		
6	07-19-93	GEN REV/ECN 6524	WCK				

NOTES

1. THESE GENERAL ARRANGEMENTS 906-D-030 THRU 035 SUPERSEDE EBASCO GENERAL ARRANGEMENTS 902-D-033 THRU 038 IN THEIR ENTIRETY.

REFERENCE DRAWINGS

GENERAL ARRANGEMENT-01/14 BUILDING PLAN EL 116.50'	906-D-031
GENERAL ARRANGEMENT-01/14 BUILDING PLAN EL 130.00' & SECTIONS	906-D-032
GENERAL ARRANGEMENT-01/14 BUILDING PLAN EL 144.00' & SECTIONS	906-D-033
GENERAL ARRANGEMENT-01/14 BUILDING SECTIONS	906-D-034
GENERAL ARRANGEMENT-01/14 BUILDING SECTIONS	906-D-035
CHANGE ROOM EXTENSION ARRGT&FDTNS	900-D-037 900-D-038
TRUCK LOADOUT EXTENSION ARRGT&FDTNS	900D-1380 900D-1479 900D-1480
LWTS CONTROL ROOM EXTENSION ARRGT'S	900D-1180 900D-1385 900D-389 SH4
01/14 BLDG EXISTING FOUNDATIONS	2401-01-801-2
OFF-GAS TRENCH ARRGT	906-D-030 SH2
SHOWER/EYE WASH STATION	906-D-083 SH1
FIRE WATER LINES	900-D-253 900D-4464 SH1 15R-L-81
CATCH BASINS	900D-4798 SH1
HVAC PLANS 01/14 BLDG	906D-430 THRU 906D-436
HANTEK CONVEYOR CONTROL ENCL	906D-1512
STAIRWELL @ EL 98'-0	906D-121



KEY PLAN

0 3 6 9FT 3/8"=1'-0

FOR DRAWING INDEX SEE DRAWING NO.

EBASCO SERVICES INCORPORATED

FOR WEST VALLEY NUCLEAR SERVICES COMPANY, INC. WEST VALLEY, NEW YORK

WEST VALLEY DEMONSTRATION PROJECT
VITRIFICATION FACILITY
GENERAL ARRANGEMENT
01/14 BUILDING PLAN EL 98.00'

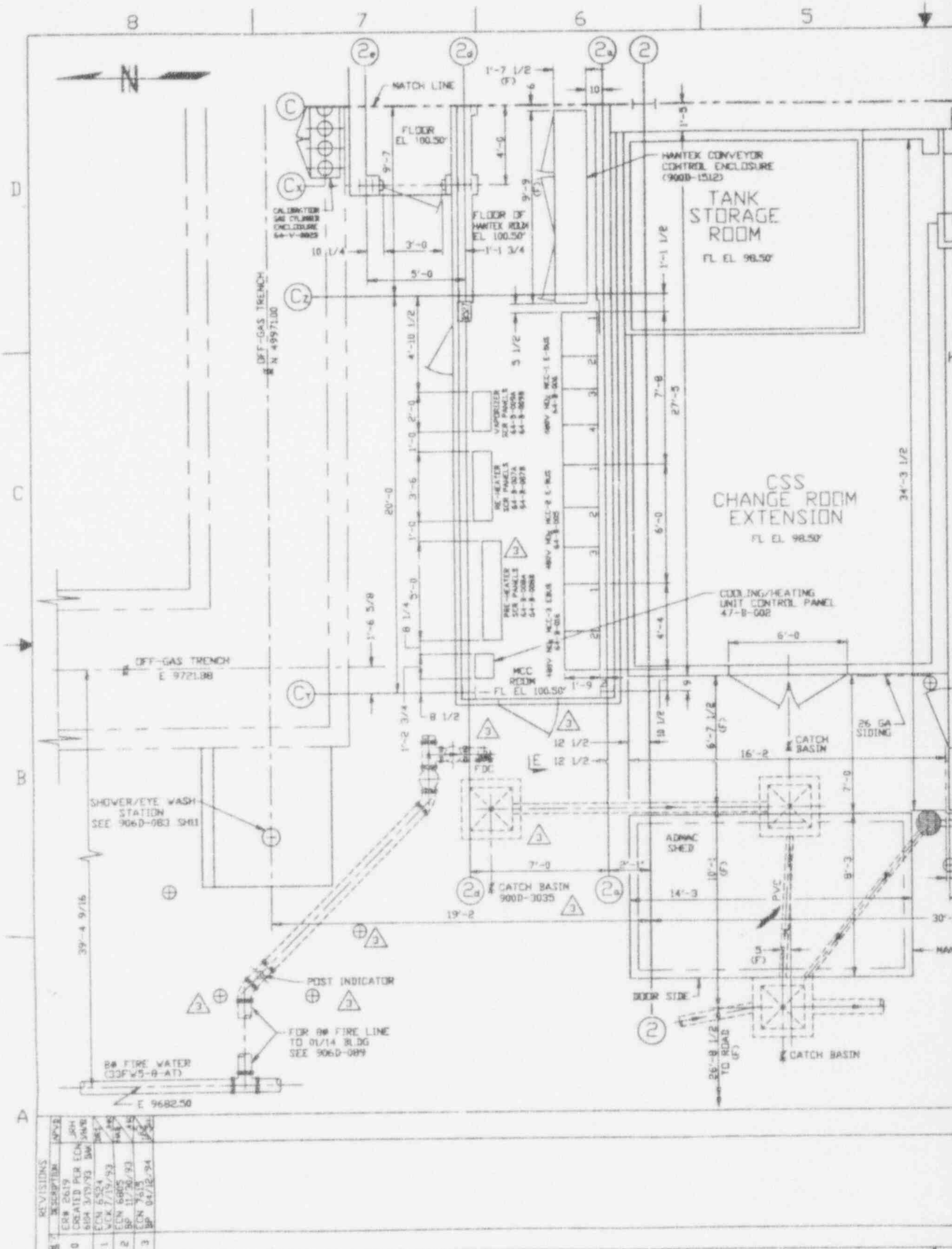
PROJECT MGR F. J. E. STOREY
ENGINEER SUPV F. S. KOWALCZYK
LEAD DISC ENGR F. S. KOWALCZYK
DESIGN R. J. LEVKO
CHECKED P. PANASCI
DRAWN R. J. LEVKO

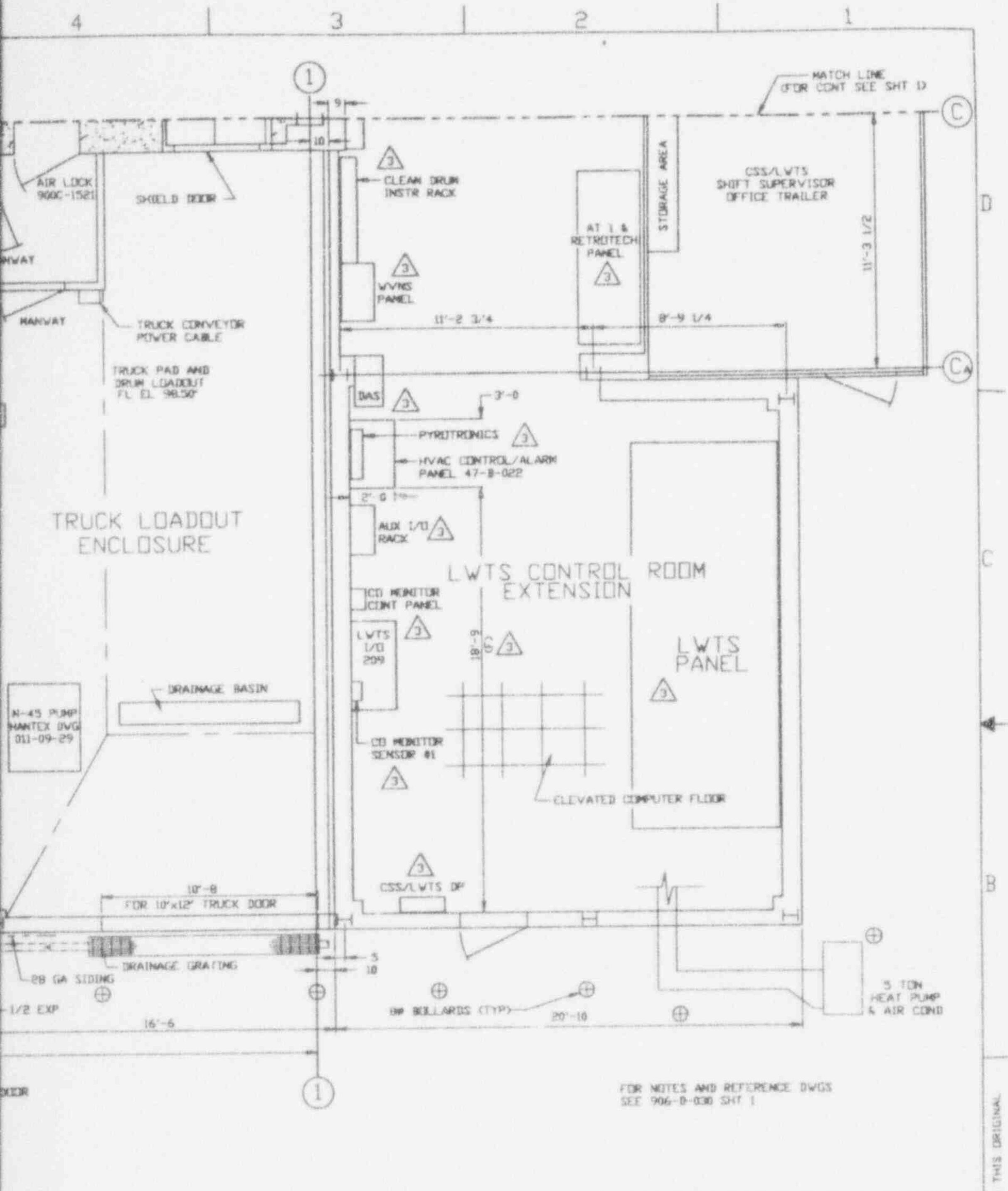
SIZE D — DRAWING NO. 906-D-030 — REV. 7

SCALE 3/8"=1'-0 — A/E SHEET NO. 906-D-030 SH1 C

ISSUED FOR CONSTRUCTION

9406240136 -29


N
MATCH LINE
FLOOR EL 100.50'
HANTEK CONVEYOR CONTROL ENCLOSURE (900D-1512)
TANK STORAGE ROOM
FL EL 98.50'
FLOOR OF HANTEK ROOM EL 100.50'
OFF-GAS TRENCH N 4997.00
VAPORIZER SCR PANELS
RE-HEATER SCR PANELS
PRE-HEATER SCR PANELS
CSS CHANGE ROOM EXTENSION
FL EL 98.50'
COOLING/HEATING UNIT CONTROL PANEL 47-B-G02
OFF-GAS TRENCH E 9721.88
MCC ROOM
FL EL 100.50'
FDC
CATCH BASIN
26 GA SIDING
SHOWER/EYE WASH STATION SEE 906D-083 SH11
ADWAC SHED
CATCH BASIN 900D-3035
PVC
POST INDICATOR
FOR 8" FIRE LINE TO 01/14 BLDG SEE 906D-089
DOOR SIDE
8" FIRE WATER (33FW5-8-AT)
E 9682.50
26'-8 1/2 TO ROAD (F)
CATCH BASIN
REVISIONS
ER# 2619
CREATED PER ECN
ECN 6524
ECN 6805
ECN 7618



QTY REQD	ITEM NO	NOMENCLATURE OR DESCRIPTION	PART OR IDENTIFYING NO.	MATERIAL OR SPEC

PARTS LIST

UNLESS OTHERWISE SPECIFIED
ALL DIMS IN INCHES
TOLERANCES-DO NOT SCALE

2 PL DEC	3 PL DEC	ANGLES
± N/A	± N/A	± N/A

FRACTIONS ± N/A
DLSPEC NO
NEXT ASSEMBLY

DRAFTER	D. KUREK	DATE 3/19/93
CHECKED	H BARKER	DATE 05/11/93
ENGR	J H KRUZICKI	DATE 05/11/93
COG MGR APPVL	T E COTTRELL	DATE 5/12/93
SYS ENGR APPVL	R F VANCE	DATE 14 MAY 93
QA APPVL	R N KRAPF	DATE 5/13/93
OPTS SUPR	JOHN HORTON	DATE 5/14/93

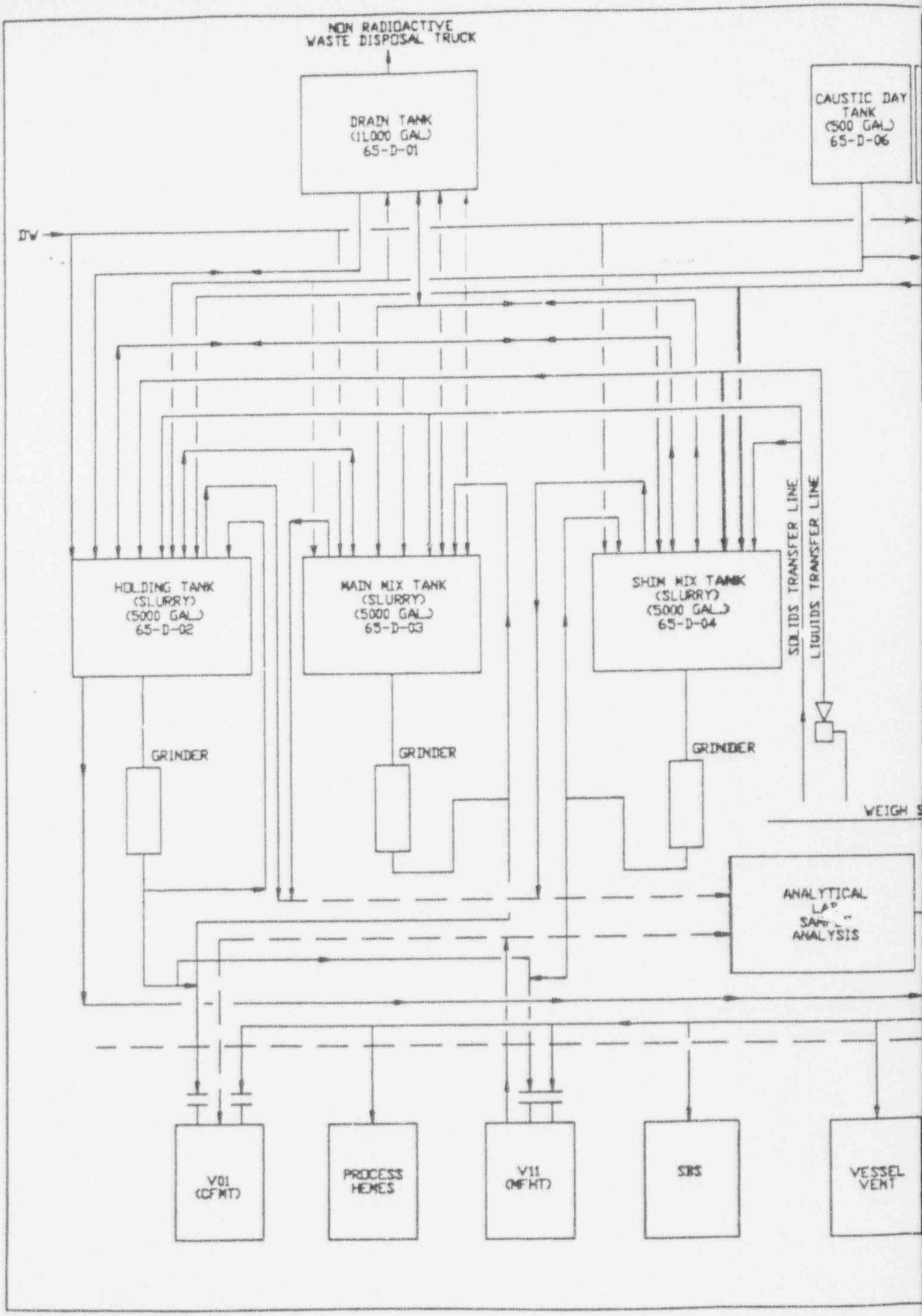
A/E DRAWING NO.
CONF BEAT NO
FOR
WEST VALLEY NUCLEAR SERVICES CO., INC.
WEST VALLEY, NEW YORK

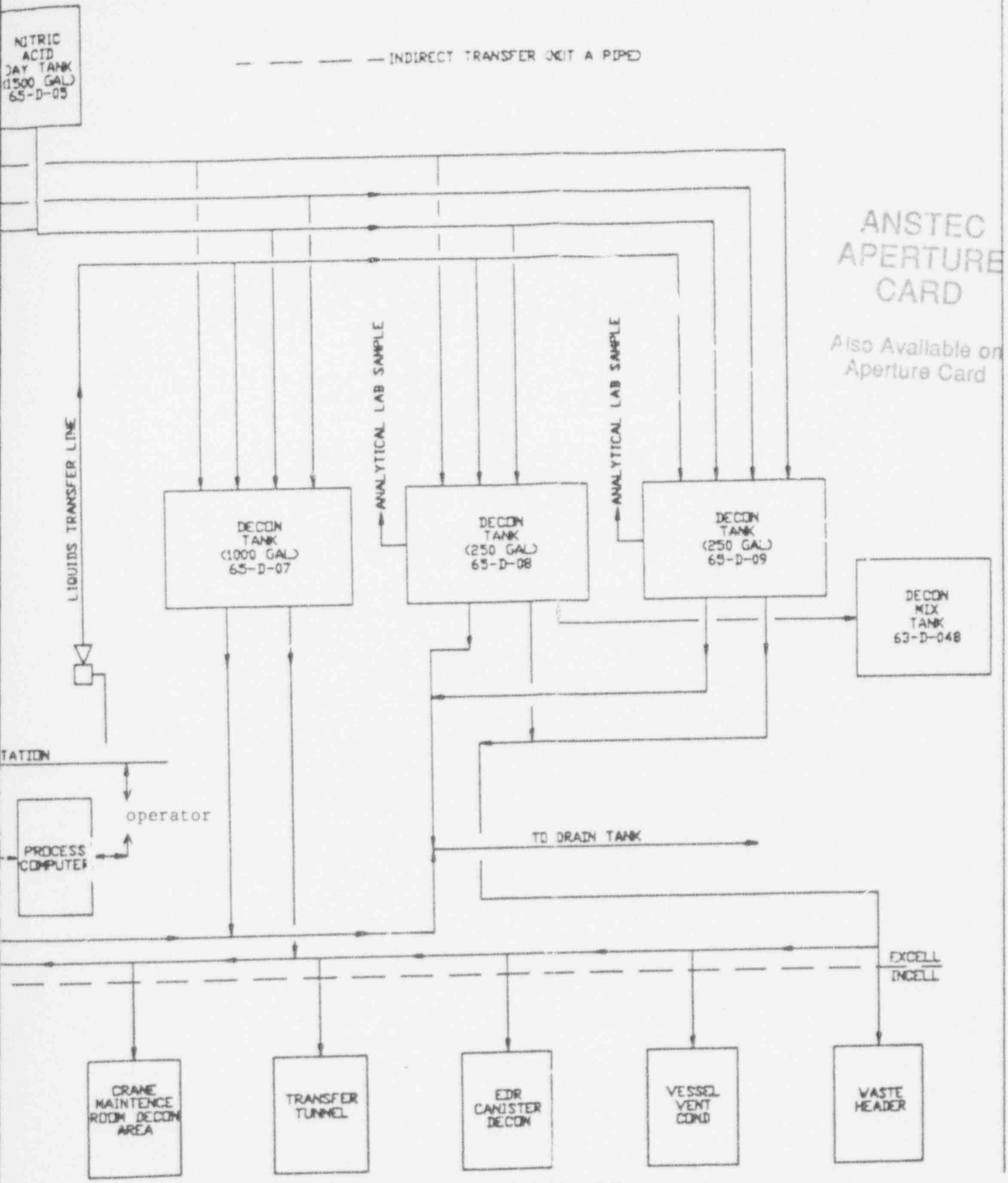
WEST VALLEY DEMONSTRATION PROJECT
VITRIFICATION FACILITY
GENERAL ARRANGMENT
01/14 BUILDING PLAN EL 98.00'

DWG SIZE D | SCALE 3/8"=1'-0 | WEIGHT | DWG NO. 906-D-030 | REV 3
A/E DWG NO. | SHEET 3 OF
PLOT: 1=32

CAD DRAWING-DO NOT REVISE THIS ORIGINAL

9406240136-30


NON RADIOACTIVE WASTE DISPOSAL TRUCK
DRAIN TANK (1,000 GAL) 65-D-01
CAUSTIC DAY TANK (500 GAL) 65-D-06
DW
HOLDING TANK (SLURRY) (5000 GAL) 65-D-02
MAIN MIX TANK (SLURRY) (5000 GAL) 65-D-03
SHIM MIX TANK (SLURRY) (5000 GAL) 65-D-04
SOLIDS TRANSFER LINE
LIQUIDS TRANSFER LINE
GRINDER
GRINDER
GRINDER
ANALYTICAL
ANALYSIS
V01 (CFMT)
PROCESS HEMES
V11 (MFHT)
SBS
VESSEL VENT



NOTE: THIS DIAGRAM IS A SCHEMATIC REPRESENTATION OF THE MAJOR FLOWS. FOR ACCURACY AND DETAIL SEE COLD CHEMICAL SYSTEM P & ID'S HDS: 905D-015, 905D-016, 905D-017, 905D-018.

Figure 2.2.2-1
Cold Chemical System Flow Diagram