GPU Nuclear

GPU Nuclear Corporation
Post Office Box 480
Route 441 South
Middletown, Pennsylvania 17057-0191
717 944-7621
TELEX 84-2386
Writer's Direct Dial Number:

(717) 948-8461

June 22, 1988
4410-88-L-0094/0185P

US Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Dear Sirs:

Three Mile Island Nuclear Station, Unit 2 (TMI-2)
Operating License No. DPR-73
Docket No. 50-320
Annual Update of Auxiliary Building Emergency Liquid Clean-up System
(EPICOR II)
System Description

As requested by NRC Letter dated February 4, 1982, GPU Nuclear has performed the annual review of the Auxiliary Building Emergency Liquid Clean-up System (EPICOR II) System Description. Revision 6 of the System Description is attached for your information.

Sincerely,

F. R. Standerfer
Director, TMI-2

EDS/emf

Attachment

cc: Senior Resident Inspector, TMI - R. J. Conte
Regional Administrator, Region 1 - W. T. Russell
Director, Plant Directorate IV - J. F. Stolz
Systems Engineer, TMI Site - L. H. Thonus

A001
1/1

8806290292 880622
PDR ADOCK 05000320
P DCD

GPU Nuclear

S D 3526-004 REV 6

ISSUE DATE June 1988

☒ ITS
☐ NSR
☐ NITS

DIVISION

SYSTEM DESCRIPTION

FOR

Auxiliary Building Emergency

Liquid Clean-up System (EPICOR II)

COG ENG Stephen J. Richfield DATE 6-6-88

RTR Thomas O. Goshalill DATE 6-6-88

COG ENG MGR [illegible] DATE 6-8-88

DOCUMENT PAGE 1 OF 92

8806290293 880622
PDR ADOCK 05000320
P DCD

Rev.	SUMMARY OF CHANGE	Approval	Date
0	Initial issue per GPU Nuclear letter 4410-82-L-0017.		2/82
1	Updated per GPU Nuclear letter 4410-83-L-0078.		4/83
2	Updated per GPU Nuclear letter 4410-84-L-0023.		2/84
3	Updated per GPU Nuclear letter 4410-85-L-0074. Incorporated ECM 3475.8, Revision 8.		4/85
4	Updated per GPU Nuclear letter 4410-86-L-0069.		4/86
5	Annual update to reflect the current operating configuration of the EPICOR II system. Adds further detail as to the operation of the Transfer Pump ALC-P-5 in Section 2.1.2. Revised the description of demineralizer ALC-F-1 in Section 2.1.3. Revised Section 2.1.19 concerning system isolation valves. Adds new Section 3.4.2 and 3.4.3.		5/87
6	Annual update to reflect the following: a. Clarification of Section 1.0 regarding approved receiving tanks for EPICOR II processed water and routine/nonroutine operations. b. Installation of a stainless steel ALC-P-5 transfer pump has changed Section 2.1.2 and Table 2 regarding total dynamic head. c. Replacement of ALC-RE-18 (ALC Ventilation Rad Monitor) required modification to Section 2.2.2.4 and Tables 10 & 12. d. Table 15 (ALC Valve List) has been expanded to include two new valves added for MMA 3526-87-0010 (ALC-F-1 Bypass). e. Table 15 also now includes the descriptions of "WG" valves commonly used when processing MWHT, RCBTs, and Neutralizer Tanks through EPICOR II. When the "TANKFARM" S.D. #3230-003 was cancelled, these "WG" valves should have been incorporated into S.D. #3526-004.		6/88

TABLE OF CONTENTS

SECTION		PAGE
1.0	INTRODUCTION	5
1.1	System Functions	5
1.2	Summary Description of the System	6
1.3	System Design Requirements	7
2.0	DETAILED DESCRIPTION OF THE SYSTEM	11
2.1	Components	11
2.2	Instruments, Controls, Alarms, and Protective Devices	25
3.0	PRINCIPAL MODES OF OPERATION	28
3.1	Startup	28
3.2	Normal Operation	29
3.3	Shutdown	30
3.4	Special or Infrequent Operation	31
3.5	Emergency	32
4.0	HAZARDS AND PRECAUTIONS	33

TABLE OF CONTENTS (Cont'd)

TABLE		PAGE
1.	EPICOR II Pumps	34
2.	Transfer Pump	35
3.	Filters	36
4.	Demineralizers	37
5.	Miscellaneous Waste Hold-up Tank	38
6.	Clean Water Receiving Tank	39
7.	Off-Spec Water Receiving/Batch Tank	40
8.	Sump Pump, Chemical Cleaning Building	41
9.	Monorail Hoist System	42
10.	CCB Ventilation System Nameplate Data	43
11.	Air Compressors	44
12.	Instrumentation and Controls	45
13.	Radwaste Processing System (EPICOR II)	54
14.	Radwaste Processing System (EPICOR II)	56
15.	Valve List	57
16.	Radwaste Processing System (EPICOR II)	92

1.0 INTRODUCTION

1.1 System Functions

The functions of the Auxiliary Building Emergency Liquid Clean-up (EPICOR II) System are:

1.1.1 To decontaminate, by filtration and ion exchange, radioactive waste water contained in TMI Unit 2, or to serve as a polishing ion exchanger system for the Submerged Demineralizer System (SDS).

1.1.2 To transfer EPICOR II processed water from the Clean Water Receiving Tank (CC-T-2) to the following tanks:

a. Processed Water Storage Tanks (PW-T-1 or 2).

b. Off-Spec. Water Receiving Batch Tank (CC-T-1) to be used for decontamination of the Reactor Building and Auxiliary/Fuel Handling Buildings. CC-T-1 is also used for recycle processing when required.

c. Evaporator Condensate Test Tanks (ECTTs or WDL-T-9A/B) to be used for various decontamination activities and make-up water/chemical additions via the Boric Acid Mix Tank (BAMT).

NOTE: The transfer to WDL-T-9A/B passes through Unit 1 Turbine Building, but is physically isolated from all Unit 1 systems.

d. On a non-routine basis to either the Condensate Storage Tank (CO-T-1A), Borated Water Storage Tank (BWST) or the "B" Spent Fuel Storage Pool via the Truck Fill Station.

1.1.3 To provide remote handling of spent resin containers from their position inside the Chemical Cleaning Building to the transport cask and truck.

1.1.4 To limit releases of radioactive material to the environment to "as low as reasonably achievable."

1.1.5 To provide for operation, and maintenance of the liquid cleanup system in compliance with "as low as reasonably achievable" radiation doses to personnel.

1.1.6 To accomplish the above independently from TMI Unit-1 (for exception see NOTE above).

1.2 Summary Description of the System

The Auxiliary Building Emergency Cleanup System, as the name implies, was designed and constructed originally for the primary purpose of processing and cleaning up the accident-generated water that collected in Auxiliary Building. It has, since then, evolved into a radwaste liquid processing system, differentiated from a regular radwaste liquid processing facility, in that the water processed by the former is accident-generated. The system is currently referred to as EPICOR II.

The system consists of a liquid radwaste process system which is located in the Chemical Cleaning Building. It decontaminates, by filtration and ion exchange, radioactive waste water contained in the Auxiliary Building, Fuel Handling Building, Service Building, and Reactor Building of TMI Unit 2. Contaminated water is pumped from a connection located on the Miscellaneous Waste Holdup Tank (WDL-T-2) by a pump located in the Chemical Cleaning Building through the yard and into the process system, or it will be obtained from the Monitor Tanks SDS-T1A/T1B, or the Contaminated Drain Tanks, or Reactor Coolant Bleed Tanks (RCBT's) or the Neutralizer Tanks WDL-T-8A and B. Yard piping is shielded and enclosed within a guard pipe, the open end of which terminates inside the Chemical Cleaning Building.

The primary process system consists of three demineralizers (ALC-F-1, ALC-K-1, and ALC-K-2), connected in series. Waste liquid is transferred from the Source Tank (MWHT, WDL-T-8A/B, RCBT, CDT, or SDS-T1A/T1B) through the demineralizers, to the Clean Water Receiving Tank (CC-T-2). Change-out Criteria for the various units are indicated in Table 13, 14, and 16.

Processed water is delivered to the Clean Water Receiving Tank (CC-T-2) for sampling and analysis. The processed water is either pumped to the Liquid Waste Disposal System of TMI Unit 2, the Spent Fuel Storage Pool, the PWST's, the BWST, CO-T-1A, WDL-T-9 A/B or the truck fill station for transfer to the NLB Pump if within specification. Additionally, the processed water can be transferred to the Off-Spec Water Receiving Batch Tank (CC-T-1) for recycling through the process system or use in the decontamination of the Reactor Building or Auxiliary and Fuel Handling Buildings. Reprocessing under a feed and bleed scheme (via CC-T-2) can be done if it does not meet the end process criteria, but is not a routine operation since feed and bleed processing requires a long time to accomplish.

The Chemical Cleaning Building (CCB) has been made into a low leakage confinement building and provided with an exhaust ventilation system to maintain the building at a negative pressure.

Moisture separators, HEPA filters, and charcoal filters have been provided in the exhaust ventilation system in order to filter the building air before it is released to the stack at the roof line of the CCB. All effluent air is monitored for radioactivity at this point. Provisions for grab samples are available.

Normal operation of the processing system is by remote means except for infrequent operations such as sampling, spent resin container removal and new resin container installation. All remote system operations are controlled from the TV Monitor Control Building located outside the northwest corner of the Chemical Cleaning Building.

Remote handling of spent resin containers from their position inside the Chemical Cleaning Building to the transport cask and truck is via a remotely operated twenty-ton monorail hoist system.

A fire protection system is installed in the HVAC equipment room, the Control Building and the CCB. A 4" tie-in to the existing fire main supplies a sprinkler system in the TV Monitor Control Building and a hose station in the CCB, as well as the sprinkler line to the air filtration unit charcoal filters. The key to the lock on the valve for this sprayline is kept in the Auxiliary Building Emergency Liquid Clean-up System Control Room which is also known as the TV Monitor and Control Building. Line and grid pressure indication is provided in the Control Building.

The system interfaces with the TMI Unit 2 Radwaste Disposal Miscellaneous Liquids System, Demineralized Water System, the Submerged Demineralizer System, the Processed Water Storage System, the BOP Electrical System, Service Air System, the Unit I Liquid Waste Disposal System, Fire Protection System, and the Unit 2 Radwaste Disposal Reactor Coolant Liquid System.

NOTE: Although there is an interface with the Unit I Liquid Waste Disposal System, the Unit I System will not be used. In this respect Unit II will function independently. Valve ALC-V169 shall remain locked closed (unless transferring CC-T-1 or -2 to the "B" Spent Fuel Pool) and a spectacle flange is installed downstream of valve ALC-V169 at the transition between Unit 1 and Unit 2 Liquid Radwaste Systems. Valves downstream of ALC-V169 are no longer accessible to Unit 2 operators due to unit separation.

1.3 System Design Requirements

1.3.1 Process System Design Requirements

1.3.1.1 The process line pipe size is nominally 2" schedule 40 based upon the EPICOR II system flow rate of 10-30 gpm. Other line sizes are based on service requirements and function, such as service air, demineralized water, recirculation and sampling.

1.3.1.2 Pumps ALC-P-1 through P-4 have hose connections and are provided with drip trays to collect leakage. Drip trays have nozzles as close to the bottom of the tray as possible and are served by flexible tubing which leads to the nearest floor or equipment drain using the floor slope to induce flow. This tubing will be placed well down into the floor drain.

1.3.1.3 Remote system operations are directed and controlled from outside of the Chemical Cleaning Building from the TV Monitor and Control Building. This area is provided with remote closed circuit television monitoring of the operating areas inside and outside the Chemical Cleaning Building.

1.3.1.4 Process instrumentation consists of pH, and conductivity monitors. Resin bed radiation levels, process line radiation levels, process flow rates, process totalizers, and tank/demineralizer levels are also monitored. Accelerometers for P-1 through P-4 are provided for equipment protection and an alternate method to determine processing flowrates.

1.3.1.5 The system tank vents are provided with in line heaters, demister filters, and charcoal filters for adsorption of evolved iodine. These units are sloped to drain demisted liquids back into the system tanks.

1.3.1.6 Liquid waste feed to the system will be drawn from the Source Tank (MWHT, RCBT, SDS-T1A/T1B, WDL-T-11 A/B, WDL-T8A/B, CC-T-2, or CC-T-1) is pumped to the first EPICOR II pump (ALC-P-1). The Miscellaneous Waste Holdup Tank pump is not used when processing the MWHT. This provides better system pressure and flow control.

1.3.1.7 The EPICOR II System is contained within the Chemical Cleaning Building which was originally designed to meet seismic criteria per Zone 1 of the building code. The EPICOR II System and major components when constructed were considered to be non-Q.C. scope, however the system has since been reclassified ITS, in Q.C. scope.

1.3.1.8 All system piping is welded stainless steel except for air piping which is welded carbon steel or copper tubing. Instrument tubing systems are 316 SS Tubing. The instrument tubing system is made up using compression fittings. The process system piping is rated at 150 lb. and is designed, installed and inspected in accordance with ANSI B31.1 (Power Piping).

<u>NOTE</u>: Flanged and screwed connections are used as necessary on certain components.

1.3.1.9 Capability is provided to obtain a representative sample of tanks CC-T-1 and 2, and the effluents of Demineralizers ALC-F-1, ALC-K-1 and ALC-K-2, while in a low radiation area in accordance with Regulatory Guide 1.21. Representative sample for CC-T-1 or 2 is here defined as "after recirculating the tank contents for three volume changes". Also the sample line for CC-T-1 and 2 shall be purged to the sample sink for five line volumes prior to drawing the sample, and for ALC-F-1, ALC-K-1 and ALC-K-2 the sample lines shall be flushed for three (3) minutes minimum prior to drawing the sample.

NOTE: ALC-F-1 is the first demineralizer, followed in series by demineralizers ALC-K-1 and ALC-K-2.

1.3.1.10 The building sump is a covered sump.

1.3.1.11 System blowdown air and demineralized water lines are provided with individual check valves ALC-V060 through V079 to minimize contamination of these systems.

1.3.1.12 The demineralized water supply header is provided with demineralized water from TMI Unit 2 in the range of 80-90 psig to meet EPICOR II requirements.

1.3.1.13 The System Air supply header is provided with a pressure regulator operating in the range of 80-90 psig, and a moisture separator. An air oiler, and an anti-freeze injector are provided for the portion of the System Air header servicing the EPICOR II pumps. Provisions are available to connect the plant Service Air System to the system if necessary. Also two air compressors (ALC-P-7/8) are available for use and tie into the air supply header via ALC-V145.

NOTE: The Plant Service Air System is the preferred air supply.

1.3.1.14 If sampling indicates that the processed water is within limits for usage, the decontaminated liquid from CC-T-2 can be routed to the TMI Unit 2 Liquid Waste Disposal System, the TMI Unit 2 Spent Fuel Storage Pool, the PWST's, CC-T-1, or a truck fill hose connection that is provided as a means of transferring decontaminated liquids for use in the decontamination of the Reactor, Auxiliary and Fuel Handling Buildings.

1.3.1.15 All system overflow lines discharge to the Chemical Cleaning Building sump. All floor drains also discharge to the sump. The water collected in the sump is staged in the Off-Spec Water Receiving Batch Tank CC-T-1 by the sump pump for recycle through the cleanup system or it is drawn and processed directly through the EPICOR II system via existing valves and piping.

1.3.1.16 Since the elevation of the discharge nozzle of tank CC-T-2, and the Chemical Cleaning Building floor were fixed prior to design and construction of EPICOR II, the hydraulic design for draining CC-T-2 is not adequate for complete draining of the tank. However, the system was designed to facilitate draining to the maximum extent possible. Final draining of CC-T-2 is accomplished with the manual drain line (valves ALC-V131 and V132).

1.3.1.17 Three resin traps are installed downstream of the demineralizers.

1.3.1.18 A one micron (nominally rated) cartridge type filter is installed downstream of the three resin traps.

1.3.1.19 The system shall have personnel shielding on various components to reduce the radiation levels in the operating areas of the building.

1.3.1.20 A resin trap is installed on the outlet from the casks overflow line to prevent resin carryover into the sump.

1.3.2 Material Handling Design Requirements

1.3.2.1 Normal operation of the Auxiliary Building Liquid Processing System is by remote methods.

1.3.2.2 Demineralized water and service air connections are provided to flush and blowdown the entire system or portions of it to allow system maintenance.

1.3.2.3 4x4 liners or HIC demineralizers with adapter lift ring attached may be removed from the building by making use of the shield bell designed for this purpose. The shield bell is positioned over the radioactive liner. The shield doors on the bottom of the bell are opened and the liner is drawn up into the bell. The doors are reclosed and the bell is carried, by the crane, to the truck which may have a concrete shield vessel for isolating the bell during transportation to the staging facility. Monitoring of the area is carried on during these activities to assure the safety of personnel. Another liner is positioned in the vacated space. Shielding, process lines, and level instrumentation are repositioned and the unit is returned to service.

NOTE: The transfer bell is no longer routinely used and will only be used if operation of the system results in radiation levels from the demineralizers exceeding limits for unshielded handling.

1.3.2.4 6x6 liners and lightly loaded 4x4 liners are handled in and out of the building without shielding. This is accomplished by remote operation and by establishing appropriate barriers limiting the approach of personnel to the handling operation. Spent resin containers are lifted directly from within substantial shielding barriers in the Chemical Cleaning Building and deposited directly in the transfer cask located on the unmanned truck located immediately outside the building, or loaded unshielded on a transport truck depending on the liner's radiation levels.

1.3.3 Air Handling Design Requirements

1.3.3.1 A ventilation fan is provided to maintain the Chemical Cleaning Building at a negative pressure.

1.3.3.2 The MSA Filtration Unit is designed to meet the requirements of NRC Regulatory Guide 1.140.

1.3.3.3 The moisture separator is provided to remove water vapor droplets from the air.

1.3.3.4 An electric heater is provided within the Filtration Unit to lower relative humidity to 30% with 100% RH inlet air.

1.3.3.5 The prefilter has an average atmospheric air strain efficiency of 85%.

1.3.3.6 The two HEPA filter banks are DOP tested in place to assure an efficiency of 99.95% for removing 0.3 micron particles.

2.0 DETAILED DESCRIPTION OF THE SYSTEM

2.1 Components

2.1.1 EPICOR II Pumps (ALC-P-1 through 4)

Pumps (1-4) are air-driven, positive displacement pumps with a capacity of from 10 gpm to 120 gpm. Each pump is equipped with a pulsation dampener in the process outlet.

Pumps ALC-P-1 through 4 are utilized in the system to circulate the liquid through the demineralizers. The hoses furnished for the flexible connections to the pumps, filters, demineralizers, and traps have a design pressure of 100 psi.

Air supplied to the pumps passes through an air oiler and an anti-freeze injector to a valve manifold. Pump speed and capacity will be varied by the EPICOR II operator to achieve the optimum flow through the radwaste process system. Pump speed is controlled by throttling the drive air at the Fava Control Panel. Demineralized water and oil free air

connections are provided on the suction and discharge side of each pump for flushing and blowdown purposes. Refer to Table 1 for pump details. Pump noise and vibration monitors are present for pumps ALC-P-1 through 4 and have a read-out on panel ALC-PNL-2 in the TV Monitor and Control Building.

2.1.2 Transfer Pump ALC-P-5

The transfer pump (Table 2) is a single stage horizontal centrifugal pump with a capacity of 200 GPM at 100' head. The pump motor is rated at 10 HP and is powered from MCC 2-33A in the TV Monitor and Control Building. The pump is controlled by push buttons for START/STOP from MCC 2-33A, a hand selector switch for low level control of tank CC-T-1 or CC-T-2 from the panel ALC-PNL-1 in the TV Monitor Control Building and level switches in panel ALC-PNL-1 for tanks CC-T-1 and CC-T-2. The level switches receive their signals from level transmitters ALC-LT-1 and ALC-LT-2 at tanks CC-T-1 and CC-T-2, respectively. CC-T-1 and 2 also have high level cutouts to ALC-P-5.

Demineralized water is supplied to the pump mechanical seal from a solenoid operated valve, ALC-V136, controlled from the pump motor starting circuit. The valve opens, when the motor is started, by energizing the solenoid. The seal water flow rate is maintained at 1-2 GPM by throttling ALC-V134 when seal water injection is required.

Seal water injection is only required if the pump is handling water which contains greater than 7000 ppm boron. If the pump handles clean water, it is acceptable to allow the mechanical seal to be lubricated through the pump's internal passages. As long as the water, which pump ALC-P-5 handles, has passed through the one micron filter (ALC-F-5), the water is clean enough (from a grit standpoint) to lubricate the mechanical seal. Thus, as long as filter ALC-F-5 is in use, the demineralized seal water can be turned off with valve ALC-V134 to reduce the total volume of processed water or radwaste.

The pump is used to transfer water from the Clean Water Receiving Tank or the Off-Spec Water Receiving Batch Tank to the TMI Unit 2 Liquid Waste Disposal System, the Spent Fuel Storage Pool, the PWST's, or a hose connection at the truck fill station. It is also used to transfer water from the Clean Water Receiving Tank to the Off-Spec. Water Receiving Batch Tank.

Furthermore, the pump is also used for recirculating and sampling the contents of the Clean Water Receiving Tank and the Off Spec Water Receiving Batch Tank. The sample connection terminates at the Sample System sink. The pump is provided with a discharge pressure gage, and a flow element on

the discharge line to Units No. 1, No. 2, the Spent Fuel Pool, the PWST's and the truck fill station. Remote indication of flow (ALC-FI-2) and a flow totalizer (ALC-FQ-2) are located on Panel ALC-PNL-1.

To protect the pump from operating at shutoff or low flow, it is provided with a solenoid-operated minimum flow control valve ALC-V291. The minimum flow line branches to both CC-T-1 and CC-T-2; the direction of the flow is to the tank where the water is originating. The operation of the minimum flow control valve is automatic although manual control is provided as well. Automatic control is provided by differential pressure switch ALC-DPS-1. The switch measures the flow through the pump in terms of ΔP across the equipment. When the flow is less than 40 gpm, the minimum flow control valve opens and it will remain open until the flow has increased to approximately 90 gpm at which time it will close. Manual control permits the opening and closing of the valve at any time.

2.1.3 Demineralizer (ALC-F-1)

The first stage demineralizer (Table 4) is generally used to remove sodium and other non-radioactive chemicals plus removal of low concentrations of radioactive isotopes. During this polishing mode, the cesium and strontium radioisotope concentrations have been reduced by SDS processing or are low enough that they do not require removal prior to polishing. This demineralizer may be a carbon steel tank approximately 6 feet in diameter and 6 feet high (6x6) or 4 feet by 4 feet (4x4) loaded with organic resins.

Should conditions require gross cesium and strontium removal, a HIC loaded with Zeolite Resins may be placed in the first position acting as a roughing filter. This mode of operation would preclude the need for SDS providing a "once-through" process, vice two (2) systems operating in series. The HIC is similar in size to the carbon steel 4x4. The major difference in design being the materials used during fabrication of each type. HIC demineralizers are constructed of a very high grade stainless steel, enabling the container to meet the burial limits of Class B and Class C.

In all cases, the top of either a 6x6 or 4x4 or HIC have four (4) quick disconnect fittings: an inlet (pump discharge), an outlet (pump suction), a combination vent/overflow, and an air type QD fitting for the level bubbler tube. As a means of backup level indicator, a threaded level conductivity probe also penetrates the tank top.

An air connection is provided at the top of the 6x6 liner to allow removal of the plug from the top of the false bottom after final dewatering. The false bottom is filled with an approved sorbent to absorb water that may tend to accumulate. The false bottom is not required because the water volume absorbed is less than the 0.5% limit for shallow land burial. A manway with approximately a 20" diameter opening is installed on top of the tank.

The inlet nipple is connected to a full dispersion manifold in the top of the tank. The outlet nipple (pump suction line) connects to a single layer filter manifold which is located at the bottom of the tank.

The level probe or bubbler system maintains tank level between 4" and 6" from the top of the resin by opening and closing solenoid valve (ALC-V185) on the air supply to pump ALC-P-1, which is supplying the tank, starting the pump on low level, and stopping the pump and closing valves ALC-V043 or ALC-V242 on high level. On Hi Hi level 4" from the tank top, an audible alarm is sounded at the EPICOR Monitoring Console, located in the TV Monitor and Control Building, ALC-V255 closes, and the pump motor operated valve closes. The EPICOR II operator may select either air bubbler or conductivity level control on the Fava Control Panel located in the TV Monitor and Control Building.

The demineralizer tank is vented, via hose connections, to a 2" vent header which leads into the top of the Off Spec Water Receiving Batch Tank (CC-T-1).

A tee is provided in this vent line for a hose connection to a common header which discharges to the CCB sump. The line is provided as a demineralizer overflow line and demineralizer overpressure protection. A loop seal is provided to ensure that all cask gases are routed to tank CC-T-1 and its vent filters, rather than directly into the Chemical Cleaning Building. A level switch (ALC-LS-21) is installed in the loop seal for indication of flow in the header and provides an alarm at panel ALC-PNL-1 in the TV Monitor and Control Building.

The shielding in the ALC-F-1 position consists of a 5 1/8" thick, square lead brick wall (3 1/8" thick on south side) plus a 1/2" of shield-supporting steel. Radiation monitors (ALC-RM-1 and 2) are located inside this shield 180 degrees apart at different elevations to monitor accumulated radiation levels in the demineralizer. When the HIC is installed, a concrete shield (culvert) will provide additional shielding and a place to land the transfer bell while removing the spent HIC.

To avoid breakthrough of sodium to the second liner when the F-liner is organically loaded, the batch size through the ALC-F-1 demineralizer is limited.

If a High Integrity Container is in service in the F-position, activity breakthrough will be limited through batch size or by the activity as measured by ALC-RM-7, installed at the influent header of ALC-K-1 demineralizer. The second liner will then be organically loaded for sodium removal.

If the water source if very low in cesium and strontium, but still requires further polishing (i.e., recycle processing of CC-T-1 or CC-T-2), a jumper hose has been provided to bybass the HIC demineralizer in the ALC-F-1 position. In this configuration, the first liner in the series will be the ALC-K-1 demineralizer followed by the ALC-K-2 demineralizer (two liners vice three). Processing relatively clean water will rinse cesium and/or strontium activity off of the HIC zeolites on to the downstream ALC-K-1 demineralizer. This is why the "BYPASS" mode has been employed. Refer to paragraph 2.1.19 for details regarding demineralizer level controls. Refer to paragraphs 3.4.2 and 3.4.3 regarding operations and systems that prepare a HIC/demineralizer for shipping and burial.

Remote indication is provided on the Cleanup Panel ALC-PNL-1 for ALC-RM-1 and 2. During system operation, radiation levels as indicated on ALC-RM-1 and 2 should not be allowed to exceed 1 R/HR.

2.1.4 Demineralizer (ALC-K-1, ALC-K-2)

Two demineralizers (Table 4) are installed in series with ALC-F-1 to further remove radioactivity from the waste liquid and polish the effluent.

The demineralizer (ALC-K-1), a 4x4 or 6x6 liner, is primarily used to reduce the activity level of the process fluid through ion exchange and filtering. For this reason, the anticipated activity levels are high and the shielding around ALC-K-1 is identical to shielding around the ALC-F-1 demineralizer when ALC-F-1 demineralizer is a 6x6 liner.

Demineralizer (ALC-K-2), a 4x4 or 6x6 liner, is primarily used to polish the effluent water from ALC-K-1 and act as a guard in the event of a resin breakthrough from ALC-K-1. For this reason, the anticipated activity levels in ALC-K-2 are lower than ALC-K-1.

Each demineralizer has the same external connections as ALC-F-1. The demineralizer resin composition and quantity will be determined on the basis of system samples and operating data.

As with the ALC-F-1, two radiation detectors are located at different elevations 180 degrees apart inside the lead shield. Remote indication is provided in the TV Monitor and Control Building on Panel ALC-PNL-1. During system operation, radiation levels as indicated on ALC-RMI-3 and 4 for ALC-K-1, should not be allowed to exceed 1 R/HR. Radiation levels as indicated on ALC-RMI-5 and 6 for ALC-K-2, should not be allowed to exceed 1R/HR.

2.1.5 Miscellaneous Waste Hold-up Tank (WDL-T-2)

The Miscellaneous Waste Hold-up Tank (Table 5) which has a capacity of 19,518 gallons, can receive liquid from the following sources:

a. Auxiliary Building Sump Tank

b. Neutralizer Tanks

c. Contaminated Drain Tanks

d. Reactor Building Sump

e. Deborating demineralizer back wash outlet

f. Fuel Storage Pool Submersible Pump Discharge

g. Demineralized Water System

h. Submerged Demineralizer System (SDS)

i. Cond. Polisher Sump

j. Water Treatment Sump

k. Reactor Coolant Bleed Tanks

l. Concentrated Waste Storage Tank

The tank also has connections to the Miscellaneous Waste Tank Pump suction, recirculation, a caustic and sulphuric acid inlet, two nitrogen inlets, a vent, a gas sample connection and a relief valve. The tank is normally nitrogen blanketed, but may be vented to the WDG System. To prevent acid splashing on the inner tank walls, the inlet piping extends into the tank 8 ft. The diameter of the tank is 10'-9-1/4". The Miscellaneous Waste Hold-up Tank is located in the Auxiliary Building elevation 305'.

A temporary tee connection is installed in place of the suction line strainer, WDL-U202B, on the Miscellaneous Waste Tank Pump WDL-P-6B suction line. Connected to this tee is a

2" line which supplies the liquid from the Miscellaneous Waste Holdup Tank to the suction side of EPICOR II Pump ALC-P-1. A 4" guard pipe with a combination of lead and concrete shielding encloses the suction piping run from the Auxiliary Building corridor to the Chemical Cleaning Building penetration. The guard pipe is open to the atmosphere of the Chemical Cleaning Building, which is under a slight negative pressure.

2.1.6 Clean Water Receiving Tank (CC-T-2)

The Clean Water Receiving Tank (Table 6) is a stainless steel atmospheric pressure tank with a capacity of 133,700 gallons located in the Chemical Cleaning Building. The tank receives the processed liquid from the discharge of pump ALC-P-4 via, in order, three resin traps, a one-micron crud filter, conductivity cell, pH meter, and an inlet flowmeter/totalizer.

An overflow line with a loop seal is provided near the top of the tank. A demineralized water supply is provided for the loop seal. A suction line from the transfer pump (ALC-P-5) penetrates the tank skirt and connects to the bottom of the tank. A connection on the top of the tank is also provided for the transfer pump recirculation line, a feature that enhances mixing of the content. Level indication and high level alarm are provided on panel ALC-PNL-1. A future xenon hold-up tank connection is provided on the vent line. A 2" demineralized water line is also provided on top of the tank for whenever large quantities of demineralized water are required in the tank. This would include preoperational testing or tank cleanup. A drain line is provided off the Transfer Pump (ALC-P-5) suction piping to drain the suction piping and the remaining water in the tank that the transfer pump cannot drain.

The tank has a 2" vent line exhausting to the Chemical Cleaning Building through a two-stage demister filter. The first stage consists of two moisture separators and an HEPA filter. The second stage consists of two charcoal filters and an HEPA filter. A heater in the common 2" vent line is controlled from Power Panel MP-2-33A. The heater is normally energized.

Processed water is stored in the tank until a batch is completed. A representative sample of the processed water can be obtained from the discharge of the transfer pump at the sample sink after recirculating three volumes of the tank and purging the sample lines for five line volumes before drawing the sample. If the sample indicates the water quality is unsatisfactory, the water can be pumped to the Off-Spec Water Receiving Batch Tank for temporary storage or routed directly back into the suction line of pump ALC-P-1 for reprocessing

through the filter and demineralizers until the quality is acceptable for discharge to the plant or storage tanks. If sampling indicates that the tank's contents are satisfactory for use in the plant (e.g., decon flush or makeup to other plant processes) the water is pumped normally into the TMI Unit 2 Liquid Waste Disposal System, the Spent Fuel Storage Pool, the PWST's or to the NLB pump from the truck fill station, however, it may be stored in the Off-Spec Water Receiving Batch Tank, if desired. The Off-Spec Water Receiving Batch Tank should be flushed clean with demineralized water or clean processed water before it is used for clean water storage.

2.1.7 Off-Spec Water Receiving Batch Tank (CC-T-1)

The Off-Spec Water Receiving Batch Tank (Table 7) is a stainless steel tank with a capacity of approximately 86,000 gallons designed for full vacuum to 75 psig. For the Auxiliary Building Clean-up System, the tank is operated at atmospheric pressure only. The tank can receive the discharge from the Clean Water Receiving Tank Transfer Pump whenever it is desired to either recycle the water for further processing, or store the purified water for future disposition. CC-T-1 may also be used as a source of processed water to supply the NLB pump used for containment decon. This feature allows greater availability of the Clean Water Receiving Tank.

The Tank is piped up to receive the discharge from the sump pump, if desired, but normally the sump is drained by a 2" suction line to the Pump ALC-P-1 (see para. 2.1.8). A suction line at the bottom of the tank can be lined up either to Pump ALC-P-1 for reprocessing the tank's contents through the system or to the Transfer Pump ALC-P-5 for recirculation and sampling, or discharge. The recirculation line connects to the top of the tank.

The tank is vented to the building in the same manner as the Clean Water Receiving Tank. An over-flow line with a loopseal is provided near the top of the tank. A demineralized water supply is provided for the loop seal. A connection at the top of the tank receives vents from the prefilter, the demineralizers and the crud filter. Level indication and high level alarm are provided on panel ACL-PNL-1. A future xenon hold-up tank connection is provided on the vent line.

The tank has a 2" vent line exhausting to the Chemical Cleaning Building through a two-stage demister filter. The first stage consists of two moisture separators and a HEPA filter. The second stage consists of two charcoal filters and a HEPA filter. A heater in the common 2" vent line is controlled from Power Panel MP-2-33A. The heater is normally energized.

2.1.8 Chemical Cleaning Building Sump

The Chemical Cleaning Building sump is a stainless steel lined pit with a capacity of 4000 gallons located in the northwest corner of the building. All leakage from the tank overflow, equipment, and floor drains are collected in the sump. One sump pump (Table 8), is installed to permit the transfer of the liquid from the sump to the Off Spec Water Receiving Batch Tank, if desired. The pump is a single stage centrifugal pump with a capacity of 100 gpm. The pump motor is rated at 20 HP and is controlled from a (MAN-OFF-AUTO) selector switch located on MCC2-33A. When in AUTO, the pump is controlled by conductivity type level switch ALC-LS-1 which starts and stops the pump automatically. A High Sump Level Alarm is provided on Cleanup Panel ALC-PNL-1.

The pump is started when the water level in the sump reaches a level that is 48 1/4 inches below the face of the pump mounting. The pump stops when the level of water has been lowered to a level that is 90 3/8 inches below the pump face. The high level alarm is actuated when the water level reaches 36 1/4 inches below the face of the pump mounting. The volume of water removed from pump START to pump STOP is approximately 1600 gallons. There is also a volume of nearly 1700 gallons above the High Alarm before the sump overflows.

The sump is normally drained by a 2" line provided from the sump to 2" Flushing Line just upstream of its entry into the suction line of pump ALC-P-1. This permits the return of the sump water to the clean up system directly from the sump without circulating through the pump CC-P-2A and the Off-Spec Water Receiving Batch Tank CC-T-1. A 3/4" branch connection is provided in this line with "Quick Disconnects" attached to permit ready access for flushing with demineralized water from an outlet downstream of valve ALC-V015 with a short length of hose.

2.1.9 20 Ton Monorail Hoist System

A 20 ton hoist is provided for removal and replacement of the demineralizers and other large pieces of auxiliary equipment in and out of the building. It is mounted on the monorail which extends from the north side of the Chemical Cleaning Building above the resin traps through the south end of the building, extending 18' outside of the building over the cask loading area. Table 9 provides specifications on the monorail hoist system.

In order to minimize the radiation exposure to personnel during demineralizer removal, the hoist is operated remotely using a remote pendant operating station in the TV Monitor and Control Building. Remote operation is aided through the use

of a closed circuit TV system with six cameras. The pendant has six pushbuttons for trolley and hoist operation - one START, one STOP, two for north/south movement of the single speed trolley, and two for the hoist Quad-Speed Control System which are, a 4-step button for creep, low, medium and high speed RAISE, and a 4-step button for creep, low, medium and high speed LOWER.

There is also a local monorail hoist pendant located on the CCB operating floor. This pendant is used for performing operations where there is little radiation exposure, such as bringing a new liner of resin into the building.

To aid positioning of the hoist remotely for demineralizer replacement, the monorail has visible target markings above the demineralizers, and in the cask loading area all of which can be viewed with the TV cameras.

2.1.10 Resin Filter - ALC-F-4A, B and C

Three Resin Filters are provided downstream of EPICOR pump, ALC-P-4, to prevent resin fines from entering the Clean Water Receiving Tank. If the filters contact radiation level reaches 250 mR/HR on any part of the filter, the system must be shutdown and the filters replaced. Four sides of the filters are shielded by solid concrete blocks 8" thick. The top is shielded with 1/2 inch of lead.

2.1.11 Crud Filter - ALC-F-5

A one micron nominally rated filter with isolation valves is provided between the resin filter and the Clean Water Receiving Tank. The primary purpose of this filter is to eliminate most particulates present in the processed water. A vent line connected to the Off-Spec Water Receiving Batch Tank and a drain line to the equipment drain system is provided for draining the filter housing prior to inserting or removing a filter cartridge. The filter is shielded by 3 1/8" lead bricks on three sides, and by a concrete wall on the fourth side.

During removal of the filter, it should be handled as radioactive material. The filter must be replaced whenever the contact radiation level reaches 250 mR/HR or when the pressure drop reduces the process flowrate below an acceptable value. A special lever is provided to aid in removal of the filter cartridge.

2.1.12 Ventilation Heating Unit and Moisture Separator

Heating unit no. ALC-E-H1 (Table 10) is mounted on the inlet of the filtration unit at elevation 304' and consists of a moisture separator (ALC-E-F1) and a 60 KW 480 volt, 3 phase heater. The heater is powered from MCC2-33A.

2.1.13 Ventilation Filter Unit

The filter unit consists of a single housing containing, in order: a prefilter (ALC-E-F2) (not used), a high efficiency particulate air (HEPA) filter (ALC-E-F3), charcoal filter beds (ALC-E-F4) and a final HEPA filter (ALC-E-F5). A manually actuated fire protection water supply is provided for the charcoal beds.

2.1.14 Ventilation Fan Assembly

Fan assembly no. ALC-E-1 (Table 10) is a 30HP, 460 volt, 3 phase, 60 cycle, radial flow centrifugal unit with a capacity of 8000 cfm. The fan, powered from MCC2-33A, is mounted on the outlet of the filter unit and discharges the ventilation exhaust through ducting (monitored by a radiation detector) and out through the roof.

2.1.15 Ventilation Radiation Monitor

The radiation monitor (Table 10) samples air in the fan discharge line isokinetically at a rate of 4 cfm to provide local (at monitor) and remote indication on Panel ALC-PNL-1 of discharge particulate, and noble gas activity levels. Remote indication of these parameters is recorded on a strip chart recorder. The monitor will provide an alarm at a radiation level of 5,000 CPM, and 20,000 CPM for a particulate, or gaseous activity on the panel in the Control Building. The radiation monitor is powered from MCC2-33A. A splitter block has been provided in the line to the radiation monitor to provide a means of taking grab samples as may be required.

2.1.16 Ventilation Weatherproof Enclosures

The weatherproof enclosure is located at grade level and houses the components discussed in 2.1.12 through 2.1.15 (above).

2.1.17 Chemical Cleaning Building Radiation Monitors

Four area radiation monitors (ALC-RM-8 through 11 or equivalent) and an air sampler (ALC-RM-12) are provided in the Chemical Cleaning Building. The four area radiation monitors (ALC-RM-8 through 11) are provided with remote indication on the Radiation Monitoring Panel ALC-PNL-1 in the Control Building. The air sampler (ALC-RM-12) is located in the HVAC Building, but draws its sample from the Chemical Cleaning Building near ALC-F-1. Remote indication for ALC-RM-12 is also provided on the Radiation Monitoring Panel ALC-PNL-1. The area monitors and air sampler will provide a common alarm at a high radiation level and monitor failure on Panel ALC-PNL-1. These radiation monitors are provided for operator information.

2.1.18 Closed Circuit TV System

A closed circuit TV system is provided to aid in remote handling of the demineralizers and to aid in system surveillance during operation. The system consists of seven TV cameras strategically located in the Chemical Cleaning Building. The TV monitors and necessary controls are mounted on the TV Monitor Console located in the TV Monitor and Control Building. Camera No. 3 has a PAN-TILT control and is mounted to provide a view of ALC-K-2 for remote handling. The PAN-TILT control allows remote movement of the camera to permit scanning a large area of the Chemical Cleaning Building for surveillance during system operation. Camera No. 6 is mounted to provide a view of the EPICOR II pumps ALC-P-1 through 4. This camera provides the operator with a remote surveillance capacity for viewing this area of the building during system operation.

Camera No. 1 mounted on the monorail support structure outside the Chemical Cleaning Building to allow viewing of the prefilter or demineralizer while being loaded into the transfer cask. Camera No. 2 is mounted directly on the 20 Ton Hoist and provides a direct view of the monorail. Target markings which can be viewed with this camera are provided on the monorail to aid in the positioning of the Hoist. Cameras No. 4 and No. 5 provide a view of the top area ALC-F-1 and ALC-K-1 to aid in remote handling of these casks and to provide a surveillance capability for these casks during operation of the system. Camera No. 7 has a PAN-TILT control and is mounted on the west wall between ALC-K-1 and ALC-K-2 to provide remote monitoring of potential leak areas.

2.1.19 Major System Valves

Inlet Isolation Valve to EPICOR II System - ALC-V043

One stainless steel, 2", 120V motor operated ball valve is installed on the inlet line from the source tank to the EPICOR II radwaste processing system. The valve is powered from the 120/208V Power Panel MP-2-33A and controlled by a handswitch located on MCC-2-33A, Compartment 3D and a prefilter level probe. Valve position and control power availability indications are provided by red, green and white indicating lights also located on Compartment 3D. The three lights will be on while the valve is in an intermediate position. The valve is provided with a manual override for "close" operation only. Valve ALC-V043 is interlocked with valve ALC-V242 to assure that only one of these two valves can be OPEN at a time. ALC-V043 is also interlocked with the level monitor of ALC-F-1 and ALC-K-1. The valve closes automatically when a high level occurs in the controlling demineralizer, to prevent overfilling of the vessel. The choice of the controlling

demineralizer is dictated by the configuration of the processing train through selector switch ALC-SS-1 (F-1 ON LINE - F-1 BYPASSED). If ALC-F-1 is in the processing train, its level controller will control ALC-V043; if ALC-F-1 is bypassed, control of ALC-V043 is transferred to ALC-K-1 level controller.

Service Air Regulator - ALC-V109

One 3" pressure regulating valve with a 300# rating is installed on the service air header supply to the EPICOR II system to reduce the pressure to 80 psig.

Process Supply Line Valve (ALC-V255) to Demineralizer (ALC-F-1)

One 2" solenoid valve (ALC-V255) with a 150 # rating at 120°F is installed on the line from ALC-P-1 to ALC-F-1 between manual valves ALC-V191 and ALC-V207, the valve ALC-V255 is normally closed unless energized and is interlocked to close on high level in ALC-F-1. Additionally it closes on loss of electrical power or when system is not running.

Off Spec. Water Supply Isolation Valves to ALC-P-1 - ALC-V086 and ALC-V242

One stainless steel, 2", air operated ball valve, ALC-V242, is installed on the supply line from Off Spec Water Receiving Batch Tank CC-T-1 to the suction of Pump ALC-P-1. The valve allows reprocessing of water from CC-T-1 or CC-T-2. The valve is powered from the 120/208V Power Panel MP-2-33A and controlled by a handswitch located on MCC-2-33A, Compartment 3E. Valve position and power availability indications function in the same manner as for ALC-V043. Valve ALC-V242 is interlocked with Valve ALC-V043 to assure that only one of these two valves can be OPEN at a time. Valve ALC-V242 is an air operated ball valve which is energized to open. This valve will close on loss of power thus avoiding uncontrolled draining of tanks CC-T-1 or CC-T-2. The valve is interlocked with ALC-V043 such that only one valve can be opened at a time to prevent crossflow. It is also interlocked with the level controller of ALC-F-1 and ALC-K-1, in the same arrangement as ALC-V043.

Valve ALC-V086 is a stainless steel, 2", 120V motor operated ball valve which is also installed on the outlet line of the Off Spec. Water Receiving Batch Tank CC-T-1. It is controlled by a manual handswitch mounted in MCC-2-33A, compartment 3E. By opening valve ALC-V086 and closing ALC-V242, clean water can be sent from tank CC-T-1 to the suction of the transfer pump (ALC-P-5) for transfer to the Processed Water Storage Tanks or other transfer points.

2.1.20 Sample System

A Sample System is provided to obtain a representative sample of tanks CC-T-1 and 2 and the effluents of Demineralizers ALC-F-1, ALC-K-1 and ALC-K-2.

The samples from the Demineralizers and the sample obtained from the Miscellaneous Waste Holdup Tank are used to determine the isotopic inventory held up on the resin beds. The determination is made by analyzing the influent and effluent isotopic concentrations, the difference of which is held up on the bed. This information is required for shipment of the spent containers to the waste disposal site.

A common collection station shielded by an 8 inch thick solid block wall is located on the Chemical Cleaning Building mezzanine, and is provided for controlled and safe sampling.

The collection station consists of individual sample stations for CC-T-1 and 2, ALC-F-1, ALC-K-1 and ALC-K-2, and a sample sink.

The sample sink is provided with demineralized water for the sink spray header and bottle washing. The drain from the sink is routed to the Chemical Cleaning Building sump. The sink is also provided with ventilation which consists of a hood and ductwork which is tied into the Chemical Cleaning Building ventilation system.

Recirculation of the sample lines from ALC-F-1, ALC-K-1 and ALC-K-2 back to the suction of ALC-P-2, and the collection of samples is controlled by solenoid valves. The ability to obtain grab samples is provided in the recirculation line for flow verification. Piping for the sample lines is 1/2" stainless steel tubing with compression type connectors.

NOTE: See sections 2.1.6 and 2.1.7 for obtaining a sample from CC-T-1 and 2.

2.1.21 Auxiliary Building Cleanup System Air Compressors

Rotary air compressors ALC-P-7 and 8 (Table 11) are provided as a backup air supply for the EPICOR II system, while the plant Service Air system is the normal air supply. Either of these air compressors have sufficient capacity for the operation of the EPICOR II system. These compressors are located in the ventilation unit's building. These compressors are single stage rotary screw, electrically driven, packaged units (pre-wired and pre-plumbed) with capacities of 115 and 98 CFM at 100 psig (the compressors are not the same model).

The compressors are controlled by local hand switches which allow the choice of either START/STOP (for intermittent air demand) or CONTINUOUS (for continuous air demand) control modes for flexibility. The units are piped up so that they can be used individually when a small volume of air is required or in parallel to handle larger air demands. In all of the operating modes, the air pressure in each unit's reservoir is automatically maintained within preset limits.

2.1.22 ALC-F-1 Liner Breakthrough Monitor

ALC-RMI-7 is installed on the discharge of ALC-F-1 liner to monitor for activity breakthrough on the first demineralizer. The monitor has two alarm setpoints. The Alert Alarm setpoint is 68,000 cpm above background, and the High Alarm setpoint is 136,000 cpm above background.

2.2 Instruments, Controls, Alarms, and Protective Devices

2.2.1 Cleanup System

The Auxiliary Building Emergency Liquid Cleanup System is normally operated and monitored from control panel ALC-PNL-1 located in the TV Monitor and Control Building which is a separate prefabricated building. The TV Monitor and Control Building is adjacent to the northwest corner of the Chemical Cleaning Building.

Electrical power is supplied to the Auxiliary Building Emergency Cleanup System from 750 KVA Unit Substation USS 2-33 located on the mezzanine floor at elevation 305' in the southeast corner of the Turbine Building for Unit 2. USS 2-33 was originally the power supply to the Control Rod Drive Motors. 480V power from USS 2-33 is supplied to MCC 2-33A located inside the TV Monitor and Control Building. The HVAC system fan and heaters, the transfer pump, building sump pump, and the 20-ton hoist are powered from MCC 2-33A. A 480-120/208 Vac, 25 KVA transformer, supplied from MCC 2-33A, supplies all other system electrical loads from Power Panel MP2-33A, except heat traces and ALC-P-8 which are supplied from the control rod breaker (2-43).

The EPICOR II pumps are controlled through an automatic control unit which provides AUTO/MANUAL on-off switches and indicating lights for the pumps, demineralizer high level alarms, and an ON/OFF switch for the unit. Control power is provided for the EPICOR II solenoid operated air supply valves through these units. The speed of the pumps is controlled by throttling motor operated valves ALC-V260, 261, 262 and 263. A turbine flowmeter (ALC-FI-1) is provided to monitor process flow rates.

All process instrumentation monitored in the control center is mounted on Cleanup Panel, ALC-PNL-1. Audible alarms and indicating lights are provided on this panel for CCB Sump High Level, CCB Ventilation System Trouble, CCB Charcoal Filter High Temperature, CCB High Exhaust Radiation Level, CCB Radiation Monitor Failed, Building Radiation Level, and ALC-F-1, ALC-K-1 and 2 Loop Seal Flow. Remote indication is provided for the area radiation monitors and the air sampler on the Radiation Monitoring Panel located adjacent to the Cleanup Panel. A complete instrument list including range and setpoints is provided in Table 12.

2.2.2 Ventilation System

2.2.2.1 Heating Unit and Moisture Separator

The moisture separator is instrumented with a differential pressure indicator and switch, ALC-DPI-11 and ALC-DPS-11. The heating unit (ALC-E-H1) is provided with a temperature indicating controller and a high temperature switch.

The temperature indicating controller functions to maintain the heaters energized providing a heater outlet air temperature of no more than 146°F. Should the air temperature rise to 160°F, the high temperature switch will automatically deenergize the heaters. If the heaters are to be reenergized, the reset button must be depressed when air temperature at the thermocouple drops below the 160°F temperature switch setpoint.

Indication of operation of the temperature indicating controller and high temperature switches are provided on the switches, both of which are located in the heater control panel near the heaters on the filtration unit.

Manual energizing/deenergizing of the heater control panel occurs at MCC2-33A. The heater panel is also deenergized automatically should the system ventilation fan trip or in any other way fail to maintain minimum flow at the fan discharge flow switch.

A red light on the heater controller panel indicates power available to the heater control panel.

2.2.2.2 Filter Unit

Differential pressure indication is provided for the filter unit's moisture separator (ALC-E-F1). While a differential pressure indication (DPI-11) is provided locally, a differential pressure switch (DPS-11) will actuate a remote "Trouble" alarm warning the operator of a restricted flow condition existing in the moisture separator. (Note: The moisture separator should be replaced when it exhibits a pressure drop of 1" w.g.)

Two differential pressure switches (one not connected) and a differential pressure indicator (DPI-13) are located on the first HEPA filter (ALC-E-F3) in the Filter Unit for indication and alarm: DPS-13 warns of a high differential pressure condition by actuating the Ventilation Unit common "Trouble" alarm at 3" W.G.

The charcoal filter is instrumented with a fire detection system. A prealarm (TS-15-1 set at 250°F) will actuate a local amber light, a remote high temperature alarm and a horn warning of increasing temperature in the charcoal bed. At 300°F, (remote common "Trouble" and local red light) alarms will be actuated from TS-15-2 indicating a Hi Hi temperature condition exists in the bed.

Indication of operability of the fire detection system is provided by an "Abnormal Detection" white light, located on the filtration unit fire detection panel.

Also provided on the charcoal absorber is a differential pressure indicating controller (ALC-DPI-14). This is not connected.

The final stage of filtration in the filtration unit occurs in the last HEPA filter (ALC-E-F5). In addition to being provided with local differential pressure indication (DPI-16), the remote "Trouble" alarm is actuated on a high HEPA filter differential pressure of 3" W.G. by the locally mounted differential pressure switch (DPS-16).

2.2.2.3 Fan Assembly

The fan assembly, as previously noted, is interlocked with the 60 KW heater. A control interlock is provided through the fan and heater circuitry such that the heater may not be energized unless the fan is running. A flow indicating switch (FIS-17) on the discharge of the fan provides a safety interlock: if the filtration unit is operating and the discharge flow of the fan falls below 4,000 cfm, the heater and fan monitor will trip. FIS-17 is also tied into the common, remote panel mounted "Trouble" alarm. The fan is started and stopped from MCC2-33A.

2.2.2.4 Radiation Monitor (Controls)

The Radiation Monitor (ALC-RE-18) is energized and deenergized locally at the monitor cabinet. Separate control switches are provided: one on the unit itself and another for the monitor sample pump. (Note: During operation of the Chemical Cleaning Building Ventilation System, the Radiation Monitor must be energized at all times). A "Power Available" light is provided on the unit.

Local indication of the ventilation exhaust particulate and/or gaseous activity level is provided on the monitor. At a level of 4.11E-2 μCi particulate, or 3.81E-4 μCi/cc noble gas the High Radiation alarm will sound on the panel in the control shed.

3.0 PRINCIPAL MODES OF OPERATION

3.1 Startup

3.1.1 Ventilation System

Prior to startup of this unit, the manual dampers ALC-E-D1 and D2 shall be checked open. Ensure that the radiation monitor is energized and operational.

When the fan is started (at MCC2-33A) ensure sufficient air flow exists (approx. 4000 CFM minimum) through the unit before energizing the heaters (Note: Heaters should not energize if insufficient air flow exists). After startup, verify that ventilation unit temperature, flow and activity indications are normal before leaving unit unattended.

NOTE: Start push button will have to be depressed and held until flow increases above lower limit or fan will trip.

3.1.2 Cleanup System

Initial startup of the Auxiliary Building Emergency Cleanup System will be with the Demineralizers empty of liquid. The Chemical Cleanup Building Ventilation System shall be in operation prior to operating the cleanup system.

Normal Startup of the Auxiliary Building Emergency Cleanup System is accomplished by supplying the system with the process feedwater from CC-T-1, CC-T-2, SDS, or the various source tanks. Except for the Miscellaneous Waste Holdup Tank (MWHT) the process feedwater is delivered to the process stream by source tank's motive power system. In the case MWHT is the feedwater source, the supply header is primed initially. Depending on the source of the process feed, the feed supply valve (e.g., ALC-V043, ALC-V242) is then opened and process pump ALC-P-1 started. Startup of ALC-P-1 is accomplished by opening the air supply valve (ALC-V011), stop valve (ALC-V185) and control valve (ALC-V260), the latter is used to control the pump speed. The water drawn from the feedwater supply header by ALC-P-1 is pumped to demineralizer ALC-F-1. When ALC-F-1 is full, pump ALC-P-1 will stop automatically on high level. Similarly, process pump ALC-P-2 is operated until demineralizer ALC-K-1 is full, then ALC-P-3 is operated until demineralizer ALC-K-2 is full. As soon as the demineralizers are full, processing is then commenced by

starting pump ALC-P-4 and opening discharge valve ALC-V277. Using the process pumps respective control valves (ALC-V260 through ALC-V263), the pump speed is adjusted to attain and maintain a balanced flow of about 10 gpm through the demineralizers.

NOTE: The initial batch quantity will be determined by the efficiency of the demineralizer resin charge and may require a change in resin composition and/or flow rate to effectively process the radioactive waste water.

3.2 Normal Operation

3.2.1 Ventilation System

During normal operation, the ventilation unit should require little operator action. The unit should be periodically checked to ensure that indication is operable and that temperatures, flows and radiation levels are within the normal ranges.

Increasing differential pressures across the moisture separator and HEPA filters are an indication that the components are retaining dirt, etc. These components should be replaced as required to ensure that flow through the ventilation unit is maximized.

The radiation monitor and recorder should be checked periodically and reviewed for evidence of trends indicating that increasing levels of activity are being discharged. A trend showing increasing discharge activity levels can be indicative of carryover from the filter unit and should be treated accordingly.

3.2.2 Cleanup System

Once the flow rate is established for the process, the system operates automatically by starting and stopping the pumps (ALC-P-1, 2, 3 and 4) in order to maintain the proper level in the process tanks. Instrumentation is provided on the control panel to monitor system parameters and to balance the system to minimize pump cycling.

When a desired volume has been reached in CC-T-2, Transfer Pump ALC-P-5 is started to recirculate at least three tank volumes of water through the Clean Water Receiving Tank after which a sample is drawn for analysis by the TMI water chemistry laboratory. Water acceptable for use in the plant will be pumped to the TMI Unit 2 Liquid Waste Disposal System, CC-T-1, COT-1-A or to the Processed Water Storage Tanks. Out of Specification water may be pumped to the Off-Spec Water

Receiving Batch Tank for reprocessing (See para. 2.1.6 and 2.1.7) or it may be processed directly from CC-T-2 under a feed and bleed scheme.

NOTE: Normal operation is the same whether the system is being used in the Auxiliary Liquid Cleanup Mode, or in the SDS Polishing Mode. The exception to this is when the ALC-F-1 liner is bypassed depending on cesium and strontium concentrations.

3.3 Shutdown

3.3.1 Ventilation System

The purpose of the ventilation system is to ensure that all air leaving the Chemical Cleaning Building is filtered and monitored for radiation. Shutdown of the ventilation system will preclude filtration and monitoring of the air and should not be performed unless dictated by other casualty/operational considerations. To shutdown the ventilation unit, deenergize the 60 KW heaters, fan (ALC-E-1) and radiation monitor from their respective breakers in MCC 2-33A.

3.3.2 Cleanup System

The system is shutdown and flow through the process system stopped by closing the air supply valves to EPICOR II Pumps, ALC-P-1 through 4. To shutdown the system upon completion of processing a batch, the pumps are secured and the liquid supply valve ALC-V043 or ALC-V086 is closed. Valves ALC-V242 and ALC-V255 close automatically as power is shutdown. Close ALC-V277 to prevent syphoning of the third demineralizer to CC-T-2.

The system is shut down and the affected unit replaced when radiation monitors on any of the demineralizers indicate the unit has collected a quantity of material which is limited by shipping regulations, or system sampling indicates that the resins are exhausted chemically. To replace one of the units, the liner is emptied of water, the three hoses, the level probe cable and the bubbler unit disconnected from the liner, and the remotely operated hoist used to transport the demineralizer to the outside of the Chemical Cleaning Building to the transfer cask. The replacement unit is then installed, the hoses, the level probe cable and the bubbler line reconnected and the system started as described in paragraph 3.1. Each liner has its own level probe which will be discarded with the liner.

NOTE: Shutdown is the same whether the system is being used in the Auxiliary Building Liquid Cleanup mode or in the SDS Polishing mode.

3.4 Special or Infrequent Operation

3.4.1 Filter Change-out

When a filter bank requires changing, the Aux. Building Emergency Liquid Clean-up System should be shutdown. The ventilation system shall be in operation during the filter change-out.

3.4.2 HIC/Demineralizer Dewatering and Drying

The Zeolite Resin Drying System dries process media (i.e., zeolite resin, activated carbon and/or sand) in a 50 cu. ft. HIC/demineralizer for transportation and disposal at a low level waste disposal facility

This is accomplished in a three (3) step process. First the bulk of the free water is removed using procedures associated with HIC installation and removal in EPICOR II and DWCS. Second, the drying unit's sandpiper is started and its blower is energized to recirculate air down through the media. The air is heated as it passes through the blower and as this warm dry air passes through the media it entrains and vaporizes moisture. This warm air then passes through the entrainment separator, enroute to the blower inlet, where refrigeration coils condense the water vapor in the air and any entrained water is removed. Water is removed from the entrainment separator using the dewatering pump. Air is circulated down through the media for four (4) hours. Finally, the drying process shifts from downflow to upflow. This is done in order to have the driest media at the bottom of the container where they can best absorb any water generated through condensation as the container cools during storage and shipment. Air is circulated up through zeolite resin for 12 hours or activated carbon for 20 hours. At this point, the relative humidity of the air stream leaving the container should be at or below the required value, indicating that the media is dry. The system is then shut down and the container is ready to be sealed and shipped.

The dewatering pump (sandpiper) not only removes entrained water from the separator tank but, for the most part, maintains the process under a vacuum thereby minimizing the potential spread of contamination due to hose/connection leaks. The excess air removed by the dewatering pump is directed through a filtered drain path/container approved by Rad Con personnel.

The drying system is a skid mounted unit which provides the mobility necessary to dry HIC/demineralizers at their respective locations (EPICOR II/DWCS), vice relocating liners to a central area. This will reduce the amount of manrem

exposure generally received when handling radwaste processing liners. The services required for drying operations are 480 VAC (standard 4 pole welding receptacle), 100 psi service air and DW or processed water needed to fill and flush the system.

3.4.3 Remove Closure Device

The Remote Closure Device is designed to provide a safe and efficient means of sealing an EPICOR II or DWCS HIC/demineralizer to meet the requirements for disposal at a low level waste disposal facility.

Performing this operation (installing the ENVIROALLOY Lid) to a HIC/demineralizer is done remotely in order to minimize exposure of operating personnel to ionizing radiation. This is accomplished by means of hydraulic skid. Aligning the closure head with the HIC/demineralizer is performed using the CCTV cameras and monitor. Maintaining proper alignment is important so that the eight wedges are driven evenly into their respective holes on top of the HIC/demineralizer. This operation pushes down on the lid and seals the container. Once the container is sealed, it can be removed from service for storage and/or shipment to the burial site.

3.5 Emergency

3.5.1 Loss of Chemical Building Ventilation System

On loss of the Chemical Cleaning Building Ventilation System, the Auxiliary Building Emergency Liquid Cleanup System shall be shutdown, and the Chemical Cleaning Building sealed.

3.5.2 Loss of Electrical Power

On loss of electrical power to the Chemical Cleaning Building MCC 2-33A, EPICOR II Pumps ALC-P-1, 2, 3 and 4 will automatically stop as the solenoid valves on the air supply lines fail closed on loss of power. Valves ALC-V043 and V086 fail "As Is". Valve ALC-V255 fails closed. Valve ALC-V242 fails closed on loss of power to stop flow from tank CC-T-1. If flow through the system is from the Misc. Waste Holdup Tank, WDL-T-2, operator action is required to close valve WDL-V262B. Power will be lost to Ventilation System 60KW heaters, exhaust fan and radiation monitor. The ventilation unit inlet and outlet dampers should be closed. This same procedure should be followed in the event that only the exhaust fan is lost.

On loss of power to the 2-43 supply, backup air supply and heat traces will not be available.

When electrical power is lost, place all automatically controlled equipment to the manual OFF position. Then, when emergency power is available, restart the system.

3.5.3 Loss of System Air

Loss of System Air will cause the EPICOR II Pumps to secure until either the system compressors can be put into service or the Service Air System can be returned to service.

NOTE: EPICOR II uses in-plant service air as normal supply air.

3.5.4 Fire

3.5.4.1 Ventilation System

Should they become too hot, the charcoal absorber beds in the ventilation unit could ignite. Upon verification of ignition of the charcoal bed, the manually actuated fire protection sprays should be cut in.

3.5.4.2 Cleanup System

If a fire occurs in the TV Monitor Control Building the sprinkler system will automatically initiate. The Chemical Cleaning Building is provided with a hose station on the mezzanine for manual firefighting.

4.0 HAZARDS AND PRECAUTIONS

Since the system is handling radioactivity contaminated fluids, all appropriate health physics precautions must be observed during operation and maintenance. Under no circumstances will discharges be made to the environment without proper authorization.

The Chemical Cleaning Building Ventilation System will process potentially contaminated air. As such, any operations or maintenance associated with the system should fully incorporate appropriate Health Physics guidelines/requirements. Any solid or liquid ventilation system waste must be sampled and cleared by HP before release to environment.

Ensure that positive verification of charcoal bed fire exists before manual initiation of fire protection spray system since water will damage the charcoal bed.

Flushing connections are provided at various locations in the system and provide a means for reducing the radiation levels in the piping. Flushing should be exercised when maintenance is performed.

TABLE 1

EPICOR II PUMPS

Pump Details	
Identification	ALC-P-1, 2, 3, 4
Number Installed	4
Manufacturer	Warren Rupp Co.
Model no.	SA 2-A
Type	Double opposed diaphragm
Maximum rated capacity at 90 psi air supply	120 GPM at 45 Ft of head
Operating point capacity at 90 psi air supply	20 GPM at 170 Ft of head
Max. air pressure, psi	125
Lubricant	Oil

TABLE 2

TRANSFER PUMP

Pump Details	
Identification	ALC-P-5
Number Installed	1
Manufacturer	Ingersoll Rand
Model No.	3 x 2 x 10 Type HOC, Group 2, ANSI A60
Type	Horizontal Centrifugal
Standard Material Designation	Col. DI
Rated Speed, rpm	1750
Rated Capacity, gpm	200
Rated Total Dynamic Head, Ft	100
Shutoff Head, Ft	121
Design Pressure, Casing, psig	200
Design Temperature, °C	110
Lubricant	SAE 20 or 30 Oil
Motor Details	
Manufacturer	Gould Century Elect. Div.
Type	F-C
Enclosure	TEFC
Rated Horsepower, HP	10
Speed, rpm	1700
Lubricant/Coolant	Grease/air
Power Requirements	480V AC/12.5A, 3 Phase, 60HZ
Power Source	MCC-2-33A

TABLE 3

FILTERS

Resin Filters (Traps)

Tank Details	
Identification	ALC-F-4A, B, C
Number Installed	3
Manufacturer	Capolupo & Gundal, Inc.
Installation	Horizontal
Outside diameter/height, ft	10 x 28
Shell material	PVC
Design pressure, psi	100

CRUD FILTERS

Identification	ALC-F-5
Number Installed	1
Manufacturer of Housing	Pall Trinity Micro Corp.
Installation	Vertical
Outside diameter/height, inches	7 x 34
Shell thickness, inches	0.165
Shell material	SA-312 TP304
Design pressure, psi	150
Particle size rating	1 micron, nominal

TABLE 4

DEMINERALIZERS

Tank Details	
Identification	ALC-F-1, ALC-K-1, ALC-K-2
Number Installed	3
Manufacturer	EPICOR
Installation	Vertical
Outside diameter/height, ft-in	6x6 (ALC-F-1, ALC-K-1 and ALC-K-2) 4x4 (ALC-K-2 optional)
Shell thickness	1/4"
Shell material	Carbon Steel
Design pressure, psi	2

OR

Identification	ALC-F-1
Number Installed	1
Manufacturer	Nuclear Packaging Inc.
Installation	Vertical
Outside diameter/height, ft-in	4'0" x 4'3"
Shell thickness	3/8"
Shell material	Feralium (ASTM A240 UNS Desig S-32550)
Design pressure, psi	10

TABLE 5

MISCELLANEOUS WASTE HOLD-UP TANK

Tank Details	
Identification	WDL-T-2
Manufacturer	Richmond Engineering Co. Inc.
Capacity - gallons	19,518
Installation	Horizontal
Outside diameter and length, ft-in	10' - 9 1/4"; 32' - 4 5/8"
Shell material	SA-240, 304 S/S
Shell thickness, in.	3/8
Design temperature, °F	150
Design pressure, psig	20
Corrosion allowance, in.	0
Design code	1968 ASME, Sec. III, Class 3
Code stamp required	ASME Code

TABLE 6

CLEAN WATER RECEIVING TANK*

Tank Details	
Identification	CC-T-2
Number Installed	1
Manufacturer	Chicago Bridge & Iron Co.
Capacity - gallons	133,689
Installation	Vertical
Outside diameter & height - ft	25' - 35'
Shell material	304 Stainless Steel
Shell thickness	3/16" to 3/8"
Design pressure	Atmospheric
Corrosion allowance	0
Code stamp required	No

* Rinse Hold Tank for O.T.S.G. Chem. Clean Sys.

TABLE 7

OFF-SPEC WATER RECEIVING/BATCH TANK*

Tank Details	
Identification	CC-T-1
Number Installed	1
Manufacturer	Chicago Bridge & Iron Co.
Capacity - gallons	85,978
Installation	Vertical
Outside diameter & height, ft-in.	21'-10" & 39'-0"
Shell material	304 Stainless Steel
Shell thickness	
Design temperature, °F	250°F
Design pressure	Full vacuum to 75 psig
Corrosion allowance	0
Code stamp required	Yes

* Chemical Cleaning Solution Tank for O.T.S.G. Chem. Clean Sys.

TABLE 8

SUMP PUMP
CHEMICAL CLEANING BUILDING

Pump Detail	
Identification	CC-P-2A
Number Installed	1
Manufacturer	Gould
Model No.	3171
Type	Vertical
Rated speed, rpm	3600
Rated capacity, gpm	100
Rated total head, ft	250
Min. Submergence required	1 Foot
Design pressure, casing, psig	150
Design temperature, °F	450
Lubricant	Water
Min. Flow requirements, gpm	
Motor Details	
Manufacturer	General Electric
Type	Vertical Induction
Enclosure	TEFC
Rated Horsepower, HP	20
Speed, rpm	3600
Lubricant/Coolant	Grease/Air
Power Requirements	480V AC, 3 Phase, 60 HZ
Power Source	MCC 2-33A

TABLE 9

MONORAIL HOIST SYSTEM

Number Installed:	1
Manufacturer:	Harnischfeger, Inc., P&H
Model:	#36CS23E
Capacity:	20 ton
Total Lift:	25'-6"
Speed:	
Hoist:	20 FPM maximum (90% load) 10 FPM medium 5 FPM low 1 FPM creep
Trolley:	50 FPM
Control:	
Hoist:	Quad - Speed
Trolley:	Single Speed
Power Supply:	460 V AC, 3 Phase, 60 Hz MCC 2-33A
Control Voltage:	110 V AC

Control Station:

Local and Remote six pushbutton pendant control; deadman type element control

Reeving:	Four part single reeved

TABLE 10

CHEMICAL CLEANING BUILDING VENTILATION SYSTEM NAMEPLATE DATA

MSA Filter Unit

Identification No. ALC-E-H1

60KW Chromolax Heater Unit

480v, 3 Phase, 60 Hz

Cat. Number SCCP-080-3480

Type J 0-800 °F Temperature Controller

Type J 0-800 °F High Limit with Manual Reset

Internal Industrial Fan

Identification No. ALC-E-1

8000 CFM Fan Unit

30 HP

460 volts AC, 3 Phase, 60 Hz

ID Number P28G353G-G7-XD

Eberline Ping - 2A Off Line Effluent Monitor

3 Channel Readout - gaseous, particulate, iodine

110 volts, AC, 1 Phase, 60 Hz

Self contained sample/return pump (4 cfm)

TABLE 11

AIR COMPRESSORS

Identification	ALC-P-7	ALC-P-8
Number Installed	1	1
Vendor	Le Roi (Dresser Industries Inc.)	
Type	Single Stage Rotary Screw	
Model No.	30SS	25SS
Capacity (CFM at PSIG)	115 at 100 110 at 125 (Max.)	98 at 100 95 at 125 (Max.)
Rated Motor, HP, RPM	30, 1755	25, 1760
Power Source	460V, 3 Phase, 60 Hz MCC 2-33A	460V, 3 Phase, 60 Hz Power Panel PDP-W2

TABLE 12

INSTRUMENTATION AND CONTROL

TAG NO.	SERVICE	LOCATION	SUPPLIER	MODEL NO.	INPUT/SPAN OUTPUT/SCALE	SET POINT	REMARKS
ALC-AE-1	EPICOR II Sys. influent conductivity cell	Piping	L&N	4909-010-44-088-1-02	0-1000MMHO/CM	N/A	
ALC-AI-1	EPICOR II Sys. influent conductivity indicator	ALC-PNL-1	L&N	7075-1-011-120-001	0-1000MMHO/CM	N/A	
ALC-AE-3	ALC-K-1 demin. effluent conductivity cell	Piping	L&N	4909-10-44-088-1-02	0-1000MMHO/CM	N/A	
ALC-AI-3	ALC-K-1 demin. effluent conductivity indicator	ALC-PNL-1	L&N	7075-1-011-120-001	0-1000MMHO/CM	N/A	
ALC-AE-4	EPICOR II Sys. effluent conductivity cell	Piping	L&N	4909-10-44-088-1-02	0-1000MMHO/CM	N/A	
ALC-AI-4	EPICOR II Sys. effluent conductivity indicator	ALC-PNL-1	L&N	7075-1-011-120-001-000	0-1000MMHO/CM	N/A	
ALC-AE-6	ALC-K-1 demin. effluent pH cell	Piping	L&N	7774-3-1-01	0-14	N/A	
ALC-AI-6	ALC-K-1 demin. effluent pH indicator	ALC-PNL-1	L&N	7075-1-011-120-001	0-14	N/A	
ALC-AE-7	EPICOR II Sys. effluent pH cell	Piping	L&N	7774-3-1-01	0-14	N/A	
ALC-AI-7	EPICOR II Sys. effluent pH indicator	ALC-PNL-1	L&N	7075-1-011-120-001	0-14	N/A	

TABLE 12 (Cont'd)

INSTRUMENTATION AND CONTROL

TAG NO.	SERVICE	LOCATION	SUPPLIER	MODEL NO.	INPUT/SPAN OUTPUT/SCALE	SET POINT	REMARKS
ALC-FE-1	CC-T-2 inlet flow turbine flow meter	Piping	Hoffer	HO 3/4 2529-B-F1	2.5-29 GPM	N/A	
ALC-FQI-1	CC-T-2 inlet flow totalizer/indicator	ALC-PNL-1	Hoffer	26ECPRTA	0-99,999,999 GAL 0-999MGPM	N/A	
ALC-FE-2	CC-T-2 discharge flow orifice plate	Piping	Foxboro	OP-FTT	0-100 GPM 0-250" WG.	N/A	
ALC-FT-2	CC-T-2 discharge flow transmitter	ALC-RCK-1	Foxboro	NE 13DM-II H2-A-E	0-100" WG. 4-20 MADC	N/A	
ALC-FY-3	CC-T-2 discharge flow square root converter	ALC-PNL-1	Foxboro	66AT-OJ	4 to 20 MADC	N/A	
ALC-FQ-2	CC-T-2 discharge flow integrator	ALC-PNL-1	Fisher & Porter	52-ET	4-20 MADC $0-10^7$ TPM	N/A	
ALC-FI-2	CC-T-2 discharge flow indicator	ALC-PNL-1	Fisher & Porter	51-1371	4-20 MADC 0-100 GPM	N/A	
ALC-FY-4	CC-T-2 discharge flow power supply	ALC-PNL-1	Foxboro	610-AT-OJ	120V 60 Hz 4-20 MADC		
ALC-LI-1	CC-T-1 tank level indicator	ALC-PNL-1	Foxboro	257P-1C	4-20 MADC 0-38 ft		
ALC-LT-1	CC-T-1 tank level transmitter	Local	Foxboro	NE13DM-II H_2-A-E 24"-480"	4-20MADC 0-340" H_2O	N/A	

TABLE 12 (Cont'd)

INSTRUMENTATION AND CONTROL

TAG NO.	SERVICE	LOCATION	SUPPLIER	MODEL NO.	INPUT/SPAN OUTPUT/SCALE	SET POINT	REMARKS
ALC-LY-1	CC-T-1 tank level transm. PWR supply	ALC-PNL-1	Foxboro	610AT-34	120V 60 Hz 4-20 MADC	N/A	
ALC-LI-2	CC-T-2 tank level indicator	ALC-PNL-1	Foxboro	257P-1C	4-20MADC 0-35 ft		
ALC-LT-2	CC-T-2 tank level transmitter	Local	Foxboro	NE13DM- II H2-A-3 8"-428"	0-414" H_2O 4-20 MADC	N/A	
ALC-LY-2	CC-T-2 tank level transm. PWR supply	ALC-PNL-1	Foxboro	610AT-0J	120V 60 Hz 4-20 MADC	N/A	
ALC-LS-1	Chem. Clean. Bldg. sump level switch	Local	Warrick	2CIFO	0-35 ft.	36 1/4 in. Below mntg. 48 1/4 in. face. 90 3/8 in.	
ALC-LAH-1	Chem. Clean. Bldg. sump Hi alarm	ALC-PNL-1	ROCHESTER			36 1/4 in. Below mntg. face.	
ALC-PI-1	ALC-P-5 discharge pressure gage	ALC-RCL-1	Arthur Moore	U.S. Gage 1981	0-160PSIG	N/A	Purchased with diaphragm seal & capillary.
ALC-PI-2	Service air pressure gage	ALC-RCL-1	Arthur Moore	U.S. Gage 1981	0-160PSIG	N/A	
ALC-FI-3	ALC-P-5 seal water flow indicator	Local	Fisher & Porter	10A1152W/5 1-1400KA & 50 WT4000	0-14.9 GPM 0-100%	N/A	

TABLE 12 (Cont'd)

INSTRUMENTATION AND CONTROL

TAG NO.	SERVICE	LOCATION	SUPPLIER	MODEL NO.	INPUT/SPAN OUTPUT/SCALE	SET POINT	REMARKS
ALC-PI-3	Demin. water header pressure gage	ALC-RCL-1	Arthur Moore	U.S. Gage 1981	0-160 PSIG	N/A	
ALC-PI-4	CC-P-2A discharge pressure gage	ALC-RCK-1	Arthur Moore	U.S. Gage 1981	0-160 PSIG	N/A	
ALC-RM-1	ALC-F-1 gamma detector (left shield)	Local	Victoreen	847-1	1-10,000 REM/HR	N/A	
ALC-RM-2	ALC-F-1 gamma detector (right shield)	Local	Victoreen	847-1	1-10,000 REM/HR	N/A	
ALC-RM-3	ALC-K-1 gamma detector (left shield)	Local	Victoreen	847-1	1-10,000 REM/HR	N/A	
ALC-RM-4	ALC-K-1 gamma detector (right shield)	Local	Victoreen	847-1	1-10,000 REM/HR	N/A	
ALC-RM-5	ALC-K-2 gamma detector (left shield)	Local	Victoreen	847-1	1-10,000 REM/HR	N/A	
ALC-RM-6	ALC-K-2 gamma detector (right shield)	Local	Victoreen	847-1	1-10,000 REM/HR	N/A	
ALC-RM-7	EPICOR II "F" Liner Effluent Monitor	Local	Victoreen	843-30	1-10E7 CPM	N/A	
ALC-RM-8	Area Monitor - ALC-F-1	Local	Victoreen	847-1	0.1 to 10E7 MR/HR	N/A	

TABLE 12 (Cont'd)

INSTRUMENTATION AND CONTROL

TAG NO.	SERVICE	LOCATION	SUPPLIER	MODEL NO.	INPUT/SPAN OUTPUT/SCALE	SET POINT	REMARKS
ALC-RM-9	Area Monitor - Mezzanine	Local	Victoreen	857-30	0.1 to 10E5 MR/HR	N/A	
ALC-RM-10	Area Monitor - Tank Area	Field	Victoreen	857-30	0.1 to 10E5 MR/HR	N/A	
ALC-RM-11	Area Monitor - Sump Area	Field	Victoreen	857-30	0.1 to 10E5 MR/HR	N/A	
ALC-RMI-1	ALC-F-1 gamma read-out (left shield)	ALC-PNL-1	Victoreen	856-30 846-2	1-10,000 REM/HR	N/A	
ALC-RMI-2	ALC-F-1 gamma read-out (right shield)	ALC-PNL-1	Victoreen	856-30 846-2	1-10,000 REM/HR	N/A	
ALC-RMI-3	ALC-K-1 gamma read-out (left shield)	ALC-PNL-1	Victoreen	856-30 846-2	1-10,000 REM/HR	N/A	
ALC-RMI-4	ALC-K-1 gamma read-out (right shield)	ALC-PNL-1	Victoreen	856-30 846-2	1-10,000 REM/HR	N/A	
ALC-RMI-5	ALC-K-2 gamma read-out (left shield)	ALC-PNL-1	Victoreen	856-30	1-100 REM/HR	N/A	
ALC-RMI-6	ALC-K-2 gamma read-out (right shield)	ALC-PNL-1	Victoreen	856-30	1-100 REM/HR	N/A	
ALC-RMI-7	EPICOR II "F" Liner Effluent Monitor	ALC-PNL-1	Victoreen	842-11	1-10E7 CPM	N/A	

TABLE 12 (Cont'd)

INSTRUMENTATION AND CONTROL

TAG NO.	SERVICE	LOCATION	SUPPLIER	MODEL NO.	INPUT/SPAN OUTPUT/SCALE	SET POINT	REMARKS
ALC-RMI-8	Area Monitor Readout ALC-F-1	ALC-PNL-2	Victoreen	846-2	0.1 to 10E7 MR/HR	N/A	
ALC-RMI-9	Area Monitor Readout-Mezzanine	ALC-PNL-2	Victoreen	856-30	1 to 10E5 MR/H	N/A	
ALC-RMI-10	Area Monitor Readout-Tank area	ALC-PNL-2	Victoreen	856-30	1 to 10E5 MR/H	N/A	
ALC-RMI-11	Area Monitor Readout-Sump area	ALC-PNL-2	Victoreen	856-30	1 to 10E5 MR/H	10 MR/HR	
ALC-TI-1	Influent Temp. Indicator	Local					
ALC-TS-10	El. Heater Temp Switch	Filter Unit	Chromolax	C76 AK-1200 106-20-AA		160°F	
ALC-TIC-10	El. Heater Temp Indicator and Control	Filter Unit	Chromolax		0-200F	146°F	
ALC-DPI-11	Prefilter DP Indicator	Filter Unit	MSA		0-1" WG. 0-2" WG.	N/A	
ALC-DPS-11	Prefilter DP Switch	Filter Unit	DWYER	1824-2	0.5-2" WG.	1.75" WG.	
ALC-DPI-13	HEPA Filter DP Indicator	Filter Unit	MSA		0-4" WG.	N/A	
ALC-DPS-13	HEPA Filter DP Switch	Filter Unit	DWYER	1824-5	1.5-5" WG.	3" WG.	

TABLE 12 (Cont'd)

INSTRUMENTATION AND CONTROL

TAG NO.	SERVICE	LOCATION	SUPPLIER	MODEL NO.	INPUT/SPAN OUTPUT/SCALE	SET POINT	REMARKS
ALC-TE-15	Charcoal Filter Temp Element	Filter Unit	MSA				
ALC-TS-15-1	Charcoal Filter Temp Switch for Hi Alarm	Filter Unit	MSA			220°f	
ALC-TAH-15A	Charcoal Temp. Alarm	Filter Unit					
ALC-TAH-15B	Charcoal Temp. Alarm	ALC-PNL-1					
ALC-TS-15-2	Charcoal Filter Temp	Filter Unit	MSA			325°f	
ALC-TAHH-15	ALC-E-F4 Charcoal Adsorber Temp.	Filter Unit					
ALC-DPI-16	HEPA Filter DP Indicator	Filter Unit	MSA		0-4" WG.		
ALC-DPS-16	HEPA Filter DP Switch	Filter Unit	MSA		1.5-5" WG.	3" WG.	
ALC-FE-17	Exhaust Flow Element	Duct	Dietrich	ANR-76	0-0.3" WG. (0-8000 scfm)		
ALC-FIS-17	Exhaust Flow Indicator and Switch	Local	DWYER		0-0.5" WG. 0-0.5" WG.	0.1" WG.	
ALC-RE-18	Exhaust Radiation Detector	Local	Eberline	PING-2A			
ALC-RI-18	Exhaust Radiation Indicator	Local	Eberline	PING-2A	$10-10^{6}$ cpm	4.11^{E-2} µCi Particulate Iodine (not in service) 3.81^{E-4} µCi/cc	

TABLE 12 (Cont'd)

INSTRUMENTATION AND CONTROL

TAG NO.	SERVICE	LOCATION	SUPPLIER	MODEL NO.	INPUT/SPAN OUTPUT/SCALE	SET POINT	REMARKS
ALC-RR-18	Exhaust Radiation Recorder	Local	Eberline	PING-2A			
ALC-UA-19	Air Filtration Unit Trouble	ALC-PNL-1	Rochester	(Later)			
ALC-FHS-20	Air Filtration Unit Fan Control	MCC	GE	CR-2940			
ALC-DPS-1	ALC-P-5 DP Switch	Local	SOR	102AS-K603 SI-TTX	Psid corresponding to 40 gpm and 90 gpm.		
ALC-LS-21	Loop Seal Level High	Local	B/W	2-RH		2-1/2"	
ALC-UA-22	Cap-Gun Rad. Trouble	ALC-PNL-1	Rochester				from RM-1-12
ALC-FG-23	Aux. Bldg. Liquid Clean Up Sampling System Flow	Piping				N/A	
ALC-HS-24	Tank CC-T-142 Selector Switch Level Interlock	ALC-PNL-1	GE	CR2940 W/UB 200A Contact			
N/A	ALC-F-1 Level controller	Field	CAP-GUN	(Later)	(Later)	High-5" from top of tank Low-12" from top of tank	Controls air supply to ALC-P-1

TABLE 12 (Cont'd)

INSTRUMENTATION AND CONTROL

TAG NO.	SERVICE	LOCATION	SUPPLIER	MODEL NO.	INPUT/SPAN OUTPUT/SCALE	SET POINT	REMARKS
N/A	ALC-K-1 Level controller	Field	CAP-GUN		(Later)	"	Controls air supply to ALC-P-2
N/A	ALC-K-2 Level controller	Field	CAP-GUN		(Later)	"	Controls air supply to ALC-P-3
N/A	ALC-F-1 Hi Hi Level Alarm	Cap-Gun Control Unit	CAP-GUN			3" from top of tank	
N/A	ALC-K-1 Hi Hi Level Alarm	Cap-Gun Control Unit	CAP-GUN			3" from top of tank	
N/A	ALC-K-2 Hi Hi Level Alarm	Cap-Gun Control Unit	CAP-GUN			3" from top of tank	

TABLE 13

EPICOR II
RADWASTE PROCESSING SYSTEM
AUX. BLDG. EMERGENCY LIQUID CLEANUP MODE

OVERALL OBJECTIVES: (a) Achieve sufficiently high DF's to release processed water at 10 GPM to satisfy tech. spec. criteria.

(b) Process water at 10 GPM.

(c) Minimize personnel exposure.

(d) Process water at the lowest possible cost.

SPECIFIC OBJECTIVES:

Container	Vessel Size	Primary Purpose	Composition	Process Vessel Contact Radiation Level Changeout Criteria	Gallons Processed to Reach Changeout Criteria	Total Number of Containers Required(5)	Projected Shipping Category
#1 First Demin.	4'D x 4'H	1. Na Removal 2. Other Cation Removal 3. Anion Removal	Mixed Cation Resin on top/ Anion on bottom	1,000 R/Hr. (1)	Up to 100,000	50	Large Quantity (6) or Type B
#2 Second Demin.	4'D x 4'H	Cation Polishing Anion Polishing	Mixed Cation Resin Anion Resin	400 R/Hr. (2)	Up to 150,000	15	Type B or LSA] Type A (6)
#3 Third Demin.	6'D x 6'H	Water Polishing Guard Bed	Mixed Resin	20 R/Hr. (3)	Up to 250,000	7	LSA] Type A
#4 Strainer	2'H x 1 1/2'W x 1 1/2'L	Catch Resin Fines	Strainer	2-3 R/Hr. (4)	150,000	-	LSA
#5 Post Filter	2' x 1 1/2' x 1 1/2'	Colloids Removal	1 Micron Cartridge	2-3 R/Hr.	150,000	2	LSA

TABLE 13 (Cont'd)

NOTES:

(1) The 1,000 R/Hr. limit is based upon the 1,300 curie limit of the LL-60-150/TVA shipping cask projected for use.

(2) The 400 R/hr. limit is based upon a level of margin required to prevent inadvertent contamination of the 6' x 6' demin. causing this larger demin. to become a large quantity versus an LSA shipment. This change in shipping category could be caused by excessive strontium loading occurring during breakthrough of the cation polishing first demin.

(3) The 20 R/hr. limit is based upon a handling limit to control personnel exposure and a LSA category shipping limit (25 R/hr.).

(4) The 2-3 R/hr. limit is a handling limit.

(5) The total number of containers is based upon processing the 285,000 gallons of water existing on July 24, 1979. This value will change as the stored water from daily inleakage increases.

(6) A large quantity category will result since the liner will contain greater than 0.3 mc/gn of activity.

(7) Table updated to conclusion of original EPICOR II design objectives, namely the completion of processing accident generated Auxiliary and Fuel Handling Building Water.

TABLE 14

EPICOR II
RADWASTE PROCESSING SYSTEM
(SDS POLISHING MODE)

OVERALL OBJECTIVES:
(a) Polish the Submerged Demineralizer System effluent water sufficiently to satisfy tech. spec. criteria.
(b) Process water at 10 GPM.
(c) Minimize personnel exposure.
(d) Process water at the lowest possible cost.

SPECIFIC OBJECTIVES:

Container	Vessel Size	Primary Purpose	Composition	Process Vessel Contact Radiation Level Changeout Criteria(1)	Gallons Processed to Reach Changeout Criteria	Total Number of Containers Required	Projected Shipping Category
#1 First Demin.	6'D x 6'H	Na Removal Other Cation Removal Anion Removal	Cation (top)/ Anion (bottom)	[20R/Hr	Up to 50,000	70	LSA] Type A
#2 Second Demin.	6'D x 6'H	Anion Removal Cation Removal	Mixed Resin	[1 R/Hr	200,000	20	LSA or LSA] Type A
#3 Third Demin.	4'D x 4'H	Polishing Guard Bed	Mixed Resin	[1 R/Hr	200,000	15	LSA
#4 Strainer	2'H x 1 1/2'W x 1 1/2'L	Catch Resin Fines	Strainer	[1 R/Hr	150,000	-	LSA
#5 Post Filter	2' x 1 1/2' x 1 1/2'	Colloids Removal	1 Micron Cartridge	[1 R/Hr	150,000	2	LSA

NOTE: (1) Process Vessels will not be changed out on radiation levels. Values shown are the anticipated dose rates when chemical analysis indicates change out.

(2) Reflects usage projecting through 1984.

TABLE 15

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0001	3/4	GLOBE-600#-SW-40S	Process Suction Line Vent	68817	LADDISH CAT.# 7661-2407-07A	150/120	
ALC-V0002	3/4	GLOBE-600#-SW-40S	Process Suction Line Vent	68817	LADDISH CAT.# 7661-2407-07A	150/120	
ALC-V0003	3/4	GLOBE-600#-SW-40S	Process Suction Line Prime and Fill Valve		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0004	1	GLOBE-600#-SW-40S	Chemical Addition Line for CC-T-1		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0005	2	GLOBE-600#-SW-40S	Discharge Line From CC-T-1		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0006	2	GATE-600#-SW-40S	Clean Water Discharge Line to Units 1 & 2		ALOYCO FIG.# 110	150/120	
ALC-V0007	2	GATE-600#-SW-40S	Truck Fill Connection		ALOYCO FIG.# 110	150/120	
ALC-V0008	2	GATE-600#-SW-40S	Truck Fill Connection		ALOYCO FIG.# 110	150/120	
ALC-V0009	3/4	GLOBE-600#-SW-40	Service Air to ALC-P-2		HANCOCK CAT.# 5500W-1	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0010	3/4	GLOBE-600#-SW-40	Service Air to ALC-P-1		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0011	3/4	GLOBE-600#-SW-40	Oiled Air to ALC-P-1		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0012	3/4	GLOBE-600#-SW-40	Service Air to ALC-P-1		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0013	3/4	GLOBE-600#-SW-40S	Demin. Water to ALC-P-4	68817	LADDISH CAT.# 7661-2407-07A	150/120	
ALC-V0014	3/4	GLOBE-600#-SW-40S	Demin. Water to ALC-P-4	68817	LADDISH CAT.# 7661-2407-07A	150/120	
ALC-V0015	3/4	GLOBE-600#-SW-40S	Demin. Water to ALC-P-3	69001	OBERT TYPE# 103	150/120	
ALC-V0016	3/4	GLOBE-600#-SW-40S	Demin. Water to ALC-P-3	69001	OBERT TYPE# 103	150/120	
ALC-V0017	3/4	GLOBE-600#-SW-40S	Demin. Water to ALC-P-2	69001	OBERT TYPE# 103	150/120	
ALC-V0018	3/4	GLOBE-600#-SW-40S	Demin. Water to ALC-P-2	69001	OBERT TYPE# 103	150/120	
ALC-V0019	3/4	GLOBE-600#-SW-40S	Demin. Water to ALC-P-1	69001	OBERT TYPE# 103	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0020	3/4	GLOBE-600#-SW-40S	Process Line Flush Connection	69001	OBERT TYPE# 103	150/120	
ALC-V0021	3/4	GLOBE-600#-SW-40	Service Air to ALC-P-4		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0022	3/4	GLOBE-600#-SW-40	Oiled Air to ALC-P-4		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0023	3/4	GLOBE-600#-SW-40	Service Air to ALC-P-4		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0024	3/4	GLOBE-600#-SW-40	Service Air to ALC-P-3		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0025	3/4	GLOBE-600#-SW-40	Oiled Air to ALC-P-3		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0026	3/4	GLOBE-600#-SW-40	Service Air to ALC-P-3		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0027	3/4	GLOBE-600#-SW-40	Service Air to ALC-P-2		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0028	3/4	GLOBE-600#-SW-40	Oiled Air to ALC-P-2		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0029	3/4	GLOBE-600#-SW-40S	Sampled Line From ALC-P-5	68817	LADISH CAT.# 7661-2407-07A	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0030	3/4	GLOBE-600#-SW-40S	Sampled Line From ALC-P-5	68817	LADISH CAT.# 7661-2407-07A	150/120	
ALC-V0031	3/4	GLOBE-600#-SW-40S	Loop Seal Fill Connection On CC-T-1	68817	LADISH CAT.# 7661-2407-07A	150/120	
ALC-V0032	2	BALCHK-600#-SW-40S	Discharge of CC-P-2A	69001	OBERT TYPE# 50	150/120	
ALC-V0033	2	GLOBE-600#-SW-40S	Discharge of ALC-P-5 to CC-T-1	69001	OBERT TYPE# 103	150/120	
ALC-V0034	3/4	GLOBE-600#-SW-40S	Pres. Ind. Root Va. On Dischg. of ALC-P-5	68817	LADISH CAT.# 7661-2407-07A	150/120	
ALC-V0035	2	GLOBE-600#-SW-40S	Recirc. Line From ALC-P-5 to CC-T-2	69001	OBERT TYPE# 103	150/120	
ALC-V0036	3	GLOBE-150#-FLGD-40S	Suction Line From CC-T-2 to ALC-P-5	69001	NEWCO CAT.# 6415R	150/120	
ALC-V0037	2	BALCHK-600#-SW-40S	Inlet to CC-T-2	69001	OBERT TYPE# 50	150/120	
ALC-V0038	1/2	GLOBE-CMP-FIG	Sensing Line On Control Va. ALC-V-109		PARKER HANNIFIN CAT.#-436	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0039	3/4	GLOBE-600#-SW-40S	Root Va. For CC-T-2 Level Indicator	69001	HANCOCK CAT.# 5500W-1	150/120	
ALC-V0040	1/2	GLOBE-600#-SW-40S	Root Va. On ALC-P-5 Dischg. Flow Transmit		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0041	1/2	GLOBE-600#-SW-40S	Root Va. On ALC-P-5 Dischg. Flow Transmit		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0042	3/4	GLOBE-600#-SW-40S	Loop Seal Fill Connection On CC-T-2	68817	LADISH CAT.# 7661-2407-07A	150/120	
ALC-V0043	2	BALL-SW-40S	Process Suction Line From WDL-T -2 to ALC-P-1	69000	QUARTROL CAT.# 521SSSO	150/120	Motor Operated, 120 Volts
ALC-V0044	3/4	GLOBE-SW-40	Blowdn. Line From Strainer ALC-U-1		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0045	2	SWGCHK-150#-SW-40S	Process System Demin. Water Flush Supply		ALOYCO	150/120	
ALC-V0046	2	BALCHK-SW-40S	Process System From CC-T-1	69001	OBERT TYPE #50	150/120	Internals of Valve are Removed
ALC-V0047			Deleted				

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0048	3/4	GLOBE-SW-40S	Demin. Water To ALC-P-1	69001	OBERT TYPE #103	150/120	
ALC-V0049	1/2	GLOBE-600#-SW-40S	Root Va. On CC-T-2 Inlet Flow Transmit		HANCOCK CAT.#5500W-1	150/120	
ALC-V0050	1/2	GLOBE-600#-SW-40S	Root Va. On CC-T-2 Inlet Flow Transmit		HANCOCK CAT.#5500W-1	150/120	
ALC-V0051			Deleted				
ALC-V0052	3/4	GLOBE-SW-40S	Root Va. On CC-T-1 Level Indicator Line		HANCOCK CAT.#5500W-1	150/120	
ALC-V0053	2	GLOBE-SW-40S	Recirc Line From ALC-P-5 to CC-T-2	69001	OBERT TYPE# 103	150/120	
ALC-V0054	2	GLOBE-600#-SW-40S	Clean Water Discharge to Units 1 & 2		ALOYCO FIG.# 110	150/120	
ALC-V0055	2	GLOBE-600#-SW-40S	Inlet Line From CC-T-2 to ALC-F-2		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0056	2	GLOBE-600#-SW-40S	Future Xenon Hold-Up Connect. On CC-T-2		HANCOCK CAT.# 5500W-1	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0057	2	GLOBE-600#-SW-40S	Inlete Line From CC-T-1 to ALC-F-3		HANCOCK CAT. # 5500W-1	150/120	
ALC-V0058	2	GLOBE-600#-SW-40	Service Air Hdr./ Unit #2 Isolation Va.		HENRY VOGT DWG. # E-44248-RG	150/120	
ALC-V0059	2	BALCHK-600#-SW-40S	Process Sys. Suction Line	69001	OVERT TYPE #50	150/120	
ALC-V0060	1	POPCHK-SCRD-40S	Service Air Supply to ALC-P-1	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0061	1	POPCHK-SCRD-40S	Demin. Water to to ALC-P-1	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0062	1	POPCHK-SCRD-40	Oiled Air to ALC-P-1	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0063	1	POPCHK-SCRD-40	Service Air to ALC-P-1	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0064	1	POPCHK-SCRD-40	Demin. Water to ALC-P-1	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0065	1	POPCHK-SCRD-40	Demin. Water to ALC-P-2	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0066	1	POPCHK-SCRD-40S	Service Air to ALC-P-2	68819	NUPRO CAT.# B-16C4-1	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0067	1	POPCHK-SCRD-40	Oiled Air to ALC-P-2	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0068	1	POPCHK-SCRD-40S	Demin. Water To ALC-P-2	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0069	1	POPCHK-SCRD-40S	Service Air To ALC-P-2	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0070	1	POPCHK-SCRD-40S	Demin. Water To ALC-P-3	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0071	1	POPCHK-SCRD-40	Service Air To ALC-P-3	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0072	1	POPCHK-SCRD-40S	Oiled Air To ALC-P-3	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0073	1	POPCHK-SCRD-40S	Demin. Water To ALC-P-3	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0074	1	POPCHK-SCRD-40S	Service Air To ALC-P-3	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0075	1	POPCHK-SCRD-40S	Demin. Water To ALC-P-4	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0076	1	POPCHK-SCRD-40S	Service Air To ALC-P-4	68819	NUPRO CAT.# B-16C4-1	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0077	1	POPCHK-SCRD-40S	Oiled Air To ALC-P-4	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0078	1	POPCHK-SCRD-40S	Demin. Water To ALC-P-4	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0079	1	POPCHK-SCRD-40S	Service Air To ALC-P-4	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0080	3/4	GLOBE-600#-SW-40	Root Va. for Pres. Ind. on Demin. Water Header		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0081	3/4	GLOBE-600#-SW-40	Root Va. for Pres. Ind. on Service Air Header		HENRY VOGT DWG.# E-44244-R7	150/120	
ALC-V0082	2	GLOBE-SW-40S	Future Xenon Holdup Connect. On CC-T-1		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0083	1 1/4	BALL-SW-40S	Root VA. for Conductivity Probe On CC-T-2 Inlet	68875	APOLLO CAT.# 316	150/120	
ALC-V0084	1 1/4	BALL-SW-40S	Root VA. for pH Probe On CC-T-2 Inlet	68875	APOLLO CAT.# 316	150/120	
ALC-V0085			Deleted				

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0086	2	BALL-SW-40S	Discharge from Tank CC-T-1	80322	QUARTROL CAT.# 521SSSO	150/120	Motor Operated. 120 Volts
ALC-V0087	1 1/2	BALL-SW-40S	Clean Water Dis Charge to Unit #2 Cond. Test Tks. WDL-T-9A & B	80792	QUARTROL CAT.# 521SSSO	150/120	Motor Operated. 120 Volts
ALC-V0088	1 1/2	BALL-SW-40S	Clean Water Dis Charge to Unit #2 Cond. Test Tks. WDL-T-9A & B	80792	QUARTROL CAT.# 521SSSO	150/120	Motor Operated. 120 Volts
ALC-V0089	2	GLOBE-600#-SW-40S	Discharge Line From Sump Pump CC-P-2A		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0090			Deleted				
ALC-V0091	1 1/4	BALL-SW-40S	Root Valve for Cond Probe at Inlet to Pump ALC-P-1	68875	APOLLO CAT.# 316	150/120	
ALC-V0092	1 1/4	BALL-SW-40S	Root Valve for Cond Probe at Inlet to Pump ALC-P-3	68875	APOLLO CAT.# 316	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0093	1 1/4	BALL-SW-40S	Root Valve for Cond Probe at Inlet to Pump ALC-P-3	68875	APOLLO CAT.# 316	150/120	
ALC-V0094	3/4	GLOBE-600#-SW-40S	Root Valve for Pres. Ind. On Sump Pump CC-P-2A Discharge	69001	OBERT TYPE# 103	150/120	
ALC-V0095	2	GLOBE-600#-SW-40S	Process System Flush Line Near Inlet to ALC-P-1		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0096			Deleted				
ALC-V0097	3/4	GLOBE-600#-SW-40	Oiled Air to ALC-P-6		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0098	3/4	GLOBE-600#-SW-40S	Demin. Water to ALC-P-6		VELAN CAT.# 374B	150/120	
ALC-V0099	3/4	GLOBE-600#-SW-40	Service Air to ALC-P-6		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0100	3/4	GLOBE-600#-SW-40	Service Air to ALC-P-6		HENRY VOGT DWG.# E-44244-R11	150/120	
ALC-V0101	3/4	GLOBE-600#-SW-40S	Demin. Water to ALC-P-6	69001	OBERT TYPE# 103	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0102	1	POPCHK-SCRD-40	Oiled Air to ALC-P-6	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0103	1	BALCKH-600#-SW-40S	Filter ALC-F-1 Precoat Supply Line	69001	OBERT TYPE# 50	150/120	
ALC-V0104	1	POPCHK-SCRD-40	Service Air to ALC-P-6	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0105			Deleted				
ALC-V0106	2	GLOBE-600#-SW-40S	Discharge From One Micron Filter		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0107	3/4	GLOBE-600#-SW-40S	Vent on One Micron Filter		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0108	3/4	GLOBE-600#-SW-40S	Drain on One Micron Filter		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0109	2	CONTROL-FLGD-40	Service Air Supply Header	69005	FISHER TYPE# 310-32	150/120	
ALC-V0110	3	GLOBE-FLGD-40S	Suction Line From CC-T-1 to ALC-P-5	69001	NEWCO CAT.# 6415R	150/120	
ALC-V0111			Deleted				
ALC-V0112	2	GLOBE-600#-SW-40S	Inlet to One Micron Filter		HANCOCK CAT.# 5500W-1	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0113	1	POPCHK-SW-40S	Chemical Addition Line to CC-T-1	68819	NUPRO CAT.# B-16C4-1	150/120	
ALC-V0114	2	BALCHK-600#-SW-40S	Discharge From ALC-P-5	69001	OBERT TYPE# 50	150/120	
ALC-V0115	3/4	GLOBE-SW-40S	Drain Line on Process Suction Line			150/120	
ALC-V0116	3/4	GLOBE-SW-40S	Drain Line on Process Suction Line			150/120	
ALC-V0117	3/4	GLOBE-600#-SW-40S	Pressure Test Connection Near Suction of ALC-P-1		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0118 -123		No Longer in Use (Unaccesible)					Located in Unit 1
ALC-V0124	1	GLOBE-600#-SW-40S	Filter ALC-F-1 Precoat Supply Line		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0125	3/4	GLOBE-600#-SW-40S	Pressure Test Connection On Demin. Water Header		HANCOCK CAT.# 5500W-1	150/120	

TABLE 15 (Cont'd

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0126	3/4	GLOBE-600#-SW-40S	Pressure Test Connection On Service Air Header		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0127	3/4	GLOBE-600#-SW-40S	Pressure Test Connection On Sump Pump Discharge		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0128	3/4	GLOBE-600#-SW-40S	Priming Vent For ALC-P-5	68817	LADISH CAT.# 7661-2407-07A	150/120	
ALC-V0129	3/4	GLOBE-600#-SW-40S	Priming Vent For ALC-P-5	68817	LADISH CAT.# 7661-2407-07A	150/120	
ALC-V0130	3/4	BALCHK-600#-SW-40S	Drain on One Micron Filter	69001	OBERT TYPE# 103	150/120	
ALC-V0131	3/4	BALCHK-600#-SW-40S	Drain on Suction Line from CC-T-2 to ALC-P-5	69001	OBERT TYPE# 103	150/120	
ALC-V0132	3/4	GLOBE-600#-SW-40S	Drain on Suction Line From CC-T-2 to ALC-P-5	69001	OBERT TYPE# 103	150/120	
ALC-V0133	3/4	GLOBE-600#-SW-40S	ALC-DPS-1 LP Leg Root Valve	69001	OBERT TYPE# 103	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0134	3/4	GLOBE-600#-SW-40S	Demin. Water to ALC-P-5 Seals		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0135	1	POPCHK-SCRF-40S	Demin. Water to ALC-P-5 Seals	68819	NUPRO CAT.# B16C4-1	150/120	
ALC-V0136	3/4	SOLND-SCRD-40S	Demin. Water to ALC-P-5 Seals	B2188	ASCO CAT.# 8210D9	150/120	2 Way Normally Closed Energized to Open
ALC-V0137	2	GLOBE-SW-40S	Demin. Water to Flush Line to CC-T-2			150/120	
ALC-V0138	2	BALCHK-600#-SW-40S	Discharge Line From CC-P-2A	69001	OBERT TYPE# 50	150/120	
ALC-V0139	2	GLOBE-600#-SW-40	Service Air Header		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0140	2	GLOBE-600#-SW-40S	Future Waste Supply Line		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0141	2	GLOBE-600#-SW-40S	Future Waste Supply Line		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0142	2	LIFCHK-SW-40S	Demin. Water Supply Header		VELAN SERIAL # S-50-1	150/120	
ALC-V0143	1 1/2	RELIEF-SCRD-40S	Demin. Water Supply Header		J. E. LONERGAN CORP. MODEL LOT 11	150/120	Set Pressure at 150 P.S.I.G.

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0144	2	GLOBE-600#-SW-40S	Demin. Water Supply Header CC-T-2		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0145	2	GLOBE-600#-SW-40S	Spare Plant Air/ EPICOR II Air Sup. Calc-P-788 Isolation Va.		HANCOCK CAT.# 5500W-1	150/120	
ALC-V0146	1/2	BALL-COM FTG	Sample Line From ALC-P-2	80498	WHITEY CAT.# SS-45S8	150/120	
ALC-V0147	1/2	BALL-COM FTG	Sample Line From ALC-P-3	80498	WHITEY CAT.# SS-45S8	150/120	
ALC-V0148	1/2	BALL-COM FTG	Sample Line From ALC-P-4	80498	WHITEY CAT.# SS-45S8	150/120	
ALC-V0149	1/2	GLOBE-COM FTG	Grab Sample From ALC-P-2		HOKE CAT.# N2811Q8Y15	150/120	
ALC-V0150	1/2	GLOBE-COM FTG	Grab Sample From ALC-P-3		HOKE CAT.# N2811Q8Y15	150/120	
ALC-V0151	1/2	GLOBE-COM FTG	Grab Sample From ALC-P-4		HOKE CAT.# N2811Q8Y15	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0152	1/2	GLOBE-COM FTG	Grab Sample From ALC-P-5		HOKE CAT.# N2811Q8Y15	150/120	
ALC-V0153	1	BALL-COM FTG	Sample Recirc. Line	80498	WHITEY CAT.# SS-65F16	150/120	
ALC-V0154	1/2	BALL-COM FTG	Grab Sample From ALC P-5	80498	WHITEY CAT.# SS-45S8	150/120	
ALC-V0155	1/2	BALL-COM FTG	Grab Sample From ALC-P-4	80498	WHITEY CAT.# SS-45S8	150/120	
ALC-V0156	1/2	BALL-COM FTG	Grab Sample From ALC-P-3		WHITEY CAT.# SS-45S8	150/120	
ALC-V0157	1/2	BALL-COM FTG	Grab Sample From ALC-P-2	80498	WHITEY CAT.# SS-45S8	150/120	
ALC-V0158	3/4	GLOBE-600#-SW-40S	Demin. Water to Sample Sink Spray Header	68817	LADISH CAT.# 7661-2407-07A	150/120	
ALC-V0159	3/4	GLOBE-600#-SW-40S	Demin. Water to Sample Bottle Wash Hose	68817	LADISH CAT.# 7661-2407-07A	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0160	1/2	LIFCHK-COM FTG	Recirc. Line From ALC-P-2	80498	WHITNEY CAT.# SS-58S8	150/120	
ALC-V0161	1/2	LIFCHK-COM FTG	Recirc. Line From ALC-P-3	80498	WHITNEY CAT.# SS-58S8	150/120	
ALC-V0162	1/2	LIFCHK-COM FTG	Recirc. Line From ALC-P-4	80498	WHITNEY CAT.# SS-58S8	150/120	
ALC-V0163	1/2	SOLND SCRD	Recirc. Line From ALC-P-4	80548	ASCO CAT.# 8210C94	150/120	2 Way Normally Closed Energized to Open
ALC-V0164	1/2	SOLND SCRD	Sample Line From ALC-P-4	80548	ASCO CAT.# 8210C94	150/120	2 Way Normally Closed Energized to Open
ALC-V0165	1/2	SOLND SCRD	Recirc. Line From ALC-P-3	80548	ASCO CAT.# 8210C94	150/120	2 Way Normally Closed Energized to Open
ALC-V0166	1/2	SOLND SCRD	Sample Line From ALC-P-3	80548	ASCO CAT.# 8210C94	150/120	2 Way Normally Closed Energized to Open
ALC-V0167	1/2	SOLND SCRD	Recirc. Line From ALC-P-2	80548	ASCO CAT.# 8210C94	150/120	2 Way Normally Closed Energized to Open
ALC-V0168	1/2	SOLND SCRD	Sample Line From ALC-P-2	80548	ASCO CAT.# 8210C94	150/120	2 Way Normally Closed Energized to Open
ALC-V0169	2	GLOBE-600#-SW-40S	Clean Water Discharge to Unit #1		POWEL FIG.# 2474	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0170	2	GLOBE-600#-SW-40S	Clean Water Discharge to Unit #2		NEWCO CAT.# 28TF32	150/120	
ALC-V0171	3/4	GLOBE-600#-SW-40S	Clean Water Discharge to Unit #2 Drain Line	68817	LADISH CAT.# 7661-2407-07A	150/120	
ALC-V0172	3/4	GLOBE-SW-40S	Clean Water Discharge to Unit #2 Vent Line			150/120	
ALC-V0173	3/4	GLOBE-SW-40S	Clean Water Discharge to Unit #2 Drain Line			150/120	
ALC-V0174	3/4	GLOBE-600#-SW-40S	Cask Overflow Loop Seal Leveling Line	68817	LADISH CAT.# 7661-2407-07A	150/120	
ALC-V0175	3/4	GLOBE-600#-SW-40S	Cask Overflow Loop Seal Fill Line	68817	LADISH CAT.# 7661-2407-07A	150/120	
ALC-V0176	3/4	GLOBE-600#-SW-40	Oiled Air Line For ALC-P-6		HENRY VOGT DWG.# E44244-R11	150/120	
ALC-V0177	1/2	POPCHK-COM FTG	Sample Line From ALC-P-2	82033	NUPRO CAT.# SS-8C-1/3	150/120	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0178	1/2	POPCHK-COM FTG	Sample Line From ALC-P-3	82033	NUPRO CAT.# SS-8C-1/3	150/120	
ALC-V0179	1/2	POPCHK-COM FTG	Sample Line From ALC-P-4	82033	NUPRO CAT.# SS-8C-1/3	150/120	
ALC-V0180	2	BALL SCRD	Process Inlet To Pump ALC-P-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT	/	Supplied by CAP-GUN
ALC-V0181	3/4	BALL SCRD	Service Air To Pump ALC-P-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT	/	Supplied by CAP-GUN
ALC-V0182	3/4	BALL SCRD	Demin. Water To Pump ALC-P-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT	/	Supplied by CAP-GUN
ALC-V0183	3/4	BALL SCRD	Service Air To Pump ALC-P-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT	/	Supplied by CAP-GUN
ALC-V0184	3/4	BALL SCRD	Demin. Water To Pump ALC-P-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT	/	Supplied by CAP-GUN

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0185	3/4	SOLND SCRD	Oiled Air To Pump ALC-P-1		ASCO. CAT. NO. 8210D95	/	Supplied by CAP-GUN
ALC-V0186	3/4	BALL SCRD	Oiled Air to Pump ALC-P-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT	/	Supplied by CAP-GUN
ALC-V0187	3/4	ANGLE SCRD	Oiled Air to Pump ALC-P-1		WARREN RUPP CO., PART # 893-048-162	/	Supplied by Mfr. of Pump ALC-P-1 (Warren Rupp)
ALC-V0188	3/4	BALL SCRD	Service Air to Pump ALC-P-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT	/	Supplied by CAP-GUN
ALC-V0189	3/4	BALL SCRD	Sample Point Va. On Outlet Of Pump ALC-P-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT	/	Supplied by CAP-GUN This Sample Point Not Used
ALC-V0190	3/4	BALL SCRD	Demin. Water to Pump ALC-P-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT	/	Supplied by CAP-GUN
ALC-V0191	1	BALL SCRD	Process Outlet From Pump ALC-P-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0192	3/4	BALL SCRD	Service Air to Pump ALC-P-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0193	3/4	BALL SCRD	Demin. Water to Pump ALC-P-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0194	2	BALL SCRD	Process Inlet To Pump ALC-P-2		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0195	3/4	BALL SCRD	Demin. Water To Pump ALC-P-2		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0196	3/4	BALL SCRD	Service Air To Pump ALC-P-2		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0197	3/4	BALL SCRD	Service Air To Pump ALC-P-2		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0198	3/4	BALL SCRD	Service Air To Pump ALC-P-2		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0199	3/4	SOLND SCRD	Oiled Air To Pump ALC-P-2		ASCO CAT. NO. B210D95		Supplied by CAP-GUN
ALC-V0200	3/4	ANGLE SCRD	Oiled Air To Pump ALC-P-2		WARREN RUPP CO., PART # 893-043-162		Supplied by Mfr. of Pump ALC-P-2 (Warren Rupp)
ALC-V0201	2	BALL SCRD	Process Supply From Pump ALC-P-2		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0202	3/4	BALL SCRD	Demin. Water To Pump ALC-P-2		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0203			Deleted				
ALC-V0204	3/4	BALL SCRD	Service Air To Pump ALC-P-2		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0205	3/4	BALL SCRD	Demin. Water To Pump ALC-P-2		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0206	3/4	BALL SCRD	Service Air To Pump ALC-P-2		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0207	2	BALL SCRD	Process Supply To ALC-F-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0208	2	BALL SCRD	Process Supply To ALC-F-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0209	2	BALL SCRD	Process Supply To ALC-K-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0210	2	BALL SCRD	Process Supply To ALC-K-1		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0211	2	BALL SCRD	Process Supply To ALC-K-2		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0212	2	BALL SCRD	Process Supply To ALC-K-2		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0213	2	BALL SCRD	Process Inlet To Pump ALC-P-3		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0214	3/4	BALL SCRD	Demin. Water To Pump ALC-P-3		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0215	3/4	BALL SCRD	Service Air To Pump ALC-P-3		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0216	3/4	BALL SCRD	Demin. Water To Pump ALC-P-3		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0217	3/4	BALL SCRD	Service Air To Pump ALC-P-3		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0218	3/4	SOLND SCRD	Oiled Air To Pump ALC-P-3		ASCO. CAT. NO. 8210D95		Supplied by CAP-GUN
ALC-V0219	3/4	ANGLE SCRD	Oiled Air To Pump ALC-P-3		WARREN RUPP CO. PART # 893-048-162		Supplied by Mfr. of Pump ALC-P-3 (Warren Rupp)
ALC-V0220	3/4	BALL SCRD	Oiled Air To Pump ALC-P-3		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0221	3/4	BALL SCRD	Demin. Water To Pump ALC-P-3		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0222	3/4	BALL SCRD	Service Air To Pump ALC-P-3		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0223	3/4	BALL SCRD	Demin. Water To Pump ALC-P-3		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0224	3/4	BALL SCRD	Sample Point Va. on Outlet of Pump ALC-P-3		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0225	3/4	BALL SCRD	Service Air to Pump ALC-P-3		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0226	2	BALL SCRD	Process Outlet From Pump ALC-P-3		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0227	2	BALL SCRD	Process Inlet To Pump ALC-P-4		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0228	3/4	BALL SCRD	Demin. Water To Pump ALC-P-4		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0229	3/4	BALL SCRD	Service Air To Pump ALC-P-4		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0230	3/4	BALL SCRD	Demin. Water To Pump ALC-P-4		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0231	3/4	BALL SCRD	Service Air To Pump ALC-P-4		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0232	3/4	SOLND SCRD	Oiled Air To Pump ALC-P-4		ASCO CAT. NO. 8210D95		Supplied by CAP-GUN
ALC-V0233	3/4	BALL SCRD	Oiled Air To Pump ALC-P-4		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0234	3/4	BALL SCRD	Oiled Air To Pump ALC-P-4		WARREN RUPP CO., PART # 893-048-162		Supplied by Mfr. of pump ALC-P-4 (Warren Rupp)
ALC-V0235	3/4	BALL SCRD	Demin. WaterTo Pump ALC-P-4		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0236	3/4	BALL SCRD	Service Air To Pump ALC-P-4		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0237	3/4	BALL SCRD	Demin. Water To Pump ALC-P-4		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0238	3/4	BALL SCRD	Sample Point Va. On Outlet Of Pump ALC-P-4		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0239	3/4	BALL SCRD	Service Air to Pump ALC-P-4		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0240	3/4	BALL SCRD	Process Outlet From Pump ALC-P-4		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0241	3/4	BALL SCRD	Oiled Air To Pump ALC-P-2		JAMESBURY TYPE 1000 FIG. NO. 11-1100TT		Supplied by CAP-GUN
ALC-V0242	2	AIR OPERATED BALL SCRD-40S	Discharge From Tank CC-T-1		HILLS-McCANNA FIG. S302-56-T-S6	150/120	2 Way Normally Closed Energized To Open
ALC-V0243-249			DELETED				

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0250	2	GLOBE-SW-40	Discharge Line From Compressor ALC-P-7		HENRY VOGT DWG. # E-44248-R6	150/120	
ALC-V0251	2	GLOBE-SW-40	Discharge Line From Compressor ALC-P-8		HENRY VOGT DWG. # E-44248-R5	150/120	
ALC-V0252	3/4	GLOBE-SW-40	Air Supply Line From ALC-P-7 & ALC-P-8 Drain	Stock	HANCOCK CAT. # 5500W-1	150/120	
ALC-V0253	3/4	GLOBE-SW-40S	Priming Vent Line			150/120	
ALC-V0254	1/2	GLOBE-SCRD-40S	Pressure Tap on Priming Vent Line			150/120	
ALC-V0255	2	AIR OPERATED BALL SCRD-40S	Process Supply Line to Prefilter ALC-F-1		HILLS-McCANNA FIG. 5302-56-T-S6	150/120	2 Way Normally Closed Energized to Open
ALC-V0256	2	CHECK	Sump to ALC-P-1 Suction				
ALC-V0257	2	GLOBE	Sump to ALC-P-1 Suction				
ALC-V0258		GATE	EPICOR to spent Fuel Pool 'B'				Located in Unit 1

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0259		GATE	EPICOR to spent Fuel Pool 'B'				Located in Unit 1
ALC-V0260	3/4	GLOBE	ALC-P-1 Air Supply Throttle				Motor Operated
ALC-V0261	3/4	GLOBE	ALC-P-2 Air Supply Throttle				Motor Operated
ALC-V0262	3/4	GLOBE	ALC-P-3 Air Supply Throttle				Motor Operated
ALC-V0263	3/4	GLOBE	ALC-P-4 Air Supply Throttle				Motor Operated
ALC-V0264	1/2	NEEDLE	ALC-F-1 Bubbler Air Isolation				
ALC-V0265	1/2	NEEDLE	ALC-K-1 Bubbler Air Isolation				
ALC-V0266	1/2	NEEDLE	ALC-K-2 Bubbler Air Isolation				
ALC-V0267	3/8	NEEDLE	Bubbler Air Isolation				
ALC-V0268	1/2	PRESSURE REGULATOR	ALC-F-1 Bubbler Regulator				Self Contained (Int. Tap)

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0269	1/2	PRESSURE REGULATOR	ALC-K-1 Bubbler Regulator				Self Contained (Int. Tap)
ALC-V0270	1/2	PRESSURE REGULATOR	ALC-K-2 Bubbler Regulator				Self Contained (Int. Tap)
ALC-V0271	1	CHECK	Service Air to Bubblers/ALC-V-255				
ALC-V0272	3/8	GLOBE	Service Air to Bubblers/ALC-V-255				
ALC-V0273	2	GLOBE	Sump to ALC-P-1 Suction Isolation				
ALC-V0274	3/4	GLOBE	Sump to ALC-P-1 Suction Drain				
ALC-V0275	3/8	NEEDLE	Air to ALC-V-242 Isolation				
ALC-V0276	2	GLOBE	Sump to ALC-P-1 Suction Final Isolation				
ALC-V0277	2	GLOBE	ALC-P-4 Discharge				
ALC-V0278	1	GLOBE	ALC-F-1 Shield Drain				

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0279	1	GLOBE	ALC-K-1 Shield Drain				
ALC-V0280	1	GLOBE	ALC-K-2 Shield Drain				
ALC-V0281			Deleted				
ALC-V0282			Deleted				
ALC-V0283			Deleted				
ALC-V0284	3/4	GLOBE	ALC-P-6 Discharge to ALC-P-2				
ALC-V0285	3/4	GLOBE	ALC-P-6 Discharge to ALC-P-3				
ALC-V0286	2	GLOBE	CC-T-2 Process Inlet Isolation				
ALC-V0287	2	BALL	MWHT Process Isolation				
ALC-V0290	1 1/4	GLOBE	Minimum Flow Shutoff	TP-034598			
ALC-V0291	1	SOLENOID	Minimum Flow Solenoid		Automatic		Cat #8400

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
ALC-V0292	1 1/4	GLOBE	CC-T-1 Minimum Flow Shutoff	TP-034598			
ALC-V0293	1 1/4	GLOBE	CC-T-2 Minimum Flow Shutoff	TP-034598			
ALC-V0294	3/4	GLOBE	ALC-DPS-1 HP Leg Root Valve	TP-034598			
ALC-V0295	3/4	GLOBE	ALC-P-5 Vent Valve	TP-034398			
ALC-V0296	2	BALL	ALC-F-1 Bypass Inlet Isol.				MMA 3526-87-0016
ALC-V0297	2	BALL	ALC-F-1 Bypass Outlet Isol.				MMA 3526-87-0016
WG-V-05	2	BALL	Storage Tank Inlet from MWHT				ECA 3230-87-0442 FCR #87-079
WG-V-24	2	PLUG	WG Flush Conn.			150#	
WG-V-29	2	PLUG	SDS Filters Bypass			150#	
WG-V-34	1	PLUG	WG-U-3 Conn. Isol.			150#	
WG-V-47	2	PLUG	Fuel Pool Stor. to ALC Isol.			150#	

TABLE 15 (Cont'd)

AUXILIARY BUILDING EMERGENCY LIQUID CLEANUP SYSTEM (EPICOR II)

VALVE LIST

VALVE NO.	SIZE	TYPE	DESCRIPTION	PO NO.	MANUFACTURER/ MODEL	DESIGN PRESSURE TEMPERATURE	COMMENTS
WG-V-71	2	PLUG	Feed to SDS Filters			150#	
WG-V-72	2	PLUG	Misc. Wst. Sys. Isol.			150#	
WG-V-87	1/2	GLOBE	CN-FE-22 Root VLV Hi Isol.			4000#	ECM-S-366 R.1 Capped Downstream Lines
WG-V-88	1/2	GLOBE	CN-FE-22 Root VLV Lo Isol.			4000#	ECM-S-366 R.1 Capped Downstream Lines
WG-V-99	2	BALL	WG Spool Piece Isol.				ECA 3230-87-0442 FCR #87-011

TABLE 16

EPICOR II
RADWASTE PROCESSING SYSTEM
(HIC POLISHING MODE)

OVERALL OBJECTIVES: (a) Polish influent water sufficiently to satisfy tech. spec. criteria.

(b) Process water at 10 GPM.

(c) Minimize personnel exposure.

(d) Process water at the lowest possible cost.

SPECIFIC OBJECTIVES:

Container	Vessel Size	Primary Purpose	Composition	Process Vessel Contact Radiation Level Changeout Criteria	Gallons Processed to Reach Changeout Criteria	Projected Shipping Category
#1 First Demin.	4'D x 4'H (HIC)	Cesium & Strotium Removal	Zeolite (top) Sand (bottom)	<1000 Ci	dependent on feed	< Class C
#2 Second Demin.	6'D x 6'H	Na Removal Cation Removal Anion Removal	Cation (top) Anion (bottom)	< 1 uCi/cc	25,000	LSA
#3 Third Demin.		Polishing Guard Bed	Mixed Resin	< 1 R/Hr	200,000	LSA
#4 Strainer	2'H x 1 1/2'W x 1 1/2'L	Catch Resin Fines	Strainer	< 1 R/Hr	200,000	LSA
#5 Post Filter	2' x 1 1/2' x 1 1/2'	Celloid Removal	1 Micron Cartridge	< 1 R/Hr	150,000	LSA