Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

CNL-15-059

June 19, 2015

10 CFR 50.4
10 CFR 50.90

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Sequoyah Nuclear Plant, Units 1 and 2
Facility Operating License Nos. DPR-77 and DPR-79
NRC Docket Nos. 50-327 and 50-328

Subject: **Response to NRC Request for Additional Information Regarding the Review of the Sequoyah Nuclear Plant, Units 1 and 2, Related to License Amendment Request to Revise Technical Specification on Ultimate Heat Sink (TAC Nos. MF2852 and MF2853)**

References:

1. Letter to NRC, "Sequoyah Nuclear Plant, Units 1 And 2, – Proposed Technical Specification Change, Ultimate Heat Sink (UHS) Temperature Limitations Supporting Alternate Essential Raw Cooling Water (ERCW) Loop Alignments (TS-SQN-13-01 and 13-02)," dated October 2, 2013 (ADAMS Accession No. ML13280A267)
2. Electronic Mail from NRC to TVA, "Sequoyah Nuclear Plant, Units 1 and 2, Related to License Amendment Request to Revise Technical Specification on Ultimate Heat Sink (TAC Nos. MF2852 and MF2853)," dated February 11, 2015 (ADAMS Accession No. ML 15042A470)

By letter dated October 2, 2013 (Reference 1), Tennessee Valley Authority (TVA) proposed changes to Sequoyah Nuclear Plant (SQN), Units 1 and 2, Technical Specification (TS) 3.7.5, "Ultimate Heat Sink," to place additional limitations on the maximum average Essential Raw Cooling Water (ERCW) system supply header water temperature during operation with one ERCW pump per loop and during operation with one ERCW supply strainer per loop. In addition, the one-time limitations on Unit 1 Ultimate Heat Sink (UHS) temperature and the associated License Condition requirements for the Unit 2 steam generator replacement project were proposed to be deleted.

In the Reference 2 electronic mail, the Nuclear Regulatory Commission (NRC) transmitted a request for additional information (RAI) and requested that TVA provide a response by March 31, 2015. Due to emergent plant issues, the due date for this response was extended to June 19, 2015, per telecon with the NRC Project Manager. Enclosure 1 contains TVA's response to the RAIs contained in Reference 2, except for the responses to RAI 3 and RAI 8. TVA will provide a response to these RAIs in a separate letter.

Consistent with the standards set forth in 10 CFR 50.92(c), TVA has determined that the additional information, as provided in this letter, does not affect the no significant hazards considerations associated with the proposed application previously provided in Reference 1.

There are no new regulatory commitments contained in this letter. Please address any questions regarding this submittal to Tom Hess at (423) 751-3487.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 19th day of June 2015.

Respectfully,

J. W. Shea
Vice President, Nuclear Licensing

Enclosures

1. TVA Response to NRC Request for Additional Information
2. Multiflow Model calculation MDQ00006720000095

cc (Enclosures):
NRC Regional Administrator – Region II
NRC Senior Resident Inspector – Sequoyah Nuclear Plant

bcc (Enclosures):
NRC Project Manager - SQN
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Enclosure 1

TVA Response to NRC Request for Additional Information

RAI -1

BACKGROUND

The Final Safety Analysis Report (FSAR) has specified normal lineups for both the Essential Raw Cooling Water (ERCW) and Containment Cooling Systems (CCSs). Specifically, FSAR Section 9.2.2 for the ERCW system states, "The normal cooling water supply to CCS heat exchangers 1A1 and 1A2, 2A1 and 2A2, and 0B1 and 0B2, is from ERCW headers 2A, 2A, and 2B, respectively." FSAR Section 9.2.1 for the CCS system states, "Under normal power operation, the CCS will require the use of one component cooling water pump (i.e., 1A-A, or 1B-B in unit 1 and 2A-A or 2B-B in unit 2) and the CCS heat exchangers in train A of each unit. One additional CCS pump may be needed in the unit carrying the Spent Fuel Pool heat exchanger. Normally, only CCS pump C-S will be aligned to the train B headers." These statements imply that other lineups other than the normal lineup may be used during plant operations.

According to 10 CFR 50.36, each Limiting Conditions for Operation (LCO) must define the lowest functional capability or performance level of equipment required for safe operation of the facility. Since ERCW and CCS are shared systems, the safe operation of the facility includes the safety operation of both units.

ISSUE

The licensee proposed new ERCW loop OPERABLE criteria for one ERCW pump operation and for strainer outages that are dependent on the "normal ERCW lineup" to the CCS heat exchangers. Neither the proposed Technical Specifications (TS) nor the proposed TS Bases state that the "normal ERCW lineup" to the CCS heat exchangers is required for the added ERCW loop OPERABLE cases. Alternate ERCW lineups would invalidate the calculation results upon which the proposed TS change is based.

In the Design-Basis accident (DBA) analysis either the A loop ERCW or the B loop ERCW can perform the ERCW safety function thereby satisfying single failure criteria. With the A loop not available and the B loop performing the safety function, the licensee stated in response to Request for Additional Information (RAI) -1 in their August 14, 2014 letter that two train B CCS pumps are necessary.

As stated in the Background above, the CCS has normal and alternate lineups. Since the licensee plans to use the "one pump ERCW operation" lineup to clean Shutdown Boards (SDB) one at a time and the SDBs power CCS pumps, certain CCS pumps would not be available when a SDB is INOPERABLE.

REQUEST

1. *Designate in the TS change which ERCW lineups are authorized for the ERCW loop OPERABLE criteria.*

2. *For each of the eight outage cases defined in Table 4.2-6 for "One Pump per Loop ERCW Operation Case Description," identify what pre- Loss-Of-Coolant Accident (LOCA)/Main Steam Line Break (MSLB) CCS lineup and component OPERABILITY status is necessary such that upon the subsequent loss of offsite power and loss of two EDGs on the same loop, the safety functions of CCS and ERCW can be accomplished, i.e. mitigate the DBA in the accident unit and keep the shutdown unit in Mode 5.*

RESPONSE TO RAI-1 REQUEST 1

Table 4.2-6 of TVA's October 2, 2013, License Amendment Request (LAR) has been revised to include a description of the prerequisite Essential Raw Cooling Water (ERCW) Component Alignment necessary to maintain ERCW loop operability with one pump operable per loop.

RESPONSE TO RAI-1 REQUEST 2

Two columns have been added to Table 4.2-6 to respond to RAI-1 Request 2. The attached information demonstrates that the safety functions provided by the Component Cooling System (CCS) are accomplished by the one intact CCS train under the assumption that a failure removes all Emergency Diesel Generators (EDGs) / Shutdown Boards (SDBs) on the same train.

Table 4.2-6 One Pump per Loop ERCW Operation Case Description				RAI-1, Part 2 CCS Question	
Case Number (a)	**Crosstie Operation**	**Plant Condition**	**Prerequisite ERCW Component Alignment** **Post-Event Alignment**	**CCS Pre-condition**	**Failure / Results**
Outage 1a	Yard Header Crossties, 6" ESF Header Crossties and 16" Aux Bldg Header Crossties are all open.	U1 LOCA, Unit 2 outage	The ERCW is isolated to the 2A EDG, 2A CS HX, U2 TDAFWP, 2A IIRC, and the U2 A-train LCC groups and UCCs. No change to current procedures	2A CCS is not operable due to the 2A SDB being inoperable. Other loops must be operable.	Stipulate that the 1A SDB is lost. The B CCS, with any one of its three pumps, powered by either the 1B or 2B SDB, fulfills the CCS safety function
Outage 1b	Yard Header Crossties, 6" ESF Header Crossties and 16" Aux Bldg Header Crossties are all open.	U1 LOCA, Unit 2 outage	The ERCW is isolated to the 2B EDG, 2B CS HX, U2 TDAFWP, 2B IIRC, and the U2 B-train LCC groups and UCCs; 1B CRD cooler(c) No change to current procedures	2B CCS is not operable due to the 2B SDB being inoperable. Other loops must be operable.	Stipulate that the 1B SDB is lost. The 1A and 2A CCS loops, with the pumps powered by the 1A and 2A SDB respectively, fulfills the CCS safety function
Outage 2a	Yard Header Crossties, 6" ESF Header Crossties and 16" Aux Bldg Header Crossties are all open.	U1 MSLB, Unit 2 outage	The ERCW is isolated to the 2A EDG, 2A CS HX, U2 TDAFWP, 2A IIRC, and the U2 A-train LCC groups and UCCs. Isolate the 1A CSS HX, and place 1-FCV-67-146 in the 35% position (b, d).	2A CCS is not operable due to the 2A SDB being inoperable. Other loops must be operable.	Stipulate that the 1A SDB is lost. The B CCS, with any one of its three pumps, powered by either the 1B or 2B SDB, fulfills the CCS safety function
Outage 2b	Yard Header Crossties, 6" ESF Header Crossties and 16" Aux Bldg Header Crossties are all open.	U1 MSLB, Unit 2 outage	The ERCW is isolated to the 2B EDG, 2B CS HX, U2 TDAFWP, 2B IIRC, and the U2 B-train LCC groups and UCCs; also the 1B CRD cooler(c) Isolate the 1B CSS HXs(b, d)	2B CCS is not operable due to the 2B SDB being inoperable. Other loops must be operable.	Stipulate that the 1B SDB is lost. The 1A and 2A CCS loops, with the pumps powered by the 1A and 2A SDB respectively, fulfills the CCS safety function

(a) Case Number refers to a specific plant condition (e.g., Outage 1) as described in the "Crosstie Operation", "Plant Condition", and "Component Alignment" columns.
(b) Isolating the operating unit's CSS HX and placing valve FCV-67-146 in the 35% position are actions that may be necessary in the post-recirculation phase as discussed in LAR Section 4.2.4, Equipment Qualification Issue. Isolating these components is only necessary on the train that has the one-pump operable alignment.
(c) To ensure 1B CRD cooler is isolated, it is included in the prerequisite line up for one-pump operation if the B-train ERCW is in the one-pump operable alignment
(d) This analysis is the same as Outage 1a and 1b respectively, except what is being examined is the ability of the LCCs to receive 200 gpm in order to satisfy Current Technical Specification (CTS) SR 4.6.2.2.b.2.These manipulations are only necessary in order to satisfy that SR.

Table 4.2-6 One Pump per Loop ERCW Operation Case Description				RAI-1, Part 2 CCS Question	
Case Number (a)	**Crosstie Operation**	**Plant Condition**	**Prerequisite ERCW Component Alignment** **Post-Event Alignment**	**CCS Pre-condition**	**Failure / Results**
Outage 3a	Yard Header Crossties, 6" ESF Header Crossties and 16" Aux Bldg Header Crossties are all open.	U2 LOCA, Unit 1 outage	The ERCW is isolated to the 1A EDG, 1A CS HX, U1 TDAFWP, 1A IIRC, and the U1 A-train LCC groups. No change to current procedures	1A CCS is not operable due to the 1A SDB being inoperable. Other loops must be operable.	Stipulate that the 2A SDB is lost. The B CCS, with any one of its three pumps, powered by either the 1B or 2B SDB, fulfills the CCS safety function
Outage 3b	Yard Header Crossties, 6" ESF Header Crossties and 16" Aux Bldg Header Crossties are all open.	U2 LOCA, Unit 1 outage	The ERCW is isolated to the 1B EDG, 1B CS HX, U1 TDAFWP, 1B IIRC, and the U1 B-train LCC groups. No change to current procedures	1B CCS is not operable due to the 1B SDB being inoperable. Other loops must be operable.	Stipulate that the 2B SDB is lost. The 1A and 2A A CCS loops, with the pumps powered by the 1A and 2A SDB respectively, fulfills the CCS safety function
Outage 4a	Yard Header Crossties, 6" ESF Header Crossties and 16" Aux Bldg Header Crossties are all open.	U2 MSLB, Unit 1 outage	The ERCW is isolated to the 1A EDG, 1A CS HX, U1 TDAFWP, 1A IIRC, and the U1 A-train LCC groups. Isolate the 2A CSS HX, and place 2-FCV-67-146 in the 35% position[b, c]	1A CCS is not operable due to the 1A SDB being inoperable. Other loops must be operable.	Stipulate that the 2A SDB is lost. The B CCS, with any one of its three pumps, powered by either the 1B or 2B SDB, fulfills the CCS safety function
Outage 4b	Yard Header Crossties, 6" ESF Header Crossties and 16" Aux Bldg Header Crossties are all open.	U2 MSLB, Unit 1 outage	The ERCW is isolated to the 1B EDG, 1B CS HX, U1 TDAFWP, 1B IIRC, and the U1 B-train LCC groups. Isolate the 2B CSS HX [b]	1B CCS is not operable due to the 1B SDB being inoperable. Other loops must be operable.	Stipulate that the 2B SDB is lost. The 1A and 2A CCS loops, with the pumps powered by the 1A and 2A SDB respectively, fulfills the CCS safety function

(a) Case Number refers to a specific plant condition (e.g., Outage 1) as described in the "Crosstie Operation", "Plant Condition", and "Component Alignment" columns.

(b) Isolating the operating unit's CSS HX and placing valve FCV-67-146 in the 35% position are actions that may be necessary in the post-recirculation phase as discussed in LAR Section 4.2.4, Equipment Qualification Issue. Isolating these components is only necessary on the train that has the one-pump operable alignment.

(c) This analysis is the same as Outage 3a and 3b respectively, except what is being examined is the ability of the LCCs to receive 200 gpm in order to satisfy Current Technical Specification (CTS) SR 4.6.2.2.b.2.These manipulations are only necessary in order to satisfy that SR.

RAI-2
BACKGROUND

The ERCW system is a shared system that simultaneously provides cooling water flow to numerous safety related and non-safety components in both units. The system had preoperational flow testing (ERCW-Flow Balance) as described in FSAR Chapter 14 to verify sufficient flow to safety related components and thus verify the adequacy of system design. Sufficient flow was used to define system operability and LCO. As required by 10 CFR 50.36, minimum system operability and LCOs were established in TSs to define the lowest functional capability or performance level of equipment required for safe operation of the facility. Preoperational flow testing verified the ERCW flow design and was important to defining operability and the LCO. In the License Amendment Request (LAR), the licensee is proposing additional definitions for ERCW operability and additional LCOs to the ERCW supply water Ultimate Heat Sink (UHS) based on ERCW system computer modeling (Multiflow) to determine flows throughout the system. Multiflow accuracy is dependent on accurate design input. Design input to computer modeling of hydraulic systems include piping layout geometry, flow resistances of pipes, fittings, valves, and other components and pump performance levels among other design inputs.

ISSUE

The licensee is using flow modeling as a substitute for system flow testing for verifying new conditions of operability and additional LCOs. The flow modeling changes include isolation of numerous components of a shutdown unit to achieve added flow to operating plant components and represent significant system flow changes. Although computer modeling of the ERCW system can be a valuable tool in determining system performance, the NRC staff considers that margins in design inputs and unknown system problems can cause the Multiflow results that were provided in the LAR and used to establish new LCOs to not be sufficiently accurate for the stated purpose. Due to fouling by river water UHS and uncertainties in component flow resistances and unknown system flow problems, the design input may not have sufficient accuracy for the flows that were calculated and were used to establish the new LCOs. The output tables in the LAR show flow requirements and flow availability have little margin for some components. Such little margins are available that the licensee found it necessary to isolate ERCW flow to a Control Rod Drive Vent Cooler for an operating unit to help gain required flow to other components. Furthermore, Quality Assurance requirements and guidance of NQA-1 and NRC Standard Review Plan state that changes to design inputs shall be justified and subject to design control measures commensurate with those applied to the original design, which as stated above was flow testing.

REQUEST

1. *Provide and explain ERCW flow test results which show that the results of the Multiflow model for all the new configurations proposed for the new LCO conditions for both the Strainer Outage cases and the One Pump Operation cases are accurate and thus meet the lowest functional capability or performance level of equipment required for safe operation.*

2. *Propose new Surveillance Requirements to test and verify that critical ERCW flows are achieved prior to "one pump per loop operation", i.e. Outages 1a&b and 2a&b and in Strainer Outage Cases 1 through 8.*

3. *From the Multiflow model of "One Pump per Loop Operation" for either unit at power, provide the following information:*

   The itemized ERCW flowrate through both safety and non-safety related components for one ERCW pump operation before any components that are designated in Table B 3/4.7-1 are isolated. Provide this information for both the A and B ERCW loops

4. *Discuss how valve leakage is (will be) accounted for such that your Multiflow analysis, which is the basis for your TS revision, is sufficiently accurate.*

5. *Discuss how you are accounting for ERCW pump impeller wear and loss of pump efficiency over time.*

6. *Discuss how the computed ERCW flow rates are accounting for allowed variation in line voltage and frequency for both offsite power and the diesel generators.*

RAI-2 REQUEST 1

Provide and explain ERCW flow test results which show that the results of the Multiflow model for all the new configurations proposed for the new LCO conditions for both the Strainer Outage cases and the One Pump Operation cases are accurate and thus meet the lowest functional capability or performance level of equipment required for safe operation.

RESPONSE TO RAI-2 REQUEST 1

The ERCW Flow Balanced Hydraulic Model (Multiflow Model) was developed based on actual test data to determine the available ERCW system flow rates for a range of possible flow configurations. The Multiflow Model calculation, MDQ00006720000095 (Enclosure 2), includes extensive ERCW system flow test data, with the test data sets specifically developed for the purpose of validating model accuracy. The model was baselined against the test data, and the data match results are detailed in the calculation. Appendix D to the calculation provides the available ERCW flow rates for various system alignments, including the one pump operation cases.

The in-plant flow measurement testing of the ERCW system included five full data sets with the system aligned in as hydraulically diverse configurations as practical. Each data set contained over 300 flow/pressure data points. Flow test data sets were taken with the system throttle valves in both their normal and fully open positions so the valve flow coefficient (Cv) values could be accurately determined. In certain cases where the throttle valve could not be fully opened during a flow test, pressure readings were able to be taken upstream and downstream of the throttle valves so that the valve Cv could be accurately determined. Flow test data sets were obtained for each heat exchanger, and system pressure readings were taken at numerous points throughout the system to determine the proper Hazen-Williams C-factors (i.e., pipe roughness coefficients), piping internal diameter reductions, and pressure drops for the overall system, as well as for specific piping segments, components, and heat exchangers. Additional flow test data sets were obtained for certain small sections of the ERCW system where appropriate.

The Multiflow Model has been updated to reflect changes to the ERCW system since the initial model development. These changes have included several modifications to system piping configurations and changes to throttled valve positions. Limited flow measurement test data sets were obtained and incorporated into the model for the significant system changes. In-plant ERCW pump curve data was also obtained. A bounding pump curve was developed that reflects degraded ERCW pumps. These degraded pump curves are used for determining the available ERCW system flow rates in the calculation. Note that the degraded pump curves developed in the Multiflow Model are also the basis for the ERCW pump in-service test (IST) acceptance criteria. All of the above model changes and improvements were included in calculation MDQ00006720000095.

The calculation utilizes industry standard hydraulic analysis techniques (based on Crane Technical Paper 410) to determine the available system flow rates for the off-normal cases of Strainer outages and the one-pump per train alignments. This is the same software, calculation, and models that have been used in various other plant analyses, including that used for a previous License Amendment (References 1, 2, and 3) for the Ultimate Heat Sink (UHS) / ERCW system.

Below is a sample of the information contained in Appendix D of calculation MDQ00006720000095. This Appendix provides the test data values, the model predicted values, the flow difference, and also the percent of flow difference. Refer to Appendix D in the calculation for the entire set of data.

References

1. TVA to NRC Letter, “Sequoyah Nuclear Plant (SQN) - Units 1 and 2 - Technical Specifications (TS) Change 06-03 'Ultimate Heat Sink (UHS) Temperature Increase and Elevation Changes,'” dated July 12, 2006 (ML062090244)

2. TVA to NRC Letter, “Sequoyah Nuclear Plant (SQN) - Units 1 and 2 - Technical Specifications (TS) Change 06-03 'Ultimate Heat Sink (UHS) Temperature Increase and Elevation Changes Supplemental Information’ (TAC Nos. MD2621 & MD2622),” dated December 7, 2006 (ML063470029)

3. NRC to TVA Letter, “Sequoyah Nuclear Plant, Units 1 and 2 - Issuance of Amendments Regarding Increased Temperature and Level Limits of Ultimate Heat Sink (TAC Nos. MD2621 and MD2622),” dated September 28, 2007 (ML072420043)

THESE TABLES ARE EXCERPTED FROM CALCULATION MDQ00006720000095, APPENDIX D

The test data is given in the column headed “Ref 2.2 Step 6.1[41]”, and the other columns with similar headings. These are the test procedure step numbers that require a data set to be recorded.

“A” TRAIN ERCW FLOW RATES

		Ref 2.2	**File: TESTA 1**			*Ref 2.2*	**File: TESTA2**			*Ref 2.2*	**File: TESTA3**		
		Step	**Model**			***Step***	**Model**			***Step***	**Model**		
COMPONENT	**LINK**	***6.1[41]***	**Results**	**% Dif.**	**Gpm dif**	***6.1[46]***	**Results**	**% Dif.**	**Gpm dif**	***6.1[49]***	**Results**	**% Dif.**	**Gpm dif**
D/G 1A1	1A191-1A1A1	***556.2***	553.0	-0.6	-3.2	***566.2***	565.5	-0.1	-0.7	***543.4***	547.9	0.8	4.5
D/G 1A2	2B209F-1A1A2	***566.2***	569.2	0.5	3.0	***585.8***	582.3	-0.6	-3.5	***571.2***	563.9	-1.3	-7.3
D/G 2A1	2A291-2A2A1	***443.7***	449.2	1.2	5.5	***468.4***	459.3	-1.9	-9.1	***443.7***	445.1	0.3	1.4
D/G 2A2	2B209E-2A2A2	***417.6***	428.9	2.7	11.3	***434.1***	438.6	1.0	4.5	***430.8***	425.0	-1.4	-5.8
CCS HX 1A1/1A2	1B235-1A900	***4039.9***	4045.4	0.1	5.5	***3775.9***	3793.4	0.5	17.5	***3182.8***	3189.6	0.2	6.8
CCS HX 2A1/2A2	2A910-2A920	***5634.8***	5722.1	1.5	87.3	***5441.5***	5322.2	-2.2	-119.3	***4594.1***	4547.7	-1.0	-46.4
CSS HX 1A	1A121A-1A150	***4039.8***	4011.5	-0.7	-28.3	***0.0***	0.0			***0.0***			
CSS HX 2A	2A226-2A250	***0.0***	0.0			***4326.7***	4436.5	2.5	109.8	***3847.1***	3787.8	-1.5	-59.3
SUPPLY HEADER 1A	1A109-1A109AA	***5986.7***	6213.2	3.8	226.5	***2449.5***	2360.5	-3.6	-89.0	***2349.5***	2289.0	-2.6	-60.5
SUPPLY HEADER 2A	2A209-2A209AA	***11313.6***	11237.0	-0.7	-76.6	***14560.1***	14917.0	2.5	356.9	***12247.3***	12685.0	3.6	437.7
ELECT BD RM CHR A	1A575E-1A575F	***206.6***	209.0	1.2	2.4	***227.2***	223.1	-1.8	-4.1	***221.6***	217.8	-1.7	-3.8
MCR CHILLER A	1A580B-1A580C	***0.0***	0			***0.0***	0			***0.0***	0		
STATION AIR COMP A Aftercooler	1A140A-1B139A	***54.9***	54.4	-0.9	-0.5	***57.9***	57.2	-1.2	-0.7	***55.3***	55.7	0.7	0.4
STATION AIR COMP A Intercooler	1A140F-1B139A	***4.1***	4.1	0.0	0.0	***4.3***	4.4	1.2	0.0	***4.1***	4.2	3.2	0.1
STATION AIR COMP B Aftercooler	1A141A-1B140A	***66.9***	65.9	-1.5	-1.0	***69.9***	69.3	-0.9	-0.6	***66.8***	67.4	0.9	0.6
STATION AIR COMP B Intercooler	1A141F-1B140A	***4.5***	4.6	1.3	0.1	***4.8***	4.8	-0.4	0.0	***4.6***	4.7	1.3	0.1
STATION AIR COMP C	1A135N-1A135P	***125.4***	124.7	-0.6	-0.7	***131.9***	131.1	-0.6	-0.8	***125.4***	127.5	1.6	2.1
STATION AIR COMP D	1B135P-1B135R	***125.4***	124.3	-0.9	-1.1	***131.3***	130.6	-0.6	-0.7	***125.4***	127.1	1.3	1.7
EGTS 2A	2A227C3-2A685A	See 6.11	14.3			***13.1***	13.2	1.0	0.1	***10.7***	11.1	3.3	0.4
AUX CONT AIR A	1A375E-1A375F	***0.0***				***0.0***				***0.0***			
SFP & TBBP CLR 1A	1A646C-1A646D	***38.7***	39.0	0.8	0.3	***41.7***	41.7	0.0	0.0	***39.7***	40.6	2.4	0.9
714 PEN RM CLR 1A	1A565A2-1A610A	***29.5***	29.4	-0.2	-0.1	***31.2***	31.4	0.6	0.2	***29.9***	30.6	2.5	0.7
714 PEN RM CLR 2A	2A301E2-2A610A	***33.0***	33.4	1.4	0.4	***31.2***	30.9	-1.0	-0.3	***26.1***	26.3	0.7	0.2

"A" TRAIN ERCW FLOW RATES

		Ref 2.2	**File: TESTA4**			*Ref 2.2*	**File: TESTA5**			*Ref 2.2*	**File: TESTA6**		
		Step	**Model**			***Step***	**Model**			***Step***	**Model**		
COMPONENT	**LINK**	***6.1[56]***	**Results**	**% Dif.**	**gpm dif**	***6.1[65]***	**Results**	**% Dif.**	**gpm dif**	**6.1[73]**	**Results**	**% Dif.**	**gpm dif**
D/G 1A1	1A191-1A1A1	***571.2***	573.4	0.4	2.2	***551.1***	560.0	1.6	8.9				
D/G 1A2	2B209F-1A1A2	***551.1***	590.4	7.1	39.3	***583.4***	576.5	-1.2	-6.9				
D/G 2A1	2A291-2A2A1	***450.0***	465.6	3.5	15.6	***456.2***	454.8	-0.3	-1.4				
D/G 2A2	2B209E-2A2A2	***443.7***	444.6	0.2	0.9	***443.7***	434.3	-2.1	-9.4				
CCS HX 1A1/1A2	1B235-1A900	***3825.3***	3842.0	0.4	16.7	***3946.0***	4101.7	3.9	155.7				
CCS HX 2A1/2A2	2A910-2A920	***5313.7***	5378.1	1.2	64.4	***5616.5***	5789.2	3.1	172.7				
CSS HX 1A	1A121A-1A150	***0.0***				***3773.6***	3833.6	1.6	60.0				
CSS HX 2A	2A226-2A250	***3878.2***	4484.4	15.6	606.2	***0.0***							
SUPPLY HEADER 1A	1A109-1A109AA	***2623.0***	2534.4	-3.4	-88.6	***6273.8***	6426.0	2.4	152.2				
SUPPLY HEADER 2A	2A209-2A209AA	***14352.6***	15029.0	4.7	676.4	***11224.9***	11316.0	0.8	91.1				
ELECT BD RM CHR A	1A575E-1A575F	***233.8***	229.8	-1.7	-4.0	***199.7***	208.5	4.4	8.8				
MCR CHILLER A	1A580B-1A580C	***0.0***	0			***123.7***	124.6	0.7	0.9				
STATION AIR COMP A Aftercooler	1A140A-1B139A	***60.8***	60.6	-0.3	-0.2	***55.7***	56.4	1.2	0.7				
STATION AIR COMP A Intercooler	1A140F-1B139A	***4.5***	4.6	2.2	0.1	***4.1***	4.3	4.4	0.2				
STATION AIR COMP B Aftercooler	1A141A-1B140A	***72.9***	73.4	0.6	0.5	***66.1***	68.3	3.3	2.2				
STATION AIR COMP B Intercooler	1A141F-1B140A	***5.0***	5.1	1.6	0.1	***4.6***	4.7	2.2	0.1				
STATION AIR COMP C	1A135N-1A135P	***102.9***	103.6	0.7	0.7	***95.3***	96.5	1.3	1.2				
STATION AIR COMP D	1B135P-1B135R	***113.4***	114.0	0.5	0.6	***104.4***	106.2	1.8	1.8				
EGTS 2A	2A227C3-2A685A	***13.1***	13.4	2.5	0.3	***14.0***	14.5	3.6	0.5				
AUX CONT AIR A	1A375E-1A375F	***0.0***				***0.0***				**10.3**	10.2	-1.0	-0.1
SFP & TBBP CLR 1A	1A646C-1A646D	***39.7***	39.8	0.4	0.1	***36.5***	36.8	0.8	0.3				
714 PEN RM CLR 1A	1A565A2-1A610A	***29.2***	29.7	1.7	0.5	***26.4***	27.3	3.4	0.9				
714 PEN RM CLR 2A	2A301E2-2A610A	***22.7***	23.1	1.6	0.4	***24.2***	24.9	3.0	0.7				
SHUTDOWN BD RM CHR A	1A155B-1A155E	***448.0***	449.5	0.3	1.5	***413.4***	420.1	1.6	6.7				

“A” TRAIN ERCW FLOW RATES SUMMARY

		PERCENT DIFFERENCE						gpm DIFFERENCE					
COMPONENT	**LINK**	**6.1[41]**	**6.1[46]**	**6.1[49]**	**6.1[56]**	**6.1[65]**	**Average**	**6.1[41]**	**6.1[46]**	**6.1[49]**	**6.1[56]**	**6.1[65]**	**Average**
D/G 1A1	1A191-1A1A1	-0.6	-0.1	0.8	0.4	1.6	0.4	-3.2	-0.7	4.5	2.2	8.9	2.3
D/G 1A2	2B209F-1A1A2	0.5	-0.6	-1.3	7.1	-1.2	0.9	3.0	-3.5	-7.3	39.3	-6.9	4.9
D/G 2A1	2A291-2A2A1	1.2	-1.9	0.3	3.5	-0.3	0.6	5.5	-9.1	1.4	15.6	-1.4	2.4
D/G 2A2	2B209E-2A2A2	2.7	1.0	-1.4	0.2	-2.1	0.1	11.3	4.5	-5.8	0.9	-9.4	0.3
CCS HX 1A1/1A2	1B235-1A900	0.1	0.5	0.2	0.4	3.9	1.0	5.5	17.5	6.8	16.7	155.7	40.5
CCS HX 2A1/2A2	2A910-2A920	1.5	-2.2	-1.0	1.2	3.1	0.5	87.3	-119.3	-46.4	64.4	172.7	31.7
CSS HX 1A	1A121A-1A150	-0.7	NA	NA	NA	1.6	0.4	-28.3	NA	NA	NA	60.0	15.8
CSS HX 2A	2A226-2A250	NA	2.5	-1.5	See 6.11	NA	0.5	NA	109.8	-59.3	See 6.11	NA	25.2
SUPPLY HEADER 1A	1A109-1A109AA	3.8	-3.6	-2.6	-3.4	2.4	-0.7	226.5	-89.0	-60.5	-88.6	152.2	28.1
SUPPLY HEADER 2A	2A209-2A209AA	-0.7	2.5	3.6	4.7	0.8	2.2	-76.6	356.9	437.7	676.4	91.1	297.1
ELECT BD RM CHR A	1A575E-1A575F	1.2	-1.8	-1.7	-1.7	4.4	0.1	2.4	-4.1	-3.8	-4.0	8.8	-0.2
MCR CHILLER A	1A580B-1A580C	NA	NA	NA	NA	0.7	0.7	NA	NA	NA	NA	0.9	0.9
STATION AIR COMP A Aftercooler	1A140A-1B139A	-0.9	-1.2	0.7	-0.3	1.2	-0.1	-0.5	-0.7	0.4	-0.2	0.7	-0.1
STATION AIR COMP A Intercooler	1A140F-1B139A	0.0	1.2	3.2	2.2	4.4	2.2	0.0	0.0	0.1	0.1	0.2	0.1
STATION AIR COMP B Aftercooler	1A141A-1B140A	-1.5	-0.9	0.9	0.6	3.3	0.5	-1.0	-0.6	0.6	0.5	2.2	0.3
STATION AIR COMP B Intercooler	1A141F-1B140A	1.3	-0.4	1.3	1.6	2.2	1.2	0.1	0.0	0.1	0.1	0.1	0.1
STATION AIR COMP C	1A135N-1A135P	-0.6	-0.6	1.6	0.7	1.3	0.5	-0.7	-0.8	2.1	0.7	1.2	0.5
STATION AIR COMP D	1B135P-1B135R	-0.9	-0.6	1.3	0.5	1.8	0.4	-1.1	-0.7	1.7	0.6	1.8	0.4
EGTS 2A	2A227C3-2A685A	NA	1.0	3.3	2.5	3.6	2.6		0.1	0.4	0.3	0.5	0.3
SFP & TBBP CLR 1A	1A646C-1A646D	0.8	0.0	2.4	0.4	0.8	0.9	0.3	0.0	0.9	0.1	0.3	0.3
714 PEN RM CLR 1A	1A565A2-1A610A	-0.2	0.6	2.5	1.7	3.4	1.6	-0.1	0.2	0.7	0.5	0.9	0.5
714 PEN RM CLR 2A	2A301E2-2A610A	1.4	-1.0	0.7	1.6	3.0	1.2	0.4	-0.3	0.2	0.4	0.7	0.3
SHUTDOWN BD RM CHR A	1A155B-1A155E	0.1	0.0	-0.1	0.3	1.6	0.4	0.0	0.0	0.0	1.5	6.7	1.6
CCS & AFW CLR 1A	1A510D-1A510E	-0.5	-0.4	1.8	NA	1.5	0.6	-0.6	-0.5	2.1	NA	1.7	0.7
690 PEN RM CLR 1A	1A560-1A609A	0.3	0.1	3.1	3.6	-8.1	-0.2	0.1	0.0	0.9	0.7	-1.7	0.0
690 PEN RM CLR 2A	2A609B-2A301G	2.0	-0.6	0.9	1.5	3.1	1.4	0.6	-0.2	0.2	0.3	0.7	0.3
BAT & AFW CLR 2A	2A387B-2A234	0.5	-1.6	-0.8	0.1	2.1	0.1	0.4	-1.1	-0.5	0.1	1.6	0.1
UCVC 1C	1A122-1A122D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

RAI-2 REQUEST 2

Propose new Surveillance Requirements to test and verify that critical ERCW flows are achieved prior to "one pump per loop operation", i.e. Outages 1a&b and 2a&b and in Strainer Outage Cases 1 through 8.

RESPONSE TO RAI-2 REQUEST 2

The available flow values to ERCW-supplied components are determined by calculation due to the impracticality and uncertainty of performing system flow balance testing that correctly includes the relevant system flow rates. TVA performed the physical flow balances routinely through 1997. At that time, TVA recognized the need to more precisely evaluate the ERCW system conditions that could exist in an accident that were not practical to test on a shared system at an operating nuclear plant. For example, for ERCW flow being supplied to AFW pumps, the assumed failure of a section of non-safety related buried piping on the ERCW system discharge causing higher discharge header backpressures, the sharp lowering of the lake level from normal due to postulated loss of the downstream dam, the assumed clogging of the ERCW system traveling screens, and the isolation of ERCW flow to the components inside containment could not be physically performed and thus were "simulated" in the flow balance test. These "simulations" add to uncertainty in the results of the flow balance. Calculation MDQ00006720000095 (Enclosure 2), and its supporting test data referred to in RAI-2 Request 1 above, was created in order to more accurately determine the flow rates that would be available under the actual plant conditions of note.

In order to address the possibility that the actual system has changed in some manner from the modeled system, SQN periodically verifies ERCW flow rates in accordance with the site program for NRC Generic Letter (GL) 89-13. The ERCW system is aligned for molluskicide injection several times a year. That system alignment is close to the alignment that would occur during accident conditions. The ERCW system flow rates are measured at these times. Trending of the ERCW system flow rates is performed to ensure that no adverse condition exists.

Therefore, no new Surveillance Requirements are necessary to test and verify ERCW flows.

RAI-2 REQUEST 3

From the Multiflow model of "One Pump per Loop Operation" for either unit at power, provide the following information:

> *The itemized ERCW flowrate through both safety and non-safety related components for one ERCW pump operation before any components that are designated in Table B 3/4.7-1 are isolated. Provide this information for both the A and B ERCW loops.*

RESPONSE TO RAI-2 REQUEST 3

The requested information is provided in the following tables. The columns under the heading of "REQUESTED INFORMATION" are the ERCW system flow rates that would exist if the components that are designated in Table B3/4.7-1 are not isolated. The flow values currently in the LAR and the design minimum flow values for full qualification are also included. Also, a column is included indicating whether or not the individual components are safety related. Note that the CCS HXs and the CSS HX are each listed twice, for completeness. These HXs are listed under the required UHS elevation of 670, and also under the UHS elevation of 639 for information only. See the response to RAI-9 for an explanation.

RESPONSE TO RAI-2 REQUEST 3

"A" Train ERCW Flows (gpm)			As Presented in LAR				Requested Information			
			Outage 1	Outage 2	Outage 3	Outage 4	Outage 1	Outage 2	Outage 3	Outage 4
	Safety-Related Load?	DESIGN FLOW	Table 4.2-12	Table 4.2-14a	Table 4.2-13	Table 4.2-14b				
		FOR FULL QUAL	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB
These flows were determined using a UHS elevation of 639										
D/G 1A1	Y	522	481.1	626.8	0.0	0.0	395.0	509.5	379.6	511.2
D/G 1A2	Y	522	473.8	620.8	0.0	0.0	387.4	502.4	372.0	504.1
D/G 2A1	Y	522	0.0	0.0	460.7	629.0	393.2	507.1	377.9	508.8
D/G 2A2	Y	522	0.0	0.0	435.6	599.9	370.2	480.8	355.4	482.4
CCS HX 1A1/1A2	Info Only	N/A	3057.2	1993.3	1420.3	2010.3	2593.4	1679.1	1206.9	1685.0
CCS HX 2A1/2A2	Info Only	N/A	1197.4	1597.6	3177.3	1608.8	1015.2	1344.2	2693.7	1349.1
CSS HX 1A	Info Only	N/A	3022.2	0.0	0.0	0.0	2563.8	0.0	0.0	0.0
CSS HX 2A	Info Only	N/A	0.0	0.0	3021.7	0.0	0.0	0.0	2567.4	0.0
ELECT BD RM CHR A	Y	163.9	153.3	206.3	145.9	208.2	129.5	172.9	122.5	173.5
MCR CHILLER A	Y	95.4	108.8	146.5	103.5	147.9	91.8	122.7	86.9	123.2
SHUTDOWN BD RM CHR A	Y	380	361.9	486.6	347.2	491.8	306.5	408.9	291.7	410.3
CCP Pump OIL CLR 1A	Y	23	24.7	33.3	23.5	33.6	20.9	27.9	19.8	28.0
CCP Gear OIL CLR 1A	Y	12	14.0	19.0	13.3	19.2	11.7	15.8	11.1	15.9
CCP RM CLR 1A	Y	34	35.1	47.4	33.5	47.8	29.7	39.7	28.1	39.8
CCP Pump OIL CLR 2A	Y	23	27.1	36.2	25.2	36.4	22.8	30.3	21.2	30.4
CCP Gear OIL CLR 2A	Y	12	15.0	20.2	13.9	20.3	12.5	16.8	11.6	16.9

"A" Train ERCW Flows (gpm)			As Presented in LAR				Requested Information			
			Outage 1	Outage 2	Outage 3	Outage 4	Outage 1	Outage 2	Outage 3	Outage 4
	Safety-Related Load?	DESIGN FLOW	Table 4.2-12	Table 4.2-14a	Table 4.2-13	Table 4.2-14b				
		FOR FULL QUAL	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB
CCP RM CLR 2A	Y	34	39.5	52.7	36.7	53.0	33.3	44.1	31.0	44.3
SIS PMP RM CLR 1A	Y	18	26.7	35.9	25.2	36.1	22.5	30.0	21.2	30.1
SIS OIL CLR 1A	Y	4.1	7.9	10.8	7.5	10.9	6.6	9.0	6.2	9.0
SIS PMP RM CLR 2A	Y	18	25.6	34.2	23.9	34.4	21.6	28.7	20.2	28.8
SIS OIL CLR 2A	Y	4.1	9.7	13.3	9.1	13.4	8.1	11.0	7.5	11.0
EGTS 2A	Y	9	11.1	14.9	10.2	15.0	9.3	12.4	8.6	12.5
AUX CONT AIR A	Y	5.1	4.7	6.3	4.5	6.4	3.9	5.3	3.7	5.3
SFP & TBBP CLR 1A	Y	28	29.2	39.6	27.9	40.0	24.6	33.1	23.3	33.2
CCS & AFW CLR 1A	Y	55	84.0	113.8	79.9	115.0	70.7	95.0	66.8	95.4
BAT & AFW CLR 2A	Y	62	57.4	77.4	53.1	77.8	48.2	64.4	44.6	64.6
714 PEN RM CLR 1A	Y	19	23.9	32.1	22.6	32.4	20.1	26.9	19.0	27.0
714 PEN RM CLR 2A	Y	19	23.9	32.1	22.4	32.4	20.2	26.9	18.8	27.0
690 PEN RM CLR 1A	Y	12	23.7	31.9	22.4	32.1	19.9	26.7	18.8	26.8
690 PEN RM CLR 2A	Y	12	22.7	30.5	21.3	30.8	19.2	25.5	17.9	25.6
669 PEN RM CLR 1A	Y	17	39.5	53.1	37.3	53.6	33.3	44.4	31.3	44.6
669 PEN RM CLR 2A	Y	17	46.0	62.1	43.0	62.5	38.7	51.8	36.1	52.0
PIPE CHASE CLR 1A	Y	29	47.4	64.0	44.8	64.6	39.9	53.5	37.6	53.7
PIPE CHASE CLR 2A	Y	29	37.8	51.0	35.4	51.3	31.9	42.6	29.7	42.7
CNT SPR PMP RM CLR 1A	Y	10	19.8	26.7	18.7	27.0	16.7	22.3	15.7	22.4
CNT SPR PMP RM CLR 2A	Y	10	27.7	37.1	25.9	37.4	23.3	31.1	21.8	31.2

"A" Train ERCW Flows (gpm)			As Presented in LAR				Requested Information			
			Outage 1	Outage 2	Outage 3	Outage 4	Outage 1	Outage 2	Outage 3	Outage 4
	Safety-Related Load?	DESIGN FLOW	Table 4.2-12	Table 4.2-14a	Table 4.2-13	Table 4.2-14b				
		FOR FULL QUAL	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB
RHR PMP RM CLR 1A	Y	15	13.6	18.3	12.8	18.4	11.4	15.3	10.8	15.3
RHR PMP RM CLR 2A	Y	15	17.5	23.5	16.3	23.7	14.7	19.6	13.7	19.7
1A-A Strainer Backwash	Y	450	431.7	547.7	415.4	550.6	376.0	468.9	363.4	470.3
2A-A Strainer Backwash	Y	450	490.3	621.1	471.6	624.3	427.6	532.2	413.3	533.8
LCVC GROUP 1A:	Only for MSLB									
1AA LCC	Y- only MSLB	200	0.0	318.2	0.0	0.0	0.0	266.0	188.4	266.8
1A CRD	NO	84	0.0	83.0	0.0	0.0	0.0	69.6	49.6	69.8
U-1 #1RCP	NO	132	0.0	152.3	0.0	0.0	0.0	127.3	90.0	127.6
UCVC 1A	NO	23	0.0	24.8	0.0	0.0	0.0	20.9	14.9	20.9
LCVC GROUP 1C:	Only for MSLB									
1CA LCC	Y- only MSLB	200	0.0	288.2	0.0	0.0	0.0	240.3	169.2	240.9
1C CRD	NO	84	0.0	92.4	0.0	0.0	0.0	77.3	54.7	77.5
U-1 #3RCP	NO	132	0.0	144.2	0.0	0.0	0.0	120.3	84.8	120.6
LCVC GROUP 2A:	Only for MSLB									
2AA LCC	Y- only MSLB	200	0.0	0.0	0.0	288.0	182.4	239.8	0.0	240.9
2A CRD	NO	84	0.0	0.0	0.0	101.0	64.2	84.2	0.0	84.6
U-2 #1RCP	NO	132	0.0	0.0	0.0	144.3	91.1	120.0	0.0	120.6
LCVC GROUP 2C:	Only for MSLB									
2CA LCC	Y- only MSLB	200	0.0	0.0	0.0	247.8	156.6	206.1	0.0	207.1
2C CRD	NO	84	0.0	0.0	0.0	99.2	62.8	82.6	0.0	83.0
U-2 #3RCP	NO	132	0.0	0.0	0.0	146.7	91.9	121.6	0.0	122.2

"A" Train ERCW Flows (gpm)			As Presented in LAR				Requested Information			
			Outage 1	Outage 2	Outage 3	Outage 4	Outage 1	Outage 2	Outage 3	Outage 4
	Safety-Related Load?	DESIGN FLOW	Table 4.2-12	Table 4.2-14a	Table 4.2-13	Table 4.2-14b				
		FOR FULL QUAL	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB
UCVC 2A	NO	23	0.0	0.0	0.0	0.0	17.0	22.5	0.0	0.0
UCVC 2C	NO	23	0.0	0.0	0.0	0.0	19.1	25.4	0.0	0.0
INCORE INST RM CHR 1A	NO	43	0.0	0.0	0.0	0.0	0.0	0.0	22.1	31.5
INCORE INST RM CHR 2A	NO	43	0.0	0.0	0.0	0.0	25.4	33.6	0.0	0.0
TOTAL FLOW:	Info Only		11217.8	9652.3	11394.3	9608.2	11766.1	10806.1	11870.6	10789.0
PUMP FLOW:	Info Only		11218.0	9652.3	11394.0	9608.2	11766.0	10806.0	11870.0	10789.0
These flows were determined using a UHS elevation of 670										
CCS HX 1A1/1A2	Y	3605/1348	3243.1		1504.4		2748.8		1278.1	
CCS HX 2A1/2A2	Y	3605/1348	1269.7		2293.0		1075.8		2853.4	
CSS HX 1A	Y	3400	3205.8		0.0		2717.3		0.0	
CSS HX 2A	Y	3400	0.0		3202.2		0.0		2720.1	

"B" Train ERCW Flows (gpm)			As Presented in LAR				Requested Information			
			Outage 1	Outage 2	Outage 3	Outage 4	Outage 1	Outage 2	Outage 3	Outage 4
	Safety-Related Load?	MINIMUM FLOW	Table 4.2-12	Table 4.2-14a	Table 4.2-13	Table 4.2-14b				
		FOR FULL QUAL	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB
These flows were determined using a UHS elevation of 639										
D/G 1B1	Y	522	539.1	623.6	0.0	0.0	401.8	458.1	402.7	459.6
D/G 1B2	Y	522	503.5	584.6	0.0	0.0	372.5	426.1	373.3	427.5
D/G 2B1	Y	522	0.0	0.0	501.7	579.2	373.4	426.1	374.1	427.5
D/G 2B2	Y	522	0.0	0.0	515.1	597.4	379.7	435.1	380.4	436.6
CCS HX 0B1/0B2	Info Only	N/A	4089.0	4892.7	4143.4	4865.0	3485.9	4133.8	3550.2	4148.5
CSS HX 1B	Info Only	N/A	3025.8	0.0	0.0	0.0	2579.6	0.0	0.0	0.0
CSS HX 2B	Info Only	N/A	0.0	0.0	2999.5	0.0	0.0	0.0	2575.6	0.0
ELECT BD RM CHR B	Y	163.9	162.7	196.1	167.0	195.8	138.4	165.4	142.1	166.0
MCR CHILLER B	Y	95.4	119.7	144.1	122.8	143.9	101.9	121.7	104.6	122.1
SHUTDOWN BD RM CHR B	Y	380	349.8	414.8	349.0	411.3	297.4	349.6	299.1	350.9
CCP Pump OIL CLR 1B	Y	23	19.5	23.5	20.0	23.5	16.6	19.9	17.0	19.9
CCP Gear OIL CLR 1B	Y	12	10.7	12.9	11.0	12.9	9.0	10.8	9.3	10.9
CCP RM CLR 1B	Y	34	29.2	35.3	30.0	35.2	24.8	29.7	25.5	29.8
CCP Pump OIL CLR 2B	Y	23	27.0	32.1	27.0	31.9	22.9	27.0	23.1	27.1
CCP Gear OIL CLR 2B	Y	12	14.3	17.2	14.4	17.1	12.1	14.3	12.2	14.4
CCP RM CLR 2B	Y	34	37.3	44.4	37.4	44.1	31.7	37.4	32.0	37.5
SIS PMP RM CLR 1B	Y	18	23.1	27.8	23.5	27.7	19.6	23.4	20.0	23.5
SIS OIL CLR 1B	Y	4.1	9.0	10.9	9.2	10.9	7.6	9.1	7.7	9.1
SIS PMP RM CLR 2B	Y	18	28.3	33.7	28.5	33.5	24.0	28.4	24.3	28.5

"B" Train ERCW Flows (gpm)			As Presented in LAR				Requested Information			
			Outage 1	Outage 2	Outage 3	Outage 4	Outage 1	Outage 2	Outage 3	Outage 4
	Safety-Related Load?	MINIMUM FLOW	Table 4.2-12	Table 4.2-14a	Table 4.2-13	Table 4.2-14b				
		FOR FULL QUAL	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB
SIS OIL CLR 2B	Y	4.1	9.7	11.6	9.7	11.6	8.1	9.7	8.2	9.7
EGTS 2B	Y	9	11.6	13.9	11.6	13.8	9.8	11.6	9.9	11.6
AUX CONT AIR B	Y	5.1	5.3	6.3	5.3	6.3	4.5	5.3	4.5	5.3
SFP & TBBP CLR 1B	Y	28	27.4	33.3	28.2	33.3	23.2	27.9	23.9	28.0
CCS & AFW CLR 1B	Y	55	77.5	93.8	79.6	93.7	65.6	78.8	67.4	79.0
BAT & AFW CLR 2B	Y	62	57.0	68.3	57.2	67.8	48.1	57.1	48.6	57.3
714 PEN RM CLR 1B	Y	19	24.7	29.8	25.2	29.7	20.9	25.1	21.4	25.2
714 PEN RM CLR 2B	Y	19	25.9	31.0	26.1	30.8	22.0	26.0	22.2	26.1
690 PEN RM CLR 1B	Y	12	23.9	28.9	24.4	28.8	20.3	24.3	20.7	24.4
690 PEN RM CLR 2B	Y	12	24.4	29.1	24.5	28.9	20.6	24.5	20.9	24.5
669 PEN RM CLR 1B	Y	17	29.3	35.3	29.8	35.2	24.8	29.7	25.4	29.8
669 PEN RM CLR 2B	Y	17	46.8	55.9	47.1	55.6	39.6	46.9	40.1	47.1
PIPE CHASE CLR 1B	Y	29	36.5	44.0	37.2	43.8	30.9	37.0	31.6	37.1
PIPE CHASE CLR 2B	Y	29	38.4	46.0	38.7	45.7	32.6	38.6	33.0	38.7
CNT SPR PMP RM CLR 1B	Y	10	21.4	25.8	21.8	25.7	18.1	21.6	18.5	21.7
CNT SPR PMP RM CLR 2B	Y	10	29.7	35.4	29.9	35.2	25.2	29.8	25.5	29.9
RHR PMP RM CLR 1B	Y	15	12.9	15.6	13.1	15.5	10.9	13.0	11.1	13.1
RHR PMP RM CLR 2B	Y	15	15.5	18.5	15.6	18.4	13.2	15.6	13.3	15.6
1B-B Strainer Backwash	Y	450	449.7	513.2	448.3	510.6	393.3	442.7	393.5	444.0
2B-B Strainer Backwash	Y	450	455.1	518.5	453.5	515.8	399.0	448.2	399.2	449.5
LCVC GROUP 1B:	Only for MSLB									

"B" Train ERCW Flows (gpm)			As Presented in LAR				Requested Information			
			Outage 1	Outage 2	Outage 3	Outage 4	Outage 1	Outage 2	Outage 3	Outage 4
	Safety-Related Load?	MINIMUM FLOW	Table 4.2-12	Table 4.2-14a	Table 4.2-13	Table 4.2-14b				
		FOR FULL QUAL	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB
1BB LCC	Y- only MSLB	200	0.0	225.0	0.0	0.0	0.0	176.8	151.5	177.2
1B CRD	NO	84	0.0	0.0	0.0	0.0	0.0	64.2	55.0	64.3
U-1 #2RCP	NO	132	0.0	120.5	0.0	0.0	0.0	93.8	80.3	94.1
UCVC 1B	NO	23	0.0	27.5	0.0	0.0	0.0	20.3	17.4	20.3
LCVC GROUP 1D:	Only for MSLB									
1DB LCC	Y- only MSLB	200	0.0	264.2	0.0	0.0	0.0	221.8	190.4	222.4
1D CRD	NO	84	0.0	103.2	0.0	0.0	0.0	86.7	74.4	86.9
U-1 #4RCP	NO	132	0.0	124.2	0.0	0.0	0.0	104.3	89.4	104.5
LCVC GROUP 2B:	Only for MSLB									
2BB LCC	Y- only MSLB	200	0.0	0.0	0.0	242.1	174.0	204.8	0.0	205.8
2B CRD	NO	84	0.0	0.0	0.0	86.2	62.1	73.0	0.0	73.3
U-2 #2RCP	NO	132	0.0	0.0	0.0	145.7	104.4	123.1	0.0	123.7
LCVC GROUP 2D:	Only for MSLB									
2DB LCC	Y- only MSLB	200	0.0	0.0	0.0	287.7	207.2	243.6	0.0	244.8
2D CRD	NO	84	0.0	0.0	0.0	92.1	66.6	78.2	0.0	78.5
U-2 #4RCP	NO	132	0.0	0.0	0.0	122.9	88.6	104.1	0.0	104.6
UCVC 2B	NO	23	0.0	0.0	0.0	0.0	18.7	22.1	0.0	0.0
UCVC 2D	NO	23	0.0	0.0	0.0	0.0	20.7	24.4	0.0	0.0
INCORE INST RM CHR 1B	NO	43	0.0	0.0	0.0	0.0	0.0	0.0	23.5	27.6
INCORE INST RM CHR 2B	NO	43	0.0	0.0	0.0	0.0	24.0	28.3	0.0	0.0
TOTAL FLOW TO USERS:	Info Only		11095.6	10297.4	11111.4	10337.1	11665.9	11168.9	11664.0	11155.5

"B" Train ERCW Flows (gpm)			As Presented in LAR				Requested Information			
			Outage 1	Outage 2	Outage 3	Outage 4	Outage 1	Outage 2	Outage 3	Outage 4
	Safety-Related Load?	MINIMUM FLOW	Table 4.2-12	Table 4.2-14a	Table 4.2-13	Table 4.2-14b				
		FOR FULL QUAL	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB	Unit 1 LOCA	Unit 1 MSLB	Unit 2 LOCA	Unit 2 MSLB
PUMP FLOW:	Info Only		11096.0	10297.0	11111.0	10337.0	11666.0	11169.0	11664.0	11155.0
These flows were determined using a UHS elevation of 670										
CCS HX 0B1/0B2	Y	3365	4338.3	5167.7	4395.7		3483.7		3764.5	
CSS HX 1B	Y	3400	3210.7	0.0	0.0		2579.2		0.0	
CSS HX 2B	Y	3400	0.0	0.0	3182.4		0.0		2731.1	

RAI-2 REQUEST 4

Discuss how valve leakage is (will be) accounted for such that your Multiflow analysis, which is the basis for your TS revision, is sufficiently accurate.

RESPONSE TO RAI-2 REQUEST 4

Based on the large water flow rate in the ERCW, valve leakage of up to 100 gpm would not affect the results of the Multiflow analysis. The various groupings of valves that are boundary valves to each train of ERCW are described and evaluated below.

- Each ERCW train is independent. However, there are two locations where the trains touch. These locations have a single isolation valve separating the trains. SQN enters TS 3.0.3 (both trains inoperable) if one of these valves is opened with either unit in Modes 1-4. During recent maintenance activities, wherein the piping system physically close to these valves was opened, these valves were visually verified to be not leaking. Operating Experience indicates that this type of valve, i.e., Pratt rubber seated butterfly, the seat is vulcanized to the body, entire inside of the valve body is covered, is very dependable with respect to leakage.

- Each ERCW train has four pumps. Leakage from the non-running pump's discharge check valves would be lost system inventory. The ASME Section XI tests for the ERCW pumps are set up in such a way that leakage through the non-running pump's discharge check valves is determined as a part of the ASME Section XI quarterly pump tests. Check valve leakage would appear as a loss of the tested ERCW pump capacity.

- The Multiflow model credits zero flow at the various containment penetrations, under conditions where a containment isolation would occur. Because each containment penetration is actually a closed loop inside containment, there are four isolation valves in series on each loop that would stop ERCW flow (inboard and outboard Containment Isolation Valves (CIVs) for the supply line and inboard and outboard CIVs for the return line). All of these valves are in the 10 CFR 50 Appendix J program, with acceptance criteria for allowable leakage and have excellent histories on non-leakage. Any leakage that meets 10 CFR 50 Appendix J acceptance criteria through any one valve is negligible with respect to the hydraulic models.

- The non-accident unit's Containment Spray Heat Exchangers (CSHX) are assumed in the analysis to have zero leakage. The actual condition of these valves is validated during routine maintenance draining of the heat exchangers. These valves have not been noted to leak during such activities. Also, these heat exchangers are maintained in wet layup, with the water quality verified quarterly. Leakage of 1 gpm would be readily apparent. Additionally, each CSHX has an inlet and outlet valve that is normally closed. To affect the analysis, both valves would have to have significant leakage.

- ERCW to Station Air Compressors (SAC). The SACs are not safety related. The normal cooling water supply to the SACs is from the non-safety related Raw Cooling Water system. The ERCW system is capable of providing a backup cooling water source. Each train of ERCW has a supply line to the SAC, with a single 4" isolation valve that is normally closed. These valves are examined for leakage during routine maintenance on the check valves located downstream of the valves. No significant leakage has been noted. Operating Experience indicates that these valves are very dependable with respect to leakage. Due to the small size of these valves, leakage is not a concern with respect to the overall ERCW system flow model.

- ERCW to Auxiliary Feedwater (AFW) tell-tale drains. The ERCW system is the backup source of water to the suction of the AFW Pumps. At each location, there are two isolation valves in series, with a normally-open 1" tell-tale drain in between. The ERCW supplies to the Turbine Driven AFW pump are from the ERCW supply headers. The hydraulic analysis assumes that ERCW is being supplied to the Turbine Driven AFW pump. The 1-inch tell tale drains for these pumps have a 1/4" tube attached to them, routed to a floor drain. The small size of this tube makes this flow path small enough to be negligible. The motor-driven AFW pumps are supplied from the ERCW discharge headers. It is conservative to the analysis to assume that ERCW is not supplied to the motor driven AFW pumps or leaking through the tell-tale drains. For these reasons, the possible leakage from ERCW at the AFW pumps would not adversely affect the ERCW hydraulic analysis.

- ERCW to EDG Alternate supply. Each of the EDGs are cooled by the ERCW. The normal, credited, cooling water source for each EDG is supplied by the corresponding train of ERCW. As a backup, each EDG has a cooling water supply line from the opposite train of ERCW. The EDG cannot be declared operable with the opposite train supplying the cooling water. There is no automatic actuation that will open the alternate ERCW 6" supply valves. Due to the relatively small amount of leakage that could leak through a valve of this size, and the hydraulic location of these valves in the system, any leakage would have a negligible effect on the ERCW analysis.

In summary, potential valve leakage does not present a challenge to the analytical accuracy of the ERCW system hydraulic model.

RAI-2 REQUEST 5

Discuss how you are accounting for ERCW pump impeller wear and loss of pump efficiency over time.

RESPONSE TO RAI-2 REQUEST 5

The degraded pump curves that are used in the hydraulic analysis are also the basis for the ERCW pump ASME Section XI acceptance criteria. The ASME Section XI pump test procedures use the hydraulic calculation as the source of the pump test acceptance criteria. The pump test procedure acceptance criteria is the model pump curve, at the appropriate developed head, except where the Section XI allowable ranges are more restrictive. This is also discussed in RAI-2 Request 1 above.

RAI-2 REQUEST 6

Discuss how the computed ERCW flow rates are accounting for allowed variation in line voltage and frequency for both offsite power and the diesel generators.

RESPONSE TO RAI-2 REQUEST 6

The industry issue of varying line voltage and frequency has been entered in the TVA Corrective Action Program (CAP); the SQN Condition Report (CR) number is 758761. This issue has been declared a Degraded/Non-conforming condition (DNC).

TVA performed a Prompt Determination of Operability (PDO) that resulted in reducing the surveillance procedure allowable frequency band from +/-1.2Hz to +/-0.1Hz. With respect to the ERCW pumps, use of the pump affinity laws would result in reducing the ERCW flow by 0.17%. In reality, the flows would be decreased by less than 0.17% because less flow produces less head loss in the system. Adequate margins exist in system design and in actual pump performance margin to accept this loss of flow.

Recently, due to a specific issue with the 2A-A EDG governor, all loads that would be supplied by that EDG have been evaluated for a frequency band of +0.1Hz, -0.2Hz. For the two ERCW pumps that would be powered by that EDG, use of the pump affinity laws would result in reducing the ERCW flow by 0.34%. In reality, the flows would be decreased by less than 0.34% because less flow produces less head loss in the system. Adequate margins exist in system design and in actual pump performance margin to also accept this loss of flow.

TVA continues to track resolution of this industry issue.

RAI-3

BACKGROUND

On August 14, 2014, TVA submitted the responses to RAIs regarding Sequoyah Nuclear Plant, Units 1 and 2, Ultimate Heat Sink LAR. The response to RAI-1 proposed a revised TS 3.7.5 and Technical Specification Bases (TSB) 3.7.4 and 3.7.5, which superseded those found in the October 2, 2013, submittal. TVA proposed additional restrictions in the proposed TSB Table B 3/4.7-1, Minimum Requirements for ERCW – Prerequisite Actions to One Pump per Loop Operation.
10 CFR 50.36(a) (1) specifies that the Bases are considered a summary statement of the bases for the specifications or reasons for such specifications, and are not part of the TSs. 10 CFR 50.36(c)(2) states that LCO are the lowest functional capability or performance levels of equipment required for safe operation for the facility.
Ordinarily, the LCOs specify that certain systems/trains or components are to be OPERABLE to assure safe operation of the facility. The TSB would then further explain system or train operability by specifying what components must be OPERABLE for a system or train to be considered OPERABLE. The TSB also contains summary statements of the reasons for the TS. Supporting information such as analysis assumptions is provided in the Updated Final Safety Analysis Report (UFSAR).

ISSUE
1. *The proposed Table B 3/4.7-1 contains performance levels of equipment and statements that direct the operation of plant equipment – e.g., "isolate flow to the following components". The NRC staff is concerned that the Bases revision, as proposed, could be viewed as containing information defining the LCO of the ultimate heat sink and as directing plant operation.*

2. *As stated in the October 2, 2013 submittal, TVAs objective of this amendment request is to facilitate cleaning and inspection of the 6.9 kV shutdown board and associated 480v SDB without requiring a dual unit shutdown.*

REQUEST
1. *Please clarify how the proposed LCO for TS 3.7.5 sufficiently specifies the conditions in which UHS is operable with only one ERCW pump operable on one ERCW train. These conditions would include restrictions on UHS temperature, the condition of the other unit (time elapsed since last criticality and MODE), requirements for the opposite train ERCW loop, and a reference to the appropriate system lineup. A summary of the analysis and a description of the system alignment necessary to protect the analysis assumptions should be placed in the UFSAR. Please also address how the TSB should be modified to explain system or train operability and reflect a summary of the requirements for single ERCW loop operation.*

2. *Please address how the LCO should be revised such that one pump loop operation is only allowed for facilitating cleaning and inspection of the 6.9 kV shutdown board and associated 480v shutdown boards.*

RESPONSE
TVA will provide the response to this RAI in a separate letter to the NRC.

RAI-4

BACKGROUND

Table 4.2-1 lists the following "Component Minimum Design required ERCW Flow Rates" when ERCW inlet temperature is 87°F.

CCS HX Train A, LOCA unit	*3605 GPM*
CCS HX Train A, non-LOCA unit	*1348 GPM*
CCS HX 0B1/0B2	*3365 GPM*

ISSUE

The quantity of ERCW flow to these heat exchangers is vital to mitigating the LOCA and satisfying the safety requirements for the non-accident unit. Therefore, the NRC staff wants the licensee to explain the purpose of the stated flow quantities.

REQUEST

Explain why these values represent minimum flow rates by discussing what these flow rates do, including when they are needed after a DBA and any operator action that is needed to make these flow rates perform their intended safety functions.

RESPONSE

The minimum design flow rates for the CCS HXs (listed above) are the calculated minimum values required to remove the assumed heat load from the CCS following a LOCA. The majority of the heat load on the CCS comes from the Residual Heat Removal (RHR) Heat Exchanger (HX) after sump recirculation begins, which is calculated to be 43 Million British Thermal Unit (MBTU)/hr. The other heat inputs comprising an additional 0.8 MBTU/hr following a LOCA are: Containment Spray Pump (CSP) bearing cooling, Centrifugal Charging Pump (CCP) seal cooler, Safety Injection Pump (SIP) seal cooler, RHR Pump seal cooler, Seal Water HX, and various sample coolers that might be used post-accident. Therefore, the total heat load on the A-train LOCA unit is 43.8 MBTU/hr, which can be accommodated by the 3605 gpm CCS flow.

The heat load assumed for the non-LOCA unit is from the Reactor Coolant Pump (RCP) Motors, the RCP Thermal Barriers, the CCP seal coolers, the Letdown Heat Exchanger, the Seal Water HX, and various sample coolers, and the Spent Fuel Pool (SFP). The heat load for an on-line unit is ~8-12 MBTU/hr, plus the SFP heat load, which is typically less than 10 MBTU/hr when a refueling outage is not in progress. The assumed head load is over 26 MBTU/hr, which can be accommodated by the 1348 gpm CCS flow.

For the B-train CCS (referred to above as CCS HX 0B1/0B2), there is the calculated 43 MBTU/hr assumed heat load from the accident unit's RHR HX, plus the minor heat loads from the seal/bearing coolers on both units CCPs, SIP, RHR Pump, and CSP, for a total heat load of 43.3 MBTU/hr, which can be accommodated by the 3365 gpm CCS flow.

Therefore, the flow rates in Table 4.2-1 are sufficient to remove the required heat load.

Because the majority of the heat load on the CCS HXs occurs when the RHR HXs are placed in service at sump recirculation initiation, the CCS and ERCW alignments are only required to be completed at sump recirculation. The normal ERCW alignment always has flow to the CCS HXs. The CCS pumps are normally running as some minor heat loads/flow loads on the CCS are present during operation.

On accident initiation on one unit, no operator action is required with regard to ERCW or CCS until sump recirculation is initiated, other than to validate that the proper pumps started upon SI signal receipt or upon blackout restoration. At sump swapover, the ERCW throttling Motor Operated Valve (MOV) at both of the A-train CCS HXs is placed in its required position (a total of two ERCW to CCS valves to be manipulated by the Operators). The B-train similar MOV is automatically positioned by the SI signal. The ERCW valves to the accident unit Containment Spray Heat Exchangers are opened (a total of four ERCW-CSS valves to be manipulated by the Operator). The CCS valves for the accident unit's RHR HXs are opened (a total of two valves). On the B-train CCS, the flow to the non-accident unit's RHR HX may need to be adjusted (one valve). The CCS flow to the SFP HXs is removed from the accident unit, if it is supplied by the accident unit (two valves). The SFP cooling load is placed on the non-accident unit, by the non-accident unit's Operators. Therefore, a total of 11 ERCW and CCS valves are manipulated by the control room operators upon sump swapover. All of these valves are located on the same panel in the Main Control Room. The ERCW system and CCS system flow balance is set up so that the above listed manipulations, together with the set of SI-signal driven automatic actuations, would place the systems in the required configuration to support accident mitigation.

RAI-5

BACKGROUND

Outages 2a&b and 4a&b of Table 4.2-6 of the August 14, 2014 letter specify isolating the accident units containment spray system (CSS) heat exchangers and reducing flow to the A train CCS heat exchanger for MSLB in units 1 and 2 within 1 to 4 hours after the MSLB in order to provide adequate ERCW flow to the Lower Containment Coolers.

ISSUE

Isolating ERCW flow to the CSS heat exchangers makes them inoperable and thus unavailable; reducing flow to the CCS heat exchanger provide less heat sink for plant cooldown.

REQUEST

Provide justification for making the CSS heat exchangers inoperable in Outages 2a&b and 4a&b and reducing the ability for plant cooldown.

RESPONSE

Following a Main Steam Line Break (MSLB), the Containment Spray System (CSS) would automatically actuate if the containment high-high pressure setpoints are reached. The CSS initially draws suction from the refueling water storage tank (RWST); that is, the CSS HXs are not needed for the initial CSS response. The containment pressure transient is short lived for MSLB events. The CSS would be removed from service when containment pressure is reduced, per plant emergency procedures. The Lower Containment Coolers (LCCs) are placed in service sometime between one and four hours after the MSLB accident initiation in order to provide long term cooling for Environmentally Qualified (EQ) components that are located in the top of otherwise dead-ended compartments. The main components in this category are the Pressurizer Power Operated Relief Valves (PORVs). Analysis and simulator experience indicate that the containment pressure drops below the value at which the CSS is stopped before sump swap over is required for a large MSLB. For smaller leaks that take significant time for the faulted Steam Generator (SG) to dry out, the LCC would be placed in service later, (i.e., the four hour mark). The LCC and CSS are not needed to be in service concurrently following an MSLB. The two systems have different design functions. The CSS controls containment pressure; the LCCs are used for long term cooling for EQ equipment.

As stated above, the CSS system starts automatically on containment high-high pressure. The same containment high-high pressure signal generates a containment isolation signal that isolates the ERCW flow from the LCCs. Subsequent isolation of the ERCW from the CSS HXs would not make the CSS inoperable, because the ERCW flow can be re-established if a plant event caused the high-high containment pressure signal to be reached again following system shutdown. The same signal would isolate the ERCW to the LCCs again automatically. The ERCW flow to the CSS HXs is normally isolated.

SQN is licensed as a hot standby plant. Following a design basis accident, SQN has no requirement to place the accident unit in Mode 5 in any defined time frame. After an MSLB, SQN could be in Mode 4 or Mode 3 for an extended time in post-accident recovery. Therefore, the potential need for plant cooldown is not a requirement, and will be addressed as part of long term recovery from the accident.

RAI-6

BACKGROUND

Table B 3/4.7-1 of the proposed TS Bases for Unit 1 lists isolating Unit One Control Rod Drive Vent Cooler (CRDVC) 1B when Unit 1 is in Mode 1.

ISSUE

The license's response to RAI-12 in your letter dated August 14, 2014 stated that, "If there are less than two CRDVCs operating and aligned to the Reactor head shroud for CRD cooling, then the CRDMs may overheat, causing inaccurate Control Rod Position Indicators, and possibly leading to a dropped rod when Unit 1 is in Mode 1."

REQUEST

Provide your reasons for not discussing loss of CRDVC 1B in your significant hazards consideration which was submitted as section 5.3 in your LAR dated October 2, 2013 or revise your significant hazards determination accordingly.

RESPONSE

The operating procedures contain the proper guidance for the Operators to ensure that the fan alignment is correct. Plant operation requires that two of the four CRD coolers be operating, taking suction from the control rod drive area of the reactor head. The other two fans commonly are stopped. The other two fans may be operated, with the suction source aligned to lower containment, in order to provide additional cooling for containment during normal operation. Inclusion of the CRDVC in this submittal does not require a plant alignment change any different, or with more risk, than those routinely performed for normal equipment alignment changes. For these reasons, the existing significant hazards determination does not need to be revised.

Note that upon NRC approval of the Improved Technical Specifications submittal currently under review, the current LCC Technical Specifications (TS) will be moved to the Technical Requirements Manual (TRM). One of the current Surveillances in the LCC TS is that each LCC receives at least 200 gpm. When ITS is implemented, it is likely that TVA will change the required flow to reflect the actual design flow rate of 170 gpm, or remove that portion of the proposed TRM, as appropriate. With the lower flow value to the LCC, the requirement to isolate the 1B CRD Cooler will no longer be necessary. The current requirement to isolate the Containment Spray and place the 1-FCV-67-146 in its 35% position can also be modified.

RAI-7

BACKGROUND

Table B 3/4.7-1 and the “Component Alignment” column of Table 4.2-6 both list components that must be isolated when in the one pump per loop operation.

ISSUE

The information provided in the “Component Alignment” column of Table 4.2-6 does not match the alignment required in Table B 3/4.7-1.

REQUEST

Verify the information in these two tables and make corrections where necessary.

RESPONSE

The described tables have been reviewed. The noted differences in the tables are:

1. Table 4.2.6 describes an “LCC Group.” The term “LCC Group” refers to a group that consists of one Lower Containment Vent Cooler; one Control Rod Drive Vent Cooler; one Reactor Coolant Pump Motor Cooler; and for two groups on Unit 1, one Upper Compartment Cooler. The supply pipe for each group enters containment and then splits to go to the different components. Table B3/4.7-1 has spelled out a Lower Containment Vent Cooler, Control Rod Drive Vent Cooler, and Reactor Coolant Pump Motor Cooler. This is considered an editorial difference, with the Bases Table B3/4.7-1 containing a higher level of detail.

2. It is noted that there is an omission in the Unit 2 Table B3/4.7-1 for A-Loop One Pump Operation in that the paragraph 5.a.4 has omitted the 1A Upper Compartment Cooler. Also, the corresponding table for the B-Loop One Pump Operation paragraph 5.a.4 has omitted the 1B Upper Compartment Cooler. The Bases Tables B3/4.7-1 will be changed to correctly show the Upper Compartment Coolers.

3. Table 4.2-6, Cases Outage 2a and 2b, indicate that the U1 CSS HX would be isolated and 1-FCV-67-146 would be placed in the 35% position for the MSLB cases. Table B3/4.7-1 does not reflect these alignments. There is no need to change the Bases to show this because it is a conditional alignment in the event of a non-LOCA High Energy Line Break (HELB). This action is performed as a response to the event, like the manual alignments for ERCW/CCS upon sump swapover.

RAI-8

BACKGROUND

Section 3/4.7.4 of the proposed TS Bases defines OPERABILITY for an ERCW loop.

ISSUE

Items a through c in this section specify criteria “per loop,” which implies that the criteria applies to both ERCW loops, where it should only apply to an ERCW loop. Also, Item c should specify that this criteria is applicable to one ERCW loop only at a time and only during cleaning and inspection of a 6.9 kV shutdown board and associated 480v shutdown boards.

REQUEST

Correct the above issues.

RESPONSE:

TVA will provide the response to this RAI in a separate letter to the NRC.

RAI-9

BACKGROUND

The licensee is relying on the Multiflow model to determine flow rates through safety related components. The Multiflow calculated flow rates are compared to the required flow rates from Table 4.2-1, which are for an ERCW temperature of 87°F. As shown in Table 4.2-12 for Multiflow calculated flow rates less than required, a revised ERCW temperature is calculated to ensure that the required heat energy is transferred. The most limiting revised temperatures are for the CCS and CSS heat exchangers. The minimum revised temperature is used to establish limits for the new proposed TS limit.
The response to RAI-11 of the August 14, 2014 letter also listed calculated Multiflow ERCW flow rates for LOCA and MSLB as that for Table 4.2-12.

ISSUE

The ERCW flow rates for the CCS and CSS heat exchangers in the response to RAI -11 are less than those of Table 4.2-12 where they should be identical.

REQUEST

Explain why these critical calculated flow rates are different.

RESPONSE

The flow values presented in Table 4.2-12 are for an assumed river elevation of 639 ft-msl rather than using the allowable river elevation of 670 ft-msl that were used in Table 4.2-1. By SQN's design/licensing basis, and included in our hydraulic calculations, the CCS and CSS HX flow values must be met assuming a river elevation of 670 ft-msl; all other components in the system must meet the flow values at the assumed river elevation of 639 ft-msl. The updated flow values for a river elevation of 670 ft-msl are included in the revised Table 4.2-12 below.

The design/licensing basis is a conservative concurrent LOCA and loss of the downstream dam. The rate of level loss in the Chickamauga Lake is relatively slow (it is a large lake on a major river). The peak heat load on the CCS and CSS has passed prior to the lake level dropping below elevation of 670 ft-msl. The TS minimum lake level is at an elevation of 674 ft-msl (LCO 3.7.5). After more than 1.5 days, the lake level reaches steady state elevation of approximately 642 ft-msl. TVA uses elevation of 639 ft-msl as a conservative value.

The response to RAI-11 in the August 14, 2014, letter presented the elevation 639 ft-msl values for CCS and CSS, not the elevation 670 ft-msl values. This LAR used the elevation 670 ft-msl values for CCS and CSS. The SQN FSAR discusses the UHS elevation changes. The licensing basis is discussed in some detail in the Safety Evaluation for SQN License Amendment TS-06-03, referenced in the response to RAI 2. From the Safety Evaluation:

> The licensee proposes to establish 674 ft-msl as the minimum required UHS water level. The existing ERCWS flow balance for the component cooling system (CCS) and containment spray system (CSS) heat exchangers is based on a river elevation of 670 ft-msl, which is well below the minimum proposed UHS level of 674 ft-msl.

The licensee indicated that a UHS level of 674 ft-msl will supply the ERCWS with cooling water for at least 4 hours before the UHS level drops below 670 ft-msl following a LOCA event, which is sufficient to satisfy the short-term cooling demands consistent with the revised heat transfer analysis. Also, with respect to the non-accident unit, the licensee indicated that 4 hours above 670 feet provides enough time for placing the unit in hot standby; thereby maintaining the capability to satisfy the shutdown requirements that are specified by TS limiting conditions for operation.

The following replaces Table 4.2-12 provided in the August 14, 2014, letter.

	Outage 1	Outage 2		Outage 1	Outage 2
A TRAIN ERCW FLOWS			**B TRAIN ERCW FLOWS**		
D/G 1A1	481.1	626.8	D/G 1B1	539.1	623.6
D/G 1A2	473.8	620.8	D/G 1B2	503.5	584.6
D/G 2A1	0.0	0.0	D/G 2B1	0.0	0.0
D/G 2A2	0.0	0.0	D/G 2B2	0.0	0.0
ELECT BD RM CHR A	153.3	206.3	ELECT BD RM CHR B	162.7	196.1
MCR CHILLER A	108.8	146.5	MCR CHILLER B	119.7	144.1
SHUTDOWN BD RM CHR A	361.9	486.6	SHUTDOWN BD RM CHR B	349.8	414.8
CCP OIL CLR 1A	38.7	52.3	CCP OIL CLR 1B	30.2	36.5
CCP Pump OIL CLR 1A	24.7	33.3	CCP Pump OIL CLR 1B	19.5	23.5
CCP Gear OIL CLR 1A	14.0	19.0	CCP Gear OIL CLR 1B	10.7	12.9
CCP RM CLR 1A	35.1	47.4	CCP RM CLR 1B	29.2	35.3
CCP OIL CLR 2A	42.0	56.4	CCP OIL CLR 2B	41.3	49.3
CCP Pump OIL CLR 2A	27.1	36.2	CCP Pump OIL CLR 2B	27.0	32.1
CCP Gear OIL CLR 2A	15.0	20.2	CCP Gear OIL CLR 2B	14.3	17.2
CCP RM CLR 2A	39.5	52.7	CCP RM CLR 2B	37.3	44.4
SIS PMP RM CLR 1A	26.7	35.9	SIS PMP RM CLR 1B	23.1	27.8
SIS OIL CLR 1A	7.9	10.8	SIS OIL CLR 1B	9.0	10.9
SIS PMP RM CLR 2A	25.6	34.2	SIS PMP RM CLR 2B	28.3	33.7
SIS OIL CLR 2A	9.7	13.3	SIS OIL CLR 2B	9.7	11.6
EGTS 2A	11.1	14.9	EGTS 2B	11.6	13.9
AUX CONT AIR A	4.7	6.3	AUX CONT AIR B	5.3	6.3
SFP & TBBP CLR 1A	29.2	39.6	SFP & TBBP CLR 1B	27.4	33.3
CCS & AFW CLR 1A	84.0	113.8	CCS & AFW CLR 1B	77.5	93.8
BAT & AFW CLR 2A	57.4	77.4	BAT & AFW CLR 2B	57.0	68.3
714 PEN RM CLR 1A	23.9	32.1	714 PEN RM CLR 1B	24.7	29.8
714 PEN RM CLR 2A	23.9	32.1	714 PEN RM CLR 2B	25.9	31.0
690 PEN RM CLR 1A	23.7	31.9	690 PEN RM CLR 1B	23.9	28.9
690 PEN RM CLR 2A	22.7	30.5	690 PEN RM CLR 2B	24.4	29.1
669 PEN RM CLR 1A	39.5	53.1	669 PEN RM CLR 1B	29.3	35.3
669 PEN RM CLR 2A	46.0	62.1	669 PEN RM CLR 2B	46.8	55.9
PIPE CHASE CLR 1A	47.4	64.0	PIPE CHASE CLR 1B	36.5	44.0
PIPE CHASE CLR 2A	37.8	51.0	PIPE CHASE CLR 2B	38.4	46.0
CNT SPR PMP RM CLR 1A	19.8	26.7	CNT SPR PMP RM CLR 1B	21.4	25.8
CNT SPR PMP RM CLR 2A	27.7	37.1	CNT SPR PMP RM CLR 2B	29.7	35.4
RHR PMP RM CLR 1A	13.6	18.3	RHR PMP RM CLR 1B	12.9	15.6
RHR PMP RM CLR 2A	17.5	23.5	RHR PMP RM CLR 2B	15.5	18.5
1A-A STRAINER BACKWASH	431.7	547.7	1B-B STRAINER BACKWASH	449.7	513.2
2A-A STRAINER BACKWASH	490.3	621.1	2B-B STRAINER BACKWASH	455.1	518.5
1AA LCC	0.0	318.2	1BB LCC	0.0	225.0
1CA LCC	0.0	288.2	1DB LCC	0.0	264.2

The following values are provided for Elevation 670:

CCS HX 1A1/1A2	3243.1	1696.2	CCS HX 0B1/0B2	4338.3	5198.3
CCS HX 2A1/2A2	1269.7	2116.4	CSS HX 1B	3210.7	0.0
CSS HX 1A	3205.8	0	CSS HX 2B	0.0	0.0
CSS HX 2A	0.0	0			

Enclosure 2

MDQ00006720000095

Multiflow ERCW Flow Balanced Hydraulic Model Calculation

ORIGINAL

QA Record

NPG CALCULATION COVERSHEET / CTS UPDATE

REV 0 EDMS/RIMS NO.	CTS TYPE:	EDMS TYPE:	EDMS ACCESSION NO (N/A for REV. 0)
B87 030113 001	Calculation	CALCULATIONS (NUCLEAR)	B87 150604 001

Calc Title: **ERCW Flow Balanced Hydraulic Model**

	ORG	PLANT	BRANCH	NUMBER	CUR REV	NEW REV
CALC ID	NUC	SQN	MEB	MDQ00006720000095	013	014

CTS UPDATE ONLY ☐
(Verifier and Approval Signatures Not Required)

NO CTS CHANGES ☐
(For calc revision, CTS has been reviewed and no CTS changes required)

UNIT (check one)	SYSTEMS	UNIDS
0 ☒, 1 ☐, 2 ☐, 3 ☐	067	N/A

ECP,N/A	APPLICABLE DESIGN DOCUMENT(S)	CLASSIFICATION
N/A	N/A	E

QUALITY RELATED?	SAFETY RELATED? (If yes, QR = yes)	UNVERIFIED ASSUMPTION	SPECIAL REQUIREMENTS AND/OR LIMITING CONDITIONS?	DESIGN OUTPUT ATTACHMENT?	SAR/TS and/or ISFSI SAR/CoC AFFECTED
Yes ☒ No ☐	Yes ☒ No ☐	Yes ☐ No ☒	Yes ☐ No ☒	Yes ☐ No ☒	Yes ☐ No ☒

CALCULATION NUMBER REQUESTOR	PREPARING DISCIPLINE	VERIFICATION METHOD	NEW METHOD OF ANALYSIS
Name: PHONE:	M	Design Review	☐ Yes ☒ No

PREPARER (PRINT NAME AND SIGN)	DATE	CHECKER (PRINT NAME AND SIGN)	DATE
Ed Craig Ed Craig	4/8/2015	Kelli R. Yates Kelli R. Yates	4/10/15
VERIFIER (PRINT NAME AND SIGN)	**DATE**	**APPROVAL (PRINT NAME AND SIGN)**	**DATE**
Kelli R. Yates Kelli R. Yates	4/10/15	M Meeke	4/10/15

STATEMENT OF PROBLEM/ABSTRACT

Develop a flow balanced model of the Unit 1 and 2 Essential Raw Cooling Water (ERCW) System using the computer software, MULTIFLOW, that can be utilized in the determination of various system hydraulic parameters when placed in various system alignments.

A MULTIFLOW model of the Unit 1 and 2 ERCW System has been developed that is flow balanced based on the latest flow balance test data. This model has been used to determine the available flow rates to all users of ERCW. Various other ERCW flow and pressure related issues have also been examined.

MICROFICHE/EFICHE Yes ☐ No ☒ FICHE NUMBER(S) N/A

NPG CALCULATION COVERSHEET / CTSUPDATE

CALC ID	ORG	PLANT	BRANCH	NUMBER	REV
	NUC	SQN	MEB	MDQ00006720000095	14

BUILDING	ROOM	ELEVATION	COORD/AZIM	FIRM
N/A	N/A	N/A	N/A	TVA

CATEGORIES N/A

KEYWORDS (A-add, D-delete)

ACTION (A/D)	KEYWORD	A/D	KEYWORD

CROSS-REFERENCES (A-add, D-delete)

ACTION (A/D)	XREF CODE	XREF PLANT	XREF TYPE	XREF NUMBER	XREF REV

CTS ONLY UPDATES:
Following are required only when making keyword/cross reference CTS updates and page 1 of form NEDP-2-1 is not included:

N/A	N/A	N/A	N/A
PREPARER (PRINT NAME AND SIGN)	DATE	CHECKER (PRINT NAME AND SIGN)	DATE

PREPARER PHONE NO. N/A

EDMS ACCESSION NO. N/A

NPG CALCULATION RECORD OF REVISION	
CALCULATION IDENTIFIER MDQ000-067-2000-0095	
Title	ERCW Flow Balanced Hydraulic Model
Revision No.	DESCRIPTION OF REVISION
0	Initial Issue. SAR section 9.2.2 and Tech Spec LCO 3/4.7.4 have been reviewed by ED Craig and this initial issue of the calculation package does not directly or indirectly impact the information (text, graphs, or tables) in the Technical Specifications or SAR. See Appendix F for additional discussion of SAR and Tech Spec applicability relating only to Appendix F. Total number of pages in the entire calculation: 551

NPG CALCULATION RECORD OF REVISION	
CALCULATION IDENTIFIER MDQ000-067-2000-0095	
Title	ERCW Flow Balanced Hydraulic Model
Revision No.	DESCRIPTION OF REVISION
1	Revision 1 incorporates the replacement of the carbon steel discharge piping from the Main Control Room and Electrical Board Room A/C equipment with stainless steel piping. The modification was performed under DCN D-21560 and consisted of cutting and capping the existing 8" common discharge piping and rerouting the flow from the Main Control Room and Electrical Board Room A/C equipment through 6" stainless steel piping. The flow from both trains of Main Control Room and Electrical Board Room A/C equipment is now routed independently (of the other components serviced by the ERCW system) to their respective discharge header. A crossover, with two isolation valves, was added between the two trains. All piping, fittings, and valves added as a result of DCN D-21560 are Schedule 40S stainless steel and were modeled as such in Revision 1 of this calculation. Confirmed flow coefficients (Cv) for the ball valves added were not available from the manufacturer at the time of this calculation revision. The flow coefficients input to the model were therefore obtained from the Preliminary valve drawings included herein as Attachment 1 (4 sheets). All other components and piping added to the model are standard components available in the menus of the Multiflow program. The node diagrams, sheets 2 & 7, were revised to reflect the modification. Revision 1 was performed only to incorporate into the model the physical changes to the piping system performed under DCN D21560. The results of Revision 1 as compared to those of Revision 0 indicate no significant effect to the pressure or flow rate at any location in the system. However, the model may require further revision to confirm that it represents the operating condition of the system after the modification has been completed and operational test data can be obtained. Calculation is legible and is suitable for microfilming in accordance with SPP-2.4, "Records Management." All predecessor and successor documents were reviewed and revised as necessary within the scope of DCN D-21560. The SAR was affected by DCN D-21560 and changes have been made within the DCN Package. Tech Specs have been reviewed and were determined to be unaffected. Total Pages = 1013 Pages Added: 3A and Attachment 1 (4 sheets) Pages Deleted: Appendix F (42 pages) Pages Revised: 1, 2, 4, 5, 7, 15, 16, Appendix E Sheets 2 & 7, and Appendix G content replaced with Revision 1 Muliflow model input Incorporation instructions: • Replace R0 coversheet (Page 1) with R1 coversheet (Page 1) • Replace R0 CCRIS (Page 2) with R1 CCRIS (Page 2) • Insert R1 Page 3A behind R0 Page 3 • Replace R0 Pages 4, 5, 7, 15, 16, Appendix E Sheets 2 & 7, and Appendix G (385 pages) with R1 Pages 4, 5, 7, 15, 16, Appendix E Sheets 2 & 7, and Appendix G (849 pages) • Insert Attachment 1 (4 pages) behind Appendix G

NPG CALCULATION RECORD OF REVISION	
CALCULATION IDENTIFIER MDQ000-067-2000-0095	
Title	ERCW Flow Balanced Hydraulic Model
Revision No.	DESCRIPTION OF REVISION
2	Revision 2 incorporates the replacement of the diesel generator check valves. The modification was performed under DCN D-21795. This required changing the Cv of the check valves in the model. Revision 2 was performed only to incorporate into the model these Cv changes. The results of Revision 2 as compared to those of Revision 0 indicate no significant effect to the pressure or flow rate at any location in the system. However, the model may require further revision to confirm that it represents the operating condition of the system after the modification has been completed and operational test data can be obtained. At the time of the issuance of this revision to the calculation DCNs D-21795 and D-21650 had not been implemented. Before this model is used it should be determine if one or both of these DCNs have been implemented and which is the appropriate model revision to be used. If DCN D-21795 is implemented but not D-21650 then see Appendix D of calculation MDQ0067970004 for modeling instructions. The previous revision to this calculation did a hand revision to node diagrams, sheets 2 & 7, and inserted a small copy in the calc package that was un-readable. Revision 2 updates the electronic version of these node diagrams and inserts a larger readable copy in the calc. package. This was done to keep the electronic version of the node drawings current for future revisions. Also, the previous revision of the calculation included both the input and the output section of the Multiflow model. The Multiflow output is not required since this calculation does not produce a resultant model for a particular flow configuration. Only the input of the model is required as is explained in section 8.0 of the calculation. Therefore only the input section of the Rev. 2 Multiflow model was included. Removed revision log information from cover sheet and index. All predecessor and successor documents were reviewed. Successor calculations MDQ00006720030144 and MDQ00006720040149 are affected and will be revise as required. Calculations MDQ00006720020109, MDQ00006720020110, & MDQ00006720020136 address the 87°F Tech. Spec. change which has been rejected by the NRC. These calculations are to be revised before re-submittal and the R2 revision from this calculation will be incorporated at that time. The SAR and Tech Specs have been reviewed by Ron Hughes and were determined to be unaffected. Total Pages = 519 Pages Added: 3B Pages Deleted: Appendix F (42 pages)(Should have been removed last revision but was not), Appendix G (Pages 390 – 884) Pages Revised: 1, 2, 4, 5, 7, 14, 15, 16, 35, Appendix A (Sheet 1), Appendix E (Sheets 2 & 7), and Appendix G (pages 1 – 389)

NPG CALCULATION RECORD OF REVISION	
CALCULATION IDENTIFIER MDQ000-067-2000-0095	
Title	ERCW Flow Balanced Hydraulic Model
Revision No.	DESCRIPTION OF REVISION
3	Revision 3 incorporates into the flow balanced model a number of changes that have occurred to the ERCW system since the Revision 0 of this calculation was issued. The flow balanced calculation has been updated to reflect all of the ERCW system changes as of the time of issuance of this revision. New Section 7.16 contains the system changes since the revision 2 to this calculation. Appendix F has been replaced with a new Appendix F that provides details of the ERCW system alignment for the testing used to update the model in Section 7.16. New Appendix H provides a running summary of all of the model changes necessary to transition from the base model calculation to the current flow balanced model. Appendix I determines the ERCW system flow available to components under certain detailed conditions. All nodal drawings have been updated. The Multiflow input file in Appendix G has been undated. All predecessor and successor documents were reviewed. Successor calculations MDQ00006720030144 and MDQ00006720040149 are affected and will be revised as required. Calculations MDQ00006720020109, MDQ00006720020110, & MDQ00006720020136 address the 87°F Tech. Spec. change which has been rejected by the NRC. These calculations are to be revised before re-submittal and the R3 revision from this calculation will be incorporated at that time. Since this change is prepared in Word XP, and the original was prepared in Word 95, miscellaneous formatting changes have been made to preserve the pagination. The SAR and Tech Specs have been reviewed by Ed Craig and were determined to be unaffected. Total Pages = 533 Pages Added: 19, added new section 7.16 on pages 38-50, Appendix F, Appendix H, Appendix I Pages Deleted: Appendix A pages 6-26. The information on these pages is now included in ERCW Base Model Calculation MDQ0067970004 Pages Revised: 1, 2, 6-11, 17-21, Appendix A (Sheet 1), Appendix E (All), Appendix F (All) and Appendix G (pages 1 – 401)

NPG CALCULATION RECORD OF REVISION	
CALCULATION IDENTIFIER MDQ000-067-2000-0095	
Title	ERCW Flow Balanced Hydraulic Model
Revision No.	DESCRIPTION OF REVISION
4	Revision 4 reflects the addition of 4 trained cross-tie headers in the ERCW system: 6" nominal ID Train A, 6" nominal ID Train B, 16" nominal diameter Train A, and 16" nominal diameter Train B. These headers are installed per DCN(s) D21996A and D21894A. Appendix I is replaced to document the available flow rates in different header configurations for accident and non-accident scenarios. Nodal diagrams have been updated to show the header configuration. The following MultiFlow files have been revised for the header configuration: "2002_FLOW_BALANCED_MODEL_R4.net", "U1_LOCA.net", "U2_LOCA.net", "Case_1_R4.net", "Case_2_R4.net", "Case_3_R4.net", "Case_4_R4.net", "Case_5_R4.net", "Case_6_R4.net", "Case_7_R4.net", "Case_8_R4.net", "Case_9_R4.net", "Case_10_R4.net", "Case_11_R4.net", and "Case_12_R4.net". The following MultiFlow files are not being revised as they were used to verify the 2002 flow balanced model: "TESTA1.net", "TESTA1_for_CCS.net", "TESTA2.net", "TESTA3.net", "TESTA4.net", "TESTA5.net", "TESTA6.net", "TESTB1.net", "TESTB2.net", "TESTB3.net", "TESTB4.net", "TESTB5.net", "TESTB5_for_CCS.net", and"TESTB6.net". Also included in this revision is incorporating successor calculation mini-calc MDQ000-067-2000-0095-001 R0 into this (parent) calculation. The conditions examined by this mini-calc include changing the throttle positions of certain valves to full open, and also closing of valves 0-FCV-67-205 and 0-FCV-67-208. Upon implementation of DCN D22183, the existing Appendix I of the main calculation is replaced with the information in the mini-calc. Appendix H is revised to change the valve Cv listing as detailed in this mini-calc. Appendix G, the MultiFlow input file, is replaced with the file developed in the mini-calc. All nodal drawings have been updated. The Multi Flow input file in Appendix G has been updated. All predecessor and successor documents were reviewed. Successor calculations MDQ00006720020109, MDQ00006720020136, MDQ00006720030144 and MDQ00006720040149 are affected and will be revised as required. The SAR and Tech Specs have been reviewed and were determined to be unaffected. Total Pages = 545 Pages Added: 7 Pages Revised: 1, 1a, 8-18, Appendix G, Appendix H pages 1, 3-5, 9, and Appendix I

NPG CALCULATION RECORD OF REVISION

CALCULATION IDENTIFIER MDQ000-067-2000-0095	
Title	ERCW Flow Balanced Hydraulic Model
Revision No.	DESCRIPTION OF REVISION
5	Revision 5 reflects modifications to the CCP skid piping per PIC P-22204. The results in Appendix I are replaced to document the available flow rates in different header configurations for accident and non-accident scenarios. Nodal diagrams have been updated to show the revised CCP skid configuration. In addition, Appendix I, Table 1: Header alignment scenarios were revised based on SQN provided updated header operation information. The following MultiFlow files have been revised for the header configuration: "2002_FLOW_BALANCED_MODEL_R5.net", "U1_LOCA_R5.net", "U2_LOCA_R5.net", "Case_1_R5.net", "Case_2_R5.net", "Case_3_R5.net", "Case_4_R5.net", "Case_5_R5.net", "Case_6_R5.net", "Case_7_R5.net", "Case_8_R5.net", "Case_9_R5.net", "Case_10_R5.net", "Case_11_R5.net", and "Case_12_R5.net". The following MultiFlow files are not being revised as they were used to verify the 2002 flow balanced model: "TESTA1.net", "TESTA1_for_CCS.net", "TESTA2.net", "TESTA3.net", "TESTA4.net", "TESTA5.net", "TESTA6.net", "TESTB1.net", "TESTB2.net", "TESTB3.net", "TESTB4.net", "TESTB5.net", "TESTB5_for_CCS.net", and"TESTB6.net". All nodal drawings have been updated. The Multi Flow input file in Appendix G has been updated. All predecessor and successor documents were reviewed. Successor calculations MDQ00006720020109, MDQ00006720020136, MDQ00006720030142, MDQ00006720030144 and MDQ00006720040149 have been reviewed and will be revised as required. The SAR and Tech Specs have been reviewed and were determined to be unaffected. Total Pages = 566 Pages Added: Page 8, 15 pages to Appendix G, and 6 pages to Appendix I Pages Revised: 1, 2, 9, 10, 12- 17, 19, 20-21, 39, Appendix G, Appendix H pages 1, 5, and 9, and Appendix I pages 5-9, 10, 11, 12, 14, 15, 16, and 17-34

NPG CALCULATION RECORD OF REVISION	
CALCULATION IDENTIFIER MDQ000-067-2000-0095	
Title	ERCW Flow Balanced Hydraulic Model
Revision No.	DESCRIPTION OF REVISION
6	Revision 6 reflects changes to the models and updates the results section of Appendix I based on these changes. Specific model changes are changing where the fixed flow of zero is placed to isolate the train cross-ties, added a fixed flow of zero in 1B127A-1A234 and deleted a fixed flow of zero to 1B126-1B127. Reference PER 126986 and 128296. The following MultiFlow files have been revised for the correct header configuration: "2002_FLOW_BALANCED_MODEL_R6.net", "U1_LOCA_R6.net", "U2_LOCA_R6.net", "Case_1_R6.net", "Case_2_R6.net", "Case_3_R6.net", "Case_4_R6.net", "Case_5_R6.net", "Case_6_R6.net", "Case_7_R6.net", "Case_8_R6.net", "Case_9_R6.net", "Case_10_R6.net", "Case_11_R6.net", and "Case_12_R6.net". All predecessor and successor documents were reviewed and are revised as required. The SAR and Tech Specs have been reviewed and were determined to be unaffected. Total Pages = 567 Pages Added: Page 8a Pages Revised: 1, 2, 9, 11-13, 16, 17. Appendix H page 5,9 and Appendix I pages 6, 7, 15-34
7	Rev 7 incorporates model changes from MDQ0067970004 R10 and flow balances the model based on testing data for the system as a whole and also specific D/G valve testing. Only the new flow balanced model and models U1 LOCA and U2 LOCA are revised in this revision. Cases 1 through 12 will be revised at a later date. The following MultiFlow files have been revised: "2002_FLOW_BALANCED_MODEL_R7.net", "U1_LOCA_R7.net", "U2_LOCA_R7.net", All predecessor and successor documents were reviewed and are revised as required. The SAR, ISFSI SAR, Technical Specifications, and ISFSI CoC are reviewed as part of EDC 21523. App F is replaced in its entirety and this revision bars are not shown. Rev bars are also not shown on pages App I pages 17-34 as these tables are replaced in their entirety. Total Pages = 583 Pages Added: 52-58 App F pages 9-16, App G pg 395 Pages Revised: 1, 2, 8a, 9,-11, 18-20, 42-44, 50-51., Appendix F, Appendix H pages 1-7, 9 and Appendix I pages 6, 7, 17-34

NPG CALCULATION RECORD OF REVISION	
CALCULATION IDENTIFIER MDQ00006720000095	
Title	ERCW Flow Balanced Hydraulic Model
Revision No.	**DESCRIPTION OF REVISION**
8	Revision 8 incorporates model changes to Cases 1-12 that were made to U1 LOCA and U2 LOCA under revision 7. The following MultiFlow files have been revised: "Case_1_R7.net", "Case_2_R7.net", "Case_3_R7.net", "Case_4_R7.net", "Case_5_R7.net", "Case_6_R7.net", "Case_7_R7.net", "Case_8_R7.net", "Case_9_R7.net", "Case_10_R7.net", "Case_11_R7.net", and "Case_12_R7.net". All predecessor and successor documents were reviewed and are revised as required. The SAR, ISFSI SAR, Technical Specifications, and ISFSI CoC are reviewed as part of DCN 21894. Rev bars are also not shown on pages App I pages 17-34 as these tables are replaced in their entirety. Total Pages = 584 Pages Added: Page 8b Pages Revised: 1, 2, 9, 11-13,16, and Appendix I pages 6, 7, 10, 17-34

NPG CALCULATION RECORD OF REVISION	
CALCULATION IDENTIFIER MDQ00006720000095	
Title	ERCW Flow Balanced Hydraulic Model
Revision No.	DESCRIPTION OF REVISION
9	Revision 9 incorporates changes to throttle valve positions that were physically changed as part of the actions of PER 142444. Accordingly, all models were revised. Added in new cases to be examined as a result of PERs 127203, 124572, 140876, 164813 and the need to examine additional ERCW alignments related to the crosstie DCN D21894, maintenance-related alignments, system testing alignments, system high pressure analysis, and operational alignments. Added Appendix J to examine activities and compensatory measures that will be a part of the Unit 2 Steam Generator Replacement activities. All predecessor and successor documents were reviewed and are revised as required. The SAR, ISFSI SAR, Technical Specifications, and ISFSI CoC were reviewed by Ed Craig and were determined to be unaffected. Rev bars are not shown on any pages in App I as all pages have been changed. Rev bars are not included in Appendix J as the entire appendix is new. Total Pages = 714 Pages Added: Page 8c, 59-68, App I pages 36-123, App J pages 1-31 Pages Revised: 11-13,16, 17, 19, 21, Appendix H pages 1-7, 9 Pages Replaced: 1, 2, 9, App G, App I pages 1-35
10	Revision 10 adds additional cases to the analysis for Yard Header outages. Cases Yard 1, Yard 2, Yard 5, Yard 6 have been split into two new cases each, identified as Yard 1A, Yard 1B, Yard 2A, Yard 2B, Yard 5A, Yard 5B, Yard 6A, Yard 6B. An additional section was added to this calculation to analyze the effects of isolating the ERCW discharge piping from the Diesel Generators, and also for evaluating the effects of the discharge from the Diesel Generators being broken open to atmosphere. Other than the number of pages, all of the changes are in Appendix I. Rev bars have been placed at the pertinent pages. The heading for the body of the calc and for Appendix I have been changed to Rev 10, the remaining appendices have been left as Rev 9. All predecessor and successor documents were reviewed and are revised as required. The SAR, ISFSI SAR, Technical Specifications, and ISFSI CoC were reviewed by Ed Craig and were determined to be unaffected. Total Pages = 742 Pages Added: App I pages 124-151 Pages Revised: 8C, 16, 17, Appendix I pages 1, 2, 9, 15, 16 Pages Replaced: 1, 2, 9, Appendix I pages 17-123

NPG CALCULATION RECORD OF REVISION	
CALCULATION IDENTIFIER MDQ00006720000095	
Title	ERCW Flow Balanced Hydraulic Model THIS SHEET ADDED BY R11
Revision No.	DESCRIPTION OF REVISION
11	Revision 11 only affects Appendices I and J. The change is to incorporate having ERCW flow to the Control Air Compressors current with other off-normal alignments. Various Operations procedures exist that would align the ERCW supply to the air compressors if the event of a loss of the normal Raw Cooling Water (system 24) supply, whether the loss of RCW is due to a RCW fault or to a loss of offsite power. It had already been determined in case Flushing 3, and then using the results of calc MDQ00006720020109 (REF 2.36), that if the air compressors are aligned to the ERCW system that some ERCW components will not receive full design flow. Previous revision of this calc has stated that the only one off-normal alignment at a time was considered. The goal of this change was to allow ERCW flow to the air compressors when it could be justified. For the general case where one ERCW train is to be taken to an off-normal alignment, if ERCW must be aligned to the air compressors, then the train that is not off-normal should be used. The cases where air compressor flow is accounted for are: SI-1DBA, SI-2DBA, D/G1 through D/G7A. Also, in App J all of the cases for the Steam Generator Replacement included having ERCW flow to the Air Compressors. In App I, Cases Flush 7A and Flush 8A were added in order to analyze the effects of the 6" ESF header and the 16" Aux Bldg header not being service. All predecessor and successor documents were reviewed and are revised as required. The SAR, ISFSI SAR, Technical Specifications, and ISFSI CoC were reviewed by Ed Craig and were determined to be unaffected. This revision is being made August, 2011. Total Pages = 743 Pages Added: Page 8D, App I pages 152-155 as a result of material added on the revised pages. Pages Revised: 11, 16, 17, Appendix I pages 13-15, 38-44, 47, 51, 66, 69, 117-121, 128, 130, 131, 148-152; Appendix J pages 4, 5, 10, 11, 13, 16, 19-26 Pages Replaced: 1, 2, 9

NPG CALCULATION RECORD OF REVISION	
CALCULATION IDENTIFIER MDQ00006720000095	
Title ERCW Flow Balanced Hydraulic Model	THIS SHEET ADDED BY R12
Revision No.	DESCRIPTION OF REVISION
12	Revision 12 only affects Appendix I. The change was to examine two new situations: • Add cases that demonstrate the effects on the ERCW system of placing flow to the Control and Service Air Compressors, assuming that the pipe leading to the air compressors breaks off cleanly on the outside of the Auxiliary Building. The cases examined include that no other ERCW alignment is off-normal, which had not been previously documented in this calculation. These changes are detailed as new Table 8 in Appendix I. Table 8 replaces Table 4, case FLUSH 3, it its entirity, although the documentation of FLUSH 3 remains in the calculation for ease of documentation. • Add cases that demonstrate the effects on the ERCW system of placing flow through 0-FCV-67-151, with the flowpath through 0-FCV-67-152 closed. These cases had not been previously evaluated, although having 0-FCV-67-151 open concurrently with 0-FCV-67-152 had been examined. These cases are added to support maintenance work. Two Mini-Calcs (-01, -02) were identified on this calculation. These calcs are no longer needed, and will be changed to File Only status. Revision 9 of this calculation totally incorportated / changed the scope of what was in these mini-calcs. All predecessor and successor documents were reviewed and are revised as required. The SAR, ISFSI SAR, Technical Specifications, and ISFSI CoC were reviewed by Ed Craig and were determined to be unaffected. Added Pages: 8E Added pages in Appendix I: 19-20, 73-84, 167-199 Revised pages in Appendix I: 1, 2, 6-9, 13, 21, 202 Pages Replaced: 1, 2, 9 Pages Revised: 16, 17 Total number of pages in Rev 12: 795 This revision is being made February, 2012.

NPG CALCULATION RECORD OF REVISION	
CALCULATION IDENTIFIER MDQ00006720000095	
Title	ERCW FLOW BALANCED HYDRAULIC MODEL
Revision No.	DESCRIPTION OF REVISION
013	Revision 13 replaces the Containment Spray (CS) 1A HX with a different HX with a different dP. The HX dP is changing from 12 psid at 6028 gpm to 6.77 psid at 6028 gpm. The throttle valve, 1-67-537A, Cv is changed from 640 to 621 to account for this change in dP so that the flowrate through the Heat Exchanger is hydraulically equivalent. This Cv change is determined by opening the model 2002_FLOW_BALANCED_MODEL_R9.net and removing the fixed flow of zero on link 1A121A-1A150 (flow path for CS HX 1A) and executing the model. The resulting flowrate in link 1A121A-1A150 is 3738.4 sgpm. Next the dP of the heat exchanger in this link was changed from 12 psid to 6.77 psid at 6028 gpm, the throttle valve with Cv=640 in link 1A150-1A152 deleted and replaced with a fixed flow of 3738.4 gpm. The resultant calculated Cv in "Summary of Fixed Flows" is 621.94. A Cv of 621 is used for conservatism. The resultant flowrate with a Cv=621 is 3734.8 sgpm. The fixed flow of zero is restored to link 1A121A-1A150 and the resulting model is 2002_FLOW_BALANCED_MODEL_R13.net and is the only model modified in this revision. Based upon the valve information in Pratt Catalog 182-R, for a 18" butterfly valve to change the Cv by this small amount will also be a small change in the throttled position of the valve. The valve currently is 22 ¾ turns from full open based upon 0-SI-OPS-067-682.M R32 (22 April 2014). The valve position will be modified during the PMT for DCN 23322 to maintain the same flow rate through the CS 1A path. This will be confirmed in the Post Modification Test in DCN 23322. The cases using the flow balanced model as input are not revised as the flow path through the 1A CS HX will be hydraulically equivalent. The PMT should be written to ensure that the flow rate will be the same or slightly less through the 1A CS HX (<100 gpm). While it is desirable to have the same flowrate, since this is such a s slight change in required Cv and the valve is a large valve, the flow may change slightly. It is conservative to have slightly less flow through this branch line because the 1A CS HX is not one of the limiting components of A train ERCW. Successor calculation MDQ00006720010109 identifies the limiting components that result in reduced allowable ERCW inlet temperature for alternate ERCW alignments. There are no cases where the 1A CS HX is the limiting component. After the performance of the PMT and review of the flow data, if margin is desired in the system then this calculation, including all cases, and successor calculations could be revised. This potential revision is not necessary and would only be for managing margins. SQN UFSAR, Technical Specifications, ISFSI FSAR, and ISFSI CoC were reviewed in DCN 23322 and are not impacted by this revision. Successor calculations were reviewed and no revisions are necessary. Pages Added: 8F Pages Replaced: 1, 2, 9, Appendix G pages 1-381. Pages Revised: 11, 16-18, Appendix H pages 1, 3 and 9. Pages Deleted: Appendix G pages 382-395. Total Number of Pages in Rev. 013 = 770

NPG CALCULATION RECORD OF REVISION	
CALCULATION IDENTIFIER MDQ00006720000095	
Title	ERCW FLOW BALANCED HYDRAULIC MODEL
Revision No.	DESCRIPTION OF REVISION
014	Revision 14 is being done as an administrative revision. In Revision 11, a number of pages of Appendix D were inadvertently omitted. These pages are being restored in this Revision 14. There are no changes to any content on any pages of the calc. The Table of Contents has always contained the correct number of pages, the pages just were not there. The only changes to the calc are adding the rev log page, and changing the Electronic File Storage Information Sheet. The heading on the Appendix D pages has indicated Revision 9 since that appendix was created, and no changes have been made since Revision 9. The Electronic Word File from Revision 13 (Filekeeper ID 324761) was retrieved, the correct Appendix D pages are included in that file. A new Filekeeper Word file will be created, but the only changes will be the calc coversheet, this Rev Log, and the Electronic File Storage sheet. SQN UFSAR, Technical Specifications, ISFSI FSAR, and ISFSI CoC were reviewed by Ed Craig and are not impacted by this revision. Successor calculations were reviewed and no revisions are necessary. Note that Appendix D is not being changed at all in this Word file, it is only being replaced in the permanent hard copy and the electronic PDF in BSL. Added/Replaced: Appendix D in its entirety, 30 pages Pages Added: 8G Pages Replaced: 1, 2, 9 Pages Revised: 16 Pages Deleted: None. Total Number of Pages in Rev. 014 = 783

This page added in R13

NPG CALCULATION VERIFICATION FORM		
Calculation Identifier MDQ00006720000095		Revision 14
Method of verification used: 1. Design Review ☒ 2. Alternate Calculation ☐ 3. Qualification Test ☐	Verifier Kelli R. Yates Date 4/10/15	

Comments:

The results of this calculation are consistent with fluid flow methods and equations. The subject calculation has been found to be technically adequate in that computations, judgments, assumptions and logic are in accordance with generally accepted methodologies.

NGP COMPUTER INPUT FILE
STORAGE INFORMATION SHEET

Document MDQ000-067-2000-0095	Rev. 9	Plant: SQN	Page 1 of 7

Subject:

ERCW Flow Balanced Hydraulic Model – (Files stored include MULTIFLOW network input files and Nodal Diagrams. Network files open with MULTIFLOW, Nodal Drawings open with Spicer-Imagination, and the calculation file in in MS-Word)

☐ Electronic storage of the input files for this calculation is not required. Comments:

☒ Input files for this calculation have been stored electronically and sufficient identifying information is provided below for each input file. (Any retrieved file requires re-verification of its contents before use.)

File Name: **047W8451R9.smf**
Document identifier: 309343
BSL Item ID:
Description: sqn ercw multiflow model nodal diagram 1

File Name: **047W8452R10.smf**
Document identifier: 309686
BSL Item ID:
Description: sqn ercw multiflow model nodal diagram 2

File Name: **147W8453R9.smf**
Document identifier: 309345
BSL Item ID:
Description: sqn ercw multiflow model nodal diagram 3

File Name: **247W8453R9.smf**
Document identifier: 309346
BSL Item ID:
Description: sqn ercw multiflow model nodal diagram 4

File Name: **247W8454R9.smf**
Document identifier: 309347
BSL Item ID:
Description: sqn ercw multiflow model nodal diagram 5

File Name: **047W8455R9.smf**
Document identifier: 309348
BSL Item ID:
Description: sqn ercw multiflow model nodal diagram 6

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STORAGE INFORMATION SHEET

Document **MDQ000-067-2000-0095**	**Rev. 9**	Plant: SQN	**Page 2 of 7**

Subject:

ERCW Flow Balanced Hydraulic Model – (Files stored include MULTIFLOW network input files and Nodal Diagrams. Network files open with MULTIFLOW, Nodal Drawings open with Spicer-Imagination, and the calculation file in in MS-Word)

☐ Electronic storage of the input files for this calculation is not required. Comments:

☒ Input files for this calculation have been stored electronically and sufficient identifying information is provided below for each input file. (Any retrieved file requires re-verification of its contents before use.)

File Name: **147W8456R9.smf**
Document identifier: 309349
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Description: sqn ercw multiflow model nodal diagram 7

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Document identifier: 324762
BSL Item ID:
Description: MULTIFLOW FILE

R13

File Name: **U1_LOCA_R9_CROSSTIE_1.net**
Document identifier: 312555
BSL Item ID:
Description: MULTIFLOW FILE

File Name: **U1_LOCA_R9_CROSSTIE_3.net**
Document identifier: 312556
BSL Item ID:
Description: MULTIFLOW FILE

File Name: **U2_LOCA_R9_CROSSTIE_5.net**
Document identifier: 312557
BSL Item ID:
Description: MULTIFLOW FILE

R9

File Name: **U2_LOCA_R9_CROSSTIE_7.net**
Document identifier: 312558
BSL Item ID:
Description: MULTIFLOW FILE

File Name: **SGR1.net**
Document identifier: 318256
BSL Item ID:
Description: MULTIFLOW FILE

R11

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Subject:

ERCW Flow Balanced Hydraulic Model – (Files stored include MULTIFLOW network input files and Nodal Diagrams. Network files open with MULTIFLOW, Nodal Drawings open with Spicer-Imagination, and the calculation file in in MS-Word)

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Description: MULTIFLOW FILE

File Name: **TESTA1_for_CCS.net**
Document identifier: 304680
BSL Item ID:
Description: MULTIFLOW FILE

R9

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NGP COMPUTER INPUT FILE STORAGE INFORMATION SHEET

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Subject:

ERCW Flow Balanced Hydraulic Model – (Files stored include MULTIFLOW network input files and Nodal Diagrams. Network files open with MULTIFLOW, Nodal Drawings open with Spicer-Imagination, and the calculation file in in MS-Word)

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Description: MULTIFLOW FILE

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Document identifier: 304683
BSL Item ID:
Description: MULTIFLOW FILE

File Name: **TESTA5.net**
Document identifier: 304684
BSL Item ID:
Description: MULTIFLOW FILE

File Name: **TESTA6_for_CCS.net**
Document identifier: 304685
BSL Item ID:
Description: MULTIFLOW FILE

File Name: **TESTB1.net**
Document identifier: 304686
BSL Item ID:
Description: MULTIFLOW FILE

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NGP COMPUTER INPUT FILE STORAGE INFORMATION SHEET

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Subject:

ERCW Flow Balanced Hydraulic Model – (Files stored include MULTIFLOW network input files and Nodal Diagrams. Network files open with MULTIFLOW, Nodal Drawings open with Spicer-Imagination, and the calculation file in in MS-Word)

☐ Electronic storage of the input files for this calculation is not required. Comments:

☒ Input files for this calculation have been stored electronically and sufficient identifying information is provided below for each input file. (Any retrieved file requires re-verification of its contents before use.)

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File Name: **TESTB3.net**
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Description: MULTIFLOW FILE

File Name: **TESTB4.net**
Document identifier: 304689
BSL Item ID:
Description: MULTIFLOW FILE

File Name: **TESTB5.net**
Document identifier: 304690
BSL Item ID:
Description: MULTIFLOW FILE

File Name: **TESTB5_for_CCS.net**
Document identifier: 304686
BSL Item ID:
Description: MULTIFLOW FILE

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NGP COMPUTER INPUT FILE
STORAGE INFORMATION SHEET

Document MDQ000-067-2000-0095	Rev. 11	Plant: SQN	Page 7 of 7

Subject:

ERCW Flow Balanced Hydraulic Model – (Files stored include MULTIFLOW network input files and Nodal Diagrams. Network files open with MULTIFLOW, Nodal Drawings open with Spicer-Imagination, and the calculation file in in MS-Word)

☐ Electronic storage of the input files for this calculation is not required. Comments:

☒ Input files for this calculation have been stored electronically and sufficient identifying information is provided below for each input file. (Any retrieved file requires re-verification of its contents before use.)

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Document identifier: 304692
BSL Item ID:
Description: MULTIFLOW FILE

File Name: **MDQ00006720000095R14.doc**

Document identifier: 336064
Description: Microsoft Word Calculation File R14

Alternate file storage is in SQN I: drive
I:\MECH-NUC\CALCULATIONS\MDQ SERIES (ALL)\MDQ 000 067 2000 0095 ERCW\Rev 14

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NPG CALCULATION TABLE OF CONTENTS

Calculation Identifier: MDQ000-067-2000-0095 R11

TABLE OF CONTENTS

1.0 PURPOSE

Develop a MULTIFLOW computer model of the Units 1 and 2 Essential Raw Cooling Water (ERCW) System that is flow balanced to plant test data. The model will be flow balanced based on the flow balance test data from 2002 and modified based on additional flow balancing in 2007. Selected other data may be used to support accurate flow modeling. System changes since the 2002 test data were obtained and are also incorporated in this model. The model will be used to determine any flow limiting conditions as a result of the addition of four crosstie headers and an increase river inlet temperature of 87°F. The crosstie headers will be used to supply U1 from U2 and U2 from U1.

2.0 REFERENCES

2.1 TVA Calculation MDQ0067-970004, "ERCW Design Basis MULTIFLOW Hydraulic Model", Revision 11 R13

2.2 0-PI-SFT-067-005.A, "ERCW 'A' Train System Flow Balance Using Hydraulic Modeling" field data package from March, 2002

2.3 0-PI-SFT-067-005.B, "ERCW 'B' Train System Flow Balance Using Hydraulic Modeling" field data package from March, 2002

2.4 DCN D21560 Rev. A

2.5 TVA Vendor Drawing N04-2216-500, contract 820673-2

2.6 TVA Vendor Manual SQN-VTD-D012-0040

2.7 TVA ERCW flow drawings, CCD 47W845-series

2.8 User's Manual for MULTIFLOW R3, Software ID 262467.

2.9 0-SI-OPS-067-682.M, rev 23, ERCW FLOW BALANCE VALVE POSITION VERIFICATION

2.10 0-SI-OPS-067-682.Q, rev 10, ERCW NON-SAFETY RELATED FLOW BALANCE VALVE POSITION VERIFICATION

2.11 Cameron Hydraulic Data, Fourteenth Edition, Forth Printing, 1970 (Information only)

2.12 TVA Mechanical Design Standard DS-M3.5.1, "Pressure Drop Calculations for Raw Water Piping and Fittings" Rev. 5, Rims No. B45 911002 254. (Information only)

2.13 1-SI-SFT-067-739.0 "Lower Containment Vent Coolers Flow Verification Test" field data package from November, 2001

2.14 2-SI-SFT-067-739.0 "Lower Containment Vent Coolers Flow Verification Test" field data package from May, 2002

2.15 0-PI-SFT-067-001.0, "ERCW System Monitoring for Chemical Cleaning"

2.16 0-PI-SFT-067-004.A, "ERCW A-Train System Flush"

2.17 Design Criteria SQN-DC-V-7.4 ERCW system

2.18 0-PI-SFT-067-001.0, "ERCW System Monitoring for Chemical Cleaning", Train B, performance data taken the week of 7/11/05

2.19 0-PI-SFT-067-001.0, "ERCW System Monitoring for Chemical Cleaning", Train A, performance data taken the week of 7/18/05

2.20 0-PI-SFT-067-004.A, "ERCW A-Train System Flush" performance from January, 2005

2.21 0-PI-SFT-067-004.B, "ERCW B-Train System Flush" performance from January, 2005

2.22 WO 05-773940-000, replaced valve 2-67-1506, completed 5/14/06

2.23 WO 05-773944-000 replaced the piping associated with the 1A RHR Pump Room Cooler. This was completed April 27, 2006.

2.24 TVA Calculation MDQ00006720040149, "Determination of ERCW System Flow Capability, Revision 0,

2.25 1-SI-SFT-067-739.0 "Lower Containment Vent Coolers Flow Verification Test" field data package from May, 2006

2.26 DCN D-22196

2.27 DCN D-21894

2.28 DCN D-22183

2.29 PIC P-22204 for DCN D-22183

2.30 PMTI D21996-01, A Train Results

2.31 PMTI D21996-02, B Train Results

2.32 D/G Testing Train A 0-PI-SFT-067-006.0, rev 5, "ERCW Performance Testing"

2.33 D/G Testing Train B 0-PI-SFT-067-006.0, rev 5, "ERCW Performance Testing"

2.34 CCS HX Throttle Valve Positioning A 0-PI-SFT-067-006.0, rev 7, "ERCW Performance Testing" field data package from April, 2009

2.35 1-SI-SFT-067-739.0 "Lower Containment Vent Coolers Flow Verification Test" field data package from April, 2009 R9

2.36 TVA Calculation MDQ00006720020109, "ERCW System Sensitivity Review for 87F", Revision 4

3.0 DESIGN INPUT

3.1 Appendix C lists the flow balance data from flow balance test 0-PI-SFT-067-005.A (Ref 2.2) and 0-PI-SFT-067-005.B (Ref 2.3). The tables in Appendix C list the field data from each test, along with the component name and the associated MULTIFLOW model nodes and links (Ref. 2.1). This data was used for the initial R0 calculation.

3.2 Physical changes performed to the ERCW system and additional data available requires that the model be revised. The modeling changes to incorporate the physical changes and additional data are detailed in Section 7 of this calculation. These changes and additional data are:

- The 'A' Aux Air Compressor throttle valve 1-67-680 has been changed.
- 2A CSS throttle valve Cv has been corrected.
- Revised required throttled position for 2-67-1506 and 2-67-1509, due to WO05-773940-000. These are the 2A CCS HX throttle valves. Details in PMT for WO 05-773940-000, performed 5/14/05.
- Changed throttle position of the following 13 valves 1-67-511B, 1-67-516B, 1-67-510A, 1-67-511A, 1-67-515A, 1-67-516A, 2-67-511A, 2-67-511B, 2-67-515A, 2-67-516A, 2-67-510B, 2-67-515B, 2-67-516B. These throttle valves are associated with the Diesel Generators. Details are in References 2.20 and 2.21, which were performed in January-February 2005.
- The position of 5 valves was changed to Full Open: 1-67-601A, 1-67-766A, 2-67-601A, 2-67-601B, 2-67-764B. These are the CCP room and oil cooler throttle valves. All CCP room and oil cooler valves are now full open. See 0-SI-OPS-067-682.M Rev 23. from 5/19/05
- System piping changes per DCN 21560, reference 2.4. The A-train post modification testing was performed in WO 03-013351-007 on 4/21/06. The B-train post modification testing was performed in WO 03-013351-008 on 4/25/06.
- Updated test data for pipe condition on the Discharge Headers was obtained. Details in 0-PI-SFT-067-001.0, reference 2.18.
- Updated test data for pipe condition on the Supply Headers, including crossties, was obtained. Details in 0-PI-SFT-067-004.A and -.B, references 2.20 and 2.21, which were performed in January-February 2005.
- 1A RHR pump room cooler piping replaced with carbon steel. This work was completed April 27, 2006 under WO 05-773944-000.
- A 6 inch diameter and a 16 inch diameter crosstie piping system has been installed which connects Unit 1 Train A with Unit 2 Train A and Unit 1 Train B with Unit 2 Train B. This change is reflected in the 2007 flow balance testing comparison.
- The pump skids for the CCP bearing oil cooler and gear oil cooler have been modified by removing the gate valve in line with the bearing oil cooler and increasing the line size on the inlet an outlet of the bearing oil cooler.

- The throttled positions of 1-67-551A and 1-FCV-67-146 have been changed. This change was performed under 0-PI-SFT-067-006.0, Rev 7, on 4/10/09 (ref 2.34).

- Throttle valves 1-67-570B and 1-67-567D had their throttled position changed under 1-SI-SFT-067-739.0, performed on 4/21/2009 (ref 2.35). Lower Compartment Cooler piping modeling has been re-examined using plant data from 1-SI-SFT-067-739.0 and 2-SI-SFT-067-739.0 from the five performances prior to June, 2009. R9

- The Cv values of the 'B' Auxiliary Air Compressor throttle valve 2-67-680 were changed by closer examination of the original test data in Ref 2.3 that supported Rev 0 of this calculation.

3.3 Flow values for Lower Compartment Coolers, Control Rod Drive coolers, Reactor Coolant Pump motor coolers, and the 1A and 1B Upper Compartment Coolers are obtained from 1&2-SI-SFT-067-739.0 (reference 2.13, 2.14). The specific data used is from the latest available performance, which is the performance from the Unit 1 Cycle 11 and Unit 2 Cycle 11 refuel outages. This data is recorded in Appendix B. During the Unit 1 Cycle 14 refuel outage the throttle valve positions of the 1D-B Lower Compartment Cooler and the 1-2 RCP Motor Cooler were changed. Accordingly, Appendix B has been updated with the new values.

3.4 Boundary Conditions

The following pressures, temperatures, and elevations were set as boundary conditions for the model. These values may be changed to better reflect the operating mode of the system, plant conditions, or environmental conditions.

Description	Value	Reference
Chickamauga Lake Level	Nominal Average test value was Elevation 676.5	2.2, 2,3
River Water Temperature	Approximately 50F	ICS
Atmospheric Pressure	Atmosphere - 14.4 psia	2.13

4.0 ASSUMPTIONS

4.1 There are no unverified assumptions made for this calculation. Where necessary, conservative assumptions have been made concerning the model. These assumptions have been technically justified where used in the body of the calculation.

5.0 REQUIREMENTS / LIMITING CONDITIONS

SAR Section 9.2.2 "Essential Raw Cooling Water (ERCW)" has been reviewed and this calculation is in compliance. There are no requirements or limiting conditions imposed for this calculation.

6.0 GENERAL INFORMATION

6.1 General

The data used in this analysis was obtained in March, 2002 under plant procedures 0-PI-SFT-067-005.A for train A and 0-PI-SFT-067-005.B for train B (references 2.2, 2.3). Data was obtained with varying system alignments. The analysis in this calculation will determine modeling parameters based on a best-fit of the available data. In general, the model will be developed to match the flow data to a targeted goal of within 2% or one gpm, whichever is greater. Revision 3 of the design basis MULTIFLOW model (Ref. 2.1) models the ERCW system as it was when the flow balance was done. The design basis model will be configured to match the flow paths of the flow balance tests. Primary emphasis has been placed on matching flow rates through the various components and flow paths. Head data has also been compiled for model accuracy and completeness and to facilitate accurate modeling of future system evaluations.
As determining all of the modeling parameters is a highly iterative process the intermediate steps will not be documented. Only the final system configuration that best matches the available data will be presented. Since the train A test and the train B test are run separately with all the station air compressors flow being supplied by the train being tested, and only the Containment Spray Heat Exchangers and Diesel Generators of the train being tested having flow, the system modeling must be balanced in stages similar to the plant configuration that existed during the test procedures. This is because some of the flow from train A equipment (CCS HX's and Diesel Generators coolers) discharges into the train B discharge header and visa versa, which affects the back pressure in the discharge header. So when train B is balanced, the flow into the train A discharge header affects the flow in some of the train A equipment, primarily the large flow users. Each flow balance test contains the six main flow configurations in the table below. The different flow scenarios in references 2.2 and 2.3 were performed in order to have a wide diversity of data in order to obtain a model that would accurately predict system response to any postulated alignment.

Train A:

Ref. 2.2 step	Major alignments	Multiflow file name
6.1[41]	• Flow on all heat exchangers except 2A Containment Spray HX. • All small bore throttle valves open (Ref 2.2). • All strainers in service, in backwash. • Header crossties in service.	TESTA1.net
6.1[46]	• Flow on all heat exchangers except 1A Containment Spray HX. • All small bore throttle valves open (Ref 2.2). • All strainers in service, in backwash. • Header crossties in service.	TESTA2.net
6.1[49]	• Flow on all heat exchangers except 1A Containment Spray HX. • All small bore throttle valves open (Ref 2.2). • Only the A1A-A strainer in service, in backwash. • Header crossties in service.	TESTA3.net
6.1[56]	• Flow on all heat exchangers except 1A Containment Spray HX. • All throttle valves normal. • All strainers in service, in backwash. • Header crossties in service.	TESTA4.net

6.1[65]	• Flow on all heat exchangers except 2A Containment Spray HX. • All throttle valves normal. • All strainers in service, in backwash. • Header crossties in service.	TESTA5.net
6.1[73]	• No flow to the 1A or 2A Containment Spray HX • 1-FCV-67-146 and 2-FCV-67-146 in the 35% position • All throttle valves normal. • Flow on the 'A' Auxiliary Air Compressor. Data taken only for the compressor.	TESTA6.net

Train B:

Ref. 2.3 step	Major alignments	Multiflow file name
6.1[28]	• Flow on all heat exchangers except 2B Containment Spray HX. • All small bore throttle valves open (Ref 2.3). • All strainers in service, in backwash. • Header crossties in service.	TESTB1.net
6.1[33]	• Flow on all heat exchangers except 1B Containment Spray HX. • All small bore throttle valves open (Ref 2.3). • All strainers in service, in backwash. • Header crossties in service.	TESTB2.net
6.1[36]	• Flow on all heat exchangers except 1B Containment Spray HX. • All small bore throttle valves open (Ref 2.3). • Only the A1A-A strainer in service, in backwash. • Header crossties in service.	TESTB3.net
6.1[40]	• Flow on all heat exchangers except 1B Containment Spray HX. • All throttle valves normal. • All strainers in service, in backwash. • Header crossties in service.	TESTB4.net
6.1[49]	• Flow on all heat exchangers except 2B Containment Spray HX. • All throttle valves normal. • All strainers in service, in backwash. • Header crossties in service.	TESTB5.net
6.1[57]	• No flow to the 1B or 2B Containment Spray HX • 0-FCV-67-152 in the 35% position • All throttle valves normal. • Flow on the 'B' Auxiliary Air Compressor. Data taken only for the compressor.	TESTB6.net

See Appendix C for the test data used. Refer to Appendix D for the Multiflow calculated values, as well as a tabulation of the difference between the Multiflow calculated values and the actual test data.

6.2 Multiflow version 1.21 is the computer software program which will be used to perform this calculation. Revision 3 of the base model calculation (Ref. 2.1) converted the EZFLOW model to MULTIFLOW and is the current issued revision. The base model calculation provides the system layout as well as the flow rate requirements and associated pressure drop for the system equipment modeled. Node diagrams which show the MULTIFLOW model node points are contained in the base model calculation. Node drawings have been revised by this calculation to facilitate comparison of test data/Multiflow analysis results and are included in Appendix E.

6.3 Only flow values for the Lower Containment Cooler "Group" are recorded in References 2.2 and 2.3, due to plant conditions at the time of test. Therefore, flow values to the individual components (Lower Compartment Coolers, Control Rod Drive coolers, Reactor Coolant Pump motor coolers, and the 1A and 1B Upper Compartment Coolers), are determined by performing a ratio using data from 1&2-SI-SFT-067-739.0, reference 2.13 and 2.14. The values obtained from this analysis are recorded in Appendix B. In order for Appendix C to have complete data, the values for the individual components recorded in Appendix B are recorded in the applicable places in Appendix C.

6.4 No data was taken for the incore instrument room coolers. For the model, flow will be assumed to be zero through the incore instrument room coolers with the throttling valve full open. Whether there was flow or not is of little consequence since the flow to the coolers is small and the effect on the flow to the other components is inconsequential.

6.5 The pump tests performed in references 2.2 and 2.3 did not include a data point at pump shutoff head. In order to eliminate spurious Multiflow errors for the pumps that are shutoff in the model a pump performance point was inserted for each pump of 0 gpm and 372 feet developed head. In order to determine the effect of this added pump performance point this change was made in file "TESTA1.net" and compared to the results of the same file without the change. The results of this change are that essentially zero change in pump performance are seen in the actual range of model data. The only change was in the first decimal point of a flow value exceeding 10,000 gpm. The pump head pressure changed in the third decimal point.

6.6 During the testing performed in references 2.2 for the A-train, only one B-train ERCW pump was running. The flow predicted by the models for the Train A tests are higher than the highest of the pump test data points for that pump. Consequently, Multiflow indicates an off-curve error for that point. In order to eliminate this error message, an assumed data point of 12,600 gpm and 143 feet developed head was inserted for the P-B ERCW pump in the files for the Train A tests. These are the Multiflow files named TESTA1.net, TESTA2.net, etc. This data point was chosen by visual examination of the P-B ERCW pump curve as a reasonable point that would resolve the Multiflow errors. The flow existing on Train B during these tests is of little consequence, therefore there is no effect on model results for the Train A being analyzed in these files.

6.7 Various of the field data pressure points are taken at locations hydraulically close to existing tees. In the Multiflow modeling the pressures for these points is taken from the pressure at the tees. Various of tees experience flow velocities such that there is up to five feet of head difference on the three different links associated with each tee. For all of these locations the highest of the available pressure values from the model was the valued used for comparison to the field data. Generally, the test point was upstream of the tee, therefore the upstream location is the correct one. Also, the magnitude in the difference in the head pressures is not large enough to be significant for correct modeling. The potential errors in the field data are larger than the magnitude of these pressure differences.

6.8 There are three locations on the ERCW discharge headers where the Raw Cooling Water system discharges into ERCW through a 2" or a 1-1/2" pipe. The RCW flow varies at these locations but is always small. The tests (references 2.2 and 2.3) did not measure flow at these locations. The RCW inputs were fixed at zero in the Multiflow model. Any flow that might be present would have negligible effect on the Multiflow model results.

6.9 For all modeling in this calculation the Hazen-Williams C factor of 70 and a Diameter Reduction of 0.1 inches was used as the default material properties for carbon steel piping. The "design" values of H-W=55, DR=0.4" are required for original design work; however this calculation models the ERCW system in the "existing" condition. By performing multiple sensitivity runs, the values of 70 and 0.1" were selected as best approximations yielding consistent results to the test data. Many individual links had their properties set manually in order to match the test data.

6.10 The 1B pipe chase cooler model data did not match the test data between the first three test to the next two tests. In order to make the model match the test data the demister was changed from 32 to 23 to match last two data runs. The final model will reflect the demister value of 23, as that is the value used when the throttle valves are throttled. No satisfactory explanation was discovered for the model-test data discrepancy.

6.11 The following data points are considered erroneous for the reasons discussed. The preparer of Revision 0 of this calculation was also the Test Engineer in the test performances of References 2.2 and 2.3. The discussion below is from the test engineer and calculation preparer.

Pressure at nodes 1B920 and 2A920 is presumed to be erroneous. The reason for the incorrect test data is that there was difficulty in removing all of the air from the tubing to the pressure gauge. The readings were noted by the test personnel at the time to be less than expected. When the pressures at these nodes are compared to pressures obtained from other nodes that would also be reflective of the discharge header pressure, such as 1A161AA, 1A162AA, 2A261AA, 2A262AA, 1B161AA, 1B162AA, 2B262AA, 2B261AA, 1A155G, and 2B237D the discrepancy is apparent. Also, it is obvious that the head pressures recorded in the test procedure were low when it is noted that the discharge headers terminal node is at elevation 716.5.

'A' EGTS flow data in Test 1 was not taken due to oversight. Therefore, there is no test data to compare model data to for this test only, although flow was present.

There is a very high degree of variability in the test data for all of the ERCW strainer flow data. The reason for this is the close proximity of the test annubar to the strainer outlet throttled valve. This valve, which also operates under cavitation conditions, is approximately three feet from the annubar used to obtain test flow. The 1A strainer, particularly in Test 1, has obviously inconsistent data. The data point for the 1A strainer in Test 1 will not be used for comparison purposes.

The test data from step 6.1[56] for the 2A Containment Spray Heat Exchange is considered erroneous. In comparing data from step 56 to steps 46 and 49 there is an obvious discrepancy is the test flow values. In examining all of the test data, all of the various modeling results, and other test data from 0-PI-SFT-067-001.0, it is clear that the step 56 data point for the 2A Containment Spray HX is an anomaly. Therefore, no attempt was made to model the valve Cv's or other system parameters to match this data point and this data point will not figure into the averages in the Appendix D tabulation.

The original test data for the J-A ERCW pump contains a data anomaly. The test point of 217 feet head, 9549 gpm flow is obviously inconsistent when compared to adjoining data points. Therefore, this test point will be edited out of the pump curve used for modeling. The modeling results when this editing is performed are consistent with other test data. Original data, updated data, and resulting pump curves are given below.

Original pump test data:

FLOW (gpm)	PUMP dP (psid)	Pump Head (feet)
6724	120	276
8246	109	252
8569	107	248
8886	105	242
9466	97	224
9549	94	217
11021	82	189
11298	74	172
11924	67	155
12406	62	144

Pump data used for modeling

FLOW (gpm)	PUMP dP (psid)	Pump Head (feet)
6724	120	276
8246	109	252
8569	107	248
8886	105	242
9466	97	224
11021	82	189
11298	74	172
11924	67	155
12406	62	144

7.0 COMPUTATIONS AND ANALYSIS

7.1 Perform modeling changes as listed in Appendix A. Save the resulting model as "2002_Flow_Balance_Model.net". The model developed will then be further modified as described in the separate sections below. The sections below each describe the plant configuration existing during the procedural step that is given.

ERCW TRAIN A

7.2 Reference 2.2, step 6.1[41]
The file "2002_Flow_Balance_Model.net" will be modified and saved as TESTA1.net to reflect the below listing of configuration changes.

Under menu "Edit / Material Default Properties" change the Hazen-Williams C factor to 70, and change the Diameter Reduction to 0.1 inches.

Due to plant conditions at the time the test was run, the following components had no flow, and therefore will have a fixed flow=0 added into the listed links:

Component	Link
J-A ERCW pump	1A104-1A105
K-A ERCW pump	1A103-1A105
L-B ERCW pump	1B104-1B105
M-B ERCW pump	1B103-1B105
N-B ERCW pump	2B203-2B205
'A' Main Control Room Chiller	1A580C-1A580D
'A' Aux Air Compressor	1A374D-1A374E
2A Containment Spray Heat Exchanger	2A226-2A250
B-train to Station Air Compressors	1B130-1B135
1B Containment Spray Heat Exchanger	1B121A-1B150
2B Containment Spray Heat Exchanger	2B226-2B250
B-train Diesel Generators	1B190A-1B190
1C Upper Compartment Cooler	1A125-1A119
1D Upper Compartment Cooler	1B125-1B119B
2B Upper Compartment Cooler	2B266C-2B225
2C Upper Compartment Cooler	2A267C-2A225

All of the normally throttled small bore throttle valves listed below were fully opened in this test, therefore all will remain set to "default" equivalent length at this time. Refer to Appendix F of reference 2.2, 2.3.

EQUIPMENT	VALVE NUMBER	LINK
Station Air Comp C (Full open Cv=28)	0-67-1212	1A135H-1A135I
Station Air Comp D (Full open Cv=28)	0-67-1112	1B135J-1B135K
SFP & TBBP CLR 1A	0-67-646A	1A646D-1A646E
714 PEN RM CLR 1A	1-67-610A	1A565A2-1A610A
714 PEN RM CLR 2A	2-67-610A	2A301E2-2A610A
690 PEN RM CLR 1A	1-67-609A	1A560-1A609A
690 PEN RM CLR 2A	2-67-609A	2A609B-2A301G
CCP OIL CLR 1A	1-67-766A	1A515C-1A601
CCP RM CLR 1A	1-67-601A	1A602>1A602A
CCP RM CLR 2A	2-67-601A	2A169B-2A169D
669 PEN RM CLR 1A	1-67-608A	1A556-1A557
669 PEN RM CLR 2A	2-67-608A	2A347A-2A347B
PIPE CHASE CLR 1A	1-67-611A	1A570A1-1A570A3
PIPE CHASE CLR 2A	2-67-611A	2A301F1-2A302C
CNT SPR PMP RM CLR 1A	1-67-605A	1A185A>1A321
CNT SPR PMP RM CLR 2A	2-67-605A	2A605A>2A351
RHR PMP RM CLR 2A	2-67-606A	2A606B>2A351

This paragraph is provided for information only, as no model changes are required. The following listing of valves remained in their normally throttled position during all of the flow testing, steps 6.1[41] through 6.1[73] of reference 2.2. See references 2.9 and 2.10 for the positions. The Cv values for these valves are in Appendix A.

COMPONENT	LINK	Valve Number
D/G 1A1	1A1A1>1FE6769	1-67-510A
D/G 1A2	1A1A2>1FE67277	1-67-515A
1A-A D/G	1A195>1A196A	1-67-516B
1A-A D/G	1A195>1B297C	1-67-511A
D/G 2A1	2A2A1>2FE6769	2-67-510A
D/G 2A2	2A2A2>2FE67277	2-67-515A
2A-A D/G	2A295>1A196	2-67-516B
2A-A D/G	2A295>1B297	2-67-511A
CCS HX 1A1/1A2	1A910>1A915	1-67-1509
CCS HX 1A1/1A2	1A905>1A915	1-67-1506
CCS HX 1A1/1A2	1A915>1B920	1-67-551A
CCS HX 1A1/1A2	1A915>1B920	1-FCV-67-146
CCS HX 2A1/2A2	2A907>2A910	2-67-1506
CCS HX 2A1/2A2	2A906>2A910	2-67-1509
CCS HX 2A1/2A2	2A910>2A920	2-67-551
CCS HX 2A1/2A2	2A910>2A920	2-FCV-67-146
CSS HX 1A	1A150>1A152	1-67-537A
CSS HX 2A	2A250>2A152	2-67-537A
UCVC 1A	1A124A-1A124B	1-67-666A
1A CRD	1A112A-1A122B	1-67-567A
1C CRD	1A111A-1A171	1-67-567C
2A CRD	2A212A-2A270	2-67-567A
U-2 #1 RCP	2A216-2A270B	2-67-572A
2C CRD	2A211A-2A271	2-67-567C
U-2 #3 RCP	2A215-2A271B	2-67-572C
CNT SPR PMP RM CLR 1A	1A185A>1A321	1-67-605A
CNT SPR PMP RM CLR 2A	2A605A>2A351	2-67-605A
RHR PMP RM CLR 2A	2A606B>2A351	2-67-606A
1A-A STRAINER BACKWASH	1A106B-1A106C	1-67-1070
2A-A STRAINER BACKWASH	2A206B-2A206C	2-67-1070

The A SDBR chiller was running during this test, flow was measured to be 37.6 gpm. Accordingly, added fixed flow at A SDBR, link 1A155B-1A155E of 37.6

Flow was present in the 1A Containment Spray Heat Exchanger, therefore ensure there is no fixed flow in link 1A121A-1A150

The 1A and 2A ERCW strainers were in continuous, throttled backwash, therefore remove fixed flow in links 1A106B-1A106C and 2A206B-2A206C.

Flow was present in the 1A and 2A Diesel Generators, therefore ensure no fixed flow in link 1A190B-1A190.

Flow was shut off in the 1B and 2B Diesel Generators, therefore ensure fixed flow =0 in link 1B190A-1B190.

The Q-A, R-A, and P-B pumps were running during the test, therefore ensure no fixed flows in links 2A203-2A205, 2A204-2A205, 2B204-2B205

The Train B feed to the Control Air Compressors was isolated, therefore set flow=0 in link 1B130-1B135 and ensure no fixed flow in link 1A130-1A130AA.

Save as "TESTA1.net" to reflect the changes made.

7.3 Reference 2.2, step 6.1[46]

The file "TESTA1.net" will be modified to reflect the below listing of configuration changes.
Place fixed flow=0 in link 1A121A-1A150 to isolate Unit 1 CSS flow , and place flow on Unit 2 CSS HX by removing fixed flow=0 in link 2A226-2A250. Change fixed flow at A SDBR chiller, link 1A155B-1A155E to 54.6. Save as "TESTA2.net" to reflect the changes made.

7.4 Reference 2.2, step 6.1[49]

The file "TESTA2.net" will be modified to reflect the below listing of configuration changes.
Isolate the 2A ERCW strainer by setting flow to zero at link 2A205C-2A206 and isolate the 2A strainer backwash by setting flow to zero on link 2A206B-2A206C. During the testing the Q-A ERCW pump was stopped and the J-A ERCW pump was started, accordingly flow will be set to zero on link 2A203-2A205 and zero flow will be removed on link 1A104-1A105. Changed fixed flow at A SDBR chiller, link 1A155B-1A155E to 41.5. Save as "TESTA3.net" to reflect the changes made.

7.5 Reference 2.2, step 6.1[56]
The file "TESTA2.net" will be modified to reflect the below listing of configuration changes.
Added Cv for the valves that are normally throttled as shown in Appendix A, step A.7and table of valves fully opened in section 7.2. Showed the A SDBR chiller as full open by removing fixed flow in link1A155B-1A155E. Test conditions had the 1A CCS/AFW pump space cooler isolated, therefore showed zero flow in link 1A510D-1A510E. During the testing the Q-A ERCW pump was stopped and the J-A ERCW pump was started, accordingly flow will be set to zero on link 2A203-2A205 and zero flow will be removed on link 1A104-1A105. Save as "TESTA4.net" to reflect the changes made.

7.6 Reference 2.2, step 6.1[65]
The file "TESTA4.net" will be modified to reflect the below listing of configuration changes.
Shut off 2A CSS, opened up 1A CSS by placing fixed flow=0 in link 2A226-2A250 and removing fixed flow in link 1A121A-1A150. The dP was noted to change at the 1A Containment Spray Heat Exchanger due to a suspected influx of clam shells, therefore to model this component added fake flow resistance to 1A CSS of 5 psid @ 3800 gpm called "Fouling on 1A CSS HX" in link 1A121A-1A150. Removed fixed flow of zero on MCR chiller from link 1A580C-1A580D, removed fixed flow of zero on 1A CCS space cooler from link 1A510D-1A510E. Save as "TESTA5.net" to reflect the changes made.

7.7 Reference 2.2, step 6.1[73]
The file "TESTA5.net" will be modified to reflect the below listing of configuration changes.
Removed fixed flow from Aux Control Air Compressor 'A', link 1A374D-1A374E.
Stopped flow to the 1A CSS HX, therefore insert fixed flow=0 in link 1A121A-1A150.
Placed 1-FCV-67-146 and 2-FCV-67-146 in 35% position, therefore in link 2A910-2A920 make the second valve Cv be 235, and in link 1A915-1B920 make the second valve Cv = 550. Save as "TESTA6.net" to reflect the changes made.

ERCW TRAIN B

7.8 Reference 2.3, step 6.1[28]
The file "2002_Flow_Balance_Model.net" will be modified and saved as TESTB1.net to reflect the below listing of configuration changes.

All of the normally throttled small bore throttle valves listed below were fully opened in the first three tests, therefore all will remain set to "default" equivalent length at this time.

Due to plant conditions at the time the test was run, the following components had no flow, and therefore will have a fixed flow=0 added into the listed links:

Component	Link
J-A ERCW pump	1A104-1A105
K-A ERCW pump	1A103-1A105
M-B ERCW pump	1B103-1B105
N-B ERCW pump	2B203-2B205
'B' Main Control Room Chiller	1B680C-1B680D
'B' Aux Air Compressor	2B680A-2B680A2
2B Containment Spray Heat Exchanger	2B226-2B250
A-train to Station Air Compressors	1A130-1A130AA
1A Containment Spray Heat Exchanger	1A121A-1A150
2A Containment Spray Heat Exchanger	2A226-2A250
A-train Diesel Generators	1A190B-1A190
1D Upper Compartment Cooler	1B125-1B119B
2B Upper Compartment Cooler	2B266C-2B225
1-FCV-67-146 Full Open	1A915-1B920
2-FCV-67-146 Full Open	2A910-2A920
1C PD charging pump	1B128E-1B172

The 'B' Shutdown Board Chiller was in service for tests 1-4, therefore the flow will be fixed to the value actually experienced in each step of the test in link 2B237A-2B237C. For this test the flow was not measured. Due to similarity of conditions to the later tests the flow for modeling purposes was assumed to be 50 gpm. Therefore, inserted a fixed flow of 50 gpm in link 2B237A-2B237C.

All of the normally throttled small bore throttle valves listed below were fully opened in this test, therefore all will remain set to "default" equivalent length at this time.

EQUIPMENT	VALVE NUMBER	LINK
EGTS Room Cooler 2B-B	0-67-685B	2B685B-2B227C
Auxiliary Control Air Compressor B-B	2-67-680	2B227A>2B680
714 Penetration Rm 1B-B	1-67-610B	1B665A2-1B610B
714 Penetration Rm 2B-B	2-67-610B	2B301C2-2B610B
CCS/AFW Pump Space Cooler 1B-B	0-67-643B	1B603E>1B133A
690 Penetration Rm 1B-B	1-67-609B	1B660B4-1B311B
690 Penetration Rm 2B-B	2-67-609B	2B609A-2B301E
BAT/AFW Pmp Space Clr 2B-B	0-67-673B	2B234A2-2B234
CCP 2B-B Oil Clr	2-67-764B	2B229D-2B229E
CCP 2B-B Room Clr	2-67-601B	2B171B>2B171D
669 Pen Room Clr 1B-B	1-67-608B	1B656-1B657
669 Pen Room Clr 2B-B	2-67-608B	2B349A-2B608A
Pipe Chase Clr 1B-B	1-67-611B	1B670A1-1B671
Pipe Chase Clr 2B-B	2-67-611B	2B301D1-2B302B
Containment Spray Pump 1B-B Room Clr	1-67-605B	1B187A>1B321
Containment Spray Pump 2B-B Room Clr	2-67-605B	2B187A>2B351
RHR Pump Rm Clr 2B-B	2-67-606B	2B606A>2B351
B-B Shutdown Board Room Chiller	0-67-555B	2B237D-2B245A
Station Air Comp C (Full open Cv=28)	0-67-1212	1A135H-1A135I
Station Air Comp C (Full open Cv=28)	0-67-1112	1B135J-1B135K

This paragraph is provided for information only, as no model changes are required. The following listing of valves remained in their normally throttled position during all of the flow testing, steps 6.1[28] through 6.1[57] of reference 2.3. See references 2.9 and 2.10 for the actual valve positions. The Cv values for these valves are in Appendix A.

COMPONENT	LINK	Valve Number
D/G 1B1	1B1B1>1FE6774	1-67-510B
D/G 1B2	1B1B2>1FE67280	1-67-515B
1B-B D/G	1B195>1B196	1-67-511A
1B-B D/G	1B195>1B297A	1-67-516B
D/G 2B1	2B2B1>2FE6774	2-67-510B
D/G 2B2	2B2B2>2FE67280	2-67-515B
2B-B D/G	2B295>1B196A	2-67-511A
2B-B D/G	2B295>1B297B	2-67-516B
CCS HX 0B1	2B915>2B920	0-67-1506
CCS HX 0B2	2B910>2B920	0-67-1509
CCS HX 0B1/0B2	2B925>1B920	0-67-553
CCS HX 0B1/0B2	2B925>1B920	0-FCV-67-152
0B1/0B2 to "A" discharge	2B925>2A920	0-67-552
0B1/0B2 to "A" discharge	2B925>2A920	0-FCV-67-151
CSS HX 1B	1B150>1B152	1-67-537B
CSS HX 2B	2B250>2B152	2-67-537B
AUX CONT AIR B	2B227A>2B680	2-67-680
UCVC 1B	1B123A-1B123B	1-67-666B
1B CRD	1B111A-1B122E	1-67-567B
1D-B LCC	1B112>1B112C	1-67-564D
1D CRD	1B112A-1B170	1-67-567D
U-1 #4 RCP	1B116-1B170B	1-67-572D
2B CRD	2B211A>2B271	2-67-567B
2D-B LCC	2B212>2B212C	2-67-564D
2D CRD	2B212A>2B270	2-67-567D
U-2 #4 RCP	2B216-2B270B	2-67-572D
1B-B STRAINER BACKWASH	1B106B-1B106C	1-67-1073
2B-B STRAINER BACKWASH	2B206B-2B206C	2-67-1073

Flow was present in the 1B Containment Spray Heat Exchanger, therefore ensure there is no fixed flow in link 1B121A-1B150

The 1B and 2B ERCW strainers were in continuous, throttled backwash, therefore remove fixed flow in links 1B106B-1B106C and 2B206B-2B206C.

Flow was present in the 1B and 2B Diesel Generators, therefore ensure no fixed flow in link 1B190A-1B190.

The Q-A, R-A, L-B, and P-B pumps were running during the test, therefore ensure no fixed flows in links 2A203-2A205, 2A204-2A205, 1B104-1B105, 2B204-2B205

The model as set up by Appendix A used a Cv for the 1B CSS HX of 645. During testing in Reference 2.3, step 6.1[49] the throttle vlv for the 1B CSS HX was adjusted, therefore changed the Cv from 488 to 645 in link 1B150-1B152. During this test the proper Cv is 488

Save as "TESTB1.net" to reflect the changes made.

7.9 Reference 2.3, step 6.1[33]
The file "TESTB1.net" will be modified to reflect the below listing of configuration changes.
Isolate Unit 1 CSS flow in link 1B121A-1B150, and place flow on the 2B CSS HX in link 2B226-2B250. Changed fixed flow at B SDBR, link 2B237A-2B237C to 50.1. Save as "TESTB2.net" to reflect the changes made.

7.10 Reference 2.3, step 6.1[36]
The file "TESTB2.net" will be modified to reflect the below listing of configuration changes.
Isolate the 2B ERCW strainer by setting flow to zero at link 2B205C-2B206 and isolate the 2B strainer backwash by setting flow to zero on link 2B206B-2B206C. Changed fixed flow at B SDBR, link 2B237A-2B237C to 46.9. Save as "TESTB3.net" to reflect the changes made.

7.11 Reference 2.3, step 6.1[40]
The file "TESTB2.net" will be modified to reflect the below listing of configuration changes.
Added Cv for the valves that are normally throttled. Changed fixed flow at B SDBR, link 2B237A-2B237C to 46.9. Test conditions had the D SAC isolated, therefore showed zero flow in link 1B135P-1B135R. Save as "TESTB4.net" to reflect the changes made.

7.12 Reference 2.3, step 6.1[49]
The file "TESTB4.net" will be modified to reflect the below listing of configuration changes.
Shut off 2B CSS by adding fixed flow=0 in link 2B226-2B250, opened up 1B CSS by removing fixed flow in link 1B121A-1B150. During testing the throttle vlv for the 1B CSS HX was adjusted, therefore changed the Cv from 488 to 645 in link 1B150-1B152. Removed fixed flow of zero on MCR chiller from link 1B680C-1B680D. During the testing the L-B ERCW pump was stopped and the N-B ERCW pump was started, accordingly flow will be set to zero on link 1B104-1B105 and the fixed flow will be removed on link 2B203-2B205. Test conditions had the D SAC isolated, therefore showed zero flow in link 1B135P-1B135R. The B SDBR was failed open, therefore the fixed flow will be removed in link 2B237A-2B237C. Save as "TESTB5.net" to reflect the changes made.

7.13 Reference 2.3, step 6.1[57]
The file "TESTB5.net" will be modified to reflect the below listing of configuration changes.
Removed fixed flow from Aux Control Air Compressor 'B', link 2B680A-2B680A2. Stopped flow to the 1B CSS HX, therefore insert fixed flow=0 in link 1B121A-1B150. Placed 0-FCV-67-152 in 35% position, therefore in link 2B925-1B920 make the second valve Cv be 1600. Save as "TESTB6.net" to reflect the changes made.

7.14 The results from all of the model runs in sections 7.2 through 7.13 are tabulated in Appendix D.

7.15 At the Component Cooling Heat Exchangers there are multiple throttle valves. 1-FCV-67-146, 2-FCV-67-146, 0-FCV-67-152, and 0-FCV-67-151 are multi-position motor operated valves. Test data was taken with 1-FCV-67-146, 2-FCV-67-146, 0-FCV-67-152, and 0-FCV-67-151 in their 35%, 50%, and 100% positions. The Cv of these valves in their various positions, as well as manual throttle valve 0-67-552, will be determined in this section by best fit of the available data. The resulting Cv values are reflected in the appropriate table of Appendix A. The field data for 1-FCV-67-146, 2-FCV-67-146, and 0-FCV-67-152 was taken in procedure steps 6.1[7], 6.1[11], and 6.1[15] of reference 2.2. The field data for 0-FCV-67-151 and 0-67-552 was taken in procedure steps 6.1[64], 6.1[66], and 6.1[68] of reference 2.3. The field data and the model results are tabulated in the tables below.

7.15. A Computation for 1-FCV-67-146, 2-FCV-67-146, and 0-FCV-67-152

File "TESTA1" will be used due to ease of file modification.
File 'TESTA1" will be modified by inserting fixed flow =0 for the following links:

Component	Link
1A ERCW strainer backwash	1A106B-1A106C
2A ERCW strainer backwash	2A206B-2A206C
1B ERCW strainer backwash	1B106B-1B106C
2B ERCW strainer backwash	2B206B-2B206C
1A Containment Spray Heat Exchanger	1A121A-1A150
2A Containment Spray Heat Exchanger	2A226-2A250
1B Containment Spray Heat Exchanger	1B121A-1B150
2B Containment Spray Heat Exchanger	2B226-2B250
A-train Diesel Generators	1A190B-1A190
B-train Diesel Generators	1B190A-1B190

To simplify the determination of the CCS HX throttle valve Cv's and to better match test data, a fixed flow of 0 was inserted in links 2A210-2A210B (2A, 2C Lower Containment Cooler group), 2B210-2B210B (2B, 2DC Lower Containment Cooler group), and 2B226B-2B227 (Unit 2 train B ESF header). Link 1B118-1B118A (1B, 1D Lower Containment Cooler group) was given a fixed flow of 200 gpm, in order to have the flow and pressure more easily match the limited test data taken. The reason for the above changes is that the system alignment at the time the test data was taken had all of the equipment Temperature Control Valves (TCVs) in automatic, which resulted in sharp reductions in flow as compared to the how the model would otherwise have all of the TCVs full open.

The Cv factors of 1-FCV-67-146, 2-FCV-67-146, and 0-FCV-67-152 will then be varied to match the test data obtained in the referenced steps from Reference 2.2.
File will be saved as "TEST1A_for_CCS.net"

RESULTS:

1A1/1A2 CCS HX

		Step from Reference 2.2:					
		6.1[7]	Model Results	6.1[11]	Model Results	6.1[15]	Model Results
Flow	1B235-1A900	4199.3	4144.0	4900.2	4895.9	5051.2	5045
HEAD	1A902	964.6	950.8	904.5	894.5	878.0	867.2
HEAD	1A905	953.0	942.4	886.1	882.7	860.7	854.8
HEAD	1A910	954.2	942.9	888.4	883.5	861.2	855.6
HEAD	1A915	924.2	913.4	846.2	842.3	817.9	811.8
HEAD	1B920	708.2	725.4	726.7	727.0	728.4	727.6
Position of 1-FCV-67-146		35%		50%		100%	
Resultant Cv in link 1A915-1B920		550		1240		Default	

2A1/2A2 CCS HX

		Step from Reference 2.2:					
		6.1[7]	Model Results	6.1[11]	Model Results	6.1[15]	Model Results
Flow	2A235-2A900	2262.9	2295.9	5697.9	5654.4	7023.7	7180
HEAD	2A904	966.9	954.3	904.0	897.3	879.1	868.8
HEAD	2A907	964.6	952.0	884.9	883.7	850.8	846.9
HEAD	2A906	963.4	951.5	880.3	880.3	843.9	841.4
HEAD	2A910	955.3	942.8	831.2	827.9	754.4	757
HEAD	2A920	707.1	719.2	704.8	722.8	711.7	724.8
Position of 2-FCV-67-146		35%		50%		100%	
Resultant Cv in link 2A910-2A920		235		930		Default	

0B1/0B2 CCS HX, Flow thru 0-FCV-67-152

		Step from Reference 2.2:					
		6.1[7]	Model Results	6.1[11]	Model Results	6.1[15]	Model Results
Flow	2B236-2B900	6945.5	6905.0	7445.8	7351.0	7589.5	7548
HEAD	2B908	898.8	898.5	887.2	888.4	883.7	883.3
HEAD	2B915	882.6	885.9	869.3	874.1	865.3	868.2
HEAD	2B910	879.1	881.9	864.7	869.6	860.7	863.4
HEAD	2B920	793.7	796.9	766.0	773.3	751.5	761.9
Position of 0-FCV-67-152		35%		50%		100%	
Resultant Cv in link 2B925-1B920		1600		3000		Default	

7.15. B Computation for 0-FCV-67-151 and 0-67-552

File "TESTB5" will be used due to ease of file modification.
File 'TESTB5" will be modified by inserting fixed flow =0 for the following links:

Component	Link
1B Containment Spray Heat Exchanger	1B121A-1B150
A-train Diesel Generators	1A190B-1A190
B-train Diesel Generators	1B190A-1B190
1A ERCW strainer backwash	1A106B-1A106C
2A ERCW strainer backwash	2A206B-2A206C
1B ERCW strainer backwash	1B106B-1B106C
2B ERCW strainer backwash	2B206B-2B206C

Additionally, valve 1-FCV-67-146 and 2-FCV-67-146 were in their 50% positions, accordingly edit link 1A915-1B920 to show the second valve as having a Cv of 1240 and edit link 2A910-2A920 to show the second valve having a Cv of 930.

Insert fixed flow of zero for link 2B925-1B920 and delete fixed flow for 2B925-2A920 to reflect plant conditions for the data taking.

The Cv factors of 0-FCV-67-151 and 0-67-552 will then be varied to match the test data obtained in the referenced steps from Reference 2.3. The resulting Cv values are reflected in the appropriate table of Appendix A.
File will be saved as "TESTB5_for_CCS.net".

RESULTS:

0B1/0B2 CCS HX, Flow thru 0-FCV-67-151

		Step from Reference 2.3:					
		6.1[64]	Model Results	6.1[66]	Model Results	6.1[68]	Model Results
Flow	2B236-2B900	7730.5	7796.1	6841.1	6823.3	5817.2	5856.5
HEAD	2B908	914.9	912.5	928.0	928.3	941.5	943.1
HEAD	2B915	895.3	896.4	912.6	916	931.1	934
HEAD	2B910	890.7	891.3	908.0	912.1	927.6	931.1
HEAD	2B920	783.3	783	829.5	829.1	868.7	870
HEAD	2A920	728.3	739.1	728.1	736.9	728.8	734.7
Position of 0-FCV-67-151		100%		50%		35%	
Resultant Cv in link 2B925-2A920 for 0-FCV-67-151		Default		1355		848	
Resultant Cv in link 2B925-2A920 for 0-67-552		1950		1950		1950	

7.16 CHANGES TO THE ERCW SYSTEM SINCE REVISION 0 OF THIS CALCULATION

The following list comprises the physical changes performed on the ERCW system affecting the Multiflow calculation since Rev 0 of this calculation was issued. Also included are instances where data was obtained relative to piping or component conditions that are useful to accurate modeling. The sub-paragraphs of this paragraph contain additional details. For instance, #4 below is discussed in greater depth in corresponding paragraph 7.16.4. The model results presented in this section are performed using the Multiflow file "ERCW_FLOW_BALANCED_MODEL_R3.net" as prepared by Appendix H of this calculation. Other model files were used to determine the necessary changes to go into Appendix H. The other model files were not retained. Only the final results using "ERCW_FLOW_BALANCED_MODEL_R3.net" are given. Appendix F contains the alignment for all components in the ERCW trains for the items specified below.

1 Test data has been obtained at high flow rates in the Component Cooling Heat Exchangers. This data will more accurately describe the flow and pressure loss in the Component Cooling Heat Exchangers. Details in References 2.20 and 2.21. Testing was performed in January, 2005.

2 Correct error for the Cv value of the 2A Containment Spray Heat Exchanger throttle valve 2-67-537A in link 2A250-2A152.

3 Updated test data has been obtained that will allow for the pipe condition on the Discharge Headers to be more accurately determined. Details in Reference 2.18. See Appendix F for the exact system alignments.

4 Updated test data has been obtained that will allow for the pipe condition on the A-train Supply Headers to be more accurately determined. Details in Reference 2.20. Testing was performed in January, 2005. See Appendix F for the exact system alignments.

5 Updated test data has been obtained that will allow for the pipe condition on the B-train Supply Headers to be more accurately determined. Details in Reference 2.21. Testing was performed in January, 2005. See Appendix F for the exact system alignments.

6 The throttled position of the throttle valves 1-67-511B, 1-67-516B, 1-67-510A, 1-67-511A, 1-67-515A, 1-67-516A, 2-67-511A, 2-67-511B, 2-67-515A, 2-67-516A, 2-67-510B, 2-67-515B, 2-67-516B has been changed. These valves are associated with the Diesel Generators. Data was obtained to determine the Cv values of these valves, and also more accurately determine the condition of the piping associated with the Diesel Generators. Details in References 2.20 and 2.21. Testing was performed in January, 2005. See Appendix F for the exact system alignments.

7 Valves 2-67-1506 and 2-67-1509 had their throttled positions changed during the PMT for WO05-773940-000. These are the 2A CCS HX throttle valves. Details in PMT for Reference 2.22. Testing was performed on 5/14/05. See Appendix F for the exact system alignments.

8 The position of 5 valves were changed to Full Open: 1-67-601A, 1-67-766A, 2-67-601A, 2-67-601B, 2-67-764B. These are the CCP room and oil cooler throttle valves. All CCP room and oil cooler valves are now full open. See Reference 2.9, changes made 5/19/05.

9 DCN 21560 (Reference 2.4) changed the piping on the return from the Main Control Room and Electrical Board Room chillers. Data was obtained during the PMT for this DCN that enables a more accurate determine of the piping condition and specific pressure drops of the piping and components associated with the Control Room Chillers and Electrical Board Room Chillers. A-train was tested under WO 03-013351-007 on 4/21/06. B-train was tested under WO 03-013351-008 on 4/25/06. See Appendix F for the exact system alignments.

10 The piping associated with the 1A RHR pump room cooler was replaced with new carbon steel piping. The model will be revised to indicate that the new piping has a C factor of 100. The piping will soon corrode to have an actual C of less than 100, but the value of 100 will be used to ensure that the components surrounding the 1A RHR pump room cooler are not starved of flow. Work was completed April 27, 2006 under WO 05-773944-000, reference 2.23.

11 Change the throttled position of 1-67-680, the throttle valve for the A Auxiliary Air Compressor.

12. Changed the throttled positions of 1-67-570B, the Unit 1 RCP#2 throttle valve, and also changed the throttled position of 1-67-564D, the throttle valve for the 1D Lower Compartment Cooler. These changes were made under Reference 2.25. See Appendix F for the exact system alignments.

13. A 6" and a 16" diameter crosstie piping system has been installed which has the capability to connect Unit 1 A Train with Unit 2 A Train and Unit 1 B Train with Unit 2 B Train.

14. The CCP pump skids have been modified by removing the existing isolation gate valve to the pump bearing oil cooler and increasing the supply and discharge tubing to and from the bearing oil cooler.

15. A detailed model of the CCP skid including the gear oil coolers and the pump bearing oil coolers has been added to the models. See the nodal diagrams for the details of the arrangements.

7.16.1 Reference 2.20 measured the dP on the 2A1 CCS HX to be 37 psid at 5788 gpm. Accordingly, all of the similar heat exchangers have had their flow resistance changed to match in Appendix H. This includes: 1A1 CCS HX in link 1A902-1A905, 1A2 CCS HX in link 1A904-1A910, 2A1 CCS HX in link 2A904-2A915, and the 2A2 CCS HX in link 2A902-2A905.

Reference 2.21 measured the dP on the 0B1 and 0B2 CCS HXs to be 25.5 psid at 12060 gpm total, or 6030 gpm to each heat exchanger. Accordingly, all of the similar heat exchangers have had their flow resistance changed to match in Appendix H. This includes: 0B1 CCS HX in link 2B908-2B915, 0B2 CCS HX in link 2B909-2B910.

7.16.2 Reference 2.24 determined that the proper Cv of the 2A Containment Spray Heat Exchanger throttle valve 2-67-537A is 695. Therefore, the Cv for this valve in link 2A250-2A152 has been changed.

7.16.3 Data recorded under Ref 2.18 is useful to determine the proper C factor for the B ERCW discharge header. Modeling was performed to mimic the system alignment in Ref 2.18. The flow rates and pressures were iterated with varying C factors on the B discharge header until agreement was reached. Accordingly, changed C to 85 in link 2B245C-1B246, and changed C to 90 in link 1B247-1B247B. The new piping C factors are recorded in Appendix H. See Appendix F for the exact system alignments.

					Model Results**
	Node/Link	READING	ELEV	HEAD	Head
1-67-702	1B920	2.5	726.5	732.3	732.3
1-FE-67-62	1B109AA	94	669	886.1	888.6
2-FE-67-62	2B209AA	91	669	879.2	879.6
			dP	Flow	Flow
1-FE-67-62	1B109AA-1B109A		121	6222.6	6233.0
2-FE-67-62	2B209AA-2B209		37.5	8660.2	8655.1

**Model results using Multiflow file "ERCW_FLOW_BALANCED_MODEL_R3.net" as prepared by Appendix H.

7.16.4 Data recorded under Ref 2.20 is useful to determine the proper C factor for the A-train ERCW supply headers. Modeling was performed to mimic the system alignment in Ref 2.20. The flow rates and pressures were iterated with varying C factors on the supply headers until agreement was reached. The results were a changed C factors of 60 in links 1A105C-1A106, 1A106-1A107, 1A108-1A108A, 1A108A-1A108C, 1A108C-1A109, 1A109-1A109AA, 1A109AA-1A109A, 1A109A-1A109B, 1A109B-1A110 to 60 and link 1A107-1A108 is 58. Changed C factor in links 2A208-2A208A, 2A208A-2A208C, 2A208C-2A209 to 80, and changed the C factor in link 2A207-2A208 to 75. Link 2A205C-2A206 C factor was changed to 65. Link 2A206-2A207 is 70. Link 2A209-2A209AA is 75. Changed old strainer dP from 1.8 to 2.0 in links 1A108E-1A108EE and 2A208G-2A208E. The new piping C factors are recorded in Appendix H. See Appendix F for the exact system alignments.

	Node/Link	Data with the 1A strainer isolated.	Model Results**	Data with the 2A strainer isolated	Model Results**
		Flow (gpm)	**Flow (gpm)**	**Flow (gpm)**	**Flow (gpm)**
CCS HX 1A1/1A2	1A915-1B920	4957	4958.9	4459	4286.1
CCS HX 2A1/2A2	2A910-2A920	5400	5250.5	4719	4599.0
CSS HX 2A	2A226-2A250	4040	3840.9	3555	3362.5
1A Supply Header flow	1A109AA-1A109A	748	727.2	748	735.1
2A Supply Header flow	2A209AA-2A209A	14832	14872	13115	13013
		Pressure (Head)	**Pressure (Head)**	**Pressure (Head)**	**Pressure (Head)**
1A Strainer Outlet	1A106	97		91.5	
		(913.0)	914.4	(900.8)	899.5
2A Strainer Outlet	2A206	86.25		105.5	
		(888.6)	890.7	(933.3)	931.5
1A Aux Bldg FE High Side	1A109AA	79		79.5	
		(852.7)	852.7	(854.0)	855.0
2A Aux Bldg FE High Side	2A209AA	70.5		59	
		(833.0)	835.6	(806.2)	808.4
CCW Pump Station Cross-Tie	1A108EE	78.5		72.5	
		(853.0)	853.7	(839.1)	840.9

**Model results using Multiflow file "ERCW_FLOW_BALANCED_MODEL_R3.net" as prepared by Appendix H.

Data recorded under Ref 2.21 is useful to determine the proper C factor for the B-train ERCW supply headers. Modeling was performed to mimic the system alignment in Ref 2.21. The flow rates and pressures were iterated with varying C factors on the supply headers until agreement was reached. The results were a changed C factors of 60 in links 1B107-1B108 and 1B108C-1B108D. Changed C factors in links 1B105C-1B106, 1B106-1B107, 1B108-1B108A, 1B108A-1B108C, 1B108C-1B109, 1B109-1B109AA, 1B109AA-1B109A, 1B109A-1B109B, 1B109B-1B110, 1B110-1B110A, 1B110A-1B121 to 65. Changed C factor in link 1B105C-2B205C to 100. Changed the C factor in links 2B205C-2B206, 2B206-2B207, 2B207-2B208, 2B208-2B208A, 2B208A-2B208C, 2B208C-2B209, 2B209-2B209C, 2B209C-2B209AA to 70. Changed the dP of old strainer in link 1B108E-1B108EE from 1.8 psid to 2.3 psid. The new piping C factors are recorded in Appendix H. See Appendix F for the exact system alignments.

	Node/Link	Data with the 1B strainer isolated.	Model Results**	Data with the 2B strainer isolated	Model Results**
		Flow (gpm)	**Flow (gpm)**	**Flow (gpm)**	**Flow (gpm)**
1B Supply Header flow	1B109AA-1B109A	979.8	945.2	979.8	960
2B Supply Header flow	2B209AA-2B209A	14764.7	14757	13190.8	13261
		Pressure (Head)	**Pressure (Head)**	**Pressure (Head)**	**Pressure (Head)**
1B Strainer Outlet	1B106	98.75		94	
		(916.1)	917.2	(905.1)	902.5
2B Strainer Outlet	2B206	89.25		105	
		(894.1)	894.3	(930.5)	931.3
1B Aux Bldg FE High Side	1B109AA	78.5		84	
		(850.3)	851.7	(863.0)	861.8
2B Aux Bldg FE High Side	2B209AA	70		61	
		(830.7)	829.6	(809.9)	808.8
CCW Pump Station Cross-Tie	1B108EE	78.25		76	
		(851.2)	852.8	(846.0)	846.9

**Model results using Multiflow file "ERCW_FLOW_BALANCED_MODEL_R3.net" as prepared by Appendix H.

7.16.6 Testing performed under Ref 2.32 and Ref 2.33 repositioned most of the throttle valves at the Diesel Generator Building. Data taken during this testing enabled the throttle valve Cv to be determined. This data is also useful to determine the proper C factor for the ERCW piping in the vicinity of the Diesel Generators. Modeling was performed to mimic the system alignment in Ref 2.32 and Ref 2.33. The flow rates and pressures were iterated with varying valve Cv and C factors on the piping until agreement was reached. The new valve Cv and piping C factors are recorded in Appendix H. See Appendix F for the exact system alignments.

TRAIN A FLOW TESTING OF ERCW PIPING AT THE DIESEL GENERATORS

			7.16.6 A THROTTLE VALVES OPEN				7.16.6 B NORMAL SUPPLY THROTTLE VALVES NORMAL			
			TEST VALUES	Head/ Flow		Model ** Results	TEST VALUES	Head/ Flow		Model ** Results
1A1	dP	1FE6769	217	1104.8	GPM	1111.1	116	807.8	GPM	807.8
	Inlet P	1A191	27	784.4	FT	782.1	43.5	822.5	FT	817
	Outlet P	1FE6769	12.6	751.1	FT	753.2	9.25	743.4	FT	743.1
1A2	dP	1FE67277	91	715.5	GPM	745.13	115	804.3	GPM	804.3
	Inlet P	2B209F	19.5	767.0	FT	767.3	34	800.5	FT	799
	Outlet P	1FE67277	10.5	746.2	FT	746.7	8.7	742.1	FT	743.6
2A1	dP	2FE6769	190	1033.8	GPM	1062.9	115	804.3	GPM	804.3
	Inlet P	2A291	26.5	783.2	FT	779.5	41	816.7	FT	809
	Outlet P	2FE6769	10.7	746.7	FT	747.9	12.15	750.1	FT	755.8
2A2	dP	2FE67277	88	703.6	GPM	709.08	106	772.2	GPM	772.2
	Inlet P	2B209E	20.5	769.3	FT	767	35	802.8	FT	794
	Outlet P	2FE67277	8.85	742.4	FT	744.4	12.45	750.8	FT	758.7
crosstie pressure		1A108EE	106.5	916.5	FT	916.7	916.7	918.8	FT	920
Total flow		1A190A		3557.6	GPM	3615.1	3615.1	3188.5	GPM	3188.6
1A Aux Bldg total flow		1A109AA	2036		2036	2036	2053		GPM	2053
2A Aux Bldg total flow		2A209AA	11347		11347	11347	11428		GPM	11428

**Model results using Multiflow file “2002_FLOW_BALANCED_MODEL_R7.net” as prepared by Appendix H.

TRAIN B FLOW TESTING OF ERCW PIPING AT THE DIESEL GENERATORS

			7.16.6 C Alternate Supply THROTTLE VALVES OPEN				7.16.6 D Normal SUPPLY VALVES OPEN				7.16.6 E NORMAL SUPPLY THROTTLE VALVES NORMAL			
			TEST VALUES	Head/ Flow		Model ** pg43 Results	TEST VALUES	Head/ Flow		Model **pg43 Results	TEST VALUES	Head/ Flow		Model **pg 43 Results
1B1	dP	1FE6774	156	936.7	GPM	913.2	177	997.8	GPM	997	110	786.6	GPM	786.6
	Inlet P	1B191	30.5	792.4	FT	792.3	26	782.0	FT	781.3	35	802.8	FT	800.7
	Outlet P	1FE6774	12.6	751.1	FT	768.3	10	745.1	FT	755.8	7.4	739.1	FT	748.7
1B2	dP	1FE67280	217	1104.8	GPM	1171.8	79	666.6	GPM	684	102	757.5	GPM	757.5
	Inlet P	2A209F	45.5	827.1	FT	813.7	19.5	767.0	FT	767.7	26	782.0	FT	784.2
	Outlet P	1FE67280	15.5	757.8	FT	775.0	8	740.5	FT	750.7	7.7	739.8	FT	748.7
2B1	dP	2FE6774	197	1052.7	GPM	1033.3	151	921.6	GPM	924	98	742.5	GPM	742.5
	Inlet P	2B291	36	805.1	FT	789.2	21.75	772.2	FT	763	28.25	787.2	FT	775.8
	Outlet P	2FE6774	13.3	752.7	FT	762.0	8.05	740.6	FT	744.2	6.35	736.7	FT	740.5
2B2	dP	2FE67280	237	1154.6	GPM	1246.4	74	645.2	GPM	632	105	768.5	GPM	771
	Inlet P	2A209E	52	842.1	FT	818	17.5	762.4	FT	752.1	21	770.5	FT	760
	Outlet P	2FE67280	15.5	757.8	FT	774.8	6.4	736.8	FT	741.5	6.6	737.2	FT	744.19
crosstie pressure		1B108EE			FT		105	913.1	FT	913.5	913.5			915.33
Total flow		1B119		0	GPM			3231.2	GPM	3237.8	3237.8	3055.1	GPM	3058.8
Alternate Supply Crosstie Pressure		1A108EE	121	949.9	FT	949.8								
1A Aux Bldg total flow		1A109AA	2257.5		GPM	2257.5								
2A Aux Bldg total flow		2A209AA	7171.9		GPM	7171.9								
1B Aux Bldg total flow		1B109AA					1072		GPM	1072	1072		GPM	1090
2B Aux Bldg total flow		2B209AA					7537		GPM	7537	7537		GPM	7562
Alternate Supply Total gpm		2A507-2A209D		4248.9	gpm			0	gpm			786.6		

7.16.7 Valves 2-67-1506 and 2-67-1509 were repositioned under reference 2.22. The PMT for this work order changed the throttled positions for 2-67-1506 and 2-67-1509. Valve 2-67-1506 is in link 2A907-2A910, valve 2-67-1509 is in link 2A906-2A910. In order to determine the new Cv positions for these valves, modeling was performed in order to best simulate the field data associated with this change (reference 2.22). The Cv of 2-67-1509 in link 2A906-2A910 was determined to be 600. The Cv of 2-67-1506 in link 2A907-2A910 was determined to be 608. This data was also used to change the Cv of 1-67-551A in link 1A915-1B920 to 770 and 2-67-551 in link 2A910-2A920 to 2160. The new valve Cv and piping C factors are recorded in Appendix H. See Appendix F for the exact system alignments.

Results from the modeling change:

		Field data (reference 2.22)			Model Results**
Test points	Node	Pressure (gauge El 714)	Head		Head
2-67-1502	2A902	73	882.6		882.6
2-67-1503	2A906	57.75	847.4		846.9
2-67-1504	2A904	73	882.6		882.2
2-67-1507	2A907	57.5	846.8		845.9
2-67-1512	2A910	18	755.6		754.0
	Link	dP (inches)	dP (feet)		dP (feet)
2A1 CCS HX dP	2A904-2A915	415.5"	34.6		37.1
2A2 CCS HX dP	2A902-2A905	415.5"	34.6;		36.5
2-67-1506 dP	2A907-2A910		91.2		90.12
2-67-1509 dP	2A906-2A910		91.8		90.83
1A1/1A2 CCS HX flow (gpm)	1A915-1B920	4938.4 gpm			4920.7 gpm
1A1/1A2 CCS HX flow (gpm)	2A910-2A920	7590 gpm			7599 gpm

**Model results using Multiflow file "ERCW_FLOW_BALANCED_MODEL_R3.net" as prepared by Appendix H.

7.16.8 The position of 5 valves were changed to Full Open: 1-67-601A, 1-67-766A, 2-67-601A, 2-67-601B, 2-67-764B. These valves are CCP room and oil cooler throttle valves. All CCP room and oil cooler valves are now full open. Accordingly, valve Cv table in Appendix H has been updated to reflect this change. No data was taken; this is a modeling change only. See 0-SI-OPS-067-682.M Rev 23. from 5/19/05

7.16.9 DCN 21560 changed the piping on the return from the Main Control Room and Electrical Board Room chillers. Data was obtained during the PMT for this DCN that enables a more accurate determine of the piping condition and specific pressure drops of the piping and components associated with the Control Room Chillers and Electrical Board Room Chillers. Data taken during this testing enabled the throttle valve Cv to be determined. This data is also useful to determine the proper C factor for the ERCW piping in the vicinity of the Main Control Room and Electrical Board Room chillers. Modeling was performed to mimic the system alignment in WO 03-013351-007 and WO 03-013351-008. The flow rates and pressures were iterated with varying valve Cv and C factors on the piping until agreement was reached. The testing resulted in new valve Cv for the Temperature Control Valves associated with the listed chillers, these new valve Cv are recorded in Appendix H. The new piping C factors are recorded in Appendix H. See Appendix F for the exact system alignments.

DCN D21560 Stage 6, A-train ERCW headers:

			Test Data	Calculated Value				Model Results**	
A SAC	Pressure	0-67-900B Gauge El. 687.5	16.5	Head	725.6	ft	1B139A	721.0	ft
	dP	0-FE-67-204	116	Flow	75.4	gpm	1B139A-1B143	78.0	gpm
	Flow to compressor 'A"	Ultrasonic	0				1A140B-1A140C	0	gpm
B SAC	Pressure	0-67-899B Gauge El. 687.5	8.35	Head	706.8	ft	1B140A	713.9	ft
	dP	0-FE-67-210	145	Flow	84.3	gpm	1B140A-1B140	85.3	gpm
	Flow to compressor 'B"	Ultrasonic	0				1A141B-1A141C	0	gpm
C SAC	Pressure	0-67-898B (0-FE-67-205) Floor El. 685	3.7	Head	693.5		1A135N	705	
	Pressure	0-PI-67-1213 Gauge El. 689	10	Head	712.1		1A135I	731.3	
	Pressure	0-PI-67-1219 Gauge El. 688	3	Head	694.9	ft	1A135N	705	ft
	dP	0-FE-67-204	110	Flow	129.0	gpm	1A135N-1A135P	132.2	gpm
D SAC	THE D AIR COMPRESSOR WAS ISOLATED AND HAD NO FLOW								
	Pressure	1-FE-67-61 High Side	112	Head	927.7	ft	1A109AA	927.7	ft
		Gauge Elevation of pressure reading	669						

	Pressure	0-67-1561	101.5	Head	903.4	ft	1A575A	902.9	ft
		Gauge Elevation of pressure reading	669						
	Pressure	1-67-1604A	7.9	Head	732.2	ft	1A580F	732.0	ft
		Gauge Elevation of pressure reading	714						
	Pressure	1-67-1605A	8.55	Head	733.7	ft	1A580HI	735.5	ft
		Gauge Elevation of pressure reading	714						
	Pressure or Elevation	2-67-703 Gauge El 726.5	2.8	Head	733.0	ft	2A920	733.2	ft

			Test Data	Calculated Value					
A EBR	Pressure	0-67-616A Floor El 669	97.5	Head	894.2	ft	1A575C	894.2	ft
	dP	0-FE-67-196	11.25	Flow	250.6	gpm	1A575E-1A575F	256.4	gpm
	Pressure	0-FE-67-196 High Side Gauge El 669	36.5	Head	753.3	ft	1A575E	748.5	ft

			Test Data	Calculated Value					
A MCR	Pressure	0-67-621A Floor El 732	65	Head	882.1	ft	1A580A	885.5	ft
	Pressure	0-FE-67-198 High Side Gauge El 706	12.2	Head	734.2	ft	1A580E	735.8	ft
	dP	0-FE-67-198	35	Flow	177.5	gpm	1A580D-1A580E	175.5	gpm

1A ERCW Header Flow	Computer Point 1F1126A	2062	gpm			1A109AA	1896.2	gpm
1B ERCW Header Flow	Computer Point 1F1127A	1330	gpm			1B109AA	940.6	gpm
2A ERCW Header Flow	Computer Point 2F1126A	13390	gpm			2A209AA	13263	gpm
2B ERCW Header Flow	Computer Point 2F1127A	9900	gpm			2B209AA	9842.5	gpm

**Model results using Multiflow file “ERCW_FLOW_BALANCED_MODEL_R3.net” as prepared by Appendix H.

DCN D21560 Stage 7, B-train ERCW headers:

			Test Data		Calculated Value				Model Results**	
A SAC	Pressure	0-67-900B Floor El. 687.5	19.8		Head	733.2	ft	1B139A	719.4	ft
	dP	0-FE-67-204	125		Flow	78.3	gpm	1B139A-1B143	75.9	gpm
	Flow to compressor 'A"	Ultrasonic	0			0.0		1A140B-1A140C	0	gpm
B SAC	Pressure	0-67-899B Floor El. 685	11.7		Head	712.0	ft	1B140A	712.7	ft
	dP	0-FE-67-210	142		Flow	83.4	gpm	1B140A-1B140	82.9	gpm
	Flow to compressor 'B"	Ultrasonic	0			0.0		1A141B-1A141C	0	gpm
C SAC	Pressure	0-67-898B (0-FE-67-205) Floor El. 685	6.3		Head	699.5	ft	1A135N	704.4	ft
	Pressure	0-PI-67-1213 Gauge El. 689	12		Head	716.7	ft	1A135I	724	ft
	Pressure	0-PI-67-1219 Gauge El. 688	2.5		Head	693.8	ft	1A135N	703	ft
	dP	0-FE-67-204	108		Flow	127.8	gpm	1A135N-1A135P	128.7	gpm
D SAC	THE D AIR COMPRESSOR WAS ISOLATED AND HAD NO FLOW									
	Pressure	1-FE-67-62 High Side	107.5		Head	917.3	ft	1B109AA	917.2	ft
		Gauge Elevation of pressure reading	669							
	Pressure	0-67-614B	97.5		Head	896.8	ft	1B675A	897.2	ft
		Gauge Elevation of pressure reading	671.6							
	Pressure	1-67-1604B	5.8		Head	727.4	ft	1B680F	725.7	ft
		Gauge Elevation of pressure reading	714							
	Pressure	1-67-1605B	6.5		Head	729.0	ft	1B680HI	731.6	ft
		Gauge Elevation of pressure reading	714							
	Pressure or Elevation	1-67-702	-0.75		Head	724.8		1B920	724.8	ft
		Gauge Elevation of pressure reading	726.5							

B EBR	Pressure	0-67-616B Floor El 669	96		Head	890.7	ft	1B675C	891.0	ft
	dP	0-FE-67-200	13.5		Flow	274.5	gpm	1B675E- 1B675F	275.9	gpm
	Pressure	0-FE-67-200 High Side Gauge El 671	35		Head	751.8	ft	1B675E	752.2	ft

B MCR	Pressure	0-67-621B Floor El 732	62.5		Head	876.3	ft	1B680A	877.9	ft
	Pressure	0-FE-67-202 High Side Gauge El 706	9.5		Head	727.9	ft	1B680E	732.0	ft
	dP	0-FE-67-202	98		Flow	297.0	gpm	1B680D- 1B680E	284.9	gpm

	1A ERCW Header Flow	Computer Point 1F1126A	1165					1A109AA	1223.7	gpm
	1B ERCW Header Flow	Computer Point 1F1127A	698					1B109AA	1002	gpm
	2A ERCW Header Flow	Computer Point 2F1126A	13218					2A209AA	12878	gpm
	2B ERCW Header Flow	Computer Point 2F1127A	8153					2B209AA	8328.6	gpm

**Model results using Multiflow file "ERCW_FLOW_BALANCED_MODEL_R3.net" as prepared by Appendix H.

7.16.10 The piping associated with the 1A RHR pump room cooler was replaced with new carbon steel piping in April, 2006. No flow data is applicable. The model will be revised to indicate that the new piping has a C factor of 100 with no diameter reduction. The piping will soon corrode to have an actual C of less than 100, but the value of 100 will be used in the model to ensure that the components surrounding the 1A RHR pump room cooler are not starved of flow. The piping C factors are reflected in Appendix H. No data was taken, this is a modeling change only. WO 05-773944-000.

7.16.11 Reference 2.24 determined that the proper Cv of the A Auxiliary Air Compressor throttle valve 1-67-680 is 1.61. Therefore, the Cv for this valve in link 1A129E-1A374A is reflected in Appendix H.

7.16.12 Changed the throttled positions of 1-67-570B in link 1B171A-1B123B, the Unit 1 RCP#2 throttle valve, and also changed the throttled position of 1-67-564D in link 1B112-1B112C, the throttle valve for the 1D Lower Compartment Cooler. These changes were made under Reference 2.25. The field data from reference 2.25 is:

	Inlet Node	Node/Link Outlet Node	Field data Flow (gpm)	Model Results** Flow (gpm)
1B GROUP	1B161AA	1B118	460.9	462.4
1B LCC	1B111B	1B161	212.3	213.6
1B CRD	1B171A	1B171B	79.8	83
#2 RCP	1B115	1B123B	142.3	139.9
1B UCC	1B123A	1B123B	26.5	25.9
1D GROUP	1B162AA	1B118	533.8	532.3
1D LCC	1B112B	1B162	287.6	283.0
1D CRD	1B170A	1B170B	110.4	112.2
#4 RCP	1B116	1B170B	135.8	137.1
dP	1B110FF	1B161AA	43 psid	42.6 psid
dP	1B110EE	1B162AA	44.5 psid	43.1 psid

**Model results using Multiflow file "ERCW_FLOW_BALANCED_MODEL_R3.net" as prepared by Appendix H.

In order to determine the required changes, the model used in 7.16.9 for Train B was modified by removing all fixed flows for the items in Unit 1 containment, B-train. A fixed flow of 994.7 was applied to link 1B110-1B110D.

The resulting model changes are to change the Cv for the Upper Compt Cooler 1B to 7.4 in link 1B123A-1B123B. Change the 1D Lower Compt Cooler Cv to 300 in link 1B112-1B112C. Change demisters for the: 1D LCC to 18 psid in link 1B112B-1B162, 1B LCC to 32 psid in link 1B111B-1B161, #2 RCP to 0.01 psid in link 1B115-1B123B, #4 RCP to 6 psid in link 1B116-1B170B, 1B CRD to 23 psid in link 1B171A-1B171B, and the 1D CRD to 14 psid in link 1B170A-1B170B. These changes are reflected in the appropriate tables in Appendix H. See Appendix F for the exact system alignments.

7.16.13 A detailed model of the CCP skid including the gear oil coolers and the pump bearing oil coolers has been added to the models. See the nodal diagrams for the details of the arrangements.

7.16.14 Additional flow testing of the ERCW took place in 2007 and the model was re-flow balanced in R7 of this calculation. The field data was gathered in two configurations. The first was with the ERCW Train A/B in the normal configuration, with the ESF header crosstie out of service. The second was with the ERCW Train A/B ESF header crosstie in service and the ESF normal supply isolated. The evaluation was performed by modifying the model "2002_FLOW_BALANCE_MODEL_R6.net" to the system arrangements shown in App F . The pump performance was modified such that the main supply header flow and pressure at the entrance to the Auxiliary Building closely matches the field data. Then various components were modified until the percent difference between the field data model prediction was less than 5%. Next the model was revised for the crosstie open and the model and field results were compared. Some components are under predicted with the header open and over predicted with the header isolated. For these cases the model was modified to keep the maximum over prediction to 5% or less. In the B train testing the SIS Oil Cooler 2B is under predicted by more than 5% however there are no model changes that can fix this and this is a very small amount of flow as well as it is in the conservative direction.

Changes to the model:

A Train Changes

	INLET NODE	OUTLET NODE	
ELECT BD RM CHR A	1A575E	1A575F	TCV in 1A575D1-D2: changed Cv from 34.5 to 37
MCR CHILLER A	1A580C	1A580D	changed Cv from 24.5 to 27
714 PEN RM CLR 1A	1A565A2	1A610A	changed dP from 22 at 30 gpm to 18 at 30 gpm
714 PEN RM CLR 2A	2A301E2	2A610A	changed dP from 16 at 30 gpm to 20 at 30 gpm
690 PEN RM CLR 1A	1A560	1A609A	changed dP from 18 at 30 gpm to 15 at 30 gpm
BAT & AFW CLR 2A	2A387B	2A234	changed 2 globe valves Leq from default to 40 ft
CCP OIL CLR 1A	1A515	1A515A	changed dP from 13.5 at 30 gpm to 4 at 30 gpm
CCP OIL CLR 2A	2A227I	2A227H	changed dP from 4.5 at 30 gpm to 2 at 30 gpm
SIS PMP RM CLR 1A	1A535	1A525	changed dP from 2.26 at 30 gpm to 1.5 at 30 gpm
SIS OIL CLR 1A	1A530	1A540	Added demister with Cv of 6.1844
SIS OIL CLR 2A	2A232C	2A232F	Changed dP from 0.1 at 3.1 gpm to 0.2 at 3.1 gpm
PIPE CHASE CLR 2A	2A301F1	2A302C	changed dP from 9.35 at 30 gpm to 6 at 30 gpm
CNT SPR PMP RM CLR 2A	2A350A2	2A605A	changed dP from 7 at 30 gpm to 5 at 30 gpm
RHR PMP RM CLR 1A	1A552	1A606B	Added demister with Cv of 9

B Train Changes

	INLET NODE	OUTLET NODE	changes
MCR CHILLER B	1B680C	1B680D	changed globe valve Cv from 41 to 25.5
EGTS 2B	2B685B	2B227C	changed demister dP from 5 at 15 gpm to 3 at 15 gpm
SFP & TBBP CLR 1B	1B601I	1B601J	changed demister dP from 9 at 40 gpm to 7 at 40 gpm
CCS & AFW CLR 1B	1B603D	1B603E	changed demister dP from7.5 at 100 gom to 5 at 100 gpm
690 PEN RM CLR 1B	1B660B4	1B311B	changed demister dP from 23 at 400 gpm to 25 at 40 gpm
690 PEN RM CLR 2B	2B609A	2B301E	changed demister dP from28 at 40 gpm to 25 at 40 gpm
BAT & AFW CLR 2B	2B234A2	2B234	deleted demister and changes globe valves from defatult to Leq of 40
CCP OIL CLR 1B	1B497	1B497A	changed demister dP from19 at 50 gpm to 30 at 50 gpm

CCP OIL CLR 2B	2B229A	2B229B	changed demister dP from 0.0001 at 50 gpm to 7 at 50 gpm
SIS OIL CLR 1B	1B630	1B640	changed demister dP from 2 at 13 gpm to 1.8 at 13 gpm
SIS OIL CLR 2B	2B232C	2B232G	changed C factor from default 120 to 140
PIPE CHASE CLR 1B	1B670A1	1B671	changed demister dP from 23 at 40 gpm to 15 at 40 gpm
PIPE CHASE CLR 2B	2B301D1	2B302B	changed demister dP from 15 at 50 gpm to 19 at 50 gpm
CNT SPR PMP RM CLR 1B	1B187	1B187A	changed demister dP from19 at 30 gpm to 15 at 30 gpm
CNT SPR PMP RM CLR 2B	2B187	2B187A	changed demister dP from 6 at 30 gpm to 4 at 30 gpm
RHR PMP RM CLR 2B	2B191C	2B606A	changed demister dP from 12 at 20 pm to 15 at 20 gpm

TRAIN A 2007 Flow Balancing

	INLET NODE	OUTLET NODE	7.16.14 A Crosstie closed Model	PMTI Test Data	percentage difference	7.16.14 B Cross tie open Model	PMTI Test Data	percentage difference
D/G 1A1	1A191	1A1A1	0.0	0		0.0	0	
D/G 1A2	2B209F	1A1A2	0.0	0		0.0	0	
D/G 2A1	2A291	2A2A1	0.0	0		0.0	0	
D/G 2A2	2B209E	2A2A2	0.0	0		0.0	0	
CCS HX 1A1/1A2	1A915	1B920	4559.1	4664.9	-2.27%	4543.3	4501	0.94%
CCS HX 2A1/2A2	2A910	2A920	5606.6	5796.5	-3.28%	5595.2	5891.2	-5.02%
CSS HX 1A	1A121A	1A150	0.0	0		0.0	0	
CSS HX 2A	2A226	2A250	0.0	0		0.0	0	
SUPPLY HEADER 1A	1A109	1A109AA	2790.7	2939	-5.05%	1596.4	1600	-0.22%
SUPPLY HEADER 2A	2A209	2A209AA	11997.0	12409.6	-3.32%	12831.0	13341.5	-3.83%
ELECT BD RM CHR A	1A575E	1A575F	289.0	301.1	-4.01%	217.7	224.1	-2.87%
MCR CHILLER A	1A580C	1A580D	200.9	199.9	0.48%	151.0	154.9	-2.54%
STATION AIR COMP A AFTERCOOLER	1A140A	1B139A	0.0			0.0		
STATION AIR COMP A INTERCOOLER	1A140F	1B139A	0.0			0.0		
STATION AIR COMP B AFTERCOOLER	1A141A	1B140A	0.0			0.0		
STATION AIR COMP B	1A141F	1B140A	0.0			0.0		

	INLET NODE	OUTLET NODE	7.16.14 A Crosstie closed Model	PMTI Test Data	percentage difference	7.16.14 B Cross tie open Model	PMTI Test Data	percentage difference
INTERCOOLER								
STATION AIR COMP C	1A135N	1A135P	0.0			0.0		
STATION AIR COMP D	1B135P	1B135R	0.0			0.0		
EGTS 2A	2A227C3	2A685A	19.3			18.6		
AUX CONT AIR A	1A375E	1A375F	0.0			0.0		
SFP & TBBP CLR 1A	1A646C	1A646D	54.9	56.1	-2.15%	40.7	41.9	-2.80%
714 PEN RM CLR 1A	1A565A2	1A610A	44.1	43.4	1.60%	34.6	34.8	-0.64%
714 PEN RM CLR 2A	2A301E2	2A610A	41.3	45	-8.16%	36.1	34.4	4.81%
SHUTDOWN BD RM CHR A	1A155B	1A155E	0.0	0		0.0		
CCS & AFW CLR 1A	1A510D	1A510E	157.3	160.4	-1.93%	117.5	119.8	-1.93%
690 PEN RM CLR 1A	1A560	1A609A	43.7	44.6	-1.99%	34.3	35.5	-3.44%
690 PEN RM CLR 2A	2A609B	2A301G	39.3	39.7	-1.06%	34.3	33.7	1.68%
BAT & AFW CLR 2A	2A387B	2A234	99.8	103.2	-3.29%	93.8	95.5	-1.81%
UCVC 2A	2A266C	2A225	0.0	0		0.0	0	
UCVC 2C	2A267C	2A225	0.0	0		0.0	0	
INCORE INST RM CHR 1A	1A524F	1A524G	0.0			0.0		
INCORE INST RM CHR 2A	2A524F	2A524G	10.0			10.0		
CCP OIL CLR 1A	1A515	1A515A	72.0	73.9	-2.62%	53.9	55.6	-2.97%
CCP OIL CLR 2A	2A227I	2A227H	72.5	71.1	1.95%	67.4	65.7	2.60%
CCP RM CLR 1A	1A169	1A169A	65.1	63	3.36%	48.9	46.8	4.48%
CCP RM CLR 2A	2A169	2A169A	67.4	70.1	-3.91%	62.7	64.4	-2.59%
SIS PMP RM CLR 1A	1A535	1A525	48.9	50.8	-3.68%	38.4	39.8	-3.52%
SIS OIL CLR 1A	1A530	1A540	15.0	15	-0.12%	11.6	12	-3.07%
SIS PMP RM CLR 2A	2A232B	2A232D	44.2	44	0.35%	38.6	40	-3.55%
SIS OIL CLR 2A	2A232C	2A232F	16.5	19	-13.02%	14.3	14	2.30%
669 PEN RM CLR 1A	1A556	1A557	72.8	74.6	-2.40%	57.1	58.7	-2.68%
669 PEN RM CLR 2A	2A347A	2A347B	80.1	78.4	2.17%	69.8	67.8	2.89%

	INLET NODE	OUTLET NODE	7.16.14 A Crosstie closed Model	PMTI Test Data	percentage difference	7.16.14 B Cross tie open Model	PMTI Test Data	percentage difference
PIPE CHASE CLR 1A	1A570A1	1A570A3	88.1	88	0.08%	68.9	69.3	-0.53%
PIPE CHASE CLR 2A	2A301F1	2A302C	65.7	63.8	2.97%	57.2	55.6	2.96%
LCVC GROUP 1A	1A162AA	1A118	769.3	760+		779.3	760+	
1AA LCC	1A112B	1A162	468.4			475.2		
1A CRD	1A170A	1A170B	80.0			80.0		
U-1 #1RCP	1A116	1A124B	194.8			197.6		
UCVC 1A	1A122C	1A164	26.2			26.5		
LCVC GROUP 1C	1A161AA	1A118	705.9	725	-2.64%	715.4	730	-1.99%
1CA LCC	1A111B	1A161	433.0			439.6		
1C CRD	1A171A	1A171B	80.0			80.0		
U-1 #3RCP	1A115	1A171B	192.9			195.9		
LCVC GROUP 2A	2A262AA	2A218	620.9	500+		620.6	500+	
2AA LCC	2A212B	2A262	389.4			389.2		
2A CRD	2A270A	2A270B	40.0			40.0		
U-2 #1RCP	2A216	2A270B	191.5			191.4		
LCVC GROUP 2C	2A261AA	2A218	576.7	500+		576.5	500+	
2CA LCC	2A211B	2A261	335.7			335.6		
2C CRD	2A271A	2A271B	40.0			40.0		
U-2 #3RCP	2A215	2A271B	201.0			200.9		
CNT SPR PMP RM CLR 1A	1A185	1A185A	36.5	37.7	-3.12%	28.6	29.7	-3.67%
CNT SPR PMP RM CLR 2A	2A350A2	2A605A	47.7	48.2	-0.95%	41.7	41.5	0.41%
RHR PMP RM CLR 1A	1A552	1A606B	27.1	27.6	-1.99%	21.2	20.5	3.52%
RHR PMP RM CLR 2A	2A189A	2A606B	30.3	29.2	3.82%	26.4	25.2	4.87%
1A-A STRAINER BACKWASH	1A106B	1A106C	0.0	0		0.0	0	
2A-A STRAINER BACKWASH	2A206B	2A206C	0.0	0		0.0	0	
J-A PUMP	1A104	1A105	7412.8			7230.5		
K-A PUMP	1A103	1A105	7375.3			7197.0		
Q-A PUMP	2A203	2A205	0.0			0.0		
R-A PUMP	2A204	2A205	0.0			0.0		
U1 TDAFWP	1A109B	1A109C	0.0			0.0		
U2 TDAFWP	2A209G	2A209H	0.0			0.0		
1A HEADER PRESSURE	1A105C	1A106	952.4			954.5		

	INLET NODE	OUTLET NODE	7.16.14 A Crosstie closed Model	PMTI Test Data	percentage difference	7.16.14 B Cross tie open Model	PMTI Test Data	percentage difference
(feet)								
1A Header Pressure (psig)	1A105C	1A106	113.6			114.5		
2A HEADER PRESSURE (feet)	2A205C	2A206	948.0			950.2		
2A Header Pressure (psig)	2A205C	2A206	111.7			112.7		
FLOW INTO TB LEAK	1A130Z	1ABREAK	0.0			0.0		

Train B 2007 Flow Balancing

	INLET NODE	OUTLET NODE	7.16.14 C Cross tie closed model	PMTI data	percent diff	7.16.14 D Cross tie open model	PMTI data	percent difference
D/G 1B1	1B191	1B1B1	0.0	0		0.0	0	
D/G 1B2	2A209F	1B1B2	0.0	0		0.0	0	
D/G 2B1	2B291	2B2B1	0.0	0		0.0	0	
D/G 2B2	2A209E	2B2B2	0.0	0		0.0	0	
CCS HX 0B1/0B2	2B920	2B925	8008.7	8005	0.05%	8021.5	8005	0.21%
CSS HX 1B	1B121A	1B150	0.0	0		0.0	0	
CSS HX 2B	2B226	2B250	0.0	0		0.0	0	
SUPPLY HEADER 1B	1B109	1B109AA	2461.3	2529.8	-2.71%	1311.5	1264.9	3.68%
SUPPLY HEADER 2B	2B209C	2B209AA	10193.0	10099.4	0.93%	10947.0	11045.3	-0.89%
ELECT BD RM CHR B	1B675E	1B675F	301.5	303.4	-0.64%	223.6	221	1.18%
MCR CHILLER B	1B680C	1B680D	220.8	210.6	4.85%	164.1	171	-4.02%
STATION AIR COMP A AFTERCOOLER	1A140A	1B139A	0.0	0		0.0	0	
STATION AIR COMP A INTERCOOLER	1A140F	1B139A	0.0	0		0.0	0	
STATION AIR COMP B AFTERCOOLER	1A141A	1B140A	0.0	0		0.0	0	
STATION AIR COMP B INTERCOOLER	1A141F	1B140A	0.0	0		0.0	0	
STATION AIR COMP C	1A135N	1A135P	0.0	0		0.0	0	

	INLET NODE	OUTLET NODE	7.16.14 C Cross tie closed model	PMTI data	percent diff	7.16.14 D Cross tie open model	PMTI data	percent difference
STATION AIR COMP D	1B135P	1B135R	0.0	0		0.0	0	
EGTS 2B	2B685B	2B227C	20.5	21.1	-2.76%	19.5	19.3	0.89%
AUX CONT AIR B	2B794A	2B227C	9.7	0		9.2	0	
SFP & TBBP CLR 1B	1B601I	1B601J	52.0	51.3	1.27%	37.9	38.7	-1.97%
714 PEN RM CLR 1B	1B665A2	1B610B	46.1	46.3	-0.35%	36.8	36.1	1.84%
714 PEN RM CLR 2B	2B301C2	2B610B	45.7	46.1	-0.91%	39.8	39.8	0.07%
SHUTDOWN BD RM CHR B	2B237D	2B245A	129.1			50.0		
CCS & AFW CLR 1B	1B603D	1B603E	145.8	141.9	2.75%	107.4	108.3	-0.83%
690 PEN RM CLR 1B	1B660B4	1B311B	44.7	44.1	1.25%	35.6	34.4	3.45%
690 PEN RM CLR 2B	2B609A	2B301E	42.8	44	-2.64%	37.4	36.1	3.51%
BAT & AFW CLR 2B	2B234A2	2B234	101.3	106.3	-4.69%	94.9	94.6	0.30%
UCVC 2B	2B266C	2B225	0.0	0		0.0	0	
UCVC 2D	2B267C	2B225	43.5	25+		43.6	25+	
INCORE INST RM CHR 1B	1B524F	1B524G	10.0			10.0		
INCORE INST RM CHR 2B	2B524F	2B524G	0.0	0		0.0	0	
CCP OIL CLR 1B	1B497	1B497A	56.4	53.9	4.65%	41.7	40.6	2.61%
CCP OIL CLR 2B	2B229A	2B229B	71.6	72.1	-0.69%	66.5	64.2	3.64%
CCP RM CLR 1B	1B616	1B616A	54.4	53.3	2.05%	40.2	40.2	0.08%
CCP RM CLR 2B	2B171	2B171A	65.0	65.6	-0.97%	60.5	58.4	3.52%
SIS PMP RM CLR 1B	1B625	1B635	42.8	44.2	-3.17%	34.2	35.6	-3.97%
SIS OIL CLR 1B	1B630	1B640	17.1	18	-4.73%	13.5	13	4.22%
SIS PMP RM CLR 2B	2B232C	2B232E	49.3	50	-1.38%	43.1	42.3	1.88%
SIS OIL CLR 2B	2B232C	2B232G	17.4	20	-- 12.95%	15.1	17	-11.20%
669 PEN RM CLR 1B	1B656	1B657	54.5	53.9	1.18%	43.5	42	3.55%
669 PEN RM CLR 2B	2B349A	2B608A	82.5	82	0.64%	71.9	69.8	3.05%
PIPE CHASE CLR 1B	1B670A1	1B671	67.8	67.1	0.98%	54.1	51.9	4.20%
PIPE CHASE CLR 2B	2B301D1	2B302B	67.7	69.6	-2.72%	59.0	59	0.08%
LCVC GROUP 1B	1B161AA	1B118	616.8	600	2.80%	625.6	610	2.55%

	INLET NODE	OUTLET NODE	7.16.14 C Cross tie closed model	PMTI data	percent diff	7.16.14 D Cross tie open model	PMTI data	percent difference
1BB LCC	1B111B	1B161	316.5			321.4		
1B CRD	1B171A	1B171B	50.0			50.0		
U-1 #2RCP	1B115	1B123B	210.1			213.4		
UCVC 1B	1B123A	1B123B	40.2			40.8		
LCVC GROUP 1D	1B162AA	1B118	666.6	640	4.15%	675.9	645	4.79%
1DB LCC	1B112B	1B162	414.5			420.8		
1D CRD	1B170A	1B170B	50.0			50.0		
U-1 #4RCP	1B116	1B170B	202.1			205.1		
LCVC GROUP 2B	2B261AA	2B218	650.0	500+		651.4	500+	
2BB LCC	2B211B	2B261	380.9			381.8		
2B CRD	2B271A	2B271B	50.0			50.0		
U-2 #2RCP	2B215	2B271B	219.1			219.6		
LCVC GROUP 2D	2B262AA	2B218	709.0	500+		710.5	500+	
2DB LCC	2B212B	2B262	462.8			463.9		
2D CRD	2B270A	2B270B	50.0			50.0		
U-2 #4RCP	2B216	2B270B	196.2			196.7		
CNT SPR PMP RM CLR 1B	1B187	1B187A	39.8	40.4	-1.60%	31.7	31.4	0.97%
CNT SPR PMP RM CLR 2B	2B187	2B187A	51.9	52.4	-0.95%	45.3	43.8	3.49%
RHR PMP RM CLR 1B	1B652A	1B606C	24.3	23.8	2.09%	19.3	18.7	3.09%
RHR PMP RM CLR 2B	2B191C	2B606A	27.1	27.7	-2.21%	23.7	22.7	4.26%
1B-B STRAINER BACKWASH	1B106B	1B106C	0.0	0		0.0	0	
2B-B STRAINER BACKWASH	2B206B	2B206C	0.0	0		0.0	0	
L-B PUMP	1B104	1B105	6337.8			6138.7		
M-B PUMP	1B103	1B105	6316.4			6119.4		
N-B PUMP	2B203	2B205	0.0			0.0		
P-B PUMP	2B204	2B205	0.0			0.0		
U1 TDAFWP	1B109B	1B109C	0.0			0.0		
U2 TDAFWP	2B209B	2B209G	0.0			0.0		
1B HEADER PRESSURE (feet)	1B105C	1B106	958.2			961.3		
1B HEADER PRESSURE (psig)	1B105C	1B106	116.1			117.5		
2B HEADER PRESSURE (feet)	2B205C	2B206	955.9			959.0		

	INLET NODE	OUTLET NODE	7.16.14 C Cross tie closed model	PMTI data	percent diff	7.16.14 D Cross tie open model	PMTI data	percent difference
2B HEADER PRESSURE (psig)	2B205C	2B206	115.1			116.5		
FLOW INTO TB LEAK	1B130Z	1BBREAK	0.0			0.0		

7.16.15

In order to enhance flow margins, two valves had their throttled positions changed. The field testing for these items was performed 4/11/09 under 0-PI-SFT-067-006.0 R7. Valve 1-FCV-67-146 had its 35% and 50% positions changed. 1-67-551A had its position changed. Both of these valves are located in link 1A915-1B920.

In each case, flow data was taken at 1-FE-67-222, located in link 1B235-1A900. Differential pressure was measured from valve 1-67-1512 (just upstream of the valves) to 1-67-702 (just downstream of the valves. 1-67-1512 is located 20 feet of straight pipe downstream of tee 1A915, 1-67-702 is located physically on tee 1B920.

New Cv values are determined as follows:
1) Use model "2002_FLOW_BALANCED_MODEL_R7.net"
2) Change nodes 1B247B and 1A247B to Elev 716.5
3) Set fixed flow of 0 for the 2B CSS HX in link 2B226-2B250
4) Set a fixed flow of 7143 gpm in link 1B235-1A900.
5) Set the valve properties for both valves in link 1A915-1B920 to "default".
6) Solve, then record the head values at tees 1A915 and 1B920 in the first row in the table below.
7) The test value and calculated value did not closely match. This is attributed to the default value for the valves and the actual valve dP being different. Therefore, the default value for the valves is set to 870 feet equivalent length, yielding the values in the second line in the table below. R9
8) The Cv value for 1-FCV-67-146 at 50% position was determined by iterations of Cv values for that valve, leaving the equivalent length of 1-67-551A at 870 feet. The fixed flow previously set in link 1B235-1A900 was changed to 6874 gpm to match the test value. Results are below.
9) The Cv value for 1-FCV-67-146 at 35% position was determined by iterations of Cv values for that valve, leaving the equivalent length of 1-67-551A at 870 feet. The fixed flow previously set in link 1B235-1A900 was changed to 2840 gpm to match the test value. Results are below.
10) The Cv value for 1-67-551A was determined by iterations of Cv values for that valve, leaving the equivalent length of 1-FCV-67-146 at 870 feet. The fixed flow previously set in link 1B235-1A900 was changed to 5088 gpm to match the test value. Results are in the table below.

Notes: The location of the valve 1-67-702 used for the data at tee 1B920 is physically on the tee. Therefore, the head values for the tee were all averaged together to yield the values in the table below. The location of the valve 1-67-1512 used for the data at tee 1A915 is approximately 20 feet of pipe downstream of the tee. Accordingly, Multiflow data for the tee outlet is used, then 0.25 feet of head is subtracted. The 0.25 is the approximate head loss in 20 feet of pipe, using the data in the link detail for link 1A915-1B920 at 7143 gpm. The values of head loss are slightly different at the other flow rates, the difference is considered inconsequential and thus 0.25 feet of head is used for all flow rates.

	Field Test Values		Calculated Values				
Alignment Description	Flow (gpm)	dP (psid)	Head at outlet of 1A915 - 0.25 ft	Average Head at 1B920	Subtract head values1A915-1B920	Convert to PSID	Cv
Step 6.3 [11] 1-FCV-67-146 Open, 1-67-551A Open	7143	5	733	730	3	1	
Step 6.3 [11] 1-FCV-67-146 Open, 1-67-551A Open	7143	5	741	730	11	5	
Step 6.3[13] 1-FCV-67-146 50%, 1-67-551A Open	6876	8	748	730	18	8	3030
Step 6.3[21] 1-FCV-67-146 35%, 1-67-551A Open	2840	77	902	724	178	77	325
Step 6.3[30] 1-FCV-67-146 Open, 1-67-551A Throttled	5088	41	821	727	94	41	813

R9

7.16.16

During the Unit 1 Cycle 16 refuel outage, two throttle valves were re-positioned in order to correct flow shortfalls during the performance of 1-SI-SFT-067-739.0 on 4/21/2009. The repositioned valves are 1-67-570B and 1-67-567D. 1-67-570B is for the Unit 1 #2 RCP motor cooler, and was repositioned from 4 turns to 1 turn from full open. 1-67-567D is for the 1D CRD cooler, and was only nominally changed, from position 3 to position 3.25. This is a plug valve, position 1 is fully closed and position 7 is fully open. The positions are evenly spread across the 90 degree rotation of this valve. Analyzing the changes revealed weakness in the model basis for the Lower Compartment Coolers, the RCP motor coolers, and the CRD coolers, as well as the Unit 1 Upper Compartment Coolers. Essentially, the current modeling uses a single performance of 1/2-SI-SFT-067-739.0 (reference 2.13 and 2.14) to distribute the flow recorded in Ref 2.3 and 2.4. It is proposed to replace this with an average of the previous 5 tests for all except the Unit 1 B and D groups. The 1B and 1D groups (the 1B ERCW train components) had some throttle valves adjusted in U1C14 refuel outage on 5/10/2006, therefore only the three last tests will be averaged together for these groups. R9

Analysis was performed by taking the test data from references 2.13 and 2.14 for the last 5 tests. For the 1B train, only the last 3 tests were used as some throttle valve position changes had occurred that made the earlier data invalid for this analysis. The data for each component, and the total flow rates, were then averaged. The test pressure differential from the supply to the return flow elements was also used. The file "2002_FLOW_BALANCED_MODEL_R7" was obtained and modified by placing a fixed flow equivalent to the averaged total flow for each train in links 1A110-1A110B (1029.7 gpm), 1B110-1B110D (981.1 gpm), 2A210-2A210B (1023.7 gpm), 2B210-2B210B (1074.7 gpm). Fixed flow of zero had to be removed from links 2A262AA-2A218, 2A261AA-2A218, 2B261AA-2B218, and 2B262AA-2B218. Various demisters, valve Cv, and piping roughness values were then varied so that the individual component flow and the differential pressure from the supply to the return closely matched the average data from ref 2.13 and 2.14, as indicated in the tables below.

Demisters changed:

Component	Link	dP (psid)	Flow (gpm)
1AA LCC	1A112B-1A162	9	300
1A CRD	1A170A-1A170B	18.5	75
U-1 #1RCP	1A116-1A124B	2.5	150
1CA LCC	1A111B-1A161	4	300
U-1 #3RCP	1A115-1A171B	0.5	100
2AA LCC	2A212B-2A262	20	300
2A CRD	2A270A-2A270B	23	100
2C-A LCC	2A211B-2A261	16	250
2C CRD	2A271A-2A271B	18	100
U-2 #3RCP	2A215-2A271B	2	150
1B-B LCC	1B111B-1B161	25	300
U-1 #2 RCP	1B115-1B123B	9.5	150
1D-B LCC	1B112B-1B162	16	300
U-1 #4 RCP	1B116-1B170B	6.5	100
2B-B LCC	2B211B-2B261	13	300
2B CRD	2B271A-2B271B	16	100
2D-B LCC	2B212B-2B262	9	300
2D CRD	2B270A-2B270B	21	100
U-2 #4 RCP	2B216-2B270B	6	100

R9

Train A valve Cv changed:

EQUIPMENT	LINK	VALVE NUMBER	Cv for throttle vlv
UCVC 1A	1A124A-1A124B	1-67-666A	5.5

Change the following piping Hazen-Williams C factors and diameter reduction.

Inlet Node	Exit Node	HW C Factor	Diameter Reduction
1A115	11171B	90	0
1A161	1A161AA	75	def
1A162	1A162AA	75	def
2A261	2A261AA	90	def
2A262	2A262AA	75	def
2B261	2B261AA	90	0

Results are below:

Unit 1

Lower Compartment Coolers

Outage	Date	1A	1C	1B	1D
U1C12	05/30/03	317.9	289.4		
U1C13	11/14/04	273.9	280.3		
U1C14 AL	05/09/06	287.6	280.9	212.3	287.6
U1C15	10/31/07	292.3	270.8	241.3	280.3
U1C16	04/19/09	315.5	223.4	231.6	287.0
	Average:	297.4	269.0	228.4	285.0
	Link:	1A112B-1A162	1A111B-1A161	1B111B-1B161	1B112B-1B162
	Multiflow Result:	297.1	268.8	225.6	285.0

Reactor Coolant Pump Motor Coolers

Outage	Date	1A	1C	1B	1D
U1C12	05/30/03	134.6	136.7		
U1C13	11/14/04	171.0	135.0		
U1C14 AL	05/09/06	136.7	129.9	142.3	135.8
U1C15	10/31/07	133.3	134.2	100.1	136.7
U1C16	04/19/09	136.7	134.6	121.9	132.5
	Average:	142.5	134.1	121.4	135.0
	Link	1A116-1A124B	1A115-1A171B	1B115-1B123B	1B116-1B170B
	Multiflow Result:	142.2	134.5	120.0	132.7

R9

Control Rod Drive Coolers

Outage	Date	1A	1C	1B	1D
U1C12	05/30/03	82.4	76.2		
U1C13	11/14/04	75.3	84.6		
U1C14 AL	05/09/06	77.1	89.1	79.8	110.4
U1C15	10/31/07	73.4	87.4	82.0	109.7
U1C16	04/19/09	80.7	89.1	80.7	95.2
	Average:	77.8	85.3	80.8	105.1
	Link	1A170A-1A170B	1A171A-1A171B	1B171A-1B171B	1B170A-1B170B
	Multiflow Result:	77.6	86.3	81.9	110.1

Upper Compartment Coolers

Outage	Date	1A	1B
U1C12	05/30/03	24.0	
U1C13	11/14/04	22.9	
U1C14 AL	05/09/06	22.9	26.5
U1C15	10/31/07	20.5	25.7
U1C16	04/19/09	28.3	24.0
	Average:	23.7	25.4
	Link	1A122C-1A164	1B123A-1B123B
	Multiflow Result:	23.2	25.8

Flow Totals:

Outage	Date	1A	1C	1B	1D
U1C12	05/30/03	558.9	502.3		
U1C13	11/14/04	543.1	499.9		
U1C14 AL	05/09/06	524.3	499.9	460.9	533.8
U1C15	10/31/07	519.5	492.4	449.1	526.7
U1C16	04/19/09	561.2	447.1	458.2	514.7
	Average:	541.4	488.3	456.1	525.1
	Multiflow Result:	540.1	489.6	453.3	527.8

R9

Total 1A train 1029.7 Total 1B train 981.1

	1A	1C	1B	1D
dP from high side of inlet FE to high side of outlet FE:	37.5	37	43	44.5

Multiflow Result:

	Inlet Node	Head (ft)	Outlet Node	Head (ft)	dP (psid)
1A	1A110DD	826.4	1A161AA	740.0	37.4
1C	1A110CC	826.5	1A162AA	739.1	37.8
1B	1B110FF	834.8	1B161AA	739.5	41.3
1D	1B110EE	834.3	1B162AA	738.0	41.7

Unit 2

Lower Compartment Coolers

Outage	Date	2A	2C	2B	2D
U2C11	5/8/02	291.1	252.4	274.4	352.6
U2C12	11/11/03	293.8	246.2	269.6	325.6
U2C13	4/29/05	281.2	232.2	262.8	333.1
U2C14	12/1/06	290.3	253.8	275.1	285.7
U2C15	5/8/08	282.6	248.8	265.8	292.8
	Average:	**287.8**	**246.7**	**269.5**	**318.0**
	Link	2A212B-2A262	2A211B-2A261	2B211B-2B261	2B212B-2B262
	Multiflow Result:	287.0	247.0	266.5	316.5

Reactor Coolant Pump Motor Coolers

Outage	Date	2A	2C	2B	2D
U2C11	5/8/02	143.1	147.7	156.6	148.5
U2C12	11/11/03	145.0	147.7	153.7	136.2
U2C13	4/29/05	157.3	148.0	162.9	135.8
U2C14	12/1/06	145.4	147.0	151.5	135.0
U2C15	5/8/08	124.6	141.9	150.0	122.3
	Average:	143.1	146.5	154.9	135.6
	Link	2A216-2A224B	2A215-2A271B	2B215-2B223B	2B216-2B270B
	Multiflow Result:	143.9	146.2	160.6	135.2

R9

Control Rod Drive Coolers

Outage	Date	2A	2C	2B	2D
U2C11	5/8/02	99.6	94.8	98.1	98.8
U2C12	11/11/03	99.6	95.9	91.4	92.6
U2C13	4/29/05	85.8	107.1	101.0	96.7
U2C14	12/1/06	98.1	99.2	92.9	108.4
U2C15	5/8/08	121.9	96.6	94.0	109.7
	Average:	101.0	98.7	95.5	101.2
	Link	2A270A-2A270B	2A271A-2A271B	2B271A-2B271B	2B270A-2B270B
	Multiflow Result:	100.7	98.9	94.8	101.2

Flow Totals:

Outage	Date	2A	2C	2B	2D
U2C11	5/8/02	533.8	494.9	529.1	599.9
U2C12	11/11/03	538.4	489.8	514.7	554.4
U2C13	4/29/05	524.3	487.3	526.7	565.6
U2C14	12/1/06	533.8	500.0	519.5	529.1
U2C15	5/8/08	529.1	487.3	509.8	524.8
	Average:	531.9	491.9	520.0	554.8
	Multiflow Result:	531.6	492.1	521.9	552.9

Total 2A train 1023.7 Total 2B train 1074.7

dP from high side of inlet FE to high side of outlet FE:	46	44.5	41	42.5

Multiflow Result:

	Inlet Node	Head (ft)	Outlet Node	Head (ft)	dP (psid)
2A	2A210DD	845.7	2A262AA	739.8	45.8
2C	2A210CC	846.2	2A261AA	740.8	45.6
2B	2B210EE	838.6	2B261AA	740.6	42.4
2D	2B210DD	839.1	2B262AA	737.8	43.8

R9

7.16.17

It has been noted that the 'B' Aux Air Compressor data match on the original calculation, paragraph 7.13, was not as good as possible. It is desirable to perform a better data match. This is especially true in light of the model changes described in paragraph 7.16.11, along with reference 2.24. The original test data documented in Appendix C will be used. No system changes have occurred that would make this data invalid.

The file "TestB6.net" was obtained, unaltered from the file generated under Rev 0 of this calculation. The file was modified as follows in order to better match the field data:

- In link 2B680A-2B680A2, change the valve from "default" to "Leq=40".
- In link 2B227A-2B680 change the Cv of the throttled valve from Cv=2.42 to Cv=1.7.
- In link 2B680A3-2B680A3A change the "other: 'B' ACA aftercooler" dp from 2.38 to 0.38.
- In link 2B680A3A-2B227D change the "other: 'B' ACA" dp from 2.38 to 2.6.
- In order to make the main supply header pressure match at node 2B209AA, the flow to the B-train Diesels was isolated and the flow to the "B" SDBR chiller was greatly reduced. This was accomplished by setting a fixed flow of 0 in links 1B190-2B291 and 1B191B-1B191, and a fixed flow of 30 in link 2B237D-2B245A. R9

The listing of model changes in Appendix H is updated accordingly.

The results of these changes are in the table below:

PARAMETER	Source	Field Data	Model Results Original "TestB6"	Model Results
Head at node 2B209AA (ft)	Appendix C, p17	934.6 ft	914.0 ft	934.2 ft
Head at node 2B680A3A (ft)	Appendix C, p16	799.8 ft	793.4 ft	798.1 ft
Head at orifice in link 2B794A-2B227C (ft)	Appendix C, p16	739.4 ft	738.0 ft	738.4 ft
Flow at 2-FE-67-340 (gpm) Link 2B794A-2B227C	Appendix C, p 3	9.4 gpm	9.3 gpm	9.4 gpm

8.0 SUMMARY OF RESULTS

This calculation originally did not have a stated purpose for determination of any answers, only to develop a flow balanced Multiflow model of the ERCW system. However, the new Appendix I has been added which determines the available flows to the ERCW system users for the alignments that are specified in Appendix I. See Appendix I.

9.0 CONCLUSIONS

The modifications to the base model as listed in Appendix A produce a model that closely agrees with the available field data.

SUMMARY OF CHANGES MADE TO THE MODEL

NOTE: This Appendix, in conjunction with Appendixes B, C, and D, performed the original changes to the ERCW Multiflow base model in order to reflect actual flow balanced system, according to data from testing in 2002. Changes that have occurred to the ERCW system since that time will not be reflected in this Appendix until and unless a full system flow balances effort is again performed. Changes to the system since the original flow balancing are reflected in Section 7.16 of this calculation. The only changes that will be made to this Appendix are to remove modeling changes such as inserting nodes that have no effect on the flow balance, and other changes that are inserted into the ERCW base model calculation MDQ0067970004, revision 3, reference 2.1. Changes to the ERCW system such as deleting check valves by a design change will not be reflected in this Appendix. The reason for the statements in this Note is to preserve the ability to reproduce the model.

A.1 Under menu "Edit/Project Title and Site Name" change the title "MDQ0067-970004 - ERCW BASE MODEL APPENDIX B" to "2002 Flow Balance Model". For Site select "Sequoyah Nuclear Plant".

When saving the file change the file name from "sqnercw.net" to "2002_Flow_Balance_Model.net".

A.2 To use the flow balance model a default "C" factor for the carbon steel piping must be determined. From extensive experimenting with the model, it was determined that a default "C" factor of 70 with a 0.1 diameter reduction for the carbon steel piping was a best-fit of the available data. Many links have had the "C" factor and diameter reduction individually specified. A numerical analysis of "C" factors had been attempted for the supply headers but was discarded as being not representative of the system as a whole. Therefore, under menu "Edit / Material Default Properties" change the carbon steel Hazen-Williams C factor to 70, and change the Diameter Reduction to 0.1 inches. Note that this change must be verified each time the file is solved. Multiflow does not maintain these parameters each time the program is started.

A.3 The testing performed under References 2.2, 2.3 was performed in early to mid March, 2002. The ERCW temperature that existed during this timeframe was approximately 50F. Therefore, under menu "Edit / Default Values" change the temperature to 50F.

A.4 The following corrections were made to the model to reflect actual components installed in the system:

Correct model to indicate the presence of the old ERCW strainers (gutted per DCN M6635) in links 1A108E>1A108EE, 1B108E>1B108EE, 2A208G>2A208E, 2B208G>2A208E. Strainers shown as "Other: Gutted old strainer, dp=1.8 flow=10000).

For Check valves at Diesel Generators, Changed from default to Cv of 1125 for 6" valves in links 1A190C-1A191, 1A190-2A291, 1B190-2B291, 1B191B-1B191, 2A209D-2A209E, 2A209I-2A209F, 2B209D-2B209E, 2B209H-2B209F. Per Reference 2.6.

For check valves at Diesel Generators, changed from Default to Cv of 2000 for 8" valves in links 1A195-1A196A, 1A195-1B297C, 2A295-1B297, 2A295-1A196, 1B195-1B196, 1B195-1B297A, 2B295-1B297B, 2B295-1B196A. Per Reference 2.6.

Changed the ERCW pump discharge check valves from default to Cv of 21,700, per Reference 2.5. Nodes 1A104-1A105, 1A103-1A105, 2A203-2A205, 2A204-2A205, 1B104-1B105, 1B103-1B105, 2B203-2B205, 2B204-2B205

Model changes are also required to correct an error in the modeling of the new strainer backwash valves installed by DCN D20099. The ERCWBASE.NET file shows these valves with a Cv of 2184, the current valves have a smaller full open Cv. However, the full open position of these valves is not used in this analysis, therefore no changes will be made. These items are in links 1A106B-1A106C, 1B106B-1B106C, 2A206B-2A206C, 2B206B-2B206C.

The ERCW crossties are normally configured open, and all test data obtained in Reference 2.2 and 2.3 were obtained with flow present in the ERCW crossties. Accordingly, the fixed flow of zero will be removed in links 1A108C-1A108D and 1B108C-1B108D.

Throughout the testing the lake level remained fairly constant, accordingly the lake level will be set to the average test value of 676.5 in nodes 1ALAKE, 1BLAKE, 2ALAKE, and 2BLAKE.

A.5 Auxiliary Air Compressors A and B (links 1A374E-1A374F, 2B680A3-2B227D) piping geometry was revised to insert intermediate node points between the compressor and the aftercooler (nodes 1A374EE and 2B680A3A). Specific details regarding the old and revised link detail are provided in section A.8. While no specific drawings exist that include the detail of the vendor supplied internal tubing, the configuration was walked down and the model results closely match the test data taken.

A.6 The following links had components added to them to simplify modeling in lieu of varying piping "C" factors, obtaining real valve Cv factors, obtaining real heat exchanger pressure drop, etc. A single component type ("Demister") was used for ease of recognition to simulate pressure losses attributed to overall piping condition, form losses, and to facilitate matching model results to the flow test values. The format for these components is: "other: Demister", dp=5, flow=30"

Component	Link	dP (psid)	Flow (gpm)
Station Air Compressor A Aftercooler	1A140A-1B139A	19.5	50
Station Air Compressor A Intercooler	1A140F-1B139A	80	10
Station Air Compressor B Aftercooler	1A141A-1B140A	11	50
Station Air Compressor B Intercooler	1A141F-1B140A	50	10
SFP & TBBP CLR 1A	1A646C-1A646D	5.4	30
714 PEN RM CLR 1A	1A565A2-1A610A	22	30
714 PEN RM CLR 2A	2A301E2-2A610A	16	30
690 PEN RM CLR 1A	1A560-1A609A	18	30
690 PEN RM CLR 2A	2A609B-2A301G	17	30
UCVC 2A	2A222A-2A222B	13	30
CCP OIL CLR 1A	1A515-1A515A	13.5	30
CCP OIL CLR 2A	2A227I-2A227H	4.5	30
CCP RM CLR 1A	1A169-1A169A	3.2	30
CCP RM CLR 2A	2A169-2A169A	3	30
SIS PMP RM CLR 1A	1A535-1A525	2.2	30
SIS PMP RM CLR 2A	2A232B-2A232D	3.3	30
669 PEN RM CLR 1A	1A556-1A557	4.25	30
669 PEN RM CLR 2A	2A347A-2A347B	0.6	30
PIPE CHASE CLR 1A	1A570A1-1A570A3	3	30
PIPE CHASE CLR 2A	2A301F1-2A302C	9.35	30
1AA LCC	1A112B-1A162	6.2	300
1A CRD	1A170A-1A170B	27.5	75
U-1 #1RCP	1A116-1A124B	9.1	150
1CA LCC	1A111B-1A161	1	300
1C CRD	1A171A-1A171B	13	100
U-1 #3RCP	1A115-1A171B	0.25	100
2AA LCC	2A212B-2A262	18	300
2A CRD	2A270A-2A270B	23.6	100
U-2 #1RCP	2A216-2A270B	10	150
2C-A LCC	2A211B-2A261	14	250
2C CRD	2A271A-2A271B	20	100
CNT SPR PMP RM CLR 1A	1A185-1A185A	16.6	30
CNT SPR PMP RM CLR 2A	2A350A2-2A605A	7	30

Component	Link	dP (psid)	Flow (gpm)
RHR PMP RM CLR 1A	1A552-1A606B	25	30
RHR PMP RM CLR 2A	2A189A-2A606B	12	30
EGTS 2B	2B685B-2B227C	5	15
SFP & TBBP CLR 1B	1B601I-1B601J	9	40
714 PEN RM CLR 1B	1B665A2-1B610B	28	40
714 PEN RM CLR 2B	2B301C2-2B610B	27	40
CCS & AFW CLR 1B	1B603D-1B603E	7.5	100
690 PEN RM CLR 1B	1B660B4-1B311B	23	40
690 PEN RM CLR 2B	2B609A-2B301E	28	40
BAT & AFW CLR 2B	2B234A2-2B234	0.0001	80
UCVC 2D	2B222-2B222D	1	30
CCP OIL CLR 1B	1B497-1B497A	19	50
CCP OIL CLR 2B	2B229A-2B229B	0.0001	50
CCP RM CLR 1B	1B616-1B616A	27	50
CCP RM CLR 2B	2B171-2B171A	12	50
SIS PMP RM CLR 1B	1B625-1B635	13	40
SIS OIL CLR 1B	1B630-1B640	2	13
SIS PMP CLR RM 2B	2B232C-2B232E	2.2	40
669 PEN RM CLR 1B	1B656-1B657	29	50
669 PEN RM CLR 2B	2B349A-2B608A	3	50
PIPE CHASE CLR 1B*	1B670A1-1B671	23*	40
PIPE CHASE CLR 2B	2B301D1-2B302B	15	50
1B-B LCC	1B111B-1B161	20	300
1B CRD	1B171A-1B171B	28	100
U-1 #2 RCP	1B115-1B123B	6	150
1D-B LCC	1B112B-1B162	30	300
1D CRD	1B170A-1B170B	18	100
U-1 #4 RCP	1B116-1B170B	9	100
2B-B LCC	2B211B-2B261	9.5	300
2B CRD	2B271A-2B271B	13	100
2D-B LCC	2B212B-2B262	5.5	300
2D CRD	2B270A-2B270B	26	100
U-2 #4 RCP	2B216-2B270B	4.25	100
CNT SPR PMP RM CLR 1B	1B187-1B187A	19	30
CNT SPR PMP RM CLR 2B	2B187-2B187A	6	30
RHR PMP RM CLR 1B	1B652A-1B606C	7.5	20
RHR PMP RM CLR 2B	2B191C-2B606A	12	20

*1B pipe chase cooler demister changed from 32 to 23 to match last two data runs

A.7 The following table lists the optimum throttle valve Cv factors determined from the multiple sensitivity evaluations to best match Multiflow model results to the test data:

Train A valve Cv:

EQUIPMENT	LINK	VALVE NUMBER	Cv for throttle vlv
STATION AIR COMP C	1A135H-1A135I	0-67-1212	17
STATION AIR COMP D	1B135J-1B135K	0-67-1112	19.6
SFP & TBBP CLR 1A	1A646D-1A646E	0-67-646A	14.3
714 PEN RM CLR 1A	1A565A2-1A610A	1-67-610A	7.3
714 PEN RM CLR 2A	2A301E2-2A610A	2-67-610A	5.5
690 PEN RM CLR 1A	1A560-1A609A	1-67-609A	3.9
690 PEN RM CLR 2A	2A609B-2A301G	2-67-609A	5
CCP OIL CLR 1A	1A515C-1A601	1-67-766A	20
CCP RM CLR 1A	1A602>1A602A	1-67-601A	5.4
CCP RM CLR 2A	2A169B-2A169D	2-67-601A	8.1
669 PEN RM CLR 1A	1A556-1A557	1-67-608A	5
669 PEN RM CLR 2A	2A347A-2A347B	2-67-608A	6.8
PIPE CHASE CLR 1A	1A570A1-1A570A3	1-67-611A	5.8
PIPE CHASE CLR 2A	2A301F1-2A302C	2-67-611A	30
CNT SPR PMP RM CLR 1A	1A185A>1A321	1-67-605A	8.5
CNT SPR PMP RM CLR 2A	2A605A>2A351	2-67-605A	6
RHR PMP RM CLR 2A	2A606B>2A351	2-67-606A	6
D/G 1A1	1A1A1>1FE6769	1-67-510A	105
D/G 1A2	1A1A2>1FE67277	1-67-515A	120
1A-A D/G	1A195>1A196A	1-67-516B	1500
1A-A D/G	1A195>1B297C	1-67-511A	1500
D/G 2A1	2A2A1>2FE6769	2-67-510A	73.5
D/G 2A2	2A2A2>2FE67277	2-67-515A	72.8
2A-A D/G	2A295>1A196	2-67-516B	1300
2A-A D/G	2A295>1B297	2-67-511A	1200
CCS HX 1A1/1A2	1A910>1A915	1-67-1506	573
CCS HX 1A1/1A2	1A905>1A915	1-67-1509	601
CCS HX 1A1/1A2	1A915>1B920	1-67-551A	850
CCS HX 1A1/1A2 (35%)	1A915>1B920	1-FCV-67-146	550
CCS HX 1A1/1A2 (50%)	1A915>1B920	1-FCV-67-146	1240
CCS HX 1A1/1A2 (100%)	1A915>1B920	1-FCV-67-146	Default
CCS HX 2A1/2A2	2A907>2A910	2-67-1506	548
CCS HX 2A1/2A2	2A906>2A910	2-67-1509	628
CCS HX 2A1/2A2	2A910>2A920	2-67-551	2000
CCS HX 2A1/2A2 (35%)	2A910>2A920	2-FCV-67-146	235
CCS HX 2A1/2A2 (50%)	2A910>2A920	2-FCV-67-146	930
CCS HX 2A1/2A2 (100%)	2A910>2A920	2-FCV-67-146	Default
CSS HX 1A	1A150>1A152	1-67-537A	640
CSS HX 2A	2A250>2A152	2-67-537A	850 (695 in test 4)
UCVC 1A	1A124A-1A124B	1-67-666A	3.7
1A CRD	1A112A-1A122B	1-67-567A	90
1C CRD	1A111A-1A171	1-67-567C	99
2A CRD	2A212A-2A270	2-67-567A	100
U-2 #1 RCP	2A216-2A270B	2-67-572A	100
2C CRD	2A211A-2A271	2-67-567C	100
U-2 #3 RCP	2A215-2A271B	2-67-572C	145
1A-A STRAINER BACKWASH	1A106B-1A106C	1-67-1070	82
2A-A STRAINER BACKWASH	2A206B-2A206C	2-67-1070	95.5

Train B valve Cv:

EQUIPMENT	LINK	VALVE NUMBER	Cv for throttle vlv
EGTS Room Cooler 2B-B	2B685B-2B227C	0-67-685B	2.8
Auxiliary Control Air Compressor B-B	2B227A>2B680	2-67-680	2.42
714 Penetration Rm 1B-B	1B665A2-1B610B	1-67-610B	5.1
714 Penetration Rm 2B-B	2B301C2-2B610B	2-67-610B	6.5
CCS/AFW Pump Space Cooler 1B-B	1B603E>1B133A	0-67-643B	15
690 Penetration Rm 1B-B	1B660B4-1B311B	1-67-609B	3.4
690 Penetration Rm 2B-B	2B609A-2B301E	2-67-609B	3.6
BAT/AFW Pump Space Cooler 2B-B	2B234A2-2B234	0-67-673B	19
CCP 2B-B Oil Clr	2B229D-2B229E	2-67-764B	11
CCP 2B-B Room Clr	2B171B>2B171D	2-67-601B	9
669 Penetration Room Clr 1B-B	1B656-1B657	1-67-608B	3.6
669 Penetration Room Clr 2B-B	2B349A-2B608A	2-67-608B	5.9
Pipe Chase Clr 1B-B	1B670A1-1B671	1-67-611B	50
Pipe Chase Clr 2B-B	2B301D1-2B302B	2-67-611B	9.1
Containment Spray Pump 1B-B Room Clr	1B187A>1B321	1-67-605B	7
Containment Spray Pump 2B-B Room Clr	2B187A>2B351	2-67-605B	3.3
RHR Pump Rm Clr 2B-B	2B606A>2B351	2-67-606B	4.6
B-B Shutdown Board Room Chiller	2B237D-2B245A	0-67-555B	210
D/G 1B1	1B1B1>1FE6774	1-67-510B	85
D/G 1B2	1B1B2>1FE67280	1-67-515B	83
1B-B D/G	1B195>1B196	1-67-511A	700
1B-B D/G	1B195>1B297A	1-67-516B	700
D/G 2B1	2B2B1>2FE6774	2-67-510B	92
D/G 2B2	2B2B2>2FE67280	2-67-515B	145
2B-B D/G	2B295>1B196A	2-67-511A	800
2B-B D/G	2B295>1B297B	2-67-516B	800
CCS HX 0B1	2B915>2B920	0-67-1506	532
CCS HX 0B2	2B910>2B920	0-67-1509	598
CCS HX 0B1/0B2	2B925>1B920	0-67-553	2150
CCS HX 0B1/0B2 (35%)	2B925>1B920	0-FCV-67-152	1600
CCS HX 0B1/0B2 (50%)	2B925>1B920	0-FCV-67-152	3000
CCS HX 0B1/0B2 (100%)	2B925>1B920	0-FCV-67-152	Default
0B1/0B2 to "A" discharge	2B925>2A920	0-67-552	1950
0B1/0B2 to "A" discharge (35%)	2B925>2A920	0-FCV-67-151	848
0B1/0B2 to "A" discharge (50%)	2B925>2A920	0-FCV-67-151	1355
0B1/0B2 to "A" discharge (100%)	2B925>2A920	0-FCV-67-151	Default
CSS HX 1B	1B150>1B152	1-67-537B	645
CSS HX 2B	2B250>2B152	2-67-537B	613
UCVC 1B	1B123A-1B123B	1-67-666B	5
1B CRD	1B111A-1B122E	1-67-567B	100
1D-B LCC	1B112>1B112C	1-67-564D	150
1D CRD	1B112A-1B170	1-67-567D	100
U-1 #4 RCP	1B116-1B170B	1-67-572D	115
2B CRD	2B211A>2B271	2-67-567B	115
2D-B LCC	2B212>2B212C	2-67-564D	200
2D CRD	2B212A>2B270	2-67-567D	115
U-2 #4 RCP	2B216-2B270B	2-67-572D	115
1B-B STRAINER BACKWASH	1B106B-1B106C	1-67-1073	84
2B-B STRAINER BACKWASH	2B206B-2B206C	2-67-1073	84

A.8 The modeling changes that were previously in this paragraph are now part of the ERCW base model calculation, reference 2.1.

A.9 Miscellaneous Changes

Changed the 1A header C factor from default to 65 for links from 1A105C to 1A110. Links 1A105C-1A106, 1A106-1A107, 1A107-1A108, 1A108-1A108A, 1A108A-1A108C, 1A108C-1A109, 1A109-1A109AA, 1A109AA-1A109A, 1A109A-1A109B, 1A109B-1A110.

Fixed C and reduction for 88 and 0.1 on the 2A supply header from 2A206 to 2A209AA. Links 2A206-2A207, 2A207-2A208, 2A208-2A208A, 2A208A-2A208C, 2A208C-2A209, 2A209-2A209AA.

Changed the 1B header C factor from default to 65 for links from 1B105C to 1B110. Links 1B105C-1B106, 1B106-1B107, 1B107-1B108, 1B108-1B108A, 1B108A-1B108C, 1B108C-1B109, 1B109-1B109AA, 1B109AA-1B109A, 1B109A-1B109B, 1B109B-1B110.

Fixed C and reduction for 88 and 0.1 on the 2B supply header from 2B206 to 2B209AA. Links 2B206-2B207, 2B207-2B208, 2B208-2B208A, 2B208A-2B208C, 2B208C-2B209, 2B209-2B209C, 2B209C-2B209AA.

EBR A Change Cv to 34.3 to match flow data in link 1A575D1-1A575D2

EBR B Changed Cv to 34.7 to match flow data in link 1B675D1-1B675D2. Changed link 1B129-1B129A to C=55, 0.4 to make flow and pressure look better on EBR, MCR, and SAC.

MCR A Change Cv to 28.5 in link 1A580C-1A580D. Changed C to 50 with a diameter reduction of .53 inches in links 1A130B-1A580A, 1A580D-1A131B.

To help the A-train MCR, EBR, and Air Compressors, made link 1A129-1A129A to C=60, 0.3.

MCR B Change Cv to 19.2 to match flow and pressure data best in link 1B680C-1B680D. Changed link 1B680D-1B131B to C=40, .4, Change link 1B130A-1B130 to C=55, 0.4

SDBR A Change Cv to 67 in link 1A155E-1A155F

SDBR B Change Cv to 63 in link 2B237A-2B237C SDBR chiller changed HX dP from 200 gpm@.88 psid to 448 gpm@ 3.51 psid (98") in link 2B237-2B237A, matching data from PI-5.A.

Change traveling screens from flow=22000, dp=1.1 to flow=22000, dp=0.1 in links 1ALAKE-1AWELL, 1BLAKE-1BWELL, 2BLAKE-2BWELL, 2ALAKE-2AWELL. Matches pump curves well. Justification: With the actual lake level during the test there is approximately 50 vertical feet of the traveling screen that experiences flow. Therefore, the differential level across the screen is very small. The plant traveling screen level instruments likewise reflect a negligible screen dP normally, also the screen dP during the testing was between 0 and 1 inch.

Fixed flow to zero for all Incore Room Chiller 1A524F-1A524G, 1B524F-1B524G, 2A524F-2A524G, 2B524F-2B524G

Made C=135 in links 2A227A-2A227E, 2A387B-2A234 (2A BAT) and changed BAT dP from 2.47 to 1.2 in link 2A227E-2A387A

Made C=126 in links 2B227E-2B234A, 2B234A2-2B234 (2B BAT) and changed BAT dP from 2.47 to 1.2 in link 2B234A-2B234A2

Made U-2 RCP #3 link 2A211D-2A213 be C=65, 0.1
Made Unit 1 Containment Coolers supply and return nodes 1A110-1A110B and 1A118-1A118D be C=50, 0.4.

Averaged the dP of the B-train strainers and got 5.2 psid @ 16,000 gpm. Changed A-train strainer dP accordingly. Did not include the A-train strainers in the averaging due to obviously inconsistent test data for the A-train strainers (see section 6.11). Changed all strainer dPs in links 1A105C-1A106, 2A205C-2A206, 1B105C-1B106, 2B205C-2B206.

Changed C factors for D/G links 1A1: 1A190C-1A191 to 82, 1A2: 1A191-2B209F to 83, 2A2 2A291-2B209E to 85.

Changed C factor for D/G links 1B119-1B190A to 50.
Changed C factor for D/G links 2B291-2A209E to 100.

An apparent data anomaly exists in the that the 1A strainer backwash flow was equal to the 2A in Test 1, but were not close in the remaining tests. Accordingly, the balance will be done to match the later tests at the expense of Test 1.

Got the Train A SIS pump flow to match by changing the flow/dP to 3.1 gpm at .29 psid for 1A530-1A540 (1A SIP), then for 2A232C-2A232F made it 3.1 gpm at .1 psid (2A SIP).

Got the Train B SIS pump flow to match by changing the flow/dP to 3.1 gpm at .3 psid for 1B630-1B640 (1B SIP), then for 2B232G-2B232F made it 3.1 gpm at .2 psid (2B SIP).

Got the SAC data to match pretty good by adding a demister (dp=5.3, flow=350) in link 1A130-1A130AA, adding a demister (dp=3, flow=300) in link 1B130-1B135, changing C to 55 with a .16 diameter reduction for links 1A140-1A140B, 1A140B-1A140C, 1A142-1A141B, 1A141B-1A141C. Then played with demisters at various air compressors, and changed the flow vs dp of the C and D SAC to dP=4.4, flow=95 in links 1A135M-1A135N, & 1B135O-1B135P and changed the full-open Cv of the 0-67-1212 and 1112 throttle vlvs to 28 in links 1A135H-1A135I, and 1B135J-1B135K. Changed C to 140 in links 1A135N-1A135P, 1A135P-1A135S, 1A135S-1A135U, 1B135P-1B135R, 1B135R-1A135P. Changed link 1B130-1B135 to C=60, 0.2. Changed fixed pressure at terminal node 1A135V to be 2 psig to make pressure at 0-67-637 in test data match model data at Tee 1B146.

Changed dP for CCP Oil Cooler 2B from 1.8 to 1.5 in link 2B228-2B229A. Note that the existing modeling was simplified in that the configuration only shows the pump oil cooler, not the gear oil cooler. This change was made to allow the model to more closely reflect the field test data.

Made U-2 #2 RCP nodes 2B211D-2B213 & 2B215-2B271B be C=95, 0.1, and c=90 in link 2B213-2B215.

Changed C in links 2A226B-2A235 to 60, and changed C and diameter reduction in links 1B235-2A235 and 1B235-1A900 to 50, 0.2.

Changed C and diameter reduction in link 1A190A-1A190B to 55, 0.4.

A.10 The testing under Reference 2.2 and 2.3 included development of pump curves. Below are the test data points from References 2.2 and 2.3. Refer to

ERCW pump J-A (See Paragraph 6.11)

FLOW	Pump Head
0	372
6723.791	276.3868
8245.677	252.1374
8568.546	247.5185
8885.64	241.7448
9465.757	224.4238
9548.974	216.918
11020.91	188.627
11297.99	171.9988
11923.87	155.1397
12406.35	143.5924

ERCW pump K-A

FLOW	Pump Head
0	372
6842.544	280.6605
7627.835	263.3395
8321.109	255.2564
9108.937	244.8637
9743.053	229.8522
10043.49	223.5012
10937.8	195.2102
11504.03	180.1986
12141.22	163.455
12778.4	147.8661

ERCW pump L-B

FLOW	Pump Head
0	372
6318.465	287.5889
7187.463	270.2679
7657.211	262.1848
8515.212	254.1016
9328.263	241.3995
9781.538	228.6975
10441.54	206.7575
11058.25	189.4365
11590.8	175.5797
11839.17	169.806

ERCW pump M-B

FLOW	Pump Head
0	372
6702.979	282.97
7480.831	271.4226
8471.008	261.03
8965.921	248.9053
9567.629	233.3164
9982.659	222.3464
10614.26	207.9122
11162.02	191.1686
11750.6	175.5797
11959.62	169.806

ERCW pump N-B

FLOW	Pump Head
0	372
6078.656	289.8984
6954.84	273.1547
7395.849	265.649
8429.115	253.5242
9217.588	239.0901
9681.547	228.1201
10796.15	204.448
11005.73	192.9007
11660.63	176.7344
11926.06	170.3834

ERCW pump P-B

FLOW	Pump Head
0	372
6130.898	286.4342
6906.247	271.4226
7688.734	261.03
8534.841	250.6374
9159.701	239.6674
9645.433	227.5427
10477.85	204.448
11100.66	187.127
11598.94	172.1155
11769.97	166.9192

ERCW pump Q-A

FLOW	Pump Head
0	372
6563.456	278.6963
7348.442	268.3037
8023.49	255.6016
8981.897	242.3222
9543.492	227.888
9721.422	222.9804
11433.22	179.9665
12069.95	162.0681
12720.53	147.0566

ERCW pump R-A

FLOW	Pump Head
0	372
6910.062	276.6189
7602.438	262.7621
8324.612	254.1016
9072.557	243.1316
9615.88	229.8522
9915.88	222.9238
10748.01	195.2102
11395.43	177.3118
12004.01	159.4134
12661.83	142.6697

TRAIN A

COMPONENT	TEST DATA FROM 1&2-SI-SFT-067-739.0 (gpm)	FRACTION OF GROUP FLOW	STEPS AND FLOW VALUES FROM 0-PI-SFT-067-005.A (Bold Italics are calculated component flow values) 6.1[41]	6.1[46]	6.1[49]	6.1[56]	6.1[65]
1A GROUP	545.4		570.1	608.3	576.6	605.2	562.3
1A LCC	323.2	0.59259	***337.8***	***360.4***	***341.7***	***358.6***	***333.2***
1A CRD	69.9	0.12816	***73.1***	***78.0***	***73.9***	***77.6***	***72.1***
#1 RCP	134.6	0.24679	***140.7***	***150.1***	***142.3***	***149.4***	***138.8***
1A UCC	17.7	0.03245	***18.5***	***19.7***	***18.7***	***19.6***	***18.2***
1C GROUP	504.9		526.7	562.3	532.6	559.0	514.7
1C LCC	289.3	0.57298	***301.8***	***322.2***	***305.2***	***320.3***	***294.9***
1C CRD	87	0.17231	***90.8***	***96.9***	***91.8***	***96.3***	***88.7***
#3 RCP	128.6	0.25470	***134.2***	***143.2***	***135.7***	***142.4***	***131.1***
2A GROUP	533.8		520.8	491.2	410.0	484.8	522.0
2A LCC	291.1	0.54534	***284.0***	***267.9***	***223.6***	***264.4***	***284.7***
2A CRD	99.6	0.18659	***97.2***	***91.6***	***76.5***	***90.5***	***97.4***
#1 RCP	143.1	0.26808	***139.6***	***131.7***	***109.9***	***130.0***	***139.9***
2C GROUP	494.9		470.4	443.0	369.9	435.9	461.0
2C LCC	252.4	0.51000	***239.9***	***225.9***	***188.7***	***222.3***	***235.1***
2C CRD	94.8	0.19155	***90.1***	***84.9***	***70.9***	***83.5***	***88.3***
#3 RCP	147.7	0.29844	***140.4***	***132.2***	***110.4***	***130.1***	***137.6***

TRAIN B

COMPONENT	TEST DATA FROM 1&2-SI-SFT-067-739.0		STEPS AND FLOW VALUES FROM 0-PI-SFT-067-005.B (Bold Italics are calculated component flow values)				
	(gpm)	FRACTION OF GROUP FLOW	6.1[28]	6.1[33]	6.1[36]	6.1[40]	6.1[49]
1B GROUP	492.6		538.5	561.2	533.8	567.9	517.2
1B LCC	254.7	0.51705	***278.4***	***290.2***	***276.0***	***293.6***	***267.4***
1B CRD	82	0.16646	***89.6***	***93.4***	***88.9***	***94.5***	***86.1***
#2 RCP	134.4	0.27284	***146.9***	***153.1***	***145.7***	***154.9***	***141.1***
1B UCC	21.5	0.04365	***23.5***	***24.5***	***23.3***	***24.8***	***22.6***
1D GROUP	512.3		556.8	580.9	552.3	585.2	533.8
1D LCC	260.5	0.50849	***283.1***	***295.4***	***280.8***	***297.6***	***271.5***
1D CRD	113.5	0.22155	***123.4***	***128.7***	***122.4***	***129.7***	***118.3***
#4 RCP	138.3	0.26996	***150.3***	***156.8***	***149.1***	***158.0***	***144.1***
2B GROUP	529.1		597.9	566.8	494.9	574.4	585.2
2B LCC	274.4	0.51862	***310.1***	***293.9***	***256.7***	***297.9***	***303.5***
2B CRD	98.1	0.18541	***110.9***	***105.1***	***91.8***	***106.5***	***108.5***
#2 RCP	156.6	0.29597	***177.0***	***167.7***	***146.5***	***170.0***	***173.2***
2D GROUP	599.9		665.1	629.4	550.0	636.3	649.9
2D LCC	352.6	0.58776	***390.9***	***369.9***	***323.2***	***374.0***	***382.0***
2D CRD	98.8	0.16469	***109.5***	***103.7***	***90.6***	***104.8***	***107.0***
#4 RCP	148.5	0.24754	***164.6***	***155.8***	***136.1***	***157.5***	***160.9***

A TRAIN ERCW FLOW RATES

		Step from reference 2.2					
COMPONENT	LINK	6.1[41]	6.1[46]	6.1[49]	6.1[56]	6.1[65]	6.1[73]
D/G 1A1	1a191-1A1A1	556.2	566.2	543.4	571.2	551.1	
D/G 1A2	2B209F-1A1A2	566.2	585.8	571.2	551.1	583.4	
D/G 2A1	2A291-2A2A1	443.7	468.4	443.7	450.0	456.2	
D/G 2A2	2B209E-2A2A2	417.6	434.1	430.8	443.7	443.7	
CCS HX 1A1/1A2	1B235-1A900	4039.9	3775.9	3182.8	3825.3	3946.0	
CCS HX 2A1/2A2	2A910-2A920	5634.8	5441.5	4594.1	5313.7	5616.5	
CSS HX 1A	1A121A-1A150	4039.8	0.0	0.0	0.0	3773.6	
CSS HX 2A	2A226-2A250	0.0	4326.7	3847.1	3878.2	0.0	
SUPPLY HEADER 1A	1A109-1A109AA	5986.7	2449.5	2349.5	2623.0	6273.8	
SUPPLY HEADER 2A	2A209-2A209AA	11313.6	14560.1	12247.3	14352.6	11224.9	
ELECT BD RM CHR A	1A575E-1A575F	206.6	227.2	221.6	233.8	199.7	
MCR CHILLER A	1A580B-1A580C	0.0	0.0	0.0	0.0	123.7	
STATION AIR COMP A Aftercooler	1A140A-1B139A	54.9	57.9	55.3	60.8	55.7	
STATION AIR COMP A Intercooler	1A140F-1B139A	4.1	4.3	4.1	4.5	4.1	
STATION AIR COMP B Aftercooler	1A141A-1B140A	66.9	69.9	66.8	72.9	66.1	
STATION AIR COMP B Intercooler	1A141F-1B140A	4.5	4.8	4.6	5.0	4.6	
STATION AIR COMP C	1A135N-1A135P	125.4	131.9	125.4	102.9	95.3	
STATION AIR COMP D	1B135P-1B135R	125.4	131.3	125.4	113.4	104.4	
EGTS 2A	2A227C3-2A685A	See 6.11	13.1	10.7	13.1	14.0	
AUX CONT AIR A	1A375E-1A375F	0.0	0.0	0.0	0.0	0.0	10.3
SFP & TBBP CLR 1A	1A646C-1A646D	38.7	41.7	39.7	39.7	36.5	
714 PEN RM CLR 1A	1A565A2-1A610A	29.5	31.2	29.9	29.2	26.4	
714 PEN RM CLR 2A	2A301E2-2A610A	33.0	31.2	26.1	22.7	24.2	
SHUTDOWN BD RM CHR A	1A155B-1A155E	37.6	54.6	41.5	448.0	413.4	
CCS & AFW CLR 1A	1A510D-1A510E	111.8	119.4	113.9	0.0	110.6	
690 PEN RM CLR 1A	1A560-1A609A	29.6	31.7	30.0	20.7	21.5	
690 PEN RM CLR 2A	2A609B-2A301G	28.8	27.4	22.9	20.3	21.6	
BAT & AFW CLR 2A	2A387B-2A234	75.5	71.1	59.7	71.1	75.5	
UCVC1C	1A122-1A122D	0.0	0.0	0.0	0.0	0.0	
UCVC 2A	2A222A-2A222B	26.0	24.4	19.5	24.0	25.6	
UCVC 2C	2A222-2A222D	0.0	0.0	0.0	0.0	0.0	
INCORE INST RM CHR 1A	1A524O-1A524P	0.0	0.0	0.0	0.0	0.0	
INCORE INST RM CHR 2A	2A524O-2A524P	0.0	0.0	0.0	0.0	0.0	
CCP OIL CLR 1A	1A515-1A515A	36.3	39.0	36.7	39.5	34.7	
CCP OIL CLR 2A	2A227I-2A227H	43.8	41.0	34.4	39.8	42.2	
CCP RM CLR 1A	1A169-1A169A	46.4	49.7	46.4	30.8	28.2	
CCP RM CLR 2A	2A169-2A169A	50.2	47.1	38.6	34.8	36.9	
SIS PMP RM CLR 1A	1A535-1A525	34.0	36.2	34.6	37.5	34.1	
SIS OIL CLR 1A	1A530-1A540	11.5	12.4	11.7	12.7	11.5	
SIS PMP RM CLR 2A	2A232B-2A232D	32.7	30.4	26.4	32.3	34.4	

Prepared by: ____________ Checked by: ____________

A TRAIN ERCW FLOW RATES

		Step from reference 2.2					
COMPONENT	**LINK**	**6.1[41]**	**6.1[46]**	**6.1[49]**	**6.1[56]**	**6.1[65]**	**6.1[73]**
SIS OIL CLR 2A	2A232C-2A232F	12.3	12.0	9.3	12.7	13.5	
669 PEN RM CLR 1A	1A556-1A557	51.3	55.4	52.4	30.5	30.3	
669 PEN RM CLR 2A	2A347A-2A347B	58.9	55.7	46.9	33.7	35.6	
PIPE CHASE CLR 1A	1A570A1-1A570A3	62.2	66.4	63.6	35.2	32.5	
PIPE CHASE CLR 2A	2A301F1-2A302C	43.2	40.7	33.8	44.8	47.5	
LCVC GROUP 1A	1A110D-1A112	570.1	608.3	576.6	605.2	562.3	
LCVC GROUP 1C	1A110C-1A111	526.7	562.3	532.6	559.0	514.7	
LCVC GROUP 2A	2A210D-2A212	520.8	491.2	410.0	484.8	522.0	
LCVC GROUP 2C	2A210C-2A211	470.4	443.0	369.9	435.9	461.0	
CNT SPR PMP RM CLR 1A	1A185-1A185A	26.0	27.8	26.4	25.8	22.6	
CNT SPR PMP RM CLR 2A	2A350A2-2A605A	34.0	32.0	26.9	23.3	24.6	
RHR PMP RM CLR 1A	1A552-1A606B	15.3	16.3	15.5	17.1	15.3	
RHR PMP RM CLR 2A	2A189A-2A606B	22.8	21.1	17.6	18.2	19.3	
1A-A STRAINER BACKWASH	1A106B-1A106C	690.3	604.5	654.9	611.0	604.5	
2A-A STRAINER BACKWASH	2A206B-2A206C	690.3	690.3	0.0	654.9	654.9	
Calculated Values:							
U1 AUX BLDG TOTAL:		6254.6	2379.7	2254.6	2524.1	6321.9	
U2 AUX BLDG TOTAL:		11127.0	14925.3	12776.7	14328.6	10960.4	
TOTAL FLOW:		20746.0	20654.3	17675.4	20134.7	20576.1	
AUX BLDG TOTAL:		17381.6	17305.0	15031.3	16852.8	17282.3	

Prepared by: ____________ Checked by: ____________

B TRAIN ERCW FLOW RATES

		Step from reference 2.3					
COMPONENT	**Link**	**6.1[28]**	**6.1[33]**	**6.1[36]**	**6.1[40]**	**6.1[49]**	**6.1[57]**
D/G 1B1	1B191-1B1B1	514.2	546.0	522.3	546.0	505.9	
D/G 1B2	2A209F-1B1B2	494.7	503.1	477.3	505.9	491.8	
D/G 2B1	2B291-2B2B1	522.3	519.6	474.3	525.0	505.9	
D/G 2B2	2A209E-2B2B2	677.1	679.2	645.2	691.5	666.6	
CCS HX 0B1/0B2	2B920-2B925	7048.4	6681.3	5817.2	6788.2	6841.1	
CSS HX 1B	1B121A-1B150	3622.2	0.0	0.0	0.0	4345.1	
CSS HX 2B	2B226-2B250	0.0	4157.0	3687.8	4289.6	0.0	
SUPPLY HEADER 1B	1B109-1B109AA	5959.9	2529.8	2433.1	2332.4	6499.3	
SUPPLY HEADER 2B	2B209C-2B209AA	8859.9	12489.9	10908.6	12449.8	8888.1	
ELECT BD RM CHR B	1B675E-1B675F	242.1	253.3	242.1	264.1	230.2	
MCR CHILLER B	1B680D-1B131B	0.0	0.0	0.0	0.0	116.2	
STATION AIR COMP A AFTERCOOLER	1A140A-1B139A	62.0	63.9	61.5	71.3	65.8	
STATION AIR COMP A INTERCOOLER	1A140F-1B139A	4.0	4.0	3.8	4.4	4.9	
STATION AIR COMP B AFTERCOOLER	1A141A-1B140A	74.6	76.9	72.8	84.7	79.7	
STATION AIR COMP B INTERCOOLER	1A141F-1B140A	5.2	5.3	5.1	6.0	5.5	
STATION AIR COMP C	1A135N-1A135P	140.2	143.4	137.5	120.5	112.1	
STATION AIR COMP D	1B135P-1B135R	140.8	145.0	138.1	0.0	0.0	
EGTS 2B	2B685B-2B227C	17.3	16.4	14.2	13.1	13.3	
AUX CONT AIR B	2B794A-2B227C	0.0	0.0	0.0	0.0	0.0	9.4
SFP & TBBP CLR 1B	1B601I-1B601J	40.0	42.2	39.8	42.9	38.9	
714 PEN RM CLR 1B	1B665A2-1B610B	37.5	39.1	37.1	29.0	26.0	
714 PEN RM CLR 2B	2B301C2-2B610B	38.5	36.5	31.9	31.0	31.4	
SHUTDOWN BD RM CHR B	2B237D-2B245A	50.0	50.1	46.9	46.9	432.0	
CCS & AFW CLR 1B	1B603D-1B603E	112.4	117.7	111.5	85.3	76.6	
690 PEN RM CLR 1B	1B660B4-1B311B	36.5	38.1	36.2	21.9	19.4	
690 PEN RM CLR 2B	2B609A-2B301E	34.8	32.8	29.0	21.2	21.7	
BAT & AFW CLR 2B	2B234A2-2B234	88.8	84.4	73.2	75.7	77.5	
UCVC 2B	2B221A-2B221B	0.0	0.0	0.0	0.0	0.0	
UCVC 2D	2B222-2B222D	38.4	36.1	31.2	36.6	37.2	
INCORE INST RM CHR 1B	1B524O-1B524P	0.0	0.0	0.0	0.0	0.0	
INCORE INST RM CHR 2B	2B524O-2B524P	0.0	0.0	0.0	0.0	0.0	
CCP OIL CLR 1B	1B497-1B497A	43.5	45.3	43.0	46.7	41.8	
CCP OIL CLR 2B	2B229A-2B229B	63.0	60.0	52.4	50.8	51.3	
CCP RM CLR 1B	1B616-1B616A	43.6	45.8	43.1	46.6	41.9	
CCP RM CLR 2B	2B171-2B171A	56.7	53.3	46.4	43.1	43.8	
SIS PMP RM CLR 1B	1B625-1B635	34.2	36.2	34.0	38.0	33.6	
SIS OIL CLR 1B	1B630-1B640	13.4	13.8	13.2	14.4	13.2	
SIS PMP CLR RM 2B	2B232C-2B232E	43.2	40.5	35.4	44.2	45.2	
SIS OIL CLR 2B	2B232C-2B232G	14.9	14.2	12.5	15.1	15.4	

Prepared by: ____________ Checked by: ____________

B TRAIN ERCW FLOW RATES

		Step from reference 2.3					
COMPONENT	**Link**	**6.1[28]**	**6.1[33]**	**6.1[36]**	**6.1[40]**	**6.1[49]**	**6.1[57]**
669 PEN RM CLR 1B	1B656-1B657	43.3	45.6	43.3	24.8	22.1	
669 PEN RM CLR 2B	2B349A-2B608A	70.8	67.0	58.1	37.1	37.9	
PIPE CHASE CLR 1B	1B670A1-1B671	42.0	44.0	41.7	54.2	48.7	
PIPE CHASE CLR 2B	2B301D1-2B302B	60.6	58.1	50.7	46.7	47.5	
LCVC GROUP 1B	1B110F-1B111	538.5	561.2	533.8	567.9	517.2	
LCVC GROUP 1D	1B110E-1B112	556.8	580.9	552.3	585.2	533.8	
LCVC GROUP 2B	2B210E-2B211	597.9	566.8	494.9	574.4	585.2	
LCVC GROUP 2D	2B210D-2B212	665.1	629.4	550.0	636.3	649.9	
CNT SPR PMP RM CLR 1B	1B187-1B187A	30.0	31.4	29.7	27.8	24.9	
CNT SPR PMP RM CLR 2B	2B187-2B187A	42.4	40.0	35.0	20.3	20.8	
RHR PMP RM CLR 1B	1B652A-1B606C	19.5	20.3	19.3	21.0	18.9	
RHR PMP RM CLR 2B	2B191C-2B606A	24.8	23.1	20.3	20.3	20.7	
1B-B STRAINER BACKWASH	1B106B-1B106C	666.9	678.7	707.4	690.3	701.8	
2B-B STRAINER BACKWASH	2B206B-2B206C	690.3	666.9	0.0	678.7	690.3	
Calculated Values:							
U1 AUX BLDG TOTAL:		5882.3	2353.6	2239.0	2156.7	6416.4	
U2 AUX BLDG TOTAL:		8955.7	12647.0	11087.1	12790.6	8971.9	
TOTAL FLOW:		18403.5	18594.2	16152.6	18584.8	18950.6	
AUX BLDG TOTAL:		14838.0	15000.6	13326.1	14947.3	15388.3	

Prepared by: ____________ Checked by: ____________

A TRAIN ERCW HEAD PRESSURES

		Step from reference 2.2					
COMPONENT	NODE	6.1[41]	6.1[46]	6.1[49]	6.1[56]	6.1[65]	6.1[73]
D/G 1A1	1A191	802.3	808.0	797.6	806.3	801.7	
D/G 1A1	1FE6769	732.4	733.5	731.8	733.5	732.4	
D/G 1A2	2B209F	793.6	797.1	788.4	796.5	791.9	
D/G 1A2	1FE67277	733.0	734.7	732.4	733.5	733.5	
D/G 2A1	2A291	820.7	825.9	814.4	824.8	818.4	
D/G 2A1	2FE6769	730.1	730.1	727.8	728.9	730.1	
D/G 2A2	2B209E	816.7	821.3	810.3	820.2	814.4	
D/G 2A2	2FE67277	726.0	730.1	728.4	729.5	730.1	
CCS HX 1A1/1A2	1A902	826.0	815.6	787.9	814.5	824.9	
CCS HX 1A1/1A2	1A905	813.3	804.1	779.8	804.1	812.2	
CCS HX 1A1/1A2	1A910	814.5	805.2	781.0	805.2	813.3	
CCS HX 1A1/1A2	1A915	785.6	778.7	762.5	778.7	784.4	
CCS HX 1A1/1A2	1B920	725.5	723.5	722.8	722.3	722.8	
CCS HX 2A1/2A2	2A904	824.9	815.6	787.9	814.5	824.9	
CCS HX 2A1/2A2	2A907	806.4	798.3	776.4	798.3	805.2	
CCS HX 2A1/2A2	2A906	801.8	794.8	772.9	793.7	801.8	
CCS HX 2A1/2A2	2a910	748.6	747.5	739.4	747.5	748.6	
CCS HX 2A1/2A2	2A920	717.2	718.8	717.2	719.1	719.8	
SUPPLY HEADER 1A	1A109AA	850.3	859.5	844.5	858.4	849.7	
SUPPLY HEADER 2A	2A209AA	845.1	839.9	805.3	838.7	844.5	
ELECT BD RM CHR A	1A575D1	816.8	826.0	816.8	831.8	811.0	
MCR CHILLER A	1A580A	NA	NA	NA	NA	803.6	
STATION AIR COMP A	1A140C	752.6	760.1	753.1	764.7	752.0	
STATION AIR COMP C	1A135J	723.6	727.1	723.6	714.4	710.9	
STATION AIR COMP C	1A135O	702.9	705.2	702.9	698.2	695.9	
STATION AIR COMP D	1B135L	726.0	729.4	726.0	721.3	716.7	
STATION AIR COMP D	1B135Q	705.2	707.5	705.2	702.9	700.5	
Downstream of SAC	1B146	695.6	696.1	695.4	694.9	693.7	
AUX CONT AIR A intermediate	1A374EE	NA	NA	NA	NA	NA	846.0
AUX CONT AIR A Flow elem	1A375E	NA	NA	NA	NA	NA	738.8
SHUTDOWN BD RM CHR A UPSTREAM	1A155A	842.2	858.3	844.5	856.0	841.0	
SHUTDOWN BD RM CHR A DOWNSTREAM	1A155B	843.3	860.7	844.5	851.4	835.2	
SHUTDOWN BD RM CHR A DOWNSTREAM	1A155G	728.7	729.3	726.4	736.2	736.2	
LCVC GROUP 1A INLET	1A110DD	840.5	854.9	839.9	853.8	837.6	
LCVC GROUP 1A OUTLET	1A162AA	738.3	738.3	730.2	738.3	738.3	
LCVC GROUP 1C INLET	1A110CC	841.1	855.5	839.9	853.8	837.6	
LCVC GROUP 1C OUTLET	1A161AA	739.4	740.0	736.0	739.4	740.6	
LCVC GROUP 2A INLET	2A210DD	836.4	827.8	797.2	822.0	835.3	

Prepared by: ___________ Checked by: ___________

A TRAIN ERCW HEAD PRESSURES

		Step from reference 2.2					
COMPONENT	**NODE**	**6.1[41]**	**6.1[46]**	**6.1[49]**	**6.1[56]**	**6.1[65]**	**6.1[73]**
LCVC GROUP 2A OUTLET	2A262AA	737.1	740.0	733.7	740.0	738.3	
LCVC GROUP 2C INLET	2A210CC	837.6	826.0	797.2	822.6	835.3	
LCVC GROUP 2C OUTLET	2A261AA	738.9	741.2	734.8	741.7	739.4	
Q-A / J-A ERCW pump	2A203 / 1A104	884.1	887.0	921.7	882.4	880.7	
R-A ERCW pump	2A204	883.0	885.9	922.8	883.0	879.5	
1A SUPPLY HEADER	1A106	867.0	869.9	892.4	873.3	868.1	
2A SUPPLY HEADER	2A206	867.6	869.9	816.2	871.6	865.3	
ERCW to SAC	1A130AA	NA	815.9	806.6	825.1	803.2	
ERCW CROSSTIE HEADER	1A108EE	854.3	857.8	831.8	858.3	853.1	
Lake Elevation	2ALAKE	676.5	676.5	676.5	676.2	676.9	

Prepared by: ____________ Checked by: ____________

B TRAIN ERCW HEAD PRESSURES

		Step from reference 2.3					
COMPONENT	NODE	6.1[28]	6.1[33]	6.1[36]	6.1[40]	6.1[49]	6.1[57]
D/G 1B1	1B191	832.9	831.7	819.6	833.4	827.1	
D/G 1B1	1FE6774	733.5	734.7	731.8	734.7	734.1	
D/G 1B2	2A209F	818.4	820.2	807.5	820.7	816.1	
D/G 1B2	1FE67280	734.1	734.7	731.2	735.3	734.1	
D/G 2B1	2B291	813.2	813.8	805.1	816.1	809.8	
D/G 2B1	2FE6774	735.3	736.4	734.7	736.4	735.9	
D/G 2B2	2A209E	798.8	798.2	790.1	799.4	793.0	
D/G 2B2	2FE67280	737.6	738.2	737.0	738.7	738.2	
CCS HX 0B1/0B2	2B908	872.2	857.2	826.0	859.5	864.1	
CCS HX 0B1/0B2	2B915	856.0	842.2	814.5	843.3	849.1	
CCS HX 0B1/0B2	2B910	850.3	838.7	811.0	841.0	844.5	
CCS HX 0B1/0B2	2B920	762.5	759.0	751.0	759.0	761.3	
CCS HX 0B1/0B2	1B920	735.2	732.7	727.6	729.0	732.7	
SUPPLY HEADER 1B	1B109AA	880.3	890.7	873.4	894.2	880.3	
SUPPLY HEADER 2B	2B209AA	885.5	872.2	838.7	876.9	879.2	934.6
ELECT BD RM CHR B	1B675C	848.0	856.1	843.4	867.6	836.4	
MCR CHILLER B	1B680A	NA	NA	NA	NA	867.1	
STATION AIR COMP A	1A140C	760.1	761.8	757.7	775.1	775.6	
STATION AIR COMP C INLET	1A135I	735.2	737.5	732.9	716.7	714.4	
STATION AIR COMP C OUTLET	1A135N	707.5	708.6	705.2	695.9	695.9	
STATION AIR COMP D INLET	1B135K	735.2	737.5	732.9	NA	NA	
STATION AIR COMP D OUTLET	1B135P	712.1	712.1	709.8	NA	NA	
Downstream of SAC	1B146	697.5	697.7	696.7	693.5	693.3	
AUX CONT AIR B INTERCOOLER	2B680A3A	NA	NA	NA	NA	NA	799.8
AUX CONT AIR B DOWNSTREAM	2B794A	NA	NA	NA	NA	NA	739.4
SHUTDOWN BD RM CHR B upstream	2B237	NA	865.3	831.8	866.4	868.7	
SHUTDOWN BD RM CHR B	2A237D	NA	733.9	731.6	733.9	750.0	
LCVC GROUP 1B INLET	1B110FF	875.7	884.9	867.6	888.4	866.5	
LCVC GROUP 1B OUTLET	1B161AA	748.2	751.0	747.5	752.1	747.5	
LCVC GROUP 1D INLET	1B110EE	875.7	884.9	867.6	887.2	867.6	
LCVC GROUP 1D OUTLET	1B162AA	749.3	746.4	742.9	748.7	751.0	
LCVC GROUP 2B INLET	2B210EE	879.2	863.6	830.7	866.5	869.9	
LCVC GROUP 2B OUTLET	2B261AA	754.5	746.9	741.7	747.5	752.1	
LCVC GROUP 2D INLET	2B210DD	NA	863.6	830.7	867.6	871.1	
LCVC GROUP 2D OUTLET	2B262AA	745.2	744.1	739.4	746.4	745.2	
L-B / N-B ERCW pump	1B104 / 2B203	910.7	909.0	931.5	910.7	903.8	

Prepared by: ____________ Checked by: ____________

B TRAIN ERCW HEAD PRESSURES

		Step from reference 2.3					
COMPONENT	**NODE**	**6.1[28]**	**6.1[33]**	**6.1[36]**	**6.1[40]**	**6.1[49]**	**6.1[57]**
P-B ERCW pump	2B204	910.1	908.4	932.6	910.1	903.8	
1B SUPPLY HEADER	1B106	901.6	900.5	908.6	902.2	891.2	
2B SUPPLY HEADER	2B206	900.5	898.2	846.8	900.5	893.5	
ERCW CROSSTIE HEADER	1B108EE	889.5	888.4	858.9	891.8	884.9	
Lake Elevation	2BLAKE	676.8	676.2	676.5	676.8	677.2	

Prepared by: ___________ Checked by: ___________

A TRAIN ERCW HEAD PRESSURE DETERMINATION FROM TEST DATA

		Corresponding	Step from reference 2.2					
COMPONENT	**Source**	**Node**	**6.1[41]**	**6.1[46]**	**6.1[49]**	**6.1[56]**	**6.1[65]**	**6.1[73]**
'A' SAC								
Inlet Pressure	0-67-634A Floor El. 685		29.3	32.5	29.5	34.5	29.0	N/A
Inlet head	0-67-634A Floor El. 685	1A140C	752.6	760.1	753.1	764.7	752.0	N/A
'C' SAC								
Inlet Pressure	0-PI-67-1213 Gage El. 689		15.0	16.5	15.0	11.0	9.5	N/A
Inlet head	0-PI-67-1213 Gage El. 689	1A135J	723.6	727.1	723.6	714.4	710.9	N/A
Outlet Pressure	0-PI-67-1219 Gage El. 689		6.0	7.0	6.0	4.0	3.0	N/A
Outlet head	0-PI-67-1219 Gage El. 689	1A135O	702.9	705.2	702.9	698.2	695.9	N/A
'D' SAC								
Inlet Pressure	0-PI-67-1113 Gage El. 689		16.0	17.5	16.0	14.0	12.0	N/A
Inlet head	0-PI-67-1113 Gage El. 689	1B135L	726.0	729.4	726.0	721.3	716.7	N/A
Outlet Pressure	0-PI-67-1119 Gage El. 689		7.0	8.0	7.0	6.0	5.0	N/A
Outlet head	0-PI-67-1119 Gage El. 689	1B135Q	705.2	707.5	705.2	702.9	700.5	N/A
SAC	Gage elevation 688							
Discharge Pressure	0-67-637		3.3	3.5	3.2	3.0	2.5	N/A
Discharge Head	0-67-637	1B146	695.6	696.1	695.4	694.9	693.7	N/A
Q-A/ J-A ERCW PUMP DISCHARGE PRESSURE	Floor Elev 704							
Pressure	drain valve for 0-PT-067-461/433		78.0	79.3	94.3	77.3	76.5	N/A
Head	drain valve for 0-PT-067-461/433	2A203 / 1A104	884.1	887.0	921.7	882.4	880.7	N/A
R-A ERCW PUMP DISCHARGE PRESSURE	Floor Elev 704							
Pressure	drain valve for 0-PT-067-465		77.5	78.8	94.8	77.5	76.0	N/A
Head	drain valve for 0-PT-067-465	2A204	883.0	885.9	922.8	883.0	879.5	N/A
ERCW HEADER 1A HEADER PRESSURE	Floor Elev 688							
Pressure	drain valve for 1-PI-067-491B		77.5	78.8	88.5	80.3	78.0	N/A
Head	drain valve for 1-PI-067-491B	1A106	867.0	869.9	892.4	873.3	868.1	N/A

Prepared by: ____________ Checked by: ____________

A TRAIN ERCW HEAD PRESSURE DETERMINATION FROM TEST DATA

		Corresponding	Step from reference 2.2					
COMPONENT	**Source**	**Node**	**6.1[41]**	**6.1[46]**	**6.1[49]**	**6.1[56]**	**6.1[65]**	**6.1[73]**
ERCW HEADER 2A HEADER PRESSURE	Floor Elev 688							
Pressure	drain valve for 2-PI-067-491B		77.8	78.8	55.5	79.5	76.8	N/A
Head	drain valve for 2-PI-067-491B	2A206	867.6	869.9	816.2	871.6	865.3	N/A
A-A Aux Air Compressor	Floor Elev 734							
Pressure	1-32-360		N/A	N/A	N/A	N/A	N/A	48.5
Head	1-32-360	1A374EE	N/A	N/A	N/A	N/A	N/A	846.0
A-A Aux Air Compressor	Floor Elev 714							
Press @	1-FE-67-340		N/A	N/A	N/A	N/A	N/A	10.8
Head	1-FE-67-340	1A375E	N/A	N/A	N/A	N/A	N/A	738.8
1A1/1A2 CCS HX	Floor Elev 714							
Pressure	1-67-1502		48.5	44.0	32.0	43.5	48.0	N/A
Head	1-67-1502	1A902	826.0	815.6	787.9	814.5	824.9	N/A
Pressure	1-67-1504		43.0	39.0	28.5	39.0	42.5	N/A
Head	1-67-1504	1A905	813.3	804.1	779.8	804.1	812.2	N/A
Pressure	1-67-1535		43.5	39.5	29.0	39.5	43.0	N/A
Head	1-67-1535	1A910	814.5	805.2	781.0	805.2	813.3	N/A
Pressure	1-67-1512		31.0	28.0	21.0	28.0	30.5	N/A
Head	1-67-1512	1A915	785.6	778.7	762.5	778.7	784.4	N/A
Pressure	1-67-702		5.0	4.1	3.8	3.6	3.8	N/A
Head	1-67-702	1B920	725.5	723.5	722.8	722.3	722.8	N/A

Prepared by: ____________ Checked by: ____________

A TRAIN ERCW HEAD PRESSURE DETERMINATION FROM TEST DATA

		Corresponding	Step from reference 2.2					
COMPONENT	**Source**	**Node**	**6.1[41]**	**6.1[46]**	**6.1[49]**	**6.1[56]**	**6.1[65]**	**6.1[73]**
2A1/2A2 CCS HX	Floor Elev 714							
Pressure	2-67-1502		48.0	44.0	32.0	43.5	48.0	N/A
Head	2-67-1502	2A904	824.9	815.6	787.9	814.5	824.9	N/A
Pressure	2-67-1504		40.0	36.5	27.0	36.5	39.5	N/A
Head	2-67-1504	2A907	806.4	798.3	776.4	798.3	805.2	N/A
Pressure	2-67-1507		38.0	35.0	25.5	34.5	38.0	N/A
Head	2-67-1507	2A906	801.8	794.8	772.9	793.7	801.8	N/A
Pressure	2-67-1512		15.0	14.5	11.0	14.5	15.0	N/A
Head	2-67-1512	2A910	748.6	747.5	739.4	747.5	748.6	N/A
Pressure	2-67-703		1.4	2.1	1.4	2.2	2.5	N/A
Head	2-67-703	2A920	717.2	718.8	717.2	719.1	719.8	N/A
A-A SHUTDOWN BOARD ROOM CHILLER	Pressures on El 714 @ chiller, dP on El 690							
Pressure	1-67-676		55.5	62.5	56.5	61.5	55.0	N/A
Head	1-67-676	1A155A	842.2	858.3	844.5	856.0	841.0	N/A
Pressure	1-67-677		56.0	63.5	56.5	59.5	52.5	N/A
Head	1-67-677	1A155B	843.3	860.7	844.5	851.4	835.2	N/A
Press @	1-FE-67-159		16.8	17.0	15.8	20.0	20.0	N/A
Head	1-FE-67-159	1A155G	728.7	729.3	726.4	736.2	736.2	N/A
ERCW TO STATION AIR COMPRESSOR PRESSURE	Floor Elev 690							
Pressure	0-67-944C		N/A	54.5	50.5	58.5	49.0	N/A
Head	0-67-944C	1A130AA	N/A	815.9	806.6	825.1	803.2	N/A

Prepared by: ____________ Checked by: ____________

A TRAIN ERCW HEAD PRESSURE DETERMINATION FROM TEST DATA

		Corresponding	Step from reference 2.2					
COMPONENT	**Source**	**Node**	**6.1[41]**	**6.1[46]**	**6.1[49]**	**6.1[56]**	**6.1[65]**	**6.1[73]**
1A-A LOWER CONTAINMENT COOLING GROUP	Floor Elev 669							
Pressure	High Side of 1-FE-67-231		74.3	80.5	74.0	80.0	73.0	N/A
Head	High Side of 1-FE-67-231	1A110DD	840.5	854.9	839.9	853.8	837.6	N/A
Pressure	High Side of 1-FE-67-233		30.0	30.0	26.5	30.0	30.0	N/A
Head	High Side of 1-FE-67-233	1A162AA	738.3	738.3	730.2	738.3	738.3	N/A
1C-A LOWER CONTAINMENT COOLING GROUP	Floor Elev 669							
Pressure	High Side of 1-FE-67-237		74.5	80.8	74.0	80.0	73.0	N/A
Head	High Side of 1-FE-67-237	1A110CC	841.1	855.5	839.9	853.8	837.6	N/A
Pressure	High Side of 1-FE-67-239		30.5	30.8	29.0	30.5	31.0	N/A
Head	High Side of 1-FE-67-239	1A161AA	739.4	740.0	736.0	739.4	740.6	N/A
1A HEADER PRESSURE	Floor Elev 669							
Pressure	Upstream side of 1-FE-67-61		78.5	82.5	76.0	82.0	78.3	N/A
Head	Upstream side of 1-FE-67-61	1A109AA	850.3	859.5	844.5	858.4	849.7	N/A
2A HEADER PRESSURE	Floor Elev 669							
Pressure	Upstream side of 2-FE-67-61		76.3	74.0	59.0	73.5	76.0	N/A
Head	Upstream side of 2-FE-67-61	2A209AA	845.1	839.9	805.3	838.7	844.5	N/A
2A-A LOWER CONTAINMENT COOLING GROUP	Floor Elev 669							
Pressure	High Side of 2-FE-67-231		72.5	68.8	55.5	66.3	72.0	N/A
Head	High Side of 2-FE-67-231	2A210DD	836.4	827.8	797.2	822.0	835.3	N/A
Pressure	High Side of 2-FE-67-233		29.5	30.8	28.0	30.8	30.0	N/A
Head	High Side of 2-FE-67-233	2A262AA	737.1	740.0	733.7	740.0	738.3	N/A

Prepared by: ____________ Checked by: ____________

A TRAIN ERCW HEAD PRESSURE DETERMINATION FROM TEST DATA

		Corresponding	Step from reference 2.2					
COMPONENT	**Source**	**Node**	**6.1[41]**	**6.1[46]**	**6.1[49]**	**6.1[56]**	**6.1[65]**	**6.1[73]**
2C-A LOWER CONTAINMENT COOLING GROUP	Floor Elev 669							
Pressure	High Side of 2-FE-67-237		73.0	68.0	55.5	66.5	72.0	N/A
Head	High Side of 2-FE-67-237	2A210CC	837.6	826.0	797.2	822.6	835.3	N/A
Pressure	High Side of 2-FE-67-239		30.3	31.3	28.5	31.5	30.5	N/A
Head	High Side of 2-FE-67-239	2A261AA	738.9	741.2	734.8	741.7	739.4	N/A
1A1 D/G HEAT EXCHANGER dP	Floor Elev 722							
Inlet Pres.	1-67-712A		34.8	37.3	32.8	36.5	34.5	N/A
Head	1-67-712A	1A191	802.3	808.0	797.6	806.3	801.7	N/A
Outlet Pres.	High Side 1-FE-67-69		4.5	5.0	4.3	5.0	4.5	N/A
Head	High Side 1-FE-67-69	1FE6769	732.4	733.5	731.8	733.5	732.4	N/A
1A2 D/G HEAT EXCHANGER dP	Floor Elev 722							
Inlet Pres.	1-67-713A		31.0	32.5	28.8	32.3	30.3	N/A
Head	1-67-713A	2B209F	793.6	797.1	788.4	796.5	791.9	N/A
Outlet Pres.	High Side 1-FE-67-277		4.8	5.5	4.5	5.0	5.0	N/A
Head	High Side 1-FE-67-277	1FE67277	733.0	734.7	732.4	733.5	733.5	N/A
2A1 D/G HEAT EXCHANGER dP	Floor Elev 722							
Inlet Pres.	2-67-712A		42.8	45.0	40.0	44.5	41.8	N/A
Head	2-67-712A	2A291	820.7	825.9	814.4	824.8	818.4	N/A
Outlet Pres.	High Side 2-FE-67-69		3.5	3.5	2.5	3.0	3.5	N/A
Head	High Side 2-FE-67-69	2FE6769	730.1	730.1	727.8	728.9	730.1	N/A
2A2 D/G HEAT EXCHANGER dP	Floor Elev 722							
Inlet Pres.	2-67-713A		41.0	43.0	38.3	42.5	40.0	N/A
Head	2-67-713A	2B209E	816.7	821.3	810.3	820.2	814.4	N/A
Outlet Pres.	High Side 2-FE-67-277		1.8	3.5	2.8	3.3	3.5	N/A
Head	High Side 2-FE-67-277	2FE67277	726.0	730.1	728.4	729.5	730.1	N/A

Prepared by: ____________ Checked by: ____________

A TRAIN ERCW HEAD PRESSURE DETERMINATION FROM TEST DATA

		Corresponding	Step from reference 2.2					
COMPONENT	**Source**	**Node**	**6.1[41]**	**6.1[46]**	**6.1[49]**	**6.1[56]**	**6.1[65]**	**6.1[73]**
A-A MAIN CONTROL ROOM CHILLER	Pressure on El 732 @ chiller, flow @ El 706							
Pressure	0-67-621A		N/A	N/A	N/A	N/A	31.0	N/A
Head	0-67-621A	1A580A	N/A	N/A	N/A	N/A	803.6	N/A
A-A ELECTICAL BOARD ROOM CHILLER	Floor Elev 669							
Pressure	0-67-616A		64.0	68.0	64.0	70.5	61.5	N/A
Head	0-67-616A	1A575D1	816.8	826.0	816.8	831.8	811.0	N/A
ERCW TRAIN 'A' CROSSTIE PRESSURE	Floor Elev 680.5							
Pressure	drain valve for 0-PI-067-18		75.3	76.8	65.5	77.0	74.8	N/A
Head	drain valve for 0-PI-067-18	1A108EE	854.3	857.8	831.8	858.3	853.1	N/A
CHICKAMAUGA LAKE ELEVATION								
Lake Elevation	Computer point 0Y2200A	1ALAKE, 2ALAKE	676.5	676.5	676.5	676.2	676.9	N/A

Prepared by: ____________ Checked by: ____________

B TRAIN ERCW HEAD PRESSURE DETERMINATION FROM TEST DATA

		Corresponding	Step from reference 2.3					
COMPONENT	**Source**	**Node**	**6.1[28]**	**6.1[33]**	**6.1[36]**	**6.1[40]**	**6.1[49]**	**6.1[57]**
'A' SAC	Floor Elev 685							
Inlet Pressure	0-67-634A		32.5	33.3	31.5	39.0	39.3	N/A
Head	0-67-634A	1A140C	760.1	761.8	757.7	775.1	775.6	N/A
'C' SAC								
Inlet Pressure	0-PI-67-1213 Gage El. 689		20.0	21.0	19.0	12.0	11.0	N/A
Head	0-PI-67-1213	1A135I	735.2	737.5	732.9	716.7	714.4	N/A
Outlet Pressure	0-PI-67-1219 Gage El. 689		8.0	8.5	7.0	3.0	3.0	N/A
Head	0-PI-67-1219	1A135N	707.5	708.6	705.2	695.9	695.9	N/A
'D' SAC								
Inlet Pressure	0-PI-67-1113 Gage El. 689		20.0	21.0	19.0	N/A	N/A	N/A
Head	0-PI-67-1113	1B135K	735.2	737.5	732.9	N/A	N/A	N/A
Outlet Pressure	0-PI-67-1119 Gage El. 689		10.0	10.0	9.0	N/A	N/A	N/A
Head	0-PI-67-1119	1B135P	712.1	712.1	709.8	N/A	N/A	N/A
SAC	Gauge Elev 688							
Discharge Pressure	0-67-637		4.1	4.2	3.75	2.4	2.3	N/A
Head	0-67-637	1B146	697.5	697.7	696.7	693.5	693.3	N/A
L-B /N-B ERCW PUMP DISCHARGE PRESSURE	Floor Elev 704							
Pressure	drain valve for 0-PT-067-441/453		89.5	88.8	98.5	89.5	86.5	N/A
Head	drain valve for 0-PT-067-441/453	1B104 / 2B203	910.7	909.0	931.5	910.7	903.8	N/A
P-B ERCW PUMP DISCHARGE PRESSURE	Floor Elev 704							
Pressure	drain valve for 0-PT-067-457		89.3	88.5	99.0	89.3	86.5	N/A
Head	drain valve for 0-PT-067-457	2B204	910.1	908.4	932.6	910.1	903.8	N/A
ERCW HEADER 1B HEADER PRESSURE	Floor Elev 688							
Pressure	drain valve for 1-PI-067-490B		92.5	92.0	95.5	92.8	88.0	N/A
Head	drain valve for 1-PI-067-490B	1B106	901.6	900.5	908.6	902.2	891.2	N/A

Prepared by: ____________ Checked by: ____________

B TRAIN ERCW HEAD PRESSURE DETERMINATION FROM TEST DATA

		Corresponding	Step from reference 2.3					
COMPONENT	**Source**	**Node**	**6.1[28]**	**6.1[33]**	**6.1[36]**	**6.1[40]**	**6.1[49]**	**6.1[57]**
ERCW HEADER 2B HEADER PRESSURE	Floor Elev 688							
Pressure	drain valve for 2-PI-067-490B		92.0	91.0	68.8	92.0	89.0	N/A
Head	2-PI-067-490B	2B206	900.5	898.2	846.8	900.5	893.5	N/A
B-B Aux Air Compressor	Floor Elev 734							
Pressure	2-32-364		N/A	N/A	N/A	N/A	N/A	28.5
Head	2-32-364	2B680A3A	N/A	N/A	N/A	N/A	N/A	799.8
B-B Aux Air Compressor	Floor Elev 714							
Press @	2-FE-67-340		N/A	N/A	N/A	N/A	N/A	11.0
Head	2-FE-67-340	2B794A	N/A	N/A	N/A	N/A	N/A	739.4
0B1/0B2 CCS HX	Floor Elev 714							
Pressure	1-67-702		9.2	8.1	5.9	6.5	8.1	N/A
Head	1-67-702	1B920	735.2	732.7	727.6	729.0	732.7	N/A
Pressure	0-67-1502		68.5	62.0	48.5	63.0	65.0	N/A
Head	0-67-1502	2B908	872.2	857.2	826.0	859.5	864.1	N/A
Pressure	0-67-1504		61.5	55.5	43.5	56.0	58.5	N/A
Head	0-67-1504	2B915	856.0	842.2	814.5	843.3	849.1	N/A
Pressure	0-67-1507		59.0	54.0	42.0	55.0	56.5	N/A
Head	0-67-1507	2B910	850.3	838.7	811.0	841.0	844.5	N/A
Pressure	0-67-1512		21.0	19.5	16.0	19.5	20.5	N/A
Head	0-67-1512	2B920	762.5	759.0	751.0	759.0	761.3	N/A
B-B SHUTDOWN BOARD ROOM CHILLER	Pressures on El 714 @ chiller, Pressure @ FE on El 690							
Pressure	2-67-676		N/A	65.5	51.0	66.0	67.0	N/A
Head	2-67-676	2B237	N/A	865.3	831.8	866.4	868.7	N/A
Pressure	2-FE-67-159		N/A	19.0	18.0	19.0	26.0	N/A
Head	2-FE-67-159	2A237D	N/A	733.9	731.6	733.9	750.0	N/A

Prepared by: ____________ Checked by: ____________

B TRAIN ERCW HEAD PRESSURE DETERMINATION FROM TEST DATA

		Corresponding	Step from reference 2.3					
COMPONENT	Source	Node	6.1[28]	6.1[33]	6.1[36]	6.1[40]	6.1[49]	6.1[57]
1B-B LOWER CONTAINMENT COOLING GROUP	Floor Elev 669							
Pressure	High Side of 1-FE-67-245		89.5	93.5	86.0	95.0	85.5	N/A
Head	High Side of 1-FE-67-245	1B110FF	875.7	884.9	867.6	888.4	866.5	N/A
Pressure	High Side of 1-FE-67-247		34.3	35.5	34.0	36.0	34.0	N/A
Head	High Side of 1-FE-67-247	1B161AA	748.2	751.0	747.5	752.1	747.5	N/A
1D-B LOWER CONTAINMENT COOLING GROUP	Floor Elev 669							
Pressure	High Side of 1-FE-67-251		89.5	93.5	86.0	94.5	86.0	N/A
Head	High Side of 1-FE-67-251	1B110EE	875.7	884.9	867.6	887.2	867.6	N/A
Pressure	High Side of 1-FE-67-253		34.8	33.5	32.0	34.5	35.5	N/A
Head	High Side of 1-FE-67-253	1B162AA	749.3	746.4	742.9	748.7	751.0	N/A
1B HEADER PRESSURE	Floor Elev 669							
Pressure	Upstream side of 1-FE-67-62		91.5	96.0	88.5	97.5	91.5	N/A
Head	Upstream side of 1-FE-67-62	1B109AA	880.3	890.7	873.4	894.2	880.3	N/A
2B HEADER PRESSURE	Floor Elev 669							
Pressure	Upstream side of 2-FE-67-62		93.8	88.0	73.5	90.0	91.0	115.0
Head	Upstream side of 2-FE-67-62	2B209AA	885.5	872.2	838.7	876.9	879.2	934.6
2B-B LOWER CONTAINMENT COOLING GROUP	Floor Elev 669							
Pressure	High Side of 2-FE-67-245		91.0	84.3	70.0	85.5	87.0	N/A
Head	High Side of 2-FE-67-245	2B210EE	879.2	863.6	830.7	866.5	869.9	N/A
Pressure	High Side of 2-FE-67-247		37.0	33.8	31.5	34.0	36.0	N/A
Head	High Side of 2-FE-67-247	2B261AA	754.5	746.9	741.7	747.5	752.1	N/A

Prepared by: ____________ Checked by: ____________

B TRAIN ERCW HEAD PRESSURE DETERMINATION FROM TEST DATA

		Corresponding	Step from reference 2.3					
COMPONENT	**Source**	**Node**	**6.1[28]**	**6.1[33]**	**6.1[36]**	**6.1[40]**	**6.1[49]**	**6.1[57]**
2D-B LOWER CONTAINMENT COOLING GROUP	Floor Elev 669							
Pressure	High Side of 2-FE-67-251		N/A	84.3	70.0	86.0	87.5	N/A
Head	High Side of 2-FE-67-251	2B210DD	N/A	863.6	830.7	867.6	871.1	N/A
Pressure	High Side of 2-FE-67-253		33.0	32.5	30.5	33.5	33.0	N/A
Head	High Side of 2-FE-67-253	2B262AA	745.2	744.1	739.4	746.4	745.2	N/A
1B1 D/G HEAT EXCHANGER dP	Floor Elev 722							
Inlet Pres.	1-67-712B		48.0	47.5	42.3	48.3	45.5	N/A
Head	1-67-712B	1B191	832.9	831.7	819.6	833.4	827.1	N/A
Outlet Pres.	High Side 1-FE-67-74		5.0	5.5	4.3	5.5	5.3	N/A
Head	High Side 1-FE-67-74	1FE6774	733.5	734.7	731.8	734.7	734.1	N/A
1B2 D/G HEAT EXCHANGER dP	Floor Elev 722							
Inlet Pres.	1-67-713B		41.8	42.5	37.0	42.8	40.8	N/A
Head	1-67-713B	2A209F	818.4	820.2	807.5	820.7	816.1	N/A
Outlet Pres.	High Side 1-FE-67-280		5.3	5.5	4.0	5.8	5.3	N/A
Head	High Side 1-FE-67-280	1FE67280	734.1	734.7	731.2	735.3	734.1	N/A
2B1 D/G HEAT EXCHANGER dP	Floor Elev 722							
Inlet Pres.	2-67-712B		39.5	39.8	36.0	40.8	38.0	N/A
Head	2-67-712B	2B291	813.2	813.8	805.1	816.1	809.8	N/A
Outlet Pres.	High Side 2-FE-67-74		5.8	6.3	5.5	6.3	6.0	N/A
Head	High Side 2-FE-67-74	2FE6774	735.3	736.4	734.7	736.4	735.9	N/A
2B2 D/G HEAT EXCHANGER dP	Floor Elev 722							
Inlet Pres.	2-67-713B		33.3	33.0	29.5	33.5	30.8	N/A
Head	2-67-713B	2A209E	798.8	798.2	790.1	799.4	793.0	N/A
Outlet Pres.	High Side 2-FE-67-280		6.8	7.0	6.5	7.3	7.0	N/A
Head	High Side 2-FE-67-280	2FE67280	737.6	738.2	737.0	738.7	738.2	N/A

B TRAIN ERCW HEAD PRESSURE DETERMINATION FROM TEST DATA

		Corresponding	**Step from reference 2.3**					
COMPONENT	**Source**	**Node**	**6.1[28]**	**6.1[33]**	**6.1[36]**	**6.1[40]**	**6.1[49]**	**6.1[57]**
B-B MAIN CONTROL ROOM CHILLER	Pressure on El 732							
Pressure	0-67-621B		N/A	N/A	N/A	N/A	58.5	N/A
Head	0-67-621B	1B680A	N/A	N/A	N/A	N/A	867.1	N/A
B-B ELECTRICAL BOARD ROOM CHILLER	Floor Elev 669							
Pressure	0-67-616B		77.5	81.0	75.5	86.0	72.5	N/A
Head	0-67-616B	1B675C	848.0	856.1	843.4	867.6	836.4	N/A
ERCW TRAIN 'B' CROSSTIE PRESSURE	Floor Elev 680.5							
Pressure	drain valve for 0-PI-067-17		90.5	90.0	77.3	91.5	88.5	N/A
Head	drain valve for 0-PI-067-17	1B108EE	889.5	888.4	858.9	891.8	884.9	N/A
CHICKAMAUGA LAKE ELEVATION								
Lake Elevation	computer point 0Y2200A	1BLAKE, 2BLAKE	676.8	676.2	676.5	676.8	677.2	N/A

Prepared by: ___________ Checked by: ___________

A TRAIN ERCW FLOW RATES

		Ref 2.2	File: TESTA 1			*Ref 2.2*	File: TESTA2			*Ref 2.2*	File: TESTA3		
		Step	Model			*Step*	Model			*Step*	Model		
COMPONENT	**LINK**	***6.1[41]***	**Results**	**% Dif.**	**Gpm dif**	***6.1[46]***	**Results**	**% Dif.**	**Gpm dif**	***6.1[49]***	**Results**	**% Dif.**	**Gpm dif**
D/G 1A1	1A191-1A1A1	***556.2***	553.0	-0.6	-3.2	***566.2***	565.5	-0.1	-0.7	***543.4***	547.9	0.8	4.5
D/G 1A2	2B209F-1A1A2	***566.2***	569.2	0.5	3.0	***585.8***	582.3	-0.6	-3.5	***571.2***	563.9	-1.3	-7.3
D/G 2A1	2A291-2A2A1	***443.7***	449.2	1.2	5.5	***468.4***	459.3	-1.9	-9.1	***443.7***	445.1	0.3	1.4
D/G 2A2	2B209E-2A2A2	***417.6***	428.9	2.7	11.3	***434.1***	438.6	1.0	4.5	***430.8***	425.0	-1.4	-5.8
CCS HX 1A1/1A2	1B235-1A900	***4039.9***	4045.4	0.1	5.5	***3775.9***	3793.4	0.5	17.5	***3182.8***	3189.6	0.2	6.8
CCS HX 2A1/2A2	2A910-2A920	***5634.8***	5722.1	1.5	87.3	***5441.5***	5322.2	-2.2	-119.3	***4594.1***	4547.7	-1.0	-46.4
CSS HX 1A	1A121A-1A150	***4039.8***	4011.5	-0.7	-28.3	***0.0***	0.0			***0.0***			
CSS HX 2A	2A226-2A250	***0.0***	0.0			***4326.7***	4436.5	2.5	109.8	***3847.1***	3787.8	-1.5	-59.3
SUPPLY HEADER 1A	1A109-1A109AA	***5986.7***	6213.2	3.8	226.5	***2449.5***	2360.5	-3.6	-89.0	***2349.5***	2289.0	-2.6	-60.5
SUPPLY HEADER 2A	2A209-2A209AA	***11313.6***	11237.0	-0.7	-76.6	***14560.1***	14917.0	2.5	356.9	***12247.3***	12685.0	3.6	437.7
ELECT BD RM CHR A	1A575E-1A575F	***206.6***	209.0	1.2	2.4	***227.2***	223.1	-1.8	-4.1	***221.6***	217.8	-1.7	-3.8
MCR CHILLER A	1A580B-1A580C	***0.0***	0			***0.0***	0			***0.0***	0		
STATION AIR COMP A Aftercooler	1A140A-1B139A	***54.9***	54.4	-0.9	-0.5	***57.9***	57.2	-1.2	-0.7	***55.3***	55.7	0.7	0.4
STATION AIR COMP A Intercooler	1A140F-1B139A	***4.1***	4.1	0.0	0.0	***4.3***	4.4	1.2	0.0	***4.1***	4.2	3.2	0.1
STATION AIR COMP B Aftercooler	1A141A-1B140A	***66.9***	65.9	-1.5	-1.0	***69.9***	69.3	-0.9	-0.6	***66.8***	67.4	0.9	0.6
STATION AIR COMP B Intercooler	1A141F-1B140A	***4.5***	4.6	1.3	0.1	***4.8***	4.8	-0.4	0.0	***4.6***	4.7	1.3	0.1
STATION AIR COMP C	1A135N-1A135P	***125.4***	124.7	-0.6	-0.7	***131.9***	131.1	-0.6	-0.8	***125.4***	127.5	1.6	2.1
STATION AIR COMP D	1B135P-1B135R	***125.4***	124.3	-0.9	-1.1	***131.3***	130.6	-0.6	-0.7	***125.4***	127.1	1.3	1.7
EGTS 2A	2A227C3-2A685A	See 6.11	14.3			***13.1***	13.2	1.0	0.1	***10.7***	11.1	3.3	0.4
AUX CONT AIR A	1A375E-1A375F	***0.0***				***0.0***				***0.0***			
SFP & TBBP CLR 1A	1A646C-1A646D	***38.7***	39.0	0.8	0.3	***41.7***	41.7	0.0	0.0	***39.7***	40.6	2.4	0.9
714 PEN RM CLR 1A	1A565A2-1A610A	***29.5***	29.4	-0.2	-0.1	***31.2***	31.4	0.6	0.2	***29.9***	30.6	2.5	0.7
714 PEN RM CLR 2A	2A301E2-2A610A	***33.0***	33.4	1.4	0.4	***31.2***	30.9	-1.0	-0.3	***26.1***	26.3	0.7	0.2

A TRAIN ERCW FLOW RATES

		Ref 2.2	File: TESTA 1			*Ref 2.2*	File: TESTA2			*Ref 2.2*	File: TESTA3		
		Step	Model			*Step*	Model			*Step*	Model		
COMPONENT	**LINK**	*6.1[41]*	Results	% Dif.	Gpm dif	*6.1[46]*	Results	% Dif.	Gpm dif	*6.1[49]*	Results	% Dif.	Gpm dif
SHUTDOWN BD RM CHR A	1A155B-1A155E	***37.6***	37.6	0.1	0.0	***54.6***	54.6	0.0	0.0	***41.5***	41.5	-0.1	0.0
CCS & AFW CLR 1A	1A510D-1A510E	***111.8***	111.2	-0.5	-0.6	***119.4***	118.9	-0.4	-0.5	***113.9***	116.0	1.8	2.1
690 PEN RM CLR 1A	1A560-1A609A	***29.6***	29.7	0.3	0.1	***31.7***	31.7	0.1	0.0	***30.0***	30.9	3.1	0.9
690 PEN RM CLR 2A	2A609B-2A301G	***28.8***	29.4	2.0	0.6	***27.4***	27.2	-0.6	-0.2	***22.9***	23.1	0.9	0.2
BAT & AFW CLR 2A	2A387B-2A234	***75.5***	75.9	0.5	0.4	***71.1***	70.0	-1.6	-1.1	***59.7***	59.2	-0.8	-0.5
UCVC 1C	1A122-1A122D	***0.0***	0.0			***0.0***	0.0			***0.0***	0.0		
UCVC 2A	2A222A-2A222B	***26.0***	26.1	0.5	0.1	***24.4***	24.1	-1.1	-0.3	***19.5***	20.4	4.5	0.9
UCVC 2C	2A222-2A222D	***0.0***	0.0			***0.0***	0.0			***0.0***	0.0		
INCORE INST RM CHR 1A	1A524O-1A524P	***0.0***	0.0			***0.0***	0.0			***0.0***	0.0		
INCORE INST RM CHR 2A	2A524O-2A524P	***0.0***	0.0			***0.0***	0.0			***0.0***	0.0		
CCP OIL CLR 1A	1A515-1A515A	***36.3***	36.0	-0.8	-0.3	***39.0***	38.5	-1.2	-0.5	***36.7***	37.5	2.3	0.8
CCP OIL CLR 2A	2A227I-2A227H	***43.8***	43.0	-1.8	-0.8	***41.0***	39.8	-2.8	-1.2	***34.4***	33.9	-1.5	-0.5
CCP RM CLR 1A	1A169-1A169A	***46.4***	46.5	0.1	0.1	***49.7***	49.7	0.0	0.0	***46.4***	48.5	4.4	2.1
CCP RM CLR 2A	2A169-2A169A	***50.2***	50.7	1.1	0.5	***47.1***	47.0	-0.2	-0.1	***38.6***	40.0	3.6	1.4
SIS PMP RM CLR 1A	1A535-1A525	***34.0***	34.0	0.1	0.0	***36.2***	36.3	0.2	0.1	***34.6***	35.4	2.4	0.8
SIS OIL CLR 1A	1A530-1A540	***11.5***	11.7	1.7	0.2	***12.4***	12.5	0.8	0.1	***11.7***	12.2	4.3	0.5
SIS PMP RM CLR 2A	2A232B-2A232D	***32.7***	33.1	1.3	0.4	***30.4***	30.7	1.0	0.3	***26.4***	26.1	-1.1	-0.3
SIS OIL CLR 2A	2A232C-2A232F	***12.3***	12.8	4.1	0.5	***12.0***	11.8	-1.7	-0.2	***9.3***	9.9	6.5	0.6
669 PEN RM CLR 1A	1A556-1A557	***51.3***	51.7	0.7	0.4	***55.4***	55.3	-0.2	-0.1	***52.4***	53.9	3.0	1.5
669 PEN RM CLR 2A	2A347A-2A347B	***58.9***	59.9	1.6	1.0	***55.7***	55.4	-0.5	-0.3	***46.9***	47.0	0.2	0.1
PIPE CHASE CLR 1A	1A570A1-1A570A3	***62.2***	62.5	0.5	0.3	***66.4***	66.8	0.6	0.4	***63.6***	65.1	2.4	1.5
PIPE CHASE CLR 2A	2A301F1-2A302C	***43.2***	43.5	0.8	0.3	***40.7***	40.3	-0.9	-0.4	***33.8***	34.2	1.3	0.4
LCVC GROUP 1A	1A110DD-1A112	***570.1***	562.6	-1.3	-7.5	***608.3***	600.8	-1.2	-7.5	***576.6***	585.7	1.6	9.1
1AA LCC	1A112B-1A162	***337.8***	333.2	-1.4	-4.6	***360.4***	356.0	-1.2	-4.4	***341.7***	347.0	1.6	5.3
1A CRD	1A170A-1A170B	***73.1***	72.1	-1.3	-1.0	***78.0***	76.9	-1.4	-1.1	***73.9***	75.0	1.5	1.1
U-1 #1RCP	1A116-1A124B	***140.7***	138.8	-1.3	-1.9	***150.1***	148.2	-1.3	-1.9	***142.3***	144.4	1.5	2.1
UCVC 1A	1A122C-1A164	***18.5***	18.6	0.5	0.1	***19.7***	19.8	0.3	0.1	***18.7***	19.3	3.1	0.6
LCVC GROUP 1C	1A110CC-1A111	***526.7***	521.3	-1.0	-5.4	***562.3***	557.3	-0.9	-5.0	***532.6***	543.0	2.0	10.4

A TRAIN ERCW FLOW RATES

		Ref 2.2	File: TESTA 1			*Ref 2.2*	File: TESTA2			*Ref 2.2*	File: TESTA3		
		Step	Model			*Step*	Model			*Step*	Model		
COMPONENT	**LINK**	***6.1[41]***	**Results**	**% Dif.**	**gpm dif**	***6.1[46]***	**Results**	**% Dif.**	**gpm dif**	***6.1[49]***	**Results**	**% Dif.**	**gpm dif**
1CA LCC	1A111B-1A161	***301.8***	298.6	-1.1	-3.2	***322.2***	319.3	-0.9	-2.9	***305.2***	311.1	1.9	5.9
1C CRD	1A171A-1A171B	***90.8***	89.9	-0.9	-0.9	***96.9***	96.0	-0.9	-0.9	***91.8***	93.6	2.0	1.8
U-1 #3RCP	1A115-1A171B	***134.2***	132.8	-1.0	-1.4	***143.2***	141.9	-0.9	-1.3	***135.7***	138.3	1.9	2.6
LCVC GROUP 2A	2A210DD-2A212	***520.8***	520.7	0.0	-0.1	***491.2***	484.9	-1.3	-6.3	***410.0***	412.2	0.5	2.2
2AA LCC	2A212B-2A262	***284.0***	284.8	0.3	0.8	***267.9***	265.2	-1.0	-2.7	***223.6***	225.5	0.8	1.9
2A CRD	2A270A-2A270B	***97.2***	96.7	-0.5	-0.5	***91.6***	90.1	-1.7	-1.5	***76.5***	76.7	0.3	0.2
U-2 #1RCP	2A216-2A270B	***139.6***	139.2	-0.3	-0.4	***131.7***	129.6	-1.6	-2.1	***109.9***	110.0	0.1	0.1
LCVC GROUP 2C	2A210CC-2A211	***470.4***	470.1	-0.1	-0.3	***443.0***	437.4	-1.3	-5.6	***369.9***	371.1	0.3	1.2
2C-A LCC	2A211B-2A261	***239.9***	239.1	-0.3	-0.8	***225.9***	222.5	-1.5	-3.4	***188.7***	188.9	0.1	0.2
2C CRD	2A271A-2A271B	***90.1***	89.7	-0.5	-0.4	***84.9***	83.5	-1.6	-1.4	***70.9***	71.0	0.2	0.1
U-2 #3RCP	2A215-2A271B	***140.4***	141.4	0.7	1.0	***132.2***	131.4	-0.6	-0.8	***110.4***	111.2	0.7	0.8
CNT SPR PMP RM CLR 1A	1A185-1A185A	***26.0***	26.2	0.9	0.2	***27.8***	28.0	0.8	0.2	***26.4***	27.3	3.4	0.9
CNT SPR PMP RM CLR 2A	2A350A2-2A605A	***34.0***	34.2	0.7	0.2	***32.0***	31.6	-1.3	-0.4	***26.9***	26.9	0.1	0.0
RHR PMP RM CLR 1A	1A552-1A606B	***15.3***	15.4	0.8	0.1	***16.3***	16.5	0.9	0.2	***15.5***	16.1	4.1	0.6
RHR PMP RM CLR 2A	2A189A-2A606B	***22.8***	22.8	0.0	0.0	***21.1***	21.0	-0.4	-0.1	***17.6***	17.9	1.9	0.3
1A-A STRAINER BACKWASH	1A106B-1A106C	***690.3***	596.2	-13.6	-94.1	***604.5***	601.5	-0.5	-3.0	***654.9***	651.0	-0.6	-3.9
2A-A STRAINER BACKWASH	2A206B-2A206C	***690.3***	678.8	-1.7	-11.5	***690.3***	681.9	-1.2	-8.4	***0.0***	0.0		0.0
Q-A pump	2A203-2A205		10320.0				10250.0				8744.3	Note 1	
R-A pump	2A202-2A204		10405.0				10357.0				8862.1		
Calculated Values													
U1 AUX BLDG TOTAL:	See Note 2	***6254.6***	6213.3	-0.7	-41.4	***2379.7***	2360.4	-0.8	-19.3	***2254.6***	2288.7	1.5	34.1
U2 AUX BLDG TOTAL:	See Note 3	***11127.0***	11237.4	1.0	110.4	***14925.3***	14917.4	-0.1	-7.9	***12776.7***	12684.4	-0.7	-92.3
TOTAL FLOW:	See Note 4	***20746.1***	20726.0	-0.1	-20.1	***20654.3***	20606.9	-0.2	-47.4	***17675.4***	17606.0	-0.4	-69.4
AUX BLDG TOTAL:	See Note 5	***17381.6***	17450.7	0.4	69.0	***17305.0***	17277.8	-0.2	-27.2	***15031.3***	14973.1	-0.4	-58.3

Note 1: The J-A pump (Link 1A104-1A105) was used in files TESTA3, TEST A4, TESTA5, TESTA6
Note 2: This is the sum of the individual users flowing through the Unit 1 supply header into the Auxiliary Building.
Note 3: This is the sum of the individual users flowing through the Unit 2 supply header into the Auxiliary Building.
Note 4: This is the sum of the individual users on the entire train
Note 5: This is the sum of the individual users flowing through the Unit 1 and Unit 2 supply header into the Auxiliary Building.

A TRAIN ERCW FLOW RATES

		Ref 2.2	File: TESTA4			*Ref 2.2*	File: TESTA5			*Ref 2.2*	File: TESTA6		
		Step	Model			*Step*	Model			*Step*	Model		
COMPONENT	**LINK**	*6.1[56]*	**Results**	**% Dif.**	**gpm dif**	*6.1[65]*	**Results**	**% Dif.**	**gpm dif**	**6.1[73]**	**Results**	**% Dif.**	**gpm dif**
D/G 1A1	1A191-1A1A1	*571.2*	573.4	0.4	2.2	*551.1*	560.0	1.6	8.9				
D/G 1A2	2B209F-1A1A2	*551.1*	590.4	7.1	39.3	*583.4*	576.5	-1.2	-6.9				
D/G 2A1	2A291-2A2A1	*450.0*	465.6	3.5	15.6	*456.2*	454.8	-0.3	-1.4				
D/G 2A2	2B209E-2A2A2	*443.7*	444.6	0.2	0.9	*443.7*	434.3	-2.1	-9.4				
CCS HX 1A1/1A2	1B235-1A900	*3825.3*	3842.0	0.4	16.7	*3946.0*	4101.7	3.9	155.7				
CCS HX 2A1/2A2	2A910-2A920	*5313.7*	5378.1	1.2	64.4	*5616.5*	5789.2	3.1	172.7				
CSS HX 1A	1A121A-1A150	*0.0*				*3773.6*	3833.6	1.6	60.0				
CSS HX 2A	2A226-2A250	*3878.2*	4484.4	15.6	606.2	*0.0*							
SUPPLY HEADER 1A	1A109-1A109AA	*2623.0*	2534.4	-3.4	-88.6	*6273.8*	6426.0	2.4	152.2				
SUPPLY HEADER 2A	2A209-2A209AA	*14352.6*	15029.0	4.7	676.4	*11224.9*	11316.0	0.8	91.1				
ELECT BD RM CHR A	1A575E-1A575F	*233.8*	229.8	-1.7	-4.0	*199.7*	208.5	4.4	8.8				
MCR CHILLER A	1A580B-1A580C	*0.0*	0			*123.7*	124.6	0.7	0.9				
STATION AIR COMP A Aftercooler	1A140A-1B139A	*60.8*	60.6	-0.3	-0.2	*55.7*	56.4	1.2	0.7				
STATION AIR COMP A Intercooler	1A140F-1B139A	*4.5*	4.6	2.2	0.1	*4.1*	4.3	4.4	0.2				
STATION AIR COMP B Aftercooler	1A141A-1B140A	*72.9*	73.4	0.6	0.5	*66.1*	68.3	3.3	2.2				
STATION AIR COMP B Intercooler	1A141F-1B140A	*5.0*	5.1	1.6	0.1	*4.6*	4.7	2.2	0.1				
STATION AIR COMP C	1A135N-1A135P	*102.9*	103.6	0.7	0.7	*95.3*	96.5	1.3	1.2				
STATION AIR COMP D	1B135P-1B135R	*113.4*	114.0	0.5	0.6	*104.4*	106.2	1.8	1.8				
EGTS 2A	2A227C3-2A685A	*13.1*	13.4	2.5	0.3	*14.0*	14.5	3.6	0.5				
AUX CONT AIR A	1A375E-1A375F	*0.0*				*0.0*				10.3	10.2	-1.0	-0.1
SFP & TBBP CLR 1A	1A646C-1A646D	*39.7*	39.8	0.4	0.1	*36.5*	36.8	0.8	0.3				
714 PEN RM CLR 1A	1A565A2-1A610A	*29.2*	29.7	1.7	0.5	*26.4*	27.3	3.4	0.9				
714 PEN RM CLR 2A	2A301E2-2A610A	*22.7*	23.1	1.6	0.4	*24.2*	24.9	3.0	0.7				
SHUTDOWN BD RM CHR A	1A155B-1A155E	*448.0*	449.5	0.3	1.5	*413.4*	420.1	1.6	6.7				

A TRAIN ERCW FLOW RATES

		Ref 2.2	File: TESTA4			Ref 2.2	File: TESTA5			Ref 2.2	File: TESTA6		
		Step	Model			Step	Model			Step	Model		
COMPONENT	LINK	6.1[56]	Results	% Dif.	gpm dif	6.1[65]	Results	% Dif.	gpm dif	6.1[73]	Results	% Dif.	gpm dif
CCS & AFW CLR 1A	1A510D-1A510E	0.0				110.6	112.3	1.5	1.7				
690 PEN RM CLR 1A	1A560-1A609A	20.7	21.4	3.6	0.7	21.5	19.8	-8.1	-1.7				
690 PEN RM CLR 2A	2A609B-2A301G	20.3	20.6	1.5	0.3	21.6	22.3	3.1	0.7				
BAT & AFW CLR 2A	2A387B-2A234	71.1	71.2	0.1	0.1	75.5	77.1	2.1	1.6				
UCVC 1C	1A122-1A122D	0.0	0.0			0.0	0.0						
UCVC 2A	2A222A-2A222B	24.0	24.4	1.8	0.4	25.6	26.4	3.1	0.8				
UCVC 2C	2A222-2A222D	0.0	0.0			0.0	0.0						
INCORE INST RM CHR 1A	1A524O-1A524P	0.0	0.0			0.0	0.0						
INCORE INST RM CHR 2A	2A524O-2A524P	0.0	0.0			0.0	0.0						
CCP OIL CLR 1A	1A515-1A515A	39.5	38.9	-1.4	-0.6	34.7	35.7	2.9	1.0				
CCP OIL CLR 2A	2A227I-2A227H	39.8	40.7	2.3	0.9	42.2	44.0	4.2	1.8				
CCP RM CLR 1A	1A169-1A169A	30.8	31.3	1.5	0.5	28.2	28.8	2.2	0.6				
CCP RM CLR 2A	2A169-2A169A	34.8	34.8	-0.1	0.0	36.9	37.6	1.8	0.7				
SIS PMP RM CLR 1A	1A535-1A525	37.5	37.9	1.2	0.4	34.1	34.8	2.1	0.7				
SIS OIL CLR 1A	1A530-1A540	12.7	13.1	3.1	0.4	11.5	12.0	4.3	0.5				
SIS PMP RM CLR 2A	2A232B-2A232D	32.3	32.8	1.7	0.5	34.4	35.4	3.0	1.0				
SIS OIL CLR 2A	2A232C-2A232F	12.7	12.7	0.0	0.0	13.5	13.8	2.2	0.3				
669 PEN RM CLR 1A	1A556-1A557	30.5	30.7	0.7	0.2	30.3	28.3	-6.8	-2.0				
669 PEN RM CLR 2A	2A347A-2A347B	33.7	33.6	-0.4	-0.1	35.6	36.2	1.8	0.6				
PIPE CHASE CLR 1A	1A570A1-1A570A3	35.2	35.5	0.9	0.3	32.5	32.7	0.7	0.2				
PIPE CHASE CLR 2A	2A301F1-2A302C	44.8	43.2	-3.6	-1.6	47.5	46.7	-1.6	-0.8				
LCVC GROUP 1A	1A110DD-1A112	605.2	608.5	0.5	3.3	562.3	568.3	1.1	6.0				
1AA LCC	1A112B-1A162	358.6	360.7	0.6	2.1	333.2	336.6	1.0	3.4				
1A CRD	1A170A-1A170B	77.6	77.8	0.3	0.2	72.1	72.8	1.0	0.7				
U-1 #1RCP	1A116-1A124B	149.4	150.1	0.5	0.7	138.8	140.2	1.0	1.4				
UCVC 1A	1A122C-1A164	19.6	20.1	2.3	0.5	18.2	18.8	3.0	0.6				
LCVC GROUP 1C	1A110CC-1A111	559.0	564.5	1.0	5.5	514.7	526.6	2.3	11.9				
1CA LCC	1A111B-1A161	320.3	323.6	1.0	3.3	294.9	301.7	2.3	6.8				

A TRAIN ERCW FLOW RATES

COMPONENT	LINK	*Ref 2.2* *Step* *6.1[56]*	File: TESTA4 Model Results	% Dif.	gpm dif	*Ref 2.2* *Step* *6.1[65]*	File: TESTA5 Model Results	% Dif.	gpm dif	*Ref 2.2* *Step* 6.1[73]	File: TESTA6 Model Results	% Dif.	gpm dif
1C CRD	1A171A-1A171B	96.3	97.3	1.0	1.0	88.7	90.8	2.4	2.1				
U-1 #3RCP	1A115-1A171B	142.4	143.8	1.0	1.4	131.1	134.1	2.3	3.0				
LCVC GROUP 2A	2A210DD-2A212	***484.8***	490.1	1.1	5.3	***522.0***	527.0	1.0	5.0				
2AA LCC	2A212B-2A262	264.4	268.1	1.4	3.7	284.7	288.2	1.2	3.5				
2A CRD	2A270A-2A270B	90.5	91.1	0.7	0.6	97.4	97.9	0.5	0.5				
U-2 #1RCP	2A216-2A270B	130.0	131.0	0.8	1.0	139.9	140.9	0.7	1.0				
LCVC GROUP 2C	2A210CC-2A211	***435.9***	442.2	1.5	6.3	***461.0***	474.1	2.8	13.1				
2C-A LCC	2A211B-2A261	222.3	224.9	1.2	2.6	235.1	242.6	3.2	7.5				
2C CRD	2A271A-2A271B	83.5	84.4	1.1	0.9	88.3	91.0	3.1	2.7				
U-2 #3RCP	2A215-2A271B	130.1	132.9	2.2	2.8	137.6	140.5	2.1	2.9				
CNT SPR PMP RM CLR 1A	1A185-1A185A	***25.8***	25.8	-0.1	0.0	***22.6***	23.7	5.0	1.1				
CNT SPR PMP RM CLR 2A	2A350A2-2A605A	***23.3***	23.2	-0.4	-0.1	***24.6***	25.1	1.9	0.5				
RHR PMP RM CLR 1A	1A552-1A606B	***17.1***	17.3	1.0	0.2	***15.3***	15.8	3.0	0.5				
RHR PMP RM CLR 2A	2A189A-2A606B	***18.2***	18.5	1.7	0.3	***19.3***	20.0	3.6	0.7				
1A-A STRAINER BACKWASH	1A106B-1A106C	***611.0***	614.4	0.6	3.4	***604.5***	608.9	0.7	4.4				
2A-A STRAINER BACKWASH	2A206B-2A206C	***654.9***	686.0	4.7	31.1	***654.9***	683.3	4.3	28.4				
J-A pump	1A104-1A105		10539.0	Note 1			10610.0	Note 1					
R-A pump	2A202-2A204		10399.0				10449.0						
Calculated Values:													
U1 AUX BLDG TOTAL:	See Note 2	***2524.1***	2535.0	0.4	10.8	***6321.9***	6426.1	1.6	104.2				
U2 AUX BLDG TOTAL:	See Note 3	***14328.6***	15029.0	4.9	700.4	***10960.4***	11316.0	3.2	355.6				
TOTAL FLOW:	See Note 4	***20134.7***	20938.4	4.0	803.7	***20576.1***	21059.9	2.4	483.8				
AUX BLDG TOTAL:	See Note 5	***16852.8***	17564.0	4.2	711.2	***17282.3***	17742.1	2.7	459.8				

Note 2: This is the sum of the individual users flowing through the Unit 1 supply header into the Auxiliary Building.
Note 3: This is the sum of the individual users flowing through the Unit 2 supply header into the Auxiliary Building.
Note 4: This is the sum of the individual users on the entire train
Note 5: This is the sum of the individual users flowing through the Unit 1 and Unit 2 supply header into the Auxiliary Building.

A TRAIN ERCW HEAD PRESSURES

		Ref 2.2	File: TESTA1			*Ref 2.2*	File: TESTA2			*Ref 2.2*	File: TESTA3	
		Step	Model			*Step*	Model			*Step:*	Model	
COMPONENT	**NODE**	***6.1[41]***	**Results**	**DH**		***6.1[46]***	**Results**	**DH**		***6.1[49]***	**Results**	**DH**
D/G 1A1	1A191	***802.3***	804.1	1.8		***808.0***	807.9	-0.1		***797.6***	802.1	4.5
D/G 1A1	1FE6769	***732.4***	732.3	-0.1		***733.5***	732.8	-0.7		***731.8***	731.6	-0.2
D/G 1A2	2B209F	***793.6***	793.0	-0.6		***797.1***	796.3	-0.8		***788.4***	791.2	2.8
D/G 1A2	1FE67277	***733.0***	732.8	-0.2		***734.7***	733.4	-1.3		***732.4***	732.1	-0.3
D/G 2A1	2A291	***820.7***	820.0	-0.7		***825.9***	824.5	-1.4		***814.4***	817.7	3.3
D/G 2A1	2FE6769	***730.1***	728.7	-1.4		***730.1***	729.1	-1.0		***727.8***	728.1	0.3
D/G 2A2	2B209E	***816.7***	813.6	-3.1		***821.3***	817.8	-3.5		***810.3***	811.4	1.1
D/G 2A2	2FE67277	***726.0***	728.7	2.7		***730.1***	729.1	-1.0		***728.4***	728.1	-0.3
CCS HX 1A1/1A2	1a902	***826.0***	818.8	-7.2		***815.6***	807.6	-8.0		***787.9***	783.8	-4.1
CCS HX 1A1/1A2	1A905	***813.3***	810.8	-2.5		***804.1***	800.6	-3.5		***779.8***	778.8	-1.0
CCS HX 1A1/1A2	1A910	***814.5***	811.3	-3.2		***805.2***	801.1	-4.1		***781.0***	779.1	-1.9
CCS HX 1A1/1A2	1A915	***785.6***	783.1	-2.5		***778.7***	776.3	-2.4		***762.5***	761.6	-0.9
CCS HX 1A1/1A2	1B920	***725.5***	729.1	3.6		***723.5***	728.8	5.3		***722.8***	727.9	5.1
CCS HX 2A1/2A2	2A904	***824.9***	820.5	-4.4		***815.6***	809.2	-6.4		***787.9***	784.8	-3.1
CCS HX 2A1/2A2	2A907	***806.4***	806.5	0.1		***798.3***	797.1	-1.2		***776.4***	776.0	-0.4
CCS HX 2A1/2A2	2A906	***801.8***	803.1	1.3		***794.8***	794.1	-0.7		***772.9***	773.8	0.9
CCS HX 2A1/2A2	2a910	***748.6***	749.4	0.8		***747.5***	747.7	0.2		***739.4***	739.8	0.4
CCS HX 2A1/2A2	2A920	***717.2***	729.0	11.8		***718.8***	730.0	11.2		***717.2***	*726.9*	9.7
SUPPLY HEADER 1A	1A109AA	***850.3***	849.7	-0.6		***859.5***	856.7	-2.8		***844.5***	848.1	3.6
SUPPLY HEADER 2A	2A209AA	***845.1***	844.9	-0.2		***839.9***	838.8	-1.1		***805.3***	806.5	1.2
ELECT BD RM CHR A	1A575D1	***816.8***				***826.0***				***816.8***		
MCR CHILLER A	1A580A											
STATION AIR COMP A	1A140C	***752.6***	755.1	2.5		***760.1***	761.8	1.7		***753.1***	758.0	4.9
STATION AIR COMP C	1A135I	***723.6***	730.2	6.6		***727.1***	734.2	7.1		***723.6***	732.0	8.4
STATION AIR COMP C	1A135N	***702.9***	706.8	3.9		***705.2***	707.5	2.3		***702.9***	707.0	4.1
STATION AIR COMP D	1B135K	***726.0***	730.5	4.5		***729.4***	734.6	5.2		***726.0***	732.0	6.0
STATION AIR COMP D	1B135P	***705.2***	706.0	0.8		***707.5***	708.0	0.5		***705.2***	707.0	1.8

A TRAIN ERCW HEAD PRESSURES

		Ref 2.2	File: TESTA1			*Ref 2.2*	File: TESTA2			*Ref 2.2*	File: TESTA3	
		Step	Model			*Step*	Model			*Step:*	Model	
COMPONENT	**NODE**	*6.1[41]*	**Results**	**dH**		*6.1[46]*	**Results**	**dH**		*6.1[49]*	**Results**	**dH**
Downstream of SAC	1B146	*695.6*	693.4	-2.2		*696.1*	694.0	-2.1		*695.4*	693.5	-1.9
SHUTDOWN BD RM CHR A UPSTREAM	1A155A	*842.2*	839.8	-2.4		*858.3*	855.2	-3.1		*844.5*	846.7	2.2
SHUTDOWN BD RM CHR A DOWNSTREAM	1A155B	*843.3*	839.7	-3.6		*860.7*	855.0	-5.7		*844.5*	846.6	2.1
SHUTDOWN BD RM CHR A DOWNSTREAM	1A155G	*728.7*	727.9	-0.8		*729.3*	728.0	-1.3		*726.4*	725.4	-1.0
LCVC GROUP 1A INLET	1A110DD	*840.5*	837.0	-3.5		*854.9*	851.3	-3.6		*839.9*	842.9	3.0
LCVC GROUP 1A OUTLET	1A162AA	*738.3*	738.4	0.1		*738.3*	739.4	1.1		*730.2*	736.3	6.1
LCVC GROUP 1C INLET	1A110CC	*841.1*	837.1	-4.0		*855.5*	851.3	-4.2		*839.9*	843.0	3.1
LCVC GROUP 1C OUTLET	1A161AA	*739.4*	739.5	0.1		*740.0*	740.7	0.7		*736.0*	737.6	1.6
LCVC GROUP 2A INLET	2A210DD	*836.4*	835.7	-0.7		*827.8*	825.3	-2.5		*797.2*	796.6	-0.6
LCVC GROUP 2A OUTLET	2A262AA	*737.1*	735.4	-1.7		*740.0*	737.9	-2.1		*733.7*	732.7	-1.0
LCVC GROUP 2C INLET	2A210CC	*837.6*	836.2	-1.4		*826.0*	825.7	-0.3		*797.2*	797.0	-0.2
LCVC GROUP 2C OUTLET	2A261AA	*738.9*	736.2	-2.7		*741.2*	738.5	-2.7		*734.8*	733.2	-1.6
Q-A ERCW pump	2A203	*884.1*	884.1	0.0		*887.0*	885.8	-1.2		*921.7*	921.2	-0.5
R-A ERCW pump	2A204	*883.0*	883.3	0.3		*885.9*	885.1	-0.8		*922.8*	923.6	0.8
1A SUPPLY HEADER	1A106	*867.0*	865.9	-1.1		*869.9*	868.5	-1.4		*892.4*	893.1	0.7
2A SUPPLY HEADER	2A206	*867.6*	867.6	0.0		*869.9*	868.9	-1.0		*816.2*	817.9	1.7
ERCW to SAC	1A130AA		801.5			*815.9*	812.9	-3.0		*806.6*	806.5	-0.1
ERCW CROSSTIE HEADER	1A108EE	*854.3*	854.6	0.3		*857.8*	857.0	-0.8		*831.8*	835.5	3.7
Lake Elevation	2ALAKE	*676.5*	676.5	0.0		*676.5*	676.5	0.0		*676.5*	676.5	0.0
Calculated Values												
1A Supply Header dP	1A106 minus 1A109AA	*16.7*	16.2	-0.5		*10.3*	11.8	1.5		*47.9*	45.0	-2.9
2A Supply Header dP	2A206 minus 2A209AA	*22.5*	22.7	0.2		*30.0*	30.1	0.1		*10.9*	11.4	0.5
1A to 2A Header dP	1A106 minus 2A209AA									*87.1*	86.6	-0.5

Note 1: The J-A pump was used for this data. Node 1A104

A TRAIN ERCW HEAD PRESSURES

		Ref 2.2	File: TESTA4			*Ref 2.2*	File: TESTA5			*Ref 2.2*	File: TESTA 6	
		Step:	Model			*Step:*	Model			*Step:*	Model	
COMPONENT	NODE	*6.1[56]*	Results	dH		*6.1[65]*	Results	dH		*6.1[73]*	Results	dH
D/G 1A1	1A191	806.3	810.0	3.7		801.7	806.1	4.4				
D/G 1A1	1FE6769	733.5	733.2	-0.3		732.4	732.6	0.2				
D/G 1A2	2B209F	796.5	798.6	2.1		791.9	794.9	3.0				
D/G 1A2	1FE67277	733.5	733.8	0.3		733.5	733.2	-0.3				
D/G 2A1	2A291	824.8	827.5	2.7		818.4	822.5	4.1				
D/G 2A1	2FE6769	728.9	729.4	0.5		730.1	729.0	-1.1				
D/G 2A2	2B209E	820.2	820.7	0.5		814.4	816.0	1.6				
D/G 2A2	2FE67277	729.5	729.4	-0.1		730.1	729.0	-1.1				
CCS HX 1A1/1A2	1a902	814.5	809.8	-4.7		824.9	821.4	-3.5				
CCS HX 1A1/1A2	1A905	804.1	802.6	-1.5		812.2	813.1	0.9				
CCS HX 1A1/1A2	1A910	805.2	803.1	-2.1		813.3	813.7	0.4				
CCS HX 1A1/1A2	1A915	778.7	777.7	-1.0		784.4	784.7	0.3				
CCS HX 1A1/1A2	1B920	722.3	728.9	6.6		722.8	729.2	6.4				
CCS HX 2A1/2A2	2A904	814.5	811.4	-3.1		824.9	823.1	-1.8				
CCS HX 2A1/2A2	2A907	798.3	799.1	0.8		805.2	808.8	3.6				
CCS HX 2A1/2A2	2A906	793.7	796.0	2.3		801.8	805.3	3.5				
CCS HX 2A1/2A2	2a910	747.5	748.5	1.0		748.6	750.4	1.8				
CCS HX 2A1/2A2	2A920	719.1	730.5	11.4		719.8	729.5	9.7				
SUPPLY HEADER 1A	1A109AA	858.4	860.5	2.1		849.7	852.9	3.2				
SUPPLY HEADER 2A	2A209AA	838.7	841.6	2.9		844.5	848.0	3.5				
ELECT BD RM CHR A	1A575D1	831.8				811.0	818.3	7.3				
MCR CHILLER A	1A580A					803.6	806.3	2.7				
STATION AIR COMP A	1A140C	764.7	769.5	4.8		752.0	759.0	7.0				
STATION AIR COMP C	1A135I	714.4	718.7	4.3		710.9	715.0	4.1				
STATION AIR COMP C	1A135N	698.2	702.6	4.4		695.9	701.0	5.1				
STATION AIR COMP D	1B135K	721.3	724.0	2.7		716.7	719.0	2.3				
STATION AIR COMP D	1B135P	702.9	703.9	1.0		700.5	702.0	1.5				

A TRAIN ERCW HEAD PRESSURES

COMPONENT	NODE	*Ref 2.2* *Step: 6.1[56]*	File: TESTA4 Model Results	dH		*Ref 2.2* *Step: 6.1[65]*	File: TESTA5 Model Results	dH		*Ref 2.2* *Step: 6.1[73]*	File: TESTA 6 Model Results	dH
Downstream of SAC	1B146	***694.9***	693.0	-1.9		***693.7***	693.0	-0.7				
AUX CONT AIR A	1A374EE									***846.0***	804.5	-41.5
AUX CONT AIR A FE	1A375E									***738.8***	737.7	-1.1
SHUTDOWN BD RM CHR A UPSTREAM	1A155A	***856.0***	855.4	-0.6		***841.0***	839.3	-1.7				
SHUTDOWN BD RM CHR A DOWNSTREAM	1A155B	***851.4***	842.6	-8.8		***835.2***	828.1	-7.1				
SHUTDOWN BD RM CHR A DOWNSTREAM	1A155G	***736.2***	735.0	-1.2		***736.2***	734.1	-2.1				
LCVC GROUP 1A INLET	1A110DD	***853.8***	854.8	1.0		***837.6***	839.5	1.9				
LCVC GROUP 1A OUTLET	1A162AA	***738.3***	740.1	1.8		***738.3***	739.0	0.7				
LCVC GROUP 1C INLET	1A110CC	***853.8***	854.9	1.1		***837.6***	839.6	2.0				
LCVC GROUP 1C OUTLET	1A161AA	***739.4***	741.4	2.0		***740.6***	740.1	-0.5				
LCVC GROUP 2A INLET	2A210DD	***822.0***	827.8	5.8		***835.3***	838.7	3.4				
LCVC GROUP 2A OUTLET	2A262AA	***740.0***	738.5	-1.5		***738.3***	736.1	-2.2				
LCVC GROUP 2C INLET	2A210CC	***822.6***	828.4	5.8		***835.3***	839.2	3.9				
LCVC GROUP 2C OUTLET	2A261AA	***741.7***	739.2	-2.5		***739.4***	736.8	-2.6				
J-A ERCW pump	1A104	***882.4***	884.0	1.6		***880.7***	882.1	1.4				
R-A ERCW pump	2A204	***883.0***	883.8	0.8		***879.5***	881.9	2.4				
1A SUPPLY HEADER	1A106	***873.3***	874.7	1.4		***868.1***	872.0	3.9				
2A SUPPLY HEADER	2A206	***871.6***	870.7	-0.9		***865.3***	869.5	4.2				
ERCW to SAC	1A130AA	***825.1***	824.3	-0.8		***803.2***	806.9	3.7				
ERCW CROSSTIE HEADER	1A108EE	***858.3***	860.5	2.2		***853.1***	858.0	4.9				
Lake Elevation	2ALAKE	***676.2***	676.5	0.3		***676.9***	676.5	-0.4				
Calculated Values												
1A Supply Header dP	1A106 minus 1A109AA	***15.0***	***14.2***	-0.8		***18.4***	***19.1***	0.7				
2A Supply Header dP	2A206 minus 2A209AA	***32.9***	***29.1***	-3.8		***20.7***	***21.5***	0.8				

A TRAIN ERCW FLOW RATES SUMMARY

		PERCENT DIFFERENCE						gpm DIFFERENCE					
COMPONENT	LINK	6.1[41]	6.1[46]	6.1[49]	6.1[56]	6.1[65]	Average	6.1[41]	6.1[46]	6.1[49]	6.1[56]	6.1[65]	Average
D/G 1A1	1A191-1A1A1	-0.6	-0.1	0.8	0.4	1.6	0.4	-3.2	-0.7	4.5	2.2	8.9	2.3
D/G 1A2	2B209F-1A1A2	0.5	-0.6	-1.3	7.1	-1.2	0.9	3.0	-3.5	-7.3	39.3	-6.9	4.9
D/G 2A1	2A291-2A2A1	1.2	-1.9	0.3	3.5	-0.3	0.6	5.5	-9.1	1.4	15.6	-1.4	2.4
D/G 2A2	2B209E-2A2A2	2.7	1.0	-1.4	0.2	-2.1	0.1	11.3	4.5	-5.8	0.9	-9.4	0.3
CCS HX 1A1/1A2	1B235-1A900	0.1	0.5	0.2	0.4	3.9	1.0	5.5	17.5	6.8	16.7	155.7	40.5
CCS HX 2A1/2A2	2A910-2A920	1.5	-2.2	-1.0	1.2	3.1	0.5	87.3	-119.3	-46.4	64.4	172.7	31.7
CSS HX 1A	1A121A-1A150	-0.7	NA	NA	NA	1.6	0.4	-28.3	NA	NA	NA	60.0	15.8
CSS HX 2A	2A226-2A250	NA	2.5	-1.5	See 6.11	NA	0.5	NA	109.8	-59.3	See 6.11	NA	25.2
SUPPLY HEADER 1A	1A109-1A109AA	3.8	-3.6	-2.6	-3.4	2.4	-0.7	226.5	-89.0	-60.5	-88.6	152.2	28.1
SUPPLY HEADER 2A	2A209-2A209AA	-0.7	2.5	3.6	4.7	0.8	2.2	-76.6	356.9	437.7	676.4	91.1	297.1
ELECT BD RM CHR A	1A575E-1A575F	1.2	-1.8	-1.7	-1.7	4.4	0.1	2.4	-4.1	-3.8	-4.0	8.8	-0.2
MCR CHILLER A	1A580B-1A580C	NA	NA	NA	NA	0.7	0.7	NA	NA	NA	NA	0.9	0.9
STATION AIR COMP A Aftercooler	1A140A-1B139A	-0.9	-1.2	0.7	-0.3	1.2	-0.1	-0.5	-0.7	0.4	-0.2	0.7	-0.1
STATION AIR COMP A Intercooler	1A140F-1B139A	0.0	1.2	3.2	2.2	4.4	2.2	0.0	0.0	0.1	0.1	0.2	0.1
STATION AIR COMP B Aftercooler	1A141A-1B140A	-1.5	-0.9	0.9	0.6	3.3	0.5	-1.0	-0.6	0.6	0.5	2.2	0.3
STATION AIR COMP B Intercooler	1A141F-1B140A	1.3	-0.4	1.3	1.6	2.2	1.2	0.1	0.0	0.1	0.1	0.1	0.1
STATION AIR COMP C	1A135N-1A135P	-0.6	-0.6	1.6	0.7	1.3	0.5	-0.7	-0.8	2.1	0.7	1.2	0.5
STATION AIR COMP D	1B135P-1B135R	-0.9	-0.6	1.3	0.5	1.8	0.4	-1.1	-0.7	1.7	0.6	1.8	0.4
EGTS 2A	2A227C3-2A685A	NA	1.0	3.3	2.5	3.6	2.6		0.1	0.4	0.3	0.5	0.3
SFP & TBBP CLR 1A	1A646C-1A646D	0.8	0.0	2.4	0.4	0.8	0.9	0.3	0.0	0.9	0.1	0.3	0.3
714 PEN RM CLR 1A	1A565A2-1A610A	-0.2	0.6	2.5	1.7	3.4	1.6	-0.1	0.2	0.7	0.5	0.9	0.5
714 PEN RM CLR 2A	2A301E2-2A610A	1.4	-1.0	0.7	1.6	3.0	1.2	0.4	-0.3	0.2	0.4	0.7	0.3
SHUTDOWN BD RM CHR A	1A155B-1A155E	0.1	0.0	-0.1	0.3	1.6	0.4	0.0	0.0	0.0	1.5	6.7	1.6
CCS & AFW CLR 1A	1A510D-1A510E	-0.5	-0.4	1.8	NA	1.5	0.6	-0.6	-0.5	2.1	NA	1.7	0.7
690 PEN RM CLR 1A	1A560-1A609A	0.3	0.1	3.1	3.6	-8.1	-0.2	0.1	0.0	0.9	0.7	-1.7	0.0
690 PEN RM CLR 2A	2A609B-2A301G	2.0	-0.6	0.9	1.5	3.1	1.4	0.6	-0.2	0.2	0.3	0.7	0.3
BAT & AFW CLR 2A	2A387B-2A234	0.5	-1.6	-0.8	0.1	2.1	0.1	0.4	-1.1	-0.5	0.1	1.6	0.1
UCVC 1C	1A122-1A122D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

A TRAIN ERCW FLOW RATES SUMMARY

		PERCENT DIFFERENCE						gpm DIFFERENCE					
COMPONENT	LINK	6.1[41]	6.1[46]	6.1[49]	6.1[56]	6.1[65]	Average	6.1[41]	6.1[46]	6.1[49]	6.1[56]	6.1[65]	Average
UCVC 2A	2A222A-2A222B	0.5	-1.1	4.5	1.8	3.1	1.7	0.1	-0.3	0.9	0.4	0.8	0.4
UCVC 2C	2A222-2A222D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
INCORE INST RM CHR 1A	1A524O-1A524P	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
INCORE INST RM CHR 2A	2A524O-2A524P	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CCP OIL CLR 1A	1A515-1A515A	-0.8	-1.2	2.3	-1.4	2.9	0.3	-0.3	-0.5	0.8	-0.6	1.0	0.1
CCP OIL CLR 2A	2A227I-2A227H	-1.8	-2.8	-1.5	2.3	4.2	0.1	-0.8	-1.2	-0.5	0.9	1.8	0.0
CCP RM CLR 1A	1A169-1A169A	0.1	0.0	4.4	1.5	2.2	1.7	0.1	0.0	2.1	0.5	0.6	0.6
CCP RM CLR 2A	2A169-2A169A	1.1	-0.2	3.6	-0.1	1.8	1.3	0.5	-0.1	1.4	0.0	0.7	0.5
SIS PMP RM CLR 1A	1A535-1A525	0.1	0.2	2.4	1.2	2.1	1.2	0.0	0.1	0.8	0.4	0.7	0.4
SIS OIL CLR 1A	1A530-1A540	1.7	0.8	4.3	3.1	4.3	2.9	0.2	0.1	0.5	0.4	0.5	0.3
SIS PMP RM CLR 2A	2A232B-2A232D	1.3	1.0	-1.1	1.7	3.0	1.2	0.4	0.3	-0.3	0.5	1.0	0.4
SIS OIL CLR 2A	2A232C-2A232F	4.1	-1.7	6.5	0.0	2.2	2.2	0.5	-0.2	0.6	0.0	0.3	0.2
669 PEN RM CLR 1A	1A556-1A557	0.7	-0.2	3.0	0.7	-6.8	-0.5	0.4	-0.1	1.5	0.2	-2.0	0.0
669 PEN RM CLR 2A	2A347A-2A347B	1.6	-0.5	0.2	-0.4	1.8	0.5	1.0	-0.3	0.1	-0.1	0.6	0.2
PIPE CHASE CLR 1A	1A570A1-1A570A3	0.5	0.6	2.4	0.9	0.7	1.0	0.3	0.4	1.5	0.3	0.2	0.6
PIPE CHASE CLR 2A	2A301F1-2A302C	0.8	-0.9	1.3	-3.6	-1.6	-0.8	0.3	-0.4	0.4	-1.6	-0.8	-0.4
LCVC GROUP 1A	1A110DD-1A112	-1.3	-1.2	1.6	0.5	1.1	0.1	-7.5	-7.5	9.1	3.3	6.0	0.7
1AA LCC	1A112B-1A162	-1.4	-1.2	1.6	0.6	1.0	0.1	-4.6	-4.4	5.3	2.1	3.4	0.3
1A CRD	1A170A-1A170B	-1.3	-1.4	1.5	0.3	1.0	0.0	-1.0	-1.1	1.1	0.2	0.7	0.0
U-1 #1RCP	1A116-1A124B	-1.3	-1.3	1.5	0.5	1.0	0.1	-1.9	-1.9	2.1	0.7	1.4	0.1
UCVC 1A	1A122C-1A164	0.5	0.3	3.1	2.3	3.0	1.9	0.1	0.1	0.6	0.5	0.6	0.4
LCVC GROUP 1C	1A110CC-1A111	-1.0	-0.9	2.0	1.0	2.3	0.7	-5.4	-5.0	10.4	5.5	11.9	3.5
1CA LCC	1A111B-1A161	-1.1	-0.9	1.9	1.0	2.3	0.7	-3.2	-2.9	5.9	3.3	6.8	2.0
1C CRD	1A171A-1A171B	-0.9	-0.9	2.0	1.0	2.4	0.7	-0.9	-0.9	1.8	1.0	2.1	0.6
U-1 #3RCP	1A115-1A171B	-1.0	-0.9	1.9	1.0	2.3	0.7	-1.4	-1.3	2.6	1.4	3.0	0.9
LCVC GROUP 2A	2A210DD-2A212	0.0	-1.3	0.5	1.1	1.0	0.3	-0.1	-6.3	2.2	5.3	5.0	1.2
2AA LCC	2A212B-2A262	0.3	-1.0	0.8	1.4	1.2	0.6	0.8	-2.7	1.9	3.7	3.5	1.5
2A CRD	2A270A-2A270B	-0.5	-1.7	0.3	0.7	0.5	-0.1	-0.5	-1.5	0.2	0.6	0.5	-0.1
U-2 #1RCP	2A216-2A270B	-0.3	-1.6	0.1	0.8	0.7	-0.1	-0.4	-2.1	0.1	1.0	1.0	-0.1
LCVC GROUP 2C	2A210CC-2A211	-0.1	-1.3	0.3	1.5	2.8	0.7	-0.3	-5.6	1.2	6.3	13.1	2.9

A TRAIN ERCW FLOW RATES SUMMARY

		PERCENT DIFFERENCE						gpm DIFFERENCE					
COMPONENT	LINK	6.1[41]	6.1[46]	6.1[49]	6.1[56]	6.1[65]	Average	6.1[41]	6.1[46]	6.1[49]	6.1[56]	6.1[65]	Average
2C-A LCC	2A211B-2A261	-0.3	-1.5	0.1	1.2	3.2	0.5	-0.8	-3.4	0.2	2.6	7.5	1.2
2C CRD	2A271A-2A271B	-0.5	-1.6	0.2	1.1	3.1	0.5	-0.4	-1.4	0.1	0.9	2.7	0.4
U-2 #3RCP	2A215-2A271B	0.7	-0.6	0.7	2.2	2.1	1.0	1.0	-0.8	0.8	2.8	2.9	1.3
CNT SPR PMP RM CLR 1A	1A185-1A185A	0.9	0.8	3.4	-0.1	5.0	2.0	0.2	0.2	0.9	0.0	1.1	0.5
CNT SPR PMP RM CLR 2A	2A350A2-2A605A	0.7	-1.3	0.1	-0.4	1.9	0.2	0.2	-0.4	0.0	-0.1	0.5	0.0
RHR PMP RM CLR 1A	1A552-1A606B	0.8	0.9	4.1	1.0	3.0	2.0	0.1	0.2	0.6	0.2	0.5	0.3
RHR PMP RM CLR 2A	2A189A-2A606B	0.0	-0.4	1.9	1.7	3.6	1.4	0.0	-0.1	0.3	0.3	0.7	0.3
1A-A STRAINER BACKWASH	1A106B-1A106C	See 6.11	-0.5	-0.6	0.6	0.7	0.0	See 6.11	-3.0	-3.9	3.4	4.4	0.2
2A-A STRAINER BACKWASH	2A206B-2A206C	-1.7	-1.2	0.0	4.7	4.3	1.2	-11.5	-8.4	0.0	31.1	28.4	7.9
Calculated Values													
U1 AUX BLDG TOTAL:	See Note 2	-0.7	-0.8	1.5	0.4	1.6	0.4	-41.4	-19.3	34.1	10.8	104.2	17.7
U2 AUX BLDG TOTAL:	See Note 3	1.0	-0.1	-0.7	4.9	3.2	1.7	110.4	-7.9	-92.3	700.4	355.6	213.2
TOTAL FLOW:	See Note 4	-0.1	-0.2	-0.4	4.0	2.4	1.1	-20.1	-47.4	-69.4	803.7	483.8	230.1
AUX BLDG TOTAL:	See Note 5	0.4	-0.2	-0.4	4.2	2.7	1.3	69.0	-27.2	-58.3	711.2	459.8	230.9

Note 2: This is the sum of the individual users flowing through the Unit 1 supply header into the Auxiliary Building.
Note 3: This is the sum of the individual users flowing through the Unit 2 supply header into the Auxiliary Building.
Note 4: This is the sum of the individual users on the entire train
Note 5: This is the sum of the individual users flowing through the Unit 1 and Unit 2 supply header into the Auxiliary Building.

A TRAIN ERCW HEAD PRESSURES SUMMARY

		DIFFERENTIAL HEAD					
COMPONENT	**NODE**	**6.1[41]**	**6.1[46]**	**6.1[49]**	**6.1[56]**	**6.1[65]**	**AVERAGE**
D/G 1A1	1A191	1.8	-0.1	4.5	3.7	4.4	2.9
D/G 1A1	1FE6769	-0.1	-0.7	-0.2	-0.3	0.2	-0.2
D/G 1A2	2B209F	-0.6	-0.8	2.8	2.1	3.0	1.3
D/G 1A2	1FE67277	-0.2	-1.3	-0.3	0.3	-0.3	-0.4
D/G 2A1	2A291	-0.7	-1.4	3.3	2.7	4.1	1.6
D/G 2A1	2FE6769	-1.4	-1.0	0.3	0.5	-1.1	-0.5
D/G 2A2	2B209E	-3.1	-3.5	1.1	0.5	1.6	-0.7
D/G 2A2	2FE67277	2.7	-1.0	-0.3	-0.1	-1.1	0.0
CCS HX 1A1/1A2	1a902	-7.2	-8.0	-4.1	-4.7	-3.5	-5.5
CCS HX 1A1/1A2	1A905	-2.5	-3.5	-1.0	-1.5	0.9	-1.5
CCS HX 1A1/1A2	1A910	-3.2	-4.1	-1.9	-2.1	0.4	-2.2
CCS HX 1A1/1A2	1A915	-2.5	-2.4	-0.9	-1.0	0.3	-1.3
CCS HX 1A1/1A2	1B920	3.6	5.3	5.1	6.6	6.4	5.4
CCS HX 2A1/2A2	2A904	-4.4	-6.4	-3.1	-3.1	-1.8	-3.7
CCS HX 2A1/2A2	2A907	0.1	-1.2	-0.4	0.8	3.6	0.6
CCS HX 2A1/2A2	2A906	1.3	-0.7	0.9	2.3	3.5	1.5
CCS HX 2A1/2A2	2a910	0.8	0.2	0.4	1.0	1.8	0.8
CCS HX 2A1/2A2	2A920	11.8	11.2	9.7	11.4	9.7	10.7
SUPPLY HEADER 1A	1A109AA	-0.6	-2.8	3.6	2.1	3.2	1.1
SUPPLY HEADER 2A	2A209AA	-0.2	-1.1	1.2	2.9	3.5	1.3
ELECT BD RM CHR A	1A575D1					7.3	7.3
MCR CHILLER A	1A580A					2.7	2.7
STATION AIR COMP A	1A140C	2.5	1.7	4.9	4.8	7.0	4.2
STATION AIR COMP C	1A135I	6.6	7.1	8.4	4.3	4.1	**6.1**
STATION AIR COMP C	1A135N	3.9	2.3	4.1	4.4	5.1	**4.0**
STATION AIR COMP D	1B135K	4.5	5.2	6.0	2.7	2.3	**4.1**
STATION AIR COMP D	1B135P	0.8	0.5	1.8	1.0	1.5	**1.1**
Downstream of SAC	1B146	-2.2	-2.1	-1.9	-1.9	-0.7	-1.8

A TRAIN ERCW HEAD PRESSURES SUMMARY

		DIFFERENTIAL HEAD					
COMPONENT	**NODE**	**6.1[41]**	**6.1[46]**	**6.1[49]**	**6.1[56]**	**6.1[65]**	**AVERAGE**
SHUTDOWN BD RM CHR A UPSTREAM	1A155A	-2.4	-3.1	2.2	-0.6	-1.7	-1.1
SHUTDOWN BD RM CHR A DOWNSTREAM	1A155B	-3.6	-5.7	2.1	-8.8	-7.1	-4.6
SHUTDOWN BD RM CHR A DOWNSTREAM	1A155G	-0.8	-1.3	-1.0	-1.2	-2.1	-1.3
LCVC GROUP 1A INLET	1A110DD	-3.5	-3.6	3.0	1.0	1.9	-0.2
LCVC GROUP 1A OUTLET	1A162AA	0.1	1.1	6.1	1.8	0.7	2.0
LCVC GROUP 1C INLET	1A110CC	-4.0	-4.2	3.1	1.1	2.0	-0.4
LCVC GROUP 1C OUTLET	1A161AA	0.1	0.7	1.6	2.0	-0.5	0.8
LCVC GROUP 2A INLET	2A210DD	-0.7	-2.5	-0.6	5.8	3.4	1.1
LCVC GROUP 2A OUTLET	2A262AA	-1.7	-2.1	-1.0	-1.5	-2.2	-1.7
LCVC GROUP 2C INLET	2A210CC	-1.4	-0.3	-0.2	5.8	3.9	1.6
LCVC GROUP 2C OUTLET	2A261AA	-2.7	-2.7	-1.6	-2.5	-2.6	-2.4
Q-A / J-A ERCW pump	2A203	0.0	-1.2	-0.5	1.6	1.4	0.3
R-A ERCW pump	2A204	0.3	-0.8	0.8	0.8	2.4	0.7
1A SUPPLY HEADER	1A106	-1.1	-1.4	0.7	1.4	3.9	0.7
2A SUPPLY HEADER	2A206	0.0	-1.0	1.7	-0.9	4.2	0.8
ERCW to SAC	1A130AA	0.0	-3.0	-0.1	-0.8	3.7	0.0
ERCW CROSSTIE HEADER	1A108EE	0.3	-0.8	3.7	2.2	4.9	2.1
Lake Elevation	2ALAKE	0.0	0.0	0.0	0.3	-0.4	0.0
Calculated Values							
1A Supply Header dP	1A106 minus 1A109AA	-0.5	1.5	-2.9	-0.8	0.7	-0.4
2A Supply Header dP	2A206 minus 2A209AA	0.2	0.1	0.5	-3.8	0.8	-0.4

B TRAIN ERCW FLOW RATES

		Ref 2.3	File: TESTB1			Ref 2.3	File: TESTB2			Ref 2.3	File: TESTB3		
		step	Model			step	Model			step	Model		
COMPONENT	LINK	6.1[28]	Results	% Dif	gpm dif	6.1[33]	Results	% dif	gpm dif	6.1[36]	Results	% dif	gpm dif
D/G 1B1	1B191-1B1B1	514.2	540.5	5.1	26.3	546.0	541.4	-0.8	-4.6	522.3	508.9	-2.6	-13.4
D/G 1B2	2A209F-1B1B2	494.7	500.7	1.2	6.0	503.1	501.5	-0.3	-1.6	477.3	471.2	-1.3	-6.1
D/G 2B1	2B291-2B2B1	522.3	516.5	-1.1	-5.8	519.6	517.4	-0.4	-2.2	474.3	486.0	2.5	11.7
D/G 2B2	2A209E-2B2B2	677.1	687.7	1.6	10.6	679.2	688.9	1.4	9.7	645.2	646.7	0.2	1.5
CCS HX 0B1/0B2	2B920-2B925	7048.4	7095.7	0.7	47.3	6681.3	6706.4	0.4	25.1	5817.2	5812.5	-0.1	-4.7
CSS HX 1B	1B121A-1B150	3622.2	3625.5	0.1	3.3	0.0	0.0			0.0	0.0		
CSS HX 2B	2B226-2B250	0.0	0.0			4157.0	4251.3	2.3	94.3	3687.8	3694.4	0.2	6.6
SUPPLY HEADER 1B	1B109-1B109AA	5959.9	5906.3	-0.9	-53.6	2529.8	2362.8	-6.6	-167.0	2433.1	2228.8	-8.4	-204.3
SUPPLY HEADER 2B	2B209C-2B209AA	8859.9	9023.5	1.8	163.6	12489.9	12779.0	2.3	289.1	10908.6	11085.0	1.6	176.4
ELECT BD RM CHR B	1B675E-1B675F	242.1	243.5	0.6	1.4	253.3	252.8	-0.2	-0.5	242.1	238.4	-1.5	-3.7
MCR CHILLER B	1B680D-1B131B	0.0	0			0.0	0			0.0	0		
STATION AIR COMP A AFTERCOOLER	1A140A-1B139A	62.0	60.5	-2.5	-1.5	63.9	61.9	-3.1	-2.0	61.5	58.7	-4.5	-2.8
STATION AIR COMP A INTERCOOLER	1A140F-1B139A	4.0	4.6	15.0	0.6	4.0	4.7	17.5	0.7	3.8	4.5	18.4	0.7
STATION AIR COMP B AFTERCOOLER	1A141A-1B140A	74.6	73.2	-1.9	-1.4	76.9	75.0	-2.5	-1.9	72.8	71.1	-2.4	-1.7
STATION AIR COMP B INTERCOOLER	1A141F-1B140A	5.2	5.1	-1.9	-0.1	5.3	5.2	-1.9	-0.1	5.1	4.9	-3.9	-0.2
STATION AIR COMP C	1A135N-1A135P	140.2	138.6	-1.2	-1.6	143.4	141.9	-1.1	-1.5	137.5	134.5	-2.2	-3.0
STATION AIR COMP D	1B135P-1B135R	140.8	138.1	-1.9	-2.7	145.0	141.4	-2.5	-3.6	138.1	134.0	-2.9	-4.1
EGTS 2B	2B685B-2B227C	17.3	17.5	1.4	0.2	16.4	16.4	0.2	0.0	14.2	14.2	0.2	0.0
AUX CONT AIR B	2B794A-2B227C	0.0				0.0				0.0			
SFP & TBBP CLR 1B	1B601I-1B601J	40.0	41.3	3.2	1.3	42.2	42.9	1.6	0.7	39.8	40.3	1.1	0.5
714 PEN RM CLR 1B	1B665A2-1B610B	37.5	37.5	-0.1	0.0	39.1	38.9	-0.5	-0.2	37.1	36.7	-1.1	-0.4
714 PEN RM CLR 2B	2B301C2-2B610B	38.5	39.7	3.1	1.2	36.5	37.4	2.4	0.9	31.9	32.3	1.2	0.4
SHUTDOWN BD RM CHR B	2B237D-2B245A	50.0	50.0	0.0	0.0	50.1	50.1	0.0	0.0	46.9	46.9	0.1	0.0

B TRAIN ERCW FLOW RATES

		Ref 2.3	File: TESTB1			*Ref 2.3*	File: TESTB2			*Ref 2.3*	File: TESTB3		
		step	Model			*step*	Model			*step*	Model		
COMPONENT	LINK	*6.1[28]*	Results	% Dif	gpm dif	*6.1[33]*	Results	% dif	gpm dif	*6.1[36]*	Results	% dif	gpm dif
CCS & AFW CLR 1B	1B603D-1B603E	***112.4***	114.7	2.0	2.3	***117.7***	119.1	1.2	1.4	***111.5***	112.2	0.6	0.7
690 PEN RM CLR 1B	1B660B4-1B311B	***36.5***	37.1	1.6	0.6	***38.1***	38.5	1.0	0.4	***36.2***	36.3	0.3	0.1
690 PEN RM CLR 2B	2B609A-2B301E	***34.8***	36.2	3.9	1.4	***32.8***	34.0	3.5	1.2	***29.0***	29.4	1.5	0.4
BAT & AFW CLR 2B	2B234A2-2B234	***88.8***	90.3	1.7	1.5	***84.4***	84.8	0.5	0.4	***73.2***	73.0	-0.2	-0.2
UCVC 2B	2B221A-2B221B	***0.0***	0.0			***0.0***	0.0			***0.0***	0.0		0.0
UCVC 2D	2B222-2B222D	***38.4***	37.9	-1.3	-0.5	***36.1***	35.6	-1.3	-0.5	***31.2***	30.7	-1.7	-0.5
CCP OIL CLR 1B	1B497-1B497A	***43.5***	44.5	2.3	1.0	***45.3***	46.2	2.0	0.9	***43.0***	43.6	1.4	0.6
CCP OIL CLR 2B	2B229A-2B229B	***63.0***	64.4	2.2	1.4	***60.0***	60.7	1.2	0.7	***52.4***	52.5	0.3	0.1
CCP RM CLR 1B	1B616-1B616A	***43.6***	44.0	0.9	0.4	***45.8***	45.7	-0.2	-0.1	***43.1***	43.0	-0.2	-0.1
CCP RM CLR 2B	2B171-2B171A	***56.7***	56.7	-0.1	0.0	***53.3***	53.4	0.1	0.1	***46.4***	46.3	-0.3	-0.1
SIS PMP RM CLR 1B	1B625-1B635	***34.2***	34.8	1.9	0.6	***36.2***	36.1	-0.3	-0.1	***34.0***	34.0	-0.1	0.0
SIS OIL CLR 1B	1B630-1B640	***13.4***	13.7	2.2	0.3	***13.8***	14.3	3.6	0.5	***13.2***	13.4	1.5	0.2
SIS PMP CLR RM 2B	2B232C-2B232E	***43.2***	43.1	-0.1	0.0	***40.5***	40.6	0.2	0.1	***35.4***	35.2	-0.5	-0.2
SIS OIL CLR 2B	2B232C-2B232G	***14.9***	15.1	1.3	0.2	***14.2***	14.2	0.0	0.0	***12.5***	12.2	-2.4	-0.3
669 PEN RM CLR 1B	1B656-1B657	***43.3***	44.3	2.4	1.0	***45.6***	46.0	0.8	0.4	***43.3***	43.3	0.1	0.0
669 PEN RM CLR 2B	2B349A-2B608A	***70.8***	71.7	1.2	0.9	***67.0***	67.5	0.7	0.5	***58.1***	58.3	0.4	0.3
PIPE CHASE CLR 1B	1B670A1-1B671	***42.0***	47.9	14.0	5.9	***44.0***	49.7	13.0	5.7	***41.7***	46.9	12.5	5.2
PIPE CHASE CLR 2B	2B301D1-2B302B	***60.6***	62.7	3.4	2.1	***58.1***	59.0	1.5	0.9	***50.7***	51.0	0.6	0.3
LCVC GROUP 1B	1B110FF-1B111	***538.5***	544.4	1.1	5.9	***561.2***	565.8	0.8	4.6	***533.8***	532.8	-0.2	-1.0
1B-B LCC	1B111B-1B161	***278.4***	281.0	0.9	2.6	***290.2***	292.0	0.6	1.8	***276.0***	275.0	-0.4	-1.0
1B CRD	1B171A-1B171B	***89.6***	90.9	1.4	1.3	***93.4***	94.5	1.1	1.1	***88.9***	89.0	0.2	0.1
U-1 #2 RCP	1B115-1B123B	***146.9***	148.8	1.3	1.9	***153.1***	154.7	1.0	1.6	***145.7***	145.6	0.0	-0.1
1B UCC	1B123A-1B123B	***23.5***	23.7	0.8	0.2	***24.5***	24.6	0.4	0.1	***23.3***	23.2	-0.4	-0.1
LCVC GROUP 1D	1B110EE-1B112	***556.8***	562.8	1.1	6.0	***580.9***	584.6	0.6	3.7	***552.3***	551.0	-0.2	-1.3
1D-B LCC	1B112B-1B162	***283.1***	286.5	1.2	3.4	***295.4***	297.6	0.7	2.2	***280.8***	280.6	-0.1	-0.2
1D CRD	1B170A-1B170B	***123.4***	125.0	1.3	1.6	***128.7***	129.8	0.8	1.1	***122.4***	122.4	0.0	0.0
U-1 #4 RCP	1B116-1B170B	***150.3***	151.3	0.7	1.0	***156.8***	157.2	0.2	0.4	***149.1***	148.1	-0.7	-1.0
LCVC GROUP 2B	2B210EE-2B211	***597.9***	604.5	1.1	6.6	***566.8***	570.8	0.7	4.0	***494.9***	492.6	-0.5	-2.3

B TRAIN ERCW FLOW RATES

		Ref 2.3	File: TESTB1			*Ref 2.3*	File: TESTB2			*Ref 2.3*	File: TESTB3		
		step	Model			*step*	Model			*step*	Model		
COMPONENT	LINK	*6.1[28]*	Results	% Dif	gpm dif	*6.1[33]*	Results	% dif	gpm dif	*6.1[36]*	Results	% dif	gpm dif
2B-B LCC	2B211B-2B261	*310.1*	313.9	1.2	3.8	*293.9*	296.4	0.8	2.5	*256.7*	255.8	-0.3	-0.9
2B CRD	2B271A-1B271B	*110.9*	111.5	0.6	0.6	*105.1*	105.3	0.2	0.2	*91.8*	91.0	-0.8	-0.8
U-2 #2 RCP	2B215-2B271B	*177.0*	179.2	1.3	2.2	*167.7*	169.1	0.8	1.4	*146.5*	145.9	-0.4	-0.6
LCVC GROUP 2D	2B210DD-2B212	*665.1*	670.1	0.8	5.0	*629.4*	633.2	0.6	3.8	*550.0*	547.5	-0.4	-2.5
2D-B LCC	2B212B-2B262	*390.9*	393.3	0.6	2.4	*369.9*	371.6	0.4	1.7	*323.2*	321.1	-0.7	-2.1
2D CRD	2B270A-2B270B	*109.5*	110.6	1.0	1.1	*103.7*	104.6	0.9	0.9	*90.6*	90.6	0.0	0.0
U-2 #4 RCP	2B216-2B270B	*164.6*	166.2	0.9	1.6	*155.8*	157.0	0.8	1.2	*136.1*	135.8	-0.2	-0.3
CNT SPR PMP RM CLR 1B	1B187-1B187A	*30.0*	30.6	2.1	0.6	*31.4*	31.8	1.1	0.4	*29.7*	30.0	0.9	0.3
CNT SPR PMP RM CLR 2B	2B187-2B187A	*42.4*	43.1	1.7	0.7	*40.0*	40.6	1.4	0.6	*35.0*	35.2	0.4	0.2
RHR PMP RM CLR 1B	1B652A-1B606C	*19.5*	19.6	0.5	0.1	*20.3*	20.4	0.7	0.1	*19.3*	19.2	-0.3	-0.1
RHR PMP RM CLR 2B	2B191C-2B606A	*24.8*	25.0	0.6	0.2	*23.1*	23.6	2.1	0.5	*20.3*	20.4	0.3	0.1
1B-B STRAINER BACKWASH	1B106B-1B106C	*666.9*	689.1	3.3	22.2	*678.7*	685.0	0.9	6.3	*707.4*	692.5	-2.1	-14.9
2B-B STRAINER BACKWASH	2B206B-2B206C	*690.3*	690.8	0.1	0.5	*666.9*	684.5	2.6	17.6	*0.0*	0.0		
L-B pump	1B102-1B104		9394.5				9490.7				8171.1		
P-B pump	2B202-2B204		9160.6				9270.3				7947.6		
Calculated Values:													
U1 AUX BLDG TOTAL:	See Note 2	**5882.3**	5906.3	0.4	24.0	**2353.6**	2,362.9	0.4	9.3	**2239.0**	2,228.8	-0.5	-10.2
U2 AUX BLDG TOTAL:	See Note 3	**8955.7**	9023.7	0.8	68.0	**12647.0**	12,779.6	1.0	132.6	**11087.1**	11,084.6	0.0	-2.5
TOTAL FLOW:	See Note 4	**18403.5**	18555.3	0.8	151.8	**18594.2**	18,761.2	0.9	167.0	**16152.6**	16,118.7	-0.2	-33.9
AUX BLDG TOTAL:	See Note 5	**14838.0**	14930.0	0.6	92.0	**15000.6**	15142.5	0.9	141.9	**13326.1**	13,313.4	-0.1	-12.7

Note 2: This is the sum of the individual users flowing through the Unit 1 supply header into the Auxiliary Building.
Note 3: This is the sum of the individual users flowing through the Unit 2 supply header into the Auxiliary Building.
Note 4: This is the sum of the individual users on the entire train
Note 5: This is the sum of the individual users flowing through the Unit 1 and Unit 2 supply header into the Auxiliary Building.

B TRAIN ERCW FLOW RATES

		Ref 2.3	File: TESTB4			*Ref 2.3*	File: TESTB5			*Ref 2.3*	File: TESTB6		
		step	Model			*step*	Model			*step*	Model		
COMPONENT	LINK	*6.1[40]*	Results	% dif	gpm dif	*6.1[49]*	Results	% dif	gpm dif	*6.1[57]*	Results	% dif	gpm dif
D/G 1B1	1B191-1B1B1	***546.0***	545.6	-0.1	-0.4	***505.9***	521.7	3.1	15.8				
D/G 1B2	2A209F-1B1B2	***505.9***	505.4	-0.1	-0.5	***491.8***	483.2	-1.8	-8.6				
D/G 2B1	2B291-2B2B1	***525.0***	521.4	-0.7	-3.6	***505.9***	498.4	-1.5	-7.5				
D/G 2B2	2A209E-2B2B2	***691.5***	694.3	0.4	2.8	***666.6***	663.3	-0.5	-3.3				
CCS HX 0B1/0B2	2B920-2B925	***6788.2***	6770.4	-0.3	-17.8	***6841.1***	6808.6	-0.5	-32.5				
CSS HX 1B	1B121A-1B150	***0.0***	0.0			***4345.1***	4339.3	-0.1	-5.8				
CSS HX 2B	2B226-2B250	***4289.6***	4290.8	0.0	1.2	***0.0***	0.0						
SUPPLY HEADER 1B	1B109-1B109AA	***2332.4***	2165.3	-7.2	-167.1	***6499.3***	6408.2	-1.4	-91.1				
SUPPLY HEADER 2B	2B209C-2B209AA	***12449.8***	12778.0	2.6	328.2	***8888.1***	8923.2	0.4	35.1				
ELECT BD RM CHR B	1B675E-1B675F	***264.1***	261.1	-1.1	-3.0	***230.2***	231.6	0.6	1.4				
MCR CHILLER B	1B680D-1B131B	***0.0***	0			***116.2***	115.7	-0.4	-0.5				
STATION AIR COMP A AFTERCOOLER	1A140A-1B139A	***71.3***	70.5	-1.1	-0.8	***65.8***	64.8	-1.5	-1.0				
STATION AIR COMP A INTERCOOLER	1A140F-1B139A	***4.4***	5.4	22.7	1.0	***4.9***	4.9	0.0	0.0				
STATION AIR COMP B AFTERCOOLER	1A141A-1B140A	***84.7***	85.3	0.7	0.6	***79.7***	78.5	-1.5	-1.2				
STATION AIR COMP B INTERCOOLER	1A141F-1B140A	***6.0***	5.9	-1.7	-0.1	***5.5***	5.5	0.5	0.0				
STATION AIR COMP C	1A135N-1A135P	***120.5***	121.9	1.1	1.4	***112.1***	112.3	0.2	0.2				
STATION AIR COMP D	1B135P-1B135R	***0.0***	0.0			***0.0***	0.0						
EGTS 2B	2B685B-2B227C	***13.1***	13.3	1.3	0.2	***13.3***	13.4	0.6	0.1				
AUX CONT AIR B	2B794A-2B227C	***0.0***				***0.0***				***9.4***	9.3	-0.1	0.0
SFP & TBBP CLR 1B	1B601I-1B601J	***42.9***	43.6	1.6	0.7	***38.9***	39.1	0.5	0.2				
714 PEN RM CLR 1B	1B665A2-1B610B	***29.0***	28.9	-0.2	-0.1	***26.0***	26.0	0.2	0.0				
714 PEN RM CLR 2B	2B301C2-2B610B	***31.0***	31.2	0.8	0.2	***31.4***	31.5	0.2	0.1				
SHUTDOWN BD RM CHR B	2B237D-2B245A	***46.9***	46.9	0.1	0.0	***432.0***	431.9	0.0	-0.1				

B TRAIN ERCW FLOW RATES

		Ref 2.3	File: TESTB4			*Ref 2.3*	File: TESTB5			*Ref 2.3*	File: TESTB6		
		step	Model			*step*	Model			*step*	Model		
COMPONENT	LINK	*6.1[40]*	Results	% dif	gpm dif	*6.1[49]*	Results	% dif	gpm dif	*6.1[57]*	Results	% dif	gpm dif
CCS & AFW CLR 1B	1B603D-1B603E	*85.3*	85.7	0.4	0.4	*76.6*	77.1	0.7	0.5				
690 PEN RM CLR 1B	1B660B4-1B311B	*21.9*	21.8	-0.4	-0.1	*19.4*	19.6	1.3	0.3				
690 PEN RM CLR 2B	2B609A-2B301E	*21.2*	21.1	-0.5	-0.1	*21.7*	21.3	-1.9	-0.4				
BAT & AFW CLR 2B	2B234A2-2B234	*75.7*	75.8	0.1	0.1	*77.5*	76.5	-1.2	-1.0				
UCVC 2B	2B221A-2B221B	*0.0*	0.0			*0.0*	0.0						
UCVC 2D	2B222-2B222D	*36.6*	35.9	-1.8	-0.7	*37.2*	36.3	-2.5	-0.9				
CCP OIL CLR 1B	1B497-1B497A	*46.7*	47.2	1.0	0.5	*41.8*	42.3	1.3	0.5				
CCP OIL CLR 2B	2B229A-2B229B	*50.8*	50.6	-0.4	-0.2	*51.3*	51.1	-0.5	-0.2				
CCP RM CLR 1B	1B616-1B616A	*46.6*	46.6	0.0	0.0	*41.9*	41.8	-0.1	-0.1				
CCP RM CLR 2B	2B171-2B171A	*43.1*	42.9	-0.5	-0.2	*43.8*	43.3	-1.1	-0.5				
SIS PMP RM CLR 1B	1B625-1B635	*38.0*	37.4	-1.5	-0.6	*33.6*	33.6	0.1	0.0				
SIS OIL CLR 1B	1B630-1B640	*14.4*	14.8	2.8	0.4	*13.2*	13.3	0.8	0.1				
SIS PMP CLR RM 2B	2B232C-2B232E	*44.2*	43.9	-0.7	-0.3	*45.2*	44.3	-1.9	-0.9				
SIS OIL CLR 2B	2B232C-2B232G	*15.1*	15.4	2.0	0.3	*15.4*	15.5	0.6	0.1				
669 PEN RM CLR 1B	1B656-1B657	*24.8*	24.6	-0.7	-0.2	*22.1*	22.1	0.2	0.0				
669 PEN RM CLR 2B	2B349A-2B608A	*37.1*	37.4	0.8	0.3	*37.9*	37.8	-0.3	-0.1				
PIPE CHASE CLR 1B	1B670A1-1B671	*54.2*	54.1	-0.2	-0.1	*48.7*	48.6	-0.3	-0.1				
PIPE CHASE CLR 2B	2B301D1-2B302B	*46.7*	46.6	-0.2	-0.1	*47.5*	47.0	-1.0	-0.5				
LCVC GROUP 1B	1B110FF-1B111	*567.9*	571.3	0.6	3.4	*517.2*	515.0	-0.4	-2.2				
1B-B LCC	1B111B-1B161	*293.6*	294.9	0.4	1.3	*267.4*	265.8	-0.6	-1.6				
1B CRD	1B171A-1B171B	*94.5*	95.4	0.9	0.9	*86.1*	86.1	0.0	0.0				
U-1 #2 RCP	1B115-1B123B	*154.9*	156.2	0.8	1.3	*141.1*	140.7	-0.3	-0.4				
1B UCC	1B123A-1B123B	*24.8*	24.8	0.1	0.0	*22.6*	22.4	-0.8	-0.2				
LCVC GROUP 1D	1B110EE-1B112	*585.2*	590.2	0.9	5.0	*533.8*	532.9	-0.2	-0.9				
1D-B LCC	1B112B-1B162	*297.6*	300.4	0.9	2.8	*271.5*	271.4	0.0	-0.1				
1D CRD	1B170A-1B170B	*129.7*	131.1	1.1	1.4	*118.3*	118.3	0.0	0.0				
U-1 #4 RCP	1B116-1B170B	*158.0*	158.7	0.5	0.7	*144.1*	143.2	-0.6	-0.9				
LCVC GROUP 2B	2B210EE-2B211	*574.4*	576.1	0.3	1.7	*585.2*	580.3	-0.8	-4.9				

B TRAIN ERCW FLOW RATES

		Ref 2.3	File: TESTB4			*Ref 2.3*	File: TESTB5			*Ref 2.3*	File: TESTB6		
		step	Model			*step*	Model			*step*	Model		
COMPONENT	**LINK**	***6.1[40]***	**Results**	**% dif**	**gpm dif**	***6.1[49]***	**Results**	**% dif**	**gpm dif**	***6.1[57]***	**Results**	**% dif**	**gpm dif**
2B-B LCC	2B211B-2B261	***297.9***	299.1	0.4	1.2	***303.5***	301.3	-0.7	-2.2				
2B CRD	2B271A-1B271B	***106.5***	106.3	-0.2	-0.2	***108.5***	107.0	-1.4	-1.5				
U-2 #2 RCP	2B215-2B271B	***170.0***	170.7	0.4	0.7	***173.2***	172.0	-0.7	-1.2				
LCVC GROUP 2D	2B210DD-2B212	***636.3***	639.1	0.4	2.8	***649.9***	643.7	-0.9	-6.2				
2D-B LCC	2B212B-2B262	***374.0***	375.1	0.3	1.1	***382.0***	377.8	-1.1	-4.2				
2D CRD	2B270A-2B270B	***104.8***	105.5	0.7	0.7	***107.0***	106.3	-0.7	-0.7				
U-2 #4 RCP	2B216-2B270B	***157.5***	158.5	0.6	1.0	***160.9***	159.6	-0.8	-1.3				
CNT SPR PMP RM CLR 1B	1B187-1B187A	***27.8***	27.7	-0.3	-0.1	***24.9***	24.9	-0.1	0.0				
CNT SPR PMP RM CLR 2B	2B187-2B187A	***20.3***	20.1	-1.0	-0.2	***20.8***	20.3	-2.6	-0.5				
RHR PMP RM CLR 1B	1B652A-1B606C	***21.0***	21.2	1.0	0.2	***18.9***	19.0	0.5	0.1				
RHR PMP RM CLR 2B	2B191C-2B606A	***20.3***	20.2	-0.7	-0.1	***20.7***	20.4	-1.5	-0.3				
1B-B STRAINER BACKWASH	1B106B-1B106C	***690.3***	689.3	-0.2	-1.0	***701.8***	665.5	-5.2	-36.3				
2B-B STRAINER BACKWASH	2B206B-2B206C	***678.7***	688.9	1.5	10.2	***690.3***	672.7	-2.6	-17.6				
L-B pump	1B102-1B104		9409.5				9415.0	Note 1					
P-B pump	2B202-2B204		9178.1				9421.1						
Calculated Values													
U1 AUX BLDG TOTAL:	See Note 2	**2,156.7**	2,165.2	0.4	8.5	***6,416.4***	6,407.9	-0.1	-8.4				
U2 AUX BLDG TOTAL:	See Note 3	**12,790.6**	12,777.7	-0.1	-12.9	***8,971.9***	8,923.2	-0.5	-48.7				
TOTAL FLOW:	See Note 4	**18,584.8**	18,587.8	0.0	3.0	***18,950.6***	18,835.9	-0.6	-114.7				
AUX BLDG TOTAL:	See Note 5	**14947.3**	14,942.9	0.0	-4.4	***15388.3***	15,331.1	-0.4	-57.1				

Note 1: The N-B pump (Link 2B203-2B205) was used in files TESTB5, TESTB6

Note 2: This is the sum of the individual users flowing through the Unit 1 supply header into the Auxiliary Building.

Note 3: This is the sum of the individual users flowing through the Unit 2 supply header into the Auxiliary Building.

Note 4: This is the sum of the individual users on the entire train

Note 5: This is the sum of the individual users flowing through the Unit 1 and Unit 2 supply header into the Auxiliary Building.

B TRAIN ERCW HEAD PRESSURES

COMPONENT	NODE	*Ref 2.3* *6.1[28]*	**File: TESTB1** **Model Results**	**dH**	*Ref 2.3* *6.1[33]*	**File: TESTB2** **Model Results**	**dH**	*Ref 2.3* *6.1[36]*	**File: TESTB3** **Model Results**	**dH**
D/G 1B1	1B191	***832.9***	832.5	-0.4	***831.7***	833.0	1.3	***819.6***	819.5	-0.1
D/G 1B1	1FE6774	***733.5***	731.7	-1.8	***734.7***	731.8	-2.9	***731.8***	730.1	-1.7
D/G 1B2	2A209F	***818.4***	822.0	3.6	***820.2***	822.4	2.2	***807.5***	810.1	2.6
D/G 1B2	1FE67280	***734.1***	731.6	-2.5	***734.7***	731.6	-3.1	***731.2***	730.0	-1.2
D/G 2B1	2B291	***813.2***	813.1	-0.1	***813.8***	813.4	-0.4	***805.1***	802.2	-2.9
D/G 2B1	2FE6774	***735.3***	733.5	-1.8	***736.4***	733.6	-2.8	***734.7***	731.7	-3.0
D/G 2B2	2A209E	***798.8***	800.0	1.2	***798.2***	800.3	2.1	***790.1***	790.6	0.5
D/G 2B2	2FE67280	***737.6***	736.2	-1.4	***738.2***	736.2	-2.0	***737.0***	734.1	-2.9
CCS HX 0B1/0B2	2B908	***872.2***	873.2	1.0	***857.2***	858.1	0.9	***826.0***	824.9	-1.1
CCS HX 0B1/0B2	2B915	***856.0***	859.9	3.9	***842.2***	846.2	4.0	***814.5***	815.9	1.4
CCS HX 0B1/0B2	2B910	***850.3***	855.7	5.4	***838.7***	842.5	3.8	***811.0***	813.1	2.1
CCS HX 0B1/0B2	2B920	***762.5***	765.9	3.4	***759.0***	762.3	3.3	***751.0***	752.9	1.9
CCS HX 0B1/0B2	1B920	***735.2***	735.6	0.4	***732.7***	735.1	2.4	***727.6***	732.1	4.5
ELECT BD RM CHR B	1B675C	***848.0***	861.1	13.1	***856.1***	869	12.9	***843.4***	851.3	7.9
MCR CHILLER B	1B680A	***NA***			***NA***			***NA***		
STATION AIR COMP A	1A140C	***760.1***	770	9.9	***761.8***	773.8	12.0	***757.7***	765.4	7.7
STATION AIR COMP C INLET	1A135I	***735.2***	739.3	4.1	***737.5***	741.6	4.1	***732.9***	736.5	3.6
STATION AIR COMP C OUTLET	1A135N	***707.5***	710.5	3.0	***708.6***	711.4	2.8	***705.2***	709.4	4.2
STATION AIR COMP D INLET	1B135K	***735.2***	739.7	4.5	***737.5***	742	4.5	***732.9***	736.9	4.0
STATION AIR COMP D OUTLET	1B135P	***712.1***	711.1	-1.0	***712.1***	712.1	0.0	***709.8***	710.0	0.2
Downstream of SAC	1B146	***697.5***	694.4	-3.1	***697.7***	694.6	-3.1	***696.7***	694.2	-2.5
AUX CONT AIR B INTERCOOLER	2B680A3A									
AUX CONT AIR B DOWNSTREAM	2B794A									
SHUTDOWN BD RM CHR B upstream	2B237		883.5		***865.3***	867.4	2.1	***831.8***	831.9	0.1
SHUTDOWN BD RM CHR B	2B237D		732.4		***733.9***	733	-0.9	***731.6***	730.4	-1.2
LCVC GROUP 1B INLET	1B110FF	***875.7***	881.7	6.0	***884.9***	890	5.1	***867.6***	870.3	2.7

B TRAIN ERCW HEAD PRESSURES

		Ref 2.3	File: TESTB1		*Ref 2.3*	File: TESTB2		*Ref 2.3*	File: TESTB3	
			Model			Model			Model	
COMPONENT	**NODE**	***6.1[28]***	**Results**	**dH**	***6.1[33]***	**Results**	**dH**	***6.1[36]***	**Results**	**dH**
LCVC GROUP 1B OUTLET	1B161AA	***748.2***	749.9	1.7	***751.0***	748	-3.0	***747.5***	743.7	-3.8
LCVC GROUP 1D INLET	1B110EE	***875.7***	881.6	5.9	***884.9***	889.8	4.9	***867.6***	870.1	2.5
LCVC GROUP 1D OUTLET	1B162AA	***749.3***	746.7	-2.6	***746.4***	744.6	-1.8	***742.9***	740.6	-2.3
LCVC GROUP 2B INLET	2B210EE	***879.2***	882.4	3.2	***863.6***	868.2	4.6	***830.7***	832.6	1.9
LCVC GROUP 2B OUTLET	2B261AA	***754.5***	747.2	-7.3	***746.9***	747	0.1	***741.7***	740.9	-0.8
LCVC GROUP 2D INLET	2B210DD	***NA***	882.9		***863.6***	868.6	5.0	***830.7***	832.9	2.2
LCVC GROUP 2D OUTLET	2B262AA	***745.2***	744	-1.2	***744.1***	744.1	0.0	***739.4***	738.7	-0.7
L-B ERCW pump	1B104	***910.7***	916.3	5.6	***909.0***	913.8	4.8	***931.5***	933.5	2.0
P-B ERCW pump	2B204	***910.1***	916.1	6.0	***908.4***	913.6	5.2	***932.6***	934.5	1.9
1B SUPPLY HEADER	1B106	***901.6***	908.2	6.6	***900.5***	906	5.5	***908.6***	910.0	1.4
SUPPLY HEADER 1B	1B109AA	***880.3***	893.1	12.8	***890.7***	894.7	4.0	***873.4***	874.5	1.1
2B SUPPLY HEADER	2B206	***900.5***	906.8	6.3	***898.2***	903.5	5.3	***846.8***	851.4	4.6
SUPPLY HEADER 2B	2B209AA	***885.5***	891	5.5	***872.2***	880.5	8.3	***838.7***	841.9	3.2
ERCW CROSSTIE HEADER	1B108EE	***889.5***	897.9	8.4	***888.4***	895.2	6.8	***858.9***	865.0	6.1
Lake Elevation	2BLAKE	***676.8***	676.5	-0.3	***676.2***	676.5	0.3	***676.5***	676.5	0.0
Calculated Values:										
1B Header dP	1B106 minus 1B109AA	***21.3***	15.1	-6.2	***9.8***	11.3	1.5	***35.2***	35.5	0.3
2B Header dP	2B206 minus 2B209AA	***15.0***	15.8	0.8	***26.0***	23.0	-3.0	***8.1***	9.5	1.4
1B to 2B dP	1B106 minus 2B209AA	***16.1***	17.2	1.1	***28.3***	25.5	-2.8	***69.9***	68.1	-1.8

B TRAIN ERCW HEAD PRESSURES

		Ref 2.3	File: TESTB4				*Ref 2.3*	File: TESTB5				*Ref 2.3*	File: TESTB6	
			Model					Model					Model	
COMPONENT	NODE	*6.1[40]*	Results	dH			*6.1[49]*	Results	dH			*6.1[57]*	Results	dH
D/G 1B1	1B191	833.4	834.7	1.3			827.1	824.9	-2.2					
D/G 1B1	1FE6774	734.7	732	-2.7			734.1	731.0	-3.1					
D/G 1B2	2A209F	820.7	824	3.3			816.1	815.1	-1.0					
D/G 1B2	1FE67280	735.3	731.8	-3.5			734.1	730.9	-3.2					
D/G 2B1	2B291	816.1	814.9	-1.2			809.8	806.8	-3.0					
D/G 2B1	2FE6774	736.4	733.8	-2.6			735.9	732.6	-3.3					
D/G 2B2	2A209E	799.4	801.6	2.2			793.0	794.6	1.6					
D/G 2B2	2FE67280	738.7	736.5	-2.2			738.2	735.1	-3.1					
CCS HX 0B1/0B2	2B908	859.5	860.4	0.9			864.1	863.3	-0.8					
CCS HX 0B1/0B2	2B915	843.3	848.2	4.9			849.1	851.0	1.9					
CCS HX 0B1/0B2	2B910	841.0	844.4	3.4			844.5	847.2	2.7					
CCS HX 0B1/0B2	2B920	759.0	762.7	3.7			761.3	764.6	3.3					
CCS HX 0B1/0B2	1B920	729.0	735.0	6.0			732.7	736.5	3.8					
ELECT BD RM CHR B	1B675C	867.6	877.4	9.8			836.4	851.3	14.9					
MCR CHILLER B	1B680A	NA					867.1	850.9	-16.2					
STATION AIR COMP A	1A140C	775.1	795.3	20.2			775.6	779.4	3.8					
STATION AIR COMP C INLET	1A135I	716.7	725.4	8.7			714.4	720.2	5.8					
STATION AIR COMP C OUTLET	1A135N	695.9	703.1	7.2			695.9	701.3	5.4					
STATION AIR COMP D INLET	1B135K	NA					NA							
STATION AIR COMP D OUTLET	1B135P	NA					NA							
Downstream of SAC	1B146	693.5	692.9	-0.6			693.3	692.6	-0.7					
AUX CONT AIR B INTERCOOLER	2B680A3A	NA					NA					799.8	793.4	-6.4
AUX CONT AIR B DOWNSTREAM	2B794A	NA					NA					739.4	742.8	3.4
SHUTDOWN BD RM CHR B upstream	2B237	866.4	869.8	3.4			868.7	871.4	2.7					
SHUTDOWN BD RM CHR B	2B237D	733.9	733.0	-0.9			750.0	750.8	0.8					
LCVC GROUP 1B INLET	1B110FF	888.4	892.8	4.4			866.5	868.9	2.4					

B TRAIN ERCW HEAD PRESSURES

			File: TESTB4					File: TESTB5					File: TESTB6	
			Model					Model					Model	
COMPONENT	NODE	*6.1[40]*	Results	dH			*6.1[49]*	Results	dH			*6.1[57]*	Results	dH
LCVC GROUP 1B OUTLET	1B161AA	***752.1***	748.2	-3.9			***747.5***	750.3	2.8					
LCVC GROUP 1D INLET	1B110EE	***887.2***	892.6	5.4			***867.6***	868.7	1.1					
LCVC GROUP 1D OUTLET	1B162AA	***748.7***	744.6	-4.1			***751.0***	747.4	-3.6					
LCVC GROUP 2B INLET	2B210EE	***866.5***	870.5	4.0			***869.9***	872.0	2.1					
LCVC GROUP 2B OUTLET	2B261AA	***747.5***	747.1	-0.4			***752.1***	746.9	-5.2					
LCVC GROUP 2D INLET	2B210DD	***867.6***	871.0	3.4			***871.1***	872.5	1.4					
LCVC GROUP 2D OUTLET	2B262AA	***746.4***	744.2	-2.2			***745.2***	743.9	-1.3					
L-B / N-B ERCW pump	1B104	***910.7***	915.9	5.2			***903.8***	910.4	6.6					
P-B ERCW pump	2B204	***910.1***	915.7	5.6			***903.8***	909.8	6.0					
1B SUPPLY HEADER	1B106	***902.2***	908.3	6.1			***891.2***	895.9	4.7					
SUPPLY HEADER 1B	1B109AA	***894.2***	897.4	3.2			***880.3***	881.3	1.0					
2B SUPPLY HEADER	2B206	***900.5***	905.8	5.3			***893.5***	897.4	3.9					
SUPPLY HEADER 2B	2B209AA	***876.9***	882.9	6.0			***879.2***	880.2	1.0					
ERCW CROSSTIE HEADER	1B108EE	***891.8***	897.7	5.9			***884.9***	886.8	1.9					
Lake Elevation	2BLAKE	***676.8***	676.5	-0.3			***677.2***	676.5	-0.7					
Calculated Values:														
1B Header dP	1B106 minus 1B109AA	***8.0***	10.9	2.9			***10.9***	14.6	3.7					
2B Header dP	2B206 minus 2B209AA	***23.6***	22.9	-0.7			***14.3***	17.2	2.9					
1B to 2B dP	1B106 minus 2B209AA	***25.3***	25.4	0.1			***12.0***	15.7	3.7					

B TRAIN ERCW FLOW RATES SUMMARY

		PERCENT DIFFERENCE							gpm DIFFERENCE					
COMPONENT	**LINK**	***6.1[28]***	***6.1[33]***	***6.1[36]***	***6.1[40]***	***6.1[49]***	**Average**		***6.1[28]***	***6.1[33]***	***6.1[36]***	***6.1[40]***	***6.1[49]***	**Average**
D/G 1B1	1B191-1B1B1	5.1	-0.8	-2.6	-0.1	3.1	**0.95**		26.3	-4.6	-13.4	-0.4	15.8	**4.74**
D/G 1B2	2A209F-1B1B2	1.2	-0.3	-1.3	-0.1	-1.8	**-0.45**		6.0	-1.6	-6.1	-0.5	-8.6	**-2.16**
D/G 2B1	2B291-2B2B1	-1.1	-0.4	2.5	-0.7	-1.5	**-0.25**		-5.8	-2.2	11.7	-3.6	-7.5	**-1.49**
D/G 2B2	2A209E-2B2B2	1.6	1.4	0.2	0.4	-0.5	**0.63**		10.6	9.7	1.5	2.8	-3.3	**4.28**
CCS HX 0B1/0B2	2B920-2B925	0.7	0.4	-0.1	-0.3	-0.5	**0.05**		47.3	25.1	-4.7	-17.8	-32.5	**3.46**
CSS HX 1B	1B121A-1B150	0.1				-0.1	**-0.02**		3.3				-5.8	**-1.27**
CSS HX 2B	2B226-2B250		2.3	0.2	0.0		**0.83**			94.3	6.6	1.2		**34.05**
SUPPLY HEADER 1B	1B109-1B109AA	-0.9	-6.6	-8.4	-7.2	-1.4	**-4.89**		-53.6	-167.0	-204.3	-167.1	-91.1	**-136.63**
SUPPLY HEADER 2B	2B209C-2B209AA	1.8	2.3	1.6	2.6	0.4	**1.76**		163.6	289.1	176.4	328.2	35.1	**198.48**
ELECT BD RM CHR B	1B675E-1B675F	0.6	-0.2	-1.5	-1.1	0.6	**-0.33**		1.4	-0.5	-3.7	-3.0	1.4	**-0.88**
MCR CHILLER B	1B680D-1B131B					-0.4	**-0.42**						-0.5	**-0.49**
STATION AIR COMP A AFTERCOOLER	1A140A-1B139A	-2.5	-3.1	-4.5	-1.1	-1.5	**-2.55**		-1.5	-2.0	-2.8	-0.8	-1.0	**-1.62**
STATION AIR COMP A INTERCOOLER	1A140F-1B139A	15.0	17.5	18.4	22.7	0.0	**14.73**		0.6	0.7	0.7	1.0	0.0	**0.60**
STATION AIR COMP B AFTERCOOLER	1A141A-1B140A	-1.9	-2.5	-2.4	0.7	-1.5	**-1.52**		-1.4	-1.9	-1.7	0.6	-1.2	**-1.14**
STATION AIR COMP B INTERCOOLER	1A141F-1B140A	-1.9	-1.9	-3.9	-1.7	0.5	**-1.77**		-0.1	-0.1	-0.2	-0.1	0.0	**-0.09**
STATION AIR COMP C	1A135N-1A135P	-1.2	-1.1	-2.2	1.1	0.2	**-0.61**		-1.6	-1.5	-3.0	1.4	0.2	**-0.91**
STATION AIR COMP D	1B135P-1B135R	-1.9	-2.5	-2.9			**-2.45**		-2.7	-3.6	-4.1			**-3.45**
EGTS 2B	2B685B-2B227C	1.4	0.2	0.2	1.3	0.6	**0.72**		0.2	0.0	0.0	0.2	0.1	**0.11**
AUX CONT AIR B	2B794A-2B227C													
SFP & TBBP CLR 1B	1B601I-1B601J	3.2	1.6	1.1	1.6	0.5	**1.61**		1.3	0.7	0.5	0.7	0.2	**0.66**
714 PEN RM CLR 1B	1B665A2-1B610B	-0.1	-0.5	-1.1	-0.2	0.2	**-0.34**		0.0	-0.2	-0.4	-0.1	0.0	**-0.13**
714 PEN RM CLR 2B	2B301C2-2B610B	3.1	2.4	1.2	0.8	0.2	**1.54**		1.2	0.9	0.4	0.2	0.1	**0.55**
SHUTDOWN BD RM CHR B	2B237D-2B245A	0.0	0.0	0.1	0.1	0.0	**0.04**		0.0	0.0	0.0	0.0	-0.1	**0.01**
CCS & AFW CLR 1B	1B603D-1B603E	2.0	1.2	0.6	0.4	0.7	**0.98**		2.3	1.4	0.7	0.4	0.5	**1.05**
690 PEN RM CLR 1B	1B660B4-1B311B	1.6	1.0	0.3	-0.4	1.3	**0.75**		0.6	0.4	0.1	-0.1	0.3	**0.25**

B TRAIN ERCW FLOW RATES SUMMARY

		PERCENT DIFFERENCE						gpm DIFFERENCE					
COMPONENT	LINK	*6.1[28]*	*6.1[33]*	*6.1[36]*	*6.1[40]*	*6.1[49]*	Average	*6.1[28]*	*6.1[33]*	*6.1[36]*	*6.1[40]*	*6.1[49]*	Average
690 PEN RM CLR 2B	2B609A-2B301E	3.9	3.5	1.5	-0.5	-1.9	**1.32**	1.4	1.2	0.4	-0.1	-0.4	**0.49**
BAT & AFW CLR 2B	2B234A2-2B234	1.7	0.5	-0.2	0.1	-1.2	**0.17**	1.5	0.4	-0.2	0.1	-1.0	**0.18**
UCVC 2B	2B221A-2B221B												
UCVC 2D	2B222-2B222D	-1.3	-1.3	-1.7	-1.8	-2.5	**-1.73**	-0.5	-0.5	-0.5	-0.7	-0.9	**-0.62**
CCP OIL CLR 1B	1B497-1B497A	2.3	2.0	1.4	1.0	1.3	**1.61**	1.0	0.9	0.6	0.5	0.5	**0.71**
CCP OIL CLR 2B	2B229A-2B229B	2.2	1.2	0.3	-0.4	-0.5	**0.57**	1.4	0.7	0.1	-0.2	-0.2	**0.37**
CCP RM CLR 1B	1B616-1B616A	0.9	-0.2	-0.2	0.0	-0.1	**0.06**	0.4	-0.1	-0.1	0.0	-0.1	**0.03**
CCP RM CLR 2B	2B171-2B171A	-0.1	0.1	-0.3	-0.5	-1.1	**-0.37**	0.0	0.1	-0.1	-0.2	-0.5	**-0.16**
SIS PMP RM CLR 1B	1B625-1B635	1.9	-0.3	-0.1	-1.5	0.1	**0.02**	0.6	-0.1	0.0	-0.6	0.0	**0.00**
SIS OIL CLR 1B	1B630-1B640	2.2	3.6	1.5	2.8	0.8	**2.18**	0.3	0.5	0.2	0.4	0.1	**0.30**
SIS PMP CLR RM 2B	2B232C-2B232E	-0.1	0.2	-0.5	-0.7	-1.9	**-0.62**	0.0	0.1	-0.2	-0.3	-0.9	**-0.27**
SIS OIL CLR 2B	2B232C-2B232G	1.3	0.0	-2.4	2.0	0.6	**0.32**	0.2	0.0	-0.3	0.3	0.1	**0.06**
669 PEN RM CLR 1B	1B656-1B657	2.4	0.8	0.1	-0.7	0.2	**0.54**	1.0	0.4	0.0	-0.2	0.0	**0.26**
669 PEN RM CLR 2B	2B349A-2B608A	1.2	0.7	0.4	0.8	-0.3	**0.56**	0.9	0.5	0.3	0.3	-0.1	**0.35**
PIPE CHASE CLR 1B	1B670A1-1B671	14.0	13.0	12.5	-0.2	-0.3	**7.79**	5.9	5.7	5.2	-0.1	-0.1	**3.31**
PIPE CHASE CLR 2B	2B301D1-2B302B	3.4	1.5	0.6	-0.2	-1.0	**0.85**	2.1	0.9	0.3	-0.1	-0.5	**0.53**
LCVC GROUP 1B	1B110FF-1B111	1.1	0.8	-0.2	0.6	-0.4	**0.38**	5.9	4.6	-1.0	3.4	-2.2	**2.13**
1B-B LCC	1B111B-1B161	0.9	0.6	-0.4	0.4	-0.6	**0.20**	2.6	1.8	-1.0	1.3	-1.6	**0.60**
1B CRD	1B171A-1B171B	1.4	1.1	0.2	0.9	0.0	**0.73**	1.3	1.1	0.1	0.9	0.0	**0.67**
U-1 #2 RCP	1B115-1B123B	1.3	1.0	0.0	0.8	-0.3	**0.56**	1.9	1.6	-0.1	1.3	-0.4	**0.85**
1B UCC	1B123A-1B123B	0.8	0.4	-0.4	0.1	-0.8	**0.02**	0.2	0.1	-0.1	0.0	-0.2	**0.01**
LCVC GROUP 1D	1B110EE-1B112	1.1	0.6	-0.2	0.9	-0.2	**0.43**	6.0	3.7	-1.3	5.0	-0.9	**2.49**
1D-B LCC	1B112B-1B162	1.2	0.7	-0.1	0.9	0.0	**0.56**	3.4	2.2	-0.2	2.8	-0.1	**1.62**
1D CRD	1B170A-1B170B	1.3	0.8	0.0	1.1	0.0	**0.67**	1.6	1.1	0.0	1.4	0.0	**0.85**
U-1 #4 RCP	1B116-1B170B	0.7	0.2	-0.7	0.5	-0.6	**0.01**	1.0	0.4	-1.0	0.7	-0.9	**0.03**
LCVC GROUP 2B	2B210EE-2B211	1.1	0.7	-0.5	0.3	-0.8	**0.16**	6.6	4.0	-2.3	1.7	-4.9	**1.02**
2B-B LCC	2B211B-2B261	1.2	0.8	-0.3	0.4	-0.7	**0.28**	3.8	2.5	-0.9	1.2	-2.2	**0.89**
2B CRD	2B271A-1B271B	0.6	0.2	-0.8	-0.2	-1.4	**-0.32**	0.6	0.2	-0.8	-0.2	-1.5	**-0.32**
U-2 #2 RCP	2B215-2B271B	1.3	0.8	-0.4	0.4	-0.7	**0.28**	2.2	1.4	-0.6	0.7	-1.2	**0.50**

B TRAIN ERCW FLOW RATES SUMMARY

		PERCENT DIFFERENCE							gpm DIFFERENCE					
COMPONENT	LINK	*6.1[28]*	*6.1[33]*	*6.1[36]*	*6.1[40]*	*6.1[49]*	Average		*6.1[28]*	*6.1[33]*	*6.1[36]*	*6.1[40]*	*6.1[49]*	Average
LCVC GROUP 2D	2B210DD-2B212	0.8	0.6	-0.4	0.4	-0.9	**0.08**		5.0	3.8	-2.5	2.8	-6.2	**0.60**
2D-B LCC	2B212B-2B262	0.6	0.4	-0.7	0.3	-1.1	**-0.08**		2.4	1.7	-2.1	1.1	-4.2	**-0.23**
2D CRD	2B270A-2B270B	1.0	0.9	0.0	0.7	-0.7	**0.38**		1.1	0.9	0.0	0.7	-0.7	**0.40**
U-2 #4 RCP	2B216-2B270B	0.9	0.8	-0.2	0.6	-0.8	**0.26**		1.6	1.2	-0.3	1.0	-1.3	**0.43**
CNT SPR PMP RM CLR 1B	1B187-1B187A	2.1	1.1	0.9	-0.3	-0.1	**0.75**		0.6	0.4	0.3	-0.1	0.0	**0.23**
CNT SPR PMP RM CLR 2B	2B187-2B187A	1.7	1.4	0.4	-1.0	-2.6	**0.00**		0.7	0.6	0.2	-0.2	-0.5	**0.14**
RHR PMP RM CLR 1B	1B652A-1B606C	0.5	0.7	-0.3	1.0	0.5	**0.50**		0.1	0.1	-0.1	0.2	0.1	**0.10**
RHR PMP RM CLR 2B	2B191C-2B606A	0.6	2.1	0.3	-0.7	-1.5	**0.15**		0.2	0.5	0.1	-0.1	-0.3	**0.05**
1B-B STRAINER BACKWASH	1B106B-1B106C	3.3	0.9	-2.1	-0.2	-5.2	**-0.64**		22.2	6.3	-14.9	-1.0	-36.3	**-4.76**
2B-B STRAINER BACKWASH	2B206B-2B206C	0.1	2.6		1.5	-2.6	**0.41**		0.5	17.6		10.2	-17.6	**2.63**
Calculated Values														
U1 AUX BLDG TOTAL:	See Note 2	0.4	0.4	-0.5	0.4	-0.1	**0.12**		24.0	9.3	-10.2	8.5	-8.4	**4.65**
U2 AUX BLDG TOTAL:	See Note 3	0.8	1.0	0.0	-0.1	-0.5	**0.39**		68.0	132.6	-2.5	-12.9	-48.7	**46.67**
TOTAL FLOW:	See Note 4	0.8	0.9	-0.2	0.0	-0.6	**0.24**		151.8	167.0	-33.9	3.0	-114.7	**44.02**
AUX BLDG TOTAL:	See Note 5	0.6	0.9	-0.1	0.0	-0.4	**0.28**		92.0	141.9	-12.7	-4.4	-57.1	**41.30**

Note 2: This is the sum of the individual users flowing through the Unit 1 supply header into the Auxiliary Building.
Note 3: This is the sum of the individual users flowing through the Unit 2 supply header into the Auxiliary Building.
Note 4: This is the sum of the individual users on the entire train
Note 5: This is the sum of the individual users flowing through the Unit 1 and Unit 2 supply header into the Auxiliary Building.

B TRAIN ERCW HEAD PRESSURES SUMMARY

		DIFFERENTIAL HEAD					
COMPONENT	**NODE**	**6.1[28]**	**6.1[33]**	**6.1[36]**	**6.1[40]**	**6.1[49]**	**AVERAGE**
D/G 1B1	1B191	-0.4	1.3	-0.1	1.3	-2.2	**-0.01**
D/G 1B1	1FE6774	-1.8	-2.9	-1.7	-2.7	-3.1	**-2.46**
D/G 1B2	2A209F	3.6	2.2	2.6	3.3	-1.0	**2.15**
D/G 1B2	1FE67280	-2.5	-3.1	-1.2	-3.5	-3.2	**-2.71**
D/G 2B1	2B291	-0.1	-0.4	-2.9	-1.2	-3.0	**-1.53**
D/G 2B1	2FE6774	-1.8	-2.8	-3.0	-2.6	-3.3	**-2.70**
D/G 2B2	2A209E	1.2	2.1	0.5	2.2	1.6	**1.52**
D/G 2B2	2FE67280	-1.4	-2.0	-2.9	-2.2	-3.1	**-2.32**
CCS HX 0B1/0B2	2B908	1.0	0.9	-1.1	0.9	-0.8	**0.18**
CCS HX 0B1/0B2	2B915	3.9	4.0	1.4	4.9	1.9	**3.22**
CCS HX 0B1/0B2	2B910	5.4	3.8	2.1	3.4	2.7	**3.48**
CCS HX 0B1/0B2	2B920	3.4	3.3	1.9	3.7	3.3	**3.11**
CCS HX 0B1/0B2	1B920	0.4	2.4	4.5	6.0	3.8	**3.40**
ELECT BD RM CHR B	1B675C	13.1	12.9	7.9	9.8	14.9	**11.73**
MCR CHILLER B	1B680A					-16.2	**-16.20**
STATION AIR COMP A	1A140C	9.9	12.0	7.7	20.2	3.8	**10.72**
STATION AIR COMP C INLET	1A135I	4.1	4.1	3.6	8.7	5.8	**5.26**
STATION AIR COMP C OUTLET	1A135N	3.0	2.8	4.2	7.2	5.4	**4.51**
STATION AIR COMP D INLET	1B135K	4.5	4.5	4.0			**4.34**
STATION AIR COMP D OUTLET	1B135P	-1.0	0.0	0.2			**-0.26**
Downstream of SAC	1B146	-3.1	-3.1	-2.5	-0.6	-0.7	**-2.00**
AUX CONT AIR B INTERCOOLER	2B680A3A						
AUX CONT AIR B DOWNSTREAM	2B794A						
SHUTDOWN BD RM CHR B upstream	2B237		2.1	0.1	3.4	2.7	**2.07**
SHUTDOWN BD RM CHR B	2B237D		-0.9	-1.2	-0.9	0.8	**-0.54**
LCVC GROUP 1B INLET	1B110FF	6.0	5.1	2.7	4.4	2.4	**4.12**
LCVC GROUP 1B OUTLET	1B161AA	1.7	-3.0	-3.8	-3.9	2.8	**-1.25**
LCVC GROUP 1D INLET	1B110EE	5.9	4.9	2.5	5.4	1.1	**3.94**
LCVC GROUP 1D OUTLET	1B162AA	-2.6	-1.8	-2.3	-4.1	-3.6	**-2.86**

B TRAIN ERCW HEAD PRESSURES SUMMARY

		DIFFERENTIAL HEAD					
COMPONENT	**NODE**	**6.1[28]**	**6.1[33]**	**6.1[36]**	**6.1[40]**	**6.1[49]**	**AVERAGE**
LCVC GROUP 2B INLET	2B210EE	3.2	4.6	1.9	4.0	2.1	**3.18**
LCVC GROUP 2B OUTLET	2B261AA	-7.3	0.1	-0.8	-0.4	-5.2	**-2.74**
LCVC GROUP 2D INLET	2B210DD		5.0	2.2	3.4	1.4	**3.02**
LCVC GROUP 2D OUTLET	2B262AA	-1.2	0.0	-0.7	-2.2	-1.3	**-1.08**
L-B / N-B ERCW pump	1B104 / 2B203	5.6	4.8	2.0	5.2	6.6	**4.86**
P-B ERCW pump	2B204	6.0	5.2	1.9	5.6	6.0	**4.93**
1B SUPPLY HEADER	1B106	6.6	5.5	1.4	6.1	4.7	**4.86**
SUPPLY HEADER 1B	1B109AA	12.8	4.0	1.1	3.2	1.0	**4.42**
2B SUPPLY HEADER	2B206	6.3	5.3	4.6	5.3	3.9	**5.10**
SUPPLY HEADER 2B	2B209AA	5.5	8.3	3.2	6.0	1.0	**4.80**
ERCW CROSSTIE HEADER	1B108EE	8.4	6.8	6.1	5.9	1.9	**5.83**
Lake Elevation	2BLAKE	-0.3	0.3	0.0	-0.3	-0.7	**-0.20**
Calculated Values							
1B Header dP	1B106 minus 1B109AA	-6.2	1.5	0.3	2.9	3.7	**0.44**
2B Header dP	2B206 minus 2B209AA	0.8	-3.0	1.4	-0.7	2.9	**0.28**
1B to 2B dP	1B106 minus 2B209AA	1.1	-2.8	-1.8	0.1	3.7	**0.06**

Note 1: The N-B pump (Link 2B203-2B205) was used in files TESTB5, TESTB6

ESSENTIAL RAW COOLING WATER
MULTI FLOW NODAL DIAGRAM

BASED ON 1, 2-47W845-1 (Ref. 2.1)

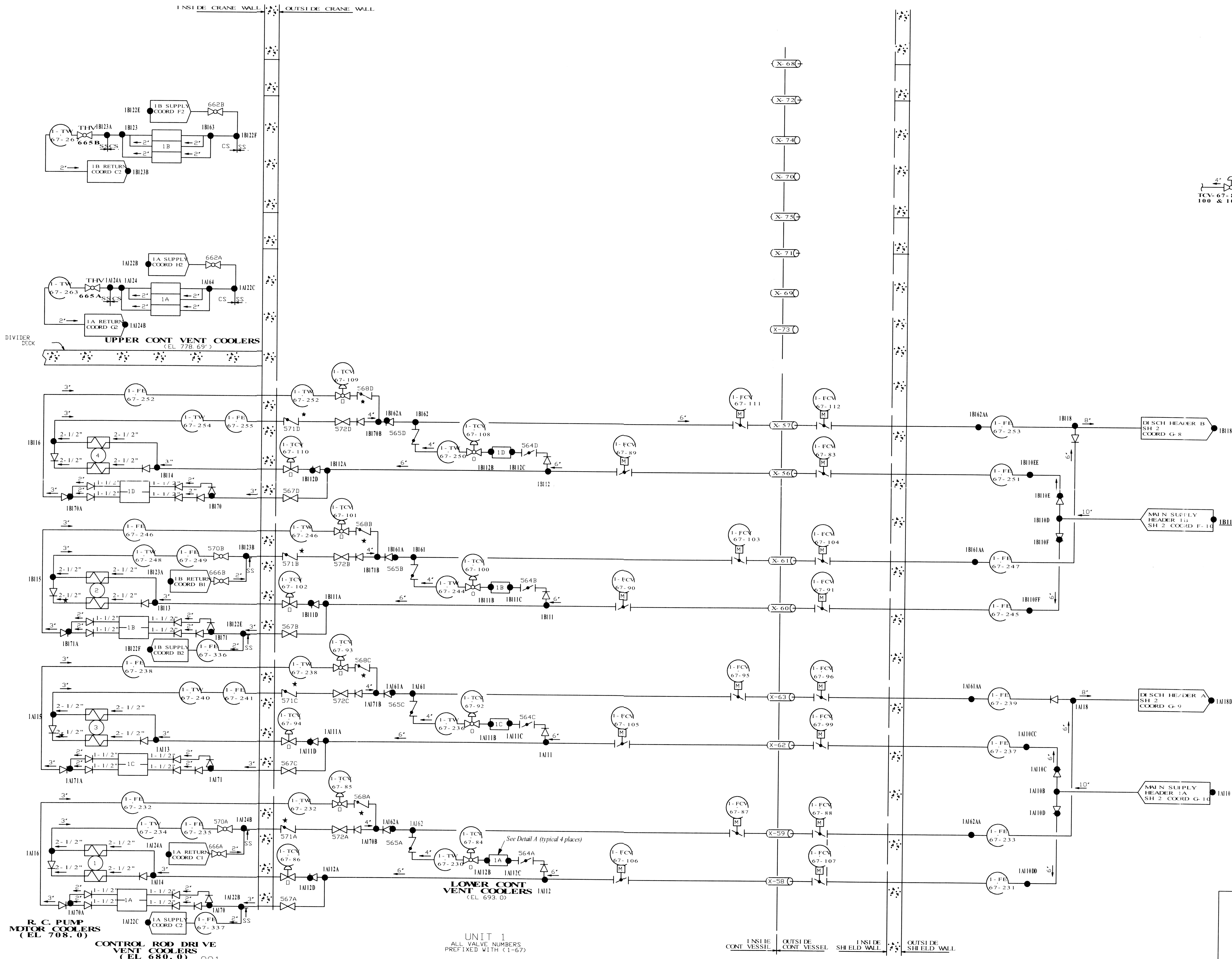
MDQ 0 067 97 0004 R9 | APPENDIX A- SHEET 1 OF 7

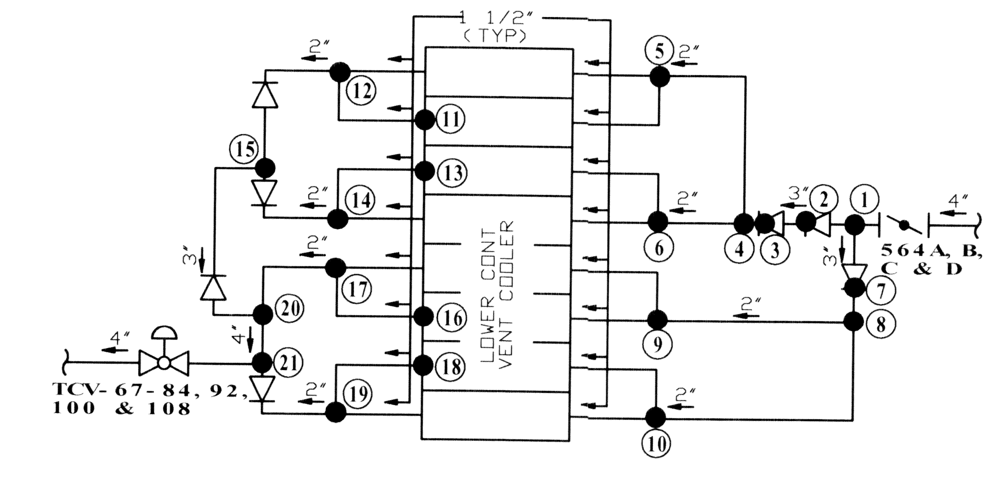
MDQ00006720000095 R7 APPENDIX E

ESSENTIAL RAW COOLING WATER
MULTIFLOW NODAL DIAGRAM
(BASED ON 1, 2-47W845-2, Ref. 2.2)

MDQ 0 067 97 0004R10 | APPENDIX A- SHEET 2 OF 7

MDQ00006720000095 R7 APPENDIX E





DETAIL A

DETAIL "A" NODE IDENTIFICATION				
	LCVC 1A	LCVC 1B	LCVC 1C	LCVC 1D
01	1A112C	1B111C	1A111C	1B112C
02	1ALC02	1BLC02	1CLC02	1DLC02
03	1ALC03	1BLC03	1CLC03	1DLC03
04	1ALC04	1BLC04	1CLC04	1DLC04
05	1ALC05	1BLC05	1CLC05	1DLC05
06	1ALC06	1BLC06	1CLC06	1DLC06
07	1ALC07	1BLC07	1CLC07	1DLC07
08	1ALC08	1BLC08	1CLC08	1DLC08
09	1ALC09	1BLC09	1CLC09	1DLC09
10	1ALC10	1BLC10	1CLC10	1DLC10
11	1ALC11	1BLC11	1CLC11	1DLC11
12	1ALC12	1BLC12	1CLC12	1DLC12
13	1ALC13	1BLC13	1CLC13	1DLC13
14	1ALC14	1BLC14	1CLC14	1DLC14
15	1ALC15	1BLC15	1CLC15	1DLC15
16	1ALC16	1BLC16	1CLC16	1DLC16
17	1ALC17	1BLC17	1CLC17	1DLC17
18	1ALC18	1BLC18	1CLC18	1DLC18
19	1ALC19	1BLC19	1CLC19	1DLC19
20	1ALC20	1BLC20	1CLC20	1DLC20
21	1A112B	1B111B	1A111B	1B112B

NOTES:

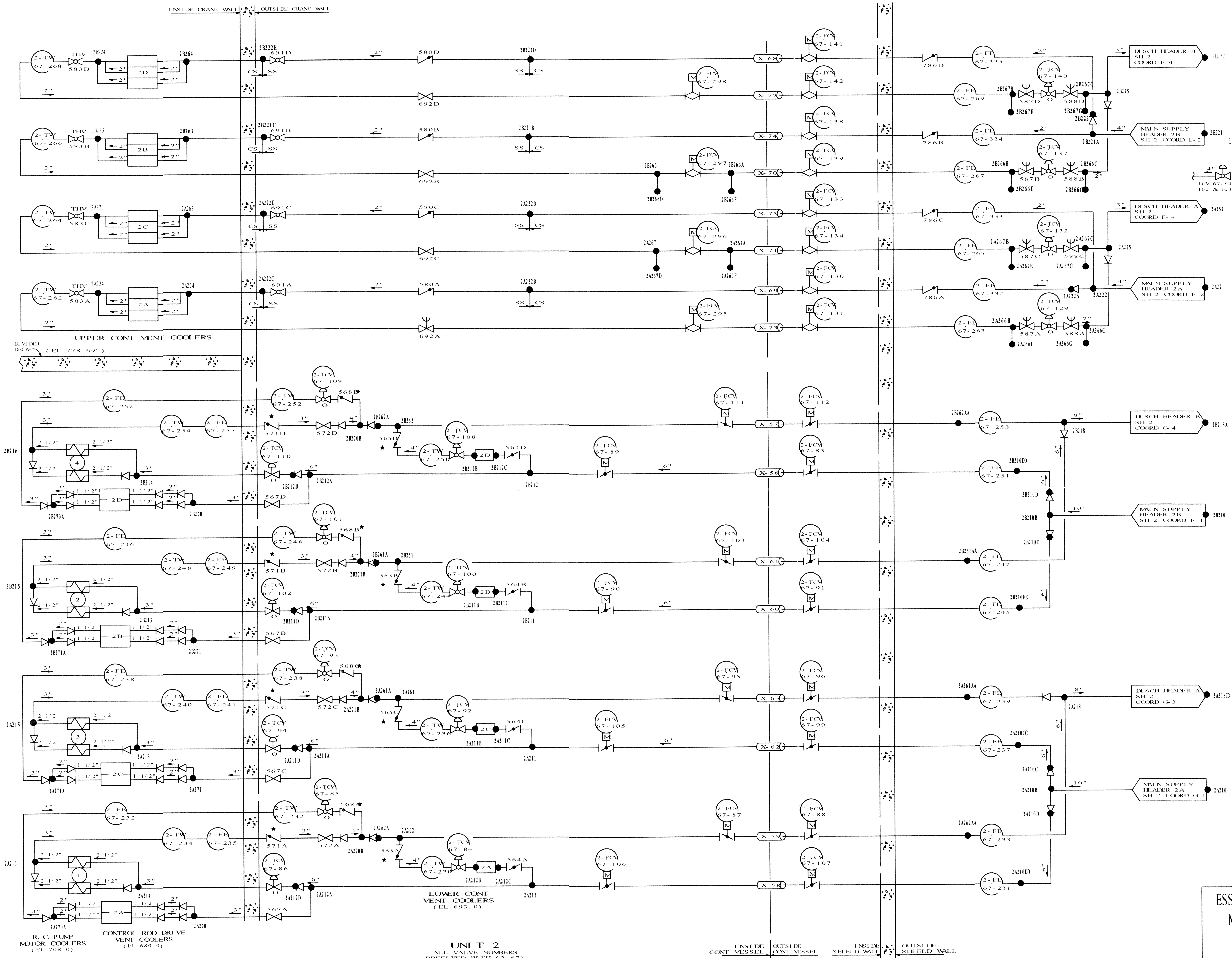
* INDICATES VALVES WITH VALVE INTERNALS REMOVED

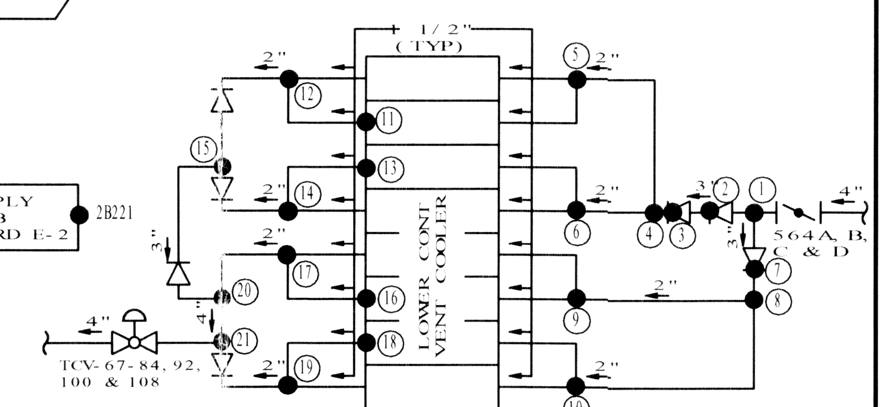
ESSENTIAL RAW COOLING WATER MULTIFLOW NODAL DIAGRAM

(BASED ON 1-47W845-3, Ref. 2.4)

MDQ 0 067 97 0004 R8	APPENDIX A - SHEET 3 OF 7

MDQ00006720000095 R7 APPENDIX E





DETAIL A

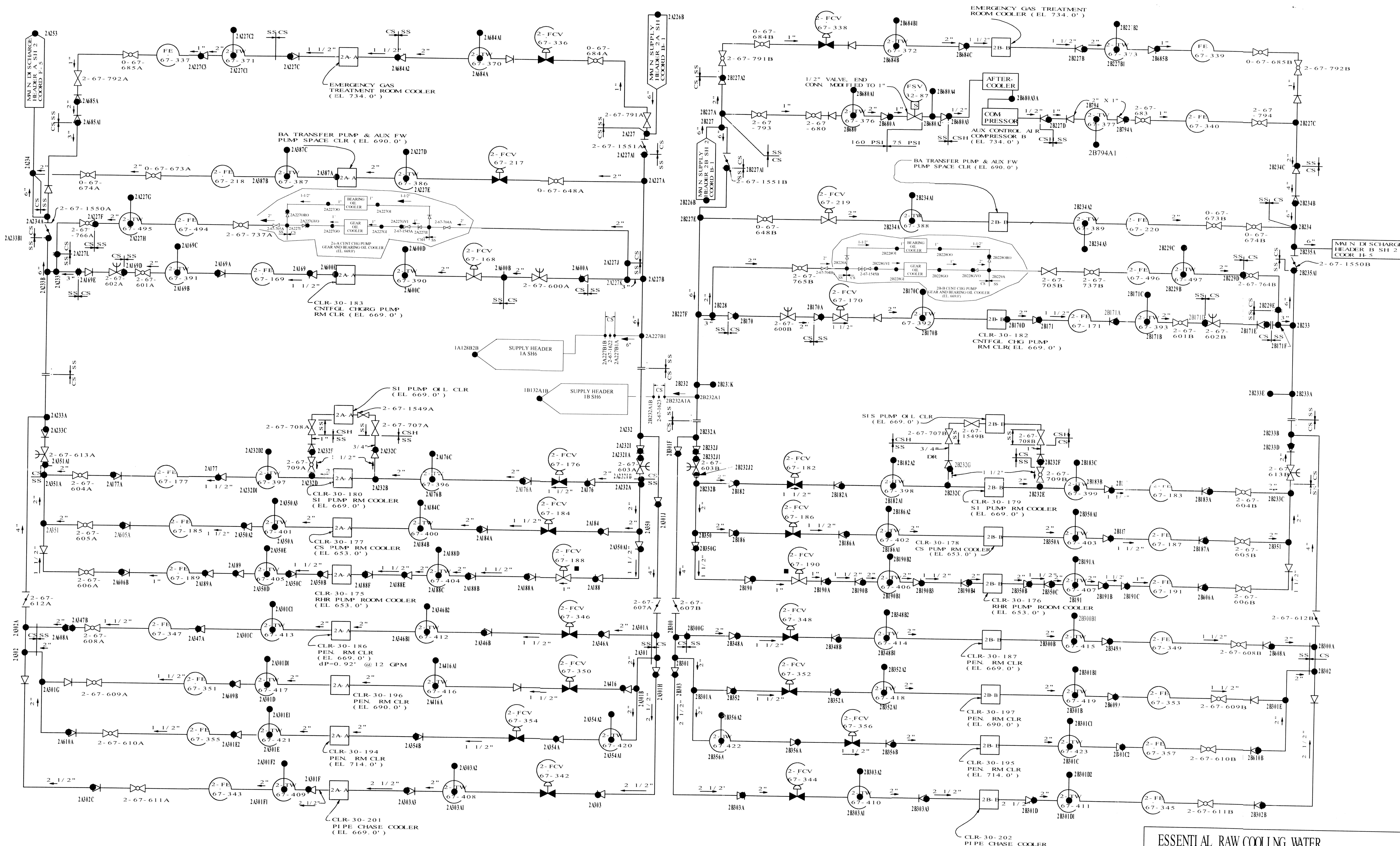
DETAIL "A" NODE IDENTIFICATION				
	LCVC 2A	LCVC 2B	LCVC 2C	LCVC 2D
01	2A212C	2B211C	2A211C	2B212C
02	2ALC02	2BLC02	2CLC02	2DLC02
03	2ALC03	2BLC03	2CLC03	2DLC03
04	2ALC04	2BLC04	2CLC04	2DLC04
05	2ALC05	2BLC05	2CLC05	2DLC05
06	2ALC06	2BLC06	2CLC06	2DLC06
07	2ALC07	2BLC07	2CLC07	2DLC07
08	2ALC08	2BLC08	2CLC08	2DLC08
09	2ALC09	2BLC09	2CLC09	2DLC09
10	2ALC10	2BLC10	2CLC10	2DLC10
11	2ALC11	2BLC11	2CLC11	2DLC11
12	2ALC12	2BLC12	2CLC12	2DLC12
13	2ALC13	2BLC13	2CLC13	2DLC13
14	2ALC14	2BLC14	2CLC14	2DLC14
15	2ALC15	2BLC15	2CLC15	2DLC15
16	2ALC16	2BLC16	2CLC16	2DLC16
17	2ALC17	2BLC17	2CLC17	2DLC17
18	2ALC18	2BLC18	2CLC18	2DLC18
19	2ALC19	2BLC19	2CLC19	2DLC19
20	2ALC20	2BLC20	2CLC20	2DLC20
21	2A212B	2B211B	2A211B	2B212B

NOTES:

* INDICATES VALVES WITH VALVE INTERNALS REMOVED

ESSENTIAL RAW COOLING WATER
MULTFLOW NODAL DIAGRAM
(BASE ON 2-47W845-3, Ref. 2.6)

MDQ 0 067 7 0004 R9 | APPENDIX A- SHEET 4 OF 7

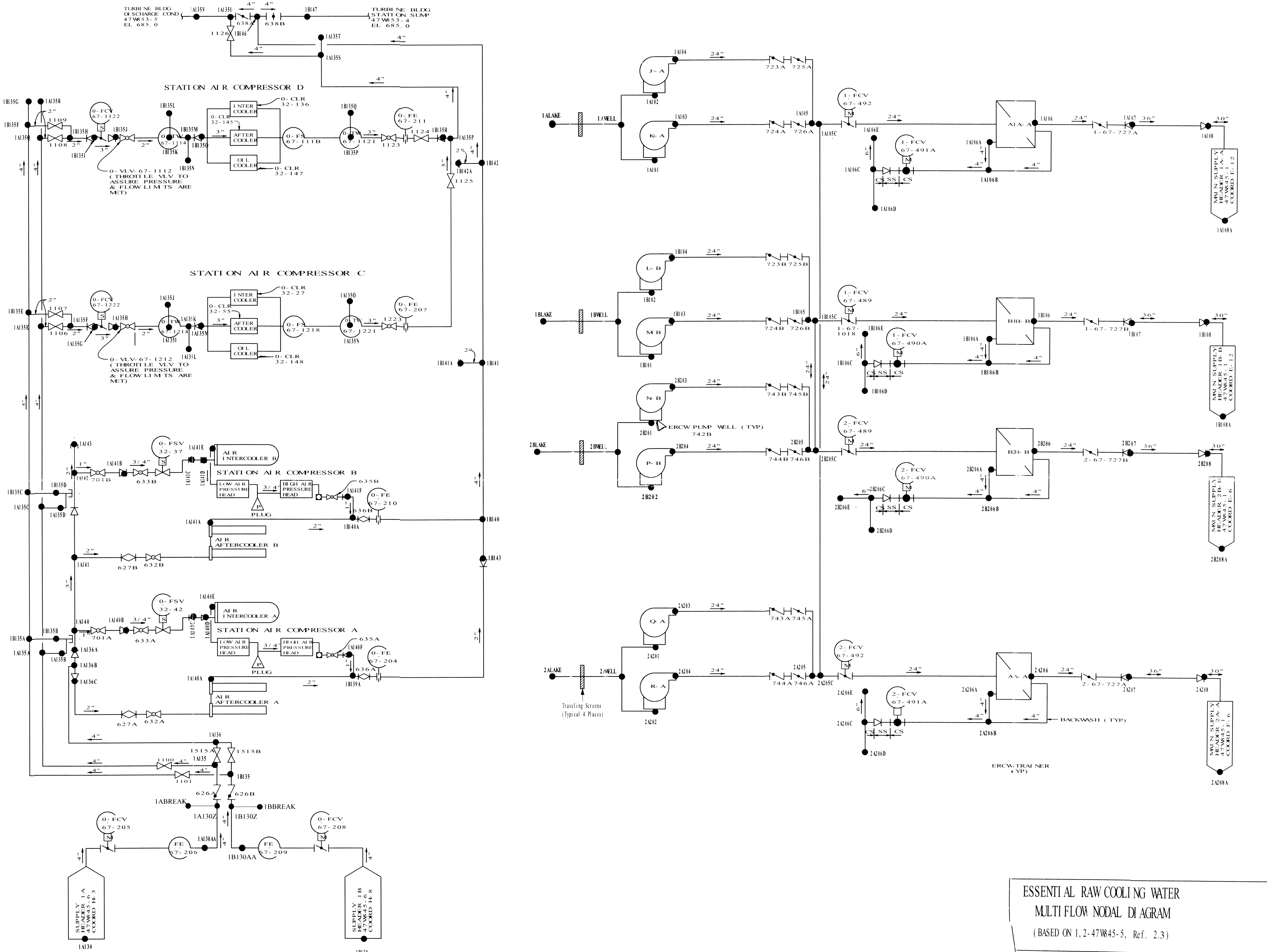


ESSENTIAL RAW COOLING WATER
MULTI FLOW NODAL DIAGRAM

(BASED ON 2-47W845-4, Ref. 2.7)

MDQ 0 067 97 0004 R9	APPENDIX A- SHEET 5 OF 7

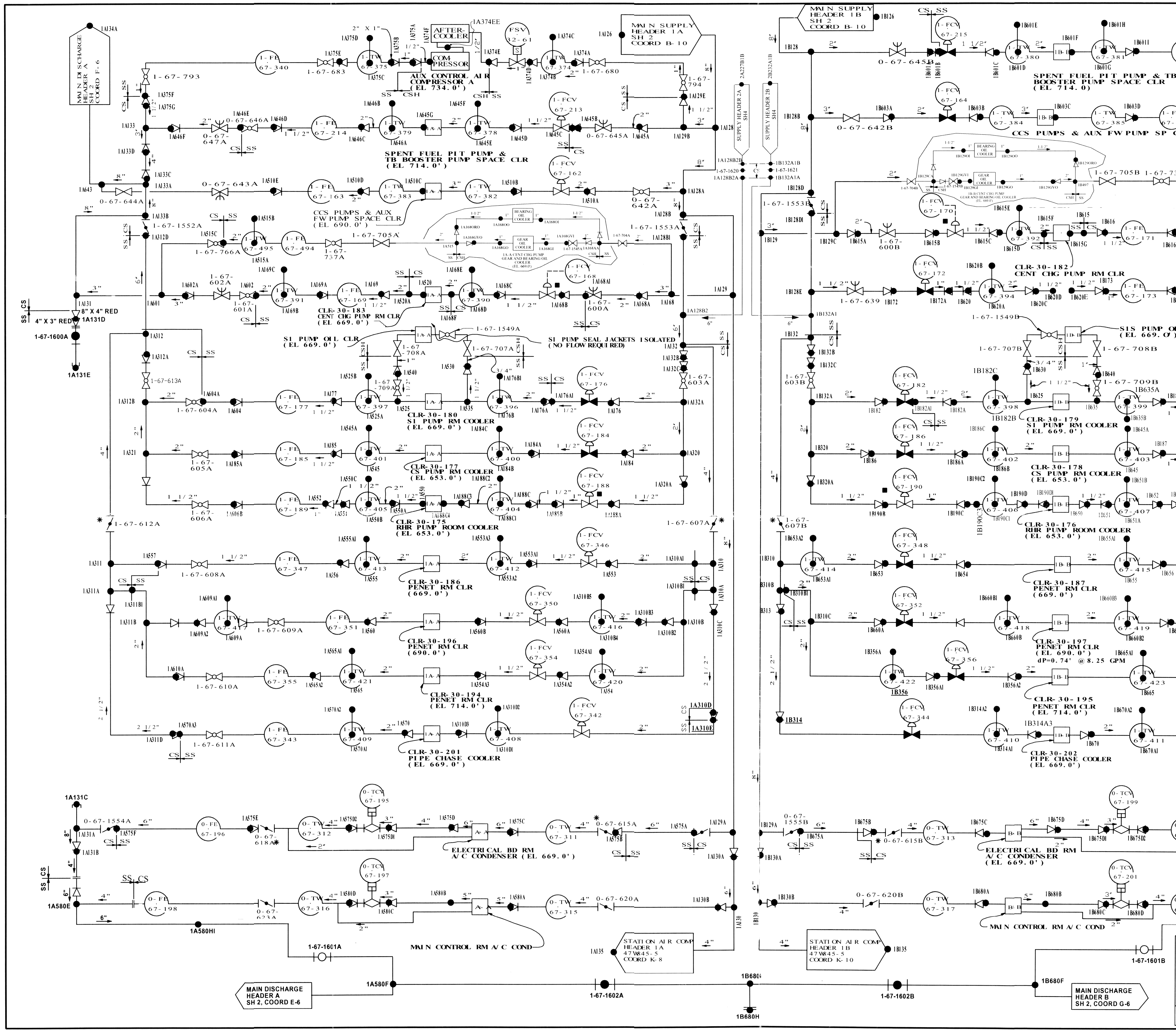
MDQ0006720000095 R7 APPENDIX E



ESSENTIAL RAW COOLING WATER
MULTIFLOW NODAL DIAGRAM
(BASED ON 1,2-47W845-5, Ref. 2.3)

DQ 0 067 97 0004 R9	APPENDIX A - SHEET 6 OF 7

1DQ000672000009516 APPENDIX E



ESSENTIAL RAW COOLING WATER MULTIFLOW NODAL DIAGRAM

(BASED ON 1-47W845-6, REF 2.5)

MDQ 0 067 97 0004 R 9 | APPENDIX A - SHEET 7 OF 7

MDQ000067200000956 APPENDIX E

TRAIN A ERCW:

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.3	7.16.4 (Note Z)	7.16.5	7.16.7	7.16.9 A	7.16.9 B	7.16.12	7.16.6 A	7.16.6 B	7.16.6 C	7.16.6 D	7.16.6 E
D/G 1A1 / 1A2	1A190C-1A191	-	X	-	-	-	-	-	X	X	-	-	-
D/G 1A1 / 1A2 Alternate Supply	2B209H-2B209F	X	-	-	-	-	-	-	-	-	-	-	-
D/G 2A1 / 2A2	1A190-2A291	-	X	-	-	-	-	-	X	X	-	-	-
D/G 2A1 / 2A2 Alternate Supply	2B209D-2B209E	X	-	-	-	-	-	-	-	-	-	-	-
CCS HX 1A1/1A2 (Note 5)	1A915-1B920	X	X	X	X	-	50%	X	50%	50%	35%	100%	100%
CCS HX 2A1/2A2 (Note 6)	2A910-2A920	X	X	X	X	X	X	X	50%	50%	35%	100%	100%
CSS HX 1A	1A121A-1A150	-	-	-	-	-	-	-	-	-	-	-	-
CSS HX 2A	2A226-2A250	-	X	-	-	X	-	-	-	-	-	-	-
ELECT BD RM CHR A	1A575D1-1A575D2	-	-	-	-	X	-	-	-	-	-	-	-
MCR CHILLER A	1A580C-1A580D	-	-	-	-	X	-	-	-	-	-	-	-
Station Air Comp A Aftercooler	1A140A-1B139A	X	X	X	X	X	X	X	X	X	X	X	X
Station Air Comp A Intercooler	1A140F-1B139A	X	X	X	X	-	-	-	X	X	X	X	X
Station Air Comp B Aftercooler	1A141A-1B140A	X	X	X	X	X	X	X	X	X	X	X	X
Station Air Comp B Intercooler	1A141F-1B140A	X	X	X	X	-	-	-	X	X	X	X	X
Station Air Comp C	1A135N-1A135P	X	X	X	X	X	X	X	X	X	X	X	X
Station Air Comp D	1B135P-1B135R	X	-	-	-	-	-	-	X	X	X	X	X
EGTS 2A	2A227C3-2A685A	X	-	-	-	-	-	-	X	X	X	X	X
AUX CONT AIR A	1A374D-1A374E	-	-	-	-	-	-	-	-	-	-	-	-
SFP & TBBP CLR 1A	1A646C-1A646D	X	-	-	-	-	-	-	X	X	X	X	X
714 PEN RM CLR 1A	1A565A2-1A610A	X	-	-	-	-	-	-	X	X	X	X	X
714 PEN RM CLR 2A	2A301E2-2A610A	X	-	-	-	-	-	-	X	X	X	X	X
SHUTDOWN BD RM CHR A	1A155E-1A155F	-	-	-	-	-	-	-	-	-	-	-	-
CCS & AFW CLR 1A	1A510D-1A510E	X	-	-	-	-	-	-	X	X	X	X	X
690 PEN RM CLR 1A	1A560-1A609A	X	-	-	-	-	-	-	X	X	X	X	X
690 PEN RM CLR 2A	2A609B-2A301G	X	-	-	-	-	-	-	X	X	X	X	X
BAT & AFW CLR 2A	2A387B-2A234	X	-	-	-	-	-	-	X	X	X	X	X
UCVC 2A	2A266C-2A225	X	-	-	-	-	-	-	-	-	-	-	-
UCVC 2C	2A267C-2A225	X	-	-	-	-	-	-	-	-	-	-	-

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.3	7.16.4 (Note Z)	7.16.5	7.16.7	7.16.9 A	7.16.9 B	7.16.12	7.16.6 A	7.16.6 B	7.16.6 C	7.16.6 D	7.16.6 E
INCORE INST RM CHR 1A	1A524F-1A524G	-	-	-	-	-	-	-	-	-	-	-	-
INCORE INST RM CHR 2A	2A524F-2A524G	X	-	-	-	-	-	-	-	-	-	-	-
CCP BEARING OIL CLR 1A	1A168OI-1A168OO	X	X	X	X	X	X	X	X	X	X	X	X
CCP BEARING OIL CLR 2A	2A227OI-2A227OO	X	X	X	X	X	X	X	X	X	X	X	X
CCP GEAR OIL CLR 1A	1A168GI-1A168GO	X	X	X	X	X	X	X	X	X	X	X	X
CCP GEAR OIL CLR 2A	2A227GI-2A227GO	X	X	X	X	X	X	X	X	X	X	X	X
CCP RM CLR 1A	1A169-1A169A	X	X	X	X	X	X	X	X	X	X	X	X
CCP RM CLR 2A	2A169-2A169A	X	X	X	X	X	X	X	X	X	X	X	X
SIS PMP RM CLR 1A	1A535-1A525	X	-	-	-	-	-	-	X	X	X	X	X
SIS OIL CLR 1A	1A530-1A540	X	-	-	-	-	-	-	X	X	X	X	X
SIS PMP RM CLR 2A	2A232B-2A232D	X	-	-	-	-	-	-	X	X	X	X	X
SIS OIL CLR 2A	2A232C-2A232F	X	-	-	-	-	-	-	X	X	X	X	X
669 PEN RM CLR 1A	1A556-1A557	X	-	-	-	-	-	-	X	X	X	X	X
669 PEN RM CLR 2A	2A347A-2A347B	X	-	-	-	-	-	-	X	X	X	X	X
PIPE CHASE CLR 1A	1A570A1-1A570A3	X	-	-	-	-	-	-	X	X	X	X	X
PIPE CHASE CLR 2A	2A301F1-2A302C	X	-	-	-	-	-	-	X	X	X	X	X
LCVC GROUP 1A (Note 4)	1A162AA-1A118	X	X	X	X	X	X	X	VARY	VARY	VARY	VARY	VARY
1AA LCC	1A112B-1A162	X	100	100	-	X	X	X	X	X	X	X	X
1A CRD	1A170A-1A170B	X	20	20	20	-	-	-	X	X	X	X	X
U-1 #1RCP	1A116-1A124B	X	X	X	X	-	-	-	X	X	X	X	X
UCVC 1A	1A122C-1A164	X	X	X	X	X	X	X	X	X	X	X	X
LCVC GROUP 1C (Note 4)	1A161AA-1A118	X	X	X	X	X	X	X	VARY	VARY	VARY	VARY	VARY
1CA LCC	1A111B-1A161	X	100	100	-	X	X	X	X	X	X	X	X
1C CRD	1A171A-1A171B	X	-	-	-	-	-	-	X	X	X	X	X

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.3	7.16.4 (Note Z)	7.16.5	7.16.7	7.16.9 A	7.16.9 B	7.16.12	7.16.6 A	7.16.6 B	7.16.6 C	7.16.6 D	7.16.6 E
U-1 #3RCP	1A115-1A171B	X	X	X	X	-	-	-	X	X	X	X	X
LCVC GROUP 2A (Note 4)	2A262AA-2A218	X	X	X	-	X	X	X	VARY	VARY	VARY	VARY	VARY
2AA LCC	2A212B-2A262	X	200	100	100	100	100	100	X	X	X	X	X
2A CRD	2A270A-2A270B	X	20	20	20	20	20	20	X	X	X	X	X
U-2 #1RCP	2A216-2A270B	X	X	X	X	X	X	X	X	X	X	X	X
LCVC GROUP 2C (Note 4)	2A261AA-2A218	X	X	X	-	X	X	X	VARY	VARY	VARY	VARY	VARY
2C-A LCC	2A211B-2A261	X	200	100	100	100	100	100	X	X	X	X	X
2C CRD	2A271A-2A271B	X	-	-	-	-	-	-	X	X	X	X	X
U-2 #3RCP	2A215-2A271B	X	X	X	X	X	X	X	X	X	X	X	X
CNT SPR PMP RM CLR 1A	1A185-1A185A	X	-	-	-	-	-	-	X	X	X	X	X
CNT SPR PMP RM CLR 2A	2A350A2-2A605A	X	-	-	-	-	-	-	X	X	X	X	X
RHR PMP RM CLR 1A	1A552-1A606B	X	X	X	X	X	X	X	X	X	X	X	X
RHR PMP RM CLR 2A	2A189A-2A606B	X	X	X	X	X	X	X	X	X	X	X	X
1A-A STRAINER	1A105C-1A106	X	X	X	X	X	X	X	X	X	X	X	X
2A-A STRAINER	2A205C-2A206	X	X	X	X	X	X	X	X	X	X	X	X
A1A-A Strainer Backwash (Note 12)	1A106B-1A106C	-	-	-	-	-	-	-	-	-	-	-	-
A2A-A Strainer Backwash (Note 12)	2A206B-2A206C	-	-	-	-	-	-	-	-	-	-	-	-
J-A pump	1A104-1A105	-	-	-	-	-	-	-	X	X	X	X	X
K-A pump	1A103-1A105	-	-	-	-	-	-	-	X	X	X	X	X
Q-A pump	2A203-2A205	X	105%	105%	105%	107.7%	107.7%	107.7%	-	-	-	-	-
R-A pump	2A204-2A205	X	105%	105%	105.75%	108%	108%	108%	-	-	-	-	-
U1 TDAFWP (Note 9)	1A109B-1A109C	-	-	-	-	-	-	-	-	-	-	-	-
U2 TDAFWP (Note 9)	2A209G-2A209H	-	-	-	-	-	-	-	-	-	-	-	-
Flow into TB leak	1A130Z-1ABREAK	-	-	-	-	-	-	-	-	-	-	-	-
Flow to Control Air Compressors	1A130Z-1A135	-	X	X	X	X	-	-	-	-	-	-	-

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.3	7.16.4 (Note Z)	7.16.5	7.16.7	7.16.9 A	7.16.9 B	7.16.12	7.16.6 A	7.16.6 B	7.16.6 C	7.16.6 D	7.16.6 E
Header Crosstie	2A208G-2A208E	X	X	X	X	X	X	X	X	X	X	X	X
6" Train A ESF Header crosstie	2A227B1-2A227B1A								-	-	-	-	-
6" Train B ESF Header crosstie	2B232A1-2B232A1A								-	-	-	-	-
16" Train A Header crosstie	1A127-1A127A1								-	-	-	-	-
16" Train B Header crosstie	1B127-1B127A1								-	-	-	-	-
1A ESF Header normal supply	1A126-1A128								X	X	X	X	X
2A ESF Header normal supply	2A226B-2A227								X	X	X	X	X
1A Aux Bldg supply	1A109A-1A109B								X	X	X	X	X
2A Aux Bldg supply	2A209A-2A209G								X	X	X	X	X
Change Values:													
Lake Level (Note 1)	Node 1ALAKE	H	H	H	H	H	H	H	678.5	678.5	678.5	678.5	678.5
Lake Level (Note 1)	Node 2ALAKE	H	H	H	H	H	H	H	678.5	678.5	678.5	678.5	678.5
Traveling Screen A dP (Note 2)	1ALAKE-1AWELL	L	L	L	L	L	L	L	L	L	L	L	L
Traveling Screen D dP (Note 2)	2ALAKE-2AWELL	L	L	L	L	L	L	L	L	L	L	L	L
A Discharge Header end elev (Note 3)	Node 1A247B	L	L	L	L	L	L	L	L	L	L	L	L
B Discharge Header end elev (Note 3)	Node 1B247B	L	L	L	L	L	L	L	L	L	L	L	L
Pump Curves (Note 10)	All Pumps	D	D	D	D	D	D	D	V 100	V 99.5	V 101.8	V 97.8	V 97.8
Piping to Turbine Building (Note 11)	1A130-1A130AA, 1A130AA-1A130Z	D	D	D	D	D	D	D					

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.14 A	7.16.14 B	7.16.14 C	7.16.14. D
D/G 1A1 / 1A2	1A190C-1A191	-	-	-	-
D/G 1A1 / 1A2 Alternate Supply	2B209H-2B209F	-	-	-	-
D/G 2A1 / 2A2	1A190-2A291	-	-	-	-
D/G 2A1 / 2A2 Alternate Supply	2B209D-2B209E	-	-	-	-
CCS HX 1A1/1A2 (Note 5)	1A915-1B920	50%	50%	100%	100%
CCS HX 2A1/2A2 (Note 6)	2A910-2A920	50%	50%	100%	100%
CSS HX 1A	1A121A-1A150	-	-	-	-
CSS HX 2A	2A226-2A250	-	-	-	-
ELECT BD RM CHR A	1A575D1-1A575D2	X	X	150 gpm	150 gpm
MCR CHILLER A	1A580C-1A580D	X	X	180 gpm	180 gpm
Station Air Comp A Aftercooler	1A140A-1B139A			-	-
Station Air Comp A Intercooler	1A140F-1B139A			-	-
Station Air Comp B Aftercooler	1A141A-1B140A			-	-
Station Air Comp B Intercooler	1A141F-1B140A			-	-
Station Air Comp C	1A135N-1A135P			-	-
Station Air Comp D	1B135P-1B135R			-	-
EGTS 2A	2A227C3-2A685A	X	X	X	X
AUX CONT AIR A	1A374D-1A374E	-	-	-	-
SFP & TBBP CLR 1A	1A646C-1A646D	X	X	X	X
714 PEN RM CLR 1A	1A565A2-1A610A	X	X	X	X
714 PEN RM CLR 2A	2A301E2-2A610A	X	X	X	X
SHUTDOWN BD RM CHR A	1A155E-1A155F	-	-	-	-
CCS & AFW CLR 1A	1A510D-1A510E	X	X	X	X
690 PEN RM CLR 1A	1A560-1A609A	X	X	X	X
690 PEN RM CLR 2A	2A609B-2A301G	X	X	X	X
BAT & AFW CLR 2A	2A387B-2A234	X	X	X	X
UCVC 2A	2A266C-2A225	-	-	-	-
UCVC 2C	2A267C-2A225	-	-	-	-
INCORE INST RM CHR 1A	1A524F-1A524G	-	-	-	-

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.14 A	7.16.14 B	7.16.14 C	7.16.14. D
INCORE INST RM CHR 2A	2A524F-2A524G	10 gpm	10 gpm	10 gpm	10 gpm
CCP BEARING OIL CLR 1A	1A168OI-1A168OO	X	X	X	X
CCP BEARING OIL CLR 2A	2A227OI-2A227OO	X	X	X	X
CCP GEAR OIL CLR 1A	1A168GI-1A168GO	X	X	X	X
CCP GEAR OIL CLR 2A	2A227GI-2A227GO	X	X	X	X
CCP RM CLR 1A	1A169-1A169A	X	X	X	X
CCP RM CLR 2A	2A169-2A169A	X	X	X	X
SIS PMP RM CLR 1A	1A535-1A525	X	X	X	X
SIS OIL CLR 1A	1A530-1A540	X	X	X	X
SIS PMP RM CLR 2A	2A232B-2A232D	X	X	X	X
SIS OIL CLR 2A	2A232C-2A232F	X	X	X	X
669 PEN RM CLR 1A	1A556-1A557	X	X	X	X
669 PEN RM CLR 2A	2A347A-2A347B	X	X	X	X
PIPE CHASE CLR 1A	1A570A1-1A570A3	X	X	X	X
PIPE CHASE CLR 2A	2A301F1-2A302C	X	X	X	X
LCVC GROUP 1A (Note 4)	1A162AA-1A118	X	X	X	X
1AA LCC	1A112B-1A162	X	X	X	X
1A CRD	1A170A-1A170B	80 gpm	80 gpm	80 gpm	80 gpm
U-1 #1RCP	1A116-1A124B	X	X	X	X
UCVC 1A	1A122C-1A164	X	X	X	X
LCVC GROUP 1C (Note 4)	1A161AA-1A118	X	X	X	X
1CA LCC	1A111B-1A161	X	X	X	X
1C CRD	1A171A-1A171B	80 gpm	80	80 gpm	80 gpm
U-1 #3RCP	1A115-1A171B	X	X	X	X
LCVC GROUP 2A (Note 4)	2A262AA-2A218	X	X	X	X
2AA LCC	2A212B-2A262	X	X	X	X
2A CRD	2A270A-2A270B	40 gpm	40 gpm	40 gpm	40 gpm
U-2 #1RCP	2A216-2A270B	X	X	X	X
LCVC GROUP 2C (Note 4)	2A261AA-2A218	X	X	X	X
2C-A LCC	2A211B-2A261	X	X	X	X

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.14 A	7.16.14 B	7.16.14 C	7.16.14. D
2C CRD	2A271A-2A271B	40 gpm	40 gpm	40 gpm	40 gpm
U-2 #3RCP	2A215-2A271B	X	X	X	X
CNT SPR PMP RM CLR 1A	1A185-1A185A	X	X	X	X
CNT SPR PMP RM CLR 2A	2A350A2-2A605A	X	X	X	X
RHR PMP RM CLR 1A	1A552-1A606B	X	X	X	X
RHR PMP RM CLR 2A	2A189A-2A606B	X	X	X	X
1A-A STRAINER	1A105C-1A106	X	X	X	X
2A-A STRAINER	2A205C-2A206	X	X	X	X
A1A-A Strainer Backwash (Note 11)	1A106B-1A106C	-	-	-	-
A2A-A Strainer Backwash (Note 11)	2A206B-2A206C	-	-	-	-
J-A pump	1A104-1A105	X	X	X	X
K-A pump	1A103-1A105	X	X	X	X
Q-A pump	2A203-2A205	-	-	-	-
R-A pump	2A204-2A205	-	-	-	-
U1 TDAFWP (Note 9)	1A109B-1A109C	-	-	-	-
U2 TDAFWP (Note 9)	2A209G-2A209H	-	-	-	-
Flow into TB leak	1A130Z-1ABREAK	-	-	-	-
Flow to Station Air Compressors	1A130Z-1A135	-	-	-	-
Header Crosstie	2A208G-2A208E	X	X	X	X
6" Train A ESF Header crosstie	1A128B2A-1A128B2	-	X	-	-
6" Train B ESF Header crosstie	1B132A1A-1B132A1	-	-	-	-
16" Train A Header crosstie	1A127-1A127A1	-	-	-	-
16" Train B Header crosstie	1B127-1B127A1	-	-	-	-
1A ESF Header normal supply	1A126-1A128	X	-	X	X
2A ESF Header normal supply	2A226B-2A227	X	X	X	X
1A Aux Bldg supply	1A109A-1A109B	X	X	X	X
2A Aux Bldg supply	2A209A-2A209G	X	X	X	X
Change Values:					
Lake Level (Note 1)	Node 1ALAKE	682.1	682.1	682.1	682.1

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.14 A	7.16.14 B	7.16.14 C	7.16.14. D
Lake Level (Note 1)	Node 2ALAKE	682.1	682.1	682.1	682.1
Traveling Screen A dP (Note 2)	1ALAKE-1AWELL	L	L	L	L
Traveling Screen D dP (Note 2)	2ALAKE-2AWELL	L	L	L	L
A Discharge Header end elev (Note 3)	Node 1A247B	L	L	L	L
B Discharge Header end elev (Note 3)	Node 1B247B	L	L	L	L
Pump Curves (Note 10)	All Pumps	V 99%	V 99%	V 99%	V 99%

NOTE Z: For the initial modeling condition, insert fixed flow of zero in links 2A902-2A905 and 1A904-1A910. Fully open the throttle valves in links 2A907-2A910 and 1A905-1A915, and both throttle valves in links 2A910-2A920 and 1A915-1B920. Isolate 1A strainer at link 1A107-1A108. To simplify modeling, put change the Cv of the throttle valve in link 1A1A1-1FE6769 to 40 to simulate the previous throttle valve settings for the Diesel Generator (Diesel Generator changes are discussed in Section 7.16.6). This modeling run matches the field data for having the A1A-A ERCW strainer isolated. Next, isolate the A2A-A strainer at 2A207-2A208 and remove fixed flow in 1A107-1A108.

NOTES:

1. For the Lake Level, L stands for LODD elevation, which is 639'. H stands for normal winter pool elevation, 675'. (See Section 6.2)
2. For the Traveling Screens, the value to be entered for H in the listed link is 1.08 psid @ 22,000 gpm, L is 0.1 psid @ 22,000 gpm. (See Section 6.2)
3. For the Discharge Header end elevation, H is 720.5' ft, L is 716.5' ft. (See Section 6.2)
4. For the LCVC Groups, the entire group flow may be isolated at the listed link.
5. The Cv of the 1A1/1A2 CCS HX 1-FCV-67-146, the second butterfly valve in the listed link, at 35% is 550, and at 50% is 1240, and at X (Full Open) is default. (See Reference 2.21, Appendix A)
6. The Cv of the 2A1/2A2 CCS HX 2-FCV-67-146, the second butterfly valve in the listed link, at 35% is 235, and at 50% is 930, and at X (Full Open) is default. (See Reference 2.21, Appendix A)
7. The Cv of the 0B1/0B2 CCS HX outlet valve 0-FCV-67-152, the second butterfly valve in the listed link, at 35% is 1600, and at 50% is 3000, and at X (Full Open) is default. (See Reference 2.21, Appendix A)
8. The Cv of the 0B1/0B2 CCS HX outlet valve 0-FCV-67-151, the second butterfly valve in the listed link, at 35% is 848, at 50% is 1355, and at X (Full Open) is default. (See Reference 2.21, Appendix A)
9. Full flow for the TDAFWP will be modeled as 685 gpm. (See Section 6.2)
10. The Pump Curves shown are Degraded (D) or Vendors (V)
11. To avoid a non-conservatism, when analyzing for design basis accidents change the properties in links 1A130-1A130AA, 1A130AA-1A130Z, 1B130-1B130AA, 1B130AA-1B130Z to be a C factor of 100 and a default diameter reduction when the alignment calls for clean pipe (C).
12. The ERCW strainer backwash valves may be positioned as full closed, full open, or throttled. T indicates throttled flow. The throttled Cv is 82 for the A1A-A ERCW strainer and is 95.5 for the A2A-A ERCW strainer, as listed in Appendix H.

TRAIN B ERCW:

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.3	7.16.4	7.16.5 (Note X)	7.16.7	7.16.9 A	7.16.9 B	7.16.12	7.16.6 A	7.16.6 B	7.16.6 C	7.16.6 D	7.16.6 E
D/G 1B1 / 1B2	1B191B-1B191	-	-	X	-	-	-	-	-	-	-	X	X
D/G 1B1 / 1B2 Alternate supply	2A209I-2A209F	-	-	-	-	-	-	-	-	-	X	-	-
D/G 2B1 / 2B2	1B190-2B291	X	-	X	-	-	-	-	-	-	-	X	X
D/G 2B1 / 2B2 Alternate supply	2A209D-2AB209E	-	-	-	-	-	-	-	-	-	X	-	-
CCS HX 0B1/0B2 (Note 7)	2B925-1B920	X	X	X	X	X	50%	X	100%	100%	100%	35%	35%
CCS HX 0B1/0B2 Disch to 'A' disch header (Note 8)	2B925-2A920	-	-	-	-	-	-	-	-	-	-	-	-
CSS HX 1B	1B121A-1B150	X	-	-	-	-	-	-	-	-	-	-	-
CSS HX 2B	2B226-2B250	-	-	X	-	-	-	-	-	-	-	-	-
ELECT BD RM CHR B	1B675D1-1B675D2	50	50	50	50	50	X	X	-	-	-	-	-
MCR CHILLER B	1B680C-1B680D	50	50	50	50	50	X	X	-	-	-	-	-
Station Air Comp A Aftercooler	1A140A-1B139A	X	X	X	X	X	X	X	X	X	X	X	X
Station Air Comp A Intercooler	1A140F-1B139A	X	X	X	X	-	-	-	X	X	X	X	X
Station Air Comp B Aftercooler	1A141A-1B140A	X	X	X	X	X	X	X	X	X	X	X	X
Station Air Comp B Intercooler	1A141F-1B140A	X	X	X	X	-	-	-	X	X	X	X	X
Station Air Comp C	1A135N-1A135P	X	X	X	X	X	X	X	X	X	X	X	X
Station Air Comp D	1B135P-1B135R	X	-	-	-	-	-	-	X	X	X	X	X
EGTS 2B	2B685B-2B227C	X	-	-	-	-	-	-	-	-	-	-	-
AUX CONT AIR B	2B794A-2B227C	X	-	-	-	-	-	-	-	-	-	-	-
SFP & TBBP CLR 1B	1B601I-1B601J	X	-	-	-	-	-	-	-	-	-	-	-
714 PEN RM CLR 1B	1B665A2-1B610B	X	-	-	-	-	-	-	-	-	-	-	-
714 PEN RM CLR 2B	2B301C2-2B610B	X	X	X	X	X	-	-	-	-	-	-	-
SHUTDOWN BD RM CHR B	2B237A-2B237C	50	50	50	50	50	-	-	-	-	-	-	-
CCS & AFW CLR 1B	1B603D-1B603E	X	-	-	-	-	-	-	-	-	-	-	-
690 PEN RM CLR 1B	1B660B4-1B311B	X	-	-	-	-	-	-	-	-	-	-	-
690 PEN RM CLR 2B	2B609A-2B301E	X	-	-	-	-	-	-	-	-	-	-	-

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.3	7.16.4	7.16.5 (Note X)	7.16.7	7.16.9 A	7.16.9 B	7.16.12	7.16.6 A	7.16.6 B	7.16.6 C	7.16.6 D	7.16.6 E
BAT & AFW CLR 2B	2B234A2-2B234	X	-	-	-	-	-	-	-	-	-	-	-
UCVC 2B	2B266C-2B225	X	-	-	-	-	-	-	-	-	-	-	-
UCVC 2D	2B267C-2B225	X	-	-	-	-	-	-	-	-	-	-	-
INCORE INST RM CHR 1B	1B524F-1B524G	X	-	-	-	-	-	-	-	-	-	-	-
INCORE INST RM CHR 2B	2B524F-2B524G	X	-	-	-	-	-	-	-	-	-	-	-
CCP BEARING OIL CLR 1B	1B129OI-1B129OO	X	X	X	X	X	X	X	X	X	X	X	X
CCP BEARING OIL CLR 2B	2B228OI-2B228OO	X	X	X	X	X	X	X	X	X	X	X	X
CCP GEAR OIL CLR 1B	1B129GI-1B129GO								X	X	X	X	X
CCP GEAR OIL CLR 2B	2B228GI-2B228GO								X	X	X	X	X
CCP RM CLR 1B	1B616-1B616A	X	X	X	X	X	X	X	X	X	X	X	X
CCP RM CLR 2B	2B171-2B171A	X	X	X	X	X	X	X	X	X	X	X	X
SIS PMP RM CLR 1B	1B625-1B635	X	-	-	-	-	-	-	-	-	-	-	-
SIS OIL CLR 1B	1B630-1B640	X	-	-	-	-	-	-	-	-	-	-	-
SIS PMP CLR RM 2B	2B232C-2B232E	X	-	-	-	-	-	-	-	-	-	-	-
SIS OIL CLR 2B	2B232C-2B232G	X	-	-	-	-	-	-	-	-	-	-	-
669 PEN RM CLR 1B	1B656-1B657	X	-	-	-	-	-	-	-	-	-	-	-
669 PEN RM CLR 2B	2B349A-2B608A	X	-	-	-	-	-	-	-	-	-	-	-
PIPE CHASE CLR 1B	1B670A1-1B671	X	-	-	-	-	-	-	-	-	-	-	-
PIPE CHASE CLR 2B	2B301D1-2B302B	X	-	-	-	-	-	-	-	-	-	-	-
LCVC GROUP 1B (Note 4)	1B161AA-1B118	100	300	300	300	300	-	X	VARY	VARY	VARY	VARY	VARY
1B-B LCC	1B111B-1B161	X	100	250	100	100	X	X	X	X	X	X	X
1B CRD	1B171A-1B171B	X	-	-	-	-	-	X	X	X	X	X	X
U-1 #2 RCP	1B115-1B123B	X	X	X	X	X	X	X	X	X	X	X	X
1B UCC	1B123A-1B123B	X	X	X	X	X	X	X	X	X	X	X	X
LCVC GROUP 1D (Note 4)	1B162AA-1B118	X	X	X	X	X	-	X	VARY	VARY	VARY	VARY	VARY
1D-B LCC	1B112B-1B162	X	100	250	100	100	X	X	X	X	X	X	X
1D CRD	1B170A-1B170B	X	20	20	20	20	X	X	X	X	X	X	X
U-1 #4 RCP	1B116-1B170B	X	X	X	X	X	X	X	X	X	X	X	X
LCVC GROUP 2B (Note 4)	2B261AA-2B218	X	X	X	X	X	X	X	VARY	VARY	VARY	VARY	VARY
2B-B LCC	2B211B-2B261	X	100	250	100	100	200	200	X	X	X	X	X

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.3	7.16.4	7.16.5 (Note X)	7.16.7	7.16.9 A	7.16.9 B	7.16.12	7.16.6 A	7.16.6 B	7.16.6 C	7.16.6 D	7.16.6 E
2B CRD	2B271A-2B271B	X	20	20	20	20	20	20	X	X	X	X	X
U-2 #2 RCP	2B215-2B271B	X	X	X	X	X	X	X	X	X	X	X	X
LCVC GROUP 2D (Note 4)	2B262AA-2B218	X	X	X	X	X	X	X	VARY	VARY	VARY	VARY	VARY
2D-B LCC	2B212B-2B262	X	100	250	100	100	200	200	X	X	X	X	X
2D CRD	2B270A-2B270B	X	-	-	-	-	-	-	X	X	X	X	X
U-2 #4 RCP	2B216-2B270B	X	X	X	X	X	X	X	X	X	X	X	X
CNT SPR PMP RM CLR 1B	1B187-1B187A	X	-	-	-	-	-	-	-	-	-	-	-
CNT SPR PMP RM CLR 2B	2B187-2B187A	X	-	-	-	-	-	-	-	-	-	-	-
RHR PMP RM CLR 1B	1B652A-1B606C	X	X	X	X	X	X	X	X	X	X	X	X
RHR PMP RM CLR 2B	2B191C-2B606A	X	X	X	X	X	X	X	X	X	X	X	X
1B-B STRAINER	1B105C-1B106	X	X	X	X	X	X	X	X	X	X	X	X
2B-B STRAINER	2B205C-2B206	X	X	X	X	X	X	X	-	-	-	-	-
B1B-B Strainer Backwash (Note 12)	1B106B-1B106C	-	-	-	-	-	-	-	T	T	T	T	T
B2B-B Strainer Backwash (Note 12)	2B206B-2B206C	-	-	-	-	-	-	-	-	-	-	-	-
L-B pump	1B104-1B105	-	-	-	-	-	-	-	X	X	X	X	X
M-B pump	1B103-1B105	-	-	-	-	-	-	-	X	X	X	X	X
N-B pump	2B203-2B205	109%	109%	106%	109%	109%	113.5%	113.5%	-	-	-	-	-
P-B pump	2B204-2B205	109.5%	109%	106%	109%	109%	109%	109%	-	-	-	-	-
U1 TDAFWP (Note 9)	1B109B-1B109C	-	-	-	-	-	-	-	-	-	-	-	-
U2 TDAFWP (Note 9)	2B209B-2B209G	-	-	-	-	-	-	-	-	-	-	-	-
Flow out TB break	1B130Z-1BBREAK	-	-	-	-	-	-	-	-	-	-	-	-
Flow to Control Air Comp	1B130Z-1B135	X	X	X	X	-	X	X	-	-	-	-	-
Header Crosstie	2B208G-2B208E	X	X	X	X	X	X	X	X	X	X	X	X
Change Values:									-	-	-	-	-
Lake Level (Note 1)	Node 1BLAKE	H	H	H	H	H	H	H	-	-	-	-	-
Lake Level (Note 1)	Node 2BLAKE	H	H	H	H	H	H	H	-	-	-	-	-
Traveling Screen B dP (Note 2)	1BLAKE-1BWELL	L	L	L	L	L	L	L	-	-	-	-	-
Traveling Screen C dP (Note 2)	2BLAKE-2BWELL	L	L	L	L	L	L	L	X	X	X	X	X

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.3	7.16.4	7.16.5 (Note X)	7.16.7	7.16.9 A	7.16.9 B	7.16.12	7.16.6 A	7.16.6 B	7.16.6 C	7.16.6 D	7.16.6 E
A Discharge Header end elev (Note 3)	Node 1A247B	L	L	L	L	L	L	L	X	X	X	X	X
B Discharge Header end elev (Note 3)	Node 1B247B	L	L	L	L	L	L	L	X	X	X	X	X
Pump Curves (Note 10)	All Pumps	D	D	D	D	D	D	D	X	X	X	X	X
Piping to Turbine Building (Note 11)	1B130-1B130AA, 1B130AA-1B130Z	D	D	D	D	D	D	D					
Change Values:													
Lake Level (Note 1)	Node 1BLAKE								678.5	678.5	678.5	678.5	678.5
Lake Level (Note 1)	Node 2BLAKE								678.5	678.5	678.5	678.5	678.5
Traveling Screen B dP (Note 2)	1BLAKE-1BWELL								L	L	L	L	L
Traveling Screen C dP (Note 2)	2BLAKE-2BWELL								L	L	L	L	L
A Discharge Header end elev (Note 3)	Node 1A247B								L	L	L	L	L
B Discharge Header end elev (Note 3)	Node 1B247B								L	L	L	L	L
Pump Curves (Note 10)	All Pumps								V 100	V 99.5	V 101.8	V 97.8	V 97.8

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.14 A	7.16.14 B	7.16.14 C	7.16.14 D
D/G 1B1 / 1B2	1B191B-1B191	-	-	-	-
D/G 1B1 / 1B2 Alternate supply	2A209I-2A209F	-	-	-	-
D/G 2B1 / 2B2	1B190-2B291	-	-	-	-
D/G 2B1 / 2B2 Alternate supply	2A209D-2AB209E	-	-	-	-
CCS HX 0B1/0B2 (Note 7)	2B925-1B920	100%	100%	100%	100%
CCS HX 0B1/0B2 Disch to 'A' disch header (Note 8)	2B925-2A920	-	-	-	-
CSS HX 1B	1B121A-1B150	-	-	-	-
CSS HX 2B	2B226-2B250	-	-	-	-

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.14 A	7.16.14 B	7.16.14 C	7.16.14 D
ELECT BD RM CHR B	1B675D1-1B675D2	150 gpm	150 gpm	X	X
MCR CHILLER B	1B680C-1B680D	180 gpm	180 gpm	X	X
Station Air Comp A Aftercooler	1A140A-1B139A	X	X	X	X
Station Air Comp A Intercooler	1A140F-1B139A	X	X	X	X
Station Air Comp B Aftercooler	1A141A-1B140A	X	X	X	X
Station Air Comp B Intercooler	1A141F-1B140A	X	X	X	X
Station Air Comp C	1A135N-1A135P	X	X	X	X
Station Air Comp D	1B135P-1B135R	X	X	X	X
EGTS 2B	2B685B-2B227C	X	X	X	X
AUX CONT AIR B	2B794A-2B227C	-	-	X	X
SFP & TBBP CLR 1B	1B601I-1B601J	X	X	X	X
714 PEN RM CLR 1B	1B665A2-1B610B	X	X	X	X
714 PEN RM CLR 2B	2B301C2-2B610B	X	X	X	X
SHUTDOWN BD RM CHR B	2B237A-2B237C	250 gpm	250 gpm	50 gpm	50 gpm
CCS & AFW CLR 1B	1B603D-1B603E	X	X	X	X
690 PEN RM CLR 1B	1B660B4-1B311B	X	X	X	X
690 PEN RM CLR 2B	2B609A-2B301E	X	X	X	X
BAT & AFW CLR 2B	2B234A2-2B234	X	X	X	X
UCVC 2B	2B266C-2B225	-	-	-	-
UCVC 2D	2B267C-2B225	X	X	X	X
INCORE INST RM CHR 1B	1B524F-1B524G	10 gpm	10 gpm	10 gpm	10 gpm
INCORE INST RM CHR 2B	2B524F-2B524G	-	-	-	-
CCP BEARING OIL CLR 1B	1B129OI-1B129OO	X	X	X	X
CCP BEARING OIL CLR 2B	2B228OI-2B228OO	X	X	X	X
CCP GEAR OIL CLR 1B	1B129GI-1B129GO	X	X	X	X
CCP GEAR OIL CLR 2B	2B228GI-2B228GO	X	X	X	X
CCP RM CLR 1B	1B616-1B616A	X	X	X	X
CCP RM CLR 2B	2B171-2B171A	X	X	X	X
SIS PMP RM CLR 1B	1B625-1B635	X	X	X	X
SIS OIL CLR 1B	1B630-1B640	X	X	X	X

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.14 A	7.16.14 B	7.16.14 C	7.16.14 D
SIS PMP CLR RM 2B	2B232C-2B232E	X	X	X	X
SIS OIL CLR 2B	2B232C-2B232G	X	X	X	X
669 PEN RM CLR 1B	1B656-1B657	X	X	X	X
669 PEN RM CLR 2B	2B349A-2B608A	X	X	X	X
PIPE CHASE CLR 1B	1B670A1-1B671	X	X	X	X
PIPE CHASE CLR 2B	2B301D1-2B302B	X	X	X	X
LCVC GROUP 1B (Note 4)	1B161AA-1B118	X	X	X	X
1B-B LCC	1B111B-1B161	X	X	X	X
1B CRD	1B171A-1B171B	X	X	50 gpm	50 gpm
U-1 #2 RCP	1B115-1B123B	X	X	X	X
1B UCC	1B123A-1B123B	X	X	X	X
LCVC GROUP 1D (Note 4)	1B162AA-1B118	X	X	X	X
1D-B LCC	1B112B-1B162	X	X	X	X
1D CRD	1B170A-1B170B	X	X	50 gpm	50 gpm
U-1 #4 RCP	1B116-1B170B	X	X	X	X
LCVC GROUP 2B (Note 4)	2B261AA-2B218	X	X	X	X
2B-B LCC	2B211B-2B261	X	X	X	X
2B CRD	2B271A-2B271B	X	X	50 gpm	50 gpm
U-2 #2 RCP	2B215-2B271B	X	X	X	X
LCVC GROUP 2D (Note 4)	2B262AA-2B218	X	X	X	X
2D-B LCC	2B212B-2B262	X	X	X	X
2D CRD	2B270A-2B270B	X	X	50 gpm	50 gpm
U-2 #4 RCP	2B216-2B270B	X	X	X	X
CNT SPR PMP RM CLR 1B	1B187-1B187A	X	X	X	X
CNT SPR PMP RM CLR 2B	2B187-2B187A	X	X	X	X
RHR PMP RM CLR 1B	1B652A-1B606C	X	X	X	X
RHR PMP RM CLR 2B	2B191C-2B606A	X	X	X	X
1B-B STRAINER	1B105C-1B106	X	X	X	X
2B-B STRAINER	2B205C-2B206	X	X	X	X
B1B-B Strainer Backwash (Note 11)	1B106B-1B106C	-	-	-	-

COMPONENT / FLOW PATH	CONTROLLING LINK	7.16.14 A	7.16.14 B	7.16.14 C	7.16.14 D
B2B-B Strainer Backwash (Note 11)	2B206B-2B206C	-	-	-	-
L-B pump	1B104-1B105	X	X	X	X
M-B pump	1B103-1B105	X	X	X	X
N-B pump	2B203-2B205	-	-	-	-
P-B pump	2B204-2B205	-	-	-	-
U1 TDAFWP (Note 9)	1B109B-1B109C	-	-	-	-
U2 TDAFWP (Note 9)	2B209B-2B209G	-	-	-	-
Flow out TB break	1B130Z-1BBREAK	-	-	-	-
Flow to Station Air Comp	1B130Z-1B135	-	-	-	-
Header Crosstie	2B208G-2B208E	X	X	X	X
6" Train A ESF Header crosstie	1A128B2A-1A128B2	-	X	-	-
6" Train B ESF Header crosstie	1B132A1A-1B132A1	-	-	-	X
16" Train A Header crosstie	1A127-1A127A1	-	-	-	-
16" Train B Header crosstie	1B127-1B127A1	-	-	-	-
1B ESF Header normal supply	1B126-1B128	X	X	X	-
2B ESF Header normal supply	2B226B-2B227	X	X	X	X
1B Aux Bldg supply	1B109A-1B109B	X	X	X	X
2B Aux Bldg supply	2B209A-2B209B	X	X	X	X
Change Values:					
Lake Level (Note 1)	Node 1BLAKE	682	682	682.1	682.1
Lake Level (Note 1)	Node 2BLAKE	682	682	682.1	682.1
Traveling Screen B dP (Note 2)	1BLAKE-1BWELL	L	L	L	L
Traveling Screen C dP (Note 2)	2BLAKE-2BWELL	L	L	L	L
A Discharge Header end elev (Note 3)	Node 1A247B	L	L	L	L
B Discharge Header end elev (Note 3)	Node 1B247B	L	L	L	L
Pump Curves (Note 10)	All Pumps	V 96%	V 96%	V 96%	V 96%

NOTE X: For the initial modeling condition, fully open the throttle valves in links 2B915-2B920, and 2B910-2B920, and both throttle valves in link 2B925-1B920. Isolate 1B strainer at link 1B107-1B108. To simplify modeling, put change the Cv of the throttle valve in link 1B1B1-1FE6774 to 40 to simulate the previous throttle valve settings for the Diesel Generator (Diesel Generator changes are discussed in Section 7.16.6). This modeling run matches the field data for having the B1B-B ERCW strainer isolated. Next, isolate the B2B-B strainer at 2B207-2B208 and remove fixed flow in 1B107-1B108.

NOTES:

1. For the Lake Level, L stands for LODD elevation, which is 639'. H stands for normal winter pool elevation, 675'. (See Section 6.2)
2. For the Traveling Screens, the value to be entered for H in the listed link is 1.08 psid @ 22,000 gpm, L is 0.1 psid @ 22,000 gpm. (See Section 6.2)
3. For the Discharge Header end elevation, H is 720.5' ft, L is 716.5' ft. (See Section 6.2)
4. For the LCVC Groups, the entire group flow may be isolated at the listed link.
5. The Cv of the 1A1/1A2 CCS HX 1-FCV-67-146, the second butterfly valve in the listed link, at 35% is 550, and at 50% is 1240, and at X (Full Open) is default. (Appendix H)
6. The Cv of the 2A1/2A2 CCS HX 2-FCV-67-146, the second butterfly valve in the listed link, at 35% is 235, and at 50% is 930, and at X (Full Open) is default. (Appendix H))
7. The Cv of the 0B1/0B2 CCS HX outlet valve 0-FCV-67-152, the second butterfly valve in the listed link, at 35% is 1600, and at 50% is 3000, and at X (Full Open) is default. (Appendix H)
8. The Cv of the 0B1/0B2 CCS HX outlet valve 0-FCV-67-151, the second butterfly valve in the listed link, at 35% is 848, at 50% is 1355, and at X (Full Open) is default. (Appendix H)
9. Full flow for the TDAFWP will be modeled as 685 gpm. (See Section 6.2)
10. The Pump Curves shown are Degraded (D) or Vendors (V)
11. To avoid a non-conservatism, when analyzing for design basis accidents change the properties in links 1A130-1A130AA, 1A130AA-1A130Z, 1B130-1B130AA, 1B130AA-1B130Z to be a C factor of 100 and a default diameter reduction when the alignment calls for clean pipe (C).
12. The ERCW strainer backwash valves may be positioned as full closed, full open, or throttled. T indicates throttled flow. The throttled Cv is 84 for the B1B-B ERCW strainer and is 84 for the B2B-B ERCW strainer, as listed in Appendix H.

DEFAULTS AND SOLUTION STATUS

System contains 3250 parts: 1721 links, 928 nodes, 8 pumps, 593 tees

Default values of parameters:
default_temperature=60
barometric_pressure=14.4
default_reaches=1
solution_control_option=1
all_check_valves_leak=0

Standard=Raw water (liquid; standard density=62.3735 lbm/ft3)

Default friction and diameter reduction values used in solution:

pipe material	Hazen-W C	roughness	dia.red.
carbon steel - CS	70.00		0.100 <== non-standard
concrete - CO	100.00		0.000
copper - CU	130.00		0.000
stainless steel - SS	120.00		0.000

Solution Status = Converged.
Number of Iterations = 15
Largest Corrections in Last Iteration:
Flow = -5.29e-005 sgpm
Pressure = -1.79e-007 psig
Tee Loss Coefficient = -3.17e-006

NETWORK DETAIL

```
link 1A101->1A103 "1A101>1A103"
 inlet=1A101, exit=1A103, sch=STD, mat="carbon steel", dia=24
 "Pump" PUMPKA

link 1A102->1A104 "1A102>1A104"
 inlet=1A102, exit=1A104, sch=STD, mat="carbon steel", dia=24
 "Pump" PUMPJA

link 1A103->1A105 "pump ka > tee"
 inlet=1A103, exit=1A105, sch=STD, mat="carbon steel", dia=24
 fixed_flow=0
 "check valve", Cv=21700
 "Straight pipe", len=3.8125
 "Straight pipe", len=3.09
 "Butterfly valve" isolation
 "Straight pipe", len=4.05
 "90ø long radius elbow"
 "Straight pipe", len=8.08

link 1A104->1A105 "pump ja > tee"
 inlet=1A104, exit=1A105, sch=STD, mat="carbon steel", dia=24
 fixed_flow=0
 "check valve", Cv=21700
 "Straight pipe", len=3.8125
 "Straight pipe", len=3.09
 "Butterfly valve" isolation
 "Straight pipe", len=4.55

link 1A105->1A105C "1A105>1A105C"
 inlet=1A105, exit=1A105C, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=8.25
 "90ø long radius elbow"
 "Straight pipe", len=4.3331

link 1A105C->1A106 "1A105C>1A106"
 inlet=1A105C, exit=1A106, sch=STD, mat="carbon steel", dia=24, HW_C=60
 "Straight pipe", len=27.17
 "90ø long radius elbow"
 "Straight pipe", len=19.33
 "Butterfly valve" isolation
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=9.25
 "other", flow=16000, dp=6
 "Straight pipe", len=0.5

link 1A105C->2A205C "1A105C>2A205C"
 inlet=1A105C, exit=2A205C, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=90.5

link 1A106->1A106A "1A106>1A106A"
 inlet=1A106, exit=1A106A, sch=STD, mat="carbon steel", dia=4
 "other", flow=151, dp=0.37

link 1A106->1A106B "1A106>1A106B"
 inlet=1A106, exit=1A106B, sch=STD, mat="carbon steel", dia=4
 "other", flow=151, dp=0.37
 "Straight pipe", len=1.4
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=4

link 1A106->1A107 "1A106>1A107"
 inlet=1A106, exit=1A107, sch=STD, mat="carbon steel", dia=24, HW_C=60
 "Straight pipe", len=9
 "Butterfly valve" isolation
 "Straight pipe", len=3.9
 "90ø long radius elbow"
 "Straight pipe", len=6.83
 "90ø long radius elbow"
 "Straight pipe", len=4.25
 "45ø long radius elbow"
 "Straight pipe", len=42.58
 "45ø long radius elbow"
 "Straight pipe", len=4.17
 "45ø long radius elbow"
 "Straight pipe", len=47.25
 "Mitered bend", angle=90
 "Straight pipe", len=5.5
 "Increaser", dia=0

link 1A106A->1A106B "1A106A>1A106B"
 inlet=1A106A, exit=1A106B, sch=STD, mat="carbon steel", dia=4
 "Straight pipe", len=1.4
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=8.7

link 1A106B->1A106C "1A106B>1A106C"
 inlet=1A106B, exit=1A106C, sch=STD, mat="carbon steel", dia=4
 "Straight pipe", len=5
 "other: "glove Valve" throttle full open Cv is 700", Cv=82
 "Increaser", dia=6

link 1A106C->1A106E "1A106C>1A106E"
 inlet=1A106C, exit=1A106E, sch=STD, mat="carbon steel", dia=6
 "Straight pipe", len=2.75
 "90ø long radius elbow"
 "Straight pipe", len=24.5
 "90ø long radius elbow"
 "Straight pipe", len=3.75
 "90ø long radius elbow"
 "Straight pipe", len=2.2
 "90ø long radius elbow"
 "Straight pipe", len=4.9
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "other", K=1

link 1A106D->1A106C "1A106D>1A106C"
 inlet=1A106D, exit=1A106C, sch=STD, mat="carbon steel", dia=4
 fixed_flow=0
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1

link 1A107->1A108 "1A107>1A108"
 inlet=1A107, exit=1A108, sch=STD, mat="carbon steel", dia=36, HW_C=58
 "Straight pipe", len=36.75
 "Mitered bend", angle=45
 "Straight pipe", len=2.5
 "Mitered bend", angle=45
 "Straight pipe", len=37.5
 "Mitered bend", angle=45
 "Straight pipe", len=137.75
 "Straight pipe", len=306.25
 "Mitered bend", angle=45
 "Straight pipe", len=24.92
 "Mitered bend", angle=45
 "Straight pipe", len=783.17
 "Mitered bend", angle=45
 "Straight pipe", len=62.083
 "Mitered bend", angle=45
 "Straight pipe", len=1149.5
 "Decreaser", dia=0

link 1A108->1A108A "1A108>1A108A"
 inlet=1A108, exit=1A108A, sch=STD, mat="carbon steel", dia=30, HW_C=60
 "Straight pipe", len=35.83
 "Mitered bend", angle=90
 "Straight pipe", len=1.75
 "Mitered bend", angle=90
 "Straight pipe", len=4.58

link 1A108A->1A108B "1A108A>1A108B vent"
 inlet=1A108A, exit=1A108B, sch=STD, mat="carbon steel", dia=30
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A108A->1A108C "1A108A>1A108C"
 inlet=1A108A, exit=1A108C, sch=STD, mat="carbon steel", dia=30, HW_C=60
 "Butterfly valve" isolation
 "Straight pipe", len=2.33
 "Mitered bend", angle=45
 "Straight pipe", len=2
 "Mitered bend", angle=45
 "Straight pipe", len=13.33
 "Mitered bend", angle=45
 "Straight pipe", len=3.58

link 1A108C->1A108D "1A108C>1A108D Train A Cross Tie"
 inlet=1A108C, exit=1A108D, sch=STD, mat="carbon steel", dia=30
 "Straight pipe", len=38
 "Decreaser", dia=0

link 1A108C->1A109 "1A108C>1A109"
 inlet=1A108C, exit=1A109, sch=STD, mat="carbon steel", dia=30, HW_C=60
 "Straight pipe", len=125
 "45ø long radius elbow"
 "Straight pipe", len=353
 "45ø long radius elbow"
 "Straight pipe", len=56.083
```

NETWORK DETAIL (continued)

```
link 1A108D->1A108E "1A108D>1A108E Train A Cross Tie"
 inlet=1A108D, exit=1A108E, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=8.8

link 1A108E->1A108EE "1A108E>1A108EE Train A Cross Tie"
 inlet=1A108E, exit=1A108EE, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=3.5
 "45ø long radius elbow"
 "Straight pipe", len=8
 "Straight pipe", len=8
 "Butterfly valve" isolation
 "90ø short radius elbow"
 "Straight pipe", len=12.5
 "90ø long radius elbow"
 "90ø long radius elbow"
 "straight pipe", len=11.5
 "Butterfly valve" isolation
 "other: Gutted old strainer", dp=2, flow=10000

link 1A108E->1A108F "1A108E>1A108F Train A Cross Tie"
 inlet=1A108E, exit=1A108F, sch=STD, mat="carbon steel", dia=24
 fixed_flow=0
 "Straight pipe", len=1

link 1A108EE->1A108G "Node 1A108EE to Node 1A108G"
 inlet=1A108EE, exit=1A108G, sch=STD, mat="carbon steel", dia=24
 "straight pipe", len=4
 "90ø short radius elbow"
 "straight pipe", len=6.5
 "90ø long radius elbow"
 "straight pipe", len=8.9
 "straight pipe", len=2.8

link 1A108G->1A108H "1A108G>1A108H Train A Disconnected Pump Stub"
 inlet=1A108G, exit=1A108H, sch=STD, mat="carbon steel", dia=20
 fixed_flow=0
 "Straight pipe", len=1

link 1A108G->1A108I "1A108G>1A108I Train A Cross Tie"
 inlet=1A108G, exit=1A108I, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=14

link 1A108I->1A108J "1A108I>1A108J Train A Disconnected Pump Stub"
 inlet=1A108I, exit=1A108J, sch=STD, mat="carbon steel", dia=20
 fixed_flow=0
 "Straight pipe", len=1

link 1A108I->2A208I "1A108I>2A208I Train A Cross Tie"
 inlet=1A108I, exit=2A208I, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=74

link 1A109->1A109AA "1A109>1A109AA"
 inlet=1A109, exit=1A109AA, sch=STD, mat="carbon steel", dia=30, HW_C=60
 "Straight pipe", len=4.5
 "Mitered bend", angle=45
 "Straight pipe", len=33.67
 "Mitered bend", angle=45
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=5.17
 "Mitered bend", angle=45
 "Straight pipe", len=16.67
 "Mitered bend", angle=45
 "Straight pipe", len=5.17
 "Mitered bend", angle=45
 "Straight pipe", len=15
 "90ø long radius elbow"
 "Straight pipe", len=32.17
 "45ø long radius elbow"
 "Straight pipe", len=9.92
 "45ø long radius elbow"
 "Straight pipe", len=68

link 1A109->1A190A "1A109>1A190A"
 inlet=1A109, exit=1A190A, sch=STD, mat="carbon steel", dia=30
 "Straight pipe", len=429.08
 "45ø long radius elbow"
 "Straight pipe", len=7.42
 "90ø long radius elbow"
 "Straight pipe", len=277.75
 "Decreaser", dia=0

link 1A109A->1A109B "1A109A>1A109B"
 inlet=1A109A, exit=1A109B, sch=STD, mat="carbon steel", dia=24, HW_C=60
 "Straight pipe", len=2.5
 "Butterfly valve" isolation
 "Straight pipe", len=4.5

link 1A109AA->1A109A "1A109AA>1A109A"
 inlet=1A109AA, exit=1A109A, sch=STD, mat="carbon steel", dia=30, HW_C=60
 "Straight pipe", len=.1
 "Orifice", diameter_ratio=0.43668, flow=8000, dp=200
 "Straight pipe", len=10
 "45ø long radius elbow"
 "Straight pipe", len=68.25
 "45ø long radius elbow"
 "Straight pipe", len=9.42
 "90ø long radius elbow"
 "Straight pipe", len=10.75
 "90ø long radius elbow"
 "Straight pipe", len=1.25
 "Straight pipe", len=33.58
 "Decreaser", dia=0

link 1A109B->1A109C "1A109B>1A109C to closed valve"
 inlet=1A109B, exit=1A109C, sch=STD, mat="carbon steel", dia=6
 fixed_flow=0
 "Straight pipe", len=1

link 1A109B->1A110 "1A109B>1A110"
 inlet=1A109B, exit=1A110, sch=STD, mat="carbon steel", dia=24, HW_C=60
 "Straight pipe", len=12

link 1A110->1A110A "1A110>1A110A"
 inlet=1A110, exit=1A110A, sch=STD, mat="carbon steel", dia=24, HW_C=60
 "Straight pipe", len=7
```

NETWORK DETAIL (continued)

```
link 1A110->1A110B "1A110>1A110B to lcvc 1a&1c"
 inlet=1A110, exit=1A110B, sch=40, mat="carbon steel", dia=10, HW_C=50, red=0.4
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "Butterfly valve" isolation
 "Straight pipe", len=5

link 1A110A->1A121 "1A110A>1A121"
 inlet=1A110A, exit=1A121, sch=STD, mat="carbon steel", dia=24, HW_C=60
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=18
 "90ø long radius elbow"
 "Straight pipe", len=11
 "90ø long radius elbow"
 "Straight pipe", len=5

link 1A110A->1A524A "1A110A>1A524A to instr rm water clr 1a"
 inlet=1A110A, exit=1A524A, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1.2
 "45ø elbow"
 "Straight pipe", len=6.5
 "Gate valve" isolation, Cv=56

link 1A110B->1A110C "1A110B>1A110C to lcvc 1a&1c"
 inlet=1A110B, exit=1A110C, sch=40, mat="carbon steel", dia=10
 "Straight pipe", len=1
 "Decreaser", dia=0

link 1A110B->1A110D "1A110B>1A110D to lcvc"
 inlet=1A110B, exit=1A110D, sch=40, mat="carbon steel", dia=10
 "Straight pipe", len=1
 "Decreaser", dia=0

link 1A110C->1A110CC "1A110C>1A110CC to lcvc 1c"
 inlet=1A110C, exit=1A110CC, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=6
 "45ø long radius elbow"
 "Straight pipe", len=6

link 1A110CC->1A111 "1A110CC>1A111 to lcvc 1c"
 inlet=1A110CC, exit=1A111, sch=40, mat="carbon steel", dia=6
 "Orifice", diameter_ratio=0.69355, flow=500, dp=50
 "Straight pipe", len=3
 "45ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=7
 "45ø long radius elbow"
 "Straight pipe", len=1.5
 "45ø long radius elbow"
 "Straight pipe", len=186
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=13.5
 "90ø long radius elbow"
 "Butterfly valve" isolation
 "Straight pipe", len=8
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=5

link 1A110D->1A110DD "1A110D>1A110DD to lcvc"
 inlet=1A110D, exit=1A110DD, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=3
 "45ø long radius elbow"
 "Straight pipe", len=6

link 1A110DD->1A112 "1A110DD>1A112 to lcvc"
 inlet=1A110DD, exit=1A112, sch=40, mat="carbon steel", dia=6
 "Orifice", diameter_ratio=0.69355, flow=500, dp=50
 "Straight pipe", len=2.5
 "45ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=20
 "90ø long radius elbow"
 "45ø long radius elbow"
 "Straight pipe", len=3
 "Butterfly valve" isolation
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=10
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=5

link 1A111->1A111A "1A111>1A111A to crd vent cooler"
 inlet=1A111, exit=1A111A, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2

link 1A111->1A111C "1A111>1A111C to lcvc 1c"
 inlet=1A111, exit=1A111C, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=3
 "Butterfly valve" throttle
 "Straight pipe", len=0.5

link 1A111A->1A111D "1A111A>1A111D to rc pump cooler"
 inlet=1A111A, exit=1A111D, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2
 "Decreaser", dia=0
```

NETWORK DETAIL (continued)

```
link 1A111A->1A171 "1A111A>1A171 to crd vnt clr 1c"
 inlet=1A111A, exit=1A171, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=1
 "other: "globe Valve" throttle, full open Cv is 294", Cv=99
 "Straight pipe", len=7.5
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=6.2
 "90ø long radius elbow"
 "Straight pipe", len=7.8
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "45ø long radius elbow"
 "Straight pipe", len=4.5
 "90ø long radius elbow"
 "Straight pipe", len=13
 "90ø long radius elbow"
 "Straight pipe", len=12.3
 "90ø long radius elbow"
 "Straight pipe", len=1.4
 "90ø long radius elbow"
 "Straight pipe", len=2.4

link 1A111B->1A161 "1A111B>1A161 from lcvc 1c"
 inlet=1A111B, exit=1A161, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=4
 "other: Demister", dp=4, flow=300

link 1A111C->1CLC02 "1A111C>1CLC02 to lcvc 1c"
 inlet=1A111C, exit=1CLC02, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1A111C->1CLC07 "1A111C>1CLC07 to lcvc 1c"
 inlet=1A111C, exit=1CLC07, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.9
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1A111D->1A113 "1A111D>1A113 to rcp clr 1c"
```

NETWORK DETAIL (continued)

```
 inlet=1A111D, exit=1A113, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=4.6
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "90ø long radius elbow"
 "Straight pipe", len=4.8
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=1.25
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=4.7
 "Straight pipe", len=4.6
 "90ø long radius elbow"
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "90ø long radius elbow"
 "Straight pipe", len=5.6
 "90ø long radius elbow"
 "Straight pipe", len=2.7
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=6.4

link 1A112->1A112A "1A112>1A112A to crd vent cooler"
 inlet=1A112, exit=1A112A, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2

link 1A112->1A112C "1A112>1A112C to lcvc 1a"
 inlet=1A112, exit=1A112C, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=3
 "Butterfly valve" throttle
 "Straight pipe", len=0.5

link 1A112A->1A112D "1A112A>1A112D to rc pump cooler"
 inlet=1A112A, exit=1A112D, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2
 "Decreaser", dia=0

link 1A112A->1A122B "1A112A>1A122B to crd vnt clr 1a and ucvc 1a"
 inlet=1A112A, exit=1A122B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=1
 "other: "globe Valve", throttle,  full open Cv is 294", Cv=90
 "Straight pipe", len=7.5
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "90ø long radius elbow"
 "Straight pipe", len=6
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2

link 1A112B->1A162 "1A112B>1A162 from lcvc 1a"
 inlet=1A112B, exit=1A162, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=4
 "other: Demister", dp=9, flow=300

link 1A112C->1ALC02 "1A112C>1ALC02 to lcvc 1a"
 inlet=1A112C, exit=1ALC02, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1A112C->1ALC07 "1A112C>1ALC07 to lcvc 1a"
 inlet=1A112C, exit=1ALC07, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.9
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1A112D->1A114 "1A112D>1A114 to rcp clr 1a"
 inlet=1A112D, exit=1A114, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=4.6
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "90ø long radius elbow"
 "Straight pipe", len=4.8
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=1.25
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=4.7
 "Straight pipe", len=4.6
 "90ø long radius elbow"
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "90ø long radius elbow"
 "Straight pipe", len=5.6
 "90ø long radius elbow"
 "Straight pipe", len=2.7
 "90ø long radius elbow"
 "Straight pipe", len=3
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=6.4

link 1A113->1A115 "1A113>1A115 rcp clr 1c"
 inlet=1A113, exit=1A115, sch=40, mat="carbon steel", dia=3
 "other", flow=132, dp=6.02

link 1A114->1A116 "1A114>1A116 rcp clr 1a"
 inlet=1A114, exit=1A116, sch=40, mat="carbon steel", dia=3
 "other", flow=132, dp=6.02

link 1A115->1A171B "1A115>1A171B from rcp clr 3(1c)"
 inlet=1A115, exit=1A171B, sch=40, mat="carbon steel", dia=3, HW_C=90, red=0
 "Straight pipe", len=6.2
 "90ø long radius elbow"
 "Straight pipe", len=0.7
 "90ø long radius elbow"
 "Straight pipe", len=7.9
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "45ø long radius elbow"
 "Straight pipe", len=1.2
 "45ø long radius elbow"
 "Straight pipe", len=4.7
 "Orifice", diameter_ratio=0.64472, flow=150, dp=100
 "Straight pipe", len=5.8
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=1.25
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=4.7
 "90ø long radius elbow"
 "Straight pipe", len=2.75
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "Straight pipe", len=3
 "globe Valve" throttle, Cv=294
 "other: Demister", dp=0.5, flow=100
 "Increaser", dia=4

link 1A116->1A124B "1A116>1A124B from rcp clr 1(1a)"
 inlet=1A116, exit=1A124B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=6.2
 "90ø long radius elbow"
 "Straight pipe", len=0.7
 "90ø long radius elbow"
 "Straight pipe", len=7.9
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "45ø long radius elbow"
 "Straight pipe", len=1.2
```

NETWORK DETAIL (continued)

```
 "45ø long radius elbow"
 "Straight pipe", len=4.7
 "Orifice", diameter_ratio=0.64472, flow=150, dp=100
 "Straight pipe", len=5.8
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=1.25
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=2.7
 "globe Valve" throttle, Cv=100
 "other: Demister", dp=2.5, flow=150

link 1A118->1A118D "1A118>1A118D"
 inlet=1A118, exit=1A118D, sch=40, mat="carbon steel", dia=8, HW_C=50, red=0.4
 "Straight pipe", len=15

link 1A118A->1A119A "1A118A>1A119A from lcvc,crd,rcp clrs 1a,1c"
 inlet=1A118A, exit=1A119A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=5.5
 "Butterfly valve" isolation
 "Straight pipe", len=2

link 1A118D->1A118A "1A118D>1A118A"
 inlet=1A118D, exit=1A118A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=6

link 1A118E->1A118D "1A118E>1A118D from rcw return"
 inlet=1A118E, exit=1A118D, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=1

link 1A119->1A119B "1A119>1A119B"
 inlet=1A119, exit=1A119B, sch=STD, mat="carbon steel", dia=20
 "Straight pipe", len=19

link 1A119A->1A119 "1A119A>1A119"
 inlet=1A119A, exit=1A119, sch=STD, mat="carbon steel", dia=20
 "Straight pipe", len=1

link 1A119B->1A119C "1A119B>1A119C disch hdr 1a"
 inlet=1A119B, exit=1A119C, sch=STD, mat="carbon steel", dia=36
 "Straight pipe", len=8

link 1A119C->1A119E "1A119C>1A119E disch hdr 1a"
 inlet=1A119C, exit=1A119E, sch=STD, mat="carbon steel", dia=36
 "Straight pipe", len=35
 "90ø long radius elbow"
 "Straight pipe", len=23.5

link 1A119E->1A246 "1A119E>1A246 disch hdr a"
 inlet=1A119E, exit=1A246, sch=STD, mat="carbon steel", dia=36
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=41.5
 "90ø long radius elbow"
 "Straight pipe", len=10.25
 "90ø long radius elbow"
 "Straight pipe", len=71
 "45ø long radius elbow"
 "Straight pipe", len=81
 "45ø long radius elbow"
 "Straight pipe", len=9.5
 "45ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=135
 "90ø long radius elbow"
 "Straight pipe", len=430
 "45ø long radius elbow"
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=470
 "90ø long radius elbow"
 "Straight pipe", len=110
 "45ø long radius elbow"
 "Straight pipe", len=24.5
 "45ø long radius elbow"
 "Straight pipe", len=20

link 1A121->1A121B "1A121>1A121B"
 inlet=1A121, exit=1A121B, sch=STD, mat="carbon steel", dia=24, HW_C=60
 "Straight pipe", len=11

link 1A121->1A122 "1A121>1A122 Capped @ header"
 inlet=1A121, exit=1A122, sch=80, mat="carbon steel", dia=4
 fixed_flow=0
 "other: CAP", Cv=1E-008

link 1A121A->1A126C "1A121A>1A126C"
 inlet=1A121A, exit=1A126C, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=4.1

link 1A121A->1A150 "1A121A>1A150 to cs hx 1a"
 inlet=1A121A, exit=1A150, sch=STD, mat="carbon steel", dia=18
 fixed_flow=0
 "Straight pipe", len=10
 "90ø long radius elbow"
 "Straight pipe", len=3
 "Butterfly valve" isolation
 "Straight pipe", len=26.25
 "90ø long radius elbow"
 "Straight pipe", len=20
 "Orifice", diameter_ratio=0.69073, flow=8000, dp=200
 "Straight pipe", len=15.5
 "90ø long radius elbow"
 "Straight pipe", len=11
 "90ø long radius elbow"
 "Straight pipe", len=6.3
 "90ø long radius elbow"
 "Straight pipe", len=15
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=8
 "90ø long radius elbow"
 "Straight pipe", len=7
 "90ø long radius elbow"
 "Straight pipe", len=4
 "other: Heat exchanger", dp=6.77, flow=6028

link 1A121B->1A121A "1A121B>1A121A"
 inlet=1A121B, exit=1A121A, sch=STD, mat="carbon steel", dia=24, HW_C=60
 "Straight pipe", len=12.25
 "90ø long radius elbow"
 "Straight pipe", len=15
 "90ø long radius elbow"
 "Straight pipe", len=7

link 1A121B->1A121D "1A121B>1A121D to Blind Flange"
 inlet=1A121B, exit=1A121D, sch=40, mat="carbon steel", dia=8
 fixed_flow=0
 "Straight pipe", len=1

link 1A122B->1A122C "1A122B>1A122C new supply from crd 1a to ucvc 1a"
 inlet=1A122B, exit=1A122C, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=2.33
 "standard Elbow"
 "Straight pipe", len=6
 "Orifice", diameter_ratio=0.56655, flow=25, dp=25
 "Straight pipe", len=23.6
 "45ø elbow"
 "Straight pipe", len=5.5
 "45ø elbow"
 "Straight pipe", len=38.5
 "standard Elbow"
 "Straight pipe", len=15.6
 "standard Elbow"
 "Straight pipe", len=4.8
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=2
 "globe Valve" isolation, Cv=38
 "Straight pipe", len=2

link 1A122B->1A170 "1A122B>1A170 to crd vnt clr 1a"
 inlet=1A122B, exit=1A170, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=4.2
 "90ø long radius elbow"
 "Straight pipe", len=7.8
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "45ø long radius elbow"
 "Straight pipe", len=4.5
 "90ø long radius elbow"
 "Straight pipe", len=13
 "90ø long radius elbow"
 "Straight pipe", len=12.3
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=1.4
 "90ø long radius elbow"
 "Straight pipe", len=2.4

link 1A122C->1A164 "1A122C>1A164 new supply to ucvc 1a"
 inlet=1A122C, exit=1A164, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5

link 1A124->1A124A "1A124>1A124A new return from ucvc 1a"
 inlet=1A124, exit=1A124A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5

link 1A124A->1A124B "1A124A>1A124B new return from ucvc 1a"
 inlet=1A124A, exit=1A124B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.7
 "globe Valve" isolation, Cv=38
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=6
 "standard Elbow"
 "Straight pipe", len=13.7
 "standard Elbow"
 "Straight pipe", len=38
 "45ø elbow"
 "Straight pipe", len=5.5
 "45ø elbow"
 "Straight pipe", len=28
 "standard Elbow"
 "Straight pipe", len=2.75
 "other: Globe Valve throttle full open Cv is 38", Cv=5.5
 "Straight pipe", len=1.2

link 1A124B->1A170B "1A124B>1A170B from rcp clr 1(1a)"
 inlet=1A124B, exit=1A170B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=2.75
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "Straight pipe", len=3
 "globe Valve" throttle, Cv=294
 "Increaser", dia=4

link 1A125->1A119 "1A125>1A119 from ucvc 1a,1c"
 inlet=1A125, exit=1A119, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=9.5
 "Gate valve" isolation
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=2.8

link 1A126->1A128 "1A126>1A128 to hvac 1a"
 inlet=1A126, exit=1A128, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=2.5
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=4
 "Butterfly valve" isolation
 "Straight pipe", len=5

link 1A126->1A226 "1A126>1A226"
 ===== Reference: DCN 21894
 inlet=1A126, exit=1A226, sch=STD, mat="carbon steel", dia=24
 "straight pipe", len=7.75

link 1A126A->1A126B "1A126A>1A126B to Blind Flange"
 inlet=1A126A, exit=1A126B, sch=40, mat="carbon steel", dia=3
 fixed_flow=0
 "Straight pipe", len=1

link 1A126A->1A127 "1A126A>1A127"
 ===== Reference: DCN 21894
 inlet=1A126A, exit=1A127, sch=STD, mat="carbon steel", dia=24
 "straight pipe", len=9.17

link 1A126C->1A126A "1A126C>1A126A"
 inlet=1A126C, exit=1A126A, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=9.4

link 1A126C->1A126D "1A126C>1A126D"
 inlet=1A126C, exit=1A126D, sch=40, mat="carbon steel", dia=3
 fixed_flow=0
 "Straight pipe", len=1

link 1A127->1A126 "Node 1A127 to Node 1A126"
 ===== Reference: DCN 21894
 inlet=1A127, exit=1A126, sch=STD, mat="carbon steel", dia=24
 "straight pipe", len=6.42

link 1A127->1A127A1 "Node 1A127 to Node 1A127A1 6 inch Flush Conn"
 ===== Reference: DCN 21894
 inlet=1A127, exit=1A127A1, sch=STD, mat="stainless steel", dia=16
 fixed_flow=0
 "straight pipe", len=1.72

link 1A127A1->1A127A2 "Node 1A127A1 to Node 1A127A2 VLV 0-67-1611"
 ===== Reference: DCN 21894
 inlet=1A127A1, exit=1A127A2, sch=STD, mat="carbon steel", dia=16
 "straight pipe", len=0.35
 "butterfly valve", Cv=11113

link 1A127A2->1A235 "Node 1A127A2 to Node 1A235"
 ===== Reference: DCN 21894
 inlet=1A127A2, exit=1A235, sch=STD, mat="stainless steel", dia=16
 "straight pipe", len=3.56
 "90ø long radius elbow"
 "straight pipe", len=8.41
 "45ø long radius elbow"
 "straight pipe", len=3.42
 "90ø long radius elbow"
 "straight pipe", len=3
```

NETWORK DETAIL (continued)

```
link 1A128->1A128A "1A128>1A128A hvac 1a"
 inlet=1A128, exit=1A128A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=8
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "90ø long radius elbow"
 "Straight pipe", len=20

link 1A128->1A129B "1A128>1A129B to sfpp & tb bstr pmp clr 1a"
 inlet=1A128, exit=1A129B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.2
 "45ø long radius elbow"
 "Straight pipe", len=0.5
 "45ø long radius elbow"
 "Straight pipe", len=28.5
 "90ø long radius elbow"
 "Straight pipe", len=0.8
 "45ø long radius elbow"
 "Straight pipe", len=13.4
 "45ø long radius elbow"
 "Straight pipe", len=0.75
 "45ø long radius elbow"
 "Straight pipe", len=1.75

link 1A128A->1A128B "1A128A>1A128B hvac 1a"
 inlet=1A128A, exit=1A128B, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1
 "45ø long radius elbow"
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=5

link 1A128A->1A510A "1A128A>1A510A to ccs & aux fw pmp rm clr 1a"
 inlet=1A128A, exit=1A510A, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=11.5
 "90ø long radius elbow"
 "Straight pipe", len=12
 "90ø long radius elbow"
 "Straight pipe", len=14.2
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=12.7
 "90ø long radius elbow"
 "Straight pipe", len=11.25
 "Gate valve" isolation
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=1.7
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "90ø long radius elbow"
 "Straight pipe", len=2.4
 "Decreaser", dia=0

link 1A128B->1A128B1 "1A128B>1A128B1 hvac 1a"
 inlet=1A128B, exit=1A128B1, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=1
```

NETWORK DETAIL (continued)

```
 "45ø long radius elbow"
 "Straight pipe", len=8
 "Butterfly valve" isolation

link 1A128B->1A129 "1A128B>1A129 to hvac 1a"
 inlet=1A128B, exit=1A129, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=16.5
 "90ø long radius elbow"
 "Straight pipe", len=1.5

link 1A128B1->1A128B2 "1A128B1>1A128B2 hvac 1a"
 ===== Reference: DCN 21996
 inlet=1A128B1, exit=1A128B2, sch=40, mat="stainless steel", dia=6
 "Straight pipe", len=29
 "90ø long radius elbow"
 "Straight pipe", len=21
 "90ø long radius elbow"
 "Straight pipe", len=8
 "90ø long radius elbow"
 "Straight pipe", len=19
 "90ø long radius elbow"
 "Straight pipe", len=28
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=12

link 1A128B2->1A132 "Node 1A128B2 to Node 1A132"
 ===== Reference: DCN 21996
 inlet=1A128B2, exit=1A132, sch=40, mat="stainless steel", dia=6
 "straight pipe", len=13

link 1A128B2A->1A128B2 "Node 1A128B2A to Node 1A128B2 TRAIN A 6 INCH CROSSTIE"
 ===== Reference: DCN 21996
 inlet=1A128B2A, exit=1A128B2, sch=40, mat="stainless steel", dia=6
 "straight pipe", len=0.76

link 1A128B2B->1A128B2A "Node 1A128B2B to Node 1A128B2A TRAIN A VLV 1-67-1620"
 ===== Reference: DCN 21996
 inlet=1A128B2B, exit=1A128B2A, sch=40, mat="carbon steel", dia=6
 "butterfly valve", Cv=1294
 "straight pipe", len=0.24

link 1A129->1A129A "1A129>1A129A to hvac 1a"
 inlet=1A129, exit=1A129A, sch=40, mat="carbon steel", dia=8, HW_C=46, red=0.5
 "Straight pipe", len=12.75
 "90ø long radius elbow"
 "Straight pipe", len=3.25
 "90ø long radius elbow"
 "Straight pipe", len=68.8
 "90ø long radius elbow"
 "Straight pipe", len=41.5

link 1A129->1A168 "1A129>1A168 to cent chg pmp rm clr 1a"
 inlet=1A129, exit=1A168, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.4
 "90ø long radius elbow"
 "Straight pipe", len=1.75
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=3

link 1A129A->1A130A "1A129A>1A130A hvac 1a"
 inlet=1A129A, exit=1A130A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1
 "Decreaser", dia=0

link 1A129A->1A575A "1A129A>1A575A  elec bd rm ac cond"
 inlet=1A129A, exit=1A575A, sch=40, mat="carbon steel", dia=6, HW_C=60
 "Straight pipe", len=1.5
 "45ø long radius elbow"
 "Butterfly valve" isolation

link 1A129B->1A129E "1A129B>1A129E to aux cap a"
 inlet=1A129B, exit=1A129E, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=1
 "standard Elbow"

link 1A129B->1A645A "1A129B>1A645A to sfpp & tb bstr pmp clr 1a"
 inlet=1A129B, exit=1A645A, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1A129E->1A374A "1A129E>1A374A to aux cap a"
 inlet=1A129E, exit=1A374A, sch=40, mat="stainless steel", dia=1
 "Straight pipe", len=0.5
 "globe Valve" isolation
 "Straight pipe", len=34
 "standard Elbow"
 "Straight pipe", len=3.25
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=6.8
 "standard Elbow"
 "Straight pipe", len=2.25
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "globe valve", Cv=1.61
 "Straight pipe", len=2.1
 "Increaser", dia=0

link 1A130->1A130AA "1A130>1A130AA to sta air comp"
 inlet=1A130, exit=1A130AA, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=8.9
 "90ø long radius elbow"
 "Straight pipe", len=1.2
 "90ø long radius elbow"

link 1A130->1A130B "1A130>1A130B hvac 1a"
 inlet=1A130, exit=1A130B, sch=40, mat="carbon steel", dia=6
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1
 "Decreaser", dia=0

link 1A130A->1A130 "1A130A>1A130 hvac 1a"
 inlet=1A130A, exit=1A130, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=21

link 1A130AA->1A130Z "1A130AA>1A130Z to sta air comp"
 inlet=1A130AA, exit=1A130Z, sch=40, mat="carbon steel", dia=4
 fixed_flow=0
 "Straight pipe", len=7

link 1A130B->1A580A "1A130B>1A580A hvac 1a"
 inlet=1A130B, exit=1A580A, sch=40, mat="carbon steel", dia=4, HW_C=55, red=0.3
 "Straight pipe", len=1
 "45ø long radius elbow"
 "Straight pipe", len=1
 "45ø long radius elbow"
 "Straight pipe", len=15.5
 "45ø long radius elbow"
 "Straight pipe", len=1
 "45ø long radius elbow"
 "90ø long radius elbow"
 "Straight pipe", len=5.25
 "90ø long radius elbow"
 "Straight pipe", len=21.4
 "90ø long radius elbow"
 "Straight pipe", len=9.3
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "Butterfly valve" isolation
 "Straight pipe", len=2.75
 "90ø long radius elbow"
 "Straight pipe", len=3
 "Increaser", dia=0

link 1A130Z->1A135 "1A130Z>1A135 to sta air comp"
 inlet=1A130Z, exit=1A135, sch=40, mat="carbon steel", dia=4
 "check valve"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Straight pipe", len=1.4

link 1A130Z->1ABREAK "Node 1A130Z to Node 1ABREAK"
 inlet=1A130Z, exit=1ABREAK, sch=STD, mat="stainless steel", dia=4
 fixed_flow=0
 "straight pipe", len=0.1

link 1A131->1A133B "1A131>1A133B from hvac 1a"
 inlet=1A131, exit=1A133B, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=17.5

link 1A131A->1A131B "1A131A>1A131B from el bd rm cooler 1a"
```

NETWORK DETAIL (continued)

```
 inlet=1A131A, exit=1A131B, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1
 "decreaser", dia=4.026

link 1A131A->1A131C "Capped 8"
 inlet=1A131A, exit=1A131C, sch=40, mat="carbon steel", dia=8
 fixed_flow=0
 "straight pipe", len=7

link 1A131B->1A580E "Node 1A131B to Node 1A580E"
 inlet=1A131B, exit=1A580E, sch=40, mat="carbon steel", dia=4, HW_C=50
 "straight pipe", len=2.5
 "90ø long radius elbow"
 "straight pipe", len=21.7
 "45ø long radius elbow"
 "straight pipe", len=1
 "45ø long radius elbow"
 "straight pipe", len=15.5
 "45ø long radius elbow"
 "straight pipe", len=1
 "45ø long radius elbow"
 "90ø long radius elbow"
 "straight pipe", len=7.2
 "90ø long radius elbow"
 "90ø long radius elbow"
 "increaser", dia=6.065

link 1A131D->1A131 "Node 1A131D to Node 1A131"
 inlet=1A131D, exit=1A131, sch=40S, mat="stainless steel", dia=3
 "increaser", dia=7.981

link 1A131E->1A131D "3"
 inlet=1A131E, exit=1A131D, sch=40S, mat="stainless steel", dia=3
 fixed_flow=0
 "square edged entrance"
 "other: BNL Regular Port Ball Valve", Cv=240
 "increaser", dia=4.026

link 1A132->1A132B "1A132>1A132B pmp rm clrs 1a"
 inlet=1A132, exit=1A132B, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=.5
 "Decreaser", dia=0

link 1A132->1A310 "1A132>1A310 to pmp rm clrs 1a"
 inlet=1A132, exit=1A310, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=15
 "45ø long radius elbow"
 "Straight pipe", len=12.5
 "Butterfly valve" isolation
 "Straight pipe", len=9
 "45ø long radius elbow"
 "Straight pipe", len=21
 "90ø long radius elbow"
 "90ø long radius elbow"
 "Straight pipe", len=5.75
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=7
 "90ø long radius elbow"
 "Straight pipe", len=35

link 1A132A->1A176 "1A132A>1A176 to si pmp rm clr 1a"
 inlet=1A132A, exit=1A176, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=2
 "Decreaser", dia=0

link 1A132A->1A320 "1A132A>1A320 to cs & rhr pmp rm clrs"
 inlet=1A132A, exit=1A320, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=7

link 1A132B->1A132C "1A132B>1A132C pmp rm clrs 1a"
 inlet=1A132B, exit=1A132C, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.33
 "Decreaser", dia=0

link 1A132C->1A132A "1A132C>1A132A to si pmp rm clr 1a"
 inlet=1A132C, exit=1A132A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2
 "globe Valve" isolation, Cv=172
 "Straight pipe", len=11

link 1A133->1A133D "1A133>1A133D from sfpp, tb bstr, aux air 1a"
 inlet=1A133, exit=1A133D, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.33
 "45ø long radius elbow"
 "Straight pipe", len=0.41
 "45ø long radius elbow"
 "Straight pipe", len=15.25
 "45ø long radius elbow"
 "Straight pipe", len=0.41
 "45ø long radius elbow"
 "Straight pipe", len=0.25
 "90ø long radius elbow"
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=0.5
 "90ø long radius elbow"
 "Straight pipe", len=14.5
 "45ø long radius elbow"
 "Straight pipe", len=0.5
 "45ø long radius elbow"
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 1A133A->1A643 "1A133A>1A643 from hvac 1a"
 inlet=1A133A, exit=1A643, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=6

link 1A133B->1A133A "1A133B>1A133A from hvac 1a"
 inlet=1A133B, exit=1A133A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=4.5
 "45ø long radius elbow"
 "Straight pipe", len=2
```

NETWORK DETAIL (continued)

```
 "45ø long radius elbow"
 "Straight pipe", len=1

link 1A133C->1A133A "1A133C>1A133A from cont air& spnt fuel pit pmp"
 inlet=1A133C, exit=1A133A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=4

link 1A133D->1A133C "1A133D>1A133C to disch hdr 1a"
 inlet=1A133D, exit=1A133C, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=3.5
 "Increaser", dia=0

link 1A134A->1A134B "Node 1A134A to Node 1A134B"
 inlet=1A134A, exit=1A134B, sch=STD, mat="carbon steel", dia=30
 "straight pipe", len=10

link 1A134B->1A155C "1A134B>1A155C disch hdr A"
 inlet=1A134B, exit=1A155C, sch=STD, mat="carbon steel", dia=30
 "Straight pipe", len=4.5
 "90ø long radius elbow"
 "Straight pipe", len=5.25

link 1A134C->1A134A "1A134C>1A134A disch hdr A"
 inlet=1A134C, exit=1A134A, sch=STD, mat="carbon steel", dia=30
 "straight pipe", len=15.3

link 1A135->1A135A "1A135>1A135A"
 inlet=1A135, exit=1A135A, sch=STD, mat="stainless steel", dia=4
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=3.1
 "90ø long radius elbow"
 "Straight pipe", len=19.5
 "Straight pipe", len=22.5
 "Straight pipe", len=2.4
 "90ø long radius elbow"
 "Straight pipe", len=2.4
 "Straight pipe", len=16.5
 "Straight pipe", len=15.6
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=4.8
 "90ø long radius elbow"
 "Straight pipe", len=8
 "Gate valve" isolation
 "Straight pipe", len=6.1
 "90ø long radius elbow"
 "Straight pipe", len=2.4
 "Straight pipe", len=4.1

link 1A135->1A136 "1A135>1A136 to sta air comp"
 inlet=1A135, exit=1A136, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=3.3
 "Gate valve" isolation
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.25

link 1A135A->1A135B "1A135A>1A135B"
 inlet=1A135A, exit=1A135B, sch=STD, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=1

link 1A135A->1A135C "1A135A>1A135C"
 inlet=1A135A, exit=1A135C, sch=STD, mat="stainless steel", dia=4
 "Straight pipe", len=2.4
 "45ø long radius elbow"
 "Straight pipe", len=1.8
 "45ø long radius elbow"
 "Straight pipe", len=14.4

link 1A135C->1A135D "1A135C>1A135D"
 inlet=1A135C, exit=1A135D, sch=STD, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=1

link 1A135C->1A135E "1A135C>1A135E"
 inlet=1A135C, exit=1A135E, sch=STD, mat="stainless steel", dia=4
 "Straight pipe", len=18

link 1A135E->1A135F "1A135E>1A135F"
 inlet=1A135E, exit=1A135F, sch=STD, mat="stainless steel", dia=2
 "Straight pipe", len=3.2
 "Gate valve" isolation
 "standard Elbow"
 "Straight pipe", len=1

link 1A135E->1A135Q "1A135E>1A135Q"
 inlet=1A135E, exit=1A135Q, sch=STD, mat="stainless steel", dia=4
 "Straight pipe", len=18

link 1A135F->1A135G "1A135F>1A135G"
 inlet=1A135F, exit=1A135G, sch=STD, mat="stainless steel", dia=2
 "Straight pipe", len=7.5
 "45ø elbow"
 "Straight pipe", len=0.85
 "45ø elbow"
 "Straight pipe", len=1.3
 "standard Elbow"
 "Straight pipe", len=2.6
 "Increaser", dia=0

link 1A135G->1A135H "1A135G>1A135H"
 inlet=1A135G, exit=1A135H, sch=STD, mat="stainless steel", dia=3
 "Butterfly valve" isolation, Leq=6
 "Decreaser", dia=0

link 1A135H->1A135I "1A135H>1A135I"
 inlet=1A135H, exit=1A135I, sch=STD, mat="stainless steel", dia=2
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=0.75
 "globe valve", Cv=17
 "Straight pipe", len=1.75
```

NETWORK DETAIL (continued)

```
link 1A135I->1A135J "1A135I>1A135J"
 inlet=1A135I, exit=1A135J, sch=STD, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=1

link 1A135I->1A135K "1A135I>1A135K"
 inlet=1A135I, exit=1A135K, sch=STD, mat="stainless steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1

link 1A135K->1A135L "1A135K>1A135L"
 inlet=1A135K, exit=1A135L, sch=STD, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=1

link 1A135K->1A135M "1A135K>1A135M"
 inlet=1A135K, exit=1A135M, sch=STD, mat="stainless steel", dia=2
 "Straight pipe", len=1
 "Increaser", dia=0

link 1A135M->1A135N "1A135M>1A135N"
 inlet=1A135M, exit=1A135N, sch=STD, mat="stainless steel", dia=3
 "other", flow=95, dp=15
 "Straight pipe", len=4.2

link 1A135N->1A135O "1A135N>1A135O"
 inlet=1A135N, exit=1A135O, sch=STD, mat="stainless steel", dia=3
 fixed_flow=0
 "Straight pipe", len=1

link 1A135N->1A135P "1A135N>1A135P"
 inlet=1A135N, exit=1A135P, sch=STD, mat="stainless steel", dia=3, HW_C=140
 "Straight pipe", len=1
 "globe Valve" isolation
 "Straight pipe", len=3.4
 "Orifice", diameter_ratio=0.62, flow=95, dp=60
 "Straight pipe", len=2.1
 "90ø long radius elbow"
 "Straight pipe", len=3.1
 "45ø long radius elbow"
 "Straight pipe", len=1.5
 "45ø long radius elbow"
 "Straight pipe", len=1.2
 "Gate valve" isolation
 "Straight pipe", len=1.5

link 1A135P->1A135S "1A135P>1A135S"
 inlet=1A135P, exit=1A135S, sch=STD, mat="stainless steel", dia=4, HW_C=140
 "Straight pipe", len=1.3
 "90ø long radius elbow"
 "Straight pipe", len=11.4
 "90ø long radius elbow"
 "Straight pipe", len=6.4

link 1A135Q->1A135R "1A135Q>1A135R"
 inlet=1A135Q, exit=1A135R, sch=STD, mat="stainless steel", dia=4
```

NETWORK DETAIL (continued)

```
 fixed_flow=0
 "Straight pipe", len=1

link 1A135Q->1B135H "1A135Q>1B135H"
 inlet=1A135Q, exit=1B135H, sch=STD, mat="stainless steel", dia=2
 "Straight pipe", len=3.2
 "Gate valve" isolation
 "standard Elbow"
 "Straight pipe", len=1

link 1A135S->1A135T "1A135S>1A135T"
 inlet=1A135S, exit=1A135T, sch=STD, mat="stainless steel", dia=4
 fixed_flow=0
 "Straight pipe", len=1

link 1A135S->1A135U "1A135S>1A135U"
 inlet=1A135S, exit=1A135U, sch=STD, mat="stainless steel", dia=4, HW_C=140
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "Gate valve" isolation
 "Straight pipe", len=1.25

link 1A135U->1A135V "1A135U>1A135V"
 inlet=1A135U, exit=1A135V, sch=STD, mat="stainless steel", dia=4
 "Straight pipe", len=1

link 1A136->1A136B "1A136>1A136B to sta air comp"
 inlet=1A136, exit=1A136B, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=43.1
 "90ø long radius elbow"
 "Straight pipe", len=30.25
 "45ø long radius elbow"
 "Straight pipe", len=16.73
 "45ø long radius elbow"
 "Straight pipe", len=4.25
 "90ø long radius elbow"
 "Straight pipe", len=6.5

link 1A136A->1A140 "1A136A>1A140 to air comp"
 inlet=1A136A, exit=1A140, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=5.7

link 1A136B->1A136A "1A136B>1A136A to air comp"
 inlet=1A136B, exit=1A136A, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.7
 "Decreaser", dia=0

link 1A136B->1A136C "1A136B>1A136C to sta air comp"
 inlet=1A136B, exit=1A136C, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.7
 "Decreaser", dia=0

link 1A136C->1A140A "1A136C>1A140A to air comp aft clr a"
 inlet=1A136C, exit=1A140A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.1
 "standard Elbow"
 "Straight pipe", len=7.25
```

NETWORK DETAIL (continued)

```
 "Gate valve" isolation, Cv=172
 "globe Valve" isolation
 "standard Elbow"
 "Straight pipe", len=2
 "other", flow=44, dp=3

link 1A140->1A140B "1A140>1A140B to sta air int clr a"
 inlet=1A140, exit=1A140B, sch=40, mat="carbon steel", dia=1, HW_C=55, red=0.16
 "Straight pipe", len=2
 "globe Valve" isolation
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=0.75
 "Decreaser", dia=0

link 1A140->1A141 "1A140>1A141 to sta air comp"
 inlet=1A140, exit=1A141, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=9.7

link 1A140A->1B139A "1A140A>1B139A from air comp aft clr a"
 inlet=1A140A, exit=1B139A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=0.67
 "standard Elbow"
 "Straight pipe", len=1.2
 "other: Demister", dp=19.5, flow=50

link 1A140B->1A140C "1A140B>1A140C to sta air int clr a"
 inlet=1A140B, exit=1A140C, sch=40, mat="carbon steel", dia=0.75, HW_C=55, red=0.16
 "globe Valve" isolation
 "Gate valve" isolation
 "Straight pipe", len=2.25
 "Straight pipe", len=1
 "45ø elbow"
 "45ø elbow"
 "Straight pipe", len=2
 "Increaser", dia=0

link 1A140C->1A140D "1A140C>1A140D to sta air comp"
 inlet=1A140C, exit=1A140D, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1A140D->1A140E "1A140D>1A140E to sta air comp"
 inlet=1A140D, exit=1A140E, sch=40, mat="carbon steel", dia=0.75
 "Straight pipe", len=1
 "other", flow=14, dp=10

link 1A140E->1A140F "1A140E>1A140F from sta air int clr a"
 inlet=1A140E, exit=1A140F, sch=40, mat="carbon steel", dia=0.75
 "Straight pipe", len=0.9
 "standard Elbow"
 "Straight pipe", len=2
 "globe Valve" isolation
 "Increaser", dia=0

link 1A140F->1B139A "1A140F>1B139A from sta air int clr a"
```

NETWORK DETAIL (continued)

```
 inlet=1A140F, exit=1B139A, sch=40, mat="carbon steel", dia=1
 "standard Elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=8.5
 "standard Elbow"
 "Straight pipe", len=8.1
 "standard Elbow"
 "Straight pipe", len=2.8
 "standard Elbow"
 "Straight pipe", len=.5
 "other: Demister", dp=80, flow=10

link 1A141->1A141A "1A141>1A141A to air comp aft clr b"
 inlet=1A141, exit=1A141A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=7.25
 "Gate valve" isolation, Cv=172
 "globe Valve" isolation
 "standard Elbow"
 "Straight pipe", len=2
 "other", flow=44, dp=3

link 1A141->1A142 "1A141>1A142 to sta air comp"
 inlet=1A141, exit=1A142, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=8.3
 "Decreaser", dia=2

link 1A141A->1B140A "1A141A>1B140A from sta air comp aft clr b"
 inlet=1A141A, exit=1B140A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=0.67
 "standard Elbow"
 "Straight pipe", len=1.2
 "other: Demister", dp=16, flow=50

link 1A141B->1A141C "1A141B>1A141C to sta air int clr b"
 inlet=1A141B, exit=1A141C, sch=40, mat="carbon steel", dia=0.75, HW_C=55, red=0.16
 "globe Valve" isolation
 "Gate valve" isolation
 "Straight pipe", len=2.25
 "Straight pipe", len=1
 "45ø elbow"
 "45ø elbow"
 "Straight pipe", len=2
 "Increaser", dia=0

link 1A141C->1A141D "1A141C>1A141D to sta air comp"
 inlet=1A141C, exit=1A141D, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1A141D->1A141E "1A141D>1A141E to sta air comp"
 inlet=1A141D, exit=1A141E, sch=40, mat="carbon steel", dia=0.75
 "Straight pipe", len=1
 "other", flow=14, dp=10

link 1A141E->1A141F "1A141E>1A141F from sta air int clr b"
```

NETWORK DETAIL (continued)

```
 inlet=1A141E, exit=1A141F, sch=40, mat="carbon steel", dia=0.75
 "Straight pipe", len=0.9
 "standard Elbow"
 "Straight pipe", len=2
 "globe Valve" isolation
 "Increaser", dia=0

link 1A141F->1B140A "1A141F>1B140A from sta air int clr b"
 inlet=1A141F, exit=1B140A, sch=40, mat="carbon steel", dia=1
 "standard Elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=8.5
 "standard Elbow"
 "Straight pipe", len=8.1
 "standard Elbow"
 "Straight pipe", len=2.8
 "standard Elbow"
 "Straight pipe", len=.5
 "other: Demister", dp=50, flow=10

link 1A142->1A141B "1A142>1A141B to sta air int clr b"
 inlet=1A142, exit=1A141B, sch=40, mat="carbon steel", dia=1, HW_C=55, red=0.16
 "Straight pipe", len=2
 "globe Valve" isolation
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=0.75
 "Decreaser", dia=0

link 1A142->1A143 "1A142>1A143 to sta air comp"
 inlet=1A142, exit=1A143, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=1

link 1A150->1A152 "from cs hx 1a"
 inlet=1A150, exit=1A152, sch=STD, mat="carbon steel", dia=18
 "Straight pipe", len=3.25
 "90ø long radius elbow"
 "Straight pipe", len=2
 "butterfly valve", Cv=621
 "Straight pipe", len=7
 "90ø long radius elbow"
 "Straight pipe", len=11
 "45ø long radius elbow"
 "Straight pipe", len=7.5
 "45ø long radius elbow"
 "Straight pipe", len=5.5
 "Butterfly valve" isolation
 "Straight pipe", len=17
 "45ø long radius elbow"
 "Straight pipe", len=1.5
 "Increaser", dia=0

link 1A152->1A119A "from cs hx 1a"
 inlet=1A152, exit=1A119A, sch=STD, mat="carbon steel", dia=20
 "Straight pipe", len=13
 "45ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.5

link 1A155->1A155A "1A155>1A155A to shutdwn bd rm ac clr 1a"
 inlet=1A155, exit=1A155A, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=5.1
 "90ø long radius elbow"
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=2
 "Butterfly valve" isolation
 "Straight pipe", len=23

link 1A155->2B236 "1A155>2B236"
 inlet=1A155, exit=2B236, sch=STD, mat="carbon steel", dia=24
 fixed_flow=0
 "Straight pipe", len=2
 "Butterfly valve" isolation
 "Straight pipe", len=2

link 1A155A->1A155B "1A155A>1A155B to shutdwn bd rm ac clr 1a"
 inlet=1A155A, exit=1A155B, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=7.5
 "90ø long radius elbow"
 "Straight pipe", len=3.75
 "90ø long radius elbow"
 "Straight pipe", len=5.75
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "Straight pipe", len=2.75
 "90ø long radius elbow"
 "Straight pipe", len=3.75
 "90ø long radius elbow"
 "Straight pipe", len=4
 "other: Heat exchanger", dp=3.51, flow=448

link 1A155A->1A155D "1A155A>1A155D 2 Inch Supply to SDBR Chiller Oil Cooler A-A"
 inlet=1A155A, exit=1A155D, sch=40, mat="carbon steel", dia=2
 "straight pipe", len=2.88
 "standard elbow"
 "straight pipe", len=2.33
 "other: Flex Hose", dp=0.7, flow=70
 "standard elbow"
 "straight pipe", len=0.85
 "standard elbow"
 "straight pipe", len=1.81
 "globe valve", Cv=21
 "straight pipe", len=0.5
 "increaser", dia=0

link 1A155B->1A155E "1A155B>1A155E from shutdwn bd rm ac clr 1a"
 inlet=1A155B, exit=1A155E, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=4.8
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=1.5
```

NETWORK DETAIL (continued)

```
 "Decreaser", dia=0

link 1A155C->1A119B "1A155C>1A119B disch hdr A"
 inlet=1A155C, exit=1A119B, sch=STD, mat="carbon steel", dia=30
 "Straight pipe", len=28
 "90ø long radius elbow"
 "Straight pipe", len=6
 "Increaser", dia=36

link 1A155D->1A155H "Node 1A155D to Node 1A155H SDBR Chiller A-A Oil Cooler"
 inlet=1A155D, exit=1A155H, sch=160, mat="carbon steel", dia=6
 "other: Heat exchanger", dp=0.2869, flow=50
 "decreaser", dia=0

link 1A155E->1A155F "1A155E>1A155F from shutdwn bd rm ac clr 1a"
 inlet=1A155E, exit=1A155F, sch=40, mat="carbon steel", dia=4
 "globe valve", Cv=67
 "Straight pipe", len=1.9
 "Increaser", dia=0

link 1A155F->1A155G "1A155F>1A155G from shutdwn bd rm ac clr 1a"
 inlet=1A155F, exit=1A155G, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=0.1

link 1A155G->1A155C "1A155G>1A155C from shutdwn bd rm ac clr 1a"
 inlet=1A155G, exit=1A155C, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2.3
 "90ø long radius elbow"
 "Straight pipe", len=9.5
 "45ø long radius elbow"
 "Straight pipe", len=1.3
 "45ø long radius elbow"
 "Straight pipe", len=5.8
 "Orifice", diameter_ratio=0.63232, flow=560, dp=100
 "Straight pipe", len=25.5
 "Butterfly valve" throttle
 "90ø long radius elbow"
 "Straight pipe", len=3.8

link 1A155H->1A155G "1-1/4 Inch Discharge from SDBR Chiller Oil Cooler A-A"
 inlet=1A155H, exit=1A155G, sch=40, mat="carbon steel", dia=1.25
 "Straight pipe", len=1
 "standard elbow"
 "straight pipe", len=0.75
 "standard elbow"
 "straight pipe", len=4.88
 "standard elbow"
 "straight pipe", len=2.67

link 1A161->1A161AA "1A161>1A161AA from lcvc,crd,rcp clrs 1c"
 inlet=1A161, exit=1A161AA, sch=40, mat="carbon steel", dia=6, HW_C=75
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=4
 "Butterfly valve" isolation
 "Straight pipe", len=2
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=14.5
 "90ø long radius elbow"
 "Straight pipe", len=208
 "45ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=12

link 1A161A->1A161 "1A161A>1A161 from crd,rcp clr 1c"
 inlet=1A161A, exit=1A161, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2

link 1A161AA->1A118 "1A161AA>1A118 from lcvc,crd,rcp clrs 1c"
 inlet=1A161AA, exit=1A118, sch=40, mat="carbon steel", dia=6
 "Orifice", diameter_ratio=0.69355, flow=500, dp=50
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=12
 "45ø long radius elbow"
 "Straight pipe", len=3
 "45ø long radius elbow"
 "Increaser", dia=8

link 1A162->1A162AA "1A162>1A162AA from lcvc,crd,rcp clrs 1a"
 inlet=1A162, exit=1A162AA, sch=40, mat="carbon steel", dia=6, HW_C=75
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Butterfly valve" isolation
 "Straight pipe", len=4.5
 "90ø long radius elbow"
 "Straight pipe", len=20
 "90ø long radius elbow"
 "Straight pipe", len=5.5
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=1
 "45ø long radius elbow"
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=7

link 1A162A->1A162 "1A162A>1A162 from crd,rcp clr 1a"
 inlet=1A162A, exit=1A162, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2
```

NETWORK DETAIL (continued)

```
link 1A162AA->1A118 "1A162AA>1A118 from lcvc,crd,rcp clrs 1a"
 inlet=1A162AA, exit=1A118, sch=40, mat="carbon steel", dia=6
 "Orifice", diameter_ratio=0.69355, flow=500, dp=50
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=5

link 1A164->1A124 "1A164>1A124 ucvc 1a"
 inlet=1A164, exit=1A124, sch=40, mat="carbon steel", dia=2
 "other", flow=23, dp=4.03

link 1A168->1A168A "1A168>1A168A to cent chg pmp rm clr 1a"
 inlet=1A168, exit=1A168A, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=9
 "Decreaser", dia=0

link 1A168->1A168AA "1A168>1A168AA to cent chg pmp oil clr 1a"
 inlet=1A168, exit=1A168AA, sch=40, mat="stainless steel", dia=2
  "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=5.9
 "standard Elbow"
 "Straight pipe", len=1.4
 "standard Elbow"
 "Straight pipe", len=19
 "standard Elbow"
 "Straight pipe", len=7.9
 "standard Elbow"
 "Straight pipe", len=7.9
 "standard Elbow"
 "Straight pipe", len=4.9
 "standard Elbow"
 "Straight pipe", len=5.3
 "standard Elbow"
 "gate valve"

link 1A168A->1A168A1 "1A168A>1A168A1 to cent chg pmp rm clr 1a"
 inlet=1A168A, exit=1A168A1, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=2

link 1A168A1->1A168B "1A168A1>1A168B to cent chg pmp rm clr 1a"
 inlet=1A168A1, exit=1A168B, sch=40, mat="stainless steel", dia=2
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1A168AA->1A168GVI "Node 1A168AA to Node 1A168GVI"
 inlet=1A168AA, exit=1A168GVI, sch=40, mat="carbon steel", dia=1
 "straight pipe", len=10
 "standard Elbow"
 "gate valve"
```

NETWORK DETAIL (continued)

```
 "increaser", dia=0

link 1A168AA->1A168OI "Node 1A168AA to Node 1A168OI"
 inlet=1A168AA, exit=1A168OI, sch=TUBE, mat="stainless steel", dia=1.5, wall=0.083
 "straight pipe", len=1
 "straight pipe", len=4
 "standard elbow"
 "long-sweep elbow"
 "decreaser", dia=0

link 1A168B->1A168C "1A168B>1A168C to cent chg pmp rm clr 1a"
 inlet=1A168B, exit=1A168C, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.5
 "globe Valve" isolation
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 1A168C->1A168D "1A168C>1A168D to cent chg pmp rm clr 1a"
 inlet=1A168C, exit=1A168D, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=0.5

link 1A168D->1A168E "1A168D>1A168E to cent chg pmp rm clr 1a"
 inlet=1A168D, exit=1A168E, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A168D->1A168F "1A168D>1A168F to cent chg pmp rm clr 1a"
 inlet=1A168D, exit=1A168F, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=13
 "45ø elbow"
 "Straight pipe", len=1.25
 "standard Elbow"

link 1A168F->1A520 "1A168F>1A520 to cent chg pmp rm clr 1a"
 inlet=1A168F, exit=1A520, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=4.5
 "standard Elbow"
 "Straight pipe", len=1.1
 "standard Elbow"
 "Straight pipe", len=19.8
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=1.5
 "other", flow=23, dp=3.52

link 1A168GI->1A168GO "Node 1A168GI to Node 1A168GO"
 inlet=1A168GI, exit=1A168GO, sch=TUBE, mat="stainless steel", dia=1, wall=0.049
 "other: CCP Gear Cooler", dp=1.8, flow=14
 "straight pipe", len=1.5
 "standard elbow"

link 1A168GO->1A168GVO "Node 1A168GO to Node 1A168GVO"
 inlet=1A168GO, exit=1A168GVO, sch=TUBE, mat="stainless steel", dia=1, wall=0.049
```

NETWORK DETAIL (continued)

```
 "straight pipe", len=1.5
 "standard elbow"
 "increaser", dia=0

link 1A168GVI->1A168GI "Node 1A168GVI to Node 1A168GI"
 inlet=1A168GVI, exit=1A168GI, sch=TUBE, mat="stainless steel", dia=1, wall=0.049
 "straight pipe", len=4
 "standard elbow"

link 1A168GVO->1A515 "Node 1A168GVO to Node 1A515"
 inlet=1A168GVO, exit=1A515, sch=40, mat="carbon steel", dia=2
 "standard elbow"
 "straight pipe", len=10

link 1A168OI->1A168OO "Node 1A168OI to Node 1A168OO"
 inlet=1A168OI, exit=1A168OO, sch=TUBE, mat="stainless steel", dia=1, wall=0.049
 "other: CCP Oil Cooler", dp=1.8, flow=14
 "straight pipe", len=1
 "standard elbow"

link 1A168OO->1A168ORO "Node 1A168OO to Node 1AORO"
 inlet=1A168OO, exit=1A168ORO, sch=TUBE, mat="stainless steel", dia=1.5, wall=0.083
 "straight pipe", len=3
 "standard elbow"
 "standard elbow"
 "increaser", dia=0

link 1A168ORO->1A515 "Node 1A168ORO to Node 1A515"
 inlet=1A168ORO, exit=1A515, sch=40, mat="carbon steel", dia=2
 "straight pipe", len=0.1

link 1A169->1A169A "1A169>1A169A from cent chg pmp rm clr 1a"
 inlet=1A169, exit=1A169A, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=4
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=2.5
 "other: Demister", dp=3.2, flow=30
 "Increaser", dia=0

link 1A169A->1A169B "1A169A>1A169B from cent chg pmp rm clr 1a"
 inlet=1A169A, exit=1A169B, sch=40, mat="stainless steel", dia=2
 "standard Elbow"
 "Straight pipe", len=.5

link 1A169B->1A169C "1A169B>1A169C from cent chg pmp rm clr 1a"
 inlet=1A169B, exit=1A169C, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=.5

link 1A169B->1A602 "1A169B>1A602 from cent chg pmp rm clr 1a"
 inlet=1A169B, exit=1A602, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5

link 1A170->1A170A "1A170>1A170A crd vnt clr 1a"
 inlet=1A170, exit=1A170A, sch=40, mat="carbon steel", dia=3
 "other", flow=84, dp=0.74

link 1A170A->1A170B "1A170A>1A170B from crd vnt clr 1a"
```

NETWORK DETAIL (continued)

```
 inlet=1A170A, exit=1A170B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=4.1
 "90ø long radius elbow"
 "Straight pipe", len=2.3
 "90ø long radius elbow"
 "Straight pipe", len=1.2
 "90ø long radius elbow"
 "Straight pipe", len=6.1
 "Orifice", diameter_ratio=0.58470, flow=84, dp=50
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=12.3
 "90ø long radius elbow"
 "Straight pipe", len=3.9
 "45ø long radius elbow"
 "Straight pipe", len=3.7
 "90ø long radius elbow"
 "Straight pipe", len=1.1
 "90ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "90ø long radius elbow"
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=5
 "globe Valve" throttle
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "other: Demister", dp=18.5, flow=75

link 1A170B->1A162A "1A170B>1A162A from crd,rcp clr 1a"
 inlet=1A170B, exit=1A162A, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=5.5
 "Increaser", dia=0

link 1A171->1A171A "1A171>1A171A crd vnt clr 1c"
 inlet=1A171, exit=1A171A, sch=40, mat="carbon steel", dia=3
 "other", flow=84, dp=0.74

link 1A171A->1A171B "1A171A>1A171B from crd vnt clr 1c"
 inlet=1A171A, exit=1A171B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=4.1
 "90ø long radius elbow"
 "Straight pipe", len=2.3
 "90ø long radius elbow"
 "Straight pipe", len=1.2
 "90ø long radius elbow"
 "Straight pipe", len=6.1
 "Orifice", diameter_ratio=0.58470, flow=84, dp=50
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=12.3
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=3.9
 "45ø long radius elbow"
 "Straight pipe", len=3.7
 "90ø long radius elbow"
 "Straight pipe", len=1.1
 "90ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "90ø long radius elbow"
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=5
 "globe Valve" throttle
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "other: Demister", dp=13, flow=100

link 1A171B->1A161A "1A171B>1A161A from crd,rcp clrs 1c"
 inlet=1A171B, exit=1A161A, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=5.5
 "Increaser", dia=0

link 1A176->1A176A1 "1A176>1A176A1 to si pmp rm clr 1a"
 inlet=1A176, exit=1A176A1, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=0.75
 "globe Valve" isolation

link 1A176A->1A176B "1A176A>1A176B to si pmp rm clr 1a"
 inlet=1A176A, exit=1A176B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=10.5
 "45ø elbow"
 "Straight pipe", len=3

link 1A176A1->1A176A "1A176A1>1A176A to si pmp rm clr 1a"
 inlet=1A176A1, exit=1A176A, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.75
 "Increaser", dia=0

link 1A176B->1A176B1 "1A176B>1A176B1 to si pmp rm clr 1a"
 inlet=1A176B, exit=1A176B1, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A176B->1A535 "1A176B>1A535 to si pmp rm clr 1a"
 inlet=1A176B, exit=1A535, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=5.4
 "standard Elbow"
 "Straight pipe", len=0.75

link 1A177->1A604 "1A177>1A604 from si pmp rm clr 1a"
 inlet=1A177, exit=1A604, sch=40, mat="stainless steel", dia=1.5
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=4
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=6.75
 "Increaser", dia=0

link 1A184->1A184A "1A184>1A184A to cd clr 1a"
 inlet=1A184, exit=1A184A, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=0.5
 "globe Valve" isolation
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 1A184A->1A184B "1A184A>1A184B to cs clr1a"
 inlet=1A184A, exit=1A184B, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=8.5
 "standard Elbow"
 "Straight pipe", len=0.5

link 1A184B->1A184C "1A184B>1A184C to cs clr1a"
 inlet=1A184B, exit=1A184C, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A184B->1A545 "1A184B>1A545 to cs clr1a"
 inlet=1A184B, exit=1A545, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=14
 "standard Elbow"
 "Straight pipe", len=6
 "standard Elbow"
 "Straight pipe", len=9
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=0.5
 "other", flow=9, dp=0.66
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=11
 "standard Elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=13.75
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=3

link 1A185->1A185A "1A185>1A185A from cs clr 1a"
```

NETWORK DETAIL (continued)

```
 inlet=1A185, exit=1A185A, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=4
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=1.5
 "other: Demister", dp=16.6, flow=30
 "Increaser", dia=0

link 1A185A->1A321 "1A185A>1A321 from cs clr 1a"
 inlet=1A185A, exit=1A321, sch=40, mat="carbon steel", dia=2
 "standard Elbow"
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=10.5
 "standard Elbow"
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=5
 "45ø elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=20
 "standard Elbow"
 "Straight pipe", len=2

link 1A188A->1A188B "1A188A>1A188B to rhr clr A"
 inlet=1A188A, exit=1A188B, sch=40, mat="carbon steel", dia=1, HW_C=100, red=0
 "Straight pipe", len=0.5
 "globe Valve" isolation
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 1A188B->1A188C "1A188B>1A188C to rhr clr A"
 inlet=1A188B, exit=1A188C, sch=40, mat="carbon steel", dia=1.5, HW_C=100, red=0
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=8
 "Increaser", dia=0

link 1A188C->1A188C1 "1A188C>1A188C1 to rhr clr A"
 inlet=1A188C, exit=1A188C1, sch=40, mat="carbon steel", dia=2, HW_C=100, red=0
 "standard Elbow"
 "Straight pipe", len=0.5

link 1A188C1->1A188C2 "1A188C1>1A188C2 to rhr clr A"
 inlet=1A188C1, exit=1A188C2, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A188C1->1A188C3 "1A188C1>1A188C3 to rhr clr A"
 inlet=1A188C1, exit=1A188C3, sch=40, mat="carbon steel", dia=2, HW_C=100, red=0
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=2
 "Decreaser", dia=0

link 1A188C3->1A188C4 "1A188C3>1A188C4 to rhr clr A"
```

NETWORK DETAIL (continued)

```
 inlet=1A188C3, exit=1A188C4, sch=40, mat="carbon steel", dia=1.5, HW_C=100, red=0
 "Straight pipe", len=8
 "45ø elbow"
 "Straight pipe", len=0.5
 "45ø elbow"
 "Straight pipe", len=8
 "45ø elbow"
 "45ø elbow"
 "standard Elbow"
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=10.83
 "Increaser", dia=0

link 1A188C4->1A550 "1A188C4>1A550 to rhr clr A"
 inlet=1A188C4, exit=1A550, sch=40, mat="carbon steel", dia=2, HW_C=100, red=0
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "other", flow=12, dp=1.66
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=2.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "Decreaser", dia=0

link 1A190->1A190C "1A190>1A190C to dsl gen 1a1"
 inlet=1A190, exit=1A190C, sch=40, mat="carbon steel", dia=14
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1A190->2A291 "1A190>2A291 to dsl gen 2a1"
 inlet=1A190, exit=2A291, sch=40, mat="carbon steel", dia=6, HW_C=66.3
 "check valve", Cv=600
 "Straight pipe", len=31
 "90ø long radius elbow"
 "Straight pipe", len=39
 "45ø long radius elbow"
 "Straight pipe", len=3.5
 "90ø long radius elbow"
 "Straight pipe", len=16
 "Straight pipe", len=1
 "Straight pipe", len=5
 "Butterfly valve" isolation
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1.2

link 1A190A->1A190B "1A190A>1A190B to dsl gen 1a, 2a"
 inlet=1A190A, exit=1A190B, sch=40, mat="carbon steel", dia=14, HW_C=57
 "Straight pipe", len=0.5
 "90ø long radius elbow"
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=17
 "Butterfly valve" isolation
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=8
 "45ø long radius elbow"
 "Straight pipe", len=42

link 1A190B->1A190 "1A190B>1A190 to dsl gen 1a, 2a"
 inlet=1A190B, exit=1A190, sch=40, mat="carbon steel", dia=14, HW_C=60
 "Straight pipe", len=11

link 1A190B->1A190D "1A190B>1A190D dsl gen stub"
 inlet=1A190B, exit=1A190D, sch=40, mat="carbon steel", dia=14
 fixed_flow=0
 "Straight pipe", len=1

link 1A190C->1A191 "1A190C>1A191 to dsl gen 1a1"
 inlet=1A190C, exit=1A191, sch=40, mat="carbon steel", dia=6, HW_C=86
 "check valve", Cv=600
 "Straight pipe", len=3
 "45ø long radius elbow"
 "Straight pipe", len=69
 "90ø long radius elbow"
 "Straight pipe", len=12
 "45ø long radius elbow"
 "Straight pipe", len=25
 "Straight pipe", len=21
 "Straight pipe", len=6
 "Butterfly valve" isolation
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1.2

link 1A191->1A1A1 "1A191>1A1A1 to dsl gen clr 1a1"
 inlet=1A191, exit=1A1A1, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=1
 "other", flow=660, dp=3

link 1A191->2B209F "1A191>2B209F dsl gen cross 1a1, 1a2"
 inlet=1A191, exit=2B209F, sch=40, mat="carbon steel", dia=6, HW_C=76
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=7.9
 "90ø long radius elbow"
 "Straight pipe", len=63
 "90ø long radius elbow"
 "Straight pipe", len=7.9
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1.25

link 1A192->1A195 "1A192>1A195 from dsl gen 1a1, 1a2"
 inlet=1A192, exit=1A195, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=31.5
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=7.67
 "90ø long radius elbow"
 "Straight pipe", len=11

link 1A192A->1A192 "1A192A>1A192 from dsl gen clr 1a2"
 inlet=1A192A, exit=1A192, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1

link 1A195->1A196A "1A195>1A196A from dsl gen clrs 1a"
 inlet=1A195, exit=1A196A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=1
 "Straight pipe", len=1.75
 "90ø long radius elbow"
 "Straight pipe", len=7.7
 "90ø long radius elbow"
 "Straight pipe", len=5.75

link 1A195->1B297C "1A195>1B297C from dsl gen clrs 1a"
 inlet=1A195, exit=1B297C, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1.5
 "Butterfly valve" isolation
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2
 "Straight pipe", len=1.75
 "90ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=6.75
 "90ø long radius elbow"
 "Straight pipe", len=30
 "Increaser", dia=0

link 1A196->1A196B "1A196>1A196B from dsl gen clrs"
 inlet=1A196, exit=1A196B, sch=40, mat="carbon steel", dia=12
 "Straight pipe", len=30
 "Increaser", dia=0

link 1A196A->1B246A "1A196A>1B246A from dsl gen clrs"
 inlet=1A196A, exit=1B246A, sch=40, mat="carbon steel", dia=14
 "Straight pipe", len=8.5
 "Straight pipe", len=35
 "45ø long radius elbow"
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=145
 "90ø long radius elbow"
 "Straight pipe", len=315
 "90ø long radius elbow"
 "Straight pipe", len=52
 "90ø long radius elbow"
 "Straight pipe", len=65
 "90ø long radius elbow"
 "Straight pipe", len=65
 "90ø long radius elbow"
 "Straight pipe", len=145
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=125
 "Increaser", dia=36

link 1A196B->1A196A "1A196B>1A196A from dsl gen clrs"
 inlet=1A196B, exit=1A196A, sch=40, mat="carbon steel", dia=14
 "Straight pipe", len=1

link 1A196C->1A196 "1A196C>1A196 from dsl gen clrs"
 inlet=1A196C, exit=1A196, sch=40, mat="carbon steel", dia=12
 "Straight pipe", len=1

link 1A1A1->1FE6769 "1A1A1>1FE6769 from  dsl gen clr 1a1"
 inlet=1A1A1, exit=1FE6769, sch=40, mat="carbon steel", dia=6, HW_C=64
 "Straight pipe", len=1
 "butterfly valve", Cv=157.97
 "Straight pipe", len=9
 "90ø long radius elbow"
 "Straight pipe", len=16

link 1A1A2->1FE67277 "1A1A2>1FE67277 from dsl gen clr 1a2"
 inlet=1A1A2, exit=1FE67277, sch=40, mat="carbon steel", dia=6, HW_C=50, red=0.2
 "Straight pipe", len=1
 "butterfly valve", Cv=216.94
 "Straight pipe", len=9
 "90ø long radius elbow"
 "Straight pipe", len=16

link 1A226->1A155 "Node 1A226 to Node 1A155"
 ===== Reference: DCN 21894
 inlet=1A226, exit=1A155, sch=STD, mat="carbon steel", dia=24
 "straight pipe", len=0.5

link 1A226->1A226A4 "Node 1A226 to Node 1A226A4"
 ===== Reference: DCN 21894
 inlet=1A226, exit=1A226A4, sch=STD, mat="stainless steel", dia=8
 "straight pipe", len=2.5625

link 1A226A4->1A226A "Node 1A226A4 to Node 1A226A"
 ===== Reference: DCN 21894
 inlet=1A226A4, exit=1A226A, sch=STD, mat="carbon steel", dia=8
 fixed_flow=0
 "straight pipe", len=0.26
 "butterfly valve", Cv=2300

link 1A234->1B235 "Node 1A234 to Node 1B235"
 ===== Reference: DCN 21894
 inlet=1A234, exit=1B235, sch=STD, mat="carbon steel", dia=24
 "straight pipe", len=15.42
 "orifice", diameter_ratio=0.64088, flow=12000, dp=200
 "straight pipe", len=9.17

link 1A234A->1A234 "Node 1A234A to Node 1A234"
 ===== Reference: DCN 21894
 inlet=1A234A, exit=1A234, sch=STD, mat="stainless steel", dia=16
 "straight pipe", len=1.72

link 1A234B->1A234A "Node 1A234B to Node 1A234A"
```

NETWORK DETAIL (continued)

```
 ===== Reference: DCN 21894
 inlet=1A234B, exit=1A234A, sch=STD, mat="carbon steel", dia=16
 "straight pipe", len=0.35
 "butterfly valve", Cv=11113

link 1A235->1A235A "Node 1A235 to Node 1A235A"
 ===== Reference: DCN 21894
 inlet=1A235, exit=1A235A, sch=STD, mat="stainless steel", dia=6
 "straight pipe", len=1.16

link 1A235->1A237 "Node 1A235 to Node 1A237"
 ===== Reference: DCN 21894
 inlet=1A235, exit=1A237, sch=STD, mat="stainless steel", dia=16
 "straight pipe", len=6
 "90ø long radius elbow"
 "straight pipe", len=2.58

link 1A235A->1A236 "Node 1A235A to Node 1A236"
 ===== Reference: DCN 21894
 inlet=1A235A, exit=1A236, sch=STD, mat="carbon steel", dia=6
 fixed_flow=0
 "straight pipe", len=0.24
 "butterfly valve", Cv=1294

link 1A237->1A234B "Node 1A237 to Node 1A234B"
 ===== Reference: DCN 21894
 inlet=1A237, exit=1A234B, sch=STD, mat="stainless steel", dia=16
 "straight pipe", len=1.6

link 1A237->1A237A "Node 1A237 to Node 1A237A"
 ===== Reference: DCN 21894
 inlet=1A237, exit=1A237A, sch=STD, mat="stainless steel", dia=6
 "straight pipe", len=1.16

link 1A237A->1A238 "Node 1A237A to Node 1A238"
 ===== Reference: DCN 21894
 inlet=1A237A, exit=1A238, sch=STD, mat="carbon steel", dia=6
 fixed_flow=0
 "straight pipe", len=0.24
 "butterfly valve", Cv=1294

link 1A246->1A247 "1A246>1A247 disch hdr a"
 inlet=1A246, exit=1A247, sch=STD, mat="carbon steel", dia=36
 "Straight pipe", len=30
 "90ø long radius elbow"
 "Straight pipe", len=150

link 1A247->1A247A "1A247>1A247A to abandoned ct pipe"
 inlet=1A247, exit=1A247A, sch=STD, mat="carbon steel", dia=30
 fixed_flow=0
 "Straight pipe", len=1

link 1A247->1A247B "1A247>1A247B disch hdr to dicsh chnl"
 inlet=1A247, exit=1A247B, sch=STD, mat="carbon steel", dia=36
 "Straight pipe", len=125
 "45ø long radius elbow"
 "Straight pipe", len=3.5
 "45ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=12
 "Butterfly valve" isolation
 "Straight pipe", len=6
 "Butterfly valve" isolation
 "Straight pipe", len=9

link 1A310->1A310A "1A310>1A310A to pmp rm clrs 1a"
 inlet=1A310, exit=1A310A, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=36.5
 "45ø long radius elbow"
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=10
 "45ø long radius elbow"
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=2

link 1A310->1A310A1 "1A310>1A310A1 to pen rm clr 1a..."
 inlet=1A310, exit=1A310A1, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
 "45ø elbow"
 "Straight pipe", len=0.5

link 1A310A->1A310B1 "1A310A>1A310B1 to el 690 & 714 pen rm clrs 1a"
 inlet=1A310A, exit=1A310B1, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3
 "45ø elbow"

link 1A310A->1A310C "1A310A>1A310C to pipe cha clr 1a"
 inlet=1A310A, exit=1A310C, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.25
 "Decreaser", dia=0

link 1A310A1->1A553 "1A310A1>1A553 to pen rm clr 1a..."
 inlet=1A310A1, exit=1A553, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "45ø elbow"
 "Straight pipe", len=1.5
 "45ø elbow"
 "Straight pipe", len=10
 "Decreaser", dia=0

link 1A310B->1A310B2 "1A310B>1A310B2 to el 690 pen rm clr 1a"
 inlet=1A310B, exit=1A310B2, sch=40, mat="stainless steel", dia=2
 "Decreaser", dia=0

link 1A310B->1A354 "1A310B>1A354 to el 714 pen rm clr 1a"
 inlet=1A310B, exit=1A354, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=11
 "standard Elbow"
 "Straight pipe", len=29.5
 "standard Elbow"
 "Straight pipe", len=46.75
 "standard Elbow"
 "Straight pipe", len=14.6
```

NETWORK DETAIL (continued)

```
link 1A310B1->1A310B "1A310B1>1A310B to el 690 & 714 pen rm clrs 1a"
 inlet=1A310B1, exit=1A310B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=13.5

link 1A310B2->1A310B3 "1A310B2>1A310B3 to el 690 pen rm clr 1a"
 inlet=1A310B2, exit=1A310B3, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.9
 "standard Elbow"
 "Straight pipe", len=1.5
 "45ø elbow"
 "Straight pipe", len=12.25
 "standard Elbow"
 "Straight pipe", len=10.5
 "Increaser", dia=0

link 1A310B3->1A310B4 "1A310B3>1A310B4 to el 690 pen rm clr 1a"
 inlet=1A310B3, exit=1A310B4, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5

link 1A310B4->1A310B5 "1A310B4>1A310B5 to el 690 pen rm clr 1a"
 inlet=1A310B4, exit=1A310B5, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A310B4->1A560A "1A310B4>1A560A to el 690 pen rm clr 1a"
 inlet=1A310B4, exit=1A560A, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=11
 "standard Elbow"
 "Decreaser", dia=0

link 1A310C->1A310D "1A310C>1A310D to pipe ch clr 1a"
 inlet=1A310C, exit=1A310D, sch=40, mat="carbon steel", dia=2.5
 "Straight pipe", len=29.5
 "standard Elbow"
 "Straight pipe", len=5.5
 "standard Elbow"
 "Straight pipe", len=13.5

link 1A310D->1A310E "1A310D>1A310E to pipe ch clr 1a"
 inlet=1A310D, exit=1A310E, sch=40, mat="stainless steel", dia=2.5
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1A310D1->1A310D2 "1A310D1>1A310D2 to pipe ch 1a"
 inlet=1A310D1, exit=1A310D2, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A310D1->1A310D3 "1A310D1>1A310D3 to pipe ch 1a"
 inlet=1A310D1, exit=1A310D3, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1.75
```

NETWORK DETAIL (continued)

```
 "Increaser", dia=0

link 1A310D3->1A570 "1A310D3>1A570 to pipe ch 1a"
 inlet=1A310D3, exit=1A570, sch=40, mat="stainless steel", dia=2.5
 "Straight pipe", len=0.25
 "other", flow=21, dp=0.48
 "Straight pipe", len=0.25
 "Decreaser", dia=0

link 1A310E->1A310D1 "1A310E>1A310D1 to pipe ch 1a"
 inlet=1A310E, exit=1A310D1, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.25
 "globe Valve" isolation
 "Straight pipe", len=1.25
 "standard Elbow"
 "Straight pipe", len=1

link 1A311->1A312 "1A311>1A312 from pipe cha, pen rm clrs 1a"
 inlet=1A311, exit=1A312, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=34.5
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=4.25
 "90ø long radius elbow"
 "Straight pipe", len=15
 "45ø long radius elbow"
 "Straight pipe", len=8
 "Butterfly valve" isolation
 "Straight pipe", len=13
 "45ø long radius elbow"
 "Straight pipe", len=13
 "90ø long radius elbow"
 "Straight pipe", len=2

link 1A311A->1A311 "1A311A>1A311 from pipe cha clr 1a"
 inlet=1A311A, exit=1A311, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=1
 "45ø long radius elbow"
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=7
 "45ø long radius elbow"
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=36.5
 "90ø long radius elbow"
 "Straight pipe", len=1.5

link 1A311B->1A311B1 "1A311B>1A311B1 from el 690 & 714 pen rm clrs 1a"
 inlet=1A311B, exit=1A311B1, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=13.5
 "standard Elbow"
 "Straight pipe", len=4

link 1A311B1->1A311A "1A311B1>1A311A from el 690 & 714 pen rm clrs 1a"
 inlet=1A311B1, exit=1A311A, sch=40, mat="carbon steel", dia=2
 "45ø elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=3

link 1A311D->1A311A "1A311D>1A311A from pipe ch clr 1a"
 inlet=1A311D, exit=1A311A, sch=40, mat="carbon steel", dia=2.5
 "Straight pipe", len=8.5
 "standard Elbow"
 "Straight pipe", len=5.5
 "standard Elbow"
 "Straight pipe", len=28.43
 "Increaser", dia=4

link 1A312->1A312D "1A312>1A312D from pmp rm clrs 1a"
 inlet=1A312, exit=1A312D, sch=40, mat="stainless steel", dia=6
 "Straight pipe", len=26
 "90ø long radius elbow"
 "Straight pipe", len=4.25
 "90ø long radius elbow"
 "Straight pipe", len=30
 "90ø long radius elbow"
 "Straight pipe", len=20
 "90ø long radius elbow"
 "Straight pipe", len=6.83
 "90ø long radius elbow"
 "Straight pipe", len=20.5
 "90ø long radius elbow"
 "Straight pipe", len=33

link 1A312A->1A312 "1A312A>1A312 from si pmp rm clr 1aq"
 inlet=1A312A, exit=1A312, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.33
 "Increaser", dia=6

link 1A312B->1A312A "1A312B>1A312A from si pmp rm clr 1a"
 inlet=1A312B, exit=1A312A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=12
 "globe Valve" isolation, Cv=172
 "Straight pipe", len=2
 "Increaser", dia=0

link 1A312D->1A133B "1A312D>1A133B from pmp rm clrs 1a"
 inlet=1A312D, exit=1A133B, sch=40, mat="carbon steel", dia=6
 "Butterfly valve" isolation
 "Straight pipe", len=7.5

link 1A320->1A184 "1A320>1A184 to cs pmp rm clr"
 inlet=1A320, exit=1A184, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=20
 "45ø elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=7
 "standard Elbow"
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=8.5
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1
 "Decreaser", dia=0

link 1A320->1A320A "1A320>1A320A to rhr pmp rm clr"
 inlet=1A320, exit=1A320A, sch=40, mat="carbon steel", dia=2
 "Decreaser", dia=0

link 1A320A->1A188A "1A320A>1A188A to rhr pmp rm clr"
 inlet=1A320A, exit=1A188A, sch=40, mat="carbon steel", dia=1.5, HW_C=100
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=10.5
 "standard Elbow"
 "Straight pipe", len=7
 "standard Elbow"
 "Straight pipe", len=9.1
 "standard Elbow"
 "Straight pipe", len=8.5
 "standard Elbow"
 "Straight pipe", len=1
 "Decreaser", dia=0

link 1A321->1A312B "1A321>1A312B from cs & rhr pmp rm clrs"
 inlet=1A321, exit=1A312B, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=4

link 1A354->1A354A1 "1A354>1A354A1 to el 714 pen rm clr 1a"
 inlet=1A354, exit=1A354A1, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A354->1A354A2 "1A354>1A354A2 to el 714 pen rm clr 1a"
 inlet=1A354, exit=1A354A2, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Decreaser", dia=0

link 1A354A2->1A354A3 "1A354A2>1A354A3 to el 714 pen rm clr 1a"
 inlet=1A354A2, exit=1A354A3, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=1
 "globe Valve" isolation
 "Straight pipe", len=2
 "Increaser", dia=0

link 1A354A3->1A565 "1A354A3>1A565 to pen rm clr1a..."
 inlet=1A354A3, exit=1A565, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=2.5
 "other", flow=18, dp=0.29
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.55
 "standard Elbow"
 "Straight pipe", len=2.5
```

NETWORK DETAIL (continued)

```
link 1A374A->1A374B "1A374A>1A374B to aux cap a"
 inlet=1A374A, exit=1A374B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.25

link 1A374B->1A374C "1A374B>1A374C tw dead end"
 inlet=1A374B, exit=1A374C, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A374B->1A374D "1A374B>1A374D to aux cap a"
 inlet=1A374B, exit=1A374D, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.25

link 1A374D->1A374E "1A374D>1A374E to aux cap a"
 inlet=1A374D, exit=1A374E, sch=40, mat="stainless steel", dia=1
 "Straight pipe", len=2.25
 "standard Elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=2
 "globe valve", Leq=40
 "Straight pipe", len=3.2
 "standard Elbow"
 "Straight pipe", len=1.9
 "Decreaser", dia=0

link 1A374E->1A374EE "1A374E>1A374EE to aux cap a"
 inlet=1A374E, exit=1A374EE, sch=TUBE, mat="copper", dia=0.5, wall=0.035
 "straight pipe", len=3
 "Straight pipe", len=1.2
 "other: 'A' Aux Air Compressor aftercooler", dp=0.38, flow=4.08

link 1A374EE->1A374F "Node 1A374EE to Node 1A374F"
 inlet=1A374EE, exit=1A374F, sch=TUBE, mat="copper", dia=0.5, wall=0.035
 "straight pipe", len=5
 "other: 'A' Aux Air Compressor", dp=5, flow=4.08
 "standard elbow"
 "increaser", dia=0

link 1A374F->1A375A "1A374F>1A375A from aux cap"
 inlet=1A374F, exit=1A375A, sch=40, mat="stainless steel", dia=0.5
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=0.75
 "Increaser", dia=0

link 1A375A->1A375B "1A375A>1A375B from aux cap"
 inlet=1A375A, exit=1A375B, sch=40, mat="stainless steel", dia=1
 "Straight pipe", len=1.8
 "standard Elbow"
 "Straight pipe", len=4.4
 "standard Elbow"
 "Straight pipe", len=2.4
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=4.5
 "standard Elbow"
 "Straight pipe", len=1
 "Increaser", dia=0

link 1A375B->1A375C "1A375B>1A375C from aux cap"
 inlet=1A375B, exit=1A375C, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.25

link 1A375C->1A375D "1A375C>1A375D tw dead end"
 inlet=1A375C, exit=1A375D, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A375C->1A375E "1A375C>1A375E from aux cap"
 inlet=1A375C, exit=1A375E, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.25

link 1A375E->1A375F "1A375E>1A375F from aux cap"
 inlet=1A375E, exit=1A375F, sch=40, mat="stainless steel", dia=1
 "Straight pipe", len=1.4
 "globe Valve" isolation
 "Straight pipe", len=1.3
 "standard Elbow"
 "Straight pipe", len=2.7
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=6.3
 "standard Elbow"
 "Straight pipe", len=2.75
 "standard Elbow"
 "Straight pipe", len=3
 "Orifice", diameter_ratio=0.60408, flow=15, dp=100
 "Straight pipe", len=31.5
 "globe Valve" isolation

link 1A375F->1A375G "1A375F>1A375G from aux cap"
 inlet=1A375F, exit=1A375G, sch=40, mat="carbon steel", dia=1
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 1A375G->1A133 "1A375G>1A133 from aux cap"
 inlet=1A375G, exit=1A133, sch=40, mat="carbon steel", dia=1.5
 "standard Elbow"
 "Straight pipe", len=1

link 1A510A->1A510B "1A510A>1A510B to ccs & aux fw pmp rm clr 1a"
 inlet=1A510A, exit=1A510B, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.2
 "globe Valve" throttle
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 1A510B->1A510C "1A510B>1A510C to ccs & aux fw pmp rm clr 1a"
 inlet=1A510B, exit=1A510C, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=14.8
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1.9
 "90ø long radius elbow"
 "Straight pipe", len=1.25
 "other", flow=53.1, dp=1.83

link 1A510C->1A510D "1A510C>1A510D from ccs & aux fw pmp rm clr 1a"
 inlet=1A510C, exit=1A510D, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.75
 "90ø long radius elbow"
 "Straight pipe", len=1.9
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "Decreaser", dia=0

link 1A510D->1A510E "1A510D>1A510E from ccs & aux fw pmp rm clr 1a"
 inlet=1A510D, exit=1A510E, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=6.3
 "Orifice", diameter_ratio=0.62737, flow=90, dp=200
 "Straight pipe", len=3
 "Increaser", dia=0

link 1A510E->1A643 "1A510E>1A643 from ccs & aux fw pmp rm clr 1a"
 inlet=1A510E, exit=1A643, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=6
 "Gate valve" throttle, Cv=190
 "Straight pipe", len=2.2
 "90ø long radius elbow"
 "Straight pipe", len=2
 "Gate valve" isolation
 "Straight pipe", len=11.4
 "90ø long radius elbow"
 "Straight pipe", len=12.9
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "90ø long radius elbow"
 "Straight pipe", len=19.7
 "90ø long radius elbow"
 "Straight pipe", len=12

link 1A515->1A515A "1A515>1A515A from cent chg pmp oil clr 1a"
 inlet=1A515, exit=1A515A, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "globe Valve" isolation
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=2.4
 "globe Valve" isolation
 "Straight pipe", len=2.7
 "standard Elbow"
 "Straight pipe", len=3.3
 "standard Elbow"
 "Straight pipe", len=3.6
 "standard Elbow"
 "Straight pipe", len=6.25
```

NETWORK DETAIL (continued)

```
 "standard Elbow"
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=14.9
 "standard Elbow"
 "Straight pipe", len=1.4
 "standard Elbow"
 "Straight pipe", len=5.9
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=4.5
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=7
 "Orifice", diameter_ratio=0.57388, flow=40, dp=60
 "Straight pipe", len=2
 "standard Elbow"
 "other: Demister", dp=4, flow=30

link 1A515A->1A515B "1A515A>1A515B tw dead end"
 inlet=1A515A, exit=1A515B, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A515A->1A515C "1A515A>1A515C from cent chg pmp oil clr 1a"
 inlet=1A515A, exit=1A515C, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.3

link 1A515C->1A601 "1A515C>1A601 from cent chg pmp oil clr 1a"
 inlet=1A515C, exit=1A601, sch=40, mat="carbon steel", dia=2
 "globe Valve" throttle
 "Straight pipe", len=1

link 1A520->1A520A "1A520>1A520A from cent chg pmp rm clr 1a"
 inlet=1A520, exit=1A520A, sch=40, mat="carbon steel", dia=2
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=17.3
 "standard Elbow"
 "Straight pipe", len=3.6
 "standard Elbow"
 "Straight pipe", len=4.5

link 1A520A->1A169 "1A520A>1A169 from cent chg pmp rm clr 1a"
 inlet=1A520A, exit=1A169, sch=40, mat="stainless steel", dia=2
 "standard Elbow"
 "Straight pipe", len=7.25
```

NETWORK DETAIL (continued)

```
 "Decreaser", dia=0

link 1A524A->1A524B "1A524A>1A524B to instr rm water clr 1a"
 inlet=1A524A, exit=1A524B, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=23
 "45ø elbow"
 "Straight pipe", len=20
 "45ø elbow"
 "Straight pipe", len=21
 "45ø elbow"
 "Straight pipe", len=3.8
 "45ø elbow"
 "Straight pipe", len=8.6
 "standard Elbow"
 "Straight pipe", len=20
 "Increaser", dia=0

link 1A524B->1A524C "1A524B>1A524C to instr rm water clr 1a"
 inlet=1A524B, exit=1A524C, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1

link 1A524C->1A524D "1A524C>1A524D tw dead end"
 inlet=1A524C, exit=1A524D, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A524C->1A524E "1A524C>1A524E to instr rm water clr 1a"
 inlet=1A524C, exit=1A524E, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.25
 "Decreaser", dia=0

link 1A524E->1A524F "1A524E>1A524F to instr rm water clr 1a"
 inlet=1A524E, exit=1A524F, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=4.6
 "standard Elbow"
 "Straight pipe", len=9.1
 "globe Valve" isolation"
 "Straight pipe", len=1.6
 "Decreaser", dia=0

link 1A524F->1A524G "1A524F>1A524G to instr rm water clr 1a"
 inlet=1A524F, exit=1A524G, sch=40, mat="stainless steel", dia=1
 "Straight pipe", len=2.3
 "globe Valve" throttle
 "Increaser", dia=0

link 1A524G->1A524H "1A524G>1A524H to instr rm water clr 1a"
 inlet=1A524G, exit=1A524H, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.2
 "standard Elbow"
 "Straight pipe", len=1.2
 "Decreaser", dia=0

link 1A524H->1A524I "1A524H>1A524I to instr rm water clr 1a"
 inlet=1A524H, exit=1A524I, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=1.1
```

NETWORK DETAIL (continued)

```
 "other", flow=35, dp=5.54

link 1A524I->1A524J "1A524I>1A524J from instr rm water clr 1a"
 inlet=1A524I, exit=1A524J, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=1.2
 "Increaser", dia=0

link 1A524J->1A524K "1A524J>1A524K from instr rm water clr 1a"
 inlet=1A524J, exit=1A524K, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.2
 "standard Elbow"
 "Straight pipe", len=1.2

link 1A524K->1A524L "1A524K>1A524L from instr rm water clr 1a"
 inlet=1A524K, exit=1A524L, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.6
 "standard Elbow"
 "Straight pipe", len=14.5
 "standard Elbow"
 "Straight pipe", len=4.6

link 1A524L->1A524M "1A524L>1A524M from instr rm water clr 1a"
 inlet=1A524L, exit=1A524M, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.25

link 1A524M->1A524N "1A524M>1A524N tw dead end"
 inlet=1A524M, exit=1A524N, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A524M->1A524O "1A524M>1A524O from instr rm water clr 1a"
 inlet=1A524M, exit=1A524O, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1

link 1A524O->1A524P "1A524O>1A524P from instr rm water clr 1a"
 inlet=1A524O, exit=1A524P, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=2.6
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=3.2
 "globe Valve" throttle
 "Straight pipe", len=15.5
 "standard Elbow"
 "Straight pipe", len=8.63
 "45ø elbow"
 "Straight pipe", len=21
 "45ø elbow"
 "Straight pipe", len=12.4
 "45ø elbow"
 "Straight pipe", len=13
 "45ø elbow"
 "Straight pipe", len=9.2
 "standard Elbow"
 "Straight pipe", len=21.3
 "standard Elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=5.1
```

NETWORK DETAIL (continued)

```
link 1A524P->1A118A "1A524P>1A118A from instr rm water clr 1a"
 inlet=1A524P, exit=1A118A, sch=40, mat="carbon steel", dia=1.5
 "Gate valve" isolation, Cv=56
 "Straight pipe", len=2.2

link 1A525->1A525A "1A525>1A525A feom si pmp rm clr 1a"
 inlet=1A525, exit=1A525A, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.25
 "standard Elbow"
 "Straight pipe", len=5.4

link 1A525A->1A177 "1A525A>1A177 from si pmp rm clr 1a"
 inlet=1A525A, exit=1A177, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=3.5
 "Decreaser", dia=0

link 1A525A->1A525B "1A525A>1A525B feom si pmp rm clr 1a"
 inlet=1A525A, exit=1A525B, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A528A->1A119E "1A528A>1A119E"
 inlet=1A528A, exit=1A119E, sch=40, mat="carbon steel", dia=6
 fixed_flow=0
 "Straight pipe", len=1

link 1A530->1A540 "1A530>1A540 si pmp oil clr 1a"
 inlet=1A530, exit=1A540, sch=40, mat="stainless steel", dia=0.75
 "Straight pipe", len=1.35
 "globe Valve" isolation
 "globe Valve" isolation
 "other: Heat exchanger", dp=0.29, flow=3.1
 "globe Valve" isolation
 "Straight pipe", len=1.5
 "other: Demister", Cv=6.1844
 "Increaser", dia=0

link 1A535->1A525 "1A535>1A525 to si pmp rm clr 1a"
 inlet=1A535, exit=1A525, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=15.6
 "standard Elbow"
 "Straight pipe", len=2
 "other", flow=14, dp=2.26
 "Straight pipe", len=4
 "standard Elbow"
 "Straight pipe", len=13.25
 "other: Demister", dp=1.5, flow=30

link 1A535->1A530 "1A535>1A530 to si pmp oil clr 1a"
 inlet=1A535, exit=1A530, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=3.7
 "standard Elbow"
 "Straight pipe", len=3.6
 "standard Elbow"
 "Straight pipe", len=16.9
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=2.4
 "standard Elbow"
 "Straight pipe", len=15.5
 "standard Elbow"
 "Decreaser", dia=0

link 1A540->1A525 "1A540>1A525 from si pmp oil clr 1a"
 inlet=1A540, exit=1A525, sch=40, mat="stainless steel", dia=1.5
 "standard Elbow"
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=15
 "standard Elbow"
 "Straight pipe", len=5.4
 "standard Elbow"
 "Straight pipe", len=16.6
 "standard Elbow"
 "Straight pipe", len=6.75
 "standard Elbow"
 "Straight pipe", len=3.4

link 1A545->1A185 "1A545>1A185 from cs clr 1a"
 inlet=1A545, exit=1A185, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=4.5
 "Decreaser", dia=0

link 1A545->1A545A "1A545>1A545A from cs clr 1a"
 inlet=1A545, exit=1A545A, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A550->1A550A "1A550>1A550A from rhr clr A"
 inlet=1A550, exit=1A550A, sch=40, mat="carbon steel", dia=1.5, HW_C=100
 "Straight pipe", len=9
 "standard Elbow"
 "Straight pipe", len=16
 "Increaser", dia=0

link 1A550A->1A550B "1A550A>1A550B from rhr clr A"
 inlet=1A550A, exit=1A550B, sch=40, mat="carbon steel", dia=2, HW_C=100
 "Straight pipe", len=2

link 1A550B->1A550C "1A550B>1A550C from rhr clr A"
 inlet=1A550B, exit=1A550C, sch=40, mat="carbon steel", dia=2, HW_C=100
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A550B->1A551 "1A550B>1A551 from rhr clr A"
 inlet=1A550B, exit=1A551, sch=40, mat="carbon steel", dia=2, HW_C=100
 "Straight pipe", len=0.25
 "Decreaser", dia=0

link 1A551->1A552 "1A551>1A552 from rhr clr A"
 inlet=1A551, exit=1A552, sch=40, mat="carbon steel", dia=1.5, HW_C=100
 "Straight pipe", len=5.25
 "Decreaser", dia=0

link 1A552->1A606B "1A552>1A606B from rhr clr A"
```

NETWORK DETAIL (continued)

```
 inlet=1A552, exit=1A606B, sch=40, mat="carbon steel", dia=1, HW_C=100
 "Straight pipe", len=3
 "Orifice", diameter_ratio=0.67043, flow=15, dp=60
 "Straight pipe", len=1.75
 "other: Demister", dp=25, flow=30
 "other: Demister", Cv=9
 "Increaser", dia=0

link 1A553->1A553A1 "1A553>1A553A1 to pen rm clr 1a..."
 inlet=1A553, exit=1A553A1, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.25
 "globe Valve" isolation
 "Straight pipe", len=0.25
 "Increaser", dia=0

link 1A553A1->1A553A2 "1A553A1>1A553A2 to pen rm clr 1a..."
 inlet=1A553A1, exit=1A553A2, sch=40, mat="stainless steel", dia=2
 "standard Elbow"
 "Straight pipe", len=1.7

link 1A553A2->1A553A3 "1A553A2>1A553A3 to pen rm clr 1a..."
 inlet=1A553A2, exit=1A553A3, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A553A2->1A555 "1A553A2>1A555 to pen rm clr 1a..."
 inlet=1A553A2, exit=1A555, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=2.25
 "other", flow=13, dp=0.4
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.6

link 1A555->1A555A1 "1A555>1A555A1 to pen rm clr 1a..."
 inlet=1A555, exit=1A555A1, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A555->1A556 "1A555>1A556 from pen rm clr 1a..."
 inlet=1A555, exit=1A556, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Decreaser", dia=0

link 1A556->1A557 "1A556>1A557 from pen rm clr 1a..."
 inlet=1A556, exit=1A557, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=2.8
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=1.5
 "globe Valve" throttle
 "Straight pipe", len=0.5
 "other: Demister", dp=4.25, flow=30
```

NETWORK DETAIL (continued)

```
 "Increaser", dia=0

link 1A556A->1A119C "1A556A>1A119C"
 inlet=1A556A, exit=1A119C, sch=40, mat="carbon steel", dia=16
 fixed_flow=0
 "Straight pipe", len=1

link 1A557->1A311 "1A557>1A311 from pen rm clr 1a..."
 inlet=1A557, exit=1A311, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=3
 "45ø elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=1.5
 "45ø elbow"
 "Straight pipe", len=1

link 1A560->1A609A "1A560>1A609A from pen rm clr 1a..."
 inlet=1A560, exit=1A609A, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=1.25
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=1.5
 "globe Valve" throttle
 "Straight pipe", len=5.75
 "other: Demister", dp=15, flow=30
 "Increaser", dia=2

link 1A560A->1A560B "1A560A>1A560B to pen rm clr 1a..."
 inlet=1A560A, exit=1A560B, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.75
 "globe Valve" throttle
 "Straight pipe", len=0.75
 "Increaser", dia=0

link 1A560B->1A560 "1A560B>1A560 to pen rm clr 1a..."
 inlet=1A560B, exit=1A560, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=2.1
 "other", flow=8.25, dp=0.32
 "Straight pipe", len=2.1
 "standard Elbow"
 "Straight pipe", len=1
 "Decreaser", dia=0

link 1A565->1A565A1 "1A565>1A565A1 from pen rm clr 1a..."
 inlet=1A565, exit=1A565A1, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A565->1A565A2 "1A565>1A565A2 from pen rm clr 1a..."
 inlet=1A565, exit=1A565A2, sch=40, mat="stainless steel", dia=2
 "Decreaser", dia=0

link 1A565A2->1A610A "1A565A2>1A610A from pen rm clr 1a..."
 inlet=1A565A2, exit=1A610A, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=2.5
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.5
 "globe Valve" throttle
 "Straight pipe", len=1.5
 "other: Demister", dp=18, flow=30
 "Increaser", dia=0

link 1A570->1A570A1 "1A570>1A570A1 from pipe ch clr 1a"
 inlet=1A570, exit=1A570A1, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.75
 "standard Elbow"
 "Straight pipe", len=1.5

link 1A570A1->1A570A2 "1A570A1>1A570A2 from pipe ch clr 1a"
 inlet=1A570A1, exit=1A570A2, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A570A1->1A570A3 "1A570A1>1A570A3 from pipe ch clr 1a"
 inlet=1A570A1, exit=1A570A3, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=2
 "Orifice", diameter_ratio=0.65194, flow=70, dp=100
 "Straight pipe", len=2
 "globe Valve" throttle
 "Straight pipe", len=1
 "other: Demister", dp=3, flow=30

link 1A570A3->1A311D "1A570A3>1A311D from pipe ch clr 1a"
 inlet=1A570A3, exit=1A311D, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 1A575A->1A575B "1A575A>1A575B  elec bd rm ac cond"
 inlet=1A575A, exit=1A575B, sch=40, mat="stainless steel", dia=6
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=10.1
 "90ø long radius elbow"
 "Straight pipe", len=2.2
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=3.3
 "90ø long radius elbow"
 "Straight pipe", len=21.5
 "90ø long radius elbow"
 "Straight pipe", len=5.5
 "90ø long radius elbow"
 "Straight pipe", len=9
 "45ø long radius elbow"
 "Straight pipe", len=4.5
 "45ø long radius elbow"
 "Straight pipe", len=11.5
 "90ø long radius elbow"
 "Straight pipe", len=31.5
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "Decreaser", dia=0

link 1A575B->1A575C "1A575B>1A575C elec bd rm ac cond"
 inlet=1A575B, exit=1A575C, sch=40, mat="carbon steel", dia=4, HW_C=60, red=0.24
 "Straight pipe", len=5
 "Butterfly valve" isolation
 "Straight pipe", len=5.1
 "90ø long radius elbow"
 "Straight pipe", len=4.5
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Increaser", dia=0

link 1A575C->1A575D "1A575C>1A575D elec bd rm ac cond"
 inlet=1A575C, exit=1A575D, sch=40, mat="carbon steel", dia=6
 "other", flow=136, dp=0.25
 "Decreaser", dia=0

link 1A575D->1A575D1 "1A575D>1A575D1 from elec bd rm cond"
 inlet=1A575D, exit=1A575D1, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=4.2
 "90ø long radius elbow"
 "Straight pipe", len=0.8
 "Decreaser", dia=0

link 1A575D1->1A575D2 "1A575D1>1A575D2 from elec bd rm cond"
 inlet=1A575D1, exit=1A575D2, sch=40, mat="carbon steel", dia=3
 "globe valve", Cv=37
 "Straight pipe", len=1.3
 "Increaser", dia=0

link 1A575D2->1A575E "1A575D2>1A575E from elec bd rm cond"
 inlet=1A575D2, exit=1A575E, sch=40, mat="carbon steel", dia=4, HW_C=50, red=0.45
 "Straight pipe", len=2.2
 "Butterfly valve" throttle
 "Straight pipe", len=4.5
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Increaser", dia=0

link 1A575E->1A575F "1A575E>1A575F from elec bd rm cond"
 inlet=1A575E, exit=1A575F, sch=40, mat="stainless steel", dia=6
 "Straight pipe", len=4
 "45ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=8.4
 "Orifice", diameter_ratio=0.70904, flow=750, dp=100
 "Straight pipe", len=24
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=13.5
 "45ø long radius elbow"
 "Straight pipe", len=3.25
 "45ø long radius elbow"
 "Straight pipe", len=9
 "90ø long radius elbow"
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=22.5
 "90ø long radius elbow"
 "Straight pipe", len=3.75
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=1
 "45ø long radius elbow"
 "Straight pipe", len=2.2
 "90ø long radius elbow"
 "Straight pipe", len=9.3
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=6.3

link 1A575F->1A131A "1A575F>1A131A from elec bd rm cond"
 inlet=1A575F, exit=1A131A, sch=40, mat="carbon steel", dia=6
 "Butterfly valve" isolation
 "45ø long radius elbow"
 "Straight pipe", len=3.2

link 1A580A->1A580B "1A580A>1A580B main con rm ac cond"
 inlet=1A580A, exit=1A580B, sch=40, mat="carbon steel", dia=5
 "other", flow=83, dp=0.06

link 1A580B->1A580C "1A580B>1A580C from main con rm ac cond"
 inlet=1A580B, exit=1A580C, sch=40, mat="carbon steel", dia=5
 "Straight pipe", len=0.75
 "Decreaser", dia=0

link 1A580C->1A580D "1A580C>1A580D from main con rm ac cond"
 inlet=1A580C, exit=1A580D, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.5
 "globe valve", Cv=27
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 1A580D->1A580E "1A580D>1A580E from main con rm ac cond"
 inlet=1A580D, exit=1A580E, sch=40, mat="carbon steel", dia=4, HW_C=50, red=0.53
 "Straight pipe", len=0.5
 "90ø long radius elbow"
 "Straight pipe", len=2.3
 "90ø long radius elbow"
 "Straight pipe", len=4.6
 "Butterfly valve" throttle
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=11.2
 "45ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.4
 "90ø long radius elbow"
 "Straight pipe", len=8.9
 "Orifice", diameter_ratio=0.68366, flow=300, dp=100
 "straight pipe", len=11.8
 "90ø long radius elbow"
 "90ø long radius elbow"
 "straight pipe", len=1

link 1A580E->1A580HI "Node 1A580E to Node 1A580HI"
 inlet=1A580E, exit=1A580HI, sch=40S, mat="stainless steel", dia=6
 "straight pipe", len=5.25
 "45ø long radius elbow"
 "straight pipe", len=2.8
 "45ø long radius elbow"

link 1A580F->1A134C "Node 1A580F to Node 1A134C"
 inlet=1A580F, exit=1A134C, sch=40S, mat="stainless steel", dia=6
 "straight pipe", len=2.3
 "45ø long radius elbow"
 "straight pipe", len=1.6
 "90ø long radius elbow"
 "straight pipe", len=4
 "45ø long radius elbow"
 "straight pipe", len=2.1
 "45ø long radius elbow"
 "straight pipe", len=1.6
 "other: BNL Full Port Ball Valve", Cv=2900
 "straight pipe", len=1.6

link 1A580F->1B680G "Node 1A580F to Node 1B680G"
 inlet=1A580F, exit=1B680G, sch=40S, mat="stainless steel", dia=6
 "90ø long radius elbow"
 "other: BNL Regular Port Ball Valve", Cv=1400
 "straight pipe", len=1

link 1A580HI->1A580F "Node 1A580HI to Node 1A580F"
 inlet=1A580HI, exit=1A580F, sch=40S, mat="stainless steel", dia=6
 "straight pipe", len=23
 "90ø long radius elbow"
 "straight pipe", len=16.1
 "90ø long radius elbow"
 "straight pipe", len=6.5
 "90ø long radius elbow"
 "straight pipe", len=18.5
 "90ø long radius elbow"
 "straight pipe", len=3.7
 "90ø long radius elbow"
 "straight pipe", len=25.5
 "90ø long radius elbow"
 "straight pipe", len=21.8
 "other: BNL Regular Port Ball Valve", Cv=1400
 "straight pipe", len=1.2
 "90ø long radius elbow"
 "straight pipe", len=2.5
 "90ø long radius elbow"
 "straight pipe", len=4.5
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "45ø long radius elbow"
 "straight pipe", len=1.7
 "45ø long radius elbow"
 "straight pipe", len=9.1

link 1A601->1A131 "1A601>1A131 from cent chg pmp rm clr 1a"
 inlet=1A601, exit=1A131, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=13
 "90ø long radius elbow"
 "Straight pipe", len=1.75
 "90ø long radius elbow"
 "Straight pipe", len=2

link 1A602->1A602A "1A602>1A602A from cent chg pmp rm clr 1a"
 inlet=1A602, exit=1A602A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
 "globe Valve" throttle
 "Straight pipe", len=0.5
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 1A602A->1A601 "1A602A>1A601 from cent chg pmp rm clr 1a"
 inlet=1A602A, exit=1A601, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1

link 1A604->1A604A "1A604>1A604A from si pmp rm clr 1a"
 inlet=1A604, exit=1A604A, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.25
 "standard Elbow"
 "Straight pipe", len=1.75

link 1A604A->1A312B "1A604A>1A312B from si pmp rm clr 1a"
 inlet=1A604A, exit=1A312B, sch=40, mat="carbon steel", dia=2
 "globe Valve" throttle
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=1

link 1A606B->1A321 "1A606B>1A321 from rhr clr A"
 inlet=1A606B, exit=1A321, sch=40, mat="carbon steel", dia=1.5, HW_C=100
 "Straight pipe", len=0.25
 "standard Elbow"
 "Straight pipe", len=2
 "globe Valve" throttle
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=9.5
 "standard Elbow"
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=6.2
```

NETWORK DETAIL (continued)

```
 "standard Elbow"
 "Straight pipe", len=8.75
 "standard Elbow"
 "Straight pipe", len=2
 "Increaser", dia=2

link 1A609A->1A609A1 "1A609A>1A609A1 tee 1A609A to plug..."
 inlet=1A609A, exit=1A609A1, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A609A->1A609A2 "1A609A>1A609A2 tee 1A609A to decreaser..."
 inlet=1A609A, exit=1A609A2, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1A609A2->1A311B "tee 1A609A2 to tee 1A311B"
 inlet=1A609A2, exit=1A311B, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=12
 "standard Elbow"
 "Straight pipe", len=13.5
 "45ø elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1
 "Increaser", dia=2

link 1A610A->1A311B "1A610A>1A311B from el 714 pen rm clr 1a"
 inlet=1A610A, exit=1A311B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=8.6
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=47
 "standard Elbow"
 "Straight pipe", len=30.5
 "standard Elbow"
 "Straight pipe", len=11
 "45ø elbow"
 "Straight pipe", len=1

link 1A643->1A134A "1A643>1A134A from hvac 1a"
 inlet=1A643, exit=1A134A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1.5
 "Butterfly valve" isolation
 "90ø long radius elbow"
 "Straight pipe", len=4

link 1A645A->1A645B "1A645A>1A645B to sfpp & tb bstr pmp clr 1a"
 inlet=1A645A, exit=1A645B, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.4
 "standard Elbow"
 "Straight pipe", len=44
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=4.75
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=27.5
 "standard Elbow"
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=5.75
 "standard Elbow"
 "Straight pipe", len=11.5
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=1.4
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=1
 "Decreaser", dia=0

link 1A645B->1A645C "1A645B>1A645C to sfpp & tb bstr pmp clr 1a"
 inlet=1A645B, exit=1A645C, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=0.6

link 1A645C->1A645D "1A645C>1A645D to sfpp & tb bstr pmp clr 1a"
 inlet=1A645C, exit=1A645D, sch=40, mat="stainless steel", dia=1.5
 "globe Valve" isolation
 "Straight pipe", len=1.4
 "Increaser", dia=0

link 1A645D->1A645E "1A645D>1A645E to sfpp, tb bstr pmp clr 1a"
 inlet=1A645D, exit=1A645E, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.25
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=12.5
 "standard Elbow"
 "Straight pipe", len=28.6
 "standard Elbow"
 "Straight pipe", len=3.5
 "standard Elbow"
 "Straight pipe", len=8.1
 "standard Elbow"
 "Straight pipe", len=4.9
 "standard Elbow"
 "Straight pipe", len=2

link 1A645E->1A645F "1A645E>1A645F tw dead end"
 inlet=1A645E, exit=1A645F, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A645E->1A645G "1A645E>1A645G to sfpp, tb bstr pmp clr 1a"
 inlet=1A645E, exit=1A645G, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=28.5, dp=3.60
```

NETWORK DETAIL (continued)

```
link 1A645G->1A646A "1A645G>1A646A from sfpp, tb bstr pmp clr 1a"
 inlet=1A645G, exit=1A646A, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"

link 1A646A->1A646B "1A646A>1A646B tw dead end"
 inlet=1A646A, exit=1A646B, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1A646A->1A646C "1A646A>1A646C from sfpp, tb bstr pmp clr 1a"
 inlet=1A646A, exit=1A646C, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=.25
 "Decreaser", dia=0

link 1A646C->1A646D "1A646C>1A646D from sfpp, tb bstr clr 1a"
 inlet=1A646C, exit=1A646D, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=1.75
 "standard Elbow"
 "Straight pipe", len=4
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=8
 "other: Demister", dp=5.4, flow=30
 "Increaser", dia=0

link 1A646D->1A646E "1A646D>1A646E from sfpp, tb bstr 1a"
 inlet=1A646D, exit=1A646E, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.25
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=28.6
 "standard Elbow"
 "Straight pipe", len=15
 "standard Elbow"
 "Straight pipe", len=1.3
 "globe Valve" throttle

link 1A646E->1A646F "1A646E>1A646F from sfpp, tb bstr 1a"
 inlet=1A646E, exit=1A646F, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.25
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=15
 "standard Elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=0.5
```

NETWORK DETAIL (continued)

```
 "standard Elbow"
 "Straight pipe", len=27.5
 "standard Elbow"
 "Straight pipe", len=4.75
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=0.7
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=33.5
 "standard Elbow"
 "Straight pipe", len=0.6
 "standard Elbow"
 "Straight pipe", len=0.7
 "standard Elbow"
 "Straight pipe", len=5.6
 "standard Elbow"
 "Straight pipe", len=0.7
 "Increaser", dia=0

link 1A646F->1A133 "1A646F>1A133 from sfpp tb bstr 1a"
 inlet=1A646F, exit=1A133, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=0.7

link 1A718A->1A134B "1A718A>1A134B stub"
 inlet=1A718A, exit=1A134B, sch=40, mat="carbon steel", dia=6
 fixed_flow=0
 "Straight pipe", len=1

link 1A900->1A901 "1A900>1A901 to css hx 1a1"
 inlet=1A900, exit=1A901, sch=STD, mat="stainless steel", dia=24
 "Decreaser", dia=0

link 1A900->1A904 "1A900>1A904 to ccs hx 1a2"
 inlet=1A900, exit=1A904, sch=40, mat="stainless steel", dia=16
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=3.5
 "Butterfly valve" isolation
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "45ø long radius elbow"
 "Straight pipe", len=1
 "Decreaser", dia=0

link 1A901->1A902 "1A901>1A902 to ccs hx 1a1"
 inlet=1A901, exit=1A902, sch=40, mat="stainless steel", dia=16
 "Straight pipe", len=7
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=10.5
 "Butterfly valve" isolation
 "Straight pipe", len=8.5
 "Decreaser", dia=0

link 1A902->1A905 "1A902>1A905 to ccs hx 1a1"
 inlet=1A902, exit=1A905, sch=40, mat="stainless steel", dia=12
 "other: Heat exchanger", dp=37, flow=5788
 "Increaser", dia=0

link 1A904->1A910 "1A904>1A910 to ccs hx 1a2"
 inlet=1A904, exit=1A910, sch=40, mat="stainless steel", dia=12
 "other: Heat exchanger", dp=37, flow=5788
 "Increaser", dia=0

link 1A905->1A915 "1A905>1A915 from ccs hx 1a1"
 inlet=1A905, exit=1A915, sch=40, mat="stainless steel", dia=16
 "Straight pipe", len=2.5
 "45ø long radius elbow"
 "Straight pipe", len=3.8
 "45ø long radius elbow"
 "Straight pipe", len=2.5
 "butterfly valve", Cv=601
 "Straight pipe", len=7.5
 "45ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=21
 "Increaser", dia=24

link 1A910->1A915 "1A910>1A915 from ccs hx 1a2"
 inlet=1A910, exit=1A915, sch=40, mat="stainless steel", dia=16
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "butterfly valve", Cv=573
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=10.5
 "90ø long radius elbow"
 "Straight pipe", len=3

link 1A915->1B920 "1A915>1B920 from ccs hx 1a 1&2"
 inlet=1A915, exit=1B920, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=29
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=6.7
 "90ø long radius elbow"
 "Straight pipe", len=4.25
 "45ø long radius elbow"
 "Straight pipe", len=4.25
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=9.5
 "90ø long radius elbow"
 "Straight pipe", len=11
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=4
 "butterfly valve", Cv=813
 "Straight pipe", len=2.5
 "Butterfly valve" throttle
 "Straight pipe", len=3

link 1ALAKE->1AWELL "1ALAKE>1AWELL"
 inlet=1ALAKE, exit=1AWELL, sch=NS, mat="concrete", dia=200
 "Straight pipe", len=1
 "other", flow=22000, dp=1.1

link 1ALC02->1ALC03 "1ALC02>1ALC03 to lcvc 1a"
 inlet=1ALC02, exit=1ALC03, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=13.3
 "45ø long radius elbow"
 "Straight pipe", len=2.7
 "45ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1ALC03->1ALC04 "1ALC03>1ALC04 to lcvc 1a"
 inlet=1ALC03, exit=1ALC04, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.4

link 1ALC04->1ALC05 "1ALC04>1ALC05 to lcvc 1a"
 inlet=1ALC04, exit=1ALC05, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.8

link 1ALC04->1ALC06 "1ALC04>1ALC06 to lcvc 1a"
 inlet=1ALC04, exit=1ALC06, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.1
 "standard Elbow"
 "Straight pipe", len=0.8

link 1ALC05->1ALC11 "1ALC05>1ALC11 to lcvc 1a"
 inlet=1ALC05, exit=1ALC11, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95

link 1ALC05->1ALC12 "1ALC05>1ALC12 to lcvc 1a"
 inlet=1ALC05, exit=1ALC12, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
```

NETWORK DETAIL (continued)

```
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1ALC06->1ALC13 "1ALC06>1ALC13 to lcvc 1a"
 inlet=1ALC06, exit=1ALC13, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95

link 1ALC06->1ALC14 "1ALC06>1ALC14 to lcvc 1a"
 inlet=1ALC06, exit=1ALC14, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1ALC07->1ALC08 "1ALC07>1ALC08 to lcvc 1a"
 inlet=1ALC07, exit=1ALC08, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.4

link 1ALC08->1ALC09 "1ALC08>1ALC09 to lcvc 1a"
 inlet=1ALC08, exit=1ALC09, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.1
 "standard Elbow"
 "Straight pipe", len=0.8

link 1ALC08->1ALC10 "1ALC08>1ALC10 to lcvc 1a"
 inlet=1ALC08, exit=1ALC10, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.8

link 1ALC09->1ALC16 "1ALC09>1ALC16 to lcvc 1a"
 inlet=1ALC09, exit=1ALC16, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
```

NETWORK DETAIL (continued)

```
link 1ALC09->1ALC17 "1ALC09>1ALC17 to lcvc 1a"
 inlet=1ALC09, exit=1ALC17, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1ALC10->1ALC18 "1ALC10>1ALC18 to lcvc 1a"
 inlet=1ALC10, exit=1ALC18, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95

link 1ALC10->1ALC19 "1ALC10>1ALC19 to lcvc 1a"
 inlet=1ALC10, exit=1ALC19, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1ALC11->1ALC12 "1ALC11>1ALC12 from lcvc 1a"
 inlet=1ALC11, exit=1ALC12, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1ALC12->1ALC15 "1ALC12>1ALC15 from lcvc 1a"
 inlet=1ALC12, exit=1ALC15, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=8.5
 "Increaser", dia=3

link 1ALC13->1ALC14 "1ALC13>1ALC14 from lcvc 1a"
```

NETWORK DETAIL (continued)

```
 inlet=1ALC13, exit=1ALC14, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1ALC14->1ALC15 "1ALC14>1ALC15 from lcvc 1a"
 inlet=1ALC14, exit=1ALC15, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1
 "Increaser", dia=3

link 1ALC15->1ALC20 "1ALC15>1ALC20 from lcvc 1a"
 inlet=1ALC15, exit=1ALC20, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=10.75

link 1ALC16->1ALC17 "1ALC16>1ALC17 from lcvc 1a"
 inlet=1ALC16, exit=1ALC17, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1ALC17->1ALC20 "1ALC17>1ALC20 from lcvc 1a"
 inlet=1ALC17, exit=1ALC20, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=4
 "standard Elbow"
 "Straight pipe", len=2

link 1ALC18->1ALC19 "1ALC18>1ALC19 from lcvc 1a"
 inlet=1ALC18, exit=1ALC19, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1ALC19->1A112B "1ALC19>1A112B from lcvc 1a"
 inlet=1ALC19, exit=1A112B, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=8.5
 "Increaser", dia=3

link 1ALC20->1A112B "1ALC20>1A112B from lcvc 1a"
```

NETWORK DETAIL (continued)

```
 inlet=1ALC20, exit=1A112B, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1

link 1AWELL->1A101 "1AWELL>1A101"
 inlet=1AWELL, exit=1A101, sch=NS, mat="concrete", dia=200
 "Straight pipe", len=1

link 1AWELL->1A102 "1AWELL>1A102"
 inlet=1AWELL, exit=1A102, sch=NS, mat="concrete", dia=200
 "Straight pipe", len=1

link 1B101->1B103 "1B101>1B103"
 inlet=1B101, exit=1B103, sch=STD, mat="carbon steel", dia=24
 "Pump" PUMPMB

link 1B102->1B104 "1B102>1B104"
 inlet=1B102, exit=1B104, sch=STD, mat="carbon steel", dia=24
 "Pump" PUMPLB

link 1B103->1B105 "pump mb > tee"
 inlet=1B103, exit=1B105, sch=STD, mat="carbon steel", dia=24
 fixed_flow=0
 "check valve", Cv=21700
 "Straight pipe", len=6.5
 "Straight pipe", len=3
 "Butterfly valve" isolation
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=8

link 1B104->1B105 "pump lb > tee"
 inlet=1B104, exit=1B105, sch=STD, mat="carbon steel", dia=24
 fixed_flow=0
 "check valve", Cv=21700
 "Straight pipe", len=6.5
 "Straight pipe", len=3
 "Butterfly valve" isolation
 "Straight pipe", len=4

link 1B105->1B105C "1B105 > 1b105c"
 inlet=1B105, exit=1B105C, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=5.75
 "90ø long radius elbow"
 "Straight pipe", len=4.33

link 1B105C->1B106 "1B105C>1B106 main strainer"
 inlet=1B105C, exit=1B106, sch=STD, mat="carbon steel", dia=24, HW_C=65
 "Straight pipe", len=27.17
 "90ø long radius elbow"
 "Straight pipe", len=16.333
 "Butterfly valve" isolation
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=9.25
 "other", flow=16000, dp=6
 "Straight pipe", len=0.5
```

NETWORK DETAIL (continued)

```
link 1B105C->2B205C "1B105C>2B205C"
 inlet=1B105C, exit=2B205C, sch=STD, mat="carbon steel", dia=24, HW_C=100
 "Straight pipe", len=39.5

link 1B106->1B106A "1B106>1B106A"
 inlet=1B106, exit=1B106A, sch=STD, mat="carbon steel", dia=4
 "other", flow=151, dp=0.37

link 1B106->1B106B "1B106>1B106B"
 inlet=1B106, exit=1B106B, sch=STD, mat="carbon steel", dia=4
 "other", flow=151, dp=0.37
 "Straight pipe", len=1.4
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=4

link 1B106->1B107 "1B106>1B107"
 inlet=1B106, exit=1B107, sch=STD, mat="carbon steel", dia=24, HW_C=65
 "Straight pipe", len=9
 "Butterfly valve" isolation
 "Straight pipe", len=3.9
 "90ø long radius elbow"
 "Straight pipe", len=6.83
 "90ø long radius elbow"
 "Straight pipe", len=14.17
 "45ø long radius elbow"
 "Straight pipe", len=4.17
 "45ø long radius elbow"
 "Straight pipe", len=37
 "Mitered bend", angle=90
 "Straight pipe", len=5.5
 "Increaser", dia=0

link 1B106A->1B106B "1B106A>1B106B"
 inlet=1B106A, exit=1B106B, sch=STD, mat="carbon steel", dia=4
 "Straight pipe", len=1.4
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=8.7

link 1B106B->1B106C "1B106B>1B106C"
 inlet=1B106B, exit=1B106C, sch=STD, mat="carbon steel", dia=4
 "Straight pipe", len=5
 "other: "glove Valve" throttle full open Cv is 700", Cv=84
 "Increaser", dia=6

link 1B106C->1B106E "1B106C>1B106E"
 inlet=1B106C, exit=1B106E, sch=STD, mat="carbon steel", dia=6
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=22
 "90ø long radius elbow"
 "Straight pipe", len=24.5
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=2.2
 "90ø long radius elbow"
 "Straight pipe", len=4.9
 "90ø long radius elbow"
 "Straight pipe", len=2.2
 "other", K=1

link 1B106D->1B106C "1B106D>1B106C"
 inlet=1B106D, exit=1B106C, sch=STD, mat="carbon steel", dia=4
 fixed_flow=0
 "Straight pipe", len=1

link 1B107->1B108 "1B107>1B108"
 inlet=1B107, exit=1B108, sch=STD, mat="carbon steel", dia=36, HW_C=60
 "Straight pipe", len=3
 "Mitered bend", angle=90
 "Straight pipe", len=37.42
 "Mitered bend", angle=45
 "Straight pipe", len=2.5
 "Mitered bend", angle=45
 "Straight pipe", len=36
 "Mitered bend", angle=45
 "Straight pipe", len=126.75
 "Straight pipe", len=300
 "Mitered bend", angle=45
 "Straight pipe", len=29.17
 "Mitered bend", angle=45
 "Straight pipe", len=784.58
 "Mitered bend", angle=45
 "Straight pipe", len=53.33
 "Mitered bend", angle=45
 "Straight pipe", len=1139.7
 "Decreaser", dia=0

link 1B108->1B108A "1B108>1B108A"
 inlet=1B108, exit=1B108A, sch=STD, mat="carbon steel", dia=30, HW_C=65
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=27.83
 "Mitered bend", angle=90
 "Straight pipe", len=1.75
 "Mitered bend", angle=90
 "Straight pipe", len=4.58

link 1B108A->1B108B "1B108A>1B108B vent"
 inlet=1B108A, exit=1B108B, sch=STD, mat="carbon steel", dia=30
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B108A->1B108C "1B108A>1B108C"
 inlet=1B108A, exit=1B108C, sch=STD, mat="carbon steel", dia=30, HW_C=65
 "Straight pipe", len=0.5
 "Butterfly valve" isolation
 "Straight pipe", len=2.33
 "Mitered bend", angle=45
 "Straight pipe", len=2
 "Mitered bend", angle=45
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=17.33
 "Mitered bend", angle=45
 "Straight pipe", len=3.58

link 1B108C->1B108D "1B108C>1B108D Train B Cross Tie"
 inlet=1B108C, exit=1B108D, sch=STD, mat="carbon steel", dia=30, HW_C=60
 "Straight pipe", len=30
 "Decreaser", dia=0

link 1B108C->1B109 "1B108C>1B109"
 inlet=1B108C, exit=1B109, sch=STD, mat="carbon steel", dia=30, HW_C=65
 "Straight pipe", len=133
 "Mitered bend", angle=45
 "Straight pipe", len=353
 "Mitered bend", angle=45
 "Straight pipe", len=59.42

link 1B108D->1B108E "1B108D>1B108E Train B Cross Tie"
 inlet=1B108D, exit=1B108E, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=4.8

link 1B108E->1B108EE "1B108E>1B108EE Train B Cross Tie"
 inlet=1B108E, exit=1B108EE, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=7.5
 "45ø long radius elbow"
 "Straight pipe", len=5
 "Straight pipe", len=8
 "45ø long radius elbow"
 "Butterfly valve" isolation
 "Straight pipe", len=5.5
 "90ø short radius elbow"
 "Straight pipe", len=12.5
 "90ø long radius elbow"
 "90ø long radius elbow"
 "straight pipe", len=9.5
 "Butterfly valve" isolation
 "other: Gutted old strainer", dp=2.3, flow=10000

link 1B108E->1B108F "1B108E>1B108F Train B Cross Tie"
 inlet=1B108E, exit=1B108F, sch=STD, mat="carbon steel", dia=24
 fixed_flow=0
 "Straight pipe", len=1

link 1B108EE->1B108G "Node 1B108EE to Node 1B108G"
 inlet=1B108EE, exit=1B108G, sch=STD, mat="carbon steel", dia=24
 "straight pipe", len=6
 "90ø short radius elbow"
 "straight pipe", len=2.8
 "45ø long radius elbow"
 "straight pipe", len=3.7
 "straight pipe", len=18.25
 "straight pipe", len=18.25

link 1B108G->1B108H "1B108G>1B108H Train B Disconnected Pump Stub"
 inlet=1B108G, exit=1B108H, sch=STD, mat="carbon steel", dia=20
 fixed_flow=0
 "Straight pipe", len=1
```

NETWORK DETAIL (continued)

```
link 1B108G->1B108I "1B108G>1B108I Train B Cross Tie"
 inlet=1B108G, exit=1B108I, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=12.7

link 1B108I->1B108J "1B108I>1B108J Train B Disconnected Pump Stub"
 inlet=1B108I, exit=1B108J, sch=STD, mat="carbon steel", dia=20
 fixed_flow=0
 "Straight pipe", len=1

link 1B108I->2B208I "1B108I>2B208I Train B Cross Tie"
 inlet=1B108I, exit=2B208I, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=9.3

link 1B109->1B109AA "1B109>1B109AA"
 inlet=1B109, exit=1B109AA, sch=STD, mat="carbon steel", dia=30, HW_C=65
 "Straight pipe", len=4.5
 "45ø long radius elbow"
 "Straight pipe", len=37.67
 "45ø long radius elbow"
 "Straight pipe", len=5.17
 "45ø long radius elbow"
 "Straight pipe", len=16.67
 "45ø long radius elbow"
 "Straight pipe", len=5.17
 "45ø long radius elbow"
 "Straight pipe", len=19
 "90ø long radius elbow"
 "Straight pipe", len=34.17
 "Mitered bend", angle=45
 "Straight pipe", len=7.75
 "Mitered bend", angle=45
 "Straight pipe", len=68

link 1B109->1B119 "1B109>1B119"
 inlet=1B109, exit=1B119, sch=STD, mat="carbon steel", dia=30
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1B109A->1B109B "1B109A>1B109B"
 inlet=1B109A, exit=1B109B, sch=STD, mat="carbon steel", dia=24, HW_C=65
 "Straight pipe", len=2.5
 "Butterfly valve" isolation
 "Straight pipe", len=11

link 1B109AA->1B109A "1B109AA>1B109A"
 inlet=1B109AA, exit=1B109A, sch=STD, mat="carbon steel", dia=30, HW_C=65
 "Straight pipe", len=0.1
 "Orifice", diameter_ratio=0.43668, flow=8000, dp=200
 "Straight pipe", len=10
 "45ø long radius elbow"
 "Straight pipe", len=68.25
 "45ø long radius elbow"
 "Straight pipe", len=5.25
 "90ø long radius elbow"
 "Straight pipe", len=14.75
 "90ø long radius elbow"
 "Straight pipe", len=34.83
 "Decreaser", dia=0
```

NETWORK DETAIL (continued)

```
link 1B109B->1B109C "1B109B>1B109C to closed valve"
 inlet=1B109B, exit=1B109C, sch=40, mat="carbon steel", dia=6
 fixed_flow=0
 "Straight pipe", len=1

link 1B109B->1B110 "1B109B>1B110"
 inlet=1B109B, exit=1B110, sch=STD, mat="carbon steel", dia=24, HW_C=65
 "Straight pipe", len=2

link 1B110->1B110A "1B110>1B110A"
 inlet=1B110, exit=1B110A, sch=STD, mat="carbon steel", dia=24, HW_C=65
 "Straight pipe", len=14.6
 "90ø long radius elbow"
 "Straight pipe", len=2

link 1B110->1B110D "1B110>1B110D to lcvc 1b&1d"
 inlet=1B110, exit=1B110D, sch=40, mat="carbon steel", dia=10
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "Butterfly valve" isolation
 "Straight pipe", len=5

link 1B110A->1B121 "1B110A>1B121"
 inlet=1B110A, exit=1B121, sch=STD, mat="carbon steel", dia=24, HW_C=65
 "Straight pipe", len=16
 "90ø long radius elbow"
 "Straight pipe", len=9
 "45ø long radius elbow"
 "Straight pipe", len=11
 "90ø long radius elbow"
 "Straight pipe", len=4.5

link 1B110A->1B524A "1B110A>1B524A to instr rm water clr 1a"
 inlet=1B110A, exit=1B524A, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=8
 "standard Elbow"
 "Straight pipe", len=1.25
 "standard Elbow"
 "Straight pipe", len=7.2
 "Gate valve" isolation, Cv=56

link 1B110D->1B110E "1B110D>1B110E to lcvc 1b"
 inlet=1B110D, exit=1B110E, sch=40, mat="carbon steel", dia=10
 "Straight pipe", len=1
 "Decreaser", dia=0

link 1B110D->1B110F "1B110D>1B110F to lcvc 1d"
 inlet=1B110D, exit=1B110F, sch=40, mat="carbon steel", dia=10
 "Straight pipe", len=1
 "Decreaser", dia=0

link 1B110E->1B110EE "1B110E>1B110EE to lcvc 1b"
 inlet=1B110E, exit=1B110EE, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=6
 "45ø long radius elbow"
 "Straight pipe", len=6
```

NETWORK DETAIL (continued)

```
link 1B110EE->1B112 "1B110EE>1B112 to lcvc 1b"
 inlet=1B110EE, exit=1B112, sch=40, mat="carbon steel", dia=6
 "Orifice", diameter_ratio=0.69355, flow=500, dp=50
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=7
 "45ø long radius elbow"
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=2
 "Butterfly valve" isolation
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=10
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=5

link 1B110F->1B110FF "1B110F>1B110FF to lcvc"
 inlet=1B110F, exit=1B110FF, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=6
 "45ø long radius elbow"
 "Straight pipe", len=6

link 1B110FF->1B111 "1B110FF>1B111 to lcvc"
 inlet=1B110FF, exit=1B111, sch=40, mat="carbon steel", dia=6
 "Orifice", diameter_ratio=0.69355, flow=500, dp=50
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=7.5
 "90ø long radius elbow"
 "Straight pipe", len=3
 "45ø long radius elbow"
 "Straight pipe", len=176
 "90ø long radius elbow"
 "Straight pipe", len=12.5
 "90ø long radius elbow"
 "Butterfly valve" isolation
 "Straight pipe", len=8
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=2
 "Butterfly valve" isolation
 "Straight pipe", len=5

link 1B111->1B111A "1B111>1B111A to crd vent cooler"
```

NETWORK DETAIL (continued)

```
 inlet=1B111, exit=1B111A, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2

link 1B111->1B111C "1B111>1B111C to lcvc 1b"
 inlet=1B111, exit=1B111C, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=3
 "Butterfly valve" throttle
 "Straight pipe", len=0.5

link 1B111A->1B111D "1B111A>1B111D to rc pump cooler"
 inlet=1B111A, exit=1B111D, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2
 "Decreaser", dia=0

link 1B111A->1B122E "1B111A>1B122E to crd vnt clr 1b"
 inlet=1B111A, exit=1B122E, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=1
 "other: "glove Valve" throttle full open Cv is 294", Cv=100
 "Straight pipe", len=7.5
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2

link 1B111B->1B161 "1B111B>1B161 from lcvc 1b"
 inlet=1B111B, exit=1B161, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=4
 "other: Demister", dp=25, flow=300

link 1B111C->1BLC02 "1B111C>1BLC02 to lcvc 1b"
 inlet=1B111C, exit=1BLC02, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1B111C->1BLC07 "1B111C>1BLC07 to lcvc 1b"
 inlet=1B111C, exit=1BLC07, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.9
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1B111D->1B113 "1B111D>1B113 to rcp clr 1b"
```

NETWORK DETAIL (continued)

```
 inlet=1B111D, exit=1B113, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=4.6
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "90ø long radius elbow"
 "Straight pipe", len=4.8
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=1.25
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=4.7
 "Straight pipe", len=4.6
 "90ø long radius elbow"
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "90ø long radius elbow"
 "Straight pipe", len=5.6
 "90ø long radius elbow"
 "Straight pipe", len=2.7
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=6.4

link 1B112->1B112A "1B112>1B112A to crd vent cooler"
 inlet=1B112, exit=1B112A, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2

link 1B112->1B112C "1B112>1B112C to lcvc 1d"
 inlet=1B112, exit=1B112C, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=3
 "butterfly valve", Cv=230
 "Straight pipe", len=0.5

link 1B112A->1B112D "1B112A>1B112D to rc pump cooler"
 inlet=1B112A, exit=1B112D, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2
 "Decreaser", dia=0

link 1B112A->1B170 "1B112A>1B170 to crd vnt clr 1d"
 inlet=1B112A, exit=1B170, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=1
 "other: "glove Valve" throttle full open Cv is 294", Cv=100
 "Straight pipe", len=7.5
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "90ø long radius elbow"
 "Straight pipe", len=6
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=6.2
 "90ø long radius elbow"
 "Straight pipe", len=7.8
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "45ø long radius elbow"
 "Straight pipe", len=4.5
 "90ø long radius elbow"
 "Straight pipe", len=13
 "90ø long radius elbow"
 "Straight pipe", len=12.3
 "90ø long radius elbow"
 "Straight pipe", len=1.4
 "90ø long radius elbow"
 "Straight pipe", len=2.4

link 1B112B->1B162 "1B112B>1B162 from lcvc 1d"
 inlet=1B112B, exit=1B162, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=4
 "other: Demister", dp=16, flow=300

link 1B112C->1DLC02 "1B112C>1DLC02 to lcvc 1d"
 inlet=1B112C, exit=1DLC02, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1B112C->1DLC07 "1B112C>1DLC07 to lcvc 1d"
 inlet=1B112C, exit=1DLC07, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.9
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1B112D->1B114 "1B112D>1B114 to rcp clr 1d"
 inlet=1B112D, exit=1B114, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=4.6
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "90ø long radius elbow"
 "Straight pipe", len=4.8
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.25
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=4.7
 "Straight pipe", len=4.6
 "90ø long radius elbow"
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "90ø long radius elbow"
 "Straight pipe", len=5.6
 "90ø long radius elbow"
 "Straight pipe", len=2.7
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=6.4

link 1B113->1B115 "1B113>1B115 rcp clr 1b"
 inlet=1B113, exit=1B115, sch=40, mat="carbon steel", dia=3
 "other", flow=132, dp=6.02

link 1B114->1B116 "1B114>1B116 rcp clr 1d"
 inlet=1B114, exit=1B116, sch=40, mat="carbon steel", dia=3
 "other", flow=132, dp=6.02

link 1B115->1B123B "1B115>1B123B from rcp clr 2(1b)"
 inlet=1B115, exit=1B123B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=6.2
 "90ø long radius elbow"
 "Straight pipe", len=0.7
 "90ø long radius elbow"
 "Straight pipe", len=7.9
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "45ø long radius elbow"
 "Straight pipe", len=1.2
 "45ø long radius elbow"
 "Straight pipe", len=4.7
 "Orifice", diameter_ratio=0.64472, flow=150, dp=100
 "Straight pipe", len=5.8
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=1.25
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=2.7
 "other: "glove Valve" throttle full open Cv is 294", Cv=100
 "other: Demister", dp=9.5, flow=150

link 1B116->1B170B "1B116>1B170B from rcp clr 4(1d)"
 inlet=1B116, exit=1B170B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=6.2
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=0.7
 "90ø long radius elbow"
 "Straight pipe", len=7.9
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "45ø long radius elbow"
 "Straight pipe", len=1.2
 "45ø long radius elbow"
 "Straight pipe", len=4.7
 "Orifice", diameter_ratio=0.64472, flow=150, dp=100
 "Straight pipe", len=5.8
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=1.25
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=4.7
 "90ø long radius elbow"
 "Straight pipe", len=2.75
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "Straight pipe", len=3
 "other: "glove Valve" throttle full open Cv is 294", Cv=115
 "other: Demister", dp=6.5, flow=100
 "Increaser", dia=4

link 1B118->1B118A "1B118>1B118A from lcvc,crd,rcp clrs 1b,1d"
 inlet=1B118, exit=1B118A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=6

link 1B118A->1B119A "1B118A>1B119A from lcvc,crd,rcp clrs 1b,1d"
 inlet=1B118A, exit=1B119A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=4.1
 "90ø long radius elbow"
 "Straight pipe", len=17
 "Butterfly valve" isolation
 "90ø long radius elbow"

link 1B119->1B190A "1B119>1B190A to dsl gen clr 1b1, 2b1"
 inlet=1B119, exit=1B190A, sch=40, mat="carbon steel", dia=14, HW_C=60
 "Straight pipe", len=97
 "Butterfly valve" isolation
 "Straight pipe", len=350
 "90ø long radius elbow"
 "Straight pipe", len=270
 "90ø long radius elbow"
 "Straight pipe", len=8.25
 "45ø long radius elbow"
 "Straight pipe", len=45
 "45ø long radius elbow"
 "Straight pipe", len=1
```

NETWORK DETAIL (continued)

```
link 1B119A->1B119B "1B119A>1B119B to disch hdr b"
 inlet=1B119A, exit=1B119B, sch=STD, mat="carbon steel", dia=20
 "Straight pipe", len=4

link 1B119B->1B134A "1B119B>1B134A disch hdr b"
 inlet=1B119B, exit=1B134A, sch=STD, mat="carbon steel", dia=20
 "Straight pipe", len=22

link 1B121->1B121B "1B121>1B121B"
 inlet=1B121, exit=1B121B, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=11.21

link 1B121->1B122 "1B121>1B122 Capped @ header"
 inlet=1B121, exit=1B122, sch=80, mat="carbon steel", dia=4
 fixed_flow=0
 "other: CAP", Cv=1E-008

link 1B121A->1B126A "1B121A>126A"
 inlet=1B121A, exit=1B126A, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=13.5

link 1B121A->1B150 "1B121A>1B150 to cs hx 1b"
 inlet=1B121A, exit=1B150, sch=STD, mat="carbon steel", dia=18
 fixed_flow=0
 "Straight pipe", len=11.25
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=10.5
 "Butterfly valve" isolation
 "Straight pipe", len=7.25
 "90ø long radius elbow"
 "Straight pipe", len=10
 "Orifice", diameter_ratio=0.69073, flow=8000, dp=200
 "Straight pipe", len=8
 "90ø long radius elbow"
 "Straight pipe", len=12
 "90ø long radius elbow"
 "Straight pipe", len=26
 "90ø long radius elbow"
 "Straight pipe", len=4
 "other", flow=6028, dp=14.5

link 1B121B->1B121A "1B121B>1B121A"
 inlet=1B121B, exit=1B121A, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=12.5
 "90ø long radius elbow"
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=15.5
 "90ø long radius elbow"
 "Straight pipe", len=11

link 1B121B->1B121C "1B121B>1B121C Blind Flange"
 inlet=1B121B, exit=1B121C, sch=40, mat="carbon steel", dia=8
 fixed_flow=0
 "Straight pipe", len=1
```

NETWORK DETAIL (continued)

```
link 1B122E->1B122F "1B122E>1B122F new supply to ucvc 1b"
 inlet=1B122E, exit=1B122F, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=2.33
 "standard Elbow"
 "Straight pipe", len=6
 "Orifice", diameter_ratio=0.56655, flow=25, dp=25
 "Straight pipe", len=23.6
 "45ø elbow"
 "Straight pipe", len=5.5
 "45ø elbow"
 "Straight pipe", len=38.5
 "standard Elbow"
 "Straight pipe", len=15.6
 "standard Elbow"
 "Straight pipe", len=5.5
 "standard Elbow"
 "Straight pipe", len=0.67
 "standard Elbow"
 "Straight pipe", len=7.9
 "standard Elbow"
 "Straight pipe", len=5.2
 "standard Elbow"
 "Straight pipe", len=1.5
 "globe Valve" isolation, Cv=38
 "Straight pipe", len=3.5
 "standard Elbow"
 "standard Elbow"
  "standard Elbow"
  "standard Elbow"
  "standard Elbow"
  "45ø elbow"
  "45ø elbow"

link 1B122E->1B171 "1B122E>1B171 to crd vnt clr 1b"
 inlet=1B122E, exit=1B171, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=4.2
 "90ø long radius elbow"
 "Straight pipe", len=7.8
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "45ø long radius elbow"
 "Straight pipe", len=4.5
 "90ø long radius elbow"
 "Straight pipe", len=13
 "90ø long radius elbow"
 "Straight pipe", len=12.3
 "90ø long radius elbow"
 "Straight pipe", len=1.4
 "90ø long radius elbow"
 "Straight pipe", len=2.4

link 1B122F->1B163 "1B122F>1B163 new supply to ucvc 1b"
 inlet=1B122F, exit=1B163, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
```

NETWORK DETAIL (continued)

```
link 1B123->1B123A "1B123>1B123A new return from ucvc 1b"
 inlet=1B123, exit=1B123A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5

link 1B123A->1B123B "1B123A>1B123B new return from ucvc 1b"
 inlet=1B123A, exit=1B123B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.5
 "globe Valve" isolation, Cv=38
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=4.3
 "standard Elbow"
 "Straight pipe", len=7.9
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=13.7
 "standard Elbow"
 "Straight pipe", len=38
 "45ø elbow"
 "Straight pipe", len=5.5
 "45ø elbow"
 "Straight pipe", len=28
 "standard Elbow"
 "Straight pipe", len=2.75
 "other: "glove Valve" throttle full open Cv is 38", Cv=7.4
 "Straight pipe", len=1.2
 "standard Elbow"
 "standard Elbow"
 "standard Elbow"
 "45ø elbow"
 "45ø elbow"
 "45ø elbow"
 "45ø elbow"
 "45ø elbow"
 "45ø elbow"

link 1B123B->1B171B "1B23B>1B171B from rcp clr 2(1b)"
 inlet=1B123B, exit=1B171B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=2.75
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "Straight pipe", len=3
 "globe Valve" throttle, Cv=294
 "Increaser", dia=4

link 1B125->1B119B "1B125>1B119B from ucvc 1b,1d"
 inlet=1B125, exit=1B119B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=12
 "90ø long radius elbow"
 "Straight pipe", len=10
 "Gate valve" isolation
 "Straight pipe", len=2

link 1B126->1B127 "1B126>1B127"
 ===== Reference: DCN 21894
```

NETWORK DETAIL (continued)

```
 inlet=1B126, exit=1B127, sch=STD, mat="carbon steel", dia=24
 "straight pipe", len=1

link 1B126->1B128 "1B126>1B128 to hvac eqpt 1b"
 inlet=1B126, exit=1B128, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=2.5
 "Butterfly valve" isolation
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "90ø long radius elbow"
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"

link 1B126A->1B126 "1B126A>1B126"
 inlet=1B126A, exit=1B126, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=12

link 1B126A->1B126B "1B126A>1B126B to Blind Flange"
 inlet=1B126A, exit=1B126B, sch=40, mat="carbon steel", dia=3
 fixed_flow=0
 "Straight pipe", len=1

link 1B127->1B127A "Node 1B127 to Node 1B127A"
 ===== Reference: DCN 21894
 inlet=1B127, exit=1B127A, sch=STD, mat="carbon steel", dia=24
 "straight pipe", len=7.58
 "90ø long radius elbow"
 "straight pipe", len=2.2

link 1B127->1B127A1 "Node 1B127 to Node 1B127A1 16inch Crosstie"
 ===== Reference: DCN 21894
 inlet=1B127, exit=1B127A1, sch=STD, mat="stainless steel", dia=16
 fixed_flow=0
 "straight pipe", len=1.72

link 1B127A->1A234 "Node 1B127A to Node 1A234"
 ===== Reference: DCN 21894
 inlet=1B127A, exit=1A234, sch=STD, mat="carbon steel", dia=24
 fixed_flow=0
 "straight pipe", len=7.05
 "butterfly valve"

link 1B127A->1B127A9 "Node 1B127A to Node 1B127A9 8 inch Flush Conn"
 ===== Reference: DCN 21894
 inlet=1B127A, exit=1B127A9, sch=STD, mat="stainless steel", dia=8
 "straight pipe", len=2.57

link 1B127A1->1B127A2 "Node 1B127A1 to Node 1B127A2 Vlv 0-67-1613"
 ===== Reference: DCN 21894
 inlet=1B127A1, exit=1B127A2, sch=STD, mat="carbon steel", dia=16
 "butterfly valve", Cv=11113
 "straight pipe", len=0.35

link 1B127A2->1B227 "Node 1B127A2 to Node 1B227 16inch Crosstie"
```

NETWORK DETAIL (continued)

```
 ===== Reference: DCN 21894
 inlet=1B127A2, exit=1B227, sch=STD, mat="stainless steel", dia=16
 "straight pipe", len=2.57
 "90ø long radius elbow"
 "straight pipe", len=11.42
 "90ø long radius elbow"
 "straight pipe", len=3.66
 "45ø long radius elbow"
 "straight pipe", len=5.5

link 1B127A9->1B127B "Node 1B127A9 to Node 1B127B VLV 1-67-1619"
 ===== Reference: DCN 21894
 inlet=1B127A9, exit=1B127B, sch=STD, mat="carbon steel", dia=8
 fixed_flow=0
 "butterfly valve", Cv=2300
 "straight pipe", len=0.26

link 1B128->1B128B "1B128>1B128B to hvac eqpt 1b"
 inlet=1B128, exit=1B128B, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=21
 "45ø long radius elbow"
 "Straight pipe", len=3.5
 "45ø long radius elbow"
 "Straight pipe", len=2

link 1B128->1B601A "1B128>1B601A to sfpp & tb bstr pmp clr 1b"
 inlet=1B128, exit=1B601A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.3
 "standard Elbow"
 "Straight pipe", len=5.25
 "45ø elbow"
 "Straight pipe", len=5.1
 "45ø elbow"
 "Straight pipe", len=12.6
 "standard Elbow"
 "Straight pipe", len=0.75
 "45ø elbow"
 "Straight pipe", len=11.6
 "45ø elbow"
 "Straight pipe", len=0.75
 "45ø elbow"
 "Straight pipe", len=4.2
 "standard Elbow"
 "Straight pipe", len=7.3
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.3
 "standard Elbow"
 "Straight pipe", len=0.6
 "standard Elbow"
 "Straight pipe", len=32.8
 "standard Elbow"
 "Straight pipe", len=1.4
 "standard Elbow"
 "Straight pipe", len=1.3
 "standard Elbow"
 "Straight pipe", len=4.5
```

NETWORK DETAIL (continued)

```
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=4.75
 "standard Elbow"
 "Straight pipe", len=27.5
 "standard Elbow"
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=4.4
 "standard Elbow"
 "Straight pipe", len=11.1
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=1.4
 "standard Elbow"
 "Straight pipe", len=0.8
 "standard Elbow"
 "Decreaser", dia=0

link 1B128B->1B128D "1B128B>1B128D to hvac eqpt 1b"
 inlet=1B128B, exit=1B128D, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=4

link 1B128B->1B603A "1B128B>1B603A to ccs &aux fw pmp rm clr 1b"
 inlet=1B128B, exit=1B603A, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=4.5
 "90ø long radius elbow"
 "Straight pipe", len=15.5
 "90ø long radius elbow"
 "Straight pipe", len=10.2
 "90ø long radius elbow"
 "Straight pipe", len=4
 "45ø long radius elbow"
 "Straight pipe", len=11
 "90ø long radius elbow"
 "Straight pipe", len=2.2
 "Gate valve" isolation
 "Straight pipe", len=1.3
 "Decreaser", dia=0

link 1B128D->1B128D1 "1B128D>1B128D1"
 inlet=1B128D, exit=1B128D1, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=1
 "45ø long radius elbow"
 "Straight pipe", len=2
 "Butterfly valve" isolation

link 1B128D->1B129 "1B128D>1B129 hvac eqpt 1b"
 inlet=1B128D, exit=1B129, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=15.5
 "90ø long radius elbow"
 "Straight pipe", len=1.5

link 1B128D1->1B128E "1B128D1>1B128E"
 inlet=1B128D1, exit=1B128E, sch=40, mat="stainless steel", dia=6
 "Straight pipe", len=26

link 1B128E->1B132A1 "1B128E>1B132A1 hvac eqpt 1b"
```

NETWORK DETAIL (continued)

```
 ===== Reference: DCN 21996
 inlet=1B128E, exit=1B132A1, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=11
 "90ø long radius elbow"
 "Straight pipe", len=21
 "90ø long radius elbow"
 "Straight pipe", len=8
 "90ø long radius elbow"
 "Straight pipe", len=19
 "90ø long radius elbow"
 "Straight pipe", len=28
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=11.88

link 1B128E->1B172 "1B128E>1B172 to recip pmp rm clr 1b"
 inlet=1B128E, exit=1B172, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=1.4
 "45ø elbow"
 "Straight pipe", len=8
 "45ø elbow"
 "Straight pipe", len=3.5
 "45ø elbow"
 "Straight pipe", len=1
 "Straight pipe", len=3
 "45ø elbow"
 "Straight pipe", len=3.3
 "45ø elbow"
 "Straight pipe", len=12.2
 "standard Elbow"
 "Straight pipe", len=0.75
 "Gate valve" isolation, Cv=56
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=0.75
 "Decreaser", dia=0

link 1B129->1B129A "1B129>1B129A hvac eqpt 1b"
 inlet=1B129, exit=1B129A, sch=40, mat="carbon steel", dia=8, HW_C=53, red=0.2
 "Straight pipe", len=14.25
 "45ø long radius elbow"
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=69.2
 "90ø long radius elbow"
 "Straight pipe", len=41.5

link 1B129->1B129C "1B129>1B129C to cent chg pmp rm clr 1b"
 inlet=1B129, exit=1B129C, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=1.75
 "90ø long radius elbow"
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=2.3
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.75

link 1B129A->1B130A "1B129A>1B130A hvac eqpt 1b"
 inlet=1B129A, exit=1B130A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1
 "Decreaser", dia=0

link 1B129A->1B675A "1B129A>1B675A elec bd rm ac clr 1b"
 inlet=1B129A, exit=1B675A, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=1.5
 "Butterfly valve" isolation

link 1B129C->1B129CA "1B129C>1B129CA to cent chg pmp oil clr 1B"
 inlet=1B129C, exit=1B129CA, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=5.4
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=15
 "standard Elbow"
 "Straight pipe", len=1.75
 "standard Elbow"
 "Straight pipe", len=4.8
 "standard Elbow"
 "Straight pipe", len=6
 "standard Elbow"
 "Straight pipe", len=3.8
 "standard Elbow"
 "Straight pipe", len=5.1
 "standard Elbow"
 "Straight pipe", len=1.5
 "Straight pipe", len=5.3
 "standard Elbow"
 "gate valve"

link 1B129C->1B615A "1B129C>1B615A to cent chg pmp rm clr 1b"
 inlet=1B129C, exit=1B615A, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=9
 "Decreaser", dia=0

link 1B129CA->1B129GVI "Node 1B129CA to Node 1B129GVI"
 inlet=1B129CA, exit=1B129GVI, sch=40, mat="carbon steel", dia=1
 "straight pipe", len=10
 "standard elbow"
 "gate valve"
 "increaser", dia=0

link 1B129CA->1B129OI "Node 1B129CA to Node 1B129OI"
 inlet=1B129CA, exit=1B129OI, sch=TUBE, mat="stainless steel", dia=1.5, wall=0.083
 "straight pipe", len=1
 "straight pipe", len=4
 "standard elbow"
 "long-sweep elbow"
 "decreaser", dia=0
```

NETWORK DETAIL (continued)

```
link 1B129D->1B131 "1B129D>1B131 from cent chg pmp rm clr 1b"
 inlet=1B129D, exit=1B131, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=10.75
 "90ø long radius elbow"
 "Straight pipe", len=1.8
 "90ø long radius elbow"
 "Straight pipe", len=2.25
 "90ø long radius elbow"
 "Straight pipe", len=1.75
 "90ø long radius elbow"
 "Straight pipe", len=1

link 1B129GI->1B129GO "Node 1B129GI to Node 1B129GO"
 inlet=1B129GI, exit=1B129GO, sch=TUBE, mat="stainless steel", dia=1, wall=0.049
 "other: CCP Gear Cooler", dp=1.8, flow=14
 "straight pipe", len=1.5
 "standard elbow"

link 1B129GO->1B129GVO "Node 1B129GO to Node 1B129GVO"
 inlet=1B129GO, exit=1B129GVO, sch=TUBE, mat="stainless steel", dia=1, wall=0.049
 "straight pipe", len=1.5
 "standard elbow"
 "increaser", dia=0

link 1B129GVI->1B129GI "Node 1B129GVI to Node 1B129GI"
 inlet=1B129GVI, exit=1B129GI, sch=TUBE, mat="stainless steel", dia=1, wall=0.049
 "straight pipe", len=4
 "standard elbow"

link 1B129GVO->1B497 "Node 1B129GVO to Node 1B497"
 inlet=1B129GVO, exit=1B497, sch=40, mat="carbon steel", dia=2
 "standard elbow"
 "straight pipe", len=10

link 1B129OI->1B129OO "Node 1B129OI to Node 1B129OO"
 inlet=1B129OI, exit=1B129OO, sch=TUBE, mat="stainless steel", dia=1, wall=0.049
 "other: CCP Oil Cooler", dp=1.8, flow=14
 "straight pipe", len=1
 "standard elbow"

link 1B129OO->1B129ORO "Node 1B129OO to Node 1B129ORO"
 inlet=1B129OO, exit=1B129ORO, sch=TUBE, mat="stainless steel", dia=1.5, wall=0.083
 "straight pipe", len=3
 "standard elbow"
 "standard elbow"
 "increaser", dia=0

link 1B129ORO->1B497 "Node 1B129ORO to Node 1B497"
 inlet=1B129ORO, exit=1B497, sch=40, mat="carbon steel", dia=2
 "straight pipe", len=0.1

link 1B130->1B130AA "1B130>1B130AA to sta air comp"
 inlet=1B130, exit=1B130AA, sch=40, mat="carbon steel", dia=4, HW_C=60, red=0.2
 "90ø long radius elbow"
 "Straight pipe", len=7.25
 "Butterfly valve" isolation
 "Straight pipe", len=1
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=1.17
 "90ø long radius elbow"

link 1B130->1B130B "1B130>1B130B hvac main cont rm clr 1b"
 inlet=1B130, exit=1B130B, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=1
 "Decreaser", dia=0

link 1B130A->1B130 "1B130A>1B130 to hvac main cont rm clr"
 inlet=1B130A, exit=1B130, sch=40, mat="carbon steel", dia=6, HW_C=90
 "Straight pipe", len=1.75
 "90ø long radius elbow"
 "Straight pipe", len=21

link 1B130AA->1B130Z "1B130AA>1B130Z to sta air comp"
 inlet=1B130AA, exit=1B130Z, sch=40, mat="carbon steel", dia=4, HW_C=60, red=0.2
 fixed_flow=0
 "Straight pipe", len=5

link 1B130B->1B680A "1B130B>1B680A hvac main cont rm ac 1b"
 inlet=1B130B, exit=1B680A, sch=40, mat="carbon steel", dia=4, HW_C=60, red=0.15
 "Straight pipe", len=1
 "45ø long radius elbow"
 "Straight pipe", len=1
 "45ø long radius elbow"
 "Straight pipe", len=15.5
 "45ø long radius elbow"
 "Straight pipe", len=1
 "45ø long radius elbow"
 "90ø long radius elbow"
 "Straight pipe", len=5.25
 "90ø long radius elbow"
 "Straight pipe", len=2.7
 "90ø long radius elbow"
 "Straight pipe", len=13
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "Butterfly valve" isolation
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=3
 "Increaser", dia=0

link 1B130Z->1B135 "1B130Z>1B135 to sta air comp"
 inlet=1B130Z, exit=1B135, sch=40, mat="carbon steel", dia=4, HW_C=60, red=0.2
 "Check valve"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "Straight pipe", len=2

link 1B130Z->1BBREAK "Node 1B130Z to Node 1BBREAK"
 inlet=1B130Z, exit=1BBREAK, sch=STD, mat="stainless steel", dia=4
 fixed_flow=0
 "straight pipe", len=0.1

link 1B131->1B133B "1B131>1B133B to disch hdr b"
```

NETWORK DETAIL (continued)

```
 inlet=1B131, exit=1B133B, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=14.5

link 1B131A->1B131B "1B131A>1B131B from elec bd rm clr"
 inlet=1B131A, exit=1B131B, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1
 "decreaser", dia=4.026

link 1B131A->1B131C "8"
 inlet=1B131A, exit=1B131C, sch=40, mat="carbon steel", dia=8
 fixed_flow=0
 "straight pipe", len=7

link 1B131B->1B680E "1B131B to1B680E from el bd rm cooler 1B"
 inlet=1B131B, exit=1B680E, sch=40, mat="carbon steel", dia=4, HW_C=60, red=0.2
 "straight pipe", len=2.5
 "90ø long radius elbow"
 "straight pipe", len=21.7
 "45ø long radius elbow"
 "straight pipe", len=1
 "45ø long radius elbow"
 "straight pipe", len=15.5
 "45ø long radius elbow"
 "straight pipe", len=1
 "45ø long radius elbow"
 "90ø long radius elbow"
 "straight pipe", len=4.7
 "90ø long radius elbow"
 "straight pipe", len=1
 "90ø long radius elbow"
 "increaser", dia=6.065

link 1B131D->1B131 "Node 1B131E to Node 1B131"
 inlet=1B131D, exit=1B131, sch=40S, mat="stainless steel", dia=4
 "increaser", dia=7.981

link 1B131E->1B131D "3"
 inlet=1B131E, exit=1B131D, sch=40S, mat="stainless steel", dia=3
 fixed_flow=0
 "square edged entrance"
 "straight pipe", len=0.5
 "other: BNL Regular Port Ball Balve", Cv=240
 "increaser", dia=4.026

link 1B132->1B132B "1B132>1B132B to si pmp rm clr 1b"
 inlet=1B132, exit=1B132B, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1B132->1B310 "1B132>1B310 to hvac clrs 1b"
 inlet=1B132, exit=1B310, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=15
 "45ø long radius elbow"
 "Straight pipe", len=12
```

NETWORK DETAIL (continued)

```
 "Butterfly valve" isolation
 "Straight pipe", len=11
 "45ø long radius elbow"
 "Straight pipe", len=21
 "90ø long radius elbow"
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=7
 "90ø long radius elbow"
 "Straight pipe", len=19

link 1B132A->1B182 "1B132A>1B182 to si pmp rm clr 1b"
 inlet=1B132A, exit=1B182, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=2
 "Decreaser", dia=0

link 1B132A->1B320 "1B132A>1B320 to cs & rhr pmp rm clrs"
 inlet=1B132A, exit=1B320, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=4.5

link 1B132A1->1B132 "Node 1B132A1 to Node 1B132"
 ===== Reference: DCN 21996
 inlet=1B132A1, exit=1B132, sch=40, mat="stainless steel", dia=6
 "straight pipe", len=12.25

link 1B132A1A->1B132A1 "1B132A1A>1B132A1 Train B 6 inch crosstie"
 ===== Reference: DCN 21996
 inlet=1B132A1A, exit=1B132A1, sch=40, mat="stainless steel", dia=6
 "straight pipe", len=0.76

link 1B132A1B->1B132A1A "1B132A1B>1B132A1A Train B Vlv 1-67-1621"
 ===== Reference: DCN 21996
 inlet=1B132A1B, exit=1B132A1A, sch=40, mat="carbon steel", dia=6
 "butterfly valve", Cv=1294
 "straight pipe", len=0.24

link 1B132B->1B132C "1B132B>1B132C to si pmp rm clr 1b"
 inlet=1B132B, exit=1B132C, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.33
 "Decreaser", dia=0

link 1B132C->1B132A "1B132C>1B132A to pmp rm clr 1b"
 inlet=1B132C, exit=1B132A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2
 "globe Valve" isolation, Cv=172
 "Straight pipe", len=12

link 1B133->1B134 "1B133>1B134 to dicsh hdr 1b"
 inlet=1B133, exit=1B134, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=5
 "Butterfly valve" isolation
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=1
```

NETWORK DETAIL (continued)

```
link 1B133A->1B133 "1B133A>1B133 to disch hdr b"
 inlet=1B133A, exit=1B133, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1.2

link 1B133B->1B133A "1B133B>1B133A to disch hdr b"
 inlet=1B133B, exit=1B133A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=4.9

link 1B133B1->1B133B "1B133B1>1B133B frm pmp rm clrs"
 inlet=1B133B1, exit=1B133B, sch=40, mat="carbon steel", dia=6
 "Butterfly valve" isolation
 "Straight pipe", len=1
 "45ø long radius elbow"

link 1B134->1B925A "1B134>1B925A disch hdr b"
 inlet=1B134, exit=1B925A, sch=STD, mat="carbon steel", dia=20
 "Straight pipe", len=75
 "Increaser", dia=0

link 1B134A->1B136 "1B134A>1B136 disch hdr b"
 inlet=1B134A, exit=1B136, sch=STD, mat="carbon steel", dia=20
 "Straight pipe", len=19
 "90ø long radius elbow"
 "Straight pipe", len=6

link 1B135->1A136 "1B135>1A136 to sta air comp"
 inlet=1B135, exit=1A136, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=4.3
 "Gate valve" isolation
 "90ø long radius elbow"
 "Straight pipe", len=2.5

link 1B135->1B135A "1B135>1B135A"
 inlet=1B135, exit=1B135A, sch=STD, mat="stainless steel", dia=4
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=2.8
 "90ø long radius elbow"
 "Straight pipe", len=18.2
 "Straight pipe", len=22.5
 "Straight pipe", len=2.4
 "90ø long radius elbow"
 "Straight pipe", len=2.4
 "Straight pipe", len=16.5
 "Straight pipe", len=14.6
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=4.8
 "90ø long radius elbow"
 "Straight pipe", len=8
 "Gate valve" isolation
 "Straight pipe", len=7.1
 "90ø long radius elbow"
 "Straight pipe", len=3.4
 "Straight pipe", len=4.1
```

NETWORK DETAIL (continued)

```
link 1B135A->1B135B "1B135A>1B135B"
 inlet=1B135A, exit=1B135B, sch=STD, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=1

link 1B135A->1B135C "1B135A>1B135C"
 inlet=1B135A, exit=1B135C, sch=STD, mat="stainless steel", dia=4
 "Straight pipe", len=2.4
 "45ø long radius elbow"
 "Straight pipe", len=1.8
 "45ø long radius elbow"
 "Straight pipe", len=14.4

link 1B135C->1B135D "1B135C>1B135D"
 inlet=1B135C, exit=1B135D, sch=STD, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=1

link 1B135C->1B135E "1B135C>1B135E"
 inlet=1B135C, exit=1B135E, sch=STD, mat="stainless steel", dia=4
 "Straight pipe", len=18

link 1B135E->1A135F "1B135E>1A135F"
 inlet=1B135E, exit=1A135F, sch=STD, mat="stainless steel", dia=2
 "Straight pipe", len=3.2
 "Gate valve" isolation

link 1B135E->1B135F "1B135E>1B135F"
 inlet=1B135E, exit=1B135F, sch=STD, mat="stainless steel", dia=4
 "Straight pipe", len=18

link 1B135F->1B135G "1B135F>1B135G"
 inlet=1B135F, exit=1B135G, sch=STD, mat="stainless steel", dia=4
 fixed_flow=0
 "Straight pipe", len=1

link 1B135F->1B135H "1B135F>1B135H"
 inlet=1B135F, exit=1B135H, sch=STD, mat="stainless steel", dia=2
 "Straight pipe", len=3.2
 "Gate valve" isolation

link 1B135H->1B135I "1B135H>1B135I"
 inlet=1B135H, exit=1B135I, sch=STD, mat="stainless steel", dia=2
 "Straight pipe", len=7.5
 "45ø elbow"
 "Straight pipe", len=0.85
 "45ø elbow"
 "Straight pipe", len=1.3
 "standard Elbow"
 "Straight pipe", len=2.6
 "Increaser", dia=0

link 1B135I->1B135J "1B135I>1B135J"
 inlet=1B135I, exit=1B135J, sch=STD, mat="stainless steel", dia=3
 "Butterfly valve" isolation, Leq=6
 "Decreaser", dia=0

link 1B135J->1B135K "1A135J>1A135K"
```

NETWORK DETAIL (continued)

```
 inlet=1B135J, exit=1B135K, sch=STD, mat="stainless steel", dia=2
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=0.75
 "globe valve", Cv=19.6
 "Straight pipe", len=1.75

link 1B135K->1B135L "1B135K>1B135L"
 inlet=1B135K, exit=1B135L, sch=STD, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=1

link 1B135K->1B135M "1B135K>1A135M"
 inlet=1B135K, exit=1B135M, sch=STD, mat="stainless steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1

link 1B135M->1B135N "1B135M>1B135N"
 inlet=1B135M, exit=1B135N, sch=STD, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=1

link 1B135M->1B135O "1B135M>1B135O"
 inlet=1B135M, exit=1B135O, sch=STD, mat="stainless steel", dia=2
 "Straight pipe", len=1
 "Increaser", dia=0

link 1B135O->1B135P "1B135O>1B135P"
 inlet=1B135O, exit=1B135P, sch=STD, mat="stainless steel", dia=3
 "other", flow=95, dp=15
 "Straight pipe", len=4.2

link 1B135P->1B135Q "1B135P>1B135Q"
 inlet=1B135P, exit=1B135Q, sch=STD, mat="stainless steel", dia=3
 fixed_flow=0
 "Straight pipe", len=1

link 1B135P->1B135R "1B135P>1B135R"
 inlet=1B135P, exit=1B135R, sch=STD, mat="stainless steel", dia=3, HW_C=140
 "Straight pipe", len=2.2
 "globe Valve" isolation
 "Straight pipe", len=4.3
 "90ø long radius elbow"
 "Straight pipe", len=6.9
 "90ø long radius elbow"
 "Straight pipe", len=4
 "Orifice", diameter_ratio=0.62, flow=95, dp=60
 "Straight pipe", len=13.6
 "Gate valve" isolation
 "Straight pipe", len=1.3
 "Increaser", dia=0

link 1B135R->1A135P "1B135R>1A135P"
 inlet=1B135R, exit=1A135P, sch=STD, mat="stainless steel", dia=4, HW_C=140
 "Straight pipe", len=2

link 1B136->1B136A "1B136>1B136A disch hdr b"
```

NETWORK DETAIL (continued)

```
 inlet=1B136, exit=1B136A, sch=STD, mat="carbon steel", dia=20
 "straight pipe", len=7.67

link 1B136A->1B134 "Node 1B136A to Node 1B134 disch. header B"
 inlet=1B136A, exit=1B134, sch=STD, mat="carbon steel", dia=20
 "straight pipe", len=2.33

link 1B139A->1B143 "1B139A>1B143 from sta air comp"
 inlet=1B139A, exit=1B143, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=4.8
 "Gate valve" isolation, Cv=172
 "standard Elbow"
 "Straight pipe", len=4.5
 "Orifice", diameter_ratio=0.65194, flow=70, dp=100
 "Straight pipe", len=20
 "Increaser", dia=0

link 1B140->1B141 "1B140>1B141 from sta air comp"
 inlet=1B140, exit=1B141, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=4

link 1B140A->1B140 "1B140A>1B140 from sta air comp b"
 inlet=1B140A, exit=1B140, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.8
 "Gate valve" isolation, Cv=172
 "standard Elbow"
 "Straight pipe", len=4.5
 "Orifice", diameter_ratio=0.65194, flow=70, dp=100
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1

link 1B141->1B142 "1B141>1B142 from sta air comp"
 inlet=1B141, exit=1B142, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=8

link 1B141A->1B141 "1B141A>1B141 from sta air comp"
 inlet=1B141A, exit=1B141, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=1

link 1B142->1B146 "1B142>1B146 from sta air comp"
 inlet=1B142, exit=1B146, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=17.2
 "90ø long radius elbow"
 "Straight pipe", len=5.5

link 1B142A->1B142 "1B142A>1B142 from sta air comp"
 inlet=1B142A, exit=1B142, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=1

link 1B143->1B140 "1B143>1B140 from sta air comp"
 inlet=1B143, exit=1B140, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.7
```

NETWORK DETAIL (continued)

```
link 1B146->1A135U "1B146>1A135U from sta air comp"
 inlet=1B146, exit=1A135U, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Butterfly valve" isolation
 "Straight pipe", len=1.9

link 1B146->1B147 "1B146>1B147 from sta air comp"
 inlet=1B146, exit=1B147, sch=40, mat="carbon steel", dia=4
 fixed_flow=0
 "Straight pipe", len=1

link 1B150->1B152 "1B150>1B152 from cs hx 1b"
 inlet=1B150, exit=1B152, sch=STD, mat="carbon steel", dia=18
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "butterfly valve", Cv=645
 "Straight pipe", len=4.6
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=4.5
 "90ø long radius elbow"
 "Straight pipe", len=23
 "Butterfly valve" isolation
 "Straight pipe", len=15
 "90ø long radius elbow"
 "Increaser", dia=0

link 1B152->1B119A "1B152>1B119A from cs hx 1b"
 inlet=1B152, exit=1B119A, sch=STD, mat="carbon steel", dia=20
 "Straight pipe", len=8.5

link 1B161->1B161AA "1B161>1B161AA from lcvc,crd,rcp clr 1b"
 inlet=1B161, exit=1B161AA, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=4
 "Butterfly valve" isolation
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=11.5
 "90ø long radius elbow"
 "Straight pipe", len=110
 "90ø long radius elbow"
 "Straight pipe", len=0.5
 "90ø long radius elbow"
 "Straight pipe", len=4
 "45ø long radius elbow"
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=70
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=12

link 1B161A->1B161 "1B161A>1B161 from crd,rcp clr 1b"
 inlet=1B161A, exit=1B161, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2

link 1B161AA->1B118 "1B161AA>1B118 from lcvc,crd,rcp clr 1b"
 inlet=1B161AA, exit=1B118, sch=40, mat="carbon steel", dia=6
 "Orifice", diameter_ratio=0.69355, flow=500, dp=50
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=10
 "90ø long radius elbow"
 "Straight pipe", len=15
 "45ø long radius elbow"
 "Straight pipe", len=3
 "45ø long radius elbow"
 "Straight pipe", len=15
 "Increaser", dia=8

link 1B162->1B162AA "1B162>1B162AA from lcvc,crd,rcp clr 1d"
 inlet=1B162, exit=1B162AA, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=12
 "90ø long radius elbow"
 "45ø long radius elbow"
 "Straight pipe", len=13.5
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=13.3

link 1B162A->1B162 "1B162A>1B162 from crd,rcp clr 1d"
 inlet=1B162A, exit=1B162, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2

link 1B162AA->1B118 "1B162AA>1B118 from lcvc,crd,rcp clr 1d"
 inlet=1B162AA, exit=1B118, sch=40, mat="carbon steel", dia=6
 "Orifice", diameter ratio=0.69355, flow=500, dp=50
 "Straight pipe", len=4
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=10
 "90ø long radius elbow"
 "Straight pipe", len=1.3

link 1B163->1B123 "1B163>1B123 ucvc 1b"
 inlet=1B163, exit=1B123, sch=40, mat="carbon steel", dia=2
 "other", flow=23, dp=4.03

link 1B170->1B170A "1B170>1B170A crd vnt clr 1d"
 inlet=1B170, exit=1B170A, sch=40, mat="carbon steel", dia=3
 "other", flow=84, dp=0.74

link 1B170A->1B170B "1B170A>1B170B from crd vnt clr 1d"
 inlet=1B170A, exit=1B170B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=4.1
 "90ø long radius elbow"
 "Straight pipe", len=2.3
 "90ø long radius elbow"
 "Straight pipe", len=1.2
 "90ø long radius elbow"
 "Straight pipe", len=6.1
 "Orifice", diameter_ratio=0.58470, flow=84, dp=50
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=12.3
 "90ø long radius elbow"
 "Straight pipe", len=3.9
 "45ø long radius elbow"
 "Straight pipe", len=3.7
 "90ø long radius elbow"
 "Straight pipe", len=1.1
 "90ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "90ø long radius elbow"
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=5
 "globe Valve" throttle
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "other: Demister", dp=14, flow=100

link 1B170B->1B162A "1B170B>1B162A from crd,rcp clr 1d"
 inlet=1B170B, exit=1B162A, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=5.5
 "Increaser", dia=0

link 1B171->1B171A "1B171>1B171A crd vnt clr 1b"
 inlet=1B171, exit=1B171A, sch=40, mat="carbon steel", dia=3
 "other", flow=84, dp=0.74

link 1B171A->1B171B "1B171A>1B171B from crd vnt clr 1b"
```

NETWORK DETAIL (continued)

```
 inlet=1B171A, exit=1B171B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=4.1
 "90ø long radius elbow"
 "Straight pipe", len=2.3
 "90ø long radius elbow"
 "Straight pipe", len=1.2
 "90ø long radius elbow"
 "Straight pipe", len=6.1
 "Orifice", diameter_ratio=0.58470, flow=84, dp=50
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=12.3
 "90ø long radius elbow"
 "Straight pipe", len=3.9
 "45ø long radius elbow"
 "Straight pipe", len=3.7
 "90ø long radius elbow"
 "Straight pipe", len=1.1
 "90ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "90ø long radius elbow"
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=5
 "globe Valve" isolation
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "other: Demister", dp=23, flow=100

link 1B171B->1B161A "1B171B>1B161A from crd,rcp clr 1b"
 inlet=1B171B, exit=1B161A, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=5.5
 "Increaser", dia=0

link 1B172->1B172A "1B172>1B172A to recip pmp rm clr 1b"
 inlet=1B172, exit=1B172A, sch=40, mat="carbon steel", dia=1
 "Straight pipe", len=0.5
 "globe Valve" isolation
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 1B172A->1B620 "1B172A>1B620 to recip chg pmp rm 1b"
 inlet=1B172A, exit=1B620, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=0.75
 "Increaser", dia=0

link 1B173->1B641 "1B173>1B641 from recip pmp rm clr 1b"
 inlet=1B173, exit=1B641, sch=40, mat="carbon steel", dia=1
 "Straight pipe", len=4
 "Orifice", diameter ratio=0.65519, flow=10, dp=30
 "Straight pipe", len=2.5
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=2.25
 "standard Elbow"
 "Increaser", dia=0

link 1B182->1B182A1 "1B182>1B182A1 to si pmp rm clr 1b"
 inlet=1B182, exit=1B182A1, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=1
 "globe Valve" isolation

link 1B182A->1B182B "1B182A>1B182B to si pmp rm clr 1b"
 inlet=1B182A, exit=1B182B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=15.25
 "standard Elbow"
 "Straight pipe", len=11.5

link 1B182A1->1B182A "1B182A1>1B182A to si pmp rm clr 1b"
 inlet=1B182A1, exit=1B182A, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=1
 "Increaser", dia=0

link 1B182B->1B182C "1B182B>1B182C to si pmp rm clr 1b"
 inlet=1B182B, exit=1B182C, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B182B->1B625 "1B182B>1B625 to si pmp rm clr 1b"
 inlet=1B182B, exit=1B625, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=6.5
 "standard Elbow"
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=7.5

link 1B183->1B604A "1B183>1B604A from si pmp rm clr 1b"
 inlet=1B183, exit=1B604A, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=4
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=3.5
 "Increaser", dia=0

link 1B186->1B186A "1B186>1B186A to cs clr 1b"
 inlet=1B186, exit=1B186A, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=0.63
 "globe Valve" isolation
 "Straight pipe", len=0.63
 "Increaser", dia=0

link 1B186A->1B186B "1B186A>1B186B to cs clr 1b"
 inlet=1B186A, exit=1B186B, sch=40, mat="carbon steel", dia=2
 "standard Elbow"
 "Straight pipe", len=8
 "standard Elbow"
 "Straight pipe", len=0.5
```

NETWORK DETAIL (continued)

```
link 1B186B->1B186C "1B186B>1B186C to cs clr 1b"
 inlet=1B186B, exit=1B186C, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B186B->1B645 "1B186B>1B645 to cs clr 1b"
 inlet=1B186B, exit=1B645, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=12.55
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=0.5
 "other", flow=9, dp=0.66
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=10.5

link 1B187->1B187A "1B187>1B187A from cs clr 1b"
 inlet=1B187, exit=1B187A, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=4
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=1.75
 "other: Demister", dp=15, flow=30
 "Increaser", dia=0

link 1B187A->1B321 "1B187A>1B321 from cs clr 1b"
 inlet=1B187A, exit=1B321, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.25
 "standard Elbow"
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=2.5
 "standard Elbow"
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=11
 "standard Elbow"
 "Straight pipe", len=26.25
 "standard Elbow"
 "Straight pipe", len=1

link 1B190->1B191B "1B190>1B191B to dsl gen 1b1"
 inlet=1B190, exit=1B191B, sch=40, mat="carbon steel", dia=14
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1B190->2B291 "1B190>2B291 to dsl gen clr 2b1"
 inlet=1B190, exit=2B291, sch=40, mat="carbon steel", dia=6, HW_C=62
 "check valve", Cv=600
 "Straight pipe", len=30
 "90ø long radius elbow"
 "Straight pipe", len=34
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=12.5
 "Butterfly valve" isolation
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1.2

link 1B190A->1B190 "1B190A>1B190 to dsl gen clr 1b1, 2b1"
 inlet=1B190A, exit=1B190, sch=40, mat="carbon steel", dia=14, HW_C=60
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=3
 "45ø long radius elbow"
 "Straight pipe", len=100
 "90ø long radius elbow"
 "Straight pipe", len=26

link 1B190A->1B191A "1B190A>1B191A dsl gen stub"
 inlet=1B190A, exit=1B191A, sch=40, mat="carbon steel", dia=14
 fixed_flow=0
 "Straight pipe", len=1

link 1B190B->1B190C "1B190B>1B190C to rhr clr B"
 inlet=1B190B, exit=1B190C, sch=40, mat="carbon steel", dia=1
 "Straight pipe", len=0.5
 "globe Valve" isolation
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 1B190C->1B190C3 "1B190C>1B190C3 to rhr clr B"
 inlet=1B190C, exit=1B190C3, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=8
 "Increaser", dia=0

link 1B190C1->1B190C2 "1B190C1>1B190C2 to rhr clr B"
 inlet=1B190C1, exit=1B190C2, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B190C1->1B190D "1B190C1>1B190D to rhr clr B"
 inlet=1B190C1, exit=1B190D, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=2
 "Decreaser", dia=0

link 1B190C3->1B190C1 "1B190C3>1B190C1 to rhr clr B"
 inlet=1B190C3, exit=1B190C1, sch=40, mat="carbon steel", dia=2
 "standard Elbow"
 "Straight pipe", len=0.5

link 1B190D->1B190D1 "1B190D>1B190D1 to rhr clr B"
 inlet=1B190D, exit=1B190D1, sch=40, mat="carbon steel", dia=1.5
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=8
 "45ø elbow"
 "Straight pipe", len=0.5
 "45ø elbow"
 "Straight pipe", len=6.5
 "45ø elbow"
 "Straight pipe", len=0.5
 "45ø elbow"
 "Straight pipe", len=10.5
 "Increaser", dia=2

link 1B190D1->1B650 "1B190D1>1B650 to rhr clr B"
 inlet=1B190D1, exit=1B650, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "other", flow=12, dp=1.66
 "Straight pipe", len=0.67
 "standard Elbow"
 "Straight pipe", len=2.5
 "standard Elbow"
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1B191->1B1B1 "1B191>1B1B1 to dsl gen clr 1b1"
 inlet=1B191, exit=1B1B1, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=1
 "other", flow=660, dp=3

link 1B191->2A209F "1B191>2A209F dsl gen clr cross 1b1, 1b2"
 inlet=1B191, exit=2A209F, sch=40, mat="carbon steel", dia=6, HW_C=73
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=7.9
 "90ø long radius elbow"
 "Straight pipe", len=63
 "90ø long radius elbow"
 "Straight pipe", len=7.9
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1.25

link 1B191B->1B191 "1B191B>1B191 to dsl gen clr 1b1"
 inlet=1B191B, exit=1B191, sch=40, mat="carbon steel", dia=6, HW_C=65
 "check valve", Cv=600
 "Straight pipe", len=34
 "90ø long radius elbow"
 "Straight pipe", len=12.5
 "Butterfly valve" isolation
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1.2
```

NETWORK DETAIL (continued)

```
link 1B192->1B195 "1B192>1B195 from dsl gen clr 1b1, 1b2"
 inlet=1B192, exit=1B195, sch=40, mat="carbon steel", dia=8, HW_C=50, red=0.2
 "Straight pipe", len=31.5
 "90ø long radius elbow"
 "Straight pipe", len=7.67
 "90ø long radius elbow"
 "Straight pipe", len=11

link 1B192A->1B192 "1B192A>1B192 from dsl gen clr1b2"
 inlet=1B192A, exit=1B192, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1

link 1B195->1B196 "1B195>1B196 from dsl gen clrs 1b"
 inlet=1B195, exit=1B196, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=1
 "Straight pipe", len=1.75
 "90ø long radius elbow"
 "Straight pipe", len=7.7
 "90ø long radius elbow"
 "Straight pipe", len=5.75

link 1B195->1B297A "1B195>1B297A from dsl gen clrs 1b"
 inlet=1B195, exit=1B297A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1.5
 "Butterfly valve" isolation
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2
 "Straight pipe", len=1.75
 "90ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=6.75

link 1B196->1A196C "1B196>1A196C from dsl gen clrs 1b, 2b"
 inlet=1B196, exit=1A196C, sch=40, mat="carbon steel", dia=10
 "Straight pipe", len=30
 "Increaser", dia=0

link 1B196A->1B196 "1B196A>1B196 from dsl gen clrs 2b"
 inlet=1B196A, exit=1B196, sch=40, mat="carbon steel", dia=10
 "Straight pipe", len=1

link 1B1B1->1FE6774 "1B1B1>1FE6774 from dsl gen clr 1b1"
 inlet=1B1B1, exit=1FE6774, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=1
 "butterfly valve", Cv=194.07
 "Straight pipe", len=9
 "90ø long radius elbow"
 "Straight pipe", len=16

link 1B1B2->1FE67280 "1B1B2>1FE67280 from dsl gen clr 1b2"
 inlet=1B1B2, exit=1FE67280, sch=40, mat="carbon steel", dia=6, HW_C=60, red=0.3
 "Straight pipe", len=1
 "butterfly valve", Cv=289.99
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=9
 "90ø long radius elbow"
 "Straight pipe", len=16

link 1B227->1B227A "Node 1B227 to Node 1B227A"
 ===== Reference: DCN 21894
 inlet=1B227, exit=1B227A, sch=STD, mat="stainless steel", dia=6
 "straight pipe", len=1.16

link 1B227->2B239 "Node 1B227 to Node 2B239"
 ===== Reference: DCN 21894
 inlet=1B227, exit=2B239, sch=STD, mat="stainless steel", dia=16
 "straight pipe", len=3.58
 "90ø long radius elbow"
 "straight pipe", len=2.5

link 1B227A->1B228 "Node 1B227A to Node 1B228"
 ===== Reference: DCN 21894
 inlet=1B227A, exit=1B228, sch=STD, mat="carbon steel", dia=6
 fixed_flow=0
 "butterfly valve", Cv=1294
 "straight pipe", len=0.24

link 1B235->1A900 "1B235>1A900 to ccs hx 1a 1&2"
 inlet=1B235, exit=1A900, sch=STD, mat="carbon steel", dia=24, HW_C=50, red=0.2
 "Straight pipe", len=6.5
 "Butterfly valve" isolation
 "Straight pipe", len=7.3
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=44.8
 "Orifice", diameter_ratio=0.64088, flow=12250, dp=200
 "Straight pipe", len=49.6

link 1B235->2A235 "1B235>2A235"
 inlet=1B235, exit=2A235, sch=STD, mat="carbon steel", dia=24, HW_C=50, red=0.2
 "Straight pipe", len=4.5
 "90ø long radius elbow"
 "Straight pipe", len=20.5
 "Butterfly valve" isolation
 "Straight pipe", len=6
 "Butterfly valve" isolation
 "Straight pipe", len=3.25

link 1B246->1B247 "1B246>1B247 disch hdr b"
 inlet=1B246, exit=1B247, sch=STD, mat="carbon steel", dia=36
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=35
 "90ø long radius elbow"
 "Straight pipe", len=9.5
 "45ø long radius elbow"
 "Straight pipe", len=25

link 1B246A->1B246 "1B246A>1B246 from dsl gen clrs"
 inlet=1B246A, exit=1B246, sch=STD, mat="carbon steel", dia=36
 "Straight pipe", len=1
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=9

link 1B247->1B247A "1B247>1B247A to abandoned ct piping"
 inlet=1B247, exit=1B247A, sch=STD, mat="carbon steel", dia=36
 fixed_flow=0
 "Straight pipe", len=1

link 1B247->1B247B "1B247>1B247B disch dhr b to disch chnl"
 inlet=1B247, exit=1B247B, sch=STD, mat="carbon steel", dia=36, HW_C=90
 "Straight pipe", len=6
 "Butterfly valve" isolation
 "Straight pipe", len=6
 "Butterfly valve" isolation
 "Straight pipe", len=9

link 1B297->1B297D "1B297>1B297D from dsl gen clrs 2a, 1a"
 inlet=1B297, exit=1B297D, sch=40, mat="carbon steel", dia=10
 "Straight pipe", len=30
 "Increaser", dia=0

link 1B297A->1B297E "1B297A>1B297E from dsl gen clrs"
 inlet=1B297A, exit=1B297E, sch=40, mat="carbon steel", dia=12
 "Straight pipe", len=30
 "Increaser", dia=0

link 1B297B->1A246 "1B297B>1A246 from dsl gen clrs"
 inlet=1B297B, exit=1A246, sch=40, mat="carbon steel", dia=14
 "Straight pipe", len=10
 "45ø long radius elbow"
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=35
 "45ø long radius elbow"
 "Straight pipe", len=6

link 1B297C->1B297 "1B297C>1B297 from dsl gen clrs 1a"
 inlet=1B297C, exit=1B297, sch=40, mat="carbon steel", dia=10
 "Straight pipe", len=1

link 1B297D->1B297A "1B297D>1B297A from dsl gen"
 inlet=1B297D, exit=1B297A, sch=40, mat="carbon steel", dia=12
 "Straight pipe", len=1

link 1B297E->1B297B "1B297E>1B297B from dsl gen clrs"
 inlet=1B297E, exit=1B297B, sch=40, mat="carbon steel", dia=14
 "Straight pipe", len=1

link 1B301A->1B311C "1B301A>1B311C from si pmp rm clr 1b"
 inlet=1B301A, exit=1B311C, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.33
 "Increaser", dia=6

link 1B310->1B310B "1B310>1B310B to hvac clrs 1b"
 inlet=1B310, exit=1B310B, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=17.3
 "90ø long radius elbow"
 "Straight pipe", len=36.5
 "45ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=10
 "45ø long radius elbow"
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=5

link 1B310->1B653A1 "1B310>1B653A1 to pen rm clr 1b..."
 inlet=1B310, exit=1B653A1, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=10.25
 "standard Elbow"
 "Straight pipe", len=1.25

link 1B310B->1B310B1 "1B310B>1B310B1 to el 690 & 714 pen rm clrs 1b"
 inlet=1B310B, exit=1B310B1, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=4.25
 "45ø elbow"
 "45ø elbow"

link 1B310B->1B313 "1B310B>1B313 to hvac eqpt 1b"
 inlet=1B310B, exit=1B313, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.25
 "Decreaser", dia=0

link 1B310B1->1B310C "1B310B1>1B310C to el 690 & 714 pen rm clrs 1b"
 inlet=1B310B1, exit=1B310C, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=7.5

link 1B310C->1B356 "1B310C>1B356 to el 714 pen rm clr 1b"
 inlet=1B310C, exit=1B356, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=14
 "standard Elbow"
 "Straight pipe", len=15.5
 "45ø elbow"
 "Straight pipe", len=4
 "45ø elbow"
 "Straight pipe", len=8
 "standard Elbow"
 "Straight pipe", len=4
 "standard Elbow"
 "Straight pipe", len=5.75
 "standard Elbow"
 "Straight pipe", len=10
 "45ø elbow"
 "Straight pipe", len=5
 "45ø elbow"
 "Straight pipe", len=30.5
 "standard Elbow"
 "Straight pipe", len=15.5
```

NETWORK DETAIL (continued)

```
 "standard Elbow"
 "Straight pipe", len=0.75

link 1B310C->1B660A "1B310C>1B660A to el 669 pen rm clr 1b"
 inlet=1B310C, exit=1B660A, sch=40, mat="stainless steel", dia=2
 "Decreaser", dia=0

link 1B311->1B311A "1B311>1B311A from pipe cha, pen rm clrs 1b"
 inlet=1B311, exit=1B311A, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=6
 "45ø long radius elbow"
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=7
 "45ø long radius elbow"
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=36.5
 "90ø long radius elbow"
 "Straight pipe", len=16.5

link 1B311A->1B311C "1B311A>1B311C from pipe cha, pen rm clrs 1b"
 inlet=1B311A, exit=1B311C, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=19.5
 "90ø long radius elbow"
 "Straight pipe", len=5.3
 "90ø long radius elbow"
 "90ø long radius elbow"
 "Straight pipe", len=2.05
 "90ø long radius elbow"
 "Straight pipe", len=7.75
 "90ø long radius elbow"
 "Straight pipe", len=16
 "45ø long radius elbow"
 "Straight pipe", len=10
 "Butterfly valve" isolation
 "Straight pipe", len=12
 "45ø long radius elbow"
 "Straight pipe", len=16.8
 "90ø long radius elbow"
 "Straight pipe", len=5

link 1B311B->1B311B1 "1B311B>1B311B1 from el 690 & 714 pen rm clrs 1b"
 inlet=1B311B, exit=1B311B1, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=7

link 1B311B1->1B311 "1B311B1>1B311 from el 690 & 714 pen rm clrs 1b"
 inlet=1B311B1, exit=1B311, sch=40, mat="carbon steel", dia=2
 "45ø elbow"
 "45ø elbow"
 "Straight pipe", len=5.75
 "standard Elbow"
 "Straight pipe", len=5

link 1B311C->1B312 "1B311C>1B312 frm sis, cs, rhr pmp rm clrs"
 inlet=1B311C, exit=1B312, sch=40, mat="stainless steel", dia=6
 "Straight pipe", len=26.1
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=23.5
 "90ø long radius elbow"
 "Straight pipe", len=16.8
 "90ø long radius elbow"
 "Straight pipe", len=9.833
 "90ø long radius elbow"
 "Straight pipe", len=23.6
 "90ø long radius elbow"
 "Straight pipe", len=8.25

link 1B312->1B133B1 "1B312>1B133B1 frm pmp rm clrs"
 inlet=1B312, exit=1B133B1, sch=40, mat="stainless steel", dia=6
 "Straight pipe", len=22.25

link 1B313->1B314 "1B313>1B314 to pipe ch clr 1b"
 inlet=1B313, exit=1B314, sch=40, mat="carbon steel", dia=2.5
 "Straight pipe", len=11
 "standard Elbow"
 "Straight pipe", len=4
 "standard Elbow"
 "Straight pipe", len=13.5
 "Decreaser", dia=0

link 1B314->1B314A1 "1B314>1B314A1 to pipe ch clr 1b"
 inlet=1B314, exit=1B314A1, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "globe Valve" isolation
 "Straight pipe", len=1

link 1B314A1->1B314A2 "1B314A1>1B314A2 to pipe ch clr 1b"
 inlet=1B314A1, exit=1B314A2, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B314A1->1B314A3 "1B314A1>1B314A3 to pipe ch clr 1b"
 inlet=1B314A1, exit=1B314A3, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.75
 "standard Elbow"
 "Straight pipe", len=2
 "Increaser", dia=0

link 1B314A3->1B670 "1B314A3>1B670 to pipe ch clr 1b"
 inlet=1B314A3, exit=1B670, sch=40, mat="carbon steel", dia=2.5
 "Straight pipe", len=0.25
 "other", flow=21, dp=0.48
 "Straight pipe", len=0.25
 "Decreaser", dia=0

link 1B320->1B186 "1B320>1B186 to cs pmp clr b"
 inlet=1B320, exit=1B186, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=28.25
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=11.5
 "standard Elbow"
 "Straight pipe", len=8
 "standard Elbow"
 "Decreaser", dia=0

link 1B320->1B320A "1B320>1B320A to rhr pmp clr b"
 inlet=1B320, exit=1B320A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1B320A->1B190B "1B320A>1B190B to rhr pmp clr 1b"
 inlet=1B320A, exit=1B190B, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=8
 "standard Elbow"
 "Straight pipe", len=2
 "Decreaser", dia=0

link 1B321->1B321A "1B321>1B321A from rhr & cs clrs"
 inlet=1B321, exit=1B321A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=7.5

link 1B321A->1B301A "1B321A>1B301A from si pmp rm clr 1b"
 inlet=1B321A, exit=1B301A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=9
 "globe Valve" isolation, Cv=172
 "Straight pipe", len=2
 "Increaser", dia=0

link 1B356->1B356A "1B356>1B356A to pen rm clr 1b..."
 inlet=1B356, exit=1B356A, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B356->1B356A1 "1B356>1B356A1 to pen rm clr 1b..."
 inlet=1B356, exit=1B356A1, sch=40, mat="stainless steel", dia=2
 "Decreaser", dia=0

link 1B356A1->1B356A2 "1B356A1>1B356A2 to pen rm clr 1b..."
 inlet=1B356A1, exit=1B356A2, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.75
 "globe Valve" isolation
 "Straight pipe", len=0.75
 "Increaser", dia=0

link 1B356A2->1B665 "1B356A2>1B665 to pen rm clr 1b..."
 inlet=1B356A2, exit=1B665, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=1.75
 "standard Elbow"
 "Straight pipe", len=2
 "other", flow=18, dp=0.29
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=2
```

NETWORK DETAIL (continued)

```
link 1B497->1B497A "1B497>1B497A from cent chg pmp oil clr 1b"
 inlet=1B497, exit=1B497A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.4
 "globe Valve" isolation
 "standard Elbow"
 "Straight pipe", len=3.1
 "globe Valve" isolation
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=8
 "standard Elbow"
 "Straight pipe", len=3.8
 "standard Elbow"
 "Straight pipe", len=4.8
 "standard Elbow"
 "Straight pipe", len=3.25
 "standard Elbow"
 "Straight pipe", len=14.4
 "standard Elbow"
 "Straight pipe", len=1.4
 "standard Elbow"
 "Straight pipe", len=5.3
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=7
 "Orifice", diameter_ratio=0.57388, flow=40, dp=60
 "Straight pipe", len=2
 "other: Demister", dp=30, flow=50

link 1B497A->1B129D "1B497A>1B129D from cent chg pmp oil clr 1b"
 inlet=1B497A, exit=1B129D, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.2
 "globe Valve" throttle
 "Straight pipe", len=1.1

link 1B497A->1B497B "1B497A>1B497B tw dead end"
 inlet=1B497A, exit=1B497B, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B524A->1B524B "1B524A>1B524B to instr rm water clr 1a"
 inlet=1B524A, exit=1B524B, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=23
 "45ø elbow"
 "Straight pipe", len=20
 "45ø elbow"
 "Straight pipe", len=21
 "45ø elbow"
 "Straight pipe", len=4.6
 "45ø elbow"
 "Straight pipe", len=8
 "standard Elbow"
 "Straight pipe", len=20
 "Increaser", dia=0
```

NETWORK DETAIL (continued)

```
link 1B524B->1B524C "1B524B>1B524C to instr rm water clr 1a"
 inlet=1B524B, exit=1B524C, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1

link 1B524C->1B524D "1B524C>1B524D tw dead end"
 inlet=1B524C, exit=1B524D, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B524C->1B524E "1B524C>1B524E to instr rm water clr 1a"
 inlet=1B524C, exit=1B524E, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.25
 "Decreaser", dia=0

link 1B524E->1B524F "1B524E>1B524F to instr rm water clr 1a"
 inlet=1B524E, exit=1B524F, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=9.2
 "globe Valve" isolation
 "Straight pipe", len=1.6
 "Decreaser", dia=0

link 1B524F->1B524G "1B524F>1B524G to instr rm water clr 1a"
 inlet=1B524F, exit=1B524G, sch=40, mat="stainless steel", dia=1
 "Straight pipe", len=2.3
 "globe Valve" throttle
 "Increaser", dia=0

link 1B524G->1B524H "1B524G>1B524H to instr rm water clr 1a"
 inlet=1B524G, exit=1B524H, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.2
 "standard Elbow"
 "Straight pipe", len=1.2
 "Decreaser", dia=0

link 1B524H->1B524I "1B524H>1B524I to instr rm water clr 1b"
 inlet=1B524H, exit=1B524I, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=1.1
 "other", flow=35, dp=5.54

link 1B524I->1B524J "1B524I>1B524J from instr rm water clr 1a"
 inlet=1B524I, exit=1B524J, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=1.4
 "Increaser", dia=0

link 1B524J->1B524K "1B524J>1B524K from instr rm water clr 1a"
 inlet=1B524J, exit=1B524K, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.2
 "standard Elbow"
 "Straight pipe", len=1.2

link 1B524K->1B524L "1B524K>1B524L from instr rm water clr 1a"
 inlet=1B524K, exit=1B524L, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.7
 "standard Elbow"
 "Straight pipe", len=14.25
```

NETWORK DETAIL (continued)

```
link 1B524L->1B524M "1B524L>1B524M from instr rm water clr 1a"
 inlet=1B524L, exit=1B524M, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.25

link 1B524M->1B524N "1B524M>1B524N tw dead end"
 inlet=1B524M, exit=1B524N, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B524M->1B524O "1B524M>1B524O from instr rm water clr 1a"
 inlet=1B524M, exit=1B524O, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1

link 1B524O->1B524P "1B524O>1B524P from instr rm water clr 1a"
 inlet=1B524O, exit=1B524P, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=2.6
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=3.2
 "globe Valve" throttle
 "Straight pipe", len=14.25
 "standard Elbow"
 "Straight pipe", len=8.8
 "45ø elbow"
 "Straight pipe", len=4.6
 "45ø elbow"
 "Straight pipe", len=21
 "45ø elbow"
 "Straight pipe", len=11
 "45ø elbow"
 "Straight pipe", len=12.3
 "45ø elbow"
 "Straight pipe", len=8.42
 "standard Elbow"
 "Straight pipe", len=21.5
 "standard Elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=5.5

link 1B524P->1B118A "1B524P>1B118A from instr rm water clr 1a"
 inlet=1B524P, exit=1B118A, sch=40, mat="carbon steel", dia=1.5
 "Gate valve" isolation, Cv=56
 "Straight pipe", len=3.5
 "standard Elbow"
 "Straight pipe", len=1.5

link 1B528B->2B245C "1B528B>2B245C"
 inlet=1B528B, exit=2B245C, sch=40, mat="carbon steel", dia=6
 fixed_flow=0
 "Straight pipe", len=1

link 1B556B->1B134A "1B556B>1B134A from flood mode leg"
 inlet=1B556B, exit=1B134A, sch=40, mat="carbon steel", dia=16
 fixed_flow=0
 "Straight pipe", len=1

link 1B601A->1B601B "1B601A>1B601B to sfpp & tb bstr pmp clr 1b"
```

NETWORK DETAIL (continued)

```
 inlet=1B601A, exit=1B601B, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=0.9

link 1B601B->1B601C "1B601B>1B601C to sfpp & tb bstr pmp clr 1b"
 inlet=1B601B, exit=1B601C, sch=40, mat="stainless steel", dia=1.5
 "globe Valve" isolation
 "Straight pipe", len=1.7
 "Increaser", dia=0

link 1B601C->1B601D "1B601C>1B601D to sfpp & tb bstr pmp clr 1b"
 inlet=1B601C, exit=1B601D, sch=40, mat="stainless steel", dia=2
 "standard Elbow"
 "Straight pipe", len=0.8
 "standard Elbow"
 "Straight pipe", len=12.6
 "standard Elbow"
 "Straight pipe", len=35.4
 "standard Elbow"
 "Straight pipe", len=4.7
 "45ø elbow"
 "Straight pipe", len=0.5
 "45ø elbow"
 "Straight pipe", len=2.8
 "standard Elbow"
 "Straight pipe", len=4.4
 "standard Elbow"
 "Straight pipe", len=2.4

link 1B601D->1B601E "1B601D>1B601E tw dead end"
 inlet=1B601D, exit=1B601E, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B601D->1B601F "1B601D>1B601F to sfpp &tb bstr pmp clr 1b"
 inlet=1B601D, exit=1B601F, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1
 "other", flow=28.5, dp=3.60

link 1B601F->1B601G "1B601F>1B601G from sfpp & tb bstr pmp clr 1b"
 inlet=1B601F, exit=1B601G, sch=40, mat="stainless steel", dia=2
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.8
 "standard Elbow"
 "Straight pipe", len=3.5

link 1B601G->1B601H "1B601G>1B601H tw dead end"
 inlet=1B601G, exit=1B601H, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B601G->1B601I "1B601G>1B601I from sfpp & tb bstr pmp clr 1b"
 inlet=1B601G, exit=1B601I, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.25
 "Decreaser", dia=0

link 1B601I->1B601J "1B601I>1B601J from sfpp & tb bstr pmp clr 1b"
```

NETWORK DETAIL (continued)

```
 inlet=1B601I, exit=1B601J, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=4.8
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=4.75
 "other: Demister", dp=7, flow=40
 "Increaser", dia=0

link 1B601J->1B601K "1B601J>1B601K from sfpp & tb bstr pmp clr 1b"
 inlet=1B601J, exit=1B601K, sch=40, mat="stainless steel", dia=2
 "standard Elbow"
 "Straight pipe", len=32.1
 "standard Elbow"
 "Straight pipe", len=15.1
 "standard Elbow"
 "Straight pipe", len=1.1
 "globe Valve" throttle

link 1B601K->1B601L "1B601K>1B601L from sfpp & tb bstr pmp clr 1b"
 inlet=1B601K, exit=1B601L, sch=40, mat="carbon steel", dia=2
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=1.4
 "standard Elbow"
 "Straight pipe", len=14.8
 "standard Elbow"
 "Straight pipe", len=3.8
 "standard Elbow"
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=27.5
 "standard Elbow"
 "Straight pipe", len=4.8
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=3.7
 "standard Elbow"
 "Straight pipe", len=1.9
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=32.4
 "standard Elbow"
 "Straight pipe", len=0.6
 "standard Elbow"
 "Straight pipe", len=1.3
 "standard Elbow"
 "Straight pipe", len=8.3
 "standard Elbow"
 "Straight pipe", len=4.8
 "45ø elbow"
 "Straight pipe", len=0.75
 "45ø elbow"
 "Straight pipe", len=11
 "45ø elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=14.9
 "45ø elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=5.2
 "45ø elbow"
 "Straight pipe", len=5.5
 "standard Elbow"
 "Straight pipe", len=0.75
 "45ø elbow"
 "Straight pipe", len=1.4
 "45ø elbow"
 "Straight pipe", len=6
 "45ø elbow"
 "Straight pipe", len=2.2
 "45ø elbow"
 "Straight pipe", len=8.5
 "Increaser", dia=0

link 1B601L->1B601M "1B601L>1B601M from sfpp & tb bstr pmp clr 1b"
 inlet=1B601L, exit=1B601M, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.5
 "90ø long radius elbow"
 "Straight pipe", len=26.5
 "90ø long radius elbow"
 "Straight pipe", len=2.67
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "90ø long radius elbow"
 "Straight pipe", len=0.67
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=0.67
 "90ø long radius elbow"
 "Straight pipe", len=32.17
 "90ø long radius elbow"
 "Straight pipe", len=0.67
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=10.58
 "90ø long radius elbow"
 "Straight pipe", len=4
 "45ø long radius elbow"
 "Straight pipe", len=12.25
 "45ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=20.57
 "45ø long radius elbow"
 "Straight pipe", len=6
 "45ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=2
```

NETWORK DETAIL (continued)

```
 "45ø long radius elbow"
 "Straight pipe", len=2.2
 "Increaser", dia=0

link 1B601M->1B133 "1B601M>1B133 from sfpp & tb bstr pmp clr 1b"
 inlet=1B601M, exit=1B133, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=3.2
 "45ø long radius elbow"
 "Straight pipe", len=1.25

link 1B603A->1B603B "1B603A>1B603B to ccs &aux fw pmp rm clr 1b"
 inlet=1B603A, exit=1B603B, sch=40, mat="carbon steel", dia=2
 "globe Valve" isolation
 "Straight pipe", len=1.3
 "Increaser", dia=0

link 1B603B->1B603C "1B603B>1B603C to ccs &aux fw pmp rm clr 1b"
 inlet=1B603B, exit=1B603C, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.2
 "90ø long radius elbow"
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=10.1
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "45ø long radius elbow"
 "Straight pipe", len=3.3
 "45ø long radius elbow"
 "Straight pipe", len=11
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=15.4
 "90ø long radius elbow"
 "Straight pipe", len=1.9
 "90ø long radius elbow"
 "Straight pipe", len=1
 "other", flow=53.1, dp=1.83

link 1B603C->1B603D "1B603C>1B603D from ccs & aux fw pmp rm clr 1b"
 inlet=1B603C, exit=1B603D, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=1.9
 "90ø long radius elbow"
 "Straight pipe", len=2
 "Decreaser", dia=0

link 1B603D->1B603E "1B603D>1B603E from ccs & aux fw pmp rm clr 1b"
 inlet=1B603D, exit=1B603E, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=5
 "Orifice", diameter_ratio=0.62737, flow=90, dp=200
 "Straight pipe", len=4.5
 "other: Demister", dp=5, flow=100
 "Increaser", dia=0
```

NETWORK DETAIL (continued)

```
link 1B603E->1B133A "1B603E>1B133A from ccs & aux fw pmp rm clr 1b"
 inlet=1B603E, exit=1B133A, sch=40, mat="carbon steel", dia=3
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=12
 "45ø long radius elbow"
 "Straight pipe", len=3.2
 "45ø long radius elbow"
 "Straight pipe", len=4.2
 "90ø long radius elbow"
 "Straight pipe", len=10
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1.4
 "Gate valve" throttle, Cv=190
 "Straight pipe", len=1.5
 "Gate valve" isolation
 "Straight pipe", len=0.7
 "90ø long radius elbow"
 "Straight pipe", len=8
 "45ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=12.4
 "90ø long radius elbow"
 "Straight pipe", len=19.2
 "90ø long radius elbow"
 "Straight pipe", len=5.2

link 1B604A->1B604B "1B604A>1B604B"
 inlet=1B604A, exit=1B604B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=1.25

link 1B604B->1B321A "1B604B>1B321A"
 inlet=1B604B, exit=1B321A, sch=40, mat="carbon steel", dia=2
 "globe Valve" throttle
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=1

link 1B606C->1B321 "1B606C>1B321 from rhr clr B"
 inlet=1B606C, exit=1B321, sch=40, mat="carbon steel", dia=1.5
 "standard Elbow"
 "Straight pipe", len=2.75
 "globe Valve" throttle
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=5
 "Increaser", dia=2
```

NETWORK DETAIL (continued)

```
link 1B610B->1B311B "1B610B>1B311B from el 714 pen rm clr 1b"
 inlet=1B610B, exit=1B311B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=30.5
 "45ø elbow"
 "Straight pipe", len=5
 "45ø elbow"
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=5.75
 "standard Elbow"
 "Straight pipe", len=4
 "standard Elbow"
 "Straight pipe", len=8
 "45ø elbow"
 "Straight pipe", len=4
 "45ø elbow"
 "Straight pipe", len=16.25
 "standard Elbow"
 "Straight pipe", len=15
 "45ø elbow"
 "Straight pipe", len=1.5

link 1B615->1B616 "1B615>1B616 from cent chg pmp rm clr 1b"
 inlet=1B615, exit=1B616, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=4.5
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=2.8
 "standard Elbow"
 "Straight pipe", len=6.25
 "Decreaser", dia=0

link 1B615A->1B615B "1B615A>1B615B to cent chg pmp rm clr 1b"
 inlet=1B615A, exit=1B615B, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1B615B->1B615C "1B615B>1B615C to cent chg pmp rm clr 1b"
 inlet=1B615B, exit=1B615C, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=0.5
 "globe Valve" isolation
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 1B615C->1B615D "1B615C>1B615D to cent chg pmp rm clr 1b"
 inlet=1B615C, exit=1B615D, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=0.5
```

NETWORK DETAIL (continued)

```
link 1B615D->1B615E "1B615D>1B615E to cent chg pmp rm clr 1b"
 inlet=1B615D, exit=1B615E, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B615D->1B615F "1B615D>1B615F to cent chg pmp rm clr 1b"
 inlet=1B615D, exit=1B615F, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=14.25
 "standard Elbow"
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=4.25
 "standard Elbow"

link 1B615F->1B615G "1B615F>1B615G to cent chg pmp rm clr 1b"
 inlet=1B615F, exit=1B615G, sch=40, mat="stainless steel", dia=2
 "standard Elbow"
 "Straight pipe", len=1.3
 "standard Elbow"
 "Straight pipe", len=17.8
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=2.5
 "other", flow=23, dp=3.52

link 1B615G->1B615 "1B615G>1B615 from cent chg pmp rm clr 1b"
 inlet=1B615G, exit=1B615, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=17.2
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"

link 1B616->1B616A "1B616>1B616A from cent chg pmp rm clr 1b"
 inlet=1B616, exit=1B616A, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=4
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=2.5
 "other: Demister", dp=27, flow=50
 "Increaser", dia=0

link 1B616A->1B616B "1B616A>1B616B from cent chg pmp rm clr 1b"
 inlet=1B616A, exit=1B616B, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=0.75

link 1B616B->1B616C "1B616B>1B616C from cent chg pmp rm clr 1b"
 inlet=1B616B, exit=1B616C, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B616B->1B616D "1B616B>1B616D from cent chg pmp rm clr 1b"
 inlet=1B616B, exit=1B616D, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.75
 "globe Valve" throttle
 "Straight pipe", len=0.5
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 1B616D->1B129D "1B616D>1B129D from cent chg pmp rm clr 1b"
 inlet=1B616D, exit=1B129D, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1

link 1B620->1B620A "1B620>1B620A to recip chg pmp rm 1b"
 inlet=1B620, exit=1B620A, sch=40, mat="carbon steel", dia=2
 "standard Elbow"
 "Straight pipe", len=1.25

link 1B620A->1B620B "1B620A>1B620B tw dead end"
 inlet=1B620A, exit=1B620B, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.75

link 1B620A->1B620C "1B620A>1B620C to recip chg pmp rm 1b"
 inlet=1B620A, exit=1B620C, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.75
 "Decreaser", dia=0

link 1B620C->1B620D "1B620C>1B620D to recip chg pmp rm 1b"
 inlet=1B620C, exit=1B620D, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=.5
 "standard Elbow"
 "Straight pipe", len=15
 "standard Elbow"
 "Straight pipe", len=4.25
 "standard Elbow"
 "Straight pipe", len=0.75
 "45ø elbow"
 "Straight pipe", len=3.5
 "standard Elbow"
 "Straight pipe", len=6
 "standard Elbow"
 "Straight pipe", len=11.35
 "standard Elbow"
 "Straight pipe", len=1.2
 "standard Elbow"
 "Straight pipe", len=4.3
```

NETWORK DETAIL (continued)

```
 "standard Elbow"
 "Straight pipe", len=2.7

link 1B620E->1B173 "1B620D>1B173 from recip pmp rm clr 1b"
 inlet=1B620E, exit=1B173, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=2.25
 "standard Elbow"
 "Straight pipe", len=13.25
 "standard Elbow"
 "Straight pipe", len=8.6
 "standard Elbow"
 "Straight pipe", len=3.75
 "45ø elbow"
 "Straight pipe", len=1.4
 "standard Elbow"
 "Straight pipe", len=4.25
 "standard Elbow"
 "Straight pipe", len=7.25
 "Decreaser", dia=0

link 1B625->1B630 "1B625>1B630 to si pmp oil clr 1b"
 inlet=1B625, exit=1B630, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=13.25
 "standard Elbow"
 "Straight pipe", len=4
 "standard Elbow"
 "Straight pipe", len=16.25
 "standard Elbow"
 "Decreaser", dia=0

link 1B625->1B635 "1B625>1B635 to si pmp rm clr 1b"
 inlet=1B625, exit=1B635, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=14
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.35
 "standard Elbow"
 "Straight pipe", len=2
 "other", flow=14, dp=2.26
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=14.5
 "other: Demister", dp=13, flow=40

link 1B630->1B640 "1B630>1B640 si pmp oil clr 1b"
 inlet=1B630, exit=1B640, sch=40, mat="stainless steel", dia=0.75
 "Straight pipe", len=1.35
 "globe Valve" isolation
 "globe Valve" isolation
 "other: Heat exchanger", dp=0.3, flow=3.1
 "globe Valve" isolation
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.75
 "other: Demister", dp=1.8, flow=13
 "Increaser", dia=0

link 1B635->1B635A "1B635>1B635A from si pmp rm clr 1b"
 inlet=1B635, exit=1B635A, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=5.75
 "standard Elbow"
 "Straight pipe", len=9.15
 "standard Elbow"
 "Straight pipe", len=6.5

link 1B635A->1B183 "1B635A>1B183 from si pmp rm clr 1b"
 inlet=1B635A, exit=1B183, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=11.5
 "standard Elbow"
 "Straight pipe", len=5
 "Decreaser", dia=0

link 1B635A->1B635B "1B635A>1B635B from si pmp rm clr 1b"
 inlet=1B635A, exit=1B635B, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B640->1B635 "1B640>1B635 from si pmp oil clr 1b"
 inlet=1B640, exit=1B635, sch=40, mat="stainless steel", dia=1.5
 "standard Elbow"
 "globe Valve" throttle
 "Straight pipe", len=16.25
 "standard Elbow"
 "Straight pipe", len=4.75
 "standard Elbow"
 "Straight pipe", len=16.25

link 1B641->1B641A "1B641>1B641A from recip pmp rm clr 1b"
 inlet=1B641, exit=1B641A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.67

link 1B641A->1B641B "1B641A>1B641B tw dead end"
 inlet=1B641A, exit=1B641B, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=.75

link 1B641A->1B641C "1B641A>1B641C from recip pmp rm clr 1b"
 inlet=1B641A, exit=1B641C, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=.5
 "Decreaser", dia=0

link 1B641C->1B312 "1B641C>1B312 from recip pmp rm clr 1b"
 inlet=1B641C, exit=1B312, sch=40, mat="carbon steel", dia=1.5
 "globe Valve" throttle
 "Straight pipe", len=1.5
 "Gate valve" isolation, Cv=56
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=13
 "45ø elbow"
 "Straight pipe", len=2.75
 "45ø elbow"
 "Straight pipe", len=3
 "45ø elbow"
 "Straight pipe", len=3
 "45ø elbow"
 "Straight pipe", len=9.5
 "45ø elbow"
 "Straight pipe", len=1

link 1B645->1B187 "1B645>1B187 from cs clr 1b"
 inlet=1B645, exit=1B187, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=4.5
 "Decreaser", dia=0

link 1B645->1B645A "1B645>1B645A from cs clr 1b"
 inlet=1B645, exit=1B645A, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B650->1B651 "1B650>1B651 from rhr clr B"
 inlet=1B650, exit=1B651, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=9
 "standard Elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=0.5
 "45ø elbow"
 "Straight pipe", len=8
 "45ø elbow"
 "Straight pipe", len=0.5
 "45ø elbow"
 "Straight pipe", len=8
 "Increaser", dia=0

link 1B651->1B651A "1B651>1B651A from rhr clr B"
 inlet=1B651, exit=1B651A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2

link 1B651A->1B651B "1B651A>1B651B from rhr clr B"
 inlet=1B651A, exit=1B651B, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B651A->1B652 "1B651A>1B652 from rhr clr B"
 inlet=1B651A, exit=1B652, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1B652->1B652A "1B652>1B652A from rhr clr B"
 inlet=1B652, exit=1B652A, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=5
 "Decreaser", dia=0

link 1B652A->1B606C "1B652A>1B606C from rhr clr B"
 inlet=1B652A, exit=1B606C, sch=40, mat="carbon steel", dia=1
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=2
 "Orifice", diameter_ratio=0.67043, flow=15, dp=60
 "Straight pipe", len=3.5
 "other: Demister", dp=7.5, flow=20
 "Increaser", dia=0

link 1B653->1B654 "1B653>1B654 to pen rm clr 1b..."
 inlet=1B653, exit=1B654, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=1
 "globe Valve" isolation
 "Straight pipe", len=1
 "Increaser", dia=0

link 1B653A1->1B653 "1B653A1>1B653 to pen rm clr 1b..."
 inlet=1B653A1, exit=1B653, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.25
 "Decreaser", dia=0

link 1B653A1->1B653A2 "1B653A1>1B653A2 to pen rm clr 1b..."
 inlet=1B653A1, exit=1B653A2, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B654->1B655 "1B654>1B655 to pen rm clr 1b..."
 inlet=1B654, exit=1B655, sch=40, mat="carbon steel", dia=2
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=2
 "other", flow=13, dp=0.4
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=2.25

link 1B655->1B655A1 "1B655>1B655A1 to pen rm clr 1b..."
 inlet=1B655, exit=1B655A1, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B655->1B656 "1B655>1B656 from pen rm clr 1b..."
 inlet=1B655, exit=1B656, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.5
 "standard Elbow"
 "Decreaser", dia=0

link 1B656->1B657 "1B656>1B657 from pen rm clr 1b..."
 inlet=1B656, exit=1B657, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=3
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=1.5
 "globe Valve" throttle
 "Straight pipe", len=1
 "other: Demister", dp=29, flow=50
 "Increaser", dia=0

link 1B657->1B311A "1B657>1B311A from pen rm clr 1b..."
```

NETWORK DETAIL (continued)

```
 inlet=1B657, exit=1B311A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=4

link 1B660A->1B660B "1B660A>1B660B to pen rm clr 1b..."
 inlet=1B660A, exit=1B660B, sch=40, mat="stainless steel", dia=1.5
 "standard Elbow"
 "Straight pipe", len=5
 "45ø elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=8
 "standard Elbow"
 "Straight pipe", len=6.2
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=3.8
 "standard Elbow"
 "Straight pipe", len=0.5
 "globe Valve" isolation
 "Increaser", dia=2

link 1B660B->1B660B1 "Tee 1B660B to plug"
 inlet=1B660B, exit=1B660B1, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B660B->1B660B2 "1B660B>1B660B2 to pen rm clr 1b..."
 inlet=1B660B, exit=1B660B2, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=2.25
 "other", flow=8.25, dp=0.32
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1.5

link 1B660B2->1B660B3 "Tee 1B660B2 to plug"
 inlet=1B660B2, exit=1B660B3, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B660B2->1B660B4 "Tee 1B660B2 to 1B660B4 from pen rm clr 1b..."
 inlet=1B660B2, exit=1B660B4, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=2
 "standard Elbow"
 "Decreaser", dia=0

link 1B660B4->1B311B "1B660B4 to Tee 1B311B from pen rm clr 1b..."
 inlet=1B660B4, exit=1B311B, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=2.96
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=1
 "globe Valve" throttle
 "45ø elbow"
 "Straight pipe", len=1
```

NETWORK DETAIL (continued)

```
 "45ø elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=6
 "standard Elbow"
 "Straight pipe", len=2.7
 "standard Elbow"
 "Straight pipe", len=5
 "45ø elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "other: Demister", dp=25, flow=40
 "Increaser", dia=2

link 1B665->1B665A1 "1B665>1B665A1 from pen rm clr 1b..."
 inlet=1B665, exit=1B665A1, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B665->1B665A2 "1B665>1B665A2 from pen rm clr 1b..."
 inlet=1B665, exit=1B665A2, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Decreaser", dia=0

link 1B665A2->1B610B "1B665A2>1B610B from pen rm clr 1b..."
 inlet=1B665A2, exit=1B610B, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=2.5
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=1.75
 "globe Valve" throttle
 "Straight pipe", len=1
 "other: Demister", dp=28, flow=40
 "Increaser", dia=0

link 1B670->1B670A1 "1B670>1B670A1 from pipe ch clr 1b"
 inlet=1B670, exit=1B670A1, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.25
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1

link 1B670A1->1B670A2 "1B670A1>1B670A2 from pipe ch clr 1b"
 inlet=1B670A1, exit=1B670A2, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 1B670A1->1B671 "1B670A1>1B671 from pipe ch clr 1b"
 inlet=1B670A1, exit=1B671, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.2
 "standard Elbow"
 "Straight pipe", len=2
 "Orifice", diameter_ratio=0.65194, flow=70, dp=100
 "Straight pipe", len=2
 "globe Valve" throttle
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1
 "other: Demister", dp=15, flow=40
 "Increaser", dia=0

link 1B671->1B311 "1B671>1B311 from pipe ch clr 1b"
 inlet=1B671, exit=1B311, sch=40, mat="carbon steel", dia=2.5
 "Straight pipe", len=6.25
 "standard Elbow"
 "Straight pipe", len=4
 "standard Elbow"
 "Straight pipe", len=10.33
 "Increaser", dia=4

link 1B675A->1B675B "1B675A>1B675B elec bd rm ac clr 1b"
 inlet=1B675A, exit=1B675B, sch=40, mat="stainless steel", dia=6
 "Straight pipe", len=2.75
 "90ø long radius elbow"
 "Straight pipe", len=6.25
 "90ø long radius elbow"
 "Straight pipe", len=8.6
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=34
 "Decreaser", dia=0

link 1B675B->1B675C "1B675B>1B675C elec bd rm ac clr 1b"
 inlet=1B675B, exit=1B675C, sch=40, mat="carbon steel", dia=4
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=5.5
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=4.8
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "Increaser", dia=0

link 1B675C->1B675D "1B675C>1B675D elec bd rm clr b"
 inlet=1B675C, exit=1B675D, sch=40, mat="carbon steel", dia=6
 "other", flow=136, dp=0.25
 "Decreaser", dia=0

link 1B675D->1B675D1 "1B675D>1B675D1 from elec bd rm clr b"
 inlet=1B675D, exit=1B675D1, sch=40, mat="carbon steel", dia=4, HW_C=90
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=3
 "Decreaser", dia=0

link 1B675D1->1B675D2 "1B675D1>1B675D2 from elec bd rm clr b"
 inlet=1B675D1, exit=1B675D2, sch=40, mat="carbon steel", dia=3
 "globe valve", Cv=37
 "Straight pipe", len=1.3
```

NETWORK DETAIL (continued)

```
 "Increaser", dia=0

link 1B675D2->1B675E "1B675D2>1B675E from elec bd rm clr b"
 inlet=1B675D2, exit=1B675E, sch=40, mat="carbon steel", dia=4, HW_C=60, red=0.2
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=6.5
 "Butterfly valve" throttle
 "90ø long radius elbow"
 "Increaser", dia=0

link 1B675E->1B675F "1B675E>1B675F from elec bd rm clr b"
 inlet=1B675E, exit=1B675F, sch=40, mat="stainless steel", dia=6
 "Straight pipe", len=6
 "Orifice", diameter_ratio=0.70904, flow=750, dp=100
 "Straight pipe", len=19.75
 "45ø long radius elbow"
 "Straight pipe", len=1.3
 "45ø long radius elbow"
 "Straight pipe", len=7.6
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "90ø long radius elbow"
 "Straight pipe", len=7.6
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=2

link 1B675F->1B131A "1B675F>1B131A from elec bd rm clr b"
 inlet=1B675F, exit=1B131A, sch=40, mat="carbon steel", dia=6
 "Butterfly valve" isolation
 "Straight pipe", len=1

link 1B680A->1B680B "1B680A>1B680B main cont rm clr"
 inlet=1B680A, exit=1B680B, sch=40, mat="carbon steel", dia=5
 "other", flow=83, dp=0.06

link 1B680B->1B680C "1B680B>1B680C from mn cont rm clr"
 inlet=1B680B, exit=1B680C, sch=40, mat="carbon steel", dia=5, HW_C=100, red=0
 "Straight pipe", len=0.75
 "Decreaser", dia=0

link 1B680C->1B680D "1B680C>1B680D from mn cont rm clr"
 inlet=1B680C, exit=1B680D, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.5
 "globe valve", Cv=25.5
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 1B680D->1B680E "1B680D>1B1680E from mn cont rm clr"
 inlet=1B680D, exit=1B680E, sch=40, mat="carbon steel", dia=4, HW_C=80
 "Straight pipe", len=0.35
 "90ø long radius elbow"
 "Straight pipe", len=3.6
 "90ø long radius elbow"
 "Straight pipe", len=3.2
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.7
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=1.25
 "Butterfly valve" throttle
 "Straight pipe", len=1.7
 "90ø long radius elbow"
 "90ø long radius elbow"
 "Straight pipe", len=9.4
 "90ø long radius elbow"
 "Straight pipe", len=7.5
 "Orifice", diameter_ratio=0.68366, flow=300, dp=100
 "Straight pipe", len=7
 "90ø long radius elbow"
 "straight pipe", len=1.4
 "45ø long radius elbow"
 "straight pipe", len=1
 "45ø long radius elbow"

link 1B680E->1B680HI "Node 1B680E to Node 1B680HI"
 inlet=1B680E, exit=1B680HI, sch=40S, mat="stainless steel", dia=6
 "straight pipe", len=6.25
 "45ø long radius elbow"
 "straight pipe", len=1.4
 "45ø long radius elbow"

link 1B680F->1B136A "Node 1B680F to Node 1B136A"
 inlet=1B680F, exit=1B136A, sch=40S, mat="stainless steel", dia=6
 "straight pipe", len=6.1
 "45ø long radius elbow"
 "straight pipe", len=1.6
 "90ø long radius elbow"
 "straight pipe", len=3.1
 "90ø long radius elbow"
 "straight pipe", len=4.1
 "90ø long radius elbow"
 "straight pipe", len=2.8
 "90ø long radius elbow"
 "straight pipe", len=1.4
 "other: BNL Full Port Ball Valve", Cv=2900
 "straight pipe", len=1.4

link 1B680F->1B680G "Node 1B680F to Node 1B680G"
 inlet=1B680F, exit=1B680G, sch=40S, mat="stainless steel", dia=6
 fixed_flow=0
 "90ø long radius elbow"
 "45ø long radius elbow"
 "straight pipe", len=0.3
 "other: BNL Regular Port Ball Valve", Cv=1400
 "straight pipe", len=1

link 1B680G->1B680H "Flush Connection Node 1B680G to Node 1B680H"
 inlet=1B680G, exit=1B680H, sch=40S, mat="stainless steel", dia=6
 fixed_flow=0
 "straight pipe", len=1

link 1B680HI->1B680F "Tee 1B680E to Tee 1B680F"
```

NETWORK DETAIL (continued)

```
 inlet=1B680HI, exit=1B680F, sch=40S, mat="stainless steel", dia=6
 "straight pipe", len=23
 "90ø long radius elbow"
 "straight pipe", len=13.4
 "90ø long radius elbow"
 "straight pipe", len=6.5
 "90ø long radius elbow"
 "straight pipe", len=19.5
 "90ø long radius elbow"
 "straight pipe", len=1.5
 "90ø long radius elbow"
 "straight pipe", len=25.5
 "90ø long radius elbow"
 "straight pipe", len=20.8
 "90ø long radius elbow"
 "straight pipe", len=3.1
 "90ø long radius elbow"
 "straight pipe", len=2.1
 "other: BNL Regular Port Ball Valve", Cv=1400
 "90ø long radius elbow"
 "straight pipe", len=5.5
 "90ø long radius elbow"
 "90ø long radius elbow"
 "straight pipe", len=1.6

link 1B718B->1B136 "1B718B>1B136 no flow from closed valve"
 inlet=1B718B, exit=1B136, sch=40, mat="carbon steel", dia=6
 fixed_flow=0
 "Straight pipe", len=1

link 1B920->1B925 "1B920>1B925 from CCS clrs"
 inlet=1B920, exit=1B925, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=19

link 1B925->2B245 "1B925>2B245 disch hdr b"
 inlet=1B925, exit=2B245, sch=STD, mat="carbon steel", dia=30
 "Straight pipe", len=30

link 1B925A->1B925 "1B925A>1B925 disch hdr b"
 inlet=1B925A, exit=1B925, sch=STD, mat="carbon steel", dia=30
 "Straight pipe", len=8

link 1BLAKE->1BWELL "1BLAKE>1BWELL"
 inlet=1BLAKE, exit=1BWELL, sch=NS, mat="concrete", dia=200
 "Straight pipe", len=1
 "other", flow=22000, dp=1.1

link 1BLC02->1BLC03 "1BLC02>1BLC03 to lcvc 1b"
 inlet=1BLC02, exit=1BLC03, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=13.3
 "45ø long radius elbow"
 "Straight pipe", len=2.7
 "45ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=0.5
```

NETWORK DETAIL (continued)

```
 "Decreaser", dia=0

link 1BLC03->1BLC04 "1BLC03>1BLC04 to lcvc 1b"
 inlet=1BLC03, exit=1BLC04, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.4

link 1BLC04->1BLC05 "1BLC04>1BLC05 to lcvc 1b"
 inlet=1BLC04, exit=1BLC05, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.8

link 1BLC04->1BLC06 "1BLC04>1BLC06 to lcvc 1b"
 inlet=1BLC04, exit=1BLC06, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.1
 "standard Elbow"
 "Straight pipe", len=0.8

link 1BLC05->1BLC11 "1BLC05>1BLC11 to lcvc 1b"
 inlet=1BLC05, exit=1BLC11, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95

link 1BLC05->1BLC12 "1BLC05>1BLC12 to lcvc 1b"
 inlet=1BLC05, exit=1BLC12, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1BLC06->1BLC13 "1BLC06>1BLC13 to lcvc 1b"
 inlet=1BLC06, exit=1BLC13, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95

link 1BLC06->1BLC14 "1BLC06>1BLC14 to lcvc 1b"
 inlet=1BLC06, exit=1BLC14, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1BLC07->1BLC08 "1BLC07>1BLC08 to lcvc 1b"
 inlet=1BLC07, exit=1BLC08, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.4

link 1BLC08->1BLC09 "1BLC08>1BLC09 to lcvc 1b"
 inlet=1BLC08, exit=1BLC09, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.1
 "standard Elbow"
 "Straight pipe", len=0.8

link 1BLC08->1BLC10 "1BLC08>1BLC10 to lcvc 1b"
 inlet=1BLC08, exit=1BLC10, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.8

link 1BLC09->1BLC16 "1BLC09>1BLC16 to lcvc 1b"
 inlet=1BLC09, exit=1BLC16, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95

link 1BLC09->1BLC17 "1BLC09>1BLC17 to lcvc 1b"
 inlet=1BLC09, exit=1BLC17, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1BLC10->1BLC18 "1BLC10>1BLC18 to lcvc 1b"
 inlet=1BLC10, exit=1BLC18, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
```

NETWORK DETAIL (continued)

```
link 1BLC10->1BLC19 "1BLC10>1BLC19 to lcvc 1b"
 inlet=1BLC10, exit=1BLC19, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1BLC11->1BLC12 "1BLC11>1BLC12 from lcvc 1b"
 inlet=1BLC11, exit=1BLC12, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1BLC12->1BLC15 "1BLC12>1BLC15 from lcvc 1b"
 inlet=1BLC12, exit=1BLC15, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=8.5
 "Increaser", dia=3

link 1BLC13->1BLC14 "1BLC13>1BLC14 from lcvc 1b"
 inlet=1BLC13, exit=1BLC14, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1BLC14->1BLC15 "1BLC14>1BLC15 from lcvc 1b"
 inlet=1BLC14, exit=1BLC15, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1
 "Increaser", dia=3

link 1BLC15->1BLC20 "1BLC15>1BLC20 from lcvc 1b"
 inlet=1BLC15, exit=1BLC20, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=10.75

link 1BLC16->1BLC17 "1BLC16>1BLC17 from lcvc 1b"
 inlet=1BLC16, exit=1BLC17, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1BLC17->1BLC20 "1BLC17>1BLC20 from lcvc 1b"
 inlet=1BLC17, exit=1BLC20, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=4
 "standard Elbow"
 "Straight pipe", len=2

link 1BLC18->1BLC19 "1BLC18>1BLC19 from lcvc 1b"
 inlet=1BLC18, exit=1BLC19, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1BLC19->1B111B "1BLC19>1B111B from lcvc 1b"
 inlet=1BLC19, exit=1B111B, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=8.5
 "Increaser", dia=3

link 1BLC20->1B111B "1BLC20>1B111B from lcvc 1b"
 inlet=1BLC20, exit=1B111B, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1

link 1BWELL->1B101 "1BWELL>1B101"
 inlet=1BWELL, exit=1B101, sch=NS, mat="concrete", dia=200
 "Straight pipe", len=1

link 1BWELL->1B102 "1BWELL>1B102"
 inlet=1BWELL, exit=1B102, sch=NS, mat="concrete", dia=200
 "Straight pipe", len=1

link 1CLC02->1CLC03 "1CLC02>1CLC03 to lcvc 1c"
 inlet=1CLC02, exit=1CLC03, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=13.3
 "45ø long radius elbow"
 "Straight pipe", len=2.7
 "45ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1CLC03->1CLC04 "1CLC03>1CLC04 to lcvc 1c"
 inlet=1CLC03, exit=1CLC04, sch=40, mat="carbon steel", dia=2
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=2.4

link 1CLC04->1CLC05 "1CLC04>1CLC05 to lcvc 1c"
 inlet=1CLC04, exit=1CLC05, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.8

link 1CLC04->1CLC06 "1CLC04>1CLC06 to lcvc 1c"
 inlet=1CLC04, exit=1CLC06, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.1
 "standard Elbow"
 "Straight pipe", len=0.8

link 1CLC05->1CLC11 "1CLC05>1CLC11 to lcvc 1c"
 inlet=1CLC05, exit=1CLC11, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95

link 1CLC05->1CLC12 "1CLC05>1CLC12 to lcvc 1c"
 inlet=1CLC05, exit=1CLC12, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1CLC06->1CLC13 "1CLC06>1CLC13 to lcvc 1c"
 inlet=1CLC06, exit=1CLC13, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95

link 1CLC06->1CLC14 "1CLC06>1CLC14 to lcvc 1c"
 inlet=1CLC06, exit=1CLC14, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1CLC07->1CLC08 "1CLC07>1CLC08 to lcvc 1c"
 inlet=1CLC07, exit=1CLC08, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.4

link 1CLC08->1CLC09 "1CLC08>1CLC09 to lcvc 1c"
 inlet=1CLC08, exit=1CLC09, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.1
 "standard Elbow"
 "Straight pipe", len=0.8

link 1CLC08->1CLC10 "1CLC08>1CLC10 to lcvc 1c"
 inlet=1CLC08, exit=1CLC10, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.8

link 1CLC09->1CLC16 "1CLC09>1CLC16 to lcvc 1c"
 inlet=1CLC09, exit=1CLC16, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95

link 1CLC09->1CLC17 "1CLC09>1CLC17 to lcvc 1c"
 inlet=1CLC09, exit=1CLC17, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1CLC10->1CLC18 "1CLC10>1CLC18 to lcvc 1c"
 inlet=1CLC10, exit=1CLC18, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95

link 1CLC10->1CLC19 "1CLC10>1CLC19 to lcvc 1c"
 inlet=1CLC10, exit=1CLC19, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1CLC11->1CLC12 "1CLC11>1CLC12 from lcvc 1c"
 inlet=1CLC11, exit=1CLC12, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1CLC12->1CLC15 "1CLC12>1CLC15 from lcvc 1c"
 inlet=1CLC12, exit=1CLC15, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=8.5
 "Increaser", dia=3

link 1CLC13->1CLC14 "1CLC13>1CLC14 from lcvc 1c"
 inlet=1CLC13, exit=1CLC14, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1CLC14->1CLC15 "1CLC14>1CLC15 from lcvc 1c"
 inlet=1CLC14, exit=1CLC15, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1
 "Increaser", dia=3

link 1CLC15->1CLC20 "1CLC15>1CLC20 from lcvc 1c"
 inlet=1CLC15, exit=1CLC20, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=10.75

link 1CLC16->1CLC17 "1CLC16>1CLC17 from lcvc 1c"
 inlet=1CLC16, exit=1CLC17, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=3.6

link 1CLC17->1CLC20 "1CLC17>1CLC20 from lcvc 1c"
 inlet=1CLC17, exit=1CLC20, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=4
 "standard Elbow"
 "Straight pipe", len=2

link 1CLC18->1CLC19 "1CLC18>1CLC19 from lcvc 1c"
 inlet=1CLC18, exit=1CLC19, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1CLC19->1A111B "1CLC19>1A111B from lcvc 1c"
 inlet=1CLC19, exit=1A111B, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=8.5
 "Increaser", dia=3

link 1CLC20->1A111B "1CLC20>1A111B from lcvc 1c"
 inlet=1CLC20, exit=1A111B, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1

link 1DLC02->1DLC03 "1DLC02>1DLC03 to lcvc 1d"
 inlet=1DLC02, exit=1DLC03, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=13.3
 "45ø long radius elbow"
 "Straight pipe", len=2.7
 "45ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 1DLC03->1DLC04 "1DLC03>1DLC04 to lcvc 1d"
 inlet=1DLC03, exit=1DLC04, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.4

link 1DLC04->1DLC05 "1DLC04>1DLC05 to lcvc 1d"
 inlet=1DLC04, exit=1DLC05, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.8

link 1DLC04->1DLC06 "1DLC04>1DLC06 to lcvc 1d"
 inlet=1DLC04, exit=1DLC06, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.1
 "standard Elbow"
 "Straight pipe", len=0.8
```

NETWORK DETAIL (continued)

```
link 1DLC05->1DLC11 "1DLC05>1DLC11 to lcvc 1d"
 inlet=1DLC05, exit=1DLC11, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95

link 1DLC05->1DLC12 "1DLC05>1DLC12 to lcvc 1d"
 inlet=1DLC05, exit=1DLC12, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1DLC06->1DLC13 "1DLC06>1DLC13 to lcvc 1d"
 inlet=1DLC06, exit=1DLC13, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95

link 1DLC06->1DLC14 "1DLC06>1DLC14 to lcvc 1d"
 inlet=1DLC06, exit=1DLC14, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1DLC07->1DLC08 "1DLC07>1DLC08 to lcvc 1d"
 inlet=1DLC07, exit=1DLC08, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.4

link 1DLC08->1DLC09 "1DLC08>1DLC09 to lcvc 1d"
 inlet=1DLC08, exit=1DLC09, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.1
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=0.8

link 1DLC08->1DLC10 "1DLC08>1DLC10 to lcvc 1d"
 inlet=1DLC08, exit=1DLC10, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.8

link 1DLC09->1DLC16 "1DLC09>1DLC16 to lcvc 1d"
 inlet=1DLC09, exit=1DLC16, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95

link 1DLC09->1DLC17 "1DLC09>1DLC17 to lcvc 1d"
 inlet=1DLC09, exit=1DLC17, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1DLC10->1DLC18 "1DLC10>1DLC18 to lcvc 1d"
 inlet=1DLC10, exit=1DLC18, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95

link 1DLC10->1DLC19 "1DLC10>1DLC19 to lcvc 1d"
 inlet=1DLC10, exit=1DLC19, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=25, dp=0.95
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6

link 1DLC11->1DLC12 "1DLC11>1DLC12 from lcvc 1d"
 inlet=1DLC11, exit=1DLC12, sch=40, mat="carbon steel", dia=2
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1DLC12->1DLC15 "1DLC12>1DLC15 from lcvc 1d"
 inlet=1DLC12, exit=1DLC15, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=8.5
 "Increaser", dia=3

link 1DLC13->1DLC14 "1DLC13>1DLC14 from lcvc 1d"
 inlet=1DLC13, exit=1DLC14, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1DLC14->1DLC15 "1DLC14>1DLC15 from lcvc 1d"
 inlet=1DLC14, exit=1DLC15, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1
 "Increaser", dia=3

link 1DLC15->1DLC20 "1DLC15>1DLC20 from lcvc 1d"
 inlet=1DLC15, exit=1DLC20, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=10.75

link 1DLC16->1DLC17 "1DLC16>1DLC17 from lcvc 1d"
 inlet=1DLC16, exit=1DLC17, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1DLC17->1DLC20 "1DLC17>1DLC20 from lcvc 1d"
 inlet=1DLC17, exit=1DLC20, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=4
 "standard Elbow"
 "Straight pipe", len=2

link 1DLC18->1DLC19 "1DLC18>1DLC19 from lcvc 1d"
 inlet=1DLC18, exit=1DLC19, sch=40, mat="carbon steel", dia=2
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=3.6

link 1DLC19->1B112B "1DLC19>1B112B from lcvc 1d"
 inlet=1DLC19, exit=1B112B, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=3.4
 "standard Elbow"
 "Straight pipe", len=8.5
 "Increaser", dia=3

link 1DLC20->1B112B "1DLC20>1B112B from lcvc 1d"
 inlet=1DLC20, exit=1B112B, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1

link 1FE67277->1A192A "1FE67277>1A192A from dsl gen clr 1a2"
 inlet=1FE67277, exit=1A192A, sch=40, mat="carbon steel", dia=6, HW_C=75
 "Orifice", diameter_ratio=0.70904, flow=750, dp=100
 "Straight pipe", len=20.6
 "Increaser", dia=0

link 1FE67280->1B192A "1FE67280>1B192A from dsl gen clr 1b2"
 inlet=1FE67280, exit=1B192A, sch=40, mat="carbon steel", dia=6
 "Orifice", diameter_ratio=0.70904, flow=750, dp=100
 "Straight pipe", len=20.6
 "Increaser", dia=0

link 1FE6769->1A192 "1FE6769>1A192 from  dsl gen clr 1a1"
 inlet=1FE6769, exit=1A192, sch=40, mat="carbon steel", dia=6, HW_C=80
 "Orifice", diameter_ratio=0.70904, flow=750, dp=100
 "Straight pipe", len=2.6
 "90ø long radius elbow"
 "Straight pipe", len=7.5

link 1FE6774->1B192 "1FE6774>1B192 from dsl gen clr 1b1"
 inlet=1FE6774, exit=1B192, sch=40, mat="carbon steel", dia=6
 "Orifice", diameter_ratio=0.70904, flow=750, dp=100
 "Straight pipe", len=2.6
 "90ø long radius elbow"
 "Straight pipe", len=7.5

link 2A152->2A252A "2A152>2A252A from cs hx 2a"
 inlet=2A152, exit=2A252A, sch=STD, mat="carbon steel", dia=20
 "Straight pipe", len=12.75
 "45ø long radius elbow"
 "Straight pipe", len=2

link 2A169->2A169A "2A169>2A169A from cent chg pmp rm clr 2a"
 inlet=2A169, exit=2A169A, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=1.2
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=2.5
```

NETWORK DETAIL (continued)

```
 "other: Demister", dp=3, flow=30
 "Increaser", dia=0

link 2A169A->2A169B "2A169A>2A169B from cent chg pmp rm clr 2a"
 inlet=2A169A, exit=2A169B, sch=40, mat="stainless steel", dia=2
 "standard Elbow"
 "Straight pipe", len=0.75

link 2A169B->2A169C "2A169B>2A169C from cent chg pmp rm clr 2a"
 inlet=2A169B, exit=2A169C, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.75

link 2A169B->2A169D "2A169B>2A169D from cent chg pmp rm clr 2a"
 inlet=2A169B, exit=2A169D, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=0.5

link 2A169D->2A169E "2A169D>2A169E from cent chg pmp rm clr 2a"
 inlet=2A169D, exit=2A169E, sch=40, mat="carbon steel", dia=2
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=1
 "Increaser", dia=0

link 2A169E->2A233 "2A169E>2A233 from cent chg pmp rm clr 2a"
 inlet=2A169E, exit=2A233, sch=40, mat="stainless steel", dia=3
 "Straight pipe", len=1

link 2A176->2A176A "2A176>2A176A to si pmp rm clr 2a"
 inlet=2A176, exit=2A176A, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.5
 "globe Valve" isolation
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 2A176A->2A176B "2A176A>2A176B to si pmp rm clr 2a"
 inlet=2A176A, exit=2A176B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=12
 "45ø elbow"
 "Straight pipe", len=1

link 2A176B->2A176C "2A176B>2A176C to si pmp rm clr 2a"
 inlet=2A176B, exit=2A176C, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A176B->2A232B "2A176B>2A232B to si pmp rm clr 2a"
 inlet=2A176B, exit=2A232B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=4.25
 "standard Elbow"
 "Straight pipe", len=0.75
```

NETWORK DETAIL (continued)

```
link 2A177->2A177A "2A177>2A177A from si pmp rm clr 2a"
 inlet=2A177, exit=2A177A, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=8.75
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=6
 "Increaser", dia=0

link 2A177A->2A351A "2A177A>2A351A from si pmp rm clr 2a"
 inlet=2A177A, exit=2A351A, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=1.25
 "globe Valve" throttle
 "Straight pipe", len=1.25
 "standard Elbow"

link 2A184->2A184A "2A184>2A184A to sc pmp clr 2a"
 inlet=2A184, exit=2A184A, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.25
 "globe Valve" isolation
 "Straight pipe", len=0.25
 "Increaser", dia=0

link 2A184A->2A184B "2A184A>2A184B to sc pmp clr 2a"
 inlet=2A184A, exit=2A184B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=8
 "standard Elbow"
 "Straight pipe", len=0.5

link 2A184B->2A184C "2A184B>2A184C to sc pmp clr 2a"
 inlet=2A184B, exit=2A184C, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A184B->2A350A "2A184B>2A350A to cs pmp clr2a"
 inlet=2A184B, exit=2A350A, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=2.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=15
 "standard Elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=10.85
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=0.5
 "other", flow=9, dp=0.66
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=2.67
```

NETWORK DETAIL (continued)

```
 "standard Elbow"
 "Straight pipe", len=9.77
 "standard Elbow"
 "Straight pipe", len=3.5
 "standard Elbow"
 "Straight pipe", len=14
 "standard Elbow"
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=3.5

link 2A188->2A188A "2A188>2A188A to rhr clr 2a"
 inlet=2A188, exit=2A188A, sch=40, mat="stainless steel", dia=1
 "Straight pipe", len=0.5
 "globe Valve" isolation
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 2A188A->2A188B "2A188A>2A188B to rhr clr 2a"
 inlet=2A188A, exit=2A188B, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=7.75
 "Increaser", dia=0

link 2A188B->2A188C "2A188B>2A188C to rhr clr 2a"
 inlet=2A188B, exit=2A188C, sch=40, mat="stainless steel", dia=2
 "standard Elbow"
 "Straight pipe", len=0.5

link 2A188C->2A188D "2A188C>2A188D to rhr clr 2a"
 inlet=2A188C, exit=2A188D, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A188C->2A188E "2A188C>2A188E to rhr clr 2a"
 inlet=2A188C, exit=2A188E, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=2
 "Decreaser", dia=0

link 2A188E->2A188F "2A188E>2A188F to rhr clr 2a"
 inlet=2A188E, exit=2A188F, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=3
 "45ø elbow"
 "45ø elbow"
 "Straight pipe", len=7.5
 "45ø elbow"
 "Straight pipe", len=0.75
 "45ø elbow"
 "Straight pipe", len=3.3
 "standard Elbow"
 "Straight pipe", len=10.83
 "Increaser", dia=0

link 2A188F->2A350B "2A188F>2A350B to rhr clr 2a"
 inlet=2A188F, exit=2A350B, sch=40, mat="stainless steel", dia=2
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "other", flow=12, dp=1.66
 "Straight pipe", len=0.67
 "standard Elbow"
 "Straight pipe", len=2.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "Decreaser", dia=0

link 2A189->2A189A "2A189>2A189A from rhr clr 2a"
 inlet=2A189, exit=2A189A, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=5.25
 "Decreaser", dia=0

link 2A189A->2A606B "2A189A>2A606B from rhr clr 2a"
 inlet=2A189A, exit=2A606B, sch=40, mat="stainless steel", dia=1
 "Straight pipe", len=3
 "Orifice", diameter_ratio=0.67043, flow=15, dp=60
 "Straight pipe", len=1.75
 "other: Demister", dp=12, flow=30
 "Increaser", dia=0

link 2A201->2A203 "2A201>2A203"
 inlet=2A201, exit=2A203, sch=STD, mat="carbon steel", dia=24
 "Pump" PUMPQA

link 2A202->2A204 "2A202>2A204"
 inlet=2A202, exit=2A204, sch=STD, mat="carbon steel", dia=24
 "Pump" PUMPRA

link 2A203->2A205 "pump qa > tee"
 inlet=2A203, exit=2A205, sch=STD, mat="carbon steel", dia=24
 "check valve", Cv=21700
 "Straight pipe", len=3.8125
 "Straight pipe", len=3.09
 "Butterfly valve" isolation
 "Straight pipe", len=4.05
 "90ø long radius elbow"
 "Straight pipe", len=8

link 2A204->2A205 "pump ra > tee"
 inlet=2A204, exit=2A205, sch=STD, mat="carbon steel", dia=24
 "check valve", Cv=21700
 "Straight pipe", len=3.8125
 "Straight pipe", len=3.09
 "Butterfly valve" isolation
 "Straight pipe", len=4.05

link 2A205->2A205C "2A205>2A205C"
 inlet=2A205, exit=2A205C, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=8.17
 "90ø long radius elbow"
 "Straight pipe", len=4.3331

link 2A205C->2A206 "2A205C>2a206"
 inlet=2A205C, exit=2A206, sch=STD, mat="carbon steel", dia=24, HW_C=65
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=27.17
 "90ø long radius elbow"
 "Straight pipe", len=19.333
 "Butterfly valve" isolation
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=9.25
 "other", flow=16000, dp=6
 "Straight pipe", len=0.5

link 2A206->2A206A "2A206>2A206A"
 inlet=2A206, exit=2A206A, sch=STD, mat="carbon steel", dia=4
 "other", flow=151, dp=0.37

link 2A206->2A206B "2A206>2A206B"
 inlet=2A206, exit=2A206B, sch=STD, mat="carbon steel", dia=4
 "other", flow=151, dp=0.37
 "Straight pipe", len=1.4
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=4

link 2A206->2A207 "2A206>2A207"
 inlet=2A206, exit=2A207, sch=STD, mat="carbon steel", dia=24, HW_C=70, red=0.1
 "Straight pipe", len=9
 "Butterfly valve" isolation
 "Straight pipe", len=3.9
 "90ø long radius elbow"
 "Straight pipe", len=6.83
 "90ø long radius elbow"
 "Straight pipe", len=16
 "Mitered bend", angle=90
 "Straight pipe", len=5.5
 "Increaser", dia=0

link 2A206A->2A206B "2A206A>2A206B"
 inlet=2A206A, exit=2A206B, sch=STD, mat="carbon steel", dia=4
 "Straight pipe", len=1.4
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=8.7

link 2A206B->2A206C "2A206B>2A206C"
 inlet=2A206B, exit=2A206C, sch=STD, mat="carbon steel", dia=4
 "Straight pipe", len=3.5
 "other: "glove Valve" throttle full open Cv is 700", Cv=95.5
 "Increaser", dia=6

link 2A206C->2A206E "2A206C>2A206E"
 inlet=2A206C, exit=2A206E, sch=STD, mat="carbon steel", dia=6
 "Straight pipe", len=4.25
 "90ø long radius elbow"
 "Straight pipe", len=24.5
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=2.5
 "45ø long radius elbow"
 "Straight pipe", len=18.2
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=2
 "other", K=1

link 2A206D->2A206C "2A206D>2A206C"
 inlet=2A206D, exit=2A206C, sch=STD, mat="carbon steel", dia=4
 fixed_flow=0
 "Straight pipe", len=1

link 2A207->2A208 "2A207>2A208"
 inlet=2A207, exit=2A208, sch=STD, mat="carbon steel", dia=36, HW_C=75, red=0.1
 "Straight pipe", len=3
 "Mitered bend", angle=90
 "Straight pipe", len=40
 "Mitered bend", angle=45
 "Straight pipe", len=2.5
 "Mitered bend", angle=45
 "Straight pipe", len=40.5
 "Mitered bend", angle=45
 "Straight pipe", len=128.5
 "Straight pipe", len=306.33
 "Mitered bend", angle=45
 "Straight pipe", len=24.92
 "Mitered bend", angle=45
 "Straight pipe", len=792.67
 "Mitered bend", angle=45
 "Straight pipe", len=81
 "Mitered bend", angle=45
 "Straight pipe", len=1175.83
 "Decreaser", dia=0

link 2A208->2A208A "2A208>2A208A"
 inlet=2A208, exit=2A208A, sch=STD, mat="carbon steel", dia=30, HW_C=80, red=0.1
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=75.83
 "Mitered bend", angle=90
 "Straight pipe", len=1.75
 "Mitered bend", angle=90
 "Straight pipe", len=4.58

link 2A208A->2A208B "2A208A>2A208B vent"
 inlet=2A208A, exit=2A208B, sch=STD, mat="carbon steel", dia=30
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A208A->2A208C "2A208A>2A208C"
 inlet=2A208A, exit=2A208C, sch=STD, mat="carbon steel", dia=30, HW_C=80, red=0.1
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=2
```

NETWORK DETAIL (continued)

```
 "45ø long radius elbow"
 "Straight pipe", len=1.5
 "45ø long radius elbow"
 "Straight pipe", len=7
 "45ø long radius elbow"
 "Straight pipe", len=9
 "45ø long radius elbow"
 "Straight pipe", len=80
 "45ø long radius elbow"
 "Straight pipe", len=15
 "45ø long radius elbow"
 "Straight pipe", len=8.5

link 2A208C->2A209 "2A208C>2A209"
 inlet=2A208C, exit=2A209, sch=STD, mat="carbon steel", dia=30, HW_C=80, red=0.1
 "Straight pipe", len=26
 "90ø long radius elbow"
 "Straight pipe", len=312
 "45ø long radius elbow"
 "Straight pipe", len=25
 "45ø long radius elbow"
 "Straight pipe", len=4.5
 "45ø long radius elbow"
 "Straight pipe", len=300
 "45ø long radius elbow"
 "Straight pipe", len=6.5
 "45ø long radius elbow"
 "Straight pipe", len=225
 "45ø long radius elbow"
 "Straight pipe", len=7.5
 "45ø long radius elbow"
 "Straight pipe", len=100

link 2A208D->2A208C "2A208D>2A208C Train A Cross Tie"
 inlet=2A208D, exit=2A208C, sch=STD, mat="carbon steel", dia=30
 "45ø long radius elbow"
 "45ø long radius elbow"
 "Straight pipe", len=32

link 2A208E->2A208D "2A208E>2A208D Train A Cross Tie"
 inlet=2A208E, exit=2A208D, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=8
 "Increaser", dia=0

link 2A208E->2A208F "2A208E>2A208F Train A Cross Tie"
 inlet=2A208E, exit=2A208F, sch=STD, mat="carbon steel", dia=24
 fixed_flow=0
 "Straight pipe", len=1

link 2A208G->2A208E "2A208G>2A208E Train A Cross Tie"
 inlet=2A208G, exit=2A208E, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=2.8
 "Straight pipe", len=8.9
 "90ø long radius elbow"
 "Straight pipe", len=6.5
 "90ø short radius elbow"
 "Straight pipe", len=15.5
 "Butterfly valve" isolation
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "90ø long radius elbow"
 "Straight pipe", len=12.5
 "90ø short radius elbow"
 "Butterfly valve" isolation
 "Straight pipe", len=8
 "Straight pipe", len=4
 "other: Gutted old strainer", dp=2, flow=10000

link 2A208G->2A208H "2A208G>2A208H Train A Disconnected Pump Stub"
 inlet=2A208G, exit=2A208H, sch=STD, mat="carbon steel", dia=20
 fixed_flow=0
 "Straight pipe", len=1

link 2A208I->2A208G "2A208I>2A208G Train A Cross Tie"
 inlet=2A208I, exit=2A208G, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=14

link 2A208I->2A208J "2A208I>2A208J Train A Disconnected Pump Stub"
 inlet=2A208I, exit=2A208J, sch=STD, mat="carbon steel", dia=20
 fixed_flow=0
 "Straight pipe", len=1

link 2A209->2A209AA "2A209>2A209AA"
 inlet=2A209, exit=2A209AA, sch=STD, mat="carbon steel", dia=30, HW_C=75, red=0.1
 "Straight pipe", len=2.5
 "45ø long radius elbow"
 "Straight pipe", len=4
 "45ø long radius elbow"
 "Straight pipe", len=2.5
 "45ø long radius elbow"
 "Straight pipe", len=115
 "45ø long radius elbow"
 "Straight pipe", len=7
 "45ø long radius elbow"
 "Straight pipe", len=67

link 2A209->2A219A "2A209>2A219A"
 inlet=2A209, exit=2A219A, sch=STD, mat="carbon steel", dia=30
 "Straight pipe", len=190
 "90ø long radius elbow"
 "Straight pipe", len=30
 "Straight pipe", len=169.5
 "Straight pipe", len=250
 "Straight pipe", len=50
 "Straight pipe", len=112.5
 "90ø long radius elbow"
 "Straight pipe", len=140
 "90ø long radius elbow"
 "Straight pipe", len=50
 "90ø long radius elbow"
 "Decreaser", dia=0

link 2A209A->2A209G "2A209A>2A209G"
 inlet=2A209A, exit=2A209G, sch=STD, mat="carbon steel", dia=24
 "Butterfly valve" isolation
 "Straight pipe", len=4.5
```

NETWORK DETAIL (continued)

```
link 2A209AA->2A209A "2A209AA>2A209A"
 inlet=2A209AA, exit=2A209A, sch=STD, mat="carbon steel", dia=30
 "Straight pipe", len=0.1
 "Orifice", diameter_ratio=0.65367, flow=20000, dp=200
 "Straight pipe", len=10
 "45ø long radius elbow"
 "Straight pipe", len=55
 "45ø long radius elbow"
 "Straight pipe", len=5.5
 "90ø long radius elbow"
 "Straight pipe", len=10.75
 "90ø long radius elbow"
 "Straight pipe", len=41
 "Decreaser", dia=0

link 2A209D->2A209E "2A209D>2A209E to dsl gen clr 2b2"
 inlet=2A209D, exit=2A209E, sch=40, mat="carbon steel", dia=6, HW_C=120
 fixed_flow=0
 "check valve", Cv=600
 "Straight pipe", len=60
 "45ø long radius elbow"
 "Straight pipe", len=1.5
 "45ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=9
 "Butterfly valve" isolation
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1.2

link 2A209D->2A209I "2A209D>2A209I to dsl gen clr 1b2"
 inlet=2A209D, exit=2A209I, sch=STD, mat="carbon steel", dia=14, HW_C=100
 "Straight pipe", len=1
 "Decreaser", dia=0

link 2A209E->2B2B2 "2A209E>2B2B2 to dsl gen clr 2b2"
 inlet=2A209E, exit=2B2B2, sch=40, mat="carbon steel", dia=6, HW_C=50
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=1
 "other", flow=660, dp=3

link 2A209F->1B1B2 "2A209F>1B1B2 to dsl gen clr 1b2"
 inlet=2A209F, exit=1B1B2, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=1
 "other", flow=660, dp=3

link 2A209G->2A209H "2A209G>2A209H to closed valve"
 inlet=2A209G, exit=2A209H, sch=40, mat="carbon steel", dia=6
 fixed_flow=0
 "Straight pipe", len=1

link 2A209G->2A210 "2A209G>2A210"
 inlet=2A209G, exit=2A210, sch=STD, mat="carbon steel", dia=24
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=12

link 2A209I->2A209F "2A209I>2A209F to dsl gen clr 1b2"
 inlet=2A209I, exit=2A209F, sch=40, mat="carbon steel", dia=6, HW_C=110
 fixed_flow=0
 "check valve", Cv=600
 "Straight pipe", len=30
 "90ø long radius elbow"
 "Straight pipe", len=60
 "45ø long radius elbow"
 "Straight pipe", len=1.5
 "45ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=9
 "Butterfly valve" isolation
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1.2

link 2A210->2A210A "2A210>2A210A"
 inlet=2A210, exit=2A210A, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=10.5
 "90ø long radius elbow"
 "Straight pipe", len=2

link 2A210->2A210B "2a210>2a210b to lcvc 2a&2c"
 inlet=2A210, exit=2A210B, sch=40, mat="carbon steel", dia=10
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "Butterfly valve" isolation
 "Straight pipe", len=5

link 2A210A->2A221 "2A210A>2A221"
 inlet=2A210A, exit=2A221, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=16.25
 "90ø long radius elbow"
 "Straight pipe", len=9
 "45ø long radius elbow"
 "Straight pipe", len=11
 "90ø long radius elbow"
 "Straight pipe", len=4.5

link 2A210A->2A524A "2A210A>2A524A to instr rm water clr 1a"
 inlet=2A210A, exit=2A524A, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=4.9
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=6.25
 "Gate valve" isolation, Cv=56

link 2A210B->2A210C "2A210B>2A210C to lcvc 2c"
 inlet=2A210B, exit=2A210C, sch=40, mat="carbon steel", dia=10
 "Straight pipe", len=1
 "Decreaser", dia=0
```

NETWORK DETAIL (continued)

```
link 2A210B->2A210D "2A210B>2A210D to lcvc cooler 2a"
 inlet=2A210B, exit=2A210D, sch=40, mat="carbon steel", dia=10
 "Straight pipe", len=1
 "Decreaser", dia=0

link 2A210C->2A210CC "2A210C>2A210CC to lcvc 2c"
 inlet=2A210C, exit=2A210CC, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=3
 "45ø long radius elbow"
 "Straight pipe", len=6

link 2A210CC->2A211 "2A210CC>2A211 to lcvc 2c"
 inlet=2A210CC, exit=2A211, sch=40, mat="carbon steel", dia=6
 "Orifice", diameter_ratio=0.69355, flow=500, dp=50
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=7
 "45ø long radius elbow"
 "Straight pipe", len=1.5
 "45ø long radius elbow"
 "Straight pipe", len=186
 "90ø long radius elbow"
 "Straight pipe", len=13.5
 "90ø long radius elbow"
 "Butterfly valve" isolation
 "Straight pipe", len=8
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=5

link 2A210D->2A210DD "2A210D>2A210DD to lcvc 2a"
 inlet=2A210D, exit=2A210DD, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=6
 "45ø long radius elbow"
 "Straight pipe", len=6

link 2A210DD->2A212 "2A210DD>2A212 to lcvc 2a"
 inlet=2A210DD, exit=2A212, sch=40, mat="carbon steel", dia=6
 "Orifice", diameter_ratio=0.69355, flow=500, dp=50
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=7.5
 "90ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=20
 "90ø long radius elbow"
 "45ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=3
 "Butterfly valve" isolation
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=10
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=5

link 2A211->2A211A "2A211>2A211A to crd vent"
 inlet=2A211, exit=2A211A, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2

link 2A211->2A211C "2A211>2A211C to lcvc 2c"
 inlet=2A211, exit=2A211C, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=3
 "Butterfly valve" throttle
 "Straight pipe", len=0.5

link 2A211A->2A211D "2A211A>2A211D to rc pump cooler"
 inlet=2A211A, exit=2A211D, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2
 "Decreaser", dia=0

link 2A211A->2A271 "2A211A>2A271 to crd vnt clr 2c"
 inlet=2A211A, exit=2A271, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=1
 "other: "glove Valve" throttle full open Cv is 294", Cv=100
 "Straight pipe", len=7.5
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=6.2
 "90ø long radius elbow"
 "Straight pipe", len=7.8
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "45ø long radius elbow"
 "Straight pipe", len=4.5
 "90ø long radius elbow"
 "Straight pipe", len=13
 "90ø long radius elbow"
 "Straight pipe", len=12.3
 "90ø long radius elbow"
 "Straight pipe", len=1.4
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=2.4

link 2A211B->2A261 "2A211B>2A261 from lcvc 2c"
 inlet=2A211B, exit=2A261, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=4
 "other: Demister", dp=16, flow=250

link 2A211C->2CLC02 "2A211C>2CLC02 to lcvc 2c"
 inlet=2A211C, exit=2CLC02, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 2A211C->2CLC07 "2A211C>2CLC07 to lcvc 2c"
 inlet=2A211C, exit=2CLC07, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.9
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 2A211D->2A213 "2A211D>2A213 to rcp clr 2c"
 inlet=2A211D, exit=2A213, sch=40, mat="carbon steel", dia=3, HW_C=65, red=0.1
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=12
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=5.5
 "45ø long radius elbow"
 "Straight pipe", len=2
 "45ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=2.75
 "Straight pipe", len=7.5

link 2A212->2A212A "2A212>2A212A to crd vent cooler"
 inlet=2A212, exit=2A212A, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2

link 2A212->2A212C "2A212>2A212C to lcvc 2a"
 inlet=2A212, exit=2A212C, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=3
 "Butterfly valve" throttle
 "Straight pipe", len=0.5

link 2A212A->2A212D "2A212A>2A212D to rc pump clr"
 inlet=2A212A, exit=2A212D, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2
 "Decreaser", dia=0

link 2A212A->2A270 "2A212A>2a270 to crd vent clr 2a"
 inlet=2A212A, exit=2A270, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=1
 "other: "glove Valve" throttle full open Cv is 294", Cv=100
 "Straight pipe", len=7.5
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=6.2
 "90ø long radius elbow"
 "Straight pipe", len=7.8
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "45ø long radius elbow"
 "Straight pipe", len=4.5
 "90ø long radius elbow"
 "Straight pipe", len=13
 "90ø long radius elbow"
 "Straight pipe", len=12.3
 "90ø long radius elbow"
 "Straight pipe", len=1.4
 "90ø long radius elbow"
 "Straight pipe", len=2.4

link 2A212B->2A262 "2A212B>2A262 from lcvc 2a"
 inlet=2A212B, exit=2A262, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=1
 "globe Valve" throttle
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=4
 "other: Demister", dp=20, flow=300

link 2A212C->2ALC02 "2A212C>2ALC02 to lcvc 2a"
 inlet=2A212C, exit=2ALC02, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 2A212C->2ALC07 "2A212C>2ALC07 to lcvc 2a"
 inlet=2A212C, exit=2ALC07, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1.9
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 2A212D->2A214 "2A212D>2A214 to rcp clr 2a"
 inlet=2A212D, exit=2A214, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=12
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=5.5
 "45ø long radius elbow"
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=2.75
 "Straight pipe", len=7.5

link 2A213->2A215 "2A213>2A215 rcp clr 2c"
 inlet=2A213, exit=2A215, sch=40, mat="carbon steel", dia=3
 "other", flow=132, dp=6.02

link 2A214->2A216 "2A214>2A216 rcp clr 2a"
 inlet=2A214, exit=2A216, sch=40, mat="carbon steel", dia=3
```

NETWORK DETAIL (continued)

```
 "other", flow=132, dp=6.02

link 2A215->2A271B "2A215>2A271B from rcp clr 3(2c)"
 inlet=2A215, exit=2A271B, sch=40, mat="carbon steel", dia=3, HW_C=80, red=0.1
 "Straight pipe", len=6.2
 "90ø long radius elbow"
 "Straight pipe", len=0.7
 "90ø long radius elbow"
 "Straight pipe", len=7.9
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "45ø long radius elbow"
 "Straight pipe", len=1.2
 "45ø long radius elbow"
 "Straight pipe", len=4.7
 "Orifice", diameter_ratio=0.64472, flow=150, dp=100
 "Straight pipe", len=5.8
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=1.25
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=4.7
 "90ø long radius elbow"
 "Straight pipe", len=2.75
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "Straight pipe", len=3
 "other: "glove Valve" throttle full open Cv is 294", Cv=145
 "other: Demister", dp=2, flow=150
 "Increaser", dia=4

link 2A216->2A270B "2A216>2A270B from rcp clr 1(2a)"
 inlet=2A216, exit=2A270B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=6.2
 "90ø long radius elbow"
 "Straight pipe", len=0.7
 "90ø long radius elbow"
 "Straight pipe", len=7.9
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "45ø long radius elbow"
 "Straight pipe", len=1.2
 "45ø long radius elbow"
 "Straight pipe", len=4.7
 "Orifice", diameter_ratio=0.64472, flow=150, dp=100
 "Straight pipe", len=5.8
 "45ø long radius elbow"
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=1.25
 "45ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.4
 "45ø long radius elbow"
 "Straight pipe", len=4.7
 "90ø long radius elbow"
 "Straight pipe", len=2.75
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "Straight pipe", len=3
 "other: "globe Valve" throttle full open Cv is 294", Cv=100
 "other: Demister", dp=10, flow=150
 "Increaser", dia=4

link 2A218->2A218D "2A218>2A218D frm lcvc, crd, rcp clrs 2c"
 inlet=2A218, exit=2A218D, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=13.5

link 2A218A->2A252A "2A218A>2A252A fem lcvc,crd,rcp clrs 2c"
 inlet=2A218A, exit=2A252A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=5.5
 "Butterfly valve" isolation
 "Straight pipe", len=2

link 2A218D->2A218A "2A218D>2A218A frm lcvc, crd, rcp clrs 2c"
 inlet=2A218D, exit=2A218A, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Straight pipe", len=6

link 2A218E->2A218D "2A218E>2A218D frm rcw return"
 inlet=2A218E, exit=2A218D, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=1

link 2A219A->2A507 "2A219A>2A507 to dsl gen clr 1b2, 2b2"
 inlet=2A219A, exit=2A507, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=1.5

link 2A221->2A222 "2A221>2A222 to ucvc 2a,2c"
 inlet=2A221, exit=2A222, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=3
 "Gate valve" isolation
 "Straight pipe", len=14
 "90ø long radius elbow"
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Butterfly valve" isolation
 "Straight pipe", len=4.75
 "90ø long radius elbow"
 "Straight pipe", len=13

link 2A221->2A226 "2A221>2A226"
 inlet=2A221, exit=2A226, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=23.5
 "90ø long radius elbow"
 "Straight pipe", len=5
 "45ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=15.5
 "90ø long radius elbow"
 "Straight pipe", len=11

link 2A222->2A222A "2A222>2A222A to ucvc 2a"
 inlet=2A222, exit=2A222A, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=1
 "Decreaser", dia=0

link 2A222->2A222D "2A222>2A222D to ucvc 2c"
 inlet=2A222, exit=2A222D, sch=40, mat="carbon steel", dia=2
 "Check valve"
 "Straight pipe", len=3.5
 "standard Elbow"
 "Straight pipe", len=3
 "Orifice", diameter_ratio=0.56655, flow=25, dp=25
 "Straight pipe", len=5
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=2.75
 "standard Elbow"
 "Straight pipe", len=6
 "standard Elbow"
 "Straight pipe", len=9
 "45ø elbow"
 "Straight pipe", len=5
 "45ø elbow"
 "Straight pipe", len=7.5
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=5
 "45ø elbow"
 "Straight pipe", len=3
 "45ø elbow"
 "Straight pipe", len=8
 "45ø elbow"
 "Straight pipe", len=10
 "45ø elbow"
 "Straight pipe", len=30
 "standard Elbow"
 "Straight pipe", len=8
 "45ø elbow"
 "Straight pipe", len=3
 "45ø elbow"
 "Straight pipe", len=15
 "45ø elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=10
 "45ø elbow"
 "Straight pipe", len=5
 "45ø elbow"
 "Straight pipe", len=6
```

NETWORK DETAIL (continued)

```
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=1
 "globe Valve" isolation, Cv=172
 "Straight pipe", len=6
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=17
 "standard Elbow"
 "Straight pipe", len=1.5
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=6
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1

link 2A222A->2A222B "2A222A>2A222B to ucvc 2a"
 inlet=2A222A, exit=2A222B, sch=40, mat="carbon steel", dia=2
 "Check valve"
 "Straight pipe", len=2.5
 "Orifice", diameter_ratio=0.56655, flow=25, dp=25
 "Straight pipe", len=7.5
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=3.75
 "standard Elbow"
 "Straight pipe", len=6
 "standard Elbow"
 "Straight pipe", len=10.5
 "45ø elbow"
 "Straight pipe", len=10.5
 "45ø elbow"
 "Straight pipe", len=3
```

NETWORK DETAIL (continued)

```
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=1.5
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=5
 "45ø elbow"
 "Straight pipe", len=10
 "45ø elbow"
 "Straight pipe", len=33.5
 "standard Elbow"
 "Straight pipe", len=15
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=10
 "45ø elbow"
 "Straight pipe", len=5
 "45ø elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=1
 "globe Valve" isolation, Cv=172
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=8
 "standard Elbow"
 "45ø elbow"
 "Straight pipe", len=0.5
 "45ø elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=15
 "standard Elbow"
 "other: Demister", dp=13, flow=30

link 2A222B->2A222C "2A222B>2A222C to ucvc 2a"
 inlet=2A222B, exit=2A222C, sch=40, mat="stainless steel", dia=2
 "Check valve"
 "Straight pipe", len=5.5
 "Straight pipe", len=5
 "globe Valve" isolation
 "Straight pipe", len=4.167

link 2A222C->2A264 "2A222C>2A264 to ucvc 2a"
 inlet=2A222C, exit=2A264, sch=40, mat="carbon steel", dia=2
```

NETWORK DETAIL (continued)

```
 "standard Elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=35.25
 "standard Elbow"
 "Straight pipe", len=90

link 2A222D->2A222E "2A222D>2A222E to ucvc 2c"
 inlet=2A222D, exit=2A222E, sch=40, mat="stainless steel", dia=2
 "Check valve"
 "standard Elbow"
 "Straight pipe", len=5
 "Straight pipe", len=11
 "globe Valve" isolation
 "Straight pipe", len=2.2

link 2A222E->2A263 "2A222E>2A263 to ucvc 2c"
 inlet=2A222E, exit=2A263, sch=40, mat="carbon steel", dia=2
 "45ø elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=3.5
 "standard Elbow"
 "Straight pipe", len=30.75
 "standard Elbow"
 "Straight pipe", len=70

link 2A223->2A267 "2A223>2A267 from ucvc 2c"
 inlet=2A223, exit=2A267, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=2.25
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=67
 "standard Elbow"
 "Straight pipe", len=29
 "standard Elbow"
 "Straight pipe", len=2.5
 "standard Elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=1.5
 "45ø elbow"
 "Straight pipe", len=6
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=2.5

link 2A224->2A266B "2A224>2A266B from ucvc 2a"
 inlet=2A224, exit=2A266B, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=10
 "globe Valve" throttle
 "Straight pipe", len=80
```

NETWORK DETAIL (continued)

```
"standard Elbow"
"Straight pipe", len=35.5
"standard Elbow"
"Straight pipe", len=5.5
"standard Elbow"
"Straight pipe", len=7
"Gate valve" isolation, Cv=70
"Straight pipe", len=5
"globe Valve" isolation, Cv=172
"Straight pipe", len=2
"standard Elbow"
"Straight pipe", len=1.5
"standard Elbow"
"Straight pipe", len=14
"standard Elbow"
"Straight pipe", len=2
"standard Elbow"
"Straight pipe", len=3
"standard Elbow"
"Straight pipe", len=9
"standard Elbow"
"Straight pipe", len=1
"45ø elbow"
"Straight pipe", len=1.5
"45ø elbow"
"Straight pipe", len=1
"standard Elbow"
"Straight pipe", len=1.5
"standard Elbow"
"Straight pipe", len=6
"globe Valve" isolation, Cv=172
"Straight pipe", len=2.5
"standard Elbow"
"Straight pipe", len=1.5
"standard Elbow"
"Straight pipe", len=1
"standard Elbow"
"Straight pipe", len=1
"standard Elbow"
"Straight pipe", len=1
"standard Elbow"
"Straight pipe", len=8
"45ø elbow"
"Straight pipe", len=3
"45ø elbow"
"Straight pipe", len=8
"45ø elbow"
"Straight pipe", len=1
"45ø elbow"
"Straight pipe", len=15
"standard Elbow"
"Straight pipe", len=32.5
"45ø elbow"
"Straight pipe", len=10
"45ø elbow"
"Straight pipe", len=5
"45ø elbow"
"Straight pipe", len=1
```

NETWORK DETAIL (continued)

```
 "45ø elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=3
 "45ø elbow"
 "Straight pipe", len=10
 "45ø elbow"
 "Straight pipe", len=9
 "standard Elbow"
 "Straight pipe", len=7
 "standard Elbow"
 "Straight pipe", len=2.75
 "standard Elbow"
 "Straight pipe", len=4
 "45ø elbow"
 "Straight pipe", len=0.5
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=0.5
 "45ø elbow"
 "Straight pipe", len=20
 "standard Elbow"
 "Straight pipe", len=2.25
 "standard Elbow"
 "Straight pipe", len=7
 "standard Elbow"
 "Straight pipe", len=6
 "45ø elbow"
 "Straight pipe", len=0.75
 "45ø elbow"
 "Straight pipe", len=4.5
 "Orifice", diameter_ratio=0.56655, flow=25, dp=25
 "Straight pipe", len=2

link 2A225->2A252 "2A225>2A252from ucvc 2a,2c"
 inlet=2A225, exit=2A252, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=9.5
 "Gate valve" isolation
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=2

link 2A226->2A226A "2A226>2A226A"
 inlet=2A226, exit=2A226A, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=2

link 2A226->2A250 "2A226>2A250 to cs hx 2a"
 inlet=2A226, exit=2A250, sch=STD, mat="carbon steel", dia=18
 fixed_flow=0
 "Straight pipe", len=11.6
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=2.75
 "Butterfly valve" isolation
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=11
 "90ø long radius elbow"
 "Straight pipe", len=20
 "Orifice", diameter_ratio=0.69073, flow=8000, dp=200
 "Straight pipe", len=16
 "90ø long radius elbow"
 "Straight pipe", len=11
 "90ø long radius elbow"
 "Straight pipe", len=6.3
 "90ø long radius elbow"
 "Straight pipe", len=19
 "90ø long radius elbow"
 "Straight pipe", len=8
 "90ø long radius elbow"
 "Straight pipe", len=7
 "90ø long radius elbow"
 "Straight pipe", len=4
 "other", flow=6028, dp=12

link 2A226A->2A226C "2A226A>2A226C"
 inlet=2A226A, exit=2A226C, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=10

link 2A226A->2A228A "2A226A>2A228A to closed valve"
 inlet=2A226A, exit=2A228A, sch=40, mat="carbon steel", dia=3
 fixed_flow=0
 "Straight pipe", len=1

link 2A226B->2A227 "2A226B>2A227 to air cond eqpt 2a"
 inlet=2A226B, exit=2A227, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=2

link 2A226B->2A235 "2A226B>2A235"
 inlet=2A226B, exit=2A235, sch=STD, mat="carbon steel", dia=24, HW_C=60
 "Straight pipe", len=34
 "90ø long radius elbow"
 "Straight pipe", len=94
 "Orifice", diameter_ratio=0.64088, flow=12000, dp=200
 "Straight pipe", len=14

link 2A226C->2A226B "2A226C>2A226B"
 inlet=2A226C, exit=2A226B, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=16

link 2A226C->2A226E "2A226C>2A226E to closed valve"
 inlet=2A226C, exit=2A226E, sch=40, mat="carbon steel", dia=3
 fixed_flow=0
 "Straight pipe", len=1

link 2A227->2A227A1 "2A227>2A227A1 to ba trans & aux fw pump coolers"
 inlet=2A227, exit=2A227A1, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=1.5
 "90ø long radius elbow"
 "Butterfly valve" isolation
```

NETWORK DETAIL (continued)

```
link 2A227->2A684A "2A227>2A684A to egtr cooler"
 inlet=2A227, exit=2A684A, sch=40, mat="stainless steel", dia=1
 "Straight pipe", len=1.5
 "standard Elbow"
 "globe Valve" isoaltion
 "Straight pipe", len=5.6
 "standard Elbow"
 "Straight pipe", len=7.5
 "standard Elbow"
 "Straight pipe", len=73.2
 "standard Elbow"
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=6
 "standard Elbow"
 "standard Elbow"
 "Straight pipe", len=18.5
 "standard Elbow"
 "Straight pipe", len=2
 "globe Valve" isolation
 "Straight pipe", len=2
 "globe Valve" isolation
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=9
 "standard Elbow"
 "Straight pipe", len=7
 "standard Elbow"
 "Straight pipe", len=4
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1
 "Increaser", dia=2

link 2A227A->2A227B "2A227A>2A227B to gear dr res&centfgl pmp hx"
 inlet=2A227A, exit=2A227B, sch=40, mat="stainless steel", dia=6
 "Straight pipe", len=10
 "90ø long radius elbow"
 "Straight pipe", len=1
 "45ø long radius elbow"
 "Straight pipe", len=1
 "45ø long radius elbow"
 "Straight pipe", len=2

link 2A227A->2A227E "2A227A>2A227E to ba trans & aux fw pmp rm clr 2a"
 inlet=2A227A, exit=2A227E, sch=40, mat="stainless steel", dia=2, HW_C=135
 "Straight pipe", len=12.3
 "standard Elbow"
 "Straight pipe", len=1.7
 "standard Elbow"
 "Straight pipe", len=65.25
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=2.25
 "standard Elbow"
 "Straight pipe", len=11.7
 "standard Elbow"
 "Straight pipe", len=0.7
 "globe Valve" isolation
 "Straight pipe", len=0.8
 "globe Valve" isolation
 "Straight pipe", len=1.4
 "standard Elbow"
 "Straight pipe", len=9.6
 "45ø elbow"
 "Straight pipe", len=4.1
 "45ø elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=9.7
 "standard Elbow"
 "Straight pipe", len=23.8
 "standard Elbow"
 "Straight pipe", len=4.1
 "standard Elbow"
 "Straight pipe", len=15.6
 "standard Elbow"
 "Straight pipe", len=1.3

link 2A227A1->2A227A "2A227A1>2A227A to ba trans & aux fw pump coolers"
 inlet=2A227A1, exit=2A227A, sch=40, mat="stainless steel", dia=6
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=6
 "45ø long radius elbow"
 "Straight pipe", len=10

link 2A227B->2A227B1 "2A227B>2A227B1 to various pmp rm coolers"
 ===== Reference: DCN 21996
 inlet=2A227B, exit=2A227B1, sch=40, mat="stainless steel", dia=6
 "Straight pipe", len=36
 "90ø long radius elbow"
 "Straight pipe", len=19
 "90ø long radius elbow"
 "Straight pipe", len=11.5
 "90ø long radius elbow"
 "Straight pipe", len=5
 "45ø long radius elbow"
 "Straight pipe", len=10
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=13
 "45ø long radius elbow"
 "Straight pipe", len=22
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=8.04

link 2A227B->2A227K "2A227B>2A227K to cent chg pmp rm clr 2a"
```

NETWORK DETAIL (continued)

```
 inlet=2A227B, exit=2A227K, sch=40, mat="stainless steel", dia=3
 "Straight pipe", len=13
 "45ø long radius elbow"
 "Straight pipe", len=2.6
 "45ø long radius elbow"
 "Straight pipe", len=0.7

link 2A227B1->2A227B1A "Node 2A227B1 to Node 2A227B1A TRAIN A 6 INCH CROSSTIE"
 ===== Reference: DCN 21996
 inlet=2A227B1, exit=2A227B1A, sch=40, mat="stainless steel", dia=6
 fixed_flow=0
 "straight pipe", len=0.76

link 2A227B1->2A232 "Node 2A227B1 to Node 2A232"
 ===== Reference: DCN 21996
 inlet=2A227B1, exit=2A232, sch=40, mat="stainless steel", dia=6
 "straight pipe", len=20

link 2A227B1A->2A227B1B "Node 2A227B1A to Node 2A227B1B TRAIN A VLV 2-67-1622"
 ===== Reference: DCN 21996
 inlet=2A227B1A, exit=2A227B1B, sch=40, mat="carbon steel", dia=6
 "butterfly valve", Cv=1294
 "straight pipe", len=0.24

link 2A227B1B->1A128B2B "Node 2A227B1B to Node 1A128B2B TRAIN A 6 INCH CROSSTIE"
 ===== Reference: DCN 21996
 inlet=2A227B1B, exit=1A128B2B, sch=40, mat="stainless steel", dia=6
 "straight pipe", len=4
 "90ø long radius elbow"
 "straight pipe", len=1.41
 "45ø long radius elbow"
 "straight pipe", len=14.75
 "90ø long radius elbow"
 "straight pipe", len=4.36
 "45ø long radius elbow"
 "straight pipe", len=2.19
 "45ø long radius elbow"
 "straight pipe", len=2.08
 "90ø long radius elbow"
 "straight pipe", len=1.05

link 2A227C->2A227C1 "2A227C>2A227C1 from em gas trt rm clr 2a"
 inlet=2A227C, exit=2A227C1, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1

link 2A227C1->2A227C2 "2A227C1>2A227C2 from em gas trt rm clr 2a"
 inlet=2A227C1, exit=2A227C2, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A227C1->2A227C3 "2A227C1>2A227C3 from em gas trt rm clr 2a"
 inlet=2A227C1, exit=2A227C3, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.25
 "Decreaser", dia=0

link 2A227C3->2A685A "2A227C3>2A685A from em gas trt rm clr 2a"
```

NETWORK DETAIL (continued)

```
 inlet=2A227C3, exit=2A685A, sch=40, mat="stainless steel", dia=1
 "Straight pipe", len=2.3
 "standard Elbow"
 "Straight pipe", len=4
 "standard Elbow"
 "Straight pipe", len=6.75
 "standard Elbow"
 "Straight pipe", len=6.5
 "Orifice", diameter_ratio=0.65519, flow=10, dp=30
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=4
 "globe Valve" throttle
 "Straight pipe", len=4
 "standard Elbow"
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=17.5
 "standard Elbow"
 "Straight pipe", len=6.5
 "standard Elbow"
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=73
 "standard Elbow"
 "Straight pipe", len=8
 "standard Elbow"
 "Straight pipe", len=5.15
 "standard Elbow"
 "globe Valve" isolation
 "Straight pipe", len=6
 "Increaser", dia=0

link 2A227E->2A227D "2A227E>2A227D tw dead end"
 inlet=2A227E, exit=2A227D, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A227E->2A387A "2A227E>2A387A to ba trans & aux fw pmp rm clr 2a"
 inlet=2A227E, exit=2A387A, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.75
 "standard Elbow"
 "Straight pipe", len=1.7
 "other", flow=42, dp=2.47

link 2A227F->2A227L "2A227F>2A227L from cent chg pmp oil clr 2a"
 inlet=2A227F, exit=2A227L, sch=40, mat="carbon steel", dia=2
 "globe Valve" throttle
 "Straight pipe", len=0.8

link 2A227GI->2A227GO "Node 2A227GI to Node 2A227GO"
 inlet=2A227GI, exit=2A227GO, sch=TUBE, mat="stainless steel", dia=1, wall=0.049
 "other: CCP Gear Cooler", dp=1.8, flow=14
 "straight pipe", len=1.5
 "standard elbow"

link 2A227GO->2A227GVO "Node 2A227GO to Node 2A227GVO"
 inlet=2A227GO, exit=2A227GVO, sch=TUBE, mat="stainless steel", dia=1, wall=0.049
```

NETWORK DETAIL (continued)

```
 "straight pipe", len=1.5
 "standard elbow"
 "increaser", dia=0

link 2A227GVI->2A227GI "Node 2A227GVI to Node 2A227GI"
 inlet=2A227GVI, exit=2A227GI, sch=TUBE, mat="stainless steel", dia=1, wall=0.049
 "straight pipe", len=4
 "standard elbow"

link 2A227GVO->2A227I "Node 2A227GVO to Node 2A227I"
 inlet=2A227GVO, exit=2A227I, sch=40, mat="carbon steel", dia=2
 "standard elbow"
 "straight pipe", len=10

link 2A227H->2A227F "2A227H>2A227F from cent chg pmp oil clr 2a"
 inlet=2A227H, exit=2A227F, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.8

link 2A227H->2A227G "2A227H>2A227G from cent chg pmp oil clr 2a"
 inlet=2A227H, exit=2A227G, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.75

link 2A227I->2A227H "2A227I>2A227H from cent chg pmp oil clr 2a"
 inlet=2A227I, exit=2A227H, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=2.1
 "globe Valve" isolation
 "standard Elbow"
 "Straight pipe", len=5
 "globe Valve" isolation
 "standard Elbow"
 "Straight pipe", len=7.2
 "standard Elbow"
 "Straight pipe", len=3.3
 "standard Elbow"
 "Straight pipe", len=5.5
 "standard Elbow"
 "Straight pipe", len=0.7
 "standard Elbow"
 "Straight pipe", len=1.4
 "standard Elbow"
 "Straight pipe", len=15.25
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=4.6
 "standard Elbow"
 "Straight pipe", len=0.5
 "45ø elbow"
 "Straight pipe", len=6.6
 "standard Elbow"
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=3.7
 "45ø elbow"
 "Straight pipe", len=1.25
 "45ø elbow"
 "Straight pipe", len=3
```

NETWORK DETAIL (continued)

```
 "Orifice", diameter_ratio=0.57388, flow=40, dp=60
 "Straight pipe", len=1
 "other: Demister", dp=2, flow=30

link 2A227J->2A227JI "2A227J>2A227JI to cent chg pmp oil clr 2a"
 inlet=2A227J, exit=2A227JI, sch=40, mat="stainless steel", dia=2
  "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=5.3
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=19.7
 "standard Elbow"
 "Straight pipe", len=7.7
 "standard Elbow"
 "Straight pipe", len=3.5
 "standard Elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=2.9
 "Straight pipe", len=5.3
 "standard Elbow"
 "gate valve"

link 2A227JI->2A227GVI "Node 2A227JI to Node 2A227GVI"
 inlet=2A227JI, exit=2A227GVI, sch=40, mat="carbon steel", dia=1
 "straight pipe", len=10
 "standard elbow"
 "gate valve"
 "increaser", dia=0

link 2A227JI->2A227OI "Node 2A227JI to Node 2A227OI"
 inlet=2A227JI, exit=2A227OI, sch=TUBE, mat="stainless steel", dia=1.5, wall=0.083
 "straight pipe", len=4
 "standard elbow"
 "long-sweep elbow"
 "straight pipe", len=1
 "decreaser", dia=0

link 2A227K->2A227J "2A227K>2A227J to cent chg pmp oil clr 2a"
 inlet=2A227K, exit=2A227J, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=0.7

link 2A227K->2A600A "2A227K>2A600A to cent chg pmp rm clr 2a"
 inlet=2A227K, exit=2A600A, sch=40, mat="stainless steel", dia=3
 "Straight pipe", len=0.67
 "90ø long radius elbow"
 "Straight pipe", len=3.33
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=8
 "Decreaser", dia=0
```

NETWORK DETAIL (continued)

```
link 2A227L->2A233 "2A227L>2A233 from cent chg pmp oil clr 2a"
 inlet=2A227L, exit=2A233, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5

link 2A227OI->2A227OO "Node 2A227OI to Node 2A227OO"
 inlet=2A227OI, exit=2A227OO, sch=TUBE, mat="stainless steel", dia=1, wall=0.049
 "other: CCP Oil Cooler", dp=1.8, flow=14
 "straight pipe", len=1
 "standard elbow"

link 2A227OO->2A227ORO "Node 2A227OO to Node 2A227ORO"
 inlet=2A227OO, exit=2A227ORO, sch=TUBE, mat="stainless steel", dia=1.5, wall=0.083
 "straight pipe", len=3
 "standard elbow"
 "standard elbow"
 "increaser", dia=0

link 2A227ORO->2A227I "Node 2A227ORO to Node 2A227I"
 inlet=2A227ORO, exit=2A227I, sch=40, mat="carbon steel", dia=2
 "straight pipe", len=0.1

link 2A232->2A232I "2A232>2A232I to pen rm clrs"
 inlet=2A232, exit=2A232I, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 2A232->2A301J "2A232>2A301J to pen rm clrs"
 inlet=2A232, exit=2A301J, sch=40, mat="carbon steel", dia=6
 "Decreaser", dia=0

link 2A232A->2A176 "2A232A>2A176 to si pmp rn clr 2a"
 inlet=2A232A, exit=2A176, sch=40, mat="stainless steel", dia=2
 "standard Elbow"
 "Straight pipe", len=1
 "Decreaser", dia=0

link 2A232A->2A350 "2A232A>2A350 to cs & rhr clrs 2a"
 inlet=2A232A, exit=2A350, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=7.92

link 2A232B->2A232C "2A232B>2A232C to si pm oil clr 2a"
 inlet=2A232B, exit=2A232C, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=3.5
 "standard Elbow"
 "Straight pipe", len=4.75
 "standard Elbow"
 "Straight pipe", len=20.5
 "standard Elbow"
 "Straight pipe", len=7.75
 "standard Elbow"
 "Straight pipe", len=6.9
 "standard Elbow"
 "Straight pipe", len=7.75
 "standard Elbow"
 "Decreaser", dia=0

link 2A232B->2A232D "2A232B>2A232D to si pmp rm clr 2a"
```

NETWORK DETAIL (continued)

```
 inlet=2A232B, exit=2A232D, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=15.6
 "standard Elbow"
 "Straight pipe", len=2
 "other", flow=14, dp=2.26
 "Straight pipe", len=3.75
 "standard Elbow"
 "Straight pipe", len=13.25
 "other: Demister", dp=3.3, flow=30

link 2A232C->2A232F "2A232C>2A232F to si pm oil clr 2a"
 inlet=2A232C, exit=2A232F, sch=40, mat="stainless steel", dia=0.75
 "Straight pipe", len=3
 "globe Valve" isolation
 "globe Valve" isolation
 "other: Heat exchanger", dp=0.1, flow=3.1
 "globe Valve" isolation
 "Straight pipe", len=2
 "Increaser", dia=0

link 2A232D->2A232D1 "2A232D>2A232D1 from si pmp rm clr 2a"
 inlet=2A232D, exit=2A232D1, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.25
 "standard Elbow"
 "Straight pipe", len=6

link 2A232D1->2A177 "2A232D1>2A177 from si pmp rm clr 2a"
 inlet=2A232D1, exit=2A177, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 2A232D1->2A232D2 "2A232D1>2A232D2 from si pmp rm clr 2a"
 inlet=2A232D1, exit=2A232D2, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A232F->2A232D "2A232F>2A232D from si pmp oil clr 2a"
 inlet=2A232F, exit=2A232D, sch=40, mat="stainless steel", dia=1.5
 "standard Elbow"
 "Straight pipe", len=7.75
 "globe Valve" throttle
 "standard Elbow"
 "Straight pipe", len=3.75
 "standard Elbow"
 "Straight pipe", len=7.75
 "standard Elbow"
 "Straight pipe", len=17.68
 "standard Elbow"
 "Straight pipe", len=4.75
 "standard Elbow"
 "Straight pipe", len=3.5

link 2A232I->2A232IA "2A232I>2A232IA to pen rm clrs"
 inlet=2A232I, exit=2A232IA, sch=40, mat="carbon steel", dia=4
 "Decreaser", dia=0

link 2A232IA->2A232IB "2A232IA>2A232IB to pmp rm clr 2a"
 inlet=2A232IA, exit=2A232IB, sch=40, mat="carbon steel", dia=2
```

NETWORK DETAIL (continued)

```
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=1.5

link 2A232IB->2A232A "2A232IB>2A232A to pmp rm clr 2a"
 inlet=2A232IB, exit=2A232A, sch=40, mat="stainless steel", dia=2
 "standard Elbow"
 "Straight pipe", len=5.25
 "standard Elbow"
 "Straight pipe", len=6.5

link 2A233->2A233B "2A233>2A233B from cent chg pmp rm clr 2a"
 inlet=2A233, exit=2A233B, sch=40, mat="stainless steel", dia=3
 "Straight pipe", len=7.2
 "90ø long radius elbow"
 "Straight pipe", len=2.4
 "90ø long radius elbow"
 "Straight pipe", len=2.8
 "90ø long radius elbow"
 "Straight pipe", len=3.3
 "90ø long radius elbow"
 "Straight pipe", len=3.3
 "90ø long radius elbow"
 "Straight pipe", len=5.5
 "90ø long radius elbow"
 "Straight pipe", len=13.75

link 2A233A->2A233B "2A233A>2A233B from cs&si pump rm coolers"
 inlet=2A233A, exit=2A233B, sch=40, mat="stainless steel", dia=6
 "Straight pipe", len=27.5
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=22
 "45ø long radius elbow"
 "Straight pipe", len=13
 "90ø long radius elbow"
 "Straight pipe", len=3.5
 "90ø long radius elbow"
 "Straight pipe", len=10.5
 "45ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=10.55
 "90ø long radius elbow"
 "Straight pipe", len=18.25
 "90ø long radius elbow"
 "Straight pipe", len=41

link 2A233B->2A233B1 "2A233B>2A233B1 from gear dr res & cntfgl pump rm HX"
 inlet=2A233B, exit=2A233B1, sch=40, mat="stainless steel", dia=6
 "Straight pipe", len=3
 "90ø long radius elbow"
 "45ø long radius elbow"
 "45ø long radius elbow"
 "Straight pipe", len=7.5

link 2A233B1->2A234A "2A233B1>2A234A from gear dr res & cntfgl pump rm HX"
 inlet=2A233B1, exit=2A234A, sch=40, mat="carbon steel", dia=6
```

NETWORK DETAIL (continued)

```
 "Butterfly valve" isolation
 "Straight pipe", len=0.75

link 2A233C->2A233A "2A233C>2A233A from si pmp rm clr 2a"
 inlet=2A233C, exit=2A233A, sch=40, mat="carbon steel", dia=4
 "Increaser", dia=6

link 2A234->2A253 "2A234>2A253 from air cond eqpt 2a"
 inlet=2A234, exit=2A253, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2
 "Butterfly valve" isolation
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1.75

link 2A234A->2A234 "2A234A>2A234 from emer gas treatm rm cooler"
 inlet=2A234A, exit=2A234, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=5

link 2A235->2A900 "to ccs hx 2A 1&2"
 inlet=2A235, exit=2A900, sch=STD, mat="carbon steel", dia=24
 "Straight pipe", len=4.42
 "90ø long radius elbow"
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=6.8
 "Butterfly valve" isolation
 "Straight pipe", len=7
 "90ø long radius elbow"
 "Straight pipe", len=6
 "45ø long radius elbow"
 "Straight pipe", len=43
 "45ø long radius elbow"
 "Straight pipe", len=6
 "45ø long radius elbow"
 "Straight pipe", len=4.5

link 2A250->2A152 "2A250>2A152 from cs hx 2a"
 inlet=2A250, exit=2A152, sch=STD, mat="carbon steel", dia=18
 "Straight pipe", len=3.5
 "90ø long radius elbow"
 "Straight pipe", len=2
 "butterfly valve", Cv=695
 "Straight pipe", len=7
 "90ø long radius elbow"
 "Straight pipe", len=11
 "45ø long radius elbow"
 "Straight pipe", len=7.5
 "45ø long radius elbow"
 "Straight pipe", len=11.5
 "Butterfly valve" isolation
 "Straight pipe", len=16
 "45ø long radius elbow"
 "Straight pipe", len=1.25
 "Increaser", dia=0

link 2A252->2A253A "2A252>2A253A disch hdr A"
 inlet=2A252, exit=2A253A, sch=STD, mat="carbon steel", dia=20
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=53.5
 "90ø long radius elbow"
 "Straight pipe", len=12

link 2A252A->2A252 "2A252A>2A252 DISCH HDR A"
 inlet=2A252A, exit=2A252, sch=STD, mat="carbon steel", dia=20
 "Straight pipe", len=1

link 2A253->2A925 "2A253>2A925 disch hdr A"
 inlet=2A253, exit=2A925, sch=STD, mat="carbon steel", dia=20
 "Straight pipe", len=37
 "Increaser", dia=30

link 2A253A->2A253 "2A253A>2A253 disch hdr A"
 inlet=2A253A, exit=2A253, sch=STD, mat="carbon steel", dia=20
 "Straight pipe", len=7

link 2A261->2A261AA "2A261>2A261AA from lcvc 2c"
 inlet=2A261, exit=2A261AA, sch=40, mat="carbon steel", dia=6, HW_C=90
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=4
 "Butterfly valve" isolation
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=14.5
 "90ø long radius elbow"
 "Straight pipe", len=208
 "45ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=12

link 2A261A->2A261 "2A261A>2A261 from rcp & crd clrs 2c"
 inlet=2A261A, exit=2A261, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2

link 2A261AA->2A218 "2A261AA>2A218 from lcvc 2c"
 inlet=2A261AA, exit=2A218, sch=40, mat="carbon steel", dia=6
 "Orifice", diameter_ratio=0.69355, flow=500, dp=50
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=12
 "45ø long radius elbow"
 "Straight pipe", len=3
 "45ø long radius elbow"
 "Increaser", dia=8

link 2A262->2A262AA "2A262>2A262AA from lcvc, crd vnt, rcp clrs 2a"
 inlet=2A262, exit=2A262AA, sch=40, mat="carbon steel", dia=6, HW_C=75
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=3
 "90ø long radius elbow"
 "Straight pipe", len=1
 "Butterfly valve" isolation
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Butterfly valve" isolation
 "Straight pipe", len=4.5
 "90ø long radius elbow"
 "Straight pipe", len=20
 "90ø long radius elbow"
 "Straight pipe", len=5.5
 "90ø long radius elbow"
 "Straight pipe", len=6
 "90ø long radius elbow"
 "Straight pipe", len=1
 "45ø long radius elbow"
 "Straight pipe", len=2
 "45ø long radius elbow"
 "Straight pipe", len=7

link 2A262A->2A262 "2A262A>2A262 from rcd vnt, rcp clrs 2a"
 inlet=2A262A, exit=2A262, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2

link 2A262AA->2A218 "2A262AA>2A218 from lcvc, crd vnt, rcp clrs 2a"
 inlet=2A262AA, exit=2A218, sch=40, mat="carbon steel", dia=6
 "Orifice", diameter_ratio=0.69355, flow=500, dp=50
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=5

link 2A263->2A223 "2A263>2A223 ucvc 2c"
 inlet=2A263, exit=2A223, sch=40, mat="carbon steel", dia=2
 "other", flow=23, dp=4.03

link 2A264->2A224 "2A264>2A224 ucvc 2a"
 inlet=2A264, exit=2A224, sch=40, mat="carbon steel", dia=2
 "other", flow=23, dp=4.03

link 2A266B->2A266C "2A266B>2A266C from ucvc 2a"
 inlet=2A266B, exit=2A266C, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=3
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=1

link 2A266B->2A266E "2A266B>2A266E from ucvc 2a (bypass)"
 inlet=2A266B, exit=2A266E, sch=40, mat="carbon steel", dia=2
```

NETWORK DETAIL (continued)

```
 fixed_flow=0
 "Straight pipe", len=1

link 2A266C->2A225 "2A266C>2A225 from ucvc 2a"
 inlet=2A266C, exit=2A225, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "Increaser", dia=3

link 2A266G->2A266C "2A266G>2A266C from ucvc 2a (bypass)"
 inlet=2A266G, exit=2A266C, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "globe Valve" isolation
 "Straight pipe", len=1

link 2A267->2A267A "2A267>2A267A from ucvc 2c"
 inlet=2A267, exit=2A267A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2
 "globe Valve" isolation, Cv=172
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1

link 2A267A->2A267B "2A267A>2A267B from ucvc 2c"
 inlet=2A267A, exit=2A267B, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=4.5
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=18.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=2.75
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=2
 "globe Valve" isolation, Cv=172
```

NETWORK DETAIL (continued)

```
"Straight pipe", len=1
"standard Elbow"
"Straight pipe", len=2.75
"standard Elbow"
"Straight pipe", len=3
"45ø elbow"
"Straight pipe", len=3
"45ø elbow"
"Straight pipe", len=8
"45ø elbow"
"Straight pipe", len=1
"45ø elbow"
"Straight pipe", len=10
"45ø elbow"
"Straight pipe", len=1.5
"45ø elbow"
"Straight pipe", len=9.25
"standard Elbow"
"Straight pipe", len=31
"45ø elbow"
"Straight pipe", len=9
"45ø elbow"
"Straight pipe", len=7
"45ø elbow"
"Straight pipe", len=2
"45ø elbow"
"Straight pipe", len=5
"45ø elbow"
"Straight pipe", len=1
"45ø elbow"
"Straight pipe", len=2
"45ø elbow"
"Straight pipe", len=1
"45ø elbow"
"Straight pipe", len=7
"45ø elbow"
"Straight pipe", len=1.5
"45ø elbow"
"Straight pipe", len=11
"standard Elbow"
"Straight pipe", len=7
"standard Elbow"
"Straight pipe", len=3.75
"standard Elbow"
"Straight pipe", len=3
"45ø elbow"
"Straight pipe", len=0.5
"45ø elbow"
"Straight pipe", len=3
"45ø elbow"
"Straight pipe", len=0.5
"45ø elbow"
"Straight pipe", len=6
"standard Elbow"
"Straight pipe", len=1.5
"standard Elbow"
"Straight pipe", len=2
"standard Elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=6
 "45ø elbow"
 "Straight pipe", len=0.75
 "45ø elbow"
 "Straight pipe", len=5.5
 "Orifice", diameter_ratio=0.56655, flow=25, dp=25
 "Straight pipe", len=2

link 2A267A->2A267F "2A267A>2A267F"
 inlet=2A267A, exit=2A267F, sch=40, mat="stainless steel", dia=0.5
 fixed_flow=0
 "Straight pipe", len=1

link 2A267B->2A267C "2A267B>2A267C from ucvc 2c"
 inlet=2A267B, exit=2A267C, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=1
 "globe Valve" throttle
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=3
 "Gate valve" isolation, Cv=70
 "Straight pipe", len=1

link 2A267B->2A267E "2A267B>2A267E from ucvc 2c (bypass)"
 inlet=2A267B, exit=2A267E, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=1

link 2A267C->2A225 "2A267C>2A225 from ucvc 2c"
 inlet=2A267C, exit=2A225, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1

link 2A267D->2A267 "2A267D>2A267"
 inlet=2A267D, exit=2A267, sch=40, mat="stainless steel", dia=0.5
 fixed_flow=0
 "Straight pipe", len=1

link 2A267G->2A267C "2A267G>2A267C from ucvc 2c (bypass)"
 inlet=2A267G, exit=2A267C, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Gate valve" isolation
 "Straight pipe", len=1

link 2A270->2A270A "2A270>2A270A crd vent clr 2a"
 inlet=2A270, exit=2A270A, sch=40, mat="carbon steel", dia=3
 "other", flow=84, dp=0.74

link 2A270A->2A270B "2A270A>2A270B from crd vnt clr 2a"
 inlet=2A270A, exit=2A270B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=4.1
 "90ø long radius elbow"
 "Straight pipe", len=2.3
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=1.2
 "90ø long radius elbow"
 "Straight pipe", len=6.1
 "Orifice", diameter_ratio=0.58470, flow=84, dp=50
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=12.3
 "90ø long radius elbow"
 "Straight pipe", len=3.9
 "45ø long radius elbow"
 "Straight pipe", len=3.7
 "90ø long radius elbow"
 "Straight pipe", len=1.1
 "90ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "90ø long radius elbow"
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=5
 "globe Valve" throttle
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "other: Demister", dp=23, flow=100

link 2A270B->2A262A "2A270B>2A262A from crd vnt, rcp clrs 2a"
 inlet=2A270B, exit=2A262A, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=5.5
 "Increaser", dia=0

link 2A271->2A271A "2A271>2A271A crd vnt clr 2c"
 inlet=2A271, exit=2A271A, sch=40, mat="carbon steel", dia=3
 "other", flow=84, dp=0.74

link 2A271A->2A271B "2A271A>2A271B from crd vnt clr 2c"
 inlet=2A271A, exit=2A271B, sch=40, mat="carbon steel", dia=3
 "Straight pipe", len=4.1
 "90ø long radius elbow"
 "Straight pipe", len=2.3
 "90ø long radius elbow"
 "Straight pipe", len=1.2
 "90ø long radius elbow"
 "Straight pipe", len=6.1
 "Orifice", diameter_ratio=0.58470, flow=84, dp=50
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=12.3
 "90ø long radius elbow"
 "Straight pipe", len=3.9
 "45ø long radius elbow"
 "Straight pipe", len=3.7
 "90ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.1
 "90ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=5.2
 "90ø long radius elbow"
 "Straight pipe", len=6.5
 "90ø long radius elbow"
 "Straight pipe", len=5
 "globe Valve" throttle, Cv=294
 "90ø long radius elbow"
 "Straight pipe", len=2
 "90ø long radius elbow"
 "Straight pipe", len=2.5
 "90ø long radius elbow"
 "Straight pipe", len=0.75
 "other: Demister", dp=18, flow=100

link 2A271B->2A261A "2A271B>2A261A from crd vnt clr 2c"
 inlet=2A271B, exit=2A261A, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=5.5
 "Increaser", dia=0

link 2A291->2A2A1 "2A291>2A2A1 to dsl gen 2a1"
 inlet=2A291, exit=2A2A1, sch=40, mat="carbon steel", dia=6
 "Straight pipe", len=2
 "Straight pipe", len=1
 "other", flow=660, dp=3

link 2A291->2B209E "2A291>2B209E dsl gen cross 2a1, 2a2"
 inlet=2A291, exit=2B209E, sch=40, mat="carbon steel", dia=6, HW_C=81
 "Straight pipe", len=1.25
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=7.9
 "90ø long radius elbow"
 "Straight pipe", len=63
 "90ø long radius elbow"
 "Straight pipe", len=7.9
 "90ø long radius elbow"
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Straight pipe", len=1.25

link 2A292->2A295 "2A292>2A295 from dsl gen 2a1, 2a2"
 inlet=2A292, exit=2A295, sch=40, mat="carbon steel", dia=8, HW_C=85
 "Straight pipe", len=31.5
 "90ø long radius elbow"
 "Straight pipe", len=7.67
 "90ø long radius elbow"
 "Straight pipe", len=11

link 2A292A->2A292 "2A292A>2A292 from dsl gen 2a2"
 inlet=2A292A, exit=2A292, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1

link 2A295->1A196 "2A295>1A196 from dsl gen clrs 2a"
```

NETWORK DETAIL (continued)

```
 inlet=2A295, exit=1A196, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1
 "butterfly valve", Cv=300
 "Straight pipe", len=1
 "Straight pipe", len=1.75
 "90ø long radius elbow"
 "Straight pipe", len=7.7
 "90ø long radius elbow"
 "Straight pipe", len=5.75

link 2A295->1B297 "2A295>1B297 from dsl gen 2a"
 inlet=2A295, exit=1B297, sch=40, mat="carbon steel", dia=8
 "Straight pipe", len=1.5
 "butterfly valve", Cv=300
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=2
 "Straight pipe", len=1.75
 "90ø long radius elbow"
 "Straight pipe", len=8.5
 "90ø long radius elbow"
 "Straight pipe", len=6.75

link 2A2A1->2FE6769 "2A2A1>2FE6769 from dsl gen 2a1"
 inlet=2A2A1, exit=2FE6769, sch=40, mat="carbon steel", dia=6, HW_C=52, red=0.2
 "Straight pipe", len=1
 "butterfly valve", Cv=202.38
 "Straight pipe", len=9
 "90ø long radius elbow"
 "Straight pipe", len=16

link 2A2A2->2FE67277 "2A2A2>2FE67277 from dsl gen 2a2"
 inlet=2A2A2, exit=2FE67277, sch=40, mat="carbon steel", dia=6, HW_C=42, red=0.2
 "Straight pipe", len=1
 "butterfly valve", Cv=377.06
 "Straight pipe", len=9
 "90ø long radius elbow"
 "Straight pipe", len=16

link 2A301->2A301B "2A301>2A301B to el 690 & 714 pen rm clrs"
 inlet=2A301, exit=2A301B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=4
 "45ø elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=13.5

link 2A301->2A301H "2A301>2A301H to pen rm clrs"
 inlet=2A301, exit=2A301H, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.25
 "Decreaser", dia=0

link 2A301A->2A301 "2A301A>2A301 to pen rm coolers"
 inlet=2A301A, exit=2A301, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=36
 "45ø long radius elbow"
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=4
 "45ø long radius elbow"
 "Straight pipe", len=6
 "45ø long radius elbow"
 "Straight pipe", len=4
 "45ø long radius elbow"
 "Straight pipe", len=2.5

link 2A301A->2A346A "2A301A>2A346A to pen rm clr 2a..."
 inlet=2A301A, exit=2A346A, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=1.5
 "45ø elbow"
 "Straight pipe", len=1.5
 "45ø elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=0.5
 "45ø elbow"
 "Straight pipe", len=5
 "Decreaser", dia=0

link 2A301B->2A354A1 "2A301B>2A354A1 to el 714 pen rm clr 2a"
 inlet=2A301B, exit=2A354A1, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=10
 "45ø elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=5
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=11
 "standard Elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=26.6
 "standard Elbow"
 "Straight pipe", len=15.5

link 2A301B->2A416 "2A301B>2A416 to el 690 pen rm clr"
 inlet=2A301B, exit=2A416, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 2A301C->2A301C1 "2A301C>2A301C1 to pen rm clr 2a..."
 inlet=2A301C, exit=2A301C1, sch=40, mat="stainless steel", dia=2
```

NETWORK DETAIL (continued)

```
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A301C->2A347A "2A301C>2A347A from pen rm clr 2a..."
 inlet=2A301C, exit=2A347A, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=2.6
 "standard Elbow"
 "Decreaser", dia=0

link 2A301D->2A301D1 "2A301D>2A301D1 from pen rm clr 2a..."
 inlet=2A301D, exit=2A301D1, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A301D->2A609B "2A301D>2A609B from pen rm clr 2a..."
 inlet=2A301D, exit=2A609B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 2A301E->2A301E1 "2A301E>2A301E1 to pen rm clr 2a"
 inlet=2A301E, exit=2A301E1, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A301E->2A301E2 "2A301E>2A301E2 to pen rm clr 2a"
 inlet=2A301E, exit=2A301E2, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 2A301E2->2A610A "2A301E2>2A610A from pen rm clr 2a..."
 inlet=2A301E2, exit=2A610A, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=2
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=1.75
 "globe Valve" throttle
 "Straight pipe", len=1.5
 "other: Demister", dp=20, flow=30
 "Increaser", dia=0

link 2A301F->2A301F1 "2A301F>2A301F1 from pipe ch clr 2a"
 inlet=2A301F, exit=2A301F1, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1.5

link 2A301F1->2A301F2 "2A301F1>2A301F2 from pipe ch clr 2a"
 inlet=2A301F1, exit=2A301F2, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A301F1->2A302C "2A301F1>2A302C from pipe ch clr 2a"
 inlet=2A301F1, exit=2A302C, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2.25
 "standard Elbow"
 "Straight pipe", len=2
 "Orifice", diameter ratio=0.65194, flow=70, dp=100
 "Straight pipe", len=1.75
 "globe Valve" throttle
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.25
 "other: Demister", dp=6, flow=30
 "Increaser", dia=0

link 2A301G->2A302 "2A301G>2A302 from el 690 & 714 pen rm clrs 2a"
 inlet=2A301G, exit=2A302, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=13.5
 "standard Elbow"
 "Straight pipe", len=5

link 2A301H->2A303 "2A301H>2A303 to pipe ch clr 2a"
 inlet=2A301H, exit=2A303, sch=40, mat="carbon steel", dia=2.5
 "Straight pipe", len=28
 "standard Elbow"
 "Straight pipe", len=5.5
 "standard Elbow"
 "Straight pipe", len=12.75
 "Decreaser", dia=0

link 2A301J->2A301A "2A301J>2A301A to pmp rm clrs"
 inlet=2A301J, exit=2A301A, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=0.5
 "Butterfly valve" isolation
 "Straight pipe", len=5.5
 "90ø long radius elbow"
 "Straight pipe", len=5.5
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=8
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=42
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=1.75
 "90ø long radius elbow"
 "Straight pipe", len=23

link 2A302->2A302A "2A302>2A302A from pen rm cooler"
 inlet=2A302, exit=2A302A, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=3.5
 "45ø long radius elbow"
 "Straight pipe", len=4
 "45ø long radius elbow"
 "Straight pipe", len=6.5
 "45ø long radius elbow"
 "Straight pipe", len=4
 "45ø long radius elbow"
 "Straight pipe", len=36
 "90ø long radius elbow"
 "Straight pipe", len=1.2

link 2A302A->2A233A "2A302A>2A233A from pen rm cooler"
 inlet=2A302A, exit=2A233A, sch=40, mat="carbon steel", dia=4
 "Straight pipe", len=21.4
```

NETWORK DETAIL (continued)

```
 "90ø long radius elbow"
 "Straight pipe", len=1
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=1.83
 "90ø long radius elbow"
 "Straight pipe", len=2.25
 "90ø long radius elbow"
 "Straight pipe", len=1.83
 "90ø long radius elbow"
 "Straight pipe", len=34.75
 "90ø long radius elbow"
 "Straight pipe", len=5
 "90ø long radius elbow"
 "Straight pipe", len=8
 "90ø long radius elbow"
 "Straight pipe", len=5.5
 "90ø long radius elbow"
 "Straight pipe", len=5.5
 "Butterfly valve" isolation
 "Straight pipe", len=0.25
 "Increaser", dia=6

link 2A302C->2A302 "2A302C>2A302 from pipe clr 2a"
 inlet=2A302C, exit=2A302, sch=40, mat="carbon steel", dia=2.5
 "Straight pipe", len=8.5
 "standard Elbow"
 "Straight pipe", len=5.5
 "standard Elbow"
 "Straight pipe", len=26
 "Increaser", dia=4

link 2A303->2A303A1 "2A303>2A303A1 to pipe ch clr 2a"
 inlet=2A303, exit=2A303A1, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1
 "globe Valve" isolation
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1

link 2A303A1->2A303A2 "2A303A1>2A303A2 to pipe ch clr 2a"
 inlet=2A303A1, exit=2A303A2, sch=40, mat="carbon steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A303A1->2A303A3 "2A303A1>2A303A3 to pipe ch clr 2a"
 inlet=2A303A1, exit=2A303A3, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=1.5
 "Increaser", dia=0

link 2A303A3->2A301F "2A303A3>2A301F to pipe ch clr 2a"
 inlet=2A303A3, exit=2A301F, sch=40, mat="carbon steel", dia=2.5
 "Straight pipe", len=0.5
```

NETWORK DETAIL (continued)

```
 "other", flow=21, dp=0.48
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 2A346A->2A346B "2A346A>2A346B to pen rm clr 2a..."
 inlet=2A346A, exit=2A346B, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.5
 "globe Valve" isolation
 "Straight pipe", len=0.25
 "Increaser", dia=0

link 2A346B->2A346B1 "2A346B>2A346B1 to pen rm clr 2a..."
 inlet=2A346B, exit=2A346B1, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=1

link 2A346B1->2A301C "2A346B1>2A301C to pen rm clr 2a..."
 inlet=2A346B1, exit=2A301C, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=2
 "other", flow=12, dp=0.4
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=2.5

link 2A346B1->2A346B2 "2A346B1>2A346B2 to pen rm clr 2a..."
 inlet=2A346B1, exit=2A346B2, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A347A->2A347B "2A347A>2A347B from pen rm clr 2a..."
 inlet=2A347A, exit=2A347B, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=1.5
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=1
 "globe Valve" throttle
 "other: Demister", dp=0.6, flow=30

link 2A347B->2A608A "2A347B>2A608A from pen rm clr 2a..."
 inlet=2A347B, exit=2A608A, sch=40, mat="carbon steel", dia=1.5
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 2A350->2A184 "2A350>2A184 to cs cooler 2a"
 inlet=2A350, exit=2A184, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=15
 "45ø elbow"
 "Straight pipe", len=3
 "45ø elbow"
 "Straight pipe", len=4.5
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=1
```

NETWORK DETAIL (continued)

```
 "standard Elbow"
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=8
 "standard Elbow"
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 2A350->2A350A1 "2A350>2A350A1 to rhr clr 2a"
 inlet=2A350, exit=2A350A1, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 2A350A->2A350A2 "2A350A>2A350A2 from cs pmp clr 2a"
 inlet=2A350A, exit=2A350A2, sch=40, mat="stainless steel", dia=2
 "standard Elbow"
 "Straight pipe", len=4.5
 "Decreaser", dia=0

link 2A350A->2A350A3 "2A350A>2A350A3 from cs pmp clr 2a"
 inlet=2A350A, exit=2A350A3, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A350A1->2A188 "2A350A1>2A188 to rhr clr 2a"
 inlet=2A350A1, exit=2A188, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=13
 "standard Elbow"
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=9.1
 "standard Elbow"
 "Straight pipe", len=8.5
 "standard Elbow"
 "Straight pipe", len=1
 "Decreaser", dia=0

link 2A350A2->2A605A "2A350A2>2A605A from cs pmp clr 2a"
 inlet=2A350A2, exit=2A605A, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=4
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=1.75
 "other: Demister", dp=5, flow=30
 "Increaser", dia=0

link 2A350B->2A350C "2A350B>2A350C from rhr clr 2a"
 inlet=2A350B, exit=2A350C, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=9
 "standard Elbow"
 "Straight pipe", len=16
 "Increaser", dia=0

link 2A350C->2A350D "2A350C>2A350D from rhr clr 2a"
 inlet=2A350C, exit=2A350D, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=2
```

NETWORK DETAIL (continued)

```
link 2A350D->2A189 "2A350D>2A189 from rhr clr 2a"
 inlet=2A350D, exit=2A189, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.25
 "Decreaser", dia=0

link 2A350D->2A350E "2A350D>2A350E from rhr clr 2a"
 inlet=2A350D, exit=2A350E, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A351->2A351A "2A351>2A351A from 2a cs & rhr clrs"
 inlet=2A351, exit=2A351A, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=5.08

link 2A351A->2A351A1 "2A351A>2A351A1 from si pmp rm clr 2a"
 inlet=2A351A, exit=2A351A1, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=8.75
 "standard Elbow"
 "Straight pipe", len=6.75
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"

link 2A351A1->2A233C "2A351A1>2A233C from si pmp rm clr 2a"
 inlet=2A351A1, exit=2A233C, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=2
 "Gate valve" isolation, Cv=70
 "Increaser", dia=0

link 2A354A->2A354B "2A354A>2A354B to pen rm clr 2a..."
 inlet=2A354A, exit=2A354B, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.5
 "globe Valve" isolation
 "Straight pipe", len=0.5
 "Increaser", dia=0

link 2A354A1->2A354A "2A354A1>2A354A to pen rm clr 2a..."
 inlet=2A354A1, exit=2A354A, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=1.3
 "standard Elbow"
 "Straight pipe", len=1
 "Decreaser", dia=0

link 2A354A1->2A354A2 "2A354A1>2A354A2 to pen rm clr 2a..."
 inlet=2A354A1, exit=2A354A2, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A354B->2A301E "2A354B>2A301E to pen rm clr 2a"
 inlet=2A354B, exit=2A301E, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=2.5
 "other", flow=18, dp=0.29
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=3.8

link 2A387A->2A387B "2A387A>2A387B from ba trans & aux fw pmp rm clr 2a"
 inlet=2A387A, exit=2A387B, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=2.3
 "standard Elbow"
 "Straight pipe", len=1.6

link 2A387B->2A234 "2A387B>2A234 from ba trans & aux fw pmp rm clr 2a"
 inlet=2A387B, exit=2A234, sch=40, mat="stainless steel", dia=2, HW_C=135
 "Straight pipe", len=1.2
 "standard Elbow"
 "Straight pipe", len=7.7
 "Orifice", diameter_ratio=0.67561, flow=42, dp=30
 "Straight pipe", len=5.3
 "standard Elbow"
 "Straight pipe", len=4.7
 "standard Elbow"
 "Straight pipe", len=25.5
 "standard Elbow"
 "Straight pipe", len=11.9
 "standard Elbow"
 "Straight pipe", len=17.2
 "standard Elbow"
 "Straight pipe", len=1.5
 "globe valve", Leq=40
 "Straight pipe", len=1.4
 "globe valve", Leq=40
 "Straight pipe", len=1.6
 "standard Elbow"
 "Straight pipe", len=14.1
 "standard Elbow"
 "Straight pipe", len=2.25
 "standard Elbow"
 "Straight pipe", len=3
 "standard Elbow"
 "Straight pipe", len=59.5
 "standard Elbow"
 "Straight pipe", len=1.75
 "standard Elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=3.5

link 2A387B->2A387C "2A387B>2A387C tw dead end"
 inlet=2A387B, exit=2A387C, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A416->2A416A "2A416>2A416A to pen rm clr 2a..."
 inlet=2A416, exit=2A416A, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1
```

NETWORK DETAIL (continued)

```
 "45ø elbow"
 "Straight pipe", len=13.25
 "standard Elbow"
 "Straight pipe", len=11
 "standard Elbow"
 "Straight pipe", len=11
 "standard Elbow"
 "Straight pipe", len=1
 "globe Valve" isolation
 "Straight pipe", len=1
 "Increaser", dia=2

link 2A416A->2A301D "2A416A>2A301D to pen rm clr 2a..."
 inlet=2A416A, exit=2A301D, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.3
 "other", flow=7, dp=0.32
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.5

link 2A416A->2A416A1 "2A416A>2A416A1 to pen rm clr 2a..."
 inlet=2A416A, exit=2A416A1, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A507->2A209D "2A507>2A209D to dsl gen clr 1b2, 2b2"
 inlet=2A507, exit=2A209D, sch=40, mat="carbon steel", dia=14, HW_C=110
 "Straight pipe", len=4
 "90ø long radius elbow"
 "Butterfly valve" isolation
 "Straight pipe", len=40
 "90ø long radius elbow"
 "Straight pipe", len=50.5
 "90ø long radius elbow"
 "Straight pipe", len=180
 "45ø long radius elbow"
 "Straight pipe", len=8
 "45ø long radius elbow"
 "Straight pipe", len=5

link 2A507->2A219 "2A507>2A219 stub, dsl gen"
 inlet=2A507, exit=2A219, sch=STD, mat="carbon steel", dia=24
 fixed_flow=0
 "Straight pipe", len=1

link 2A524A->2A524B "2A524A>2A524B to instr rm water clr 1a"
 inlet=2A524A, exit=2A524B, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=24.75
 "45ø elbow"
 "Straight pipe", len=21.25
 "45ø elbow"
 "Straight pipe", len=18
 "Increaser", dia=0
```

NETWORK DETAIL (continued)

```
link 2A524B->2A524C "2A524B>2A524C to instr rm water clr 1a"
 inlet=2A524B, exit=2A524C, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1

link 2A524C->2A524D "2A524C>2A524D tw dead end"
 inlet=2A524C, exit=2A524D, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A524C->2A524E "2A524C>2A524E to instr rm water clr 1a"
 inlet=2A524C, exit=2A524E, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "Decreaser", dia=0

link 2A524E->2A524F "2A524E>2A524F to instr rm water clr 1a"
 inlet=2A524E, exit=2A524F, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=4.4
 "standard Elbow"
 "Straight pipe", len=8.9
 "45ø elbow"
 "Straight pipe", len=0.7
 "45ø elbow"
 "Straight pipe", len=1.1
 "Gate valve" isolation, Cv=56
 "Straight pipe", len=0.3
 "Decreaser", dia=0

link 2A524F->2A524G "2A524F>2A524G to instr rm water clr 1a"
 inlet=2A524F, exit=2A524G, sch=40, mat="stainless steel", dia=1
 "Straight pipe", len=2.2
 "globe Valve" throttle
 "Increaser", dia=0

link 2A524G->2A524H "2A524G>2A524H to instr rm water clr 1a"
 inlet=2A524G, exit=2A524H, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.2
 "standard Elbow"
 "Straight pipe", len=1.2
 "Decreaser", dia=0

link 2A524H->2A524I "2A524H>2A524I to instr rm water clr 2a"
 inlet=2A524H, exit=2A524I, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=1.1
 "standard Elbow"
 "Straight pipe", len=2.2
 "other", flow=35, dp=5.54

link 2A524I->2A524J "2A524I>2A524J from instr rm water clr 1a"
 inlet=2A524I, exit=2A524J, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=1.9
 "Increaser", dia=0

link 2A524J->2A524K "2A524J>2A524K from instr rm water clr 1a"
 inlet=2A524J, exit=2A524K, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=1.2
 "standard Elbow"
 "Straight pipe", len=1.2
```

NETWORK DETAIL (continued)

```
link 2A524K->2A524L "2A524K>2A524L from instr rm water clr 1a"
 inlet=2A524K, exit=2A524L, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=4.6
 "45ø elbow"
 "Straight pipe", len=0.7
 "45ø elbow"
 "Straight pipe", len=9.3

link 2A524L->2A524M "2A524L>2A524M from instr rm water clr 1a"
 inlet=2A524L, exit=2A524M, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5

link 2A524M->2A524N "2A524M>2A524N tw dead end"
 inlet=2A524M, exit=2A524N, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.5

link 2A524M->2A524O "2A524M>2A524O from instr rm water clr 1a"
 inlet=2A524M, exit=2A524O, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=4.6
 "standard Elbow"
 "Straight pipe", len=1

link 2A524O->2A524P "2A524O>2A524P from instr rm water clr 1a"
 inlet=2A524O, exit=2A524P, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=5.6
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=2.1
 "globe Valve" throttle
 "Straight pipe", len=11.1
 "standard Elbow"
 "Straight pipe", len=13.4
 "45ø elbow"
 "Straight pipe", len=13.1
 "45ø elbow"
 "Straight pipe", len=9.5
 "standard Elbow"
 "Straight pipe", len=11.5
 "standard Elbow"
 "Straight pipe", len=1.5
 "45ø elbow"
 "Straight pipe", len=5

link 2A524P->2A218A "2A524P>2A218A from instr rm water clr 1a"
 inlet=2A524P, exit=2A218A, sch=40, mat="carbon steel", dia=1.5
 "Gate valve" isolation, Cv=56
 "Straight pipe", len=1.7

link 2A600A->2A600B "2A600A>2A600B to cent chg pmp rm clr 2a"
 inlet=2A600A, exit=2A600B, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=0.92
 "Gate valve" isolation, Cv=70
```

NETWORK DETAIL (continued)

```
 "Straight pipe", len=0.5

link 2A600B->2A600C "2A600B>2A600C to cent chg pmp rm clr 2a"
 inlet=2A600B, exit=2A600C, sch=40, mat="stainless steel", dia=2
 "globe Valve" isolation
 "Straight pipe", len=0.92

link 2A600C->2A600D "2A600C>2A600D tw dead end"
 inlet=2A600C, exit=2A600D, sch=40, mat="stainless steel", dia=2
 fixed_flow=0
 "Straight pipe", len=0.75

link 2A600C->2A600E "2A600C>2A600E to cent chg pmp rm clr 2a"
 inlet=2A600C, exit=2A600E, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=3.8
 "45ø elbow"
 "Straight pipe", len=2.4
 "45ø elbow"
 "Straight pipe", len=7.8
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=2.2
 "45ø elbow"
 "Straight pipe", len=0.7
 "standard Elbow"
 "Straight pipe", len=4.25
 "standard Elbow"
 "Straight pipe", len=1.1
 "standard Elbow"
 "Straight pipe", len=19.42
 "standard Elbow"
 "Straight pipe", len=1.3
 "standard Elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=1.83
 "standard Elbow"
 "Straight pipe", len=1.75
 "standard Elbow"
 "Straight pipe", len=1
 "other", flow=23, dp=3.52

link 2A600E->2A169 "2A600E>2A169 from cent chg pmp rm clr 2a"
 inlet=2A600E, exit=2A169, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=1.85
 "standard Elbow"
 "Straight pipe", len=1.67
 "standard Elbow"
 "Straight pipe", len=1.85
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=15.25
```

NETWORK DETAIL (continued)

```
 "standard Elbow"
 "Straight pipe", len=2.3
 "standard Elbow"
 "Straight pipe", len=4.25
 "standard Elbow"
 "Straight pipe", len=2.4
 "standard Elbow"
 "Straight pipe", len=0.75
 "standard Elbow"
 "Straight pipe", len=8.2
 "45ø elbow"
 "Straight pipe", len=2.5
 "45ø elbow"
 "Decreaser", dia=0

link 2A605A->2A351 "2A605A>2A351 from cs pmp clr 2a"
 inlet=2A605A, exit=2A351, sch=40, mat="stainless steel", dia=2
 "standard Elbow"
 "Straight pipe", len=1.25
 "globe Valve" throttle
 "Straight pipe", len=2.5
 "standard Elbow"
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=9
 "standard Elbow"
 "Straight pipe", len=0.6
 "standard Elbow"
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=3.5
 "45ø elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=15
 "standard Elbow"
 "Straight pipe", len=2.5

link 2A606B->2A351 "2A606B>2A351 from rhr clr 2a"
 inlet=2A606B, exit=2A351, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.25
 "standard Elbow"
 "Straight pipe", len=2
 "globe Valve" throttle
 "Straight pipe", len=2
 "standard Elbow"
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=9.1
 "standard Elbow"
 "Straight pipe", len=8
 "standard Elbow"
 "Straight pipe", len=12
 "standard Elbow"
 "Straight pipe", len=2
 "Increaser", dia=2
```

NETWORK DETAIL (continued)

```
link 2A608A->2A302A "2A608A>2A302A from pen rm clr 2a..."
 inlet=2A608A, exit=2A302A, sch=40, mat="carbon steel", dia=2
 "Straight pipe", len=4
 "45ø elbow"
 "Straight pipe", len=0.5
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=2
 "45ø elbow"
 "Straight pipe", len=0.5

link 2A609B->2A301G "2A609B>2A301G from pen rm clr 2a..."
 inlet=2A609B, exit=2A301G, sch=40, mat="stainless steel", dia=1.5
 "Straight pipe", len=0.5
 "standard Elbow"
 "Straight pipe", len=2.9
 "Orifice", diameter_ratio=0.62819, flow=30, dp=60
 "Straight pipe", len=1.1
 "globe Valve" throttle
 "Straight pipe", len=4.4
 "standard Elbow"
 "Straight pipe", len=10.4
 "standard Elbow"
 "Straight pipe", len=14
 "45ø elbow"
 "Straight pipe", len=1.5
 "standard Elbow"
 "Straight pipe", len=0.5
 "other: Demister", dp=17, flow=30
 "Increaser", dia=2

link 2A610A->2A301G "2A610A>2A301G from el 714 pen rm clr 2a"
 inlet=2A610A, exit=2A301G, sch=40, mat="stainless steel", dia=2
 "Straight pipe", len=8
 "standard Elbow"
 "Straight pipe", len=25
 "45ø elbow"
 "Straight pipe", len=3
 "45ø elbow"
 "Straight pipe", len=5
 "standard Elbow"
 "Straight pipe", len=18
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=1
 "standard Elbow"
 "Straight pipe", len=10
 "standard Elbow"
 "Straight pipe", len=1
 "45ø elbow"
 "Straight pipe", len=10
 "45ø elbow"
 "Straight pipe", len=1
```