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<b>How to Build the Hanford Right LVEA-X Station EPICS Vacuum Controls System</b>
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*Distribution of this draft:*  
Hanford CDS, Operators

This is an internal working note  
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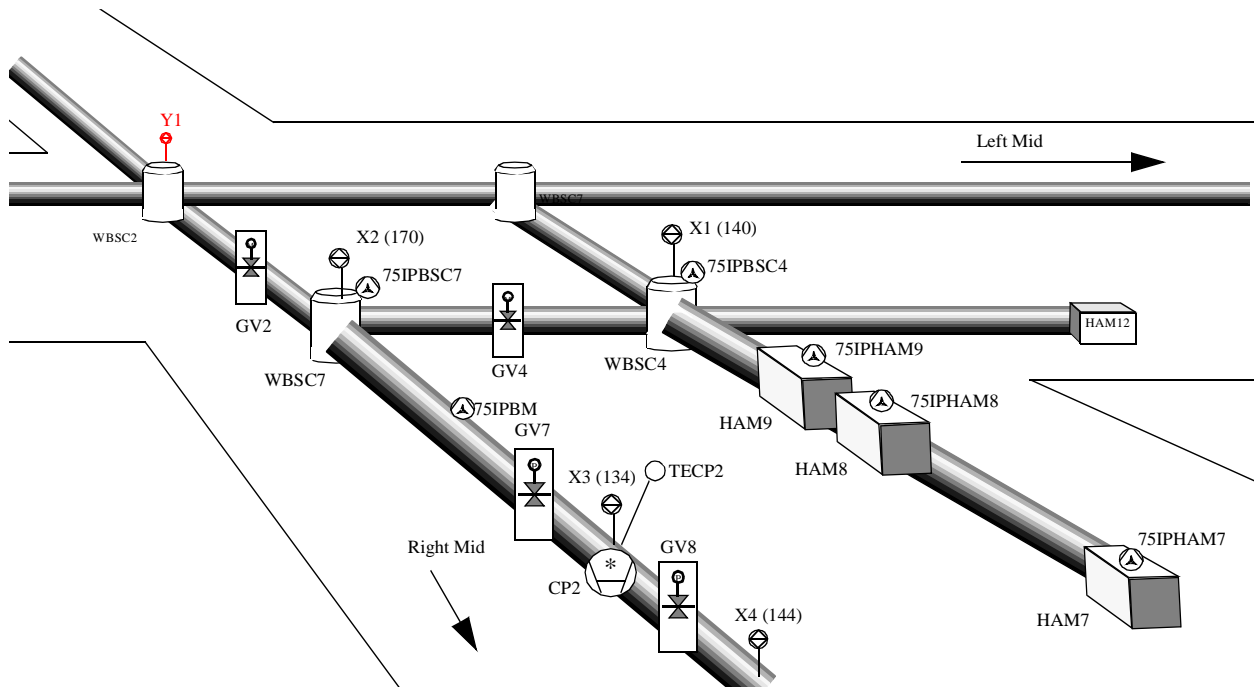
**1.0 The Hanford Left LVEA-X Station.**

The Hanford Left LVEA-X Vacuum Station is designated LX.  
 The Vacuum system comprises:

**Table 1: Hanford LX Vacuum Systems.**

System	#1	#2	#3	#4	#5	#6
Gauge Pairs	X1	X2	X3	X4		
Gate Valve (Electric)	GV2	GV4				
Gate Valve (Pneumatic)	GV7	GV8				
Cryo Pumps	CP2					
Thermocouples	TECP2					
2500l/s Ion Pumps						
75l/s Ion Pumps	75I BSC4	75IP BSC7	75IP BM	75IP HAM7	75IP HAM8	75IP HAM9

The vacuum equipment is arranged in the following order:



**2.0 File Definitions.**

**Table 2: File Macro Definitions.**

Macro	Path
\$(GENERIC)	/opt/ligo/b/epics/apple/Hanford/VE/GENERIC
\$(OPI_GENERIC)	/opt/ligo/b/epics/apple/Hanford/VE/opi/medm/GENERIC

**Table 2: File Macro Definitions.**

<b>Macro</b>	<b>Path</b>
\$(LX_TEST)	/opt/ligo/b/epics/apple/Hanford/VE/hanford62/test
\$(CONFIG_LX_TEST)	/opt/ligo/b/epics/apple/Hanford/VE/CONFIG/LX/test
\$(OPI_LX)	/opt/ligo/b/epics/apple/Hanford/VE/opi/medm/LX
\$(ALH_GEN)	/opt/ligo/b/epics/apple/Hanford/VE/alh/GENERIC
\$(ALH_LX)	/opt/ligo/b/epics/apple/Hanford/VE/alh/LX

### 3.0 Database Generation.

#### 3.1 Gauge Pairs (GP)

Gauge Pairs have two databases; the main database and the emulation database. Makefile is \$(CONFIG\_LX\_TEST)/makefile linked into the \$(LX\_TEST) directory. Build the GP system in the \$(LX\_TEST) directory with the command:

```
> make GP
```

##### 3.1.1 Main Database.

Generic db file is \$(GENERIC)/test/database/VE\_GP\_GEN.db (gdct generated).

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GP.config linked into the \$(LX\_TEST) directory.

Output files are HVE-LX:Xn.db and HVE-LX:XnS.db (n=1,2,3,4).

##### 3.1.2 Emulation Database.

Generic db file is \$(GENERIC)/test/database/VE\_GPE\_GEN.db (gdct generated).

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GPE.config linked into the \$(LX\_TEST) directory.

Output files are HVE-LX:XnE.db (n=1,2,3,4).

#### 3.2 Pneumatic Gate Valves (GVP).

Only one main db file. Emulation records are in this file. Makefile is \$(CONFIG\_LX\_TEST)/makefile linked into the \$(LX\_TEST) directory. GVP requires access to the Gauge Pair configuration files. Build the GVP system with the command:

```
> make GVP
```

##### 3.2.1 Main Database.

Generic db file is \$(GENERIC)/test/database/VE\_GVP\_GEN.db (gdct generated).

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GVP.config linked into the \$(LX\_TEST) directory.

Output files are HVE-LX:GVn.db and HVE-LX:GVnS.db (n=7,8).

#### 3.3 Electric Gate Valves (GVE).

Only one main db file. Emulation records are in this file. Makefile is \$(CONFIG\_LX\_TEST)/makefile linked into the \$(LX\_TEST) directory. GVE requires access to the Gauge Pair configuration files. Build the GVE system with the command:

```
> make GVE
```

##### 3.3.1 Main Database.

Generic db file is \$(GENERIC)/test/database/VE\_GVE\_GEN.db (gdct generated).

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GVE.config linked into the \$(LX\_TEST) directory.

Output files are HVE-LX:GVn.db and HVE-LX:GVnS.db (n=2,4).

#### 3.4 Thermocouples.

Only main db file. Makefile is \$(CONFIG\_LX\_TEST)/makefile linked into the \$(LX\_TEST) directory. Build the TE system with the command:

```
> make TE
```

##### 3.4.1 Main Database.

Generic db file is \$(GENERIC)/test/database/VE\_TE\_GEN.db (gdct generated).

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:TE.config linked into the \$(LX\_TEST) directory.

Output files are HVE-LX:TECP2.db and HVE-LX:TECP2S.db.

### 3.5 Cryo Pumps.

Two database systems are built, the main database and the emulation database. Makefile is \$(CONFIG\_LX\_TEST)/makefile linked into the \$(LX\_TEST) directory. Build the CP system with the command:

```
> make CP
```

#### 3.5.1 Main Database.

Generic db file is \$(GENERIC)/test/database/VE\_CP\_GEN.db (gdct generated).

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:CP.config linked into the \$(LX\_TEST) directory.

Output files are HVE-LX:CP2.db and HVE-LX:CP2S.db.

#### 3.5.2 Emulation Database.

Generic db file is \$(GENERIC)/test/database/VE\_CPE\_GEN.db (gdct generated).

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:CPE.config linked into the \$(LX\_TEST) directory.

Output files are HVE-LX:CP2E.db.

### 3.6 2500l/s Ion Pumps.

No 2500l/s Ion Pumps controlled by LVEA-Y.

### 3.7 75l/s Ion Pumps.

Only main db file. Makefile is \$(CONFIG\_LX\_TEST)/makefile linked into the \$(LX\_TEST) directory. Build the 75IP system with the command:

```
> make 75IP
```

#### 3.7.1 Main Database.

Generic db file is \$(GENERIC)/test/database/VE\_75IP\_GEN.db (gdct generated).

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:75IP.config linked into the \$(LX\_TEST) directory.

Output files are HVE-LX:75IPBSCn.db and HVE-LX:75IPBSCnS.db (n=4,7), HVE-LX:75IPBM.db and HVE-LX:75IPBMS.db, HVE-LX:75IPHAMn.db and HVE-LX:75IPHAMnS.db (n=7,8,9).

### 3.8 Pump Carts.

TBD

### 3.9 Full List of Database Files.

**Table 3: Full database db file list.**

System	File #1	File #2	File #3
GP X1	HVE-LX:X1.db	HVE-LX:X1S.db	HVE-LX:X1E.db
GP X2	HVE-LX:X2.db	HVE-LX:X2S.db	HVE-LX:X2E.db
GP X3	HVE-LX:X3.db	HVE-LX:X3S.db	HVE-LX:X3E.db
GP X4	HVE-LX:X4.db	HVE-LX:X4S.db	HVE-LX:X4E.db
GVP GV7	HVE-LX:GV7.db	HVE-LX:GV7S.db	
GVP GV8	HVE-LX:GV8.db	HVE-LX:GV8S.db	
GVE GV2	HVE-LX:GV2.db	HVE-LX:GV2S.db	
GVE GV4	HVE-LX:GV4.db	HVE-LX:GV4S.db	
TE TECP2	HVE-TE:TECP2.db	HVE-TE:TECP2S.db	
CP CP2	HVE-CP:CP2.db	HVE-CP:CP2S.db	HVE-CPE:CP2.db
75IP 75IPBSC4	HVE-LX:75IPBSC4.db	HVE-LX:75IPBSC4S.db	

**Table 3: Full database db file list.**

System	File #1	File #2	File #3
75IP 75IPBSC7	HVE-LX:75IPBSC7.db	HVE-LX:75IPBSC7S.db	
75IP 75IPBM	HVE-LX:75IPBM.db	HVE-LX:75IPBMS.db	
75IP 75IPHAM7	HVE-LX:75IPHAM7.db	HVE-LX:75IPHAM7S.db	
75IP 75IPHAM8	HVE-LX:75IPHAM8.db	HVE-LX:75IPHAM8S.db	
75IP 75IPHAM9	HVE-LX:75IPHAM9.db	HVE-LX:75IPHAM9S.db	

### 3.10 Database Totals.

**Table 4: Left LVEA-Y Station Totals.**

Number of db files	37
Number of records	292

## 4.0 Sequencer Generation.

### 4.1 Gauge Pairs (GP)

Gauge Pairs have two sequencers; Rate of Rise and RR emulation. Code build makefile is \$(CONFIG\_LX\_TEST)/makefile linked into the \$(LX\_TEST) directory. Build the GP system with the command:

```
> make GP
```

Source code is moved into \$(LX\_TEST)/src. Code compile makefile is in \$(LX\_TEST)/src. Recompile the code for the 162 by running make in \$(LX\_TEST)/target/mv162/obj.

#### 4.1.1 Rate of Rise.

Generic st file is \$(GENERIC)/test/src/VE\_GP\_RR\_GEN.st.

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GP.config linked into the \$(LX\_TEST) directory.

Output files are HVE\_LX\_XnRR.st (n=1,2,3,4).

#### 4.1.2 RR Emulation.

Generic st file is \$(GENERIC)/test/src/VE\_GP\_RRE\_GEN.st

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GPE.config linked into the \$(LX\_TEST) directory.

Output files are HVE\_LX\_XnERRE.st (n=1,2,3,4).

### 4.2 Pneumatic Gate Valves (GVP).

Gate Valves have two sequencers; open and emulation. Code build makefile is \$(CONFIG\_LX\_TEST)/makefile linked into the \$(LX\_TEST) directory. Build the GP system with the command:

```
> make GVE
```

Source code is moved into \$(LX\_TEST)/src. Code compile makefile is in \$(LX\_TEST)/src. Recompile the code for the 162 by running make in \$(LX\_TEST)/target/mv162/obj.

#### 4.2.1 Open.

Generic st file is \$(GENERIC)/test/src/VE\_GVE\_OPEN\_GEN.st.

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GVP.config.

Output files are HVE\_LX\_GVnOPEN.st (n=7,8).

#### 4.2.2 Emulation.

Generic st file is \$(GENERIC)/dev/src/VE\_GVEE\_GEN.st.

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GVP.config.

Output files are HVE\_LX\_GVnGVEE.st (n=7,8).

### 4.3 Electric Gate Valves (GVE).

Gate Valves have two sequencers; open and emulation. Code build makefile is \$(CONFIG\_LX\_TEST)/makefile linked into the \$(LX\_TEST) directory. Build the GP system with the command:

```
> make GVE
```

Source code is moved into \$(LX\_TEST)/src. Code compile makefile is in \$(LX\_TEST)/src. Recompile the code for the 162 by running make in \$(LX\_TEST)/target/mv162/obj.

#### 4.3.1 Open.

Generic st file is \$(GENERIC)/test/src/VE\_GVE\_OPEN\_GEN.st.  
Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GVE.config.  
Output files are HVE\_LX\_GVnOPEN.st (n=2,4).

#### 4.3.2 Emulation.

Generic st file is \$(GENERIC)/dev/src/VE\_GVEE\_GEN.st.  
Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GVE.config.  
Output files are HVE\_LX\_GVnGVEE.st (n=2,4).

### 4.4 Thermocouples.

No Sequencers.

### 4.5 Cryo Pumps.

Two sequencers per Cryo Pump; Liquid Nitrogen Consumption Rate calculation and its emulation system. Code build makefile is \$(CONFIG\_LX\_TEST)/makefile linked into the \$(LX\_TEST) directory. Build the CP system with the command:

```
> make CP
```

Source code is moved into \$(LX\_TEST)/src. Code compile makefile is in \$(LX\_TEST)/src. Recompile the code for the 162 by running make in \$(LX\_TEST)/target/mv162/obj.

#### 4.5.1 LN2 Rate.

Generic st file is \$(GENERIC)/test/src/VE\_CP\_LNRATE\_GEN.st.  
Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:CPE.config.  
Output files are HVE\_LX\_CP2LNRATE.st.

#### 4.5.2 Emulation.

Generic st file is \$(GENERIC)/dev/src/VE\_CP\_LNE\_GEN.st.  
Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:CPE.config.  
Output files are HVE\_LX\_CP2ELNE.st.

### 4.6 2500l/s Ion Pumps.

No Sequencers

### 4.7 75l/s Ion Pumps.

No Sequencers

### 4.8 Pump Carts.

TBD

### 4.9 Sequencer Code File Totals.

**Table 5: C Code Object File List.**

HVE_LX_X1RR.o	HVE_LX_X1ERRE.o
HVE_LX_X2RR.o	HVE_LX_X2ERRE.o
HVE_LX_X3RR.o	HVE_LX_X3ERRE.o
HVE_LX_X4RR.o	HVE_LX_X4ERRE.o

**Table 5: C Code Object File List.**

HVE_LX_GV7OPEN.o	HVE_LX_GV7GVVEE.o
HVE_LX_GV8OPEN.o	HVE_LX_GV8GVVEE.o
HVE_LX_GV2OPEN.o	HVE_LX_GV2GVVEE.o
HVE_LX_GV4OPEN.o	HVE_LX_GV4GVVEE.o
HVE_LX_CP2LNRATE.o	HVE_LX_CP2ELNE.o

## 5.0 C Code Generation.

### 5.1 Gauge Pairs.

C code used for Pirani gauge vacuum calculation. No code generation is needed. Source code is in \$(GENERIC)/test/src and is linked into the \$(LX\_TEST)/src directory. Code compile makefile is in the \$(LX\_TEST)/src directory. Recompile the code for the 162 by running make in \$(LX\_TEST)/test/target/mv162/obj.

#### 5.1.1 Pirani Vacuum.

Source code is \$(GENERIC)/test/src/VE\_GP\_PIRANI\_CVT\_TORR.c

No generation needed. This code is re-entrant and only one copy of the object code is required on the IOC.

Output file is in \$(LX\_TEST)/test/target/mv162/obj directory, file is VE\_GP\_PIRANI\_CVT\_TORR.o.

### 5.2 Electric Gate Valves.

No C Code.

### 5.3 Thermocouples.

No C Code.

### 5.4 Cryo Pumps.

C code used to perform pump LN2 level control. No code generation is needed. Source code is in \$(GENERIC)/test/src and is linked into the \$(LX\_TEST)/src directory. Code compile makefile is in the \$(LX\_TEST)/src directory. Recompile the code for the 162 by running make in \$(LX\_TEST)/test/target/mv162/obj.

#### 5.4.1 Pump LN2 Level Control.

Source code is \$(GENERIC)/test/src/VE\_CP\_LVLCTRL.c

No generation needed. This code is re-entrant and only one copy of the object code is required on the IOC.

Output file is in \$(LX\_TEST)/test/target/mv162/obj directory, file is VE\_CP\_LVLCTRL.o.

### 5.5 2500l/s Ion Pumps.

No C Code.

### 5.6 75l/s Ion Pumps.

C code used to convert Pump Current to Vacuum. Used for the ion pumps in the 75IP systems and in the Gate Valve systems. Source code is in \$(GENERIC)/test/src and is linked into the \$(LX\_TEST)/src directory. Code compile makefile is in the \$(LX\_TEST)/src directory. Recompile the code for the 162 by running make in \$(LX\_TEST)/test/target/mv162/obj.

#### 5.6.1 Pump current to vacuum conversion.

Source code is \$(GENERIC)/test/src/VE\_GVE\_AMPS\_TO\_TORR.c

No generation needed. This code is re-entrant and only one copy of the object code is required on the IOC.

Output file is in \$(LX\_TEST)/test/target/mv162/obj directory, file is VE\_GVE\_AMPS\_TO\_TORR.o.

### 5.7 Pump Carts.

TBD.

## 5.8 C Code File Totals.

**Table 6: C Code Object File List.**

VE_GP_PIRANI_CVT_TORR.o
VE_CP_LVLCTRL.o
VE_AMPS_TO_TORR.o

## 6.0 MEDM Screens Generation.

### 6.1 Gauge Pairs (GP).

Gauge Pairs have three displays; main, simulation and emulation. Makefile is \$(OPI\_LX)/makefile, build the GP displays with the command;

**make GP**

Configuration files are symbolic linked from \$(CONFIG\_LX\_TEST) to the current directory.

#### 6.1.1 Main.

Generic adl file is \$(OPI\_GENERIC)/VE\_GP\_GEN.adl (MEDM generated).

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GP.config.

Output file is \$(OPI\_LX)/HVE-LX:Xn.adl (n=1,2,3,4).

#### 6.1.2 Simulation.

Generic adl file is \$(OPI\_GENERIC)/VE\_GP\_GEN\_S.adl (MEDM generated).

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GP.config.

Output file is \$(OPI\_LX)/HVE-LX:XnS.adl (n=1,2,3,4).

#### 6.1.3 Emulation

Generic adl file is \$(OPI\_GENERIC)/VE\_GP\_GEN\_E.adl (MEDM generated).

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GPE.config.

Output file is \$(OPI\_LX)/HVE-LX:XnEE.adl (n=1,2,3,4).

### 6.2 Pneumatic Gate Valves (GVP).

Gate Valves have two displays; main and emulation. Makefile is \$(OPI\_LX)/makefile, build the GVP displays with the command;

**make GVP**

Configuration files are symbolic linked from \$(CONFIG\_LX\_TEST) to the current directory.

#### 6.2.1 Main.

Generic adl file is \$(OPI\_GENERIC)/VE\_GVP\_GEN.adl (MEDM generated).

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GVP.config.

Output file is \$(OPI\_LX)/HVE-LX:GVn.adl (n=7,8).

#### 6.2.2 Emulation.

Generic adl file is \$(OPI\_GENERIC)/VE\_GVP\_GEN\_E.adl (MEDM generated).

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GVP.config.

Output file is \$(OPI\_LX)/HVE-LX:GVnE.adl (n=7,8).

### 6.3 Electric Gate Valves (GVE).

Gate Valves have two displays; main and emulation. Makefile is \$(OPI\_LX)/makefile, build the GVE displays with the command;

**make GVE**

Configuration files are symbolic linked from \$(CONFIG\_LX\_TEST) to the current directory.

#### 6.3.1 Main.

Generic adl file is \$(OPI\_GENERIC)/VE\_GVE\_GEN.adl (MEDM generated).



Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GVE.config.  
 Output file is \$(OPI\_LX)/HVE-LX:GVn.adl (n=2,4).

#### 6.3.2 Emulation.

Generic adl file is \$(OPI\_GENERIC)/VE\_GVE\_GEN\_E.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:GVE.config.  
 Output file is \$(OPI\_LX)/HVE-LX:GVnE.adl (n=2,4).

### 6.4 Thermocouples.

Thermocouples have two displays; main and simulation. Makefile is \$(OPI\_LX)/makefile, build the TE displays with the command;

**make TE**

Configuration files are symbolic linked from \$(CONFIG\_LX\_TEST) to the current directory.

#### 6.4.1 Main.

Generic adl file is \$(OPI\_GENERIC)/VE\_TE\_GEN.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:TE.config.  
 Output file is \$(OPI\_LX)/HVE-LX:TECP2.adl.

#### 6.4.2 Simulation.

Generic adl file is \$(OPI\_GENERIC)/VE\_TE\_GEN\_S.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:TE.config.  
 Output file is \$(OPI\_LX)/HVE-LX:TECP2S.adl.

### 6.5 Cryo Pumps.

Cryo Pumps have three displays; main, simulation and emulation. Makefile is \$(OPI\_LX)/makefile, build the CP displays with the command;

**make CP**

Configuration files are symbolic linked from \$(CONFIG\_LX\_TEST) to the current directory.

#### 6.5.1 Main.

Generic adl file is \$(OPI\_GENERIC)/VE\_CP\_GEN.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:CP.config.  
 Output file is \$(OPI\_LX)/HVE-LX:CP2.adl.

#### 6.5.2 Simulation.

Generic adl file is \$(OPI\_GENERIC)/VE\_CP\_GEN\_S.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:CP.config.  
 Output file is \$(OPI\_LX)/HVE-LX:CP2S.adl.

#### 6.5.3 Emulation

Generic adl file is \$(OPI\_GENERIC)/VE\_CP\_GEN\_E.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:CPE.config.  
 Output file is \$(OPI\_LX)/HVE-LX:CP2EE.adl.

### 6.6 2500l/s Ion Pumps.

No 2500l/s Ion Pumps.

### 6.7 75l/s Ion Pumps.

75l/s ion pumps have two displays; main and simulation. Makefile is \$(OPI\_LX)/makefile, build the 75IP displays with the command;

**make 75IP**

Configuration files are symbolic linked from \$(CONFIG\_LX\_TEST) to the current directory.

#### 6.7.1 Main.

Generic adl file is \$(OPI\_GENERIC)/VE\_75IP\_GEN.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:75IP.config.  
 Output files are \$(OPI\_LX)/HVE-LX:75IPBSCn.adl (n=4,7), HVE-LX:75IPBM.adl, HVE-LX:75IPHAMn.adl

(n=7,8,9).

### 6.7.2 Simulation.

Generic adl file is \$(OPI\_GENERIC)/VE\_75IP\_GEN\_S.adl (MEDM generated).

Configuration file is \$(CONFIG\_LX\_TEST)/HVE-LX:75IP.config.

Output files are \$(OPI\_LX)/HVE-LX:75IPBSCnS.adl (n=4,7), HVE-LX:75IPBMS.adl, HVE-LX:75IPHAMnS.adl (n=7,8,9).

## 6.8 Pump Carts.

TBD

## 6.9 MEDM File Totals.

**Table 7: MEDM File List.**

HVE-LX:X1.adl	HVE-LX:X1S.adl	HVE-LX:X1EE.adl
HVE-LX:X2.adl	HVE-LX:X2S.adl	HVE-LX:X2EE.adl
HVE-LX:X3.adl	HVE-LX:X3S.adl	HVE-LX:X3EE.adl
HVE-LX:X4.adl	HVE-LX:X4S.adl	HVE-LX:X4EE.adl
HVE-LX:GV2.adl	HVE-LX:GV2E.adl	
HVE-LX:GV4.adl	HVE-LX:GV4E.adl	
HVE-LX:GV7.adl	HVE-LX:GV7E.adl	
HVE-LX:GV8.adl	HVE-LX:GV8E.adl	
HVE-LX:TECP2.adl	HVE-LX:TECP2S.adl	
HVE-LX:CP2.adl	HVE-LX:CP2S.adl	HVE-LX:CP2EE.adl
HVE-LX:75IPBSC4.adl	HVE-LX:75IPBSC4S.adl	
HVE-LX:75IPBSC7.adl	HVE-LX:75IPBSC7S.adl	
HVE-LX:75IPBM.adl	HVE-LX:75IPBMS.adl	
HVE-LX:75IPHAM7.adl	HVE-LX:75IPHAM7S.adl	
HVE-LX:75IPHAM8.adl	HVE-LX:75IPHAM8S.adl	
HVE-LX:75IPHAM9.adl	HVE-LX:75IPHAM9S.adl	

Total number of adl files=37.

Total number of channels monitored and/or controlled = 580.

## 7.0 Alarm Handler Generation.

### 7.1 Gauge Pairs.

Generic alh config include file is \$(ALH\_GEN)/VE\_GP\_GEN.alhConfig linked into \$(ALH\_LX). LX Vacuum template file is \$(ALH\_LX)/VacTemplate.alhConfig. Makefile is \$(ALH\_LX)/makefile, build the Alarm Handler files with the command;  
**make**

Configuration files are symbolic linked from \$(CONFIG\_LX\_TEST) to the current directory. Output file for the LX system is LX.alhConfig.

### 7.2 Thermocouples.

Generic alh config include file is \$(ALH\_GEN)/VE\_TE\_GEN.alhConfig linked into \$(ALH\_LX). LX Vacuum template file is \$(ALH\_LX)/VacTemplate.alhConfig. Makefile is \$(ALH\_LX)/makefile, build the Alarm Handler files with the command;  
**make**

Configuration files are symbolic linked from \$(CONFIG\_LX\_TEST) to the current directory. Output file for the LX system is

LX.alhConfig.

### 7.3 Gate Valves.

Generic alh config include file is \$(ALH\_GEN)/VE\_GVE\_GEN.alhConfig linked into \$(ALH\_LX). LX Vacuum template file is \$(ALH\_LX)/VacTemplate.alhConfig. Makefile is \$(ALH\_LX)/makefile, build the Alarm Handler files with the command;

**make**

Configuration files are symbolic linked from \$(CONFIG\_LX\_TEST) to the current directory. Output file for the LX system is LX.alhConfig.

### 7.4 Cryo Pumps.

Generic alh config include file is \$(ALH\_GEN)/VE\_CP\_GEN.alhConfig linked into \$(ALH\_LX). LX Vacuum template file is \$(ALH\_LX)/VacTemplate.alhConfig. Makefile is \$(ALH\_LX)/makefile, build the Alarm Handler files with the command;

**make**

Configuration files are symbolic linked from \$(CONFIG\_LX\_TEST) to the current directory. Output file for the LX system is LX.alhConfig.

### 7.5 2500l/s Ion Pumps.

Generic alh config include file is \$(ALH\_GEN)/VE\_IP\_GEN.alhConfig linked into \$(ALH\_LX). LX Vacuum template file is \$(ALH\_LX)/VacTemplate.alhConfig. Makefile is \$(ALH\_LX)/makefile, build the Alarm Handler files with the command;

**make**

Configuration files are symbolic linked from \$(CONFIG\_LX\_TEST) to the current directory. Output file for the LX system is LX.alhConfig.

### 7.6 75l/s Ion Pumps.

Generic alh config include file is \$(ALH\_GEN)/VE\_75IP\_GEN.alhConfig linked into \$(ALH\_LX). LX Vacuum template file is \$(ALH\_LX)/VacTemplate.alhConfig. Makefile is \$(ALH\_LX)/makefile, build the Alarm Handler files with the command;

**make**

Configuration files are symbolic linked from \$(CONFIG\_LX\_TEST) to the current directory. Output file for the LX system is LX.alhConfig.

### 7.7 Pump Carts.

TBD

### 7.8 Final Files

The output from alh generation is a single alh config file for the entire building.

**Table 8: Alarm Handler Configuration File List.**

LX.alhConfig
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Total number of channels monitored for alarm activity on Left LVEA-Y Station = 39.

## 8.0 SAMMI Screens Generation.

### 8.1 Gauge Pairs.

TBD

### 8.2 Thermocouples.

TBD

### 8.3 Gate Valves.

TBD

**8.4 Cryo Pumps.**

TBD

**8.5 2500l/s Ion Pumps.**

TBD

**8.6 75l/s Ion Pumps.**

TBD

**8.7 Pump Carts.**

TBD

**9.0 BURT Generation.**

**9.1 Gauge Pairs.**

TBD

**9.2 Thermocouples.**

TBD

**9.3 Gate Valves.**

TBD

**9.4 Cryo Pumps.**

TBD

**9.5 2500l/s Ion Pumps.**

TBD

**9.6 75l/s Ion Pumps.**

TBD

**9.7 Pump Carts.**

TBD

**10.0 Archiver Generation.**

**10.1 Gauge Pairs.**

TBD

**10.2 Thermocouples.**

TBD

**10.3 Gate Valves.**

TBD

**10.4 Cryo Pumps.**

TBD

**10.5 2500l/s Ion Pumps.**

TBD

**10.6 75l/s Ion Pumps.**

TBD

**10.7 Pump Carts.**

TBD