LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY
- LIGO -
CALIFORNIA INSTITUTE OF TECHNOLOGY
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Document Type	**LIGO-T970181-00 - C**	26June97

How to Build the Hanford Left LVEA-Y Station EPICS Vacuum Controls System

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Distribution of this draft:

Hanford CDS, Operators

This is an internal working note
of the LIGO Project..

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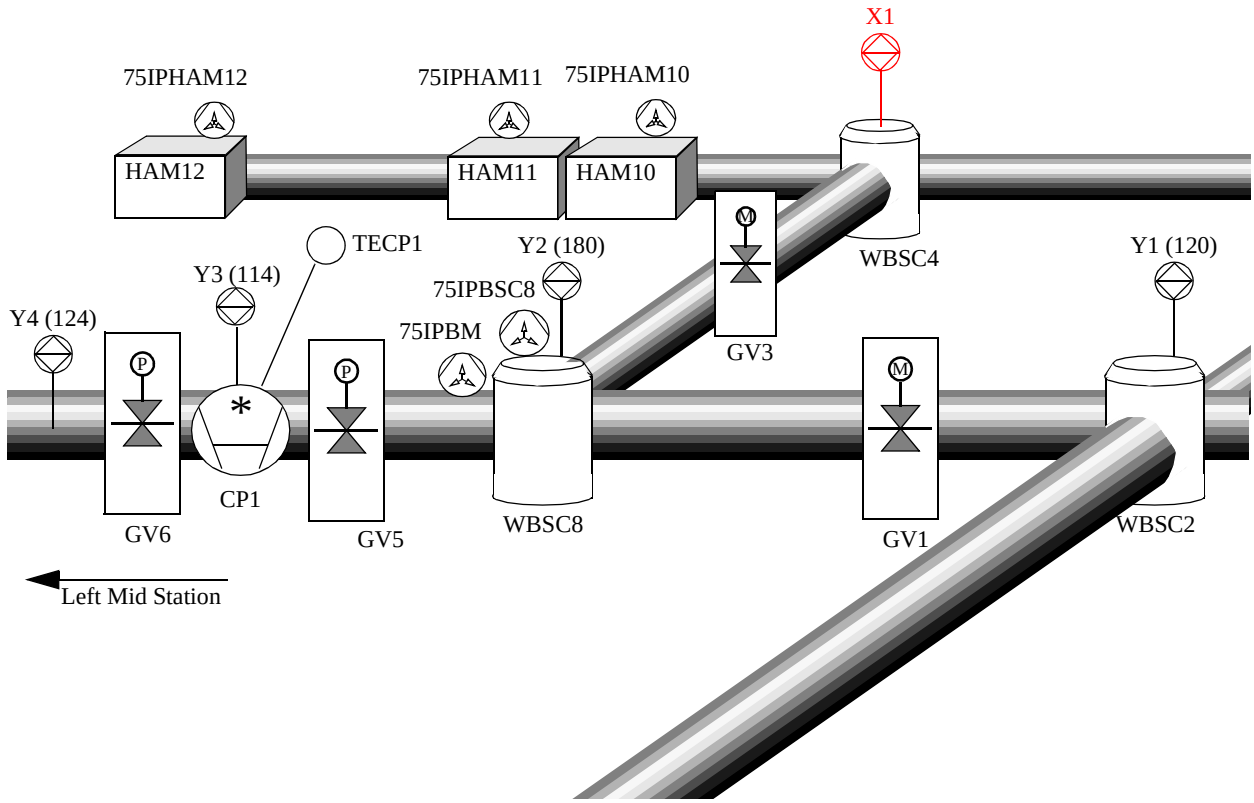
1.0 The Hanford Left LVEA-Y Station.

The Hanford Left LVEA-Y Vacuum Station is designated LY.
The Vacuum system comprises:

Table 1: Hanford LY Vacuum Systems.

System	#1	#2	#3	#4	#5
Gauge Pairs	Y1	Y2	Y3	Y4	
Gate Valve (Electric)	GV1	GV3			
Gate Valve (Pneumatic)	GV5	GV6			
Cryo Pumps	CP1				
Thermocouples	TECP1				
2500l/s Ion Pumps					
75l/s Ion Pumps	75IPBSC8	75IPBM	75IPHAM10	75IPHAM11	75IPHAM12

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
$(LY_TEST)	/opt/ligo/b/epics/apple/Hanford/VE/hanford64/test
$(CONFIG_LY_TEST)	/opt/ligo/b/epics/apple/Hanford/VE/CONFIG/LY/test
$(OPI_LY)	/opt/ligo/b/epics/apple/Hanford/VE/opi/medm/LY
$(ALH_GEN)	/opt/ligo/b/epics/apple/Hanford/VE/alh/GENERIC
$(ALH_LY)	/opt/ligo/b/epics/apple/Hanford/VE/alh/LY

3.0 Database Generation.

3.1 Gauge Pairs (GP)

Gauge Pairs have two databases; the main database and the emulation database. Makefile is $(CONFIG_LY_TEST)/makefile linked into the $(LY_TEST) directory. Build the GP system in the $(LY_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_LY_TEST)/HVE-LY:GP.config linked into the $(LY_TEST) directory.
Output files are HVE-LY:Yn.db and HVE-LY:YnS.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_LY_TEST)/HVE-LY:GPE.config linked into the $(LY_TEST) directory.
Output files are HVE-LY:YnE.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_LY_TEST)/makefile linked into the $(LY_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_LY_TEST)/HVE-LY:GVP.config linked into the $(LY_TEST) directory.
Output files are HVE-LY:GVn.db and HVE-LY:GVnS.db (n=5,6).

3.3 Electric Gate Valves (GVE).

Only one main db file. Emulation records are in this file. Makefile is $(CONFIG_LY_TEST)/makefile linked into the $(LY_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_LY_TEST)/HVE-LY:GVE.config linked into the $(LY_TEST) directory.
Output files are HVE-LY:GVn.db and HVE-LY:GVnS.db (n=1,3).

3.4 Thermocouples.

Only main db file. Makefile is $(CONFIG_LY_TEST)/makefile linked into the $(LY_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_LY_TEST)/HVE-LY:TE.config linked into the $(LY_TEST) directory.
Output files are HVE-LY:TECP1.db and HVE-LY:TECP1S.db.

3.5 Cryo Pumps.

Two database systems are built, the main database and the emulation database. Makefile is $(CONFIG_LY_TEST)/makefile linked into the $(LY_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_LY_TEST)/HVE-LY:CP.config linked into the $(LY_TEST) directory.
Output files are HVE-LY:CP1.db and HVE-LY:CP1S.db.

3.5.2 Emulation Database.

Generic db file is $(GENERIC)/test/database/VE_CPE_GEN.db (gdct generated).
Configuration file is $(CONFIG_LY_TEST)/HVE-LY:CPE.config linked into the $(LY_TEST) directory.
Output files are HVE-LY:CP1E.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_LY_TEST)/makefile linked into the $(LY_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_LY_TEST)/HVE-LY:75IP.config linked into the $(LY_TEST) directory.
Output files are HVE-MX:75IPBSC8.db and HVE-MX:75IPBSC8S.db, HVE-LY:75IPBM.db and HVE-LY:75IPBMS.db, HVE-LY:75IPHAMn.db and HVE-LY:75IPHAMnS.db (n=10,11,12).

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 Y1	HVE-LY:Y1.db	HVE-LY:Y1S.db	HVE-LY:Y1E.db
GP Y2	HVE-LY:Y2.db	HVE-LY:Y2S.db	HVE-LY:Y2E.db
GP Y3	HVE-LY:Y3.db	HVE-LY:Y3S.db	HVE-LY:Y3E.db
GP Y4	HVE-LY:Y4.db	HVE-LY:Y4S.db	HVE-LY:Y4E.db
GVP GV5	HVE-LY:GV5.db	HVE-LY:GV5S.db	
GVP GV6	HVE-LY:GV6.db	HVE-LY:GV6S.db	
GVE GV1	HVE-LY:GV1.db	HVE-LY:GV1S.db	

Table 3: Full database db file list.

System	File #1	File #2	File #3
GVE GV3	HVE-LY:GV3.db	HVE-LY:GV3S.db	
TE TECP1	HVE-TE:TECP1.db	HVE-TE:TECP1S.db	
CP CP1	HVE-CP:CP1.db	HVE-CP:CP1S.db	HVE-CPE:CP1.db
75IP 75IPBSC8	HVE-MX:75IPBSC8.db	HVE-MX:75IPBSC8S.db	
75IP 75IPBM	HVE-MX:75IPBM.db	HVE-MX:75IPBMS.db	
75IP 75IPHAM10	HVE-MX:75IPHAM10.db	HVE-MX:75IPHAM10S.db	
75IP 75IPHAM11	HVE-MX:75IPHAM11.db	HVE-MX:75IPHAM11S.db	
75IP 75IPHAM12	HVE-MX:75IPHAM12.db	HVE-MX:75IPHAM12S.db	

3.10 Database Totals.

Table 4: Left LVEA-Y Station Totals.

Number of db files	35
Number of records	287

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_LY_TEST)/makefile linked into the $(LY_TEST) directory. Build the GP system with the command:

```
> make GP
```

Source code is moved into $(LY_TEST)/src. Code compile makefile is in $(LY_TEST)/src. Recompile the code for the 162 by running `make` in $(LY_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_LY_TEST)/HVE-LY:GP.config linked into the $(LY_TEST) directory.
Output files are HVE_LY_YnRR.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_LY_TEST)/HVE-LY:GPE.config linked into the $(LY_TEST) directory.
Output files are HVE_LY_YnERRE.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_LY_TEST)/makefile linked into the $(LY_TEST) directory. Build the GP system with the command:

```
> make GVE
```

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

4.2.1 Open.

Generic st file is $(GENERIC)/test/src/VE_GVE_OPEN_GEN.st.
Configuration file is $(CONFIG_LY_TEST)/HVE-LY:GVP.config.

Output files are HVE_LY_GVnOPEN.st (n=5,6).

4.2.2 Emulation.

Generic st file is $(GENERIC)/dev/src/VE_GVEE_GEN.st.
Configuration file is $(CONFIG_LY_TEST)/HVE-LY:GVP.config.
Output files are HVE_LY_GVnGVEE.st (n=5,6).

4.3 Electric Gate Valves (GVE).

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

```
> make GVE
```

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

4.3.1 Open.

Generic st file is $(GENERIC)/test/src/VE_GVE_OPEN_GEN.st.
Configuration file is $(CONFIG_LY_TEST)/HVE-LY:GVE.config.
Output files are HVE_LY_GVnOPEN.st (n=1,3).

4.3.2 Emulation.

Generic st file is $(GENERIC)/dev/src/VE_GVEE_GEN.st.
Configuration file is $(CONFIG_LY_TEST)/HVE-LY:GVE.config.
Output files are HVE_LY_GVnGVEE.st (n=1,3).

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_LY_TEST)/makefile linked into the $(LY_TEST) directory. Build the CP system with the command:

```
> make CP
```

Source code is moved into $(LY_TEST)/src. Code compile makefile is in $(LY_TEST)/src. Recompile the code for the 162 by running make in $(LY_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_LY_TEST)/HVE-LY:CPE.config.
Output files are HVE_LY_CP1LNRATE.st.

4.5.2 Emulation.

Generic st file is $(GENERIC)/dev/src/VE_CP_LNE_GEN.st.
Configuration file is $(CONFIG_LY_TEST)/HVE-LY:CPE.config.
Output files are HVE_LY_CP1ELNE.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_LY_Y1RR.o	HVE_LY_Y1ERRE.o
HVE_LY_Y2RR.o	HVE_LY_Y2ERRE.o
HVE_LY_Y3RR.o	HVE_LY_Y3ERRE.o
HVE_LY_Y4RR.o	HVE_LY_Y4ERRE.o
HVE_LY_GV4OPEN.o	HVE_LY_GV4GVEE.o
HVE_LY_GV5OPEN.o	HVE_LY_GV5GVEE.o
HVE_LY_GV1OPEN.o	HVE_LY_GV1GVEE.o
HVE_LY_GV2OPEN.o	HVE_LY_GV2GVEE.o
HVE_LY_CP1LNRATE.o	HVE_LY_CP1ELNE.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 $(LY_TEST)/src directory. Code compile makefile is in the $(LY_TEST)/src directory Recompile the code for the 162 by running make in $(LY_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 $(LY_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 $(LY_TEST)/src directory. Code compile makefile is in the $(LY_TEST)/src directory Recompile the code for the 162 by running make in $(LY_TEST)/test/target/mv162/obj.

5.4.1 Pump LN2 Level Control.

Source code is $(GENERIC)/test/src/VE_CP_LVLCNTRL.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 $(LY_TEST)/test/target/mv162/obj directory, file is VE_CP_LVLCNTRL.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 $(LY_TEST)/src directory. Code compile makefile is in the $(LY_TEST)/src directory Recompile the code for the 162 by running make in $(LY_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 $(LY_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_LVLCNTRL.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_LY)/makefile, build the GP displays with the command;

```
make GP
```

Configuration files are symbolic linked from $(CONFIG_LY_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_LY_TEST)/HVE-LY:GP.config.
Output file is $(OPI_LY)/HVE-LY:Yn.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_LY_TEST)/HVE-LY:GP.config.
Output file is $(OPI_LY)/HVE-LY:YnS.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_LY_TEST)/HVE-LY:GPE.config.
Output file is $(OPI_LY)/HVE-LY:YnEE.adl (n=1,2,3,4).

6.2 Pneumatic Gate Valves (GVP).

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

```
make GVP
```

Configuration files are symbolic linked from $(CONFIG_LY_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_LY_TEST)/HVE-LY:GVP.config.
Output file is $(OPI_LY)/HVE-LY:GVn.adl (n=5,6).

6.2.2 Emulation.

Generic adl file is $(OPI_GENERIC)/VE_GVP_GEN_E.adl (MEDM generated).
Configuration file is $(CONFIG_LY_TEST)/HVE-LY:GVP.config.
Output file is $(OPI_LY)/HVE-LY:GVnE.adl (n=5,6).

6.3 Electric Gate Valves (GVE).

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

```
make GVE
```

Configuration files are symbolic linked from $(CONFIG_LY_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_LY_TEST)/HVE-LY:GVE.config.
Output file is $(OPI_LY)/HVE-LY:GVn.adl (n=1,3).

6.3.2 Emulation.

Generic adl file is $(OPI_GENERIC)/VE_GVE_GEN_E.adl (MEDM generated).
Configuration file is $(CONFIG_LY_TEST)/HVE-LY:GVE.config.
Output file is $(OPI_LY)/HVE-LY:GVnE.adl (n=1,3).

6.4 Thermocouples.

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

```
make TE
```

Configuration files are symbolic linked from $(CONFIG_LY_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_LY_TEST)/HVE-LY:TE.config.
Output file is $(OPI_LY)/HVE-LY:TECP1.adl.

6.4.2 Simulation.

Generic adl file is $(OPI_GENERIC)/VE_TE_GEN_S.adl (MEDM generated).
Configuration file is $(CONFIG_LY_TEST)/HVE-LY:TE.config.
Output file is $(OPI_LY)/HVE-LY:TECP1S.adl.

6.5 Cryo Pumps.

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

```
make CP
```

Configuration files are symbolic linked from $(CONFIG_LY_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_LY_TEST)/HVE-LY:CP.config.
Output file is $(OPI_LY)/HVE-LY:CP1.adl.

6.5.2 Simulation.

Generic adl file is $(OPI_GENERIC)/VE_CP_GEN_S.adl (MEDM generated).
Configuration file is $(CONFIG_LY_TEST)/HVE-LY:CP.config.
Output file is $(OPI_LY)/HVE-LY:CP1S.adl.

6.5.3 Emulation

Generic adl file is $(OPI_GENERIC)/VE_CP_GEN_E.adl (MEDM generated).
Configuration file is $(CONFIG_LY_TEST)/HVE-LY:CPE.config.
Output file is $(OPI_LY)/HVE-LY:CP1EE.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_LY)/makefile, build the 75IP displays with the command;

```
make 75IP
```

Configuration files are symbolic linked from $(CONFIG_LY_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_LY_TEST)/HVE-LY:75IP.config.
Output files are $(OPI_LY)/HVE-LY:75IPBSC8.adl, HVE-LY:75IPBM.adl, HVE-LY:75IPHAMn.adl (n=10,11,12).

6.7.2 Simulation.

Generic adl file is $(OPI_GENERIC)/VE_75IP_GEN_S.adl (MEDM generated).
Configuration file is $(CONFIG_LY_TEST)/HVE-LY:75IP.config.
Output files are $(OPI_LY)/HVE-LY:75IPBSC8S.adl, HVE-LY:75IPBMS.adl, HVE-LY:75IPHAMnS.adl (n=10,11,12).

6.8 Pump Carts.

TBD

6.9 MEDM File Totals.

Table 7: MEDM File List.

HVE-LY:Y1.adl	HVE-LY:Y1S.adl	HVE-LY:Y1EE.adl
HVE-LY:Y2.adl	HVE-LY:Y2S.adl	HVE-LY:Y2EE.adl
HVE-LY:Y3.adl	HVE-LY:Y3S.adl	HVE-LY:Y3EE.adl
HVE-LY:Y4.adl	HVE-LY:Y4S.adl	HVE-LY:Y4EE.adl
HVE-LY:GV1.adl	HVE-LY:GV1E.adl	
HVE-LY:GV3.adl	HVE-LY:GV3E.adl	
HVE-LY:GV5.adl	HVE-LY:GV5E.adl	
HVE-LY:GV6.adl	HVE-LY:GV6E.adl	
HVE-LY:TECP1.adl	HVE-LY:TECP1S.adl	
HVE-LY:CP1.adl	HVE-LY:CP1S.adl	HVE-LY:CP1EE.adl
HVE-MX:75IPBSC8.adl	HVE-MX:75IPBSC8S.adl	
HVE-MX:75IPBM.adl	HVE-MX:75IPBMS.adl	
HVE-MX:75IPHAM10.adl	HVE-MX:75IPHAM10S.adl	
HVE-MX:75IPHAM11.adl	HVE-MX:75IPHAM11S.adl	
HVE-MX:75IPHAM12.adl	HVE-MX:75IPHAM12S.adl	

Total number of adl files=35.
Total number of channels monitored and/or controlled = 470.

7.0 Alarm Handler Generation.

7.1 Gauge Pairs.

Generic alh config include file is $(ALH_GEN)/VE_GP_GEN.alhConfig linked into $(ALH_LY). LY Vacuum template file is $(ALH_LY)/VacTemplate.alhConfig. Makefile is $(ALH_LY)/makefile, build the Alarm Handler files with the command;

```
make
```

Configuration files are symbolic linked from $(CONFIG_LY_TEST) to the current directory. Output file for the LY system is

LY.alhConfig.

7.2 Thermocouples.

Generic alh config include file is $(ALH_GEN)/VE_TE_GEN.alhConfig linked into $(ALH_LY). LY Vacuum template file is $(ALH_LY)/VacTemplate.alhConfig. Makefile is $(ALH_LY)/makefile, build the Alarm Handler files with the command;

```
make
```

Configuration files are symbolic linked from $(CONFIG_LY_TEST) to the current directory. Output file for the LY system is LY.alhConfig.

7.3 Gate Valves.

Generic alh config include file is $(ALH_GEN)/VE_GVE_GEN.alhConfig linked into $(ALH_LY). LY Vacuum template file is $(ALH_LY)/VacTemplate.alhConfig. Makefile is $(ALH_LY)/makefile, build the Alarm Handler files with the command;

```
make
```

Configuration files are symbolic linked from $(CONFIG_LY_TEST) to the current directory. Output file for the LY system is LY.alhConfig.

7.4 Cryo Pumps.

Generic alh config include file is $(ALH_GEN)/VE_CP_GEN.alhConfig linked into $(ALH_LY). LY Vacuum template file is $(ALH_LY)/VacTemplate.alhConfig. Makefile is $(ALH_LY)/makefile, build the Alarm Handler files with the command;

```
make
```

Configuration files are symbolic linked from $(CONFIG_LY_TEST) to the current directory. Output file for the LY system is LY.alhConfig.

7.5 2500l/s Ion Pumps.

Generic alh config include file is $(ALH_GEN)/VE_IP_GEN.alhConfig linked into $(ALH_LY). LY Vacuum template file is $(ALH_LY)/VacTemplate.alhConfig. Makefile is $(ALH_LY)/makefile, build the Alarm Handler files with the command;

```
make
```

Configuration files are symbolic linked from $(CONFIG_LY_TEST) to the current directory. Output file for the LY system is LY.alhConfig.

7.6 75l/s Ion Pumps.

Generic alh config include file is $(ALH_GEN)/VE_75IP_GEN.alhConfig linked into $(ALH_LY). LY Vacuum template file is $(ALH_LY)/VacTemplate.alhConfig. Makefile is $(ALH_LY)/makefile, build the Alarm Handler files with the command;

```
make
```

Configuration files are symbolic linked from $(CONFIG_LY_TEST) to the current directory. Output file for the LY system is LY.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.

LY.alhConfig

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