

LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY  
- LIGO -  
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| <b>Document Type</b> <b>LIGO-T970179-00 - C</b> 26June97                          |
| <b>How to Build the Hanford Left End Station EPICS<br/>Vacuum Controls System</b> |
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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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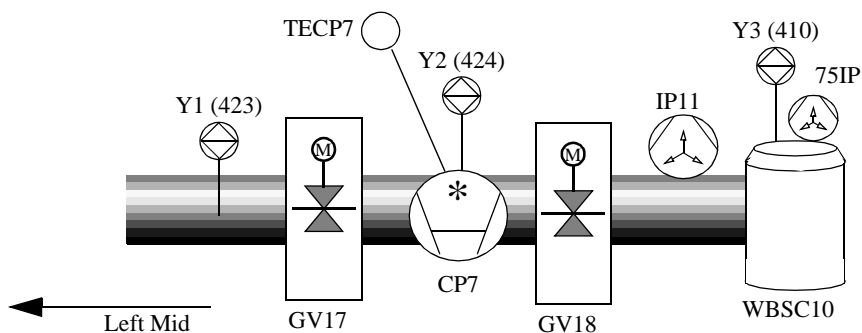
### 1.0 The Hanford Left End Station.

The Hanford Left End Vacuum Station is designated EY.  
 The Vacuum system comprises:

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

| System            | #1    | #2   | #3 |
|-------------------|-------|------|----|
| Gauge Pairs       | Y1    | Y2   | Y3 |
| Gate Valve        | GV17  | GV18 |    |
| Cryo Pumps        | CP7   |      |    |
| Thermocouples     | TECP7 |      |    |
| 2500l/s Ion Pumps | IP11  |      |    |
| 75l/s Ion Pumps   | 75IP  |      |    |

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 |
| \$(EY_TEST)        | /opt/ligo/b/epics/apple/Hanford/VE/hanford66/test   |
| \$(CONFIG_EY_TEST) | /opt/ligo/b/epics/apple/Hanford/VE/CONFIG/EY/test   |
| \$(OPI_EY)         | /opt/ligo/b/epics/apple/Hanford/VE/opi/medm/EY      |
| \$(ALH_GEN)        | /opt/ligo/b/epics/apple/Hanford/VE/alh/GENERIC      |
| \$(ALH_EY)         | /opt/ligo/b/epics/apple/Hanford/VE/alh/EY           |

### 3.0 Database Generation.

#### 3.1 Gauge Pairs (GP)

Gauge Pairs have two databases; the main database and the emulation database. Makefile is \$(CONFIG\_EY\_TEST)/makefile linked into the \$(EY\_TEST) directory. Build the GP system in the \$(EY\_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\_EY\_TEST)/HVE-MX:GP.config linked into the \$(EY\_TEST) directory.

Output files are HVE-EY:Yn.db and HVE-EY:YnS.db (n=1,2,3).

##### 3.1.2 Emulation Database.

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

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

Output files are HVE-EY:YnE.db (n=1,2,3).

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

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

```
> make GVE
```

##### 3.2.1 Main Database.

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

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

Output files are HVE-EY:GVn.db and HVE-EY:GVnS.db (n=17,18).

#### 3.3 Thermocouples.

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

```
> make TE
```

##### 3.3.1 Main Database.

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

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

Output files are HVE-EY:TECP7.db and HVE-EY:TECP7S.db.

#### 3.4 Cryo Pumps.

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

```
> make CP
```

##### 3.4.1 Main Database.

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

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

Output files are HVE-EY:CP7.db and HVE-EY:CP7S.db.

##### 3.4.2 Emulation Database.

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

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

Output files are HVE-EY:CP7E.db.

#### 3.5 2500l/s Ion Pumps.

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

```
> make IP
```

### 3.5.1 Main Database.

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

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

Output files are HVE-EY:IP11.db and HVE-EY:IP11S.db.

## 3.6 75I/s Ion Pumps.

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

```
> make 75IP
```

### 3.6.1 Main Database.

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

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

Output files are HVE-MX:75IPBSC10.db and HVE-MX:75IPBSC10S.db.

## 3.7 Pump Carts.

TBD

## 3.8 Full List of Database Files.

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

| System         | File #1             | File #2              | File #3        |
|----------------|---------------------|----------------------|----------------|
| GP Y1          | HVE-EY:Y1.db        | HVE-EY:Y1S.db        | HVE-EY:Y1E.db  |
| GP Y2          | HVE-EY:Y2.db        | HVE-EY:Y2S.db        | HVE-EY:Y2E.db  |
| GP Y3          | HVE-EY:Y3.db        | HVE-EY:Y3S.db        | HVE-EY:Y3E.db  |
| GVE GV17       | HVE-EY:GV17.db      | HVE-EY:GV17S.db      |                |
| GVE GV18       | HVE-EY:GV18.db      | HVE-EY:GV18S.db      |                |
| TE TECP7       | HVE-TE:TECP7.db     | HVE-TE:TECP7S.db     |                |
| CP CP7         | HVE-CP:CP7.db       | HVE-CP:CP7S.db       | HVE-CPE:CP7.db |
| IP IP11        | HVE-IP:IP11.db      | HVE-IP:IP11S.db      |                |
| 75IP 75IPBSC10 | HVE-MX:75IPBSC10.db | HVE-MX:75IPBSC10S.db |                |

## 3.9 Database Totals.

**Table 4: Left Mid Station Totals.**

|                    |     |
|--------------------|-----|
| Number of db files | 22  |
| Number of records  | 229 |

## 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\_EY\_TEST)/makefile linked into the \$(EY\_TEST) directory. Build the GP system with the command:

```
> make GP
```

Source code is moved into \$(EY\_TEST)/src. Code compile makefile is in \$(EY\_TEST)/src. Recompile the code for the 162 by running make in \$(EY\_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\_EY\_TEST)/HVE-EY:GP.config linked into the \$(EY\_TEST) directory.

Output files are HVE\_EY\_YnRR.st (n=1,2,3).

#### 4.1.2 RR Emulation.

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

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

Output files are HVE\_EY\_YnERRE.st (n=1,2,3).

### 4.2 Electric Gate Valves (GVE).

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

```
> make GVE
```

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

#### 4.2.1 Open.

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

Configuration file is \$(CONFIG\_EY\_TEST)/HVE-EY:GVE.config.

Output files are HVE\_EY\_GVnOPEN.st (n=17,18).

#### 4.2.2 Emulation.

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

Configuration file is \$(CONFIG\_EY\_TEST)/HVE-EY:GVE.config.

Output files are HVE\_EY\_GVnGVEE.st (n=17,18).

### 4.3 Thermocouples.

No Sequencers.

### 4.4 Cryo Pumps.

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

```
> make CP
```

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

#### 4.4.1 LN2 Rate.

Generic st file is \$(GENERIC)/test/src/VE\_CP\_LNRATE\_GEN.st.

Configuration file is \$(CONFIG\_EY\_TEST)/HVE-EY:CPE.config.

Output files are HVE\_EY\_CP7LNRATE.st.

#### 4.4.2 Emulation.

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

Configuration file is \$(CONFIG\_EY\_TEST)/HVE-EY:CPE.config.

Output files are HVE\_EY\_CP7ELNE.st.

### 4.5 2500l/s Ion Pumps.

No Sequencers

### 4.6 75l/s Ion Pumps.

No Sequencers

### 4.7 Pump Carts.

TBD

## 4.8 Sequencer Code File Totals.

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

|                    |                   |
|--------------------|-------------------|
| HVE_EY_Y1RR.o      | HVE_EY_Y1ERRE.o   |
| HVE_EY_Y2RR.o      | HVE_EY_Y2ERRE.o   |
| HVE_EY_Y3RR.o      | HVE_EY_Y3ERRE.o   |
| HVE_EY_GV17OPEN.o  | HVE_EY_GV17GVEE.o |
| HVE_EY_GV18OPEN.o  | HVE_EY_GV18GVEE.o |
| HVE_EY_CP7LNRATE.o | HVE_EY_CP7ELNE.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 \$(EY\_TEST)/src directory. Code compile makefile is in the \$(EY\_TEST)/src directory. Recompile the code for the 162 by running make in \$(EY\_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 \$(EY\_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 \$(EY\_TEST)/src directory. Code compile makefile is in the \$(EY\_TEST)/src directory. Recompile the code for the 162 by running make in \$(EY\_TEST)/test/target/mv162/obj.

#### 5.4.1 Pump LN2 Level Control.

Source code is \$(GENERIC)/test/src/VE\_CP\_LVLNTRL.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 \$(EY\_TEST)/test/target/mv162/obj directory, file is VE\_CP\_LVLNTRL.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 \$(EY\_TEST)/src directory. Code compile makefile is in the \$(EY\_TEST)/src directory. Recompile the code for the 162 by running make in \$(EY\_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 \$(EY\_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\_EY)/makefile, build the GP displays with the command;

**make GP**

Configuration files are symbolic linked from \$(CONFIG\_EY\_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\_EY\_TEST)/HVE-EY:GP.config.

Output file is \$(OPI\_EY)/HVE-EY:Yn.adl (n=1,2,3).

**6.1.2 Simulation.**

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

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

Output file is \$(OPI\_EY)/HVE-EY:YnS.adl (n=1,2,3).

**6.1.3 Emulation**

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

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

Output file is \$(OPI\_EY)/HVE-EY:YnEE.adl (n=1,2,3).

**6.2 Electric Gate Valves (GVE).**

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

**make GVE**

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

**6.2.1 Main.**

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

Configuration file is \$(CONFIG\_EY\_TEST)/HVE-EY:GVE.config.

Output file is \$(OPI\_EY)/HVE-EY:GVn.adl (n=17,18).

**6.2.2 Emulation.**

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

Configuration file is \$(CONFIG\_EY\_TEST)/HVE-EY:GVE.config.

Output file is \$(OPI\_EY)/HVE-EY:GVnE.adl (n=17,18).

**6.3 Thermocouples.**

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

**make TE**

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

### 6.3.1 Main.

Generic adl file is \$(OPI\_GENERIC)/VE\_TE\_GEN.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_EY\_TEST)/HVE-EY:TE.config.  
 Output file is \$(OPI\_EY)/HVE-EY:TECP7.adl.

### 6.3.2 Simulation.

Generic adl file is \$(OPI\_GENERIC)/VE\_TE\_GEN\_S.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_EY\_TEST)/HVE-EY:TE.config.  
 Output file is \$(OPI\_EY)/HVE-EY:TECP7S.adl.

## 6.4 Cryo Pumps.

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

**make CP**

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

### 6.4.1 Main.

Generic adl file is \$(OPI\_GENERIC)/VE\_CP\_GEN.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_EY\_TEST)/HVE-EY:CP.config.  
 Output file is \$(OPI\_EY)/HVE-EY:CP7.adl.

### 6.4.2 Simulation.

Generic adl file is \$(OPI\_GENERIC)/VE\_CP\_GEN\_S.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_EY\_TEST)/HVE-EY:CP.config.  
 Output file is \$(OPI\_EY)/HVE-EY:CP7S.adl.

### 6.4.3 Emulation

Generic adl file is \$(OPI\_GENERIC)/VE\_CP\_GEN\_E.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_EY\_TEST)/HVE-EY:CPE.config.  
 Output file is \$(OPI\_EY)/HVE-EY:CP7EE.adl.

## 6.5 2500l/s Ion Pumps.

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

**make IP**

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

### 6.5.1 Main.

Generic adl file is \$(OPI\_GENERIC)/VE\_IP\_GEN.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_EY\_TEST)/HVE-EY:IP.config.  
 Output file is \$(OPI\_EY)/HVE-EY:IP11.adl.

### 6.5.2 Simulation.

Generic adl file is \$(OPI\_GENERIC)/VE\_IP\_GEN\_S.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_EY\_TEST)/HVE-EY:IP.config.  
 Output file is \$(OPI\_EY)/HVE-EY:IP11S.adl.

## 6.6 75l/s Ion Pumps.

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

**make 75IP**

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

### 6.6.1 Main.

Generic adl file is \$(OPI\_GENERIC)/VE\_75IP\_GEN.adl (MEDM generated).  
 Configuration file is \$(CONFIG\_EY\_TEST)/HVE-EY:75IP.config.  
 Output file is \$(OPI\_EY)/HVE-EY:75IPBSC10.adl.



### 6.6.2 Simulation.

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

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

Output file is \$(OPI\_EY)/HVE-EY:75IPBSC10S.adl.

## 6.7 Pump Carts.

TBD

## 6.8 MEDM File Totals.

**Table 7: MEDM File List.**

|                      |                       |                  |
|----------------------|-----------------------|------------------|
| HVE-EY:Y1.adl        | HVE-EY:Y1S.adl        | HVE-EY:Y1EE.adl  |
| HVE-EY:Y2.adl        | HVE-EY:Y2S.adl        | HVE-EY:Y2EE.adl  |
| HVE-EY:Y3.adl        | HVE-EY:Y3S.adl        | HVE-EY:Y3EE.adl  |
| HVE-EY:GV17.adl      | HVE-EY:GV17E.adl      |                  |
| HVE-EY:GV18.adl      | HVE-EY:GV18E.adl      |                  |
| HVE-EY:TECP7.adl     | HVE-EY:TECP7S.adl     |                  |
| HVE-EY:CP7.adl       | HVE-EY:CP7S.adl       | HVE-EY:CP7EE.adl |
| HVE-EY:IP11.adl      | HVE-EY:IP11S.adl      |                  |
| HVE-MX:75IPBSC10.adl | HVE-MX:75IPBSC10S.adl |                  |

Total number of adl files=22.

Total number of channels monitored and/or controlled = 343.

## 7.0 Alarm Handler Generation.

### 7.1 Gauge Pairs.

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

**make**

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

### 7.2 Thermocouples.

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

**make**

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

### 7.3 Gate Valves.

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

**make**

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

### 7.4 Cryo Pumps.

Generic alh config include file is \$(ALH\_GEN)/VE\_CP\_GEN.alhConfig linked into \$(ALH\_EY). EY Vacuum template file

is \$(ALH\_EY)/VacTemplate.alhConfig. Makefile is \$(ALH\_EY)/makefile, build the Alarm Handler files with the command;  
**make**

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

#### 7.5 2500l/s Ion Pumps.

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

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

#### 7.6 75l/s Ion Pumps.

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

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

|              |
|--------------|
| EY.alhConfig |
|--------------|

Total number of channels monitored for alarm activity on Left Mid 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