

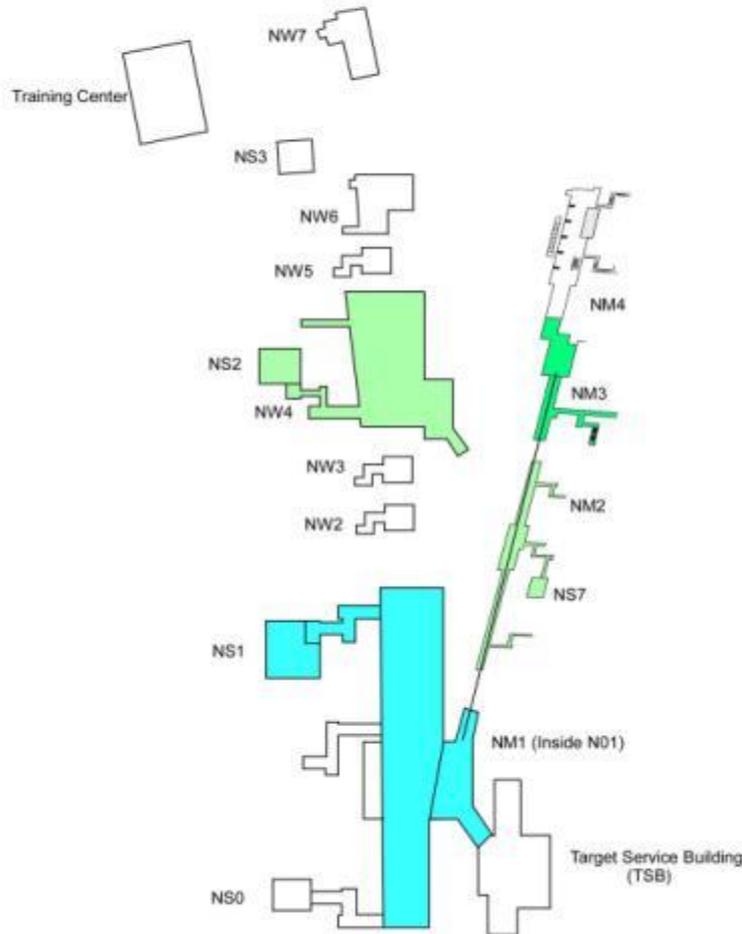
Turning on the NS1 LCW  
System, and filling the  
expansion tank when needed.

In the Neutrino beam line we have 2 LCW systems located at NS1 & NS2 and 1 RAW System located at the SeaQuest Service Building.



# Fermilab - Neutrino Area LCW

This map shows what areas, Service Buildings and enclosures, the 2 LCW systems cover.



NS2  
NS1

# NS1 LCW System

The NS1 LCW system supplies cooling water for the power supplies at NS1, and the 2 NM1U magnets in N01

The LCW system consists of 3 pumps. We normally use 1, and they are located in the LCW room at NS1

PB S53 DIGITAL STATUS

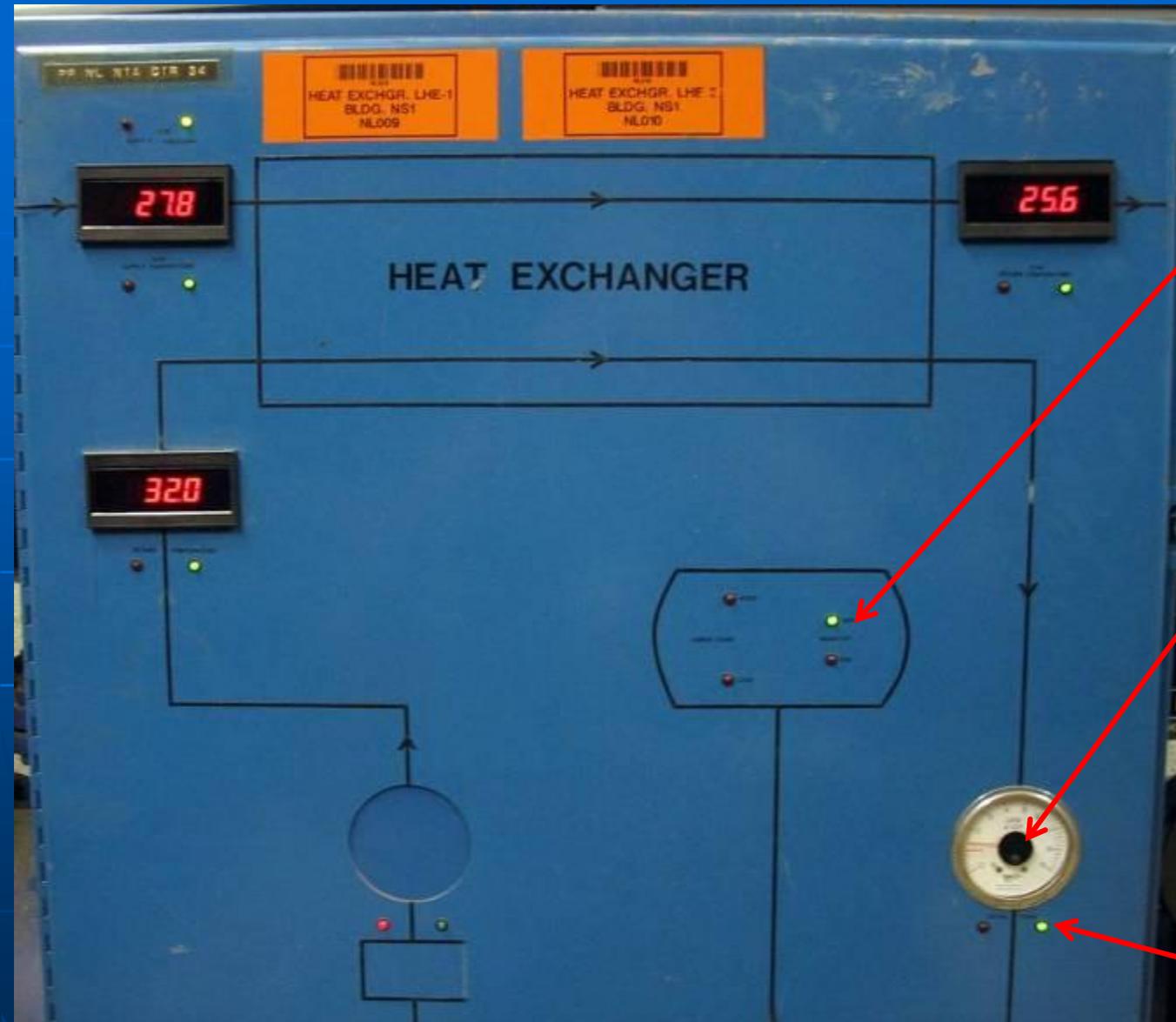
```
S53 DIGITAL STATUS                               ♦Pgm_Tools♦ AGG CONTRL
PARAM* *SA♦ X-D/A X=TIME Y=L:RF1PAI,L:RF2PAI,L:RF4PAI,L:RF5PAI *RESET
*save ---- Eng-U I= 0 I= 0 0 0 0 *ON
      One+ AUTO F= 360 F= 10000 / 10000 / 10000 / 10000 *OFF
.global .linac..booster ...mi... ..tev... ..sy... .p-bar.. .misc... collider

F:NS1LCW NS1LCW status/flow                       ♦See Alarm Log♦
♦More Info♦                                       ♦Ctrl-Menu♦
*** See HELP ***                                0 bit-31 ..... < 5
0 bit-30 ..... 0 .....
0 bit-29 ..... 0 .....
0 bit-28 ..... 0 ..... < 3
System Sum (ignore) ALARM 0 bit-27 ..... 0 .....
bit-10 ..... 0 bit-26 ..... 0 Local 5
Return Temperature OKAY 1 bit-25 ..... 0 Alarm is
Supply Temperature OKAY 1 bit-24 ..... 0 ALARMING
System Pressure ALARM 0 bit-23 ..... 0 Speech is
Air Pressure OKAY 1 bit-22 ..... 0 BYPASSED
Total System Flow ALARM 0 bit-21 ..... 0 Edit
Make-up OKAY 1 bit-20 ..... 0
Surge Tank hi level OKAY 1 < not critical call tech 0
Pump #3 OFF 0 bit-18 ..... 0
Pump #2 OFF 0 bit-17 ..... 0
Pump #1 OFF 0 bit-16 ..... 0
```

Here we see pump #2 is off.

Messages

# The Blue Box controller



Make-up indicator

Flow meter shows the rate of the water flowing through the pipes.

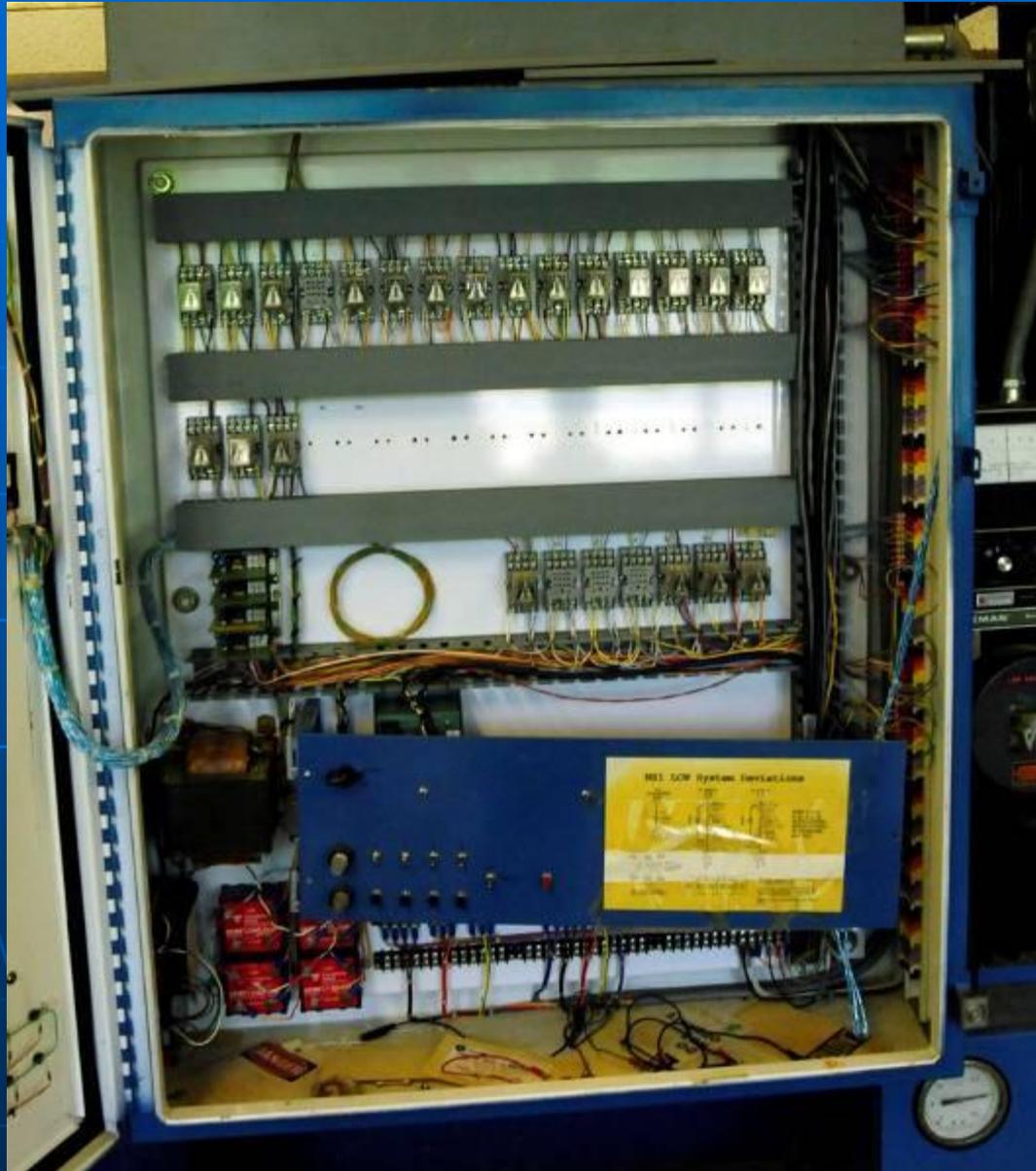
The System LEDs show that the system is on.



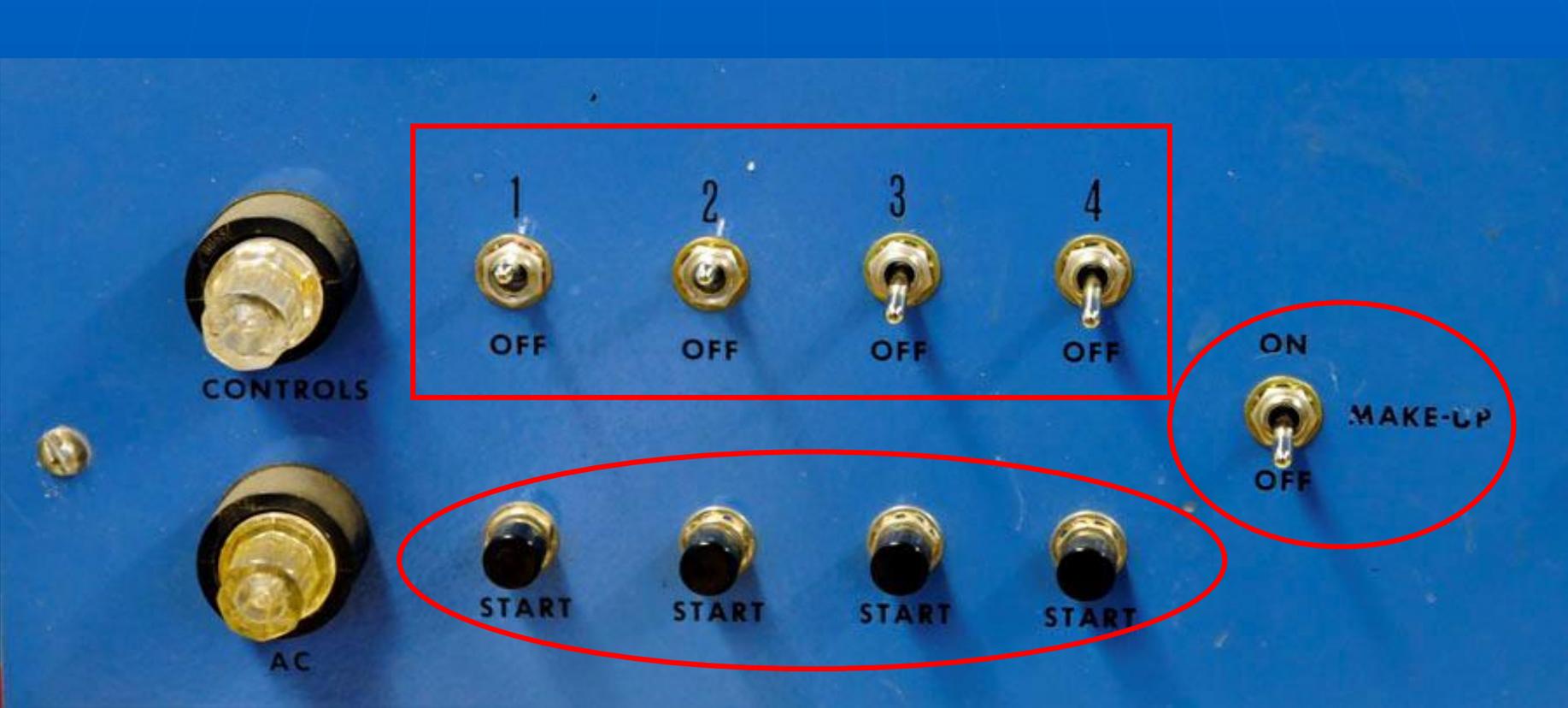
Here we see the flow meter at 0

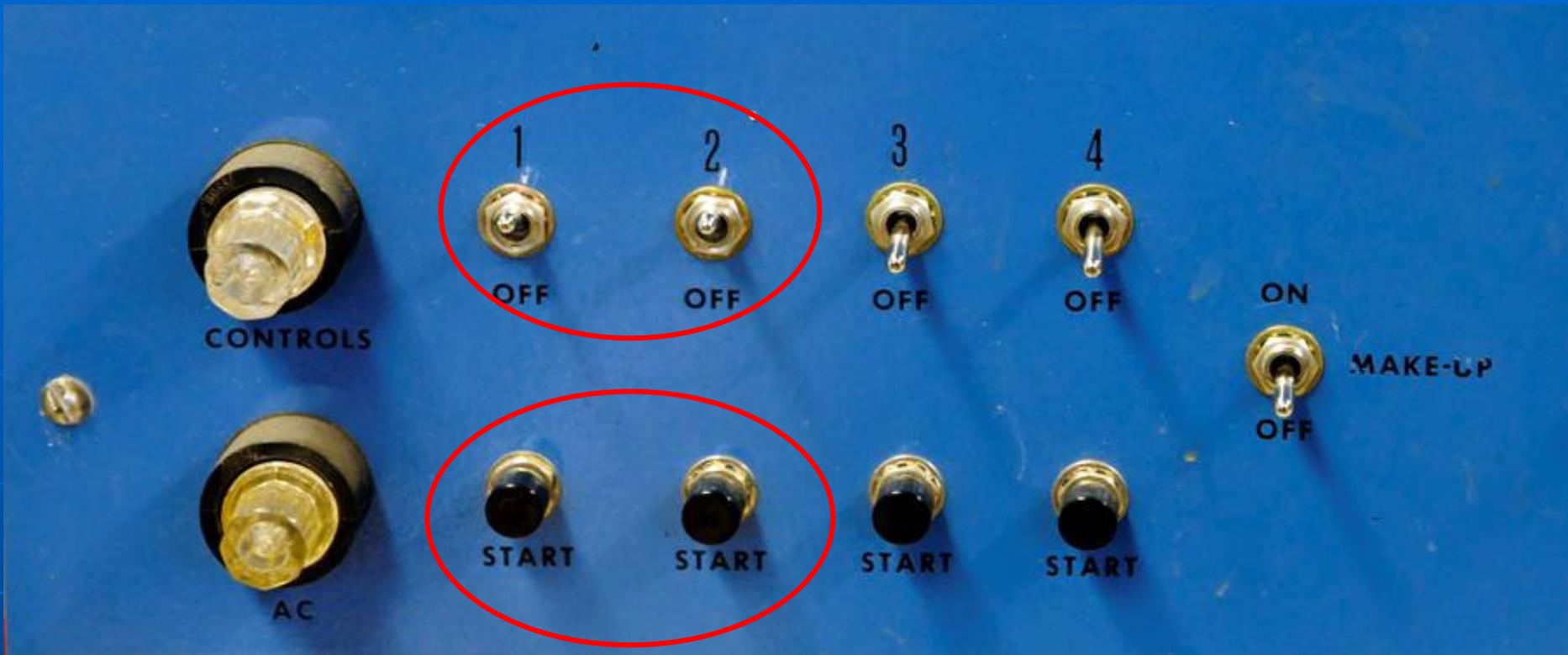
and the red LED is lit, no flow.

Let's open the blue door and see what's inside.



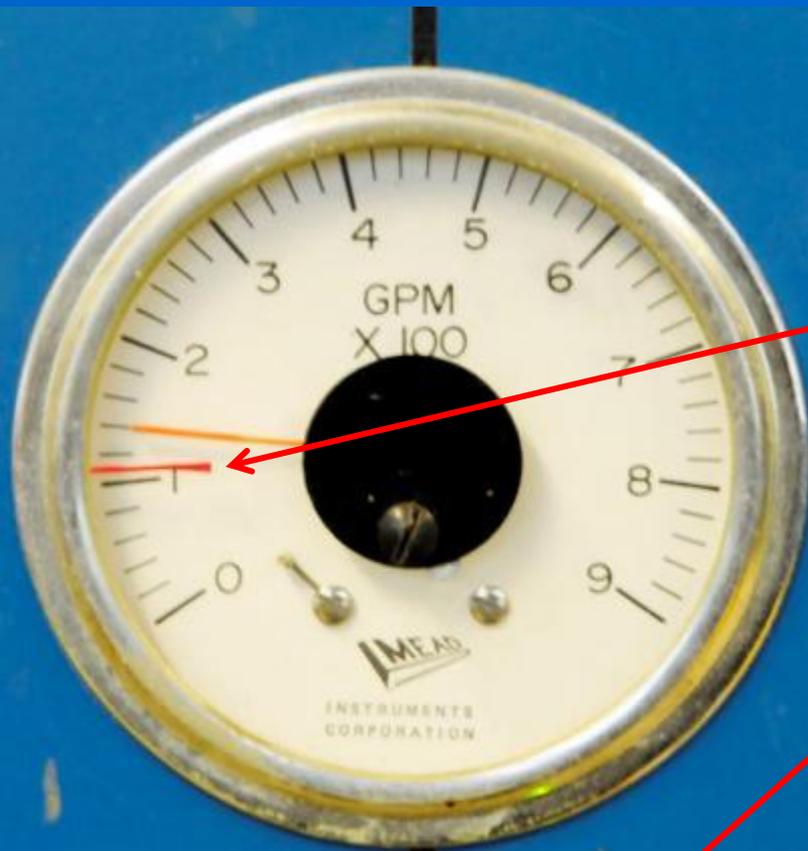
We are mostly concerned with the blue panel. The panel has 4 toggle switches for the 3 pumps and below each toggle switch is a black button used to turn on the pump. In addition, to the right is a switch to turn on the makeup for the expansion tank.





Here we see that pumps number 1 & 2 are being used, see the toggle switches are flipped to ON. To turn the NS1 LCW System on, press both start buttons for pumps 1 & 2 AND watch the Flow gauge on the front panel.

Note: The Water Werks group may change which pumps they are using, so DO NOT change the pump switches. Questions contact the Water Group.



When the system is up and running, the flow meter will show flow, GPM, above the red line and the green LED will be lit.

TOTAL



FLOW



PB 553 DIGITAL STATUS

```
S53 DIGITAL STATUS                               ♦Pgm_Tools♦ AGG CONTRL
parm  *SA♦ X-D/A  X=B:PC10FF Y=B:CHG0  ,B:BEFF15,B:BLMS01,B:BLMS06  *RESET
*save  ...X Eng-U  I=-.469512 I= 0      , 75      , 0      , 0      *ON
      One+ AUTO  F= .17439  F= 6      , 100     , .4     , 6     *OFF

.global .linac.. .booster ...mi... ..tev.. ...SY... .p-bar.. .misc... collider
hall/b WATER. neu/dmp swi/f meson sytimers diagnos spare vacuum
F: NS1LCW NS1LCW status/flow           ♦See Alarm Log♦

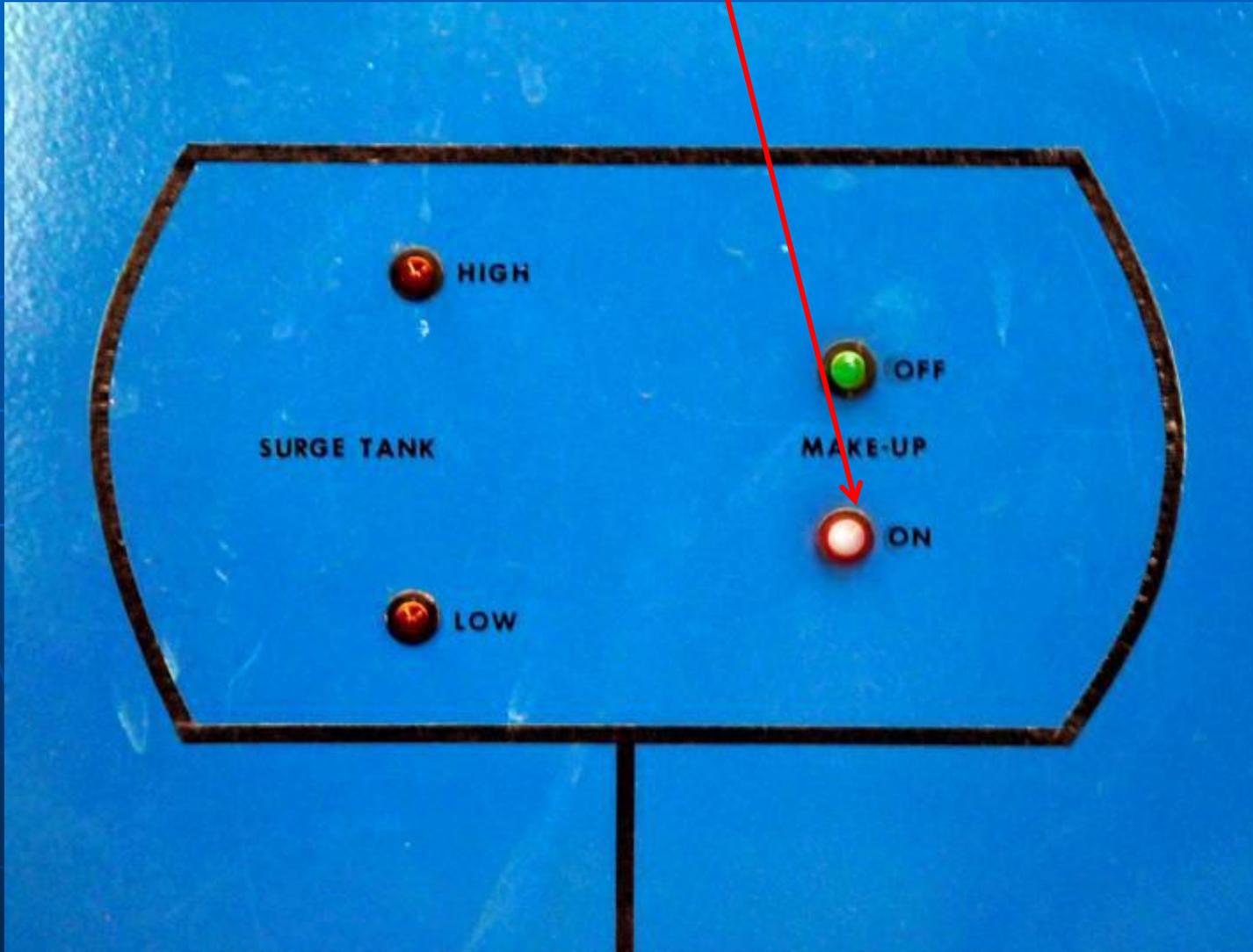
♦More Info♦                                       ♦Ctrl-Menu♦
XSpanTank Hi           Okay           0 bit-31 ..... 0 .....< S
XSpanTank MidHi        Okay           1 bit-30 ..... 0 .....
XSpanTank MidLo        Okay           1 bit-29 ..... 0 ..... -
XSpanTank Lo           Okay           1 bit-28 ..... 0 .....< 3
System Sum (ignore)    Okay           1 bit-27 ..... 0 .....
bit-10 .....           0 bit-26 ..... 0 Local 5
Return Temperature     Okay           1 bit-25 ..... 0 Alarm is
Supply Temperature     Okay           1 bit-24 ..... 0 BYPASSED
System Pressure        Okay           1 bit-23 ..... 0 Speech is
Air Pressure           Okay           1 bit-22 ..... 0 BYPASSED
Total System Flow      Okay           1 bit-21 ..... 0 Edit
Make-up               Okay           1 bit-20 ..... 0
Surge Tank hi level    Okay           1 < not critical call tech 0
Pump #3               OFF           0 bit-18 ..... 0
Pump #2               ON            1 bit-17 ..... 0
Pump #1               OFF           0 bit-16 ..... 0
```

Messages

We have pump #2 on

We may need to fill the Expansion, or Surge tank when it gets low

If the expansion tank needs filling we most likely have gotten an ACNET alarm.  
At the chassis, or blue box, the Make-up LED will be lit.



PD S53 DIGITAL STATUS

```
S53 DIGITAL STATUS                               ♦Pgm_Tools♦ AGG CONTRL
parm  *SA♦ X-A/D X=TIME      Y=I:BEAM ,I:LI607B,I:LI608A,I:HP608  *RESET
*save BL-- Eng-U I= 0      I= 0      0      0      -20      *ON
      s_MI AUTO F= 1.6     F= 48     / 40     / 40     / -50     *OFF
.global .linac.. .booster ...mi... ..tev... ..sy... .p-bar... .misc... COLLIDER
      B0      e778 raw ps 4      betaquad separatr fxt trgt collider feeddown
F:NS1LCW NS1LCW status/flow      ♦See Alarm Log♦
♦More Info♦                                     ♦Ctrl-Menu♦
*** See HELP ***                                0 bit-31 ..... 0 .....< 5
0 bit-30 ..... 0 .....
0 bit-29 ..... 0 ..... -
0 bit-28 ..... 0 .....< 3
System Sum (ignore) OKAY 1 bit-27 ..... 0 .....
bit-10 ..... 0 bit-26 ..... 0 Local 5
Return Temperature OKAY 1 bit-25 ..... 0 Alarm is
Supply Temperature OKAY 1 bit-24 ..... 0 ACTIVE-OK
System Pressure OKAY 1 bit-23 ..... 0 Speech is
Air Pressure OKAY 1 bit-22 ..... 0 BYPASSED
Total System Flow OKAY 1 bit-21 ..... 0 Edit
Make-up ALARM 1 bit-20 ..... 0
Surge Tank hi level OKAY 1 < not critical call tech 0
Pump #3 ON 1 bit-18 ..... 0
Pump #2 OFF 0 bit-17 ..... 0
Pump #1 OFF 0 bit-16 ..... 0
```

Here we see it's in alarm for make-up.

Messages

**Note:** The next few slides will instruct you on how to add water to the NS1LCW System. Currently the NS1LCW System is running with glycol, therefore we are NOT allowed to add water to the system, only the Fluids department techs are allowed to add glycol.

# What does it mean to fill the Expansion (Surge) Tank?

Every system has an expansion tank to hold water when the volume fluctuates, cold contracts and hot expands, the water has somewhere to go. It also acts as a buffer for leaks. Because of the leaks, small and large, we will occasionally need to add water to the expansion tank. The expansion tank is a large oval (normally) blue tank that is in the LCW room and usually near the ceiling. On one side of the tank there will be a glass tube, about 1/2 inch in diameter and about 36 inches long, with a ruler attached to it to help determine the level of the tank and how much water needs to be added. The Water Works Group attached 3 tie wraps on the glass tube, a low level, a high level, and a mid point. The mid point tie wrap should line up with the Surge Tank Alarm. So when the level falls below the middle tie wrap an alarm will happen on Acnet, saying we need to add water to the expansion tank. We normally fill it up about 6-8 inches, the level will be above the mid point mark.

The next few slide will explain filling the expansion tank for the NS1 LCW system using pictures.



The expansion tank is on the ceiling near the east wall.

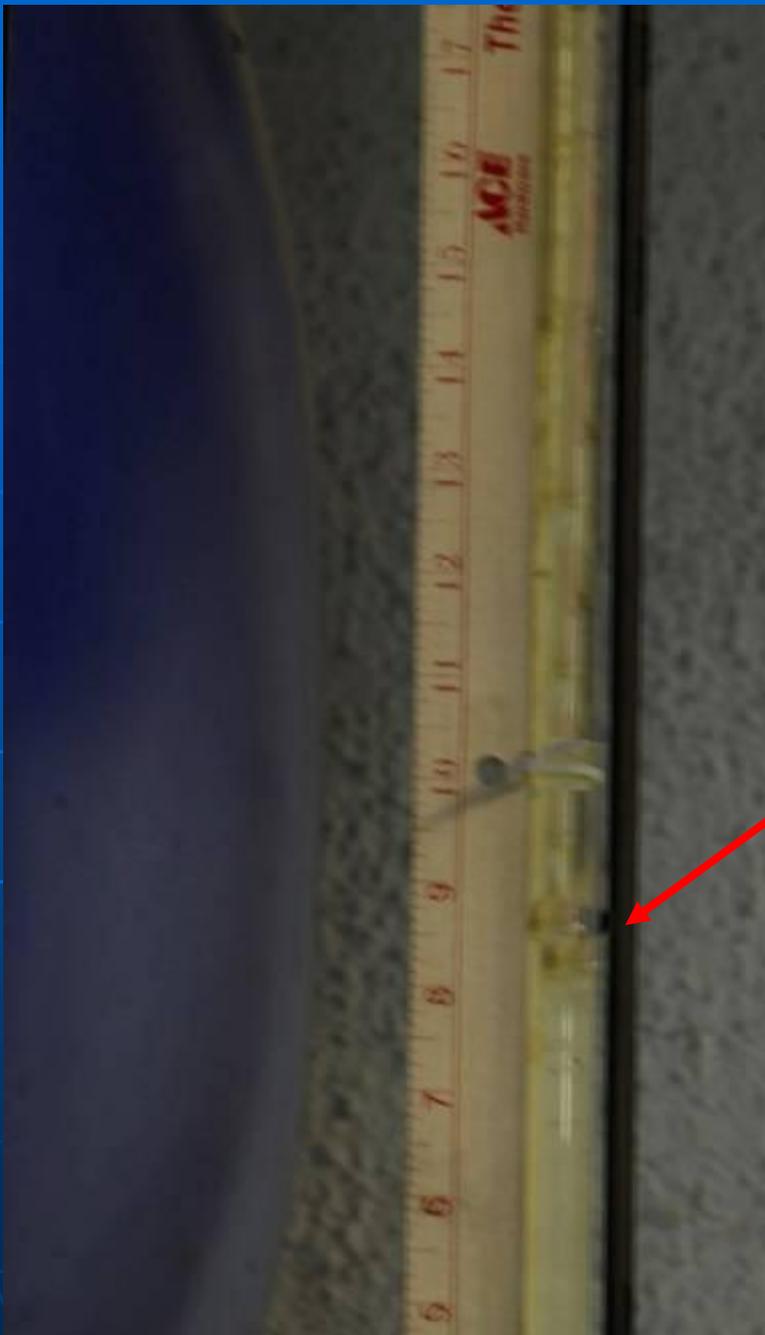


Sight  
glass

A closer picture of the expansion tank. See the sight glass for filling the tank on the right side of the tank.



Here are the 3 tie wraps.



Here we see the level below the mid level tie wrap.

Which means you will need to add water to the expansion tank.

To add water to the expansion tank, we will need to open 2 valves, flip a switch in the Blue box and the expansion tank will start filling.

Okay, now let's see if we can find those valves.

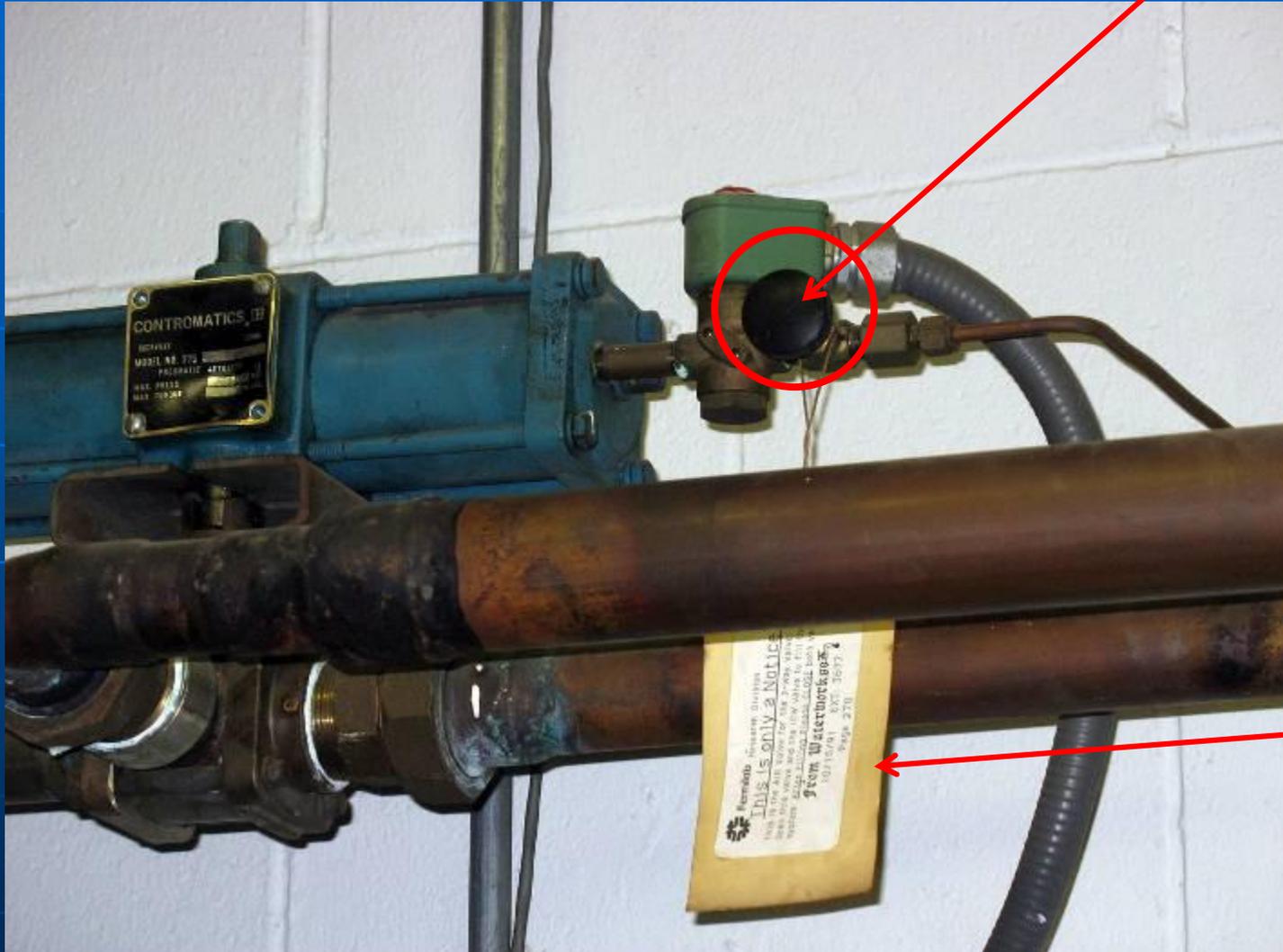
Now where are those 2 valves we need to open? In the NS1 LCW room they are located on the north wall above the DI bottles.



Here's where they are, the next two slides have better pictures.

The small needle valve is above the DI bottles, see the tag.

Rotate the black valve until it's open all the way.

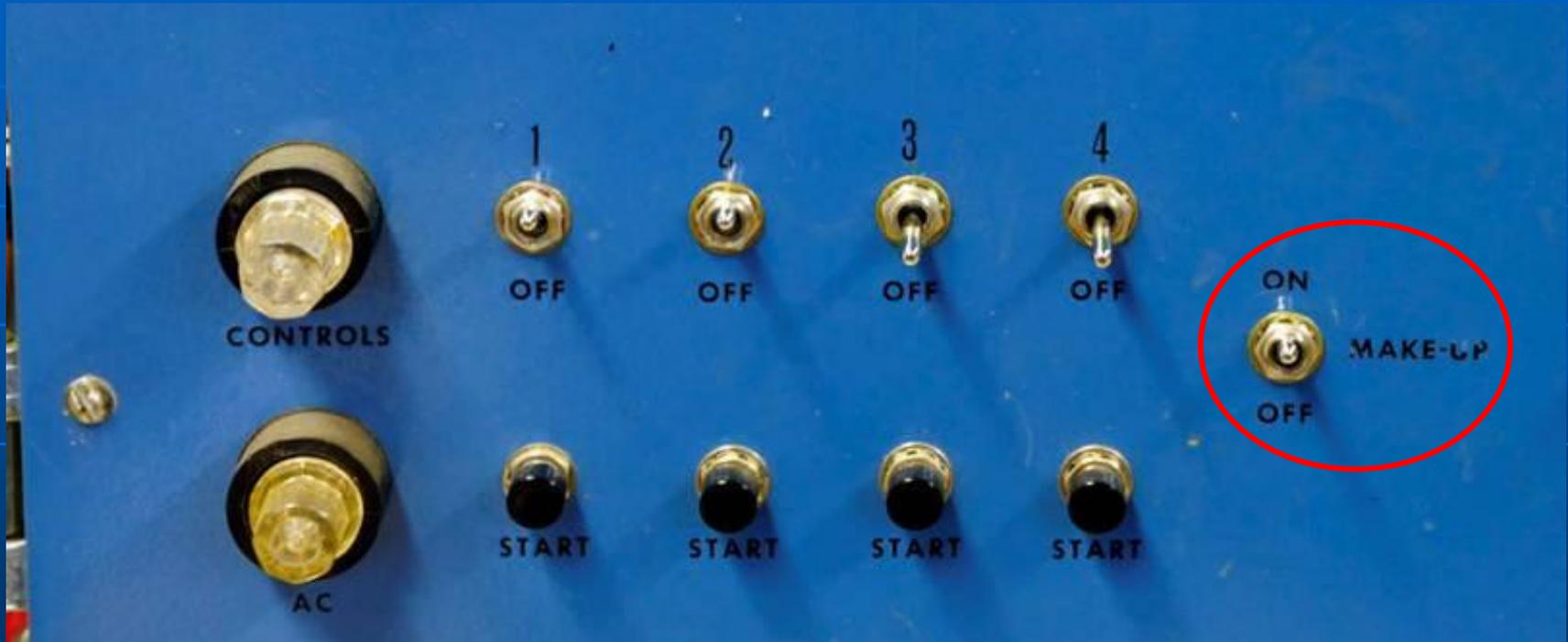


The second valve is above the DI bottles. See the tag, rotate the handle to open the valve.



da Tag

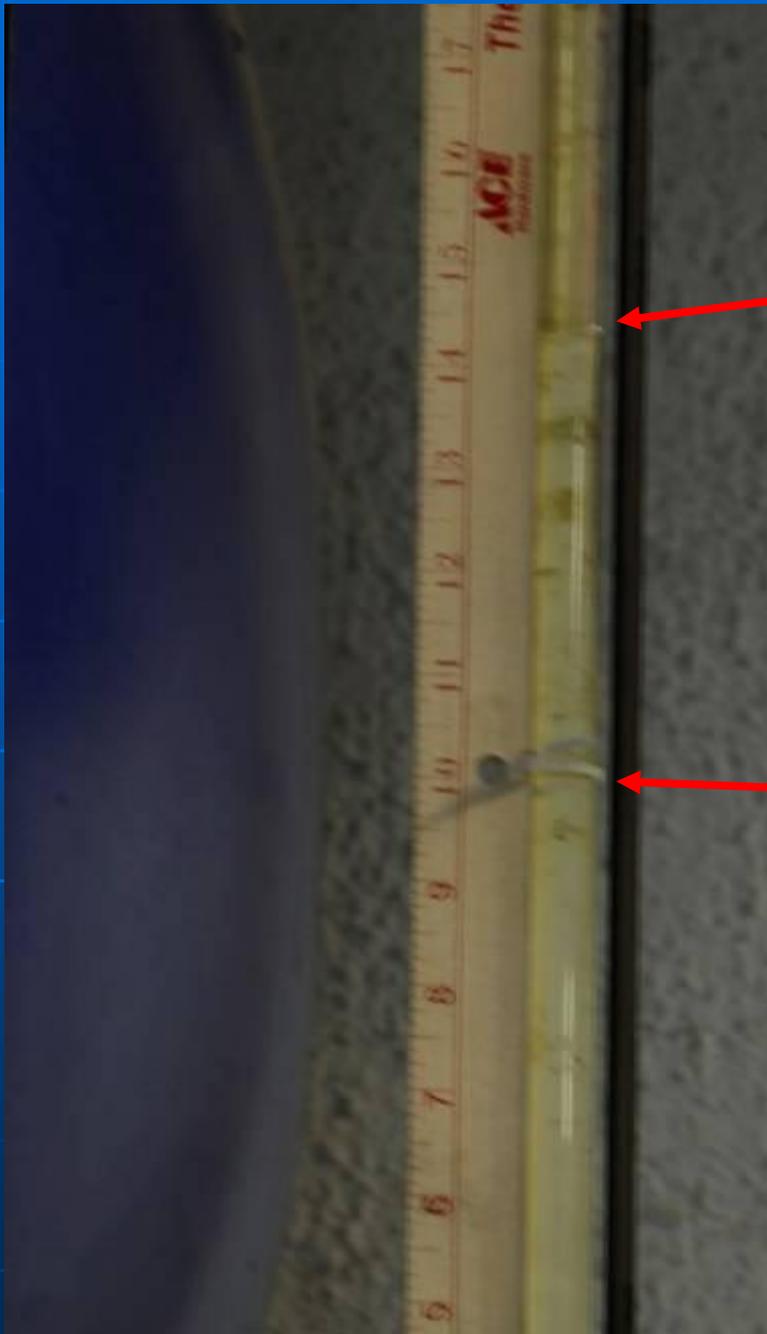
Back to the expansion tank, after the valves are opened, open the door and to the right of the pump switches you will see the Make-up switch, flip it on.





While you are filling the expansion tank, keep an eye on the sight glass checking the level. Once the sight glass shows the proper level stop.

Turn the switch off and close both valves.

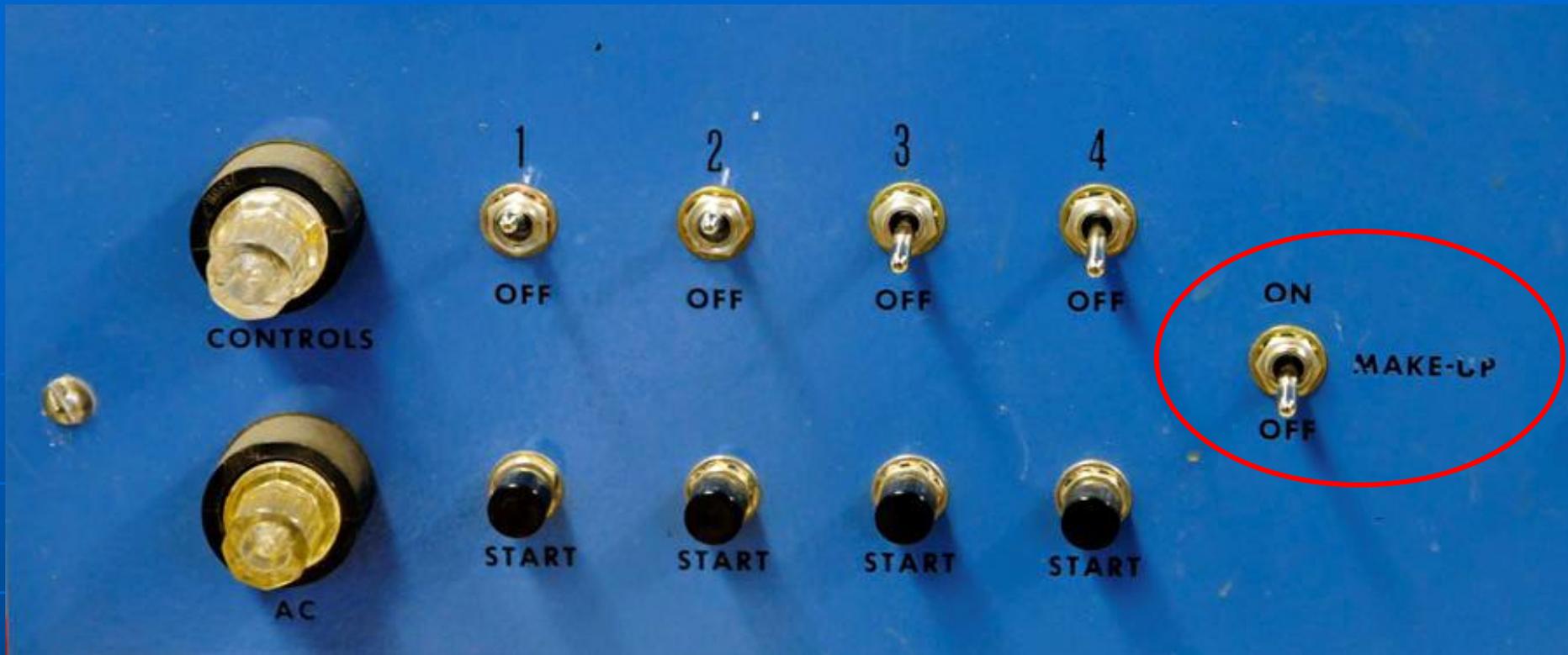


Here we see the level is above the mid level. When filling watch the Make-up panel for the Off LED to turn green.

Mid point tie wrap.

The Make-up LED should be OFF.





Flip the Make-up switch to Off, and you are finished.

```

PB S53 DIGITAL STATUS
S53 DIGITAL STATUS                               ♦Pgm_Tools♦ AGG CONTRL
parm *SA♦ X-D/A X=B:PC10FF Y=B:CHG0 ,B:BEFF15,B:BLMS01,B:BLMS06 *RESET
*save ...X Eng-U I=-.469512 I= 0 , 75 , 0 , 0 *ON
One+ AUTO F= .17439 F= 6 , 100 , .4 , 6 *OFF
.global .linac.. .booster ..mi... ..tev.. ...SY... .p-bar.. .misc... collider
hall/b WATER. neu/dmp swi/f meson sytimers diagnos spare vacuum
F:NS1LCW NS1LCW status/flow ♦See Alarm Log♦
♦More Info♦ ♦Ctrl-Menu♦
XSpanTank Hi Okay 0 bit-31 ..... 0 ..... < S
XSpanTank MidHi Okay 1 bit-30 ..... 0 .....
XSpanTank MidLo Okay 1 bit-29 ..... 0 ..... -
XSpanTank Lo Okay 1 bit-28 ..... 0 ..... < 3
System Sum (ignore) OKAY 1 bit-27 ..... 0 .....
bit-10 ..... 0 bit-26 ..... 0 Local 5
Return Temperature OKAY 1 bit-25 ..... 0 Alarm is
Supply Temperature OKAY 1 bit-24 ..... 0 BYPASSED
System Pressure OKAY 1 bit-23 ..... 0 Speech is
Air Pressure OKAY 1 bit-22 ..... 0 BYPASSED
Total System Flow OKAY 1 bit-21 ..... 0 Edit
Make-up OKAY 1 bit-20 ..... 0
Surge Tank hi level OKAY 1 < not critical call tech 0
Pump #3 OFF 0 bit-18 ..... 0
Pump #2 ON 1 bit-17 ..... 0
Pump #1 OFF 0 bit-16 ..... 0
Messages

```

Here everything is green, we only running pump #3.

da End, stay cool .....