PROCEDURES – Hydro test or Pressure Verification

All hydro tests for lines are entered in the Pressure Verification feature n the database. If you have a valid hydro test record, there should be a record of it in the database.

What is a valid hydro test record?

Any pre-test that was performed up to 5 years before the install date, any test performed at pipe installation or otherwise performed as a strength test.

For a hydro test to be VTC Verified, it must have the following 5 items entered on it:

1) Duration
2) Date of the test
3) Pressure
4) Measure (Begin/End Stations)
5) Medium

If the test has all of these, VTC = yes. If any of these 5 is not present, VTC = No

When VTC = no, VTC_Comments should have a comment similar to: "Test did not have a valid date" or "Test did not show the limits of test (stationing)"

When VTC = yes, VTC Date should be entered as the day that it was verified.

FOR 8 HOUR TESTS

Determining the pressure on a test

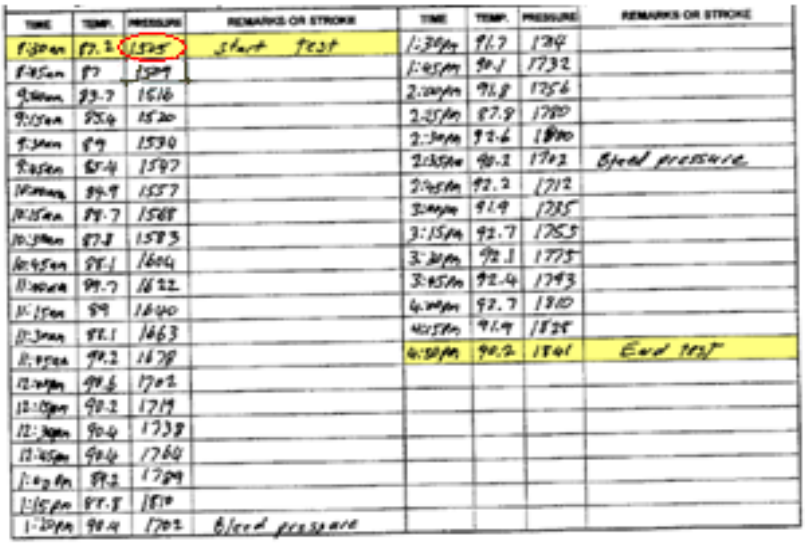
The BEST pressure can be obtained from the minimum pressure at the highest elevation. However, this is not always filled out on the form. If there is no pressure/elevation, then take the lowest pressure for continuous 8 hours of the test.

7T-234's - - Many times test come with a 7T-234 form. This form is for MAOP determination. While it is good to look at this, a pressure should NOT be determined from this.

To the right is a portion of a Hydro test sheet:

The notes of "Start Test" and "End test" will tell you how long the test lasted. In this example – 8 hours.

When determining which pressure to use, you will use the **lowest** rating during the 8 hours. This includes the pressure at the start or end times. In the example, you would use 1505 as the pressure rating.



TIME	TEMP.	PRESSURE	REMARKS OR STROKE	TIME	TEMP.	PRESSURE	REMARKS OR STROKE
7:30 am	87.2	1505	start test	1:30 pm	91.7	1719	
8:45 am	87	1599		1:45 pm	90.4	1732	
9:00 am	93.7	1616		2:00 pm	91.8	1756	
9:15 am	95.4	1520		2:15 pm	87.9	1780	
9:30 am	89	1530		2:30 pm	92.6	1800	
9:45 am	87.4	1587		2:35 pm	90.2	1702	Bleed pressure
10:00 am	89.9	1557		2:45 pm	92.2	1712	
10:15 am	89.7	1588		3:00 pm	91.9	1735	
10:30 am	87.8	1583		3:15 pm	92.7	1755	
10:45 am	88.1	1604		3:30 pm	92.1	1775	
11:00 am	89.7	1622		3:45 pm	92.4	1793	
11:15 am	89	1640		4:00 pm	92.7	1810	
11:30 am	88.1	1663		4:15 pm	91.9	1825	
11:45 am	90.2	1678		4:30 pm	90.2	1841	End test
12:00 pm	89.6	1702					
12:15 pm	90.2	1719					
12:30 pm	90.4	1738					
12:45 pm	90.4	1760					
1:00 pm	89.2	1789					
1:15 pm	88.8	1810					
1:30 pm	90.4	1702	Bleed pressure				

FOR 24 HOUR TESTS

Some pressure tests are more than 8 hours. There have been tests up to 24 hours. For these tests, you will still look at an 8 hour sliding "block" of time – not the full amount of test time. Look at the test in 8 hour time sections.

In each 8 hour section, note the **lowest** pressure.

Of all of your lowest pressures, you will use the **highest** number you have. See the example below:

The 8 hours shown by the red highlights is 1809

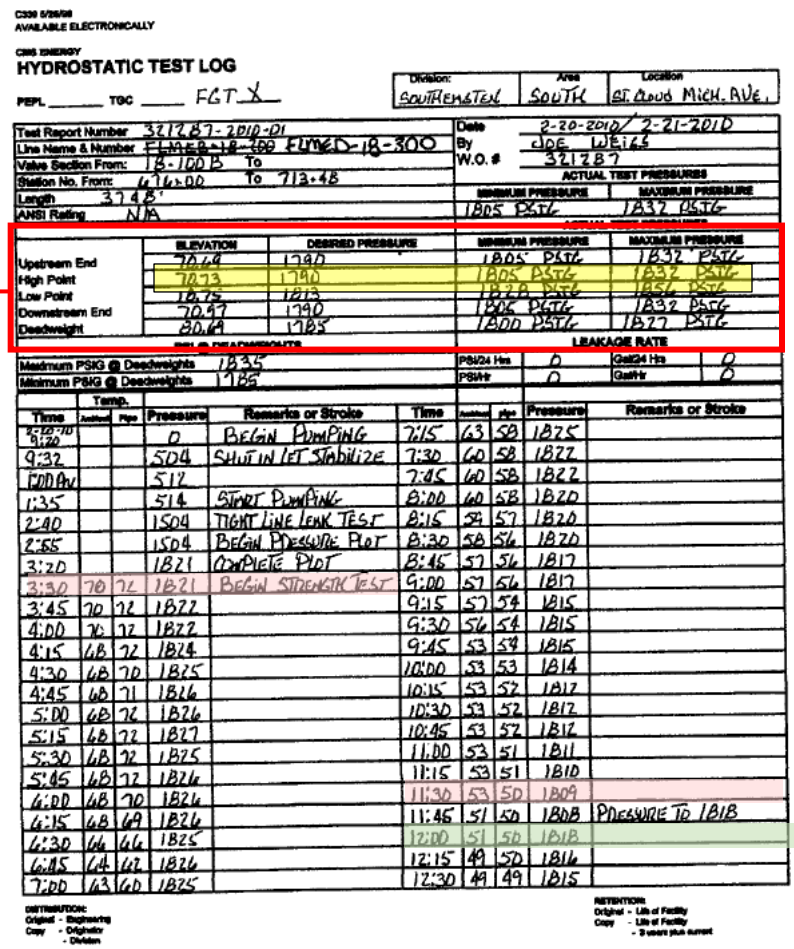
The 8 hours shown by the green highlights is 1800

The 8 hours shown by the blue highlight is not valid because the amount of time is too little.

The HIGHEST of these times is 1809. The pressure in this example would be 1809.

HOWEVER - on this particular test, the **best** indicator on the test is the elevation/pressure table. Here, the overriding factor is the HIGH POINT. The minimum pressure of the HIGH POINT would be used….

Therefore, the best pressure for this test is 1805 psig at high point elevation of 70.73



HYDROSTATIC TEST LOG

Time	Temp. Ambient	Temp. Pipe	Pressure	Remarks or Stroke	Time	Temp. Ambient	Temp. Pipe	Pressure	Remarks or Stroke
9:20			0	BEGIN PUMPING	7:15	63	58	1825	
9:32			504	SHUT IN LET STABILIZE	7:30	60	58	1822	
FOR AN			512		7:45	60	58	1822	
1:35			514	START PUMPING	8:00	60	58	1820	
2:40			1504	TIGHT LINE LEAK TEST	8:15	59	57	1820	
2:55			1504	BEGIN PRESSURE PLOT	8:30	58	56	1820	
3:20			1821	COMPLETE PLOT	8:45	57	56	1817	
3:30	70	72	1821	BEGIN STRENGTH TEST	9:00	57	56	1817	
3:45	70	72	1822		9:15	57	54	1815	
4:00	70	72	1822		9:30	56	54	1815	
4:15	68	72	1824		9:45	53	54	1815	
4:30	68	70	1825		10:00	53	53	1814	
4:45	68	71	1826		10:15	53	52	1817	
5:00	68	72	1826		10:30	53	52	1817	
5:15	68	72	1827		10:45	53	52	1812	
5:30	68	72	1825		11:00	53	51	1811	
5:45	68	72	1826		11:15	53	51	1810	
6:00	68	70	1826		11:30	53	50	1809	
6:15	68	69	1826		11:45	51	50	1808	PRESSURE TO 1818
6:30	66	66	1825		12:00	51	50	1818	
6:45	64	62	1826		12:15	49	50	1816	
7:00	63	60	1825		12:30	49	49	1815	

TEST 321287-2010-01

Time	Temp. Ambient	Temp. Pipe	Pressure	Remarks or Stroke	Time	Temp. Ambient	Temp. Pipe	Pressure
12:45	51	50	1814					
1:00	49	49	1813					
1:15	49	48	1813					
1:30	49	48	1812					
1:45	48	48	1811					
2:00	48	48	1811					
2:15	48	48	1810					
2:30	50	50	1810					
2:45	50	50	1809					
3:00	50	50	1809					
3:15	50	50	1809					
3:30	50	50	1808					
3:45	50	49	1808					
4:00	50	49	1807					
4:15	49	48	1806					
4:30	49	48	1806					
4:45	49	48	1805					
5:00	49	48	1805					
5:15	49	48	1804					
5:30	49	48	1804					
5:45	49	47	1803					
6:00	49	47	1803					
6:15	48	47	1802					
6:30	48	47	1802					
6:45	48	47	1801					
7:00	48	47	1801					
7:15	48	47	1800	BEGIN 2 HOUR HOLD				
7:30	48	47	1800					
7:45	48	48	1801					
8:00	50	49	1801					
8:15	50	51	1802					
8:30	54	56	1802					
8:45	56	59	1802					
9:00	58	60	1802					
9:15	62	62	1803	END 2 HOUR HOLD - END TEST				
9:20	63	64	1803					
9:35	—	—	—	DRAINED PRESS. TO ZERO				

In the 8 hrs shown by the red highlights (3:30 to 11:30), lowest pressure is 1809

In the 8 hrs shown by the green highlights (12:00 to 8:00), the lowest pressure is 1800.

The blue highlight does not show enough hours to consider a valid test.

NOTE: The 11:45 time is not considered because the test was pressuring up.

In this instance, the test would be entered as 8 hours at pressure of 1809.

FOR SPIKE TESTS

Some pressure tests also have a "Spike Test" on the end of it. A Spike Test may be included because the actual pressure test doesn't fall within the minimum/maximum required rating. So there is a short burst of high pressure at the end of the test (i.e. the spike test) to ensure the pipe can withstand the required pressure.

A spike test that is shown on a hydro test is always going to be added as a SECOND test. In other words, you will enter the hydro test as one record and then enter the spike test as a second record.

TEST REPORT NUMBER
LINE NAME & NUMBER
VALVE SECTION: FROM TO
STATION NO.: FROM TO
LENGTH 57,093' 18.81 miles
ANSI RATING

DATE 5/15/09
BY Bert Settle
W.O. #

ACTUAL TEST PRESSURES: MINIMUM 1360 MAXIMUM 1362

	END UPSTREAM	END DOWNSTREAM	POINT HIGH	POINT LOW	DEADWEIGHT
ELEVATION					
DESIRED PRESSURE					

PSIG @ DEADWEIGHTS: MAXIMUM 1373 MINIMUM 1358

LEAKAGE RATE: PSI/24 Hrs | PSI/Hr | Gal/24 Hrs | Gal/Hr

TIME	TEMP.	PRESSURE	REMARKS OR STROKE	TIME	TEMP.	PRESSURE	REMARKS OR STROKE
4:30 pm		0	start fill	10:16am	86.9	1270	22903 864
9:00pm		54	End fill	10:18am	87.4	1280	23770 867
8:00am	79.8	564	start pressure	10:20am	86.0	1290	24641 871
9:27am	85.1	1007	start stroke pist-0	10:22am	85.8	1300	25506 865
9:35am	85.4	1045	3428 3428	10:24am	86.5	1310	26374 868
9:45am	83.6	1107	8735 5307	10:25am	87.0	1320	27242 868
9:48am	83.4	1120	9865 1130	10:27am	86.8	1330	28103 861
9:50am	83.4	1130	10745 880	10:29am	87.6	1340	28970 867
9:52am	83.1	1140	11610 865	10:31am	86.6	1350	29835 865
9:54am	83.4	1150	12485 875	10:33am	87.1	1360	30687 852
9:56am	83.2	1160	13350 865	10:35am	87.7	1360	start spike
9:58am	83.2	1170	14225 875	10:37am	86.4	1361	
9:59am	82.9	1180	15090 865	10:55am	87.2	1362	End test
10:01am	82.7	1190	15960 870				Blow down to test
10:03am	83.6	1200	16830 870				caused settling on
10:05am	84.3	1210	17695 865				test hose, slowly
10:07am	84.9	1220	18562 867				blow discharge to
10:09am	85.2	1230	19435 873				correct
10:10am	85.3	1240	20300 865				
10:12am	85.4	1250	21168 868				
10:14am	85.8	1260	22035 867				

Examples of a Pressure Test with a Spike Test:

In this example, the test was approximately 3 hours.

You'll notice that the pressure ratings are NOT high enough to reach the minimum required pressure. Because of this, they have included a Spike Test.

When you enter the information into the database, you will have to show a comment in the remark field like this:

Spike Test Held @ (Pressure) for (Time) hrs.

0955E-2009-01
M/L PLAEA-15
15-2 TO 15-3
706+79 TO 2538+50
miles

DATE 4/9/09
BY Bert Settle
W.O. # 009555

ACTUAL TEST PRESSURES: MINIMUM 1374 MAXIMUM 1374

	END UPSTREAM	END DOWNSTREAM	POINT HIGH	POINT LOW	DEADWEIGHT
ELEVATION					
DESIRED PRESSURE					

PSIG @ DEADWEIGHTS: MAXIMUM 1387 MINIMUM 1372

LEAKAGE RATE: PSI/24 Hrs | PSI/Hr | Gal/24 Hrs | Gal/Hr

TIME	TEMP.	PRESSURE	REMARKS OR STROKE		TIME	TEMP.	PRESSURE	REMARKS OR STROKE	
6:15p	76.5	589	start pressure		11:28		36106		1298
10:08	59.6	1011	0		11:30	56.	37406		1300
10:20	58.7	1054	5554	5884	11:3	56.	1310	38708	1302
10:37	58.1	1114	13302	7748	11:3	56.	1320	40084	1296
10:39	57.9	1120	14084	782	11:40	56.0	1330	41309	1305
10:42	57.7	1130	15373	1289	11:43	56.0	1340	42610	1301
10:45	57.8	1140	16665	1292	11:45	56.0	1350	43910	1300
10:48	57.7	1150	17957	1292	11:48	55.8	1360	45213	1303
10:50	57.4	1160	19252	1295	11:52p	55.4	1370	46483	1270
10:54	57.3	1170	20545	1293	12:00a	55.3	1374	START SPIKE	
10:56	57.3	1180	21845	1300	12:15a	55.0	1374		
11:00	57.4	1190	23136	1296	12:30a	54.5	1374	End Test	
11:02	57.2	1200	24437	1301					
11:05	57.0	1210	25727	1290					
11:08	57.0	1220	27023	1296					
11:11	56.8	1230	28325	1302					
11:14	56.6	1240	29619	1294					
11:17	56.6	1250	30913	1294					
11:20	56.4	1260	32210	1297					
11:23	56.2	1270	33513	1303					
11:25	56.1	1280	34808	1295					

Entering Pressure Verification in UPDM:

There are several ways to enter a Pressure Verification record in UPDM.

1) Hydro tests can be entered by clicking on the begin point and selecting every vertice (point) until reaching the end of the line. This can be cumbersome if the line is long.
2) Hydro tests can be entered into UPDM by SNAPPING to the begin measure of the test and SNAPPING to the end measure of the test. This process will draw a straight line in UPDM, but will be "synced" to the line (draw the SHAPE of the line) in the overnight process. The RouteID numbers must be entered and the Pressure Verification record SNAPPED to the pipe segment or the "sync" process will not work.
3) Hydro tests can be entered by "copying" the pipe segment records and "pasting" them to the Pressure Verification table. The pipe segments should then be merged into one record and the values populated with the correct information.

Pressure Test records should be modified when work orders replace pipe. A test is tied to a piece of pipe. If the pipe has been removed (put in archive), the test should be removed (put in archive) also.

Duration: the length of time in hours of the test

From Route ID: This is a REQUIREMENT. Must be filled in to "attach" itself to a specific line. Since Pressure Verification can span across Pressure Systems, the "From RouteID" and "To RouteID" can be different.

To RouteID: This is a REQUIREMENT. Must be filled in to "attach" itself to a specific line. Since Pressure Verification can span across Pressure Systems, the "From RouteID" and "To RouteID" can be different.

From Measure: From Survey Station; This is a REQUIREMENT

To Measure: To Survey Station; This is a REQUIREMENT

From Date: Do not fill in

To Date: Do not fill in

Min. Adj. Press: Required be added from Hydro test

Min. Des. Pressure: use zero unless specified on paperwork

Pressure Test: from APDM – leave blank

Pretest: available choices: unknown, No, Yes; If yes, Pre-Test is only valid 5 years prior to install date.

Status: In-Service …. Hydro Tests should be "In-Service" unless you have removed the pipe that was tested (the test would then be removed) or the line (system) has been set to a status other than active.

Choices available are: Proposed, Inactive, Leased, In-Service, In-Construction, In-Service (Idle), Abandoned, Removed, Sold, Decommissioned, Retired In Place, In-Service (Deferred) but should NOT all be used.

Test Date: Date test was started

Test Medium: unknown, Air, Gas, Nitrogen, Inert Gas, Other, Soap, Water

Test Name: Not a requirement; Add if available

Test Report No: Add if available

Test Type: Strength, Spike … The majority of hydro tests will be entered as "Strength". Spike tests (1 hour) should be entered as separate test. Any test performed by the Integrity Department is considered a "Strength" test (8 hours) or a "Spike" test (1 hour). However, these tests should be noted in the 'CommentText' field with a note such as "Test performed by Integrity in accordance with 10 year maintenance rule".

Other choices available are Yield, Uprating, Class, Integrity, Test Pre-Test, Unknown. These should NOT be used under "Test Type", but could be noted in the 'CommentText' field.

TestWO: the work order number that tested the pipe.

Unit of Measure: do not fill in

VTC Material Verified: No, Yes, Unknown

Yes - Requires the following 5 items: Duration, Date of the Test, Pressure, Measure and Medium
No – If any one of the above 5 items is not present.

VTC Date Verified: Is a REQUIREMENT when VTC Material Verified = yes. Should be entered as the day that it was verified, not the date on the test.

VTC Comments: When VTC Material Verified = no, a statement such as "Paperwork does not have a test date." Or "Test only found on alignment sheet." Other comments might be "Pipeline work performed under WO xxxxx, but hydro test work performed under WO xxxxx"

VTC Comment for any test greater than 8 hours should be "Best 8 hours from duration of (# of hours)"

Hydro Tests on Alignment Sheets:

Hydro tests on alignment sheets use the "Best Test" rule.

When entering hydro tests in the Pressure Verification for UPDM, they should always show the amount of pipe tested at that time.

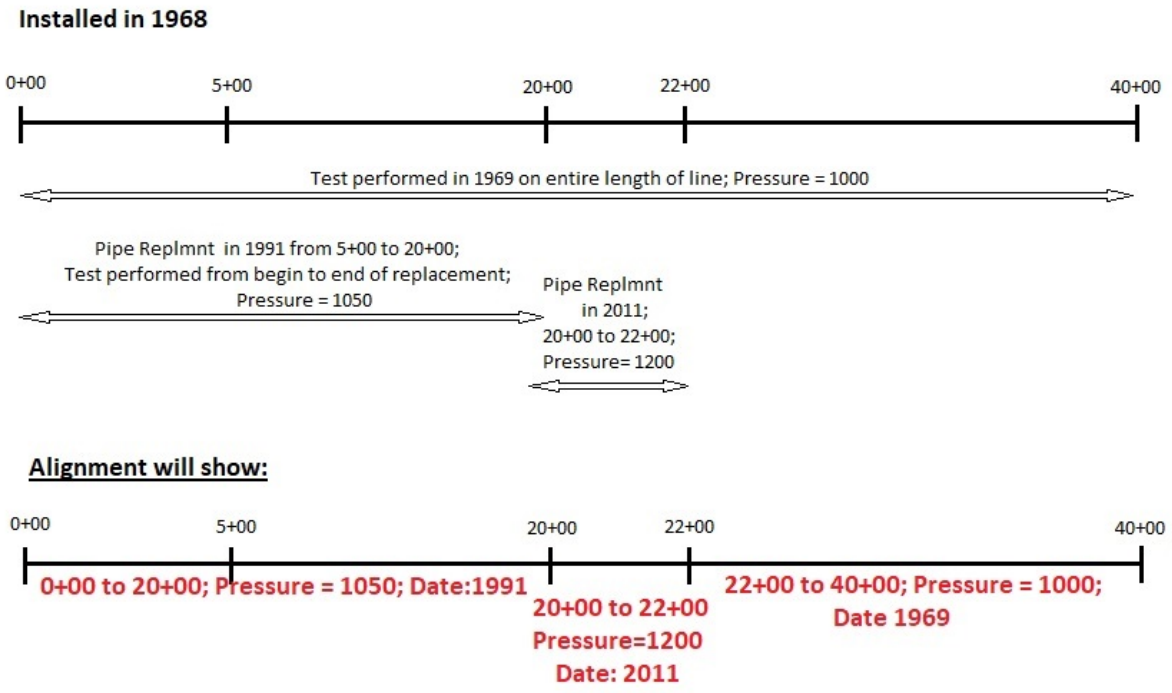
All tests in Pressure Verification should be active if the pipe segments are active. If a portion(s) of a line are Idle or Abandoned, the tests for those segments of pipe should be the same status.

Pipe Replacements should show the test for the pipe being replaced. Remember, even if the test is lower, **the original piece of tested pipe has been removed**. See example #2. When doing pipe replacement, you will have to modify other tests to show that, not only the pipe has been removed, but the hydro test that tested that piece of pipe will be removed also.

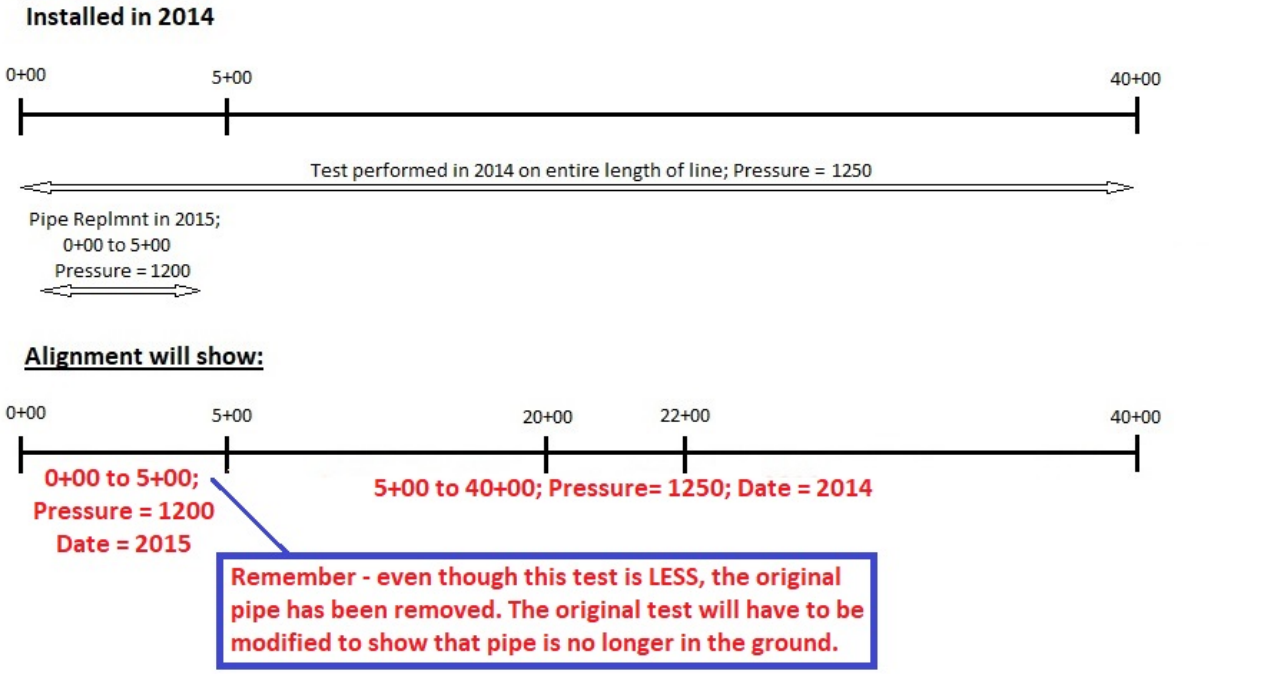
The tests that are printed on alignment sheets are the tests that have the following:

- The test that has <u>first consideration</u> and will be printed over others would be the test that has the highest pressure in an 8 hour time period. This is true of an 8 hour test or a 24 hour test AND it has the highest pressure.
- If there are other tests, the <u>next consideration</u> will be the test that is 8 hours and has the next highest pressure.

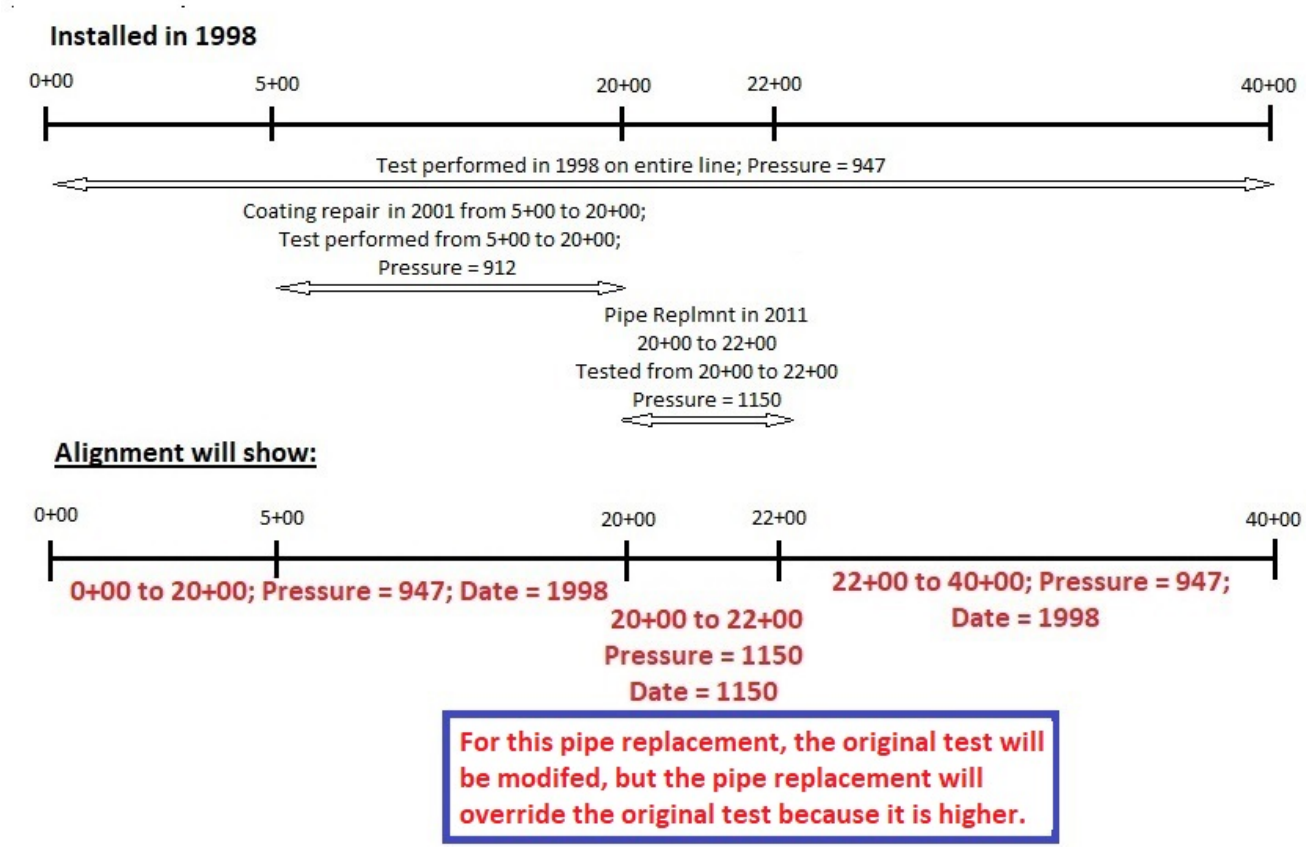
<u>Example #1</u>



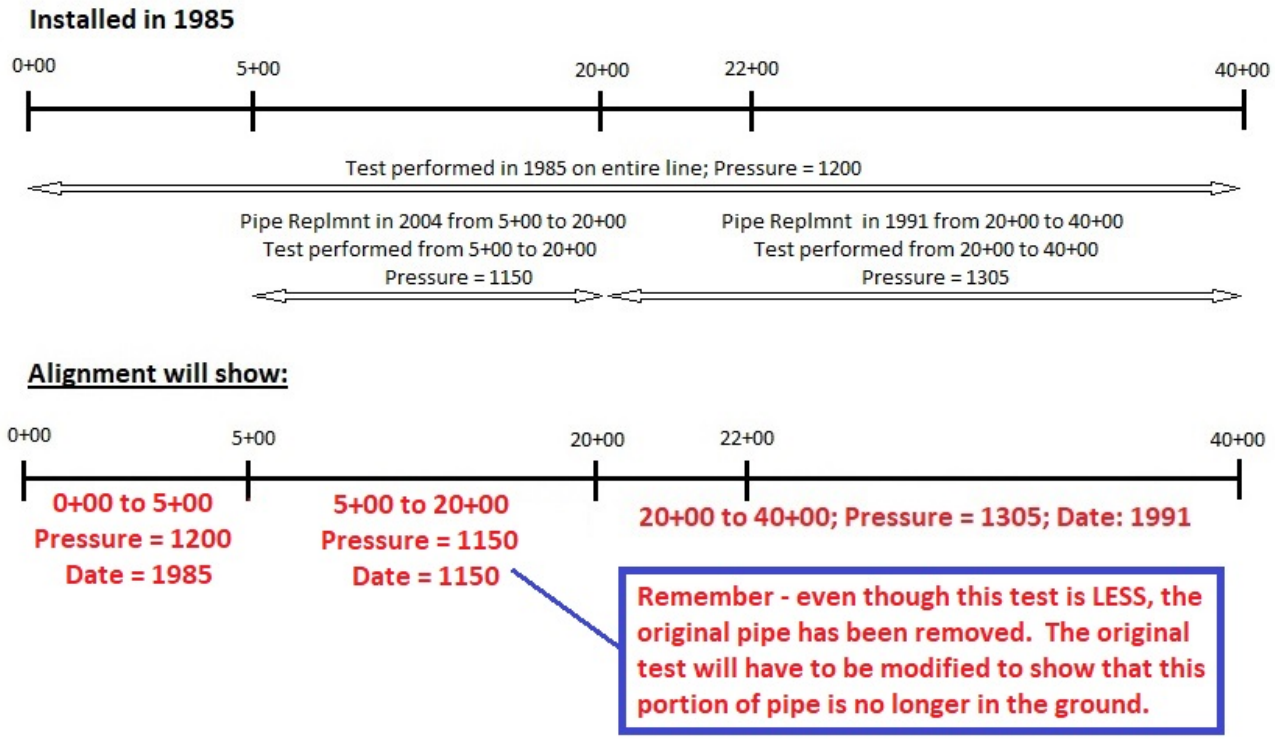
Example #2



Example #3



Example #4


Installed in 1985
0+00
5+00
20+00
22+00
40+00
Test performed in 1985 on entire line; Pressure = 1200
Pipe Replmnt in 2004 from 5+00 to 20+00
Test performed from 5+00 to 20+00
Pressure = 1150
Pipe Replmnt in 1991 from 20+00 to 40+00
Test performed from 20+00 to 40+00
Pressure = 1305
Alignment will show:
0+00
5+00
20+00
22+00
40+00
0+00 to 5+00
Pressure = 1200
Date = 1985
5+00 to 20+00
Pressure = 1150
Date = 1150
20+00 to 40+00; Pressure = 1305; Date: 1991
Remember - even though this test is LESS, the original pipe has been removed. The original test will have to be modified to show that this portion of pipe is no longer in the ground.