Bridgeton Landfill, LLC

Weekly Data Submittal

Week of June 26, 2016 – July 2, 2016

Required by Section 52.F of Agreed Order, Case No. 13SL-CC01088
Effective May 13, 2013

Contents:

Provided Separately:

- **– Leachate Level in Leachate Collection Sump Raw Data Excel Spreadsheet**
- **– Temperature Monitoring Probe Raw Data Excel Spreadsheet**
- **– Heat Extraction System TMP Raw Data Excel Spreadsheet**
- **– Gas Interceptor Well Reading Raw Data Excel Spreadsheet**
- **– Neck-Area Gas Extraction Well Data Excel Spreadsheet**

July 8, 2016

Commentary on Data

July 8, 2016

Attachment A – Leachate Levels in Leachate Collection Sumps

Leachate Collection Sumps (LCSs) LCS-1D, -4B, -5A, and -6B were fully operational during the weekly reporting period.

The level sensors in LCS-1D and LCS-4B are currently operational and responsive. Liquid levels were not recorded by either level sensor during the weekly reporting period. Both sumps are equipped with flow meters which displayed no flow during the weekly reporting period. Therefore, it can be concluded that the liquid levels in these sumps were below the bottom of the pump and level sensor in each sump.

The pumps in LCS-2D and LCS-3D were non-operational during the weekly reporting period. The transducer in LCS-3D continued to report liquid levels.

Attachment B - Temperature Monitoring Probe Analytical Charts

The following Temperature Monitoring Probes (TMPs) indicated generally consistent profiles to previous observations: TMP-1, -2, -3, -3R, -4, -4R, -6, -9, -10, -11, -14R, -16, -17, -18, -21, -22, -23, -24, -25, -26, -27, -28, and -29.

TMP readings for evaluation of the Heat Extraction System (HES) are provided as attachment "Heat Extraction System TMP Raw Data Excel Spreadsheet," but are not discussed in this report.

Attachment C - Gas Interceptor Wellhead Temperature Graphs

As part of the HES, there are currently cooling water circulation loops installed in twelve Gas Interceptor Wells (GIWs) (GIW-02 through GIW-13). The remaining well (GIW-01) had a measured gas temperature within its historical operating limits.

Attachment D – Neck Area Gas Extraction Well Data

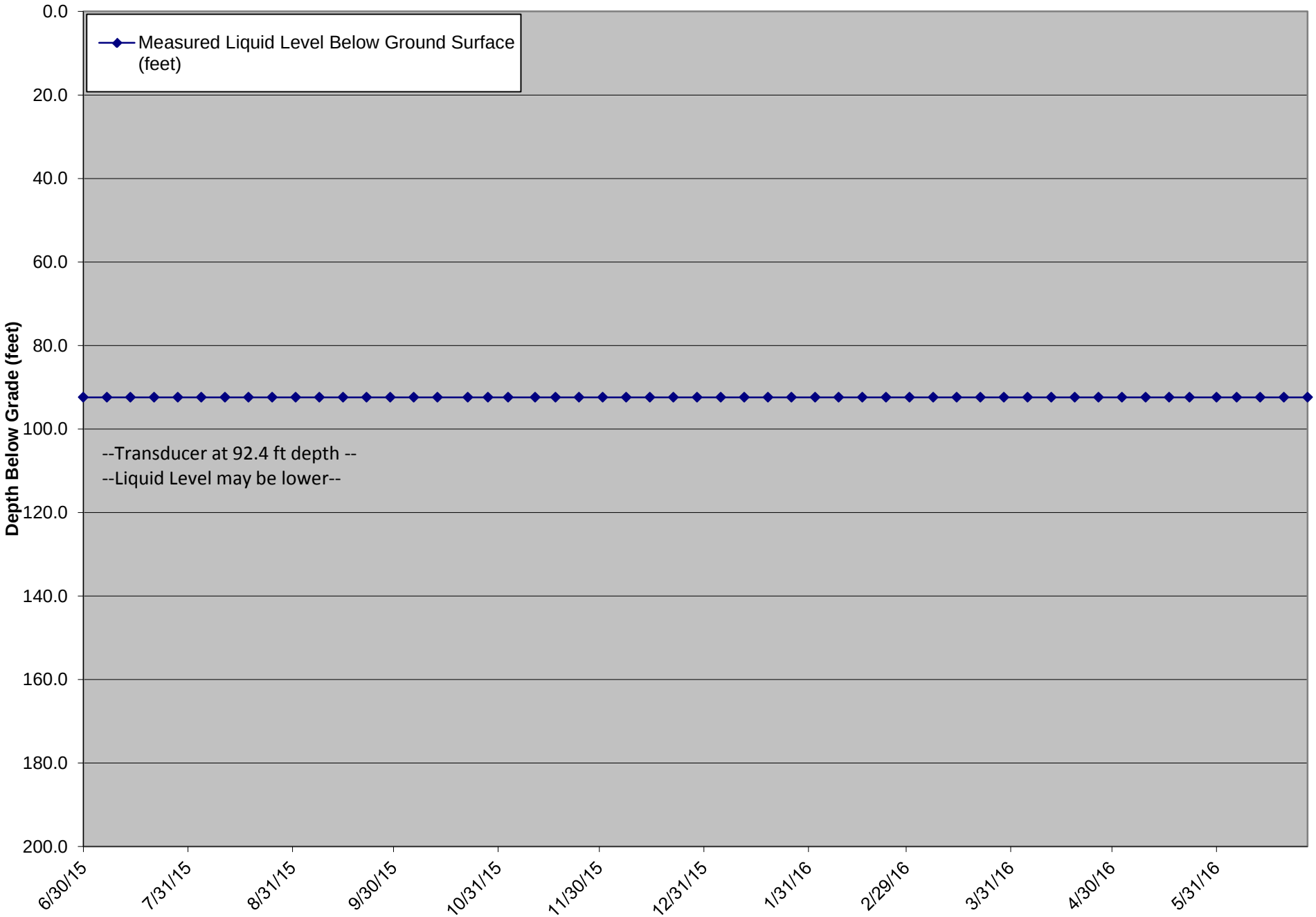
Weekly gas temperature data is collected for select Gas Extraction Wells (GEWs) located in the neck area of the landfill. These wells include GEW-008, -009, -010, -038, -039, -040, 041R, -043R, -053, -054, -055, -056R, -109, and -110.

The gas temperature in well GEW-056R dropped appreciably between 6/20/2016 and 6/28/2016 due to limited gas flow. Gas flow was diminished due to accumulated liquids at the well head. Modifications will be made to the well head to alleviate the buildup of condensate.

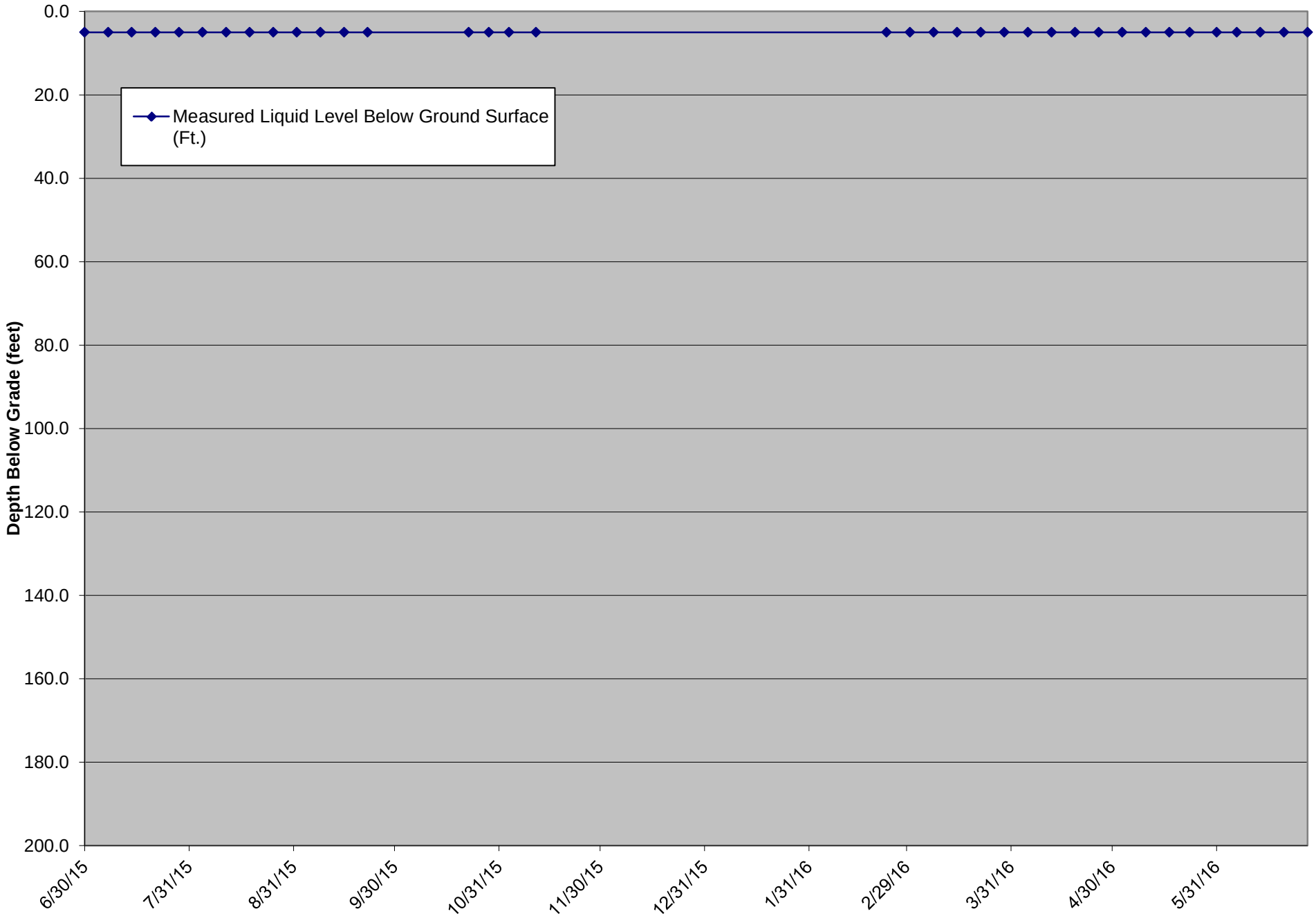
ATTACHMENT A

LEACHATE LEVELS IN LEACHATE COLLECTION SUMPS

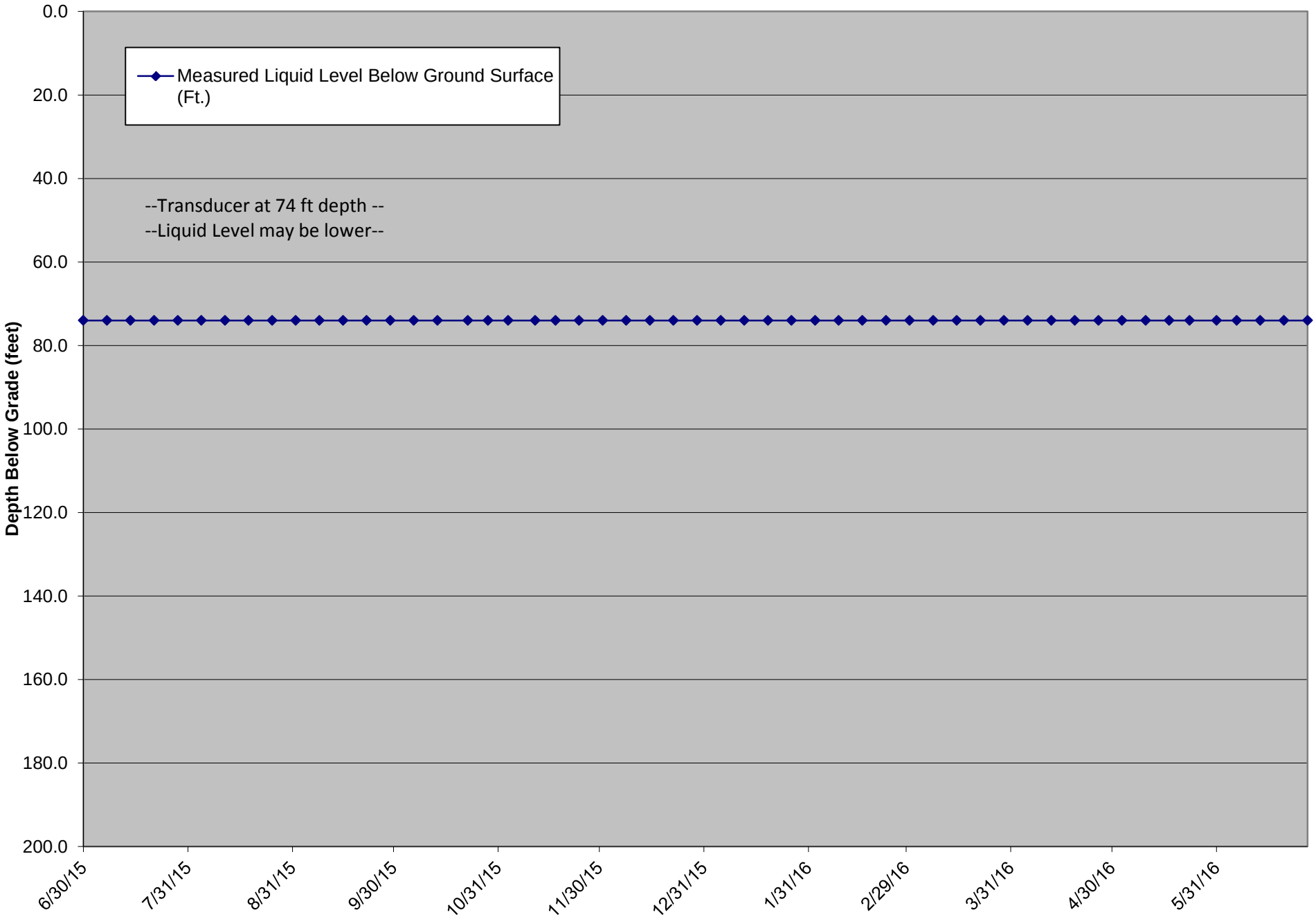
LCS-1D Liquid Level Below Ground Surface



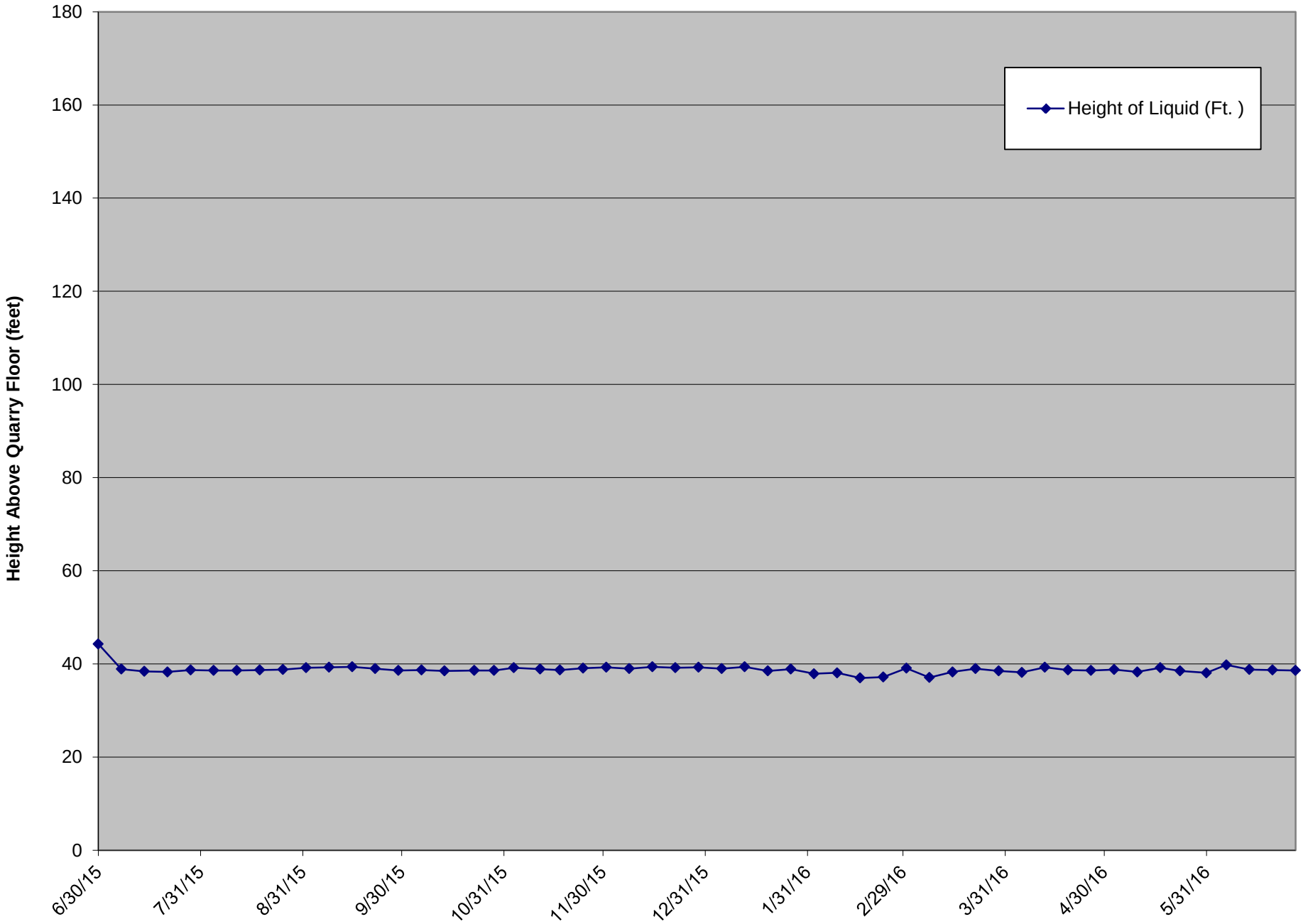
LCS-3D Liquid Level Below Ground Surface

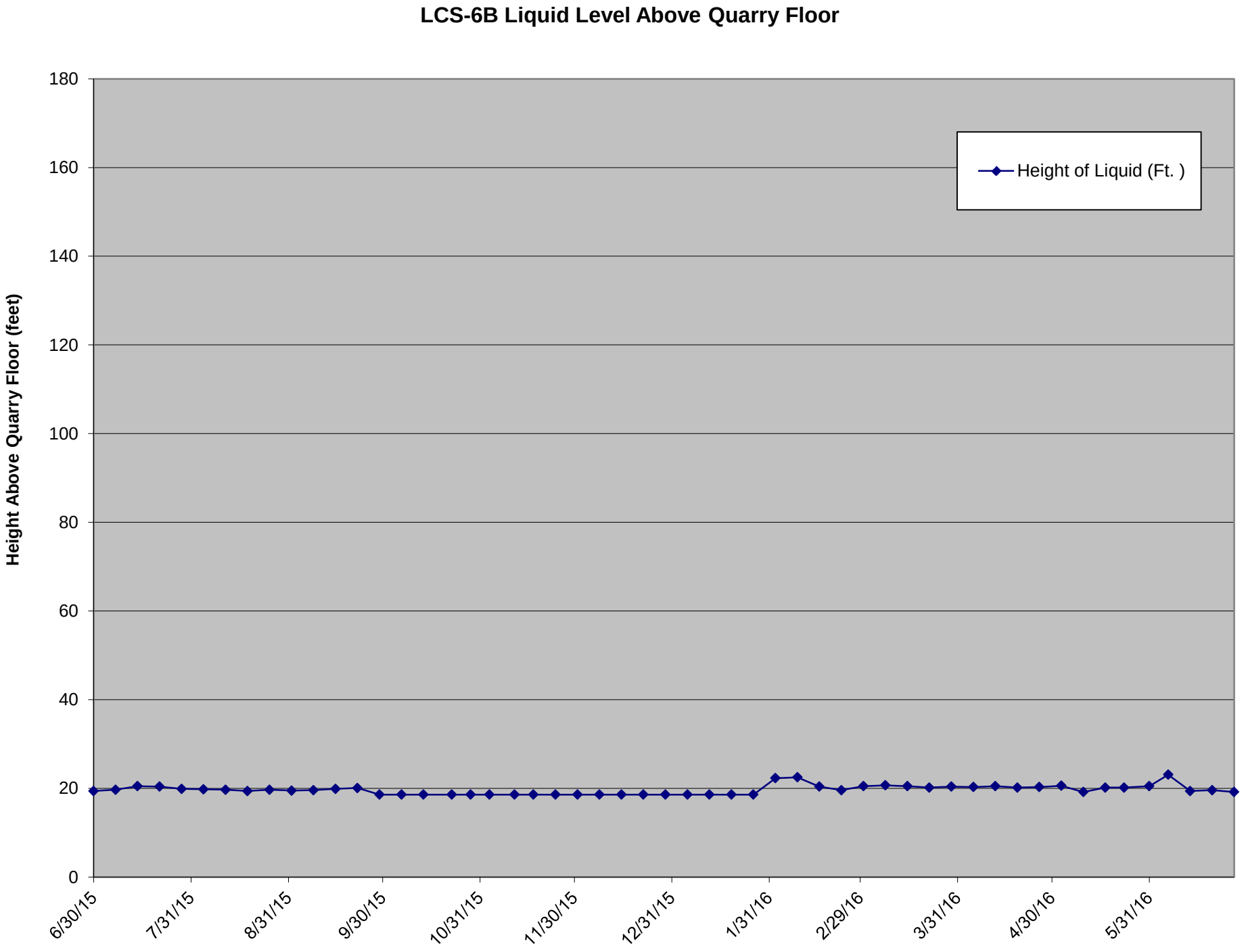


LCS-4B Liquid Level Below Ground Surface



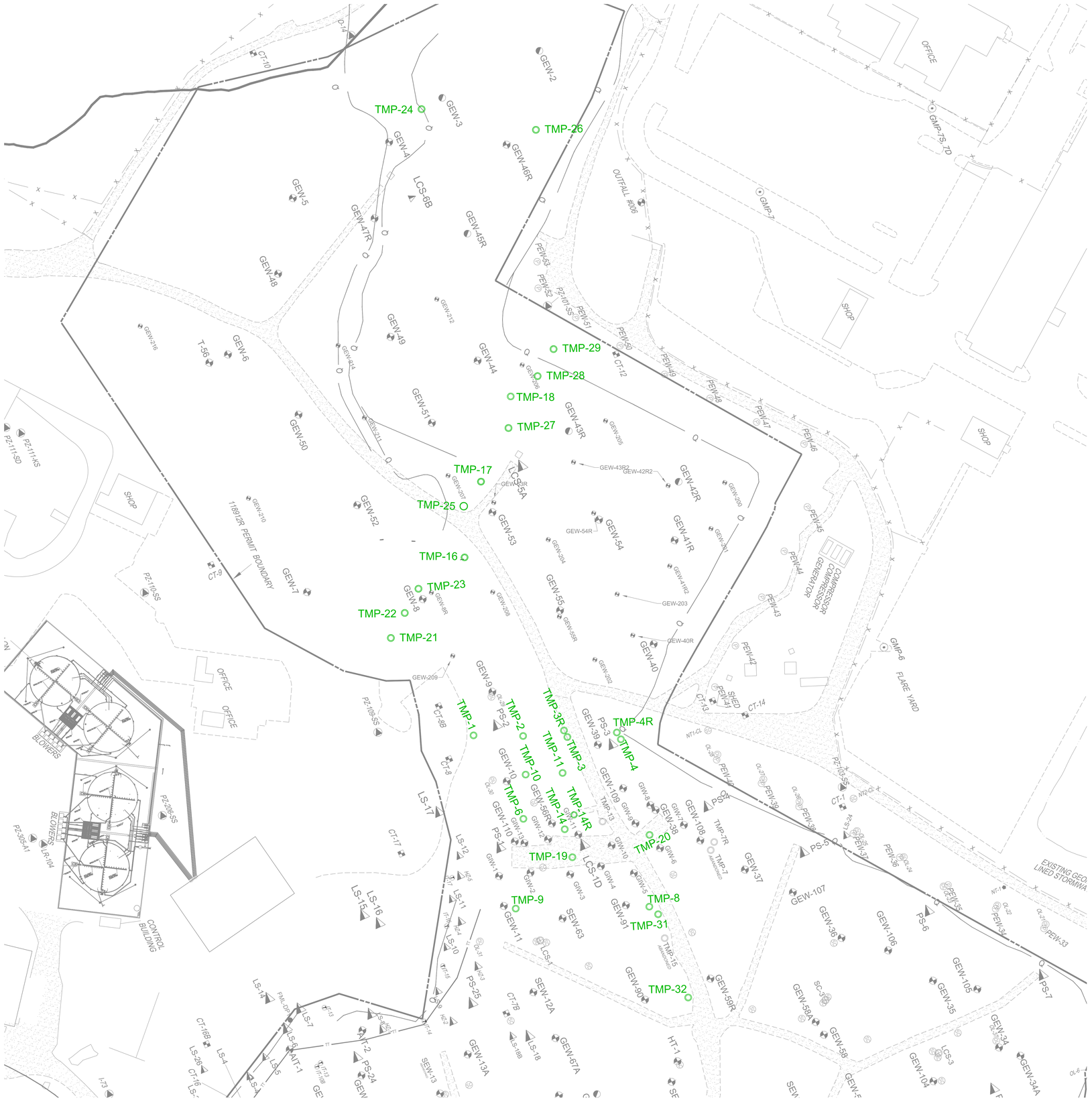
LCS-5A Liquid Level Above Quarry Floor




LCS-6B Liquid Level Above Quarry Floor
Height Above Quarry Floor (feet)
180
160
140
120
100
80
60
40
20
0
6/30/15
7/31/15
8/31/15
9/30/15
10/31/15
11/30/15
12/31/15
1/31/16
2/29/16
3/31/16
4/30/16
5/31/16
Height of Liquid (Ft.)

ATTACHMENT B

TEMPERATURE MONITORING PROBE ANALYTICAL CHARTS

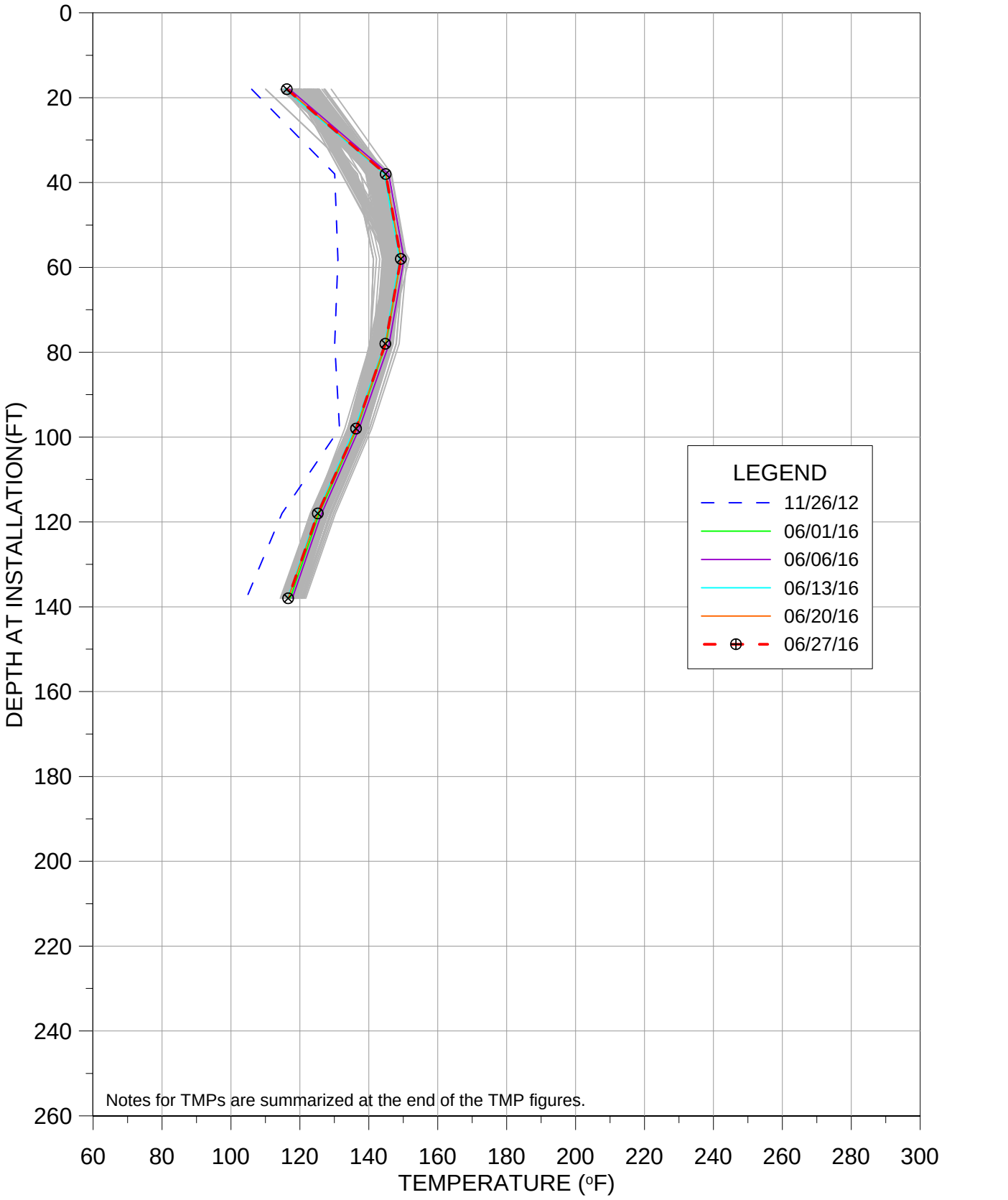


LEGEND

◎ TMP-24 TEMPERATURE MONITORING PROBE (EXISTING)

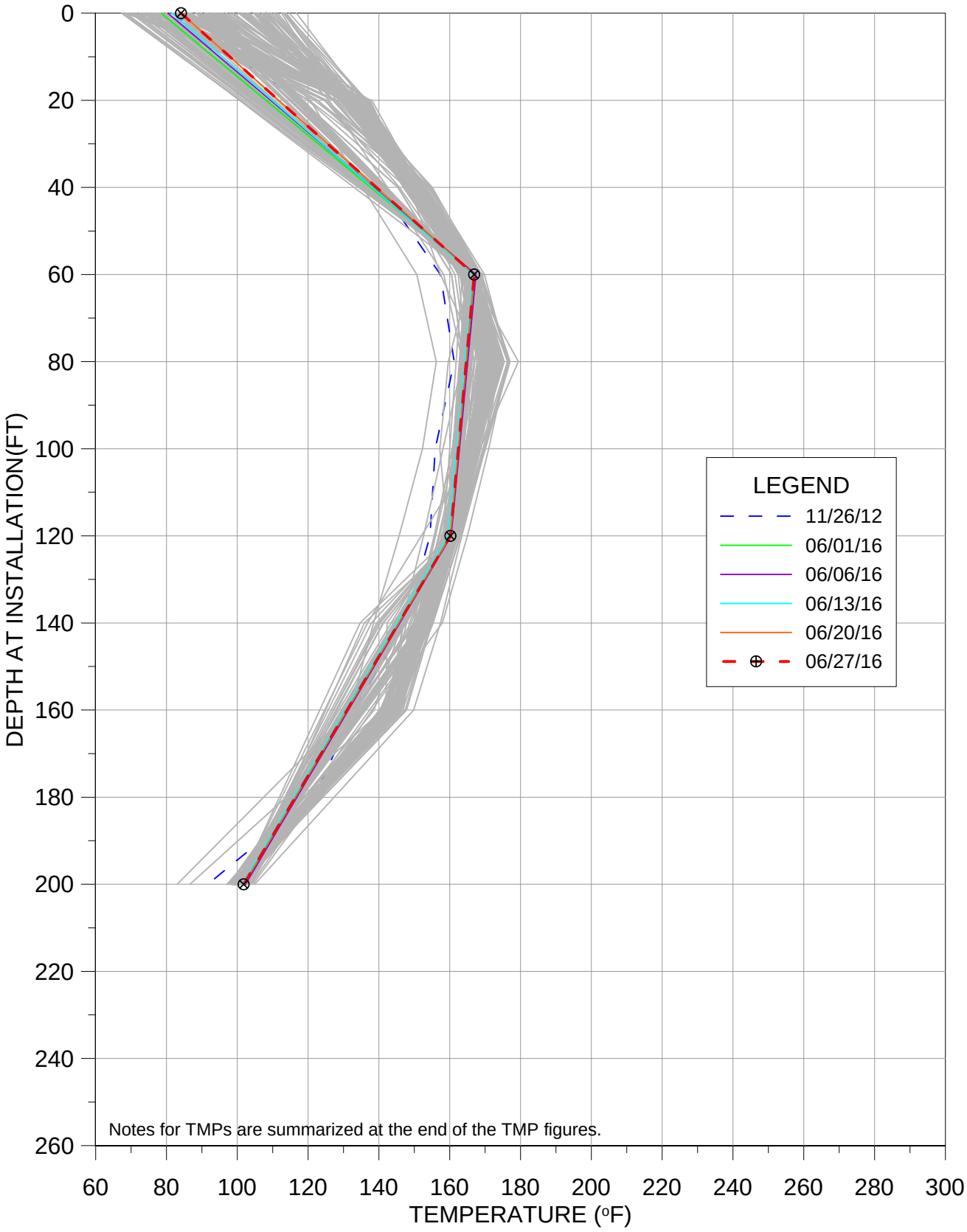
BRIDGETON LANDFILL, LLC 13570 ST. CHARLES ROCK ROAD BRIDGETON, MISSOURI 63044	BRIDGETON LANDFILL	Engineering for a Better World FEEZOR ENGINEERING, INC.	FEBRUARY 2015 DESIGNED BY: DMK APPROVED BY: ALK	DRAWING NO.: 001
WEEKLY TMP MONITORING			REVISION / DATE	
PROJECT NUMBER: BT-041	FILE PATH:			

TMP-1



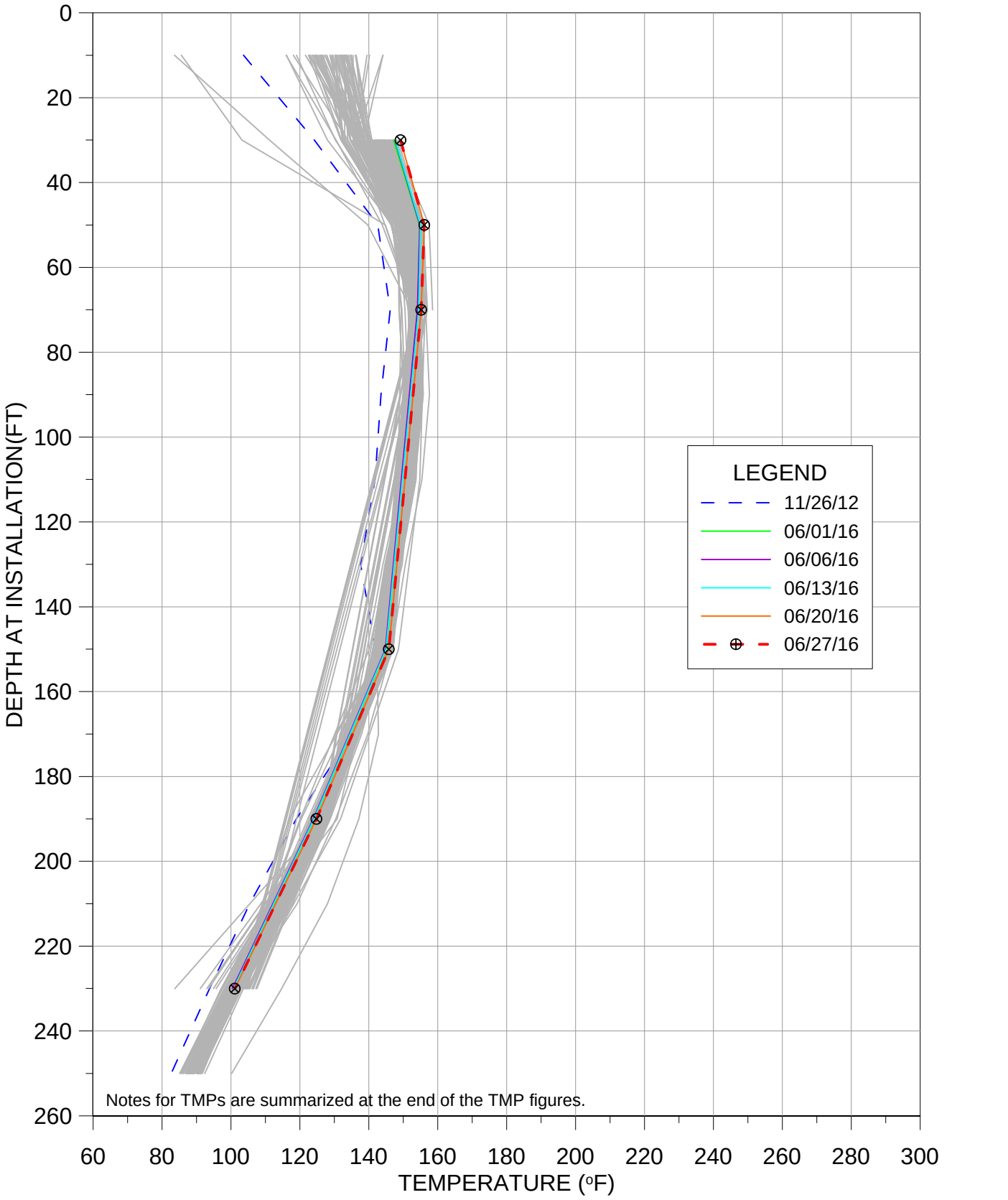
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-2



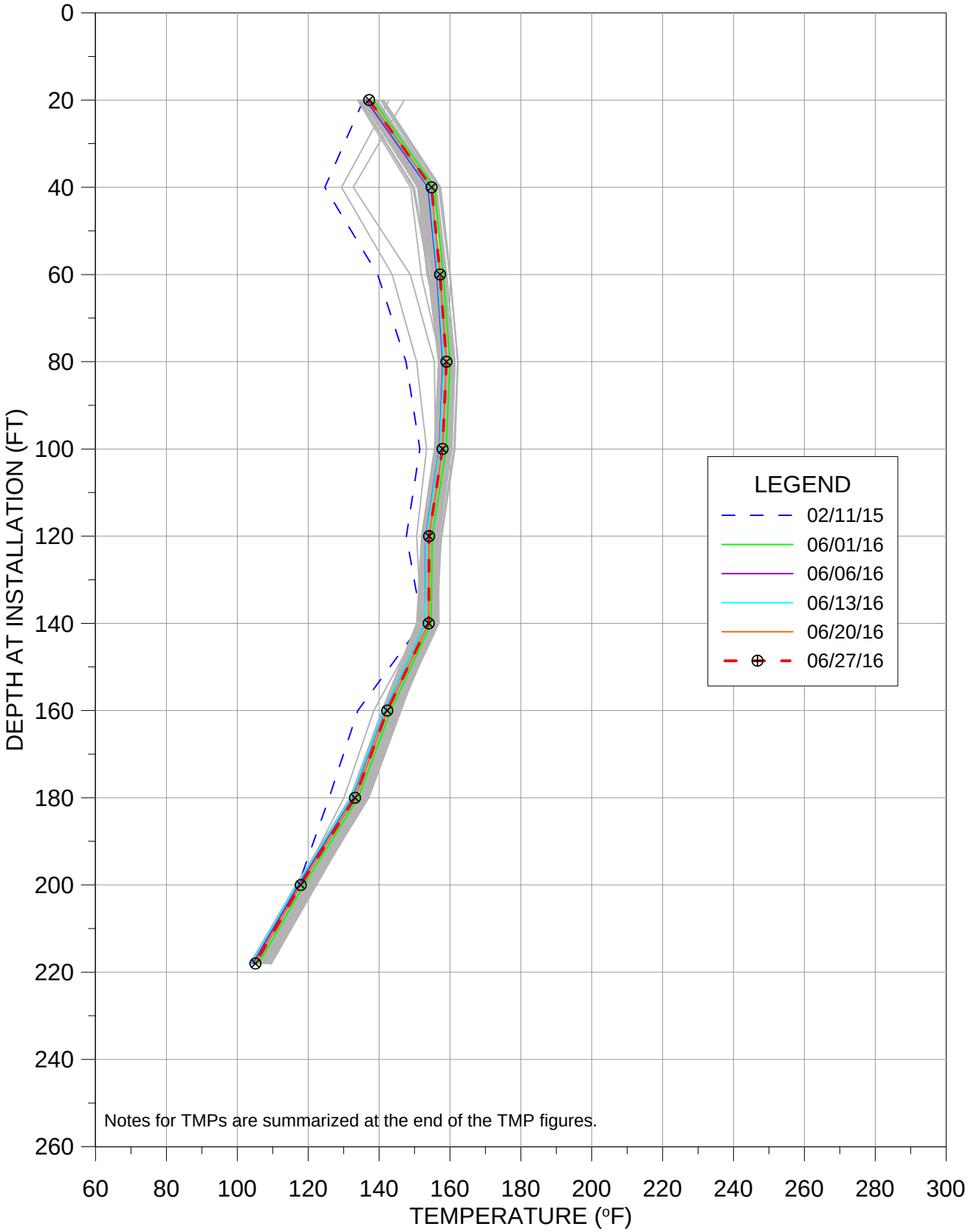
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-3



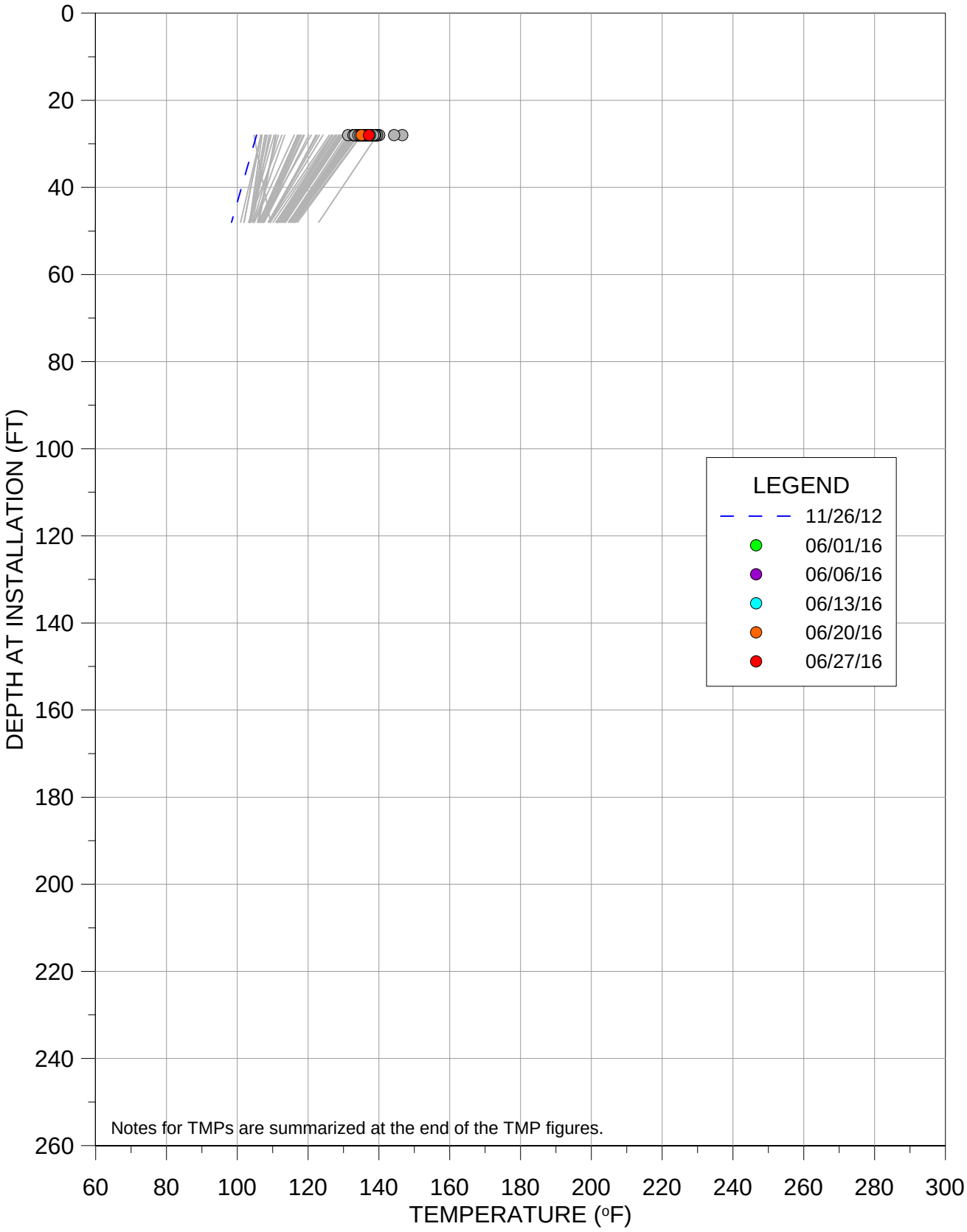
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-3R



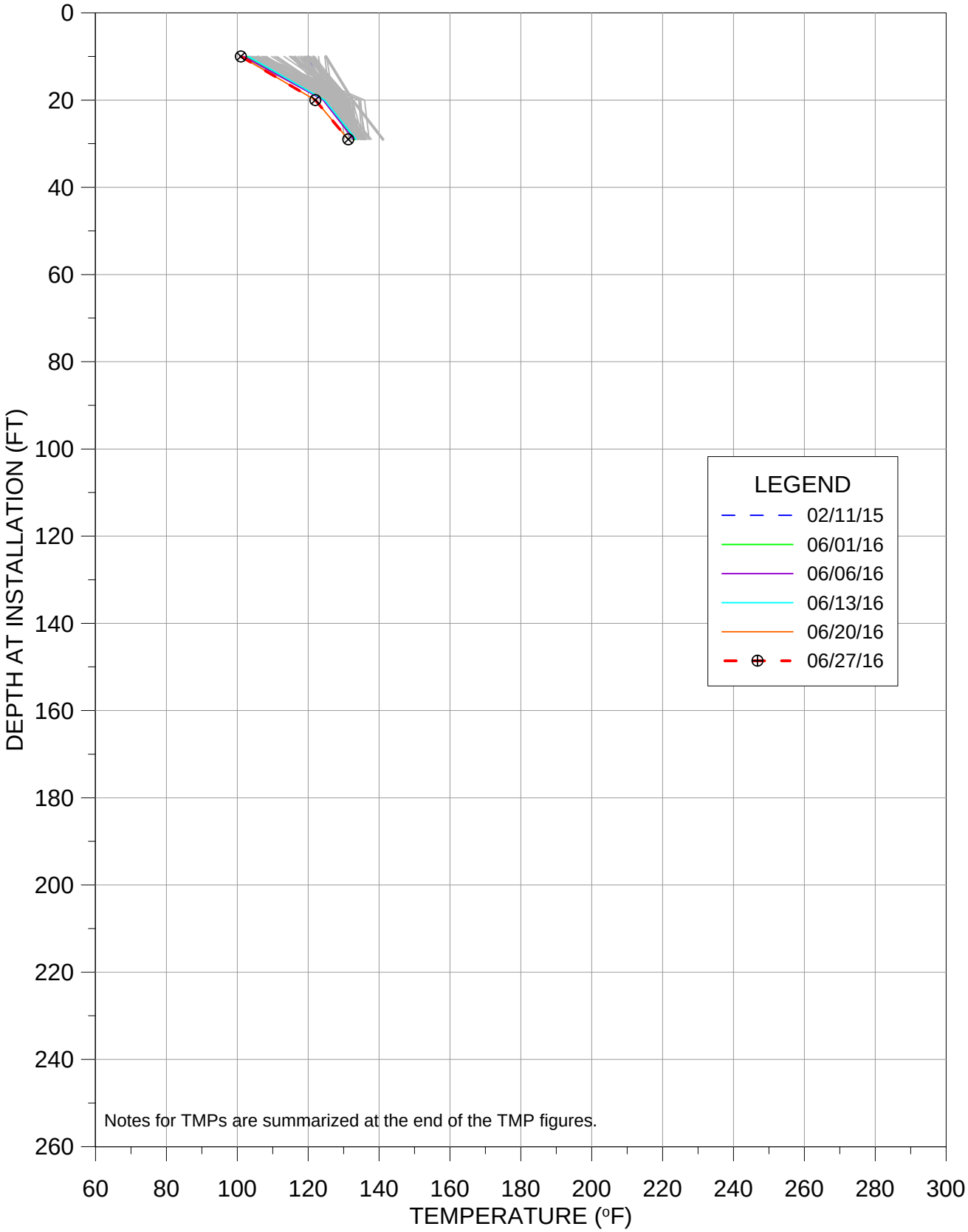
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-4



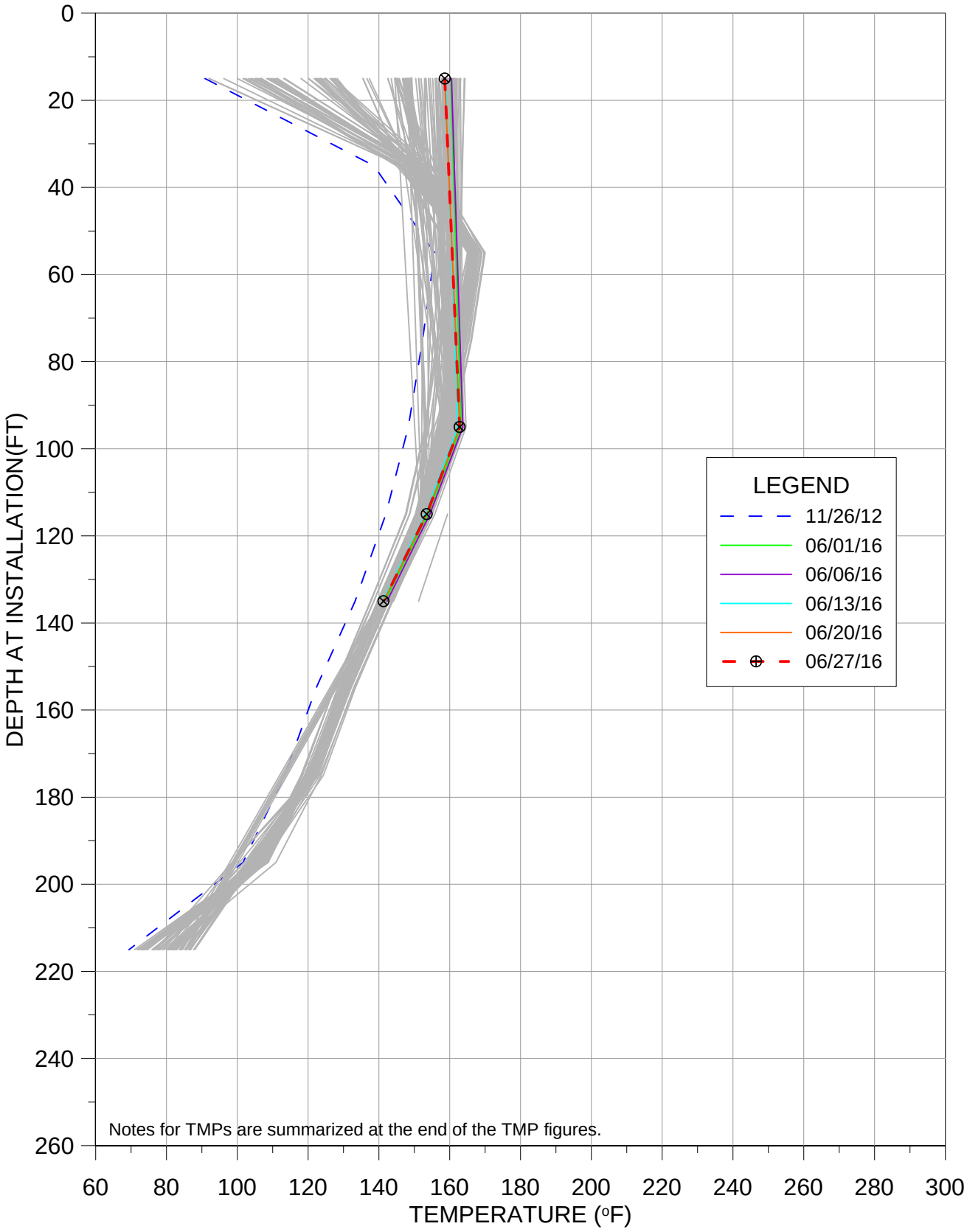
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-4R



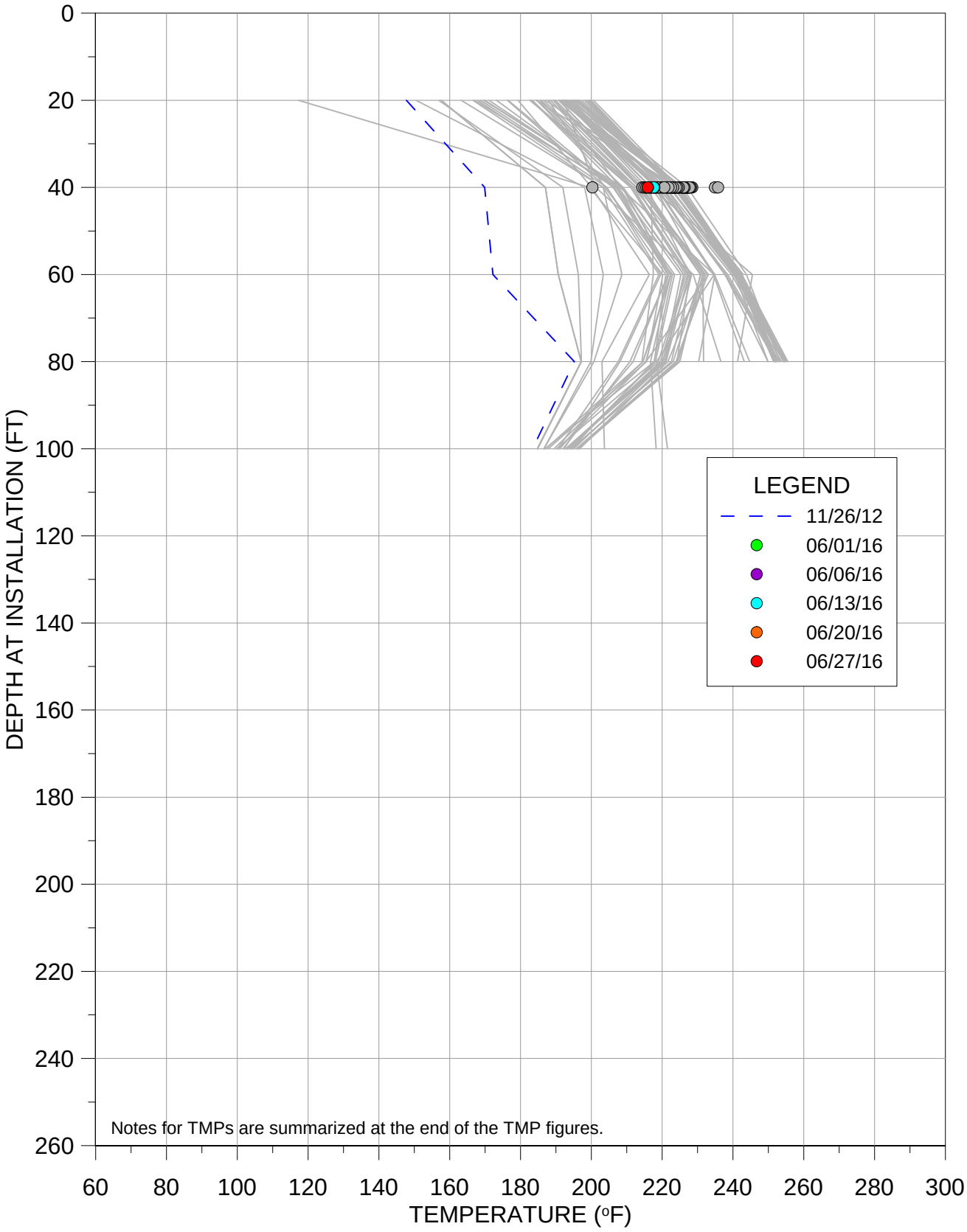
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-6



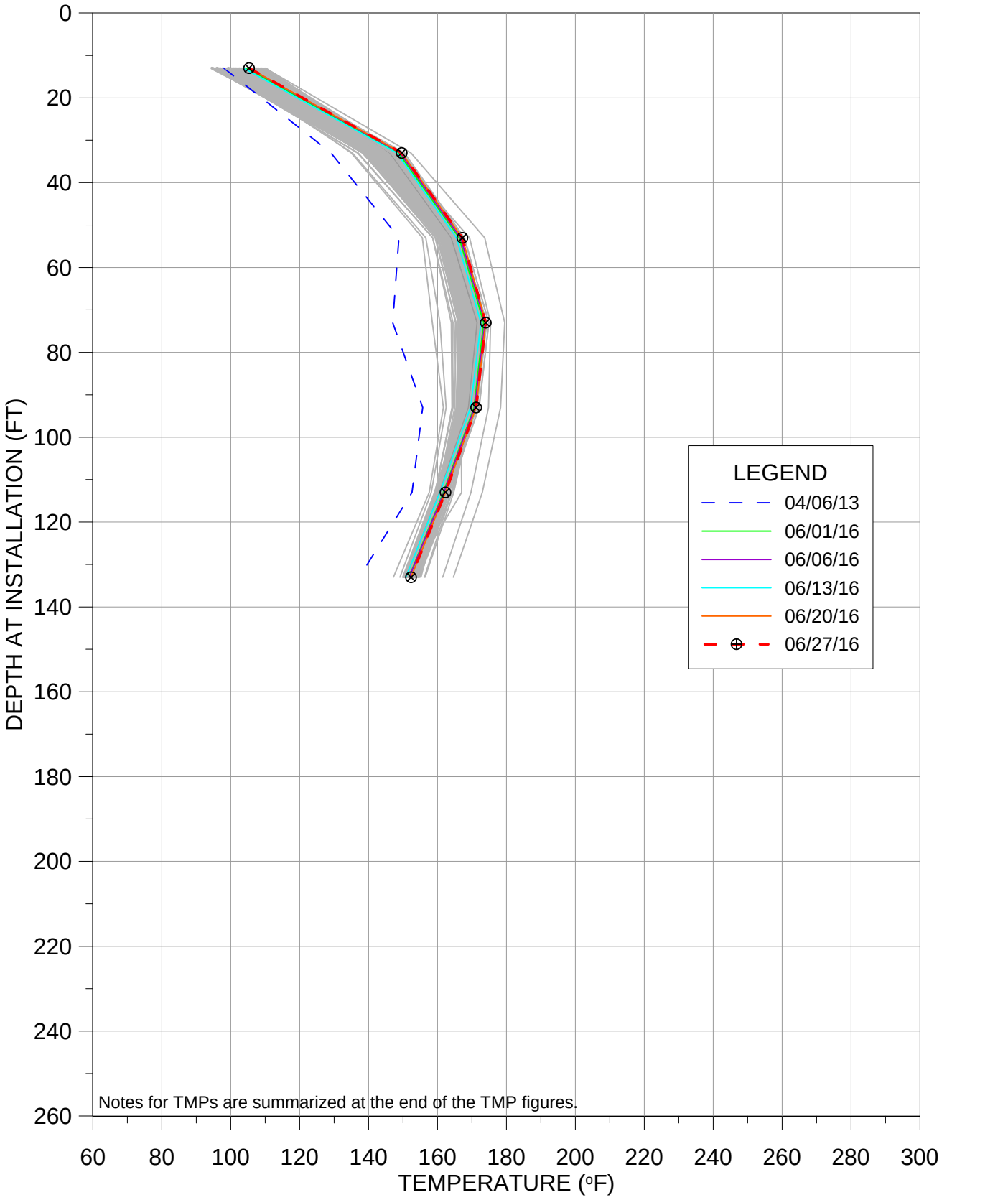
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-9



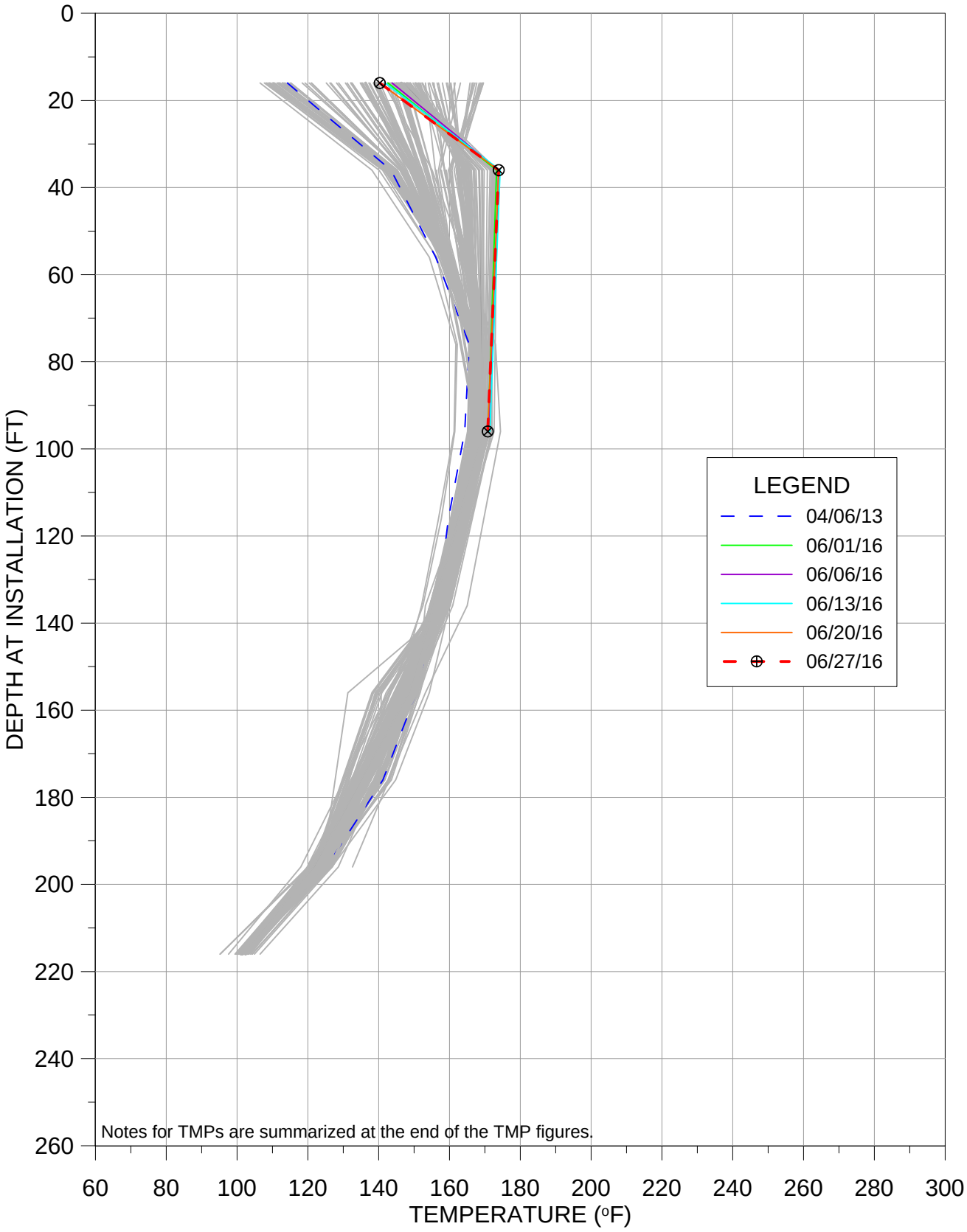
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-10



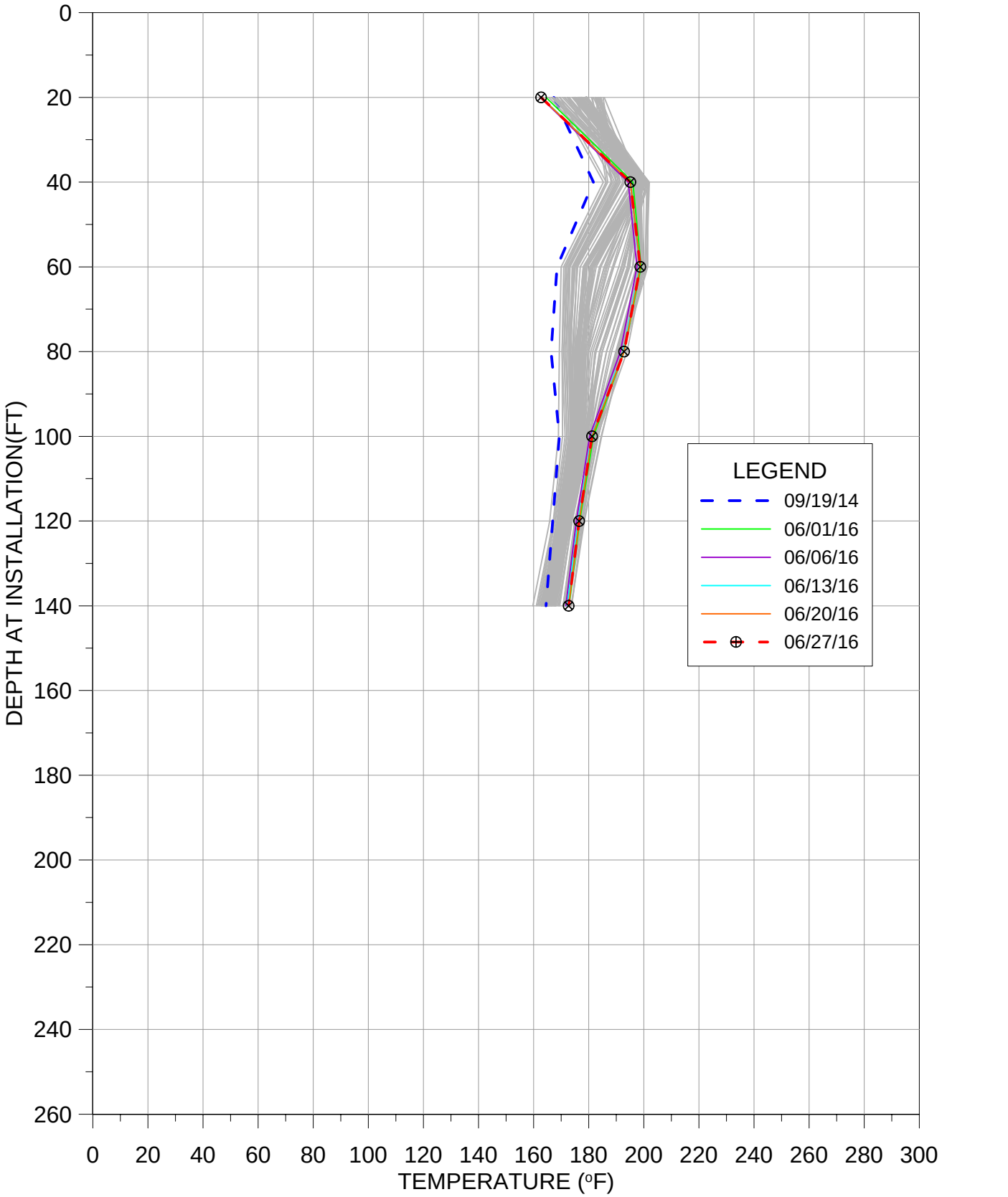
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-11



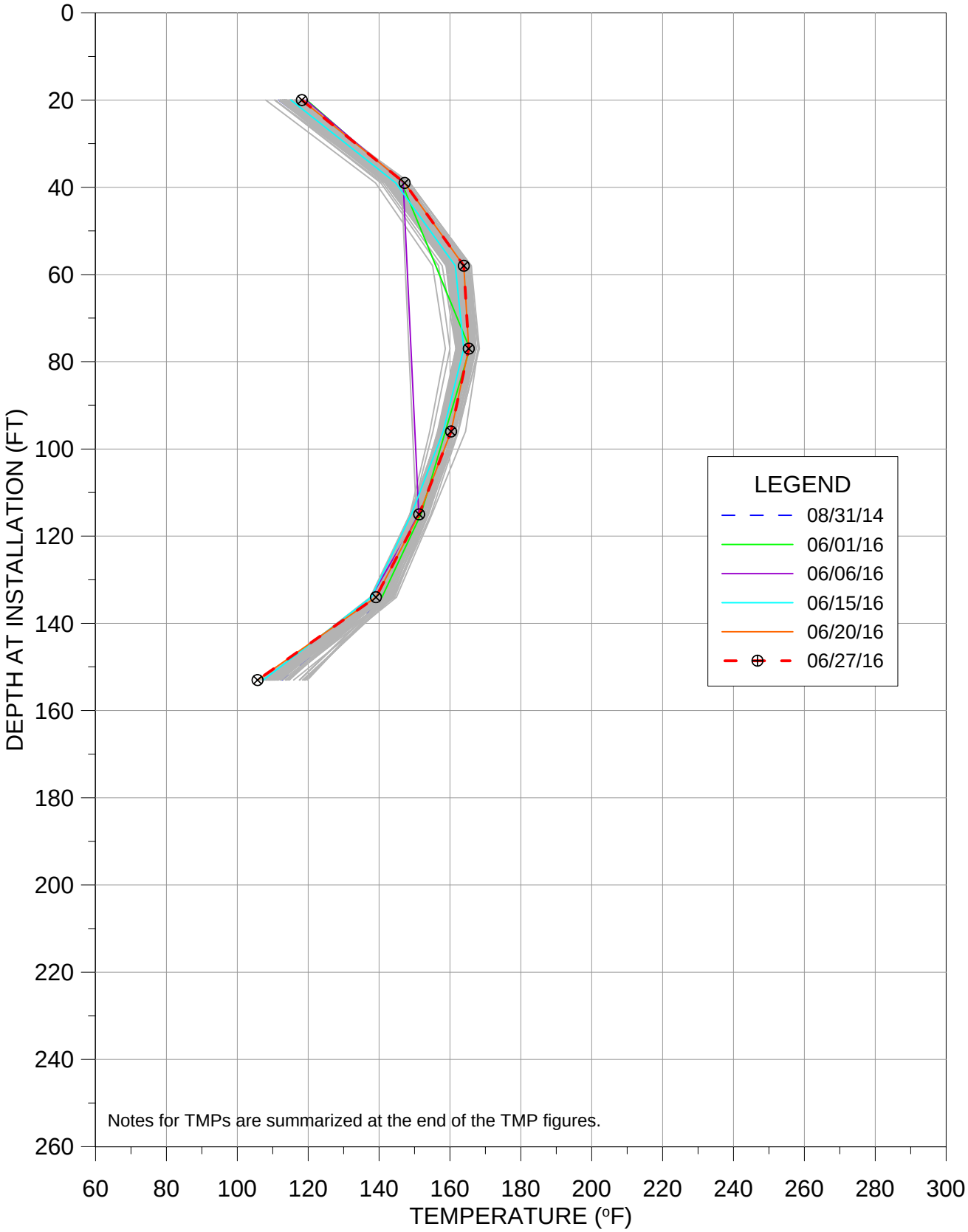
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-14R



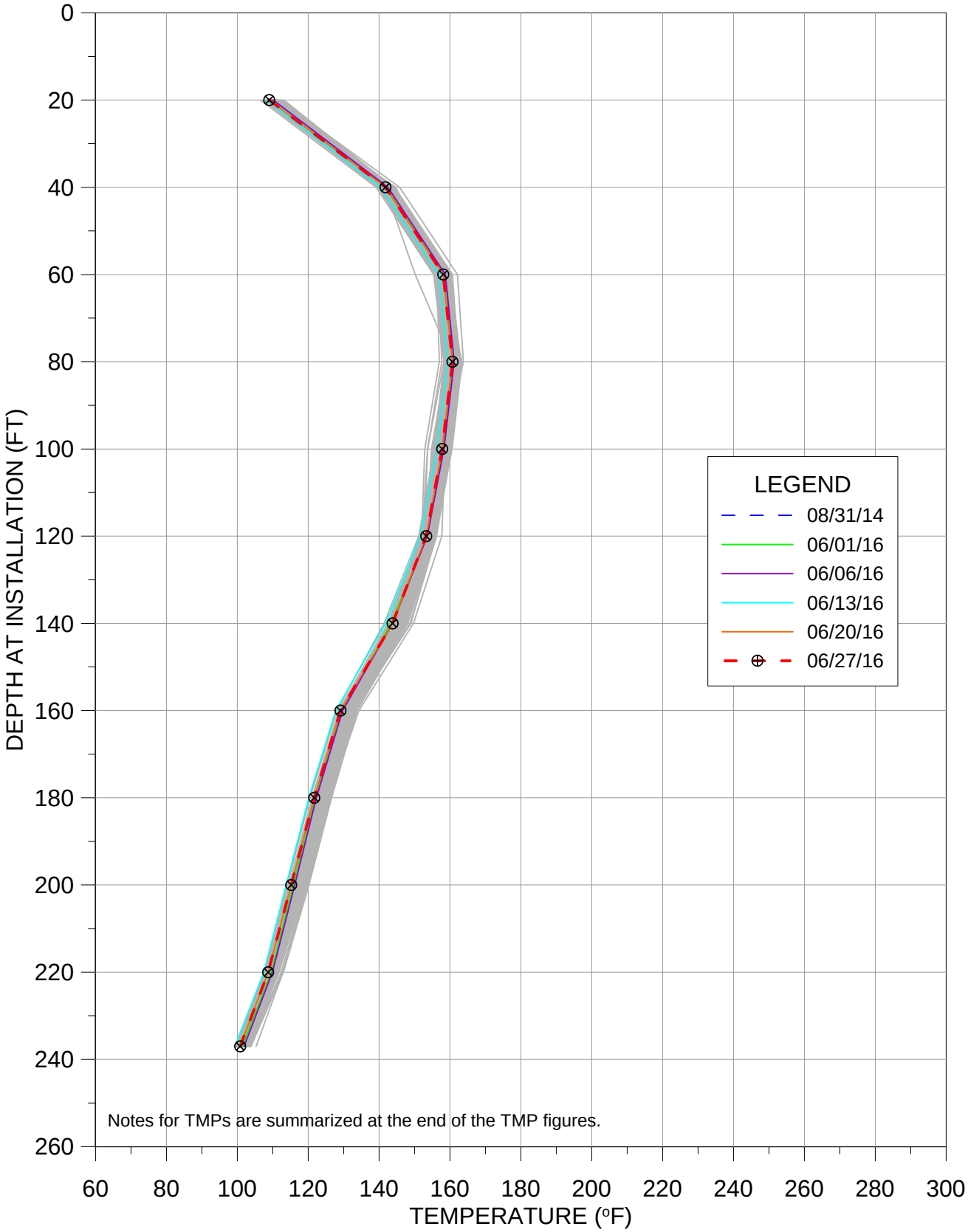
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-16



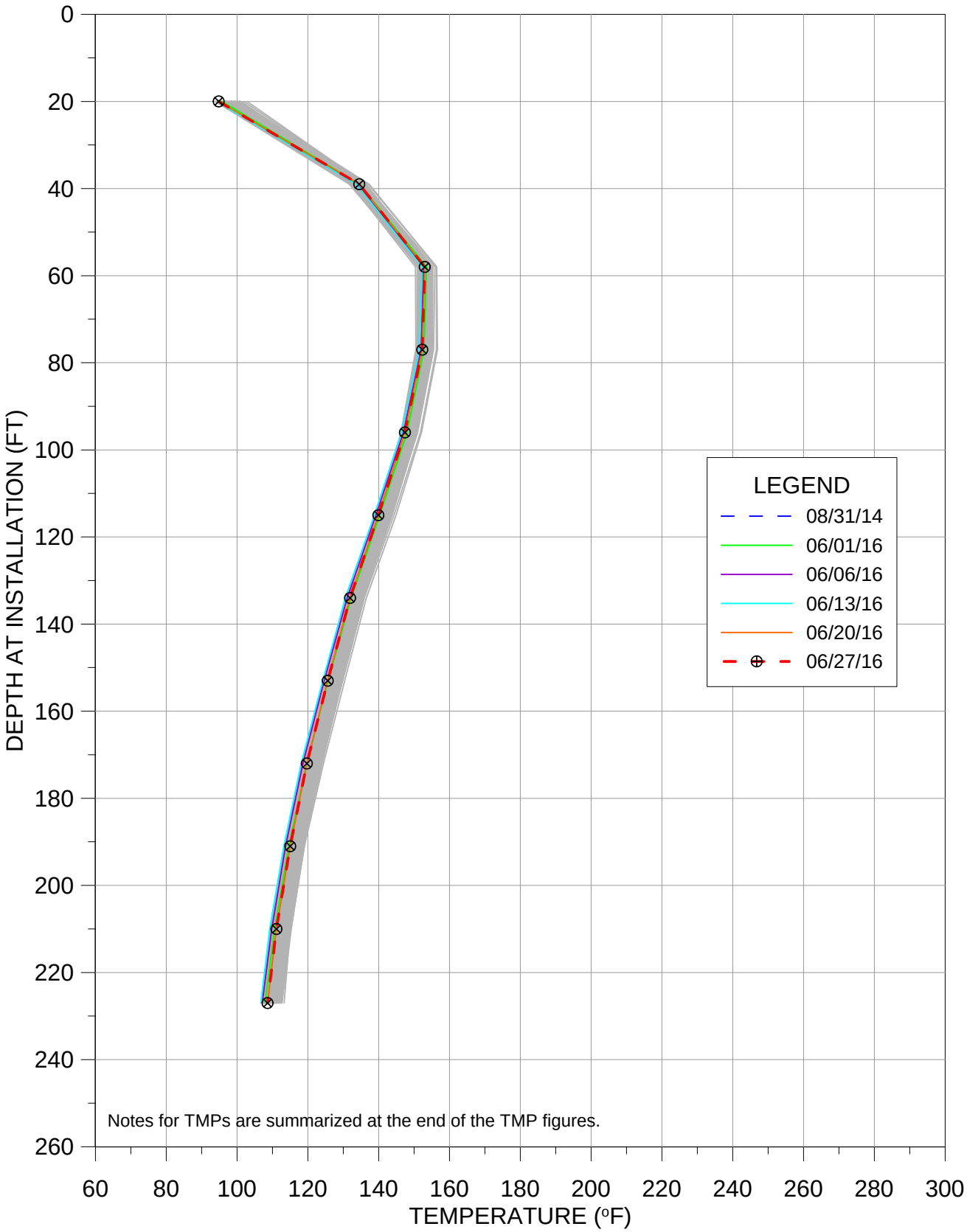
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-17



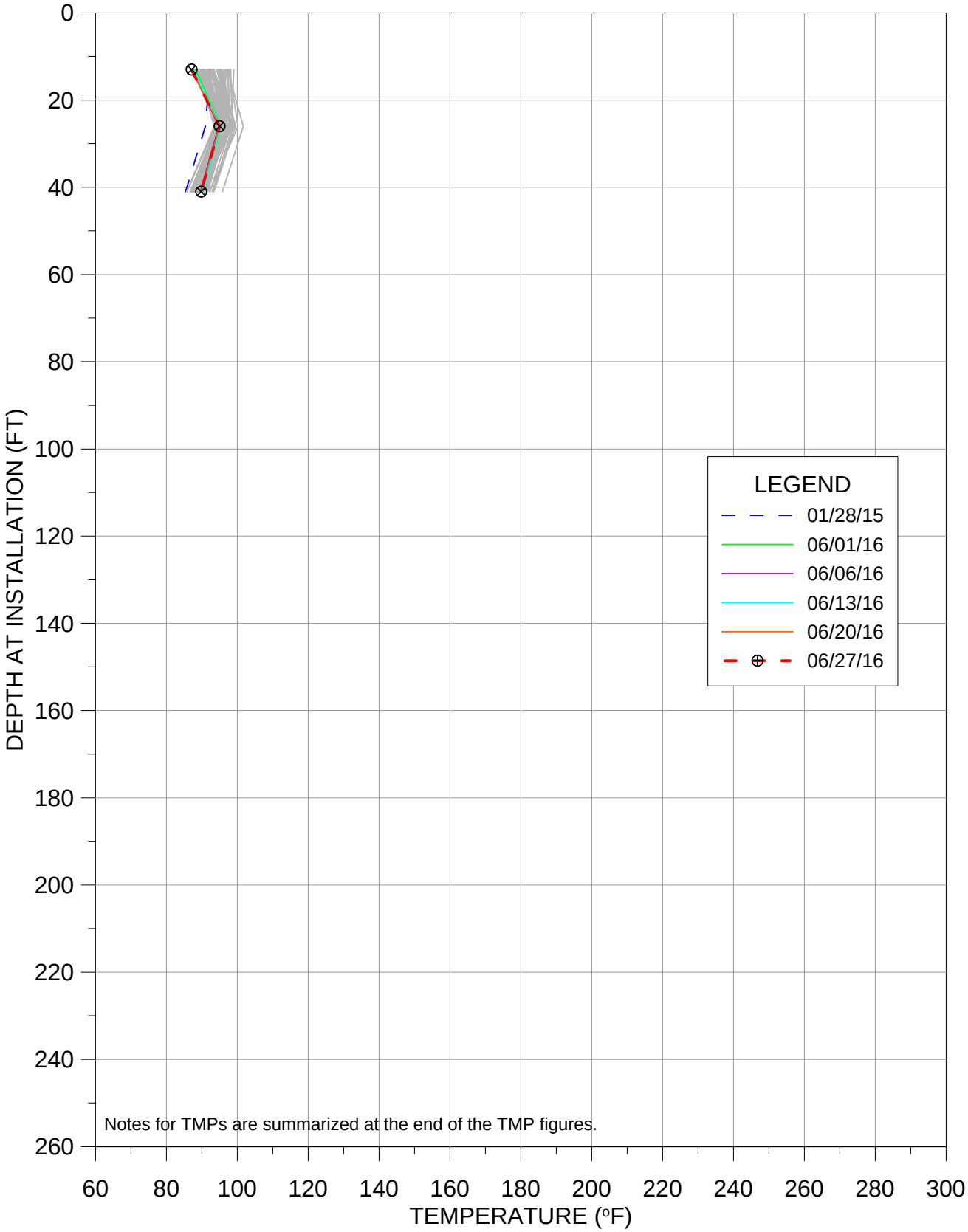
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-18



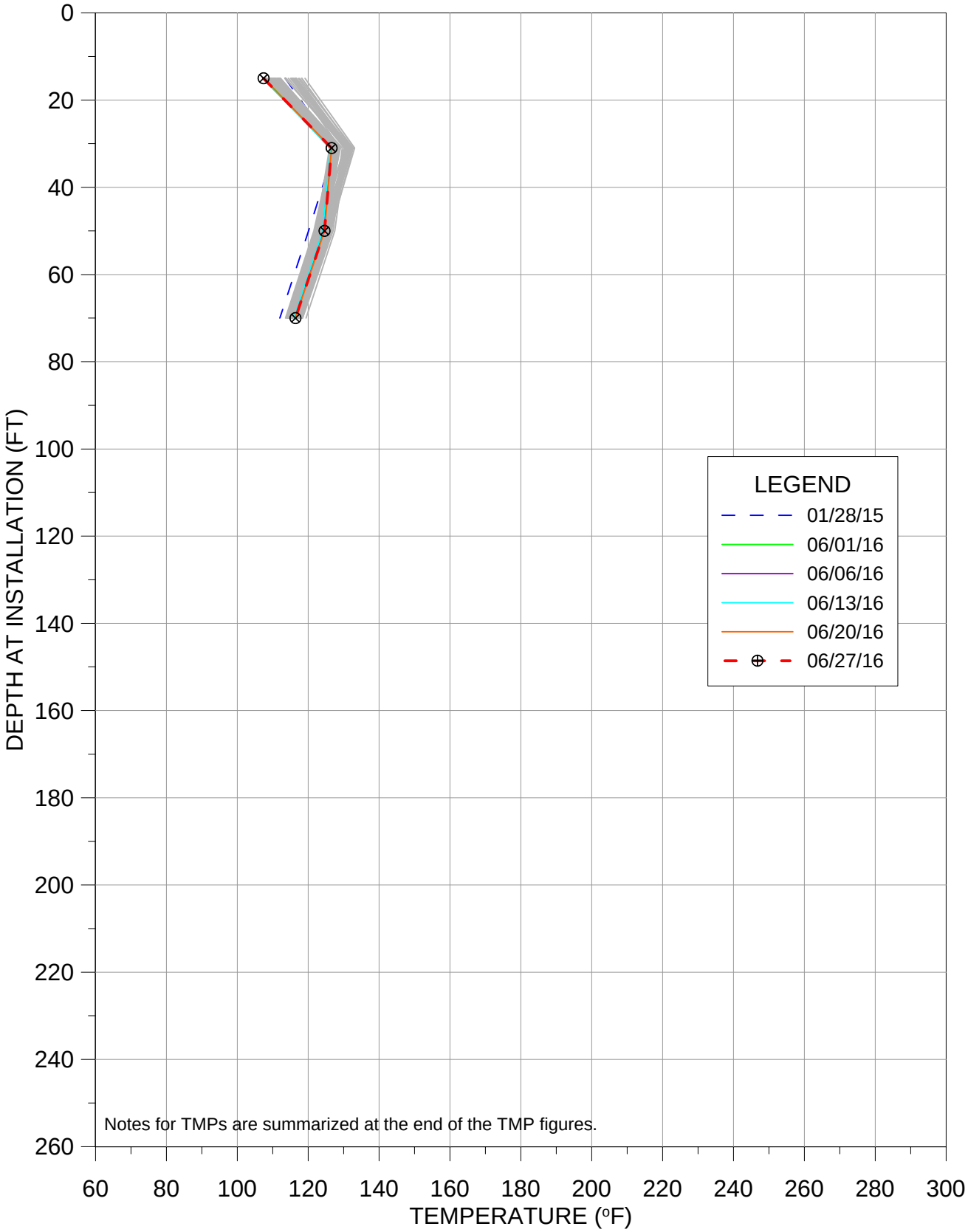
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-21



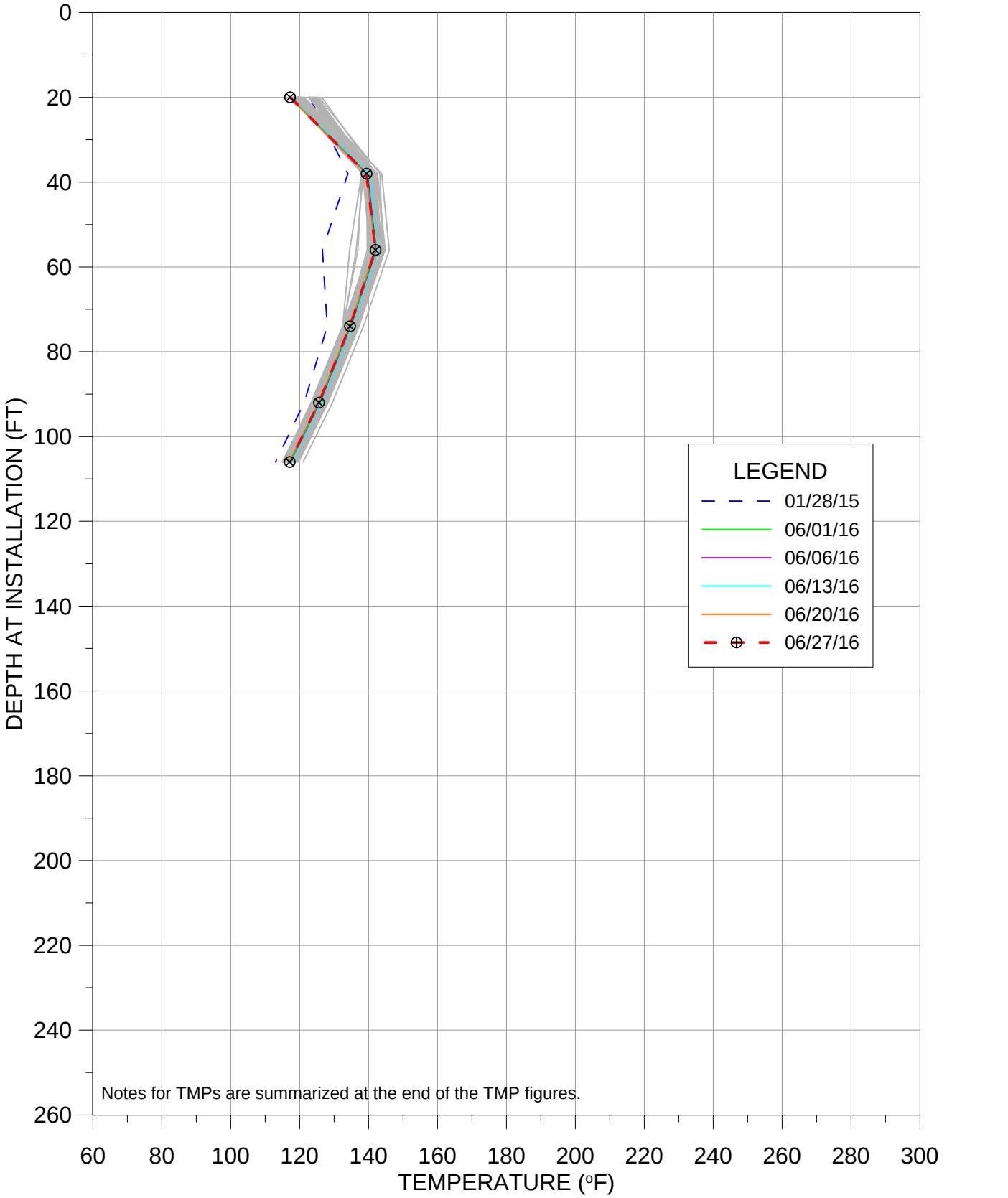
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-22



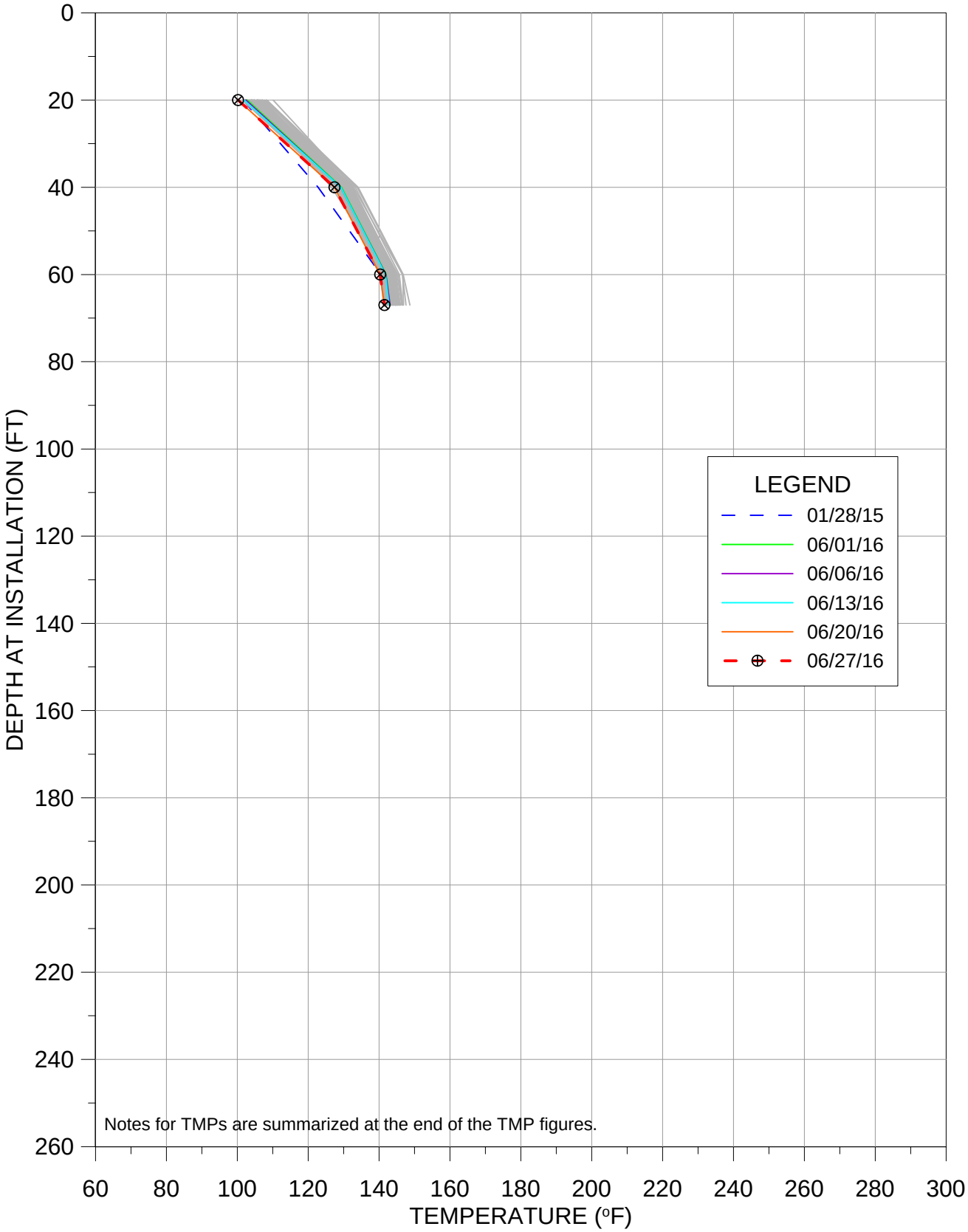
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-23



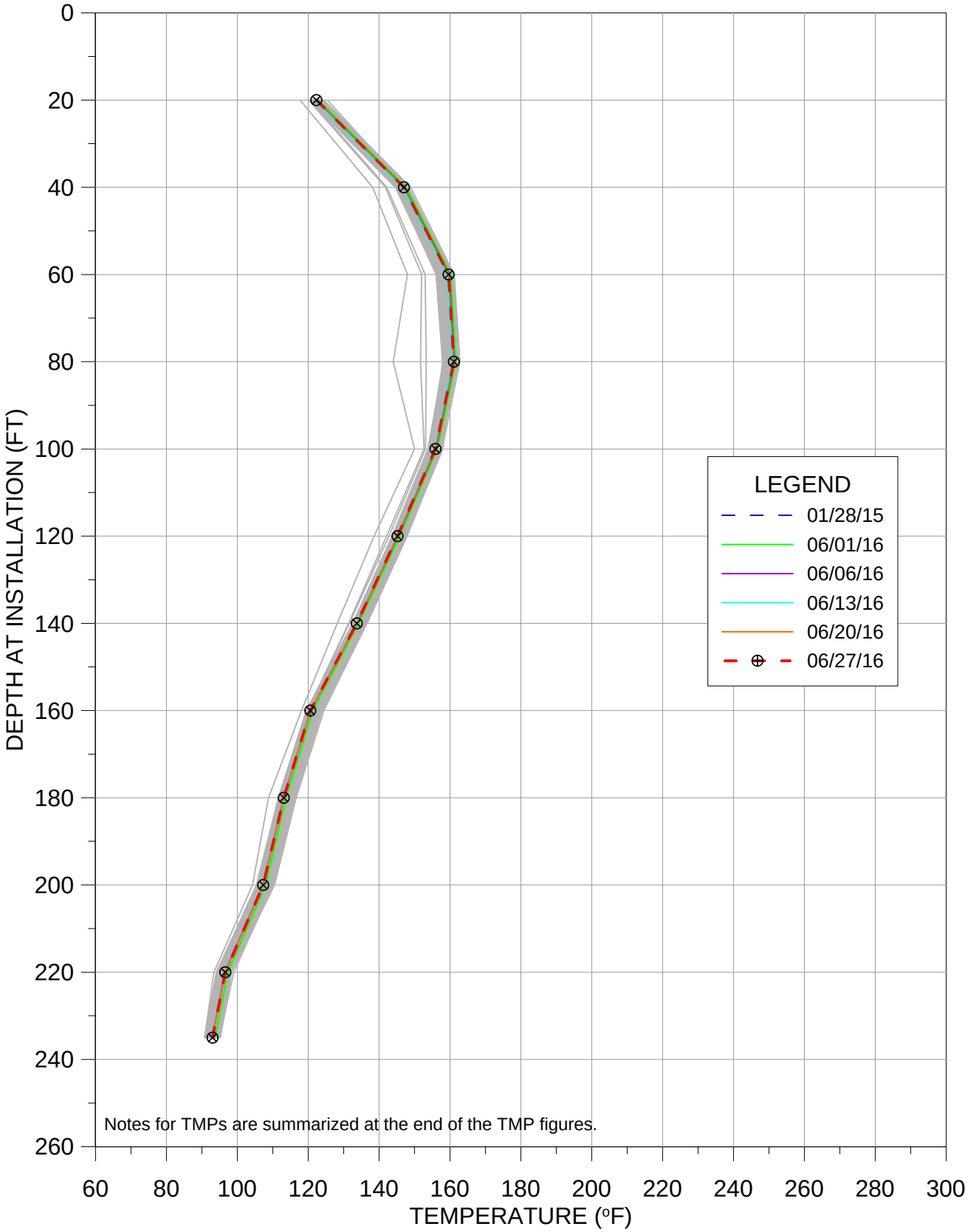
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-24



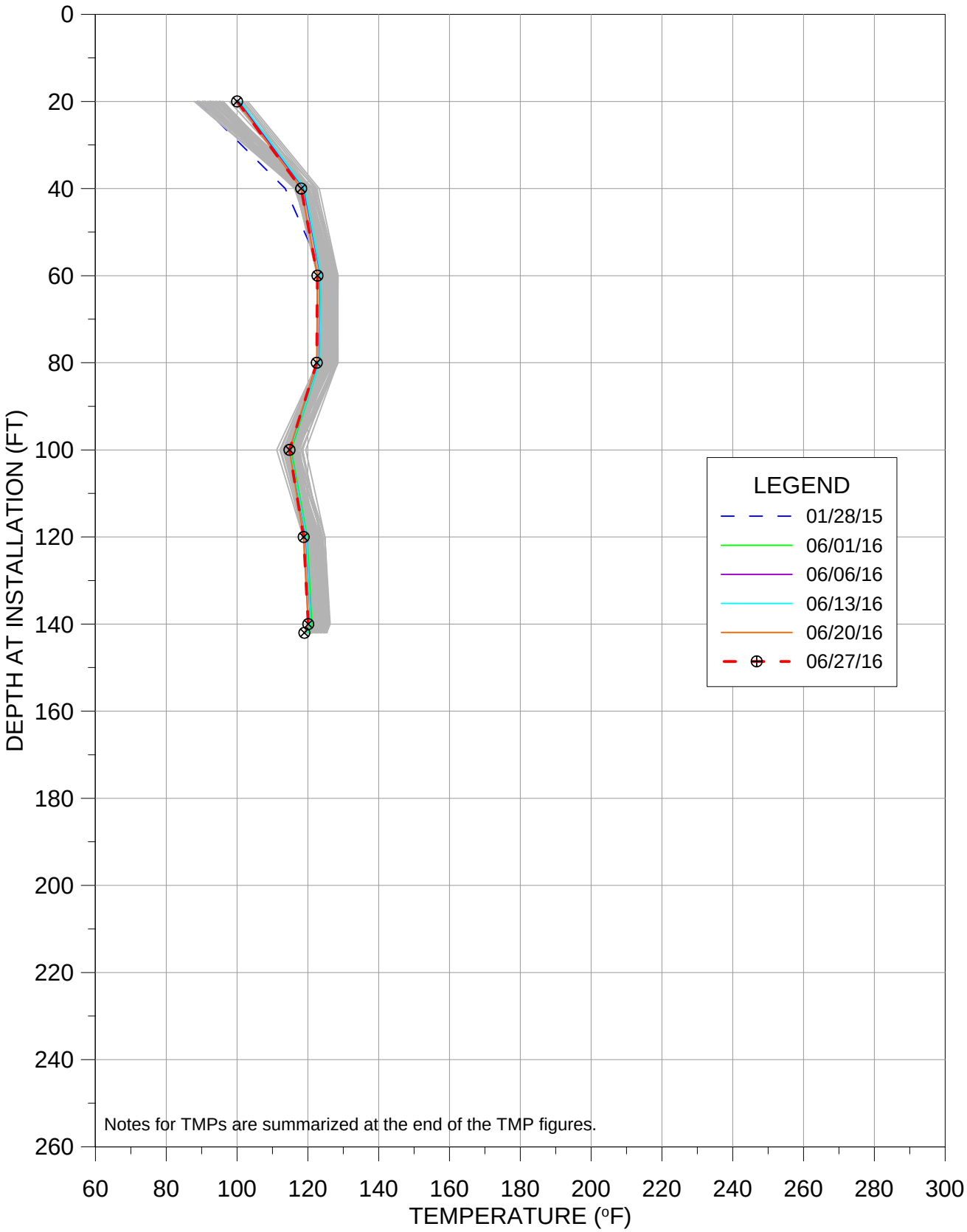
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-25



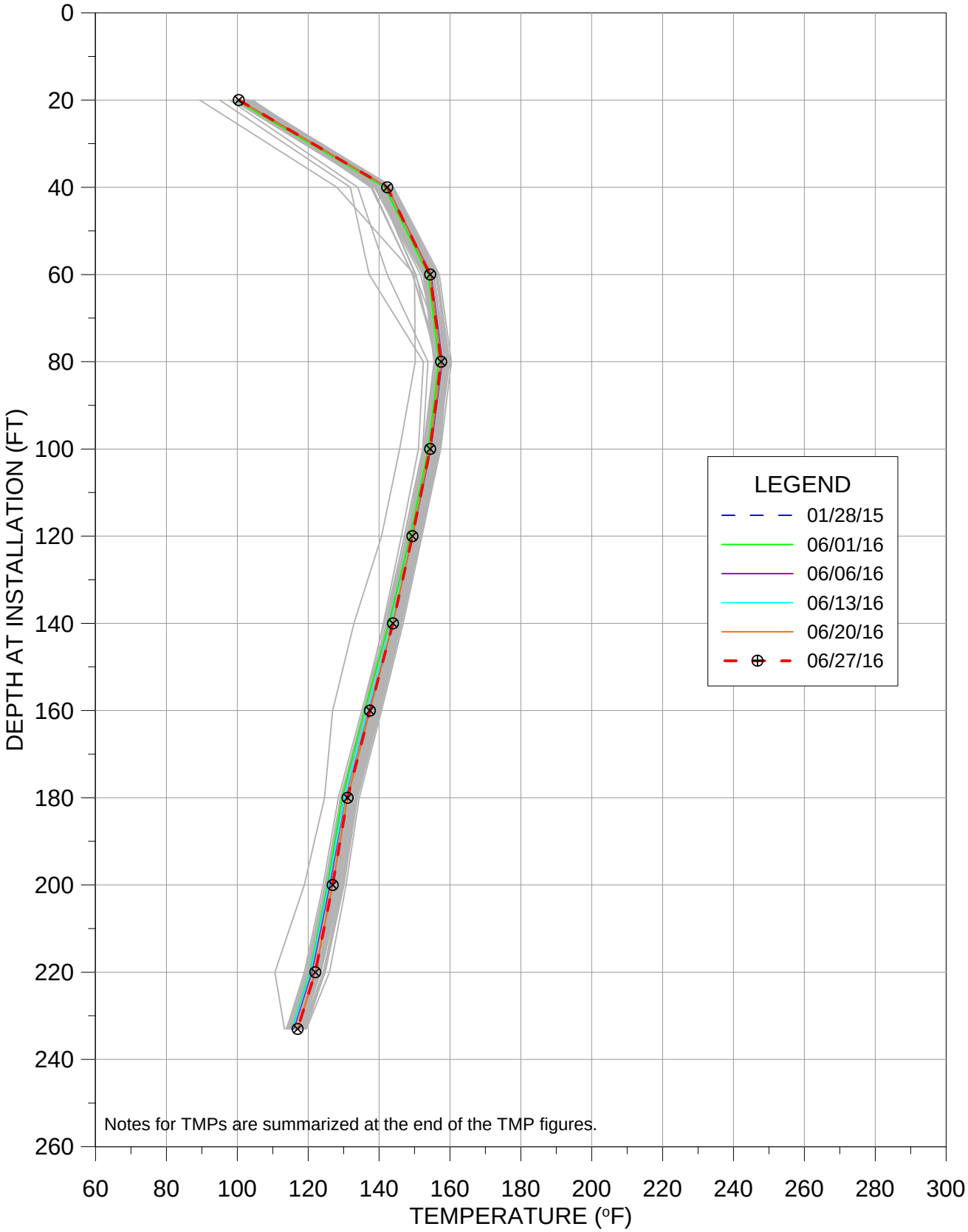
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-26



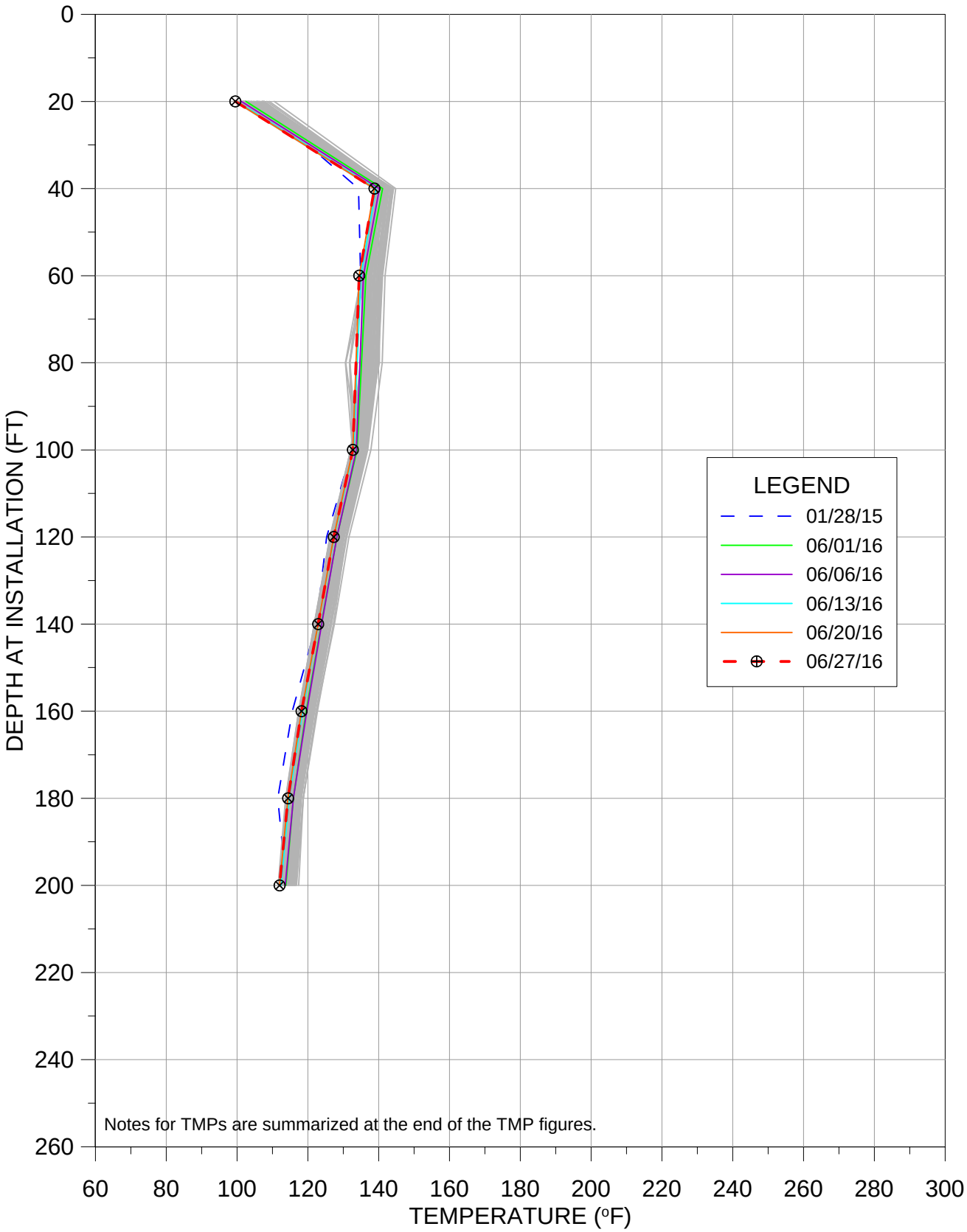
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-27



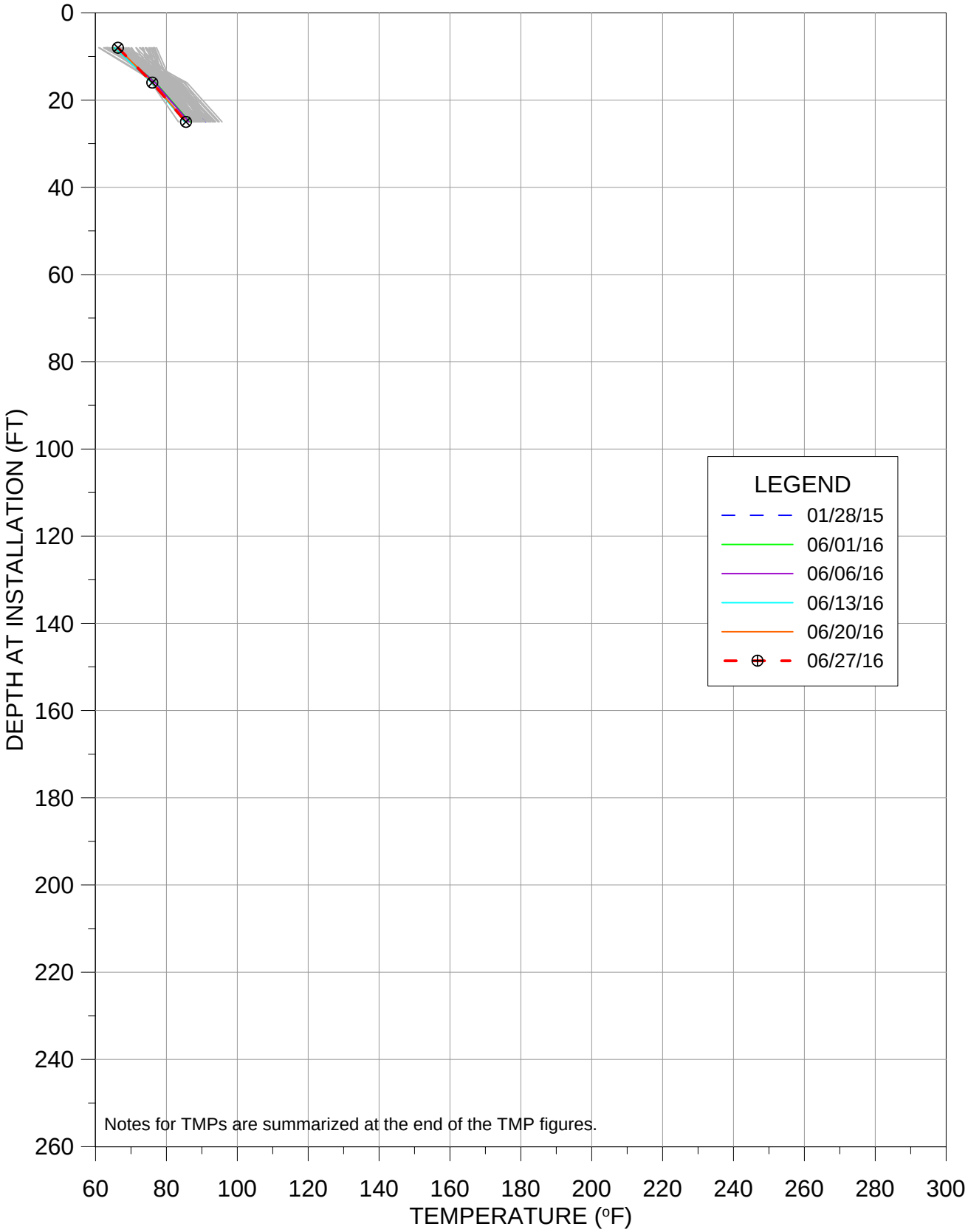
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-28



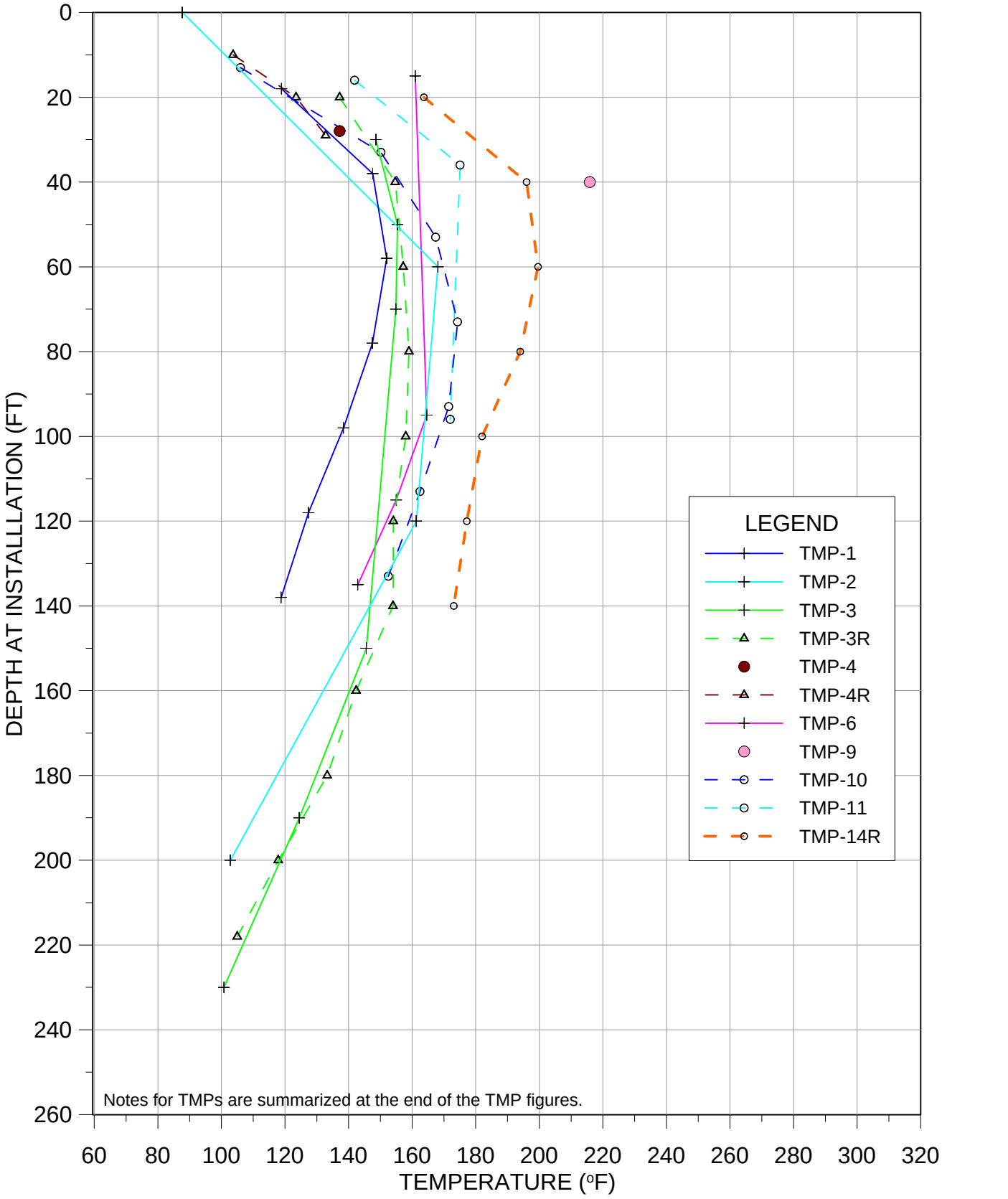
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

TMP-29



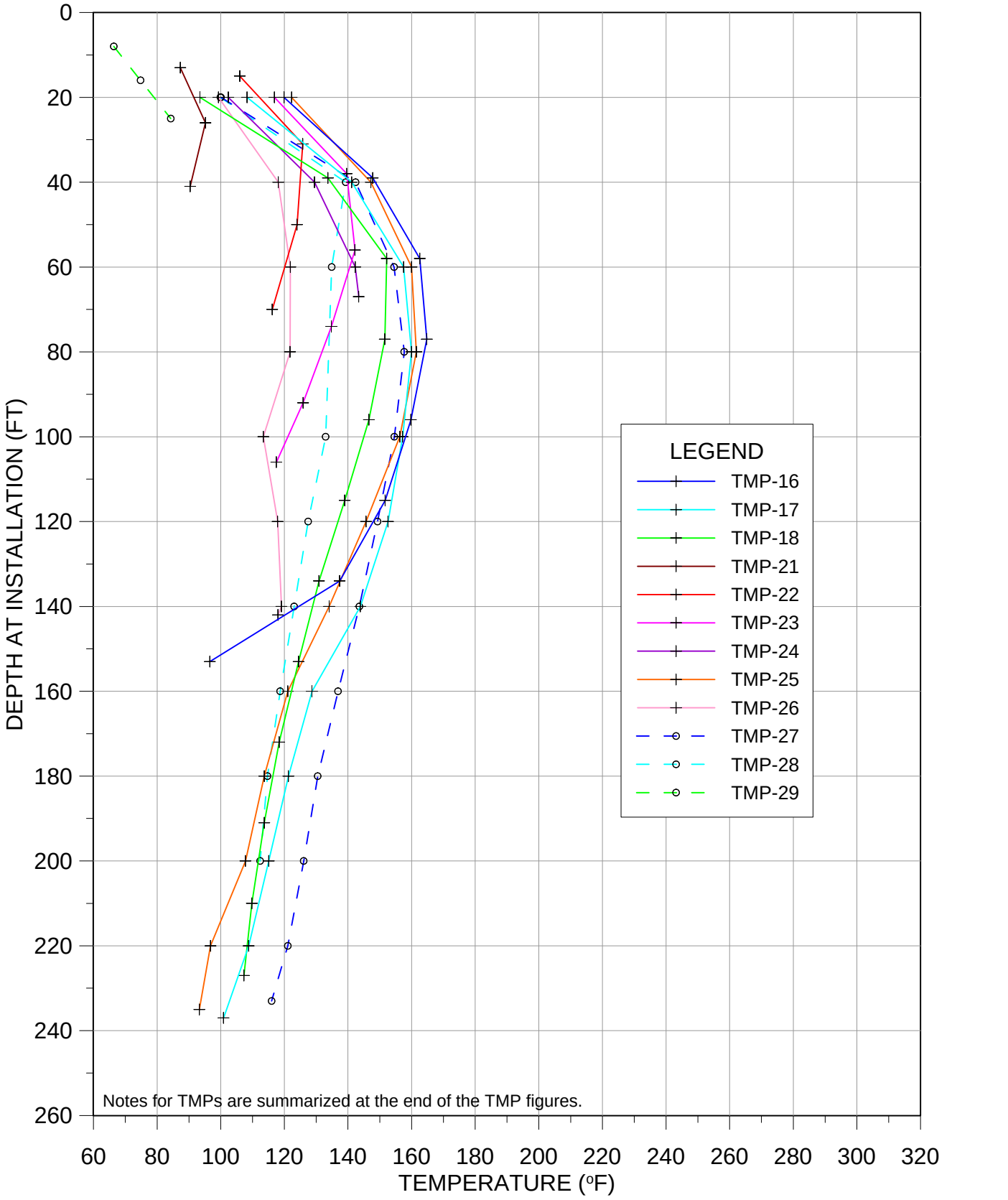
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

6/27/2016



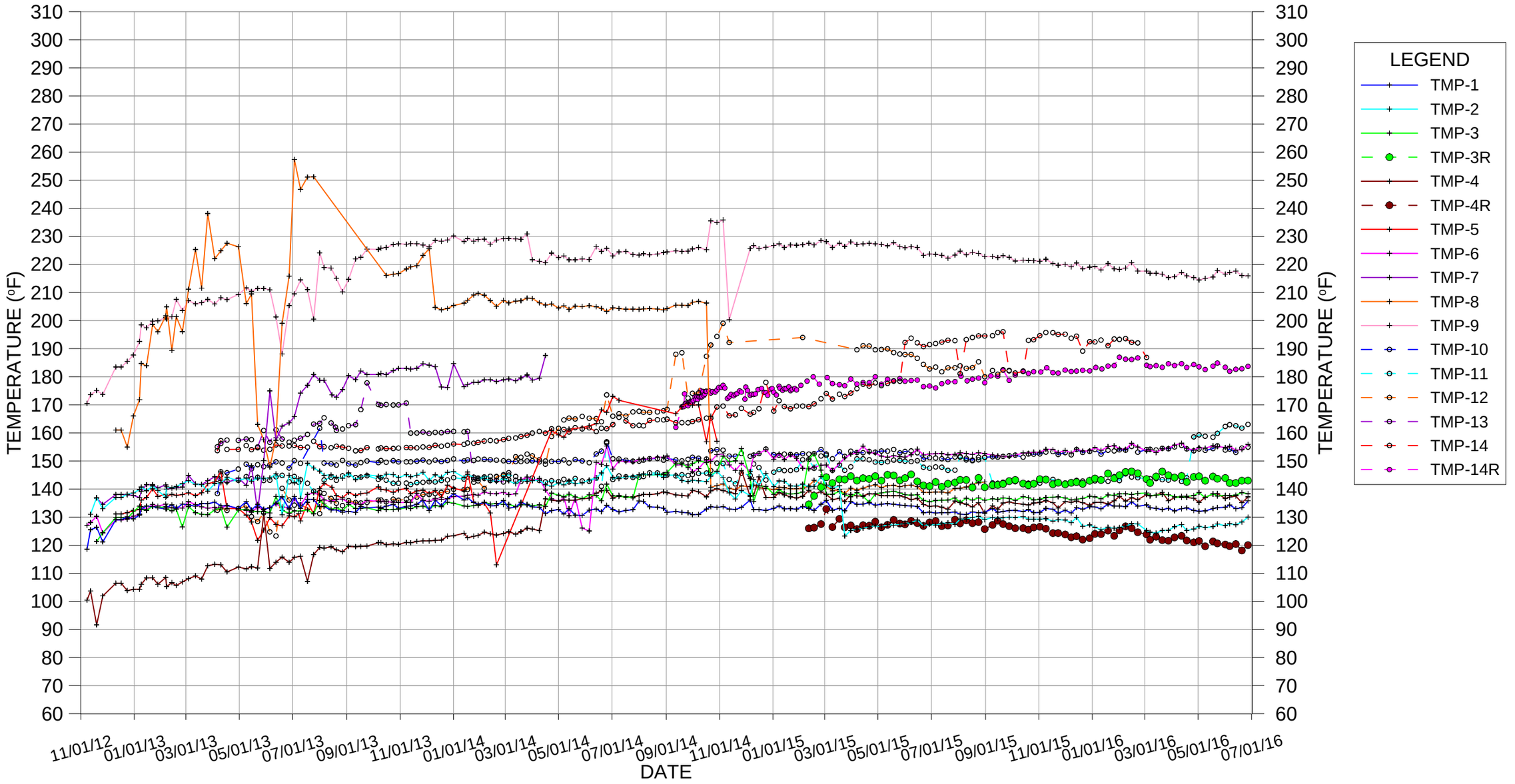
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

6/27/2016 - NORTH QUARRY



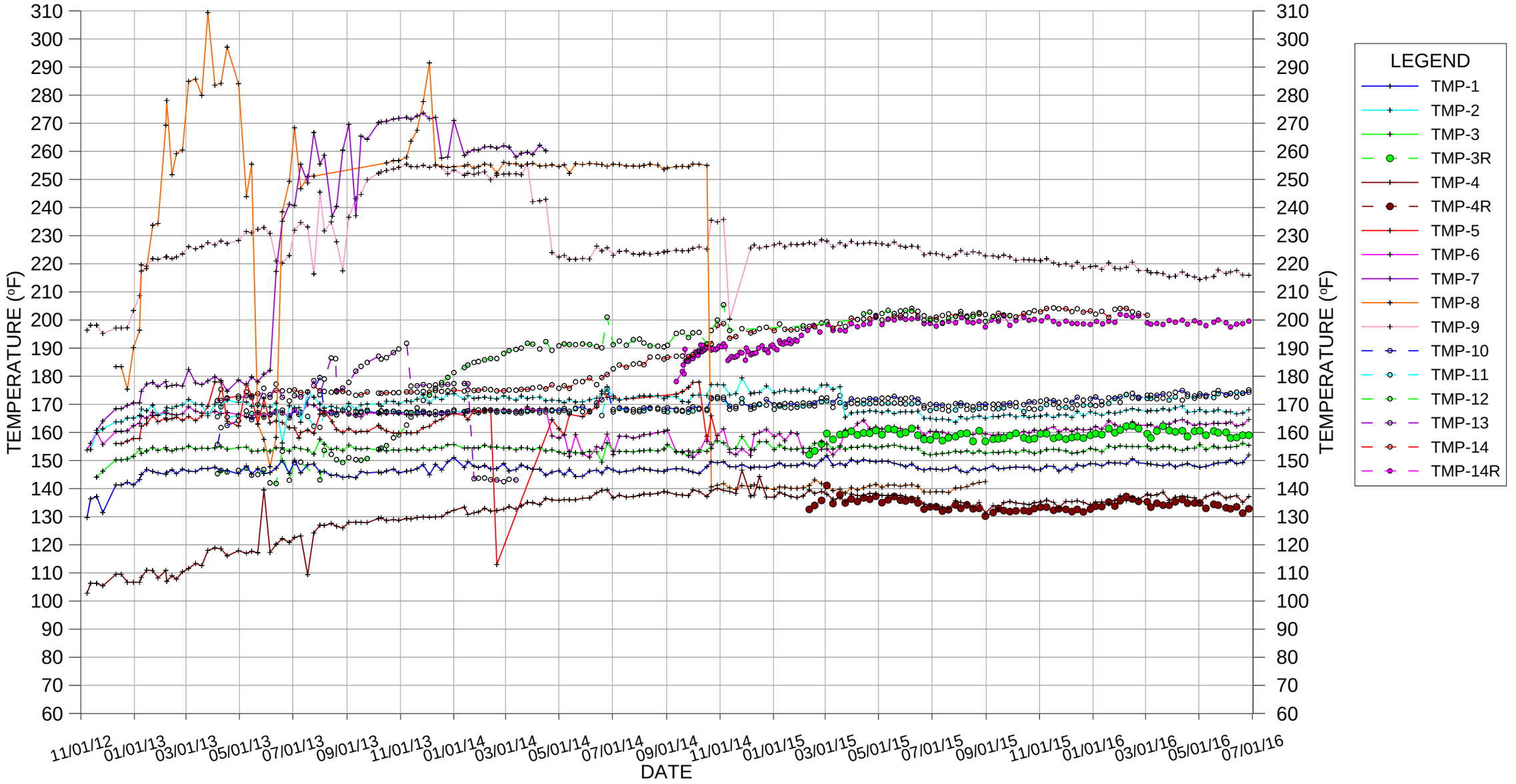
TEMPERATURE VS DEPTH
BRIDGETON LANDFILL

AVERAGE TEMPERATURES



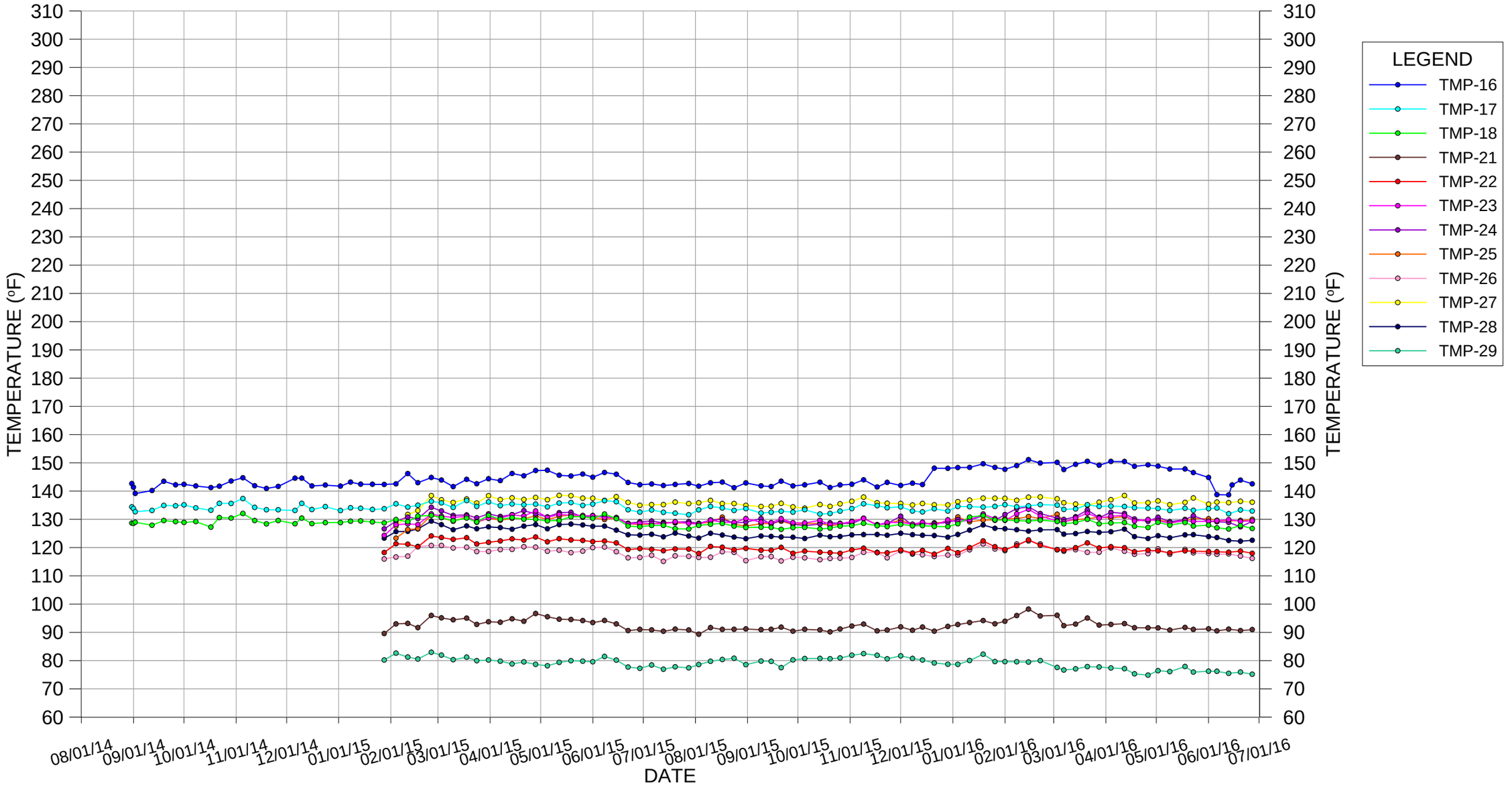
TEMPERATURE VS TIME
BRIDGETON LANDFILL

MAXIMUM TEMPERATURES



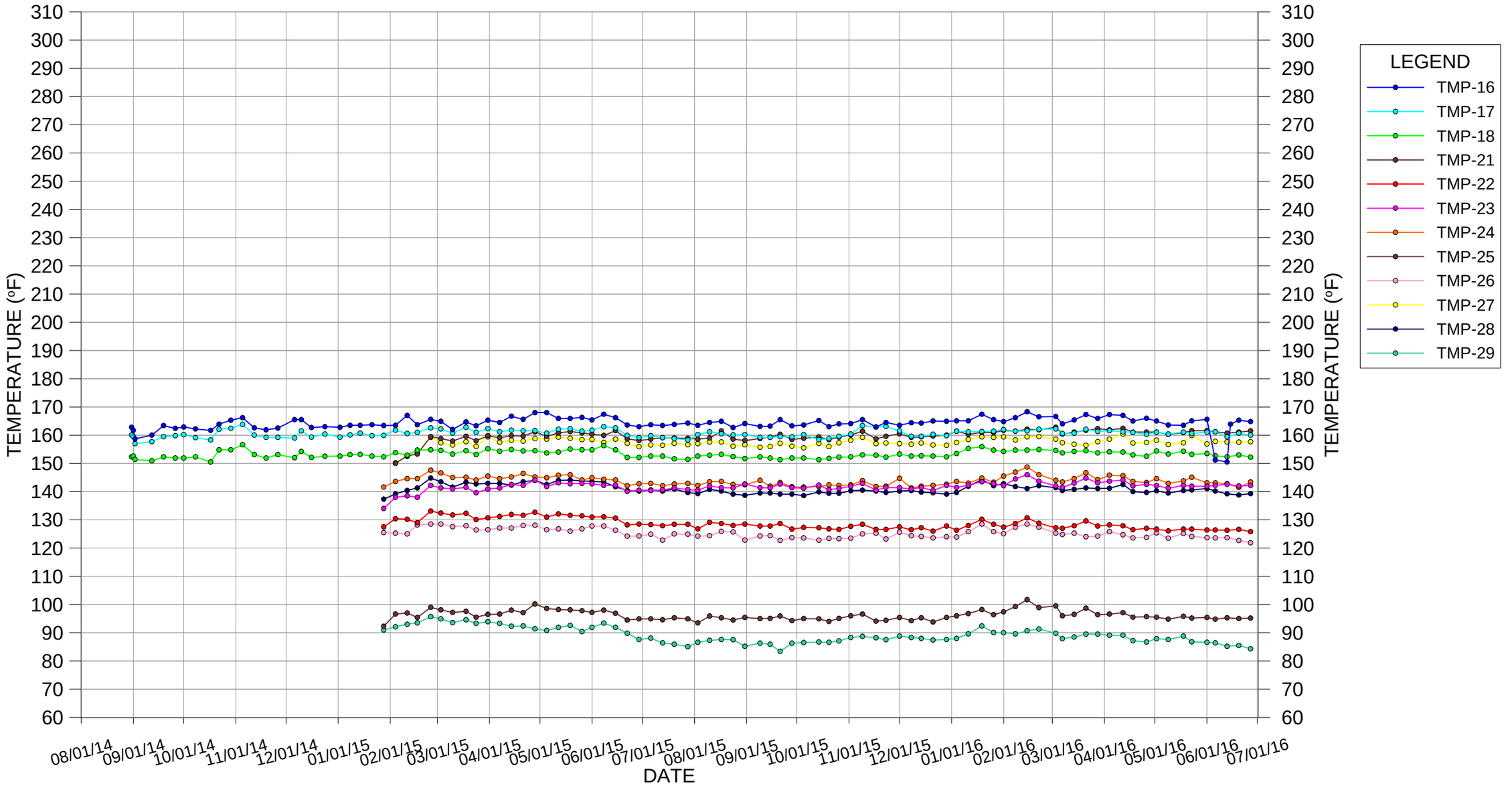
TEMPERATURE VS TIME
BRIDGETON LANDFILL

AVERAGE TEMPERATURES - NORTH QUARRY



TEMPERATURE VS TIME
BRIDGETON LANDFILL

MAXIMUM TEMPERATURES - NORTH QUARRY



TEMPERATURE VS TIME
BRIDGETON LANDFILL

CONNECTIVITYTMP BRIDGETON LANDFILL NOTES

TMP-1:

1. No reliable temperature readings at 138 ft depth from 8/1/2014 to 3/24/2015.
2. No reliable temperature readings at 78 ft depth from 8/13/2014 to 3/24/2015.
3. No reliable temperature readings at 38 ft depth from 8/2/2014 to 3/24/2015.

TMP-2:

1. Unit at 180 ft depth had resistance reading above allowable and is no longer working. No reliable reading has been obtained since 11/26/2012.
2. The resistance reading was high and no temperature readings were obtained at 160 ft depth since 6/19/2014.
3. Unit at 120 ft depth had high resistance readings that were fluctuating on 10/22/14 & from 11/5-12/6/2014 and on 12/16/2014.
4. Unit at 60 ft depth had fluctuating high resistance readings from 11/12/14 – 12/6/14 and no resistance reading between 2/11/2015 and 2/25/15, therefore the temperatures are unreliable during those dates.
5. The connectivity tests on 3/19/15 conducted by Feezor Engineering showed that units at 20', 40', 80', 100', 140' are no longer reliable.

TMP-3:

1. No reliable temperature readings have been obtained at 170' depth since 1/29/2014, except on 3/13/2014.
2. The connectivity tests on 4/11/14 conducted by CEC showed that units at 10', 90', 130', 210' and 250' are no longer reliable.
3. No reliable temperature readings were obtained at 230' depth from 8/01/2014 – 12/6/14 and 2/11/15 – 2/25/15.
4. No reliable temperature readings were obtained at 190' depth from 9/12 to 10/17/14, from 11/5 to 11/26/14 and on 12/16/14.
5. The connectivity tests on 10/28/14 conducted by Feezor Engineering showed that units at 10', 90', 110', 130', 210' and 250' are not reliable.
6. The unit at 150' no temperature or unreliable readings between 9/12/14 and 3/3/15.
7. The unit at 230' had unreliable or no readings from 10/22/-12/6/2014, between 2/11/15 – 2/25/15.
8. The unit at 190' had unreliable or no readings from 12/16/14 – 2/17/15.

TMP-3R: NONE

TMP-4:

1. The connectivity tests on 4/11/14 conducted by CEC showed that the unit at 48' depth is no longer reliable.

TMP-4R: NONE

TMP-5: TMP NO LONGER IN SERVICE– Verified by Connectivity testing by Feezor Engineering in March 2015.

TMP-6:

1. Unit at 195 ft depth had a resistance reading above acceptable on 11/20/2013.
2. Unit at 155 and depth had resistance readings above acceptable since 3/19/2014. No temperature readings were obtained.
3. Units at 195 ft depths had resistance readings above acceptable and no temperature readings obtained from 3/19/2014 to 4/11/2014.
4. The connectivity tests on 4/11/14 conducted by CEC showed that units at 35', 55', 75', 155', 175', and 195' depths are no longer reliable.
5. No reliable temperature readings were obtained at the unit at 95' on 5/13/14, 5/28-7/2/14, 10/1-10/8/14, 10/22/14, 11/12-12/6/14, 1/14/15 & 2/4/15–4/7/15. The temperatures between 12/16/14-1/8/15 are questionable due to high/fluctuating resistivity.
6. No reliable temperature readings were obtained at the 15' unit on 5/28-6/13/14, 6/25/14, 8/1-9/2/14, 10/1-10/8/14, 11/19-12/6/14, 1/2/15, & between 1/28/15 – 3/18/15. The temperature obtained on 12/16/14 is questionable due to high resistivity.
7. No reliable temperature readings were obtained at the unit at 215' since 6/13/14.

TMP-7R: TMP NO LONGER IN SERVICE

TMP-8:

1. Lines connecting data over distance of > 40' are to identify the data set and should not be used for temperature estimation.
2. The presented TMP readings represent the thermocouples that were operational on those dates.
3. No acceptable readings were obtained between 7/25/13 to 10/10/13.
4. Acceptable readings were obtained resuming on 10/16/13 from 20' to 80' depths.
5. Resistance of the unit at 80' indicates the reading is not reliable since 12/04/13.
6. The connectivity tests on 10/28/14 conducted by Feezor Engineering showed that units at 40' and 60' are not reliable.
7. A connectivity test conducted by Feezor Engineering showed that the unit at 20’ is not reliable on 9/9/15.

TMP-9:

1. All units had resistivity readings higher than acceptable levels on 7/3, 7/18, 7/25, 8/14, 8/20, 8/27, and 9/3/2013. Values shown on and between those dates are for informational purposes and should not be considered reliable. Resistivity readings since 9/11/2013 were acceptable for all units except 100'.

2. Unit at 100' depth had an inaccurate temperature reading on 8/1/2013 and no reading since 8/6/2013.
3. Unit at 80' depth had a high resistivity and no temperature readings on 4/1/2014.
4. The connectivity tests on 4/11/14 conducted by CEC showed that units at 20', 60', 80', and 100' depths are no longer reliable.
5. Unit at 40' depth had a resistance lower than credible on 11/12/14. The unit requires assessment.
6. Unit at 40' depth had a resistance which is fluctuating from week to week between 11/19 & 11/26/14. The readings are considered unreliable during that time.

TMP-10:

1. Resistance readings for 7/18 and 7/25/2013 were acceptable; however the temperature readings appear inaccurate. This issue appears to be resolved as of the 8/1/2013 readings.
2. No reliable temperature reading was obtained at 113’ depth between 3/3/15 and 3/18/15.

TMP-11:

1. None of the units had acceptable resistivity readings on 7/3/2013. The units at TMP-11 were subsequently re-read on 7/8/2013. Resistance readings for 7/8/2013 were acceptable.
2. All units had resistivity readings higher than acceptable levels on 7/18/2013. Values shown for that date are for informational purposes and should not be considered reliable.
3. All units had acceptable resistance readings starting on 7/25/13, except a high resistance reading at 116' depth since 10/30/13.
4. No temperature reading was obtained at 176' since 1/17/2014.
5. The unit at 156' depth had high or questionable resistance since 1/17/14. No temperatures were obtained between 1/17/14 and 5/13/14, on 6/19/14, between 8/13/14 and 10/17/2014, and since 2/11/15. Readings were either not obtained or deemed unreliable between 8/13/14 and 3/31/15, except for on 10/22/14 and 12/10/14.
6. The unit at 56' depth had a high resistance reading since 3/19/14 & no temperatures were obtained.
7. The connectivity tests on 4/11/14 conducted by CEC showed that units at 56', 116', and 176' depths are no longer reliable.
8. No temperature was obtained on 6/25/14 at 216' depth.
9. The connectivity tests on 10/28/14 conducted by Feezor Engineering showed that units at 56', 116' and 176' are not reliable.
10. The Unit at 76' depth had either no readings or unreasonable readings between 11/12 & 12/6/14, 12/24/14, on 1/14/15, on 2/17/15 and from 3/10/15 – 3/31/15.
11. The Unit at 16' depth had either no readings or unreasonable readings between 11/19 & 12/6/14 and 12/16/14 – 1/28/15.
12. The Units at 196’ and 216’ had high resistance readings since 4/26/16 and the temperature was unreliable.

13. The Unit at 159’ depth had a low resistance reading on 6/1/16 and the temperature was unreliable.

TMP-12:

1. All units were verified by connectivity testing by Feezor Engineering in October 2015 to be unreliable.

TMP-13: TMP NO LONGER IN SERVICE

TMP-14:

1. All units were verified by connectivity testing by Feezor Engineering in March 2016 to be unreliable.

TMP-14R:

1. Due to the connectivity test results by Feezor Engineering on TMP-14 (see note above), TMP-14R is added to this reporting data set as of 3/7/16.

TMP-15: TMP WAS NEVER IN SERVICE

TMP-16:

1. A connectivity test conducted by Feezor Engineering showed that the units on TMP-16 may not be reliable since 9/9/15. Further testing at the end of September 2015 showed possible connectivity on some of the units. The resistivity and temperatures will continue to be monitored.
2. The unit at 153 ft depth had a low resistance reading and unreliable temperature since 12/21/15.
3. The unit at 58 ft depth had no reading from 5/23/16 until repairs on 6/15/16.
4. The unit at 77 ft depth had an unreasonable drop in temperature on 6/6/16 and the temperature was not reliable on that date.
5. Broken wires were repaired and results were confirmed against results yielded directly at the leads on 6/15/16. Possible connectivity issues may still exist based on September 2015 test and new connectivity test is required to determine reliability

TMP-17: NONE

TMP-18: NONE

TMP-19: NOT PART OF THIS SUBMITTAL (HEAT EXTRACTION TMP)

TMP-20: NOT PART OF THIS SUBMITTAL (HEAT EXTRACTION TMP)

TMP-21: NONE

TMP-22: NONE

TMP-23: NONE

TMP-24: NONE

TMP-25: NONE

TMP-26: NONE

TMP-27: NONE

TMP-28:

1. The unit at 217' depth has had no resistance or temperature readings since installation.
2. The unit at 80' depth had a resistance drop and an unreasonable temperature decrease on 6/1/16. The temperature was determined to be unreliable.

TMP-29: NONE

TMP vs DEPTH and TMP vs ELEVATION (for 6/27/16):

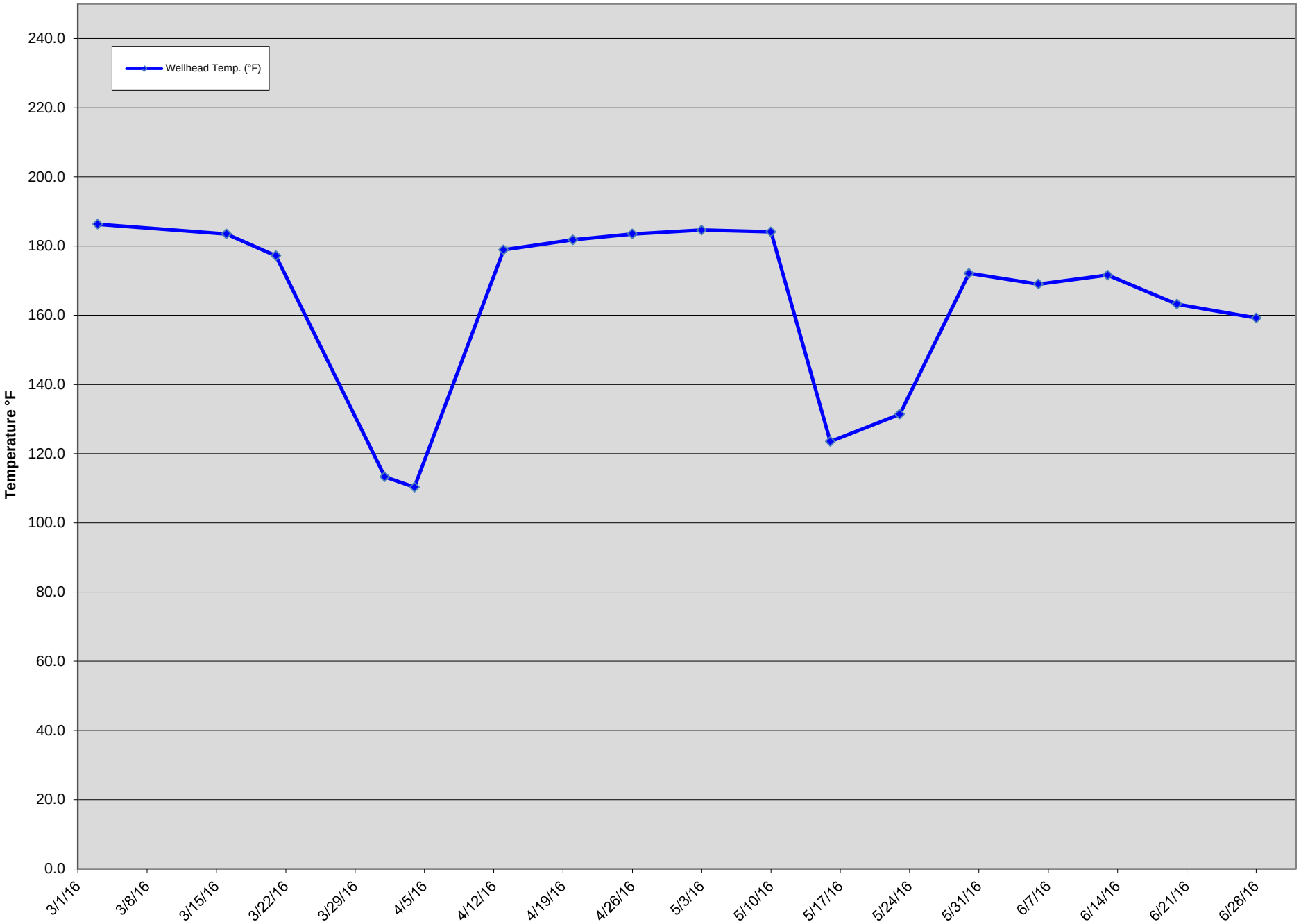
1. There were no reliable temperature readings for TMP-13 since 3/19/2014.
2. There were no reliable temperature readings for TMP-7R, as determined by the connectivity test on 4/11/14.
3. There were no reliable temperature readings for TMP-5 from 7/17-9/2/2014 and since 11/5/14.
4. There were no reliable temperature readings for TMP-9 from 11/19 - 12/26/2014.
5. There were no reliable temperature readings for TMP-12 from 11/19/2014 – 3/31/15, except 2/4/15. There were no reliable temperature readings for TMP-12 since 9/28/15.
6. There were no reliable temperature readings for TMP-8 since 9/9/15.
7. There were no reliable temperature readings for TMP-14, confirmed since 3/7/16.

ATTACHMENT C

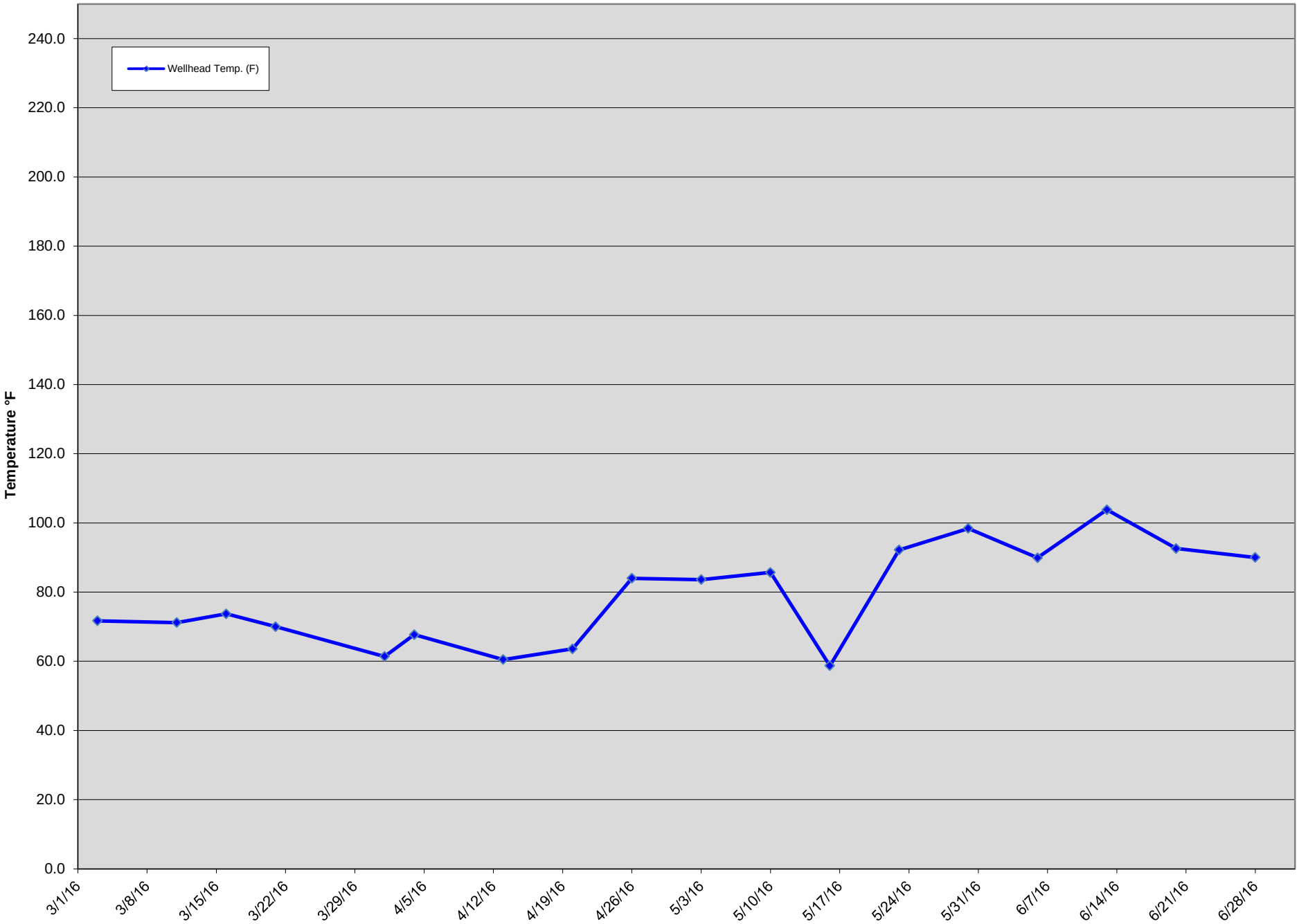
GAS INTERCEPTOR WELLHEAD TEMPERATURE GRAPHS

Gas Extraction Wells - Bridgeton Landfill

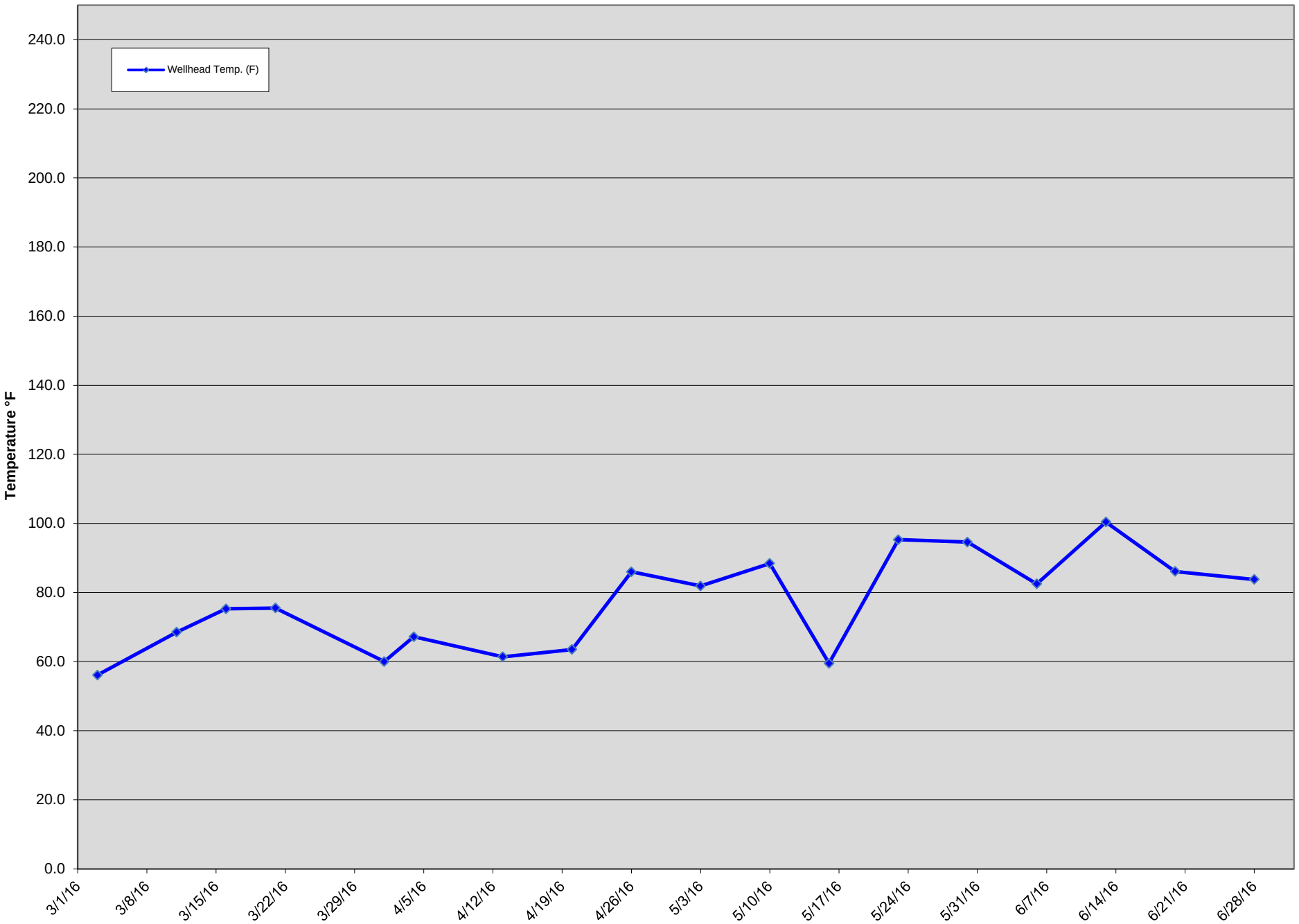
GIW-1 Wellhead Temperatures



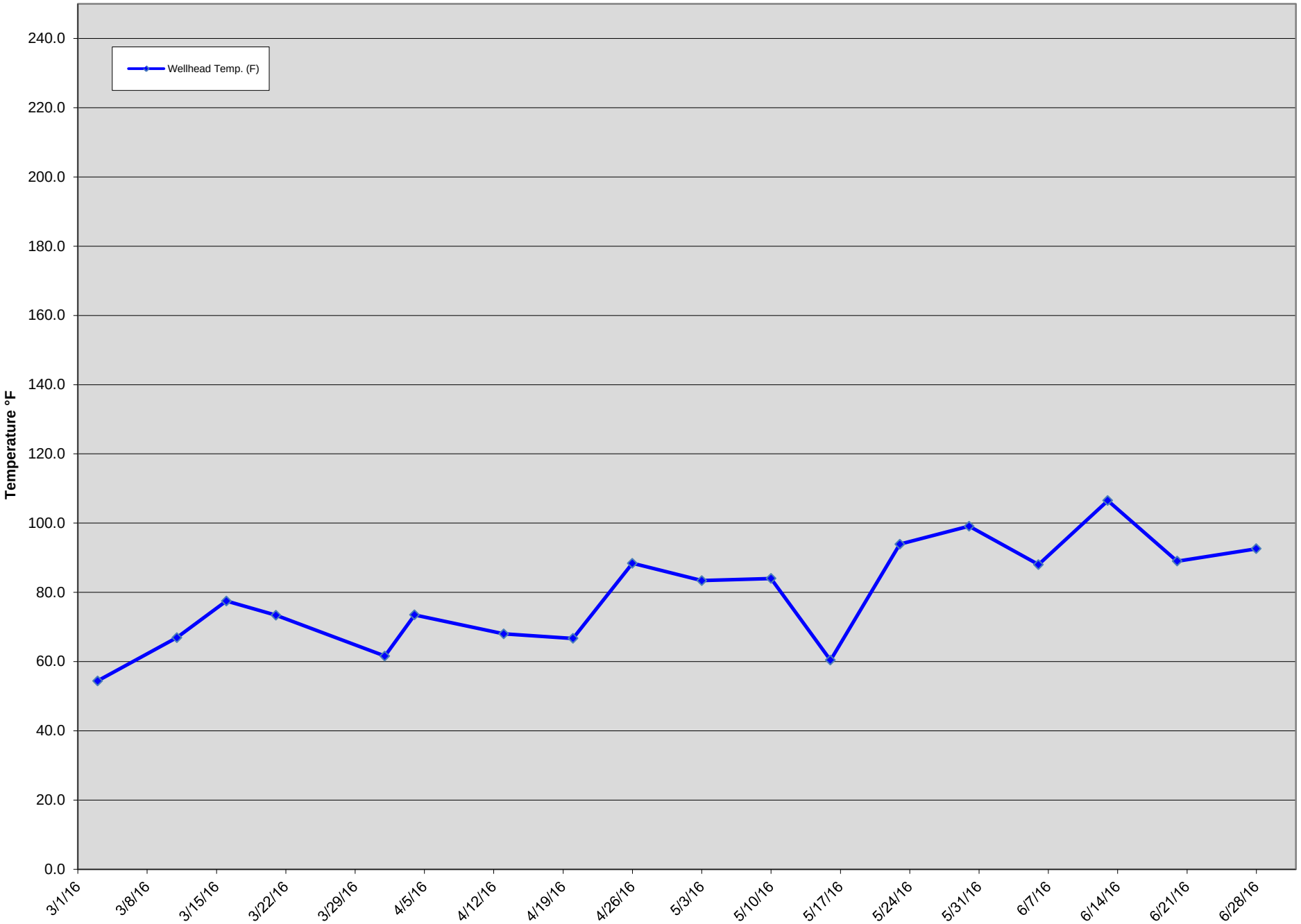
GIW-2 Wellhead Temperatures



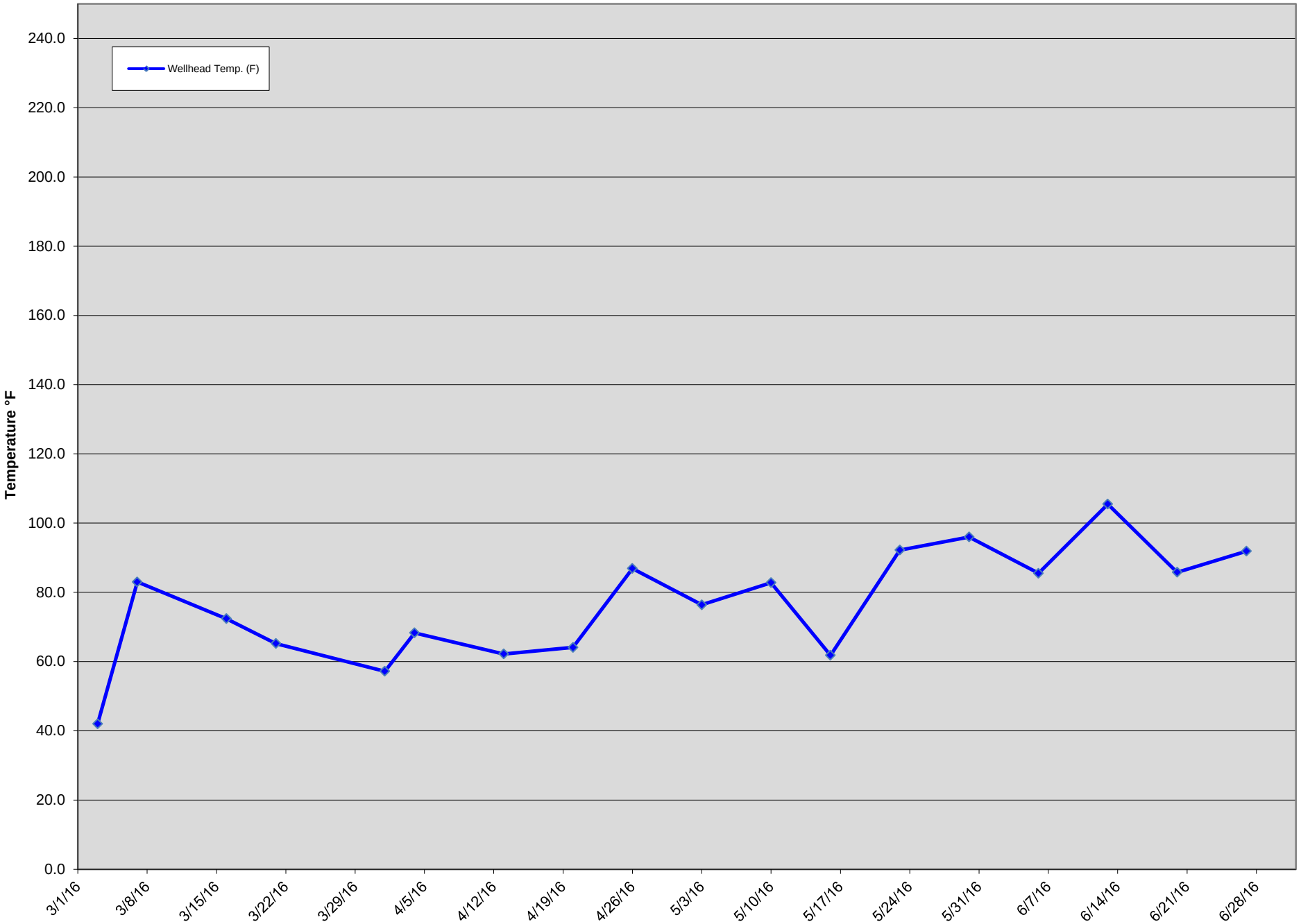
GIW-3 Wellhead Temperatures



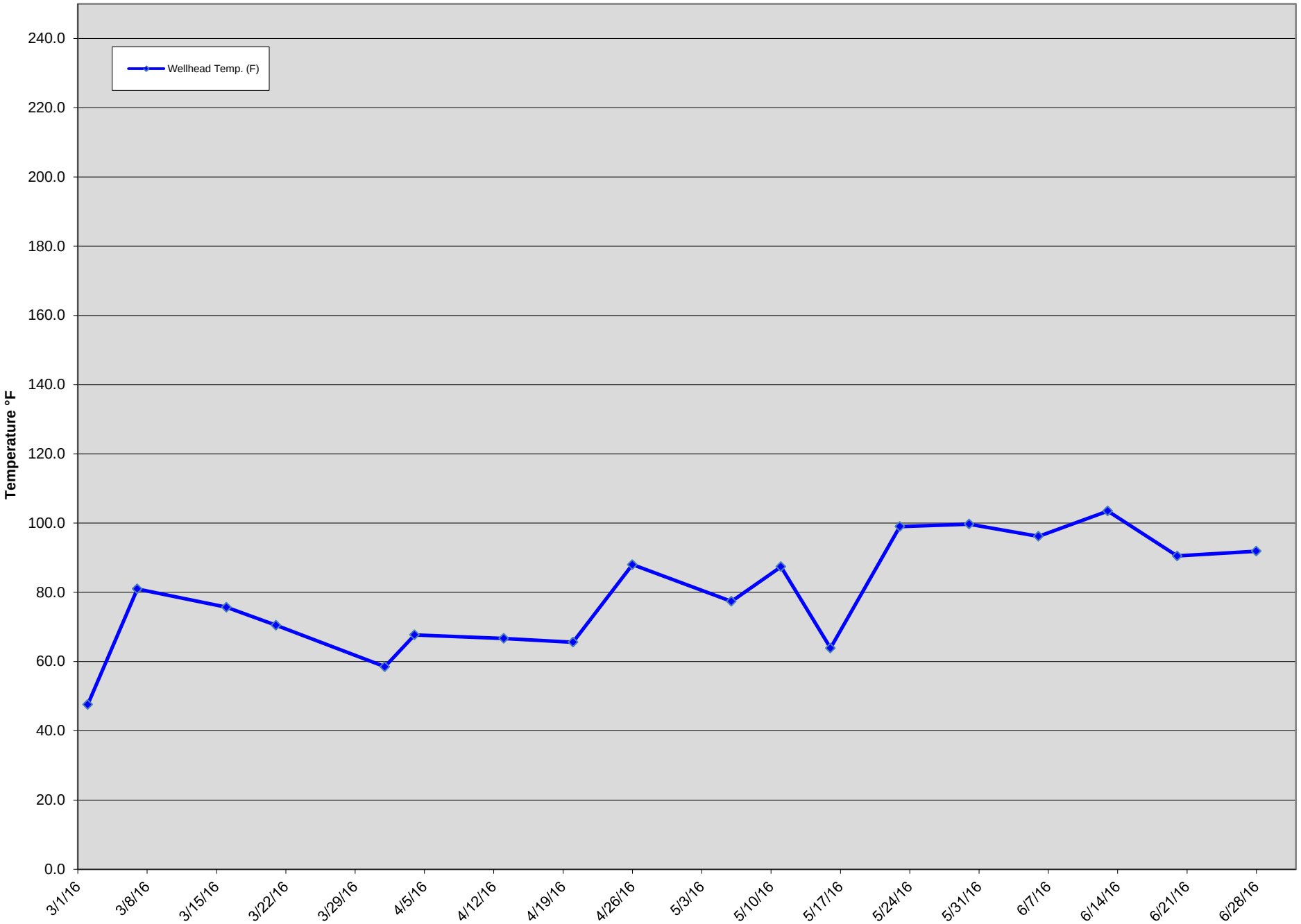
GIW-4 Wellhead Temperatures



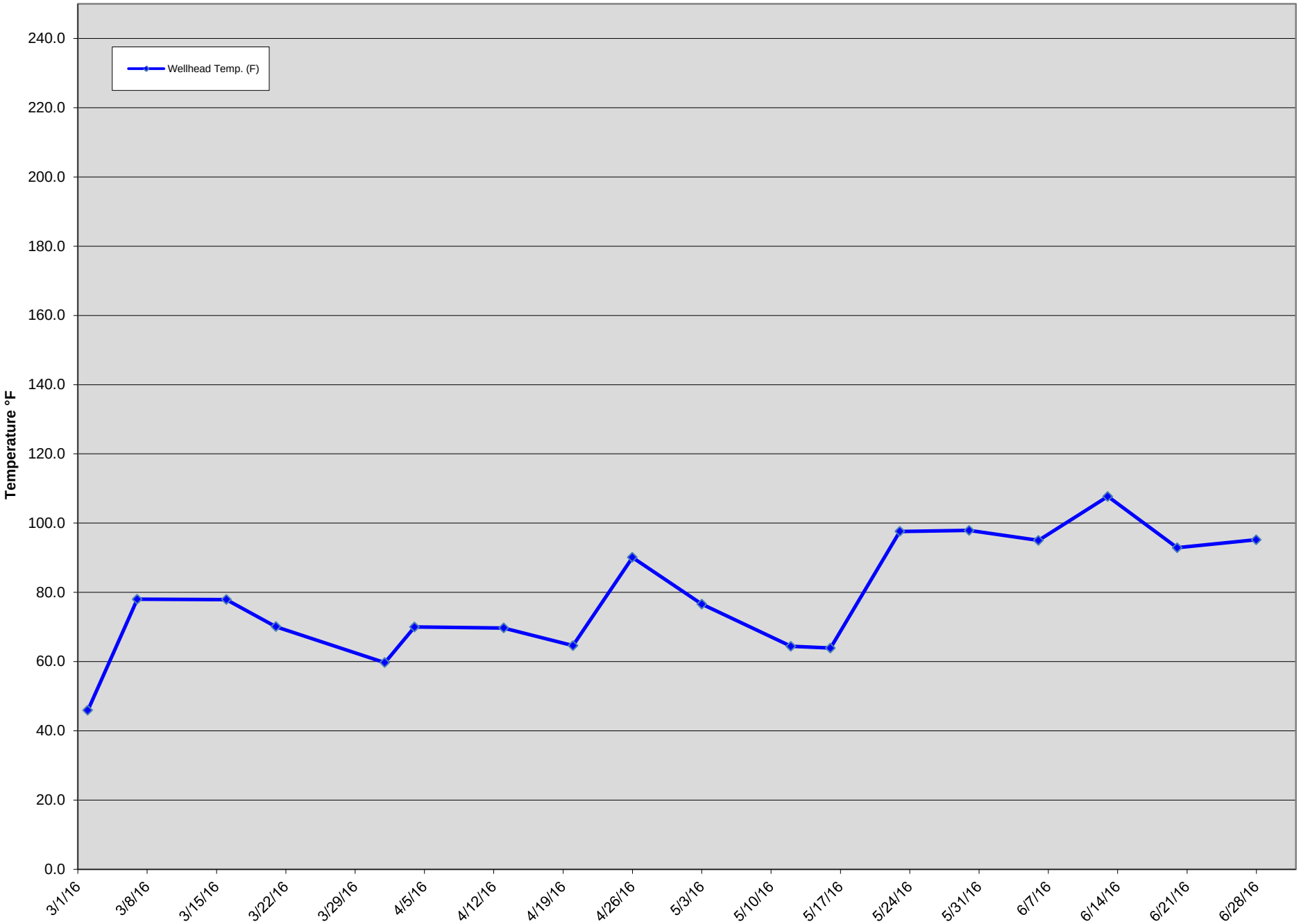
GIW-5 Wellhead Temperatures



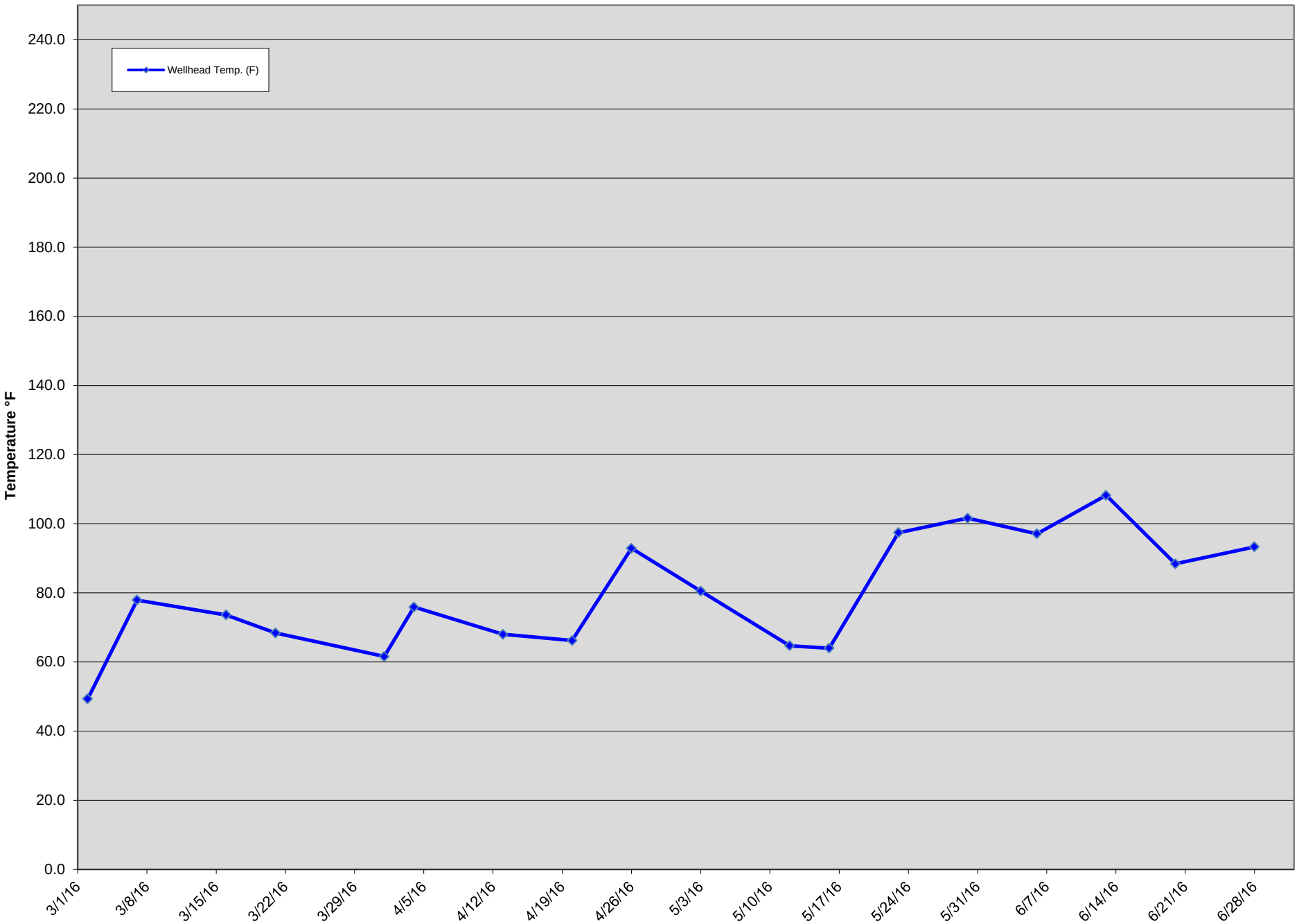
GIW-6 Wellhead Temperatures



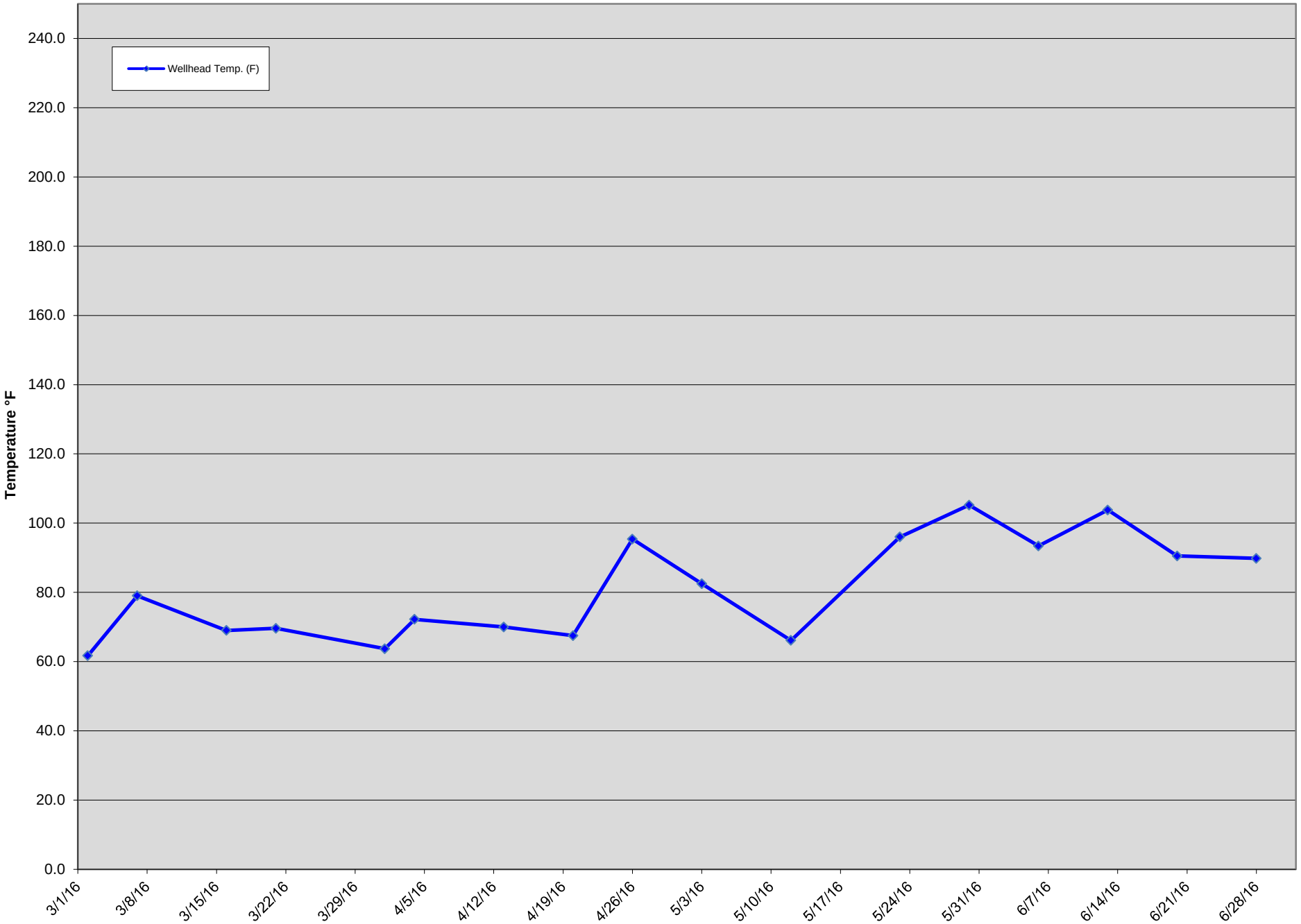
GIW-7 Wellhead Temperatures



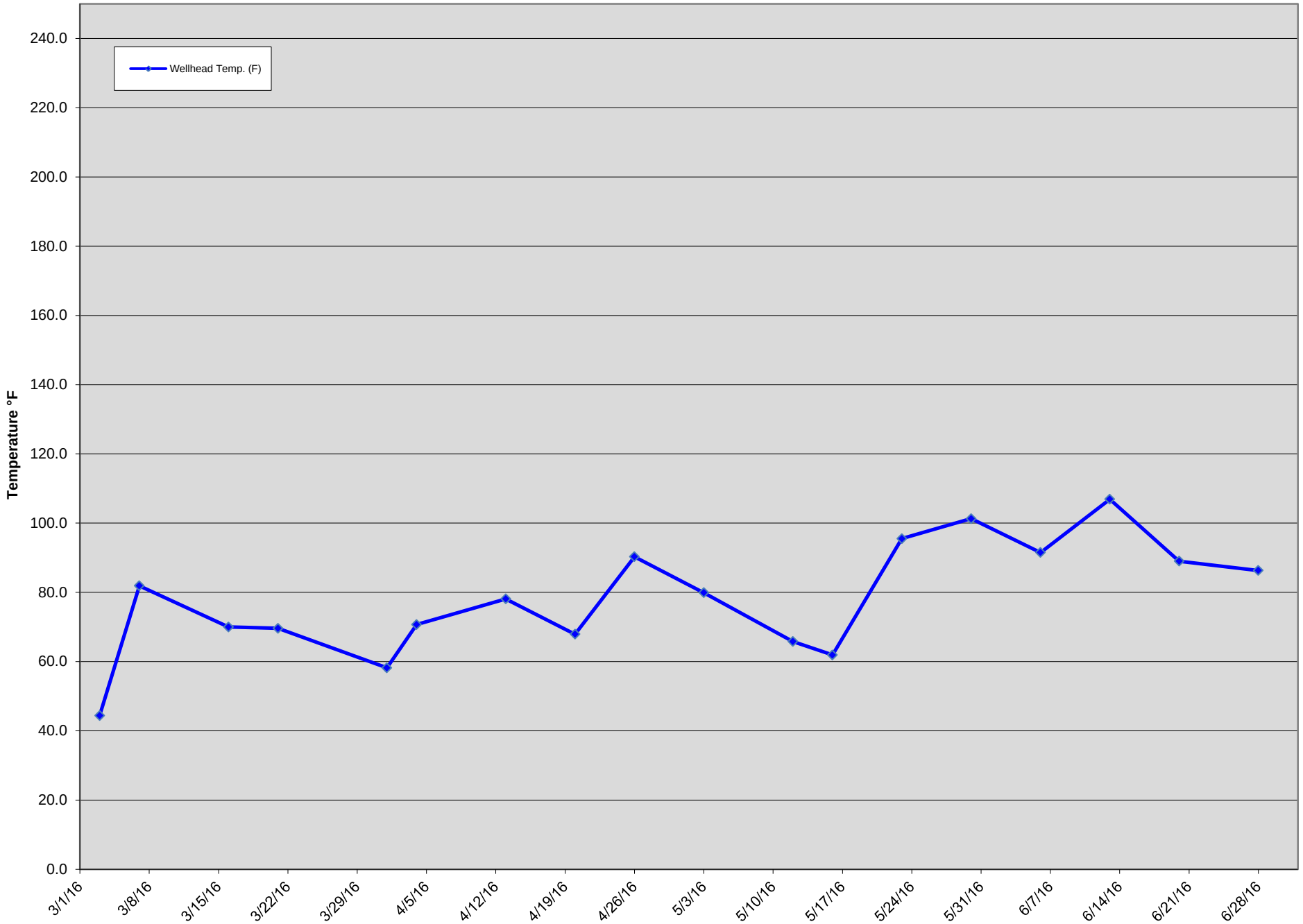
GIW-8 Wellhead Temperatures



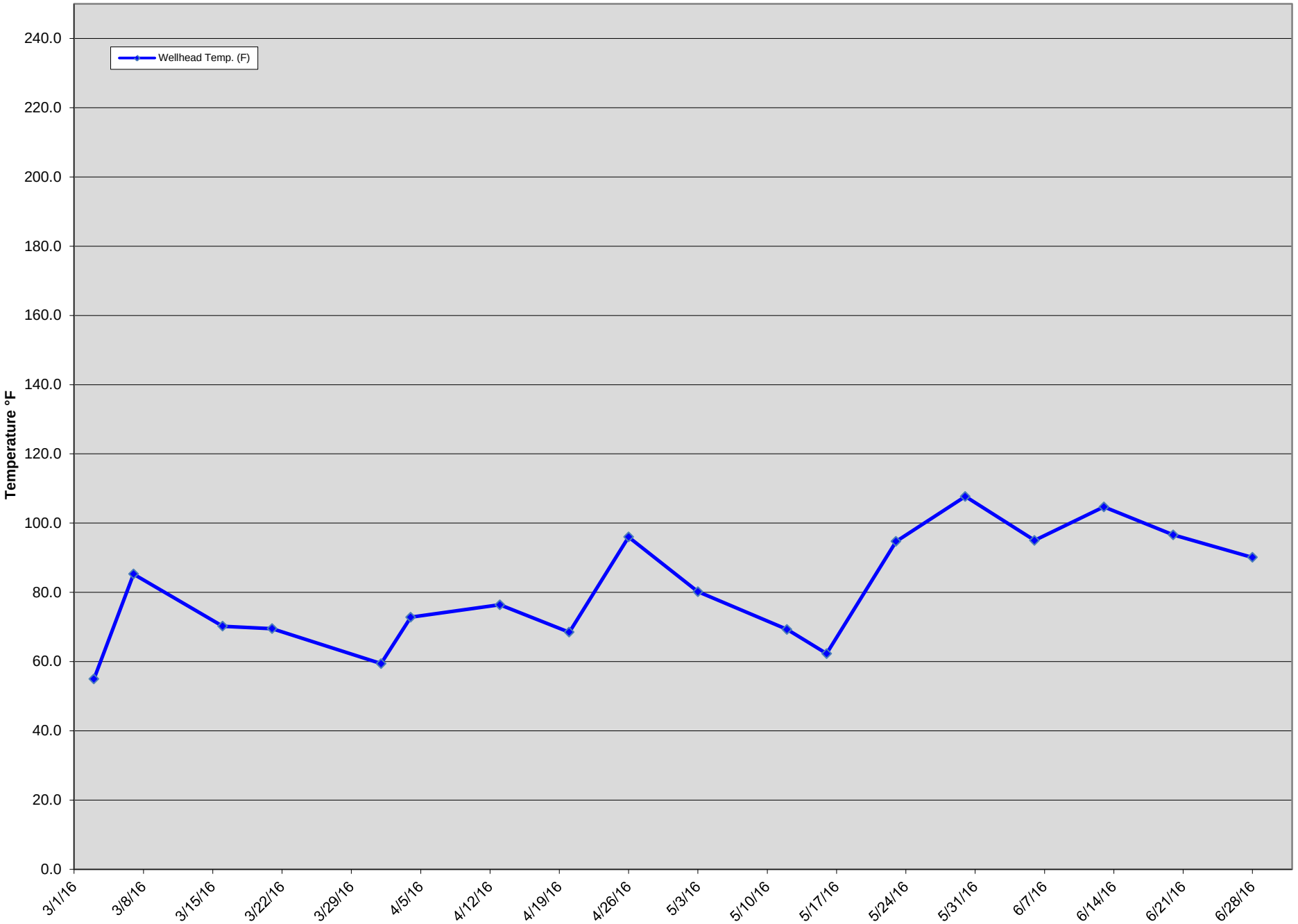
GIW-9 Wellhead Temperatures



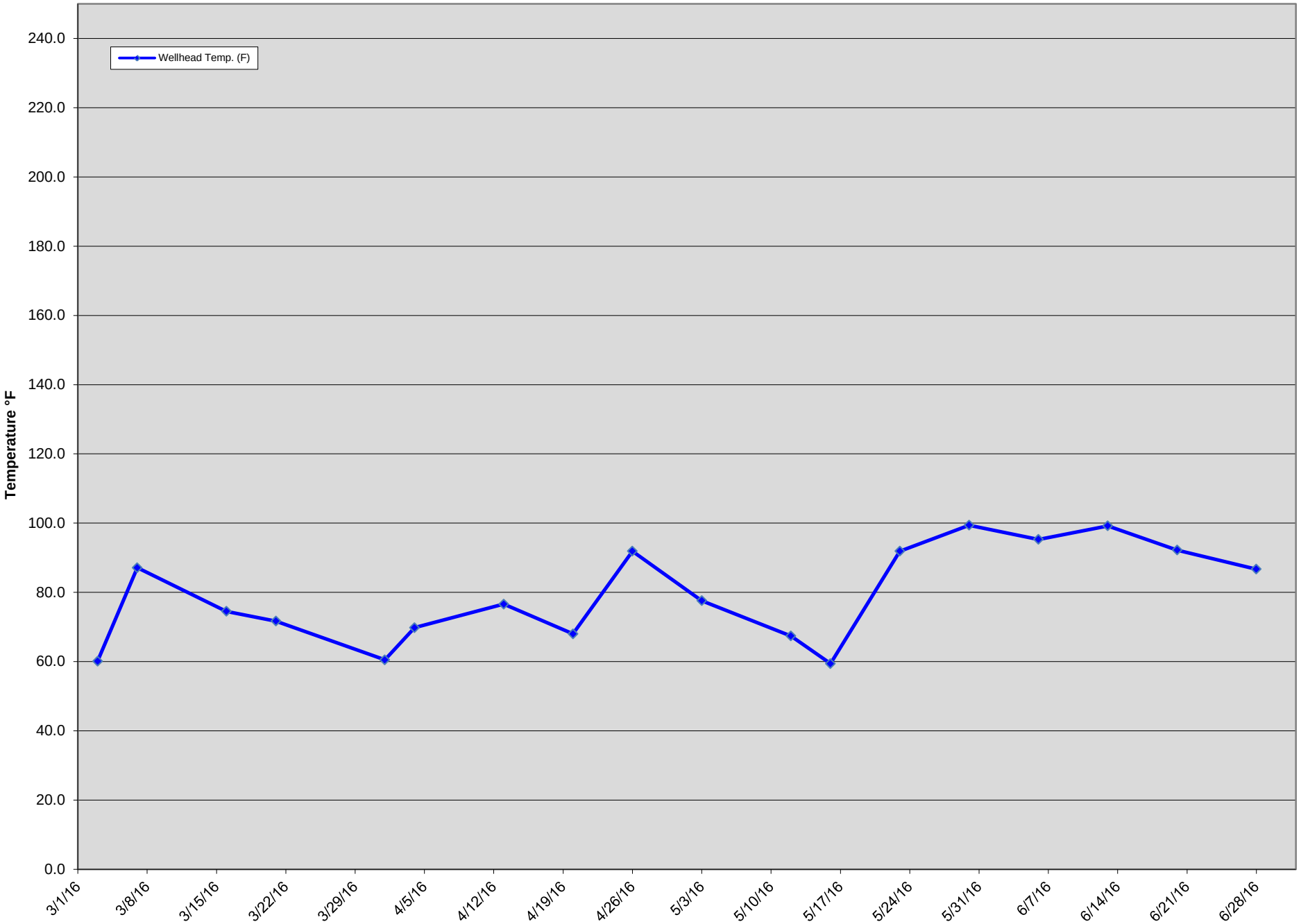
GIW-10 Wellhead Temperatures



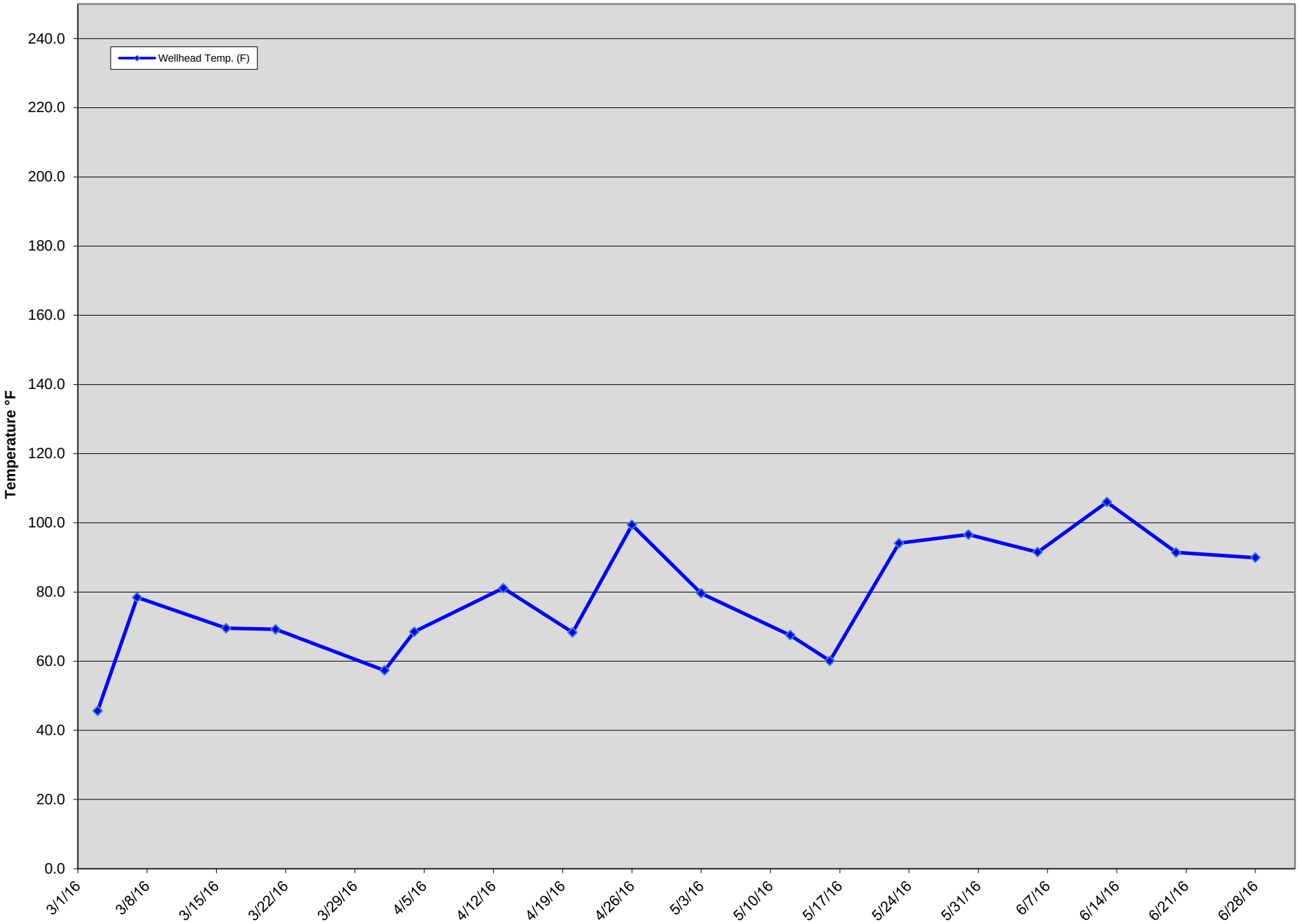
GIW-11 Wellhead Temperatures



GIW-12 Wellhead Temperatures



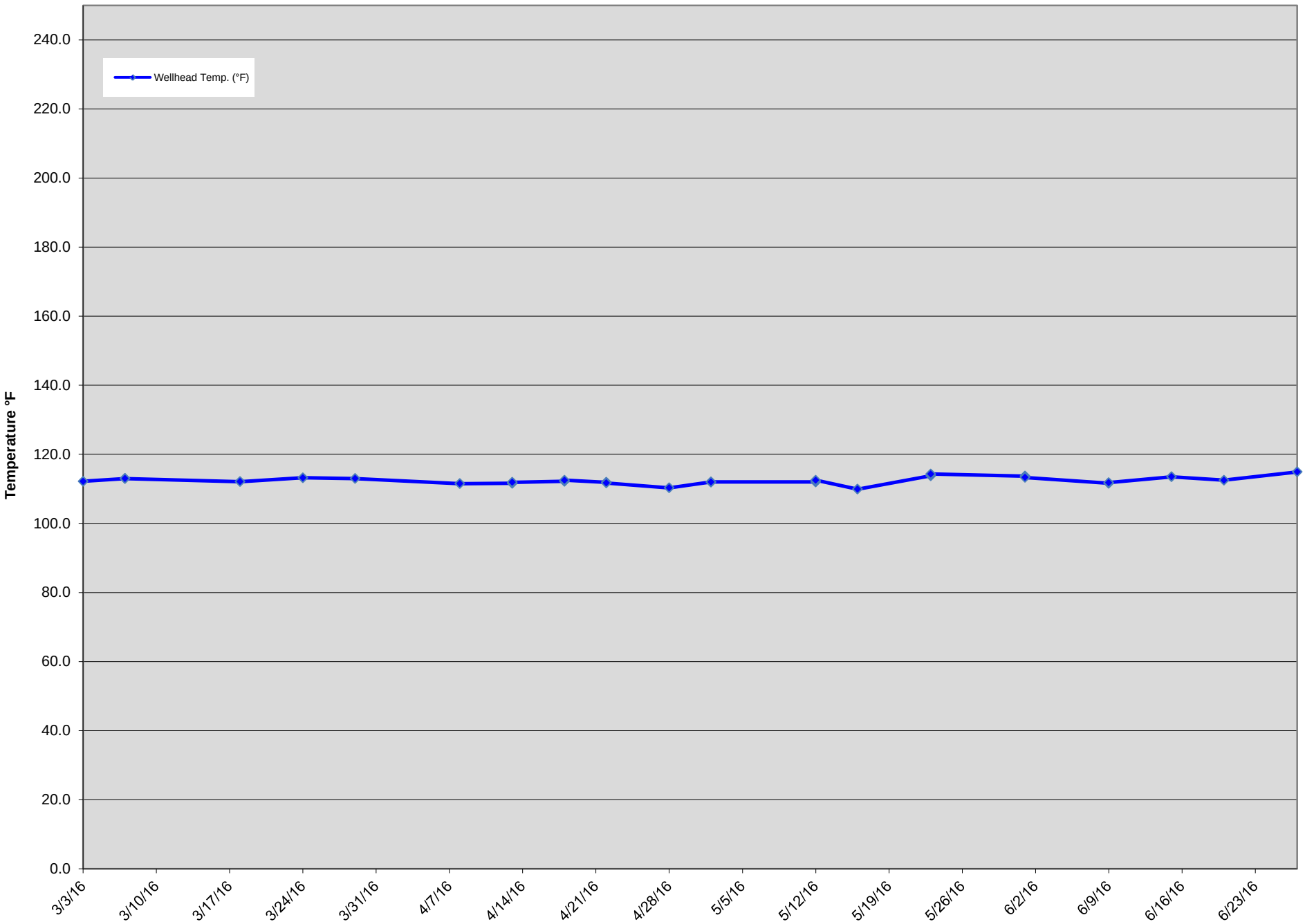
GIW-13 Wellhead Temperatures



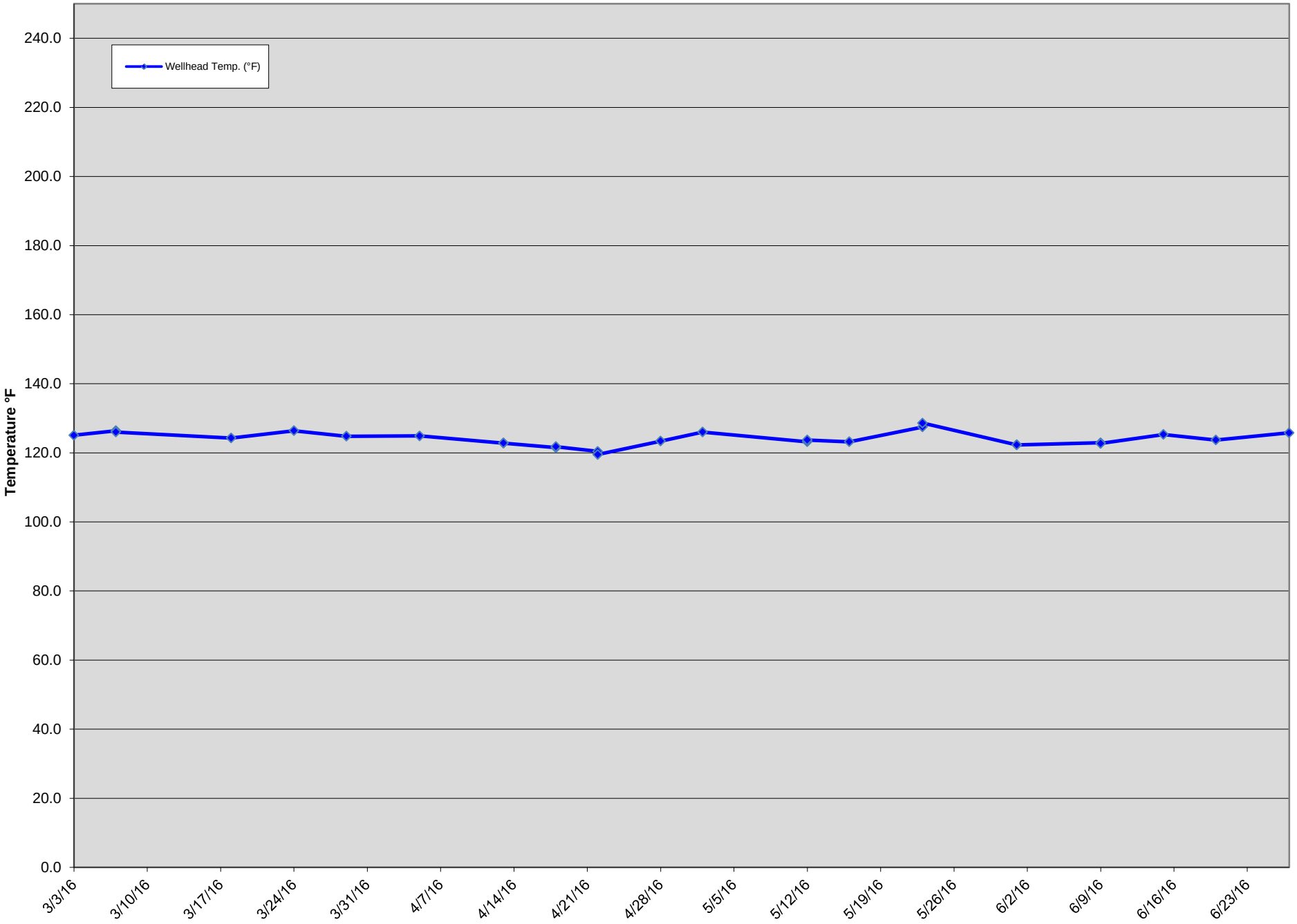
ATTACHMENT D

NECK-AREA GAS EXTRACTION WELL DATA

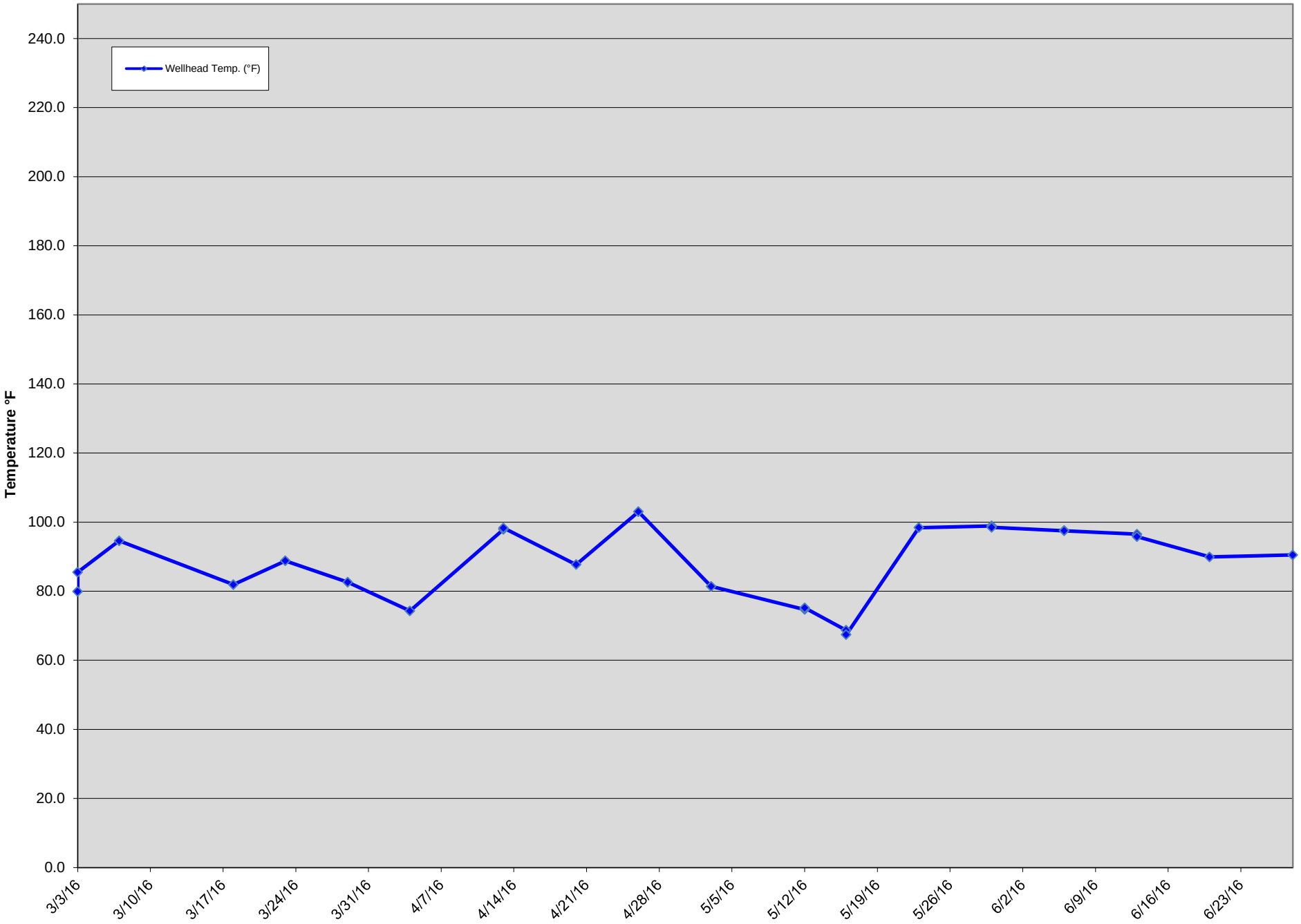
GEW-008 Wellhead Temperatures



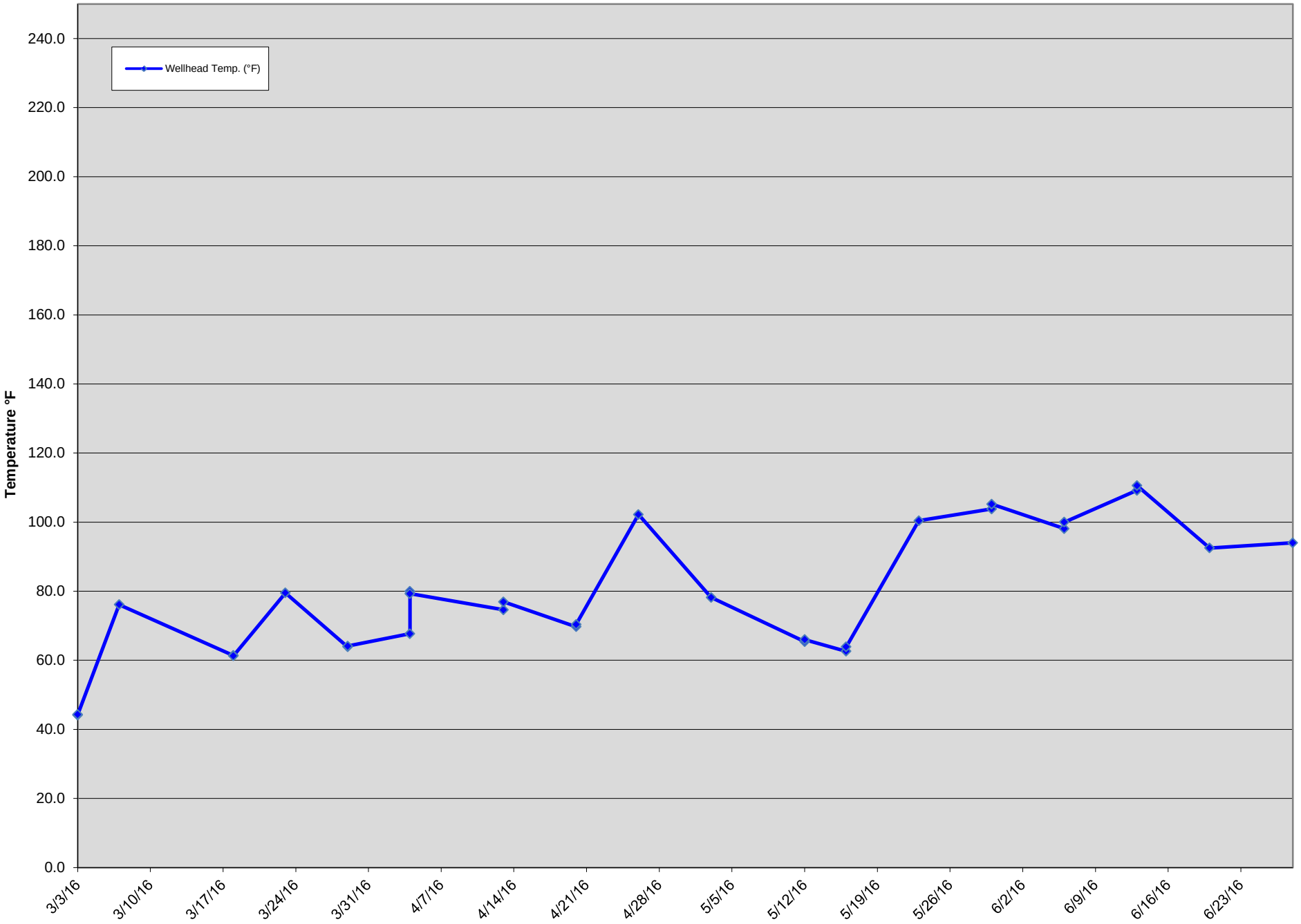
GEW-009 Wellhead Temperatures



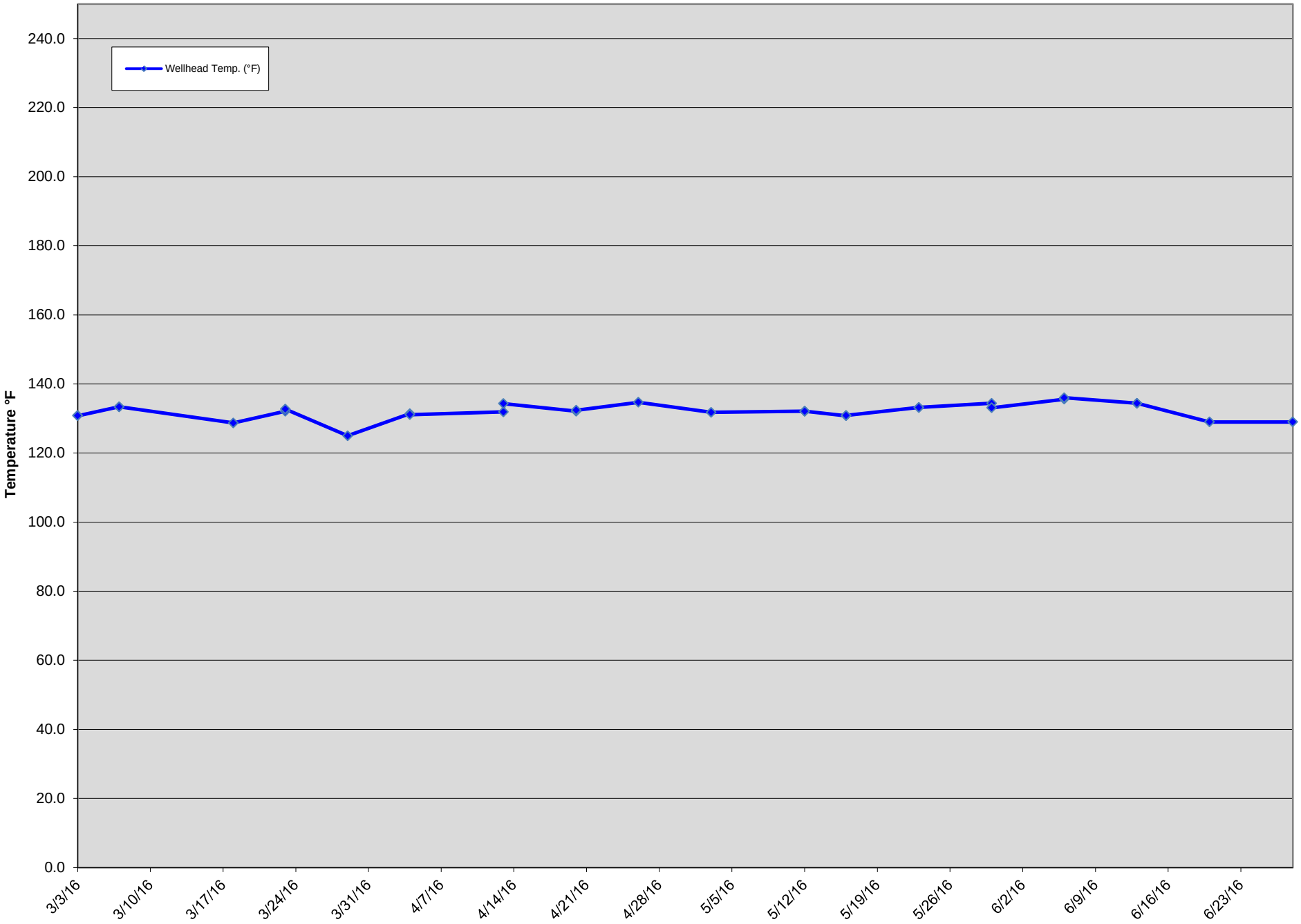
GEW-010 Wellhead Temperatures



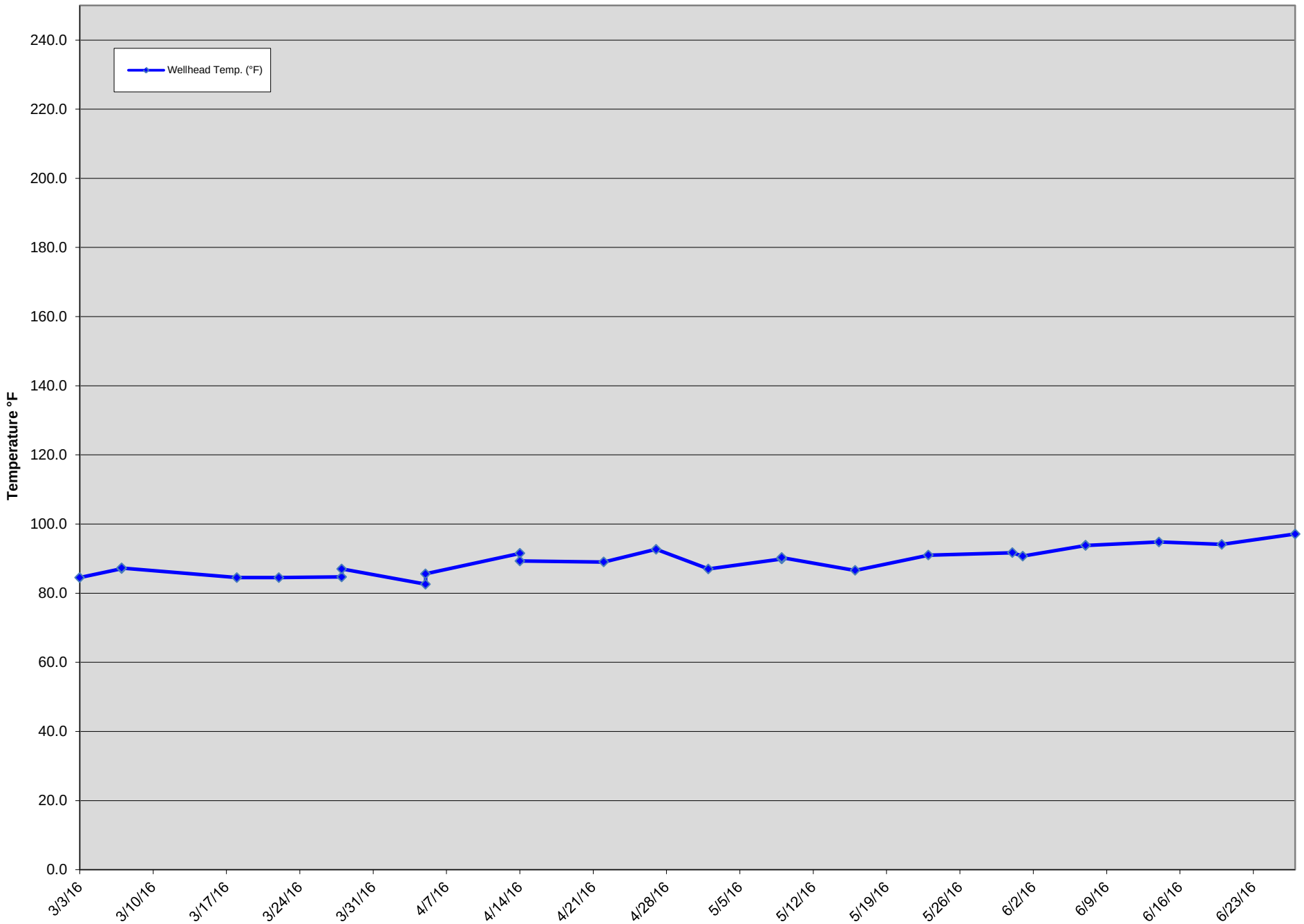
GEW-038 Wellhead Temperatures



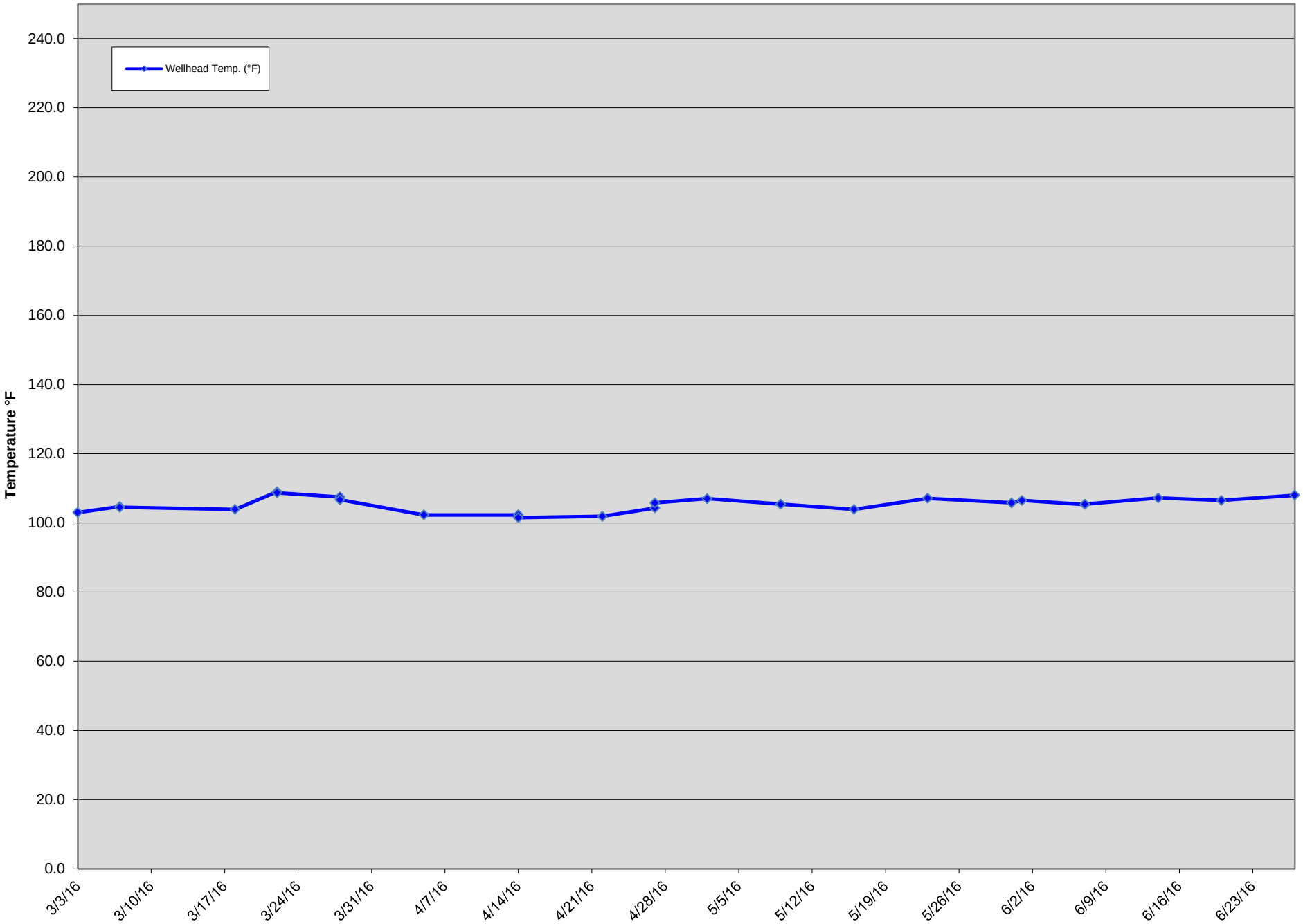
GEW-039 Wellhead Temperatures



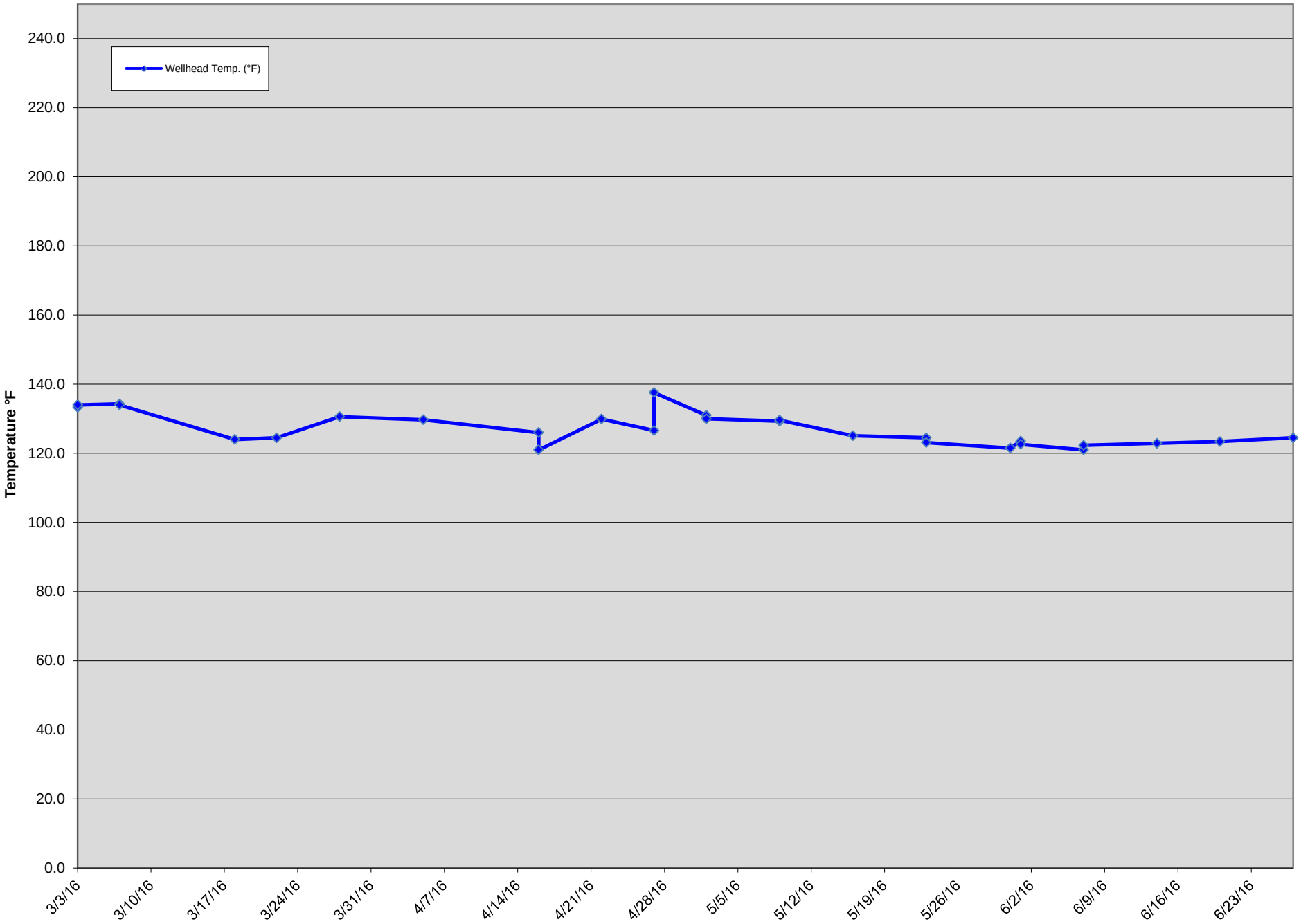
GEW-040 Wellhead Temperatures



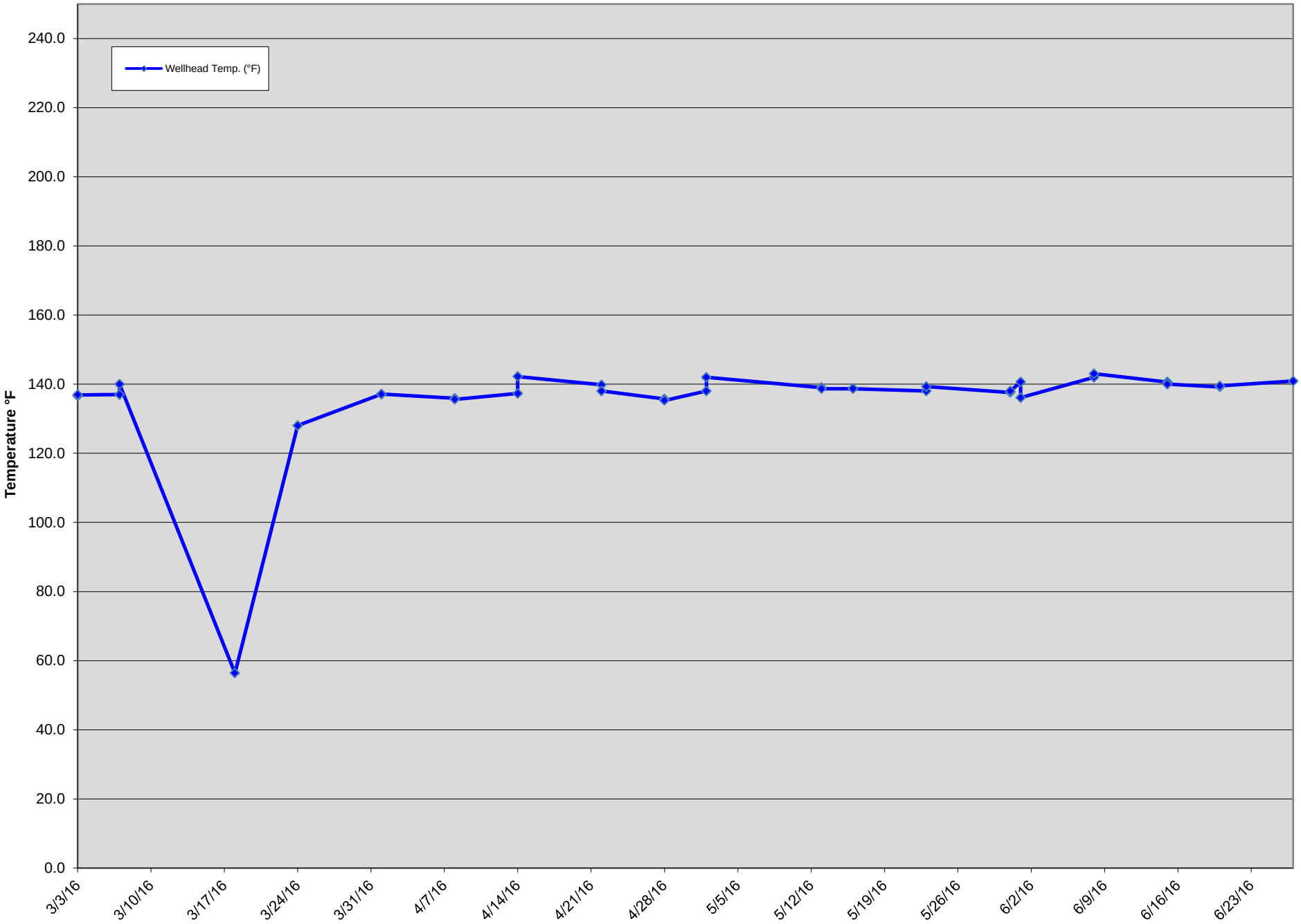
GEW-041R Wellhead Temperatures



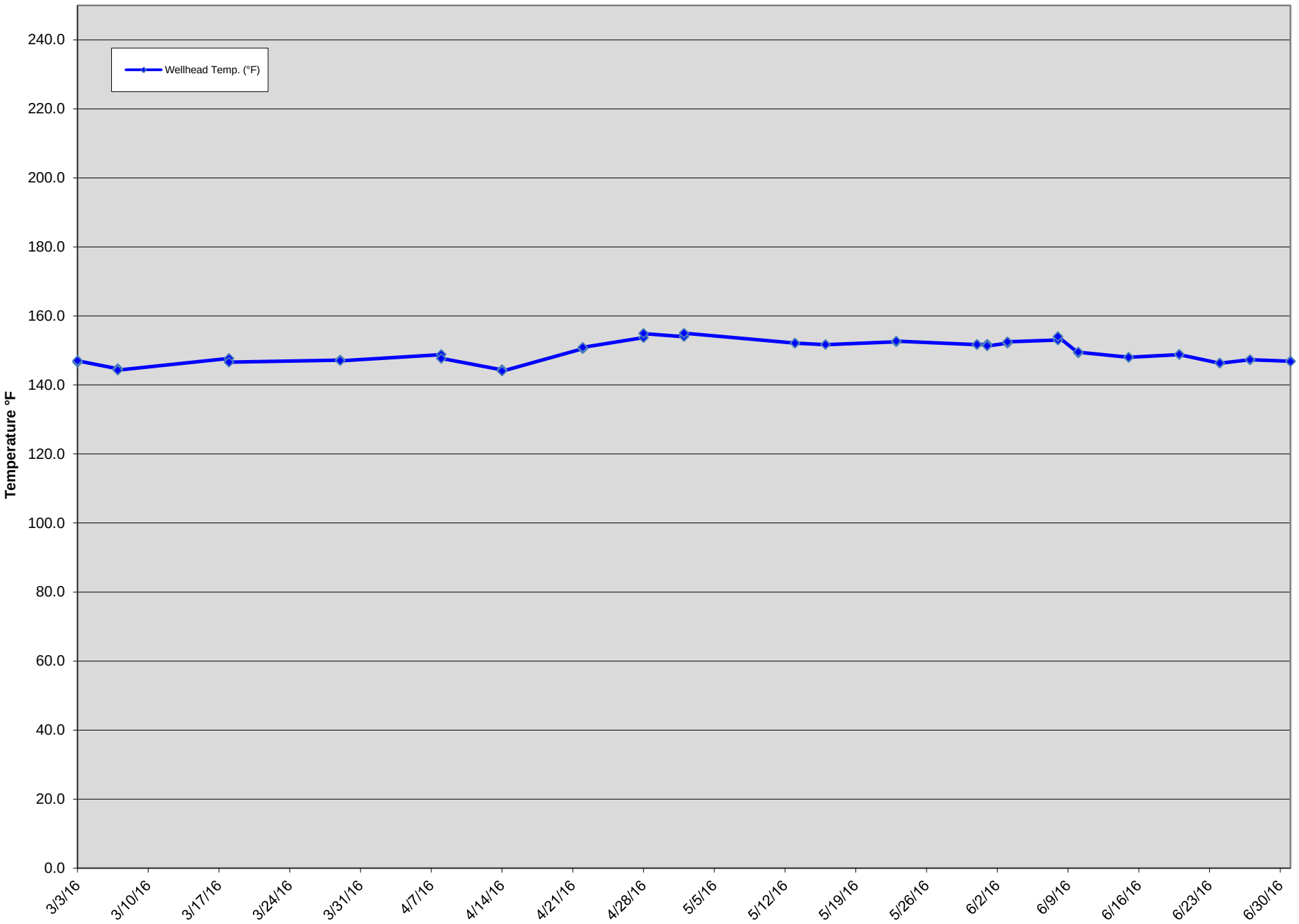
GEW-043R Wellhead Temperatures



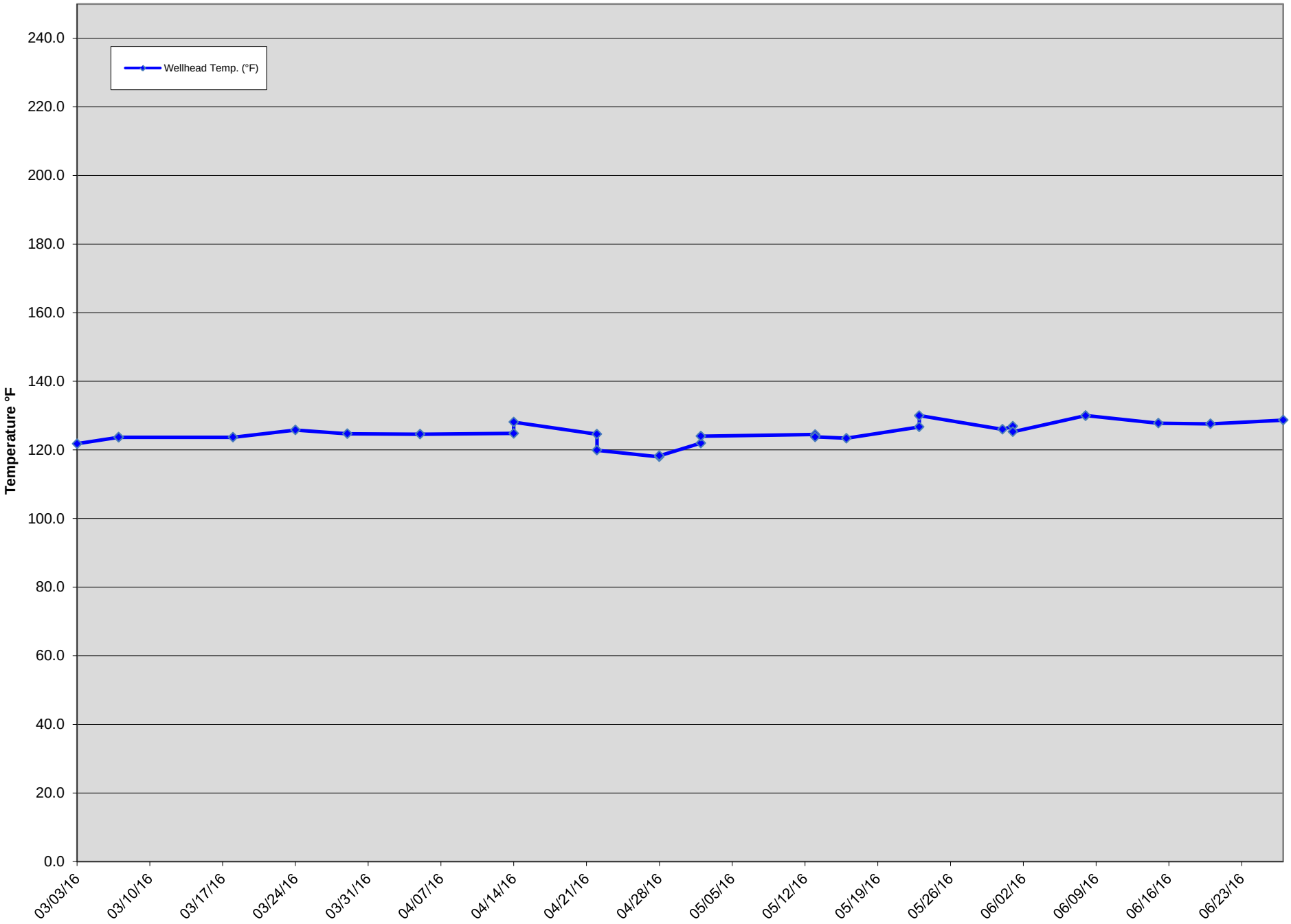
GEW-053 Wellhead Temperatures



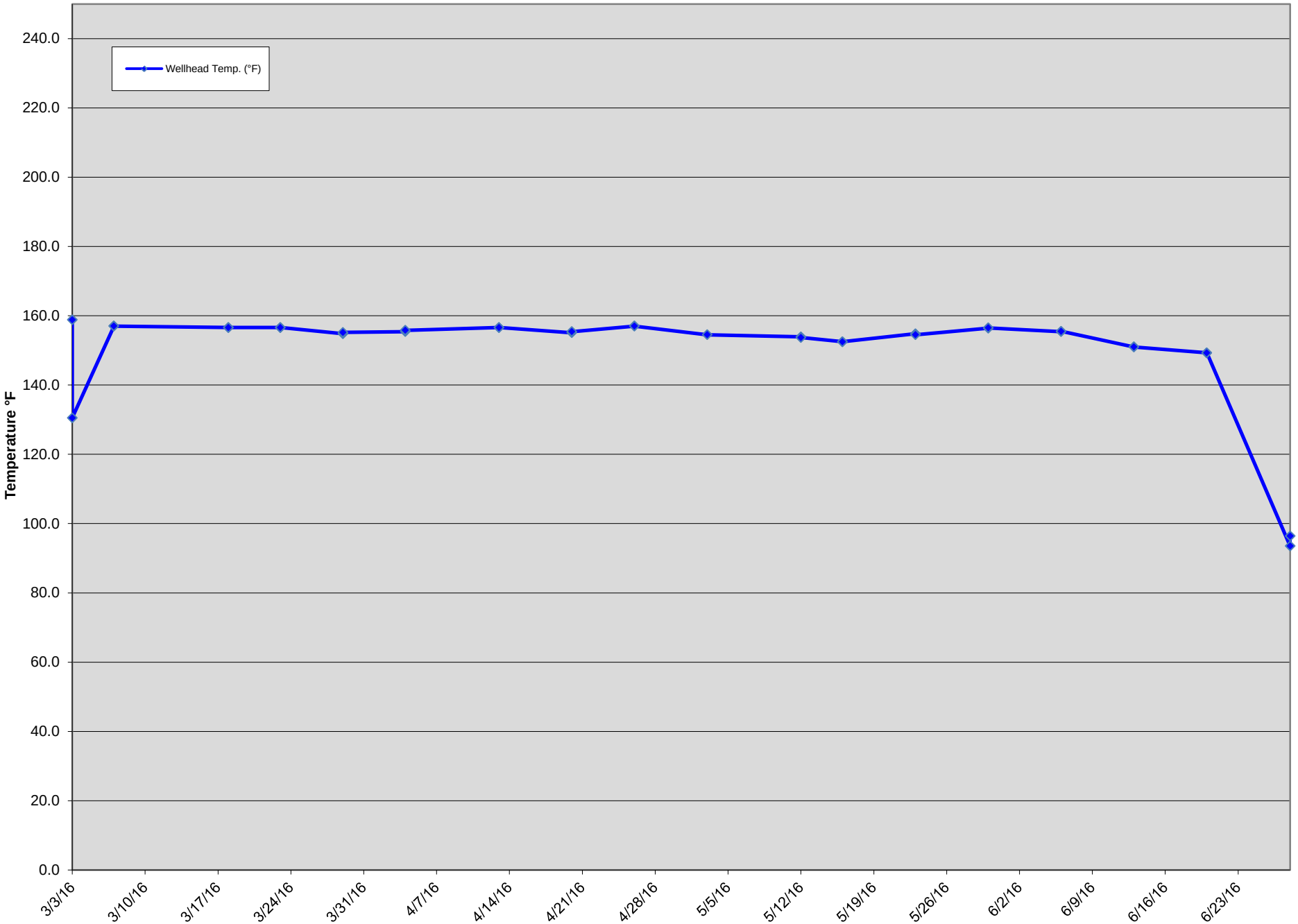
GEW-054 Wellhead Temperatures



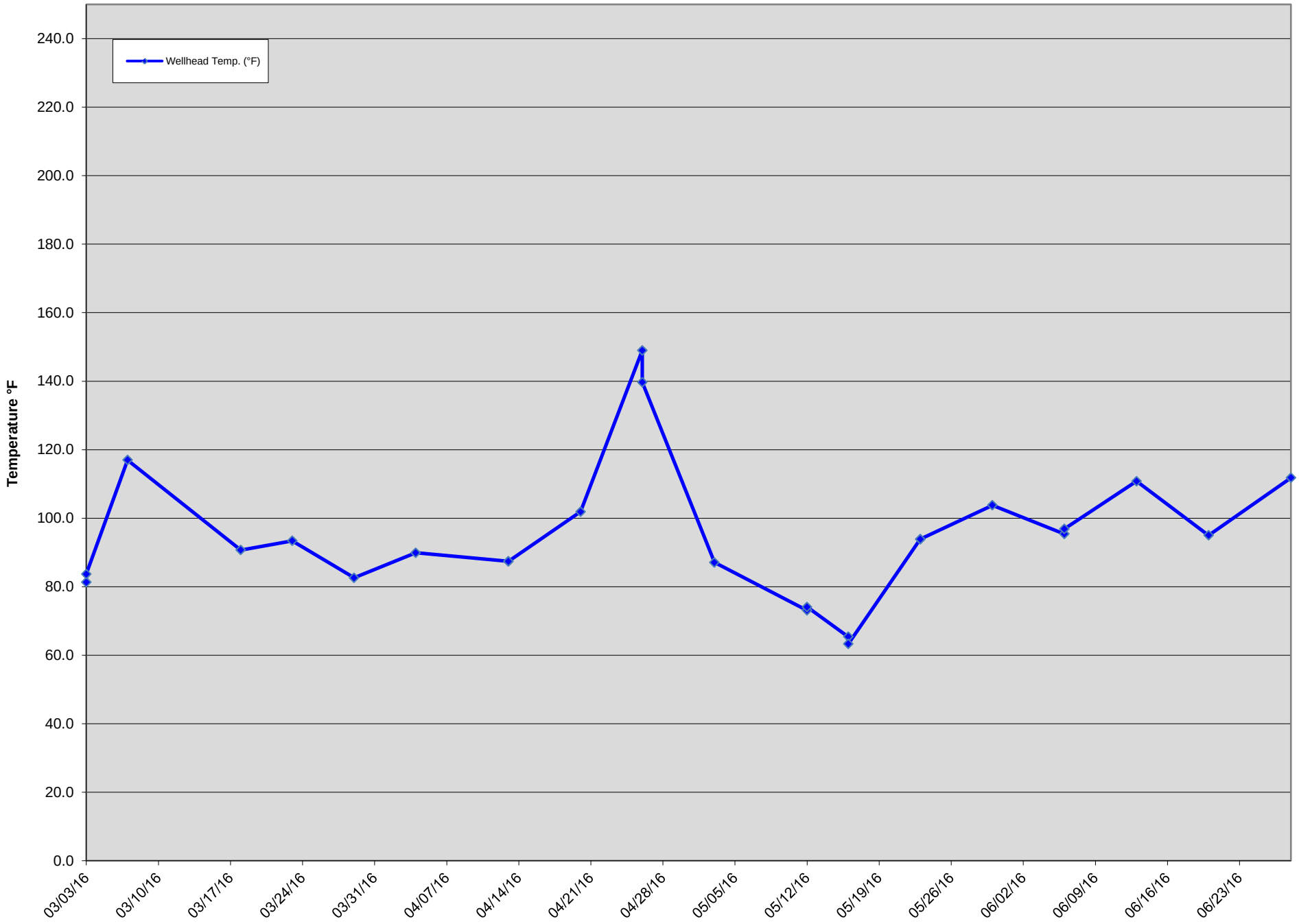
GEW-055 Wellhead Temperatures



GEW-056R Wellhead Temperatures



GEW-109 Wellhead Temperatures



GEW-110 Wellhead Temperatures