

# APPENDIX F

## Mann-Kendall Trend Analysis Summary



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## Mann-Kendall Trend Analysis Summary

December 2018



# TABLES



**Table F-1  
Monitoring Well Sulfolane Mann-Kendall Trend Analysis Summary**

**Annual 2018 Offsite Plume Monitoring Report  
Flint Hills Resources Alaska, LLC  
North Pole Terminal, North Pole, Alaska**

Well ID	Zone	Number Values	Number Detects	Percent Detected	Coefficient Of Variation	S Statistic	Confidence	Trend
MW-150A-10	Water Table	32	32	100.0	0.428	-328	100.0%	Decreasing
MW-166B-30	10-55	23	23	100.0	0.484	119	99.9%	Increasing
MW-167B-35	10-55	38	26	68.4	0.524	550	100.0%	Increasing
MW-171BR-40	10-55	2	0		All results Non-Detect			
MW-181A-15	Water Table	26	0		All results Non-Detect			
MW-181B-50	10-55	27	0		All results Non-Detect			
MW-181C-150	90-160	23	0		All results Non-Detect			
MW-185B-50	10-55	25	23	92.0	0.268	-101	99.1%	Decreasing
MW-185C-120	90-160	22	17	77.3	0.302	127	100.0%	Increasing
MW-190BR-60	10-55	19	0		All results Non-Detect			
MW-190-150	90-160	16	0		All results Non-Detect			
MW-191A-15	Water Table	22	0		All results Non-Detect			
MW-191B-60	10-55	23	2	8.7	0.085	-9	58.3%	Stable
MW-311-15	Water Table	15	0		All results Non-Detect			
MW-311-46	10-55	14	0		All results Non-Detect			
MW-314-15	Water Table	21	0		All results Non-Detect			
MW-314-150	90-160	21	0		All results Non-Detect			
MW-328-15	Water Table	20	0		All results Non-Detect			
MW-328-151	90-160	21	0		All results Non-Detect			
MW-332-41	10-55	16	0		All results Non-Detect			
MW-332-110	90-160	16	16	100.0	0.315	-99	100.0%	Decreasing
MW-332-150	90-160	23	23	100.0	0.280	-34	80.6%	Stable
MW-346-15	Water Table	14	14	100.0	0.399	44	99.2%	Increasing
MW-346-65	10-55	16	16	100.0	0.310	114	100.0%	Increasing
MW-346-150	90-160	14	4	28.6	0.159	-20	84.8%	Stable
MW-347-65	10-55	16	16	100.0	0.158	-101	100.0%	Decreasing
MW-347-150	90-160	16	16	100.0	0.298	112	100.0%	Increasing
MW-349-45	10-55	14	14	100.0	0.500	-87	100.0%	Decreasing
MW-352-40	10-55	16	16	100.0	0.186	108	100.0%	Increasing
MW-353-15	Water Table	13	13	100.0	0.247	-50	99.9%	Decreasing
MW-353-65	10-55	13	13	100.0	0.279	-69	100.0%	Decreasing
MW-353-100	55-90	13	13	100.0	0.271	-60	100.0%	Decreasing
MW-357-65	10-55	13	0		All results Non-Detect			
MW-357-150	90-160	13	0		All results Non-Detect			

**Acronyms and Abbreviations:**

ID = Identifier

**Table F-2  
Private Well Sulfolane Mann-Kendall Trend Analysis Summary**

**Annual 2018 Offsite Plume Monitoring Report  
Flint Hills Resources Alaska, LLC  
North Pole Terminal, North Pole, Alaska**

Private Well ID	Zone	POE System?	Number Values	Number Detects	Percent Detected	Coefficient Of Variation	S Statistic	Confidence	Trend
PW-0250	--	--	2	0		All results Non-Detect			
PW-0262	Subpermafrost	--	4	0		All results Non-Detect			
PW-0265	Suprapermafrost	--	6	0		All results Non-Detect			
PW-0266	Suprapermafrost	--	5	0		All results Non-Detect			
PW-0267	--	--	5	0		All results Non-Detect			
PW-0268	--	--	5	0		All results Non-Detect			
PW-0270	--	--	5	0		All results Non-Detect			
PW-0271	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0272	Subpermafrost	--	4	0		All results Non-Detect			
PW-0273	Subpermafrost	--	8	0		All results Non-Detect			
PW-0274	Subpermafrost	--	8	0		All results Non-Detect			
PW-0275	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0276	Suprapermafrost	--	7	0		All results Non-Detect			
PW-0277	Suprapermafrost	--	8	1	12.5	0.113	-5	68.3%	Stable
PW-0280	Suprapermafrost	--	7	0		All results Non-Detect			
PW-0281	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0282	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0284	Suprapermafrost	--	8	1	12.5	0.111	-3	59.4%	Stable
PW-0285	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0286	Subpermafrost	--	8	0		All results Non-Detect			
PW-0287	Subpermafrost	--	8	0		All results Non-Detect			
PW-0288	Subpermafrost	--	8	0		All results Non-Detect			
PW-0289	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0290	Subpermafrost	--	7	0		All results Non-Detect			
PW-0365	--	Yes	27	0		All results Non-Detect			
PW-0366	--	--	9	0		All results Non-Detect			
PW-0367	--	--	6	0		All results Non-Detect			
PW-0368	--	--	8	0		All results Non-Detect			
PW-0369	--	--	8	0		All results Non-Detect			
PW-0370	--	--	9	0		All results Non-Detect			
PW-0371	--	--	7	0		All results Non-Detect			
PW-0372	--	--	9	0		All results Non-Detect			
PW-0373	--	--	7	0		All results Non-Detect			
PW-0374	--	--	8	0		All results Non-Detect			
PW-0379	--	--	9	0		All results Non-Detect			
PW-0508	Suprapermafrost	--	9	0		All results Non-Detect			
PW-0512	Suprapermafrost	--	9	0		All results Non-Detect			
PW-0513	Suprapermafrost	--	9	0		All results Non-Detect			
PW-0531	--	--	8	0		All results Non-Detect			
PW-0532	--	--	6	0		All results Non-Detect			
PW-0533	--	--	6	0		All results Non-Detect			
PW-0534	--	--	6	0		All results Non-Detect			
PW-0535	--	--	6	0		All results Non-Detect			
PW-0536	--	--	6	0		All results Non-Detect			
PW-0537	--	--	6	0		All results Non-Detect			
PW-0538	Suprapermafrost	--	6	0		All results Non-Detect			
PW-0546	--	--	8	0		All results Non-Detect			
PW-0547	Suprapermafrost	--	9	1	11.1	0.190	6	69.4%	No Trend
PW-0548	Suprapermafrost	--	9	0		All results Non-Detect			
PW-0549	--	--	3	1		Insufficient data points			
PW-0555	Suprapermafrost	--	6	3	50.0	0.035	4	70.3%	No Trend
PW-0587	--	--	8	0		All results Non-Detect			
PW-0589	--	--	8	0		All results Non-Detect			
PW-0591	--	--	7	0		All results Non-Detect			
PW-0594	--	--	8	0		All results Non-Detect			
PW-0612	--	--	3	3		Insufficient data points			
PW-0623	--	--	3	3		Insufficient data points			
PW-0627	--	--	9	0		All results Non-Detect			
PW-0628	Suprapermafrost	--	9	0		All results Non-Detect			
PW-0630	--	--	9	1	11.1	0.023	-6	69.4%	Stable

**Table F-2  
Private Well Sulfolane Mann-Kendall Trend Analysis Summary**

**Annual 2018 Offsite Plume Monitoring Report  
Flint Hills Resources Alaska, LLC  
North Pole Terminal, North Pole, Alaska**

Private Well ID	Zone	POE System?	Number Values	Number Detects	Percent Detected	Coefficient Of Variation	S Statistic	Confidence	Trend
PW-0749	Suprapermafrost	--	10	0		All results Non-Detect			
PW-0750	--	--	8	0		All results Non-Detect			
PW-0751	Suprapermafrost	--	6	0		All results Non-Detect			
PW-0752	--	--	10	0		All results Non-Detect			
PW-0753	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0761	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0770	--	--	8	0		All results Non-Detect			
PW-0771	--	--	9	0		All results Non-Detect			
PW-0772	--	--	9	0		All results Non-Detect			
PW-0774	--	--	9	0		All results Non-Detect			
PW-0775	Suprapermafrost	--	9	0		All results Non-Detect			
PW-0776	Suprapermafrost	--	9	0		All results Non-Detect			
PW-0777	--	--	8	0		All results Non-Detect			
PW-0863	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0864	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0866	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0868	Suprapermafrost	--	6	0		All results Non-Detect			
PW-0869	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0870	Suprapermafrost	--	9	0		All results Non-Detect			
PW-0871	Suprapermafrost	--	9	3	33.3	0.051	18	96.2%	Increasing
PW-0872	--	--	9	1	11.1	0.021	6	69.4%	No Trend
PW-0905	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0907	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0908	Suprapermafrost	--	8	0		All results Non-Detect			
PW-0909	Suprapermafrost	--	9	0		All results Non-Detect			
PW-0910	Suprapermafrost	--	9	0		All results Non-Detect			
PW-0911	Suprapermafrost	--	9	0		All results Non-Detect			
PW-0972	Subpermafrost	--	18	0		All results Non-Detect			
PW-0973	Suprapermafrost	--	9	0		All results Non-Detect			
PW-0974	Suprapermafrost	--	9	0		All results Non-Detect			
PW-0976	Suprapermafrost	--	9	0		All results Non-Detect			
PW-0977	--	--	9	0		All results Non-Detect			
PW-0978	Subpermafrost	--	9	0		All results Non-Detect			
PW-0979	--	--	9	0		All results Non-Detect			
PW-0998	--	--	9	0		All results Non-Detect			
PW-1087	--	--	9	0		All results Non-Detect			
PW-1088	Suprapermafrost	--	8	0		All results Non-Detect			
PW-1093	Subpermafrost	--	8	0		All results Non-Detect			
PW-1185	--	--	9	0		All results Non-Detect			
PW-1230	Subpermafrost	--	20	20	100.0	0.158	124	100.0%	Increasing
PW-1333	--	--	9	0		All results Non-Detect			
PW-1433	--	--	3	3		Insufficient data points			
PW-1450	--	--	6	0		All results Non-Detect			
PW-1454	--	--	6	0		All results Non-Detect			
PW-1473	Suprapermafrost	--	6	0		All results Non-Detect			
PW-1608	Suprapermafrost	--	5	0		All results Non-Detect			
PW-1921	--	--	2	0		All results Non-Detect			
PW-1930	--	--	6	0		All results Non-Detect			
PW-2219	Suprapermafrost	Yes	13	13	100.0	0.299	22	89.8%	No Trend
PW-2233	--	--	2	0		All results Non-Detect			
PW-2234	--	--	2	0		All results Non-Detect			
PW-2237	Suprapermafrost	--	1	0		All results Non-Detect			

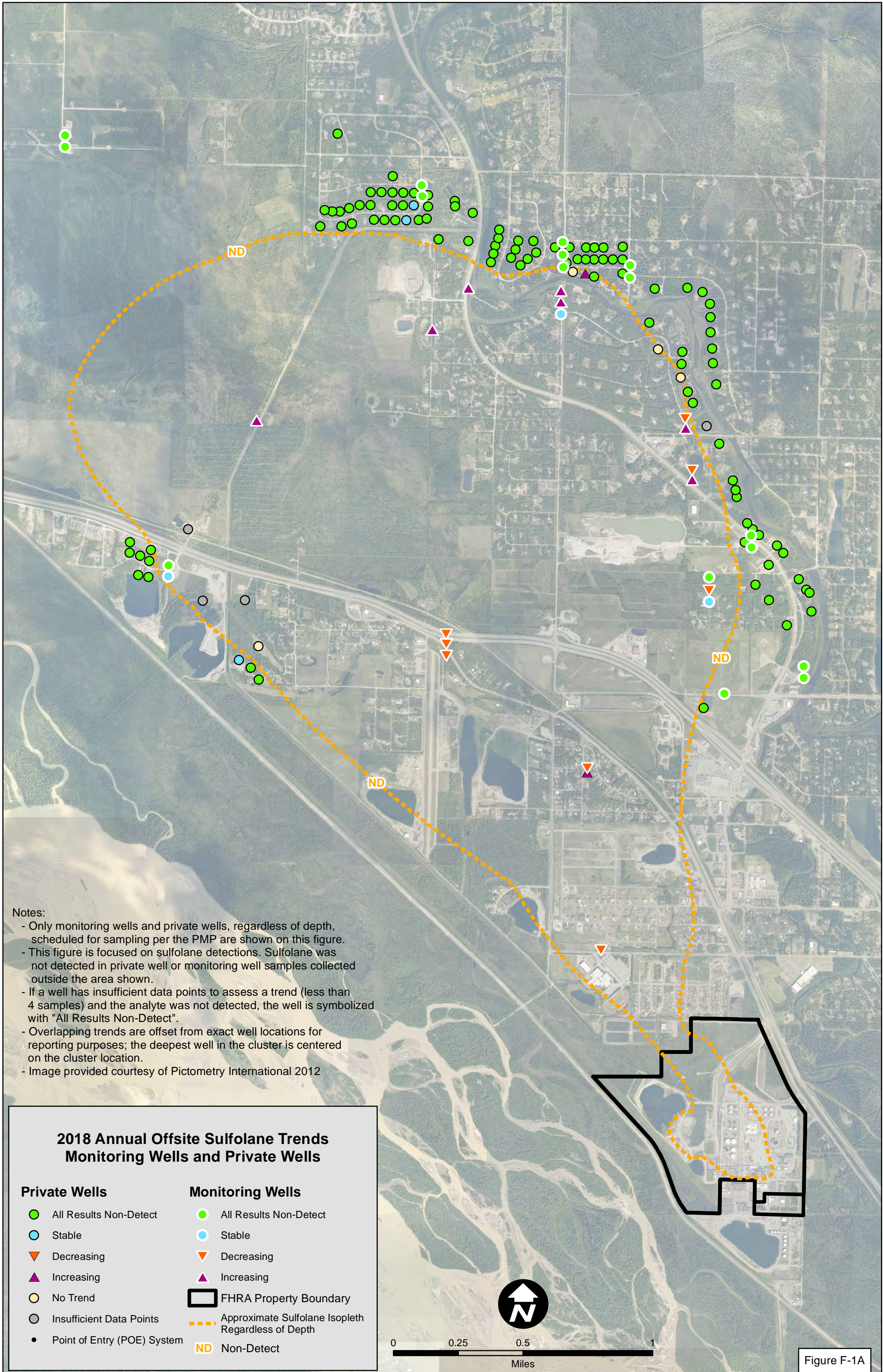
**Acronyms and Abbreviations:**

ID = Identifier  
POE = Point of entry  
PW = Private well

# FIGURES







- Notes:
- Only monitoring wells and private wells, regardless of depth, scheduled for sampling per the PMP are shown on this figure.
  - This figure is focused on sulfolane detections. Sulfolane was not detected in private well or monitoring well samples collected outside the area shown.
  - If a well has insufficient data points to assess a trend (less than 4 samples) and the analyte was not detected, the well is symbolized with "All Results Non-Detect".
  - Overlapping trends are offset from exact well locations for reporting purposes; the deepest well in the cluster is centered on the cluster location.
  - Image provided courtesy of Pictometry International 2012

### 2018 Annual Offsite Sulfolane Trends Monitoring Wells and Private Wells

#### Private Wells

- All Results Non-Detect
- Stable
- ▼ Decreasing
- ▲ Increasing
- No Trend
- Insufficient Data Points
- Point of Entry (POE) System

#### Monitoring Wells

- All Results Non-Detect
- Stable
- ▼ Decreasing
- ▲ Increasing
- ▭ FHRA Property Boundary
- - - - - Approximate Sulfolane Isopleth Regardless of Depth
- ND Non-Detect

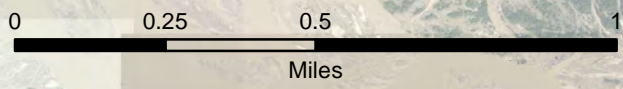
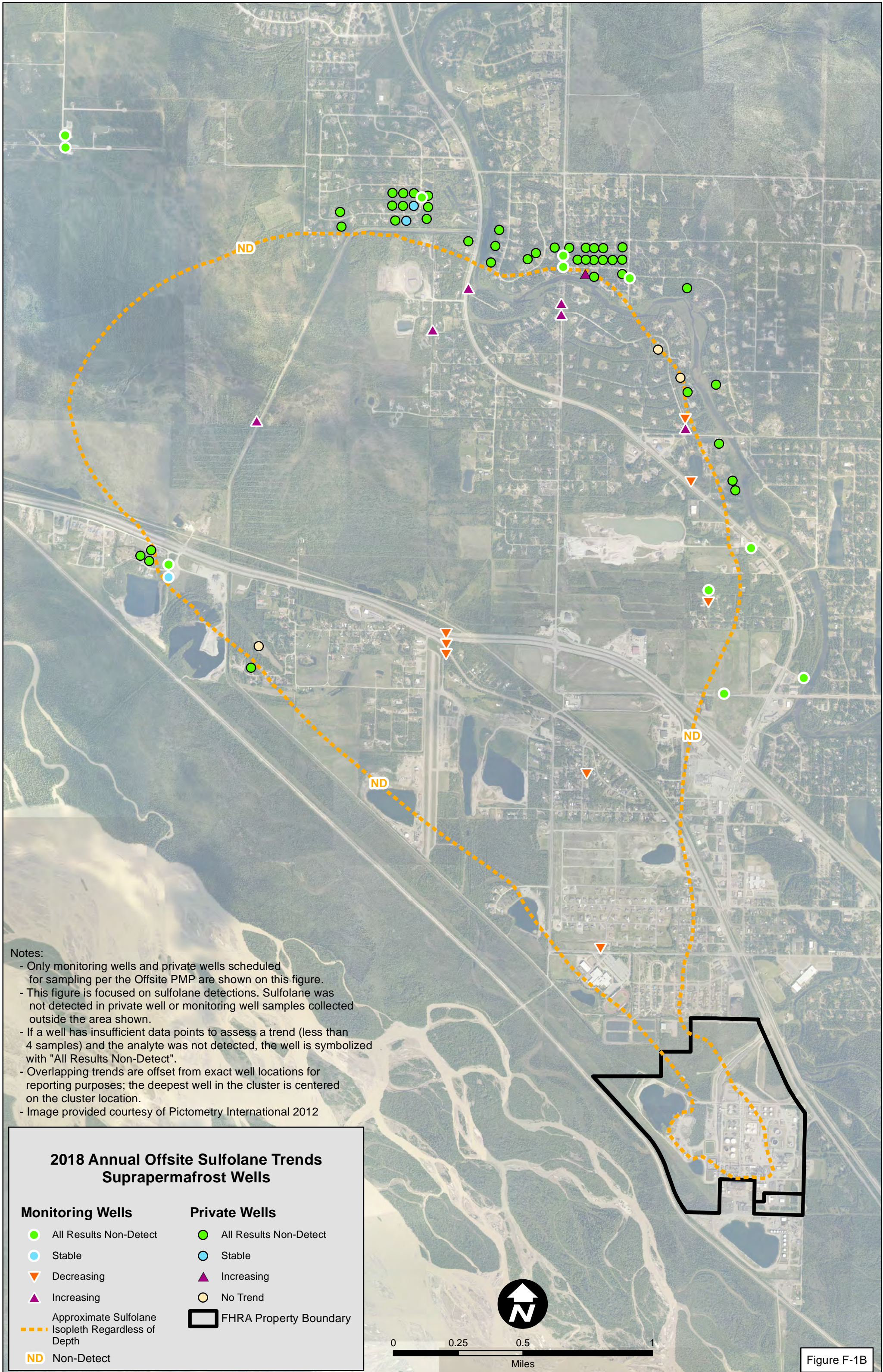


Figure F-1A





Notes:

- Only monitoring wells and private wells scheduled for sampling per the Offsite PMP are shown on this figure.
- This figure is focused on sulfolane detections. Sulfolane was not detected in private well or monitoring well samples collected outside the area shown.
- If a well has insufficient data points to assess a trend (less than 4 samples) and the analyte was not detected, the well is symbolized with "All Results Non-Detect".
- Overlapping trends are offset from exact well locations for reporting purposes; the deepest well in the cluster is centered on the cluster location.
- Image provided courtesy of Pictometry International 2012

### 2018 Annual Offsite Sulfolane Trends Suprapermafrost Wells

#### Monitoring Wells

- All Results Non-Detect
- Stable
- ▼ Decreasing
- ▲ Increasing
- - - Approximate Sulfolane Isopleth Regardless of Depth
- ND Non-Detect

#### Private Wells

- All Results Non-Detect
- Stable
- ▲ Increasing
- No Trend
- FHRA Property Boundary

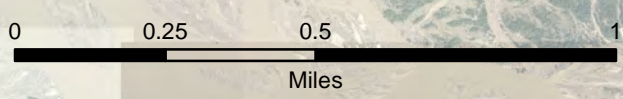


Figure F-1B





- Notes:
- Only monitoring wells and private wells scheduled for sampling per the Offsite PMP are shown on this figure.
  - Monitoring wells shown on this figure were installed as suprapermafrost wells. However, these wells are located in the inferred mixing zone of the sub- and suprapermafrost aquifers and appear to be representative of subpermafrost aquifer conditions.
  - This figure is focused on sulfolane detections. Sulfolane was not detected in private well samples collected outside the area shown.
  - If a well has insufficient data points to assess a trend (less than 4 samples) and the analyte was not detected, the well is symbolized with "All Results Non-Detect".
  - Image provided courtesy of Pictometry International 2012

### 2018 Annual Offsite Sulfolane Trends Subpermafrost Wells

#### Monitoring Wells

- All Results Non-Detect
- Stable
- ▲ Increasing
- Approximate Sulfolane Isopleth
- ND Non-Detect

#### Private Wells

- All Results Non-Detect
- ▲ Increasing
- FHRA Property Boundary
- 0000 Private-Well ID
- MW-000 Monitoring-Well ID

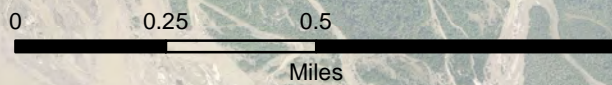


Figure F-1C



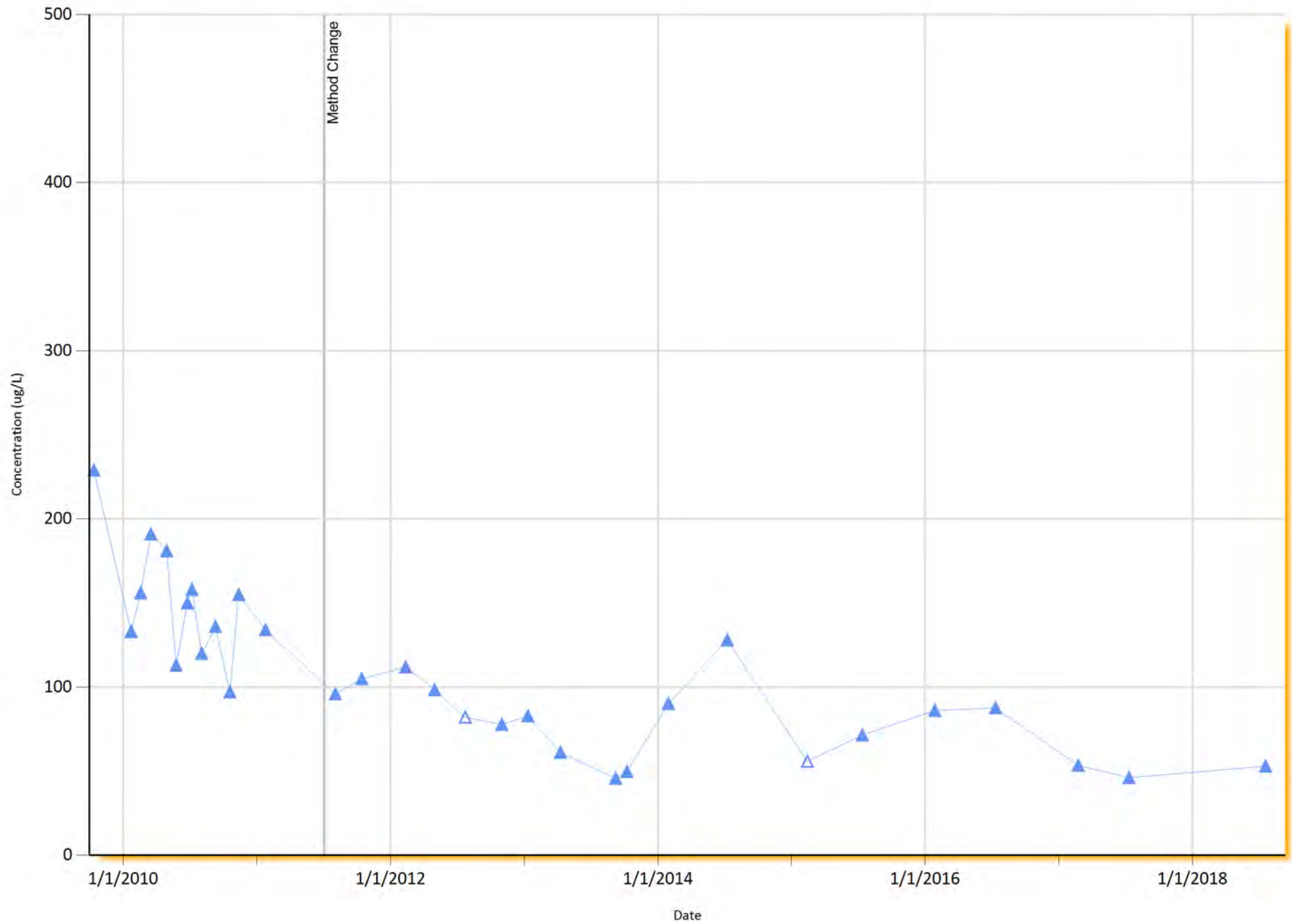
# ATTACHMENT





# FHRA Historical Analytical Data Chart

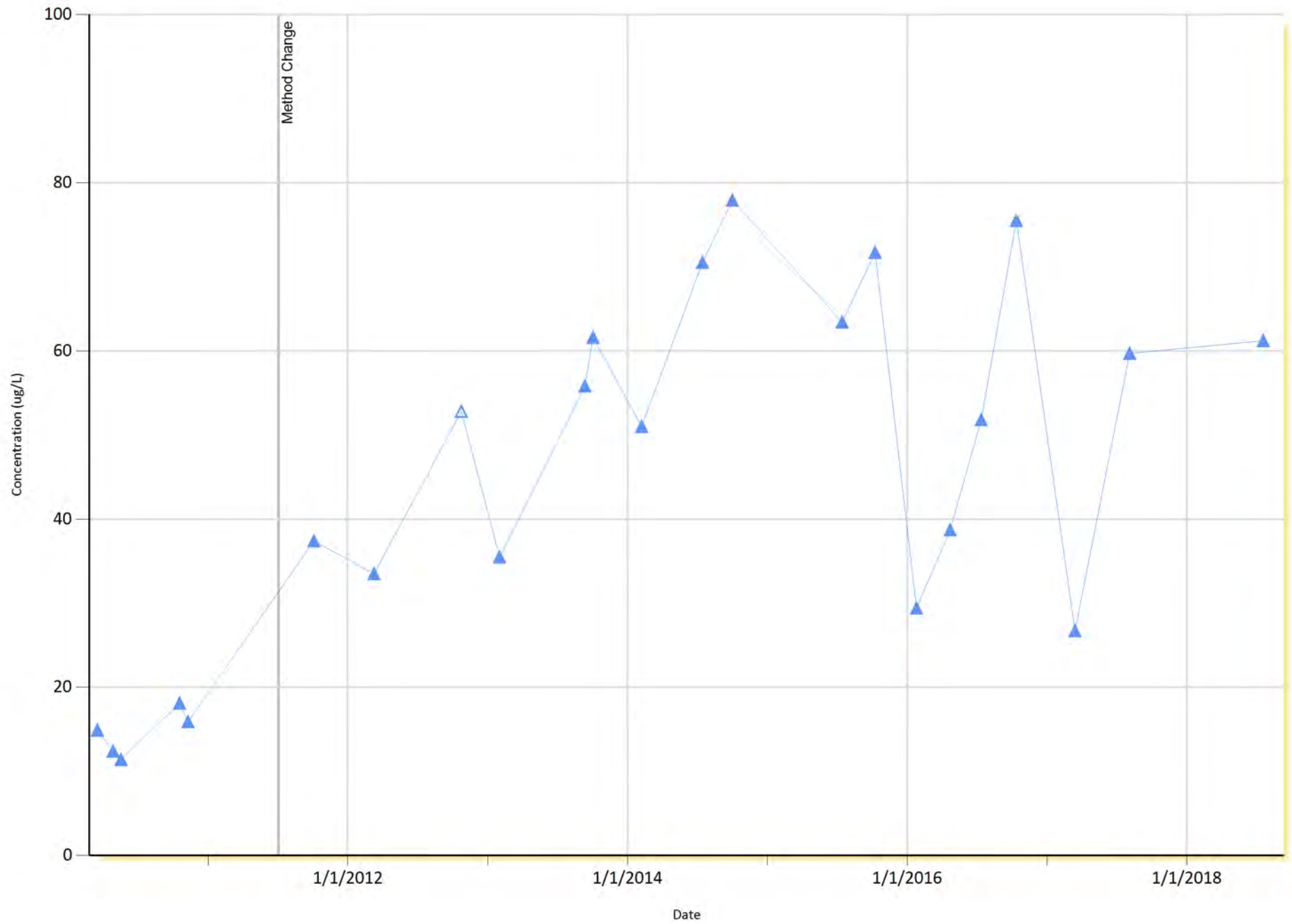
MW-150A-10, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

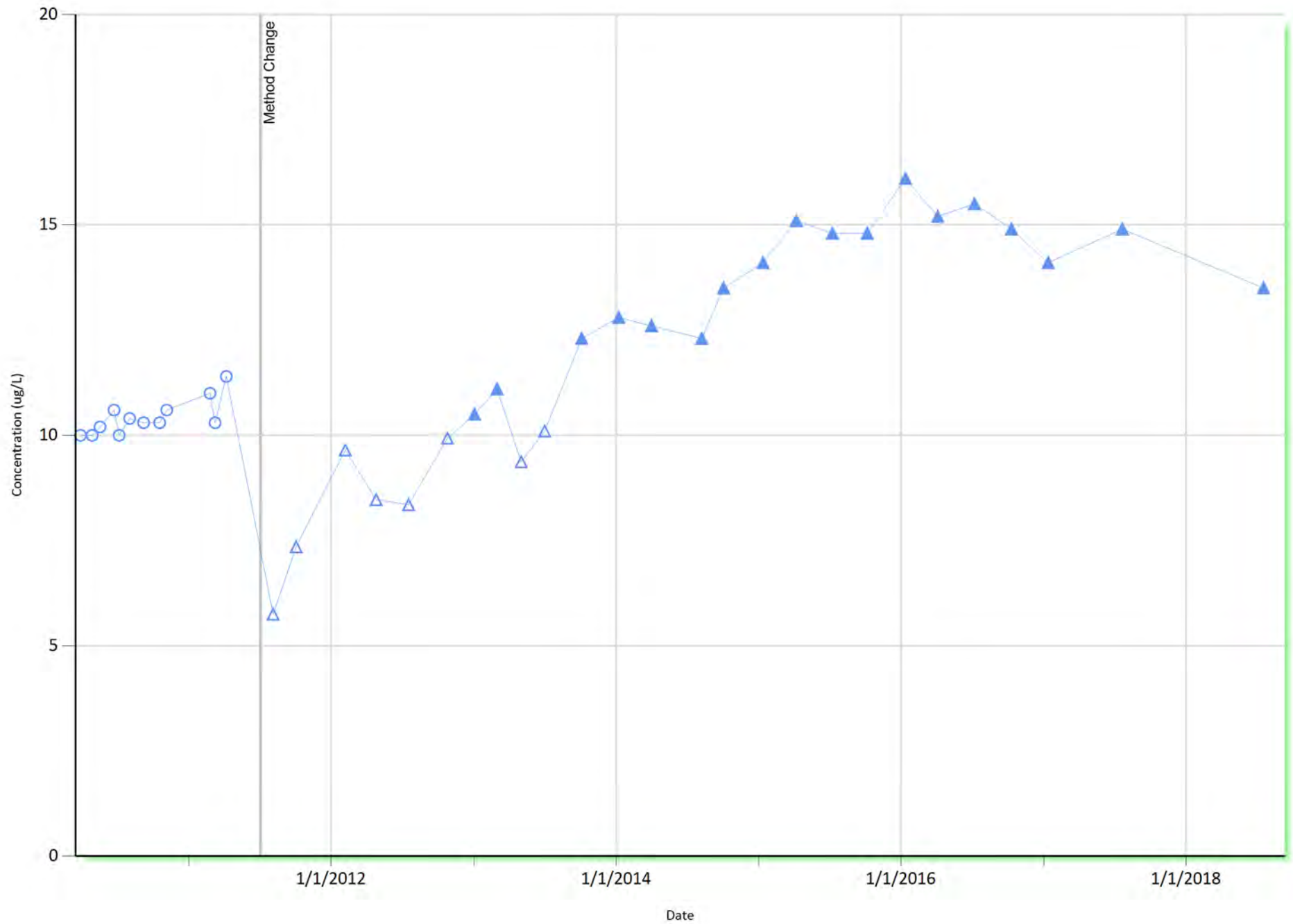
MW-166B-30, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

MW-167B-35, Off-site, Sulfolane

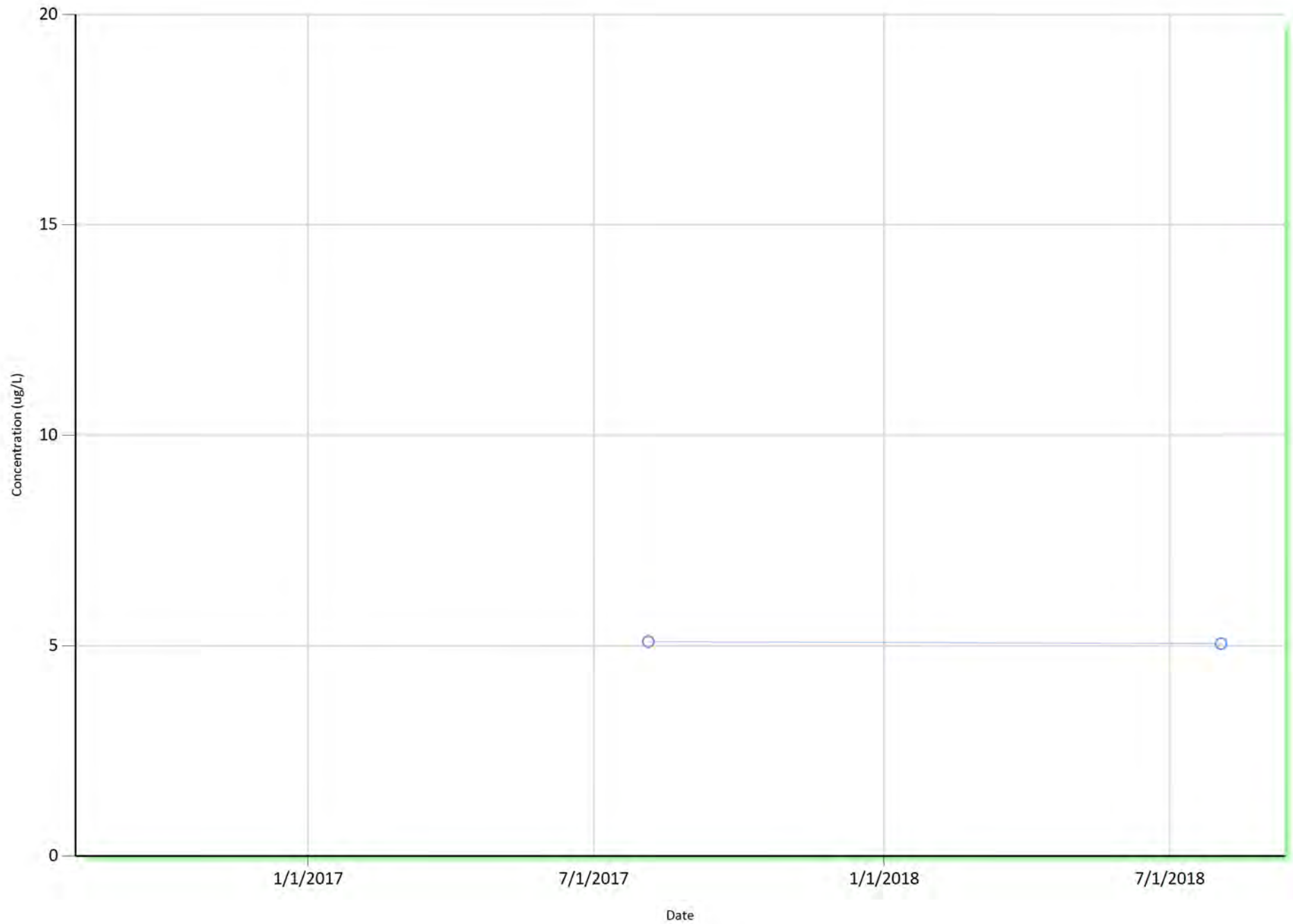


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



## FHRA Historical Analytical Data Chart

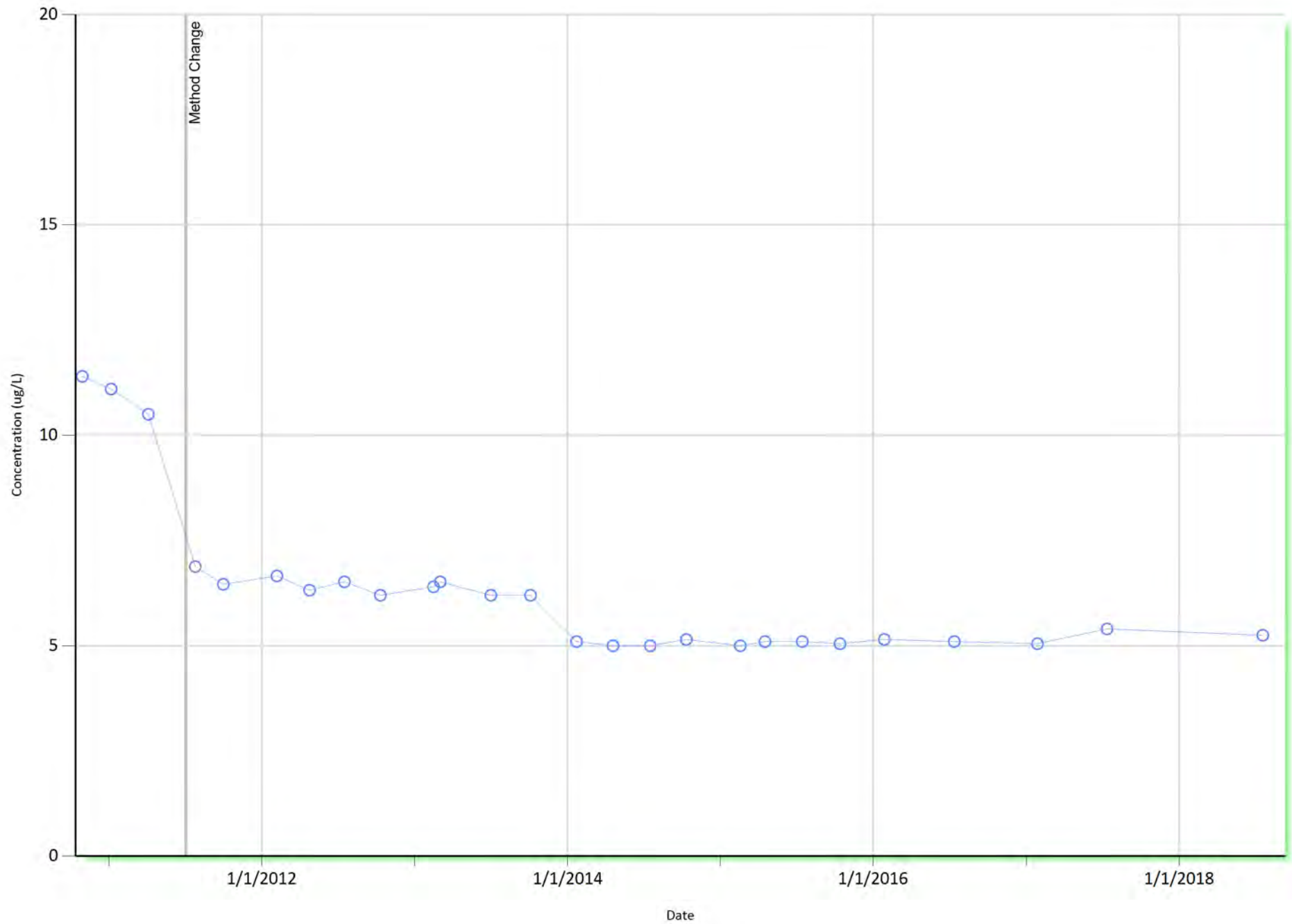
MW-171BR-40, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

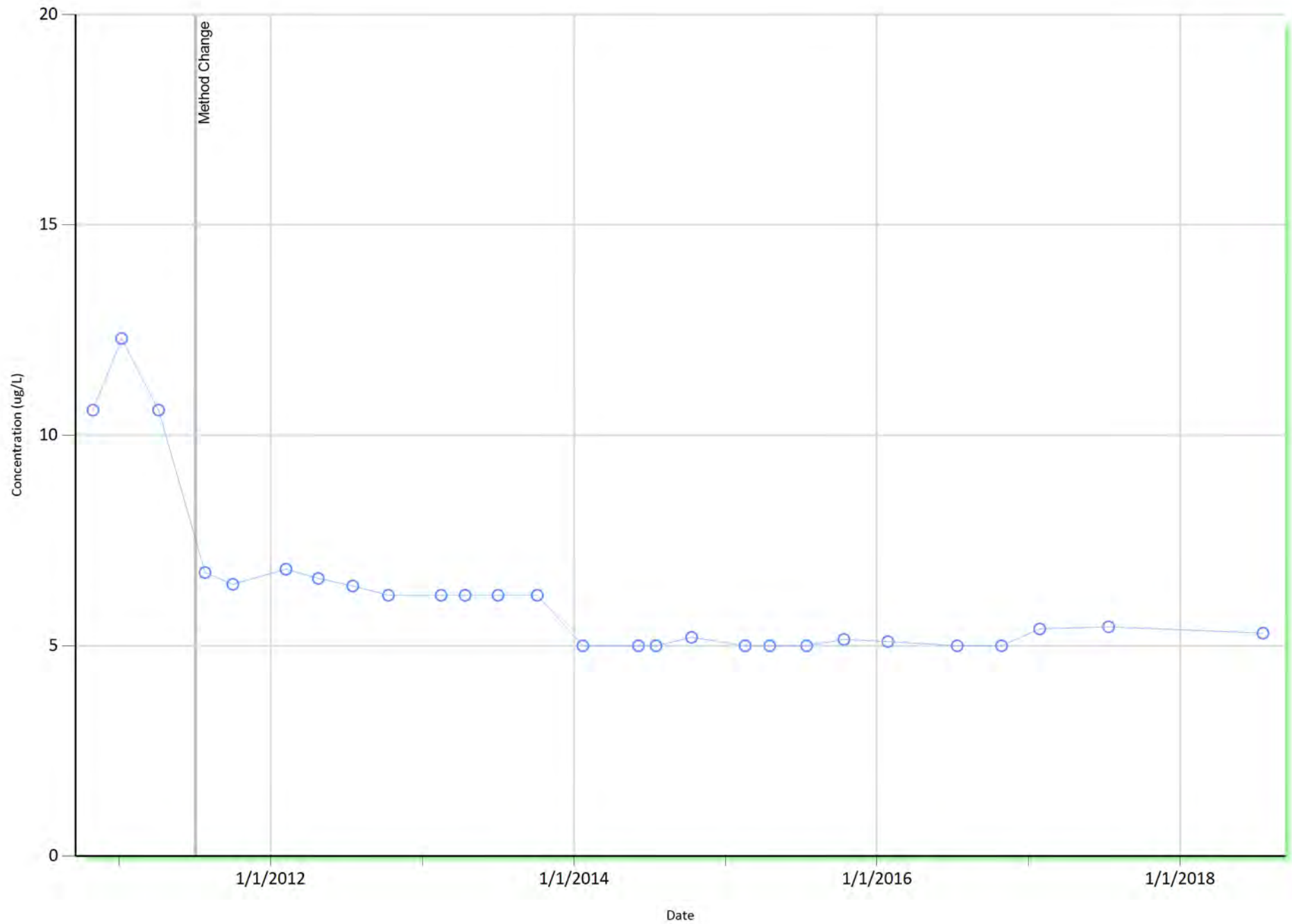
MW-181A-15, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

MW-181B-50, Off-site, Sulfolane

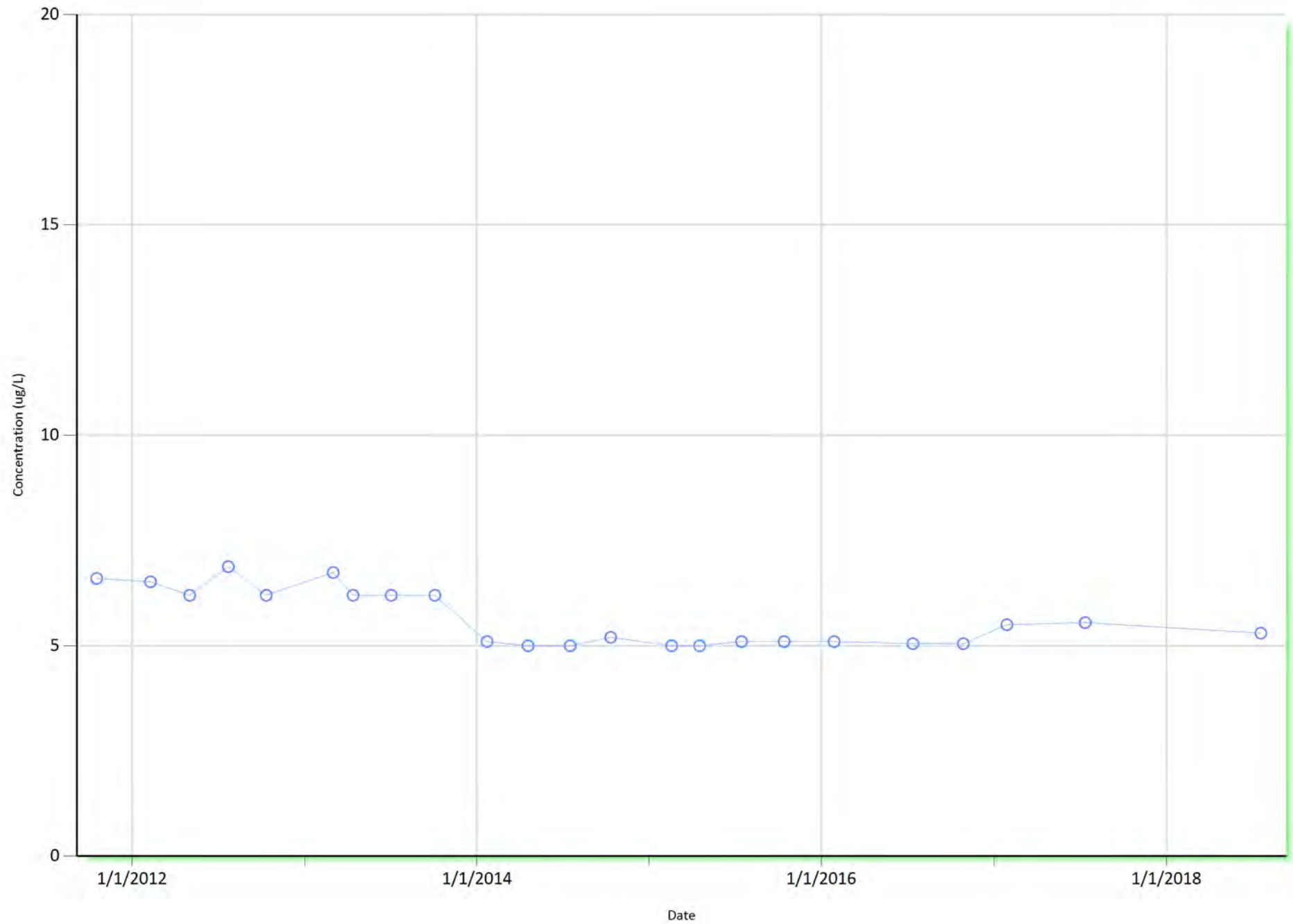


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

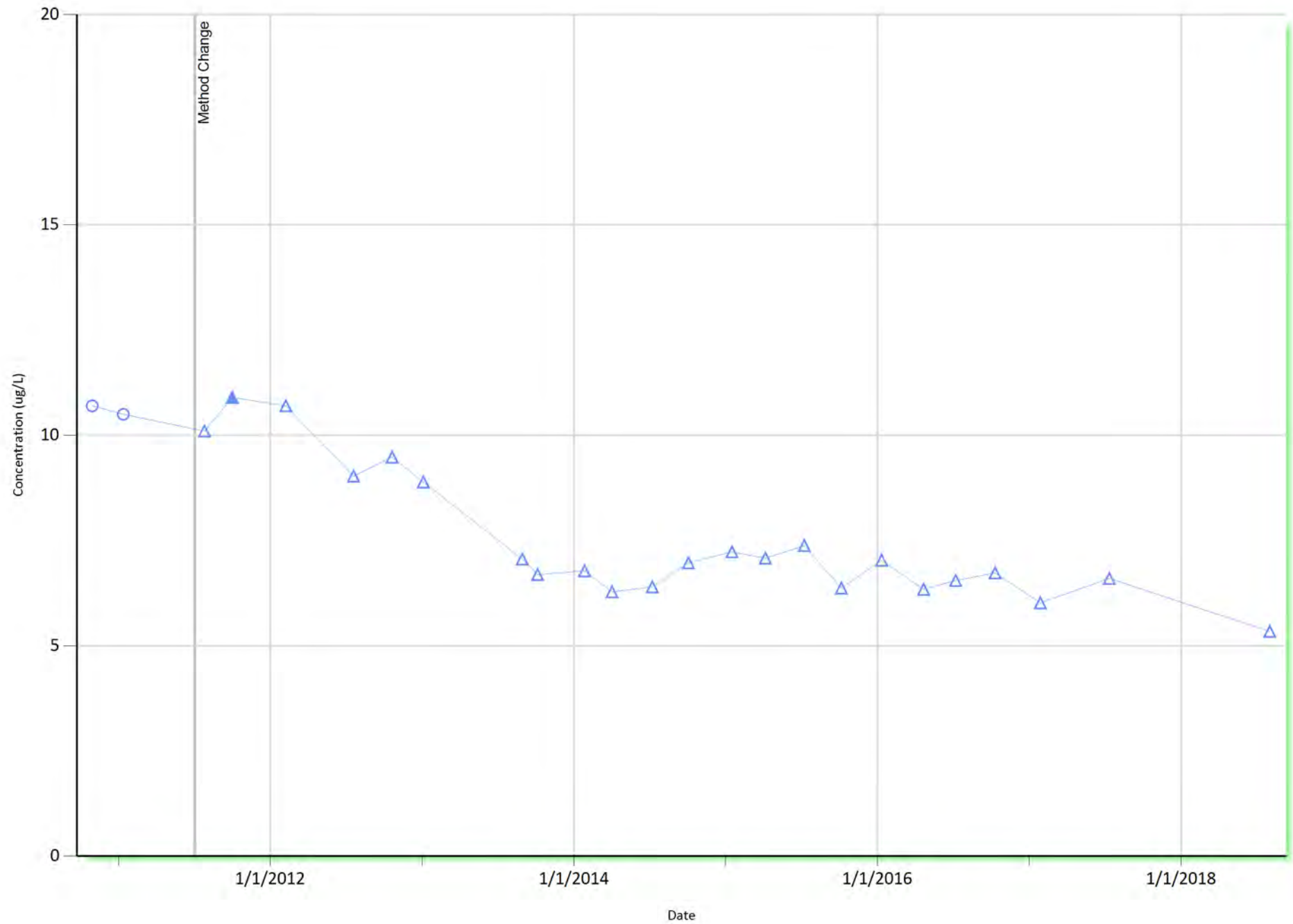
MW-181C-150, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

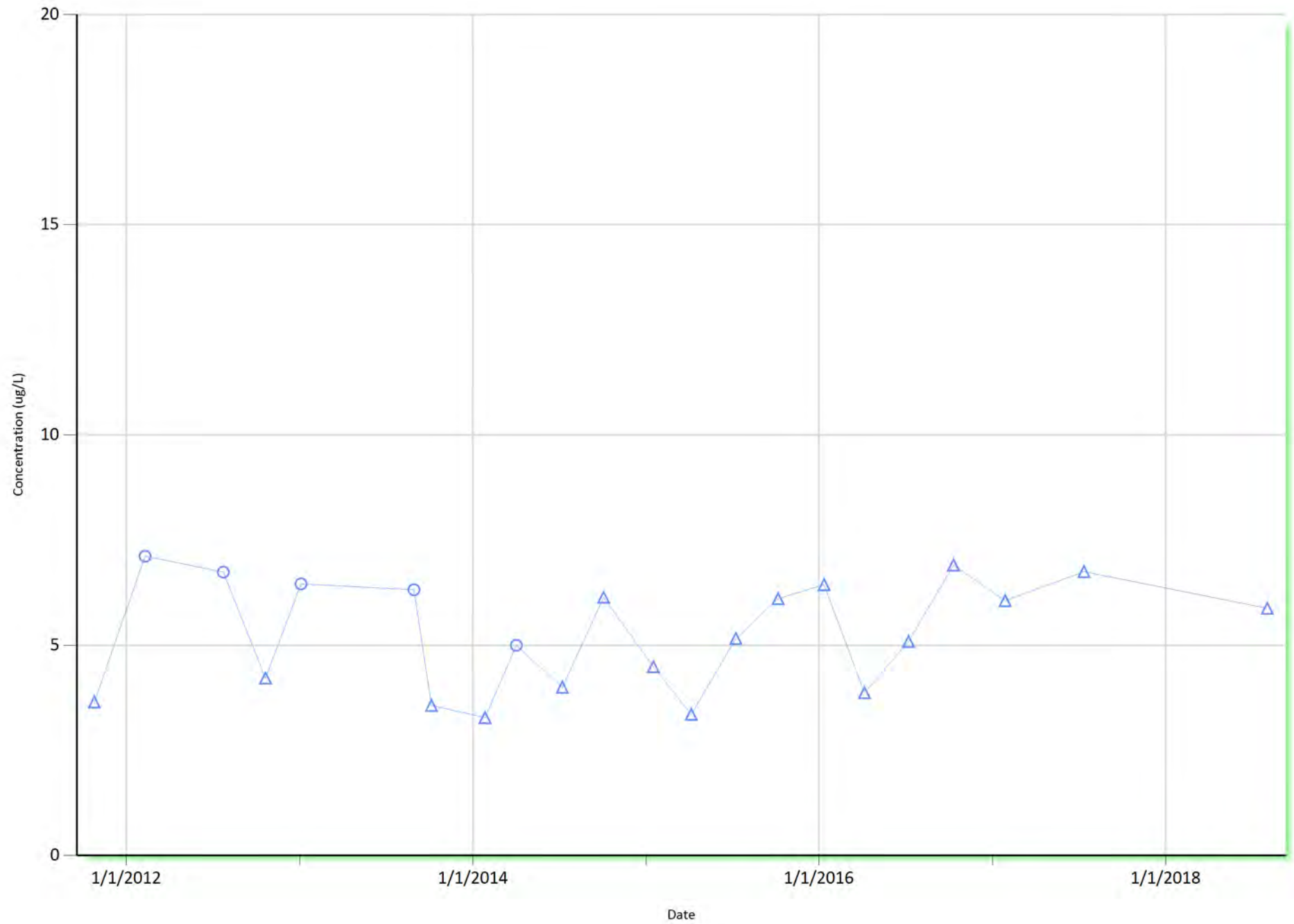
MW-185B-50, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

MW-185C-120, Off-site, Sulfolane

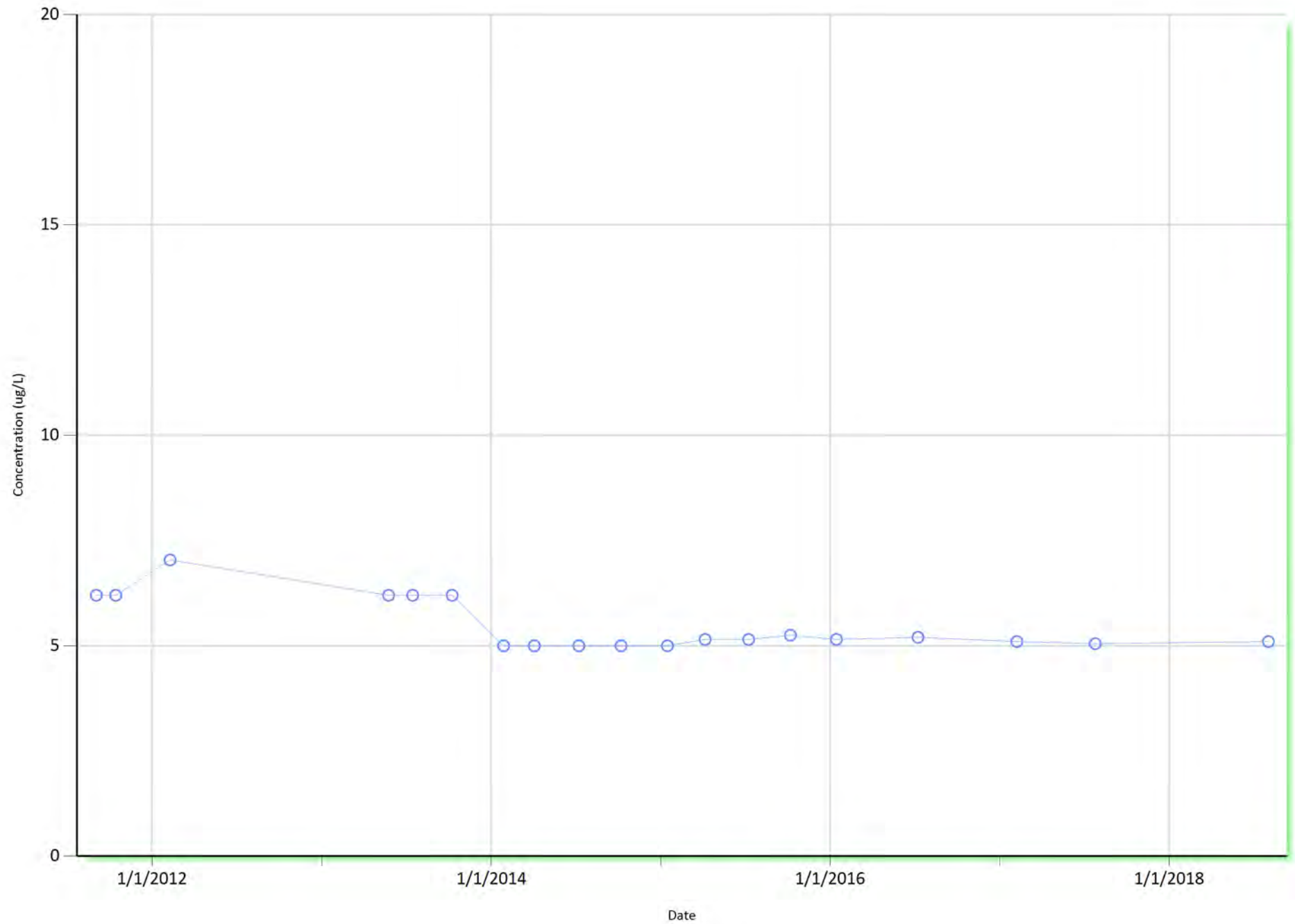


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

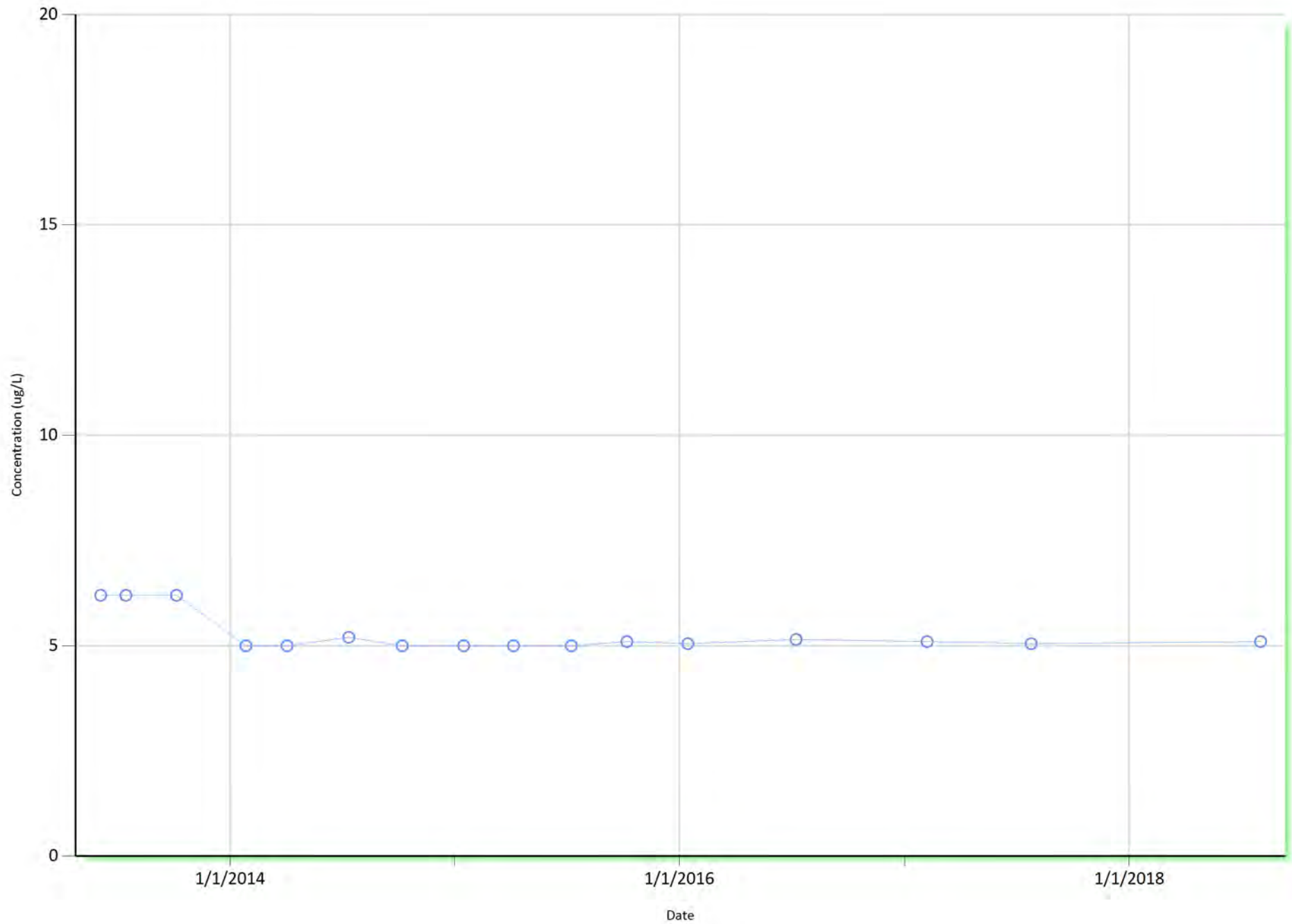
MW-190BR-60, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

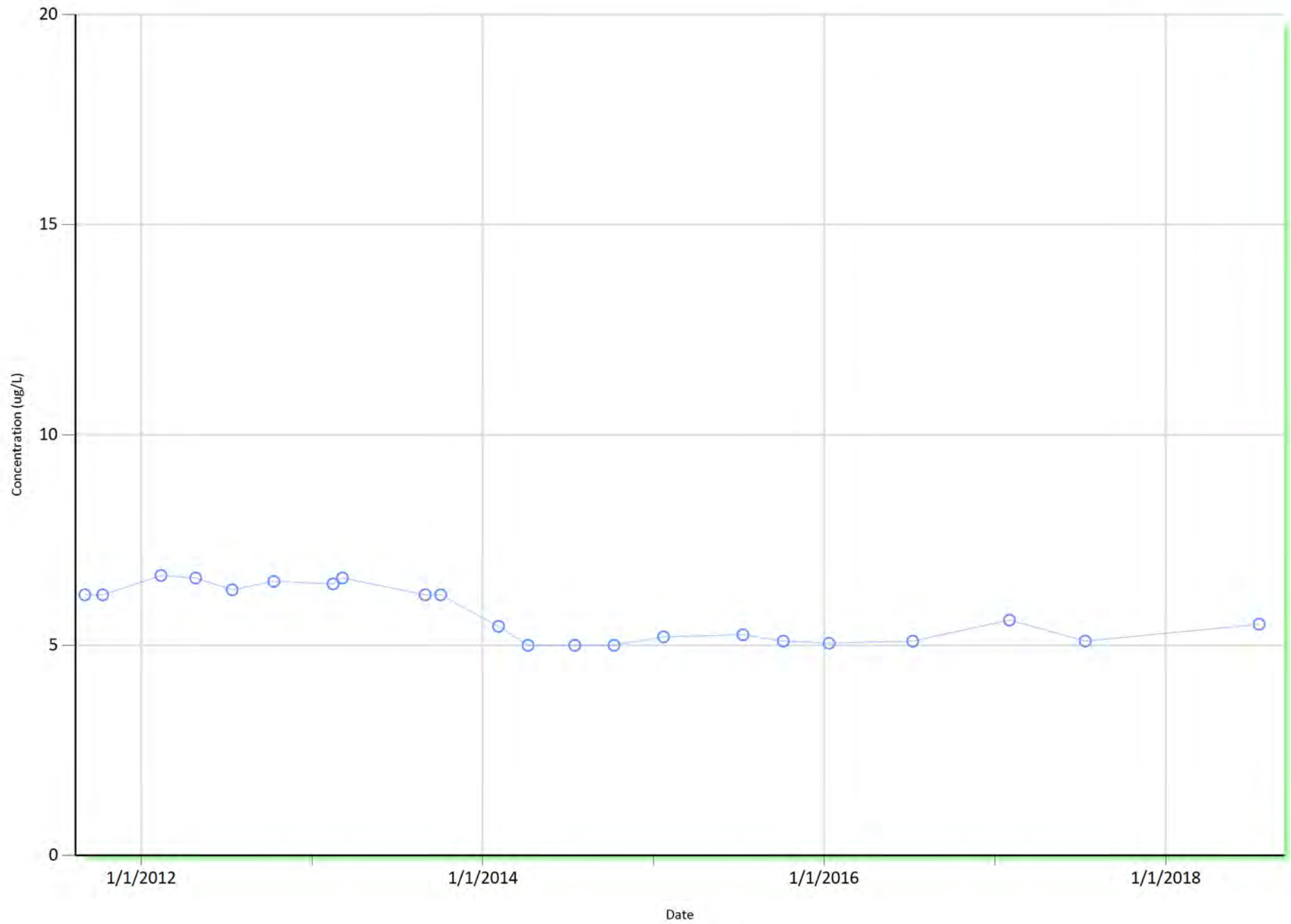
MW-190-150, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

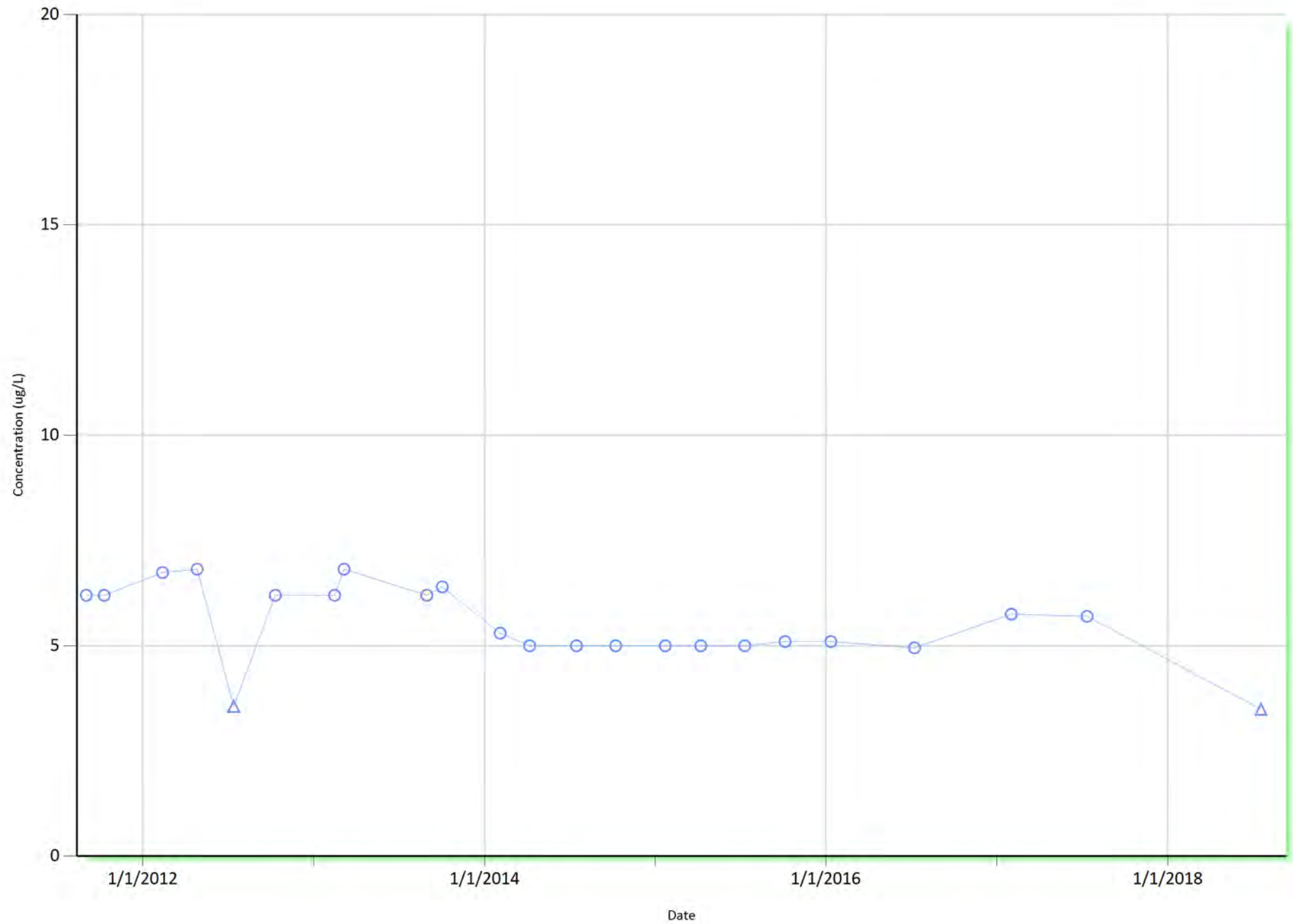
MW-191A-15, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

MW-191B-60, Off-site, Sulfolane

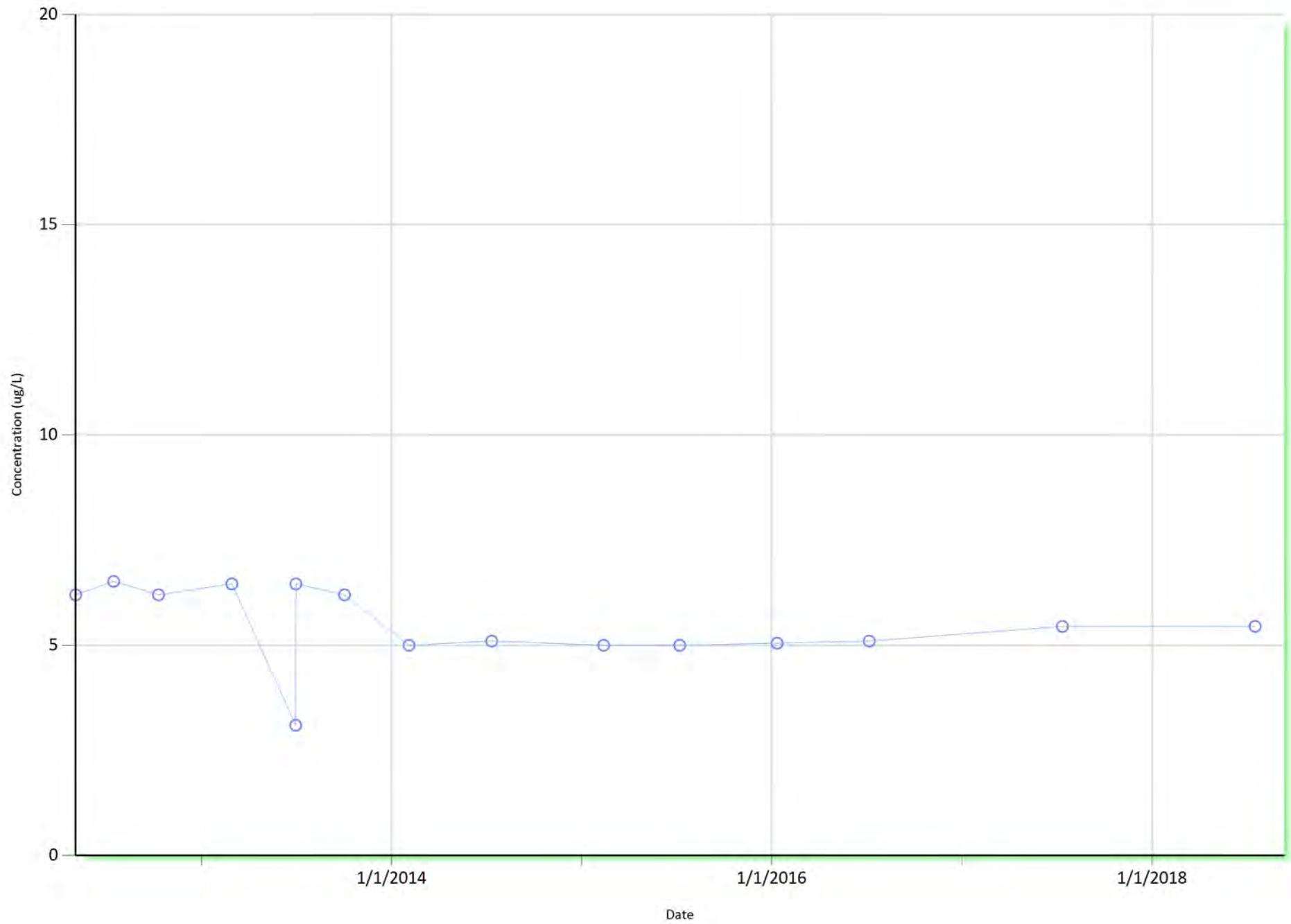


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

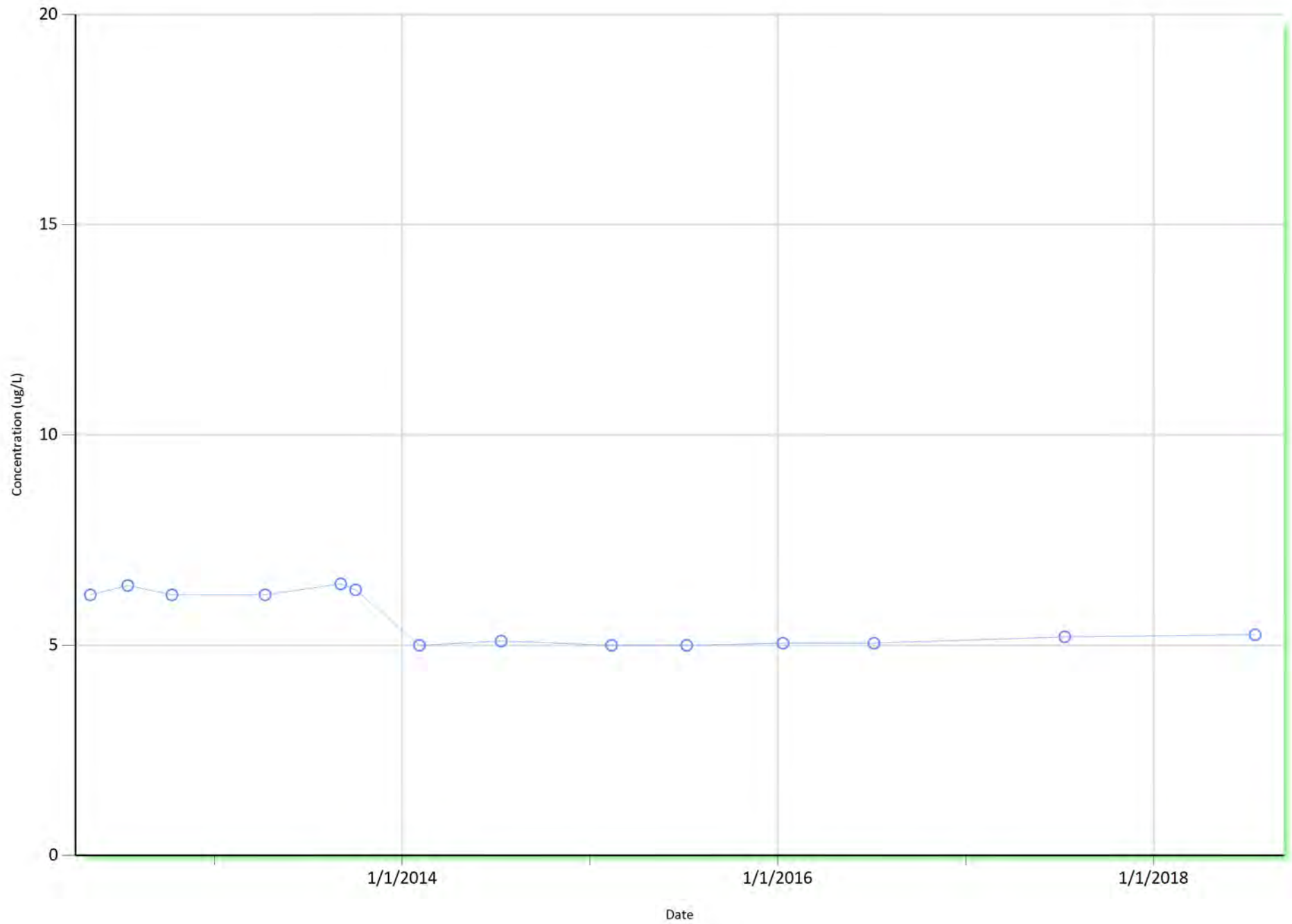
MW-311-15, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

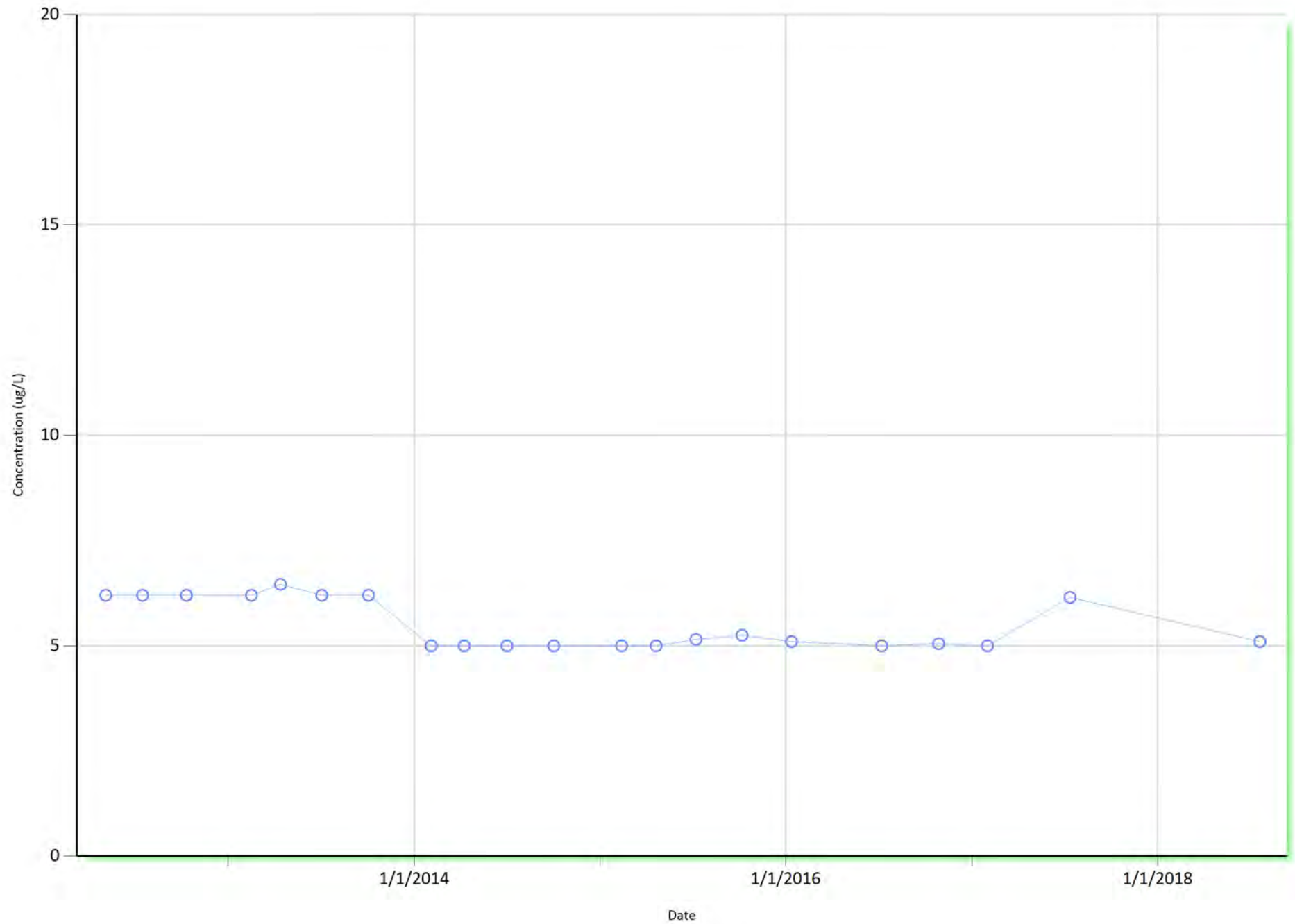
MW-311-46, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

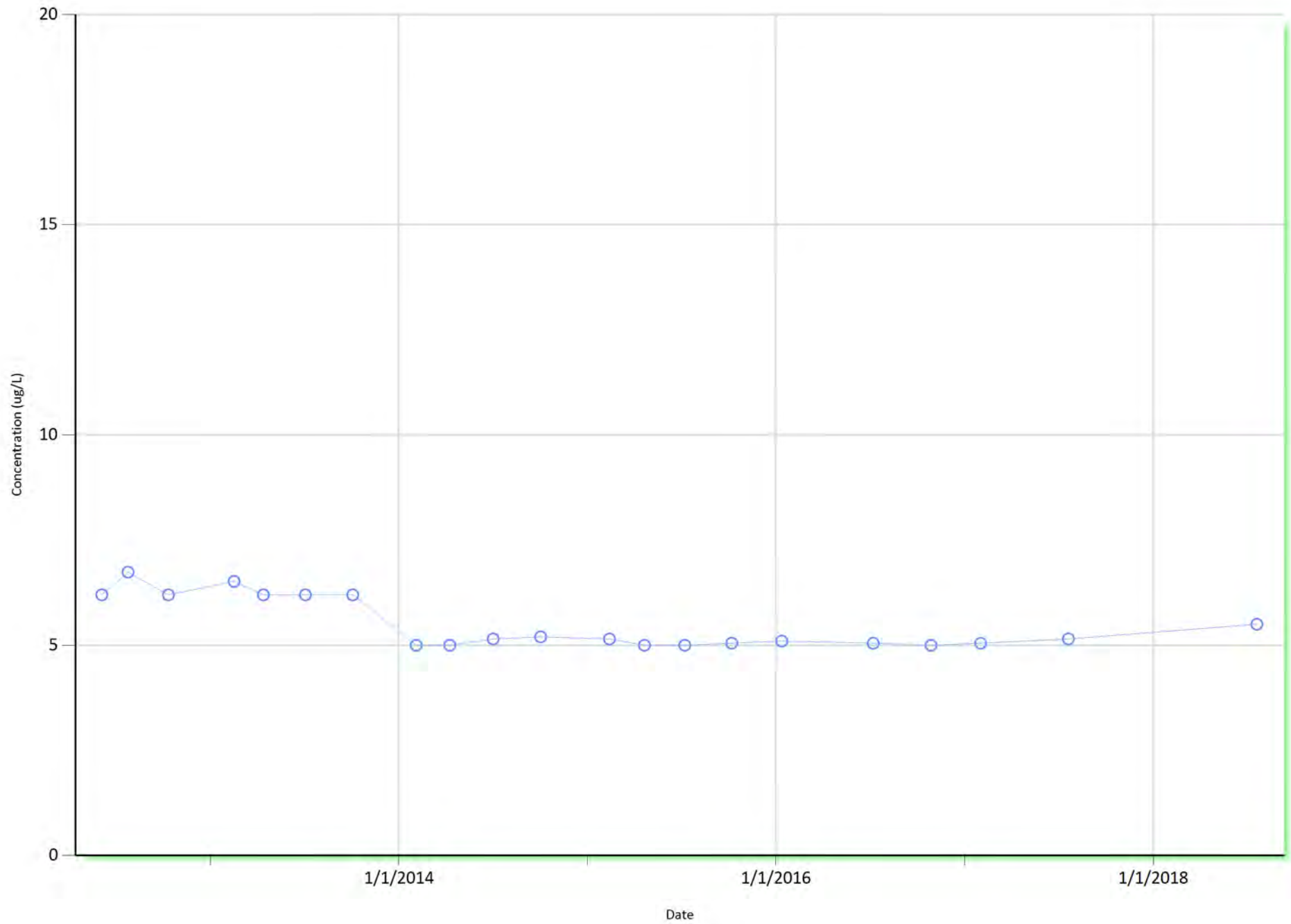
MW-314-15, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

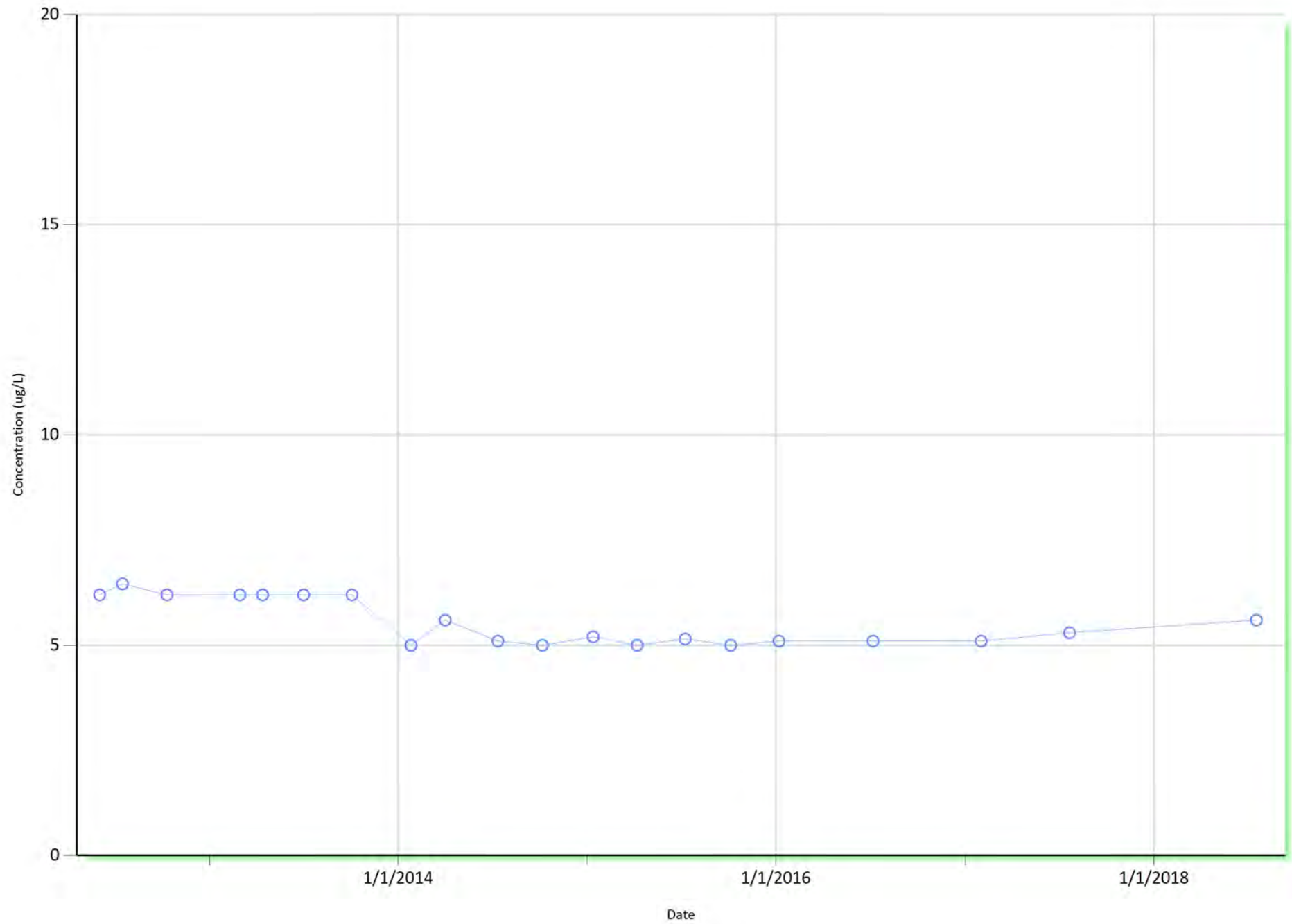
MW-314-150, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

MW-328-15, Off-site, Sulfolane

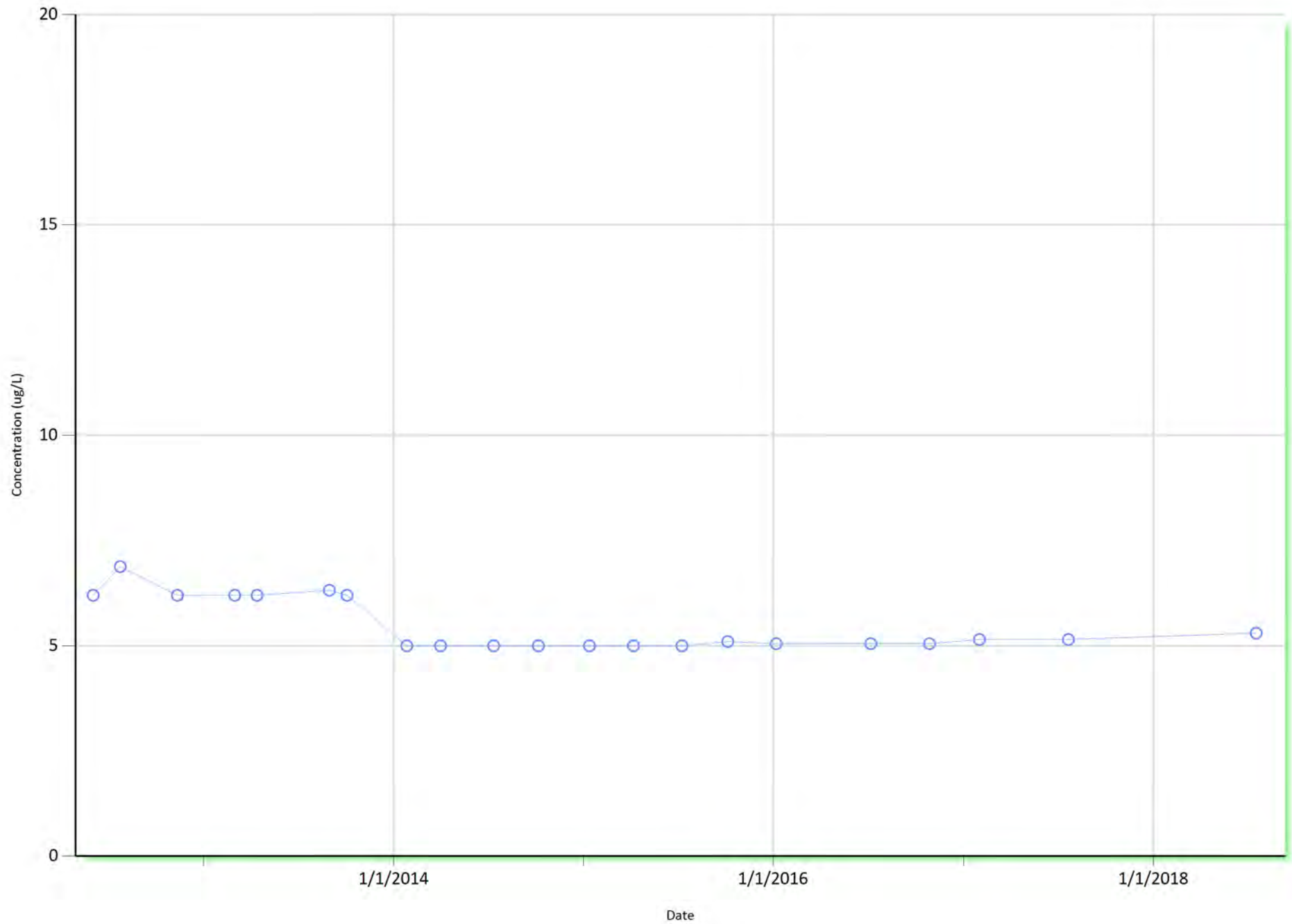


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

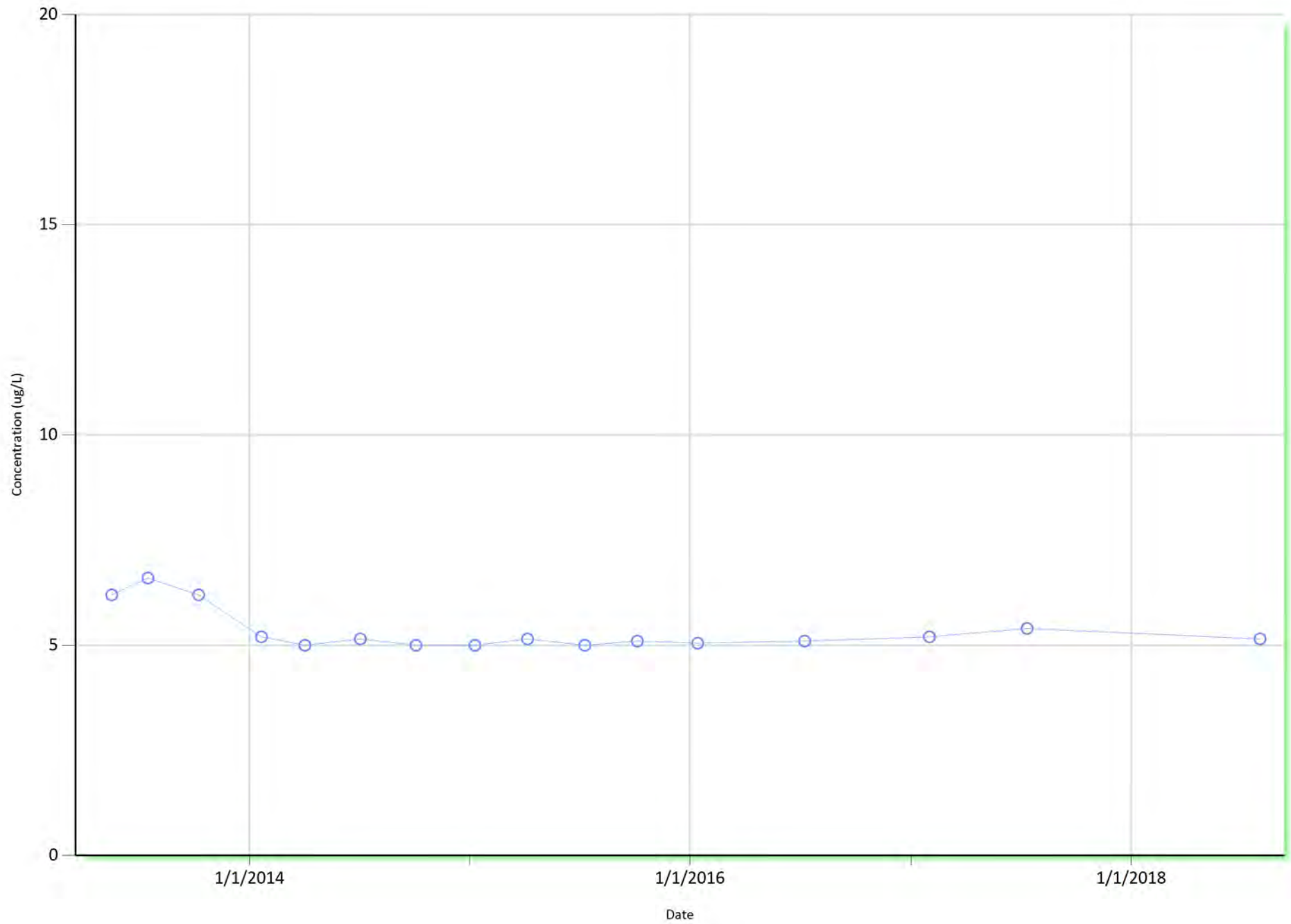
MW-328-151, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

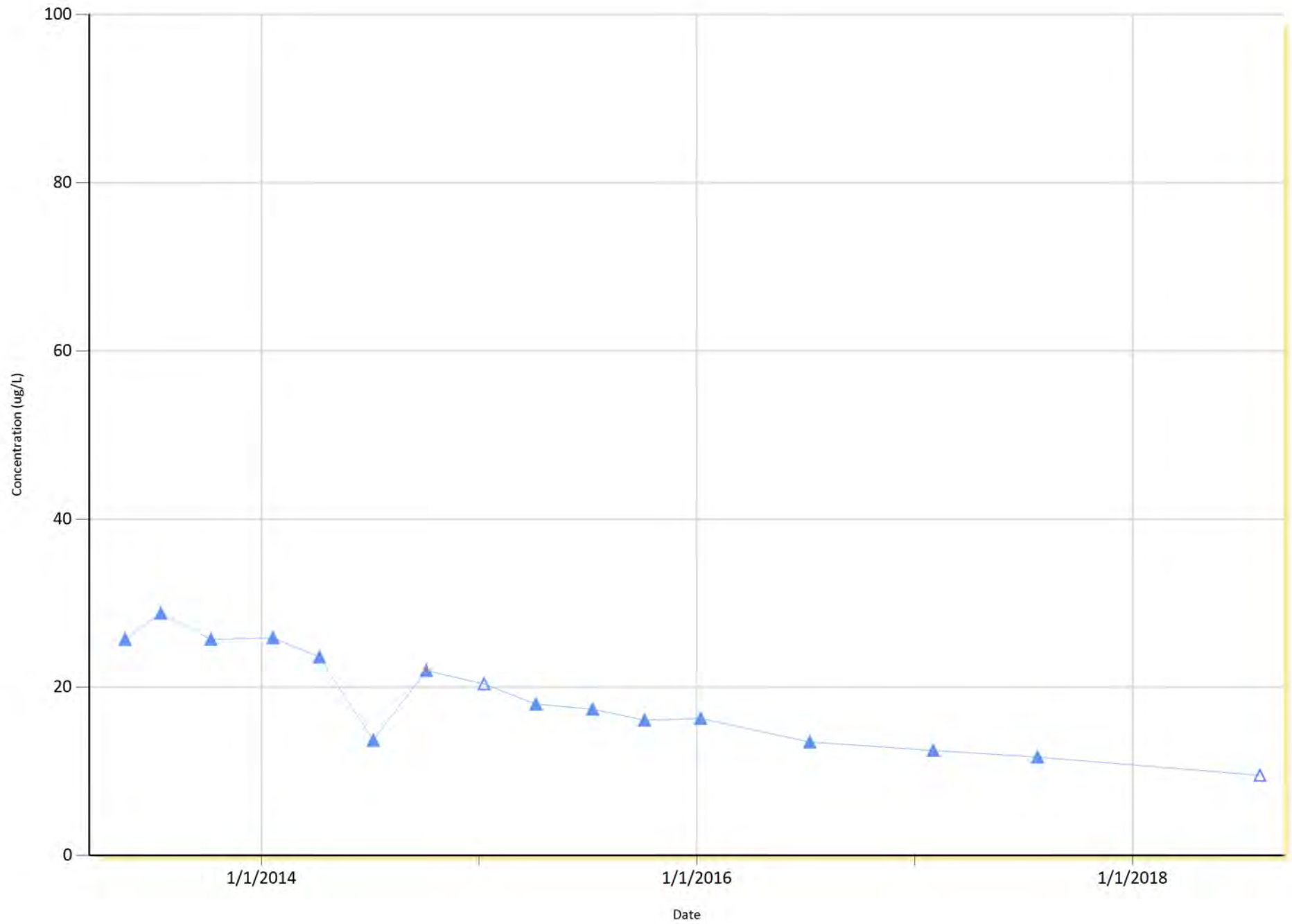
MW-332-41, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

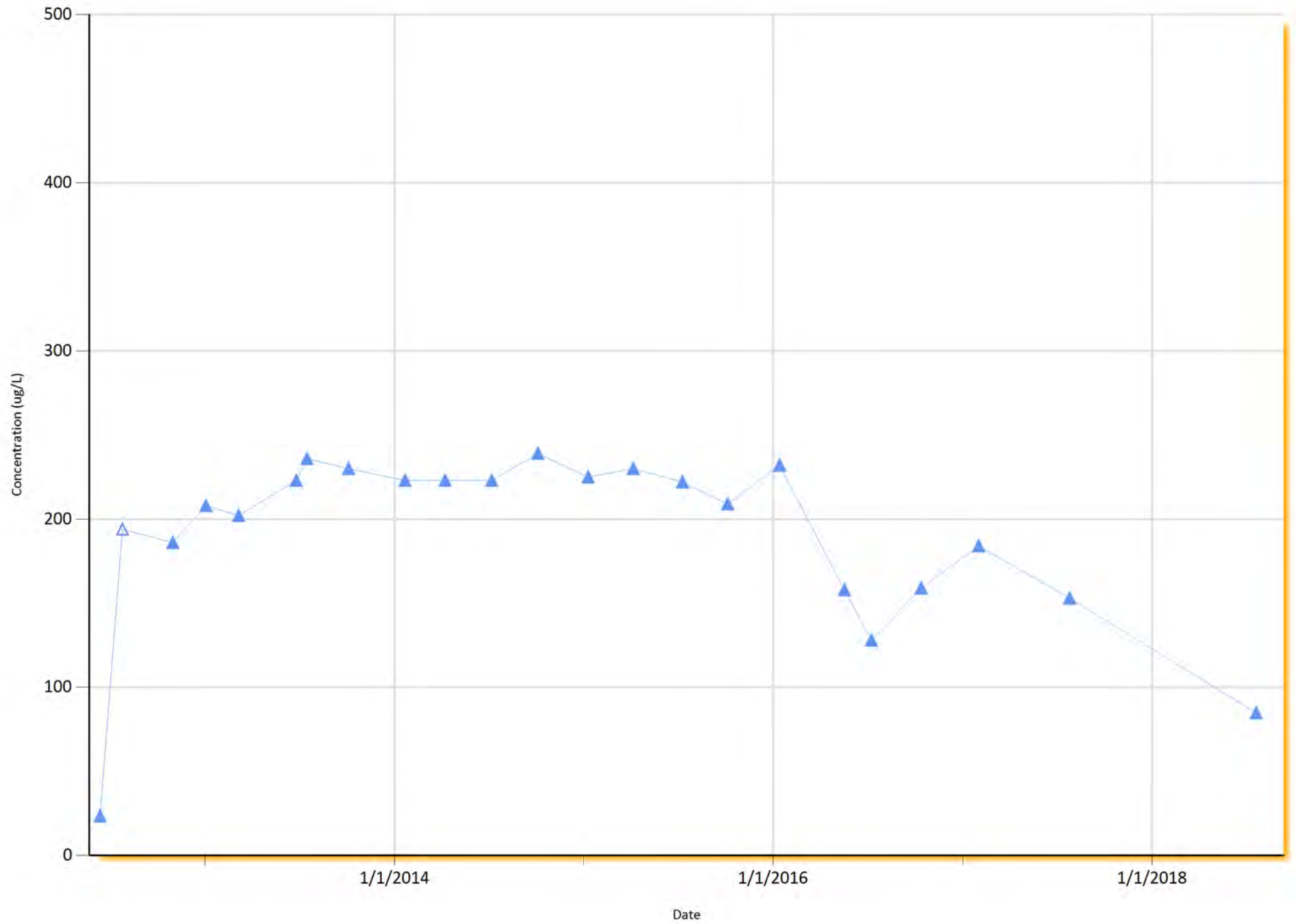
MW-332-110, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

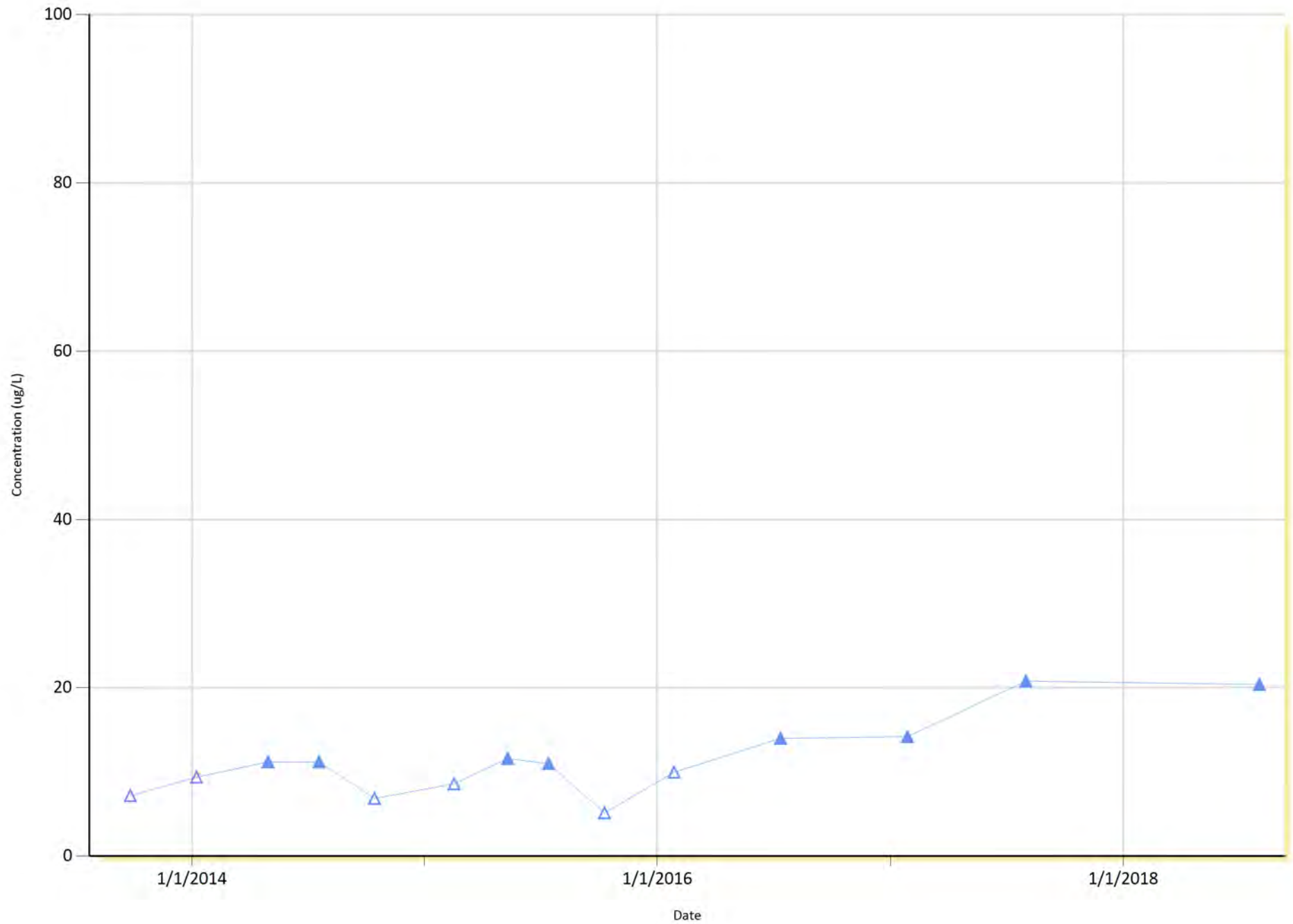
MW-332-150, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

MW-346-15, Off-site, Sulfolane

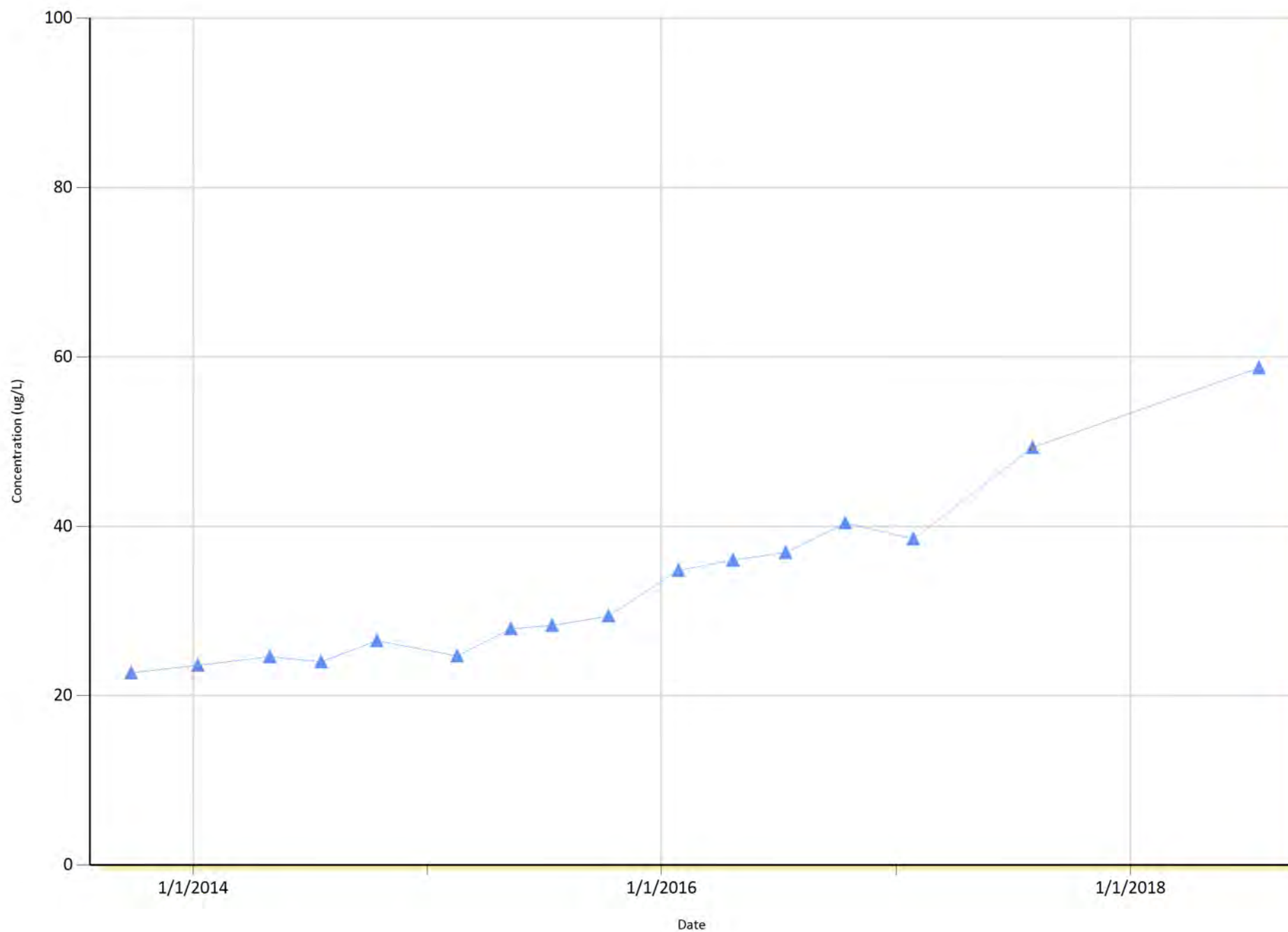


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

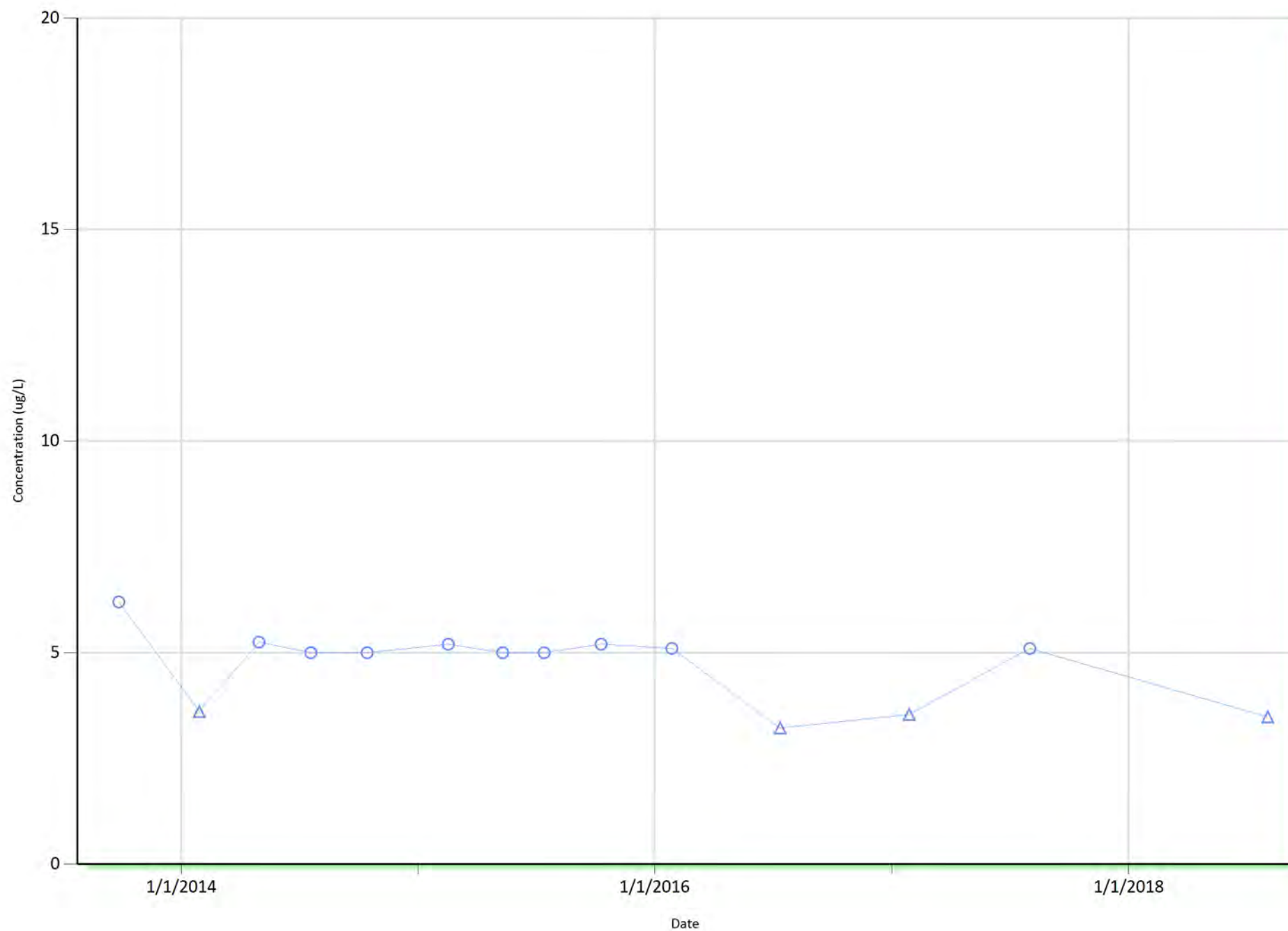
MW-346-65, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

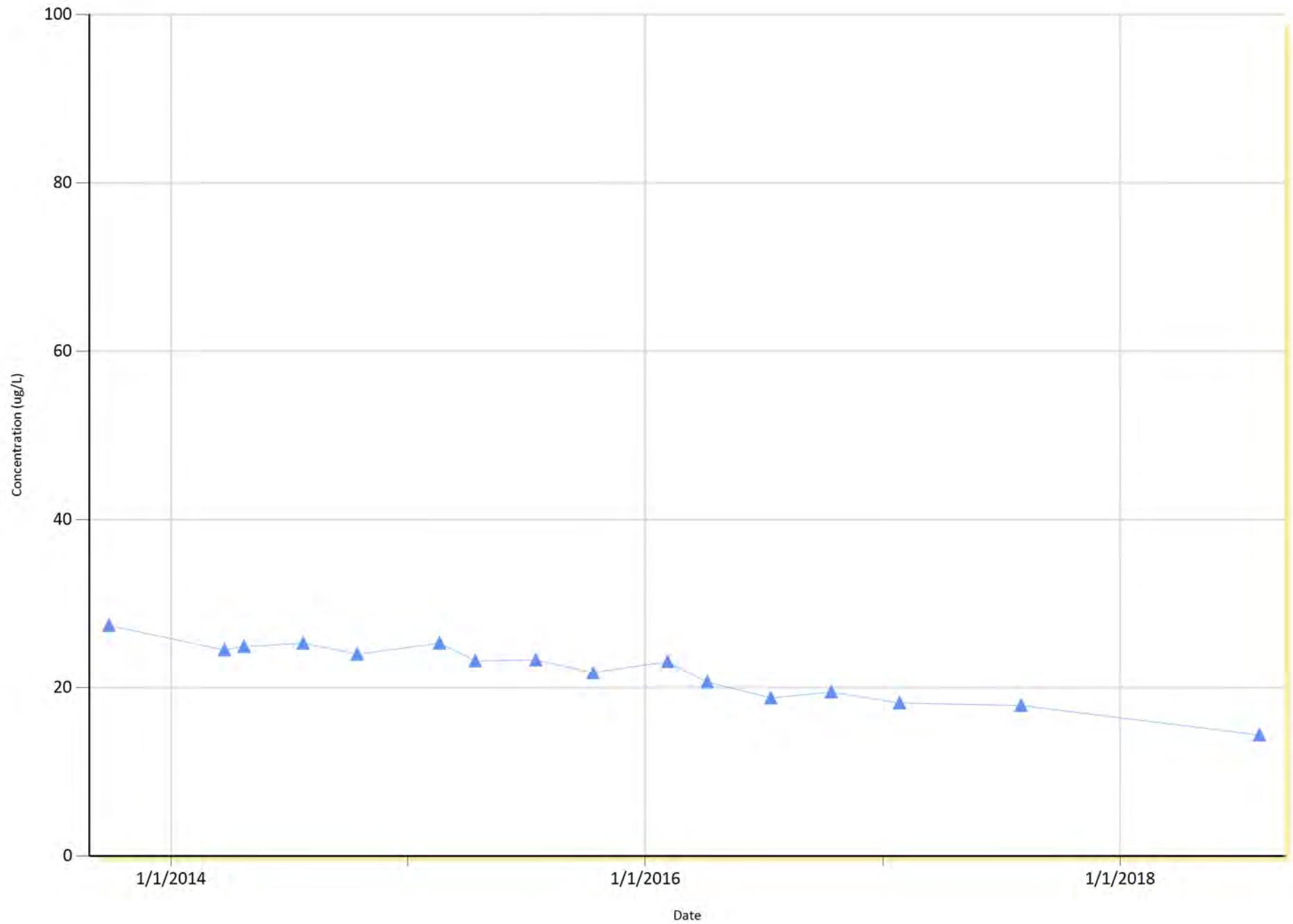
MW-346-150, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

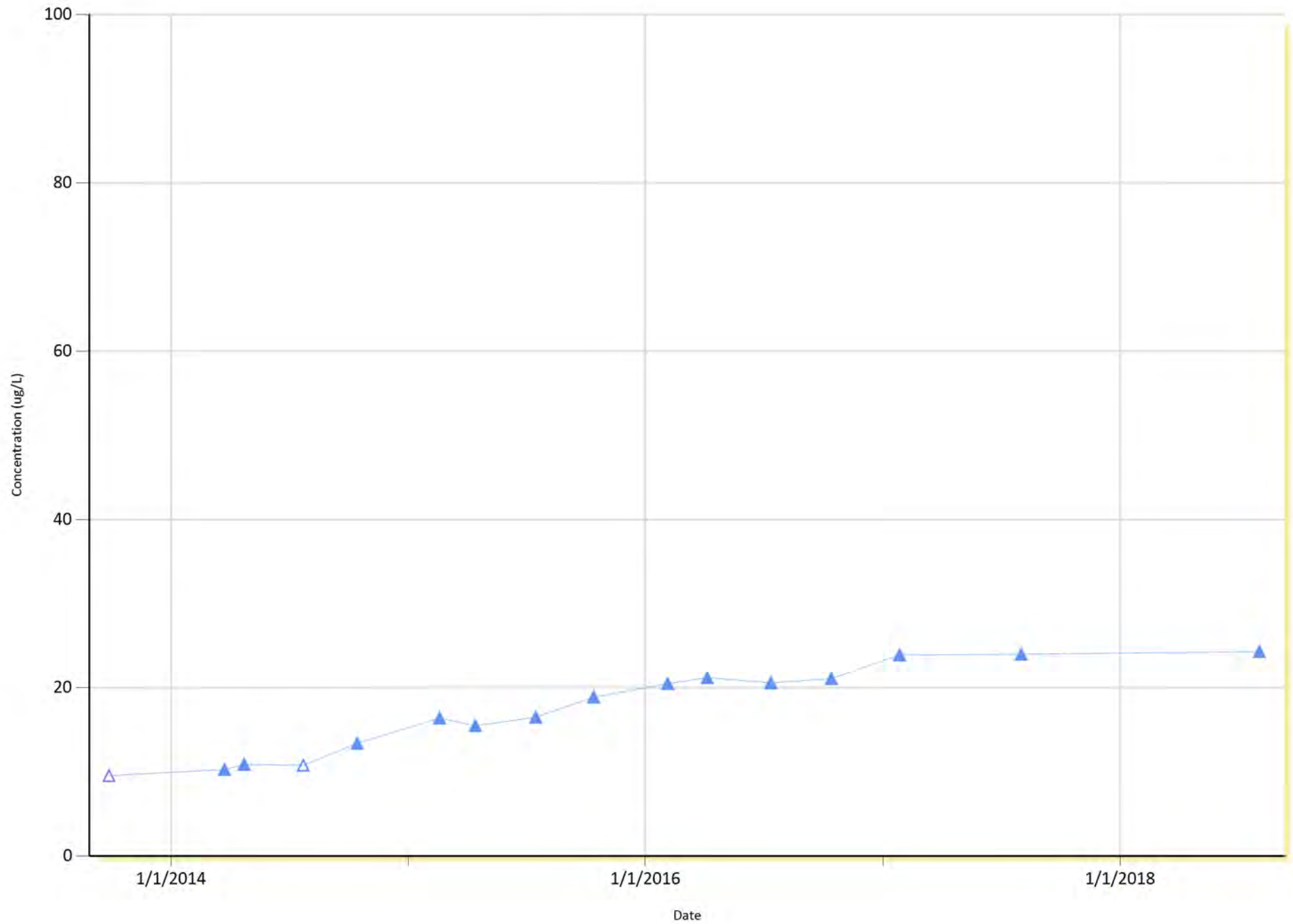
MW-347-65, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

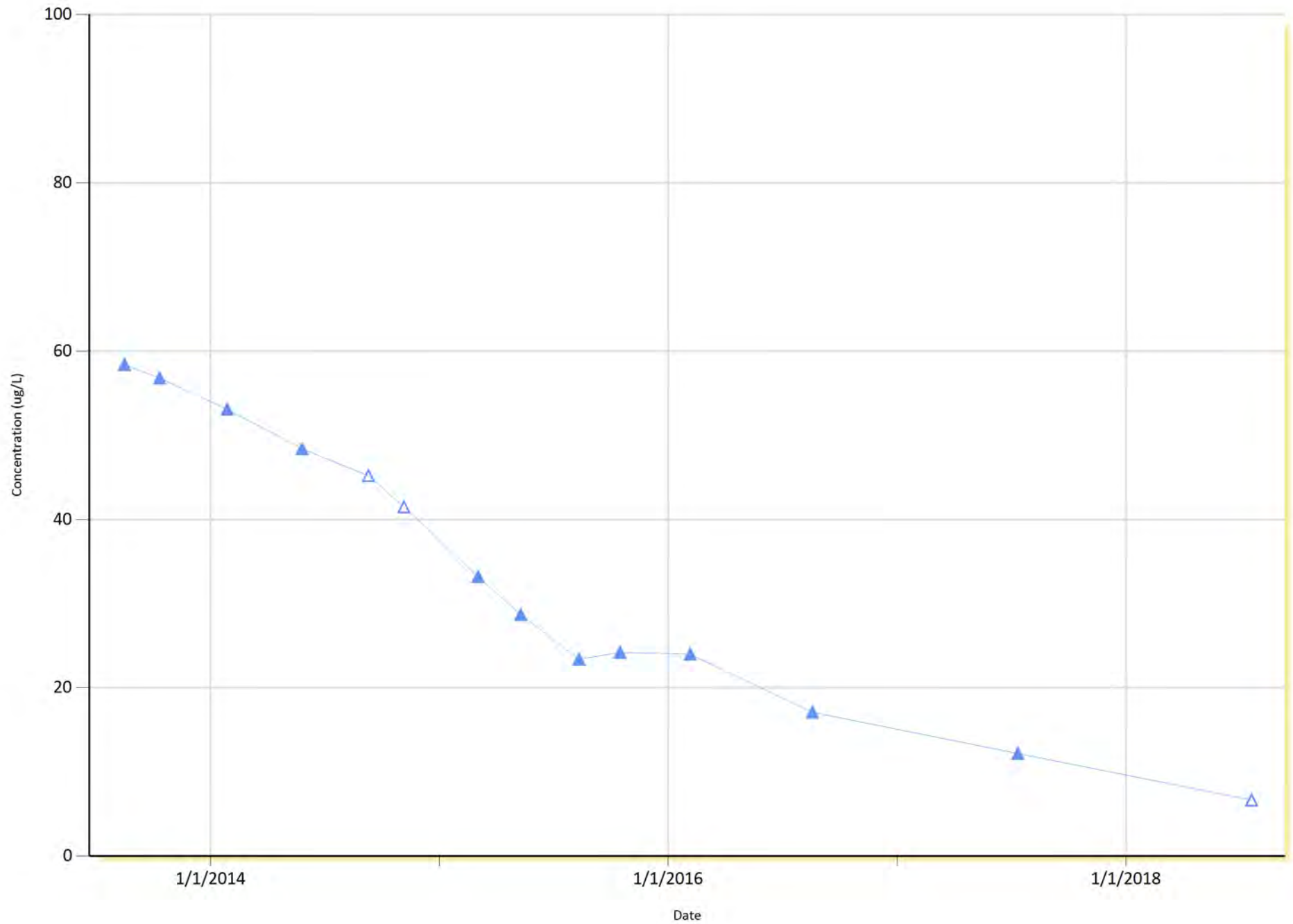
MW-347-150, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

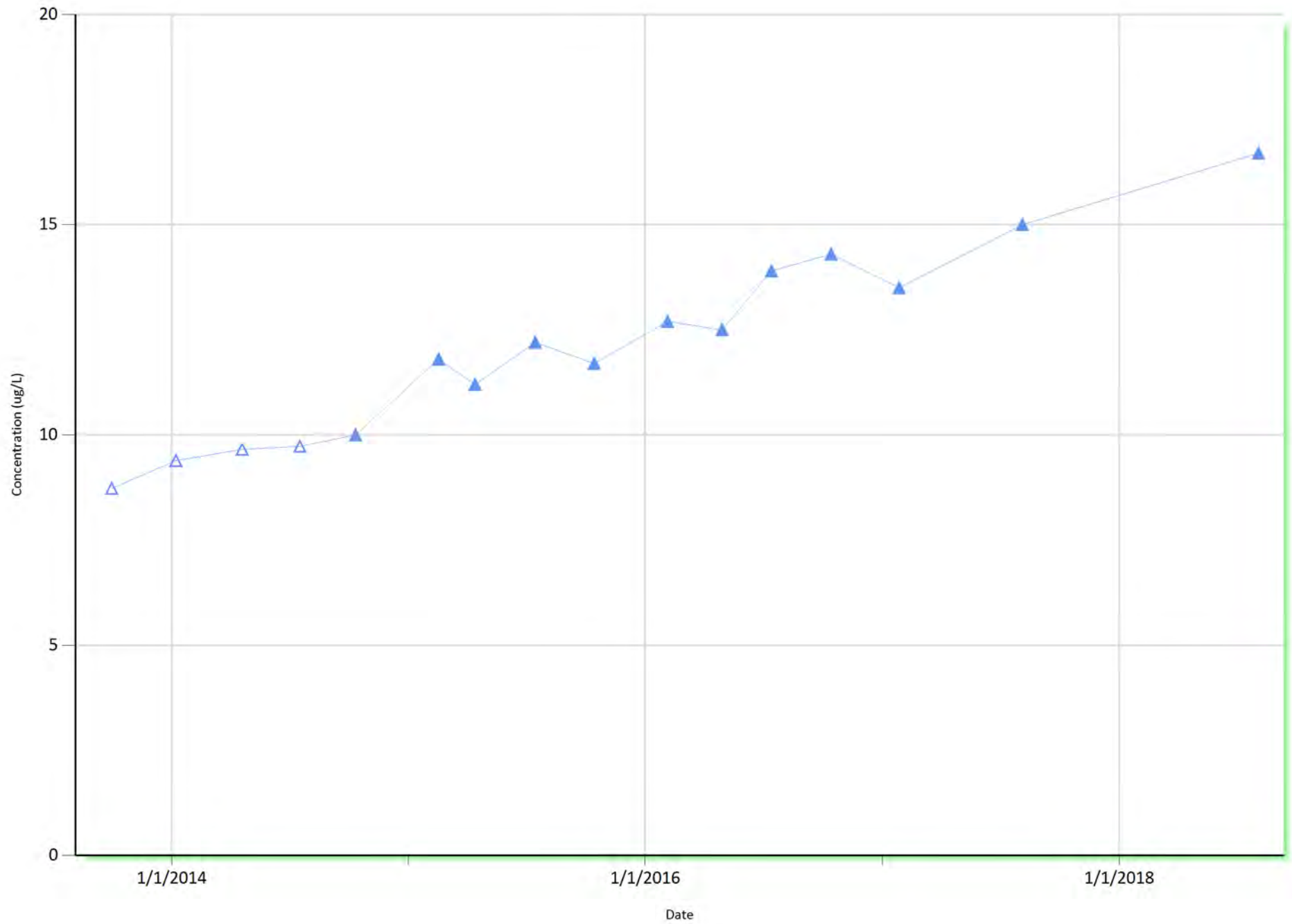
MW-349-45, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

MW-352-40, Off-site, Sulfolane

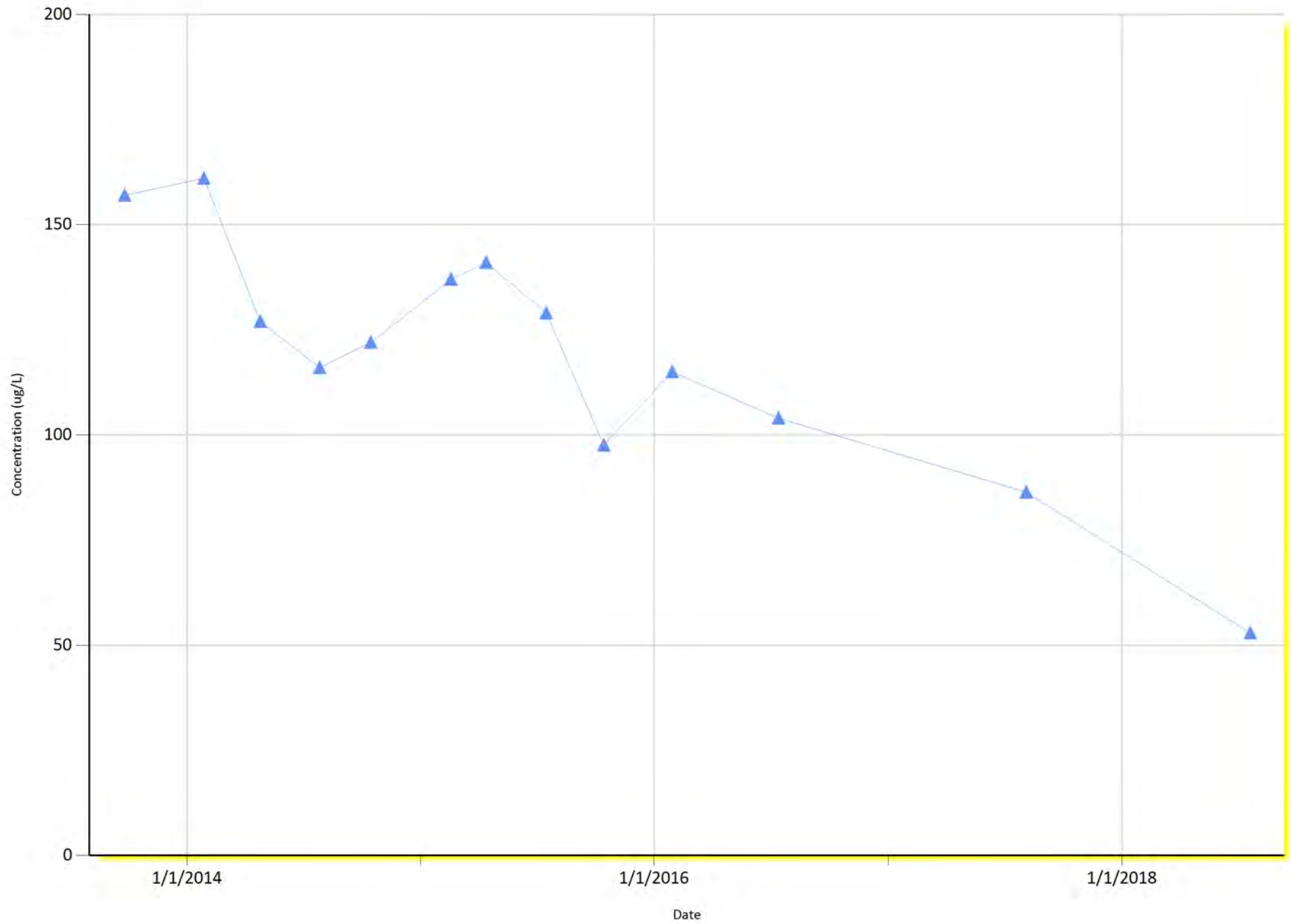


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

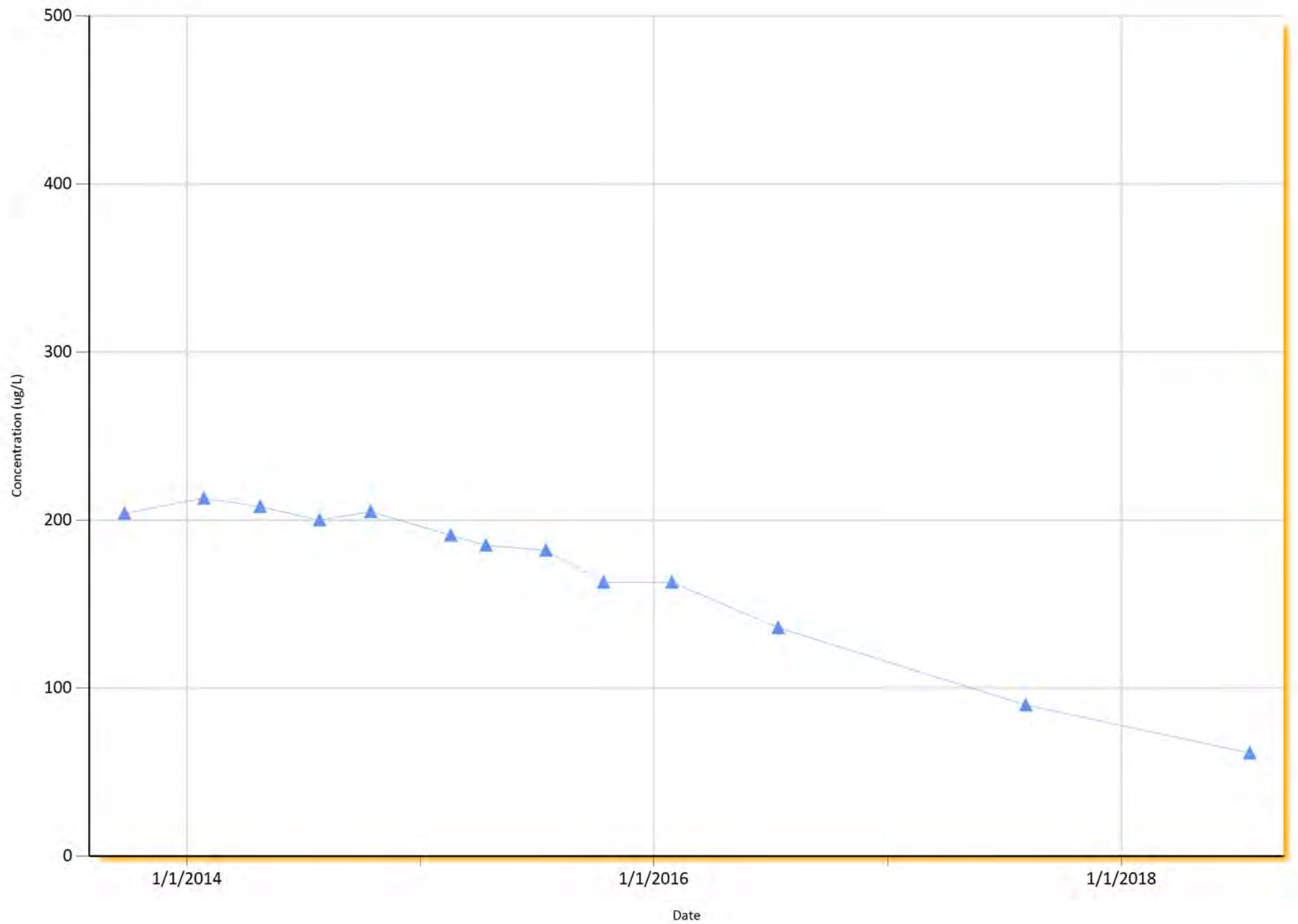
MW-353-15, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

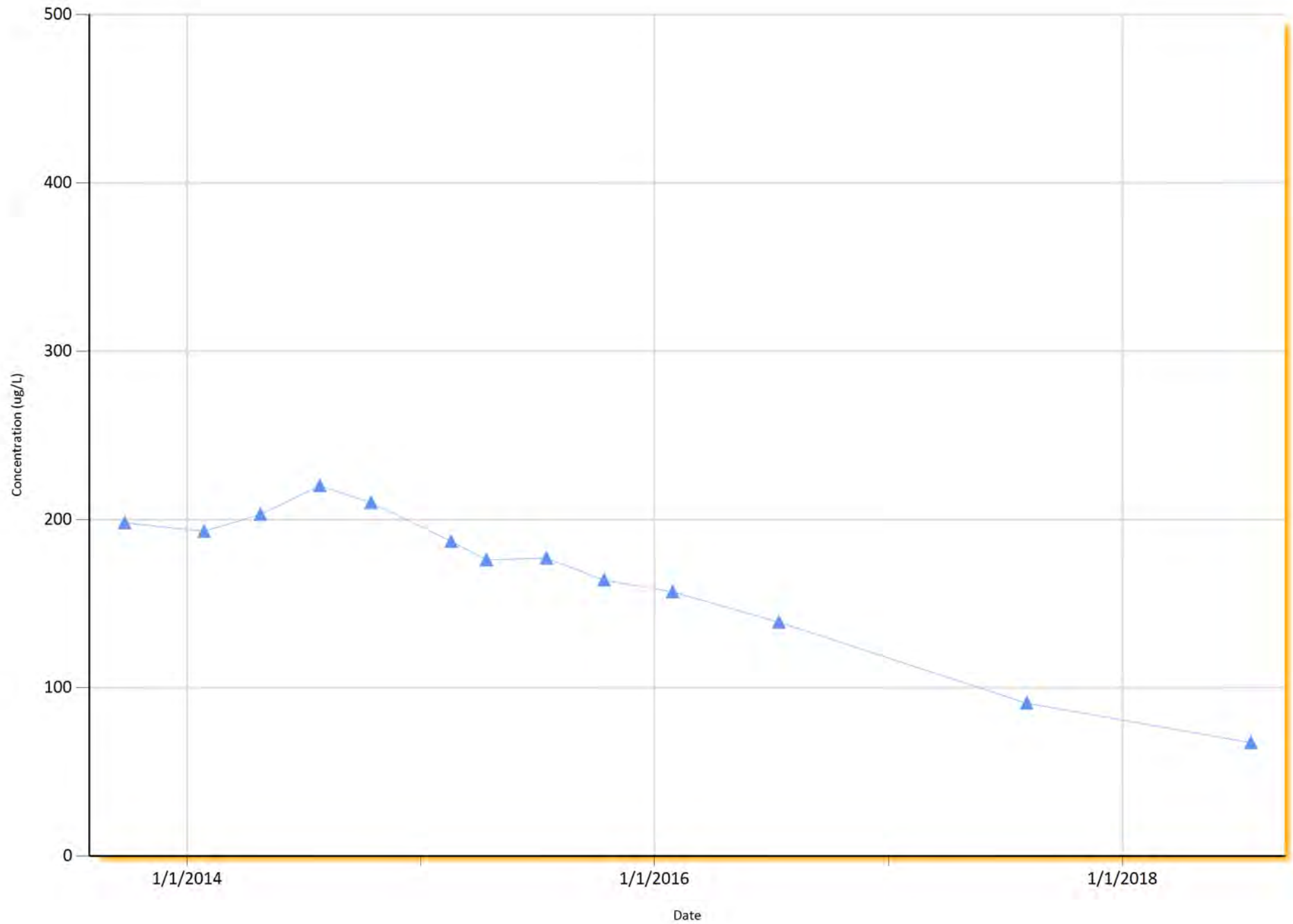
MW-353-65, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

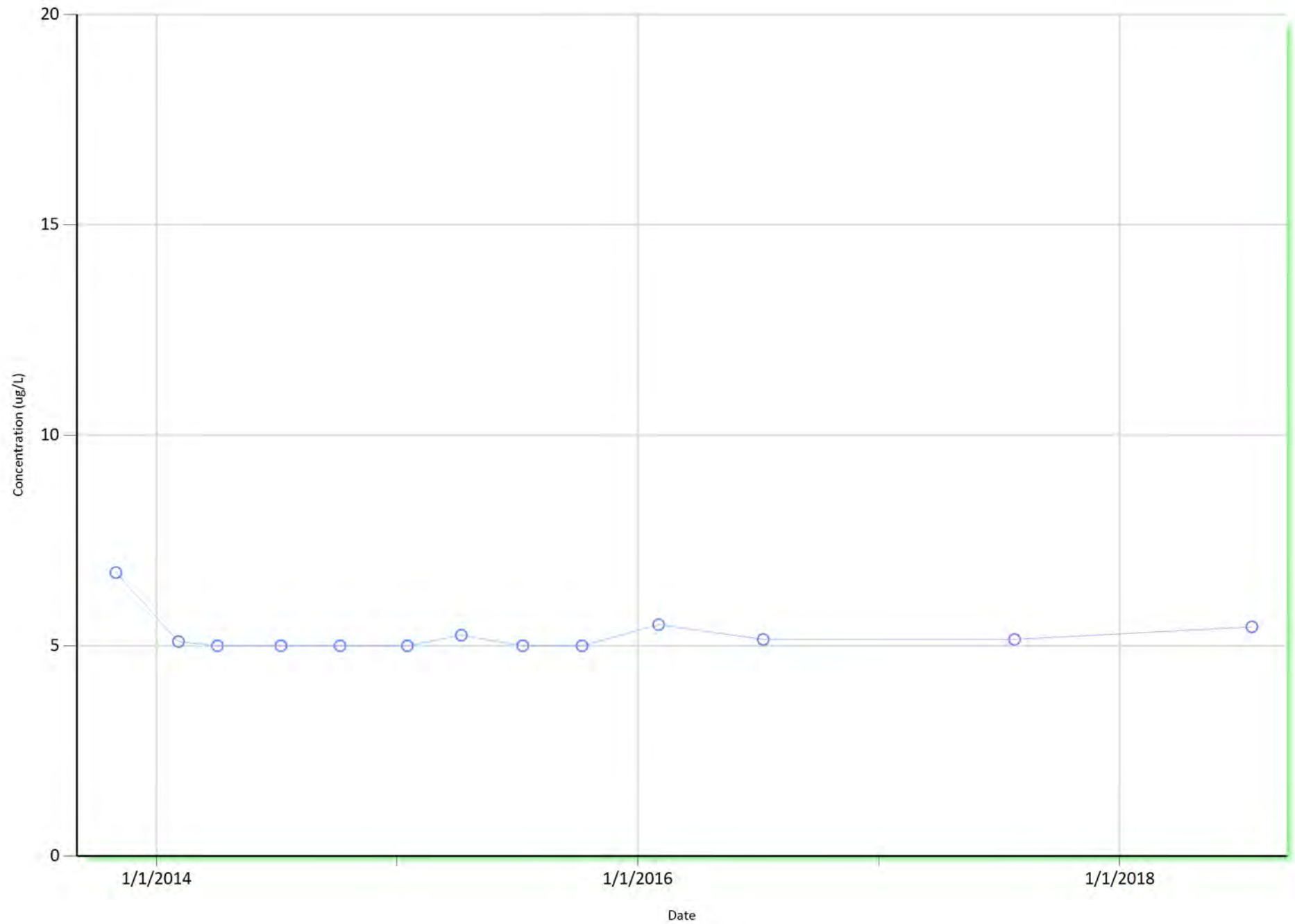
MW-353-100, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

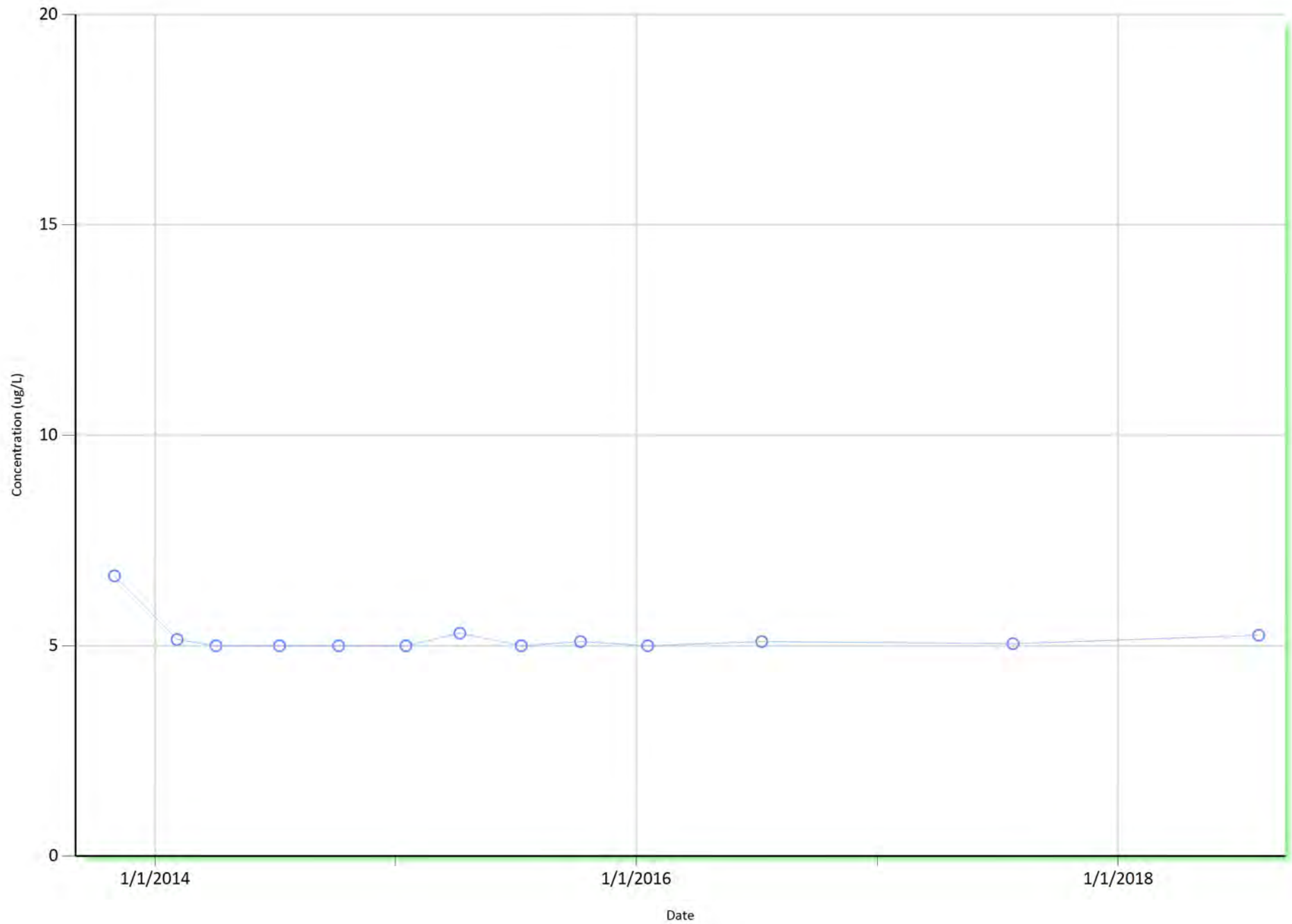
MW-357-65, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

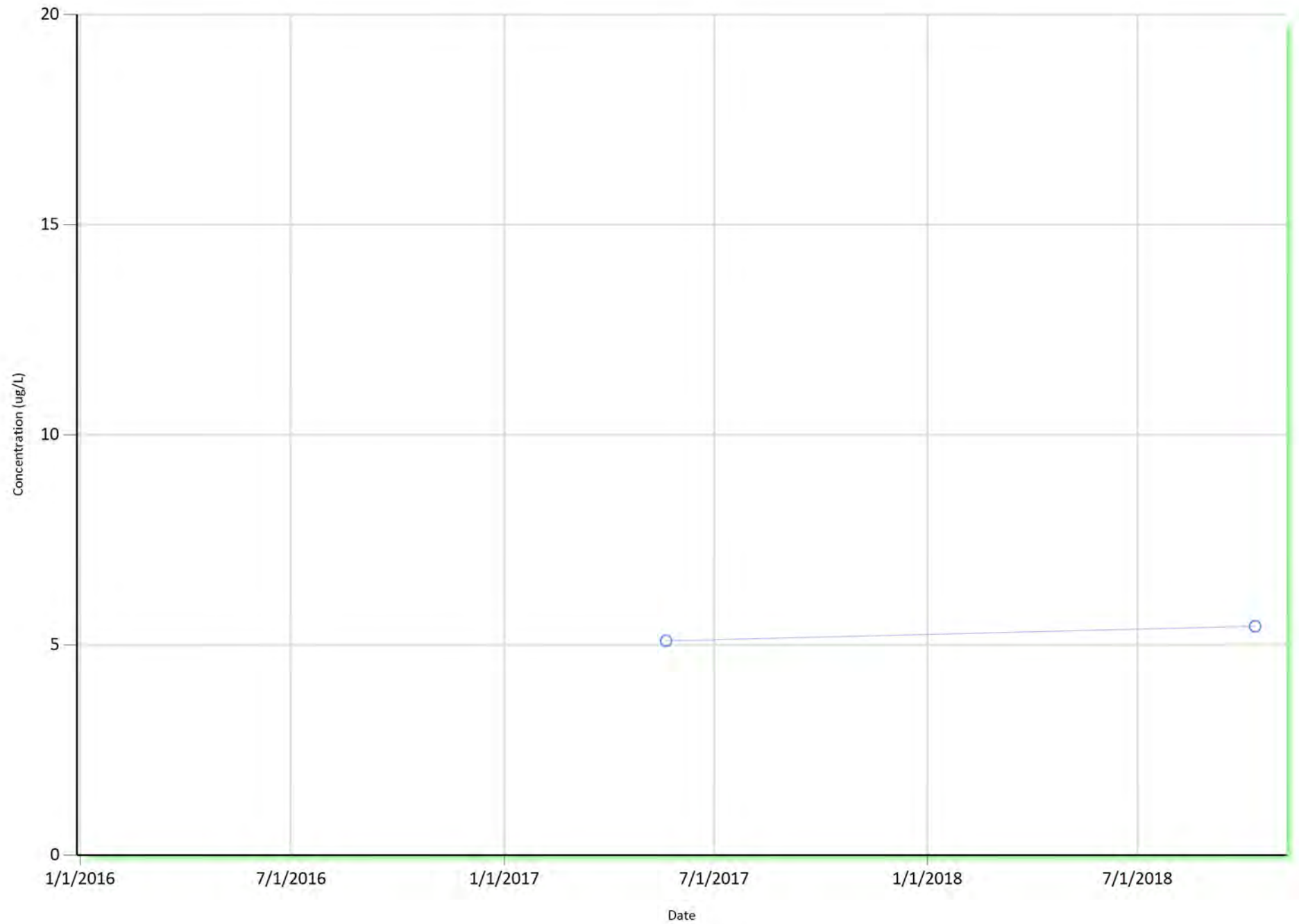
MW-357-150, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

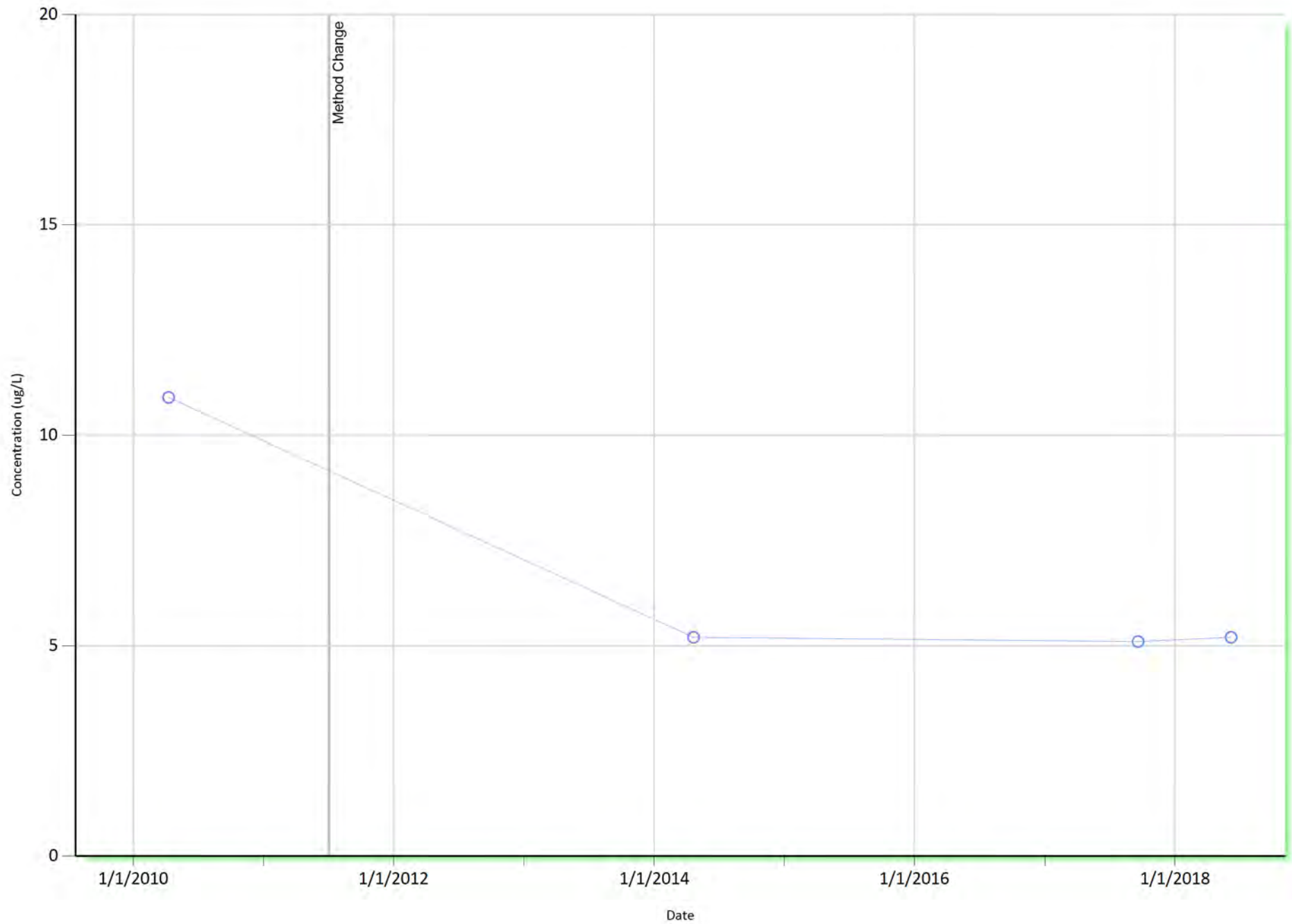
PW-0250, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0262, Off-site, Sulfolane

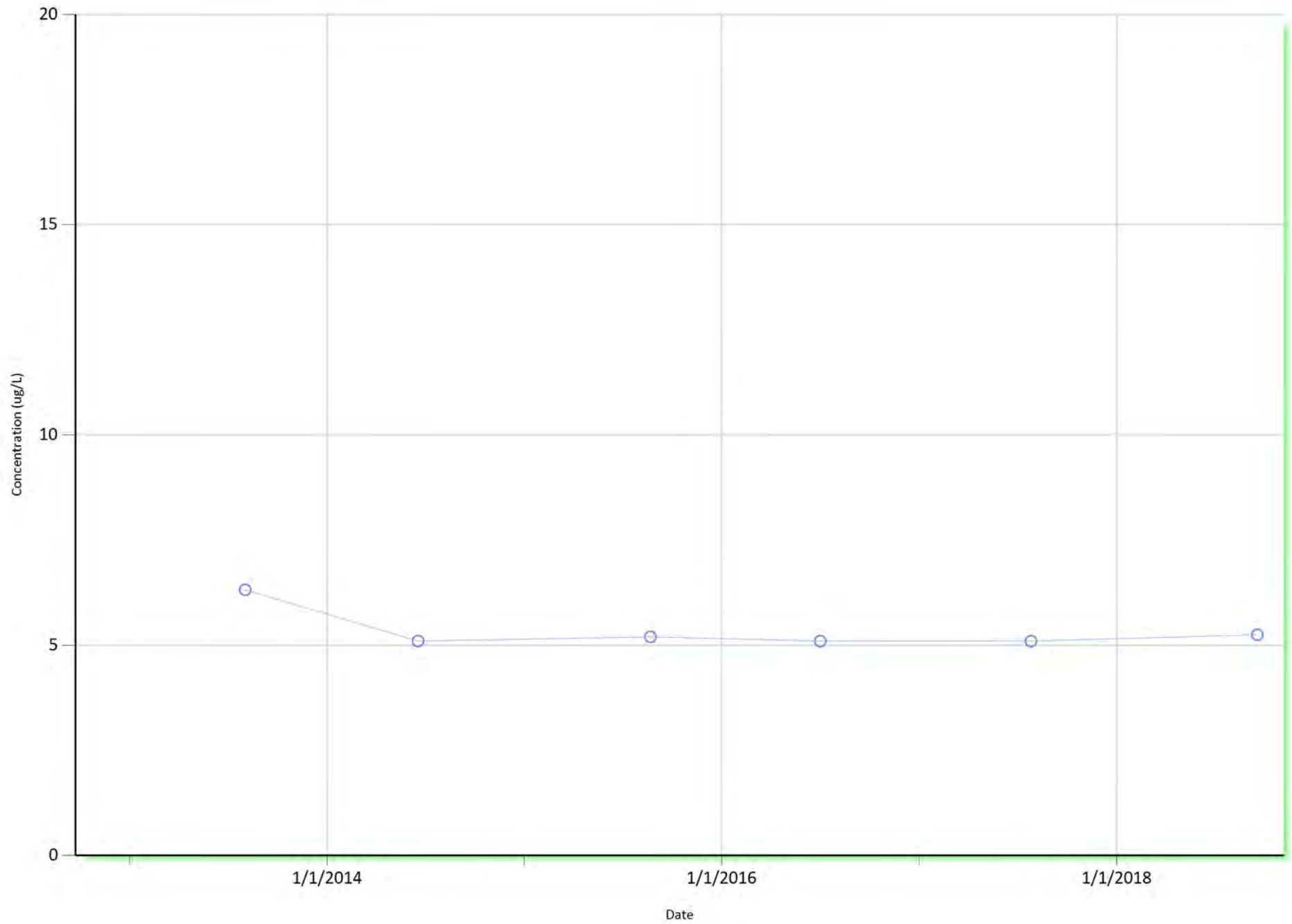


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

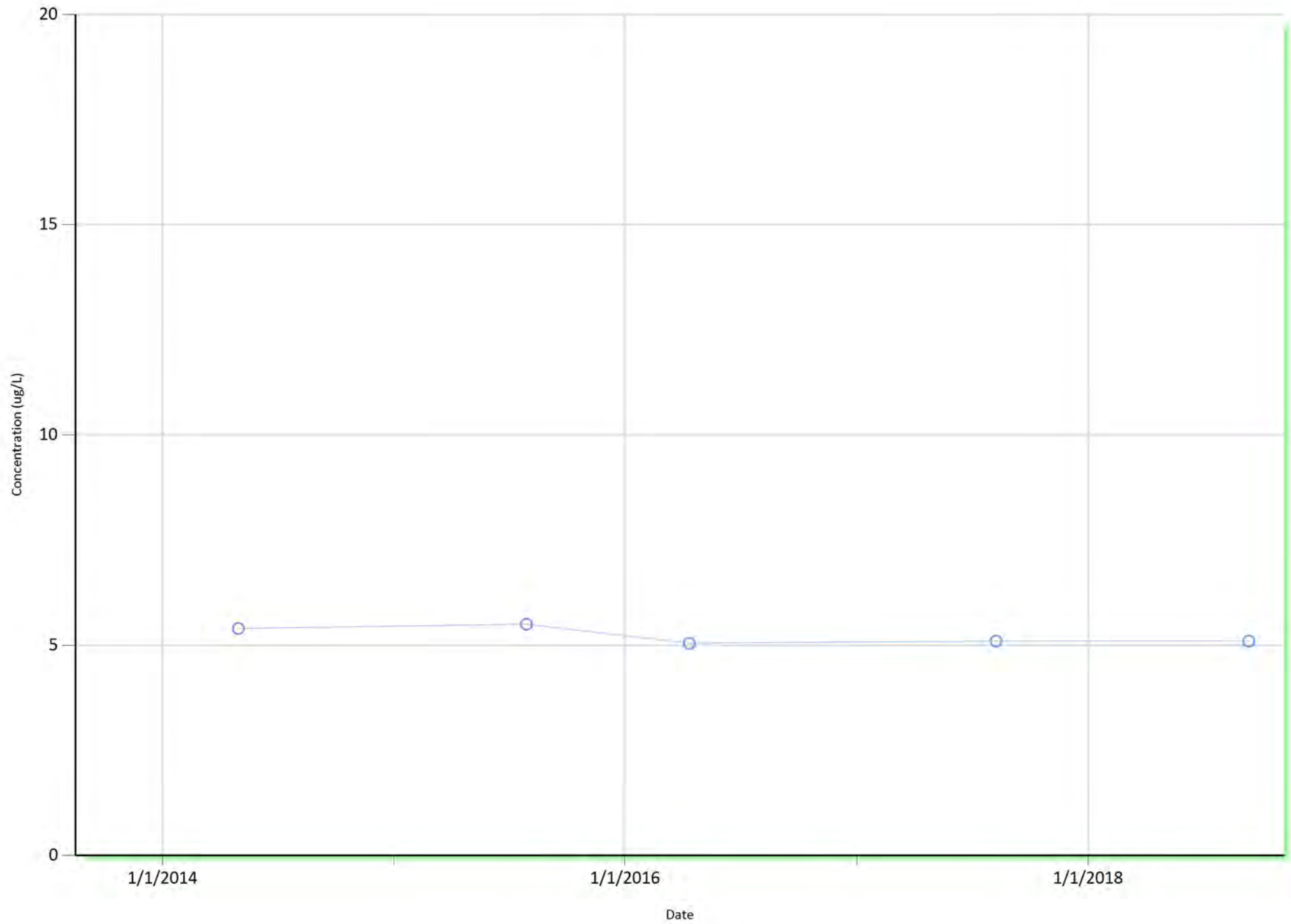
PW-0265, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

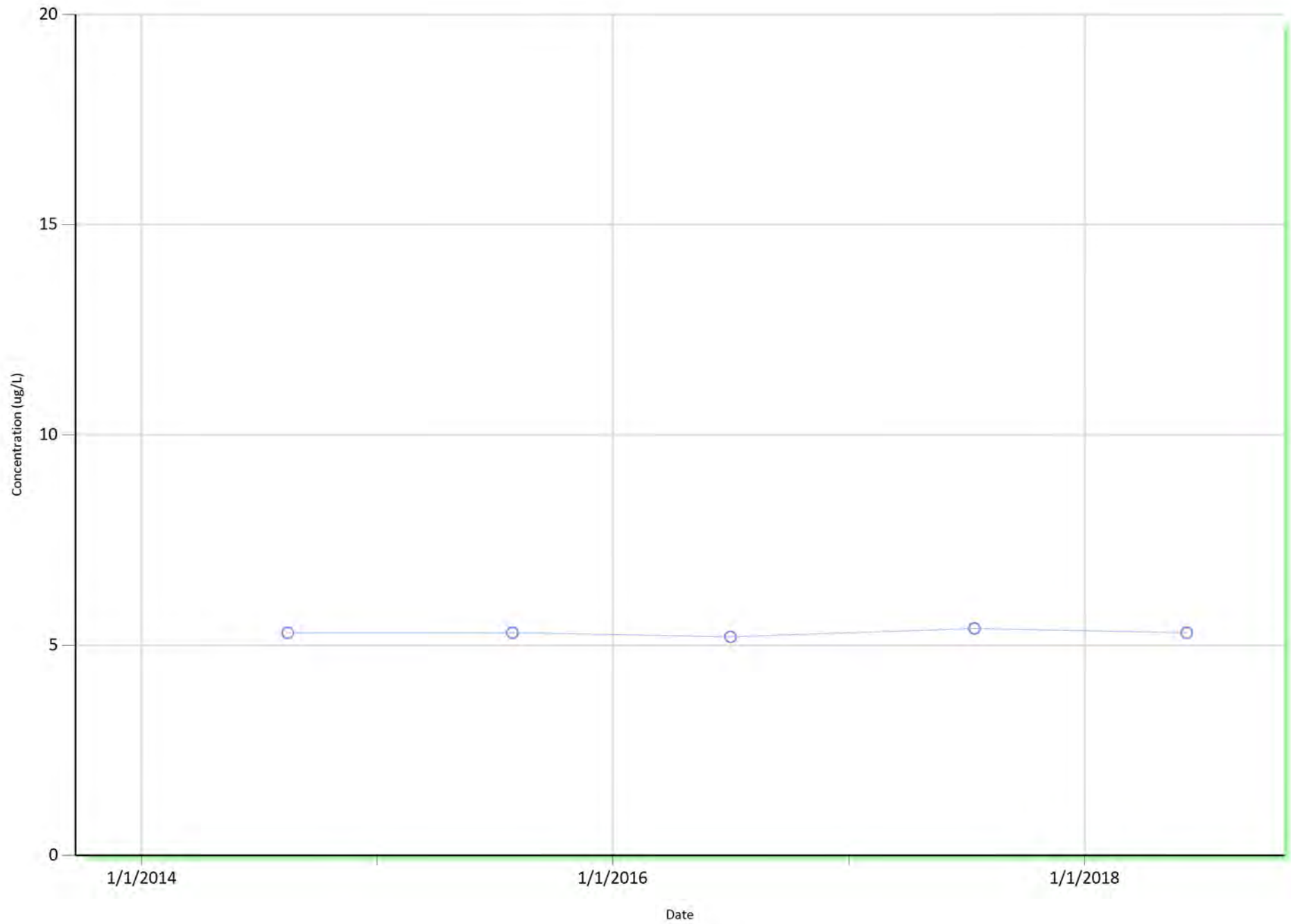
PW-0266, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

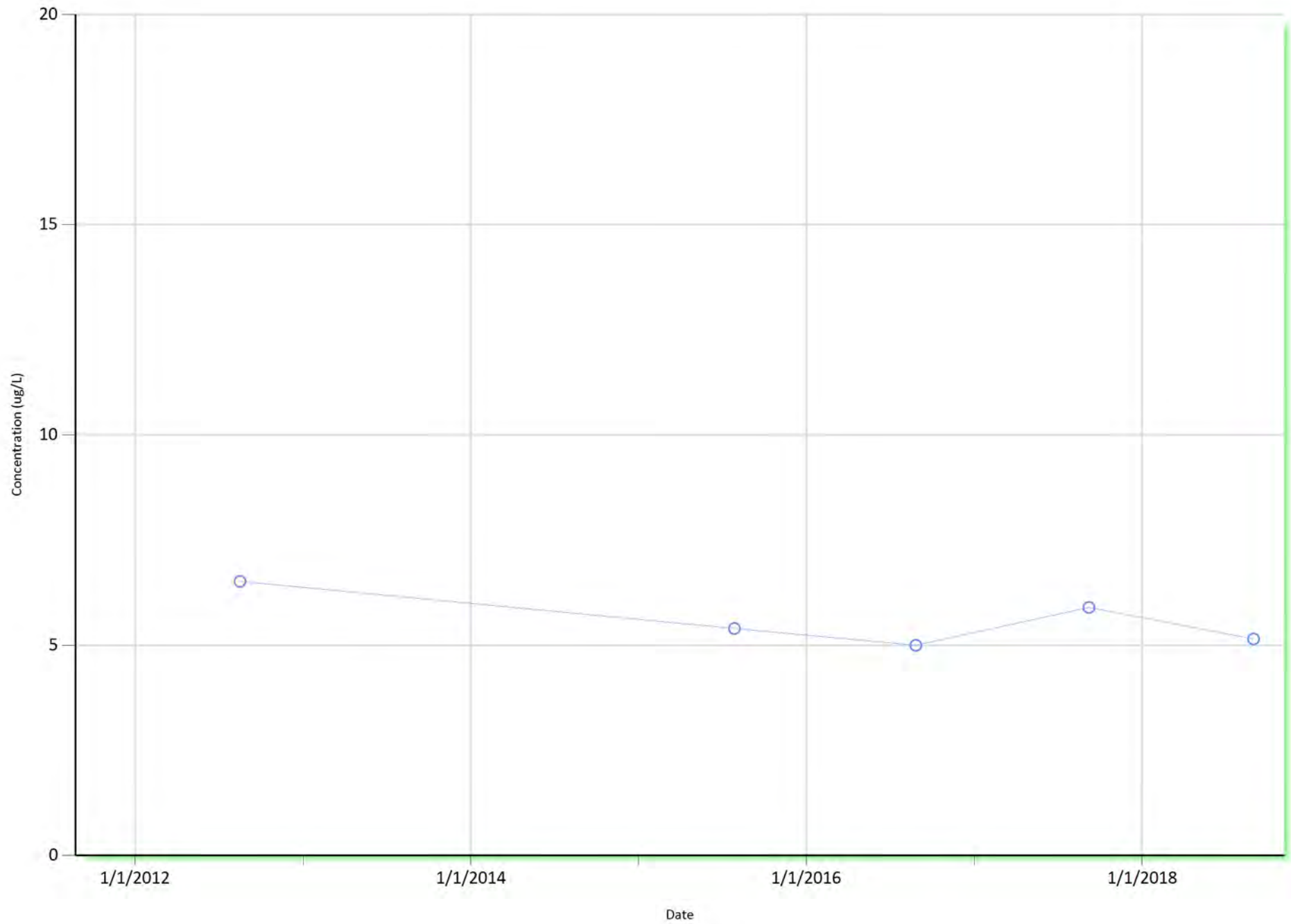
PW-0267, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

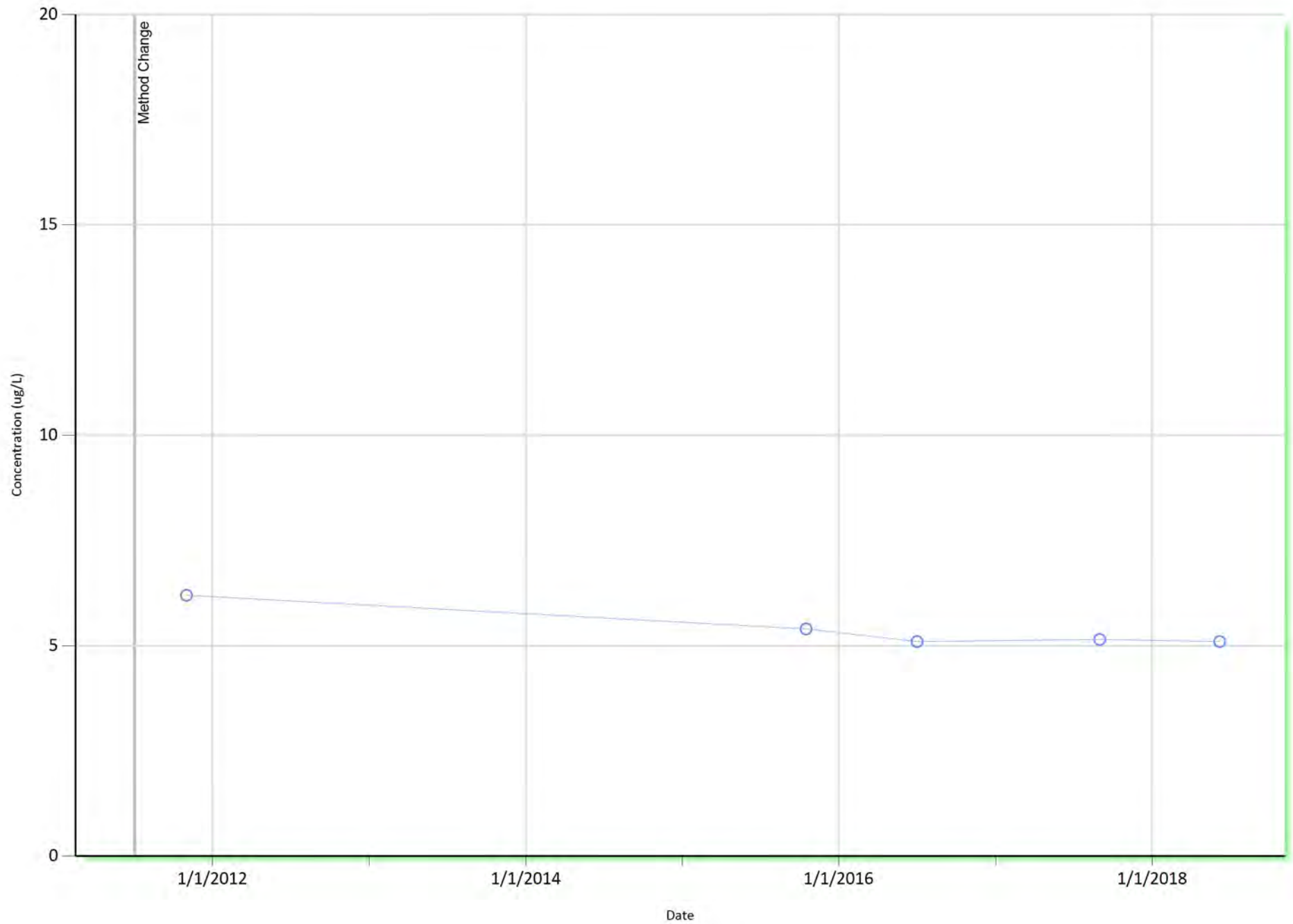
PW-0268, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

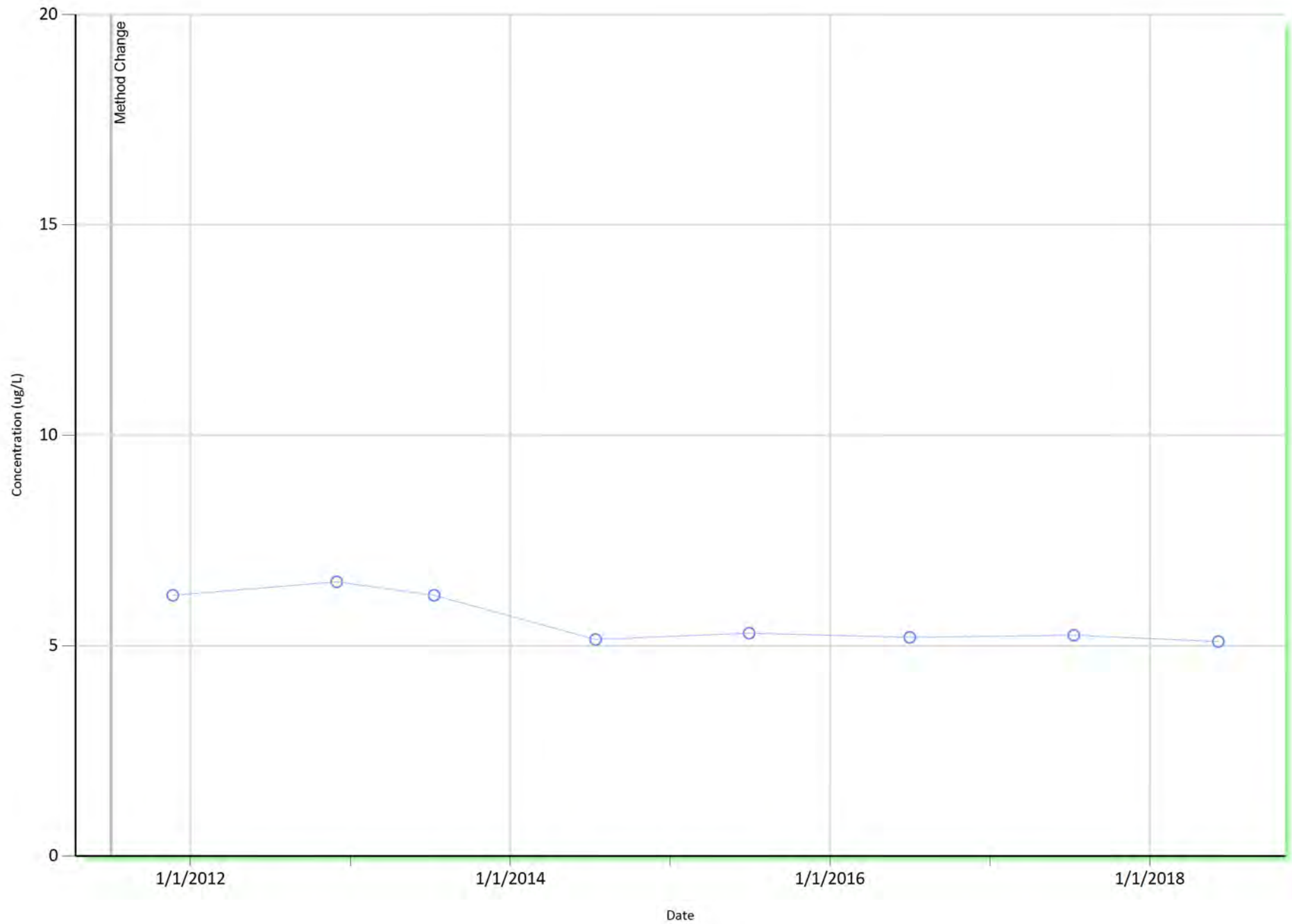
PW-0270, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

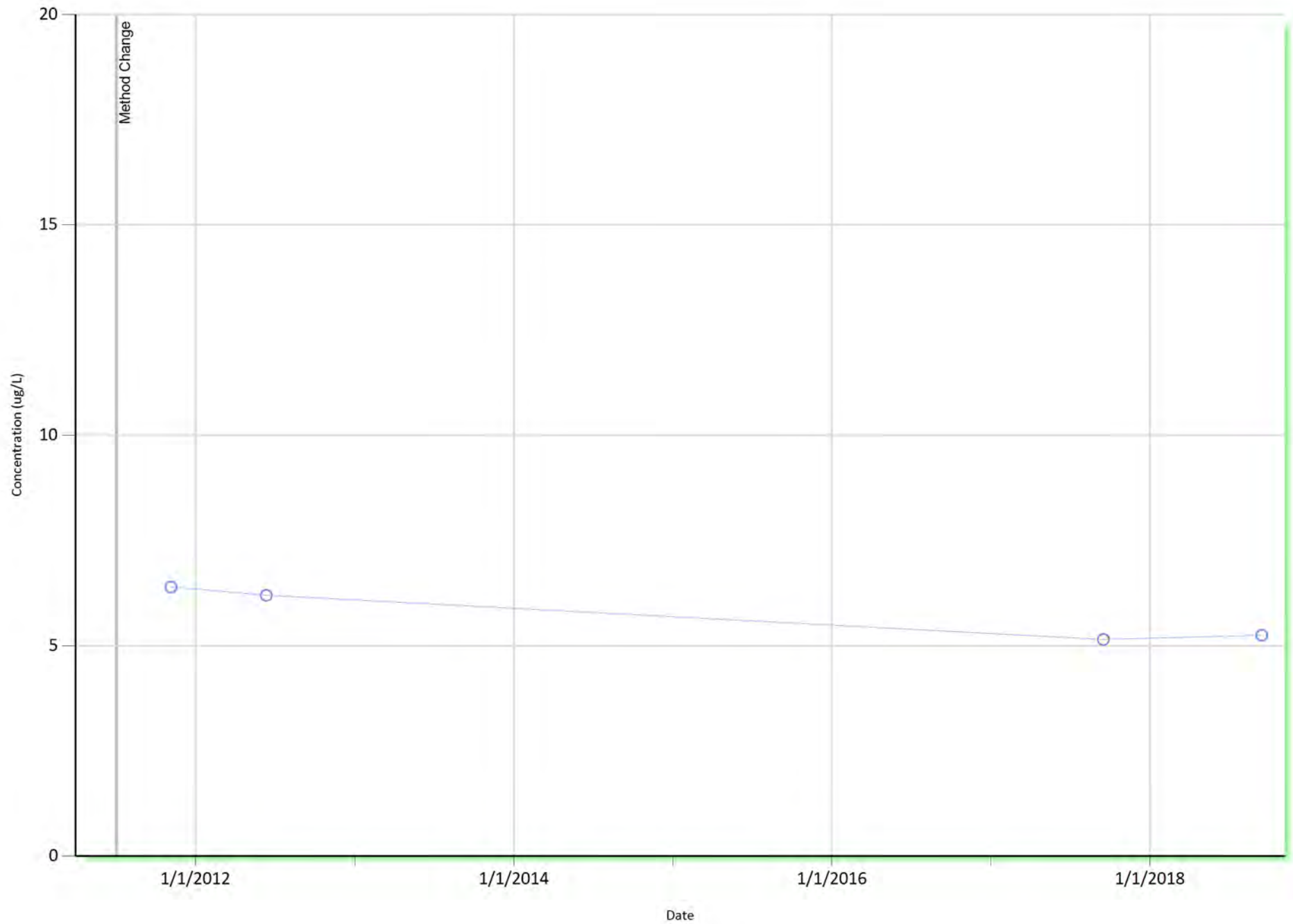
PW-0271, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

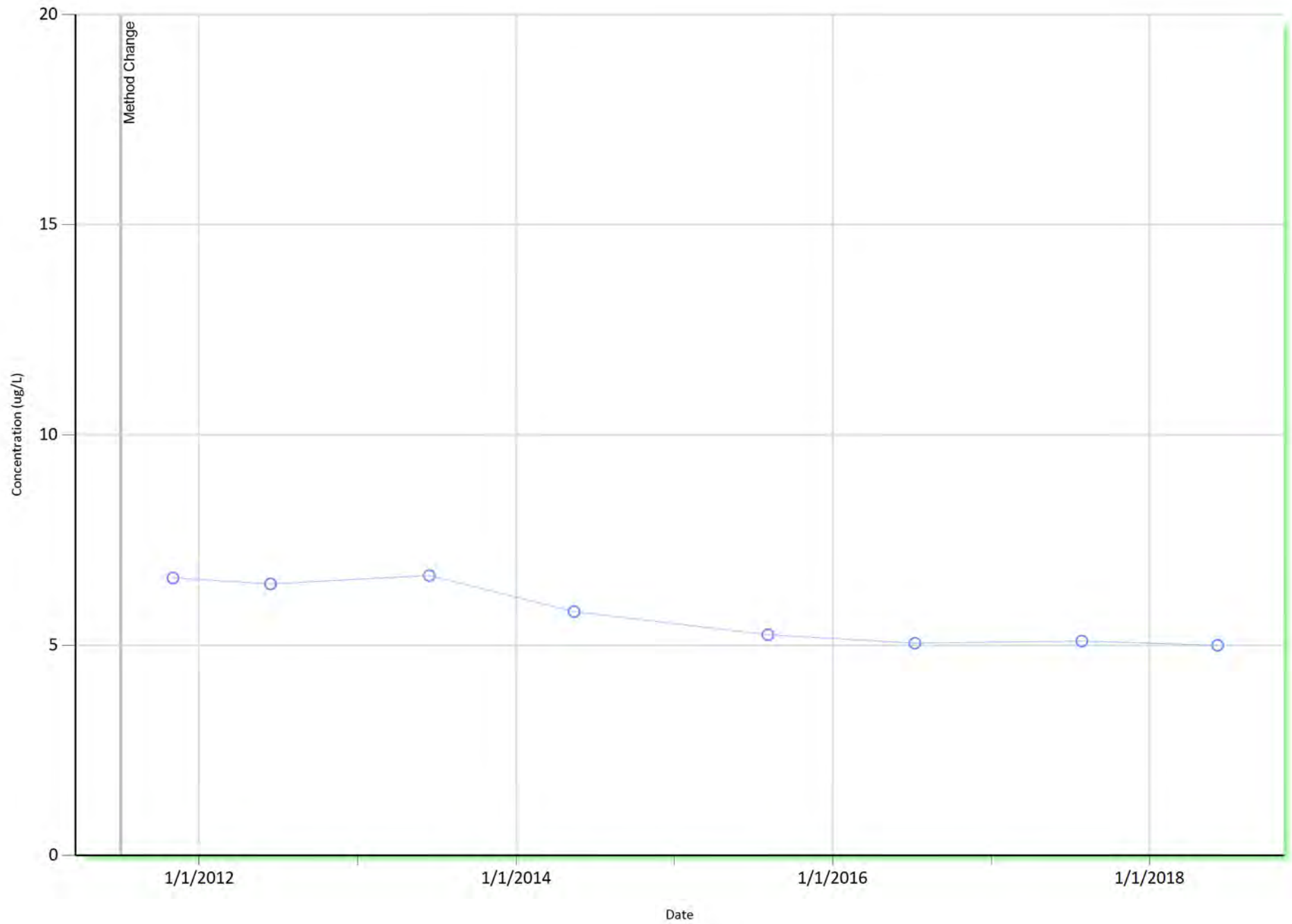
PW-0272, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0273, Off-site, Sulfolane

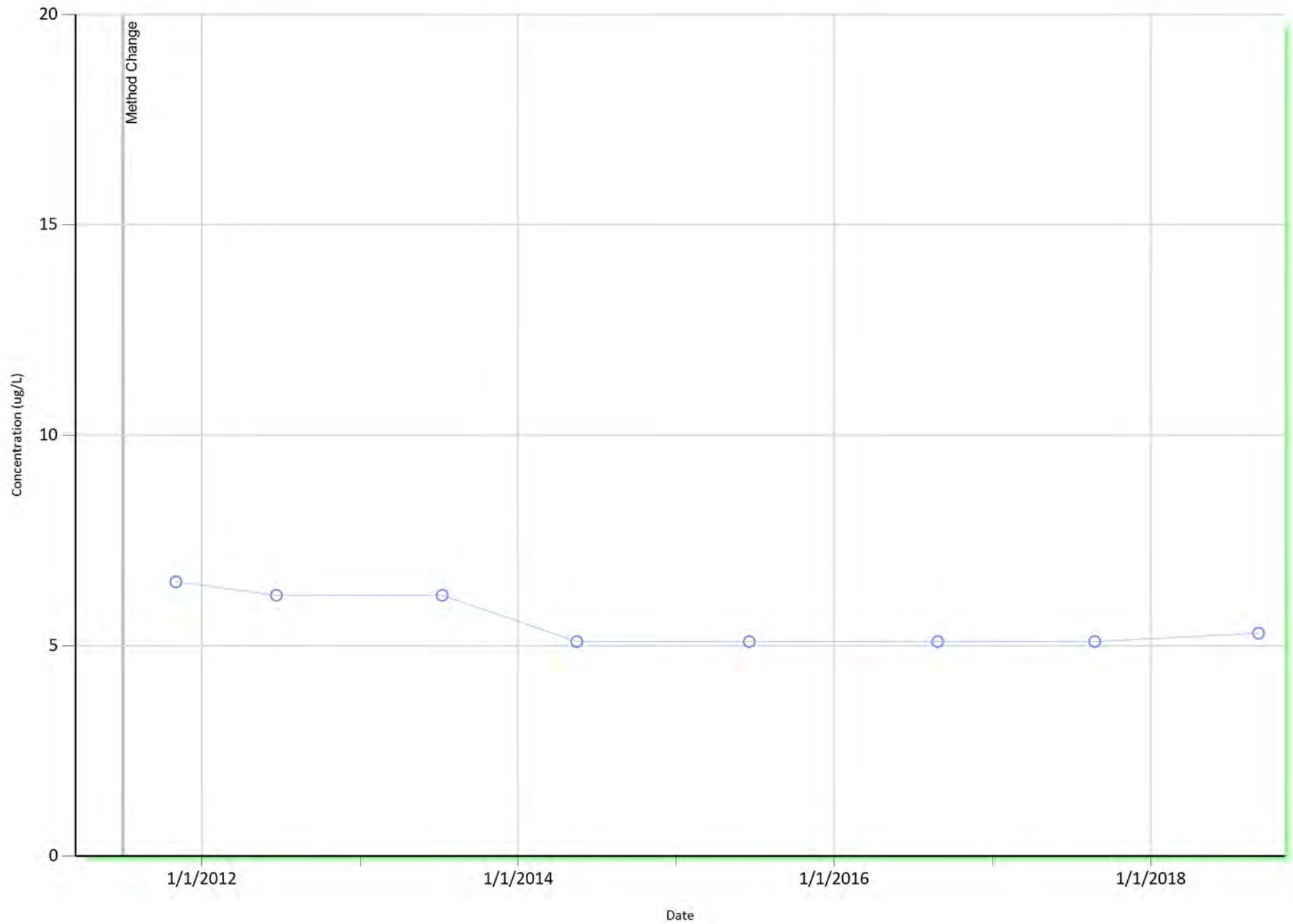


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

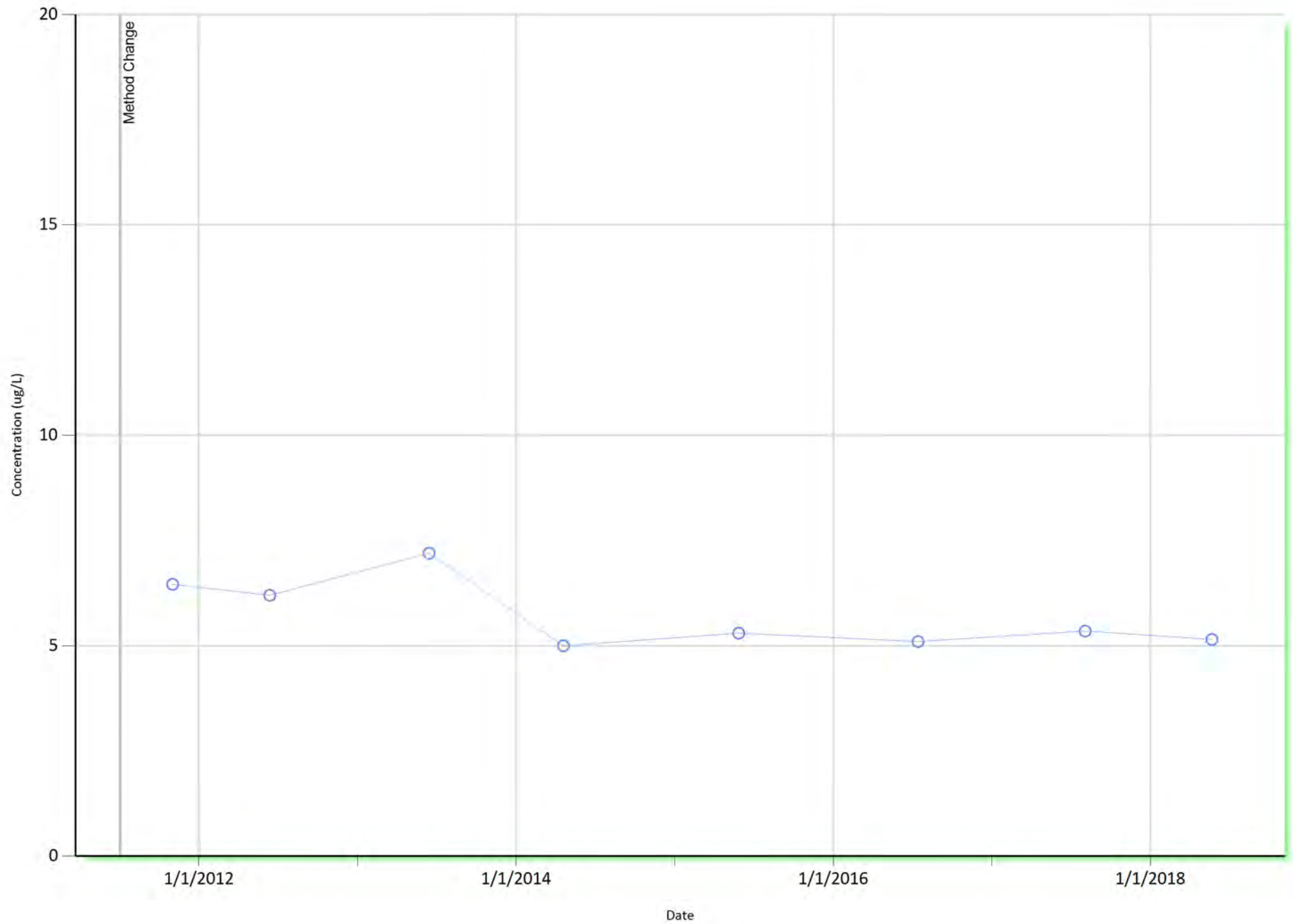
PW-0274, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

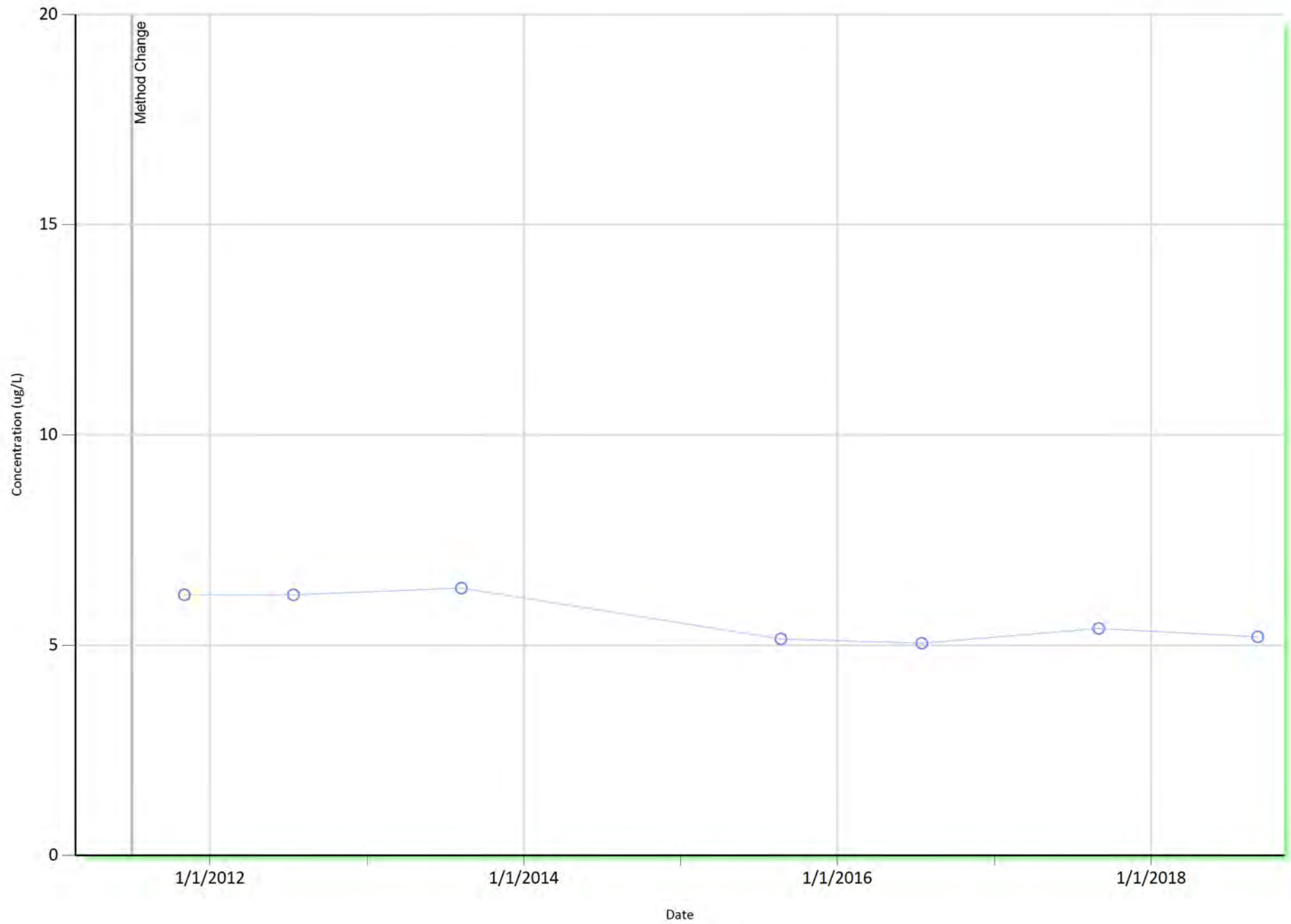
PW-0275, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

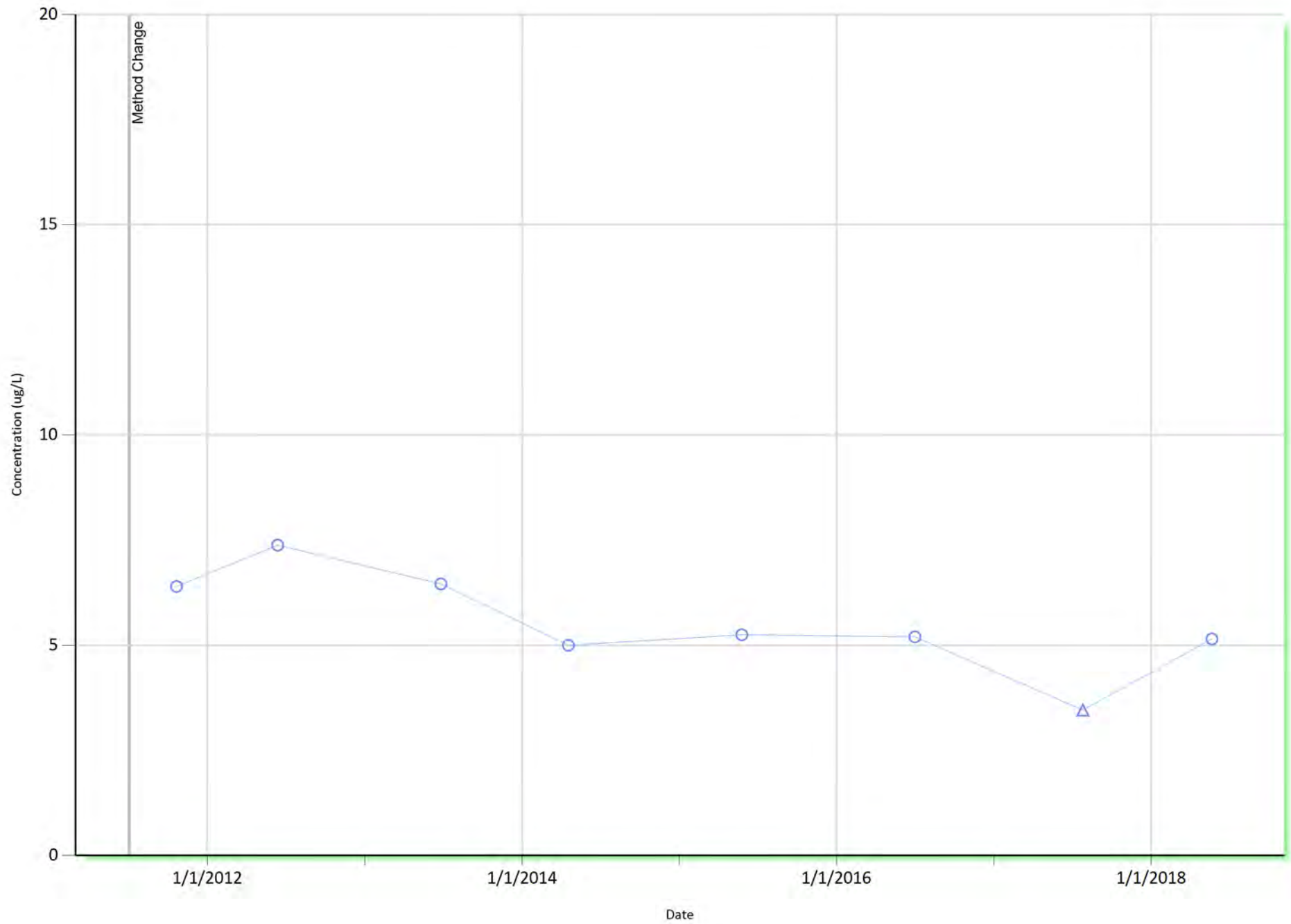
PW-0276, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0277, Off-site, Sulfolane

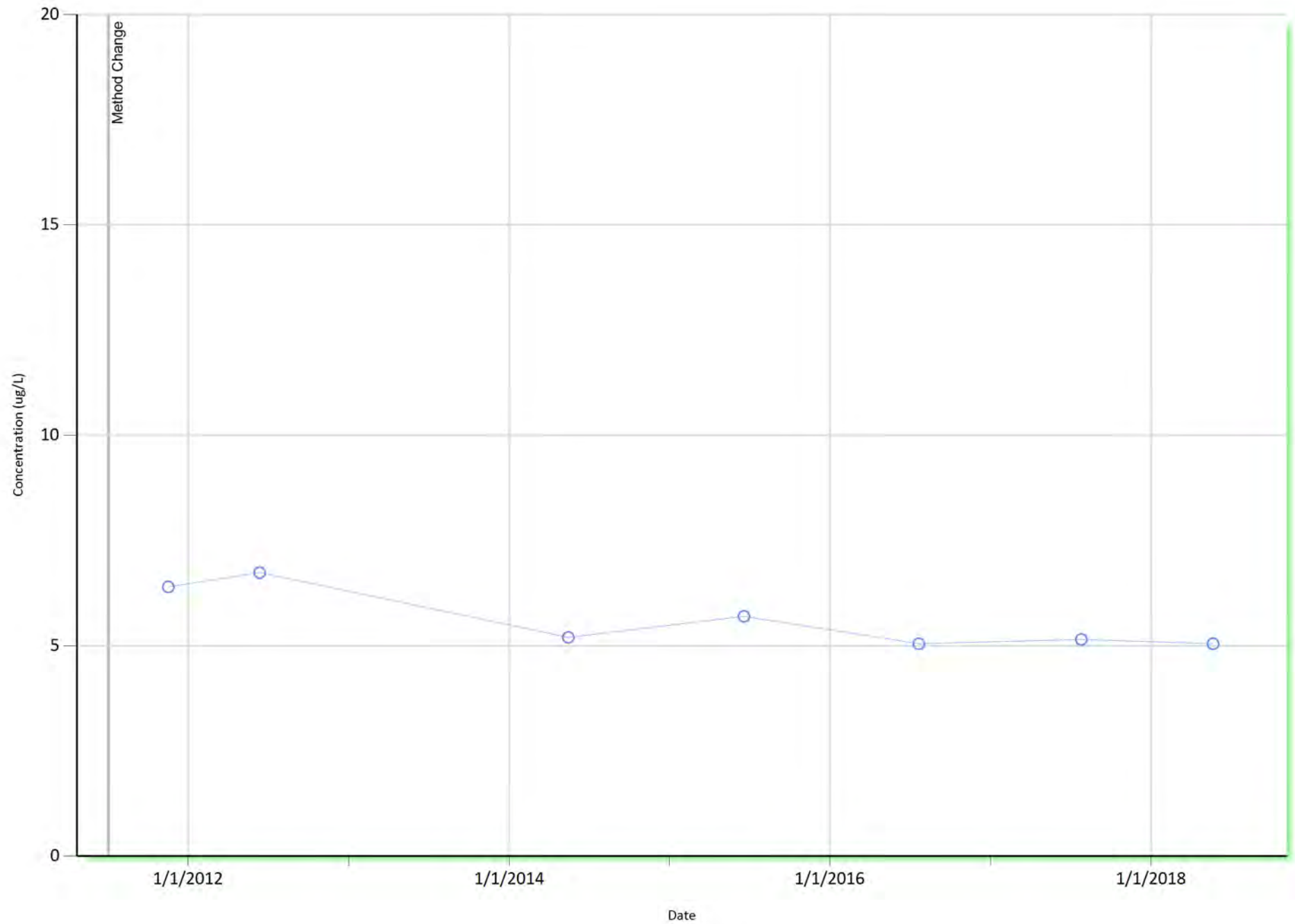


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

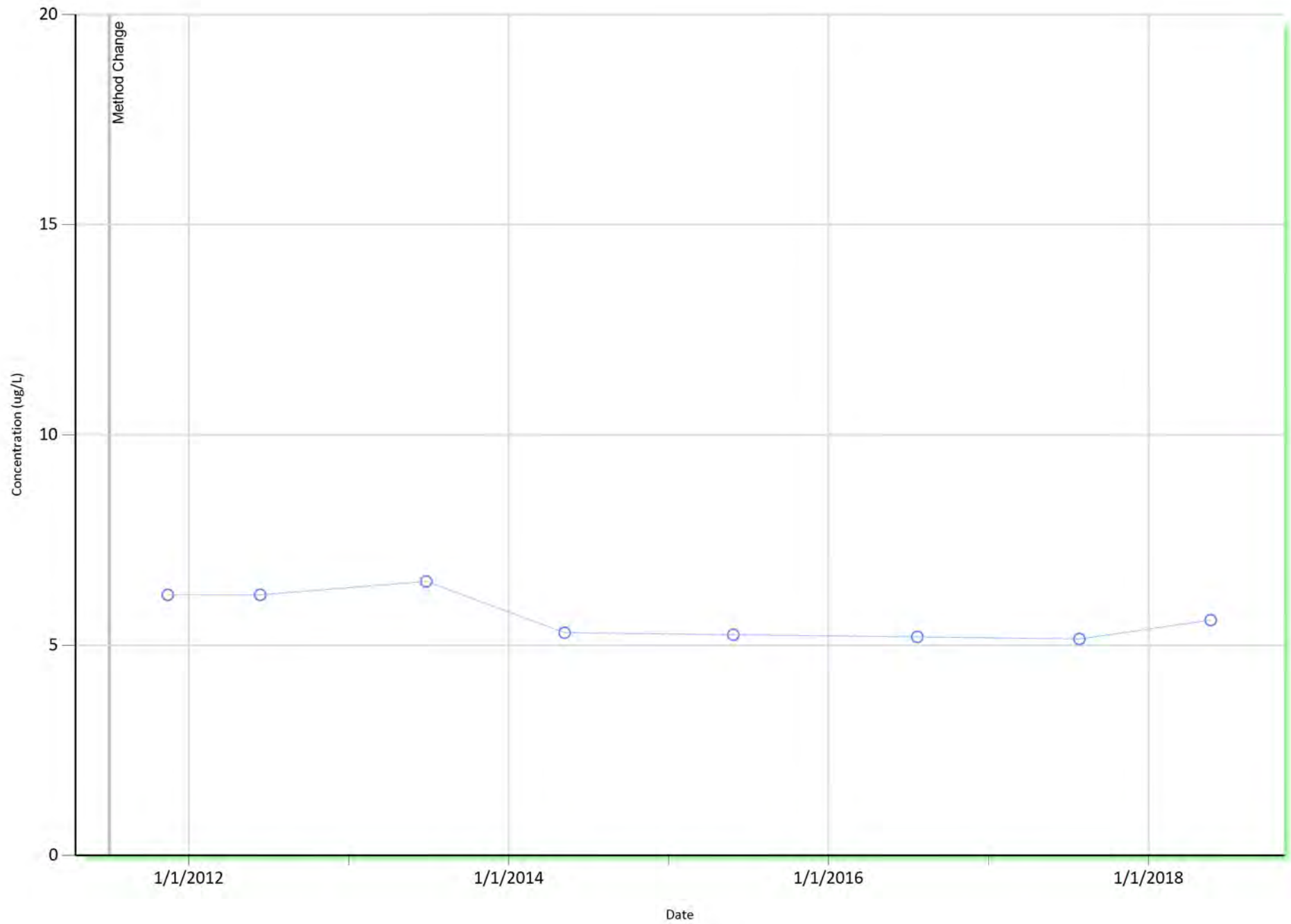
PW-0280, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

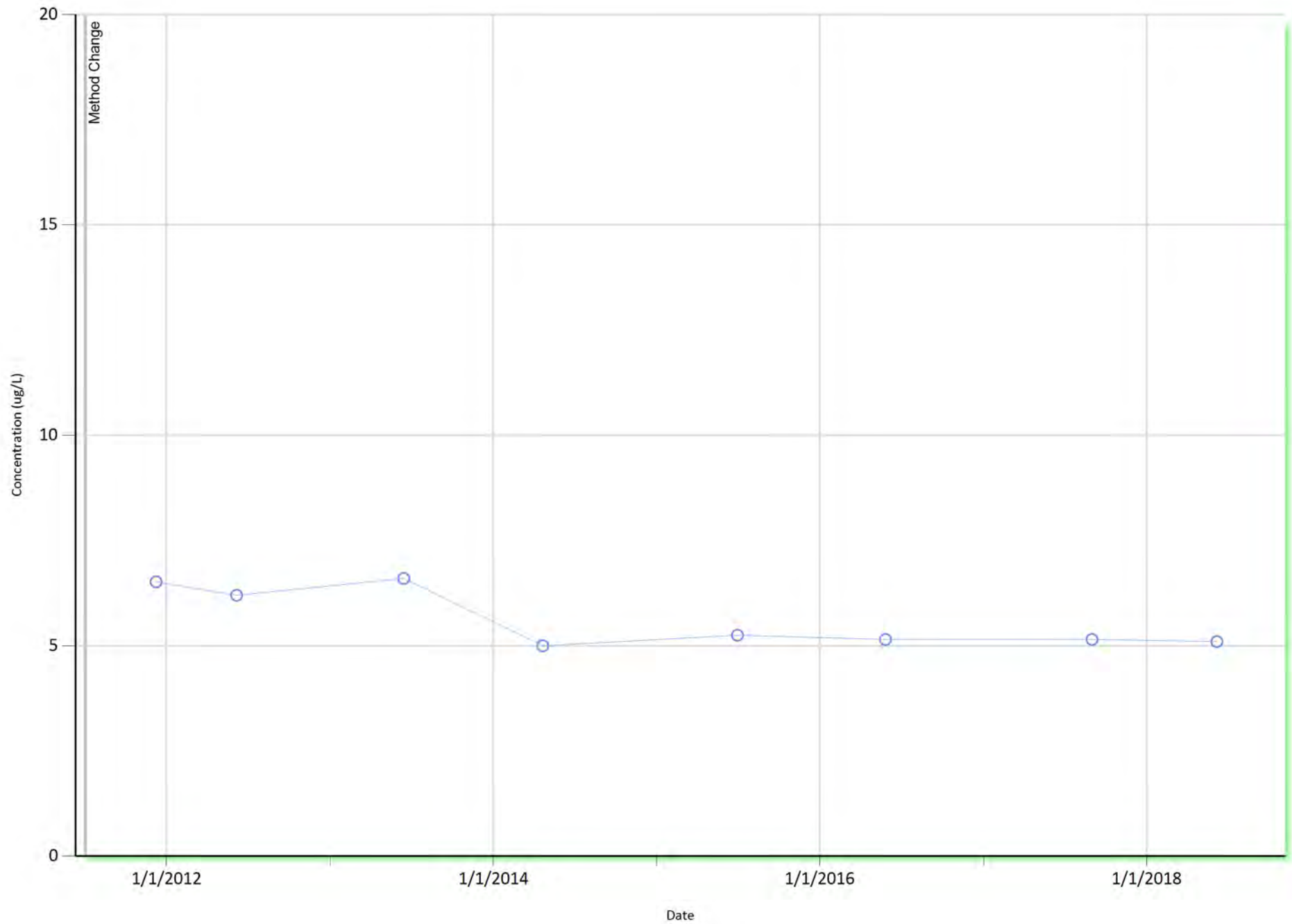
PW-0281, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

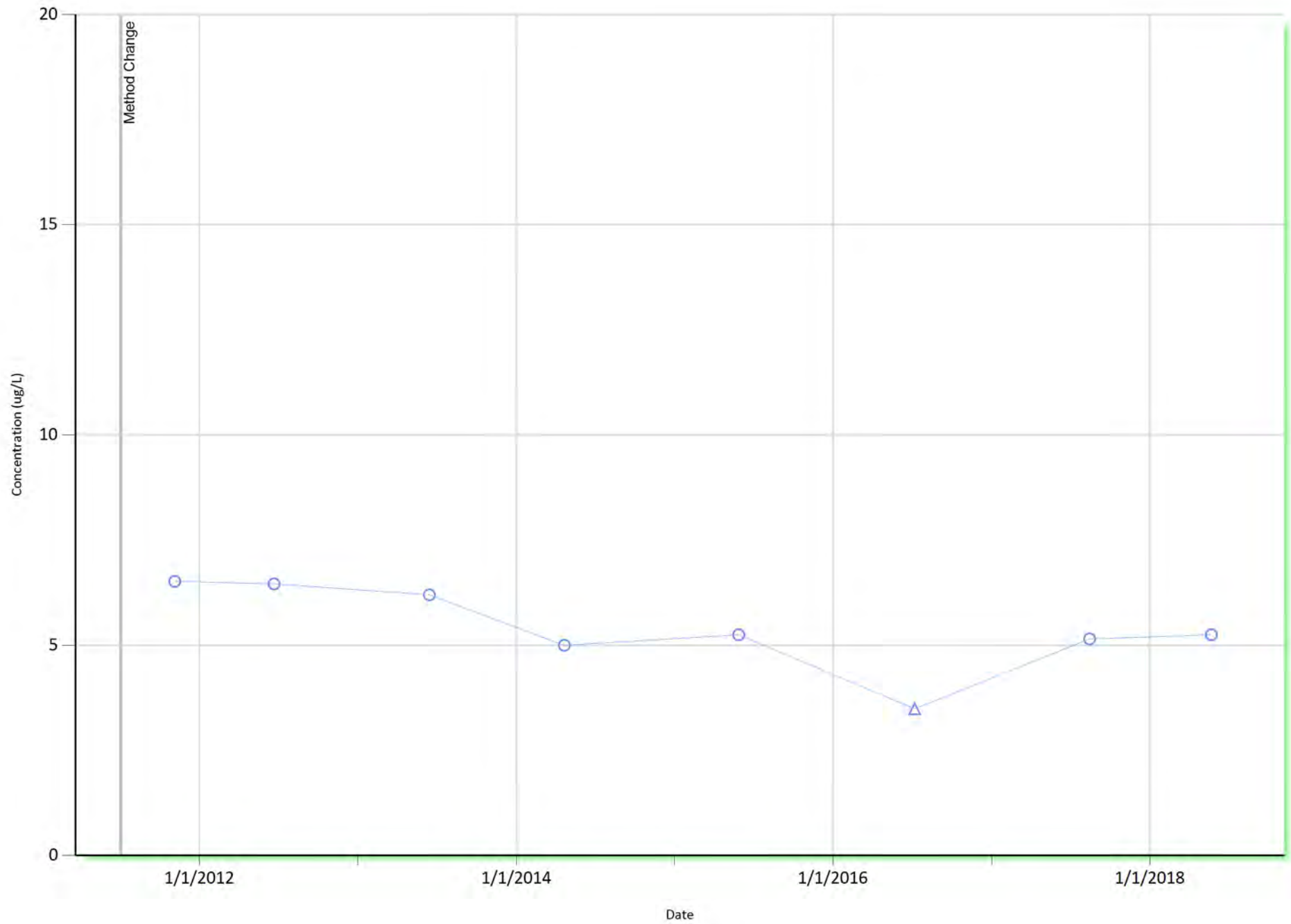
PW-0282, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0284, Off-site, Sulfolane

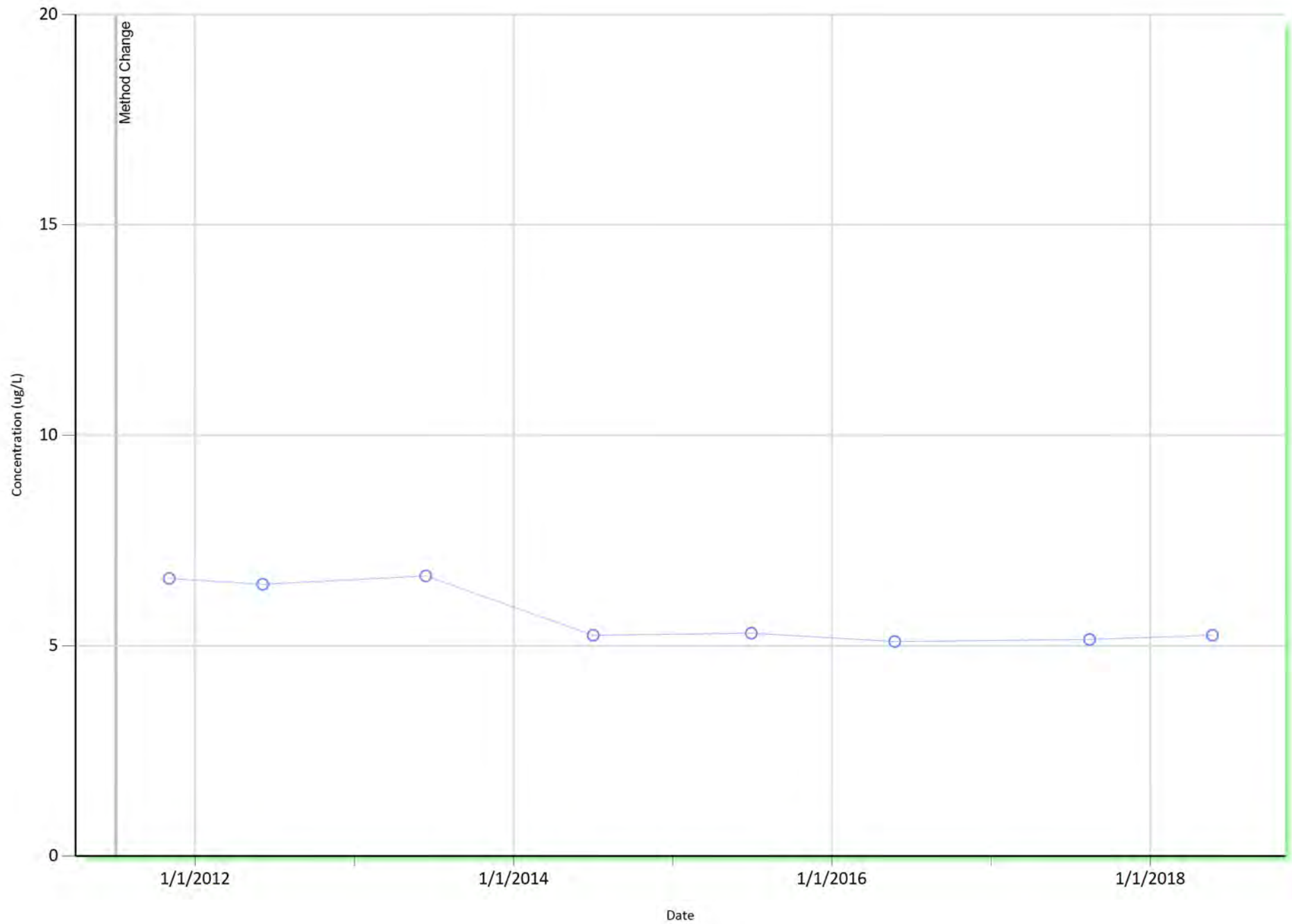


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

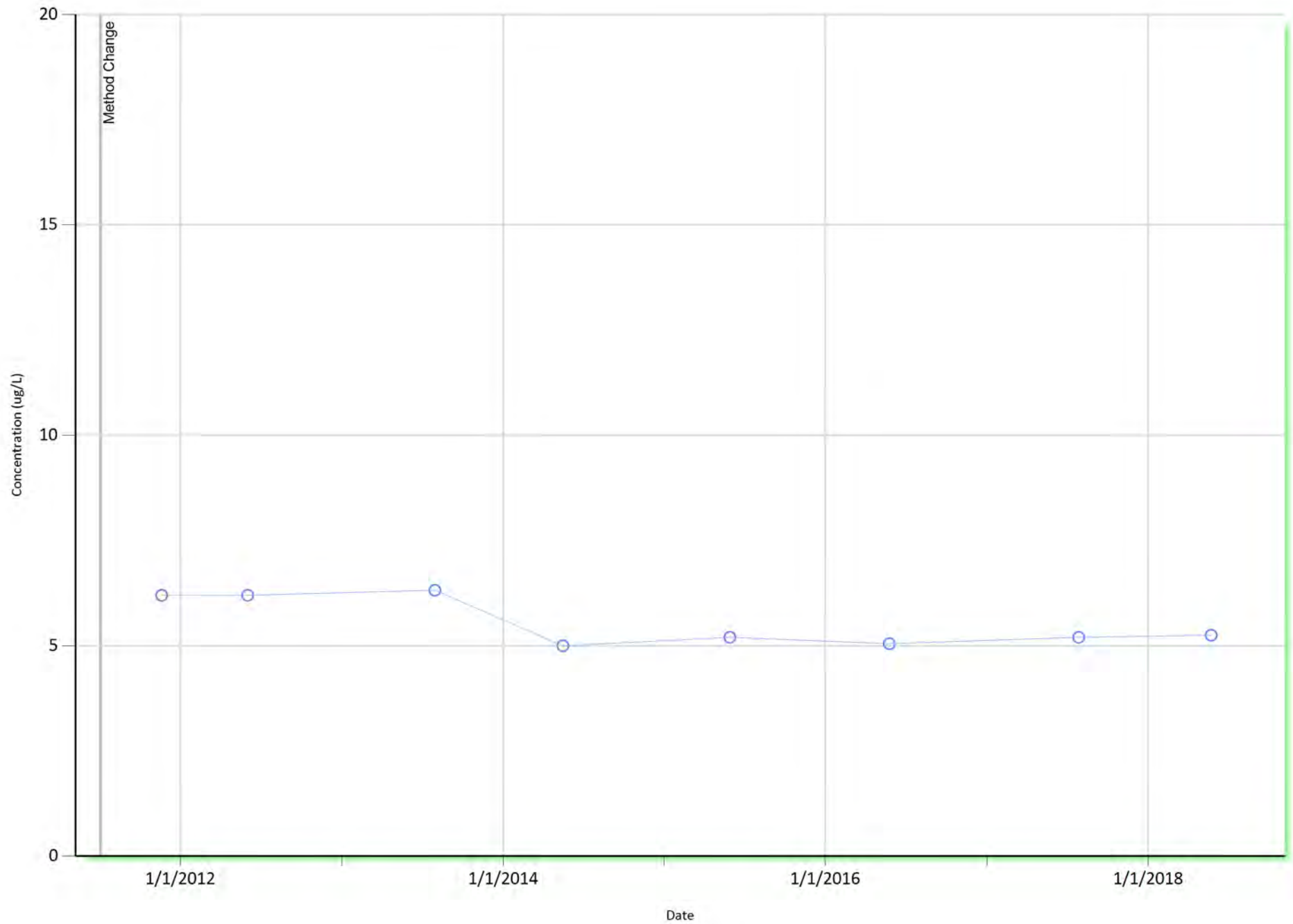
PW-0285, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

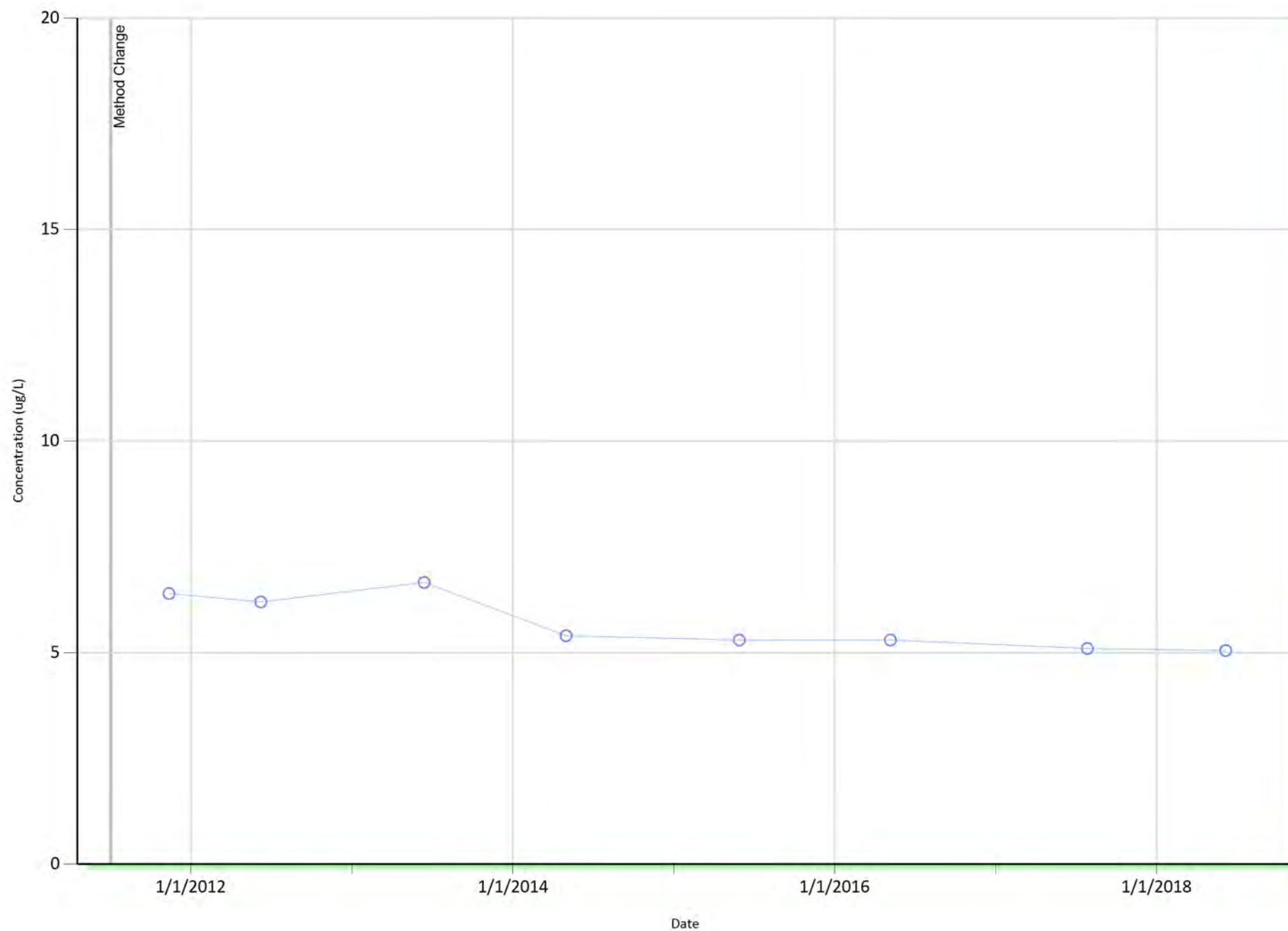
PW-0286, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

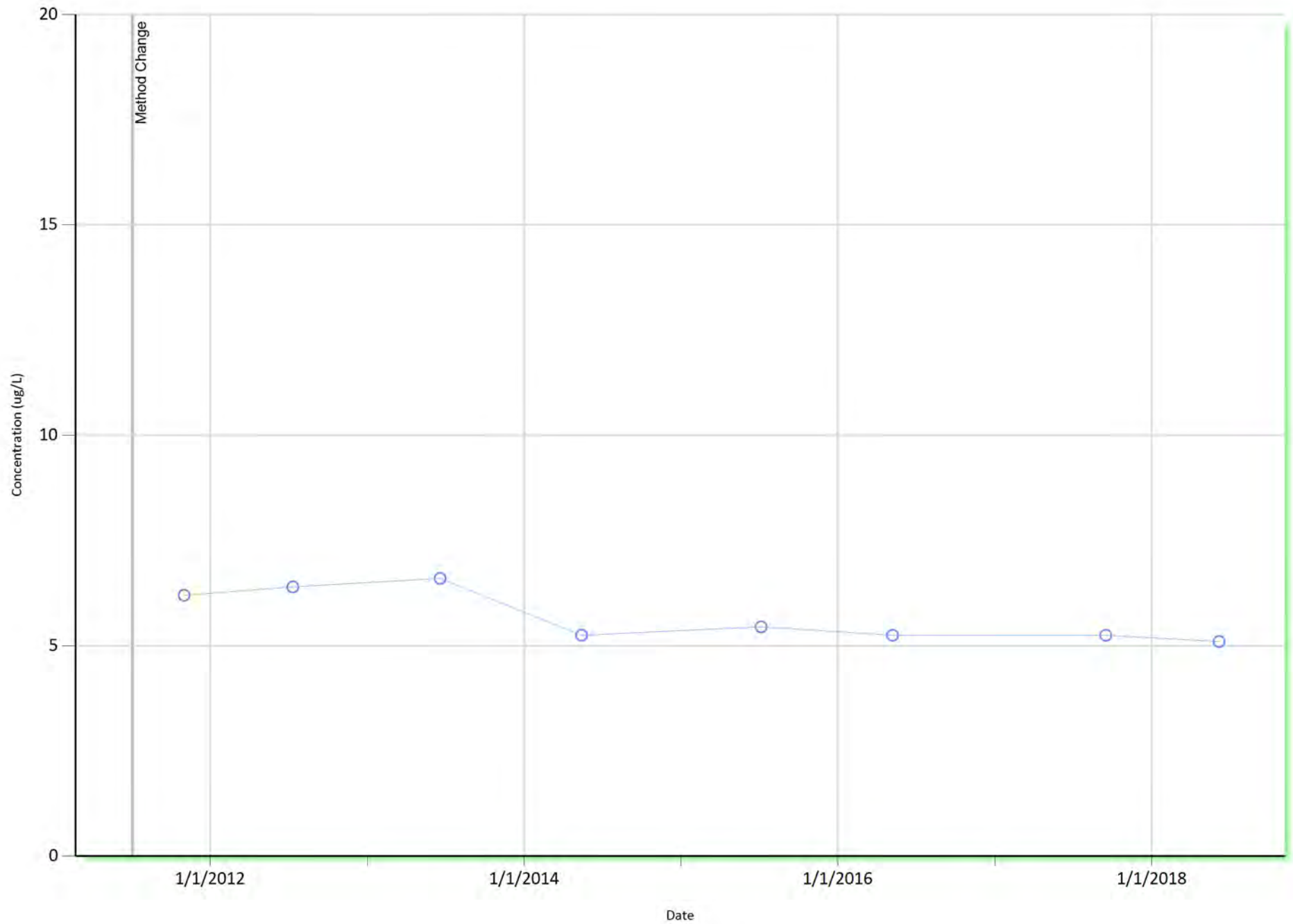
PW-0287, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

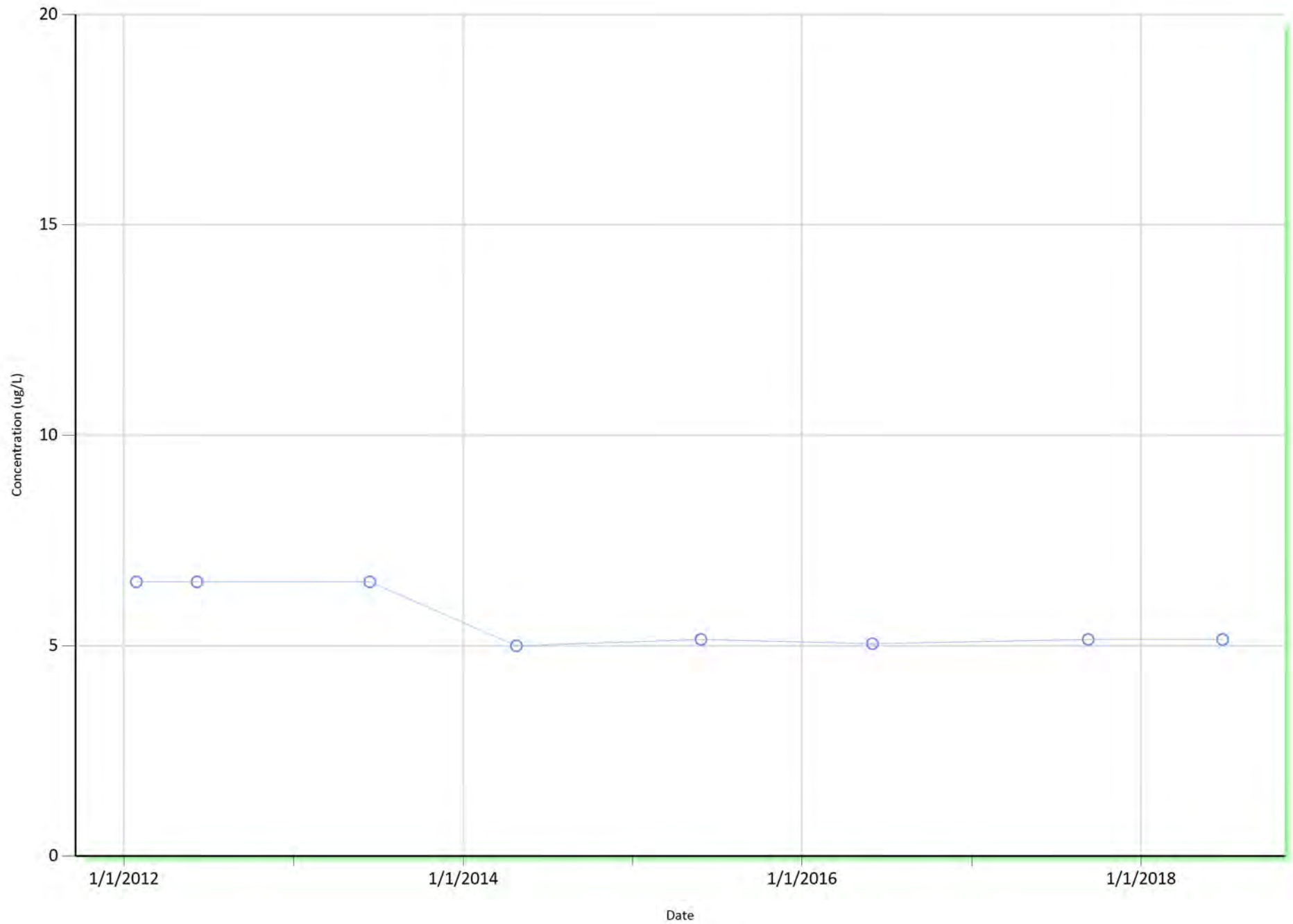
PW-0288, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0289, Off-site, Sulfolane

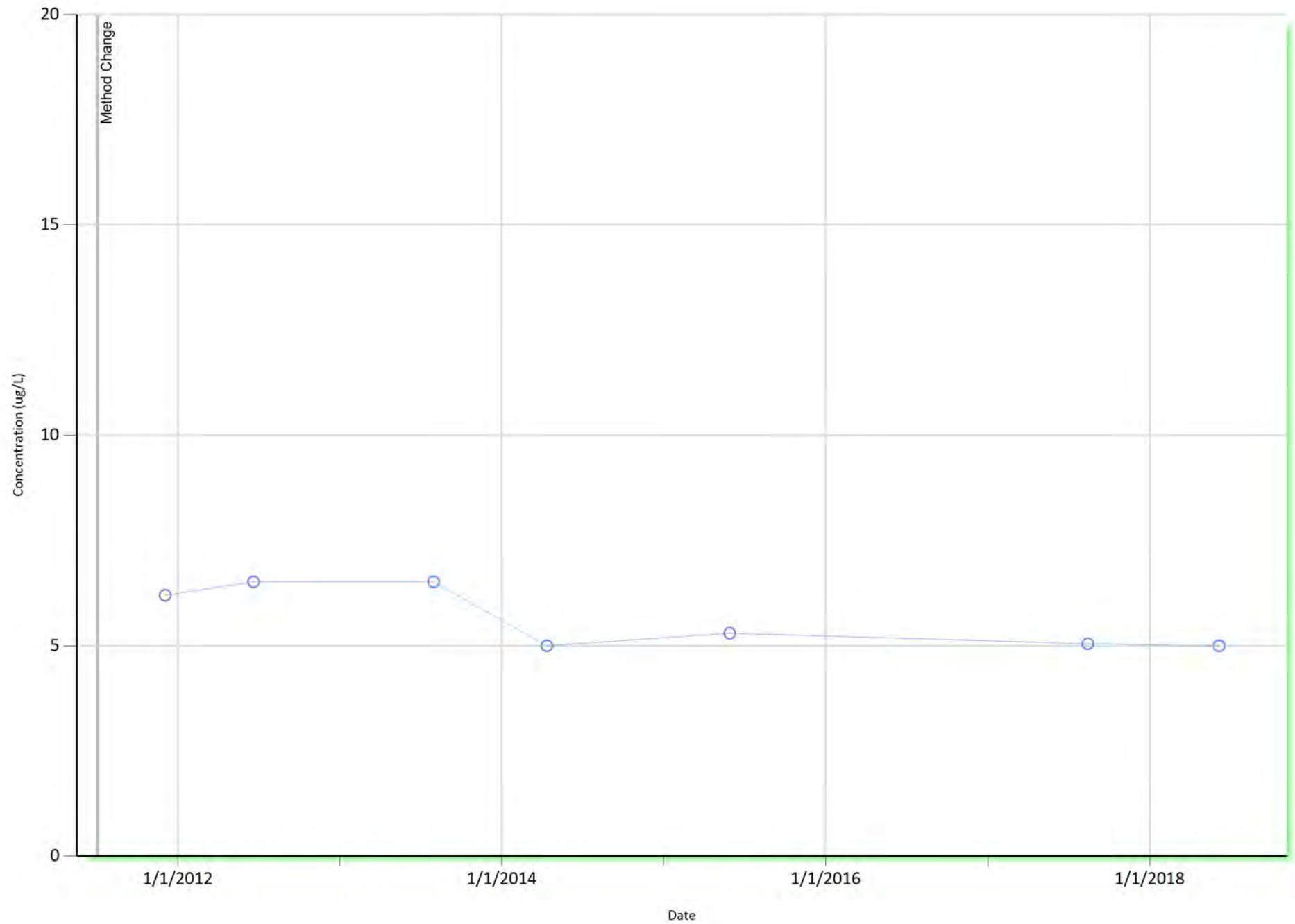


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

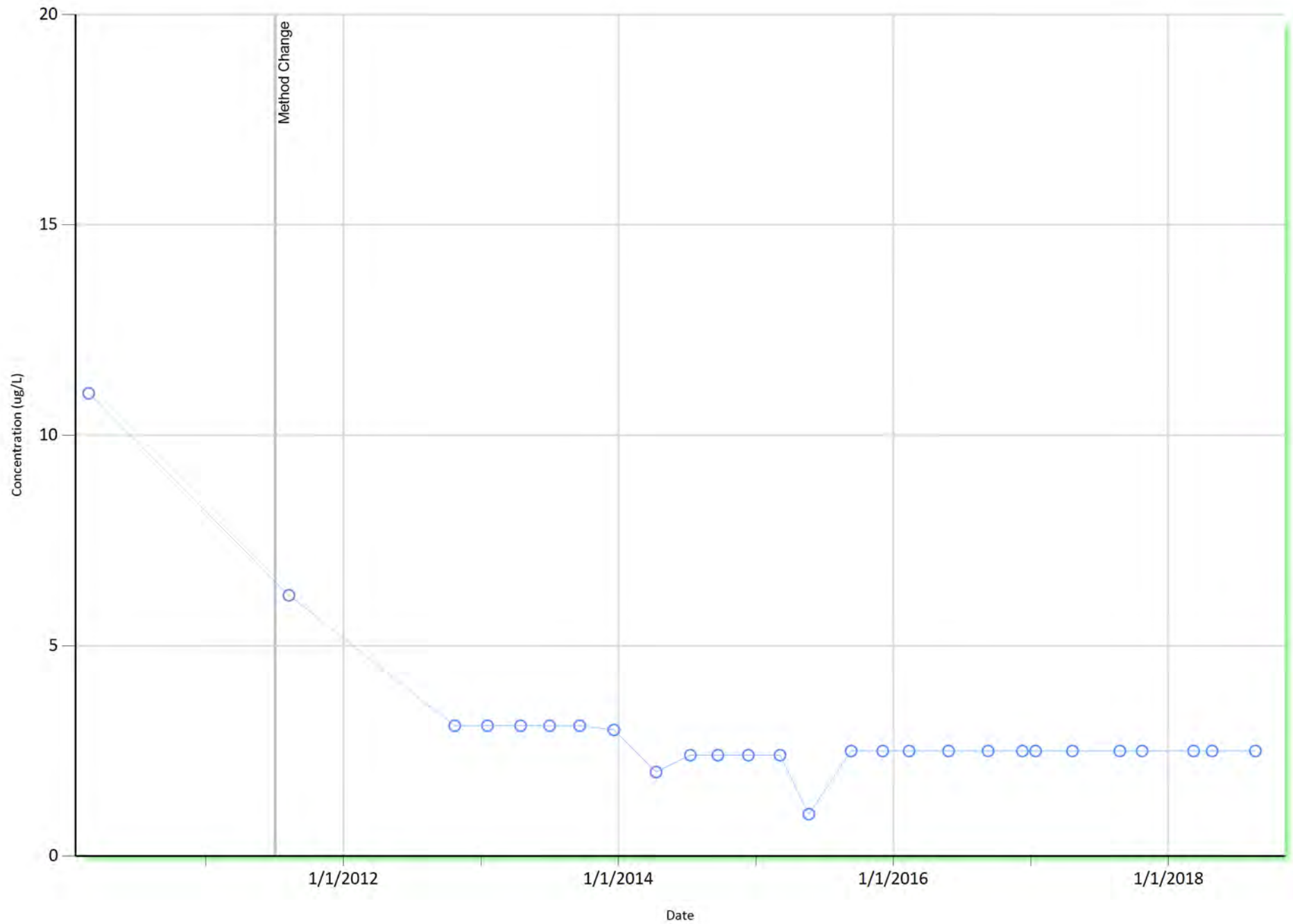
PW-0290, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

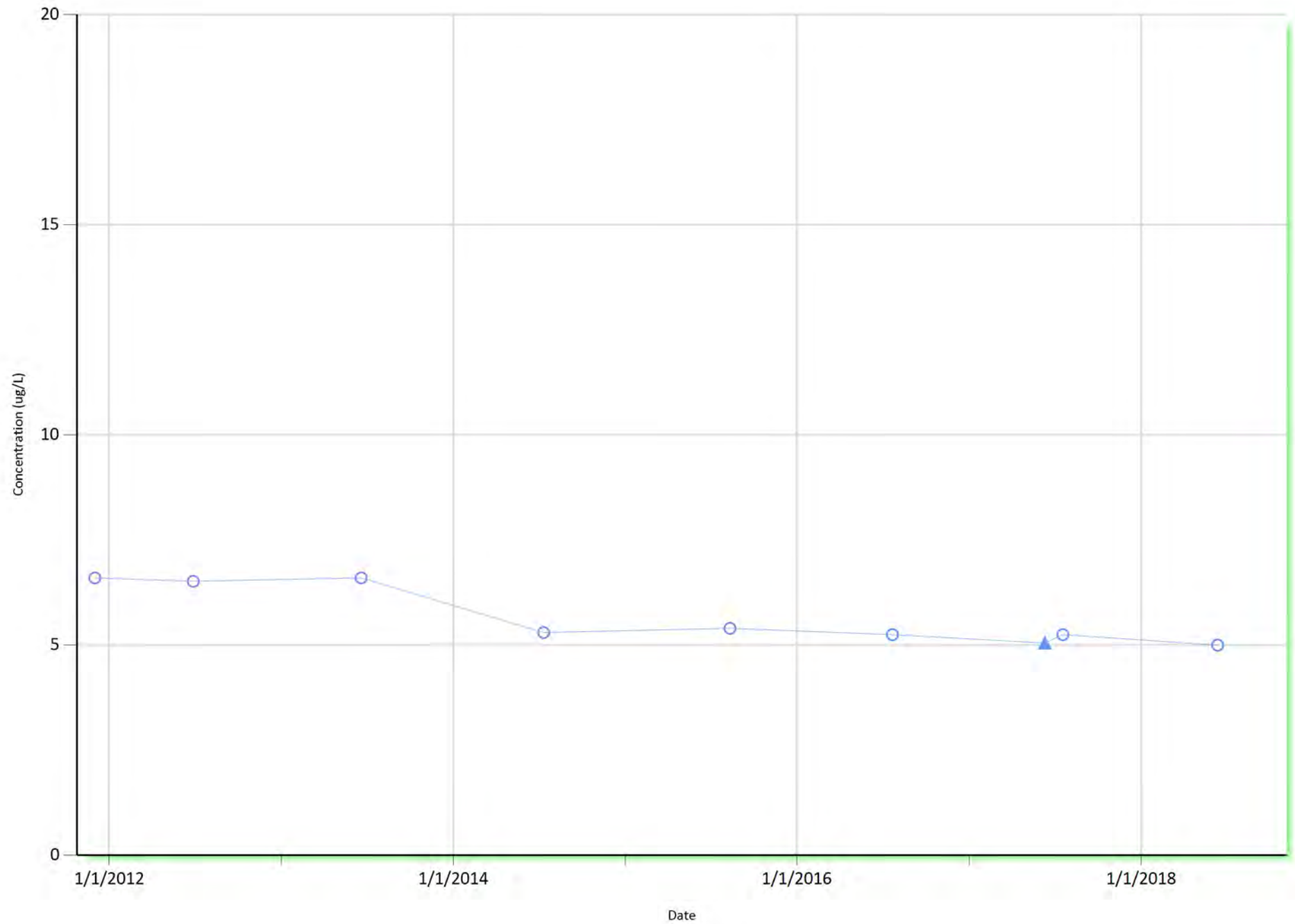
PW-0365, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

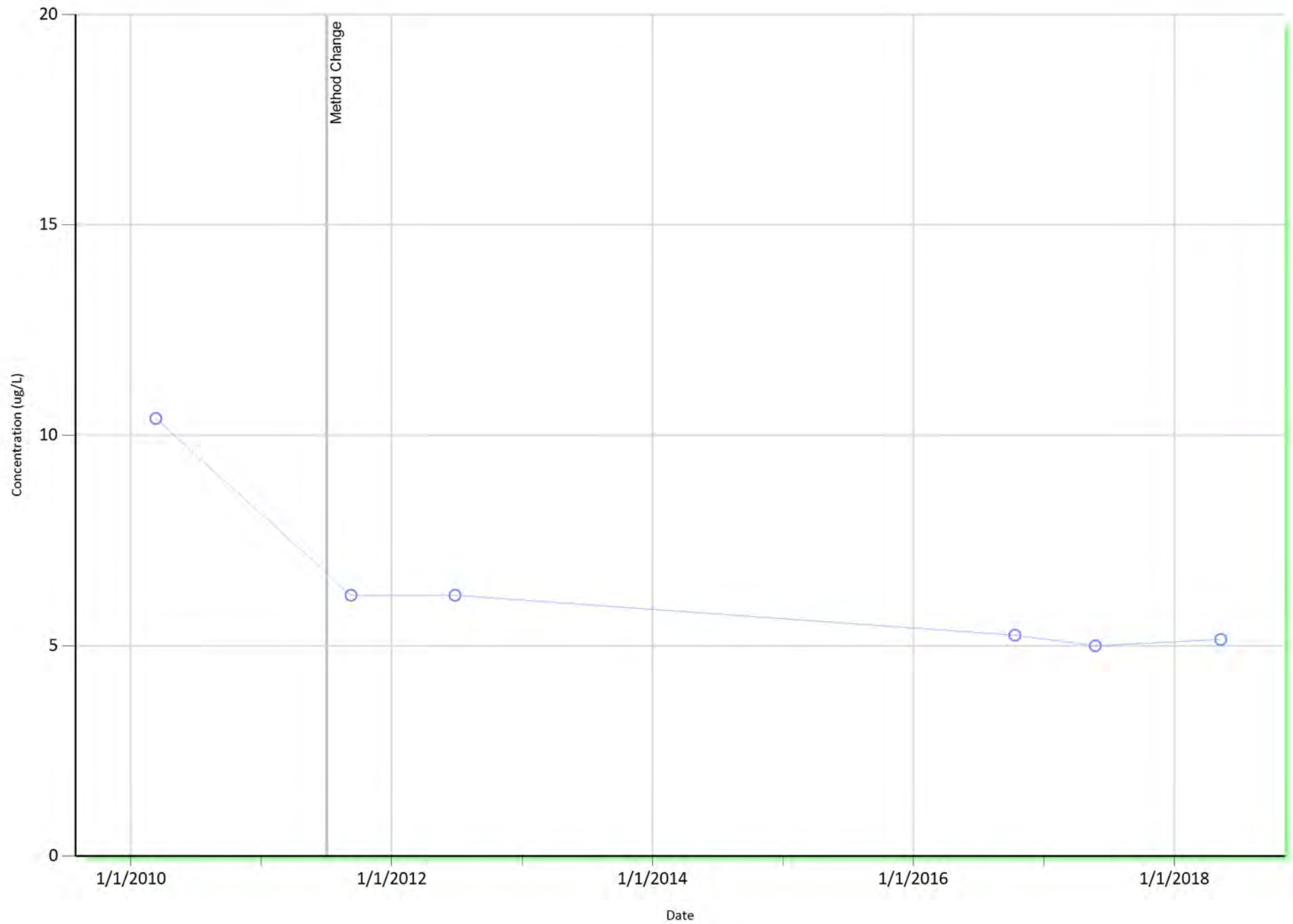
PW-0366, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

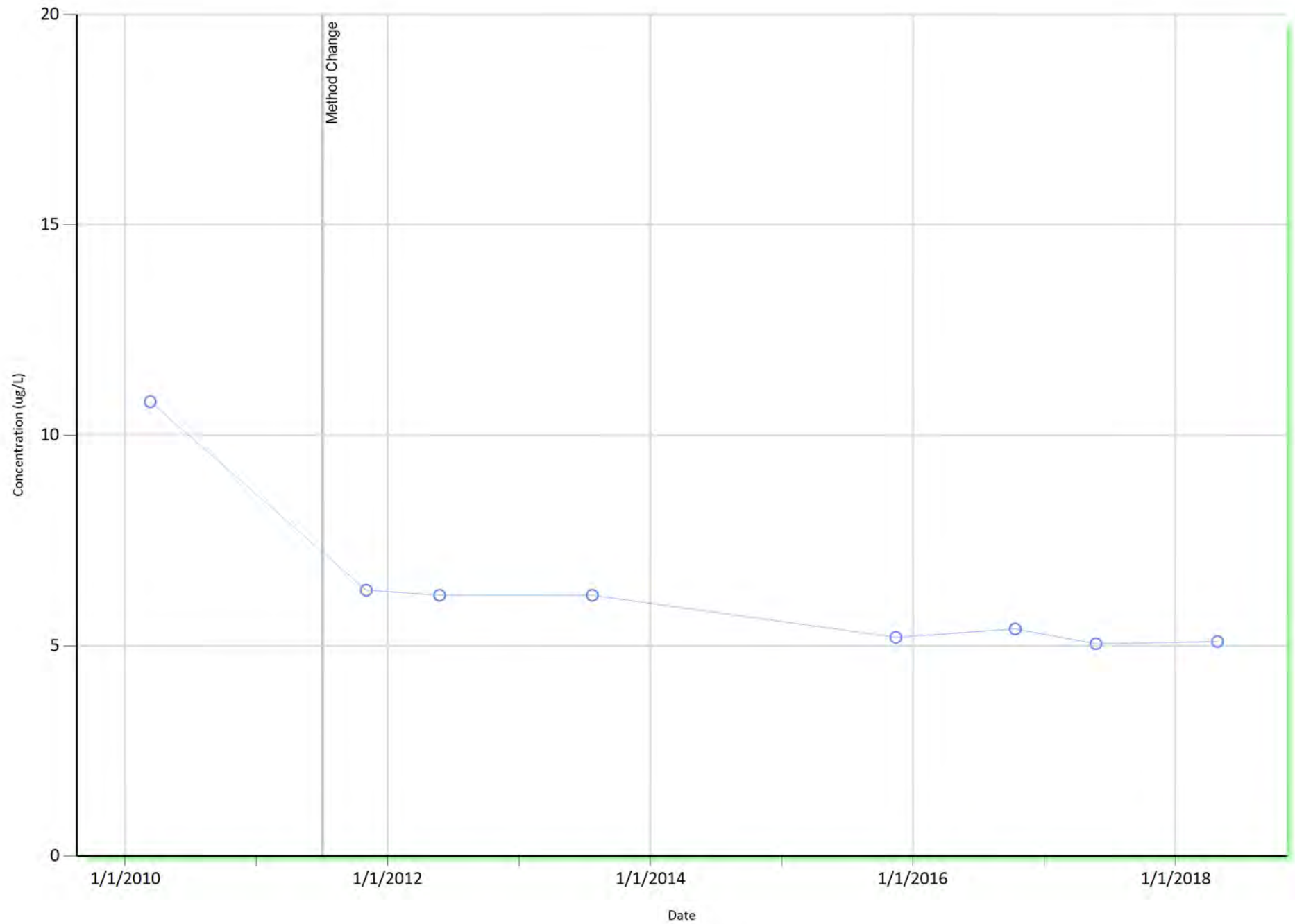
PW-0367, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

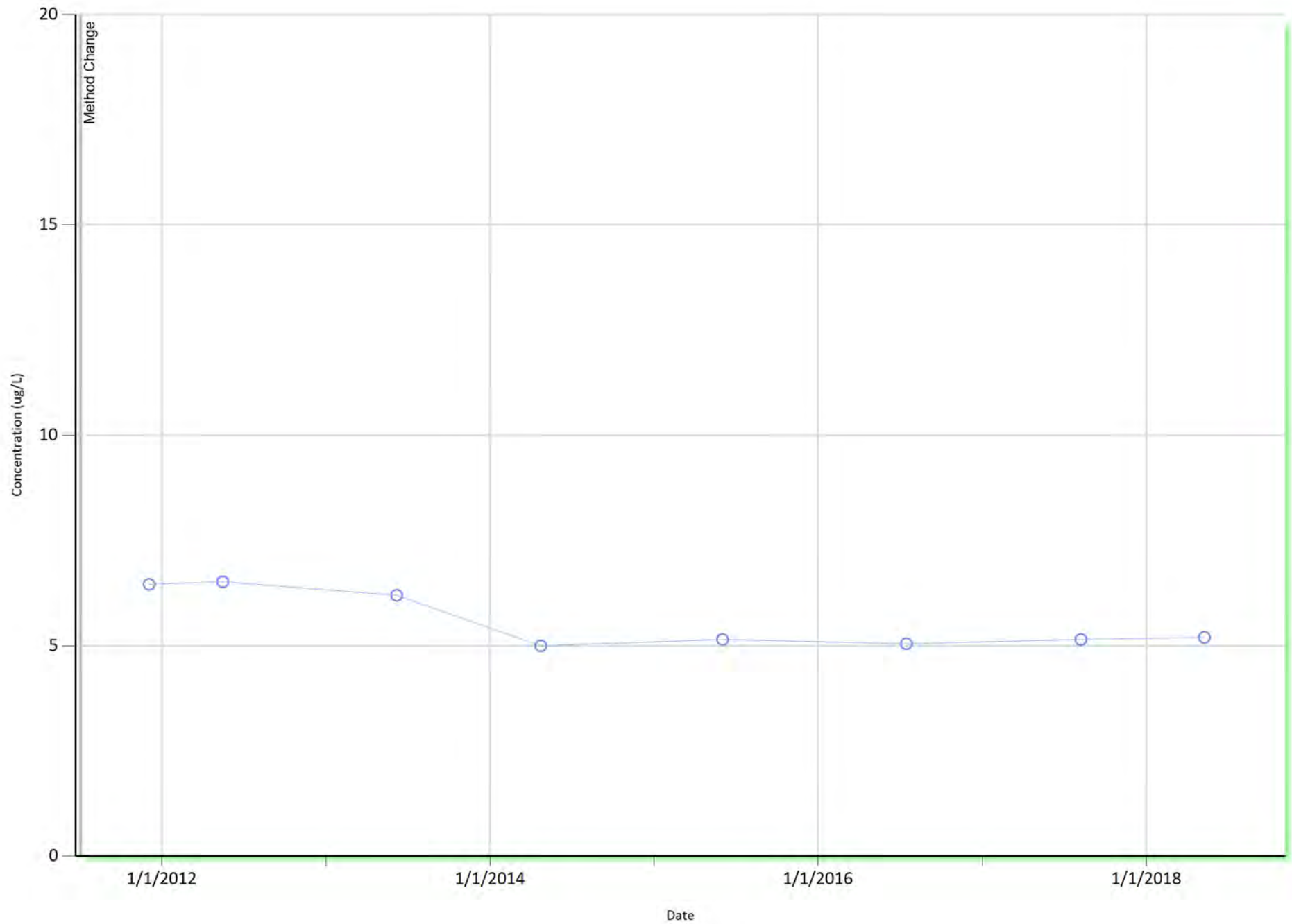
PW-0368, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0369, Off-site, Sulfolane

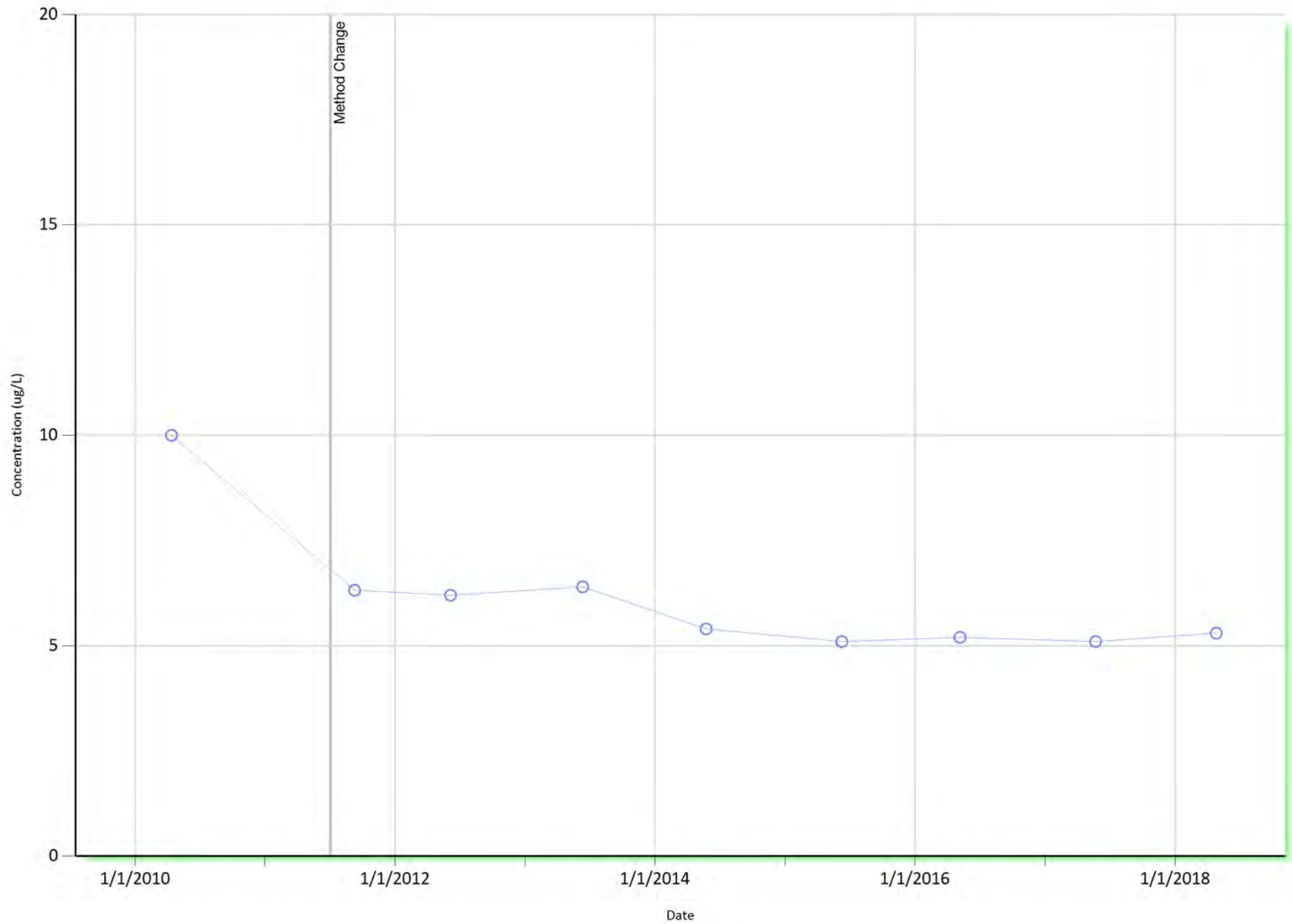


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

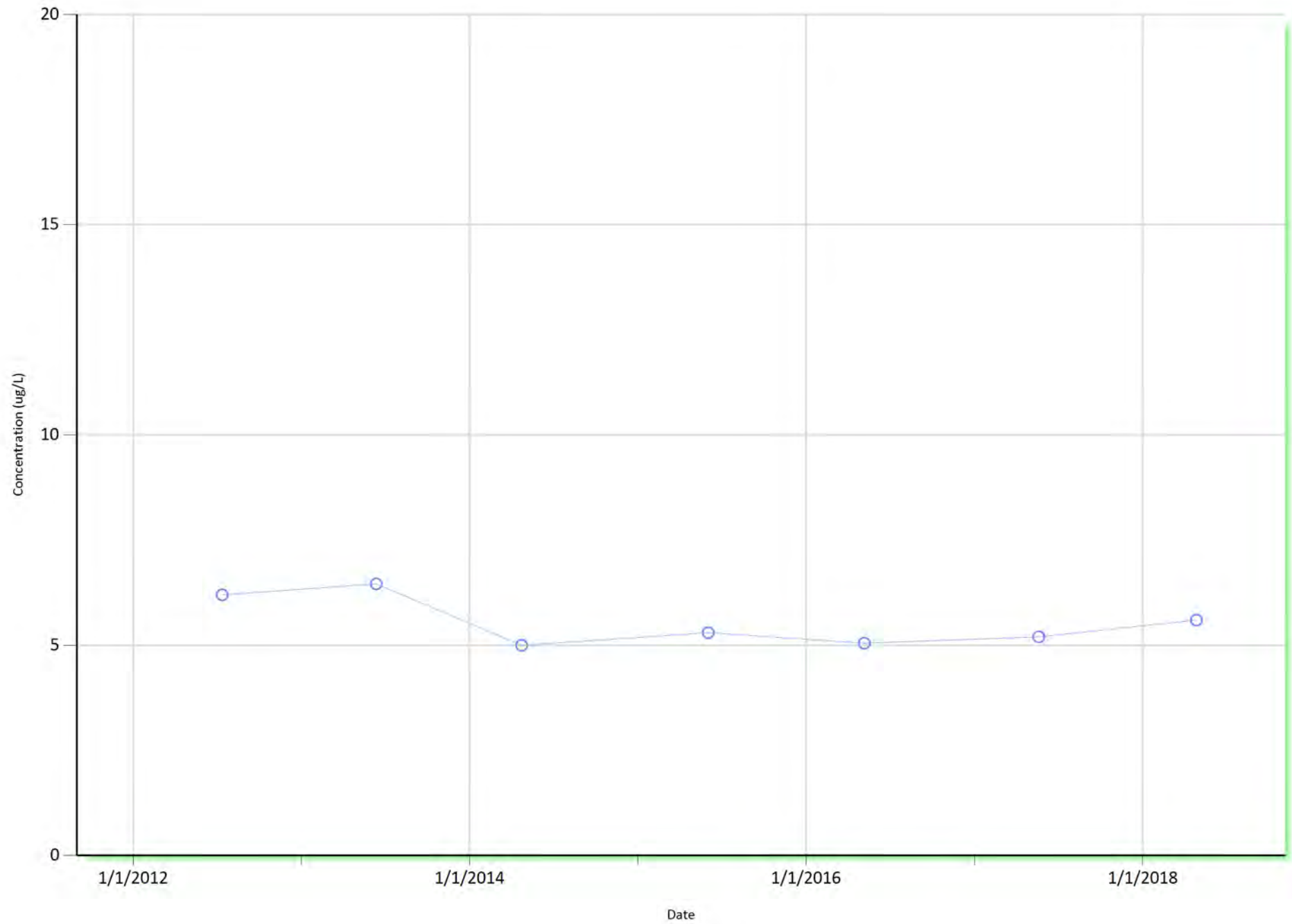
PW-0370, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

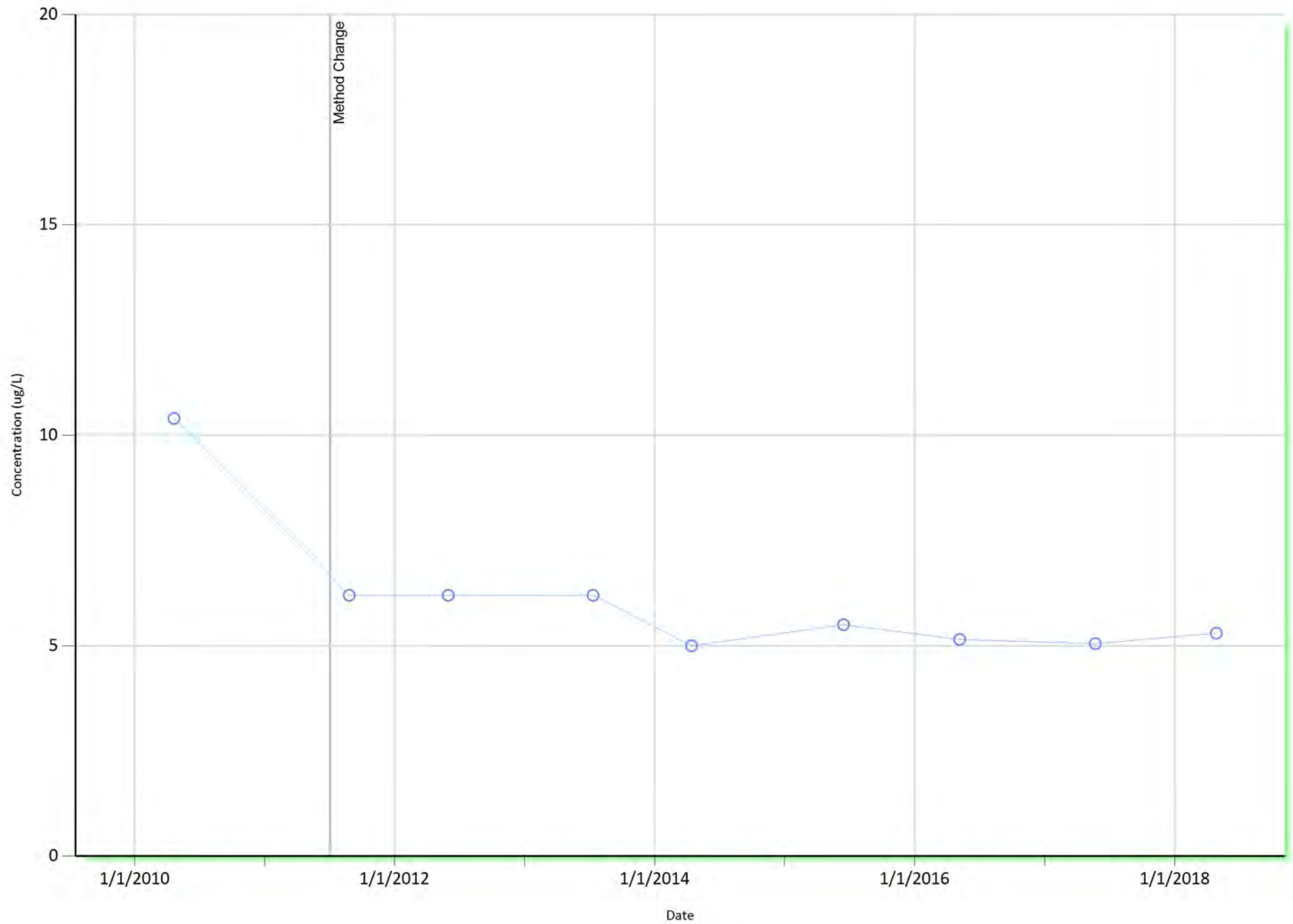
PW-0371, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

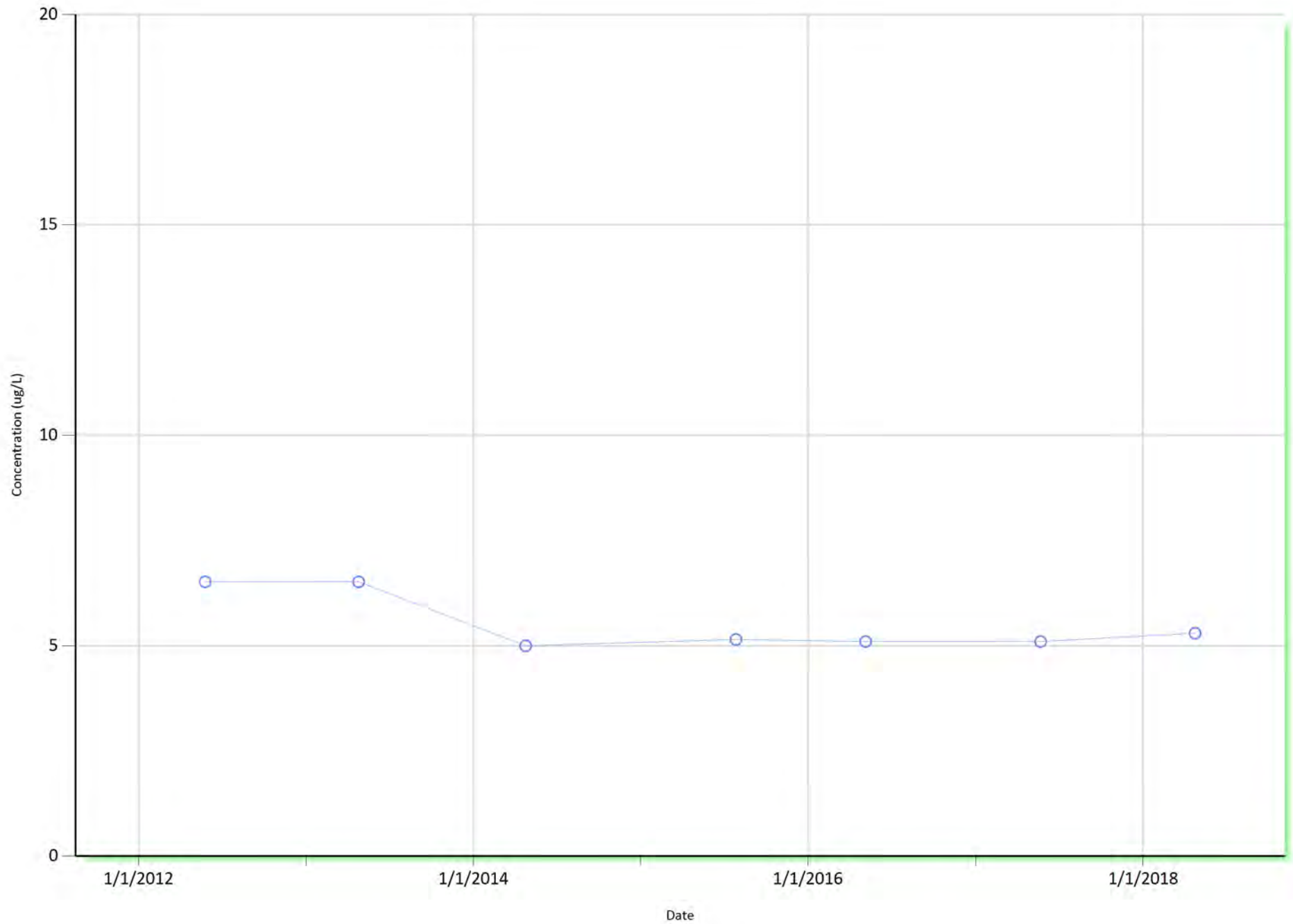
PW-0372, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

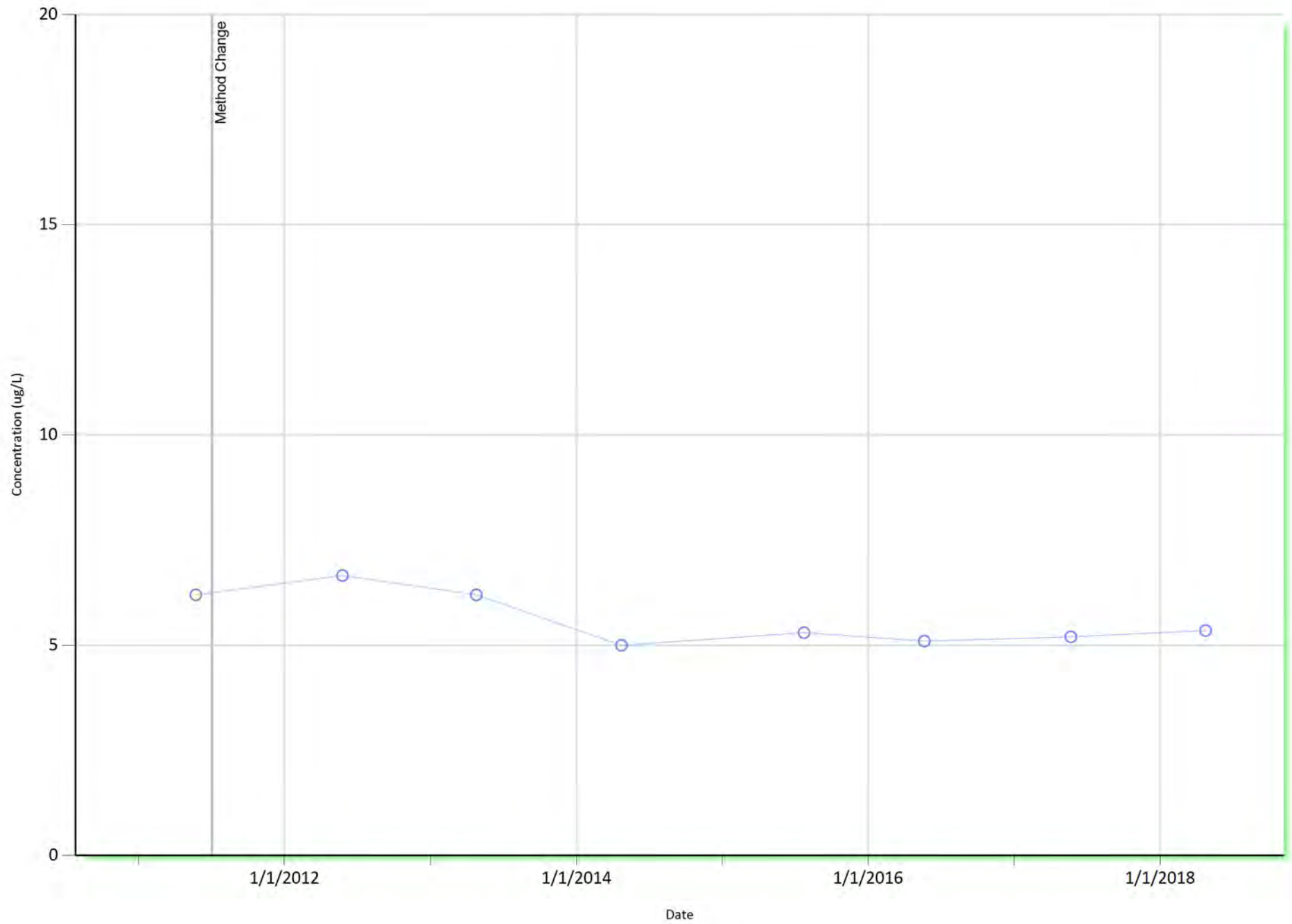
PW-0373, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

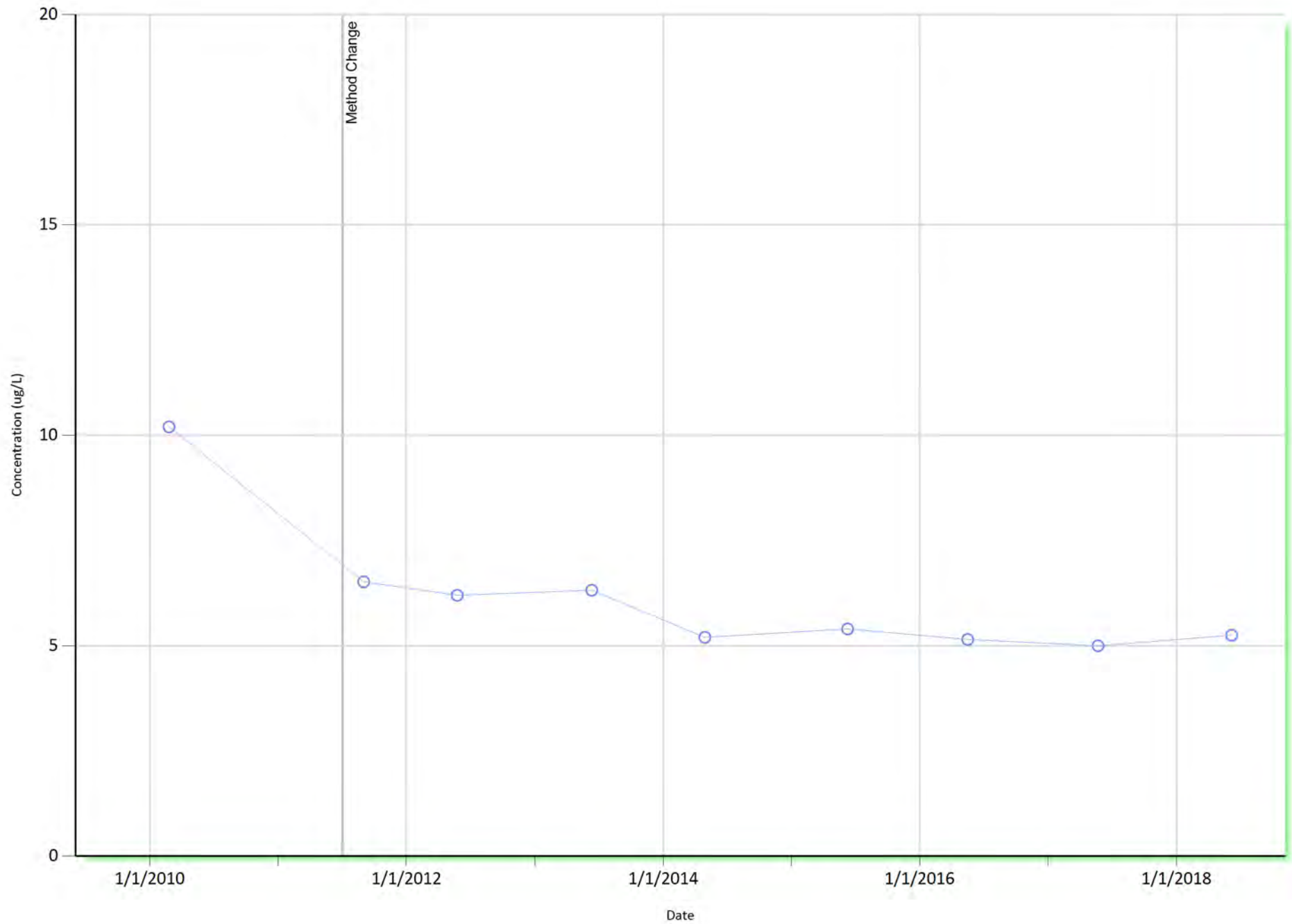
PW-0374, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0379, Off-site, Sulfolane

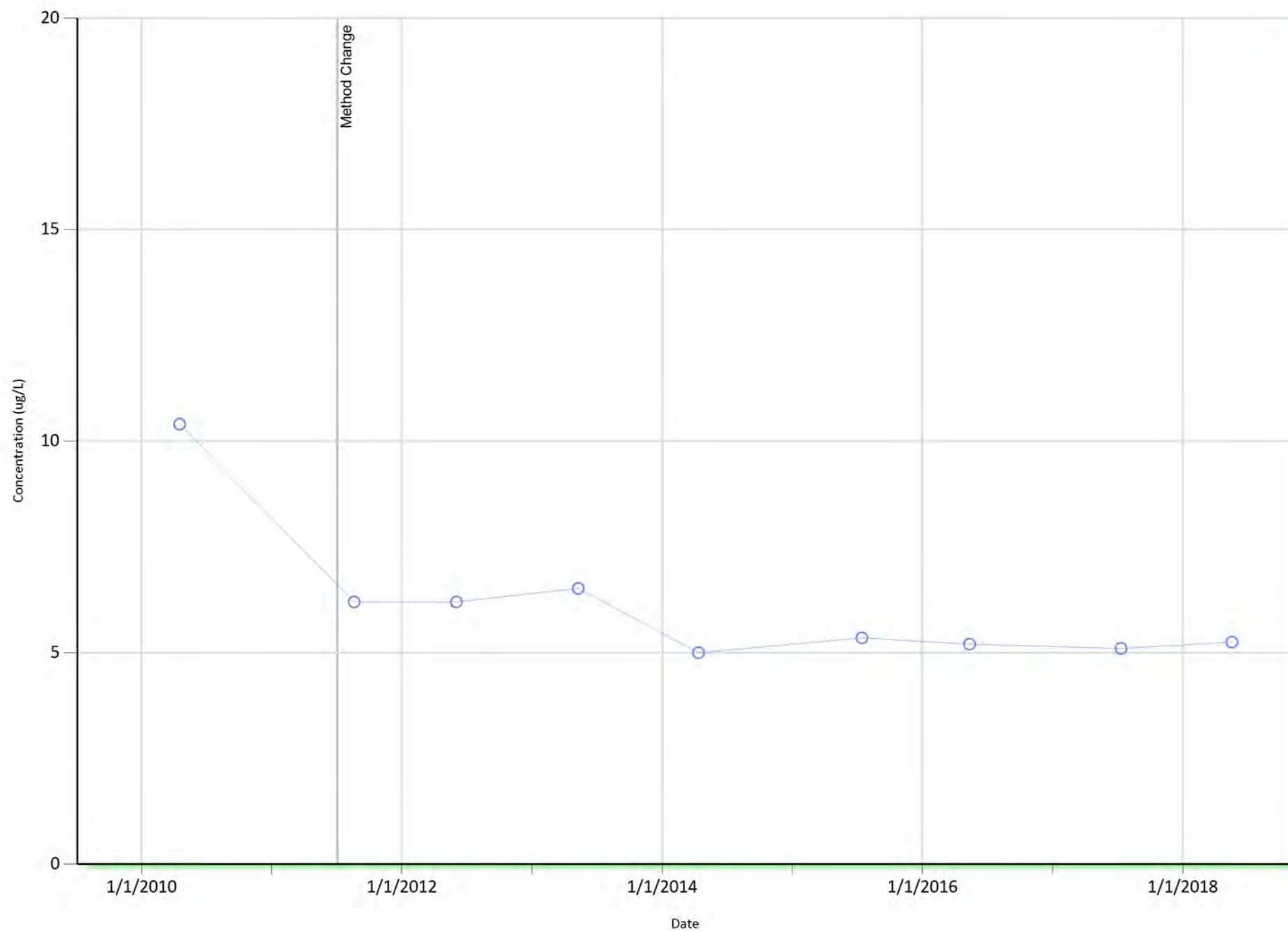


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

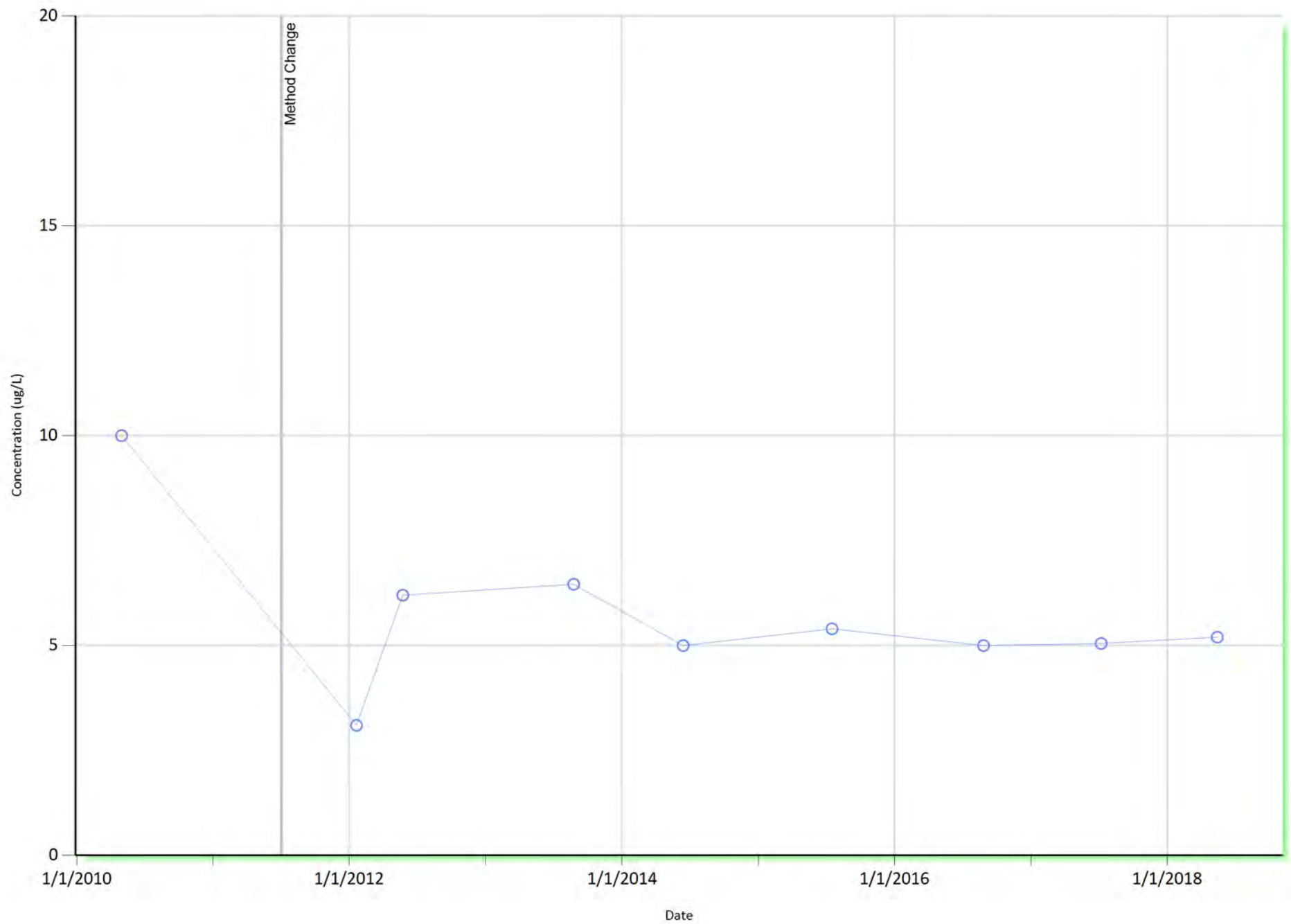
PW-0508, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

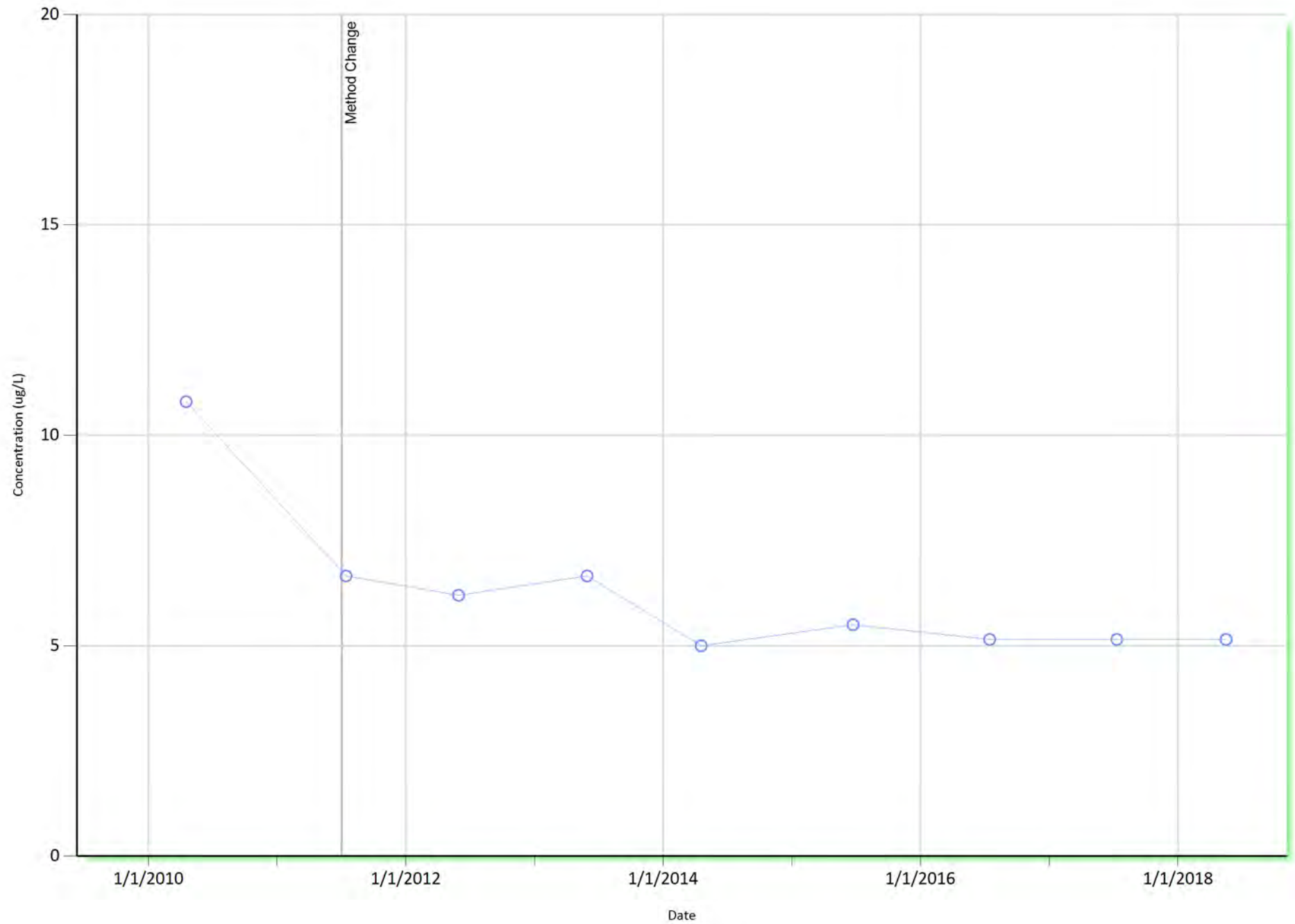
PW-0512, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

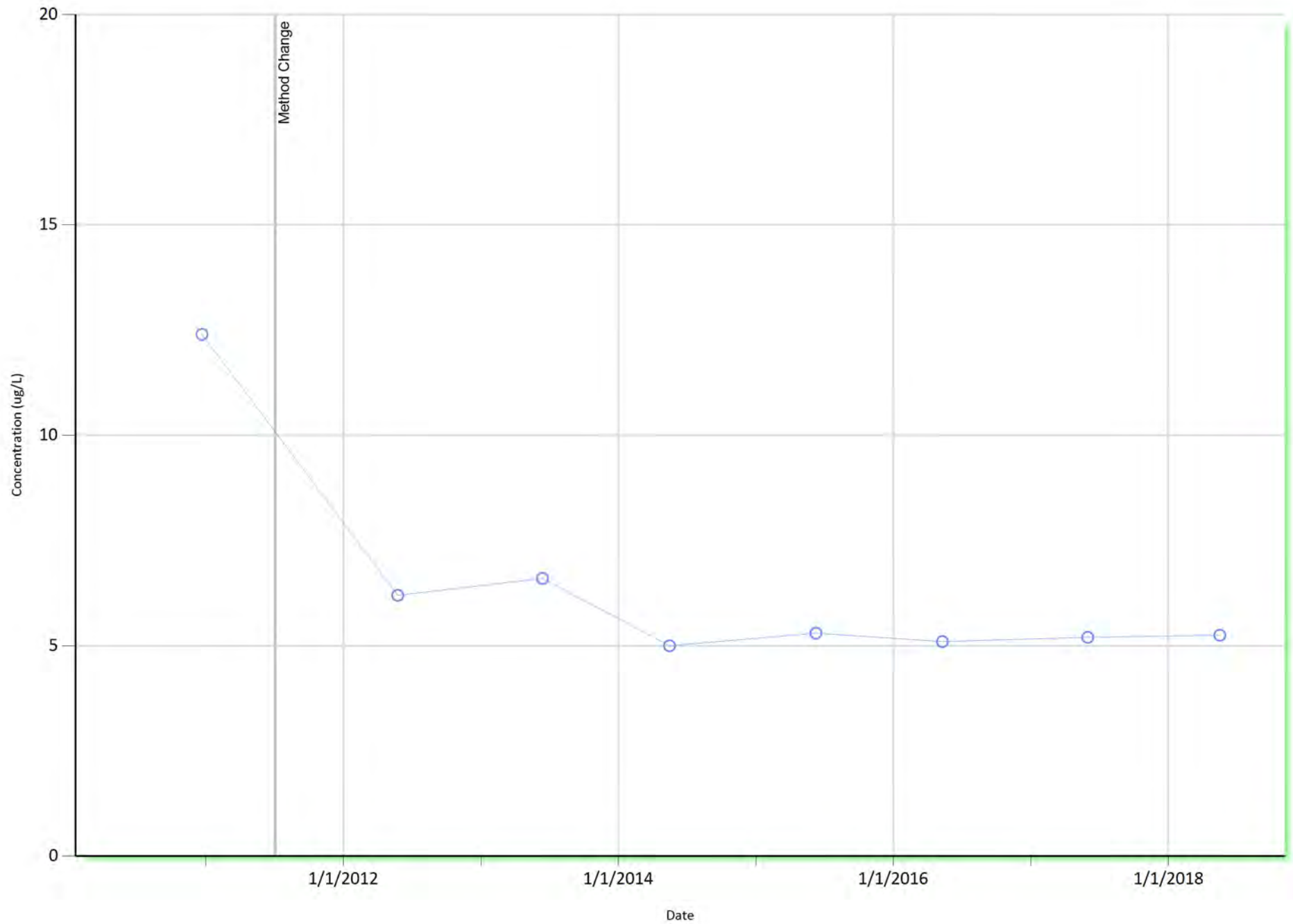
PW-0513, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

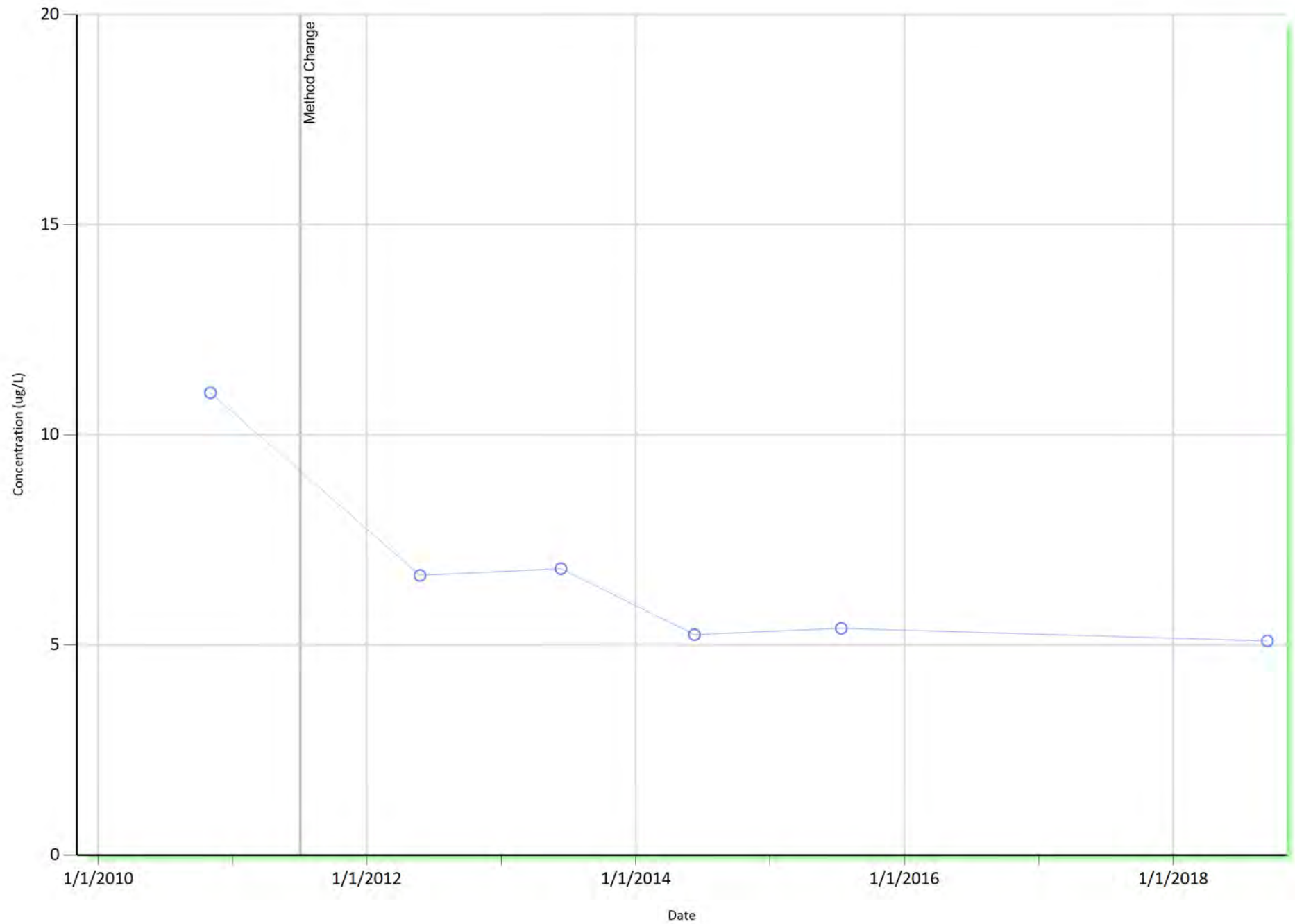
PW-0531, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

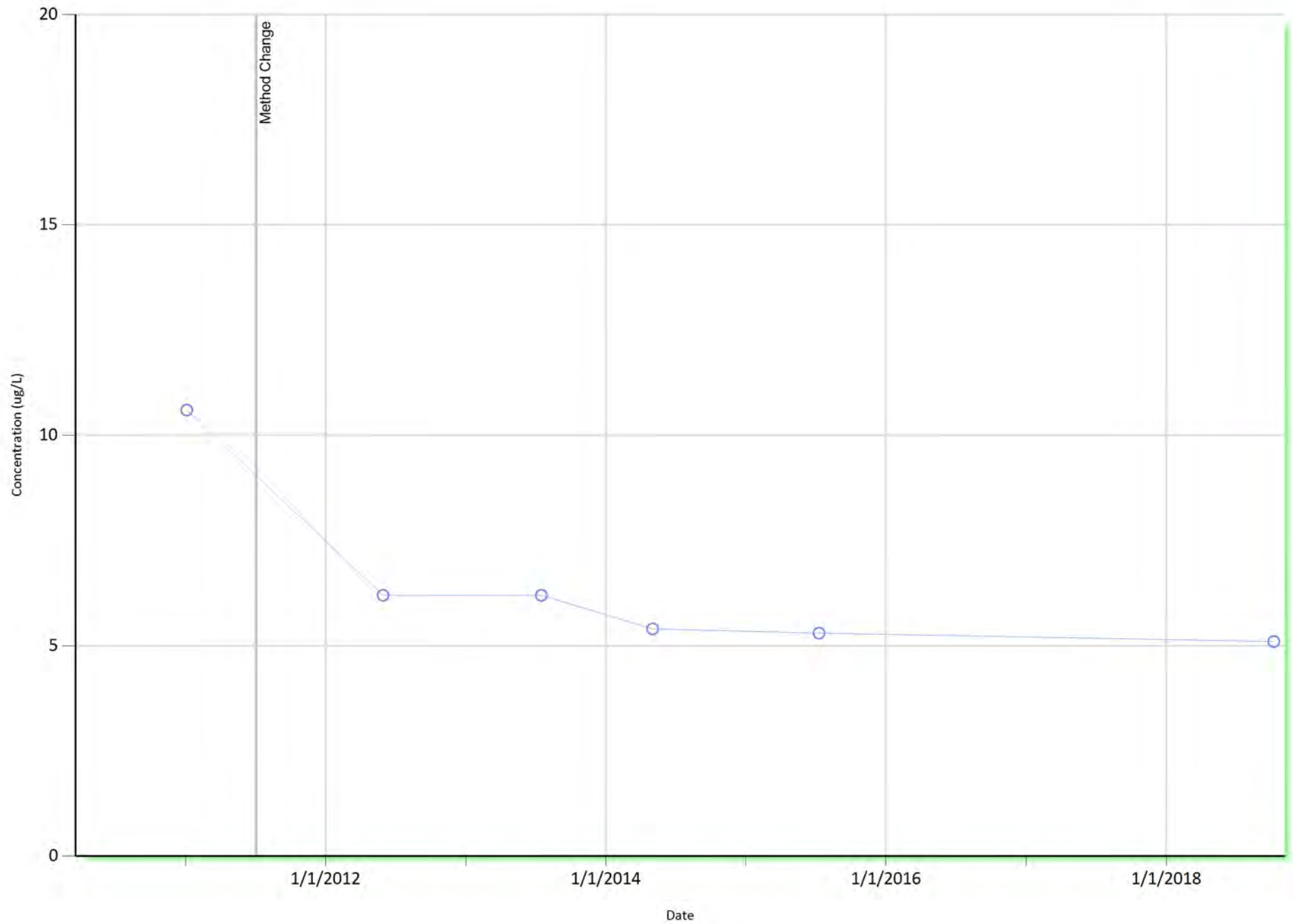
PW-0532, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0533, Off-site, Sulfolane

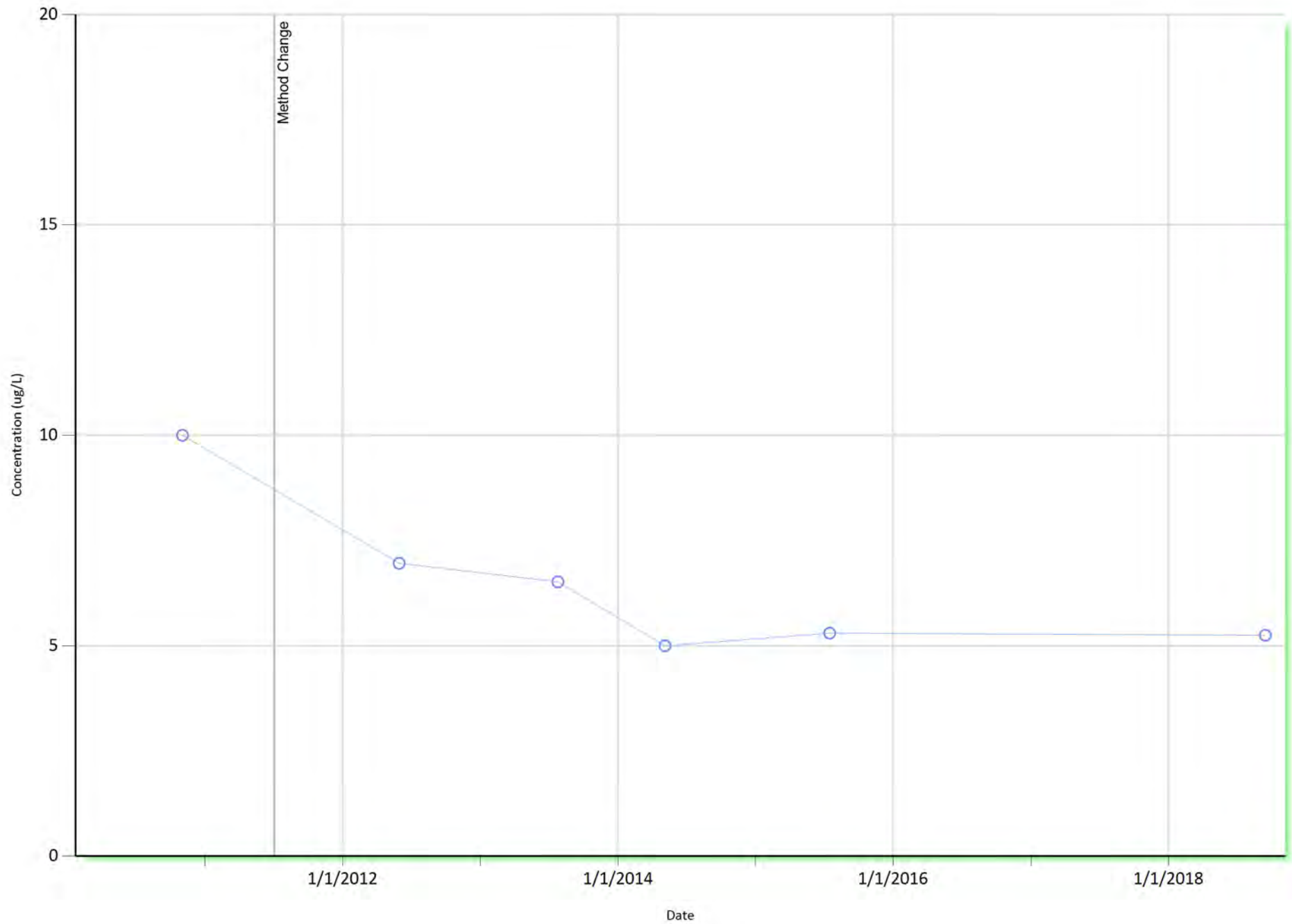


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

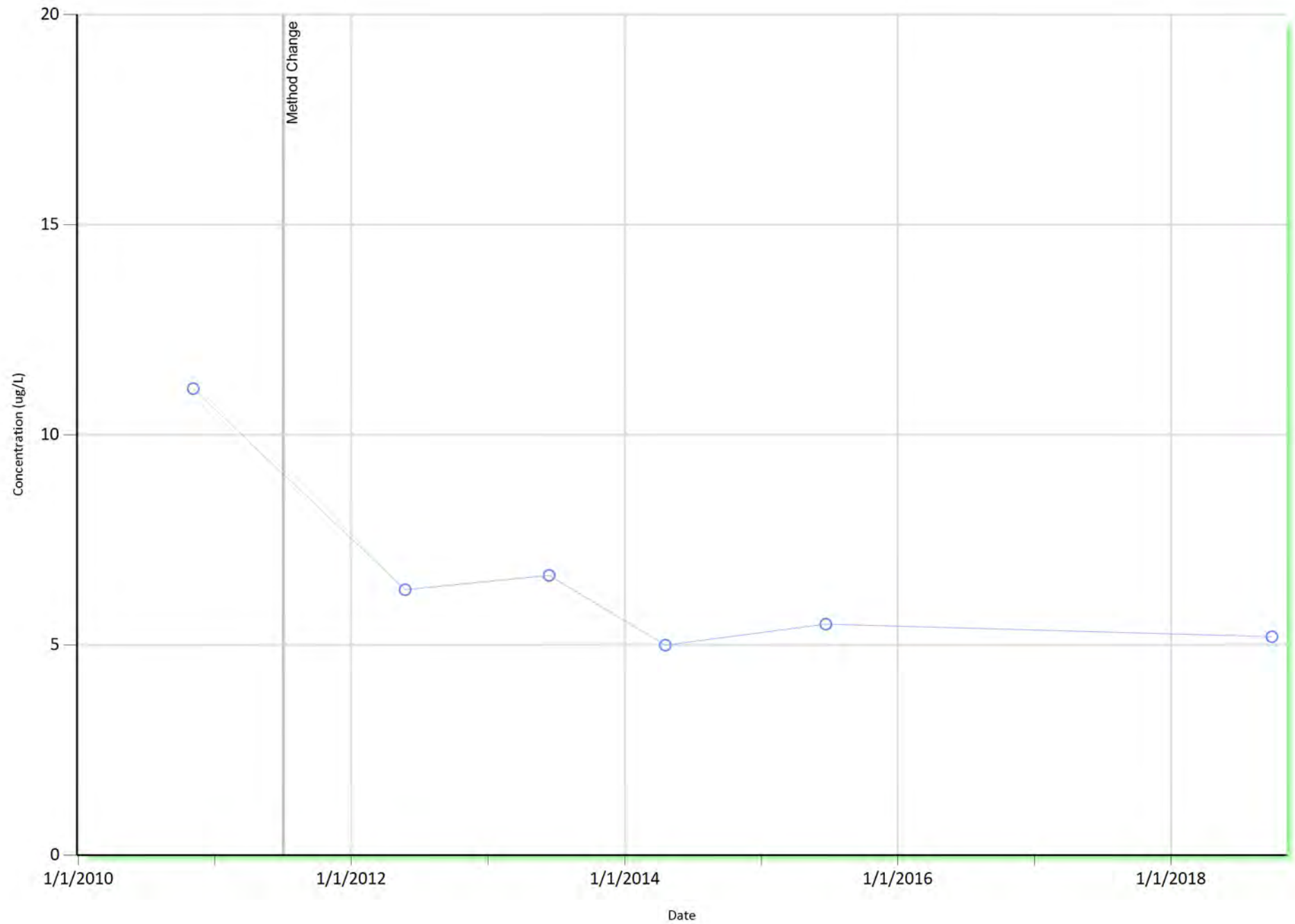
PW-0534, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

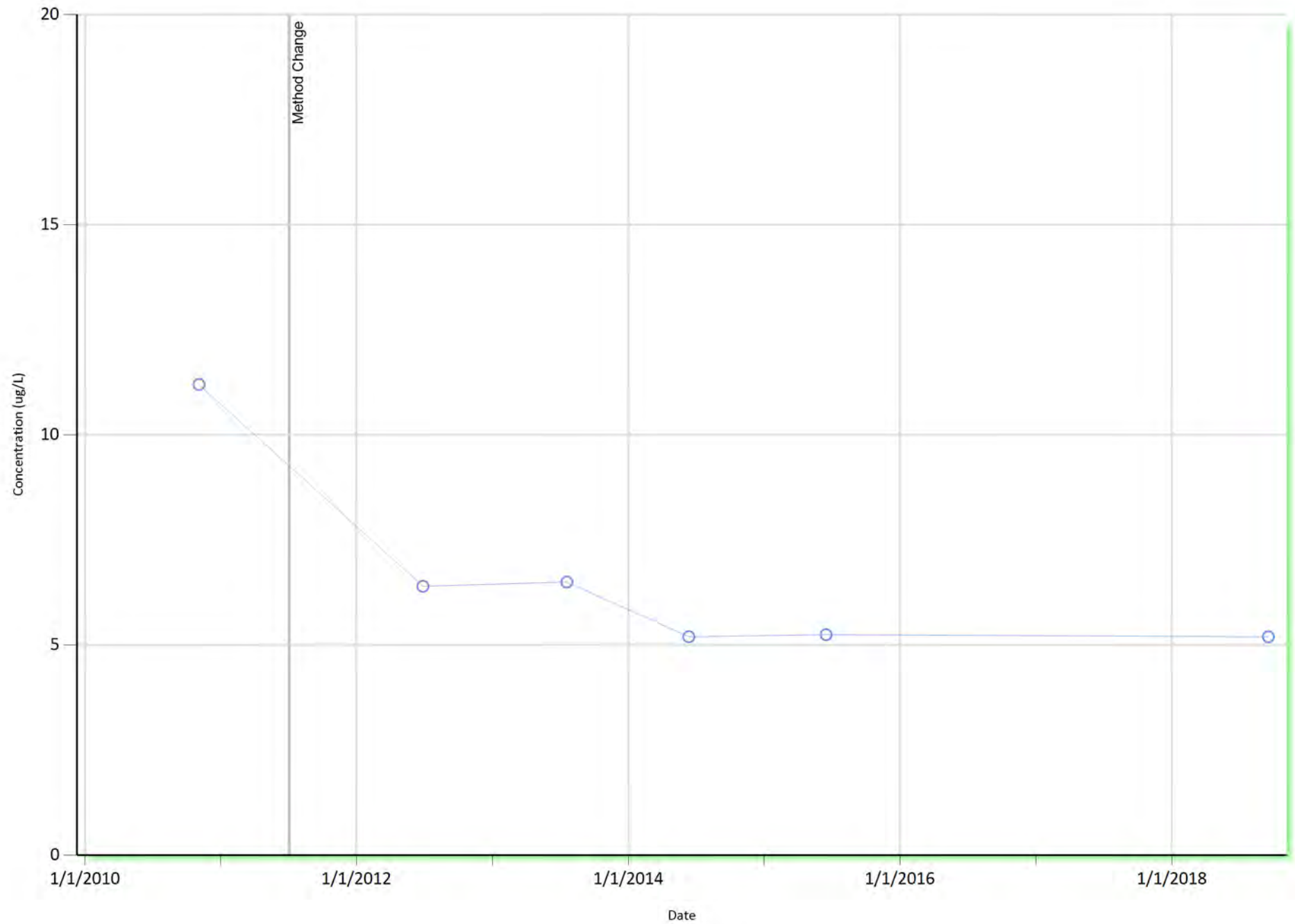
PW-0535, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

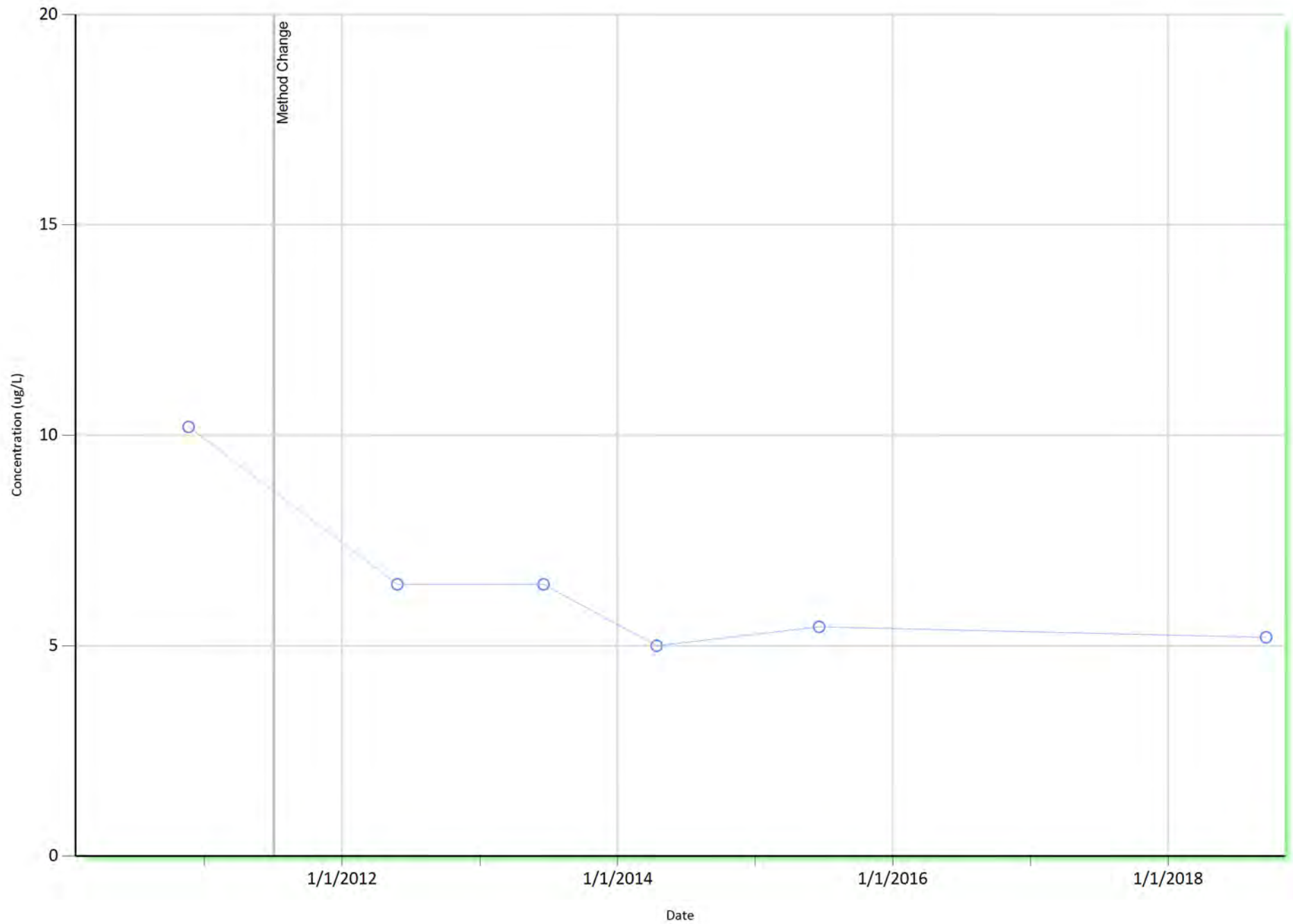
PW-0536, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

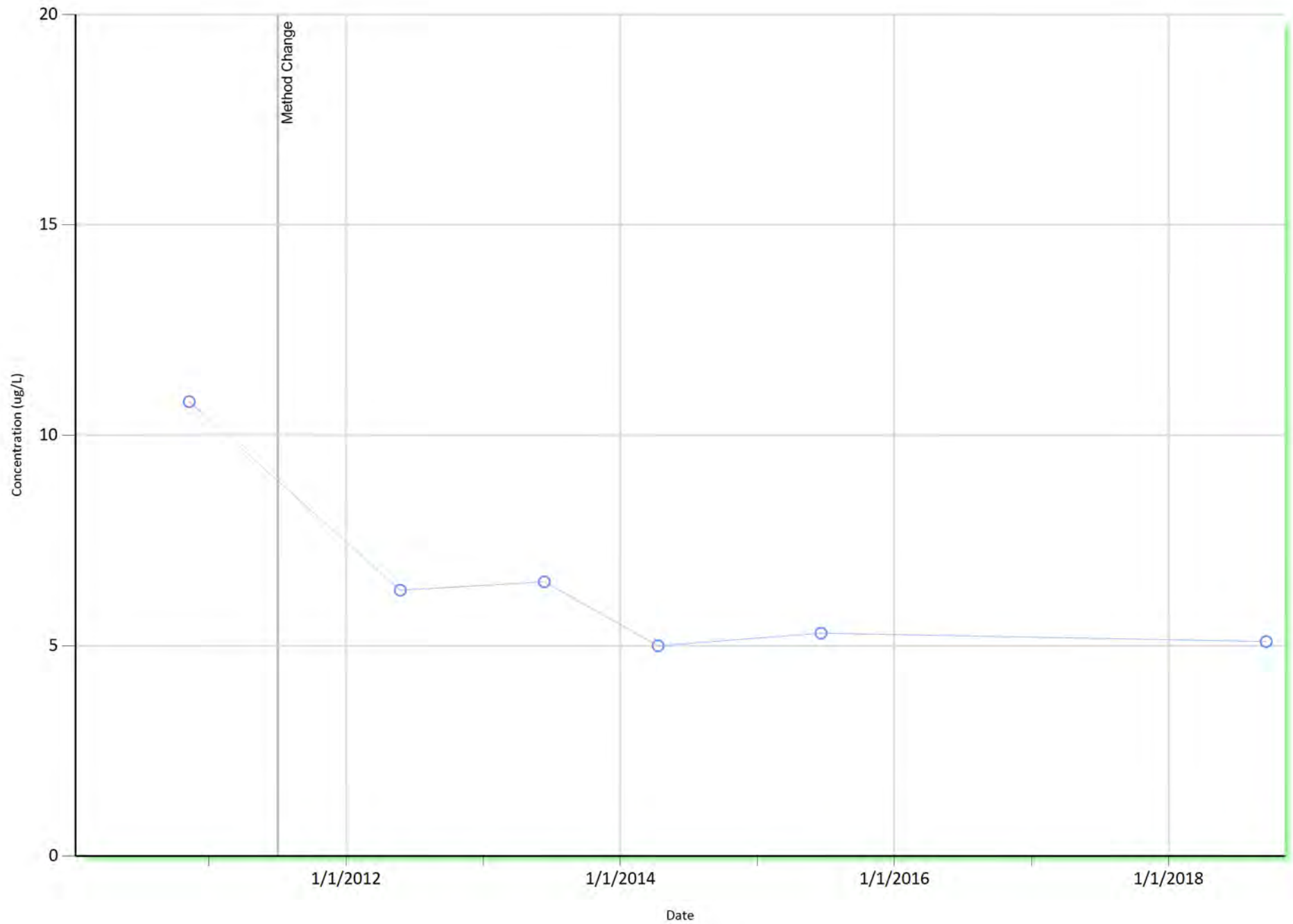
PW-0537, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

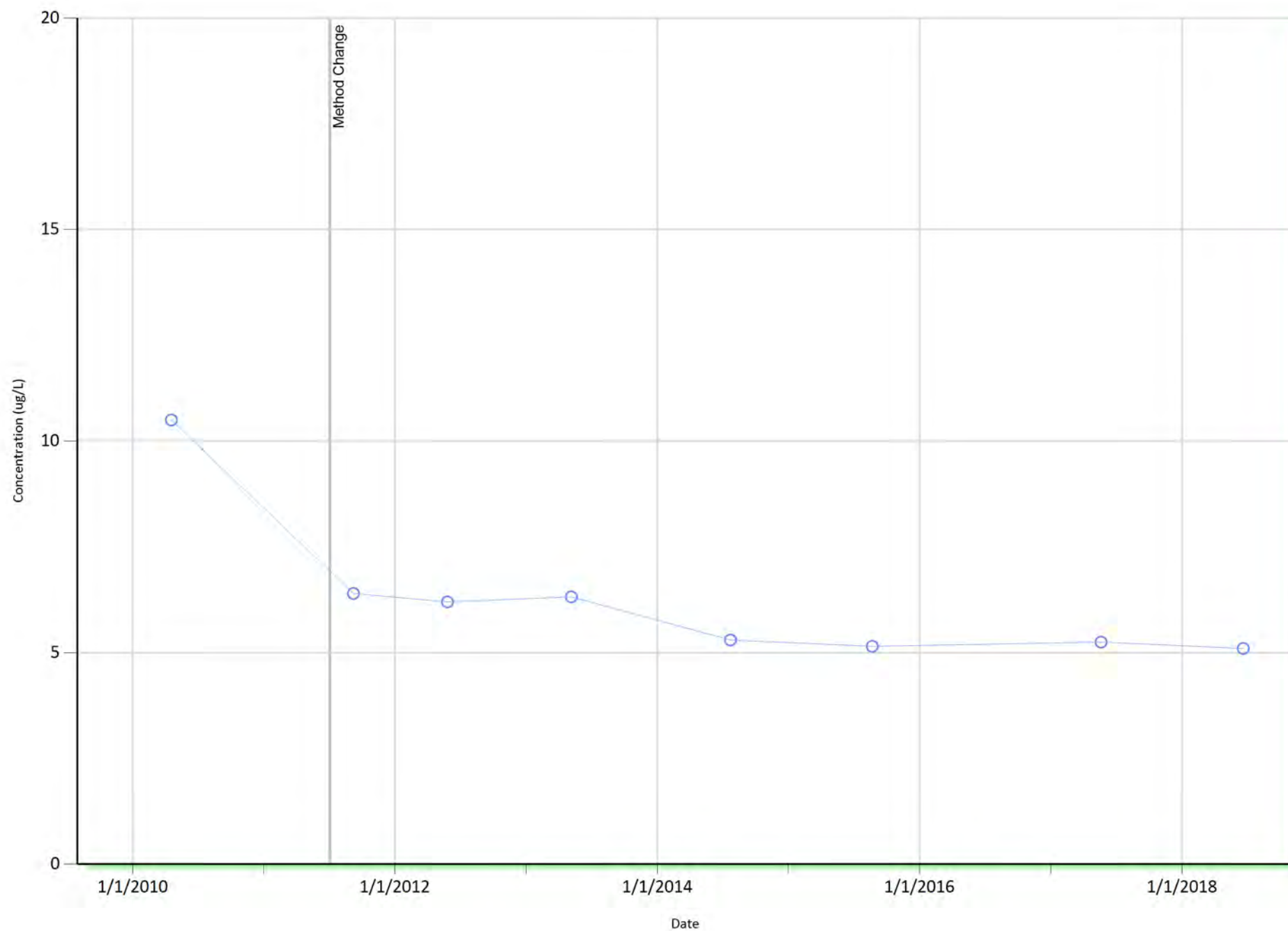
PW-0538, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0546, Off-site, Sulfolane

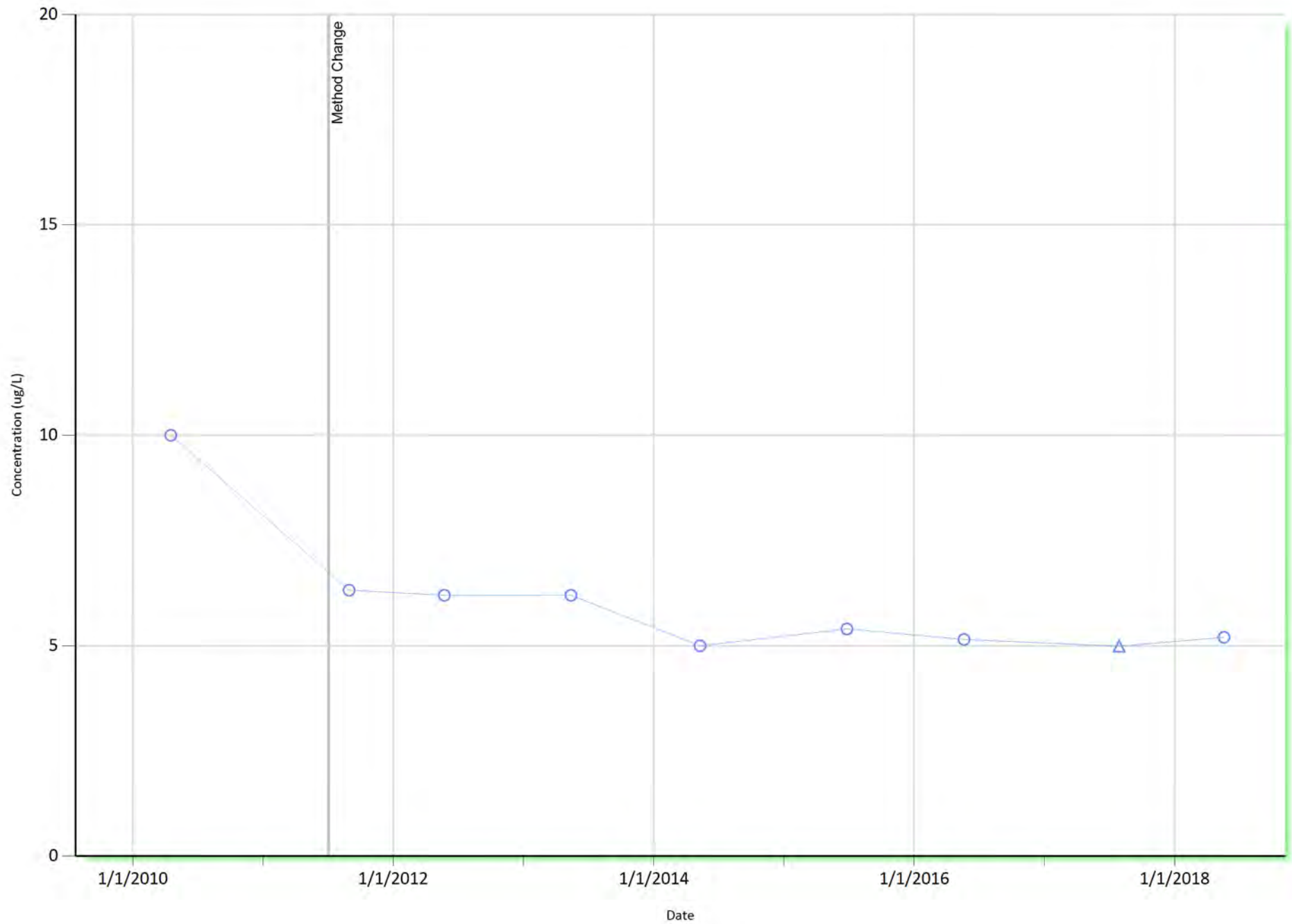


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

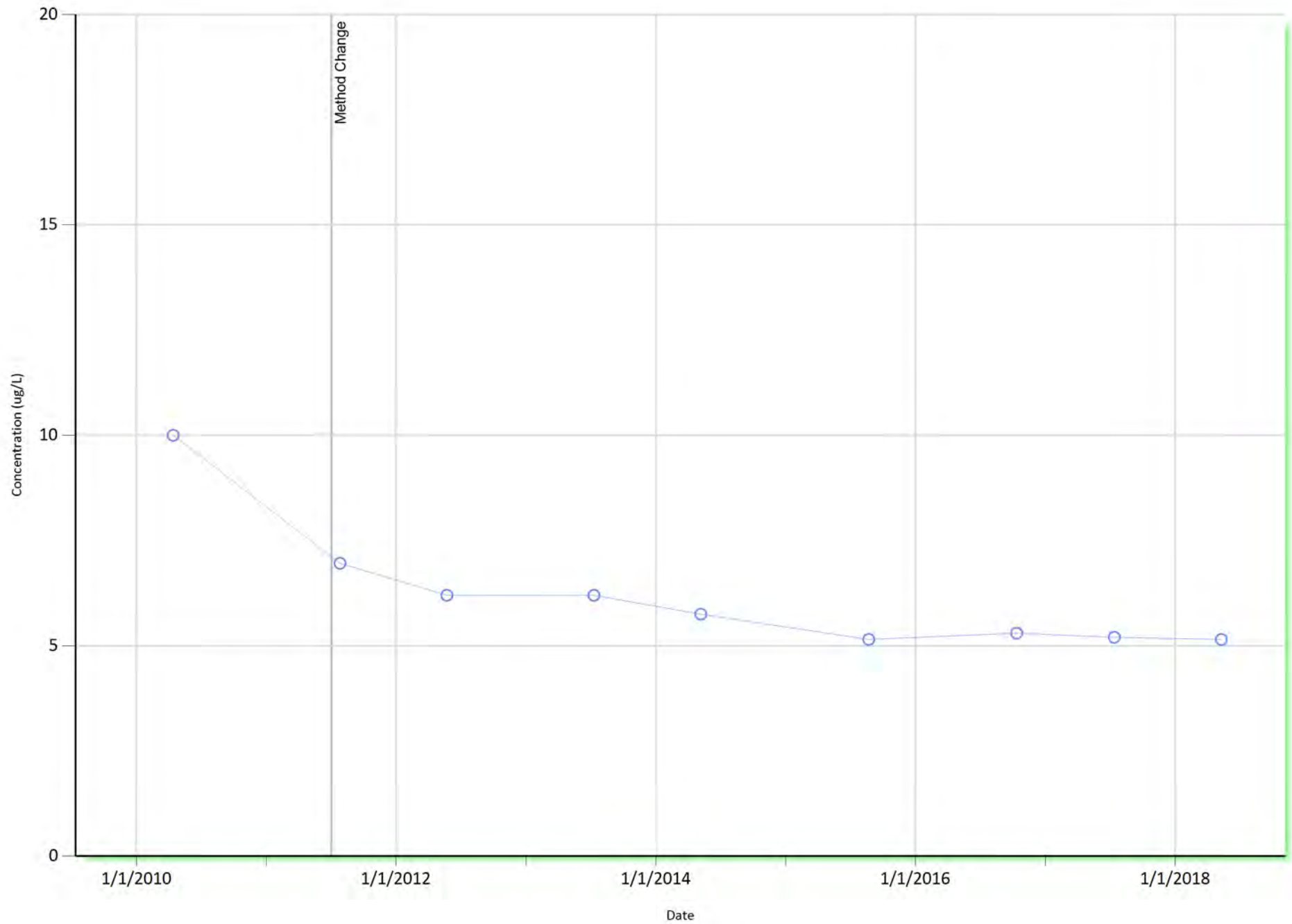
PW-0547, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

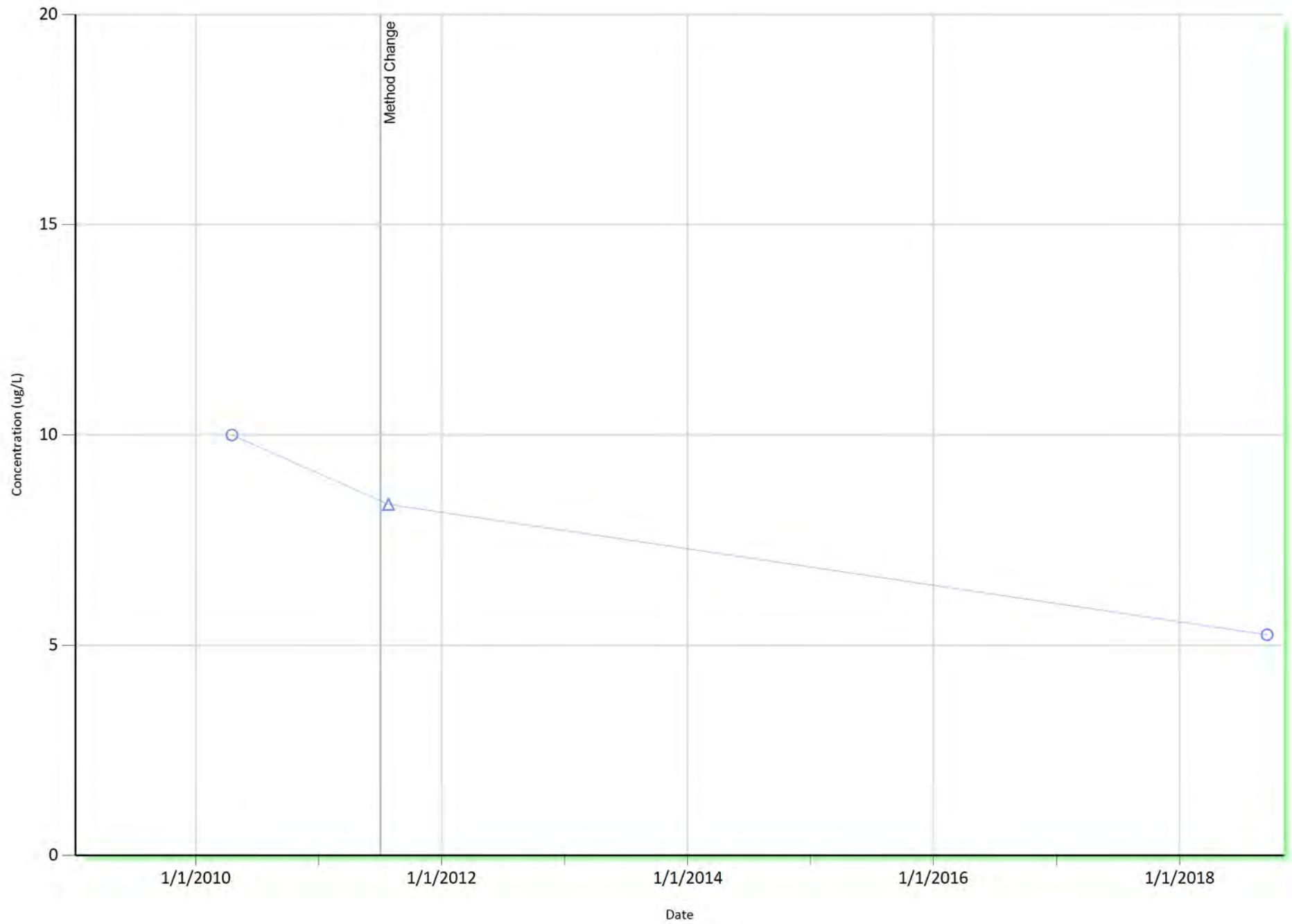
PW-0548, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

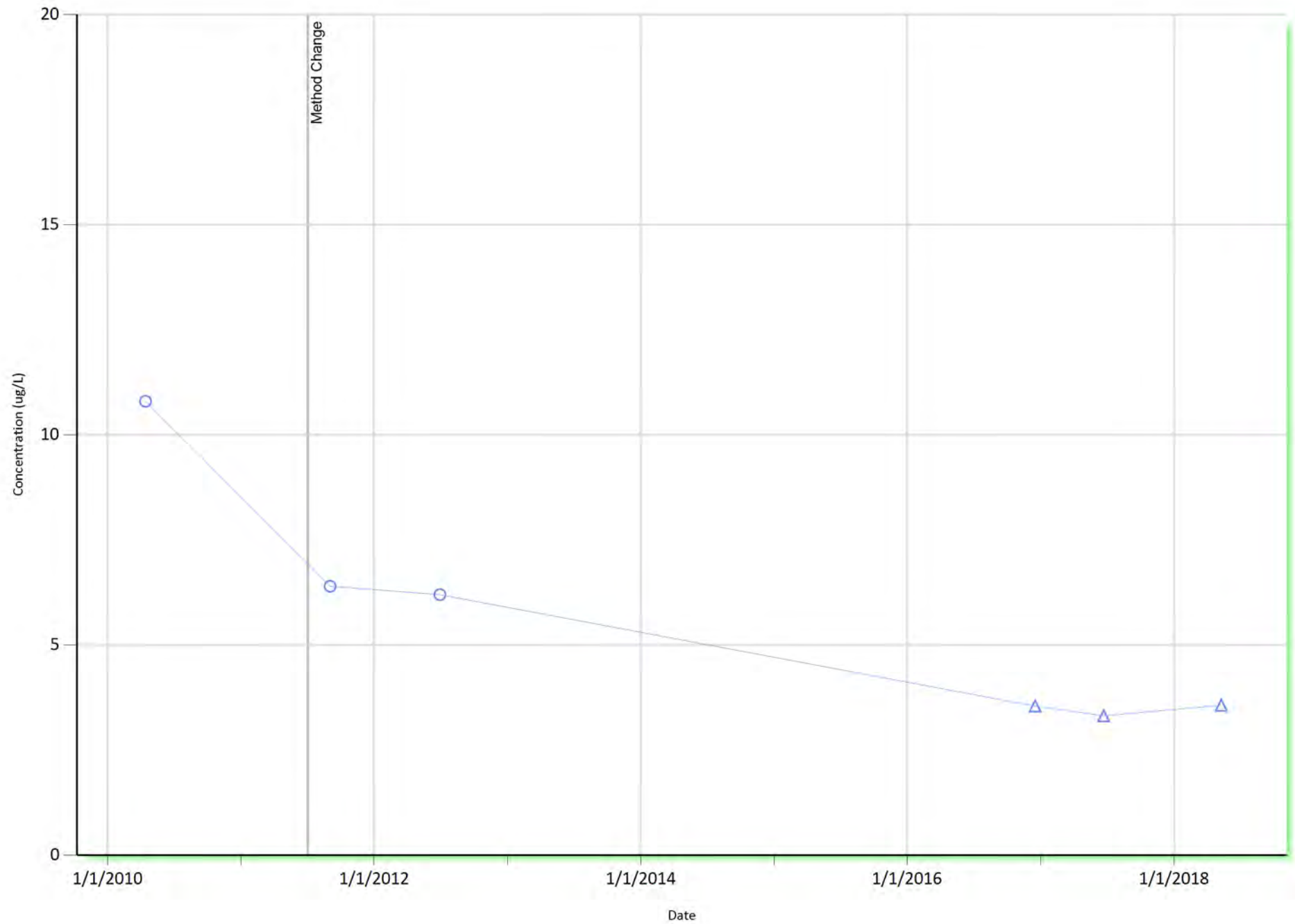
PW-0549, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

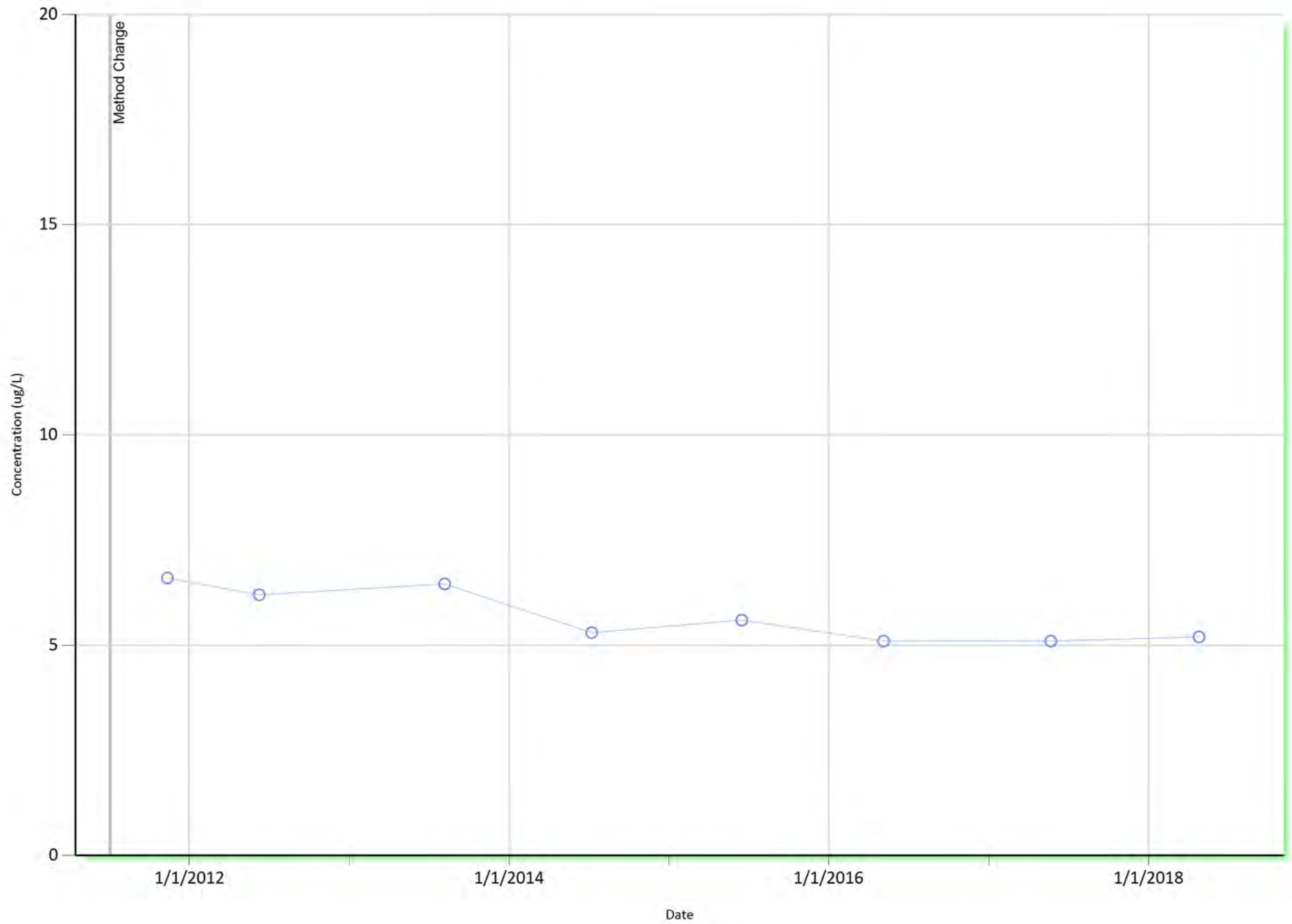
PW-0555, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

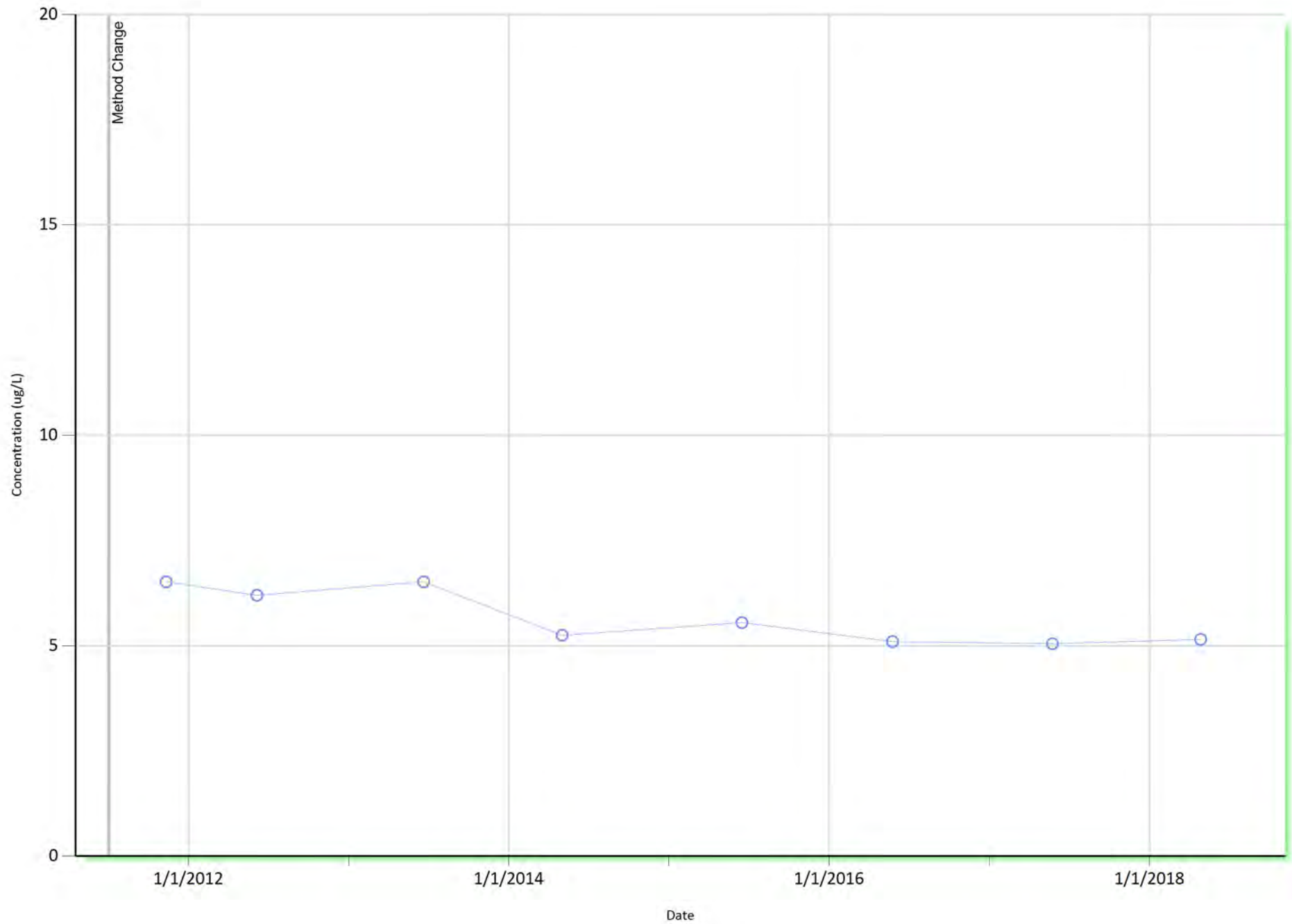
PW-0587, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

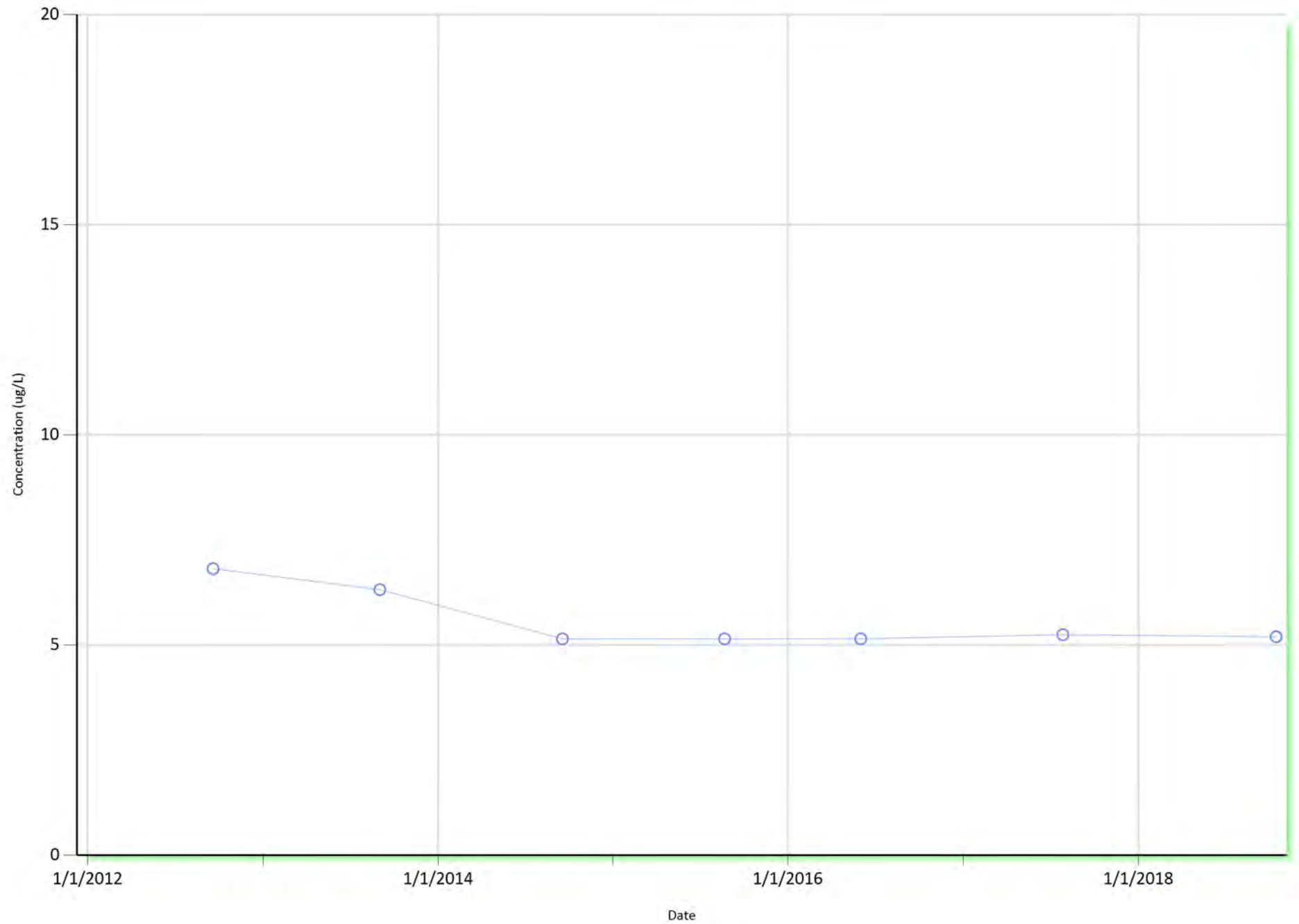
PW-0589, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0591, Off-site, Sulfolane

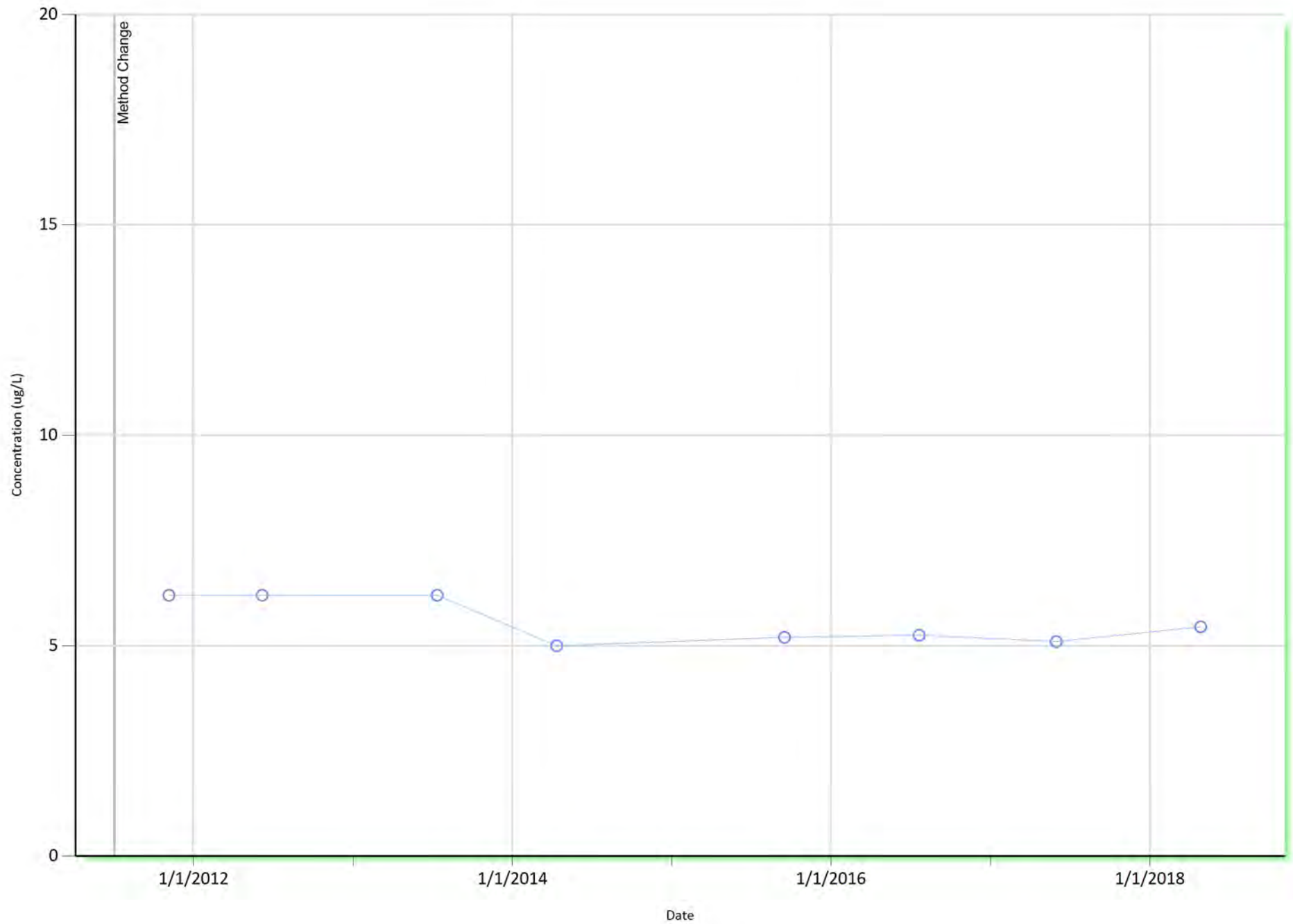


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

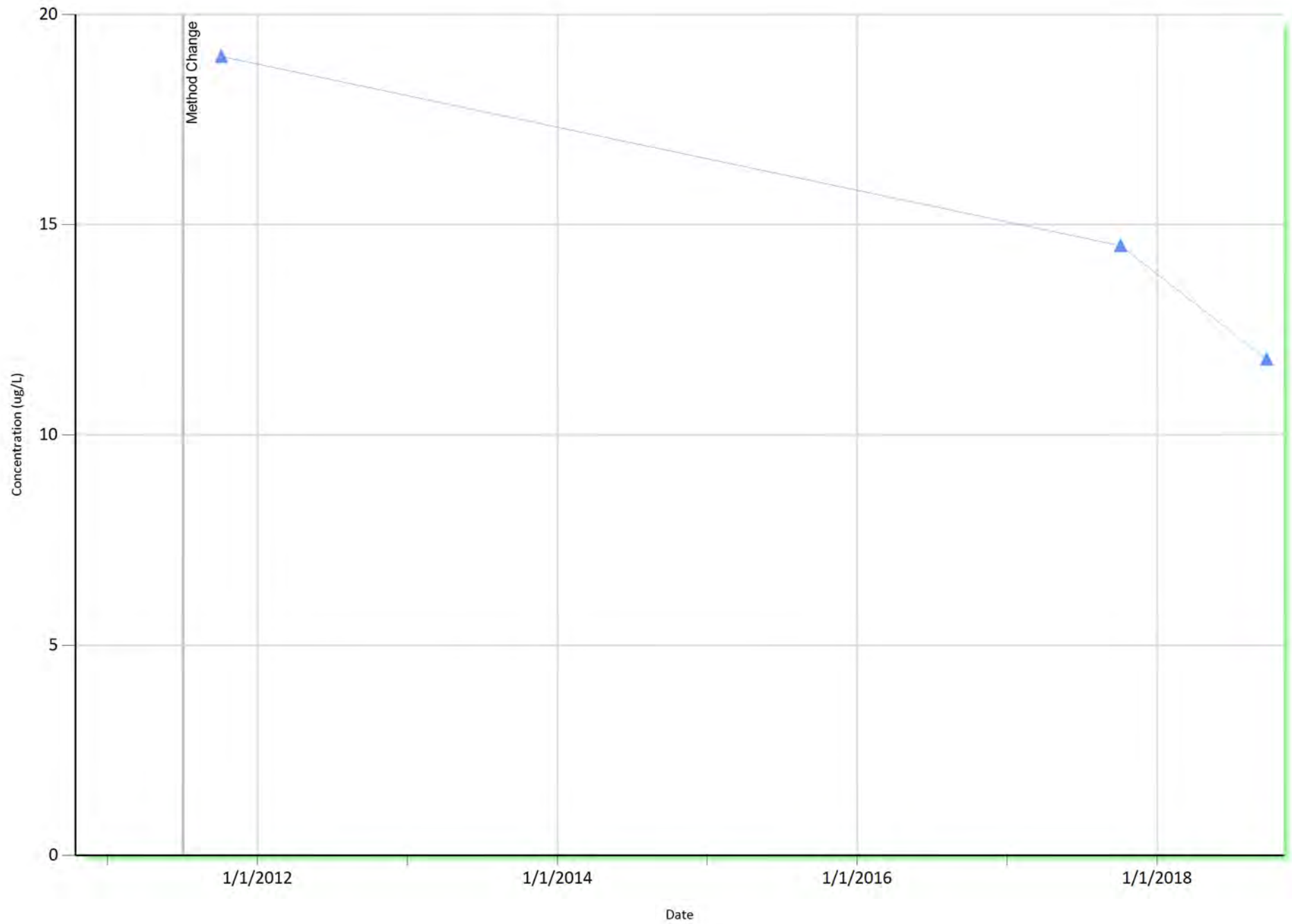
PW-0594, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

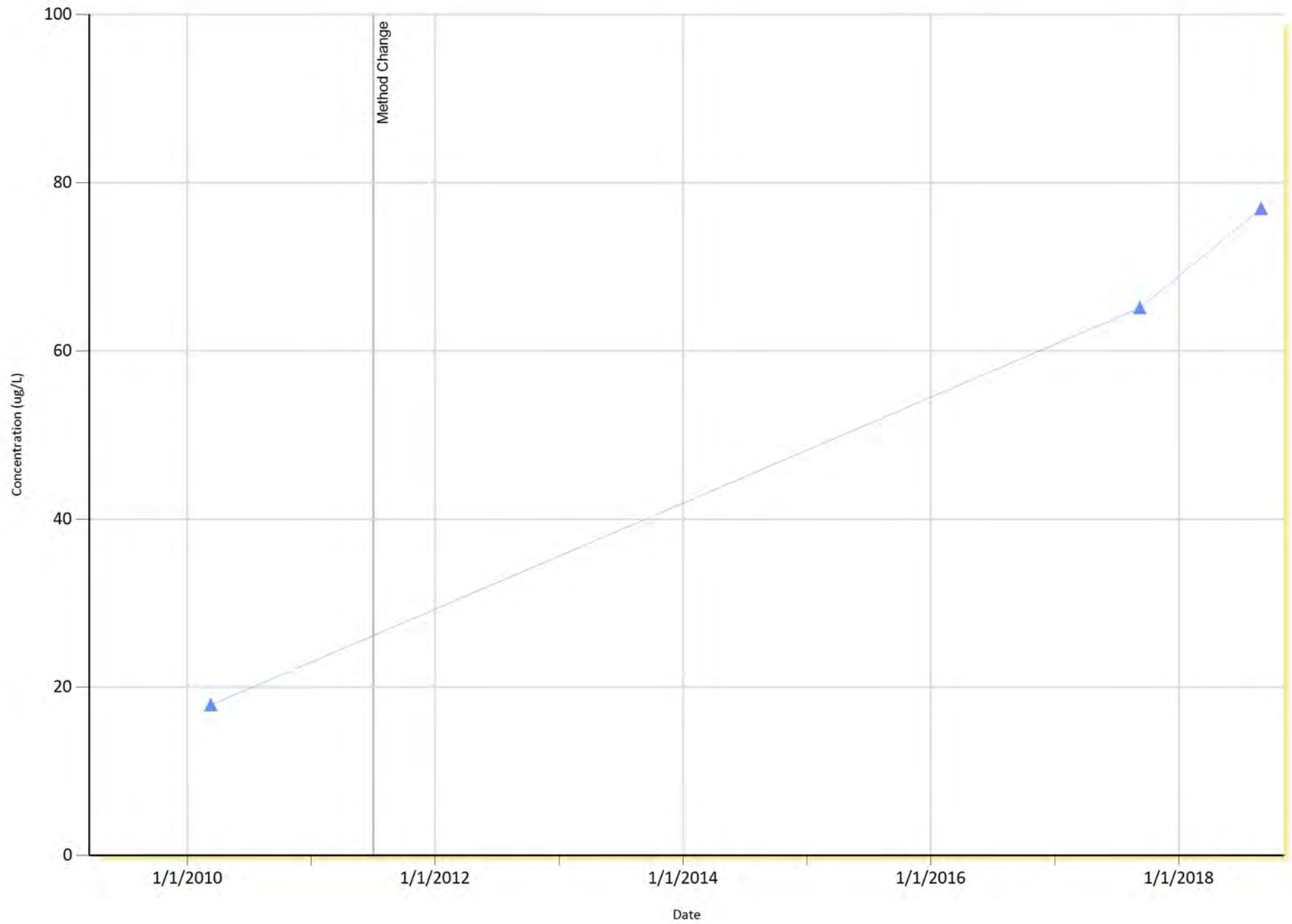
PW-0612, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

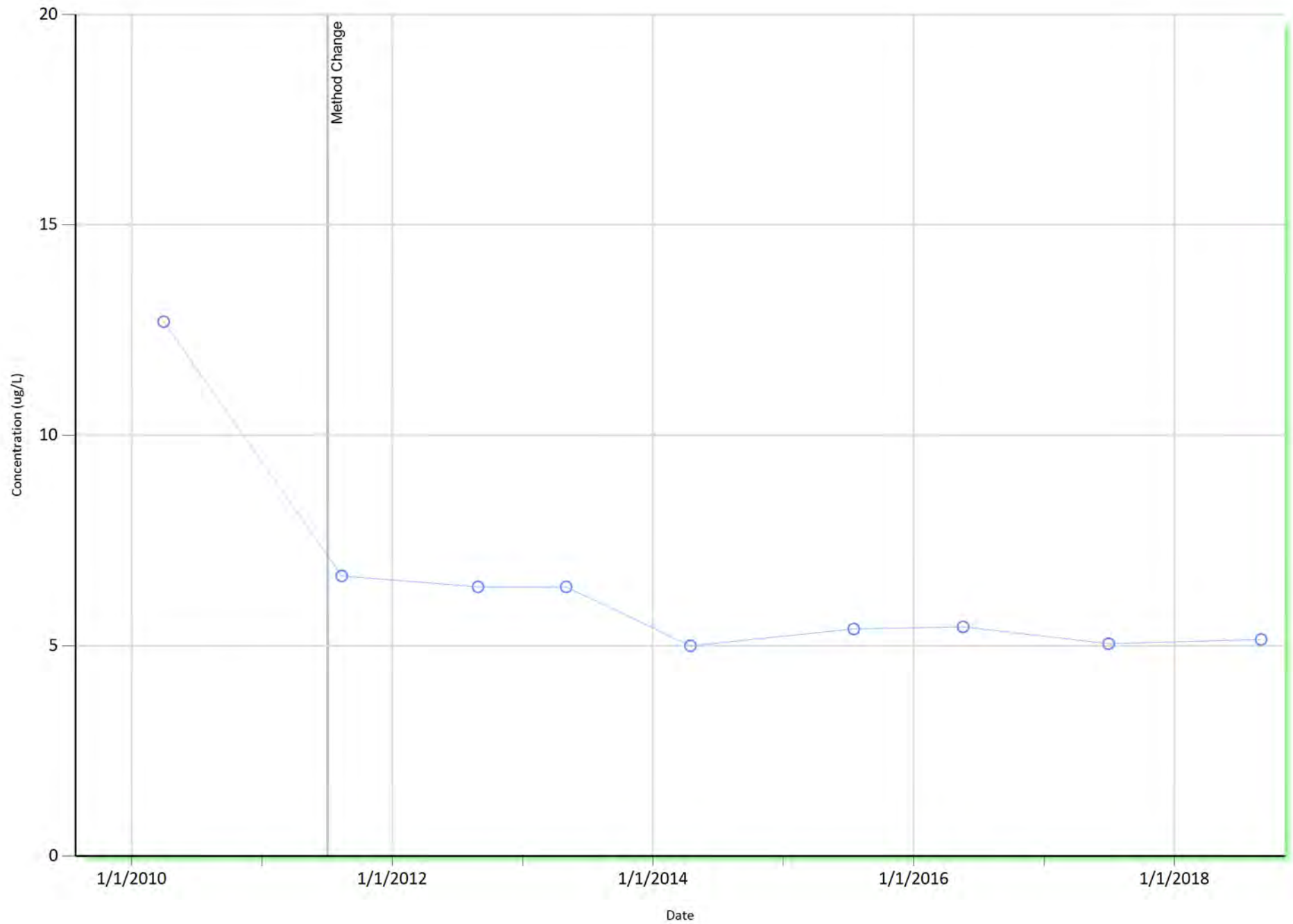
PW-0623, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

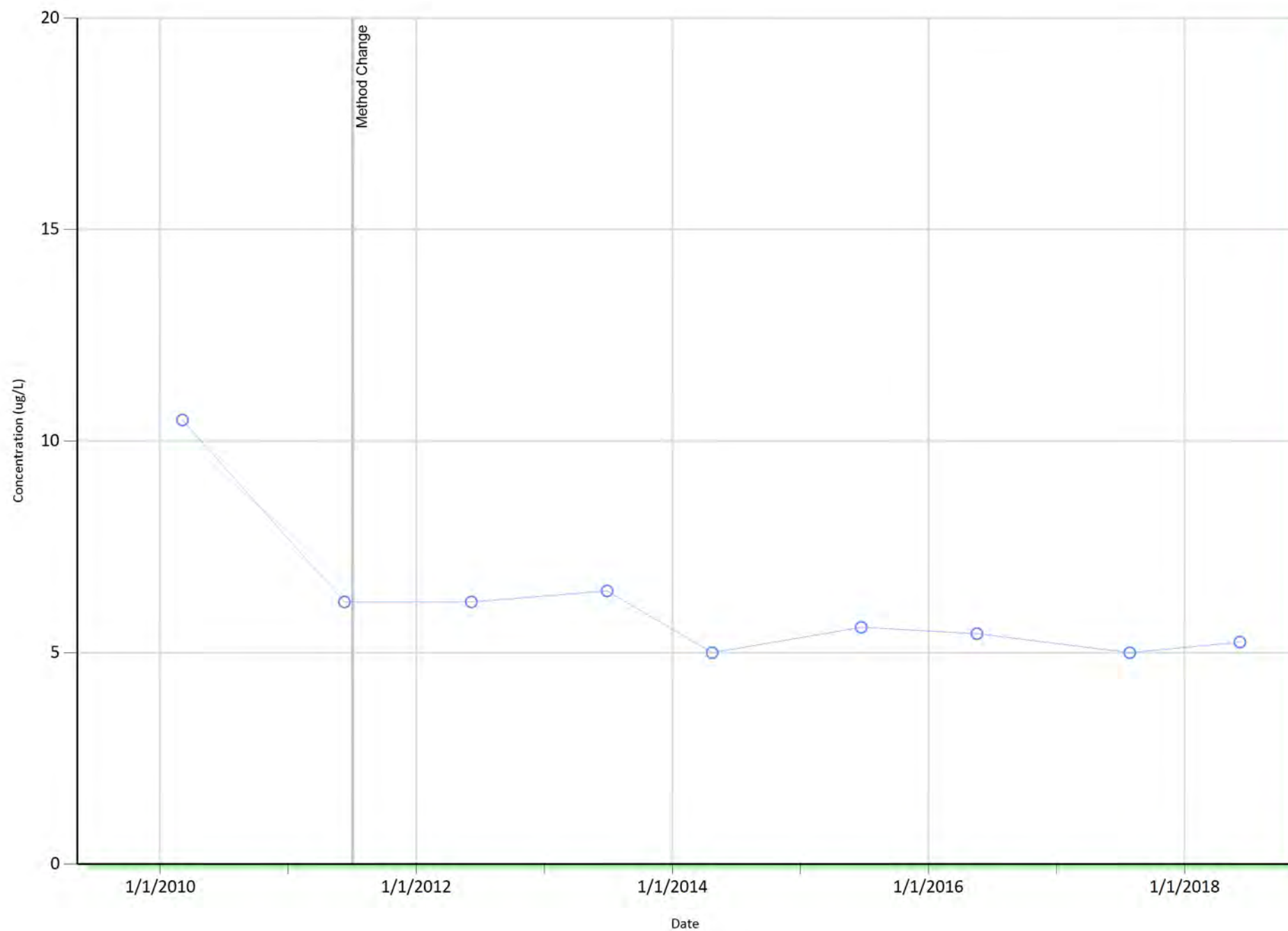
PW-0627, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

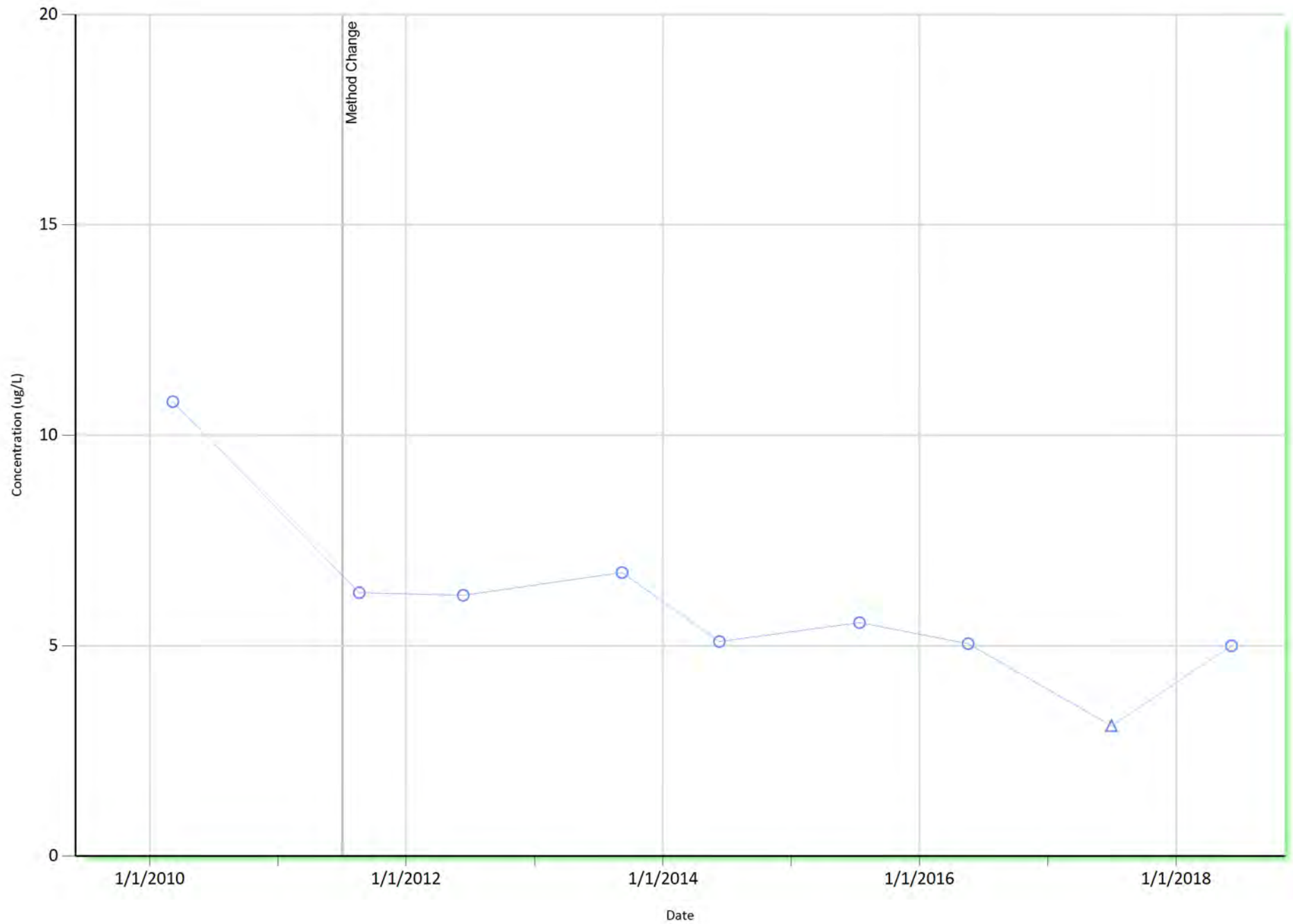
PW-0628, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

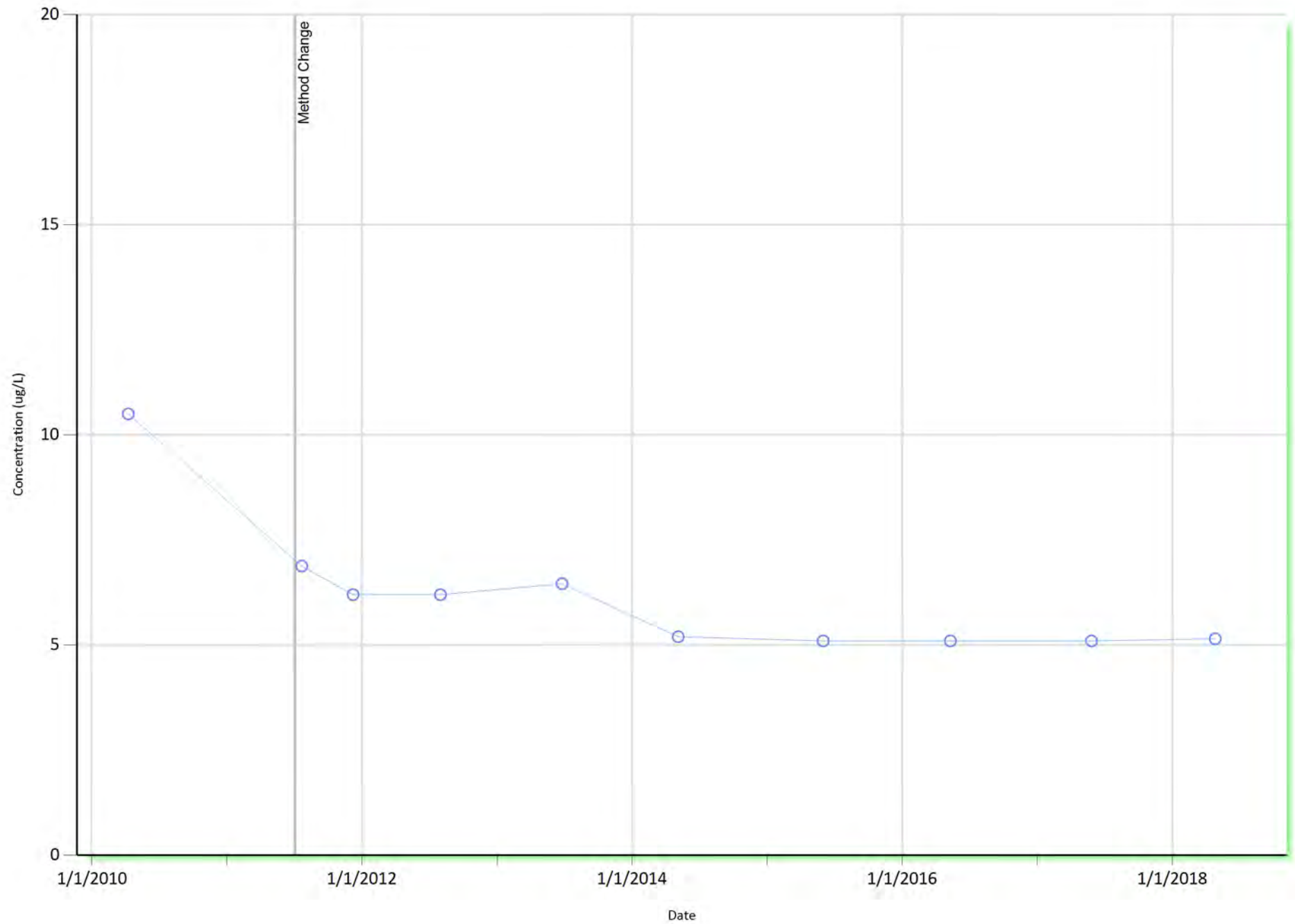
PW-0630, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0749, Off-site, Sulfolane

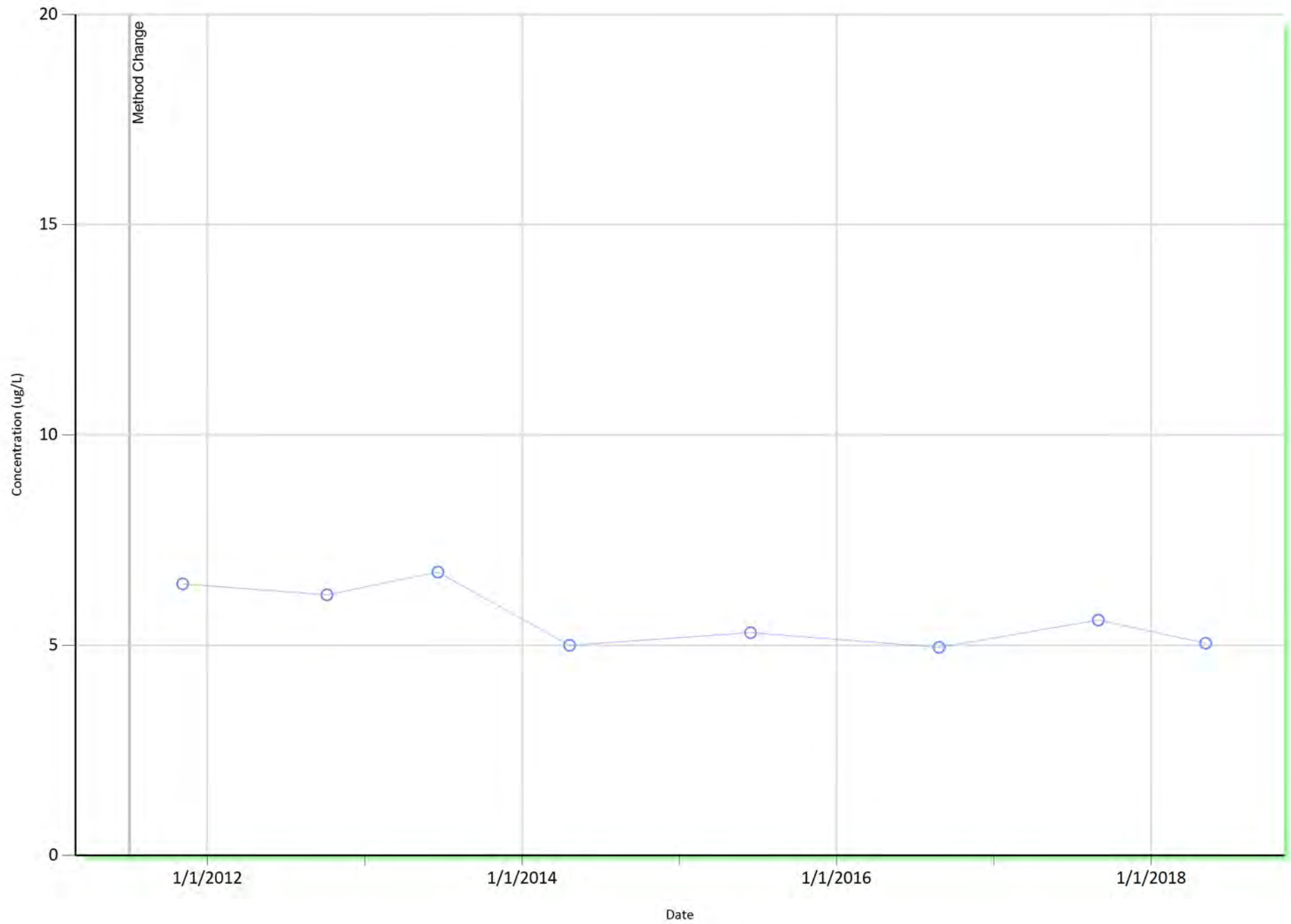


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

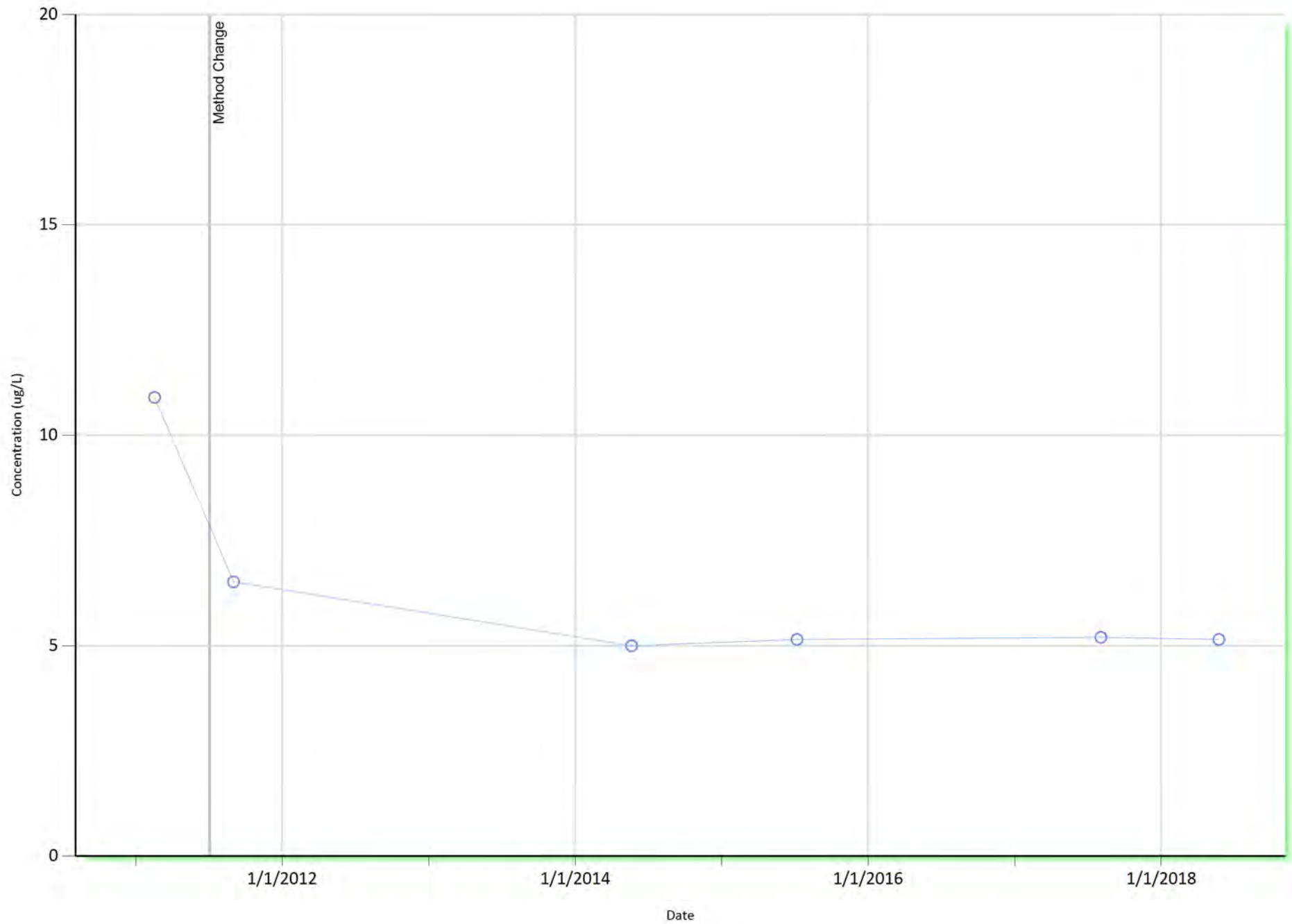
PW-0750, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

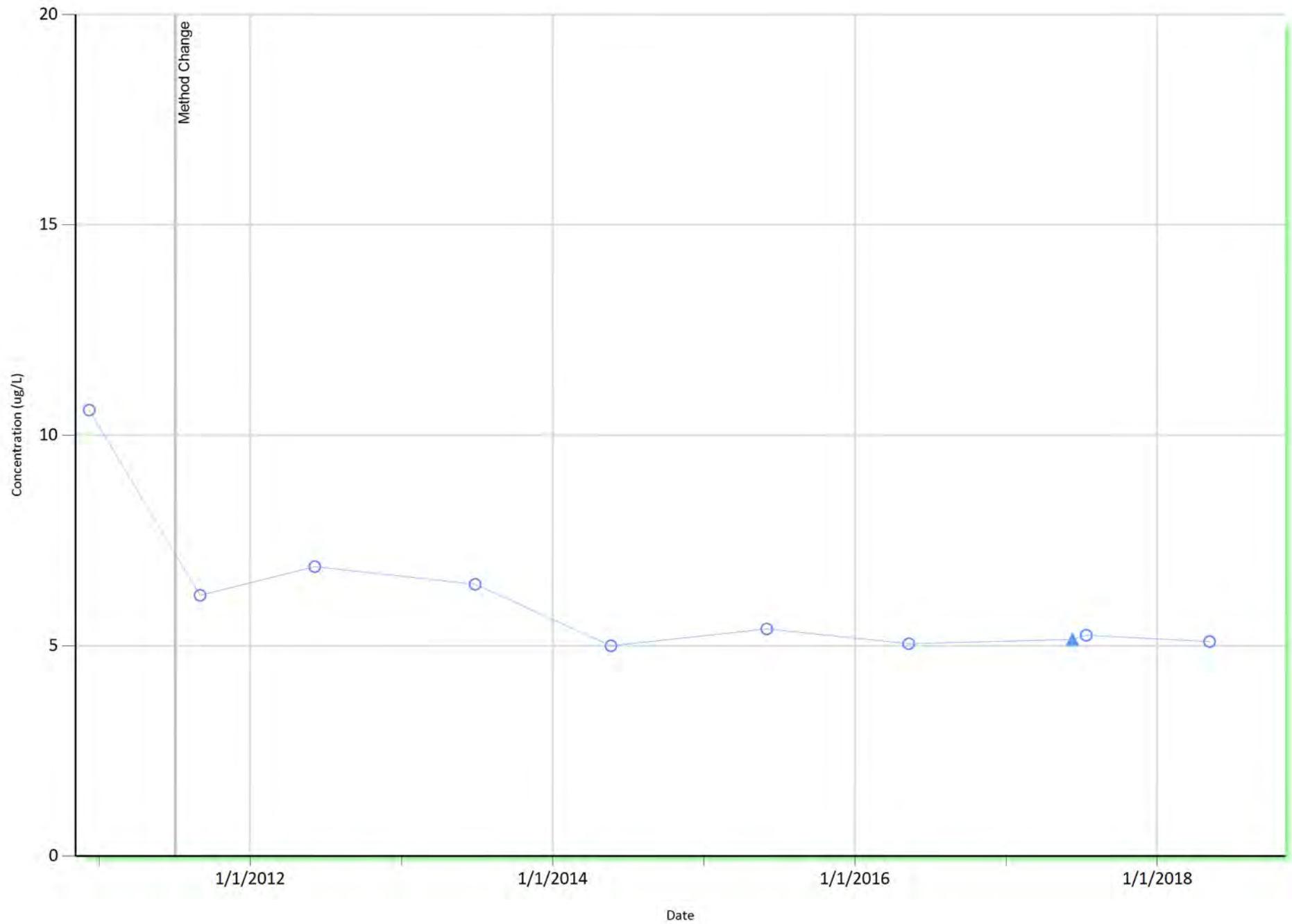
PW-0751, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

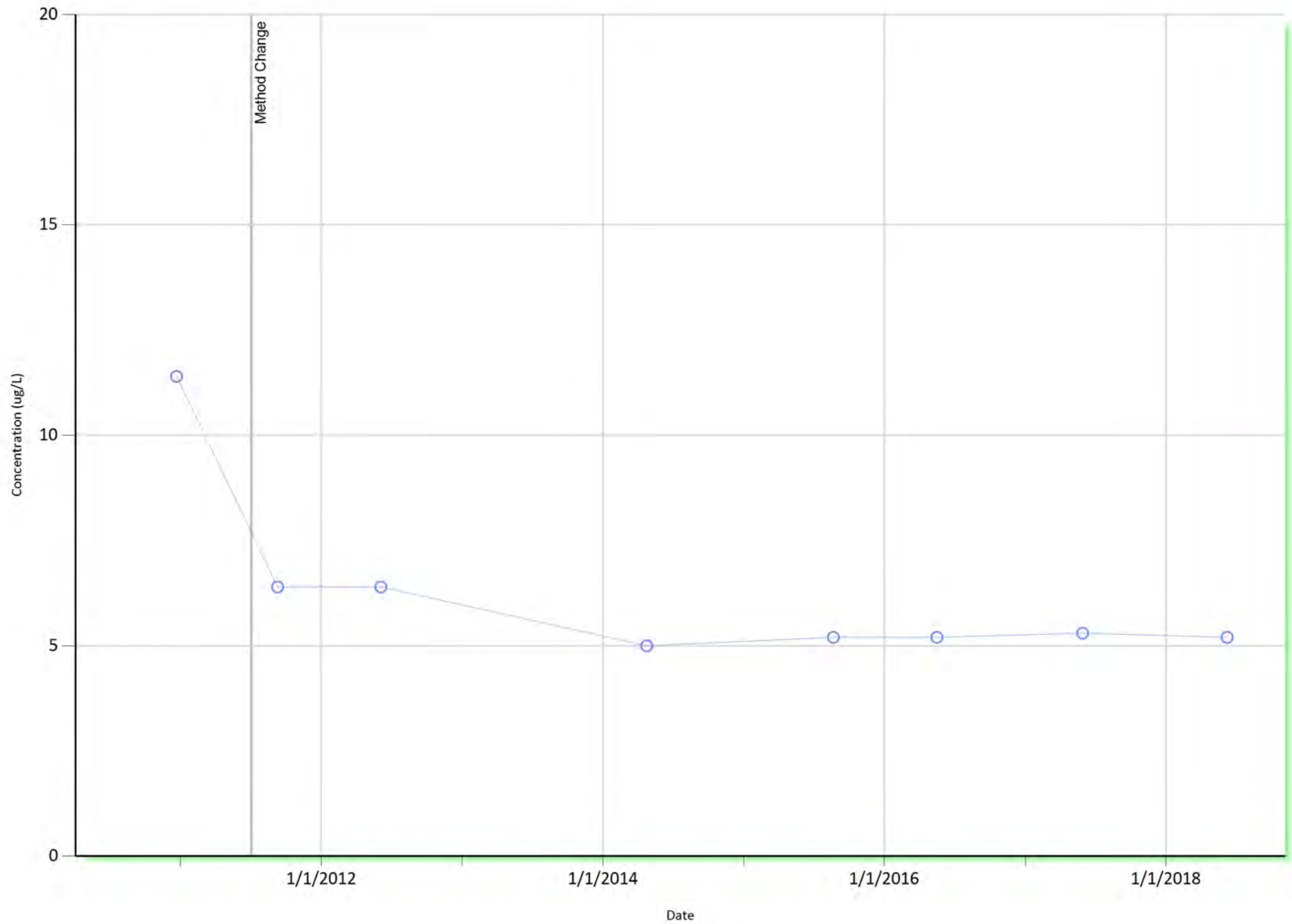
PW-0752, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

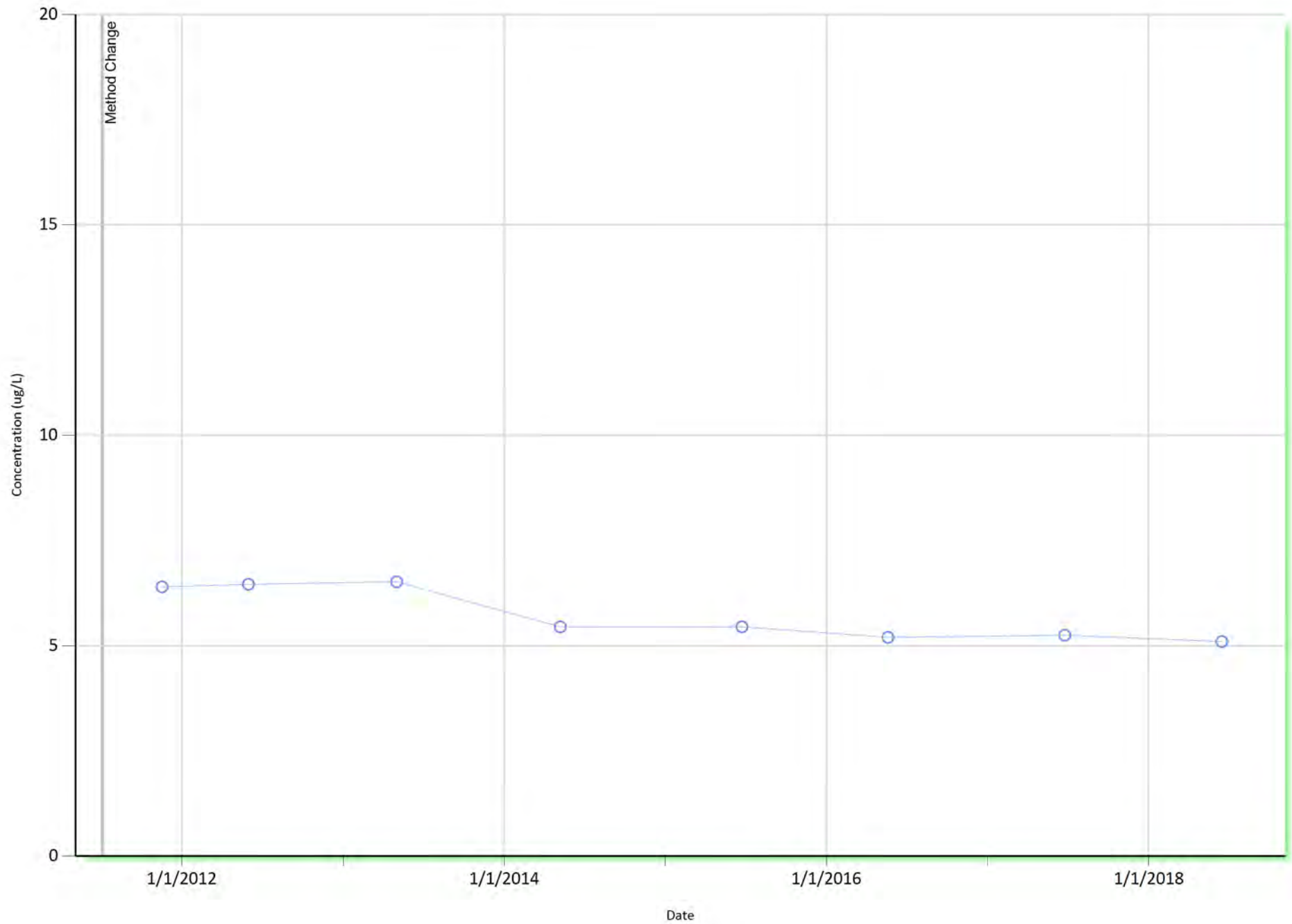
PW-0753, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

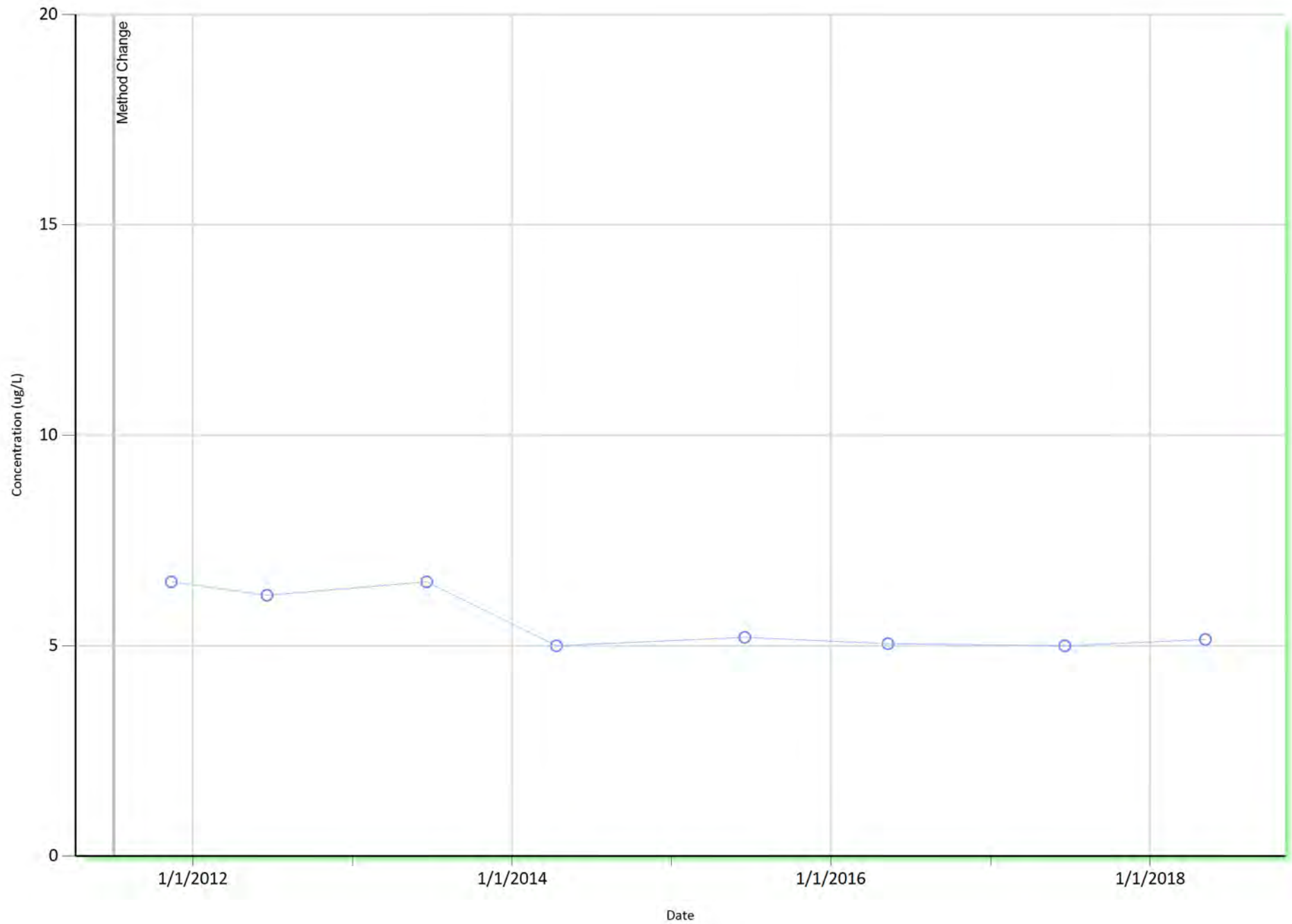
PW-0761, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

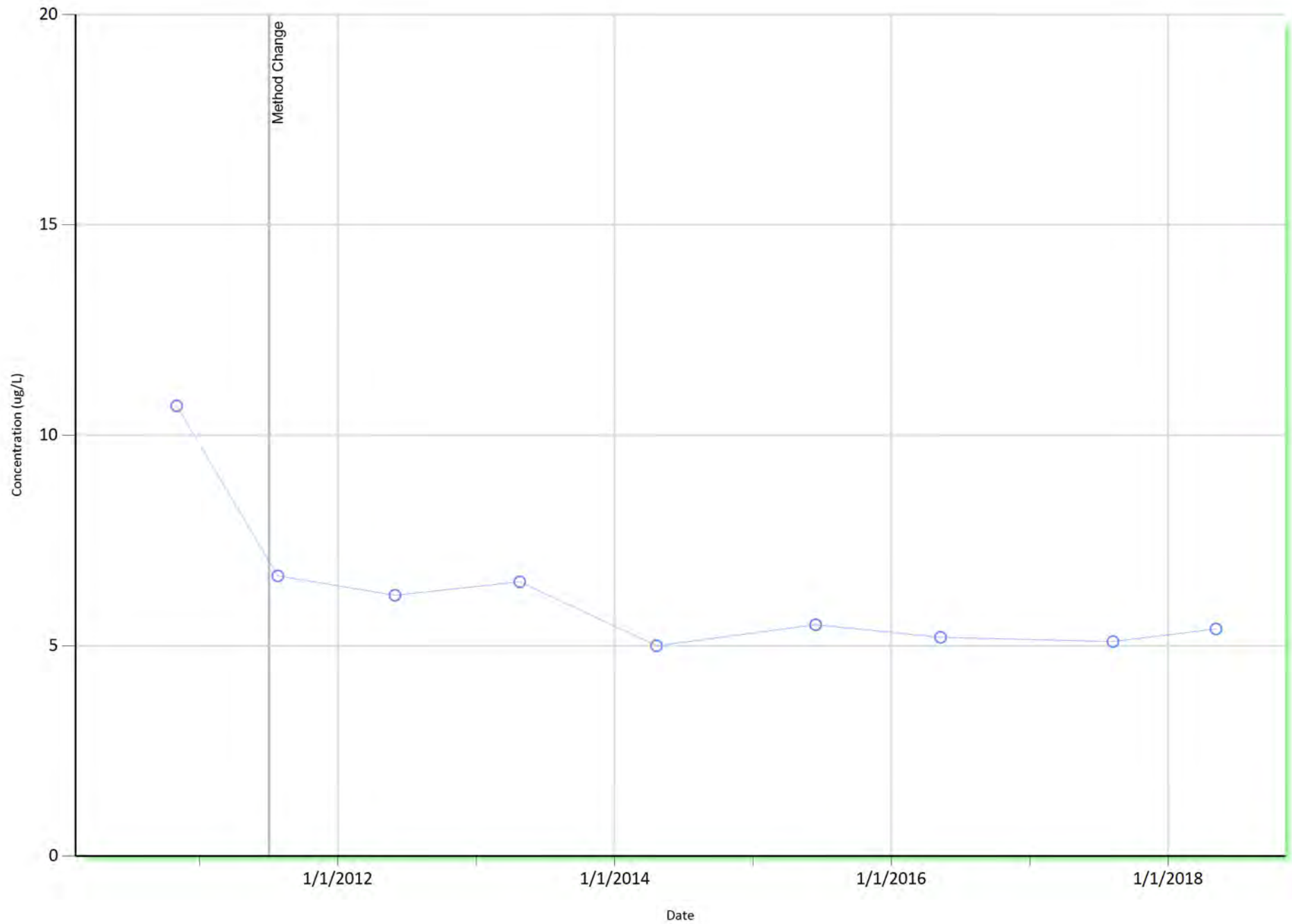
PW-0770, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

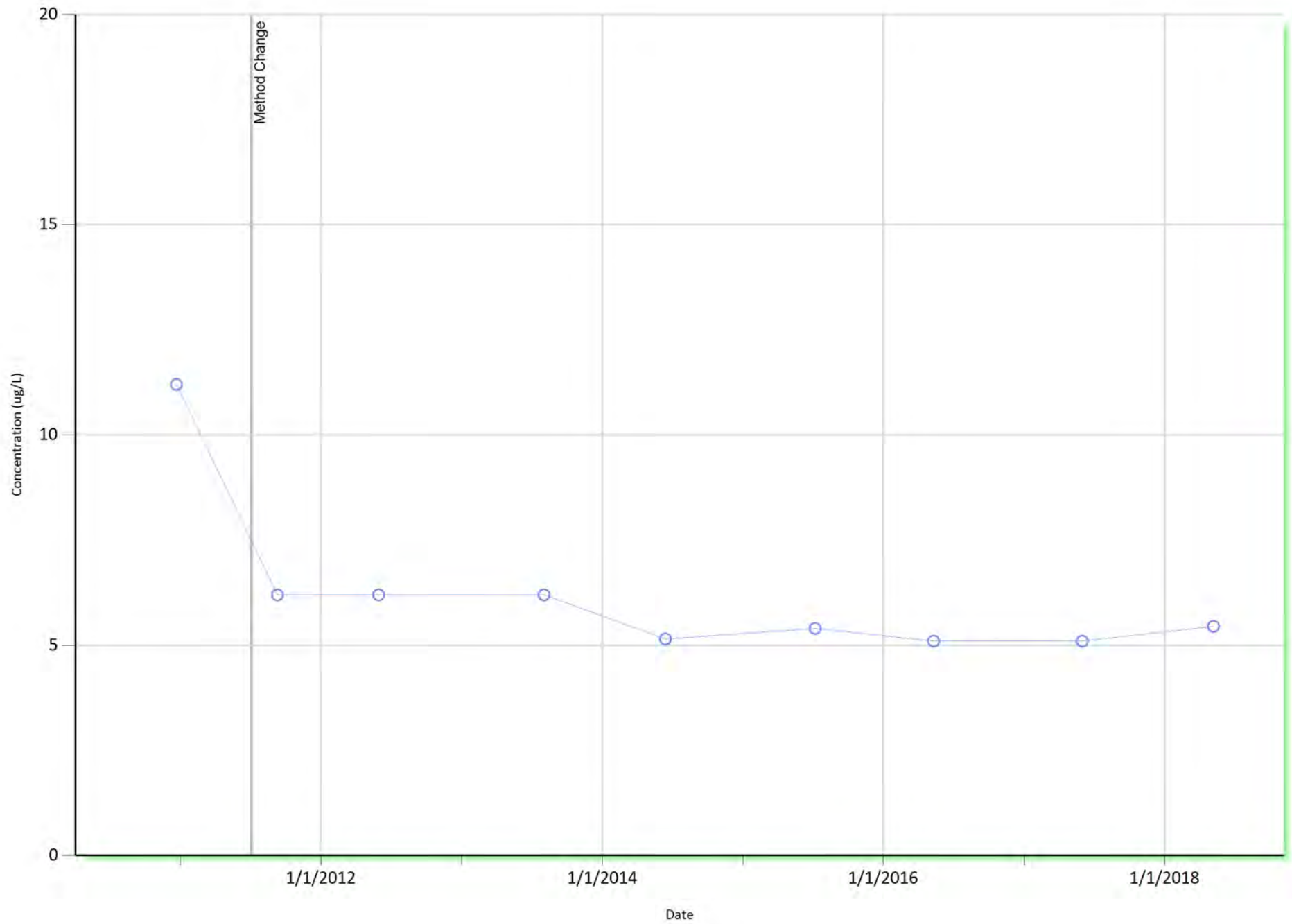
PW-0771, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0772, Off-site, Sulfolane

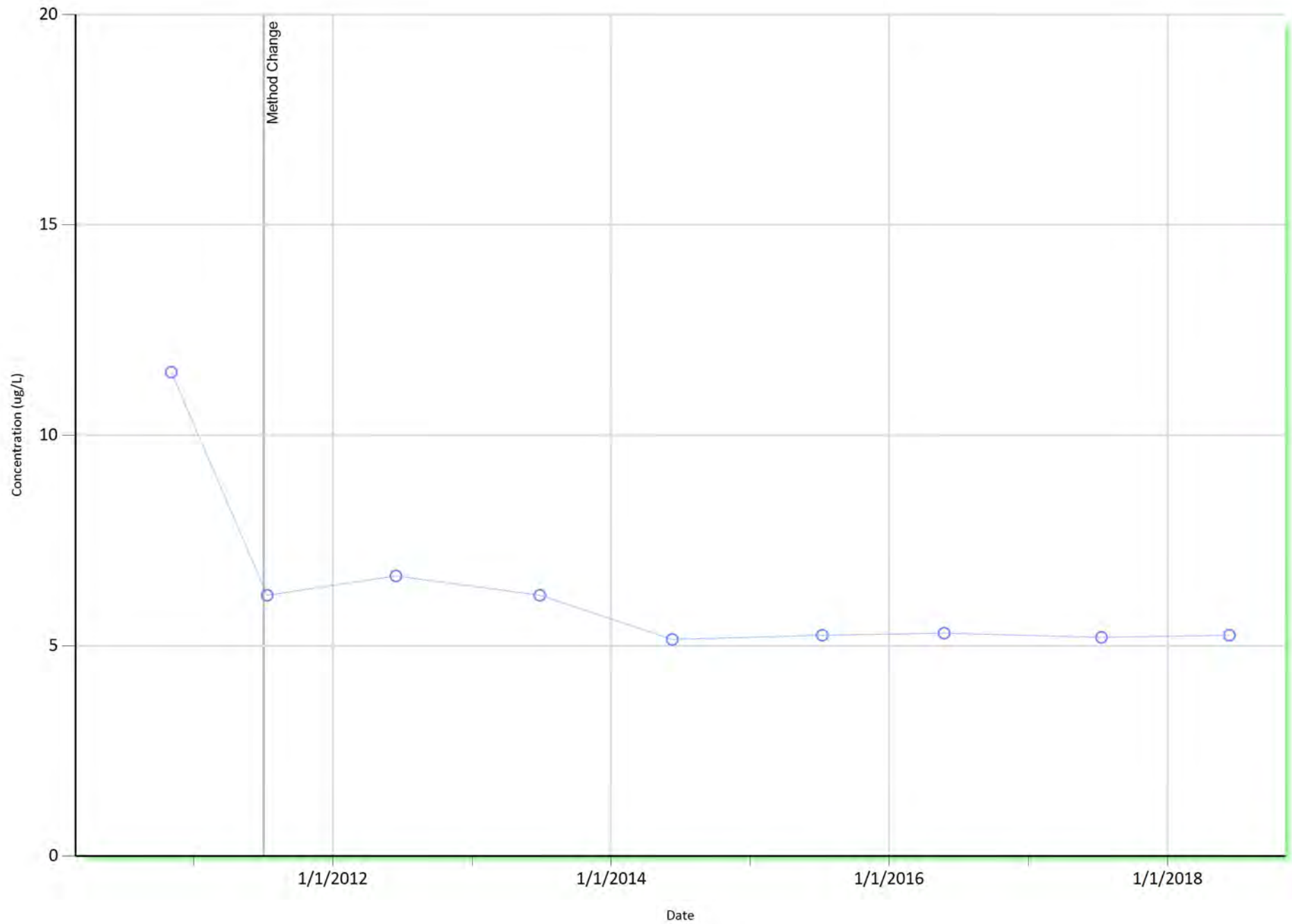


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

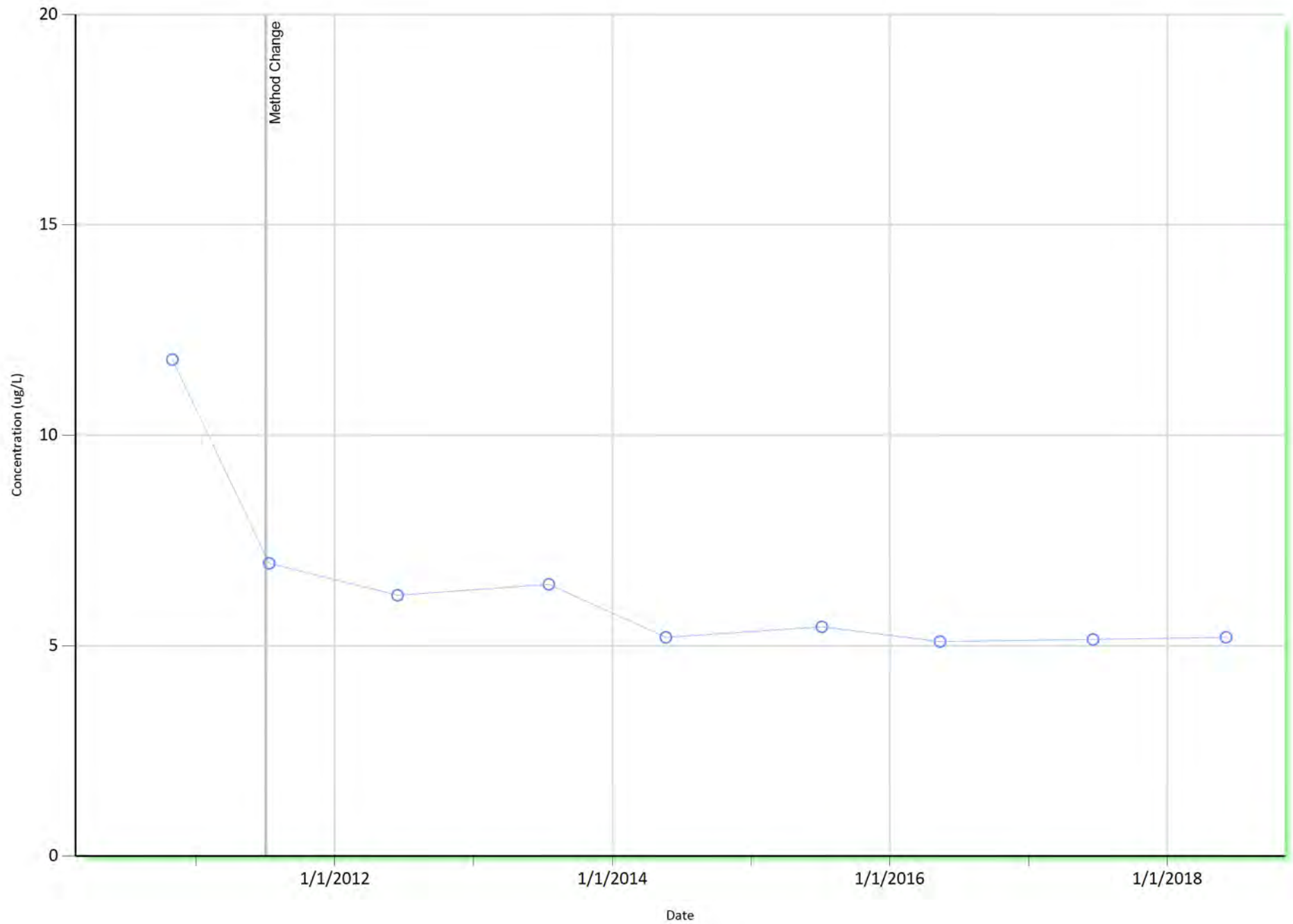
PW-0774, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

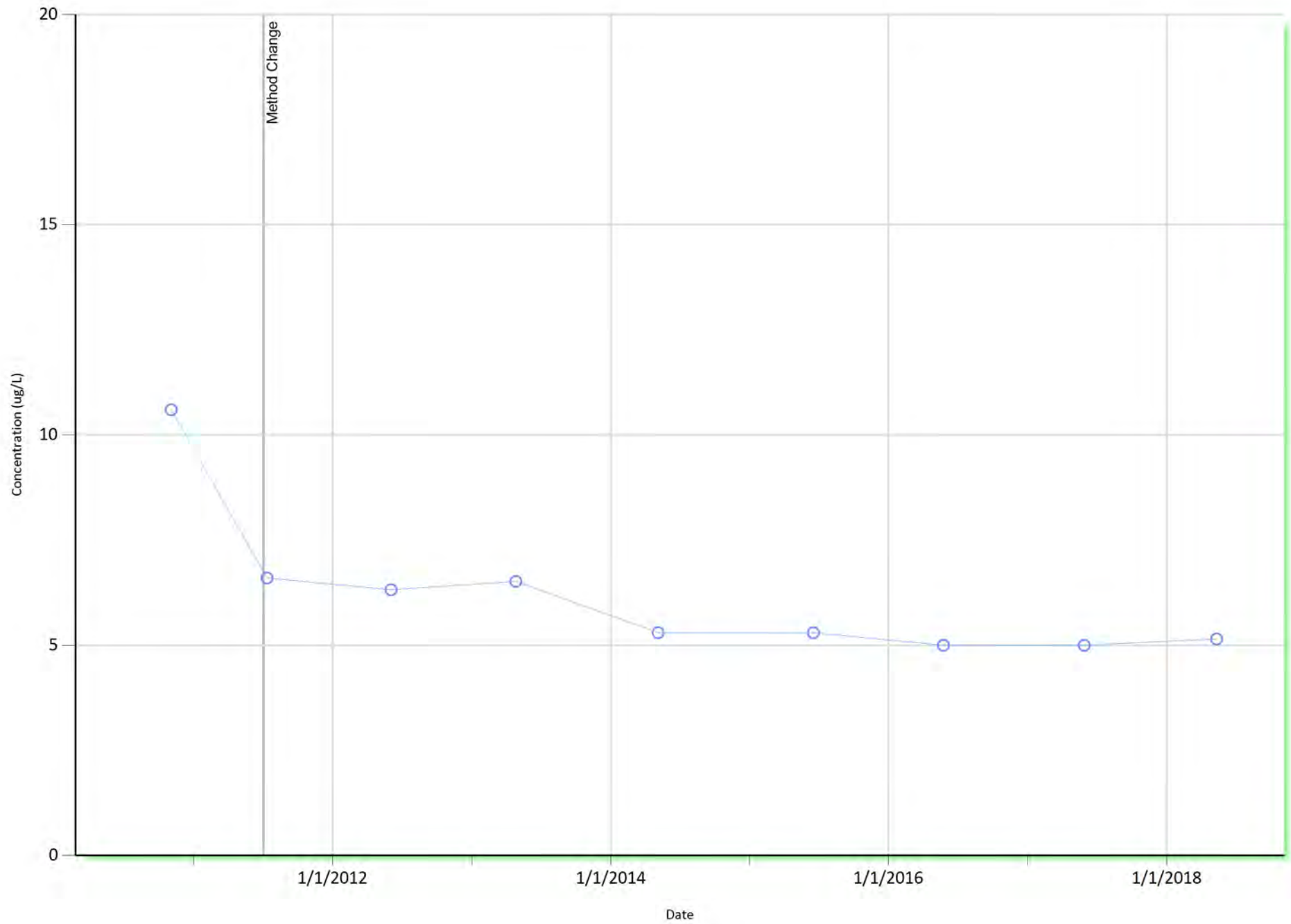
PW-0775, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

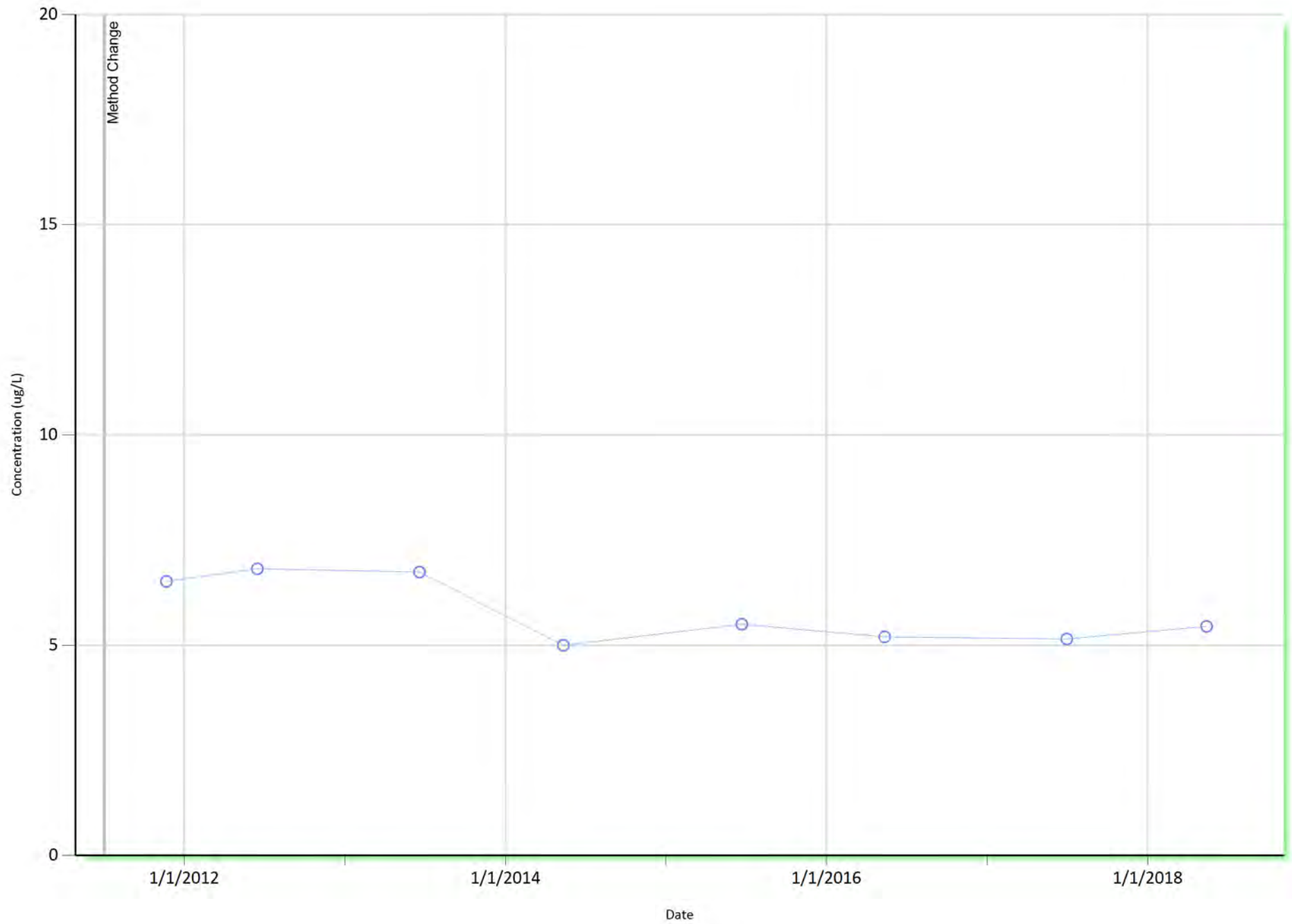
PW-0776, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

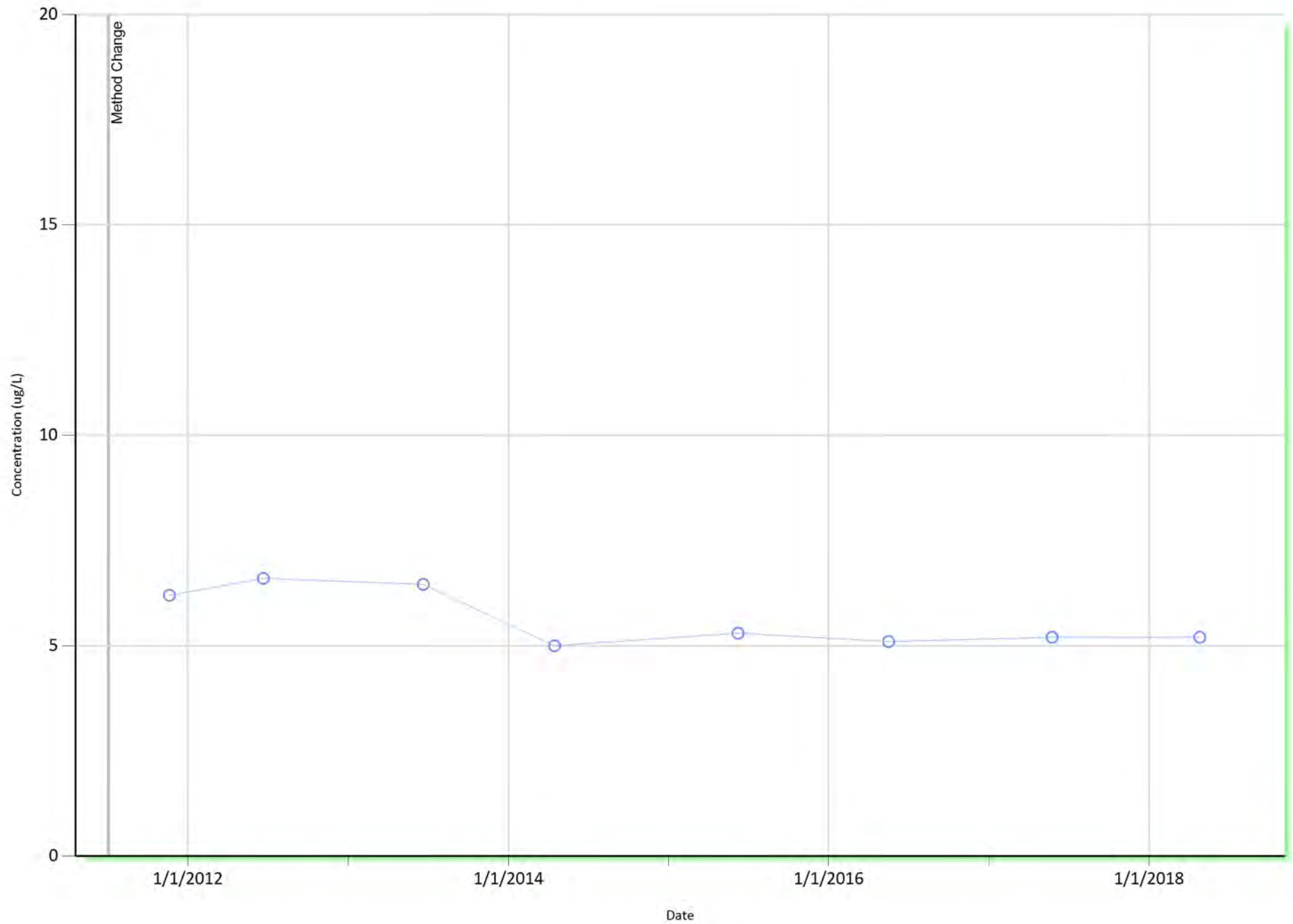
PW-0777, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

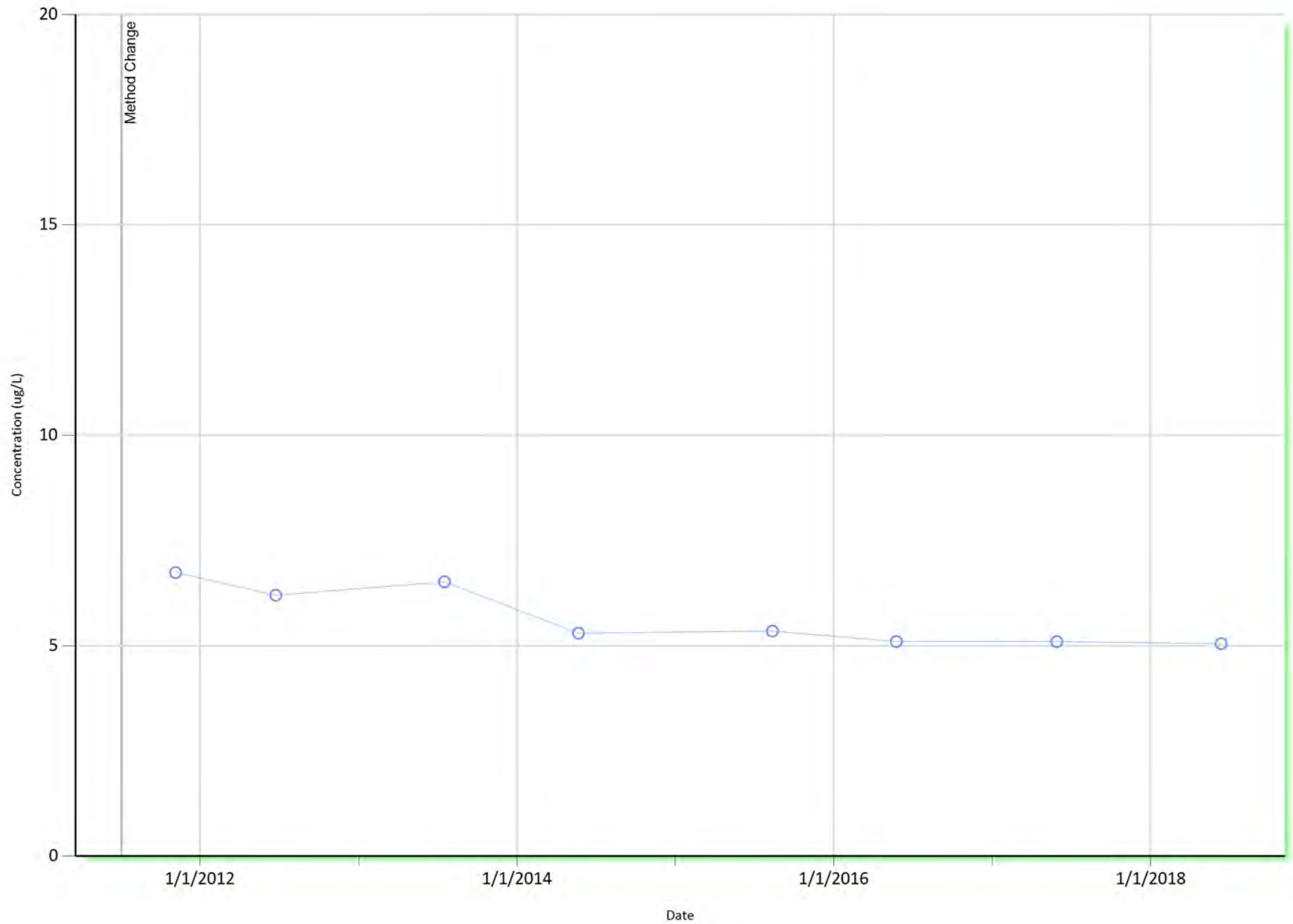
PW-0863, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

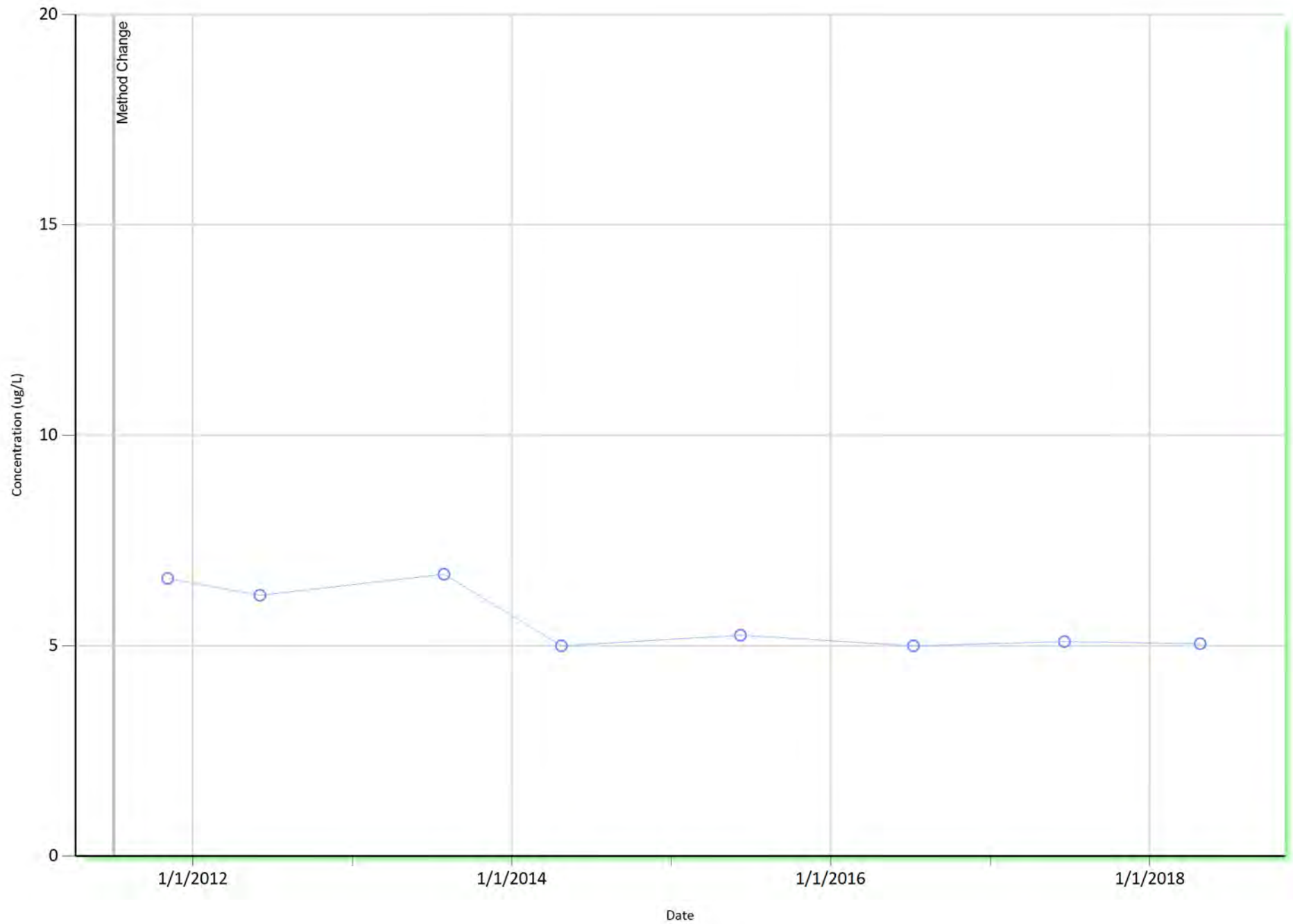
PW-0864, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

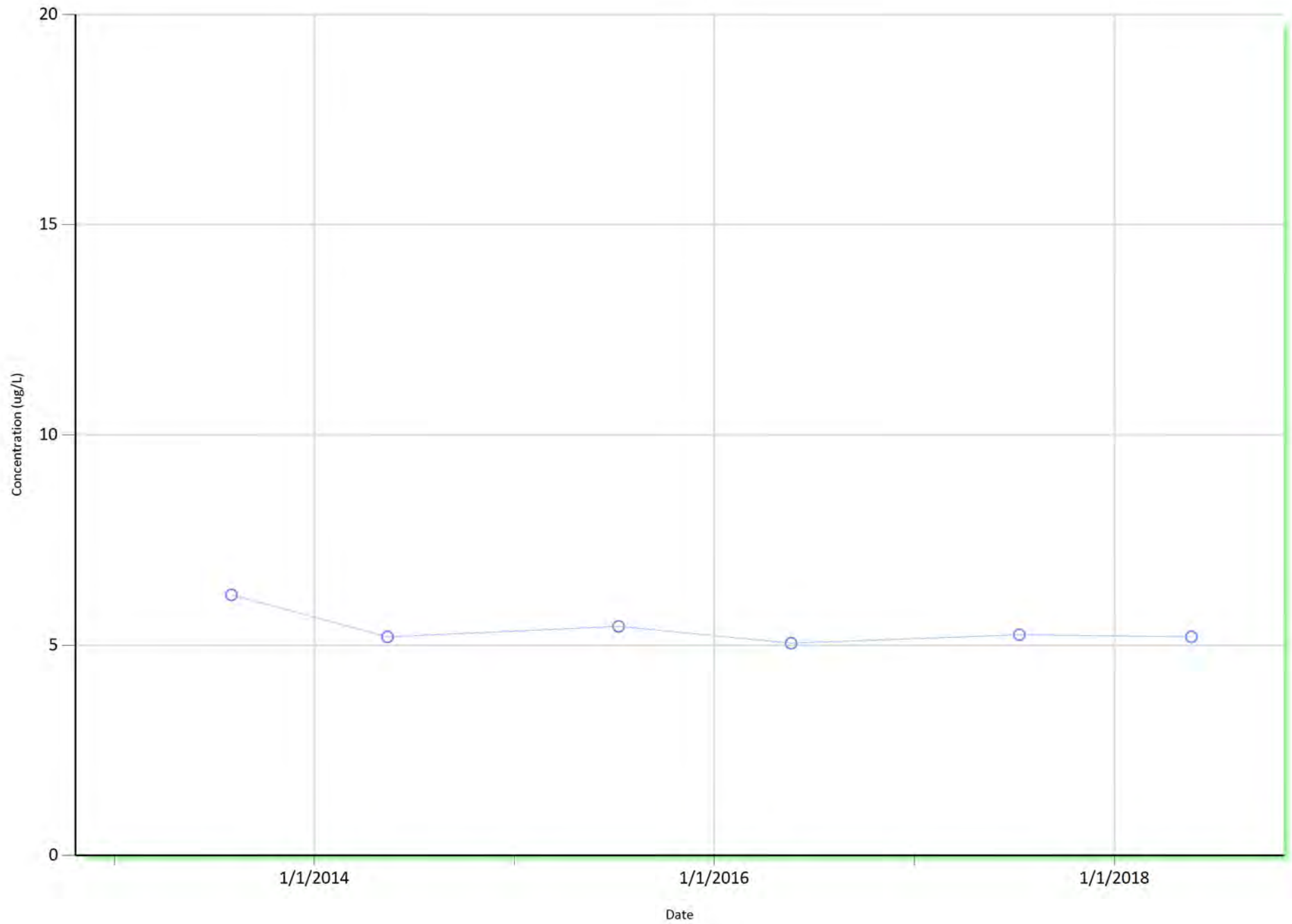
PW-0866, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0868, Off-site, Sulfolane

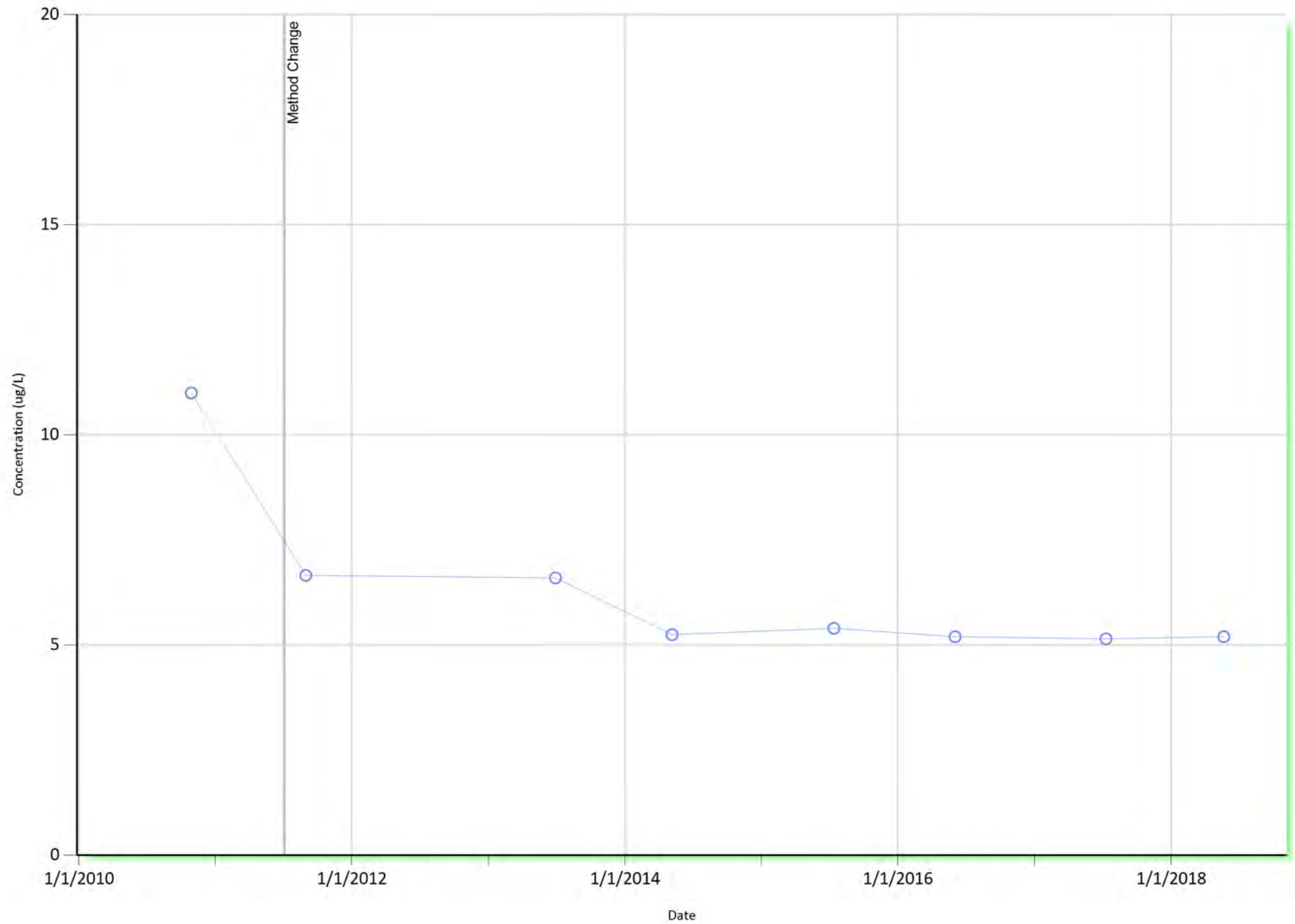


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

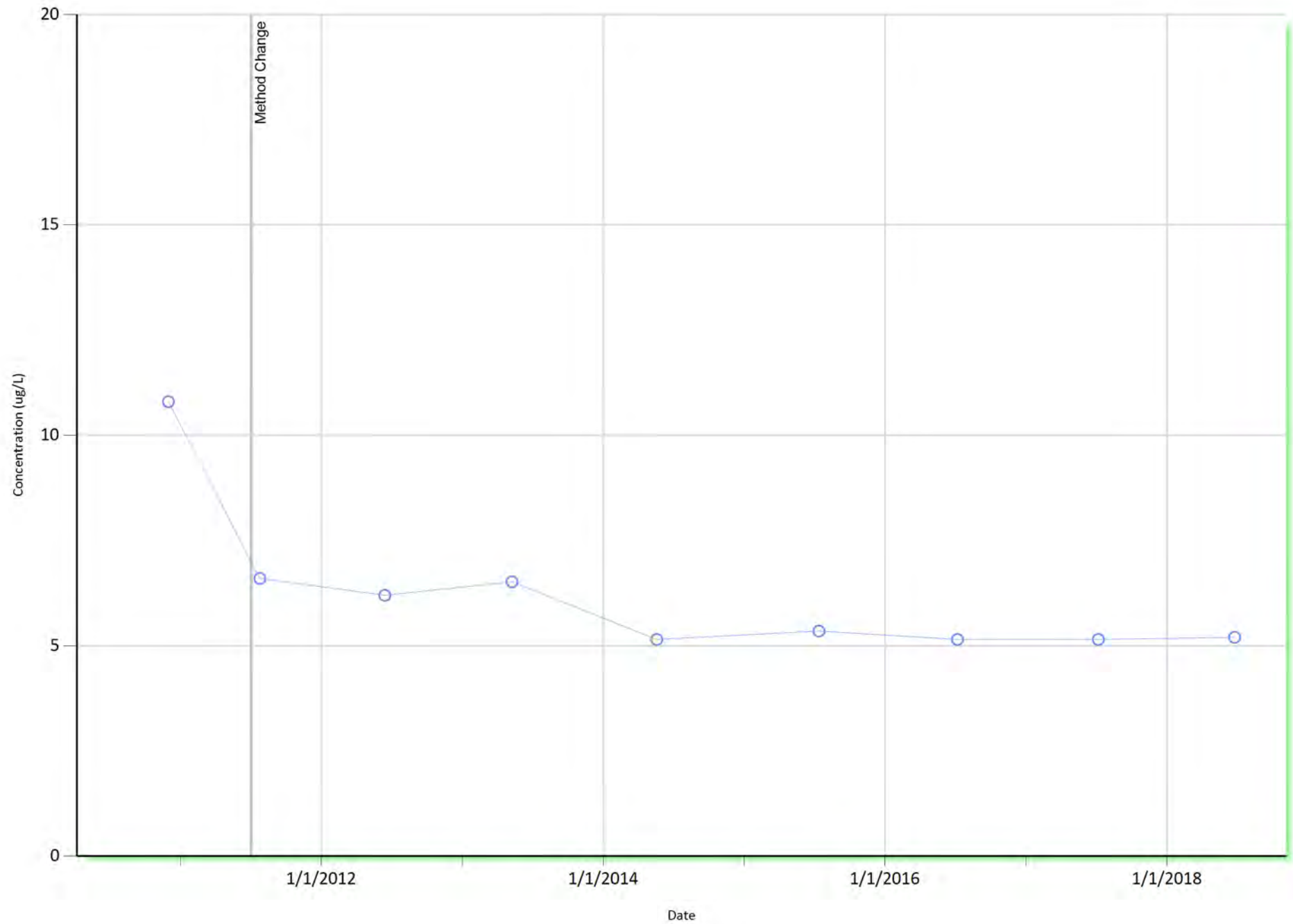
PW-0869, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

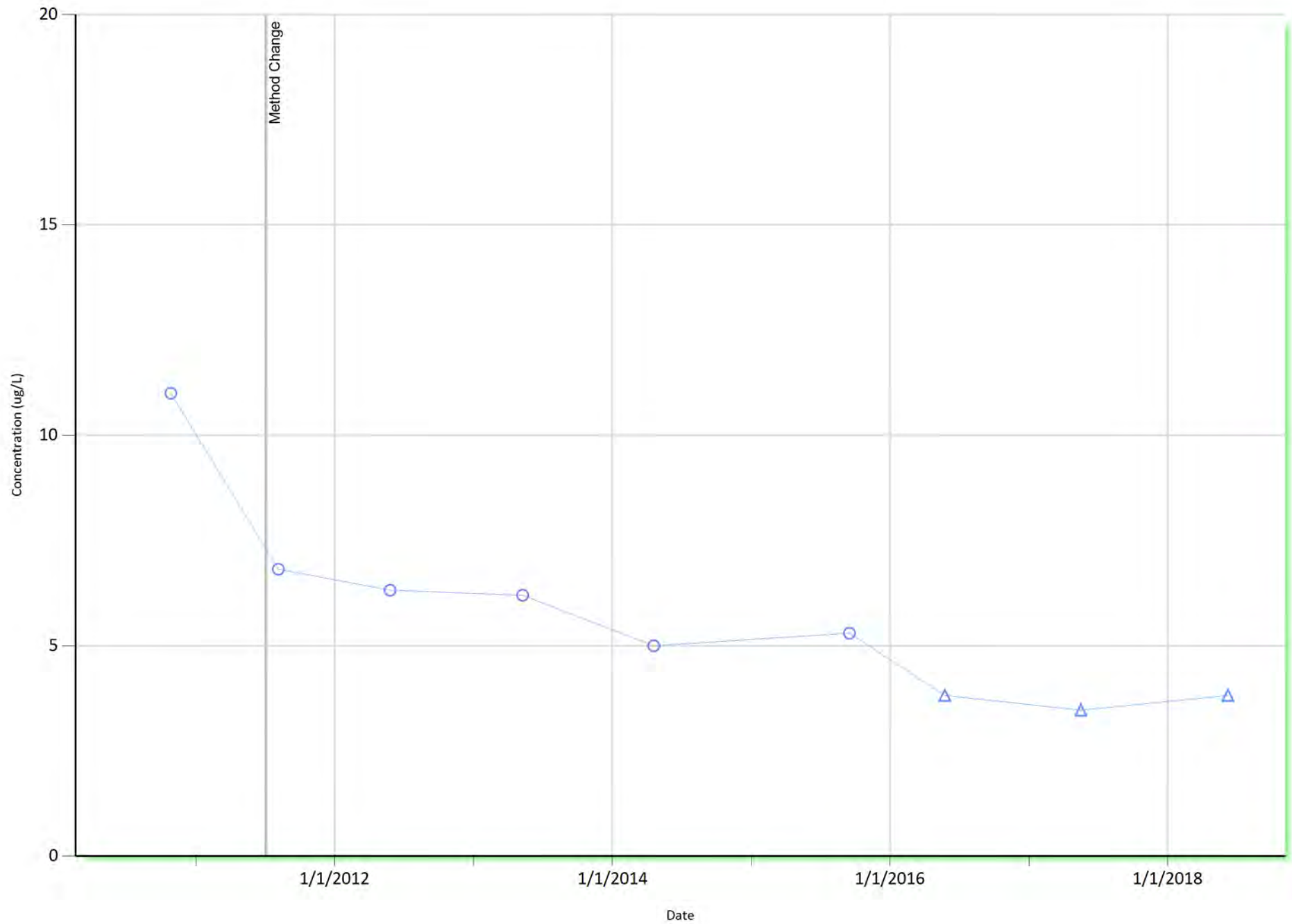
PW-0870, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

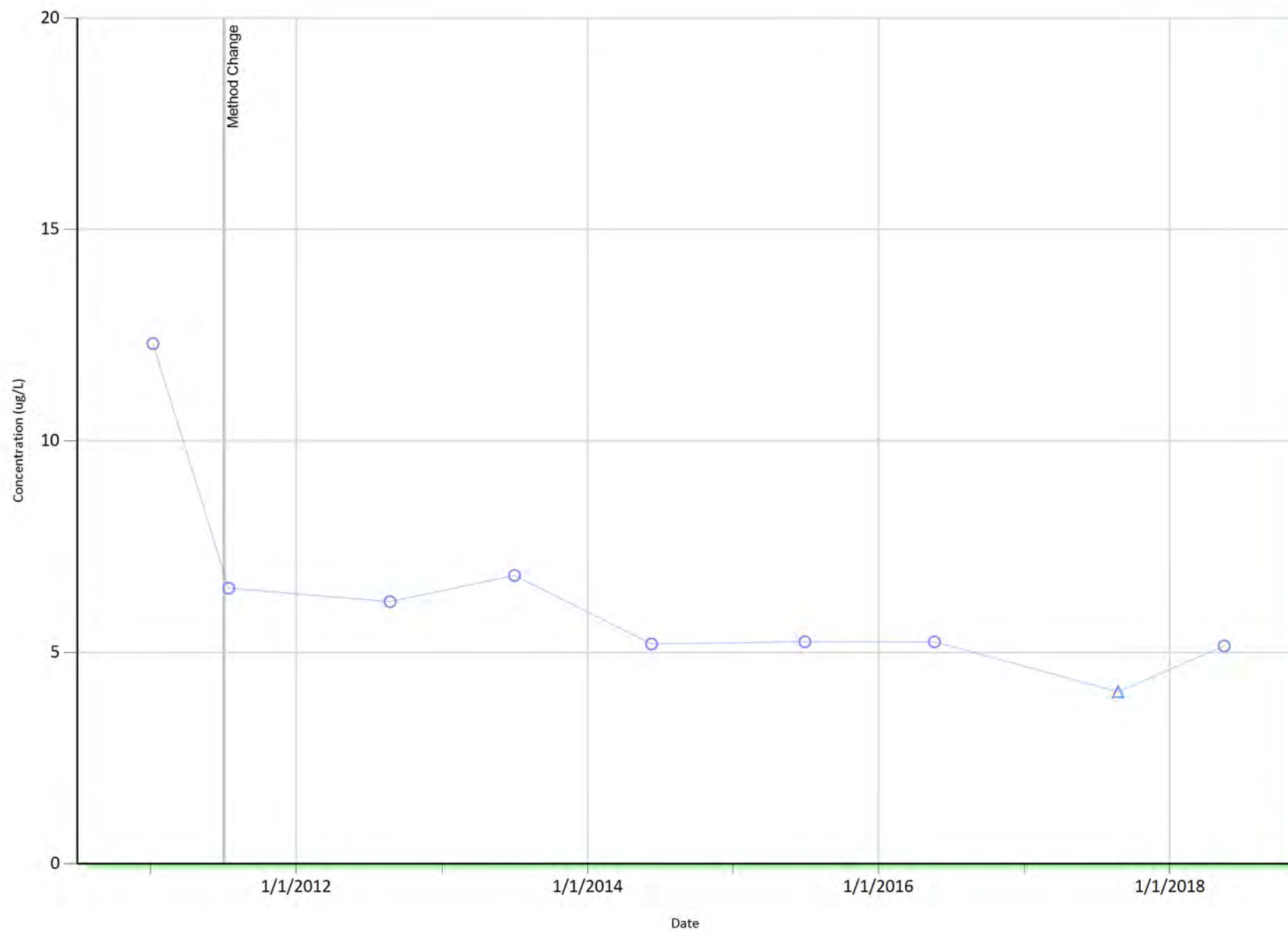
PW-0871, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

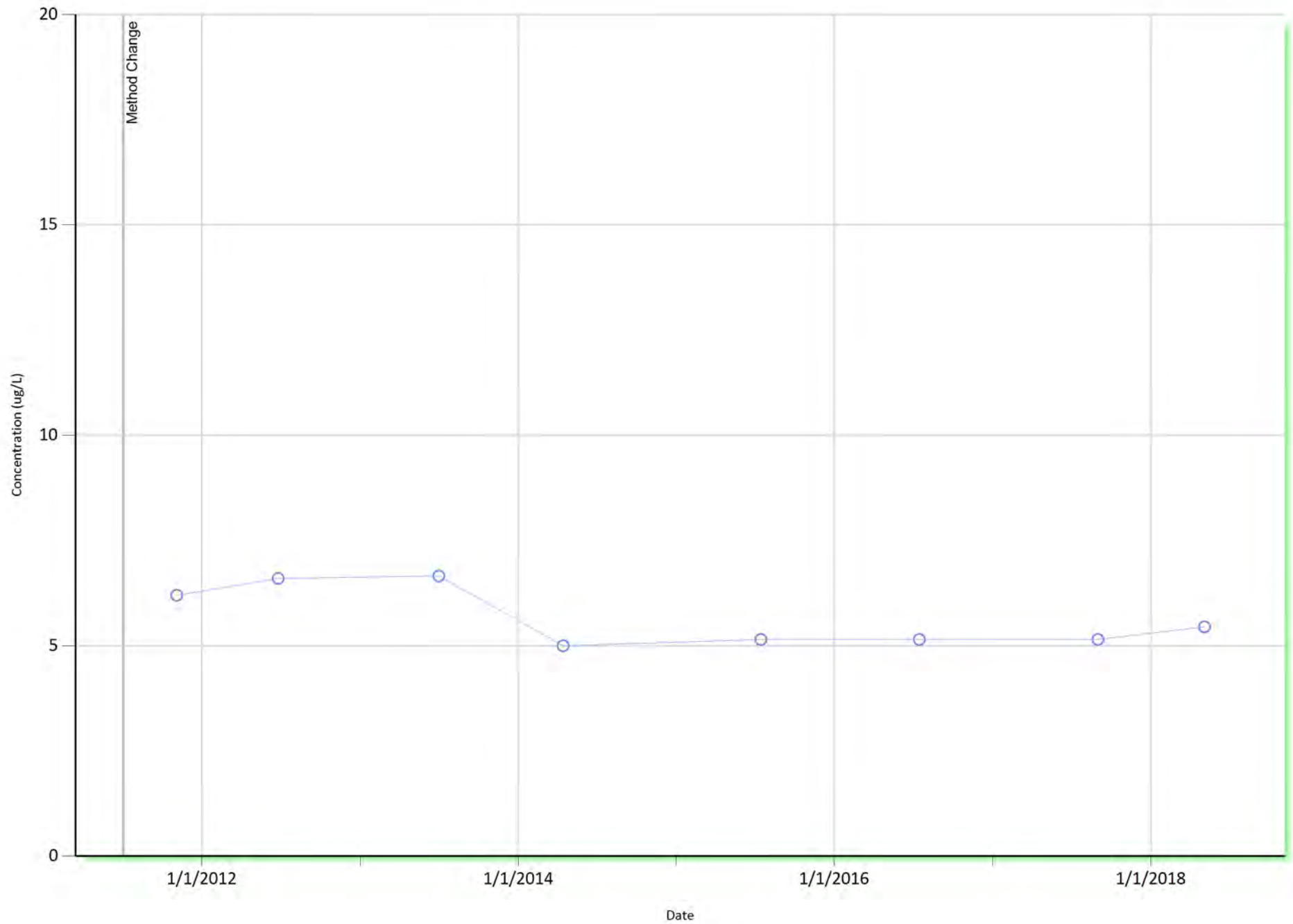
PW-0872, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

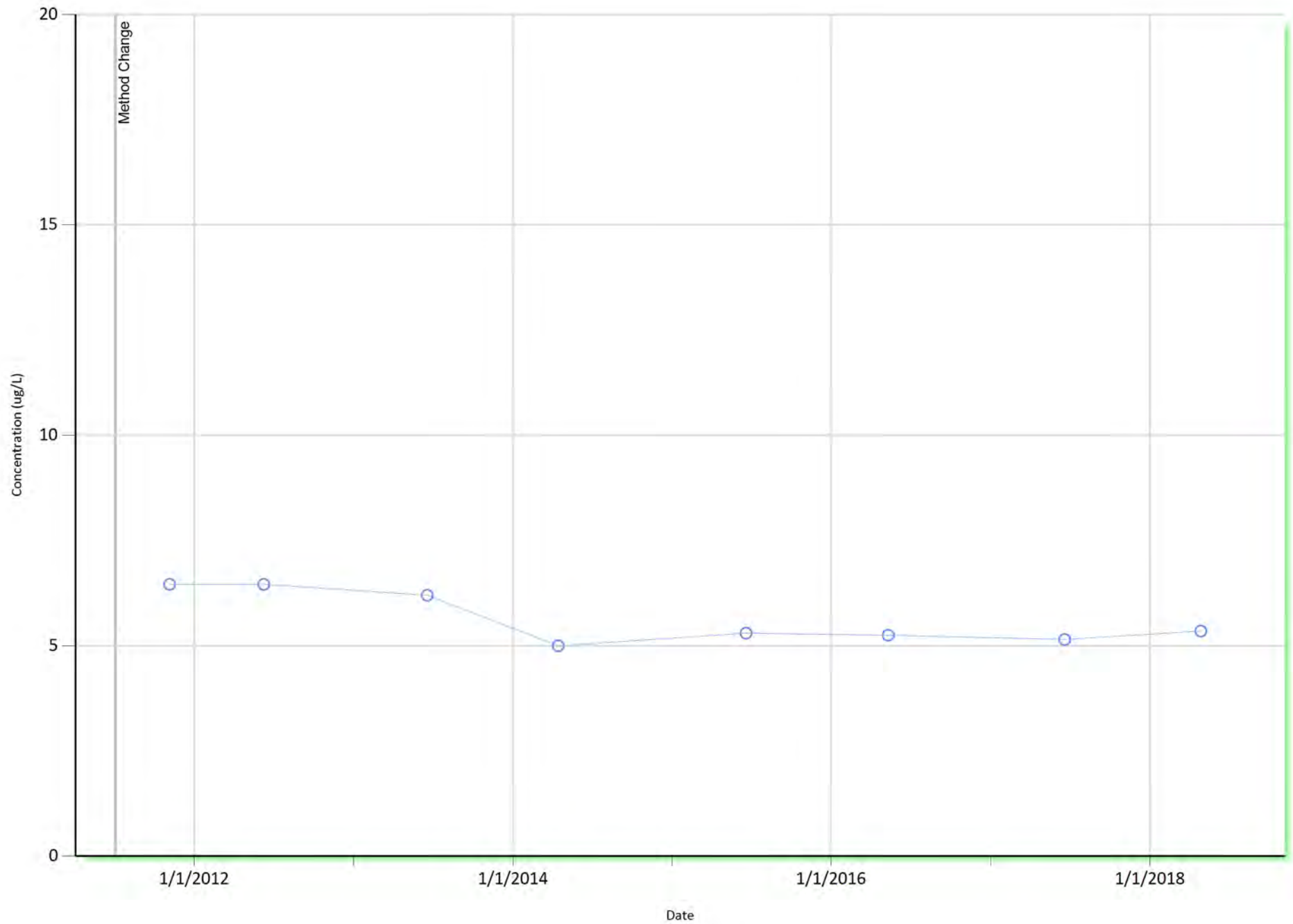
PW-0905, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

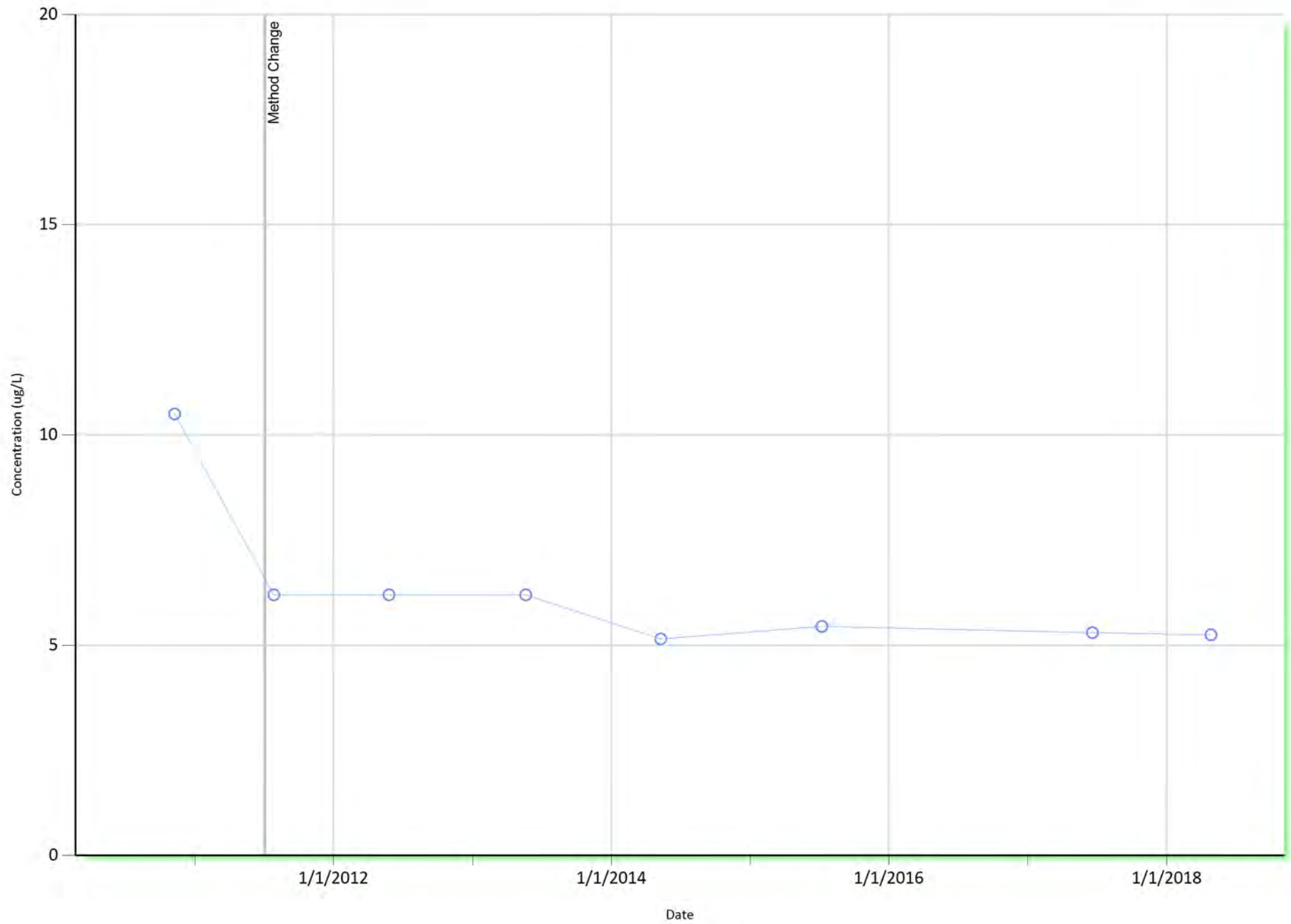
PW-0907, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

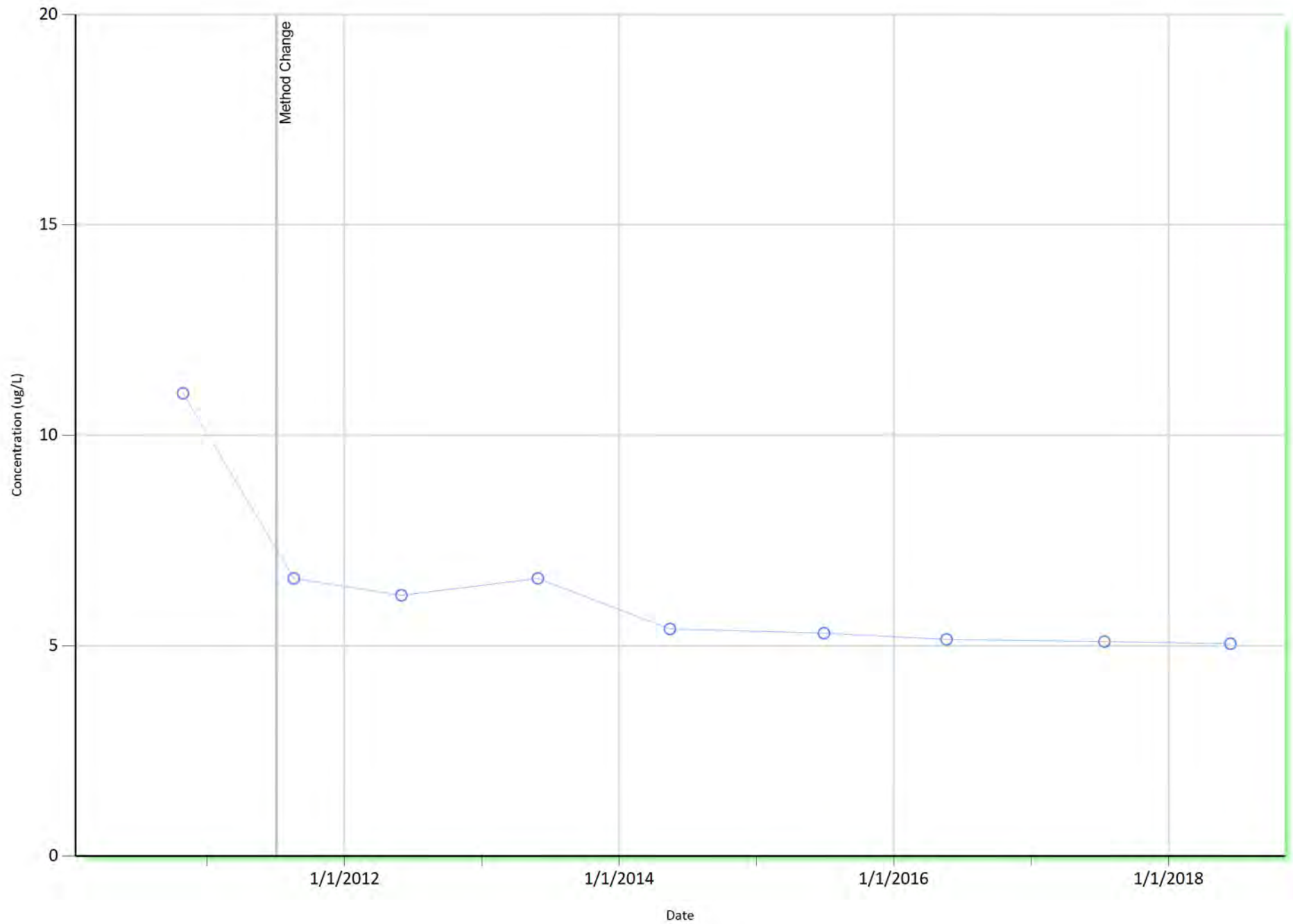
PW-0908, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0909, Off-site, Sulfolane

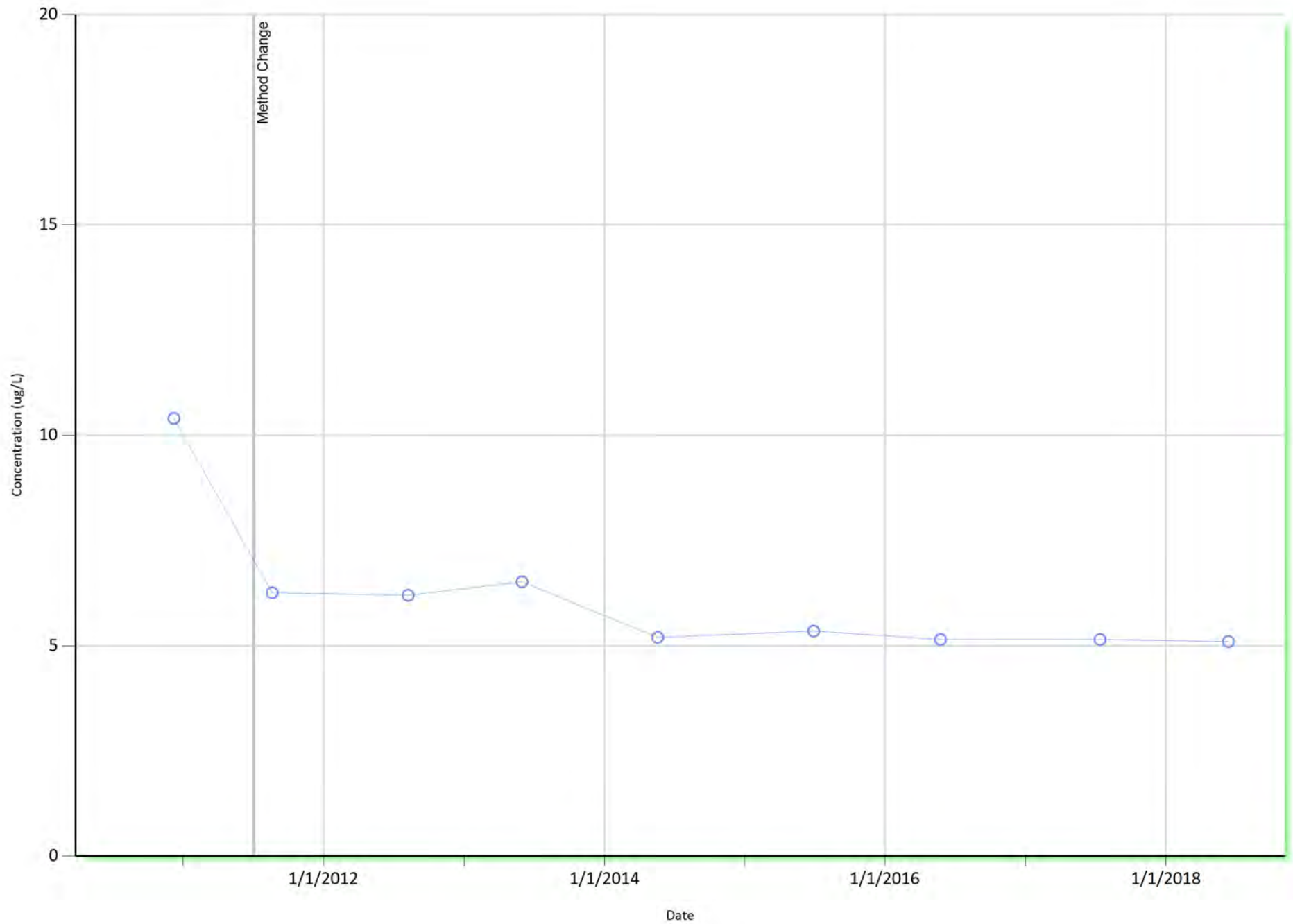


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

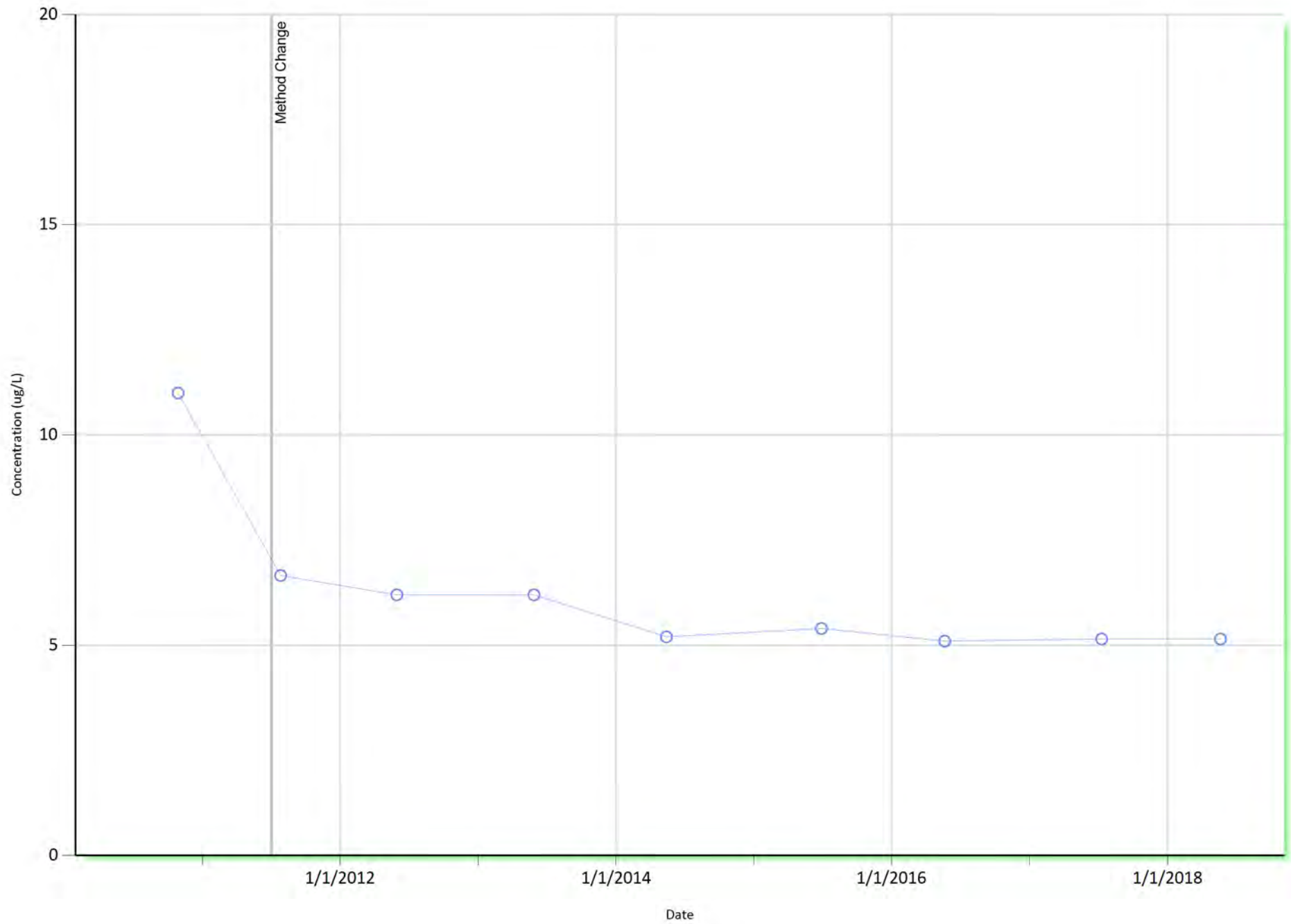
PW-0910, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

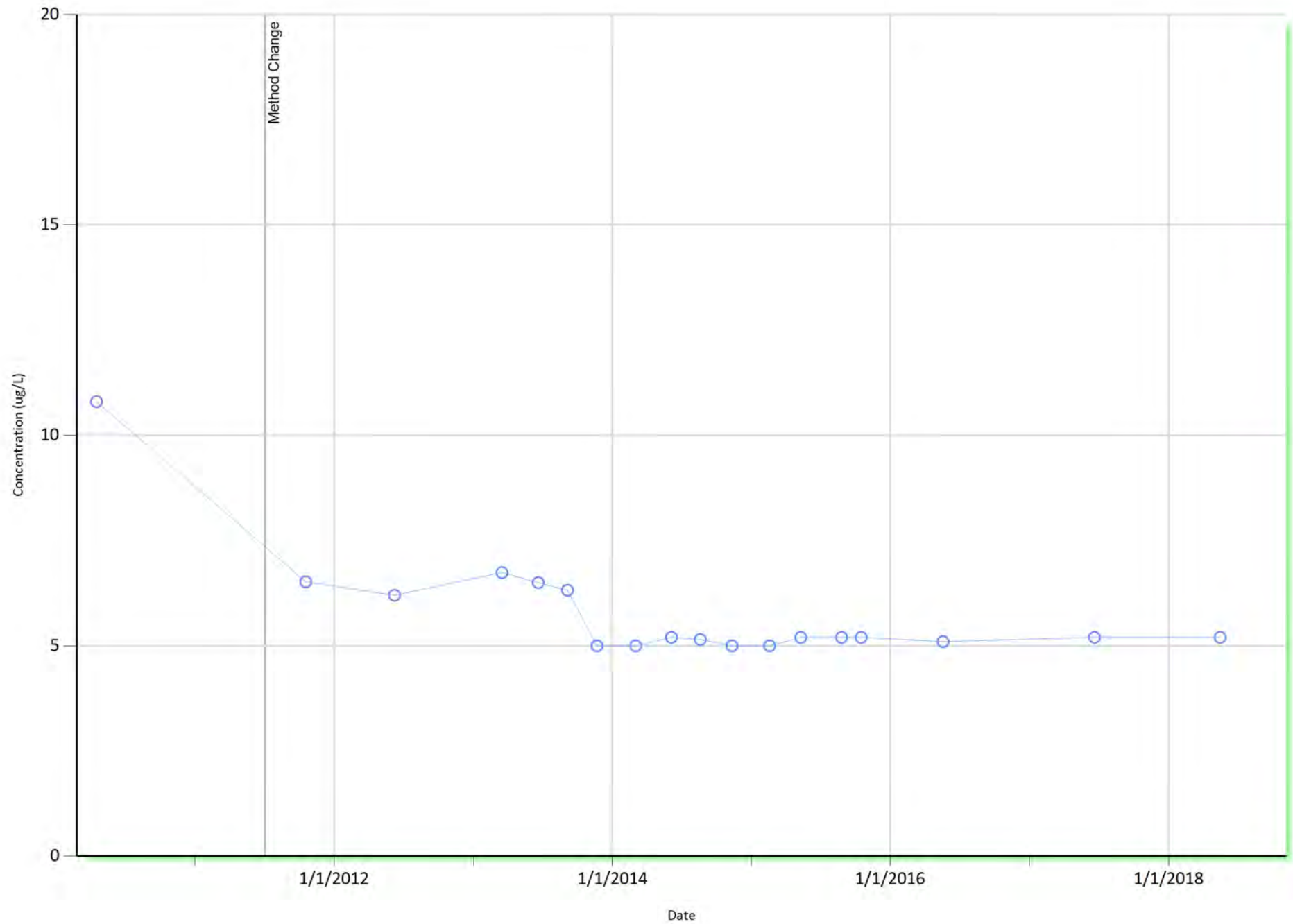
PW-0911, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

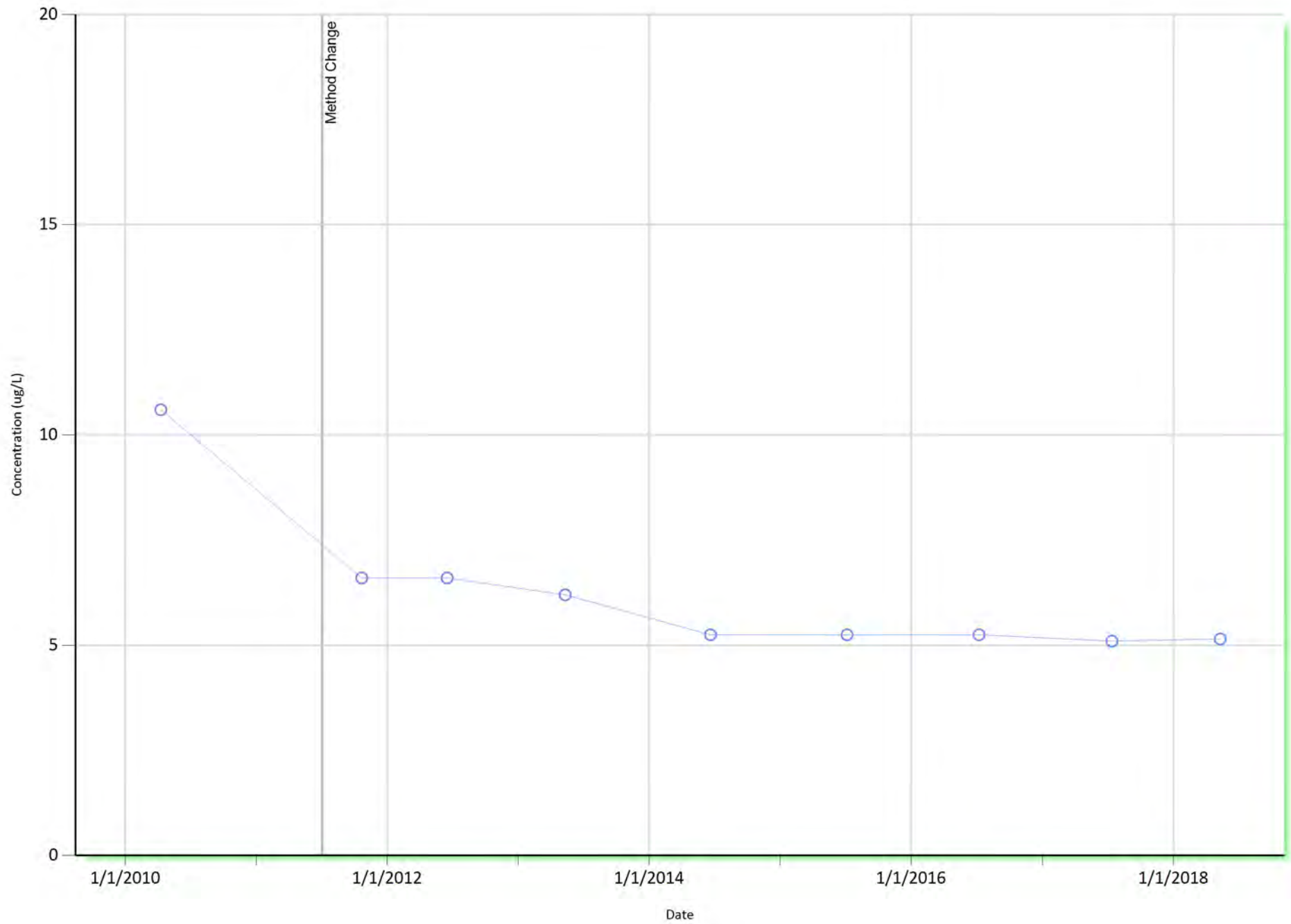
PW-0972, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

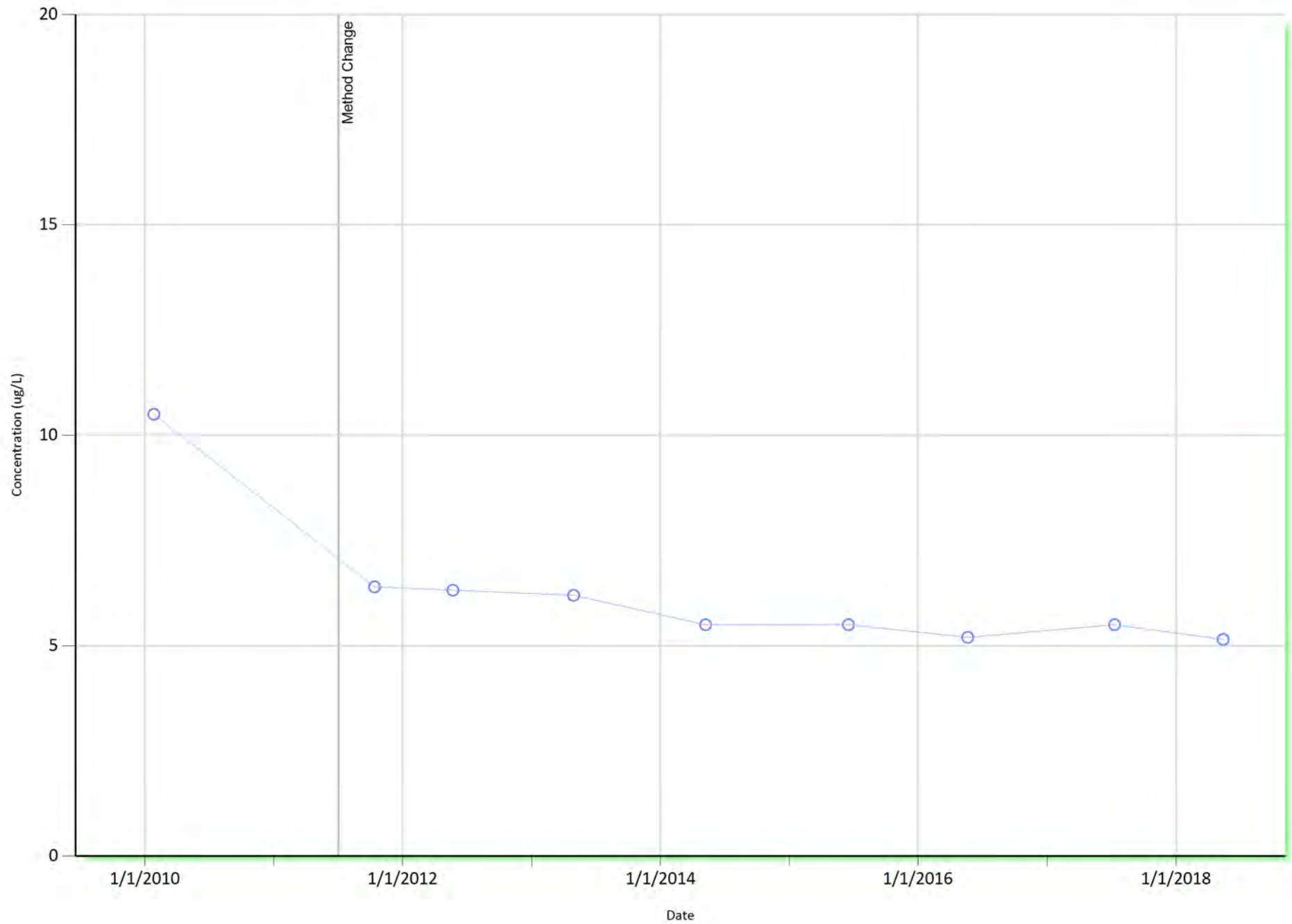
PW-0973, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

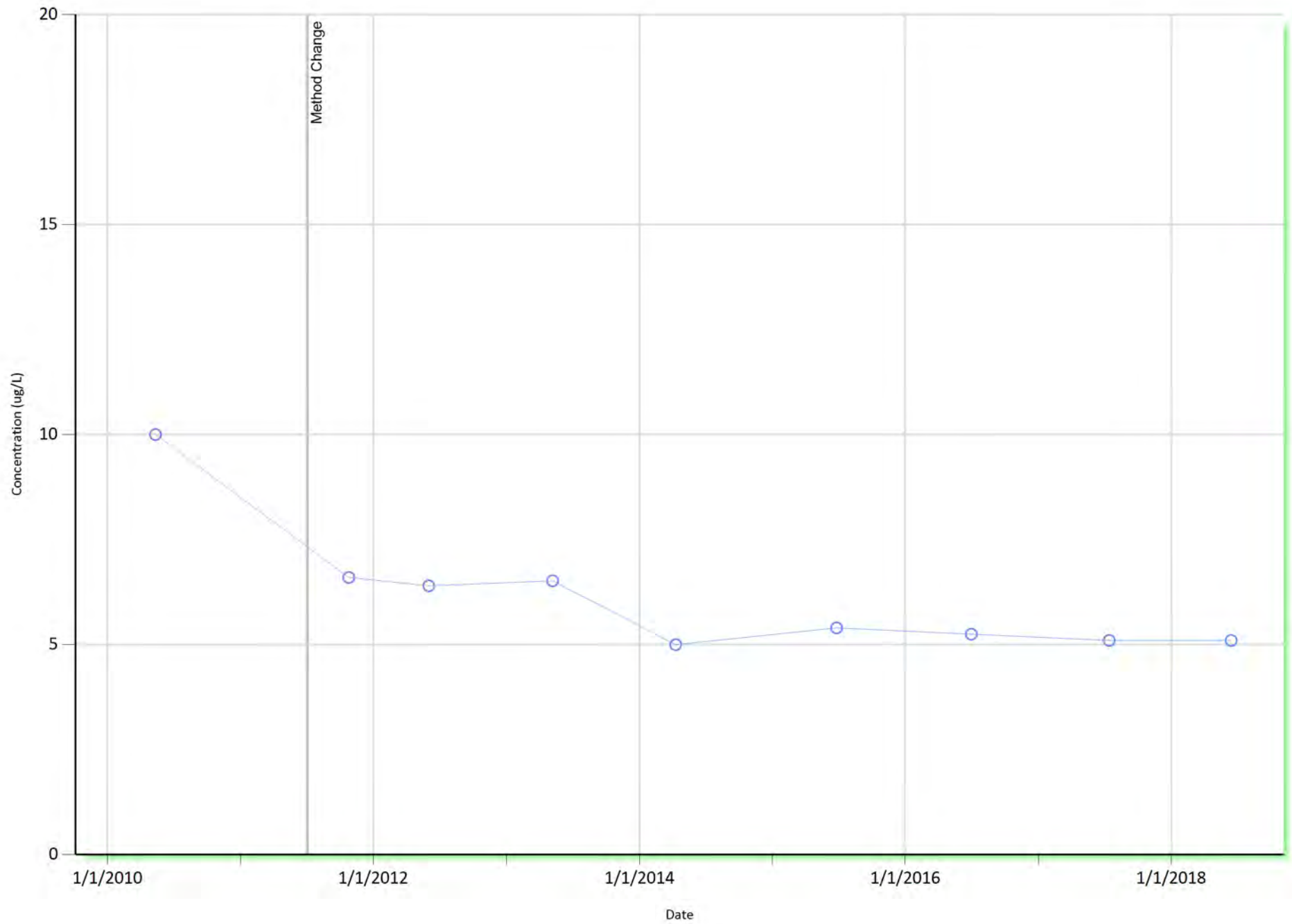
PW-0974, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

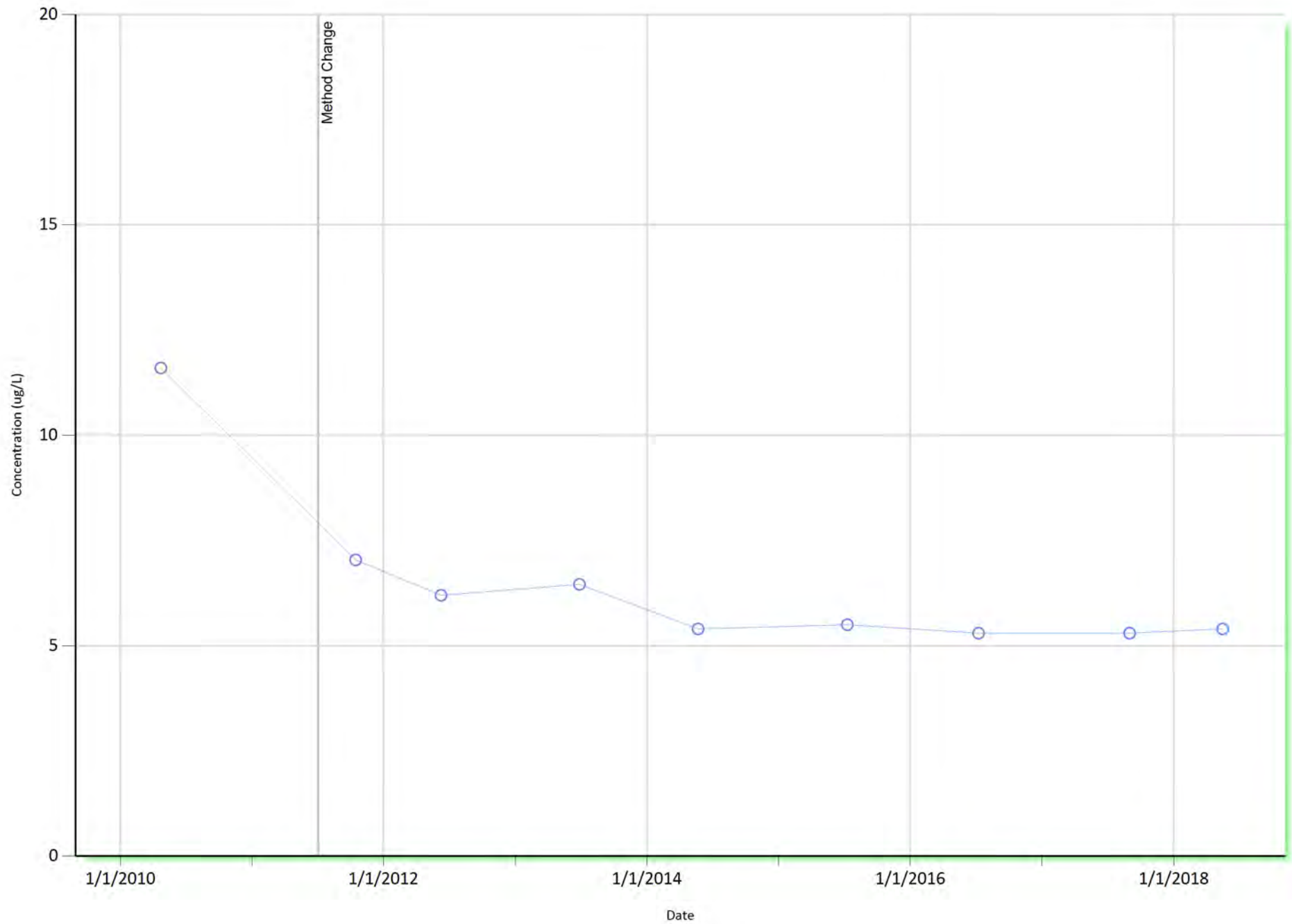
PW-0976, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

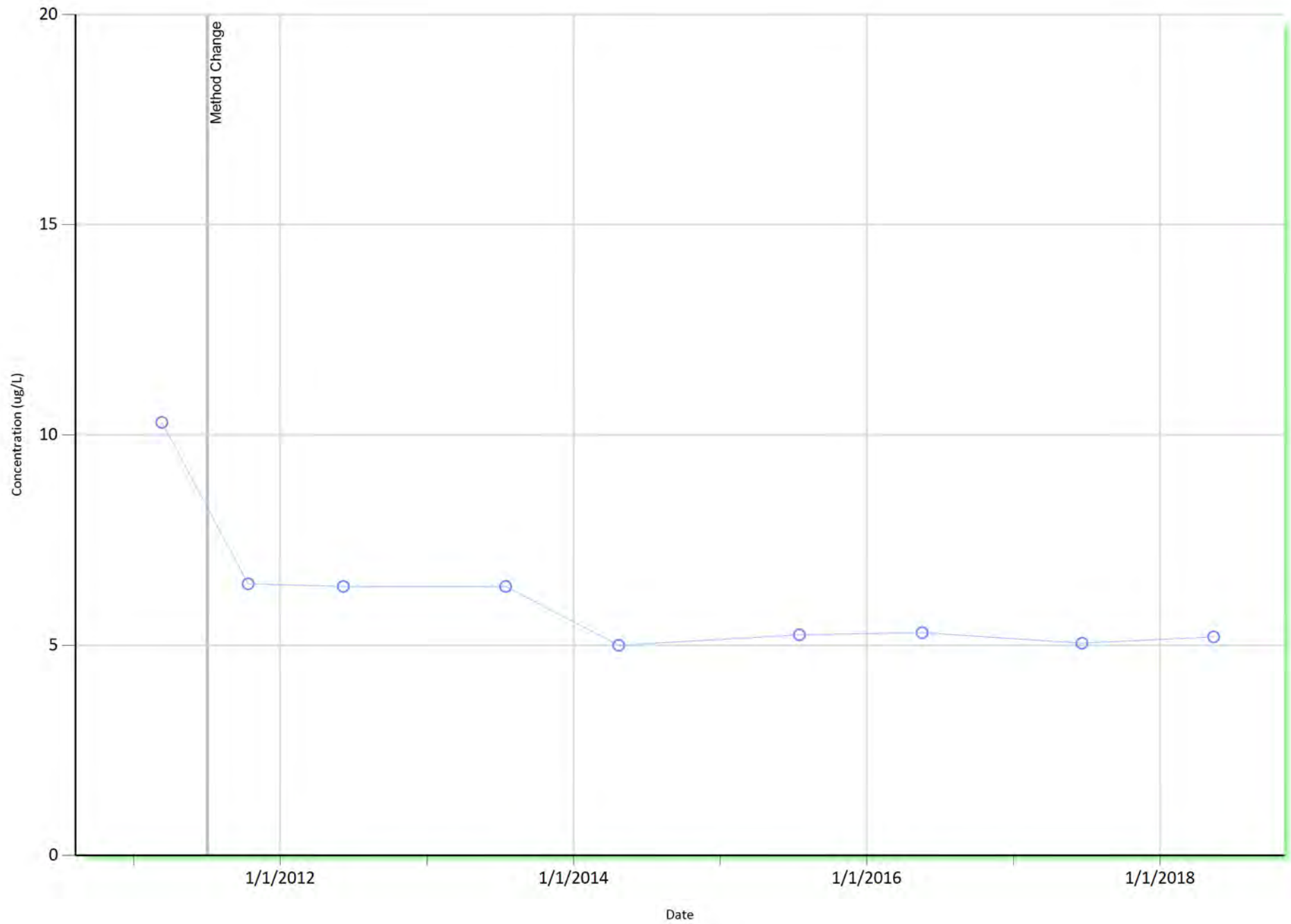
PW-0977, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-0978, Off-site, Sulfolane

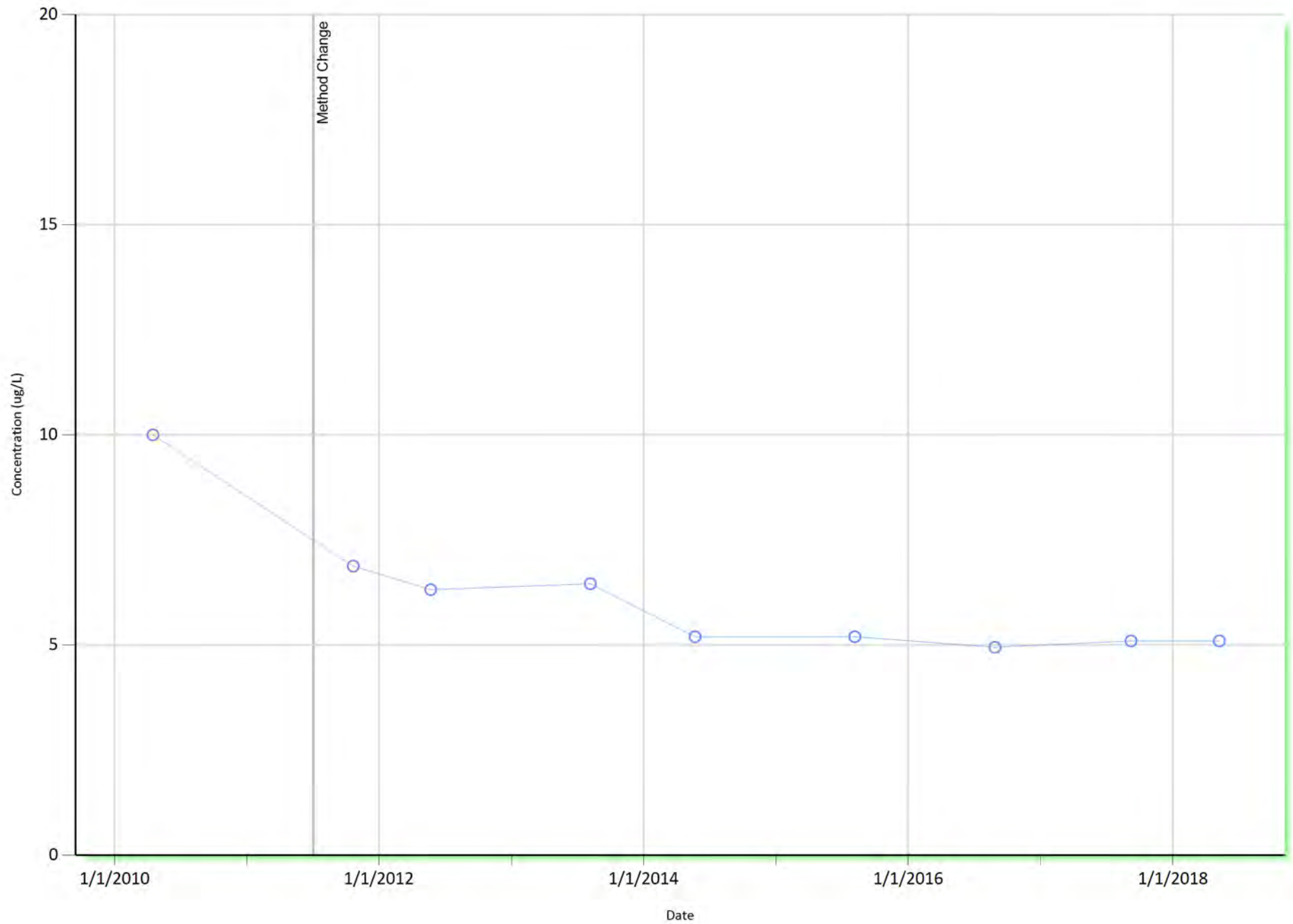


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

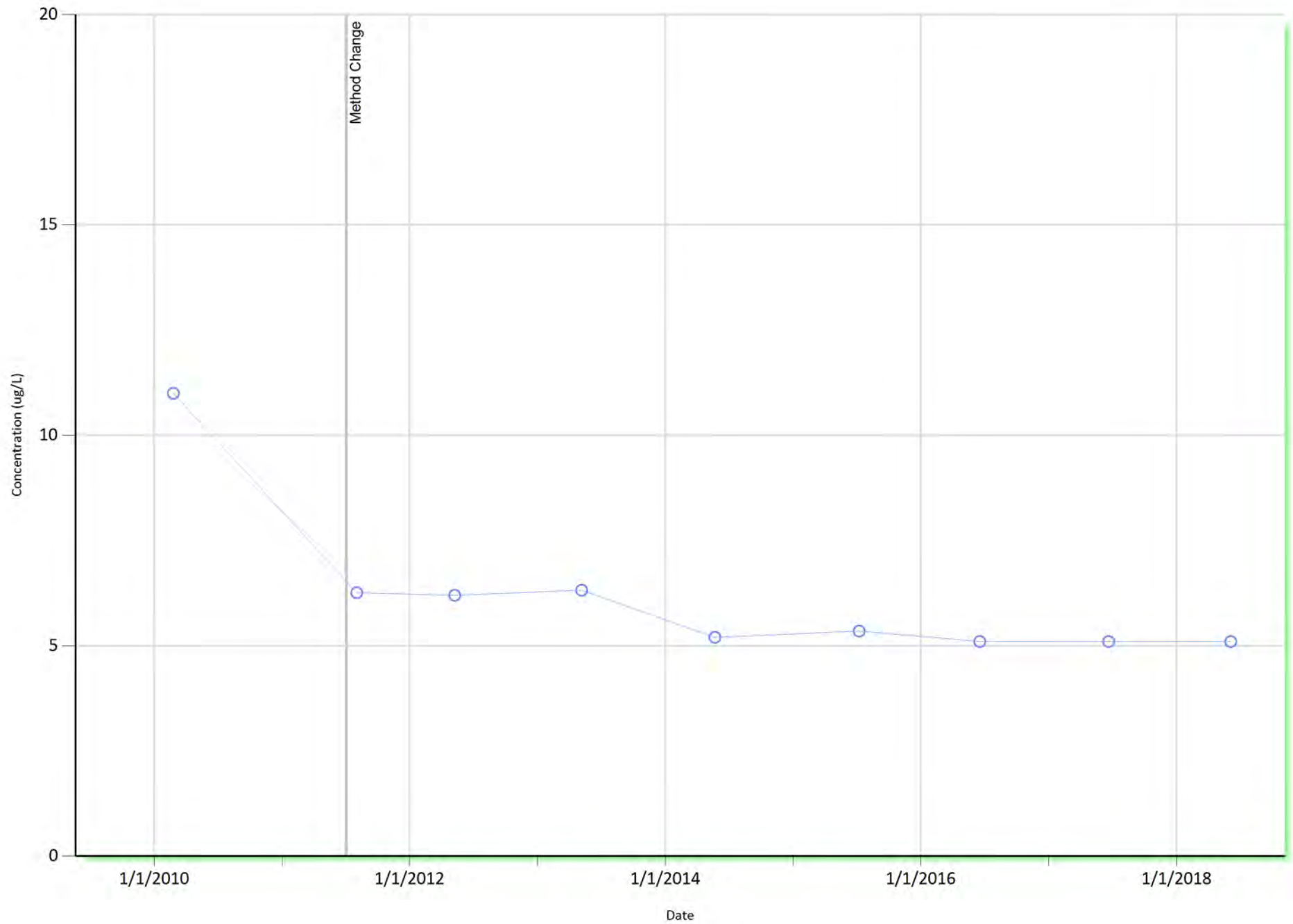
PW-0979, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

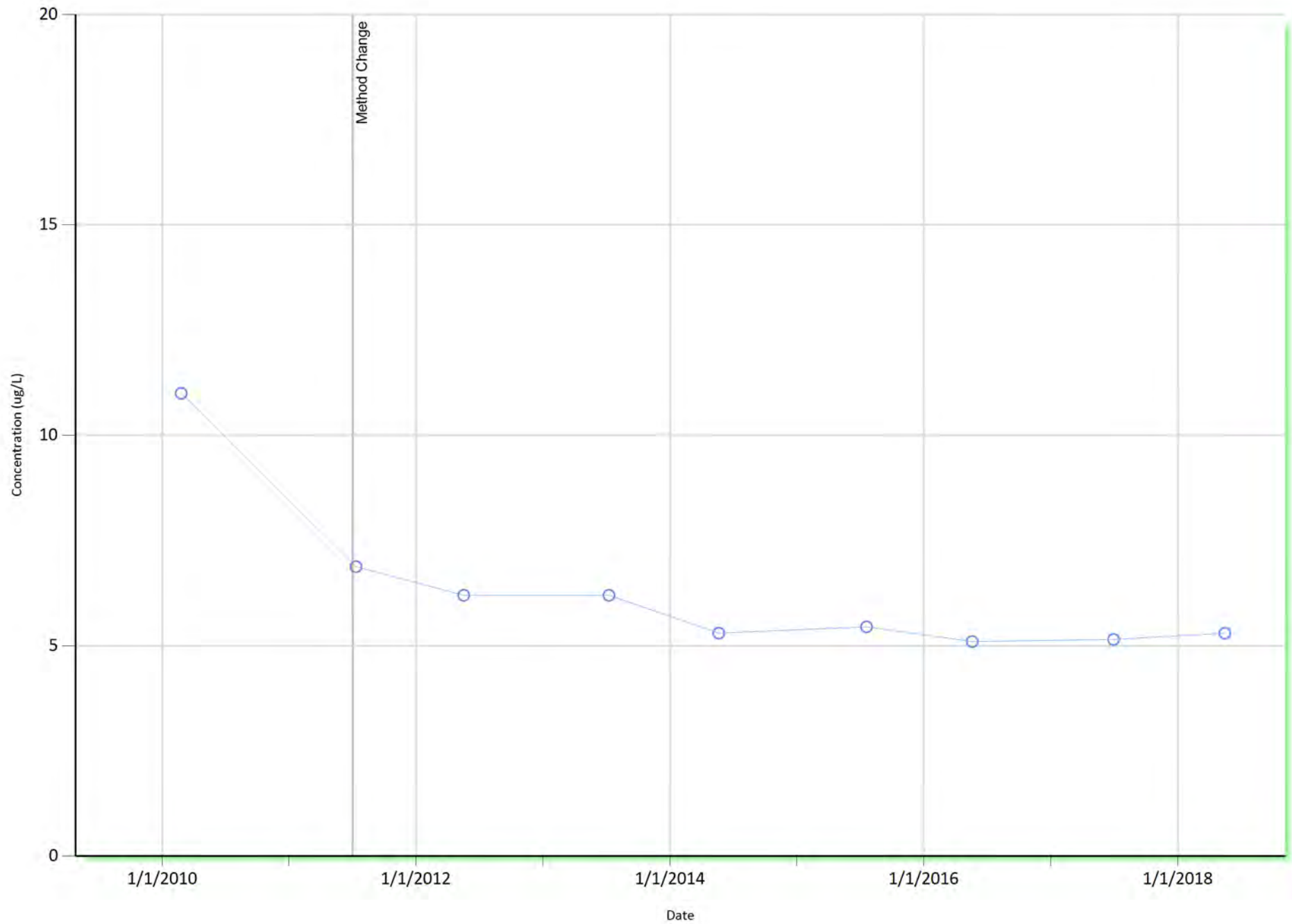
PW-0998, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

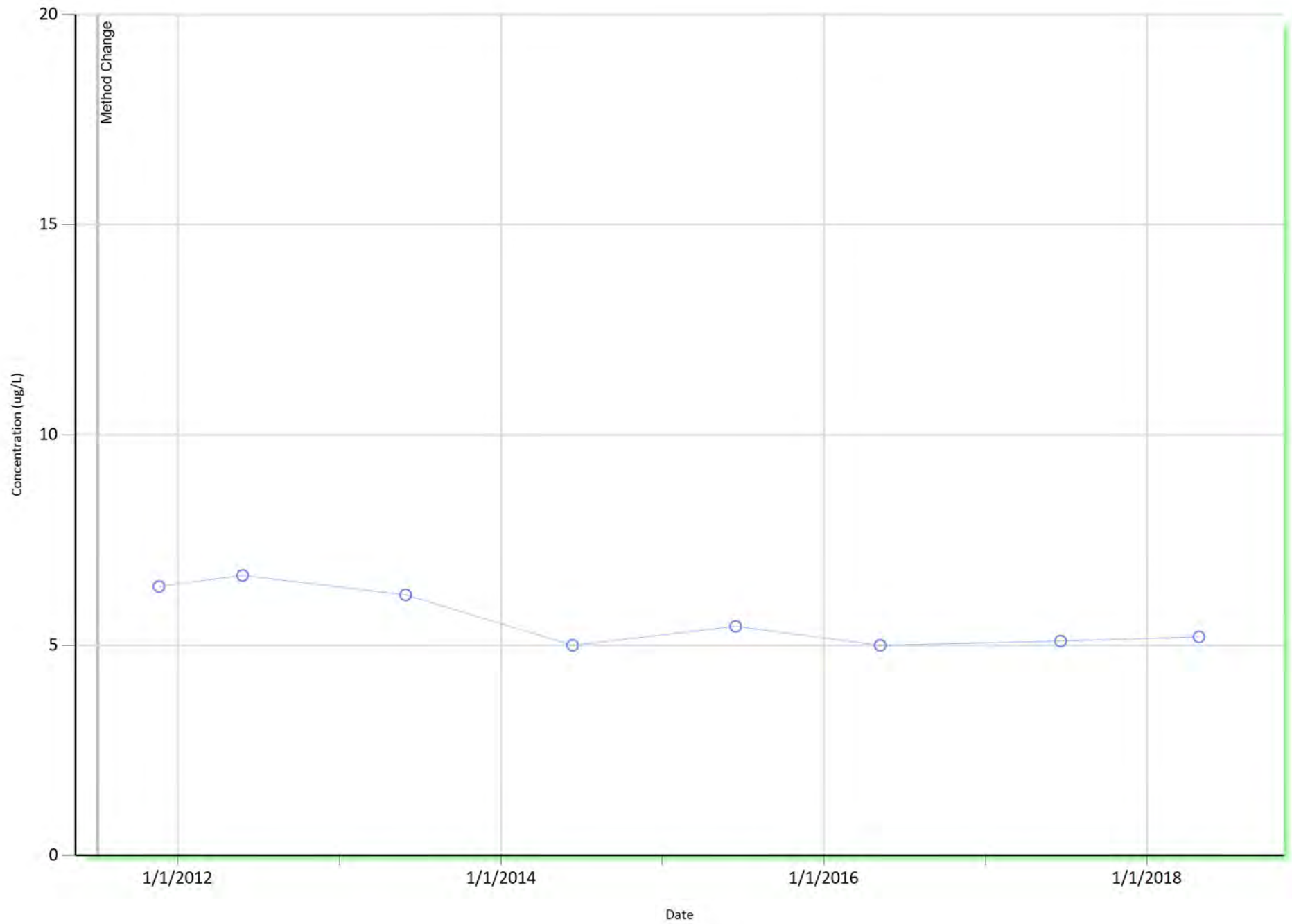
PW-1087, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

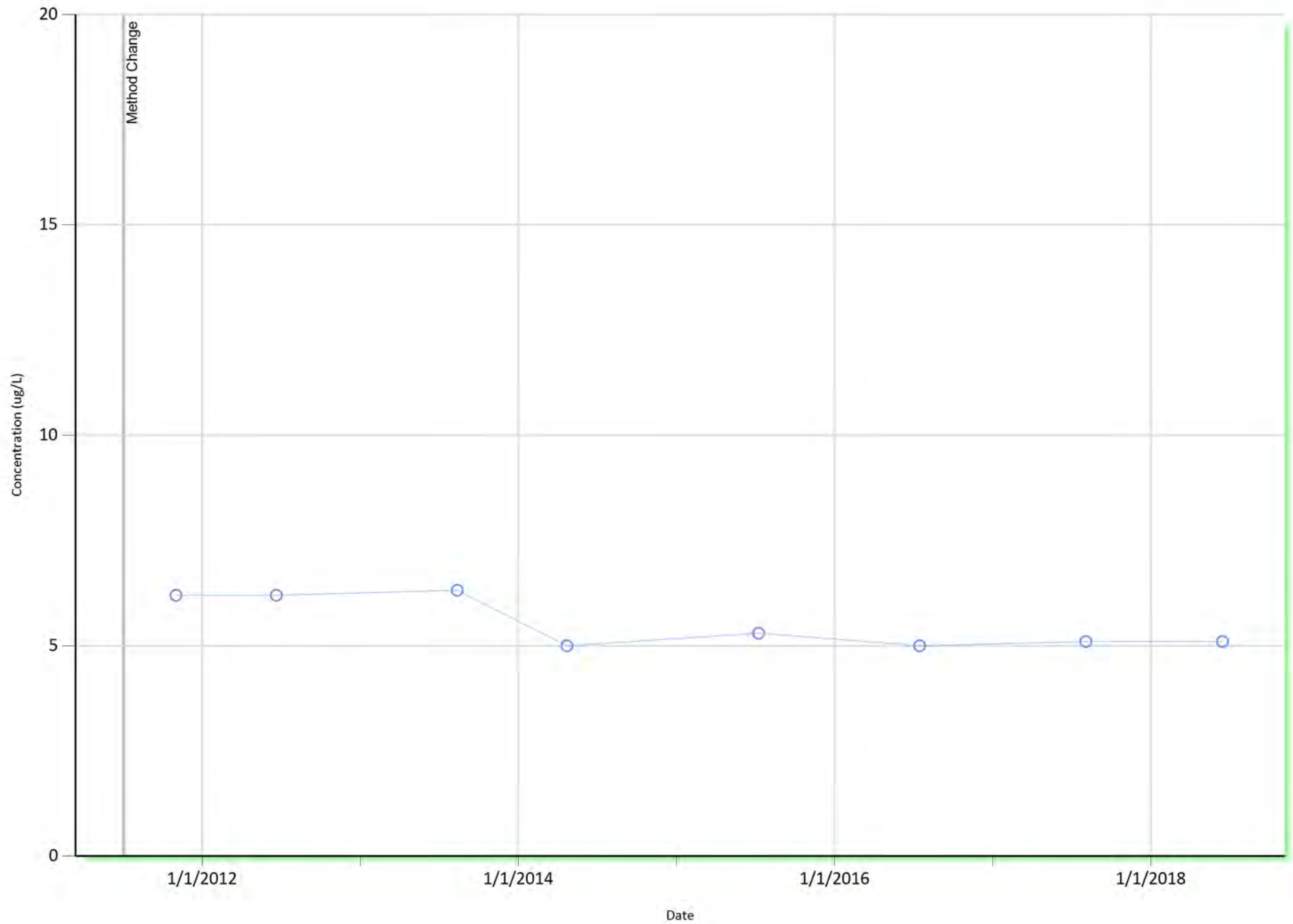
PW-1088, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

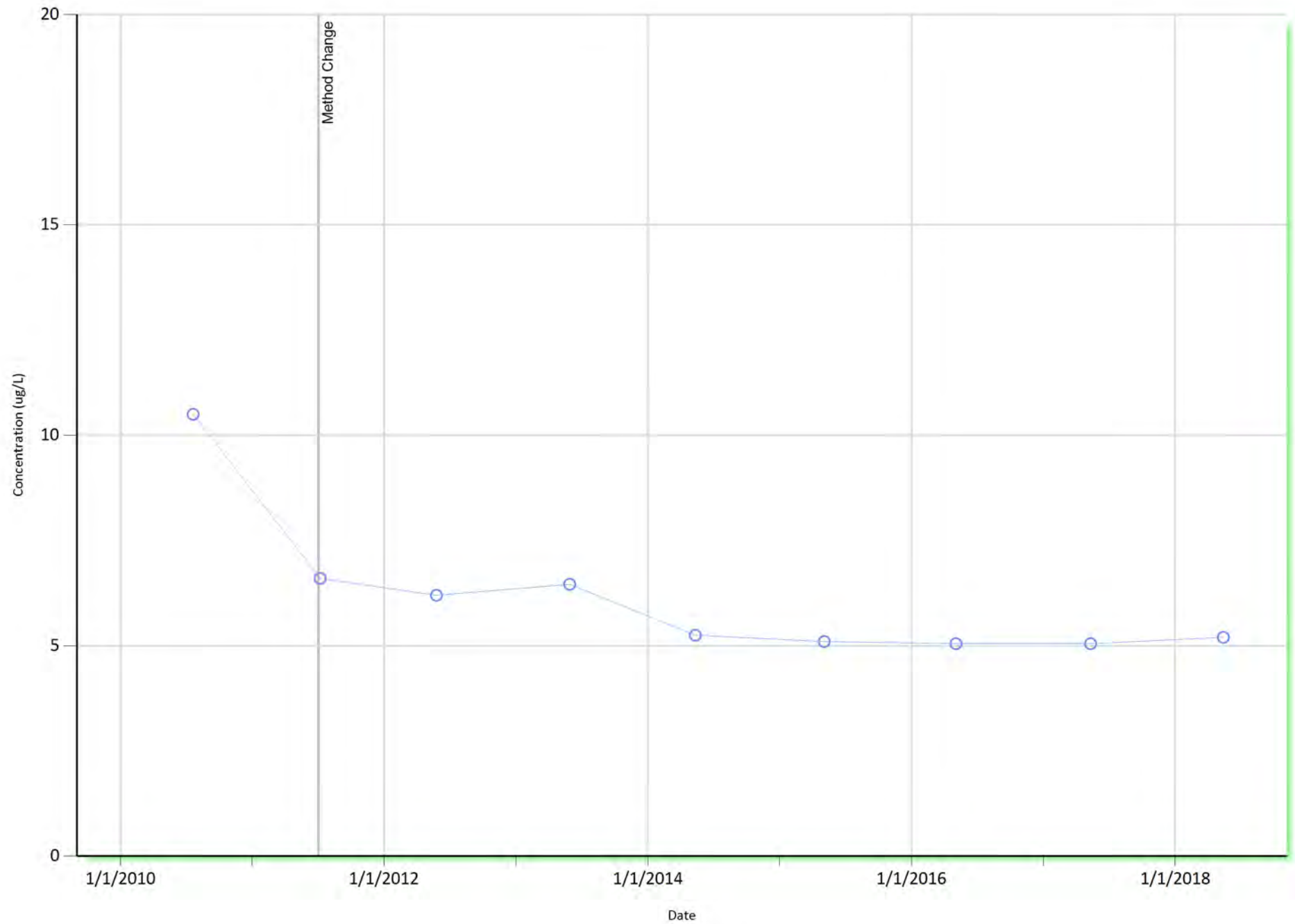
PW-1093, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

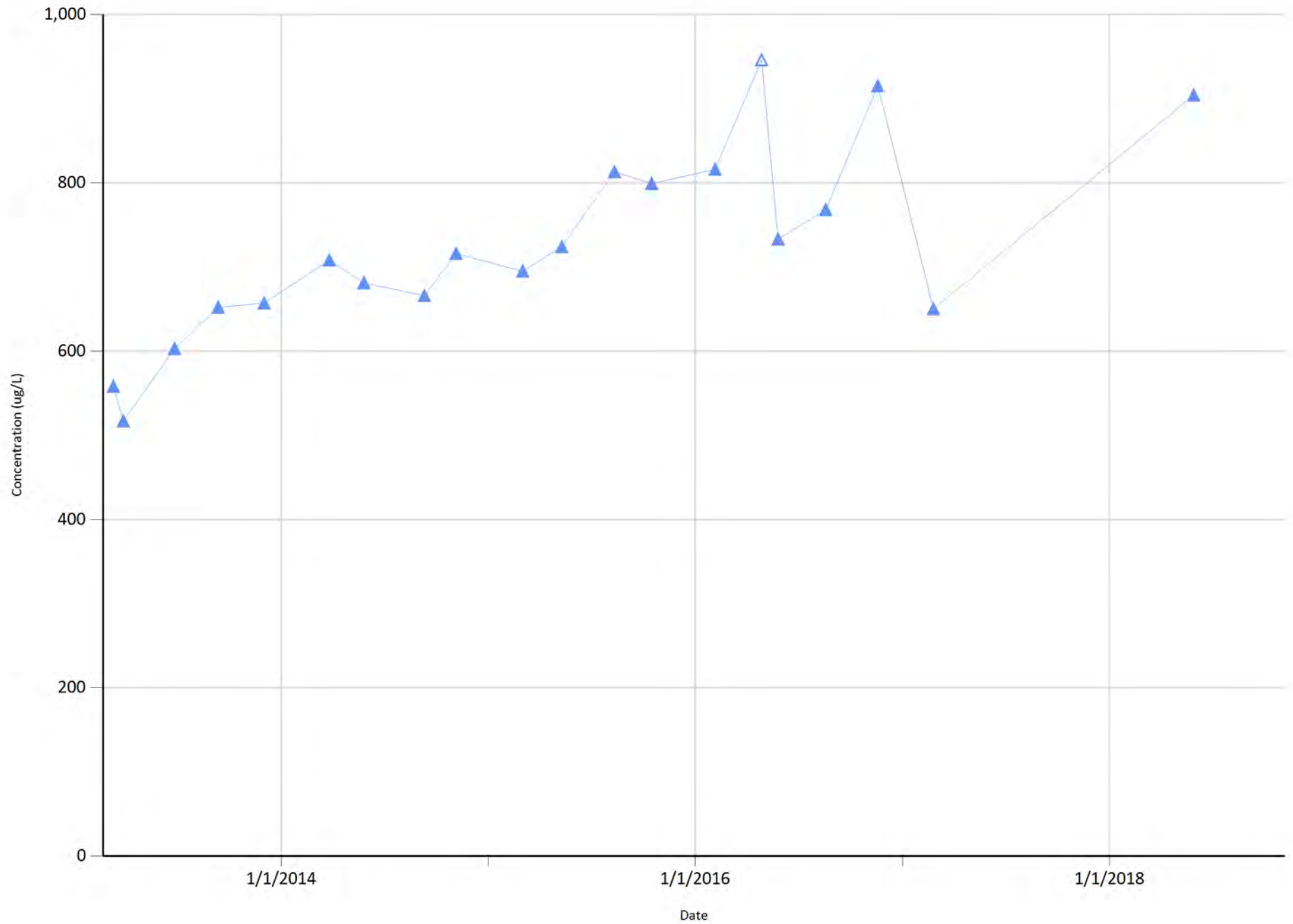
PW-1185, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

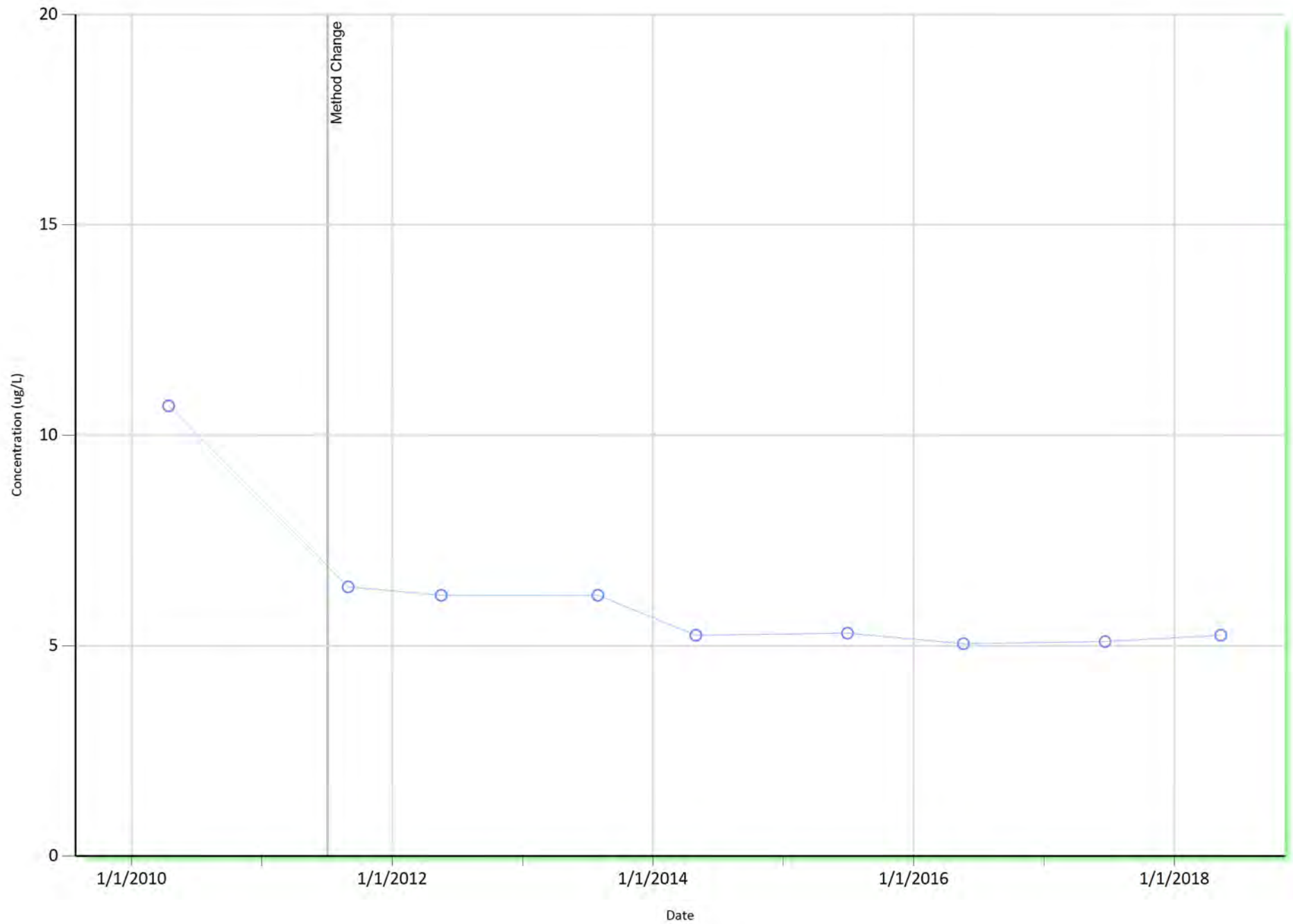
PW-1230, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-1333, Off-site, Sulfolane

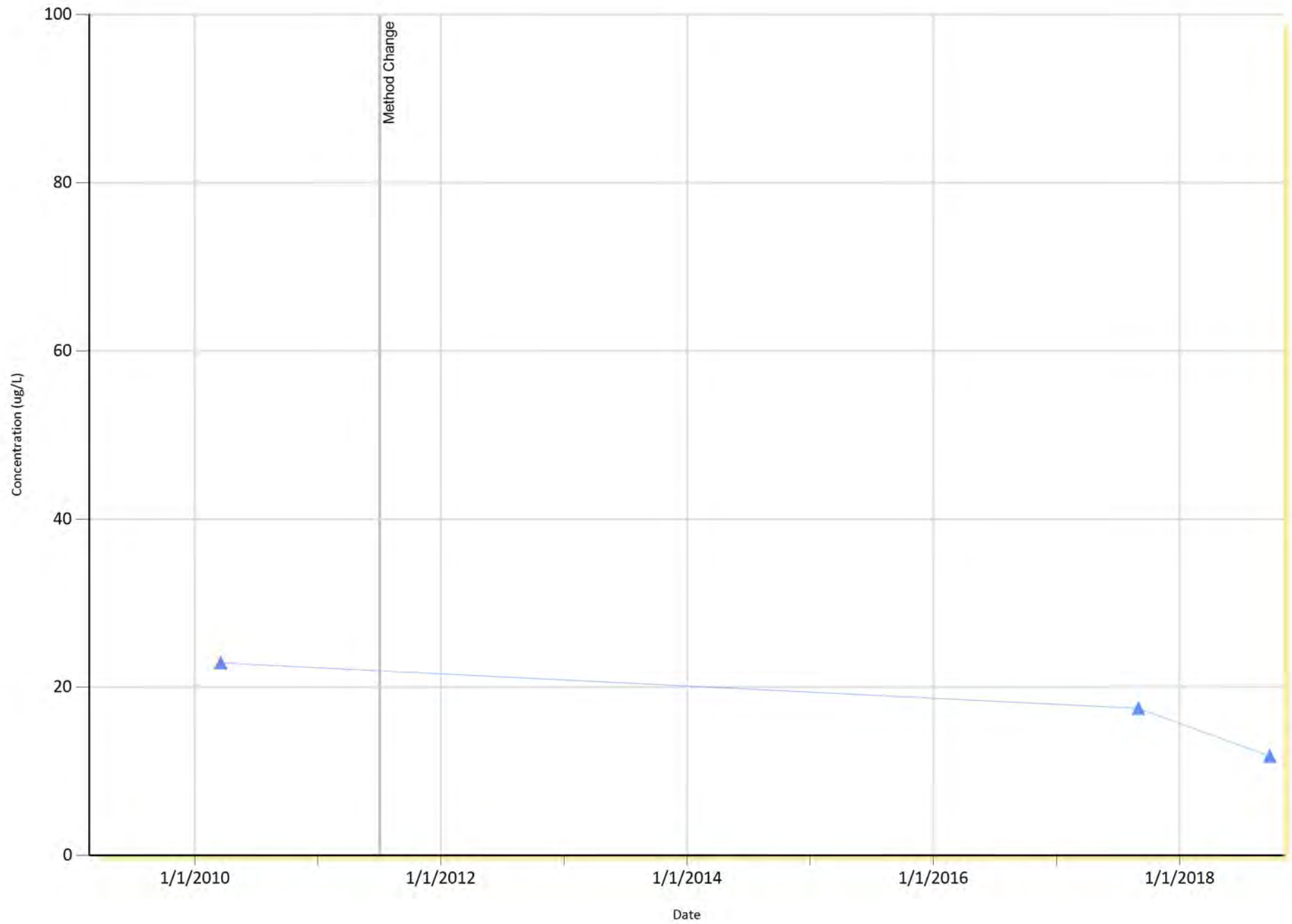


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

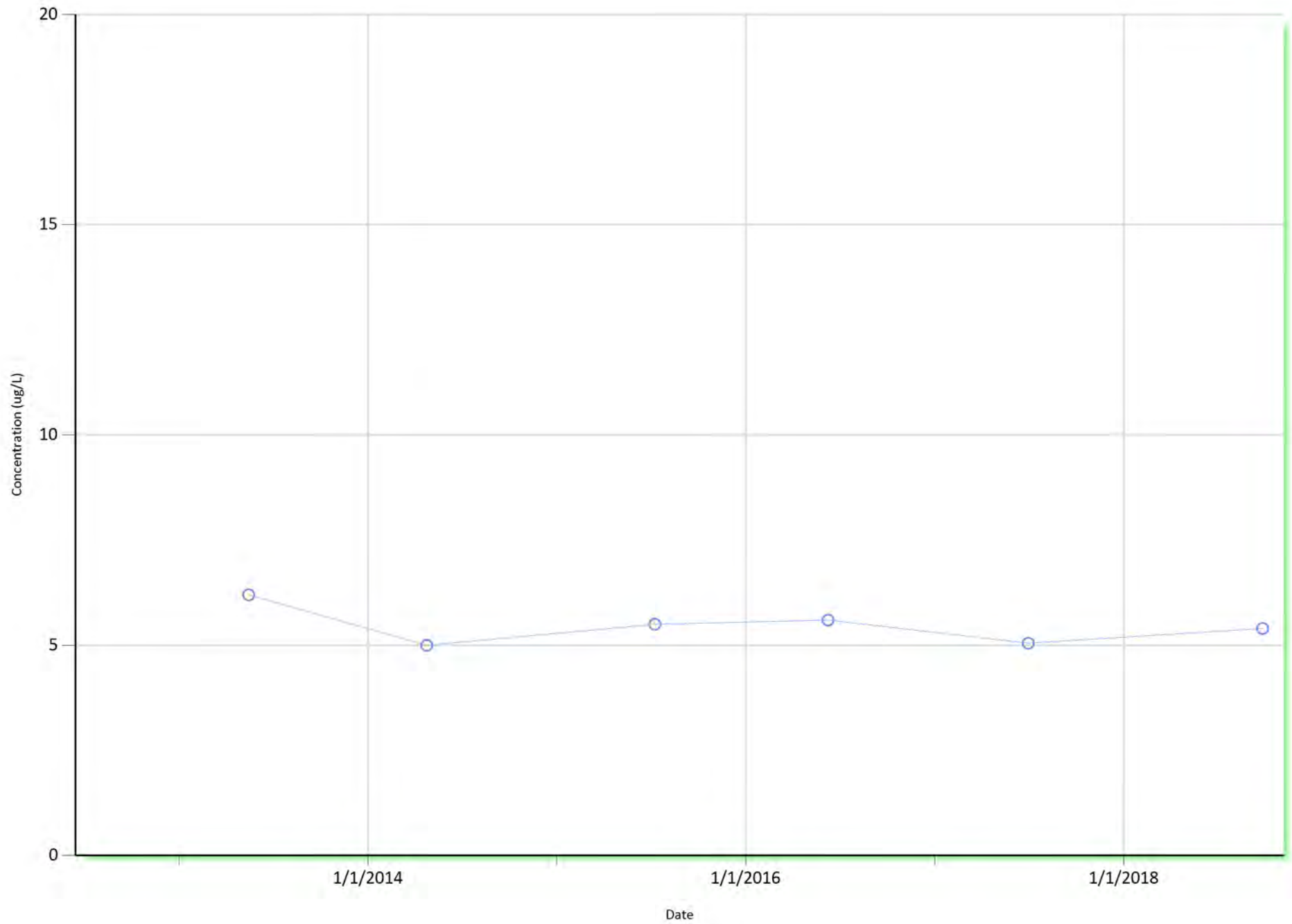
PW-1433, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

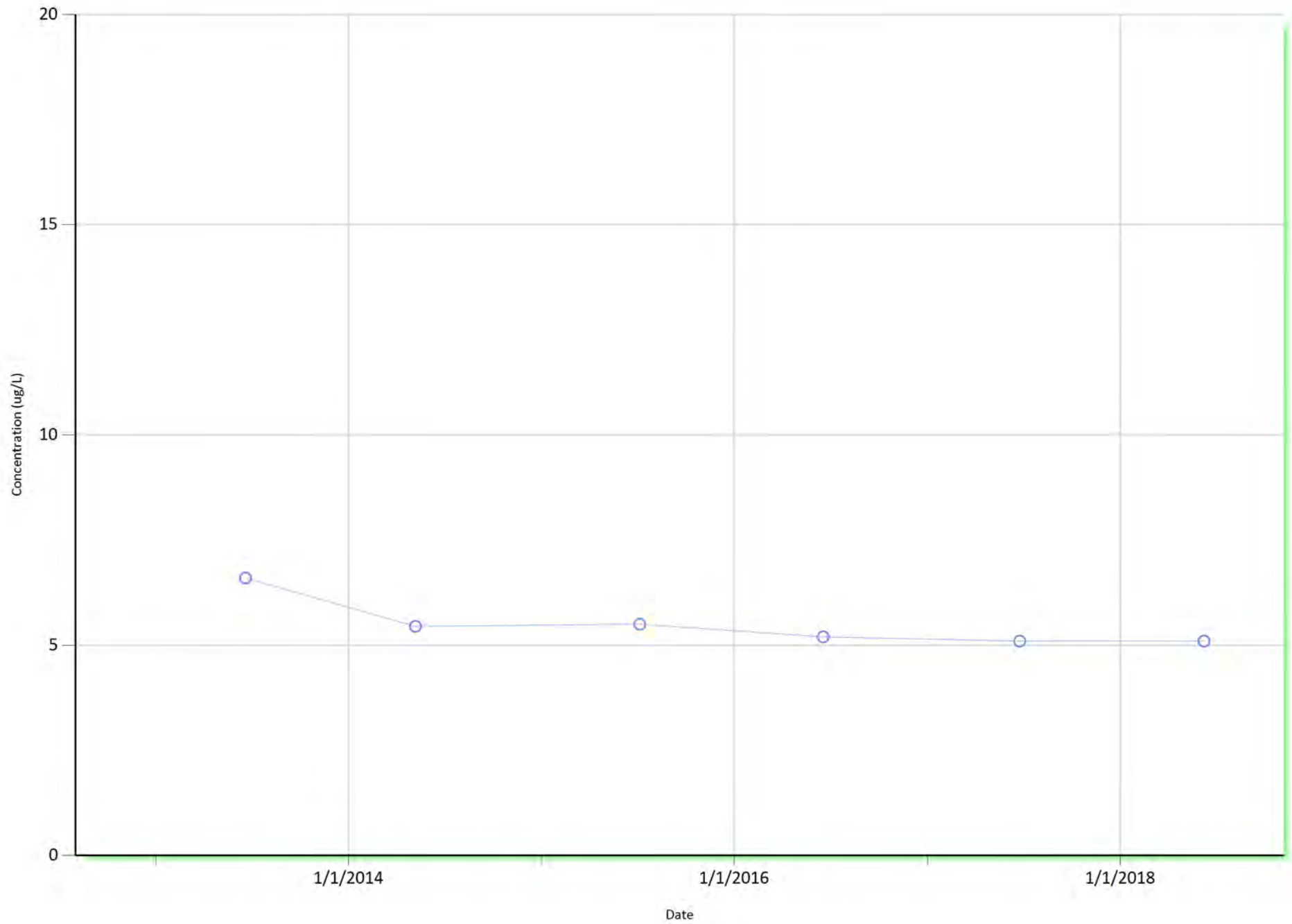
PW-1450, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

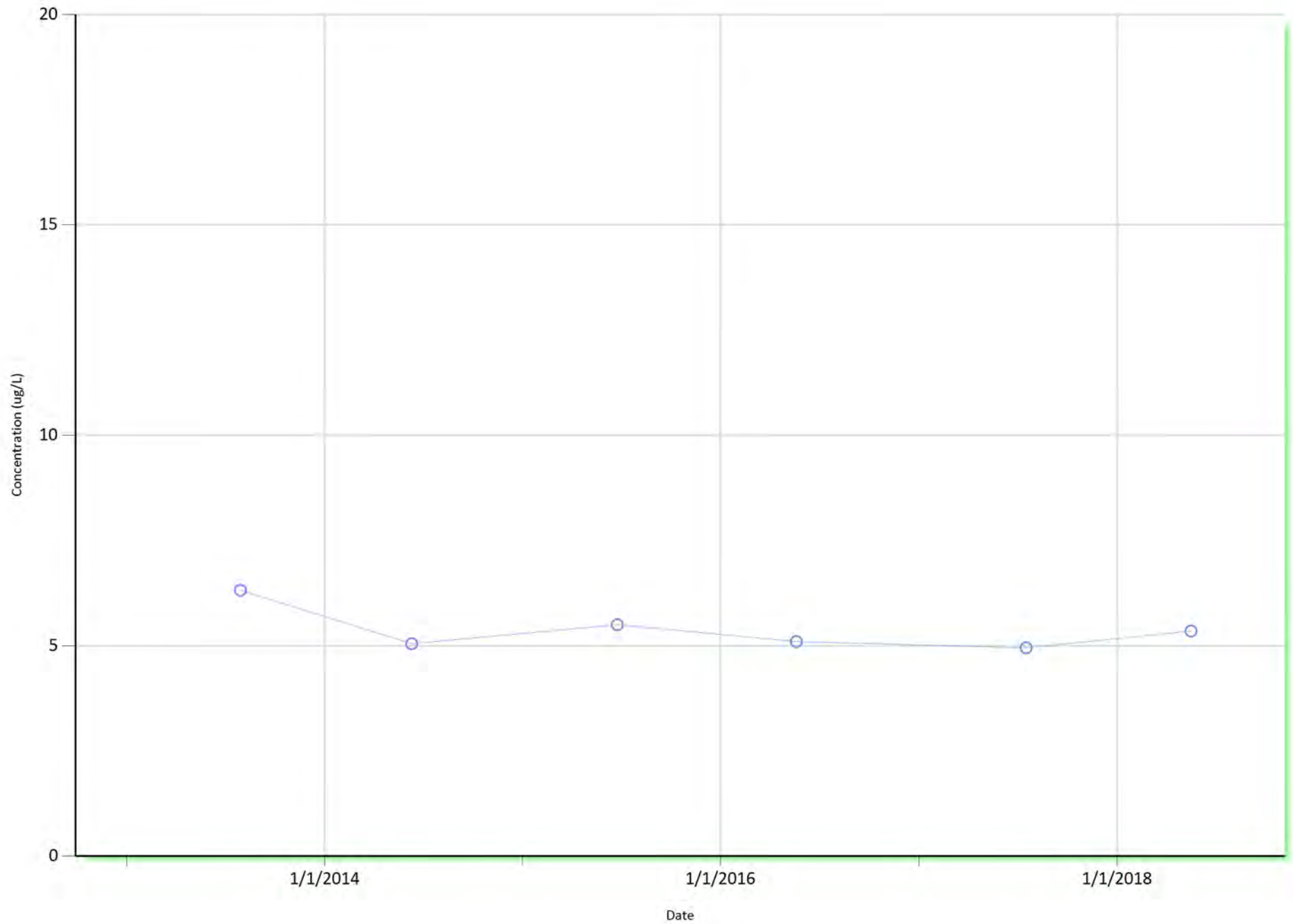
PW-1454, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

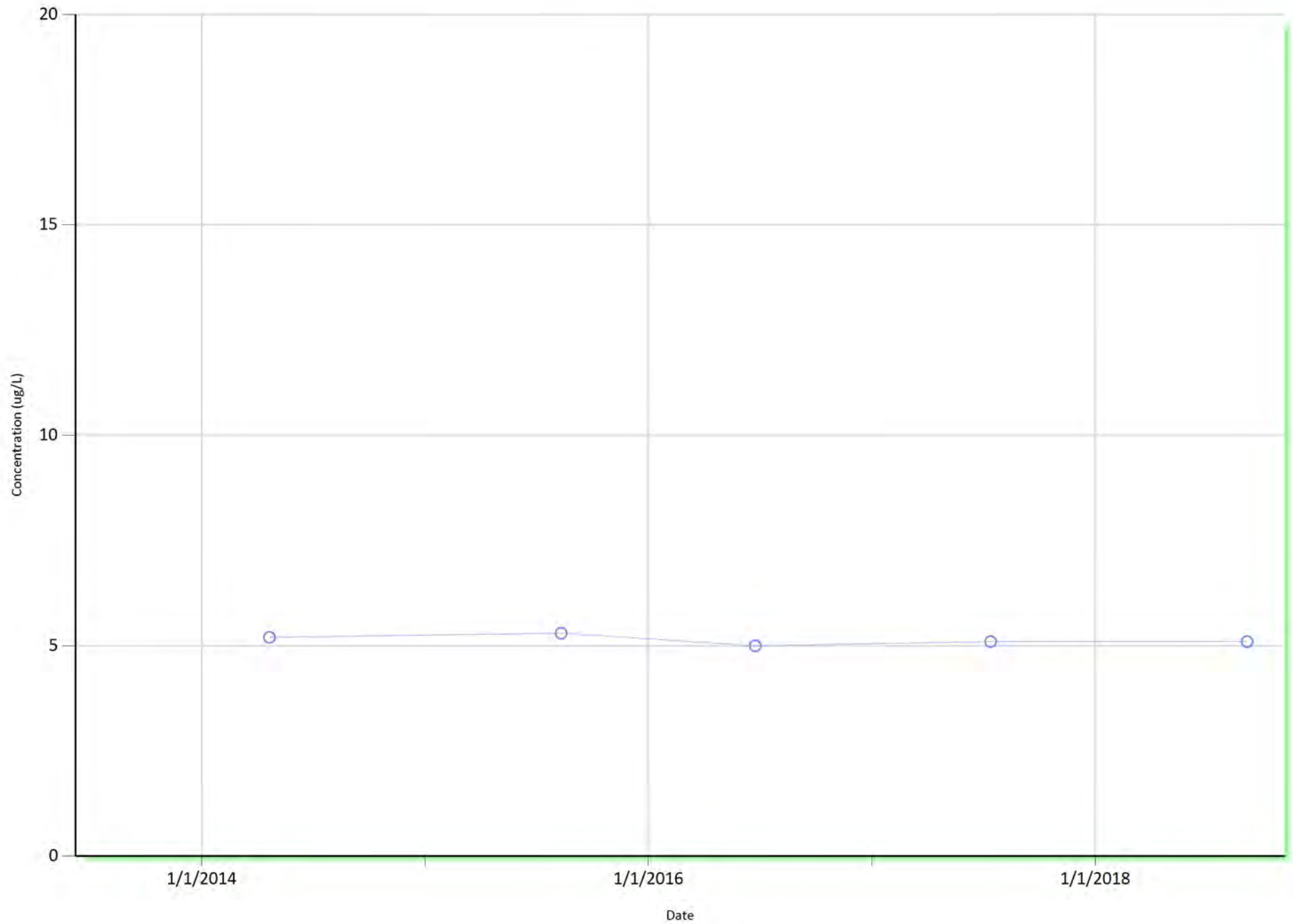
PW-1473, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

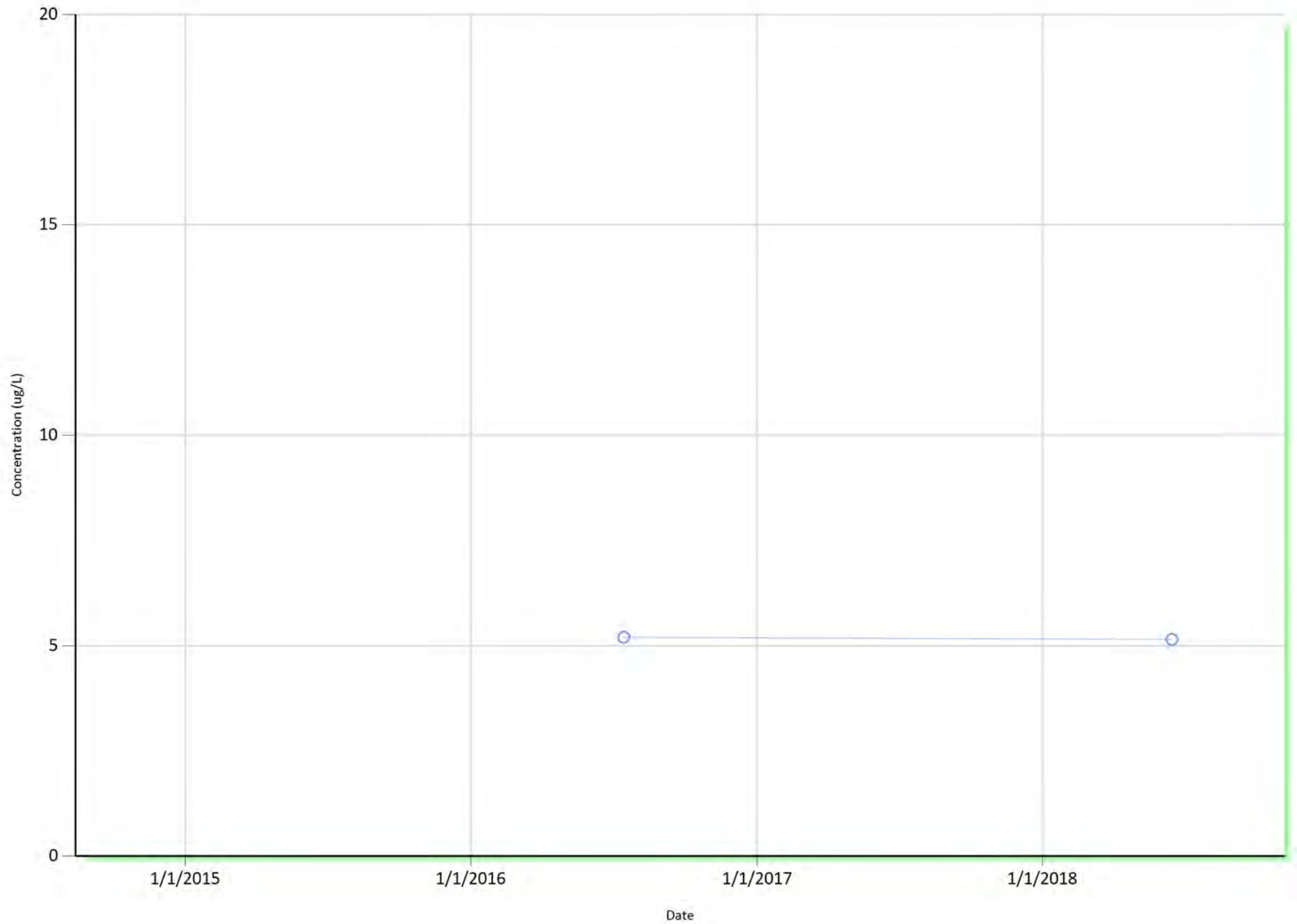
PW-1608, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

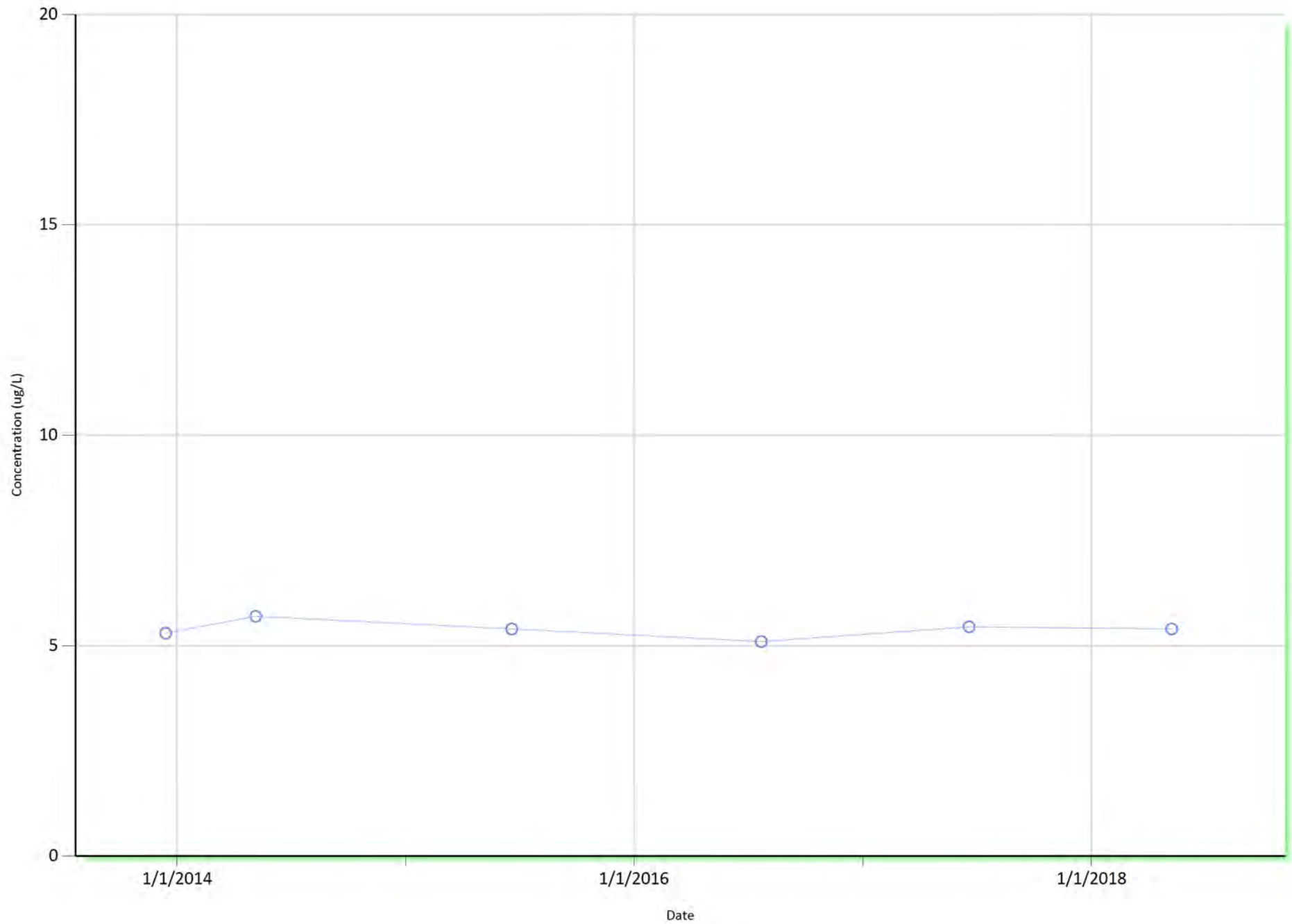
PW-1921, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

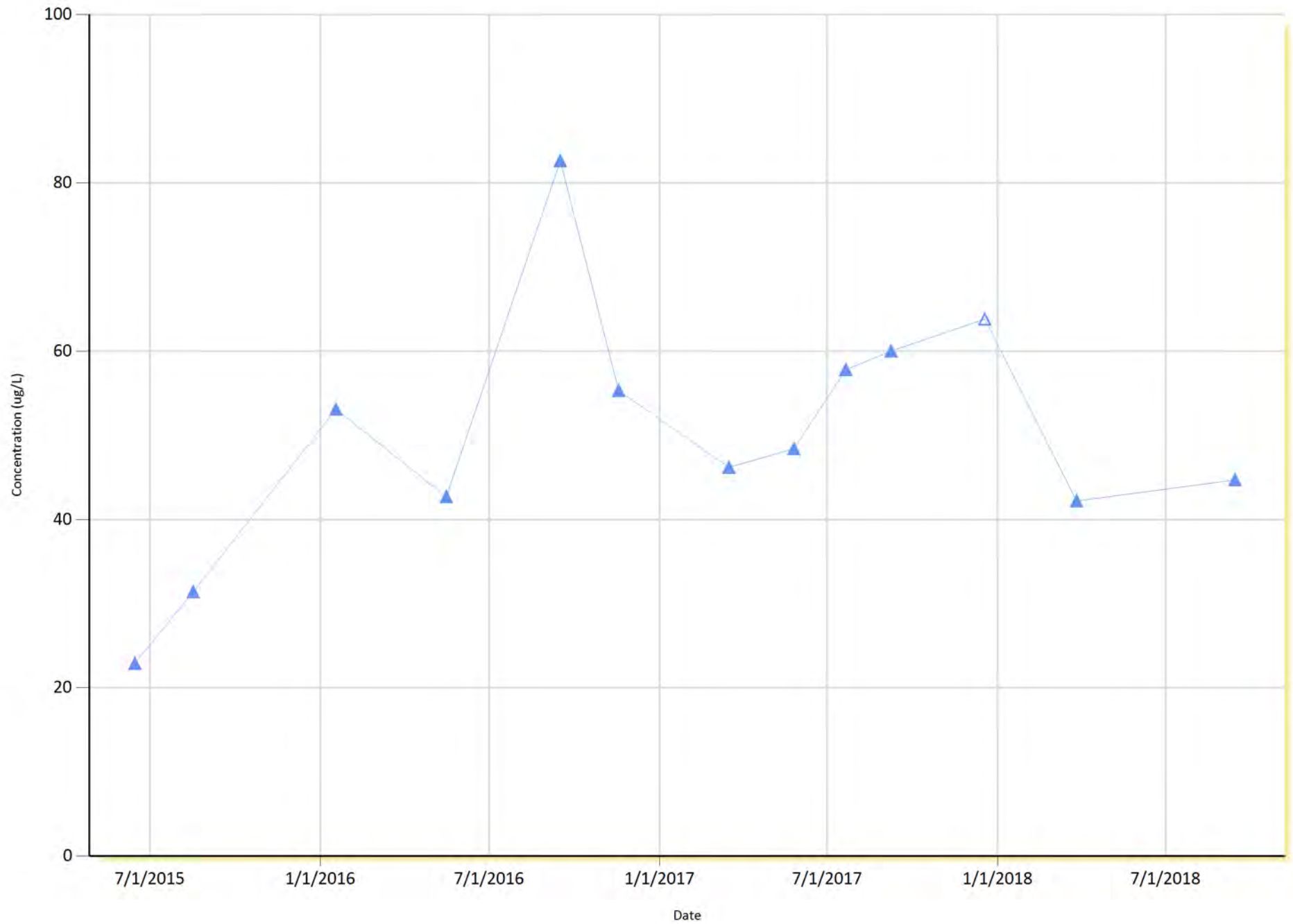
PW-1930, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-2219, Off-site, Sulfolane

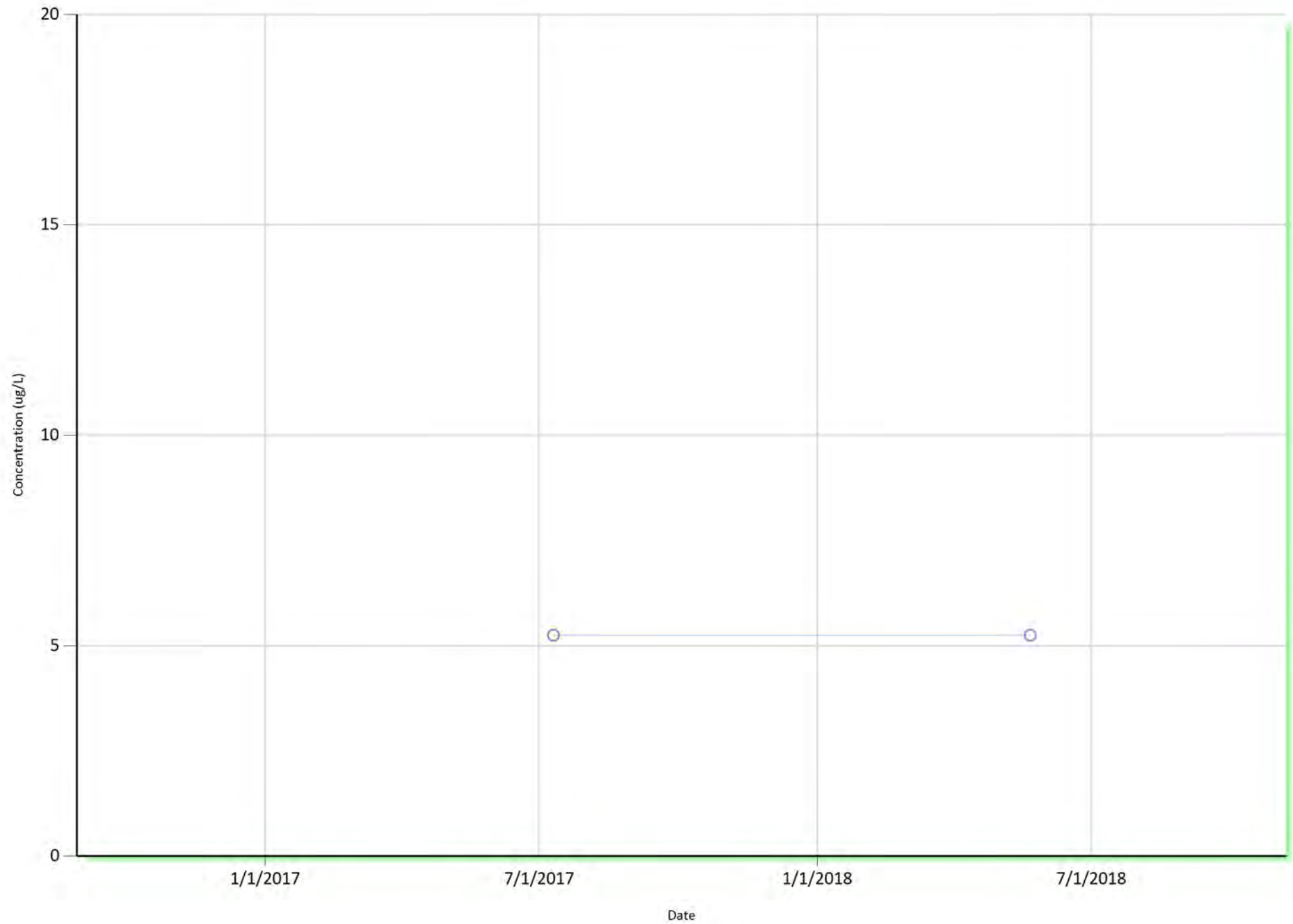


Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.



# FHRA Historical Analytical Data Chart

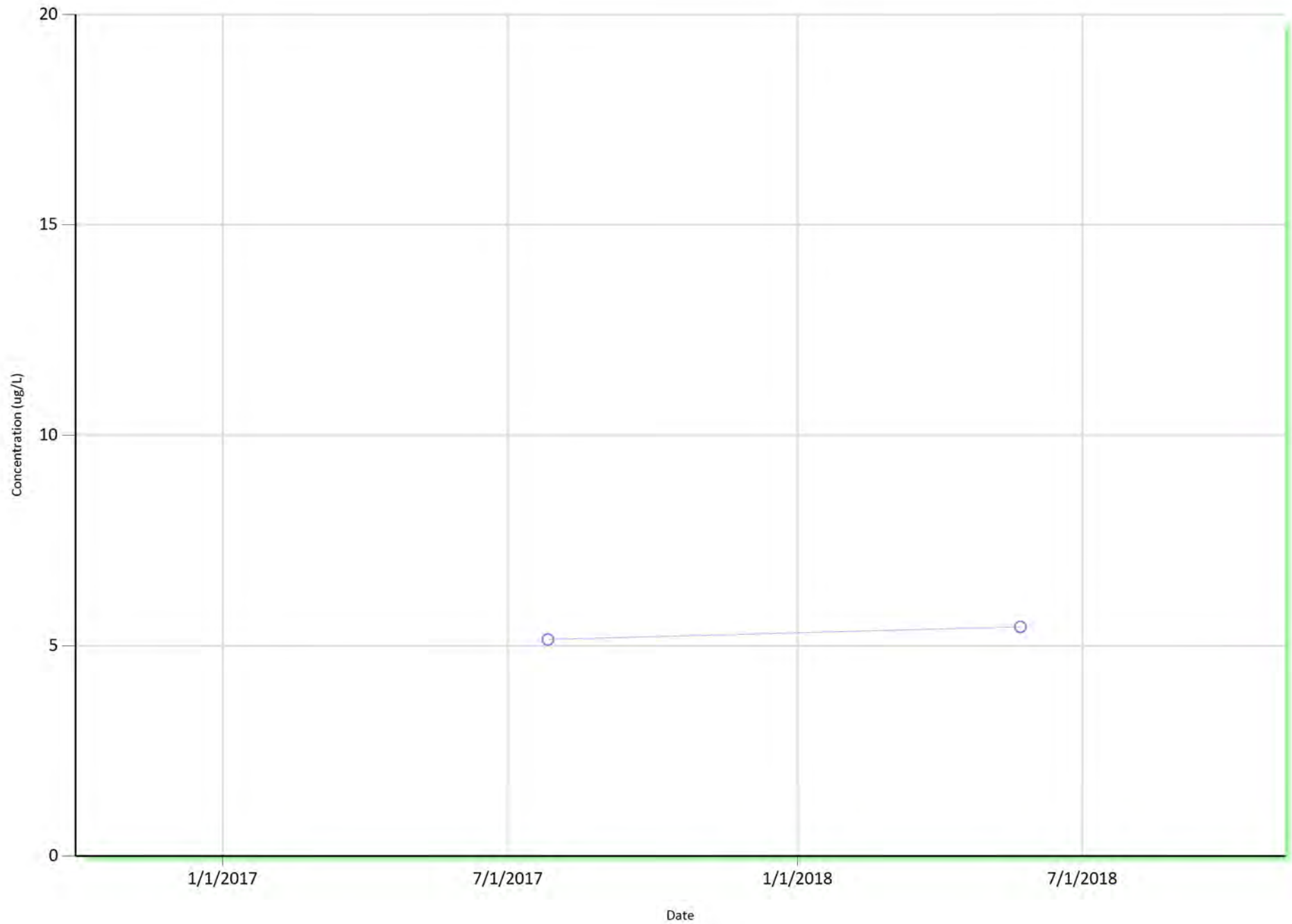
PW-2233, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# FHRA Historical Analytical Data Chart

PW-2234, Off-site, Sulfolane



Non-detect values are plotted at the reporting limit and are represented by a circular marker. Estimated (J) values are represented by an open triangle, and detections by a closed triangle.

# APPENDIX G

## Alternative Water Solutions



# APPENDIX G

## Alternative Water Solutions

December 2018



# TABLES



**Table G-1  
AWS Installation Summary**

**Annual 2018 Offsite Plume Monitoring Report  
Flint Hills Resources Alaska, LLC  
North Pole Terminal, North Pole, Alaska**

Solutions	Installation Year									Total
	2010	2011	2012	2013	2014	2015	2016	2017	2018	
Bulk Water	7	78	18	<i>11</i>	4	1	1	--	--	120
Long-Term Bottled Water	--	26	5	3	1	--	--	--	--	35
POE Treatment System	--	126	28	6	5	--	--	-1*	-1**	163
Total AWS										<b>318</b>
Connection to City Water	28	--	--	--	--	--	--	--	--	28
Grand Total										<b>346</b>

**General Notes:**

Numbers in italics differ from previous reports and have been verified.

**Acronyms and Abbreviations:**

\* = POE was removed due to foreclosure.

\*\* = POE was removed and transferred to an unauthorized location.

AWS = Alternative Water Solutions

POE = Point-of-Entry

Table G-2  
POE Treatment Systems Analytical Data Summary

Annual 2018 Offsite Plume Monitoring Report  
Flint Hills Resources Alaska, LLC  
North Pole Terminal, North Pole, Alaska

Sample Port	A	C	C1	C2	U1-C	U1-C1	U1-C2	U2-C	U2-C1	U2-C2	U3-C	U3-C1	U3-C2	D	D1	D2	U1-D	U2-D	U3-D	
Duplicates	DUP	DUP		DUP			DUP			DUP			DUP							
PW-ID	Sample Date	Sulfolane (µg/L)							Sulfolane (µg/L)											
0157	05/29/2018	10.2		<2.50																<2.50
	04/11/2017	17.3					<2.50													<2.50
	03/03/2017	16.5	18.2				<2.50													<2.50
	05/16/2016	20.9					<2.50													<2.50
	02/01/2016	22.0					<2.50	<2.50												<2.50
	10/19/2015	27.5					<2.50	<2.50												<2.50
	06/16/2015	28.8					<1.00	<1.00	<1.00											<1.00
	12/29/2014	29.8					<2.40	<2.40												<2.40
	11/17/2014	37.1					<2.40	<2.40	<2.40											<2.40
	08/18/2014	44.0	47.8				<2.40	<2.40												<2.40
	05/23/2014	52.9																		
	03/03/2014	53.3	54.1				<3.00	<3.00												<3.00J*
	11/26/2013	53.6					<3.10	<3.10												<3.10
	08/30/2013	68.9J*					<3.10J*	<3.10J*												<3.10J*
	04/05/2013	78.5J*					<3.10J*	<3.10J*												<3.10J*
	12/19/2012	103JH*					<3.10J*	<3.10J*												<3.10J*
	07/02/2012	110JL*					<3.10J*	<3.10J*												<3.10J*
01/25/2012	114J*					<3.10J*	<3.10J*												<3.10J*	
12/12/2011	115J*						<3.10J*												<3.10J*	
08/17/2011	129J*		3.40J*																	
01/04/2010	95.4	90.6																		
0158	03/23/2018	10.7	9.90J				<2.50													<2.50
	01/22/2018	18.1					<2.50													<2.50
	07/18/2017	23.1					<2.50													<2.50
	08/12/2016	26.4					<2.50													<2.50
	12/21/2015	37.1					<2.50	<2.50	<2.50											<2.50
	03/27/2015	36.3					<2.40	<2.40	<2.40											<2.40
	11/14/2014	52.6					<2.40	<2.40												<2.40
	10/06/2014						<2.40	<2.40												
	09/15/2014	51.0					<2.40	3.10J												<2.40
	07/30/2013	94.2J*					<3.10J*	<3.10J*												<3.10J*
	12/09/2011	202J*					<3.10J*	<3.10J*												<3.10J*
	07/28/2011	213J*		<3.10J*																
	01/20/2010	217																		
0159	10/05/2018	7.40J					<2.50													<2.50
	07/10/2018	9.60JL*	8.70JL*				<2.50J*													<2.50J*
	04/16/2018	9.90J	9.20J				<2.50													<2.50
	01/02/2018	12.2	12.7				<2.50													<2.50
	10/02/2017	16.3	13.1				<2.50													<2.50
	07/31/2017	15.9	14.5				<2.50													<2.50
	05/15/2017	15.1	16.5				<2.50													<2.50J*
	02/27/2017	17.6					<2.50J*													<2.50
	12/12/2016	18.2	18.3				<2.50													<2.50
	10/03/2016	15.5					<2.50													<2.50
	06/20/2016	21.8	19.6				<2.50													<2.50
	03/28/2016	24.7	25.8				<2.50													<2.50
	01/11/2016	28.8					<2.50	<2.50	<2.50											<2.50
	11/09/2015	28.5					<2.50	<2.50												<2.50
	09/28/2015	30.8					<2.50	<2.50	<2.50											<2.50
	07/28/2015	32.9					<2.50	<2.50	<2.50											<2.50
	06/01/2015	32.6					<1.00	<1.00	<1.00											<1.00
	03/30/2015	35.3					<2.40	<2.40	<2.40											<2.40
	02/02/2015	40.5					<2.40	<2.40	<2.40											<2.40
	12/02/2014	46.4					<2.40	<2.40	<2.40											<2.40
	09/30/2014	43.7	44.9				<2.40	<2.40												<2.40
	08/26/2014	50.7	50.7				<2.40	<2.40												<2.40
	06/02/2014	71.3	69.7				<2.00	<2.00												<2.00
	03/14/2014	65.3					<3.00	<3.00												<3.00
	01/17/2014	81.3	74.8				<3.00	<3.00												<3.00
	11/19/2013	71.6	66.2				<3.10	<3.10												<3.10
	09/27/2013	70.0	71.6																	
	08/20/2013	77.5J*					<3.10J*	<3.10J*												<3.10J*
	05/28/2013	96.1J*					<3.10J*	<3.10J*												<3.10J*
	03/12/2013	119J*					<3.10J*	<3.10J*												<3.10J*
	12/18/2012	124JH*					<3.10J*	<3.10J*												<3.10J*
	10/22/2012	115J*					<3.10J*	<3.10J*												<3.10J*
	08/06/2012	141J*					<3.10J*	<3.10J*												<3.10J*
	06/11/2012			<3.10																<3.10
	05/25/2012	152J*					<3.10J*	26.4J*												<3.10J*
	02/03/2012	167J*					<3.10J*	<3.10J*												<3.10J*
	07/27/2011	233J*		<3.10J*																
	01/09/2010	255																		





Table G-2  
 POE Treatment Systems Analytical Data Summary  
 Annual 2018 Offsite Plume Monitoring Report  
 Flint Hills Resources Alaska, LLC  
 North Pole Terminal, North Pole, Alaska

Sample Port	A		C		C1	C2		U1-C	U1-C1	U1-C2		U2-C	U2-C1	U2-C2		U3-C	U3-C1	U3-C2	D	D1	D2	U1-D	U2-D	U3-D		
Duplicates		DUP		DUP			DUP				DUP				DUP											
PW-ID	Sample Date	Sulfolane (µg/L)												Sulfolane (µg/L)												
0217	06/15/2018	120	117			<2.50														<2.50						
	08/15/2017	156	166			<2.50														<2.50						
	09/27/2016	137JL*	136JL*			<2.50J*														<2.50J*						
	12/15/2015	164				<2.50	<2.50	<2.50												<2.50						
	10/19/2015	146																								
	08/18/2015	136																								
	05/13/2015	148																								
	03/09/2015	151																								
	01/23/2015	146					<2.40	<2.40	<2.40												<2.40					
	11/12/2014	148																								
	08/26/2014	145	147																							
	05/27/2014	147																								
	03/10/2014	156																								
	03/07/2014	138	150				<3.00	<3.00													<3.00					
	11/19/2013	153																								
	09/05/2013	152																								
	06/05/2013	163	164																							
	05/17/2013	164J*					<3.10J*	<3.10J*													<3.10J*					
	03/11/2013	173																								
	07/18/2012	169J*					<3.10J*	<3.10J*													<3.10J*					
09/22/2011	211J*																			<3.10J*						
04/14/2011	217JL*			<5.00J*																						
03/10/2011	154																									
01/06/2010	108																									
09/17/2018	33.9					<2.50														<2.50						
03/06/2018	37.7					<2.50														<2.50						
08/11/2017	57.4	55.0				<2.50														<2.50						
11/01/2016	62.7					<2.50														<2.50						
04/05/2016	88.7					<2.50														<2.50						
06/23/2015	96.4					<1.00	<1.00													<1.00						
07/18/2014	136	128				<2.40	<2.40													<2.40						
07/26/2013	131J*					<3.10J*	<3.10J*													<3.10J*						
06/28/2012	65.1J*					<3.10J*	<3.10J*													<3.10J*						
01/06/2010	89.8																									
04/24/2018	31.2	31.3				<2.50														<2.50						
11/27/2017	40.6					<2.50														<2.50						
03/20/2017	58.3					<2.50														<2.50						
04/22/2016	85.2	81.2				<2.50														<2.50						
11/03/2015	110					<2.50	<2.50													<2.50						
05/18/2015	106					<1.00	<1.00	<1.00												<1.00						
09/11/2014	129	133				<2.40	<2.40													<2.40						
03/31/2014	120	126				<2.00	<2.00													<2.00						
08/13/2013	115J*					<3.10J*	<3.10J*													<3.10J*						
03/15/2013	155J*					<3.10J*	<3.10J*													<3.10J*						
07/19/2012	149J*					<3.10J*	<3.10J*													<3.10J*						
11/04/2011	162J*			<3.10J*																						
02/04/2010	152																									
10/23/2018	6.20J					<2.50														<2.50						
12/11/2017	10.1					<2.50														<2.50						
12/02/2016	12.7	12.3				<2.50														<2.50						
12/28/2015	17.8					<2.50	<2.50	<2.50												<2.50						
01/27/2015	19.4					<2.40	<2.40	<2.40												<2.40						
07/22/2014	23.9	24.2				<2.40	<2.40													<2.40						
04/14/2014	26.4	26.8				<2.00	<2.00													<2.00						
01/14/2014	24.4	27.9				<3.00	<3.00													<3.00						
09/17/2013	28.3	26.8				<3.10	<3.10													<3.10						
06/14/2013	30.9J*					<3.10J*	<3.10J*													<3.10J*						
03/08/2013	36.2J*					<3.10J*	<3.10J*													<3.10J*						
12/17/2012	47.3J*					<3.10J*	<3.10J*													<3.10J*						
10/08/2012	45.8J*					<3.10J*	<3.10J*													<3.10J*						
07/12/2012	51.8J*					<3.10J*	<3.10J*													<3.10J*						
04/23/2012	59.4J*					<3.10J*	<3.10J*													<3.10J*						
01/25/2012	62.4J*					<3.10J*	<3.10J*													<3.10J*						
11/14/2011	64.9J*			<3.10J*																<3.10J*						
05/23/2011	109J*			<5.00J*																<3.10J*						
11/14/2009	156																									



Table G-2  
 POE Treatment Systems Analytical Data Summary  
 Annual 2018 Offsite Plume Monitoring Report  
 Flint Hills Resources Alaska, LLC  
 North Pole Terminal, North Pole, Alaska

Sample Port	A	C	C1	C2	U1-C	U1-C1	U1-C2	U2-C	U2-C1	U2-C2	U3-C	U3-C1	U3-C2	D	D1	D2	U1-D	U2-D	U3-D	
Duplicates	DUP	DUP		DUP			DUP			DUP			DUP							
PW-ID	Sample Date	Sulfolane (µg/L)										Sulfolane (µg/L)								
0299	08/07/2018	42.9																		
	04/30/2018	35.9																		
	10/23/2017	35.8	38.0																	
	11/22/2016	22.0	22.8																	
	09/19/2016	25.4	21.2																	
	12/28/2015	22.2																		
	01/28/2015	15.9																		
	09/02/2014	16.4	16.0																	
	08/20/2013	8.40J*																		
	06/16/2012	8.00J*																		
	02/06/2012	7.90J*																		
	08/03/2011	<3.10J*																		
	07/17/2011	7.00J																		
	04/15/2010	<10.3																		
0300	10/29/2018	51.0	47.1																	
	03/06/2018	41.0	41.6																	
	05/12/2017	40.8	39.1J*																	
	09/12/2016	27.8	26.6																	
	07/22/2016	31.2	29.7																	
	03/29/2016	27.0	27.7																	
	08/14/2015	23.0																		
	09/22/2014	17.4																		
	02/03/2014	13.5	14.2																	
	09/23/2013	12.6	10.0J																	
	04/22/2013	10.3J*																		
	10/08/2012	9.80J*																		
	02/06/2012	8.70J*																		
	07/28/2011	9.80J*																		
07/21/2011	8.26J																			
02/23/2010	<10.9																			
0301	06/04/2018	28.6	25.2																	
	12/11/2017	24.1	24.2																	
	06/16/2017	25.9JH*																		
	07/22/2016	17.7																		
	04/18/2016	19.4																		
	07/31/2015	16.3																		
	08/01/2014	14.1	13.2																	
	08/26/2013	8.20J*																		
	09/26/2012	9.30J*																		
	08/04/2011	8.64J																		
	05/12/2010	<10.4																		
0302	05/14/2018	32.0																		
	06/23/2017	28.4	27.3																	
	12/06/2016	21.0	24.2																	
	07/01/2016	22.6																		
	07/20/2015	16.8																		
	08/12/2014	13.9	14.3																	
	08/27/2013	11.4J*																		
	09/18/2012	7.30J*																		
	10/26/2011	6.90J*																		
	09/22/2011	6.90J*																		
	08/01/2011	6.77J																		
04/15/2010	<10.9																			
0303	10/15/2018	29.4	28.4																	
	06/26/2018	33.1																		
	01/23/2018	24.3	26.4																	
	08/14/2017	23.5	26.1																	
	01/20/2017	20.7	20.7																	
	04/12/2016	18.6																		
	09/21/2015	15.6																		
	06/19/2015	15.2																		
	09/30/2014	15.2																		
	02/11/2014	15.0	13.9																	
	06/24/2013	14.1J*																		
	01/15/2013	11.4J*																		
	05/25/2012	12.2J*																		
	02/15/2012	11.2J*																		
	08/26/2011	10.8J*																		
	07/12/2011	12.6																		
03/16/2010	<10.3																			
12/21/2009	<10.3																			



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Sample Port	A	C	C1	C2	U1-C	U1-C1	U1-C2	U2-C	U2-C1	U2-C2	U3-C	U3-C1	U3-C2	D	D1	D2	U1-D	U2-D	U3-D		
Duplicates	DUP	DUP		DUP			DUP			DUP			DUP								
PW-ID	Sample Date	Sulfolane (µg/L)										Sulfolane (µg/L)									
0309	09/18/2018	26.3					3.70J													<2.50	
	06/11/2018	23.4					<2.50													<2.50J*	
	01/23/2018	24.0	24.7				<2.50													<2.50	
	07/17/2017	25.3	24.3				<2.50													<2.50	
	11/07/2016	17.2					<2.50													<2.50	
	01/11/2016	14.8					<2.50	<2.50												<2.50	
	03/23/2015	11.4					<2.40	<2.40	<2.40											<2.40	
	06/09/2014	10.5	10.4				<2.40	<2.40												<2.40	
	01/31/2014	9.70J*																			
	11/15/2013	9.70J					<3.10	<3.10												<3.10	
	09/24/2013	8.60J	8.80J				<3.10	<3.10												<3.10	
	07/09/2013			<3.10J*																<3.10J*	
	06/25/2013	10.2JL*					<3.10J*	<3.10J*												<3.10J*	
	04/22/2013	9.00J*					<3.10J*	<3.10J*												<3.10J*	
	01/29/2013	7.60J*					<3.10J*	<3.10J*												<3.10J*	
	11/16/2012	9.90J*					<3.10J*	<3.10J*												<3.10J*	
	06/11/2012	8.40J*					<3.10J*	<3.10J*												<3.10J*	
	04/23/2012	8.70J*					<3.10J*	<3.10J*												<3.10J*	
10/18/2011	7.70J*		<3.10J*																		
08/29/2011	7.28J																				
04/19/2010	<10.0																				
0311	08/21/2018	30.5	33.4				<2.50													<2.50	
	04/23/2018	28.8					<2.50													<2.50	
	08/01/2017	28.4	27.8				<2.50													<2.50	
	04/04/2017	23.1					<2.50													<2.50	
	11/08/2016	17.9	16.9				<2.50													<2.50	
	06/28/2016	16.7	18.4				<2.50													<2.50	
	09/11/2015	15.4					<2.50	<2.50	<2.50											<2.50	
	01/19/2015	13.6					<2.40	<2.40	<2.40											<2.40	
	07/28/2014	12.5	12.1				<2.40	<2.40												<2.40	
	02/28/2014	12.1	12.4				<3.00	<3.00												<3.00	
	10/07/2013	10.0					<3.10	<3.10												<3.10	
	03/04/2013	10.0J*					<3.10J*	<3.10J*												<3.10J*	
	07/11/2012	10.0J*					<3.10J*	<3.10J*												<3.10J*	
	09/09/2011	7.80J*		<3.10J*																<3.10J*	
	07/25/2011	7.55J																			
	04/19/2010	<10.0																			
	0347	06/22/2018	<2.50	<2.50J*				<2.50													<2.50
		07/18/2017	<2.50	<2.50				<2.50													<2.50
12/06/2016		<2.50	<2.50				<2.50													<2.50	
09/09/2016		<2.50					<2.50													<2.50	
04/19/2016		<2.50					<2.50													<2.50	
09/14/2015		<2.50					<2.50	<2.50	<2.50											<2.50	
01/19/2015		2.90J					<2.40	<2.40												<2.40	
04/21/2014		<2.00	<2.00				<2.00	<2.00												<2.00	
07/30/2013		<3.10J*					<3.10J*	<3.10J*												<3.10J*	
12/03/2012		5.10JH*					<3.10J*	<3.10J*												<3.10J*	
01/31/2012		6.10J*		<3.10J*																<3.10J*	
10/28/2011		5.16J																			
02/13/2010	<10.3																				
0348	09/04/2018	<2.50					<2.50													<2.50	
	04/03/2018	<2.50	<2.50				<2.50													<2.50	
	09/11/2017	<2.50	<2.50				<2.50													<2.50	
	02/03/2017	<2.50	<2.50				<2.50													<2.50	
	09/23/2016	<2.50	<2.50				<2.50													<2.50	
	02/05/2016	<2.50					<2.50	<2.50	<2.50											<2.50	
	02/27/2015	<2.40					<2.40	<2.40	<2.40											<2.40	
	09/22/2014	<2.40	<2.40				<2.40	<2.40												<2.40	
	06/09/2014	<2.40					<2.40	<2.40												<2.40	
	01/14/2014	<3.00	<3.00				<3.00	<3.00												<3.00	
	09/23/2013	<3.10					<3.10	<3.10												<3.10	
	02/26/2013	<3.10J*					<3.10J*	<3.10J*												<3.10J*	
07/16/2012	<3.10J*					<3.10J*	<3.10J*												<3.10J*		
11/03/2011	<3.10J*		<3.10J*																		
08/19/2011	3.37J	3.98J																			
02/22/2010	<10.9																				



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Sample Port	A	C	C1	C2	U1-C	U1-C1	U1-C2	U2-C	U2-C1	U2-C2	U3-C	U3-C1	U3-C2	D	D1	D2	U1-D	U2-D	U3-D	
Duplicates	DUP	DUP		DUP			DUP			DUP			DUP							
PW-ID	Sample Date	Sulfolane (µg/L)										Sulfolane (µg/L)								
0377	10/01/2018	<2.50	<2.50			<2.50														<2.50
	08/21/2018	2.50J	<2.50			<2.50														<2.50
	07/24/2018	3.70J	3.10J			<2.50														<2.50
	05/15/2018	2.80J	4.20J			<2.50														<2.50
	01/29/2018	2.60J				<2.50														<2.50
	11/27/2017	3.70J	3.30J			<2.50														<2.50
	08/21/2017	5.30J				<2.50														<2.50J*
	03/10/2017	4.30J				<2.50														<2.50
	09/26/2016	3.90JL*	3.30JL*			<2.50J*														<2.50J*
	05/24/2016	4.00J				<2.50														<2.50
	01/22/2016	5.00J				<2.50	<2.50													<2.50
	07/27/2015	4.20J				<2.50	<2.50													<2.50
	05/05/2015	5.70J				<2.40	<2.40													<2.40
	01/30/2015	6.00J				<2.40	<2.40	<2.40												<2.40
	10/13/2014	5.20J				<2.40	<2.40													<2.40
	06/09/2014	6.40J				<2.40	<2.40													<2.40
	05/02/2014	6.90J				<2.00	<2.00J*													<2.00
	03/17/2014	7.10J	5.60J			<3.00	<3.00													<3.00J*
	11/18/2013	6.00J	6.60J			<3.10	<3.10													<3.10
	09/03/2013	9.00JL*				<3.10J*	<3.10J*													<3.10J*
	05/06/2013	8.70J*				<3.10J*	<3.10J*													<3.10J*
	12/18/2012	16.8JH*				<3.10J*	<3.10J*													<3.10J*
	08/30/2012	9.10J*				<3.10J*	<3.10J*													<3.10J*
04/02/2012	10.8J*				<3.10J*	<3.10J*													<3.10J*	
12/20/2011	10.3J*				<3.10J*	<3.10J*													<3.10J*	
08/12/2011	12.5J*		<3.10J*																	
02/16/2010	11.9																			
0378	07/24/2018	<2.50				<2.50														<2.50
	01/29/2018	<2.50	<2.50			<2.50														<2.50
	08/21/2017	<2.50	<2.50			<2.50														<2.50
	05/30/2017	3.40J	3.40J			<2.50														<2.50
	04/11/2017	2.90J	3.00J			<2.50														<2.50J*
	01/09/2017	2.50J				<2.50														<2.50
	09/26/2016	3.70J*				<2.50														<2.50
	05/24/2016	<2.50	3.60J			<2.50														<2.50
	01/22/2016	3.20J				<2.50	<2.50	<2.50												<2.50
	09/22/2015	3.20J				<2.50	<2.50	<2.50												<2.50
	07/27/2015	3.40J				<2.50	<2.50													<2.50
	05/05/2015	<2.40				<2.40	<2.40													<2.40
	03/03/2015	3.60J				<2.40	<2.40	<2.40												<2.40
	12/16/2014	3.80J				<2.40	<2.40	<2.40												<2.40
	08/29/2014	4.10J				<2.40	<2.40													<2.40
	06/10/2014	<2.40				<2.40	<2.40													<2.40
	05/02/2014	4.00J	4.00J			<2.00	<2.00													<2.00
	02/18/2014	<3.00				<3.00	<3.00													<3.00
	11/18/2013	4.00J				<3.10	<3.10													<3.10
	09/03/2013	<3.10J*				<3.10J*	<3.10J*													<3.10J*
	07/18/2013	4.50J*				<3.10J*	<3.10J*													<3.10J*
	04/05/2013	5.60J*				<3.10J*	<3.10J*													<3.10J*
	12/03/2012	6.40JH*				<3.10J*	<3.10J*													<3.10J*
07/09/2012	6.40J*				<3.10J*	<3.10J*													<3.10J*	
12/19/2011	7.00J*		<3.10J*																	
06/16/2011	7.65J																			
0390	09/10/2018	8.40J	8.80J			<2.50														<2.50
	04/23/2018	9.80J	7.90J			<2.50														<2.50
	11/17/2017	9.00J				<2.50														<2.50
	07/14/2017	9.20J	8.40J			<2.50														<2.50
	04/10/2017	9.90J				<2.50														<2.50
	11/29/2016	7.20J	5.80J			<2.50														<2.50
	08/08/2016	5.00J	5.40J			<2.50														<2.50
	05/31/2016	7.00J	7.30J			<2.50														<2.50
	12/29/2015	7.40J				<2.50	<2.50	<2.50												<2.50
	05/22/2015	9.10J				<1.00	<1.00	<1.00												<1.00
	07/25/2014	7.10J	7.30J			<2.40	<2.40													<2.40
	09/17/2013	8.30J				<3.10	<3.10													<3.10
	06/05/2013	9.70J*				<3.10J*	<3.10J*													<3.10J*
	03/11/2013	9.00J*				<3.10J*	<3.10J*													<3.10J*
	01/22/2013	7.20J*				<3.10J*	<3.10J*													<3.10J*
	07/13/2012	8.60J*				<3.10J*	<3.10J*													<3.10J*
12/09/2011	6.30J*		<3.10J*																	
10/15/2011	7.25J																			
02/25/2010	<10.9																			







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Sample Port	A	C	C1	C2	U1-C	U1-C1	U1-C2	U2-C	U2-C1	U2-C2	U3-C	U3-C1	U3-C2	D	D1	D2	U1-D	U2-D	U3-D	
Duplicates	DUP	DUP		DUP			DUP			DUP			DUP							
PW-ID	Sample Date	Sulfolane (µg/L)										Sulfolane (µg/L)								
0466	05/08/2018	27.3																		
	10/06/2017	32.1																		
	01/20/2017	34.1																		
	03/22/2016	46.7																		
	10/29/2015	30.5																		
	08/13/2015	30.4																		
	07/13/2015																			
	06/12/2015	28.4																		
	05/07/2015	31.4																		
	02/17/2015	33.6	37.6																	
	11/12/2014	32.8																		
	09/11/2014	33.2	33.3																	
	09/10/2014	31.1																		
	06/19/2014	30.4	31.4																	
	03/11/2014	33.0																		
	12/16/2013	31.4																		
	11/01/2013	25.9	26.8																	
	09/09/2013	29.5	29.0																	
	06/12/2013	26.8																		
	04/18/2013	23.1	23.9																	
10/17/2012	20.6J*																			
09/07/2011	14.4																			
02/09/2010	<10.7																			
08/13/2018	17.7																			
08/07/2017	28.2																			
04/14/2017	29.8																			
09/02/2016	31.1																			
09/28/2015	44.9																			
08/29/2014	63.9																			
07/23/2013	83.5J*																			
07/10/2012	116J*																			
03/19/2012	111J*																			
09/26/2011	115J*																			
02/03/2010	78.7																			
07/06/2018	16.5																			
12/15/2017	18.8JH*																			
01/31/2017	22.6																			
10/14/2016	23.2																			
02/05/2016	34.0																			
10/26/2015	35.1																			
05/19/2014	61.7	61.0																		
08/16/2013	69.7J*																			
07/10/2012	122J*																			
09/22/2011	118J*																			
04/05/2011	159																			
01/23/2010	114																			
10/15/2018	13.9																			
02/13/2018	20.5	19.2																		
03/06/2017	28.0																			
12/27/2016	31.5	28.0																		
09/30/2016	24.3	28.8																		
03/18/2016	44.3	44.1																		
10/27/2015	47.6																			
07/10/2015	53.9																			
01/16/2015	62.4																			
07/07/2014	81.5	87.7																		
02/11/2014																				
01/20/2014	97.0																			
06/25/2013	112JL*																			
09/21/2012	139J*																			
11/16/2011	153J*																			
04/05/2011	187																			
01/27/2010	138																			
06/15/2018	15.9																			
02/16/2018	14.9	14.0																		
09/26/2017	26.7																			
01/13/2017	20.9J*																			
04/08/2016	41.3																			
08/25/2015	48.9																			
09/15/2014	93.3	96.1																		
06/14/2012	102J*																			
09/23/2011	103J*																			
04/15/2011	178J*																			
01/27/2010	96.2																			



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Sample Port	A	C	C1	C2	U1-C	U1-C1	U1-C2	U2-C	U2-C1	U2-C2	U3-C	U3-C1	U3-C2	D	D1	D2	U1-D	U2-D	U3-D	
Duplicates	DUP	DUP		DUP			DUP			DUP			DUP							
PW-ID	Sample Date	Sulfolane (µg/L)										Sulfolane (µg/L)								
0511**	08/24/2018	<2.50																		
	04/06/2018	<2.50																		
	10/24/2017	<2.50	<2.50																	
	08/18/2017	<2.50																		
	02/07/2017	3.60J																		
	09/06/2016	3.10J	3.70J																	
	06/10/2016	2.90J																		
	04/26/2016	3.90J																		
	03/15/2016	4.70J	4.50J																	
	09/29/2015	4.80J																		
	07/24/2015	4.00J																		
	04/07/2015	4.20J																		
	09/29/2014	4.40J																		
	05/30/2014	<2.00																		
	11/01/2013	<3.10																		
	08/02/2013	<3.10J*																		
	07/26/2013	<3.10J*																		
	07/02/2013	<3.10J*																		
	06/10/2013	<3.10J*																		
	05/07/2013	<3.10J*																		
04/12/2013	<3.10J*																			
03/15/2013	<3.10J*																			
02/15/2013	<3.10J*																			
01/18/2013	<3.10J*																			
12/10/2012	<3.10J*																			
10/22/2012	3.90J*																			
08/11/2011	4.07J	4.27J																		
02/23/2010	<10.6																			
0514	10/16/2018	5.50J	6.20J																	
	01/26/2018	6.00J																		
	03/27/2017	7.20J																		
	10/10/2016	8.10J	9.20J																	
	07/29/2016	9.90J	9.30J																	
	04/11/2016	5.40J	5.00J																	
	11/30/2015	5.50J																		
	06/26/2015	10.5																		
	04/13/2015	8.20J																		
	12/30/2014	5.50J																		
	08/19/2014	9.80JL*	10.3JL*																	
	05/06/2014	6.80J*	6.20J																	
	01/20/2014	<3.00X*	6.50J																	
	10/22/2013	5.20J																		
	07/30/2013	4.90J*																		
	06/21/2013	3.90J*																		
	04/12/2013	<3.10J*																		
	01/15/2013	6.50J*																		
	10/23/2012	6.80J*																		
	07/18/2012	6.60J*																		
04/09/2012	5.40J*																			
08/19/2011	6.60J*																			
07/21/2011	7.42J																			
04/15/2010	<10.4																			
0515	12/01/2017	<2.50	2.90J																	
	10/06/2017	2.60J	3.20J																	
	12/19/2016	3.40J	4.10J																	
	01/15/2016	6.00J																		
	02/13/2015	5.90J																		
	06/02/2014	3.80J																		
	10/21/2013	4.00J																		
	04/08/2013	<3.10J*																		
	08/08/2012	6.60J*																		
	02/01/2012	8.10J*																		
08/19/2011	7.80J*																			
07/18/2011	6.74J																			
04/13/2010	<10.0	<10.0																		





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Sample Port	A	C	C1	C2	U1-C	U1-C1	U1-C2	U2-C	U2-C1	U2-C2	U3-C	U3-C1	U3-C2	D	D1	D2	U1-D	U2-D	U3-D	
Duplicates	DUP	DUP		DUP			DUP			DUP			DUP							
PW-ID	Sample Date	Sulfolane (µg/L)										Sulfolane (µg/L)								
0559	10/01/2018	20.7																		
	06/01/2018	19.1																		
	02/26/2018	20.4																		
	12/04/2017	22.8																		
	09/08/2017	24.2																		
	04/03/2017	21.9	23.4																	
	12/13/2016	17.5	19.9																	
	01/25/2016	20.7																		
	10/19/2015	19.5																		
	08/11/2015	19.7																		
	03/20/2015	16.7																		
	12/15/2014	19.3																		
	09/05/2014	18.8	16.8																	
	05/23/2014	15.8	16.0																	
	01/13/2014	15.3																		
	08/26/2013	12.5J*																		
	04/29/2013	16.1J*																		
	12/17/2012	16.7J*																		
	08/08/2012	15.4J*																		
	03/15/2012	14.0J*																		
11/28/2011	13.4J*																			
06/06/2011	13.0J*																			
04/15/2010	13.4																			
0560	07/27/2018	63.8	61.2																	
	02/12/2018	52.1	52.8																	
	10/03/2017	56.5																		
	05/09/2017	59.4	59.3																	
	12/20/2016	43.4	45.7																	
	07/29/2016	40.9	40.7																	
	03/25/2016	37.6	42.8																	
	11/06/2015	32.7																		
	06/16/2015																			
	05/29/2015	28.0																		
	12/15/2014	24.5																		
	07/07/2014	23.0																		
	01/27/2014	18.5																		
	08/20/2013	18.4J*																		
	03/08/2013	18.6J*																		
	10/05/2012	15.8J*																		
	04/24/2012	19.8J*																		
	11/14/2011	13.7J*																		
	04/25/2011	20.5J*																		
	04/14/2010	12.4																		
0561	06/26/2018	71.1	68.4																	
	03/09/2018	69.1	71.8																	
	11/13/2017	77.2																		
	06/16/2017	80.3																		
	01/24/2017	59.2																		
	08/30/2016	49.1J*	46.0J*																	
	04/26/2016	56.6J*	54.6																	
	11/20/2015	45.4JL*																		
	06/26/2015	36.2																		
	01/26/2015	36.6																		
	04/04/2014	28.1																		
	12/27/2013	27.1																		
	09/02/2013	25.1JL*																		
	05/24/2013	23.1J*																		
	01/30/2013	21.3J*																		
	10/30/2012	24.3J*																		
	05/16/2012	24.0J*																		
	10/31/2011	<3.10J*																		
	05/11/2011	20.0J*																		
	04/24/2010	17.8																		
0562	07/10/2018	14.5JL*																		
	03/20/2018	14.9	13.5																	
	09/12/2017	14.5																		
	10/28/2016	13.0	13.3																	
	02/15/2016	16.2																		
	04/21/2015	14.9																		
	05/12/2014	16.7																		
	05/03/2013	18.7J*																		
	06/07/2011	14.1J*																		
04/14/2010	11.1																			



















Table G-2  
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Sample Port	A		C		C1	C2		U1-C	U1-C1	U1-C2		U2-C	U2-C1	U2-C2		U3-C	U3-C1	U3-C2	D	D1	D2	U1-D	U2-D	U3-D	
Duplicates	DUP		DUP			DUP				DUP				DUP											
PW-ID	Sample Date	Sulfolane (µg/L)										Sulfolane (µg/L)													
0660	08/20/2018	27.3				<2.50														<2.50					
	04/30/2018	29.9	28.2			<2.50														<2.50					
	12/29/2017	45.8	38.3			<2.50														<2.50J*					
	09/12/2017	38.9	44.4			<2.50														<2.50					
	06/26/2017	39.9	42.4			<2.50														<2.50					
	04/14/2017	48.9	50.1			<2.50														<2.50					
	01/27/2017	48.9	47.2			<2.50														<2.50					
	10/14/2016	48.3	44.4			<2.50														<2.50					
	06/24/2016	53.7	52.1			<2.50														<2.50					
	02/29/2016	68.7				<2.50	<2.50													<2.50					
	09/22/2015	71.0				<2.50	4.80J													<2.50					
	07/31/2015	75.7				3.20J	<2.50	<2.50												<2.50					
	05/22/2015			<1.00																					
	05/01/2015	70.6				<2.40	2.70J													<2.40					
	02/06/2015	74.5				<2.40	<2.40	<2.40												<2.40					
	09/23/2014					<2.40	<2.40													<2.40					
	07/29/2014	88.7				<2.40	4.90J													<2.40					
	05/27/2014	85.4	88.5			<2.00	<2.00													<2.00					
	11/26/2013	86.4	81.5			<3.10	<3.10													<3.10					
	07/09/2013	92.5J*				<3.10J*	<3.10J*													<3.10J*					
02/26/2013	95.0J*				<3.10J*	<3.10J*													<3.10J*						
09/04/2012	121J*				<3.10J*	<3.10J*													<3.10J*						
04/20/2012	115J*				<3.10J*	4.00J*													<3.10J*						
11/01/2011	107J*		<3.10J*																<3.10J*						
05/18/2011	107J*		<5.00J*																<3.10J*						
12/03/2009	45.5																								
0755	09/10/2018	6.80J				<2.50													<2.50						
	07/20/2018	9.10J	9.30J			<2.50													<2.50						
	04/06/2018	10.8	9.50J			<2.50													<2.50						
	01/08/2018	8.10J				<2.50													<2.50						
	09/18/2017	7.70J	9.10J			<2.50J*													<2.50						
	05/05/2017	9.10J	8.20J			<2.50													<2.50						
	12/12/2016	7.30J				<2.50													<2.50						
	10/31/2016	6.50J	7.20J			<2.50													<2.50						
	06/27/2016	9.00J	10.4			<2.50													<2.50						
	02/01/2016	9.20J				<2.50	<2.50	<2.50											<2.50						
	08/31/2015	8.00J				<2.50	<2.50												<2.50						
	02/09/2015	7.10J				<2.40	<2.40	<2.40											<2.40						
	09/08/2014	5.80J				<2.40	<2.40												<2.40						
	04/21/2014	4.80J				<2.00	<2.00												<2.00						
	10/07/2013	6.30J	6.50J			<3.10	<3.10												<3.10						
	06/07/2013	6.20J*				<3.10J*	<3.10J*												<3.10J*						
	12/03/2012	7.70JH*				<3.10J*	<3.10J*												<3.10J*						
	10/15/2012	5.70J*				<3.10J*	<3.10J*												<3.10J*						
	01/24/2012	6.00J*		<3.10J*															<3.10J*						
	09/06/2011	5.56J																							
02/10/2011	<11.2																								



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Sample Port	A		C		C1	C2		U1-C	U1-C1	U1-C2		U2-C	U2-C1	U2-C2		U3-C	U3-C1	U3-C2	D	D1	D2	U1-D	U2-D	U3-D	
Duplicates		DUP		DUP			DUP				DUP				DUP										
PW-ID	Sample Date	Sulfolane (µg/L)											Sulfolane (µg/L)												
0757	07/30/2018	17.8	16.6			<2.50																			<2.50
	04/13/2018	18.9	19.4			<2.50																			<2.50
	05/30/2017	19.9				<2.50																			<2.50
	11/29/2016	13.7				<2.50																			<2.50
	07/25/2016	14.7	14.7			<2.50																			<2.50
	02/08/2016	16.1				<2.50	<2.50	<2.50																	<2.50
	08/24/2015	13.1				<2.50	<2.50																		<2.50
	02/06/2015	14.1				<2.40	<2.40																		<2.40
	06/23/2014	12.4	11.6			<2.40	<2.40																		<2.40
	08/30/2013	13.0J*				<3.10J*	<3.10J*																		<3.10J*
	11/30/2012	12.7J*				<3.10J*	<3.10J*																		<3.10J*
	04/24/2012	9.30J*			<3.10J*																				
	08/19/2011	10.7																							
	01/06/2011	<14.1																							
0758	08/31/2018	31.0	29.0			6.40J																			<2.50
	03/05/2018	33.1	32.4			<2.50																			<2.50
	10/23/2017	28.7	30.0			<2.50																			<2.50
	05/08/2017	32.5J*	31.2			<2.50J*																			<2.50
	11/04/2016	19.7	20.6			<2.50																			<2.50
	09/30/2016	18.8	19.8			<2.50																			<2.50
	04/18/2016	24.6JH*	26.2			<2.50																			<2.50
	10/02/2015	21.9				<2.50	<2.50																		<2.50
	03/06/2015	18.2				<2.40	<2.40	<2.40																	<2.40
	07/08/2014	21.3	17.7			<2.40	<2.40																		<2.40
	12/03/2013	15.7	14.7			<3.10	<3.10																		<3.10
	04/19/2013	17.4J*				<3.10J*	<3.10J*																		<3.10J*
	07/24/2012	17.0J*				<3.10J*	<3.10J*																		<3.10J*
	12/07/2011	13.8J*				<3.10J*	<3.10J*																		<3.10J*
0773	06/24/2011	13.6J*			<0.790J*																				
	01/06/2011	11.6																							
	08/20/2018	4.50J	4.90J			<2.50																			<2.50
	12/08/2017	5.80J	7.00J			<2.50																			<2.50
	05/30/2017	12.5	12.2			<2.50																			<2.50
	03/20/2017	14.6	15.3			<2.50																			<2.50
	09/23/2016	4.20J	3.90J			<2.50																			<2.50
	04/05/2016	10.0	10.3			<2.50																			<2.50
	11/03/2015	5.50J				<2.50	<2.50	<2.50																	<2.50
	06/05/2015	7.60J				<1.00	<1.00	<1.00																	<1.00
	02/16/2015	7.00J				<2.40	<2.40	<2.40																	<2.40
	06/10/2014	3.20J	<2.40			<2.40	<2.40																		<2.40
	02/06/2014	6.40J	7.80J			<3.00	<3.00																		<3.00
	08/27/2013	5.00J*				<3.10J*	<3.10J*																		<3.10J*
10/23/2012	3.20J*				<3.10J*	<3.10J*																		<3.10J*	
12/07/2011	3.40J*			<3.10J*																					
09/03/2011	3.92J																								
10/30/2010	<10.8																								











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Sample Port	A		C		C1	C2		U1-C	U1-C1	U1-C2		U2-C	U2-C1	U2-C2		U3-C	U3-C1	U3-C2	D	D1	D2	U1-D	U2-D	U3-D	
	Duplicates	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP	DUP
PW-ID	Sulfolane (µg/L)											Sulfolane (µg/L)													
Sample Date																									
1099†	08/17/2018	33.0	34.5			<2.50																			
	03/09/2018	38.1	44.2			<2.50																			
	10/06/2017	47.0				<2.50																			
	05/02/2017	56.2	58.2			<2.50																			
	12/27/2016	60.6	60.5			<2.50																			
	07/12/2016	66.4				<2.50																			
	01/12/2016	79.0				<2.50	<2.50	<2.50																	
	10/16/2015	75.4																							
	08/13/2015	81.2	81.1																						
	08/03/2015	89.3				<2.50	<2.50																		
	05/18/2015	81.2	81.0																						
	03/10/2015	86.9																							
	02/03/2015	85.7				<2.40	<2.40	<2.40																	
	11/18/2014	91.5	89.8																						
	08/26/2014	101				<2.40	<2.40																		
	08/18/2014	94.4																							
	06/02/2014	96.8																							
	03/24/2014	94.9																							
	03/03/2014	99.5				<3.00	<3.00																		
	12/02/2013	113																							
09/26/2013	97.2	104																							
09/24/2013	91.5	89.6			<3.10	<3.10																			
06/04/2013	97.4	103																							
03/12/2013	107	105																							
03/01/2013	98.9J*				<3.10J*	<3.10J*																			
09/10/2012	96.8J*		<3.10J*																						
1100	06/08/2018	16.8	15.0			<2.50																			
	10/31/2017	27.3				<2.50																			
	04/04/2017	35.9	35.5			<2.50																			
	08/29/2016	42.6J*				<2.50J*																			
	03/28/2016	73.6				<2.50J*																			
	10/30/2015	101				<2.50	<2.50	<2.50																	
	04/03/2015	113				<2.40	<2.40																		
	05/15/2014	196	210			<2.00	<2.00																		
	09/06/2013	238J*				<3.10J*	<3.10J*																		
	02/04/2013	267J*				<3.10J*	<3.10J*																		
08/23/2012	313J*		<3.10J*																						
05/24/2010	185																								
1101	04/20/2018	26.5				3.70J																			
	01/04/2018	38.3				5.70J																			
	09/15/2017	39.3	37.0			<2.50																			
	04/04/2017	33.9	34.0			<2.50																			
	01/16/2017	33.0	37.3			<2.50																			
	06/06/2016	29.2	26.4			3.40J																			
	07/20/2015	26.6				<2.50	<2.50	<2.50																	
	06/30/2014	25.9	24.9			<2.40	<2.40																		
	08/26/2013	16.7J*				<3.10J*	<3.10J*																		
	05/01/2013	<3.10J*				<3.10J*	<3.10J*																		
	10/15/2012	16.1J*				<3.10J*	<3.10J*																		
05/02/2012	13.2J*		<3.10J*																						
09/02/2011	15.1																								
02/27/2010	<11.4	<10.0																							



















**Table G-2**  
**POE Treatment Systems Analytical Data Summary**  
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**Flint Hills Resources Alaska, LLC**  
**North Pole Terminal, North Pole, Alaska**

Sample Port	A		C		C1	C2		U1-C	U1-C1	U1-C2		U2-C	U2-C1	U2-C2		U3-C	U3-C1	U3-C2	D	D1	D2	U1-D	U2-D	U3-D		
Duplicates		DUP		DUP			DUP				DUP				DUP											
PW-ID	Sample Date	Sulfolane (µg/L)										Sulfolane (µg/L)														
2219†	09/14/2018	44.7				2.70J																			<2.50	
	03/27/2018	42.2	40.4			3.20J																			<2.50	
	12/18/2017	63.8JH*	63.6JH*			<2.50																			<2.50	
	09/08/2017	60.0	56.0			<2.50																			<2.50	
	07/21/2017	57.8	52.4			<2.50																			<2.50	
	05/26/2017	48.4	46.6			<2.50																			<2.50	
	03/17/2017	45.3	46.2			<2.50																			<2.50	
	11/18/2016	55.3	54.2			<2.50																			<2.50	
	09/16/2016	82.6	76.1			5.00J																			<2.50	
	05/16/2016	42.7	41.6			<2.50																			<2.50	
	01/18/2016	53.1				<2.50	<2.50																		<2.50	
	08/17/2015	31.4				<2.50	<2.50	<2.50																	<2.50	
	06/15/2015	22.9																								<2.50
	07/31/2018	59.2																								<2.50
04/10/2018	63.2	57.1			9.50J																				<2.50	
02/26/2018	56.8	52.4			<2.50																				<2.50	
12/05/2017	66.4	62.7			<2.50																				<2.50	
10/02/2017	65.7	62.0			<2.50																				<2.50	
06/26/2017	61.6				<2.50																				<2.50	
03/14/2017	66.7				<2.50																				<2.50	
11/18/2016	42.5				<2.50																				<2.50	
09/12/2016	56.0				4.80J*																				<2.50	
07/19/2016	64.2																								<2.50	
09/28/2018	13.5	12.2			<2.50																				<2.50	
04/27/2018	15.9	16.7			<2.50																				<2.50	
11/10/2017	19.1	18.3			<2.50																				<2.50	

**Notes**  
This table contains point-of-entry system sample results for laboratory data received through November 7, 2018.

**Acronyms and Abbreviations:**  
\*\* Commercial location  
† POE system was moved from the original well when a new well was installed at the property. The old well information is not presented on this table as the data was presented in previous reports and there were no additional samples collected in 2018.  
‡ System has been installed but has not been used since last sampling event due to vacant structure.  
§  
Home has been winterized and/or system is damaged due to freezing. Additionally, PW-0454 has been moved to an unauthorized location.  
DUP field duplicate sample  
PW-ID Private-well identification number  
µg/L micrograms per liter

**Data Validation Flags**  
< Sulfolane not detected above concentration listed.  
J Estimated concentration; sulfolane was detected below the laboratory limit of quantitation (LOQ) and above the detection limit (DL). Flag applied by laboratory.  
J\* Estimated concentration. Flag applied by Shannon & Wilson, Inc. due to quality control failures.  
JL\* Estimated concentration, biased low. Flag applied by Shannon & Wilson, Inc. due to quality control failures.  
JH\* Estimated concentration, biased high. Flag applied by Shannon & Wilson, Inc. due to quality control failures.  
X\* Sample switch suspected; however, we were not able to confirm.

**Sample Ports**  
A Influent water directly from private-well.  
C Post primary treatment sample port (after two tanks on a duplex system or one tank on a simplex system); these samples are typically collected at system startup.  
C1 Sample collected from sample port "C" prior to a carbon tank change out.  
C2 Sample collected from sample port "C" after a carbon tank change out.  
D Post redundant tank sample port.  
D1 Sample collected from sample port "D" prior to a redundant tank change out.  
D2 Sample collected from sample port "D" after a redundant tank change out.  
U1-X Unit 1 sample, where "X" indicates sample port; some locations may run several treatment units in parallel.  
U2-X Unit 2 sample, where "X" indicates sample port; some locations may run several treatment units in parallel.  
U3-X Unit 3 sample, where "X" indicates sample port; some locations may run several treatment units in parallel.



**Table G-3**  
**Private Well Sulfolane Results - Initial Sample Event**

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**Flint Hills Resources Alaska, LLC**  
**North Pole Terminal, North Pole, Alaska**

Private Well ID	Latitude, Longitude	Well Depth (feet)	Zone	Sample Date	Sulfolane (µg/L)
PW-0242	64.7929, -147.3929	90	90-160	3/2/2018	<5.10
PW-2236	64.7924, -147.3923	--	--	3/2/2018	<5.30

**General Notes:**

Well depth listed where information is known.

**Acronyms and Abbreviations:**

-- = not available

< = not detected; limit of detection (LOD) listed.

µg/L = micrograms per liter

**Table G-4  
2018 POE Treatment Systems Water Usage Summary**

**Annual 2018 Offsite Plume Monitoring Report  
Flint Hills Resources Alaska, LLC  
North Pole Terminal, North Pole, Alaska**

<b>Location</b>	<b>Private Well Identification Number (PW ID#)</b>	<b>Gallons of Water treated in 2018 (Approximate)</b>
1	PW-0157	4,080
2	PW-0158	21,680
3	PW-0159	65,680
4	PW-0160	31,620
5	PW-0161	49,900
6	PW-0162	15,770
7	PW-0164	36,330
8	PW-0217	34,550
9	PW-0219	45,720
10	PW-0221	20,710
11	PW-0225	17,330
12	PW-0232	22,810
13§	PW-0295	0
14	PW-0296	49,860
15	PW-0298	34,640
16	PW-0299	40,290
17	PW-0300	27,850
18	PW-0301	39,570
19	PW-0302	19,860
20	PW-0303	48,380
21	PW-0304	46,710
22	PW-0305	33,990
23	PW-0307	65,340
24	PW-0308	44,910
25	PW-0309	34,590
26	PW-0311	31,680
27	PW-0347	21,150
28	PW-0348	35,550
29	PW-0364	34,400
30	PW-0365	69,310
31	PW-0376	44,000
32	PW-0377	112,470
33	PW-0378	55,440
34	PW-0390	44,010
35	PW-0391	45,600
36	PW-0393	37,410
37	PW-0394	13,830
38	PW-0439	36,460
39‡	PW-0442	0
40	PW-0453	4,120
41	PW-0454	90
42	PW-0456	59,370
43	PW-0463	48,320
44	PW-0466	37,320
45	PW-0480	8,540
46	PW-0483	22,330
47	PW-0487	24,680
48	PW-0488	33,890
49	PW-0489	15,740
50	PW-0498	26,020

**Table G-4  
2018 POE Treatment Systems Water Usage Summary**

**Annual 2018 Offsite Plume Monitoring Report  
Flint Hills Resources Alaska, LLC  
North Pole Terminal, North Pole, Alaska**

<b>Location</b>	<b>Private Well Identification Number (PW ID#)</b>	<b>Gallons of Water treated in 2018 (Approximate)</b>
51	PW-0502	25,360
52	PW-0503	71,690
53	PW-0504	17,710
54	PW-0506	10,930
55*	PW-0511	40,630
	PW-0511	40,610
	PW-0511	26,350
56	PW-0514	33,650
57	PW-0515	21,380
58	PW-0542	48,470
59	PW-0544	61,270
60	PW-0550	34,610
61	PW-0553	53,110
62	PW-0554	80,630
63	PW-0556	28,100
64	PW-0557	81,850
65	PW-0558	85,590
66	PW-0559	69,790
67	PW-0560	48,550
68	PW-0561	67,720
69	PW-0562	51,130
70	PW-0563	44,220
71	PW-0564	45,030
72	PW-0565	31,980
73	PW-0566	118,540
74	PW-0567	43,490
75	PW-0568	48,740
76	PW-0570	29,861
77	PW-0586	35,850
78	PW-0597	45,530
79	PW-0598	45,350
80	PW-0599	16,790
81	PW-0606	40,830
82§	PW-0607	0
83	PW-0608	21,470
84§	PW-0609	0
85	PW-0610	33,200
86	PW-0615	47,750
87	PW-0617	31,000
88	PW-0618	38,260
89	PW-0620	14,230
90	PW-0622	61,690
91	PW-0636	48,740
92	PW-0646	47,330
93	PW-0647	41,070
94	PW-0648	66,600
95	PW-0649	19,600
96	PW-0651	12,470
97	PW-0653	35,300
98	PW-0656	20,650

**Table G-4  
2018 POE Treatment Systems Water Usage Summary**

**Annual 2018 Offsite Plume Monitoring Report  
Flint Hills Resources Alaska, LLC  
North Pole Terminal, North Pole, Alaska**

<b>Location</b>	<b>Private Well Identification Number (PW ID#)</b>	<b>Gallons of Water treated in 2018 (Approximate)</b>
99	PW-0657	55,850
100	PW-0658	57,040
101	PW-0660	44,180
102	PW-0755	50,386
103	PW-0757	26,630
104	PW-0758	44,060
105	PW-0773	33,710
106	PW-0929	55,070
107	PW-0931	35,160
108	PW-0932	41,520
109	PW-0933	35,960
110	PW-0936	24,720
111	PW-0937	60,300
112	PW-0938	11,230
113	PW-0940	12,010
114	PW-0942	23,270
115	PW-0943	68,030
116	PW-0944	12,590
117	PW-0945	56,580
118	PW-0946	6,930
119	PW-0947	41,580
120	PW-0948	12,230
121	PW-0988	65,820
122	PW-0996	31,570
123	PW-0997	3,340
124	PW-1086	14,600
125	PW-1095	3,200
126	PW-1096	2,080
127	PW-1097	29,990
128	PW-1099	38,380
129	PW-1100	23,820
130	PW-1101	47,200
131	PW-1103	41,500
132	PW-1104	26,180
133	PW-1105	100,610
134	PW-1106	85,550
135	PW-1107	174,830
136	PW-1108	191,780
137	PW-1109	54,340
138§	PW-1110	0
139‡	PW-1111	0
140	PW-1116	24,150
141	PW-1118	135,740
142*	PW-1155	40,790
	PW-1155	47,210
143	PW-1186	128,230
144	PW-1190	47,410
145	PW-1276	29,590
146	PW-1314	29,880
147	PW-1315	79,390

**Table G-4  
2018 POE Treatment Systems Water Usage Summary**

**Annual 2018 Offsite Plume Monitoring Report  
Flint Hills Resources Alaska, LLC  
North Pole Terminal, North Pole, Alaska**

<b>Location</b>	<b>Private Well Identification Number (PW ID#)</b>	<b>Gallons of Water treated in 2018 (Approximate)</b>
148	PW-1374	125,290
149	PW-1375	38,290
150	PW-1394	27,340
151*	PW-1395	22,680
	PW-1395	33,020
152	PW-1404	40,600
153	PW-1406	29,820
154	PW-1407	31,130
155	PW-1408	50,480
156	PW-1435	73,530
157	PW-1436	27,990
158	PW-1437	27,190
159	PW-1459	61,820
160	PW-2199	67,790
161	PW-2215	23,910
162	PW-2219	62,470
163	PW-2227	61,190
164	PW-2235	60,190
<b>Total</b>		<b>6,969,547</b>

**Notes:**

§ = Home has been winterized and/or system is damaged due to freezing.

‡ = System has been installed but has not been used since last sampling event due to vacant structure.

\* = Location has more than one POE system associated with the PW ID#.

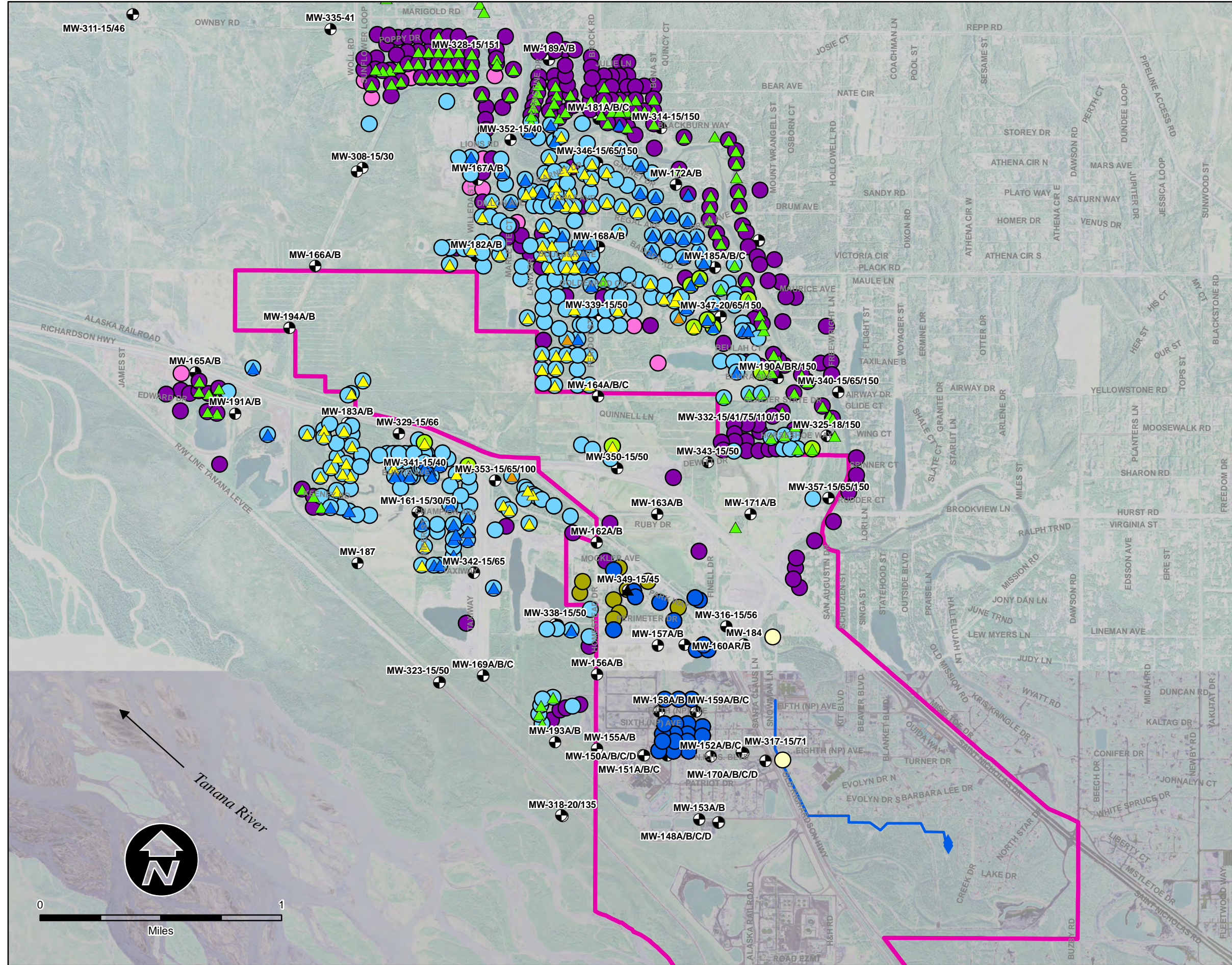
**Acronyms and Abbreviations:**

POE = Point-of-Entry

**FIGURE**







- ### Legend
- ▲ Sulfolane Not Detected in Groundwater Sample
  - ▲ 1.0 - Less Than 20 µg/L (ppb) Sulfolane Detected in Groundwater Sample
  - ▲ 20 - 100 µg/L (ppb) Sulfolane Detected in Groundwater Sample
  - ▲ 100 - 200 µg/L (ppb) Sulfolane Detected in Groundwater Sample
  - ▲ 200 - 300 µg/L (ppb) Sulfolane Detected in Groundwater Sample
  - ▲ 300 - 400 µg/L (ppb) Sulfolane Detected in Groundwater Sample
  - ▲ Greater than 400 µg/L (ppb) Sulfolane Detected in Groundwater Sample
  - City Water Solutions
  - Long Term Alternative Water Solution - Residential Property
  - Long Term Alternative Water Solution - Commercial Property
  - Interim Bottled Water Solution
  - Water Tank Listed As Water Source During Survey (Outside City Limits)
  - Auxiliary Well Sample, City Water Listed As Drinking Water Source During Survey
  - City of North Pole Fire Wells
  - ⊕ Monitoring Well
  - ◆ New NP City Wells
  - Water Main New City Wells
  - North Pole City Boundary

Notes:  
 \*ppb = parts per billion  
 \*Private well results received from November 11, 2017 to November 7, 2018 are presented on this map. The most recent result for each well is shown.

Annual 2018 Offsite Plume Monitoring Report  
 North Pole, Alaska

**POTABLE WATER SOLUTIONS  
 PROVIDED BY  
 FLINT HILLS RESOURCES**

November 2018 31-1-20025-011



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