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December 12, 2025
Project No. M8128.02.031

Wesley Thomas
Oregon Department of Environmental Quality
700 NE Multnomah Street, Suite 600
Portland, OR 97232

Re: Comments in Response to Revised Gasco OU Segment 3 – Alluvium WBZs Source Control Evaluation

Dear Wesley Thomas:

On behalf of Siltronic Corporation (Siltronic), Maul Foster & Alongi, Inc. (MFA) has prepared this letter providing comments on NW Natural's (NWN) *Revised Gasco OU Segment 3 – Alluvium WBZs Source Control Evaluation* (Revised Segment 3 SCE Report), prepared by Anchor QEA and dated July 28, 2025. The Revised Segment 3 SCE Report was prepared in response to DEQ's October 4, 2024, comments to the August 13, 2024, *Gasco OU Segment 3 – Alluvium WBZs Source Control Evaluation* (Anchor 2024).

Siltronic notes that a number of comments previously submitted by Siltronic appear to have been addressed in the Revised Segment 3 SCE Report, including the more limited use of historical data that pre-dates Siltronic's implementation of the upland EIB removal action. Siltronic appreciates NWN's consideration of these comments in the Revised Segment 3 SCE Report.

General Comment

The stated objective of the Revised Segment 3 SCE Report is to provide the technical rationale and basis for significant extension of NWN's proposed deep in situ stabilization and solidification (ISS) barrier wall interim remedial action measure (IRAM) from approximately 350 feet of Siltronic property shoreline to approximately 720 feet of Siltronic property shoreline. The report concludes that additional source controls (in the form of the proposed IRAM extension) are needed based on the number and magnitude of Gasco Operable Unit (GOU) Contaminants of Concern (COCs) which exceed Portland Harbor Record of Decision (ROD) Table 17 cleanup level (CULs) including Metals, Volatile Organic Compounds (VOCs), Polycyclic Aromatic Hydrocarbons (PAHs), Pesticides, and Cyanide.

Siltronic's primary comment to the Revised Segment 3 SCE Report is that the evaluations presented in the document do not support a conclusion that extension of the proposed IRAM, nor any other source control measure, is necessary to prevent chlorinated volatile organic compounds (CVOCs - specifically trichloroethene [TCE], cis-1,2-dichloroethene [cDCE], and vinyl chloride which are associated with historical releases from Siltronic) from discharging to the Willamette River. While the Revised Segment 3 SCE Report provides a more detailed screening of CVOC data against Portland Harbor Table 17 CULs than the previous version of this report, the presence of CUL exceedances on their own does not indicate, as the Revised Segment 3 SCE Report seems to imply, that CVOCs require source control, only that a weight-of-evidence evaluation must be conducted (DEQ and EPA

2005). The Revised Segment 3 SCE Report does not consider additional lines of evidence that could inform a more comprehensive source control decision for CVOCs, including:

- Fate and transport behavior of CVOCs in groundwater;
- Potential contaminant loading of CVOCs to the river;
- Characterization of groundwater discharge to surface water, including the location, area, or volume of groundwater discharge within the Segment 3 Evaluation Area; and
- Evaluation of existing in-river groundwater data.

An initial review of the available data and the evaluations described in the following paragraphs suggest that many of these lines of evidence would support a conclusion that CVOCs within the Segment 3 Evaluation Area do not require source control measures, let alone measures as extensive as NWN is proposing. For example, review of the most recent available in-river groundwater data from the 2024 Bayer Pre Design Investigation Report shows that no TCE was detected in the Willamette River adjacent to the Segment 3 Evaluation Area, and vinyl chloride was detected in less than 20% of the in-river groundwater samples (WSP 2024), evidencing that there is no significant discharge of CVOCs to the Willamette River.[1]

TCE has never been detected in porewater or in-river groundwater offshore of the Segment 3 evaluation area. The few detections of cDCE have all been below the Table 17 CUL. Vinyl chloride is seldomly detected, with fewer than 20% of detections occurring since 2016 (i.e. only three detections, see Table 1).

Vinyl chloride concentrations within the Gasco Sediment Site (GSS) have historically been decreasing with multiple lines of evidence confirming ongoing natural attenuation of CVOCs in porewater by reductive dechlorination (Anchor 2012). It is expected that these natural attenuation processes have and will continue into the future, resulting in further decreasing CVOC concentrations in the river over time.

As noted in the Revised Segment 3 SCE Report, riverbank wells within the Segment 3 evaluation area with detections of vinyl chloride show decreasing or stable concentration trends (see also trend plots in the Attachment to this letter). These stable, decreasing, or non-detect vinyl chloride trends in riverbank wells have likely contributed to continued decreasing downgradient vinyl chloride concentrations in the river.

In the Siltronic historical TCE release source area (source area) which is located approximately 500 feet upland from the riverbank, the vast majority of the wells exhibit decreasing vinyl chloride concentrations, or are stable at low concentrations (i.e. less than 10 ug/l) (see Attachment). Only two wells in the source area have increasing trends indicative of vinyl chloride generation from the dechlorination of cDCE by EIB. Even though these wells exhibit increasing vinyl chloride trends, the concentrations of vinyl chloride in these wells are still low. As vinyl chloride concentrations within the source area are decreasing or low, concentrations downgradient would also be expected to continue to decrease throughout the foreseeable future.

Existing data indicate there is significant attenuation of vinyl chloride between the riverbank and the river. Considerably lower vinyl chloride concentrations are observed in porewater compared to concentrations in the riverbank wells within the Segment 3 evaluation area (see Figures 1 and 2,

[1] NWN dismisses these data in the Revised Segment 3 SCE Report, indicating that cross-sections presented in the Bayer PDI Report (WSP 2024) indicate that all in-water groundwater data are representative of Fill Water Bearing Zone (FWBZ) groundwater discharge. Siltronic questions this interpretation of the cross-section, but also notes that, if it is accurate, no AWBZ groundwater is currently discharging in nearshore areas at all.

and Tables 1 and 2). Since vinyl chloride has a low sorption tendency, attenuation is likely the result of biodegradation and dispersion. Vinyl chloride's low sorption tendency and low concentrations in the river and at the riverbank suggest that vinyl chloride in groundwater is very unlikely to pose a recontamination risk to future in-water remedial actions.

Seepage rates offshore the GOU-Allen, within the silty portion of the riverbed consistent with the materials of the alluvial water-bearing zone, are very low with average measured rates ranging from 5.1 cm/day to -1.7 cm/day (indicating some groundwater recharge from the river) (EPA 2016). This suggests that groundwater discharge from the alluvial water-bearing zone in the nearshore area of the Willamette River is minimal or not present.

Together, these lines of evidence indicate that no source control measures, including the extension of the proposed IRAM, are necessary to control CVOCs from discharging to the Willamette River adjacent to the Segment 3 Evaluation Area.

On a purely technical basis, Siltronic does not necessarily oppose the extension of NWN's proposed barrier wall IRAM, provided NWN addresses Siltronic's operational and geotechnical concerns (which were detailed in Siltronic's earlier comments on this IRAM) as early in the design process as possible. Siltronic notes that increasing the length of the proposed barrier wall may increase the risk to Siltronic's operations from vibrations and geotechnical instability during construction, and if these concerns are not addressed, would provide a basis for Siltronic to oppose the proposed extension.

Specific Comments

Section 5, Upper and Lower Alluvium WBZs COC Evaluation. This section describes the screening results, and methodology used for screening groundwater data against Table 17 CULs, as well as Portland Harbor remedial action objective (RAO) 4 and RAO 8, including assessments of the frequency, recentness, and overall magnitude (as represented by exceedance ratios) of CUL exceedances for each contaminant of concern (COC). Siltronic notes that NWN evaluated each of these parameters separately and independently, rather than in sequence as would be more appropriate. For example, NWN evaluates the exceedance ratios for each COC and location, even in instances where a COC has not exceeded CULs in any recent samples. This methodology results in a misleading presentation of CUL exceedances for CVOCs that are not representative of current conditions. For example, in Section 5.4, NWN identifies TCE as exceeding CULs at monitoring wells WS-12-15 and WS-26-116, despite the fact that TCE has not exceeded CULs in those monitoring wells since 2012 and 2016, respectively.

Similarly, NWN presents exceedance ratios based on 90% upper confidence limit (UCL) values calculated from the full dataset collected at individual monitoring wells, even in instances where Mann-Kendall trend evaluations indicate that COC concentrations are decreasing. A statistically significant decreasing trend indicates that historical data is not representative of current conditions, and a UCL that is calculated using these values is not a meaningful indicator of the need for source control measures.

Finally, NWN compares data to Table 17 CULs, RAO 4, and RAO 8, but does not discuss exceedances of either individual RAO. As NWN notes in Section 4 of the Revised Segment 3 SCE report, human health endpoints represented by RAO 4 are based on consumption of clams harvested from the Willamette River, which does not occur adjacent to the Siltronic property or in the navigation channel. RAO 8 is an appropriate screening level to consider for AWBZ source control, but NWN does not provide any evaluation of whether individual COCs exceed RAO 8. No RAO 8 value was

established for vinyl chloride, and TCE does not exceed RAO 8 in any samples from monitoring wells within the Segment 3 Evaluation Area.

Section 6, Upland Sources. NWN states that there are upgradient sources present on the Siltronic property that will continue to act as sources of elevated COCs in groundwater for the foreseeable future, and presents isoconcentration maps of upgradient groundwater to support this claim. Siltronic disagrees with that suggested conclusion as it relates to CVOCs. The historical TCE release on the Siltronic property occurred approximately 40 years ago and has since been addressed by Siltronic's implementation of EIB, which has reduced the mass of TCE in source area groundwater by over 99%, and the mass of all CVOCs in source area groundwater by over 97% (MFA 2023). All available evidence indicates that the associated CVOC groundwater plume was stable prior to implementation of the EIB system and is currently declining. This is supported by the trend evaluations presented in the Revised Segment 3 SCE Report, which confirm that CVOC concentrations are stable or declining in all monitoring wells within the Segment 3 Evaluation Area. CVOC concentrations in the upgradient areas are expected to continue to decline as the EIB system continues to function within the TCE source area (MFA 2023).

NWN also indicates that there is substantial uncertainty regarding the presence of additional source areas beneath the Fab 1 building. Siltronic believes this is misleading as it relates to COVCs. While distribution of MGP waste materials from the former Gasco operations beneath the building is unknown, there is no evidence of any CVOC sources beneath the Fab 1 building. As such, the uncertainty regarding additional source areas relates to MGP waste materials, not CVOC sources.

Section 8, Conclusions. NWN states "Contaminant source areas are present upgradient (inland) of the EPA Final Project Area and the Segment 3 Evaluation Area, including the chlorinated VOC source area beneath the Fab 1 Building" This statement is incorrect; there is no known source of CVOCs located under the Fab 1 building. There is no documentation of any CVOC releases under the Fab 1 building, and no CVOCs have been detected in monitoring well WS-24-155, which provides the only available groundwater data under the Fab 1 building.

Closing

In summary, a review of this document indicates that the presented data analysis does not support the conclusion that CVOCs in groundwater warrant extension of the ISS barrier wall IRAM, or any other source control measures. In fact, the available data suggest that no source control measures are needed to address CVOCs in groundwater within the Segment 3 Evaluation Area. As such, if NWN wishes to justify the extension of the ISS Barrier Wall IRAM in the Segment 3 Evaluation Area, it should present alternative rationales to support such an extension, as the need for that extension does not exist due to the presence of CVOCs within the Segment 3 Evaluation Area.

We appreciate the opportunity to comment on this report. Please contact us should you have any questions.

Sincerely,

Maul Foster & Alongi, Inc.

Courtney Savoie, RG, LHG
Senior Hydrogeologist

Michael Murray, RG, LHG, PE
Principal Hydrogeologist

Attachments

References

Limitations

Figures

Tables

Attachment A—Riverbank and Source Area Vinyl Chloride Trends

cc: Sage Ertman, Siltronic Corporation
Samantha Hopman, Siltronic Corporation
Rachel Brown, Siltronic Corporation
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Ryan Barth, Anchor QEA
Matt Davis, Anchor QEA
John Renda, Anchor QEA
Rob Ede, Ede Environmental
Mike Crystal, Sevenson
Hunter Young, US EPA
Laura Hanna, US EPA

References

Anchor. 2012. *Draft Engineering Evaluation/Cost Estimate Gasco Sediments Cleanup Site*. Prepared for NW Natural. Anchor QEA, LLC: Portland, OR. May.

Anchor. 2024. *Gasco OU Segment 3 – Alluvium WBZs Source Control Evaluation.* Prepared for NW Natural. Anchor QEA, LLC: Portland, OR. August 13.

Anchor. 2025. *Revised Gasco OU Segment 3 – Alluvium WBZs Source Control Evaluation.* Prepared for NW Natural. Anchor QEA, LLC: Portland, OR. July 28.

DEQ and EPA. 2005. *Portland Harbor Joint Source Control Strategy*. Final. Oregon Department of Environmental Quality and U.S. Environmental Protection Agency. December 2005. Available at: https://www.oregon.gov/deq/FilterDocs/ph-JSCSFinal.pdf

DEQ. 2024. *DEQ Comments on the Gasco OU Segment 3 – Alluvium WBZs Source Control Evaluation, Former Manufactured Gas Plan Operable Unit.* Oregon Department of Environmental Quality: Portland, OR. October 4.

EPA. 2016. *Portland Harbor RI/FS Remedial Investigation Report, Final.* US. Environmental Protection Agency. February 8.

MFA. 2023. *Enhanced In Situ Bioremediation Performance Monitoring Program Progress Report.* Prepared for Siltronic Corporation. Maul Foster & Alongi, Inc., Portland, OR. August 14.

WSP. 2024. *Revised Final Pre-Design Investigation Evaluation Report, Portland Harbor Superfund Site, RM7Wb Project Area.* Prepared for Bayer CropScience Inc. WSP USA, Inc.: Merrimack, NH. April.

Limitations

The services undertaken in completing this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the use of segregated portions of this report.

Figure

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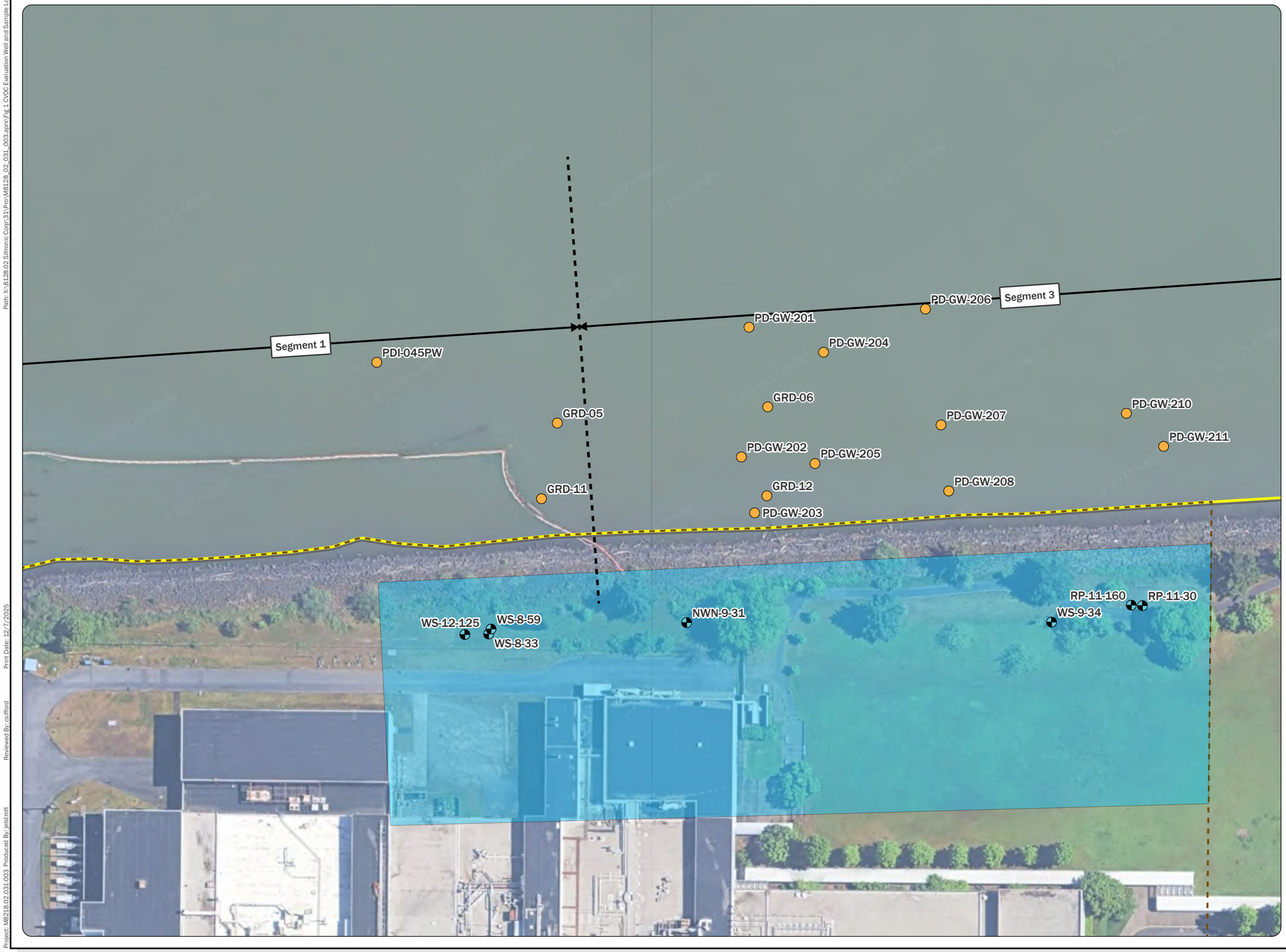
Figure 1
CVOC Evaluation Well and Sample Locations

Portland, Oregon



Legend

- Monitoring Well
- Sample Location
- Segment
- Segment Boundary
- Segment 3 Evaluation Area
- Gasco Operable Unit Boundary
- Siltronic Property Boundary

0 100
Feet

Data Sources
Aerial photograph obtained from Google.

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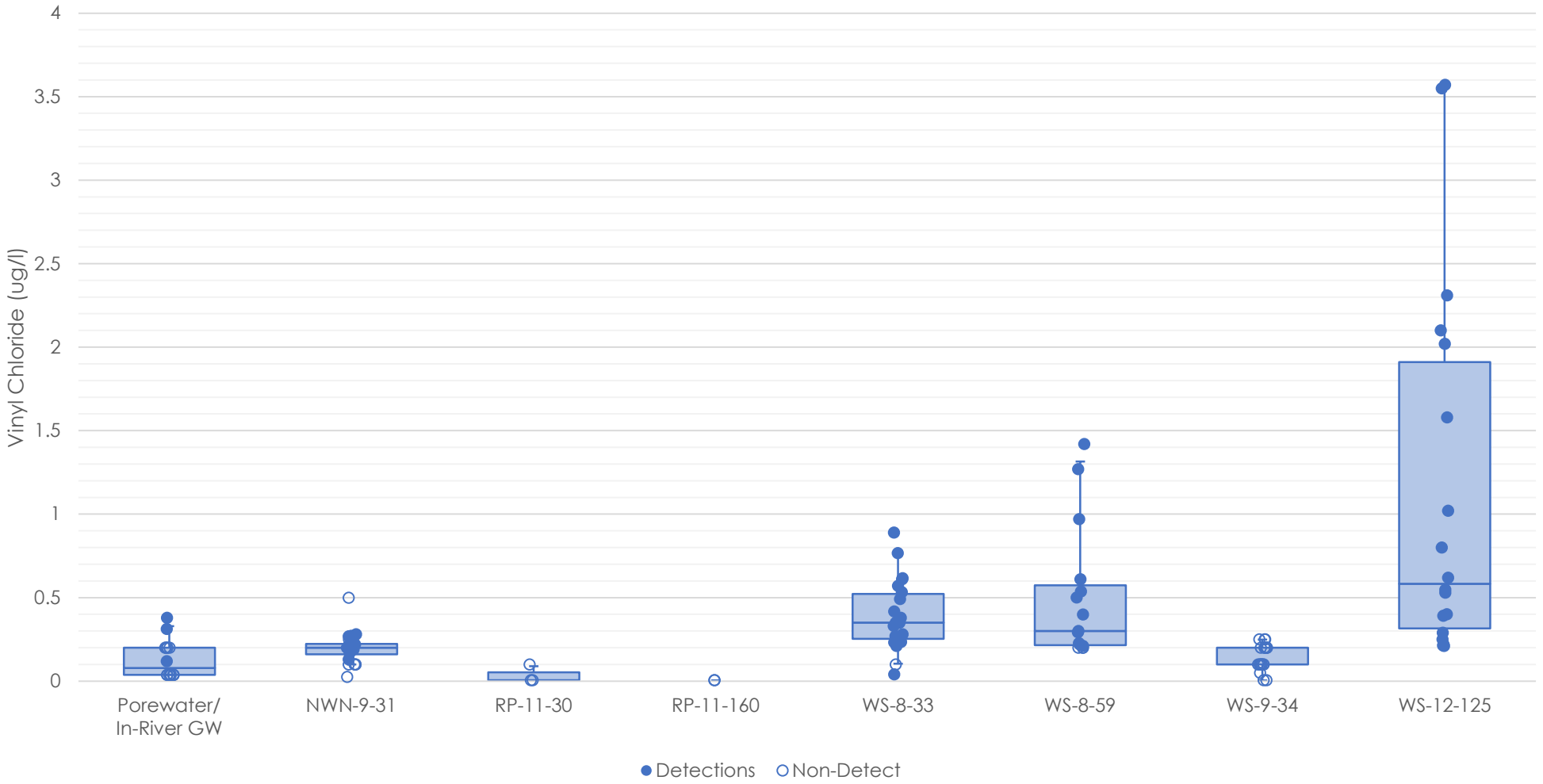
Figure 2
Porewater and In-River Groundwater vs Riverbank Groundwater Concentrations
Portland, OR



Notes
Non-detect values are shown at one-half the reporting limit.
The outlier results of 8.42 ug/l and 11.5 ug/l from the samples collected at WS-8-33 on October 31, 2016, are not shown.
Porewater/In-River GW includes the porewater and in-river groundwater samples from GRD-05, GRD-06, GRD-11, GRD-12, PD-GW-201 through PD-GW-208, PD-GW-210, PD-GW-211, and PDI-045PW.
GW = groundwater.
ug/l = micrograms per liter.

Tables

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Table 1
Summary of In-River Pore Water and Groundwater Analytical Results
Comments in Response to Revised Gasco OU Segment 3
Portland, Oregon

			Analyte:	Trichloroethene (ug/L)	cis-1,2-Dichloroethene (ug/L)	Vinyl chloride (ug/L)
Portland Harbor ROD, Groundwater CUL:[1]				0.6	70	0.022
Location:	Collection Date:	Collection Depth (ft bgs):	Sample Type:			
GRD-05	5/17/2018	0.49-1.0	N	0.4 U	0.4 U	0.4 U
GRD-06	5/16/2018	0.49-1.0	N	0.4 U	0.4 U	0.4 U
GRD-11	5/16/2018	0.49-1.0	N	0.4 U	0.4 U	0.4 U
	5/16/2018	0.49-1.0	FD	0.4 U	0.4 U	0.4 U
GRD-12	5/15/2018	0.49-1.0	N	0.4 U	0.4 U	0.4 U
PD-GW-201	8/10/2023	4.0-6.0	N	0.1 U	0.2 J	0.38 J
PD-GW-202	8/7/2023	4.0-6.0	N	0.1 UJ	0.067 UJ	0.12 J
PD-GW-203	8/7/2023	4.0-6.0	N	0.1 UJ	0.08 J	0.075 UJ
PD-GW-204	8/10/2023	4.0-6.0	N	0.1 U	0.08 J	0.075 U
PD-GW-205	8/8/2023	4.0-6.0	N	0.1 U	0.067 U	0.075 U
PD-GW-206	8/8/2023	4.0-6.0	N	0.1 U	0.067 U	0.075 U
PD-GW-207	8/4/2023	4.0-6.0	N	0.1 U	0.067 U	0.075 U
PD-GW-208	8/4/2023	4.0-6.0	N	0.1 U	0.067 U	0.075 U
PD-GW-210	8/3/2023	4.0-6.0	N	0.1 U	0.11 J	0.075 U
PD-GW-211	8/9/2023	4.0-6.0	N	0.1 U	0.067 U	0.075 U
PDI-045PW	10/29/2019	4.0-6.0	N	0.2 U	0.339 J	0.313

Notes

CUL = cleanup level.

FD = field duplicate sample.

ft bml = feet below mudline.

J = result is estimated.

N = normal environmental sample.

ROD = record of decision.

ug/L = micrograms per liter.

U = result is non-detect at the detection or reporting limit.

UJ = result is non-detect with an estimated detection limit or reporting limit.

Reference

[1]EPA. 2025. Madi Novak, Remedial Project Manager, Remedial Cleanup Branch, U.S. Environmental Protection Agency Region 10. *Errata #4 for Portland Harbor Superfund Site Record of Decision, Table 17*. Memorandum to Portland Harbor site file. September 12.

Table 2
Summary of Riverbank Groundwater
Vinyl Chloride Analytical Results
Comments in Response to Revised Gasco OU Segment 3
Portland, Oregon

			Analyte:	Vinyl chloride (ug/L)
			Portland Harbor ROD, Groundwater CUL:[1]	0.022
Location:	Collection Date:	Collection Depth (ft bgs):	Sample Type:	
RP-11-30	09/13/2017	15-30	N	0.2 U
	09/13/2017	15-30	N	0.01 U
	05/23/2019	15-30	N	0.01 U
NWN-9-31	03/18/2016	16-31	N	0.5 U
	10/31/2016	16-31	N	0.28 J
	10/31/2016	16-31	N	0.21
	04/18/2017	16-31	N	1 U
	04/18/2017	16-31	N	0.05 U
	10/19/2017	16-31	N	0.4 U
	04/10/2018	16-31	N	0.4 U
	09/24/2018	16-31	N	0.268 J
	09/24/2018	16-31	FD	0.271 J
	02/18/2019	16-31	N	0.4 U
	10/01/2019	16-31	N	0.22 J
	03/12/2020	16-31	N	0.4 U
	11/11/2020	16-31	N	0.23 J
	03/24/2021	16-31	N	0.2 U
	09/14/2021	16-31	N	0.2 U
	03/16/2022	16-31	N	0.2 U
	09/14/2022	16-31	N	0.4 U
	03/21/2023	16-31	N	0.4 U
	03/21/2023	16-31	FD	0.4 U
	09/19/2023	16-31	N	0.21
	03/14/2024	16-31	N	0.2 U
	09/17/2024	16-31	N	0.17 J
	09/17/2024	16-31	FD	0.19 J
	03/19/2025	16-31	N	0.13 J
RP-11-160	09/13/2017	150-160	N	0.01 U
	03/20/2018	150-160	N	0.01 U
WS-12-125	03/03/2016	109-124	N	1.58
	10/17/2016	109-124	N	2.1
	10/17/2016	109-124	N	2.31
	04/07/2017	109-124	N	3.57
	04/07/2017	109-124	N	3.55
	09/20/2017	109-124	N	2.02
	03/21/2018	109-124	N	0.619
	10/10/2018	109-124	N	0.8
	03/18/2019	109-124	N	0.53
	09/25/2019	109-124	N	1.02
	03/16/2020	109-124	N	0.548
	10/21/2020	109-124	N	0.392 J
	03/24/2021	109-124	N	0.213 J
	09/14/2021	109-124	N	0.21 J

Table 2
Summary of Riverbank Groundwater
Vinyl Chloride Analytical Results
Comments in Response to Revised Gasco OU Segment 3
Portland, Oregon

			Analyte:	Vinyl chloride (ug/L)
			Portland Harbor ROD, Groundwater CUL:[1]	0.022
Location:	Collection Date:	Collection Depth (ft bgs):	Sample Type:	
WS-12-125 (continued)	03/14/2022	109-124	N	0.25 J
	03/14/2022	109-124	FD	0.22 J
	09/12/2022	109-124	N	0.29 J
	03/20/2023	109-124	N	0.4 J
WS-8-33	03/16/2016	23-33	N	0.33 J
	10/27/2016	22.5-32.5	N	0.61
	10/27/2016	23-33	N	0.417
	04/18/2017	22.5-32.5	N	0.5 U
	04/18/2017	23-33	N	0.0399
	10/19/2017	22.5-32.5	N	0.532
	04/09/2018	22.5-32.5	N	0.616
	09/20/2018	22.5-32.5	N	0.232 J
	02/14/2019	22.5-32.5	N	0.767
	10/01/2019	22.5-32.5	N	0.89
	03/12/2020	22.5-32.5	N	0.27 J
	03/12/2020	22.5-32.5	FD	0.235 J
	10/21/2020	23-33	N	0.491
	03/24/2021	22.5-32.5	N	0.2 U
	09/14/2021	22.5-32.5	N	0.28 J
	03/16/2022	22.5-32.5	N	0.38 J
	09/14/2022	22.5-32.5	N	0.26 J
	03/20/2023	22.5-32.5	N	0.57
	09/19/2023	22.5-32.5	N	0.35
	03/14/2024	22.5-32.5	N	0.21
	09/17/2024	22.5-32.5	N	0.35
	03/18/2025	22.5-32.5	N	0.35
WS-8-59	03/16/2016	49-59	N	0.61
	10/31/2016	48.5-58.5	N	11.5
	10/31/2016	49-59	N	8.42
	04/18/2017	48.5-58.5	N	1.27
	04/18/2017	49-59	N	0.97
	10/10/2017	48.5-58.5	N	0.538
	04/09/2018	48.5-58.5	N	1.42
	09/20/2018	48.5-58.5	N	0.501
	02/18/2019	48.5-58.5	N	0.4 U
	10/01/2019	48.5-58.5	N	0.399 J
	03/12/2020	48.5-58.5	N	0.293 J
	10/21/2020	48.5-58.5	N	0.4 U
	03/24/2021	48.5-58.5	N	0.227 J
	09/15/2021	48.5-58.5	N	0.3 J
	03/16/2022	48.5-58.5	N	0.21 J
	09/13/2022	48.5-58.5	N	0.22 J
	03/20/2023	48.5-58.5	N	0.4 U
WS-9-34	03/18/2016	24-34	N	0.5 U
	11/01/2016	23.5-33.5	N	0.5 U

Table 2
Summary of Riverbank Groundwater
Vinyl Chloride Analytical Results
Comments in Response to Revised Gasco OU Segment 3
Portland, Oregon

			Analyte:	Vinyl chloride (ug/L)
			Portland Harbor ROD, Groundwater CUL:[1]	0.022
Location:	Collection Date:	Collection Depth (ft bgs):	Sample Type:	
WS-9-34 (continued)	11/01/2016	24-34	N	0.01 U
	04/19/2017	23.5-33.5	N	0.5 U
	04/19/2017	24-34	N	0.01 U
	10/19/2017	23.5-33.5	N	0.4 U
	04/10/2018	23.5-33.5	N	0.4 U
	09/24/2018	23.5-33.5	N	0.2 U
	02/18/2019	23.5-33.5	N	0.4 U
	10/01/2019	23.5-33.5	N	0.2 U
	03/19/2020	23.5-33.5	N	0.4 U
	10/22/2020	23.5-33.5	N	0.4 U
	03/26/2021	23.5-33.5	N	0.2 U
	09/15/2021	23.5-33.5	N	0.2 U
	03/17/2022	23.5-33.5	N	0.2 U
	09/14/2022	23.5-33.5	N	0.4 U
	03/21/2023	23.5-33.5	N	0.4 U
	09/20/2023	23.5-33.5	N	0.1 U
	03/14/2024	23.5-33.5	N	0.2 U
	09/17/2024	23.5-33.5	N	0.2 U
	03/19/2025	23.5-33.5	N	0.2 U

Notes

CUL = cleanup level.

FD = field duplicate sample.

ft bgs = feet below ground surface.

J = result is estimated.

N = normal environmental sample.

ROD = record of decision.

ug/L = micrograms per liter.

U = result is non-detect at the detection or reporting limit.

Reference

[1]EPA. 2025. Madi Novak, Remedial Project Manager, Remedial Cleanup Branch, U.S. Environmental Protection Agency Region 10. *Errata #4 for Portland Harbor Superfund Site Record of Decision, Table 17*. Memorandum to Portland Harbor site file. September 12.

Attachment A

Riverbank and Source Area Vinyl Chloride Trends

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Table A-1
Source Area Vinyl Chloride Trend Summary
Siltronic Corporation

Well	Number of Samples	Frequency of Detection	Akritas-Theil-Sen Trend	p-Value	Kendall Statistic	Qualitative Trend	Notes
WS-13-69	33	100%	Decreasing	1.36E-07	-0.646	Decreasing	--
WS-13-105	25	100%	Increasing	0.000264	0.523	Increasing	Low VC Concentrations
WS-15-85	18	100%	Decreasing	0.00352	-0.51	Decreasing	MGP DNAPL Entry
WS-15-140	6	83%	Insufficient Data	--	--	Stable	MGP DNAPL Entry; Low VC Concentrations
WS-18-71	9	67%	Decreasing	0.0102	-0.694	Decreasing	Low VC Concentrations
WS-18-101	19	100%	Decreasing	0.0000197	-0.719	Decreasing	--
WS-19-71	8	88%	No Significant Trend	0.386	-0.286	Stable	Low VC Concentrations
WS-19-101	8	25%	No Significant Trend	0.124	-0.321	Decreasing	Low VC Concentrations
WS-30-96	22	86%	Decreasing	0.0233	-0.351	Decreasing	--
WS-31-106	8	100%	No Significant Trend	0.902	-0.0714	Stable	MGP DNAPL Entry
WS-32-76	25	68%	Decreasing	0.00709	-0.38	Decreasing	--
WS-32-106	9	22%	No Significant Trend	0.484	-0.139	Stable	Low VC Concentrations
WS-33-81	22	100%	No Significant Trend	0.352	-0.147	Stable	MGP DNAPL Entry
WS-33-106	10	60%	Increasing	0.00483	0.689	Increasing	Low VC Concentrations
WS-34-71	19	84%	No Significant Trend	0.309	-0.175	Decreasing since 2021	--
WS-34-106	8	0%	Insufficient Data	--	--	Stable	All Non-Detect
WS-35-76	11	91%	No Significant Trend	0.693	-0.109	Stable	Low VC Concentrations
WS-35-106	22	95%	No Significant Trend	0.215	-0.195	Stable	Low VC Concentrations
WS-36-81	11	64%	Decreasing	0.000894	-0.764	Decreasing	Low VC Concentrations
WS-36-106	11	9%	No Significant Trend	0.134	-0.182	Stable	Low VC Concentrations
WS-37-51	24	88%	Decreasing	0.000101	-0.569	Decreasing	--
WS-38-61	11	45%	No Significant Trend	0.0821	-0.382	Decreasing	Low VC Concentrations
WS-39-101	19	100%	No Significant Trend	0.421	-0.14	Uncertain	MGP DNAPL Entry
WS-40-36	20	90%	Decreasing	0.00095	-0.537	Decreasing	--
WS-41-36	25	96%	No Significant Trend	0.102	-0.237	Decreasing	--
WS-41-91	25	100%	No Significant Trend	0.123	-0.223	Decreasing	--
WS-42-36	27	74%	No Significant Trend	0.298	-0.142	Uncertain	--
WS-43-36	32	100%	Decreasing	0.0164	-0.3	Decreasing	MGP DNAPL Entry

Table A-1
Source Area Vinyl Chloride Trend Summary
Siltronic Corporation

Well	Number of Samples	Frequency of Detection	Akritas-Theil-Sen Trend	p-Value	Kendall Statistic	Qualitative Trend	Notes
WS-13-69	33	100%	Decreasing	1.36E-07	-0.646	Decreasing	--
WS-13-105	25	100%	Increasing	0.000264	0.523	Increasing	Low VC Concentrations
WS-15-85	18	100%	Decreasing	0.00352	-0.51	Decreasing	MGP DNAPL Entry

Notes

Akritas-Thiel-Sen nonparametric trend evaluations were conducted on log-transformed concentration results from samples collected after 2016 with non-detect results equal to the full reporting limit and an alpha of 0.05.

DNAPL = dense non-aqueous-phase liquid.

Insufficient Data = less than 8 samples or no detected results.

MGP = manufactured gas plant.

p-value = probability value.

VC = vinyl chloride.

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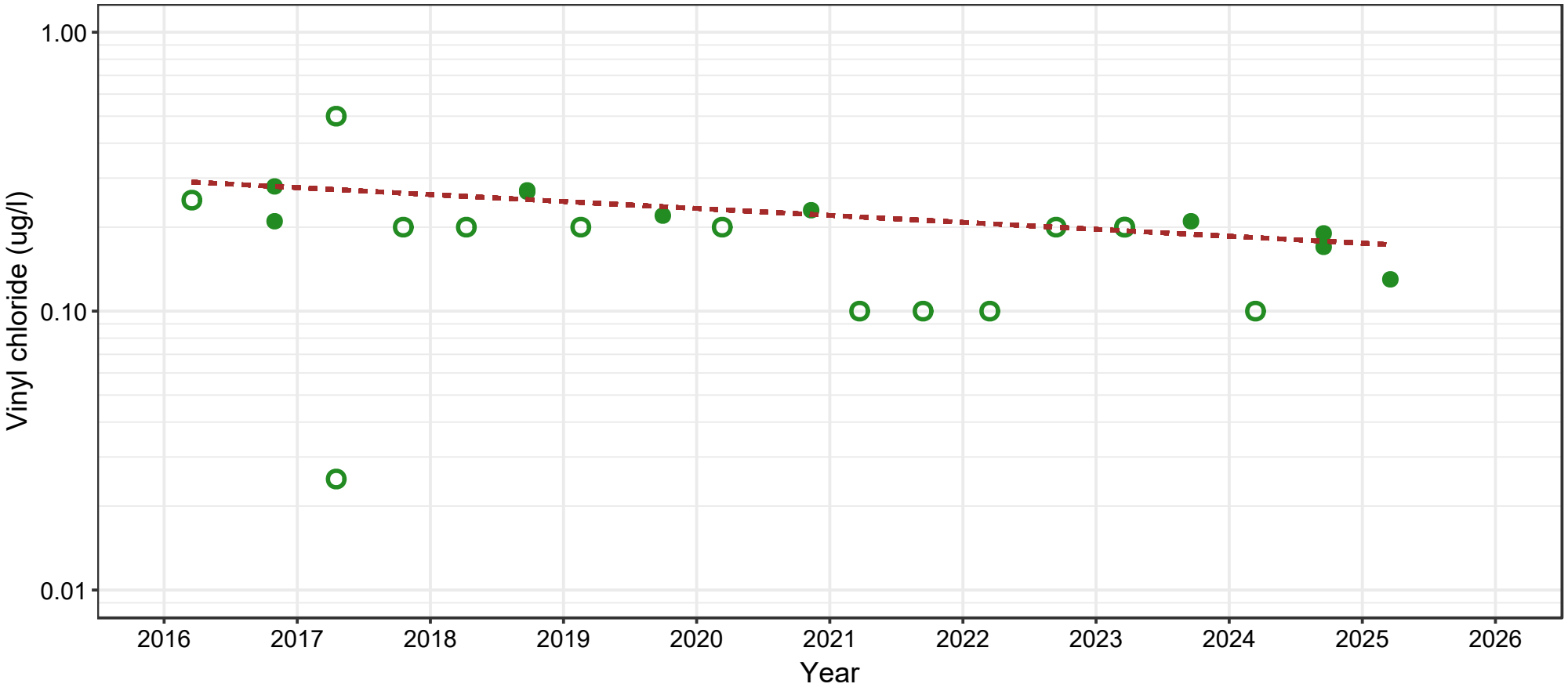
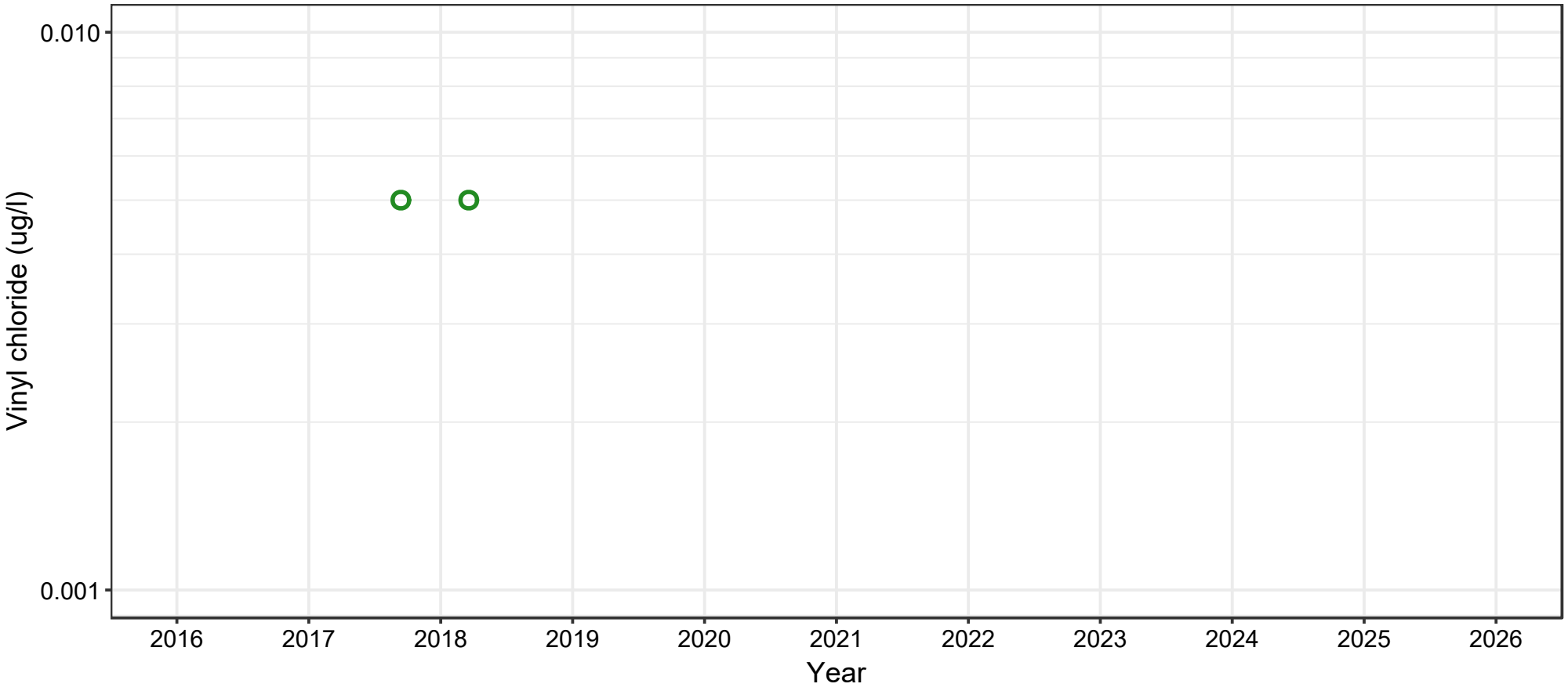
Figure A-1
Riverbank Well NWN-9-31 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
NWN-9-31	No Significant Trend	-0.0249	24	42%	0.216	-0.17

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

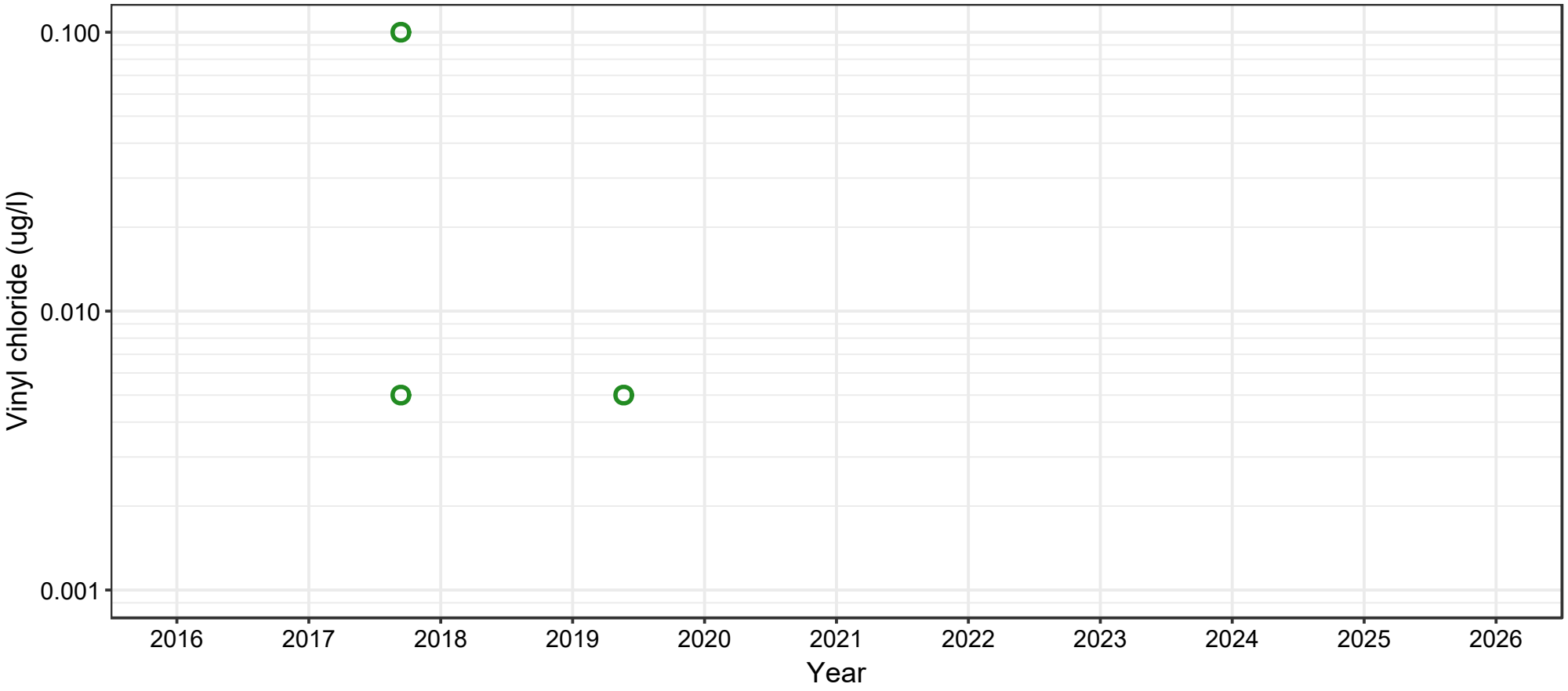
Figure A-2
Riverbank Well RP-11-160 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
RP-11-160	Insufficient Data	--	2	0%	--	--

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

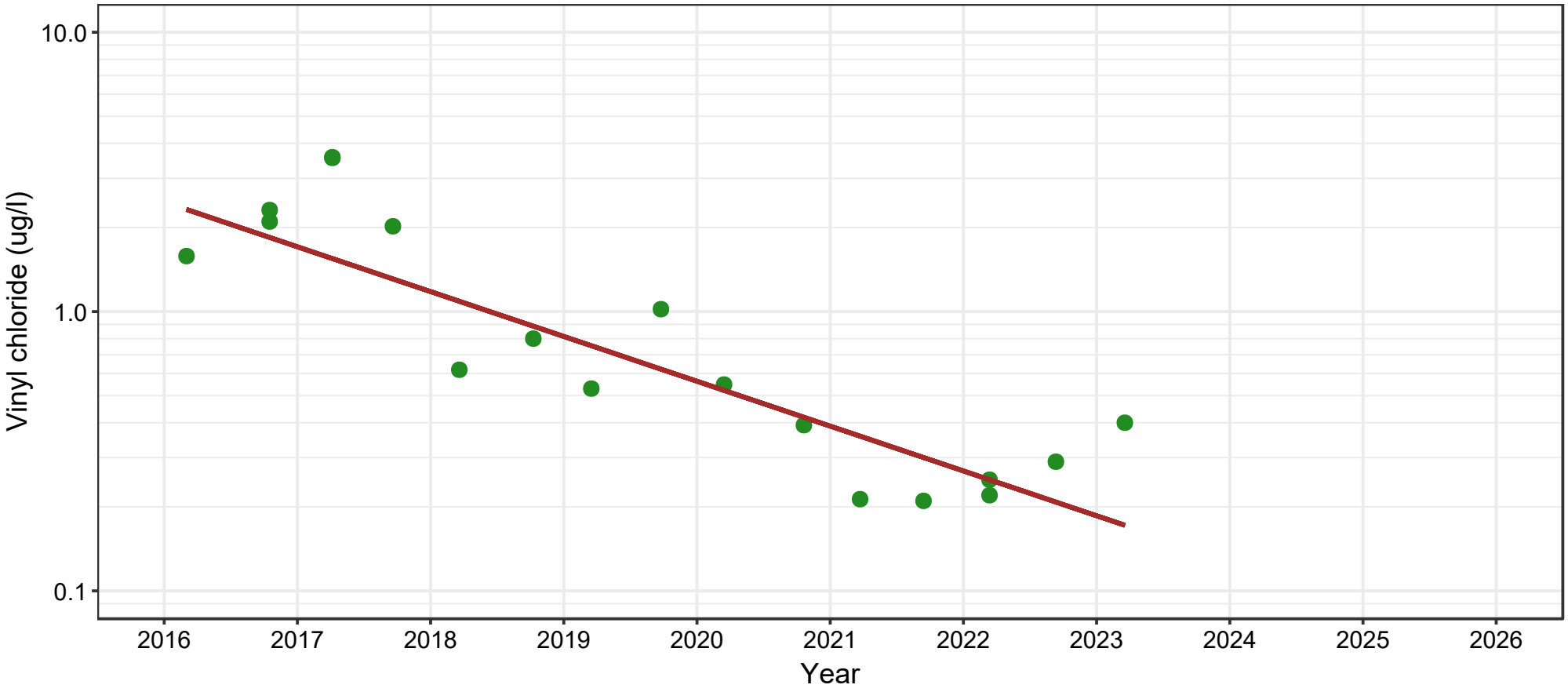
Figure A-3
Riverbank Well RP-11-30 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
RP-11-30	Insufficient Data	--	3	0%	--	--

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

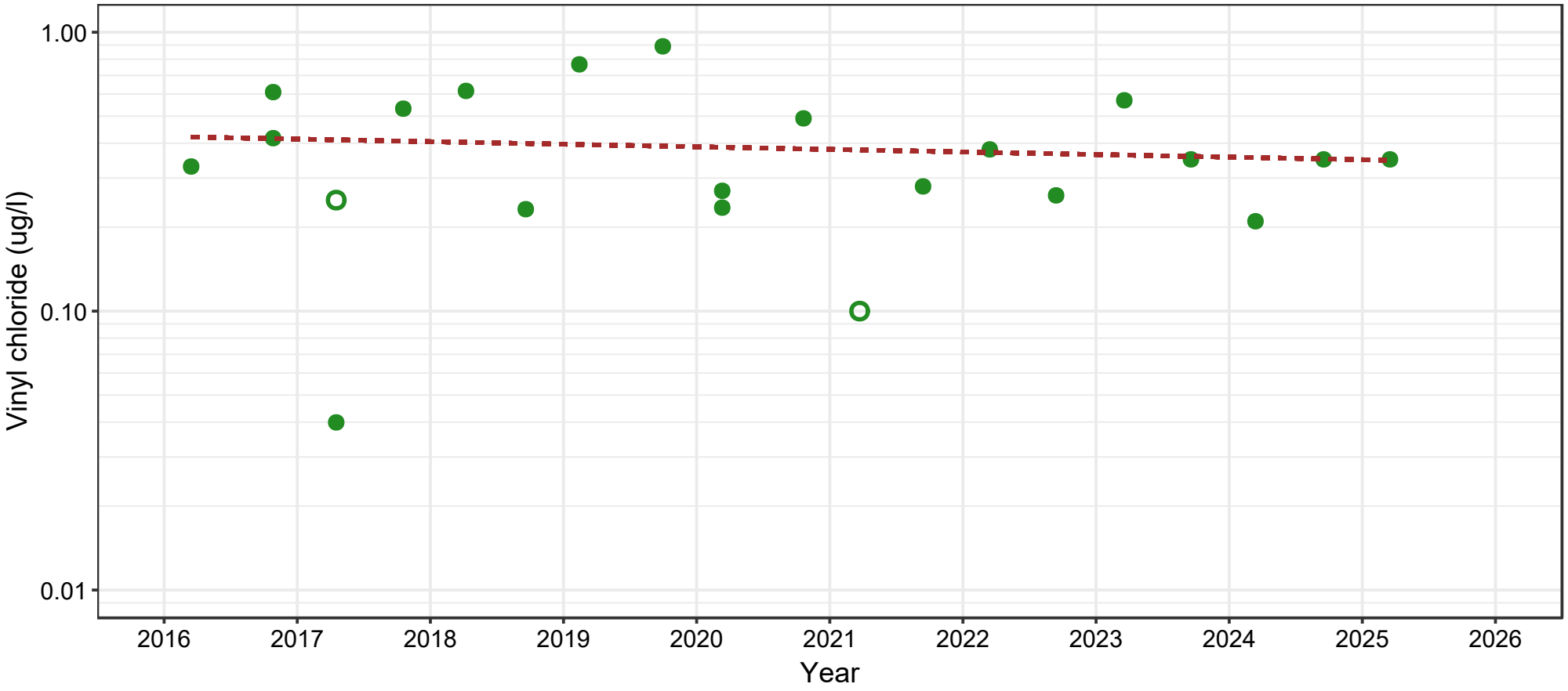
Figure A-4
Riverbank Well WS-12-125 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-12-125	Decreasing	-0.161	18	100%	0.000415	-0.614

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

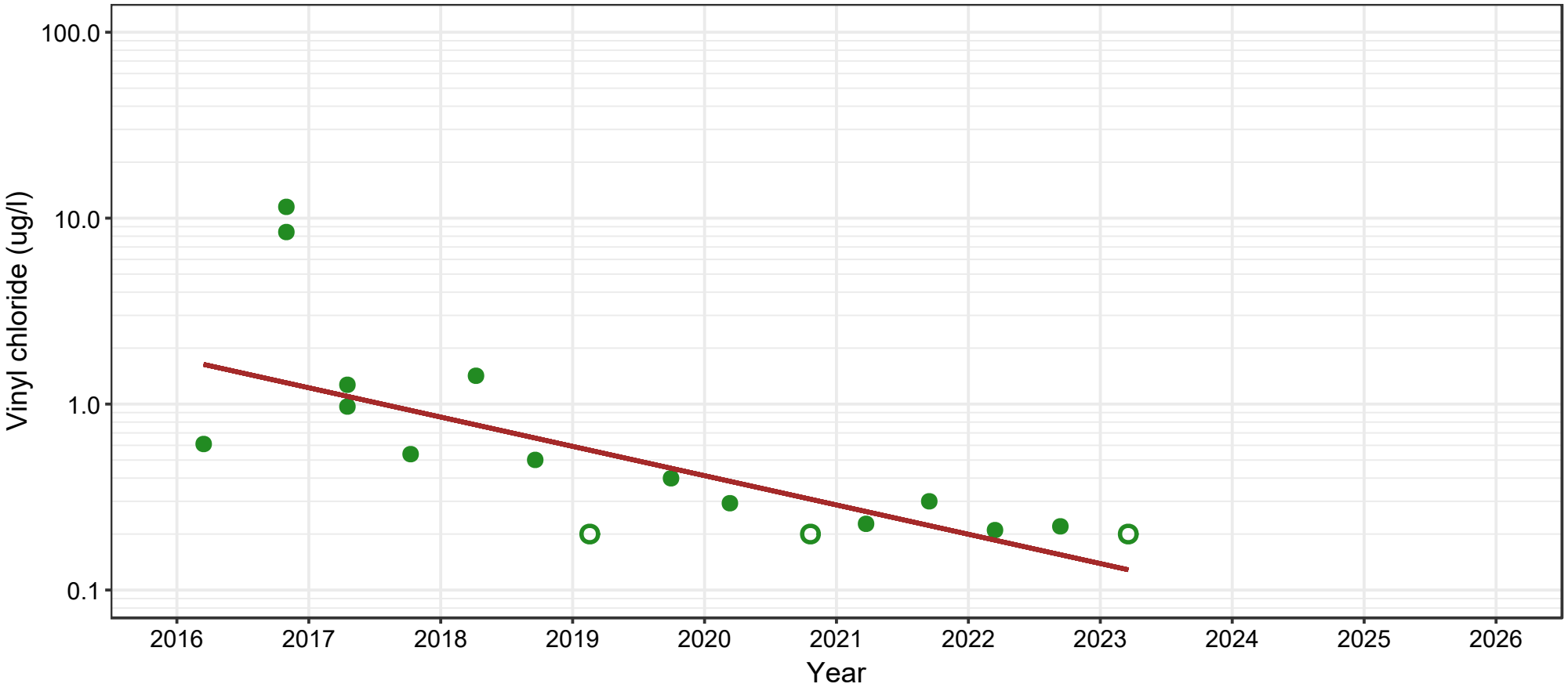
Figure A-5
Riverbank Well WS-8-33 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-8-33	No Significant Trend	-0.00924	22	91%	0.67	-0.0693

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

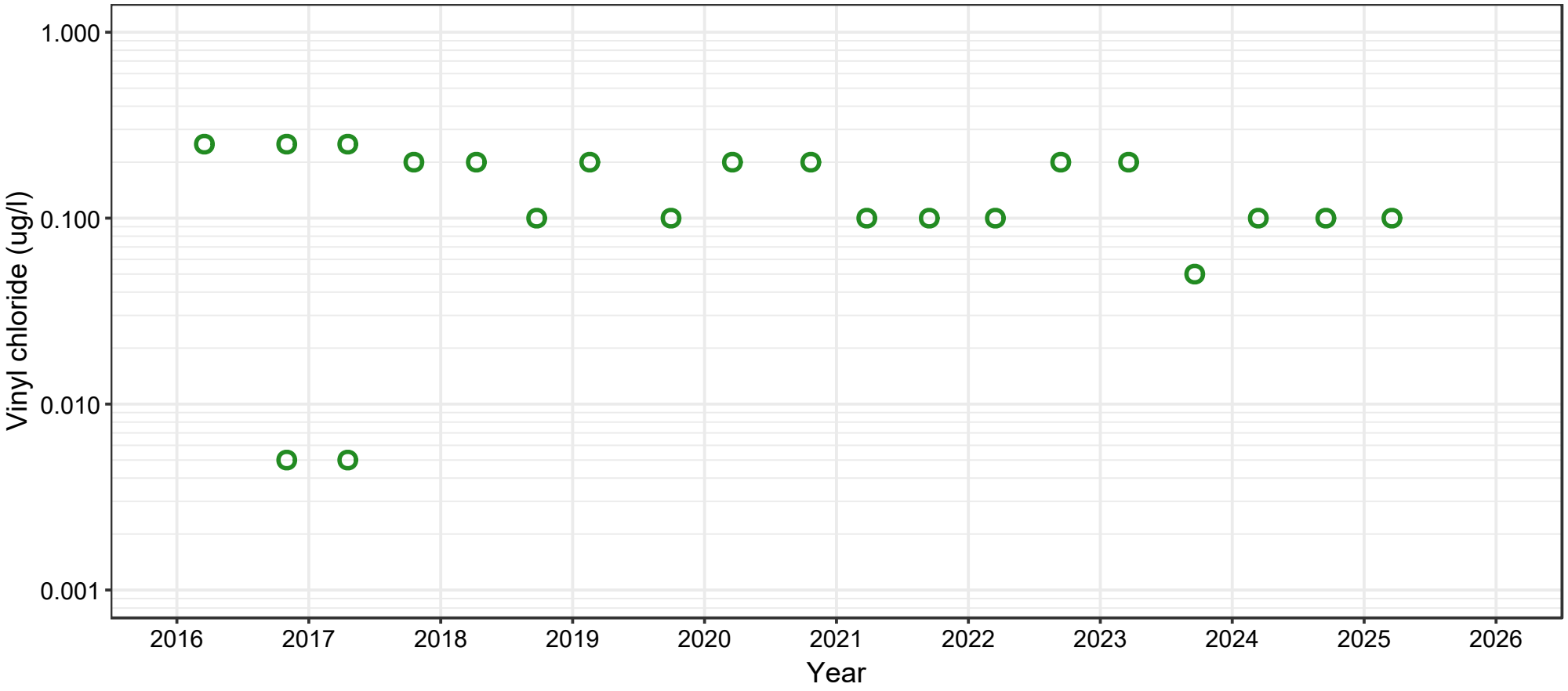
Figure A-6
Riverbank Well WS-8-59 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-8-59	Decreasing	-0.158	17	82%	0.000152	-0.669

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

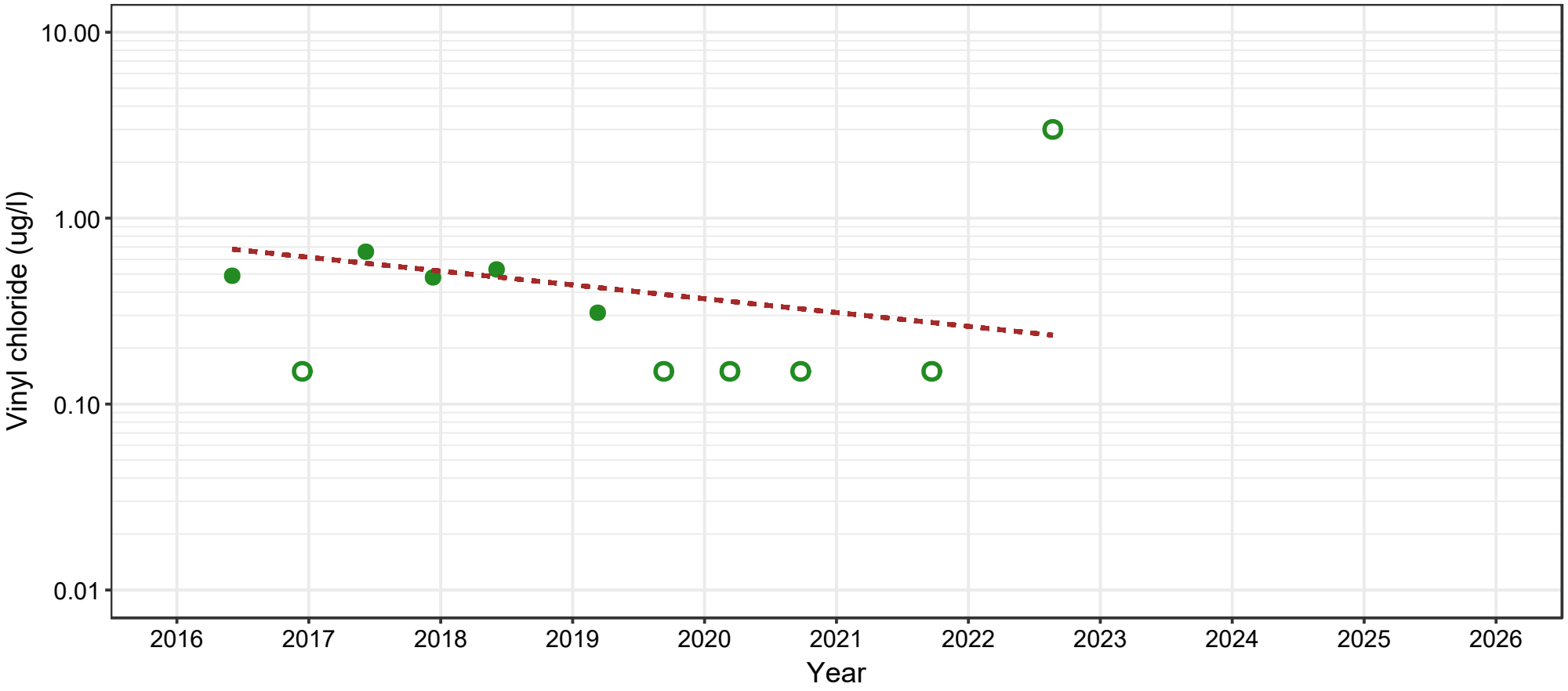
Figure A-7
Riverbank Well WS-9-34 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-9-34	Insufficient Data	--	21	0%	--	--

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

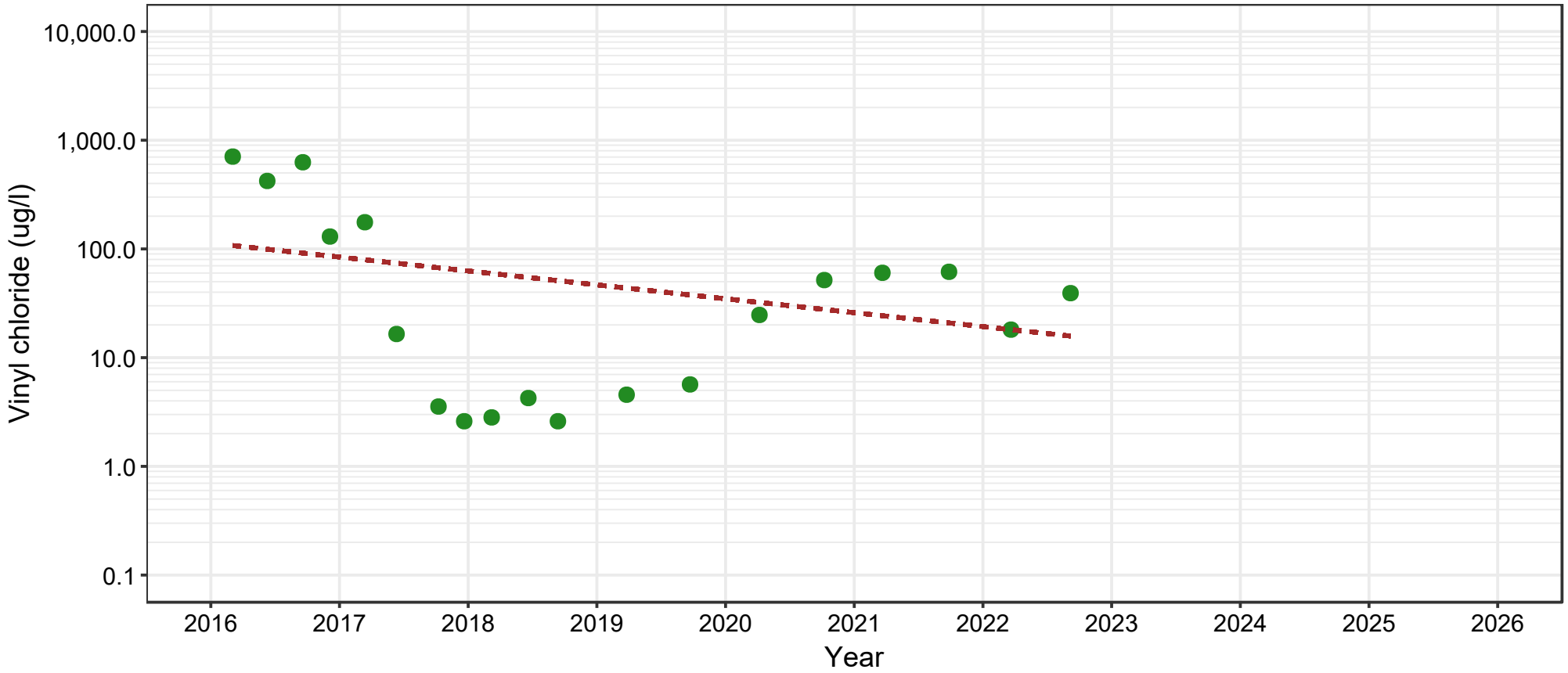
Figure A-8
Source Area Well WS-38-61 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-38-61	No Significant Trend	-0.0743	11	45%	0.0902	-0.382

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

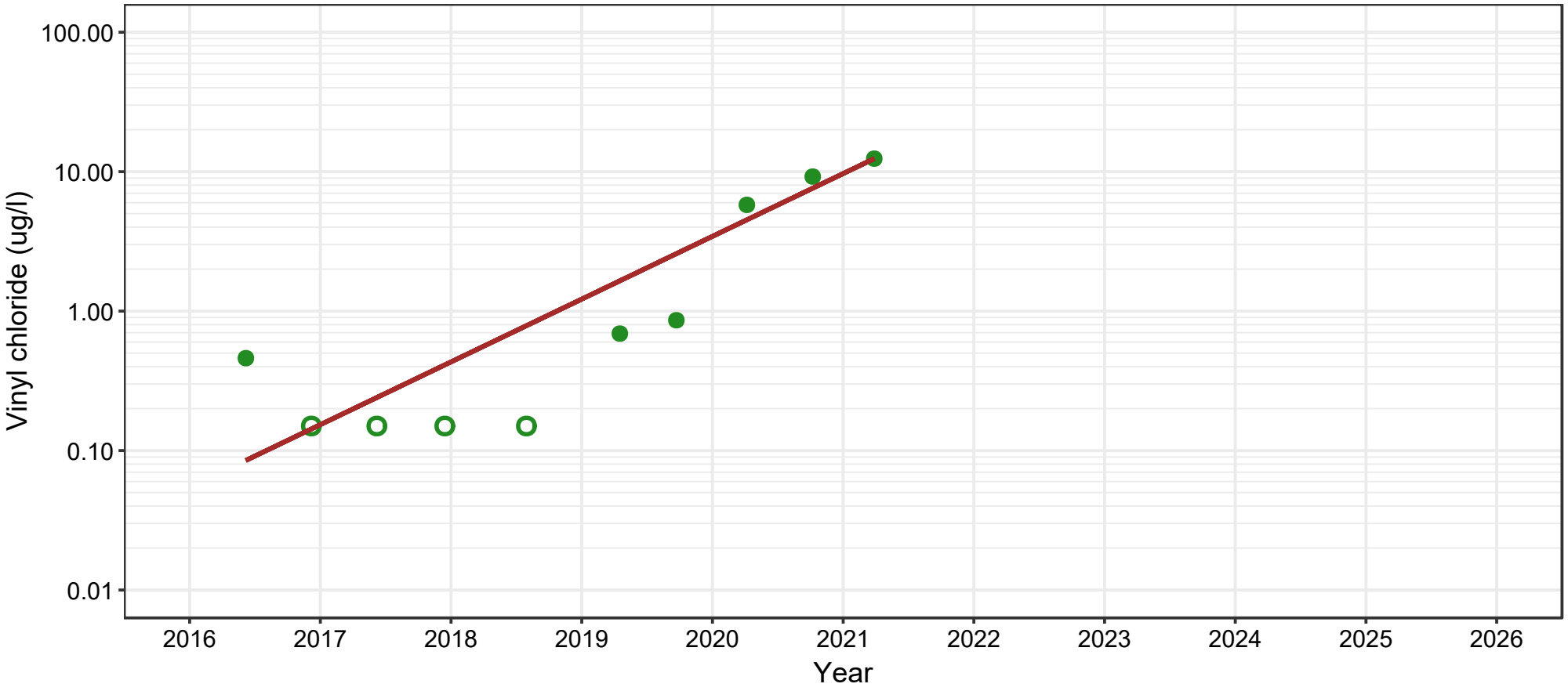
Figure A-9
Source Area Well WS-39-101 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-39-101	No Significant Trend	-0.128	19	100%	0.421	-0.14

Notes
MGP DNAPL has been observed in WS-39-101.
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an $\alpha = 0.05$ and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

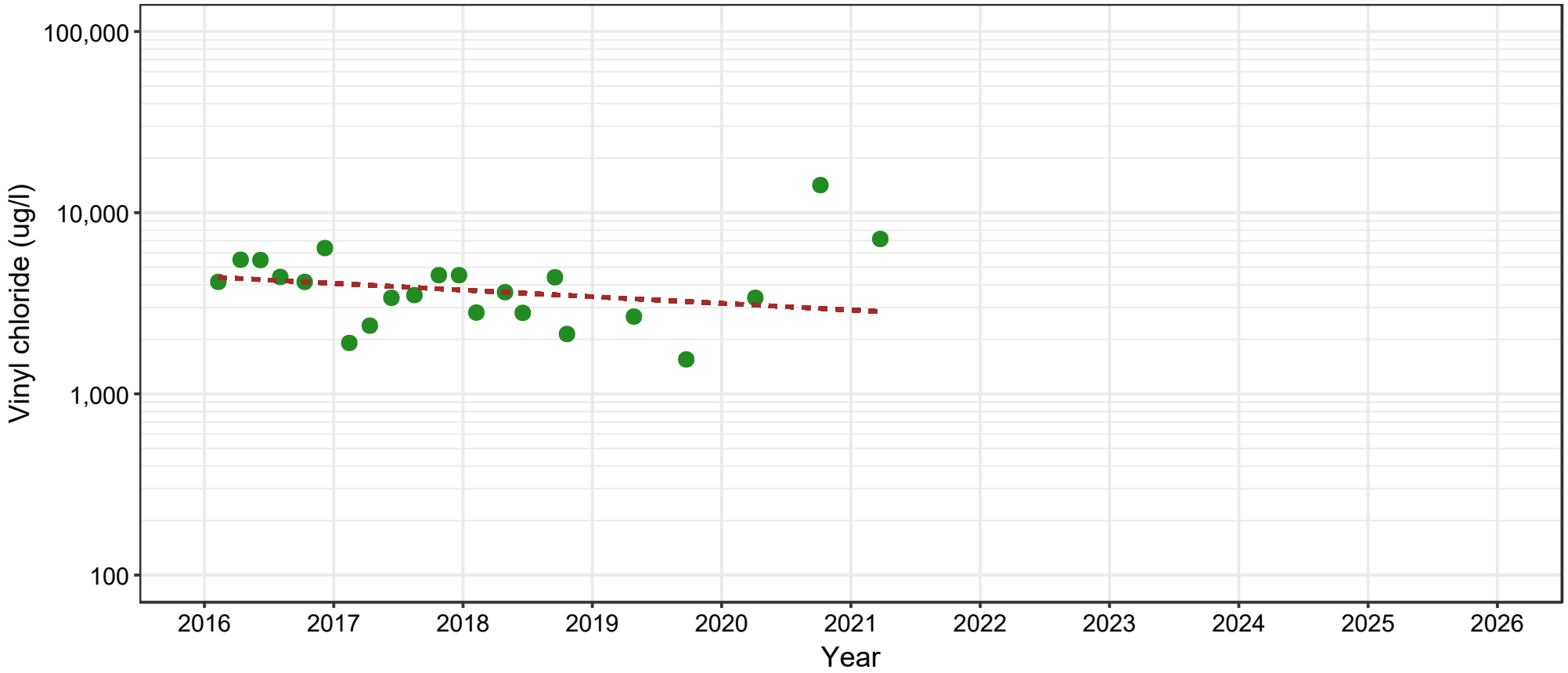
Figure A-10
Source Area Well WS-33-106 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-33-106	Increasing	0.45	10	60%	0.00561	0.689

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

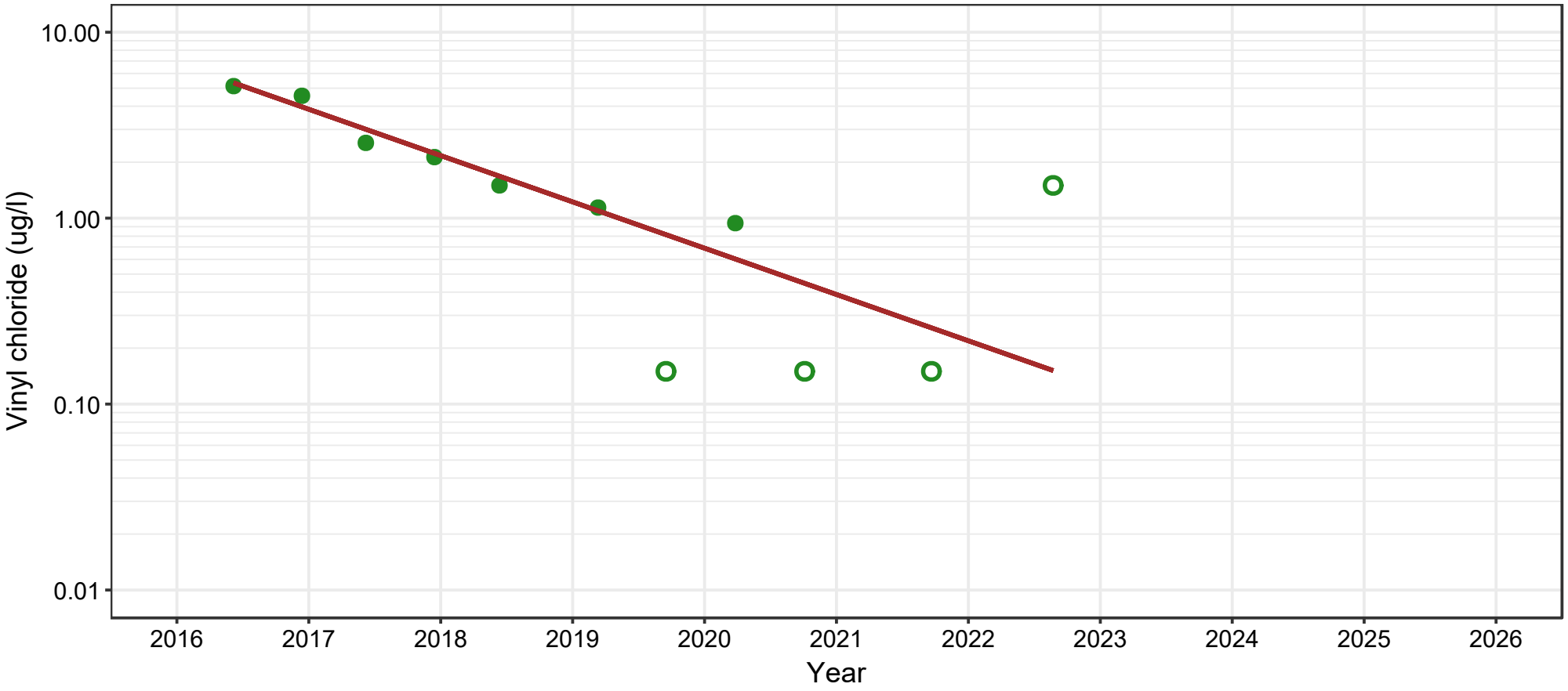
Figure A-11
Source Area Well WS-33-81 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-33-81	No Significant Trend	-0.0367	22	100%	0.352	-0.147

Notes
MGP DNAPL has been observed in WS-33-81.
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an $\alpha = 0.05$ and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

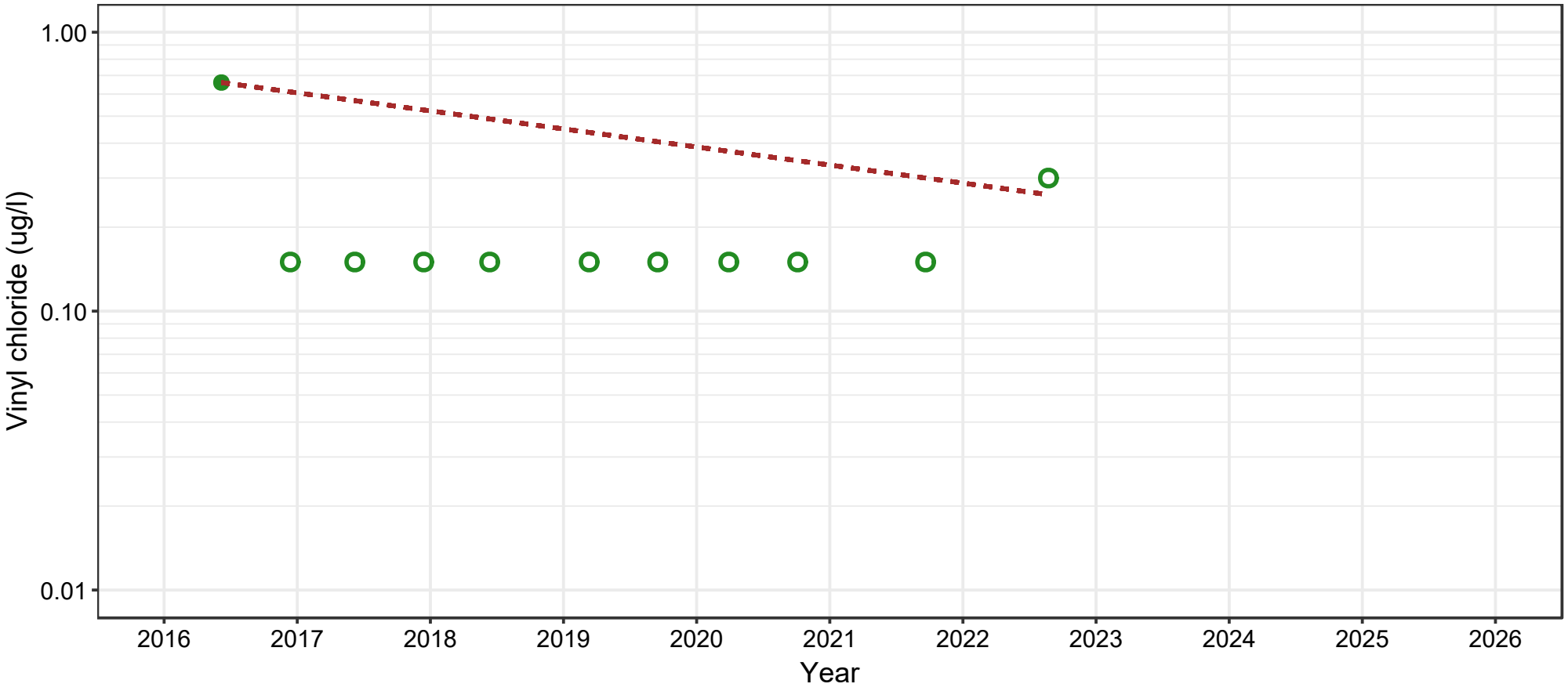
Figure A-12
Source Area Well WS-36-81 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-36-81	Decreasing	-0.249	11	64%	0.000954	-0.764

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

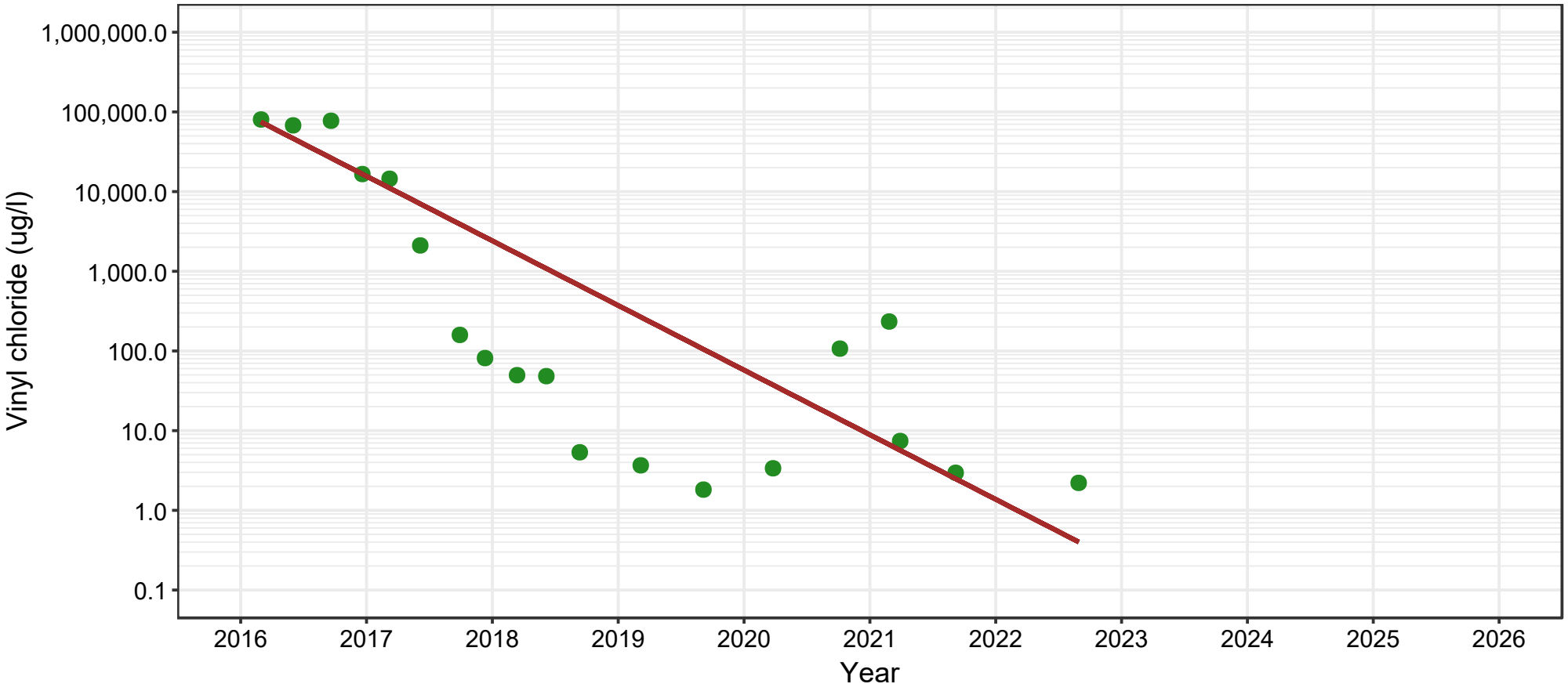
Figure A-13
Source Area Well WS-36-106 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-36-106	No Significant Trend	-0.0647	11	9%	0.252	-0.182

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

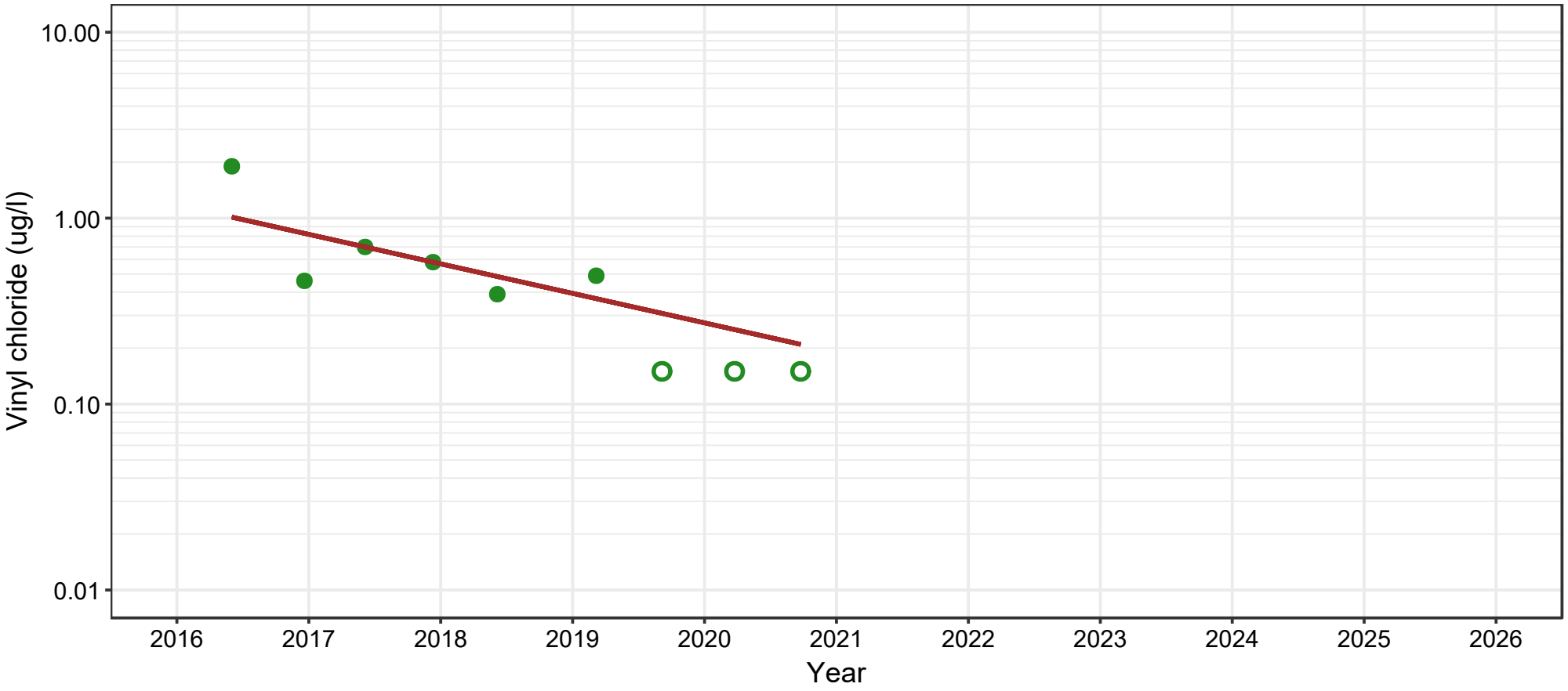
Figure A-14
Source Area Well WS-18-101 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-18-101	Decreasing	-0.811	19	100%	1.97e-05	-0.719

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

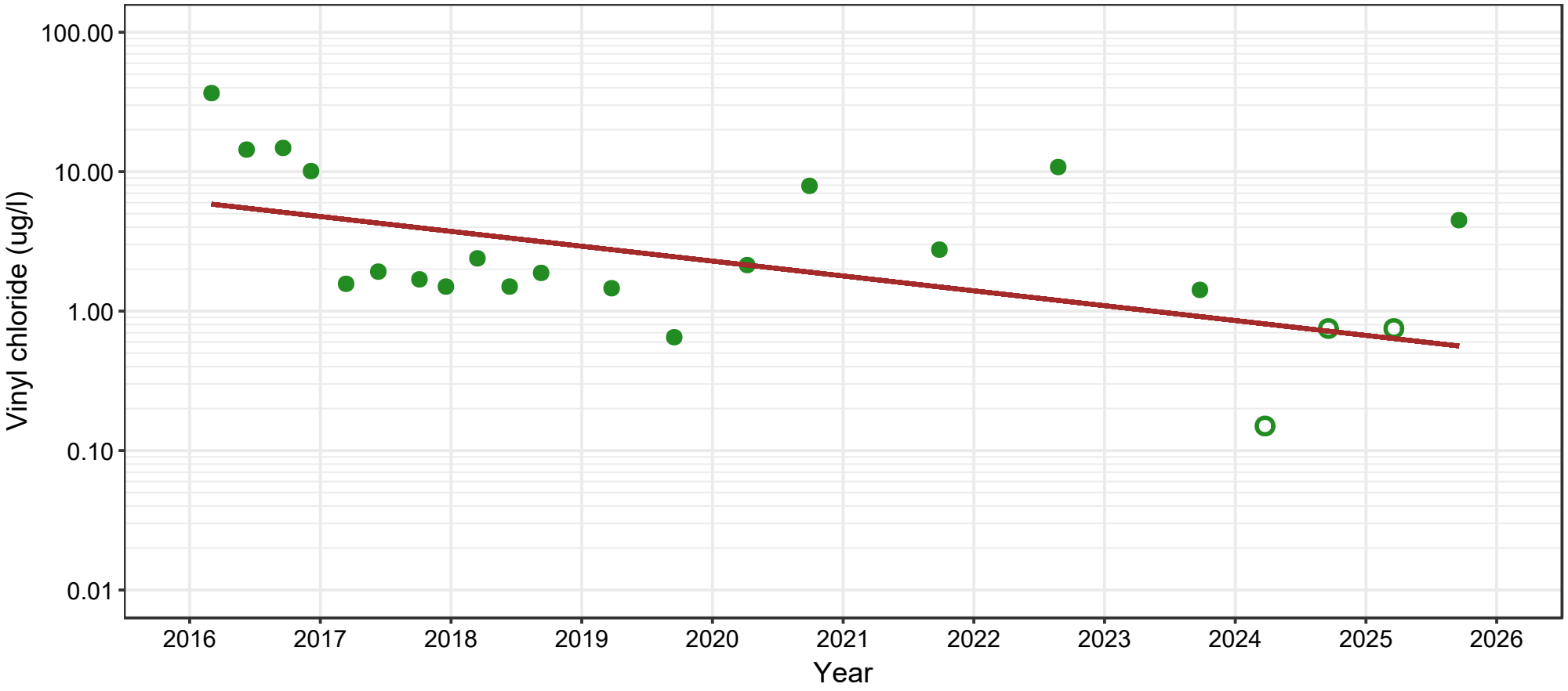
Figure A-15
Source Area Well WS-18-71 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-18-71	Decreasing	-0.159	9	67%	0.011	-0.694

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

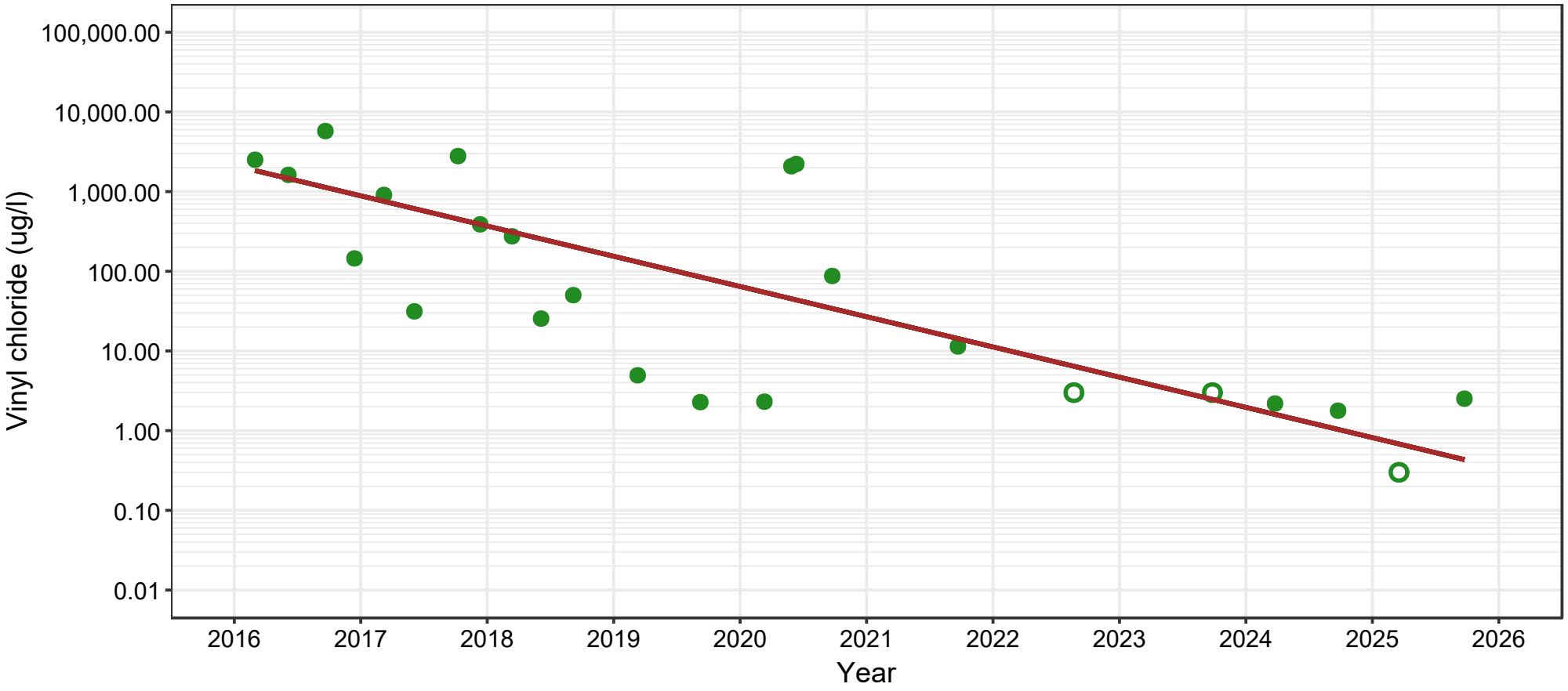
Figure A-16
Source Area Well WS-30-96 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-30-96	Decreasing	-0.107	22	86%	0.0233	-0.351

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

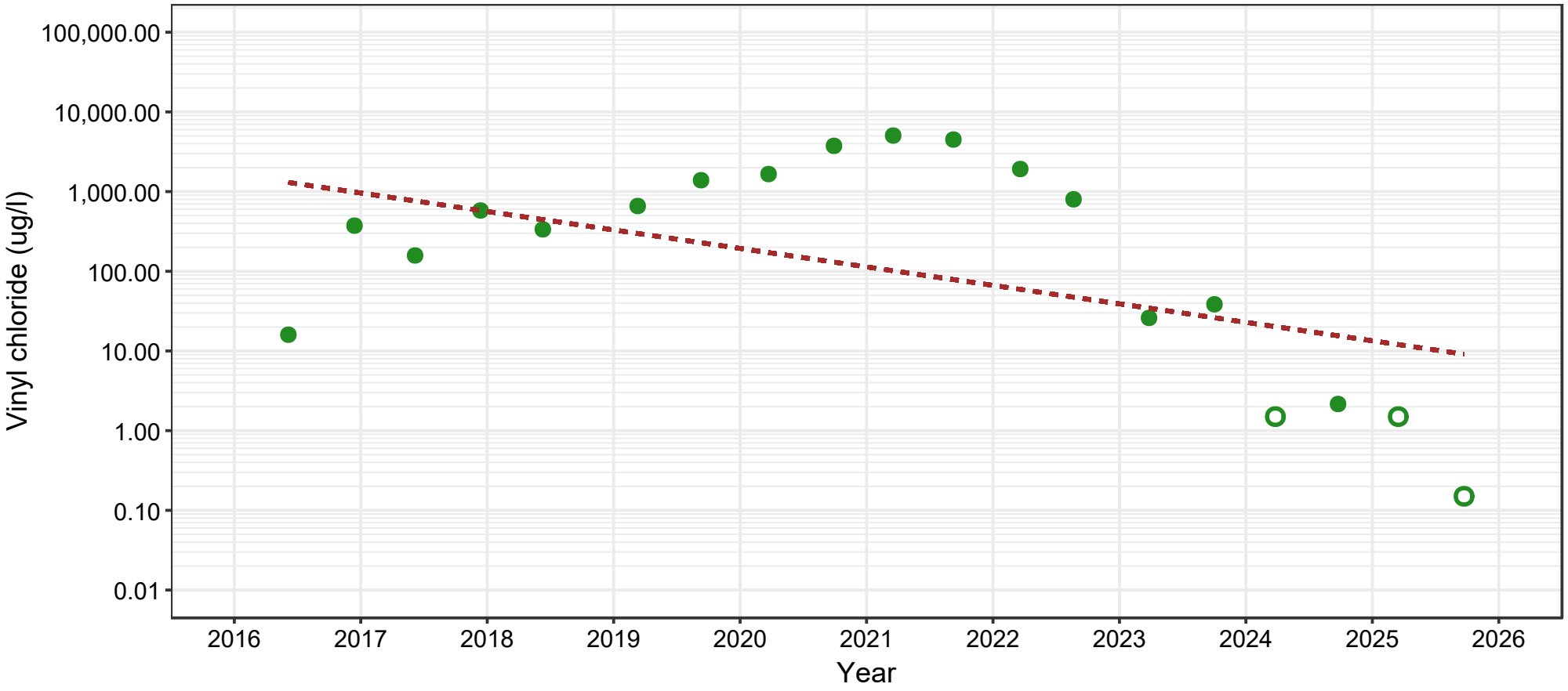
Figure A-17
Source Area Well WS-37-51 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-37-51	Decreasing	-0.379	24	88%	0.000101	-0.569

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

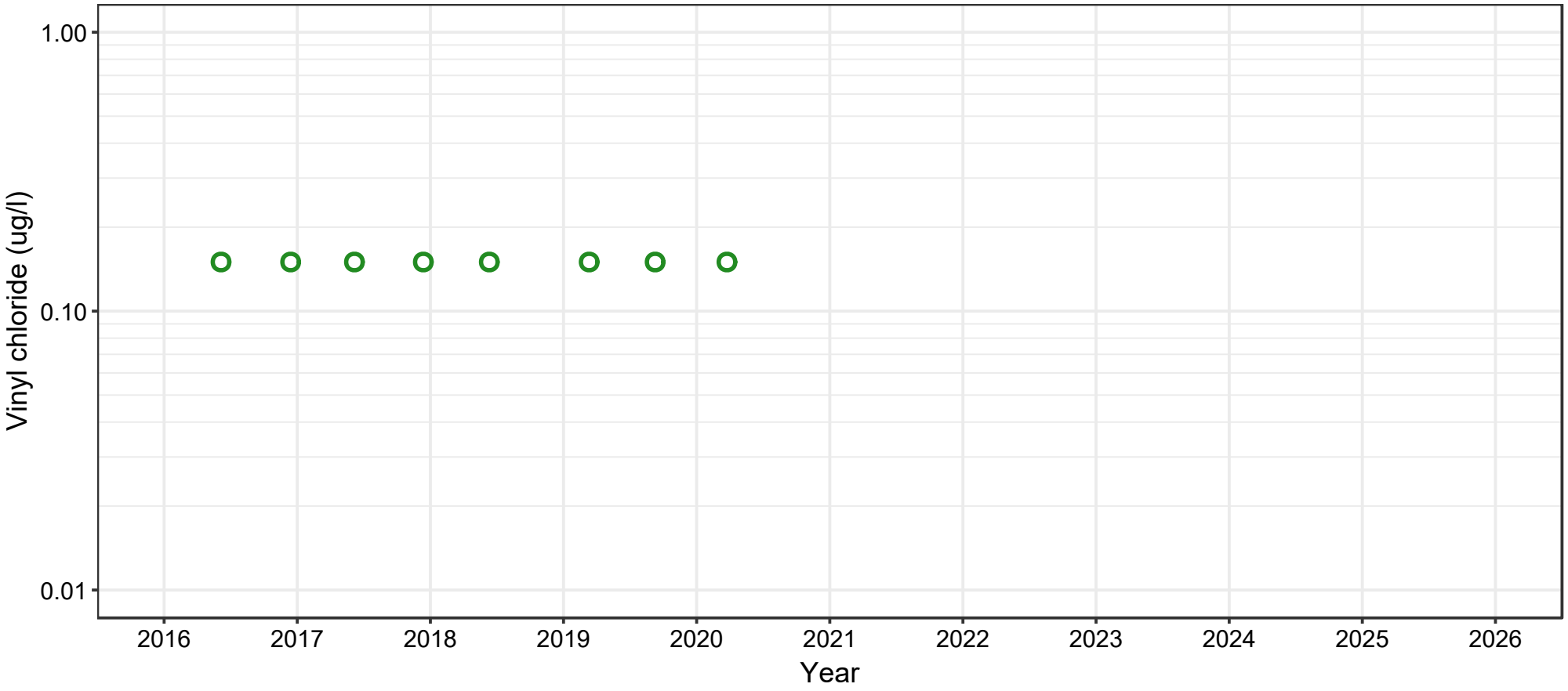
Figure A-18
Source Area Well WS-34-71 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-34-71	No Significant Trend	-0.232	19	84%	0.309	-0.175

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

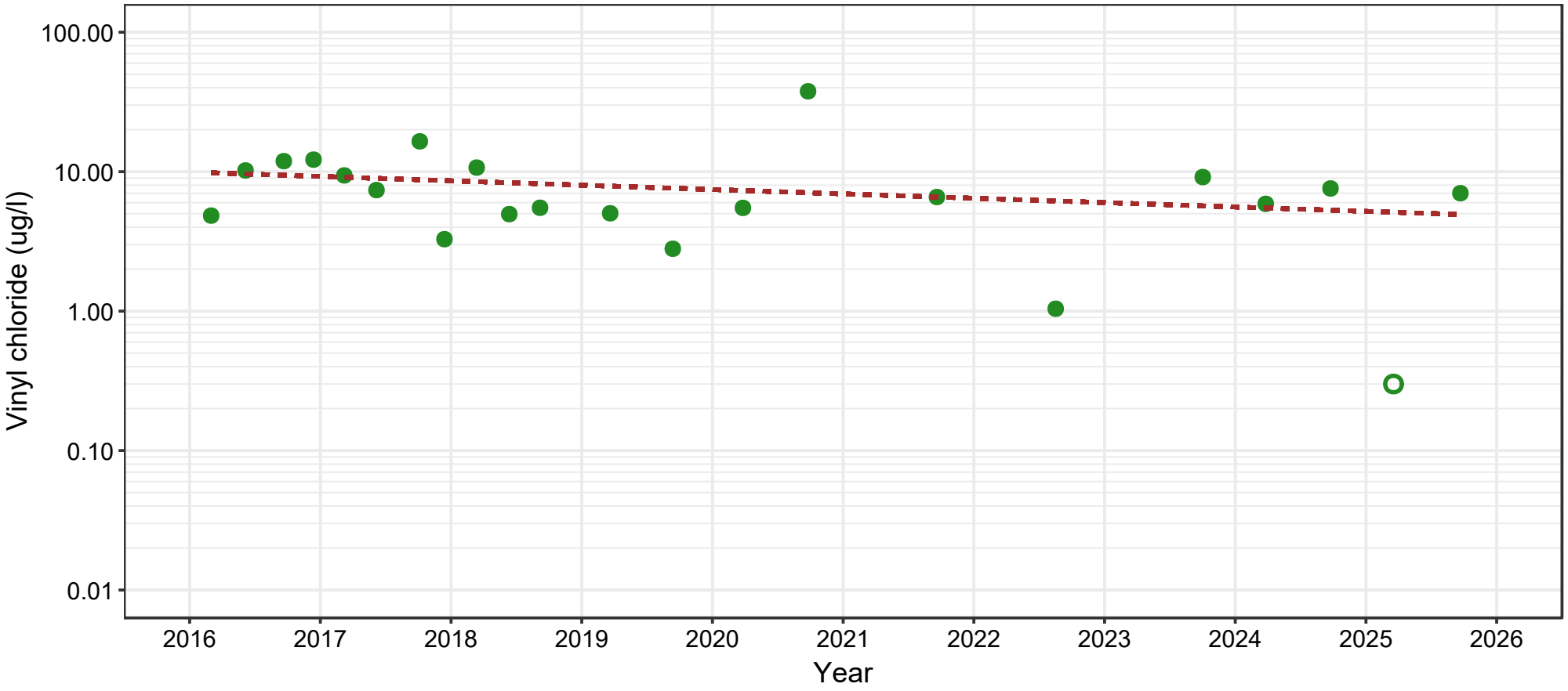
Figure A-19
Source Area Well WS-34-106 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-34-106	Insufficient Data	--	8	0%	--	--

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

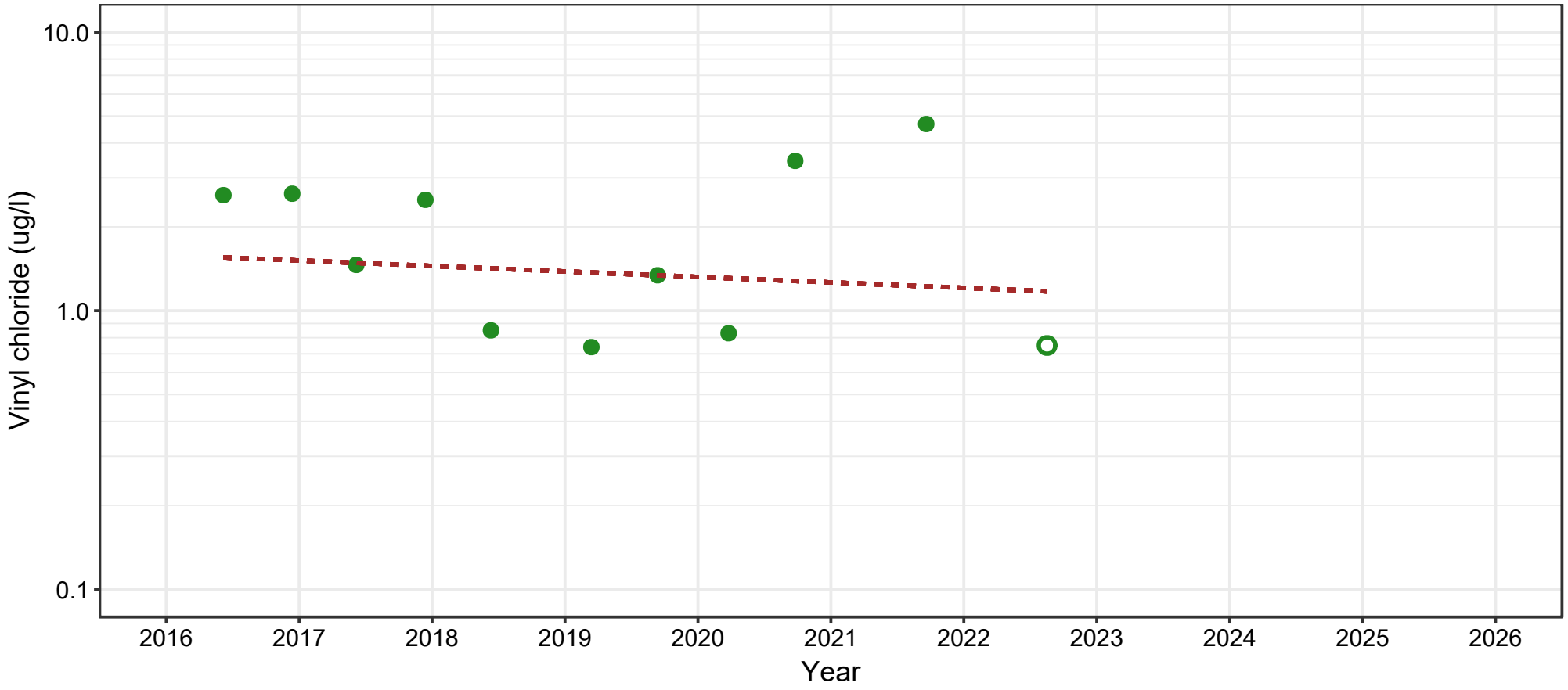
Figure A-20
Source Area Well WS-35-106 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-35-106	No Significant Trend	-0.0313	22	95%	0.215	-0.195

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

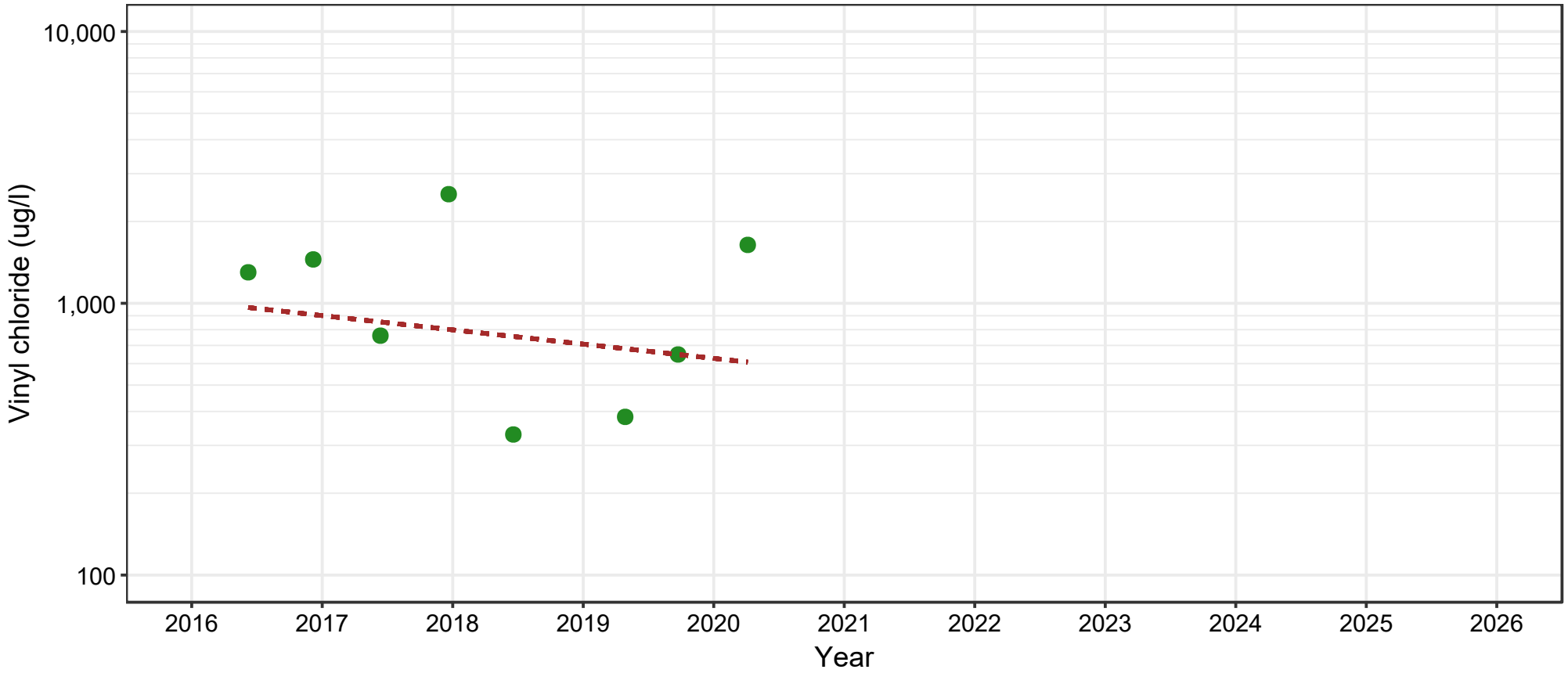
Figure A-21
Source Area Well WS-35-76 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-35-76	No Significant Trend	-0.0197	11	91%	0.693	-0.109

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

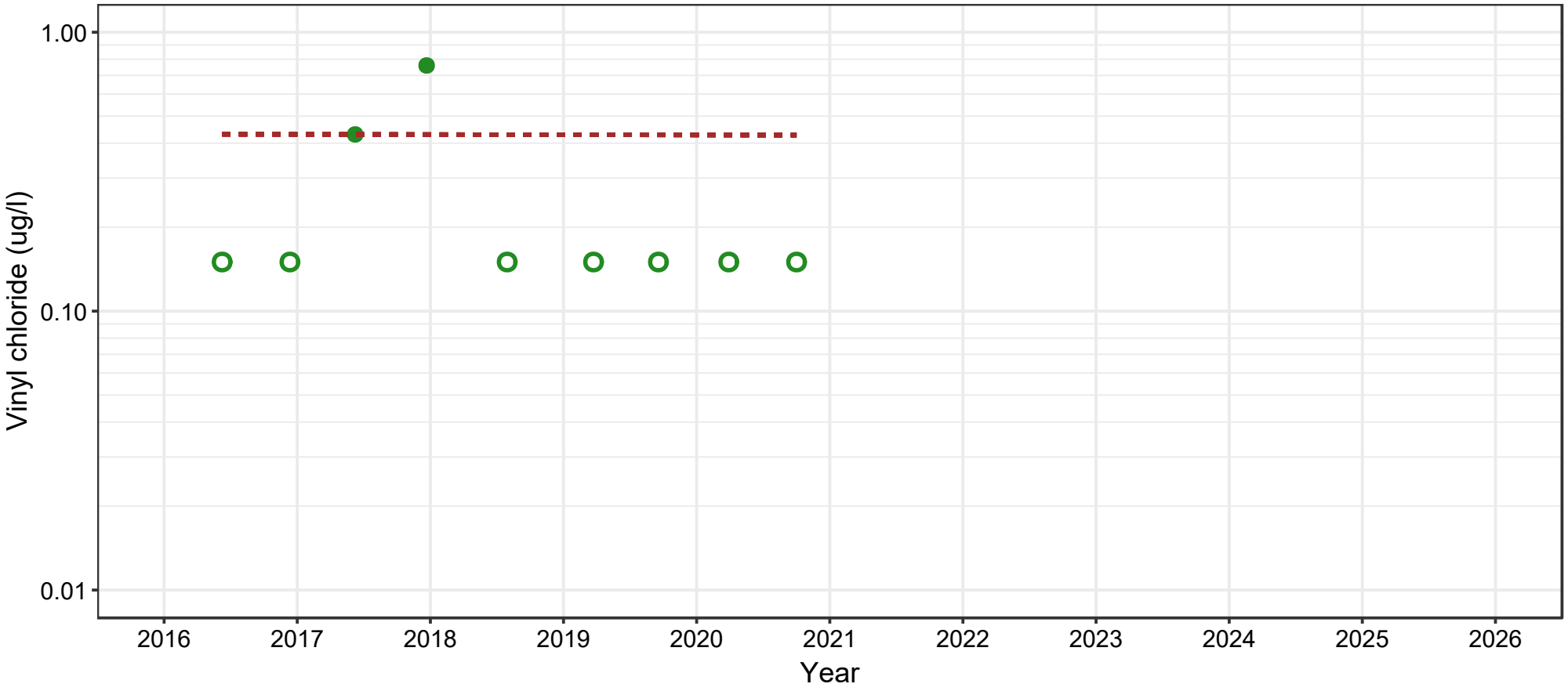
Figure A-22
Source Area Well WS-31-106 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-31-106	No Significant Trend	-0.0525	8	100%	0.902	-0.0714

Notes
MGP DNAPL has been observed in WS-31-106.
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an $\alpha = 0.05$ and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

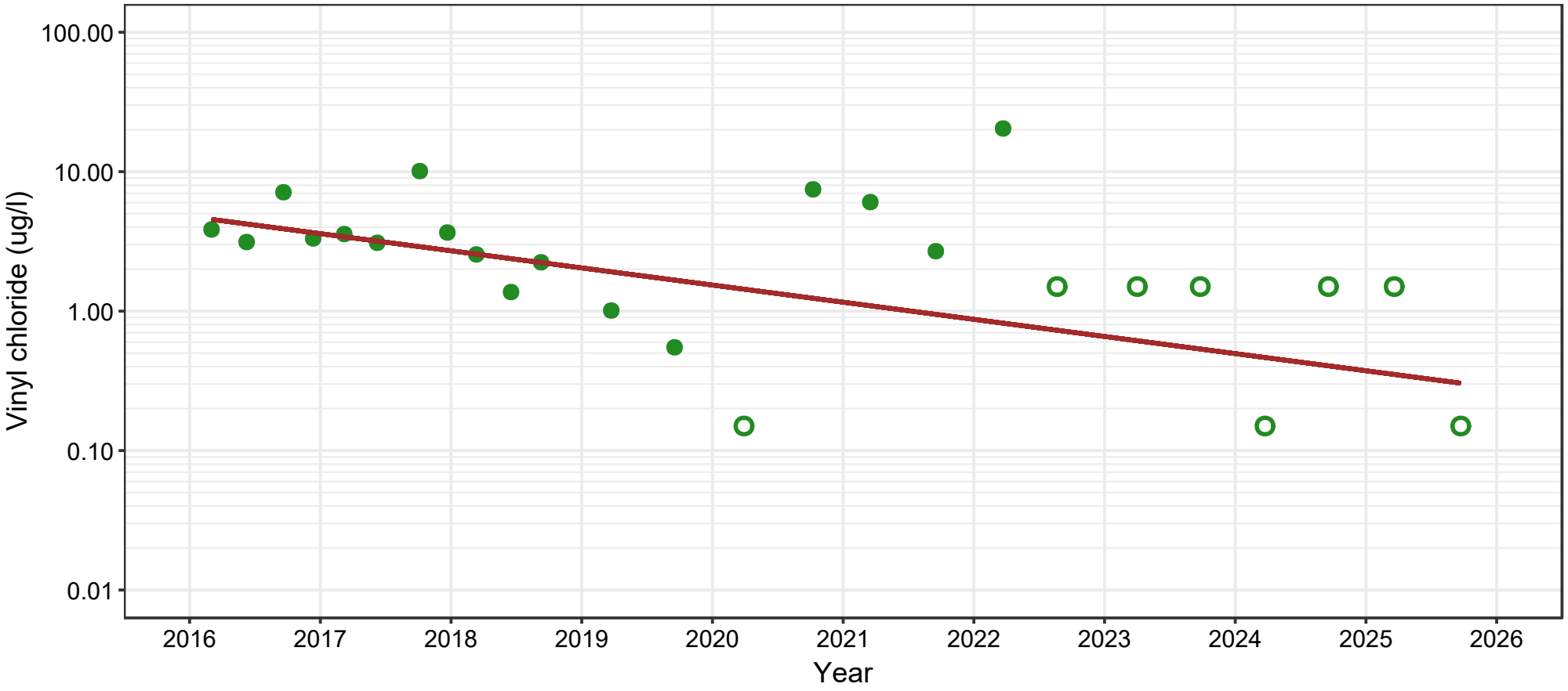
Figure A-23
Source Area Well WS-32-106 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-32-106	No Significant Trend	-0.000723	9	22%	0.562	-0.139

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

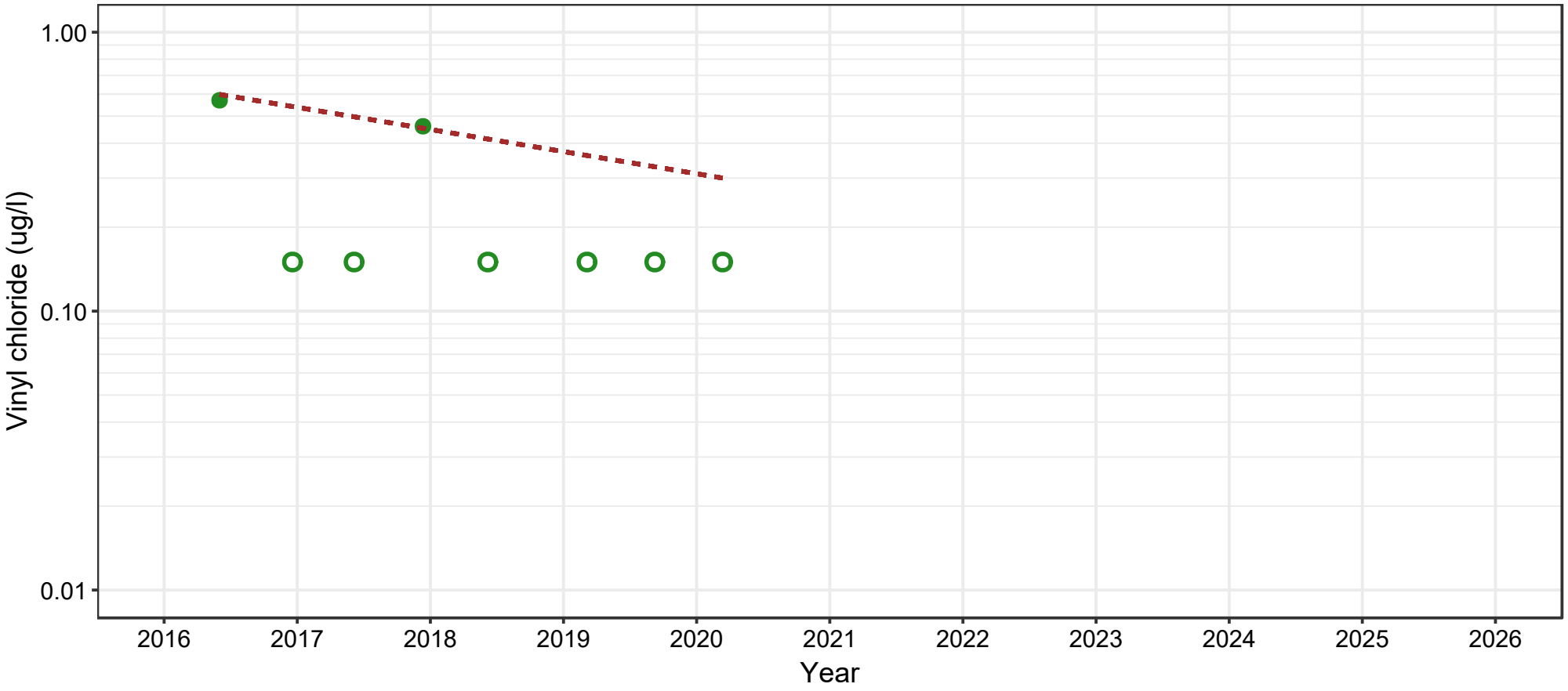
Figure A-24
Source Area Well WS-32-76 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-32-76	Decreasing	-0.123	25	68%	0.00711	-0.38

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

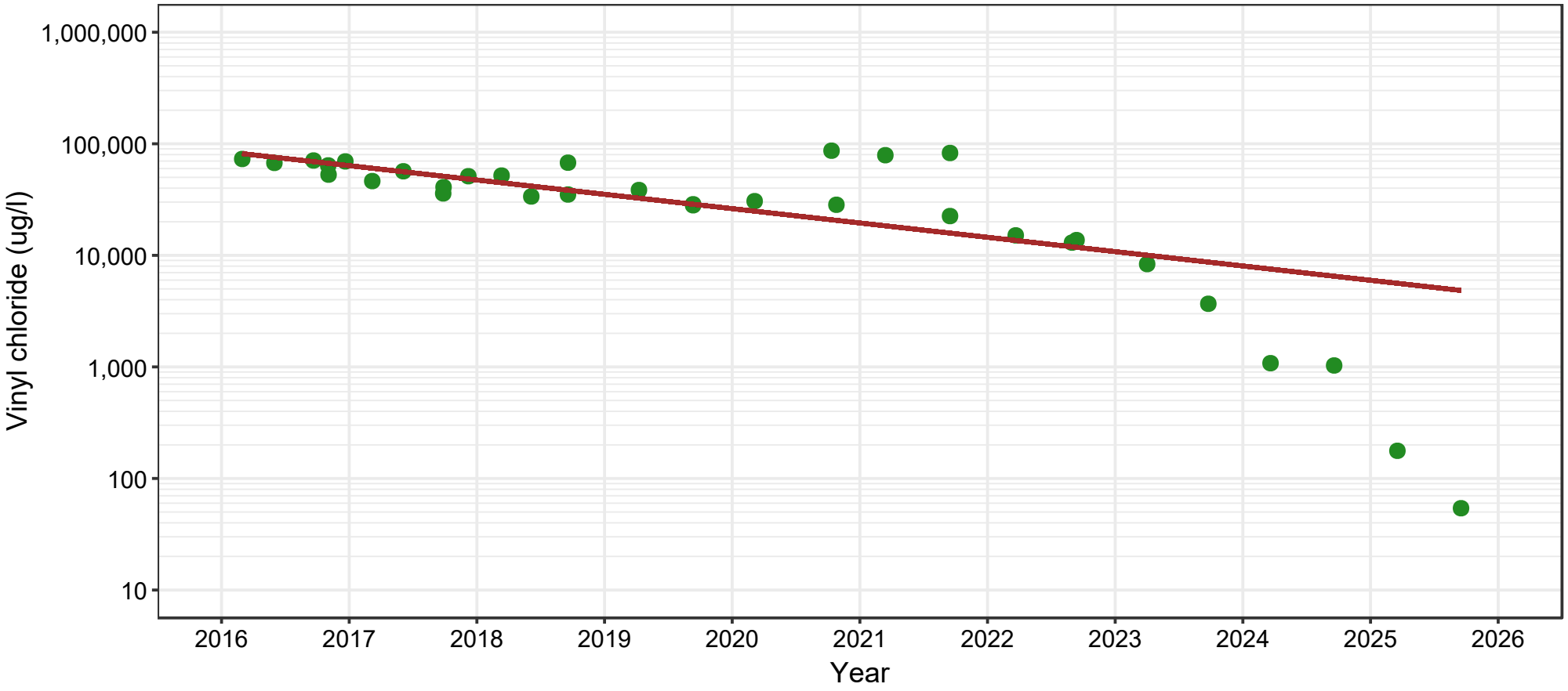
Figure A-25
Source Area Well WS-19-101 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-19-101	No Significant Trend	-0.0793	8	25%	0.192	-0.321

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

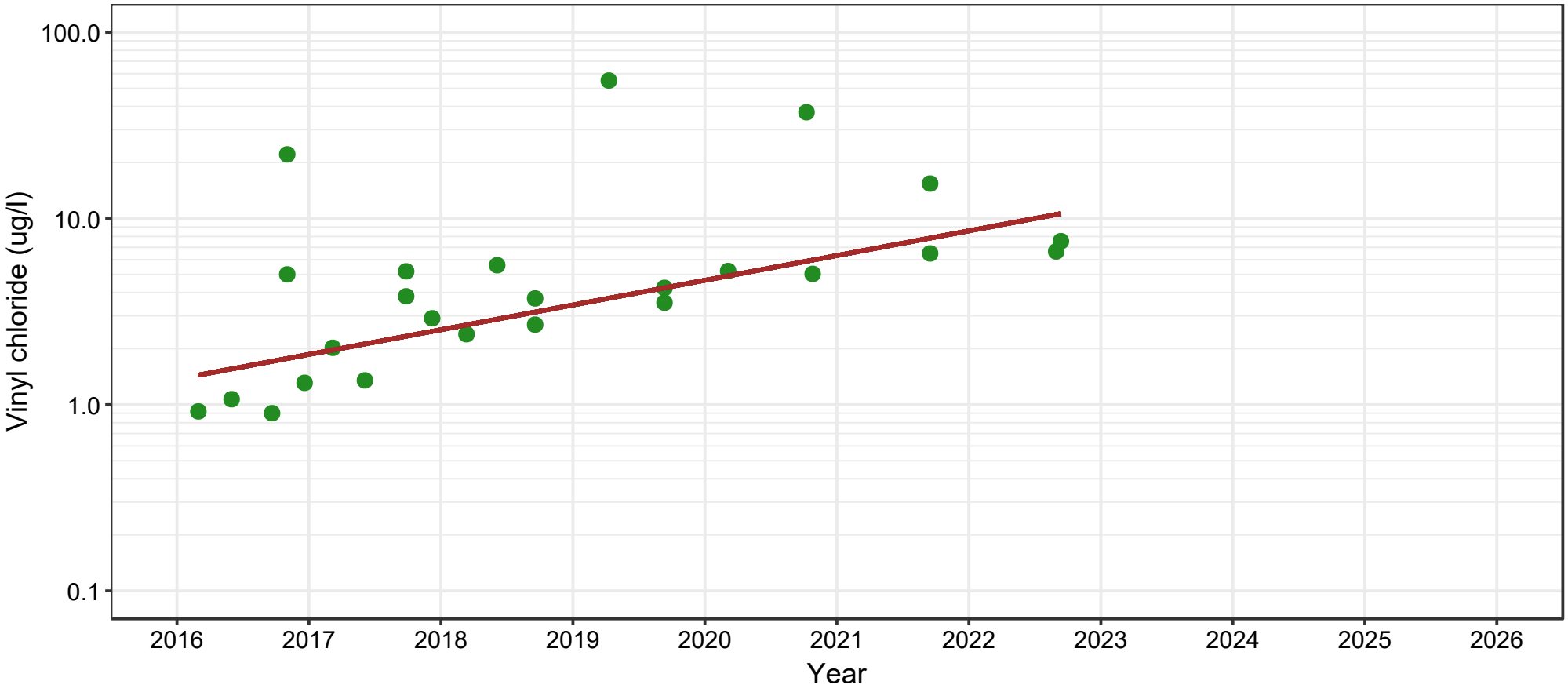
Figure A-26
Source Area Well WS-13-69 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-13-69	Decreasing	-0.128	33	100%	1.36e-07	-0.646

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

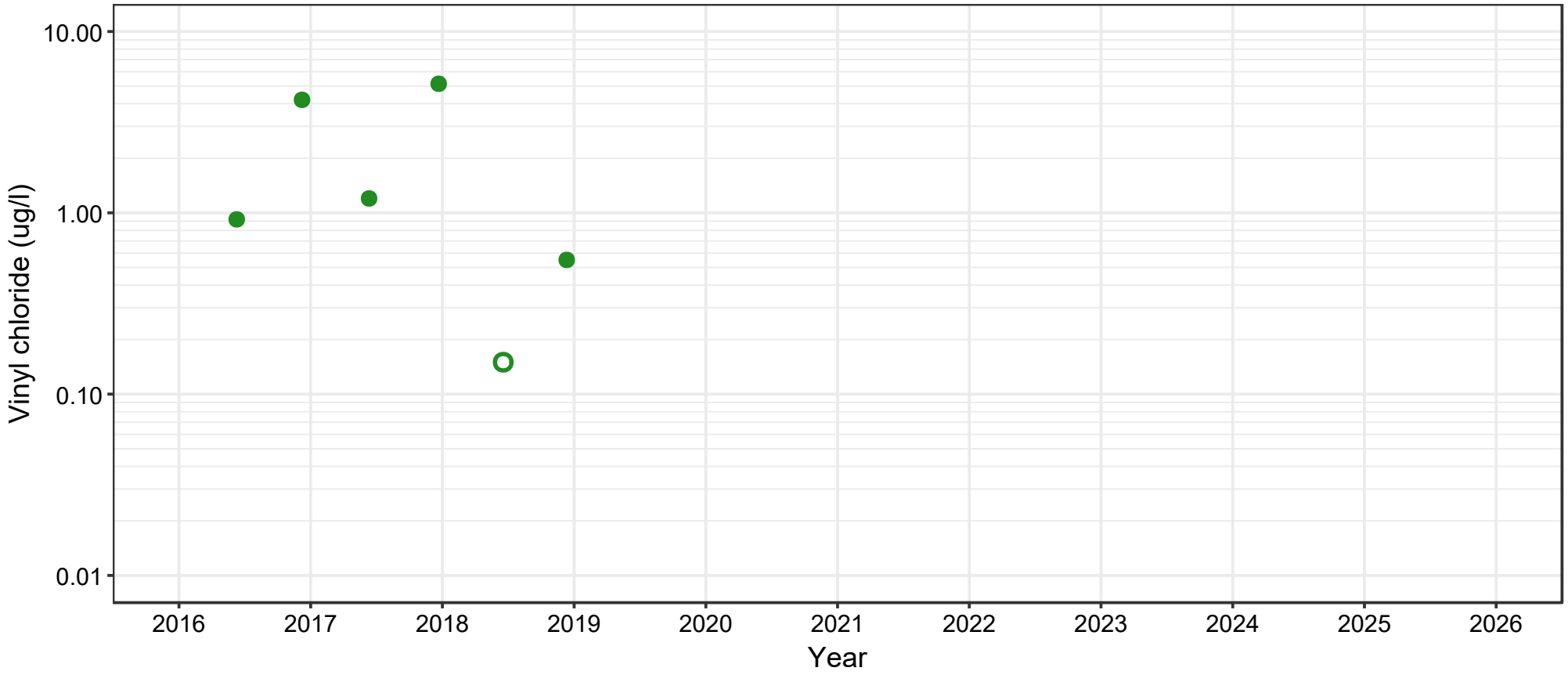
Figure A-27
Source Area Well WS-13-105 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-13-105	Increasing	0.133	25	100%	0.000264	0.523

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

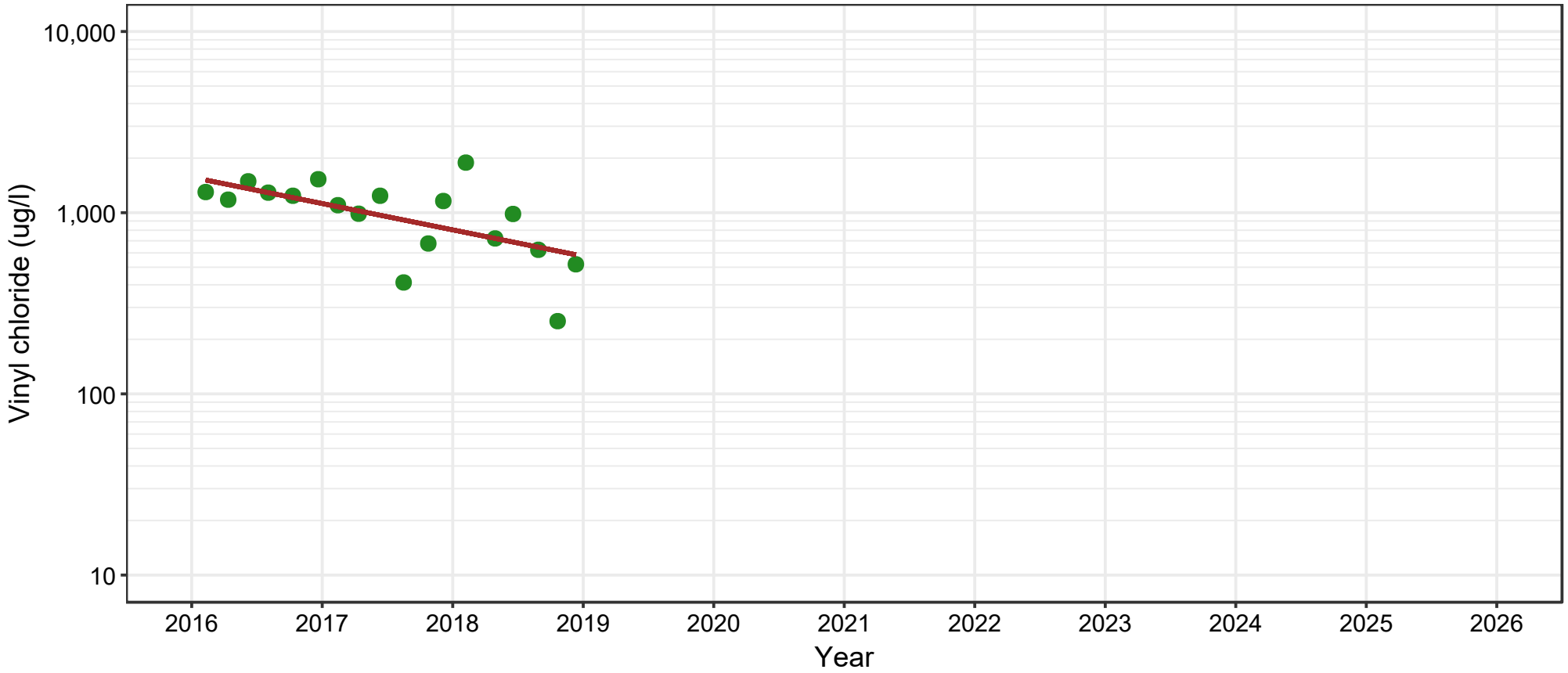
Figure A-28
Source Area Well WS-15-140 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-15-140	Insufficient Data	--	6	83%	--	--

Notes
MGP DNAPL has been observed in WS-15-140.
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an $\alpha = 0.05$ and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

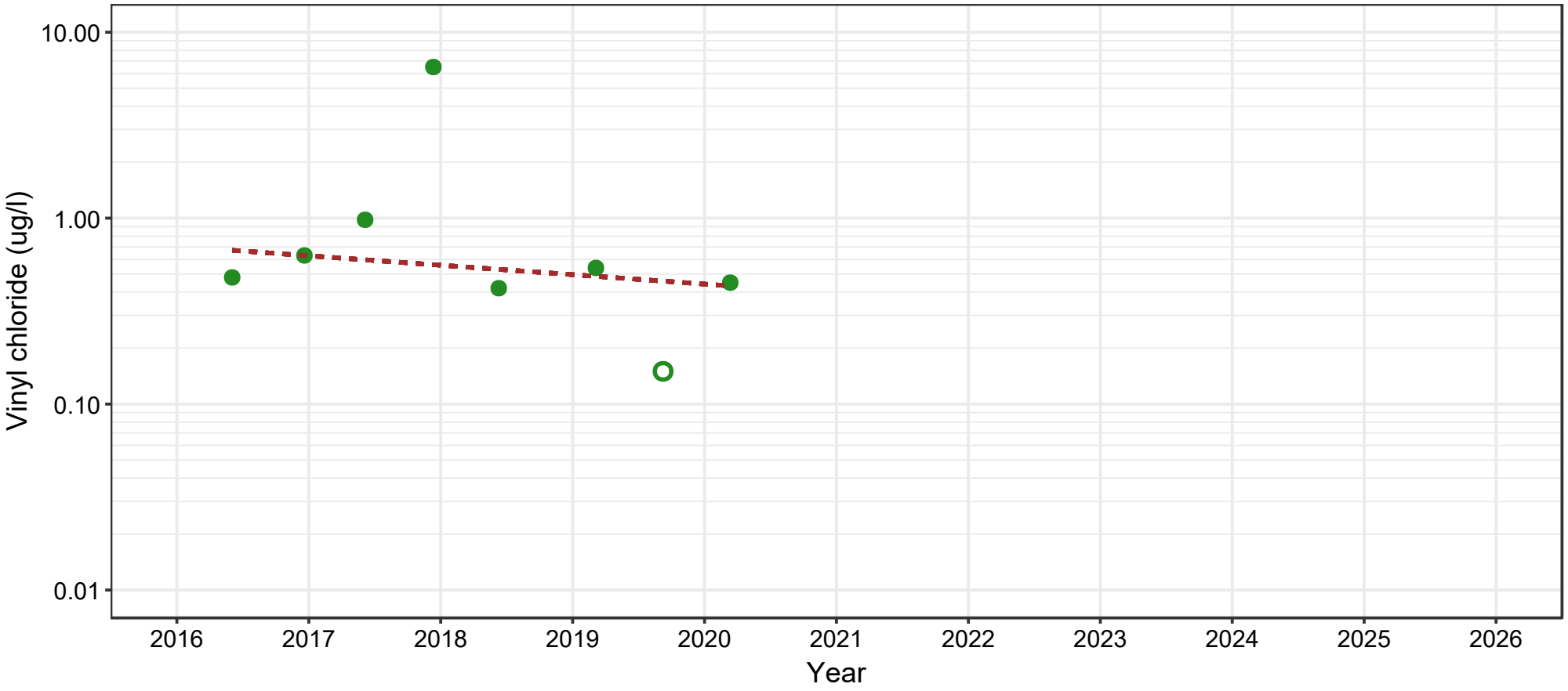
Figure A-29
Source Area Well WS-15-85 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-15-85	Decreasing	-0.145	18	100%	0.00352	-0.51

Notes
MGP DNAPL has been observed in WS-15-85.
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an $\alpha = 0.05$ and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

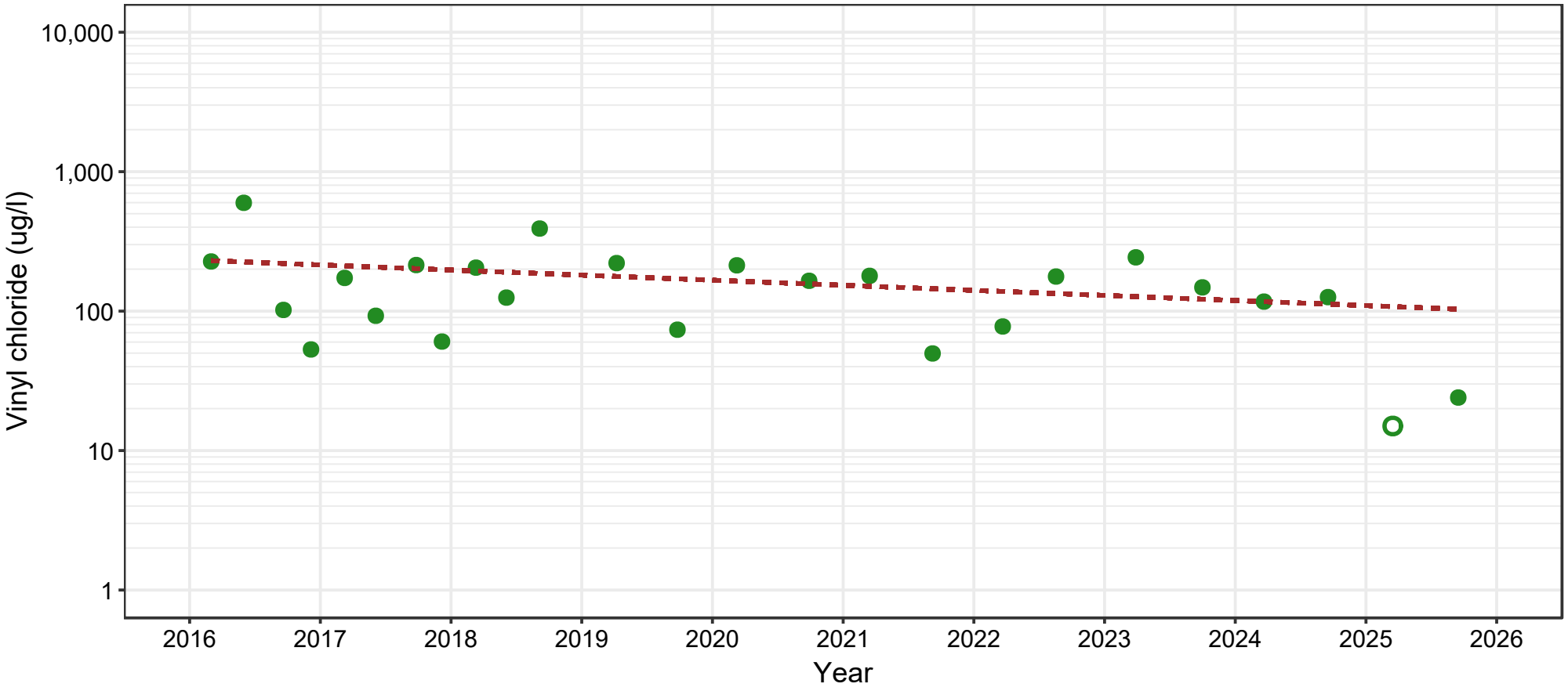
Figure A-30
Source Area Well WS-19-71 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-19-71	No Significant Trend	-0.0507	8	88%	0.386	-0.286

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

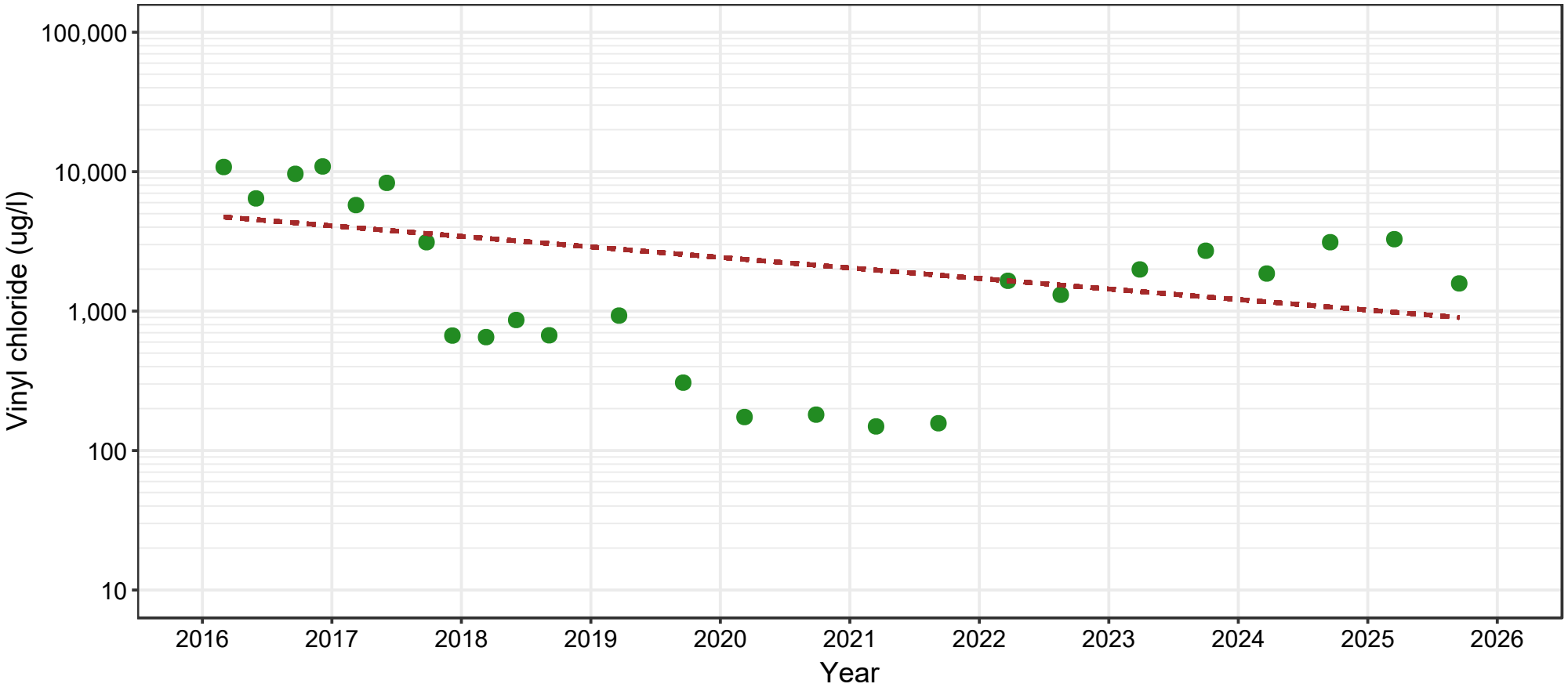
Figure A-31
Source Area Well WS-41-36 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-41-36	No Significant Trend	-0.0364	25	96%	0.102	-0.237

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

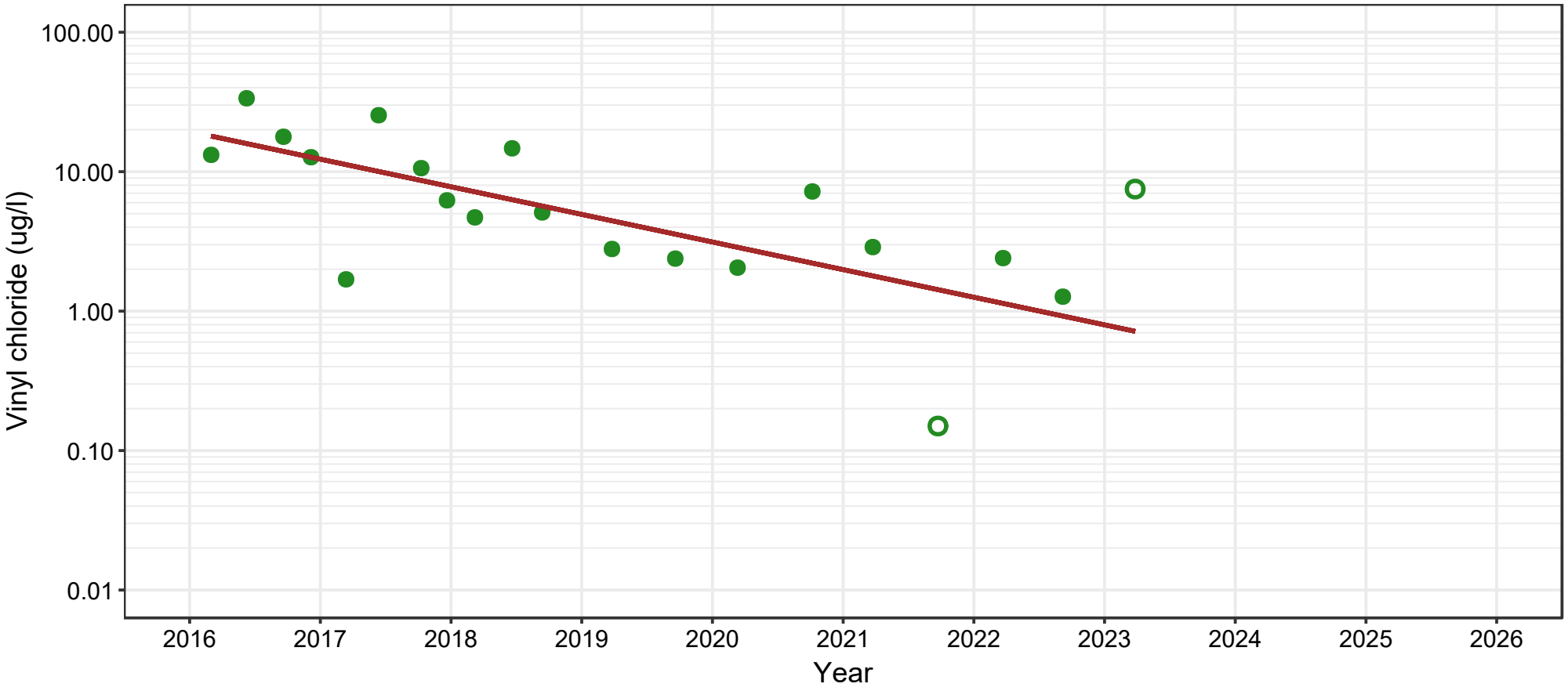
Figure A-32
Source Area Well WS-41-91 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-41-91	No Significant Trend	-0.0755	25	100%	0.123	-0.223

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

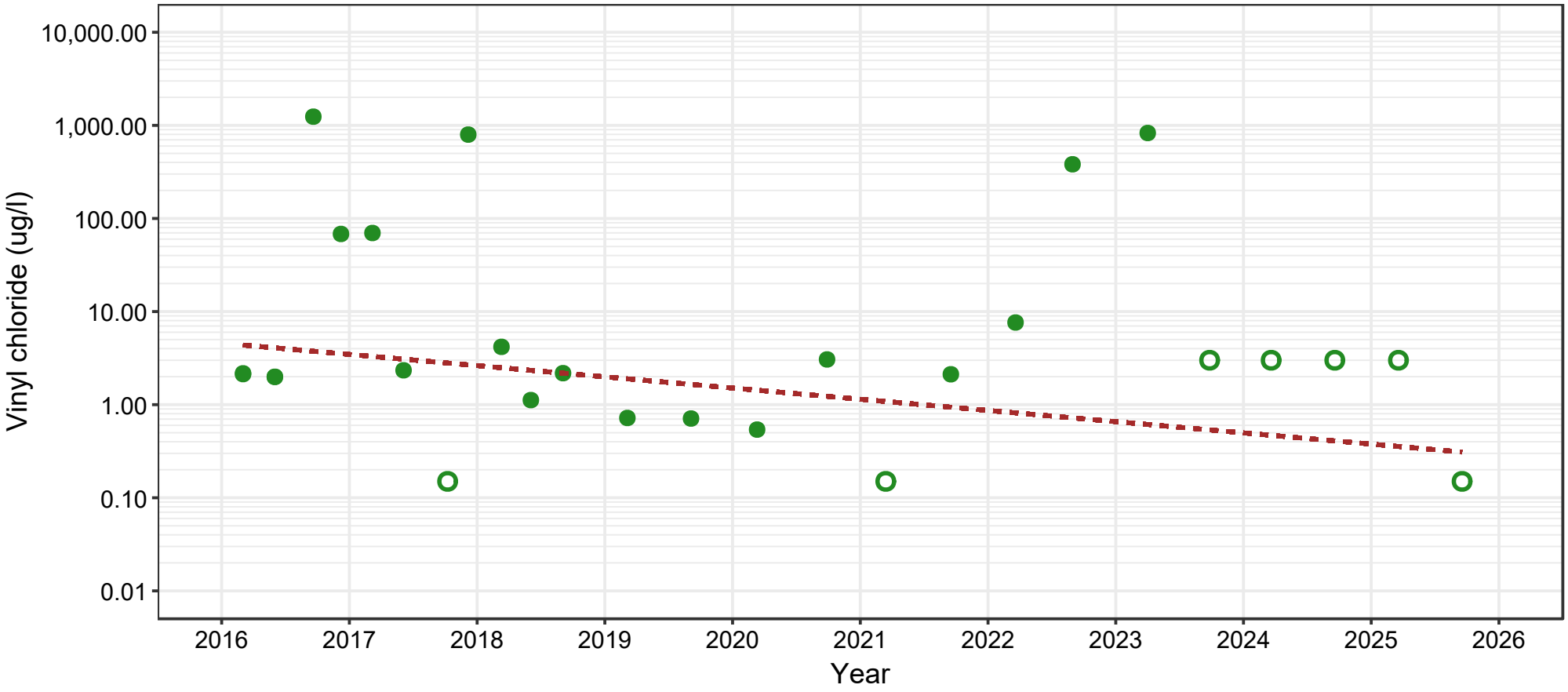
Figure A-33
Source Area Well WS-40-36 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-40-36	Decreasing	-0.198	20	90%	0.00095	-0.537

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

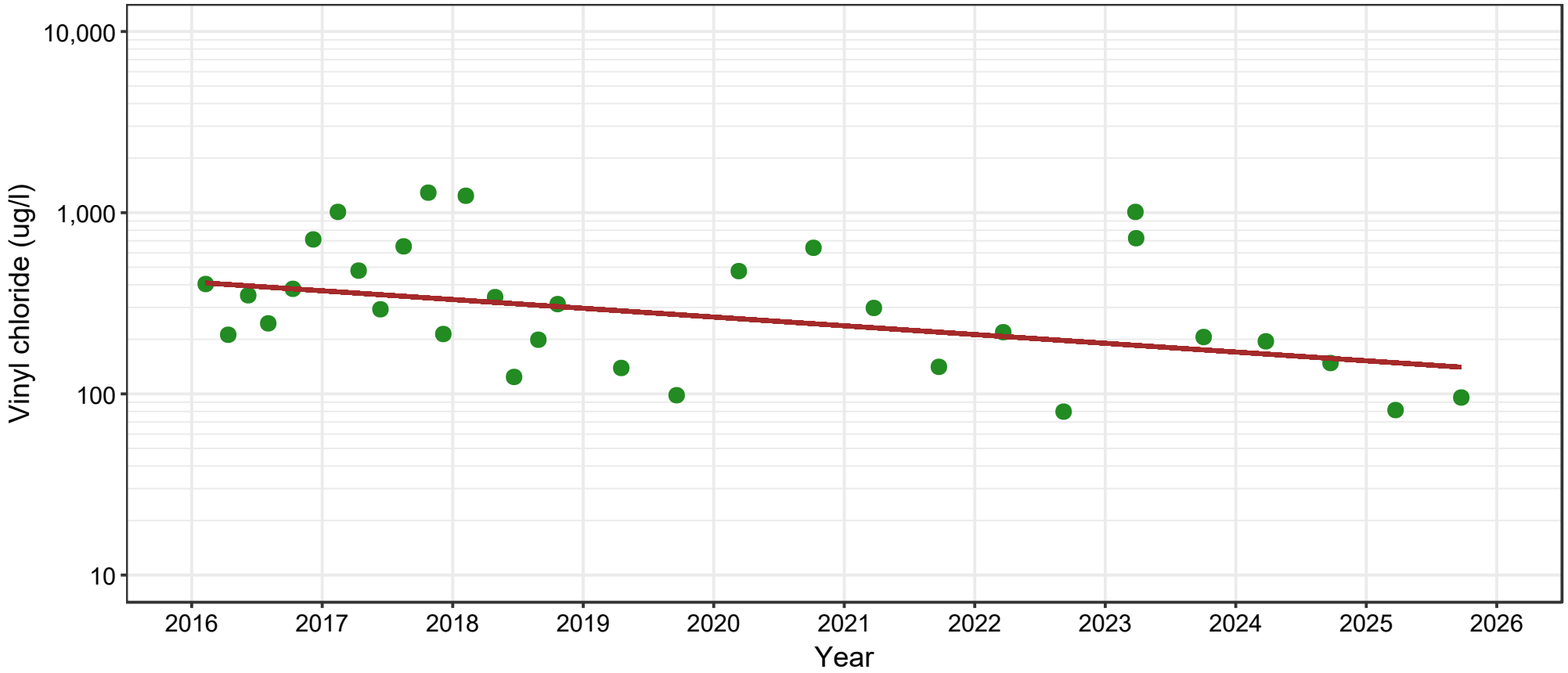
Figure A-34
Source Area Well WS-42-36 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-42-36	No Significant Trend	-0.12	27	74%	0.298	-0.142

Notes
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an α = 0.05 and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.

Figure A-35
Source Area Well WS-43-36 Vinyl chloride
Nonparametric Trend Analysis



Well	Akritas-Theil-Sen Trend Result	Akritas-Theil-Sen Trend Slope	Sample Count	Frequency of Detections	p-Value	Kendall Statistic
WS-43-36	Decreasing	-0.0483	32	100%	0.0164	-0.3

Notes
MGP DNAPL has been observed in WS-43-36.
Non-detect values shown as open circles at one half of the reporting limit.
The log-linear trendline shown is the the Akritas-Theil-Sen nonparametric line using the Turnbull estimate of intercept
Akritas-Theil-Sen trend evaluations were conducted using an $\alpha = 0.05$ and non-detect values equal to the full reporting limit.
p-value = probability value.
ug/l = micrograms per liter.