Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

FEB - 8 2018

Ms. Susan B. Fulmer, P. G., Manager
Federal Remediation Section
Division of Site Assessment, Remediation and Revitalization
Bureau of Land and Waste Management
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Mr. Jon Richards
Acting Savannah River Site Remedial Project Manager
Superfund Division
U. S. Environmental Protection Agency, Region 4
61 Forsyth Street, SW
Atlanta, Georgia 30303

Dear Ms. Fulmer and Mr. Richards:

SUBJECT: Savannah River Site's Responses to the Regulatory Comments on the 2016 Annual Comprehensive TNX Area Groundwater Monitoring and Remedial Action Effectiveness Interim Report (U) (SRNS-RP-2017-00302, Revision 0, June 2017) CERCLIS Numbers: 21, 29

In accordance with the terms of the Federal Facility Agreement, the U. S. Department of Energy (DOE) is submitting the subject comment responses for your review. The South Carolina Department of Health and Environmental Control (SCDHEC) and the U. S. Environmental Protection Agency (EPA) provided comments on the report on October 25, 2017 and November 17, 2017, respectively. The report will not be revised; however, all comment responses will be included and/or addressed in the next report, as applicable. Please review these responses and provide your approval thirty (30) days from receipt. The time and effort that the SCDHEC and the EPA have given on the subject operable unit are greatly appreciated.

Questions from you or your staff may be directed to me at (803) 952-8365, or the DOE Program Manager, Mr. Philip Prater, at (803) 952-9333.

Sincerely,

Brian T. Hennessey
SRS Remedial Project Manager
Infrastructure and Area Completion Division

IACD-18-128

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Ms. Susan Fulmer
Mr. Jon Richards

Enclosures:
1. SRS Responses to the USEPA Comments on the 2016 Annual Comprehensive TNX Area Groundwater Monitoring and Remedial Action Effectiveness Interim Report (U) (SRNS-RP-2017-00302, Revision 0, June 2017) CERCLIS Numbers: 21, 29
2. SRS Responses to the SCDHEC Comments on the 2016 Annual Comprehensive TNX Area Groundwater Monitoring and Remedial Action Effectiveness Interim Report (U) (SRNS-RP-2017-00302, Revision 0, June 2017) CERCLIS Numbers: 21, 29

cc w/o encl:
D. Scaturo, SCDHEC-Columbia
S. French, SCDHEC-Columbia
M. D. Wilson, SCDHEC-Columbia
G. K. Taylor, SCDHEC-Columbia
T. Fuss, SCDHEC–Aiken Environmental Affairs Office
R. H. Pope, EPA-Atlanta
cc w/ encl:
D. Lloyd, EPA-Atlanta
M. McRae, TechLaw, Inc.

SRS Responses to SCDHEC Comments on the 2016 Annual Comprehensive TNX Area Groundwater Monitoring and Remedial Action Effectiveness Interim Report (U), CERCLIS Number: 21, 29, SRNS-RP-2017-00302, Revision 0, Dated June 2017, Savannah River Site, Aiken, South Carolina

Comments Received 10/25/2017

SCDHEC COMMENTS:

Specific Comments

1. Section 7.1, Soil Vapor Extraction (SVE) Operations, page 41. The amounts of total VOCs, TCE, PCE and CCl4 removed from the TNX vadose zone reported in the last paragraph of this page are different from the totals listed in Table 7-2. Please correct these discrepancies.

   Response: Agree. The values reported in Section 7.1 represent the pounds of TCE, PCE, and CCl4 that were removed during 2016 from the SVE operations. The values reported in Table 7-2 were not properly updated and represent pounds of TCE, PCE, and CCl4 that were removed during 2015. An updated table with 2016 removal rates is provided as Attachment 1.

   Responsible Party: Branden Kramer, (803) 952-6378, branden.kramer@srs.gov

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Attachment 1. VOC Mass Removed by SVE (2016)

Month	TCE (lbs)	PCE (lbs)	CC14 (lbs)
January	0.027	0.029	0.001
February	0.025	0.027	0.001
March	0.026	0.028	0.001
April	0.041	0.035	0.005
May	0.039	0.031	0.004
June	0.041	0.035	0.005
July	0.077	0.036	0.002
August	0.078	0.036	0.002
September	0.075	0.035	0.002
October	0.052	0.022	0.001
November	0.050	0.021	0.001
December	0.052	0.022	0.001
Average Monthly Removed in 2016	**0.049**	**0.030**	**0.002**
Totals	**0.582**	**0.357**	**0.024**

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EPA GENERAL COMMENT

The text under the second bullet in Section 3.1, Objectives, Page 8 of 52 of the 2016 Annual Comprehensive TNX Area Groundwater Monitoring and Remedial Action Effectiveness Interim Report states one of the overall objectives of the groundwater remedial action (RA) is to return groundwater to beneficial use. While the RAs currently being implemented for the TNX Groundwater address the chlorinated volatile organic compound (cVOC) contamination, there is no RA planned for radiologically contaminated groundwater. The 2016 Annual Report states in Section 3.5, Radiological Contaminated Groundwater, Page 12 of 52 that based on monitoring data and historical trends the exceedances of the radiological contamination in groundwater are sporadic or one time occurrences. The text further asserts there are no discernible and consistent groundwater plumes present and therefore no RA is recommended at this time.
However, based on the Time Series Plot for Gross Alpha for Station TCM 5, Appendix E, Page E-108 of E-226, the majority of gross alpha concentrations in TCM 5 have fluctuated above and exceeded the 15 picocuries per liter (pCi/L) maximum contaminant level (MCL). Additionally, uranium has regularly exceeded the MCL of 30 micrograms per liter (µg/L) since 2005. The text in the Executive Summary, Recommendations, Page ES-3 of ES-8 states a new monitoring well is planned to be installed downgradient of the Old TNX Seepage Basin (OTSB) to better define the eastern edge of the trichloroethylene (TCE) groundwater plume. It should be noted that the new well will be sampled for radionuclide parameters in addition to cVOC analysis.
EPA is concerned that a discernible and consistent groundwater plume is present based on the additional monitoring well data from the new well and requests a discussion regarding radionuclide contamination cleanup with respect to returning groundwater to beneficial use. It is recommended that future Annual Report(s) be prepared to address this issue.

Response: Agree with Clarification.

SRS does not believe that existing data supports a discernible and consistent radiological groundwater plume. As agreed to and discussed in the April 2017 Core Team meeting, a new well will be installed in fiscal year 2019 downgradient of the OTSB and sampled for VOC and radiological parameters. The radiological results will be evaluated and discussed in the corresponding annual report.

The text in Section 3.5 in the 2017 Annual Report will be revised as follows:

"Based on the monitoring data and historical trends, the majority of exceedances are sporadic or one time occurrences. TCM 5 is the only well with persistent gross alpha and uranium concentrations that exceed the respective MCLs. There are no discernible and consistent groundwater plumes present and therefore no remedial action is recommended

at this time. ~~The results will continue to be monitored and reported in the annual reports.~~ However, a new well will be installed in 2019 downgradient of the OTSB and sampled for both radiological parameters and VOC analysis. The radiological results from the new well be evaluated and discussed in the corresponding annual report."

Responsible Party: Branden Kramer, (803) 952-6378, branden.kramer@srs.gov

EPA SPECIFC COMMENTS:

1. **Executive Summary, Recommendations, Page ES-3:** The Executive Summary states, "SRS proposes to reduce sampling for 1,4-dioxane to seven monitoring wells…near the TNX Burial Ground (TBG), (TBG 3, TBG 4, TBG 5, and TNX 3D), and three background wells (P 26D, P 26B, and P26A)." Based on the groundwater sampling events from May and December 2016, 1,4-dioxane was detected above the estimated quantitation limit (EQL) of 3 µg/L in groundwater samples collected from one (1) well (TBG 5) at concentrations of 8.5 µg/L and 5.1 µg/L, respectively. However, Section 5.4 on Page 24 of 52 states the regional screening level for 1,4-dioxane is 0.46 µg/L; therefore, it is unclear if the concentration of 1,4-dioxane in groundwater at the wells sampled during the May and December 2016 sample events exceeds the regional screening level since the EQL was greater than the regional screening level.
   a. It is EPA's stance that it is premature to reduce sampling and requests that the sampling regime remain the same for present monitor wells and for newly installed monitor wells.

   Response: Clarification.

   1,4-Dioxane results collected from 2014 to 2016 confirm that only TBG 5 has had detectable (i.e., above method detection limit [MDL]) concentrations. All other wells have 1,4-dioxane concentrations less than the respective MDL. The proposed 1,4-dioxane monitoring well network targets TBG 5, the monitoring wells that surround TBG 5, and the background wells. Monitoring these wells would identify any potential migration of 1,4-dioxane contaminated groundwater away from TBG 5. Therefore, SRS believes the proposed network is adequate for the intended purpose.

   Responsible Party: Branden Kramer, (803) 952-6378, branden.kramer@srs.gov

   b. Please revise the 2016 Annual Report to address this issue to ensure adequate laboratory detection limits were utilized at all wells within the monitoring well network sampled for 1,4-dioxane, as listed in Table 4-2 on Pages 18-19 of 52.

Response: Clarification.

The lowest MDL for 1,4-dioxane during 2016 sampling events was 0.85 µg/L using the USEPA 8260SIM method. SRS will direct the laboratory to attempt to achieve lower detection limits, but has not yet achieved a MDL lower than the drinking water regional screening level (RSL) for 1,4-dioxane (0.46 µg/L). SRS is unaware of a certified analytical method that can achieve these lower detection limits.

Responsible Party: Branden Kramer, (803) 952-6378, branden.kramer@srs.gov

2. **Table 4-1, TNX Monitoring Well Network, Page 17 of 52:** This table includes well name, screen zone, category for each well within the monitoring network; however, it does not include the total depth, screened interval, or the diameter of each well. Please revise Table 4-1 to include the total depth, screened interval and the diameter of each well within the monitoring well network.

Response: Agree.

The total depth, screen interval, and diameter of each well will be added to Table 4.1 in the 2017 Annual Report and subsequent reports. No changes are proposed for the 2016 Annual Report.

Responsible Party: Branden Kramer, (803) 952-6378, branden.kramer@srs.gov

3. **Section 6.7, 1,4-Dioxane, Page 39-40 of 52:** Section 6.7 states, "1,4-Dioxane was initially sampled at all TNX Area OU monitoring wells during the fourth quarter 2013 sampling. Thirty of the 38 monitoring wells had a detection of 1,4-dioxane. The detections were scattered across the TNX Area OU including the background and monitoring wells upgradient of the source areas. It is not apparent why 1,4-dioxane concentrations were detected in almost every monitoring well. Since 2014, 1,4-dioxane concentrations have been less than the detection limit at all wells except TBG 5." However, the data from the fourth quarter 2013 and subsequent sampling events is not included in the report as a supporting line of evidence. Please revise the 2016 Annual Report to include historical groundwater data (including the laboratory detection limits), for 1.4-dioxane along with the additional constituents and parameters sampled for in subsequent sampling events.

Response: Agree with Clarification.

The CD submitted with the 2016 Annual Report includes matrix tables from Appendix B. Time series graphs will be added to Appendix E of the 2017 Annual Report to display the historical 1,4-dixoane results for the monitoring well network (Attachment 2). No changes are proposed for the 2016 Annual Report.

Responsible Party: Branden Kramer, (803) 952-6378, branden.kramer@srs.gov

4. **Section 7.1, Soil Vapor Extraction (SVE) Operations, Page 41 of 52:** The second paragraph of Section 7.1 states, "the vapor samples are collected quarterly only from the SVE wells attached to a MicroBlower ™. Vapor concentrations have ranged from 1.2 ppmv to 0.002 ppmv with an average concentration of 0.1 ppmv." However, the analytical results for the quarterly vapor samples collected and assumed runtimes for the MicroBlowers ™ are not included in the report. Furthermore, it is unclear how the VOC Mass Removed by SVE (2016) (Table 7-2, Page 45 of 52) was calculated. Please revise the 2016 Annual Report to address these issues.

   Response: Agree.

   The mass removed by the MicroBlowers™ was determined using a mass balance calculation that measures the time average concentration of VOCs from the off gases. This concentration is then multiplied by the volume of air (ft^3) that passes through the MicroBlower™ during a given period. Unit conversions are integrated into these calculations. A similar description will be added to Section 7.1 of the 2017 Annual Report. The quarterly vapor concentrations and flow rates will be added to a new table in Appendix B of the 2017 Annual Report. No changes are proposed for the 2016 Annual Report.

   Responsible Party: Branden Kramer, (803) 952-6378, branden.kramer@srs.gov

5. **Table 7-2, VOC Mass Removed by SVE (2016), Page 45 of 52:** The table is labeled as data collected from 2016; however, the "average monthly removed" row states 2015. Revise the date for the "average monthly removed" row to 2016.

   Response: Agree.

   The values reported in the text in Section 7.1 represent the pounds of TCE, PCE, and CCl_4 that were removed during 2016 from the SVE operations. The values reported in

Table 7-2 were not updated and represent pounds of TCE, PCE, and CCl_4 that were removed during 2015. An updated table with 2016 removal rates is provided as Attachment 1. No changes are proposed for the 2016 Annual Report.

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6. **Table 7-3, Estimated TCE Plume Mass (2007-2016), Page 46 of 52:** Table 7-3 indicates analytical data from groundwater samples collected from two wells were used in the average TCE concentration for the plume in 2016; however, the data used was only from the December 2016 monitoring event, which was the more conservative data set from the two 2016 sampling events. For clarity, revise Table 7-3 to include a footnote indicating the data used to calculate the estimated TCE plume mass was only from the December 2016 sampling event and in subsequent reporting efforts the entire sampling interval (one year in this case) should be used when describing events over the sampling time frame under discussion.

   Response: Clarification.

   Results from the fourth quarter sampling event were used to estimate all mass calculations from 2007 to 2016. The fourth quarter results were chosen because they pair with the plume area depicted on the TCE plume maps provided in Appendix A of the annual report from 2007 to 2016. SRS believes these assumptions provide an accurate estimate for when TCE concentrations are anticipated to decrease to less than the MCL. Calculating the annual average TCE concentration could provide a more conservative estimate; however, SRS will make remedial decisions based on the empirical data and not on the estimated time to reach MCLs. SRS remains dedicated to treating the groundwater at TNX until TCE concentrations have declined below the MCL. In future reports, a footnote will be placed on Table 7-3 that states the following:

   "Fourth quarter data was utilized when determining the plume area and average TCE concentrations."

   No changes are proposed for the 2016 Annual Report.

   Responsible Party: Branden Kramer, (803) 952-6378, branden.kramer@srs.gov

7. **Appendix B, Table B-2, 4Q 2016 TNX Annual Groundwater and Monitoring Report, Page B-4 of B-4:** The minimum detection limit for gross alpha for groundwater samples

collected from well TBG 5 during the December 2016 was 25.4 pCi/L, which is greater than the MCL of 15 pCi/L; however, this potential contaminant exceedance is not discussed in Section 6.5. Revise Section 6.5 to include and discuss this issue.

Response: Agree with Clarification.
TBG 4, not TBG 5, had the elevated method detection limit (MDL) for gross alpha during December 2016. The gross alpha concentration for this sample result was 7.95 pCi/L with an MDL of 25.4 pCi/L and an estimated quantitation limit of 55.8 pCi/L. Because the result was less than the MDL, the result was qualified as non-detect.

The sample aliquot size was reduced from 200 mL to 25 mL to prevent the TBG 4 sample from exceeding a mass of 0.1 gram resulting in a larger MDL. The turbidity of the sample at TBG 4 was measured at 133 nephelometric turbidity units (NTU) and can likely be attributed to the edible oil treatment by products. The total organic carbon concentration (~6,000 mg/L) and specific conductance (6,088 µS/cm) at TBG 4 were also elevated indicating a likely abundance of particulate and dissolved material in the sample. For these reasons, the laboratory reduced the sample aliquot size from 200 mL to 25 mL to minimize mass attenuation when a sample exceeds a mass of 0.1 gram. If a reduction in the aliquot size is needed in future samples to prevent exceedance of the 0.1 gram limit, SRS has directed the laboratory to extend the count time to reduce the MDL.

SRS understands the EPA's concern that the gross alpha result at TBG 4 could be greater than the MCL (15 pCi/L) but less than the MDL. Based on the last three results, the gross alpha results have been less than the MDL and the MDL has been less than the MCL (Attachment 3). The fourth quarter 2016 gross alpha result for TBG 4 appear to follow that trend. In future annual reports, SRS will provide further discussion in the text if the MDL is greater than the MCL. No changes are proposed for the 2016 Annual Report.

Responsible Party: Branden Kramer, (803) 952-6378, branden.kramer@srs.gov

Attachment 1. Summary of VOCs Removed by SVE during 2016

Month	TCE (lbs)	PCE (lbs)	CC14 (lbs)
January	0.027	0.029	0.001
February	0.025	0.027	0.001
March	0.026	0.028	0.001
April	0.041	0.035	0.005
May	0.039	0.031	0.004
June	0.041	0.035	0.005
July	0.077	0.036	0.002
August	0.078	0.036	0.002
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October	0.052	0.022	0.001
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Average Monthly Removed in 2016	0.049	0.030	0.002
Totals	0.582	0.357	0.024

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Attachment 2. 1,4-Dioxane Time Series Plots

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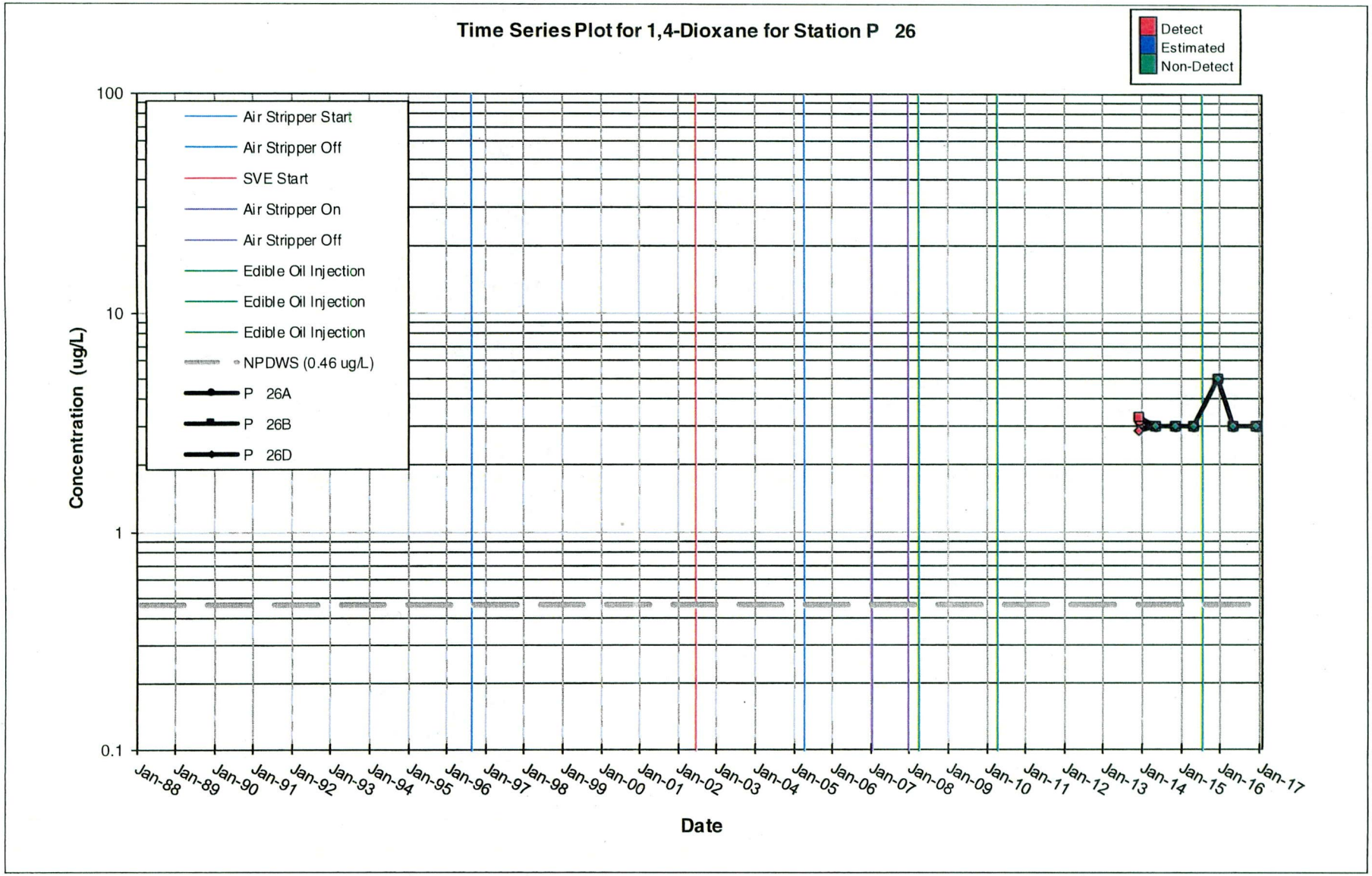

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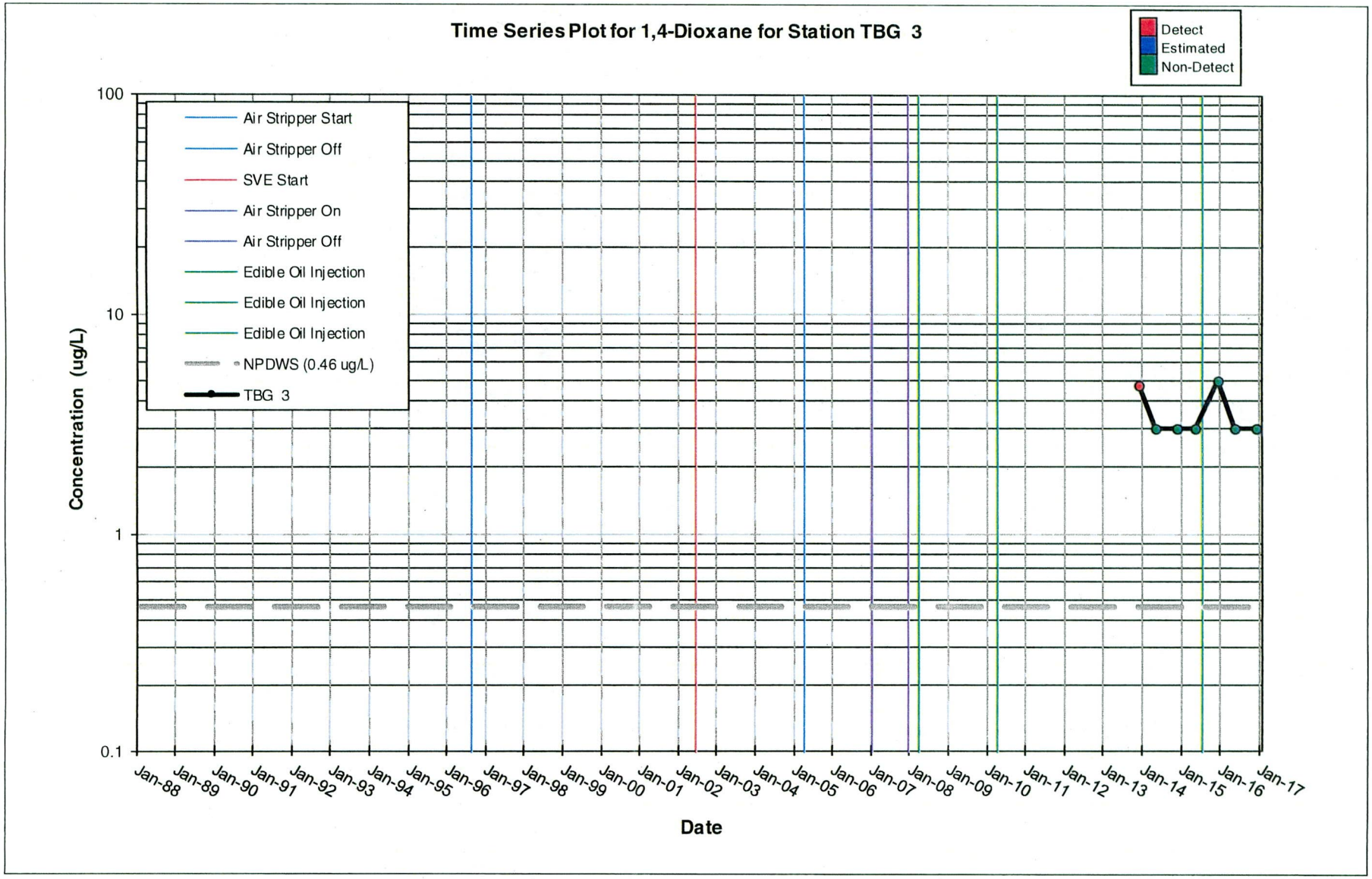

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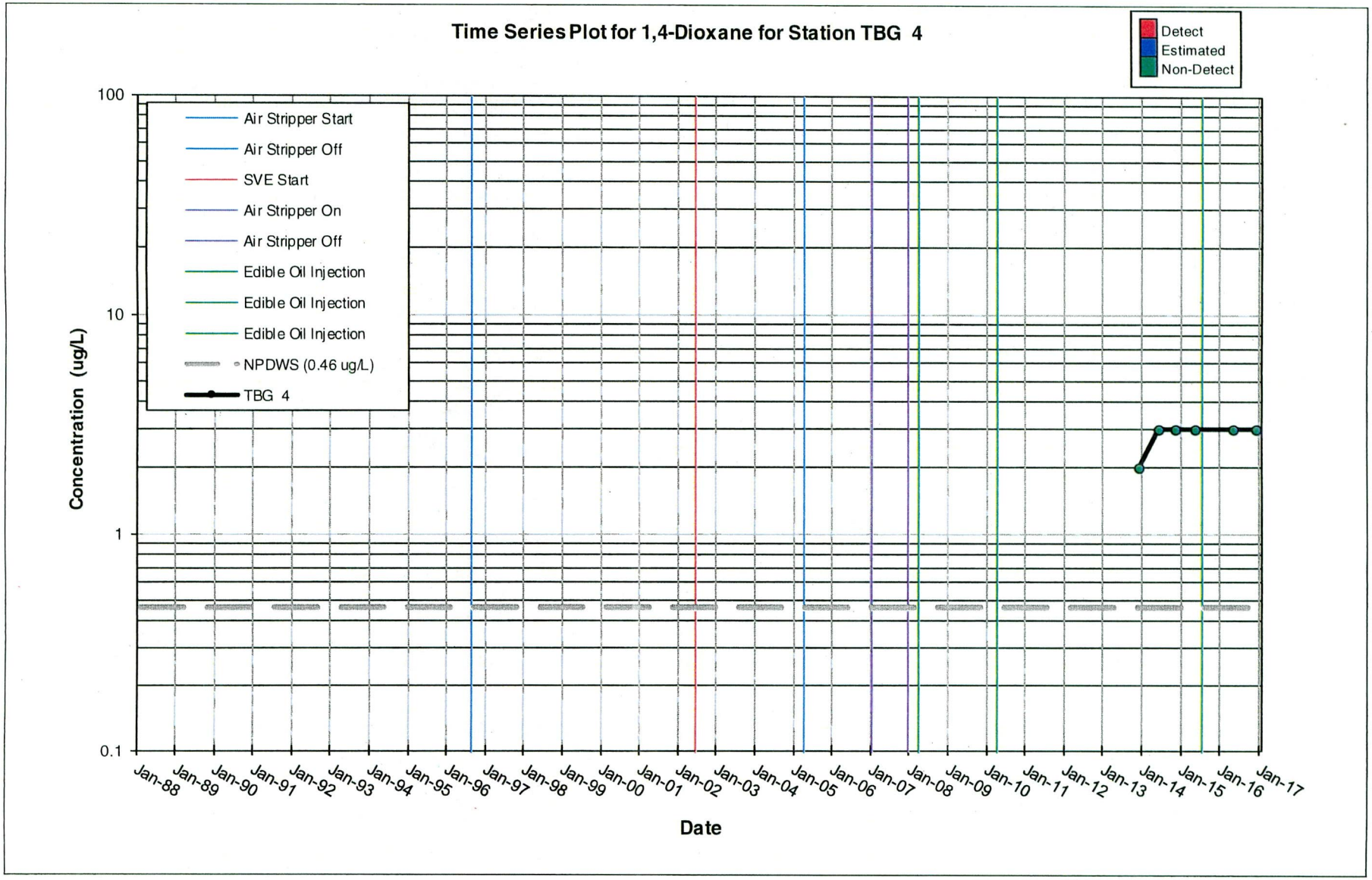

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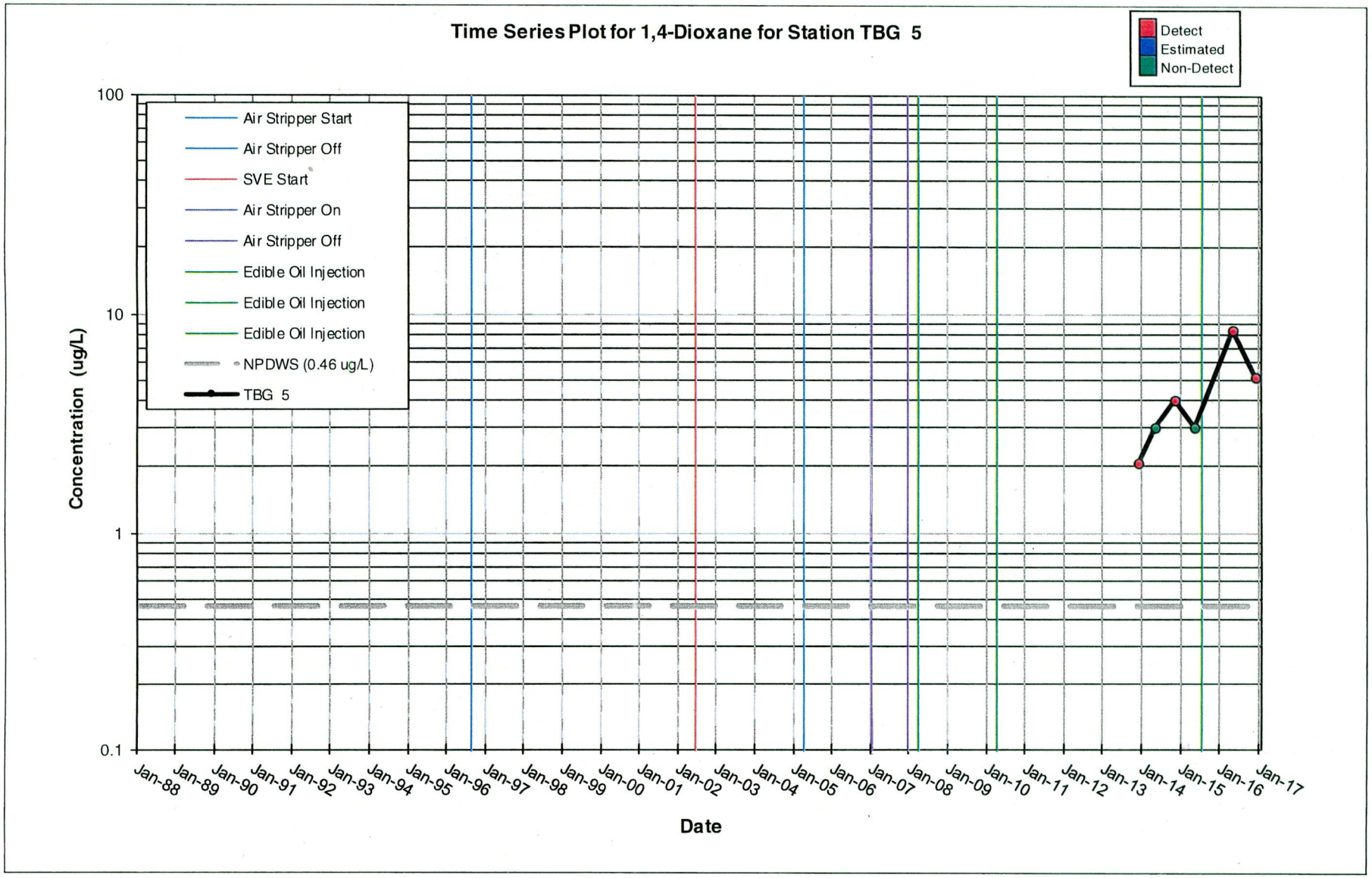

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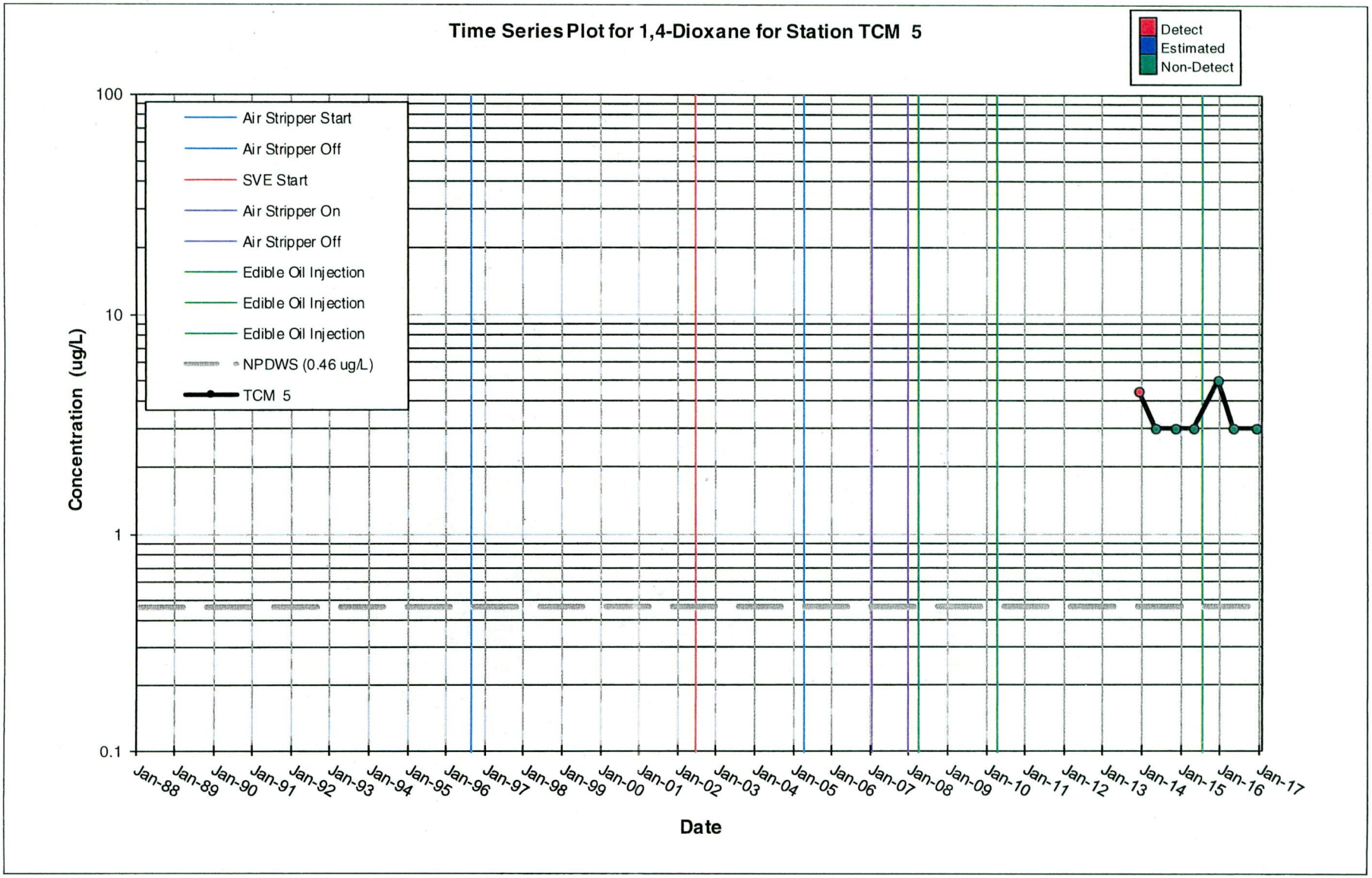

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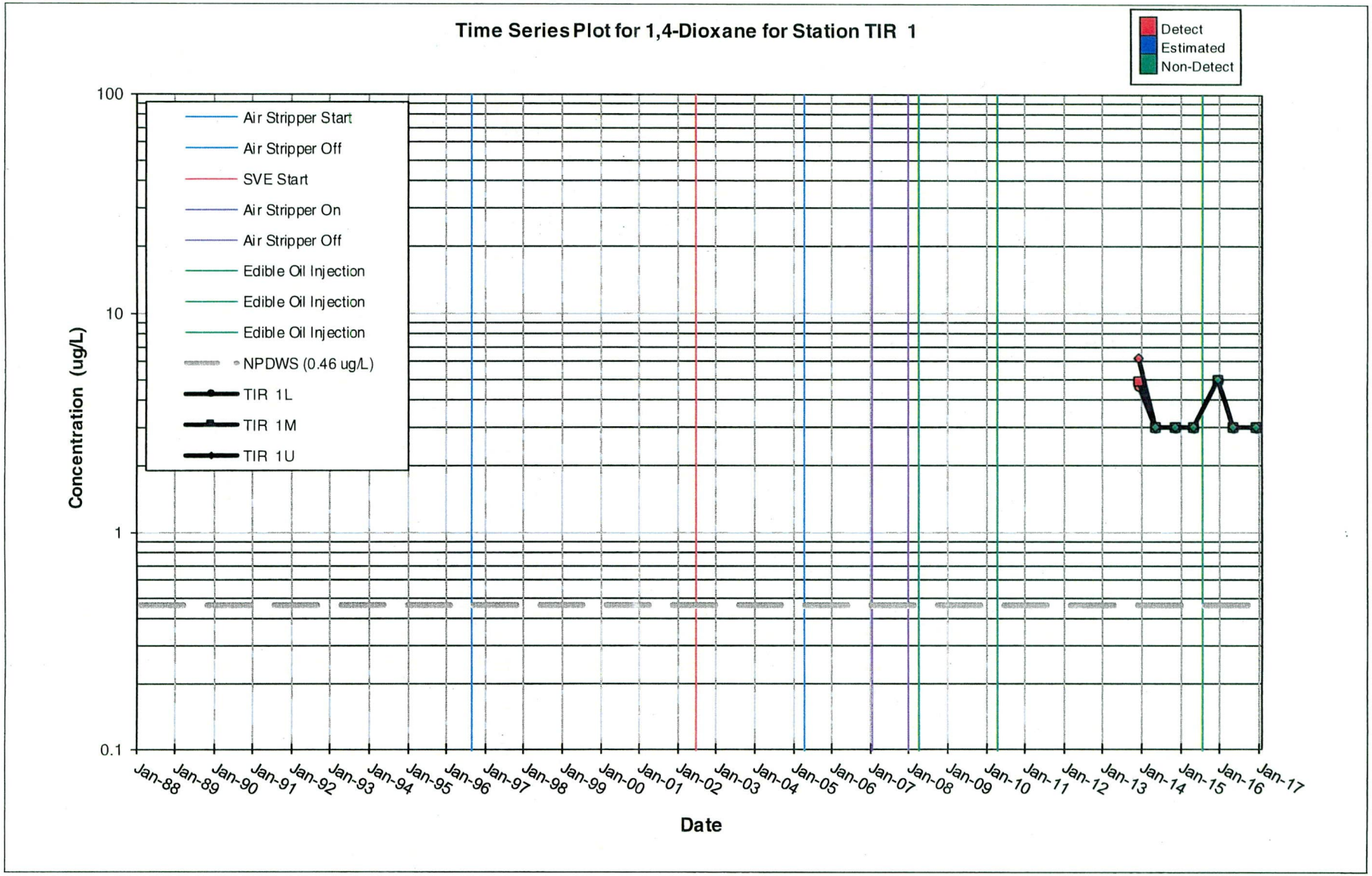

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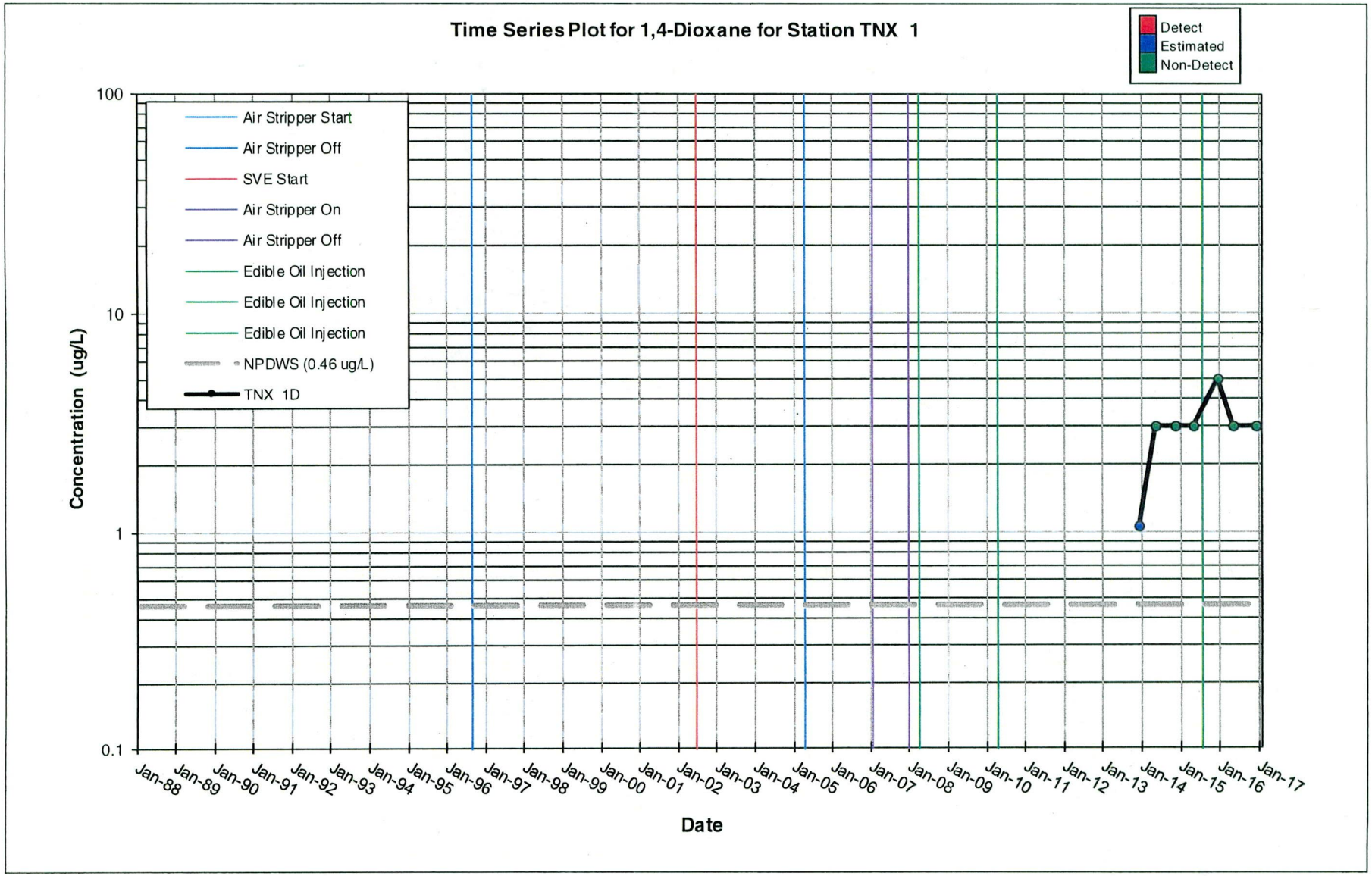

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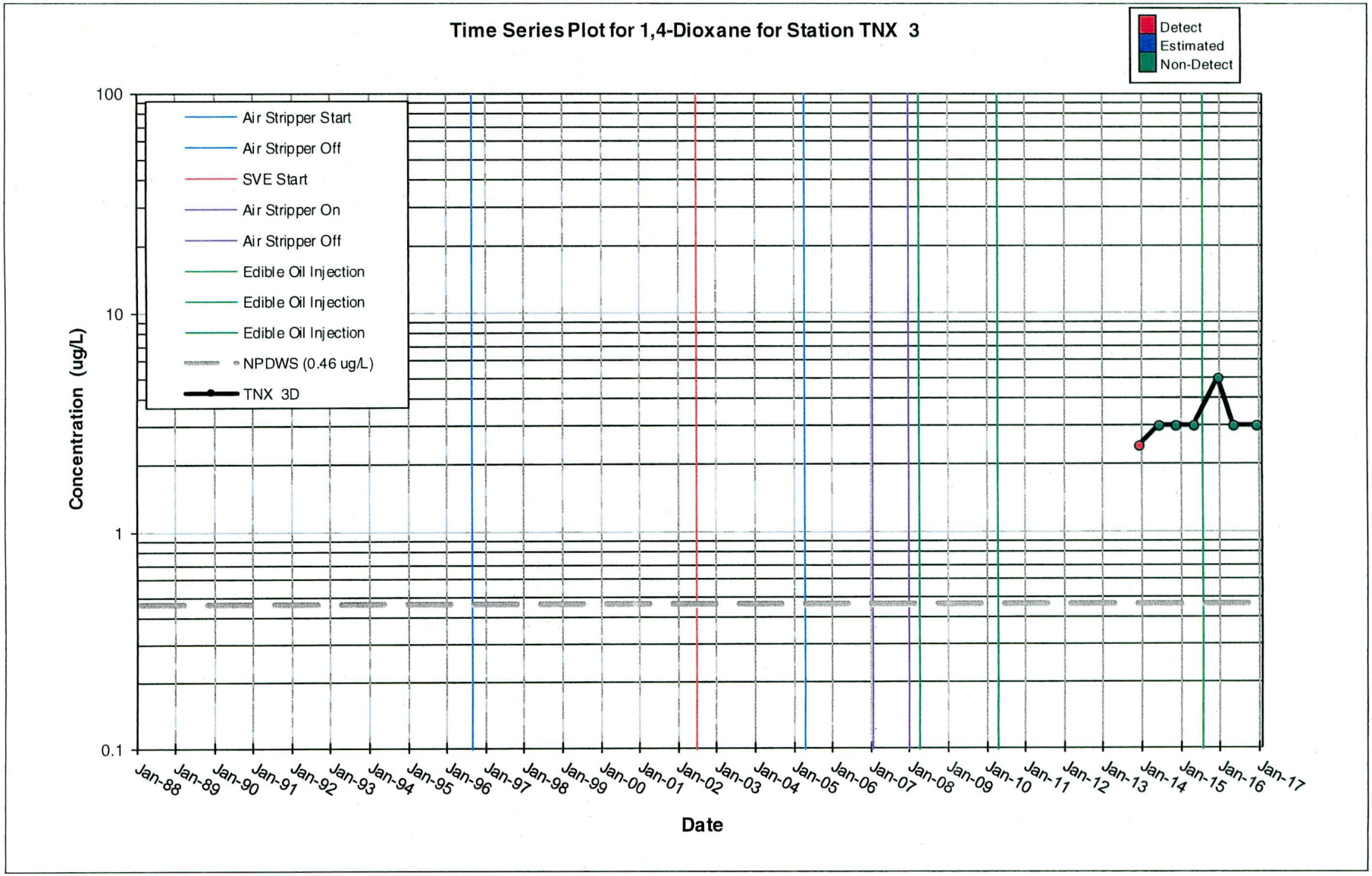

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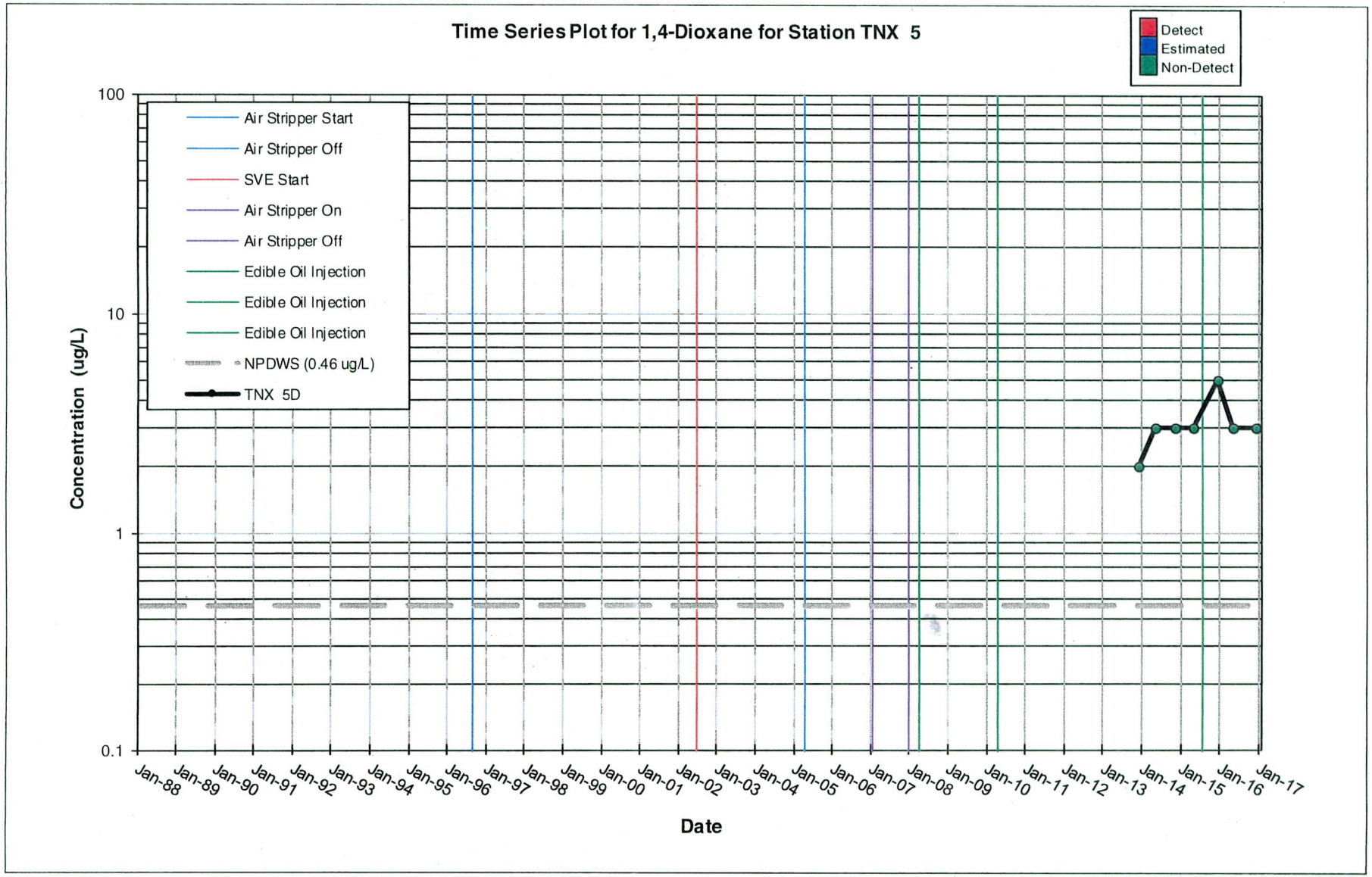

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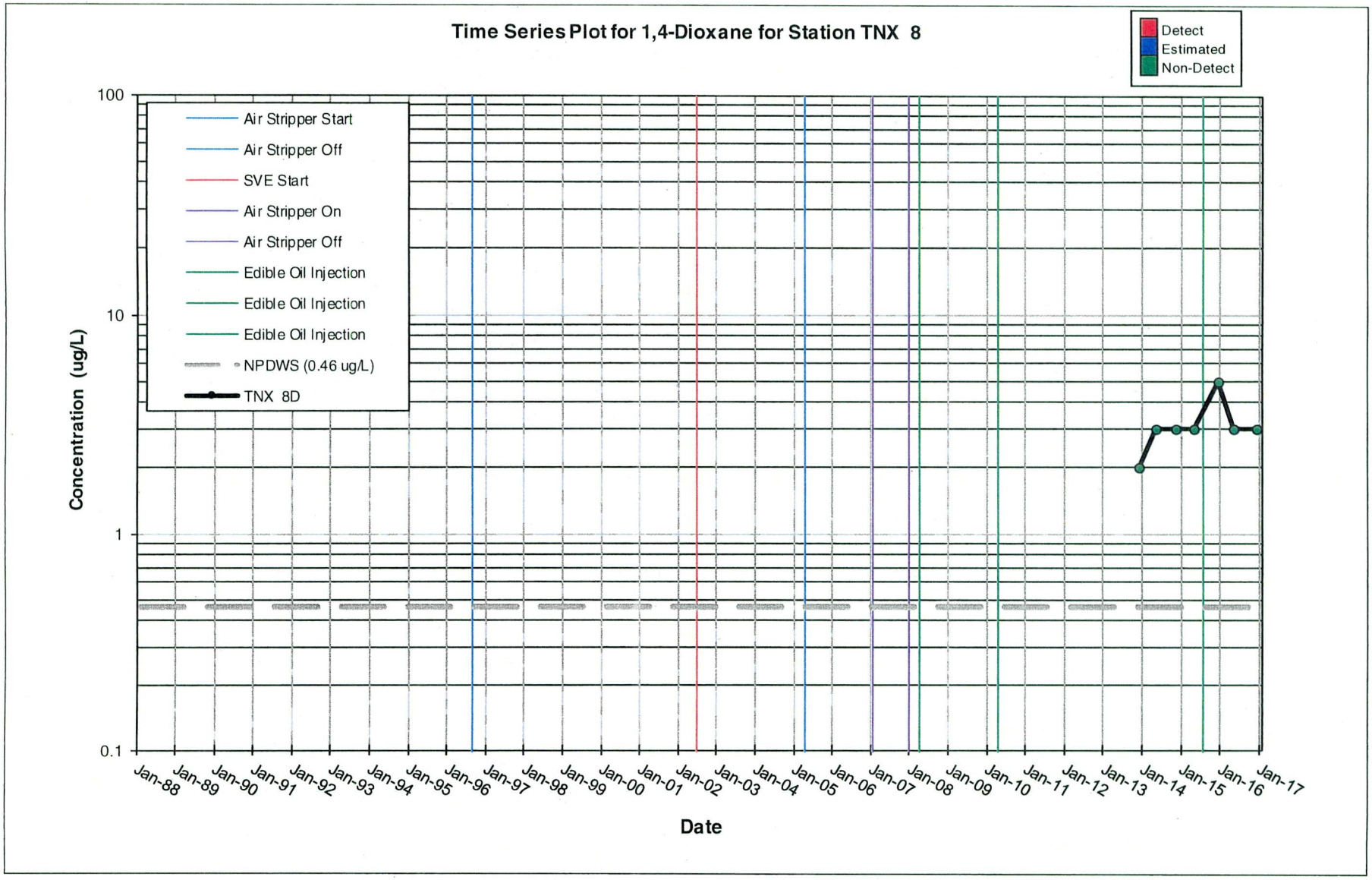

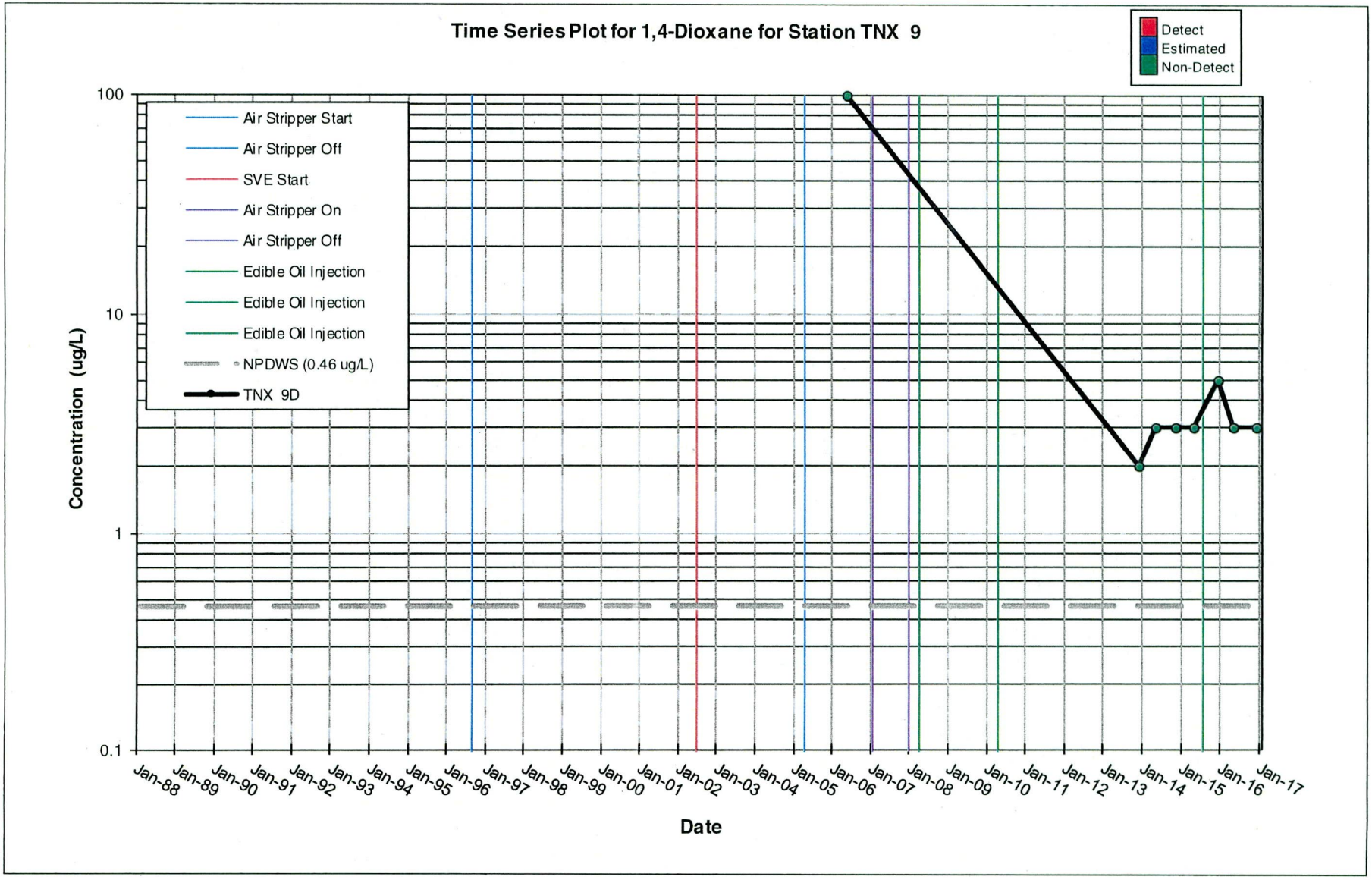
Time Series Plot for 1,4-Dioxane for Station TNX 9
Detect
Estimated
Non-Detect
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Air Stripper Off
SVE Start
Air Stripper On
Air Stripper Off
Edible Oil Injection
Edible Oil Injection
Edible Oil Injection
NPDWS (0.46 ug/L)
TNX 9D
Concentration (ug/L)
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10
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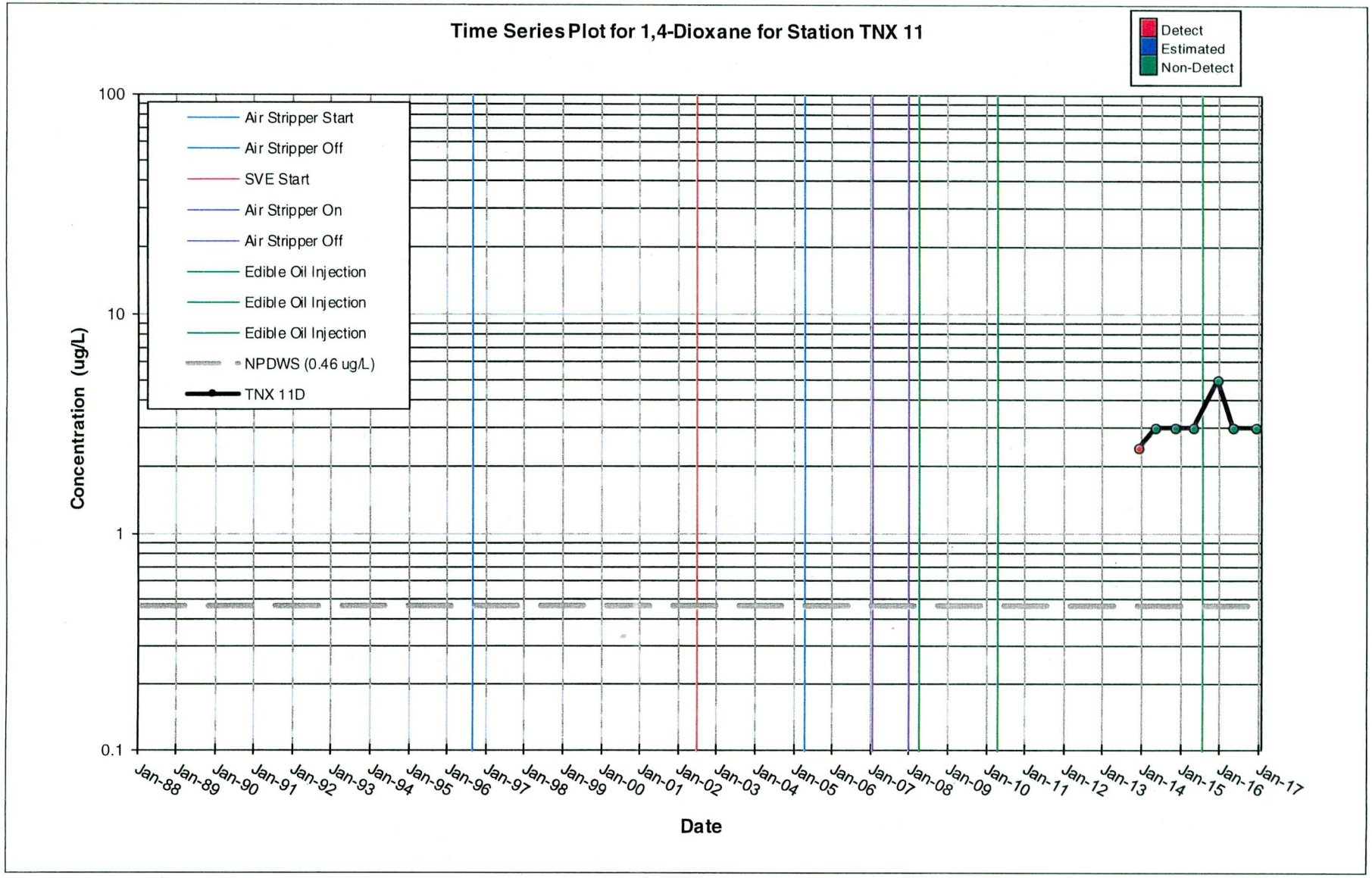

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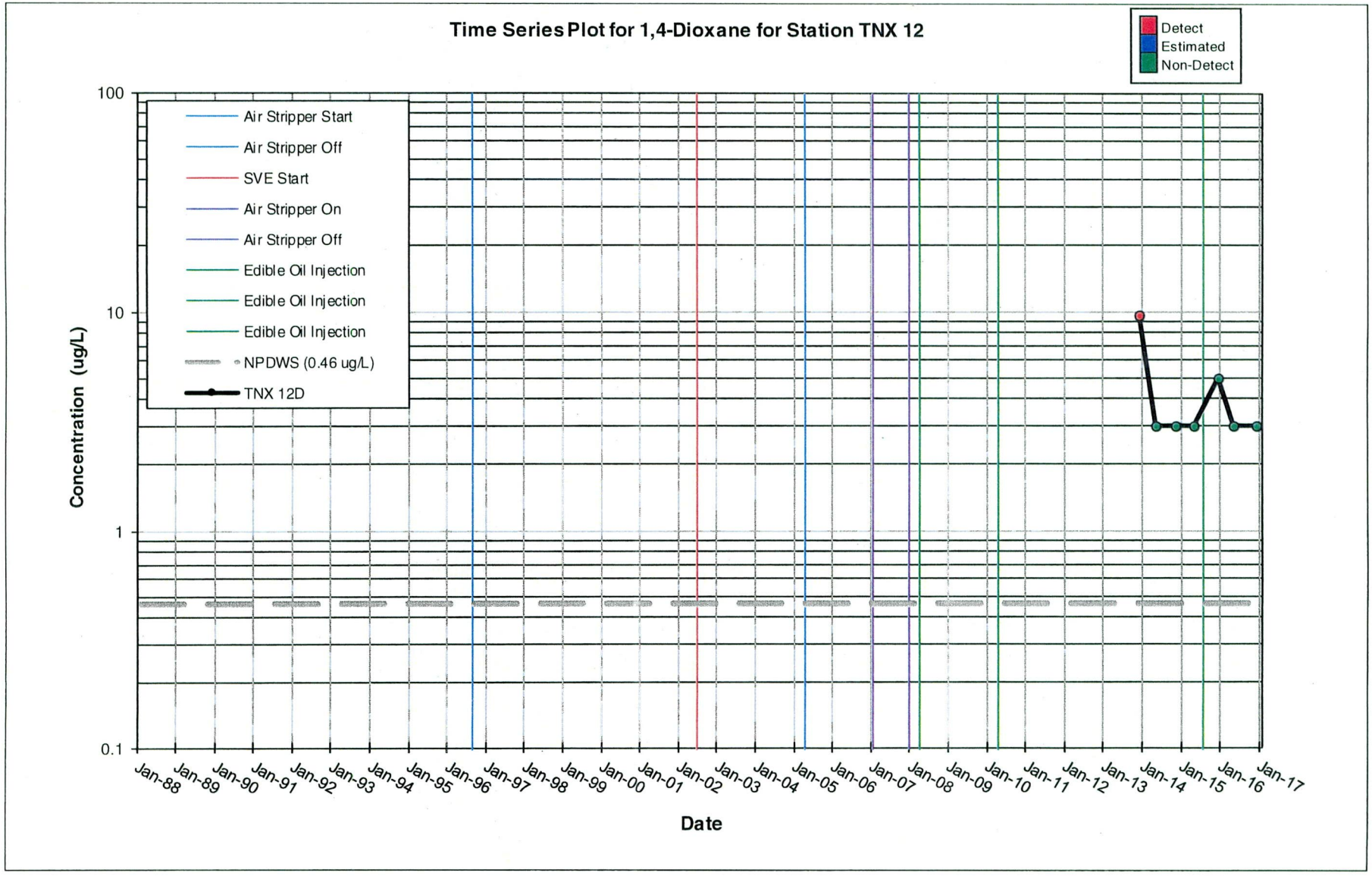

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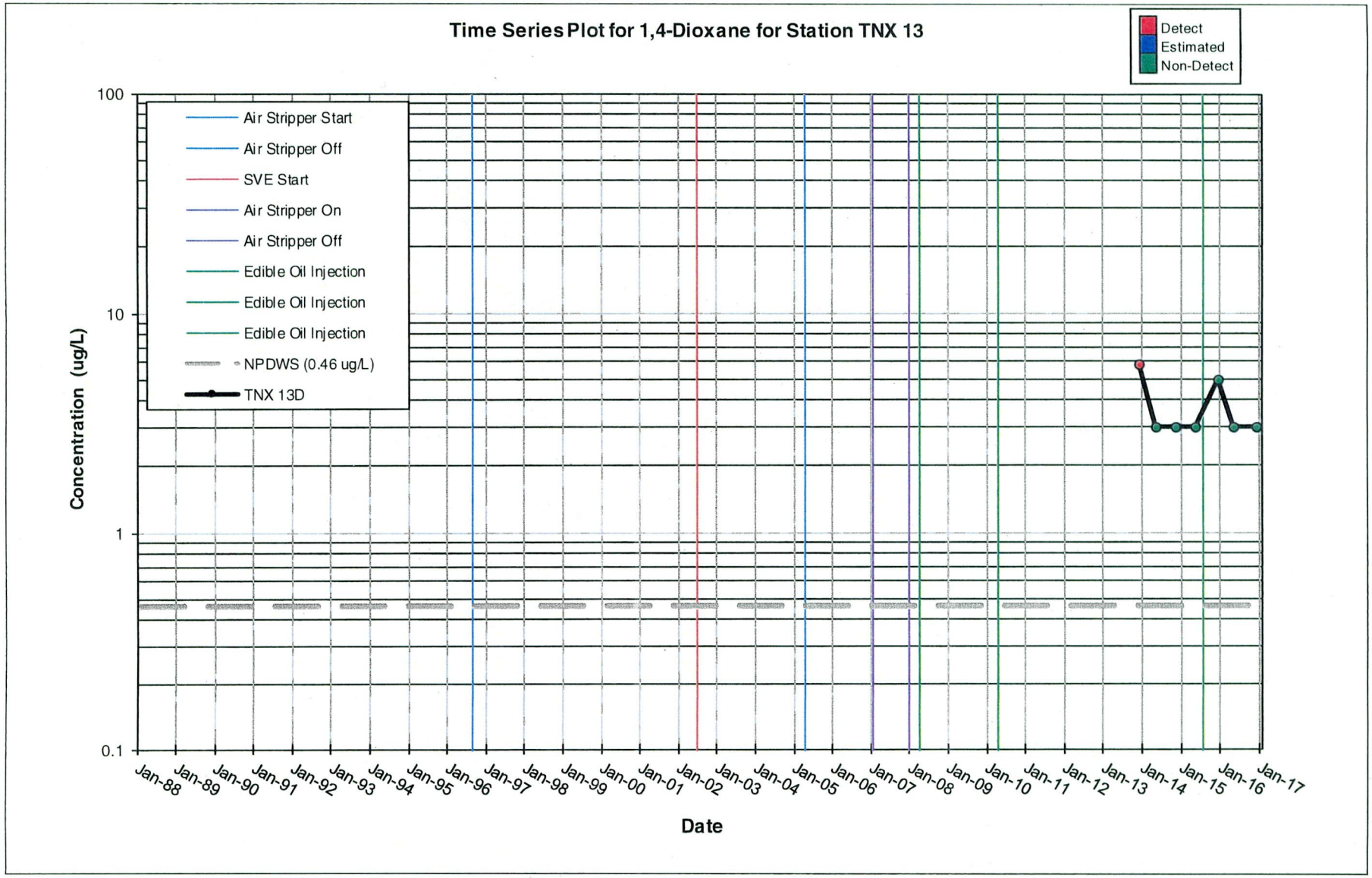

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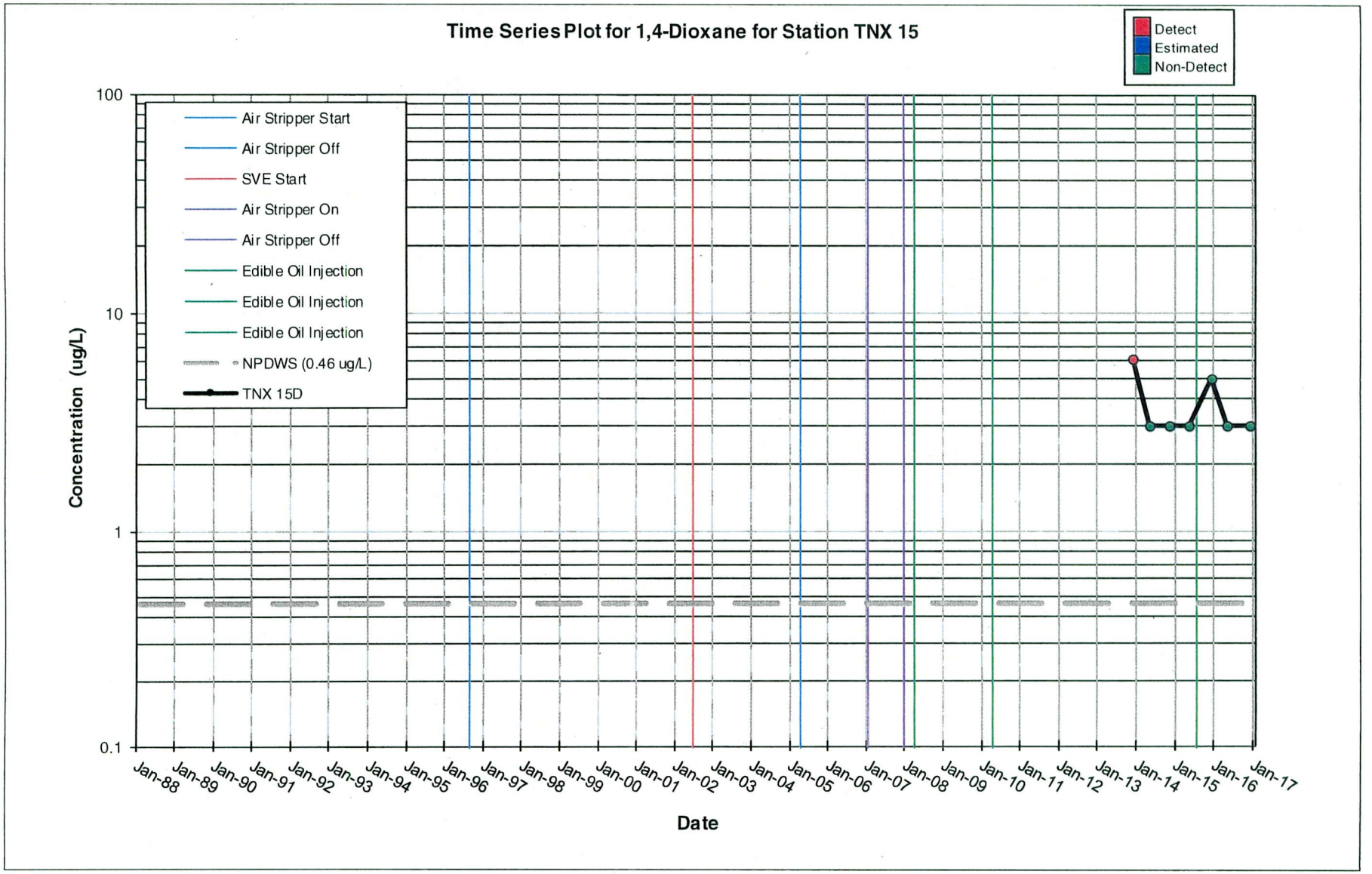

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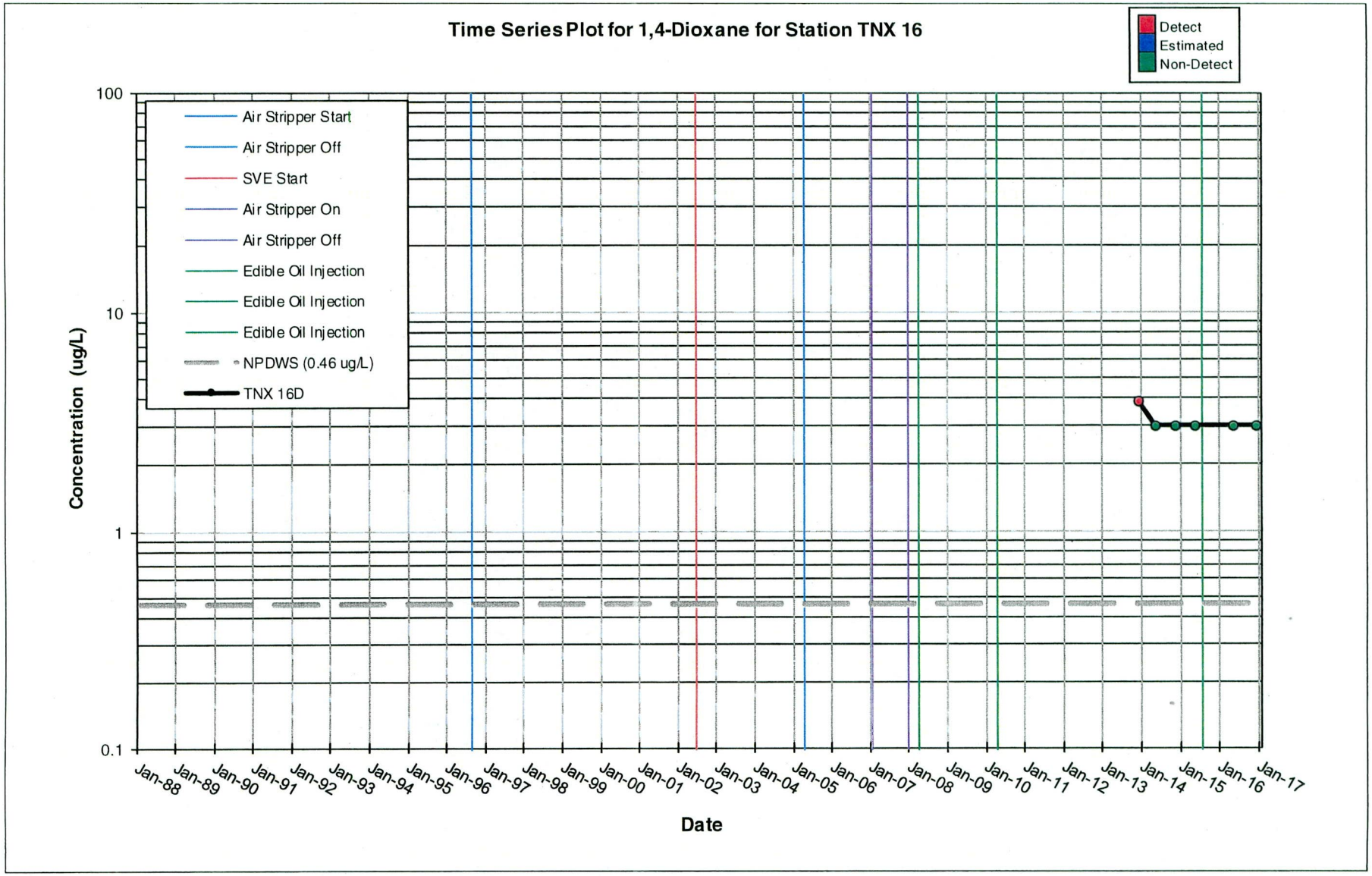

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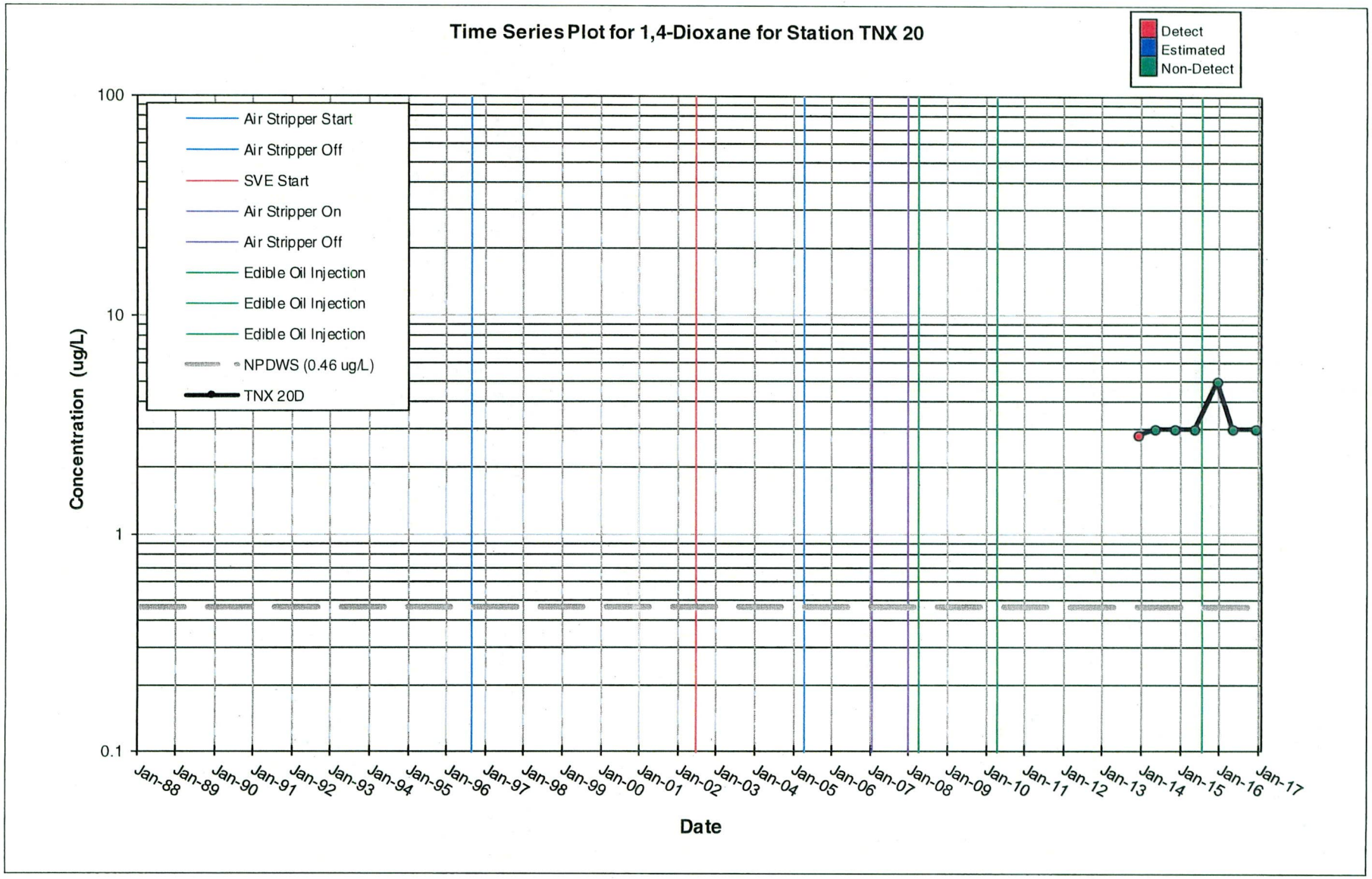

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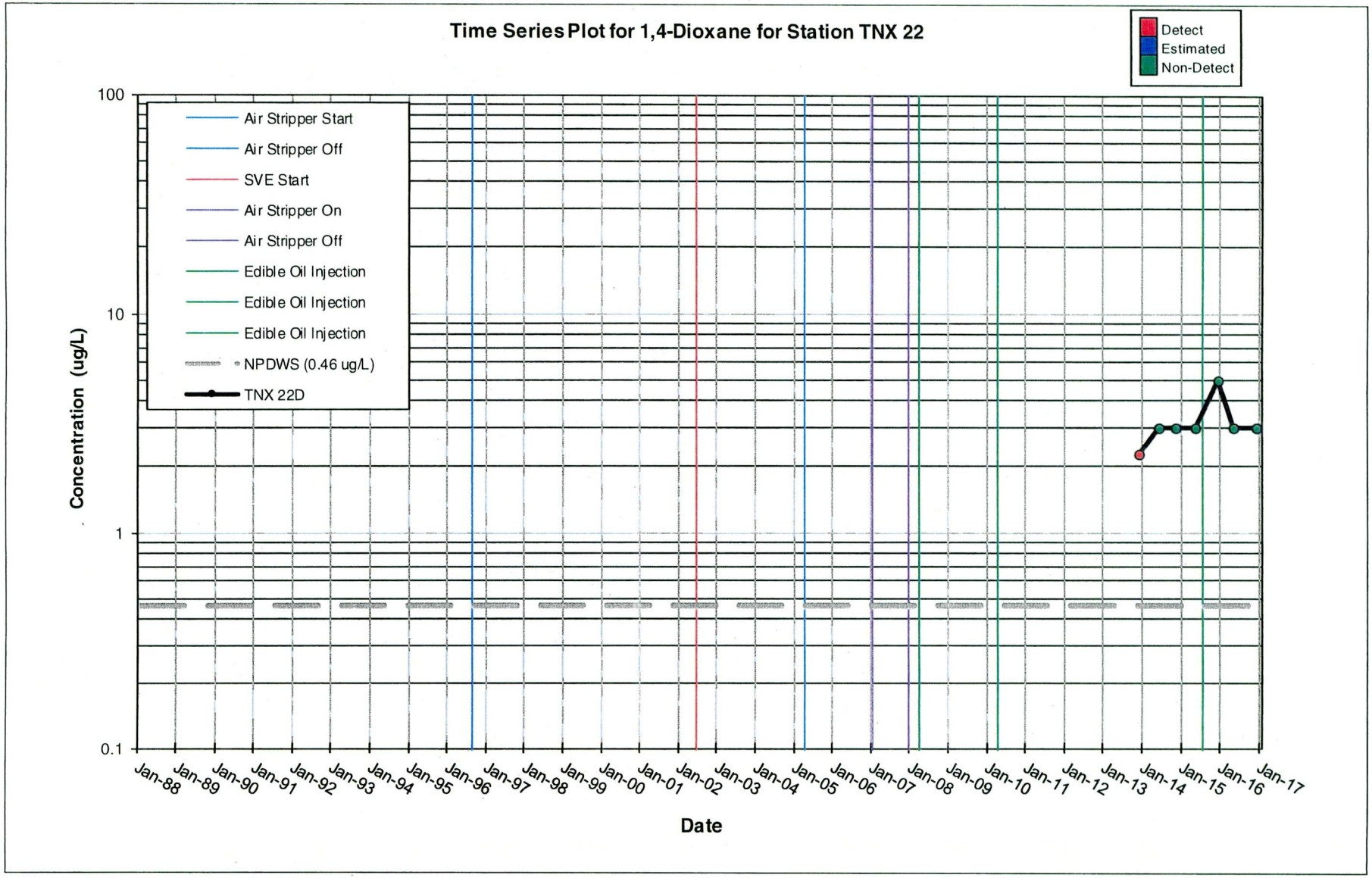

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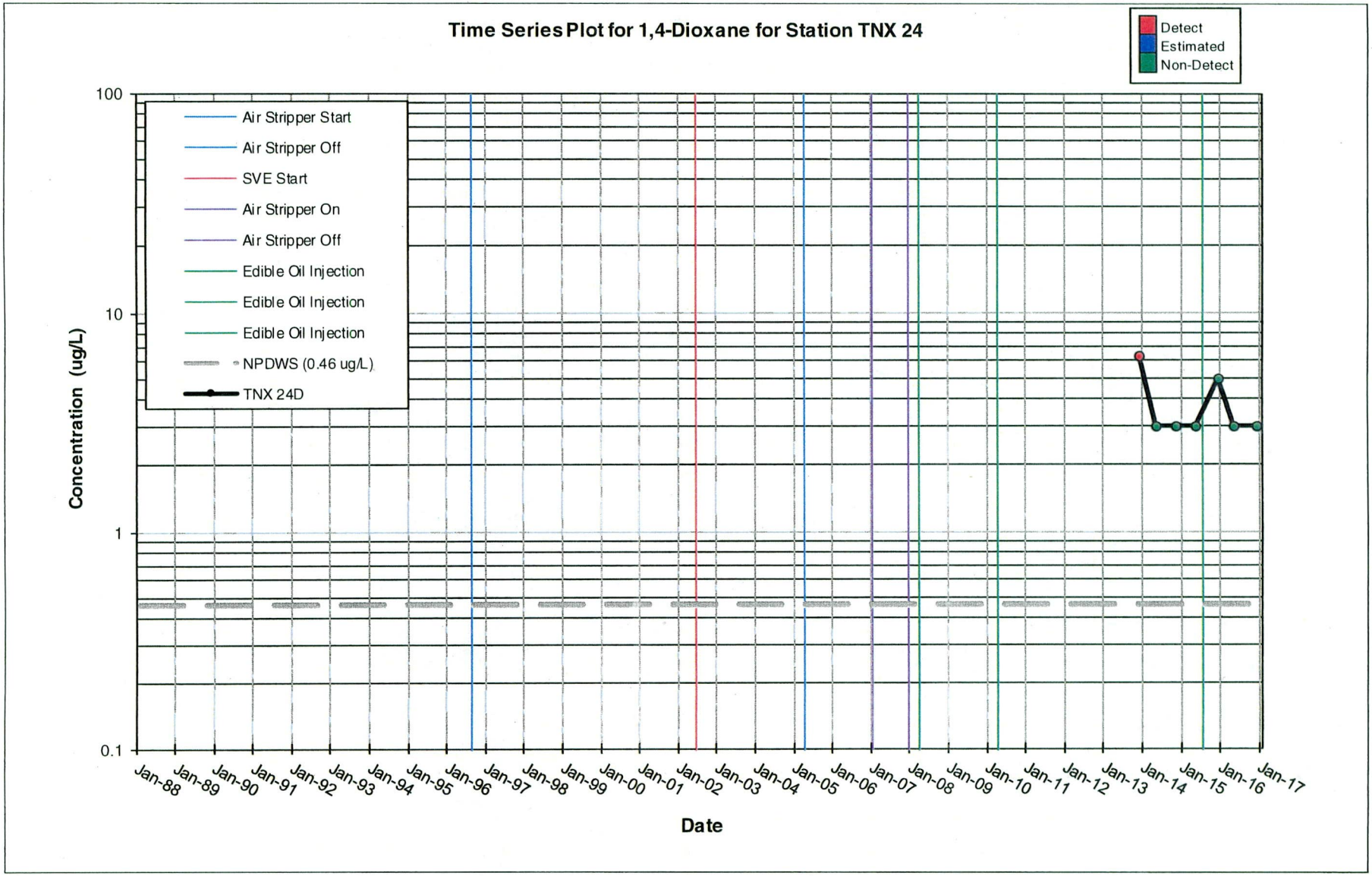

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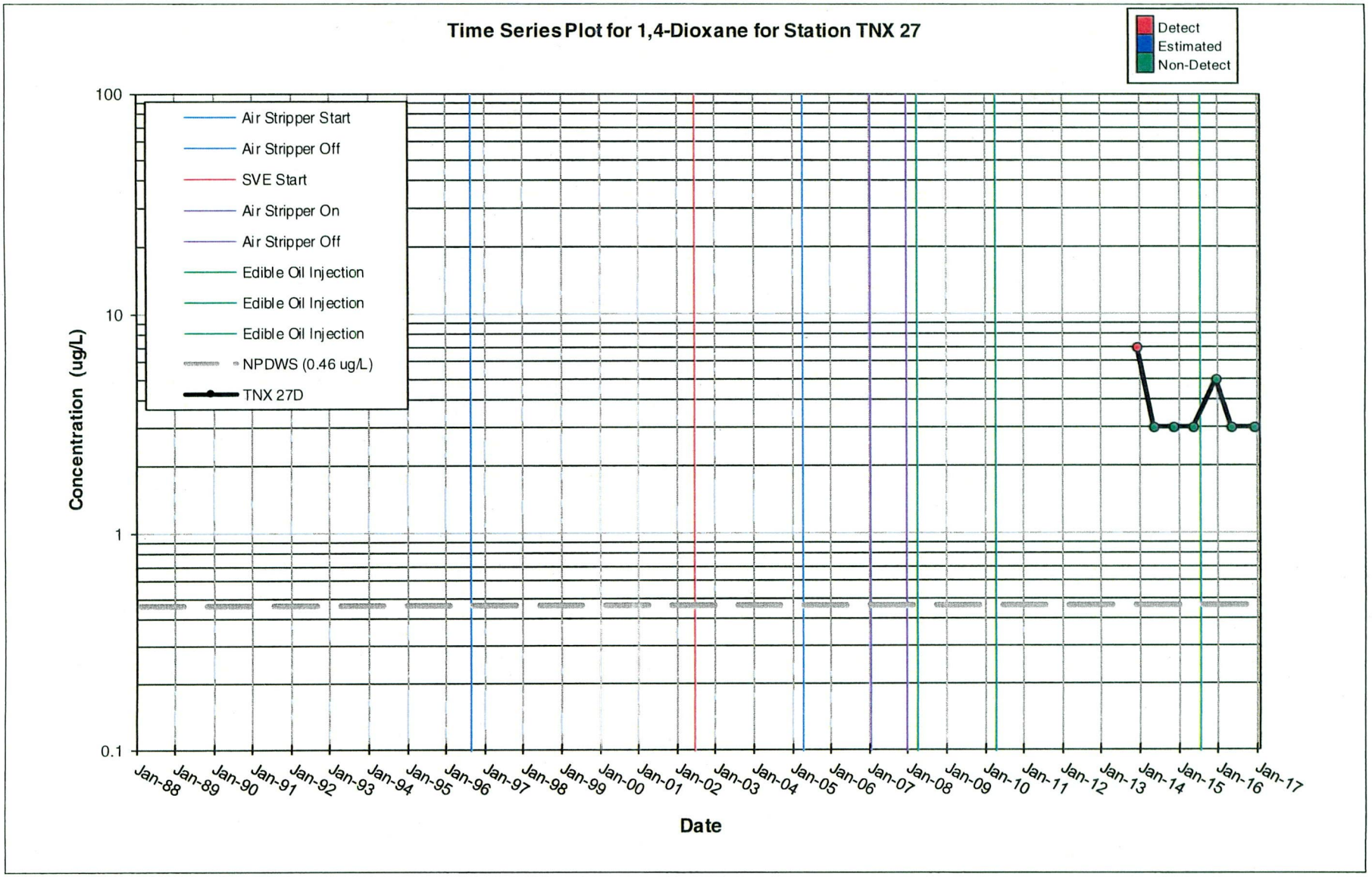

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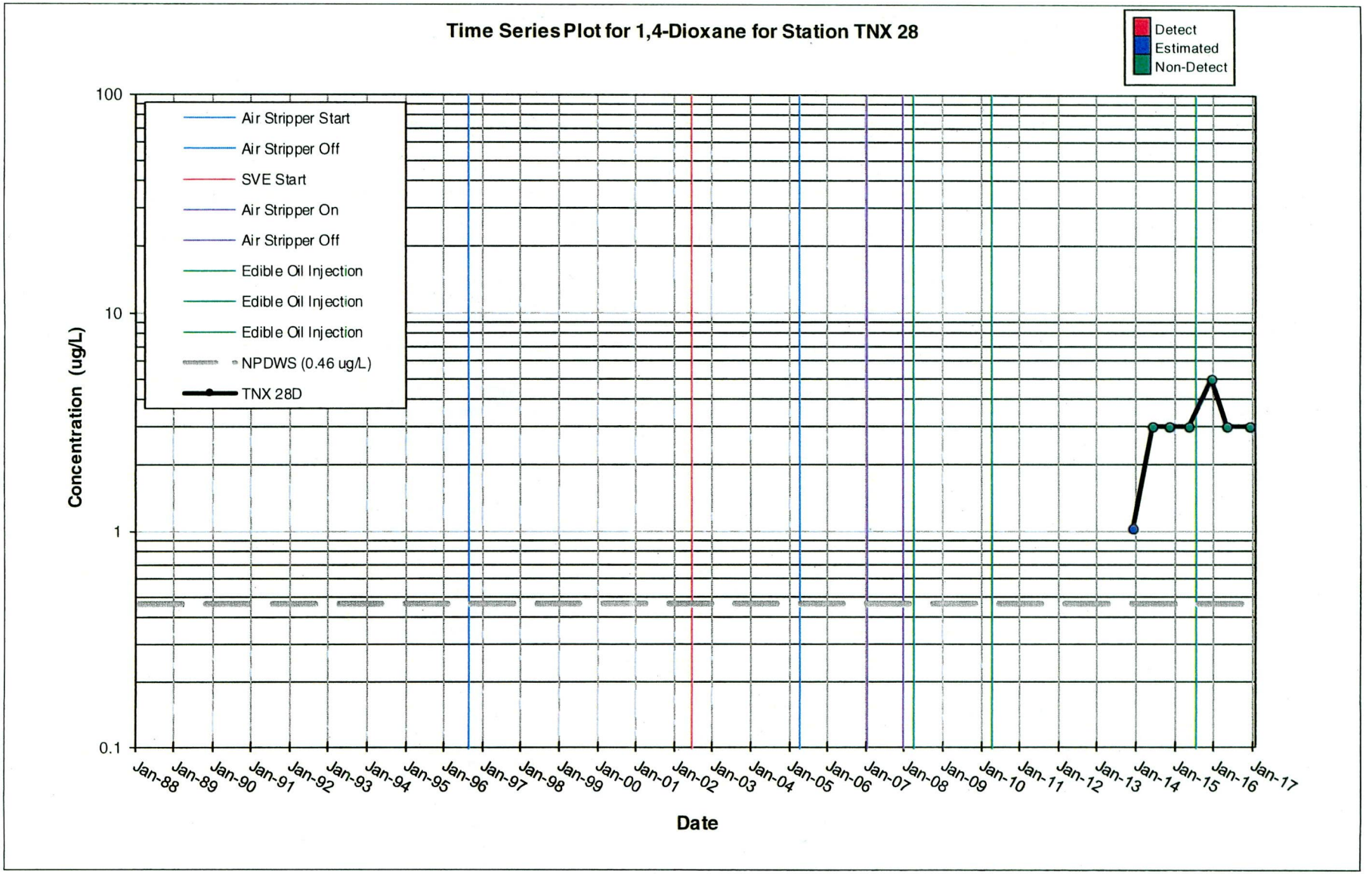

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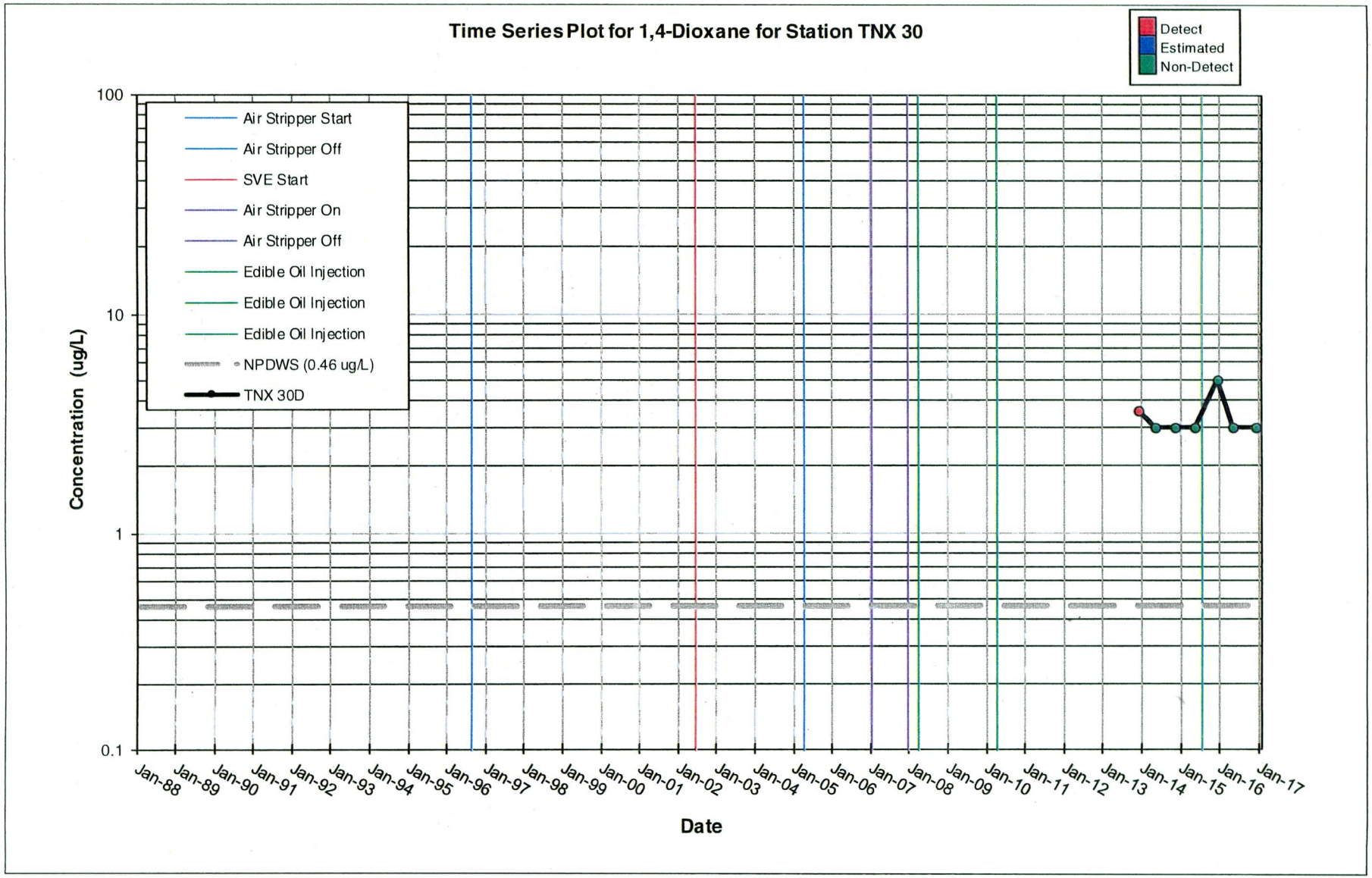

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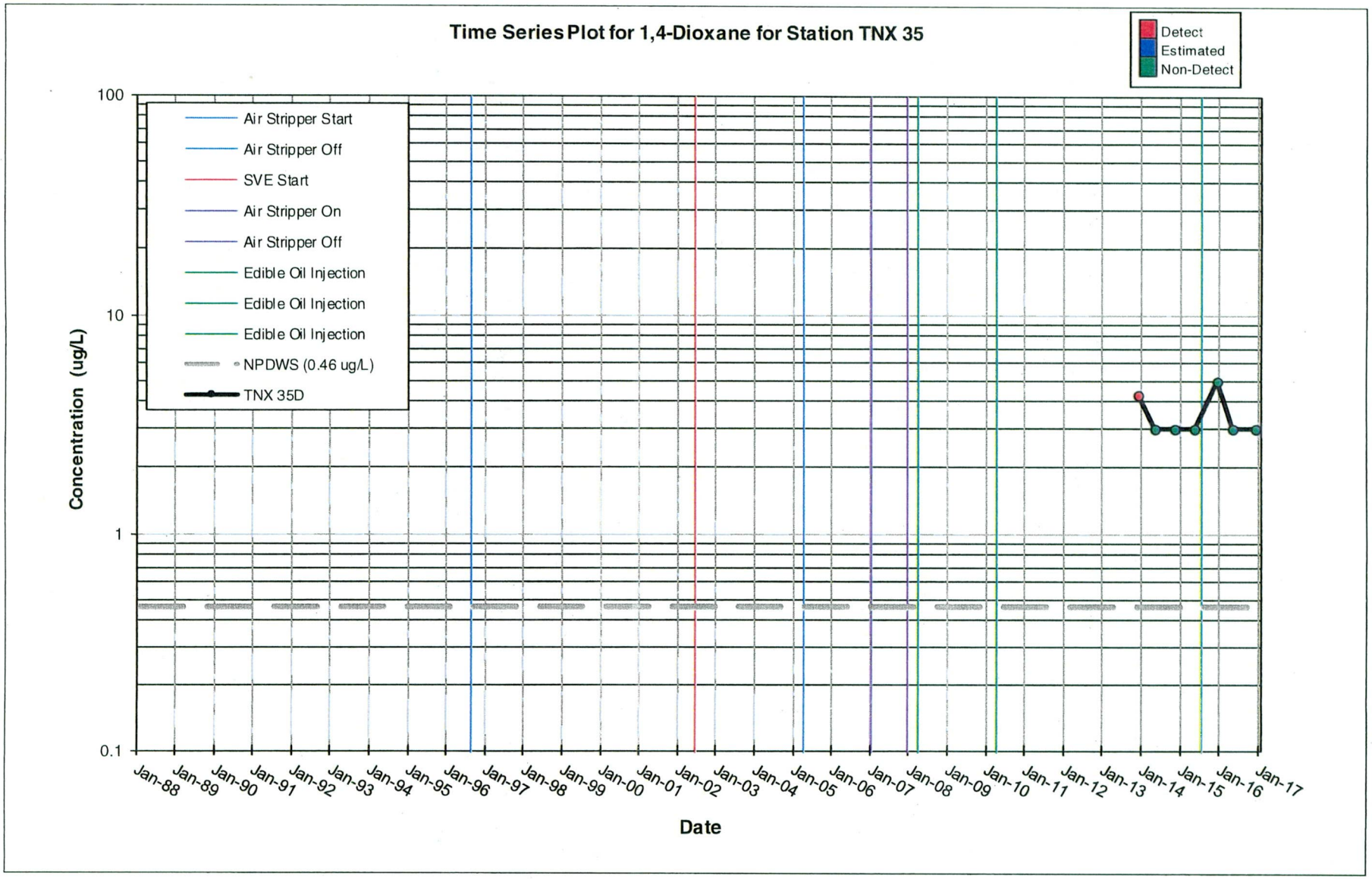

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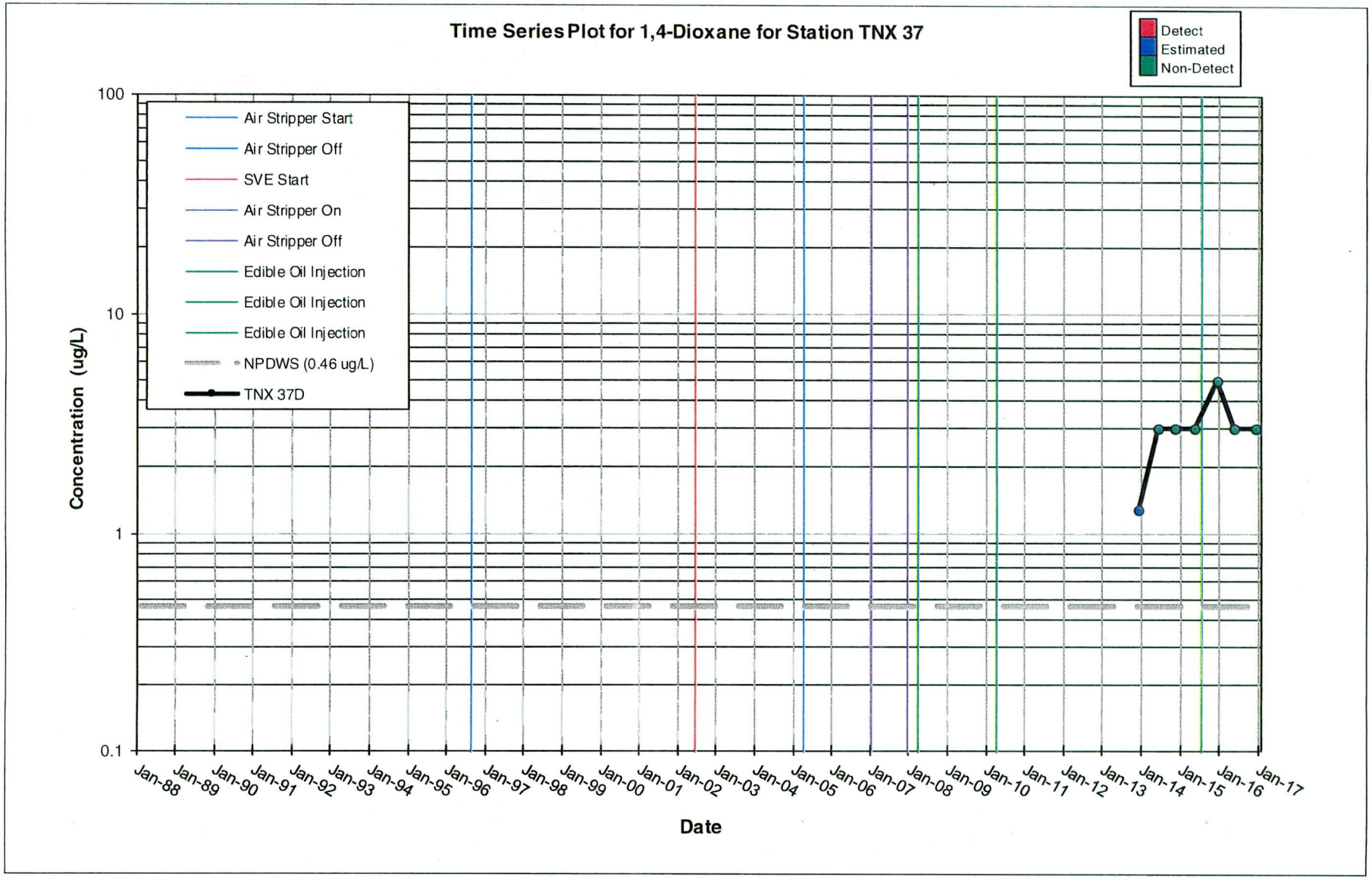

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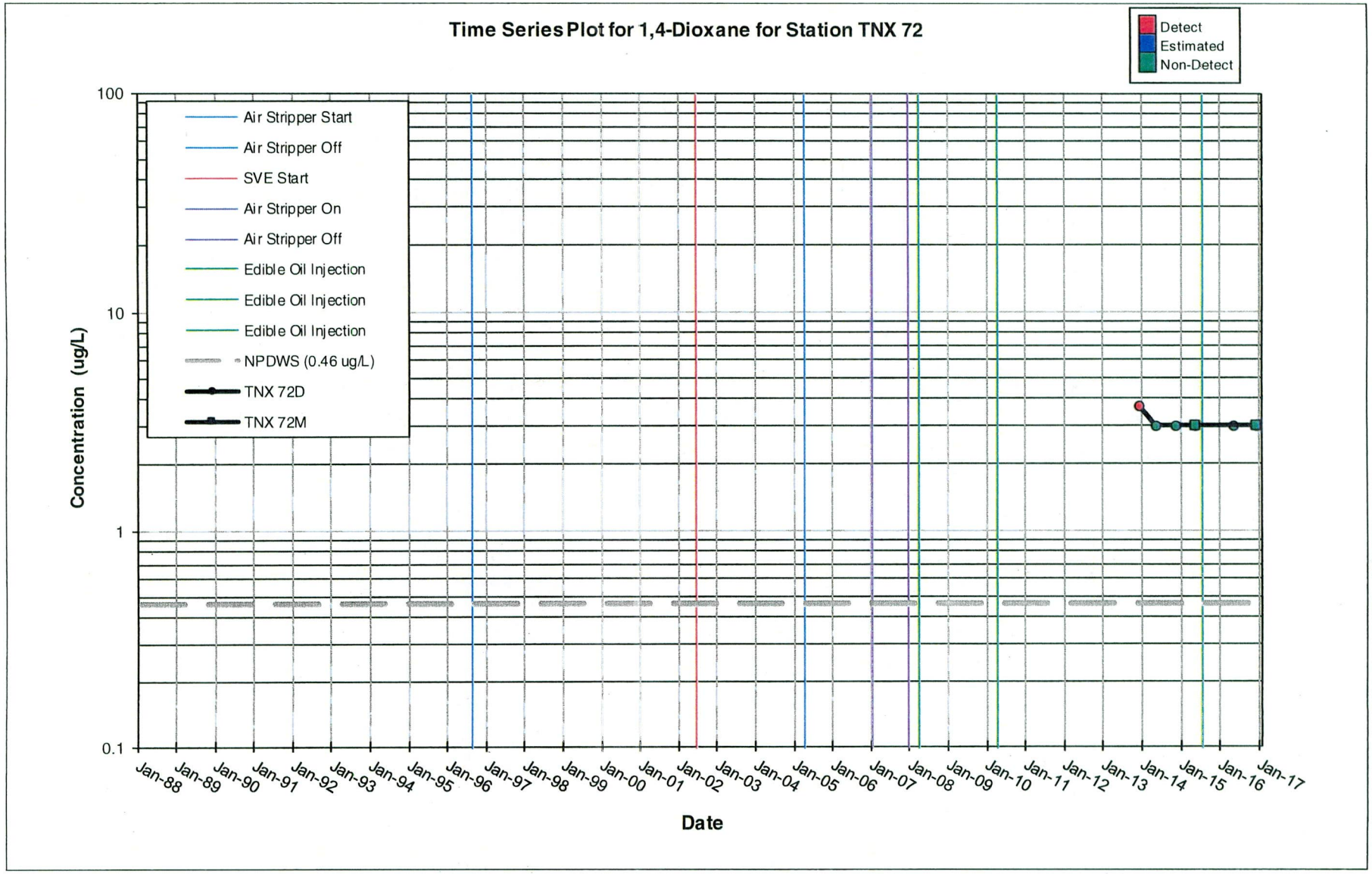

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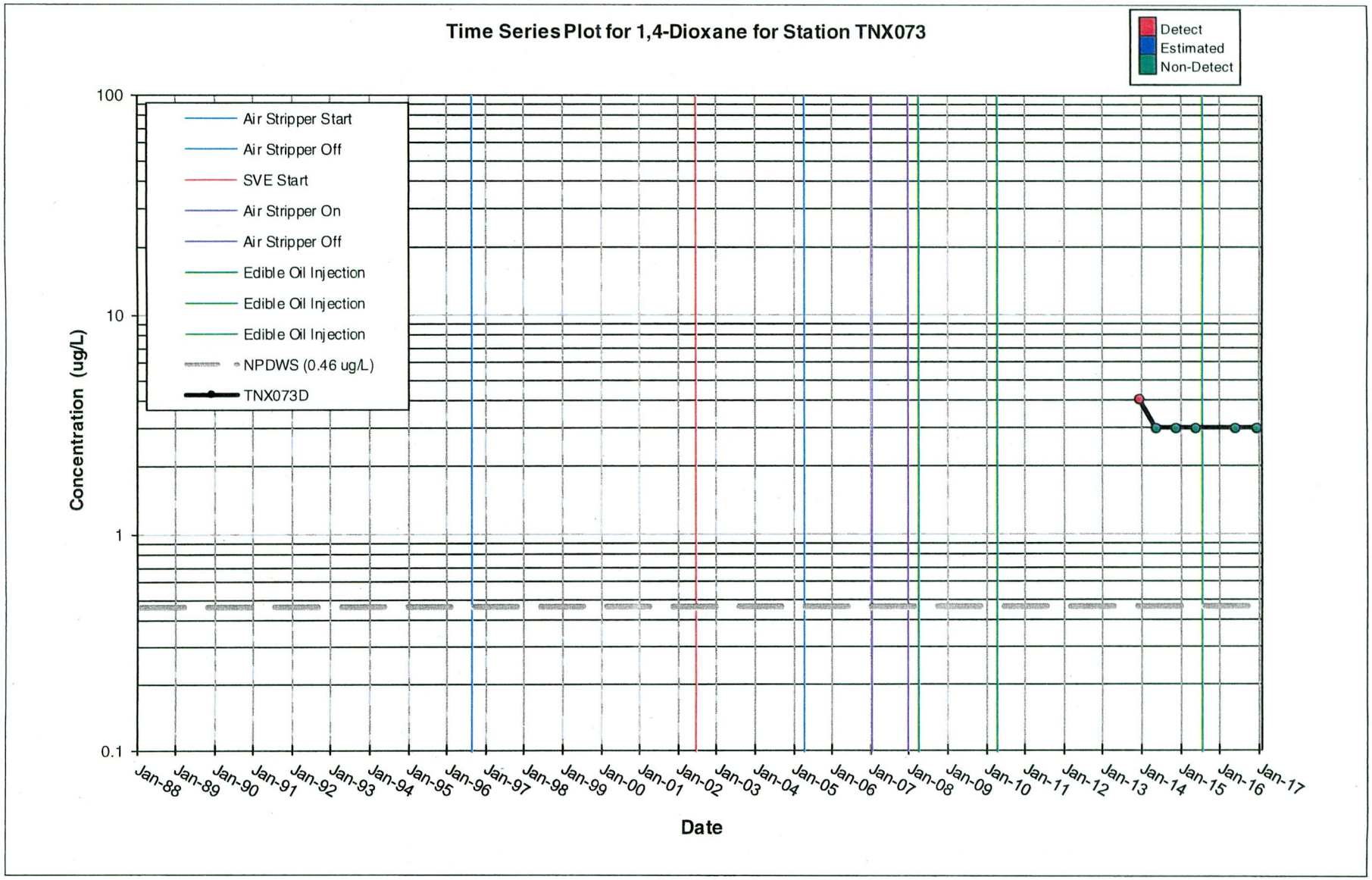

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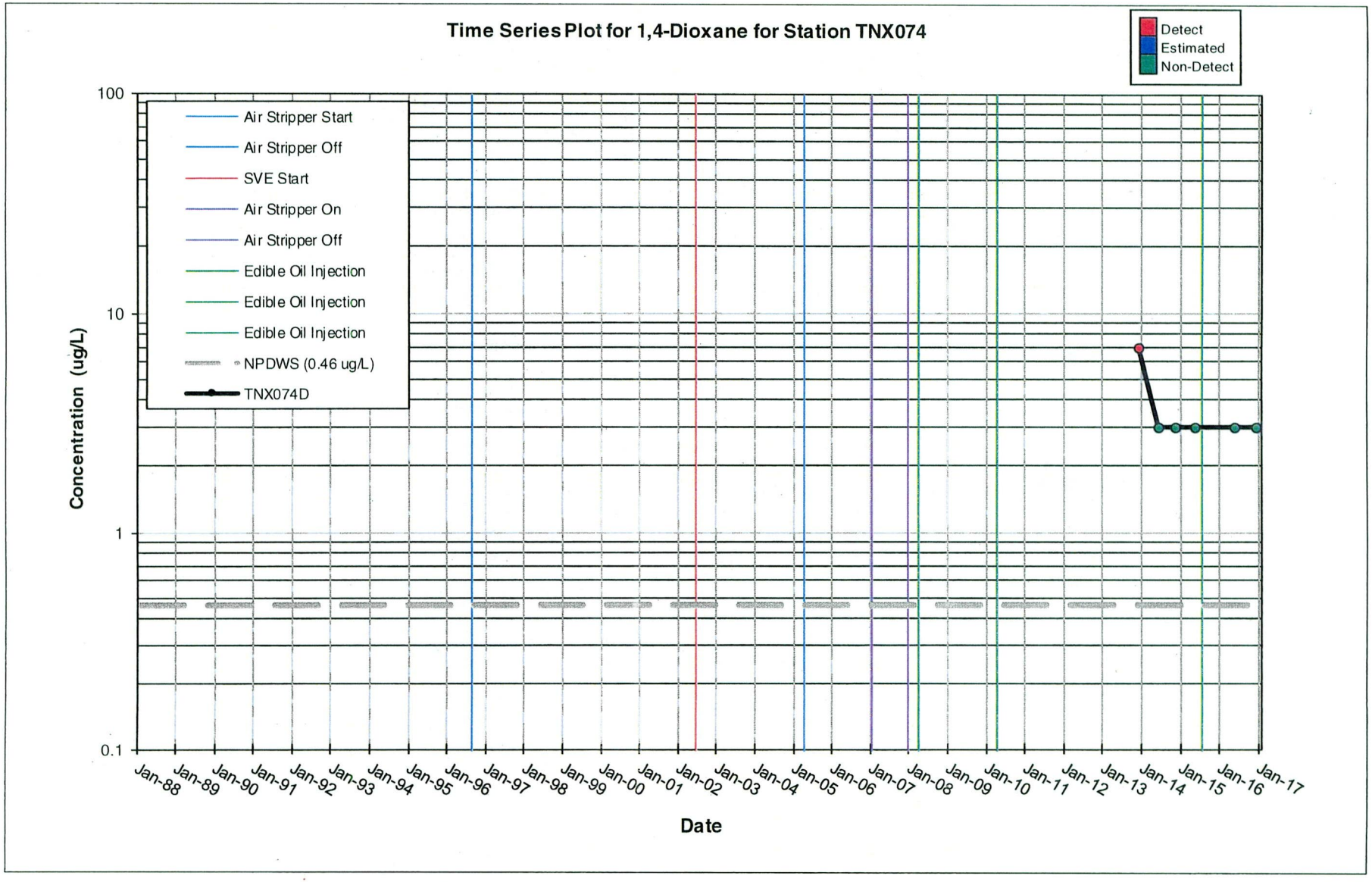

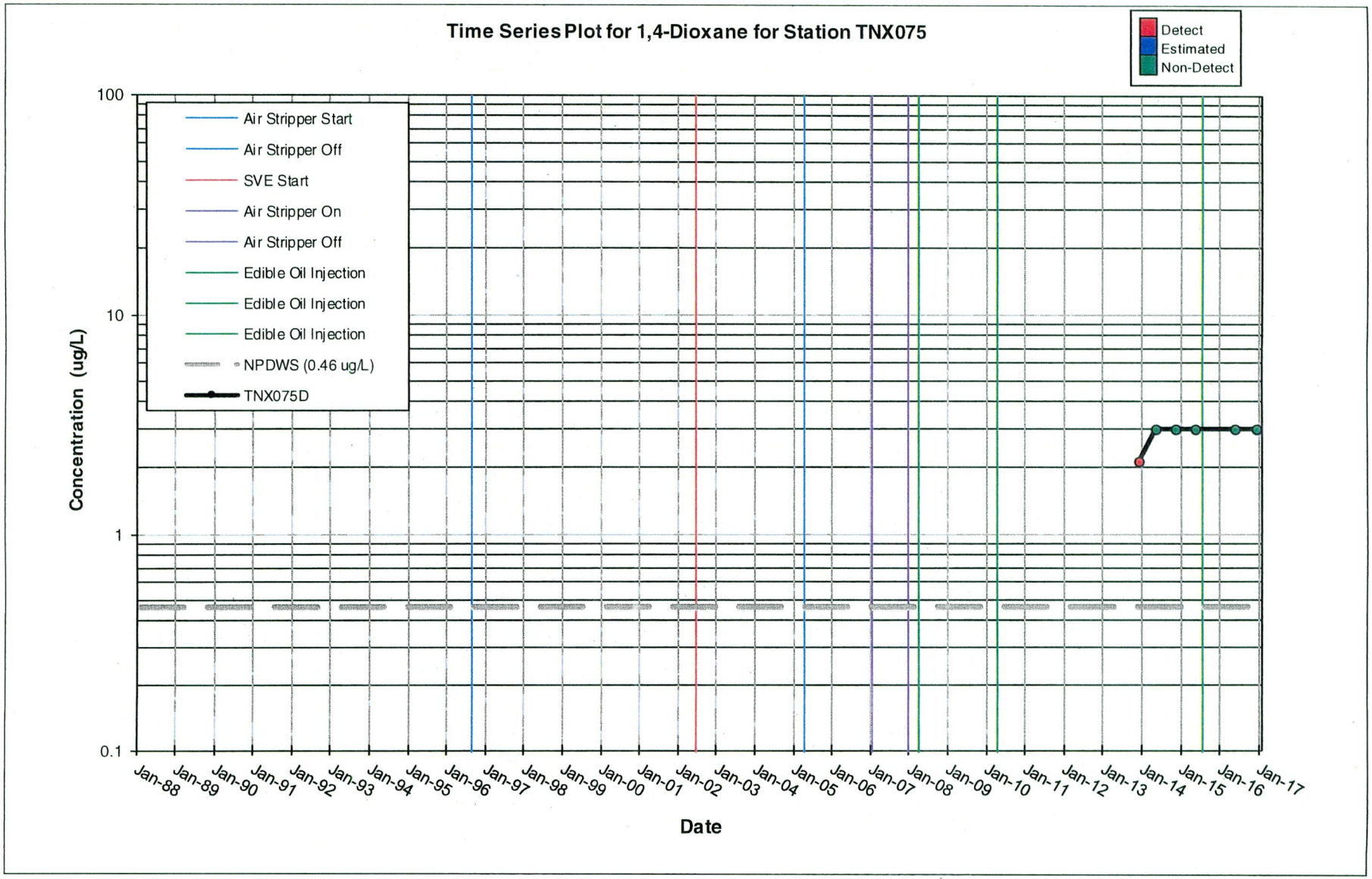
Time Series Plot for 1,4-Dioxane for Station TNX075
Detect
Estimated
Non-Detect
Air Stripper Start
Air Stripper Off
SVE Start
Air Stripper On
Air Stripper Off
Edible Oil Injection
Edible Oil Injection
Edible Oil Injection
NPDWS (0.46 ug/L)
TNX075D
100
10
1
0.1
Concentration (ug/L)
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
Jan-04
Jan-05
Jan-06
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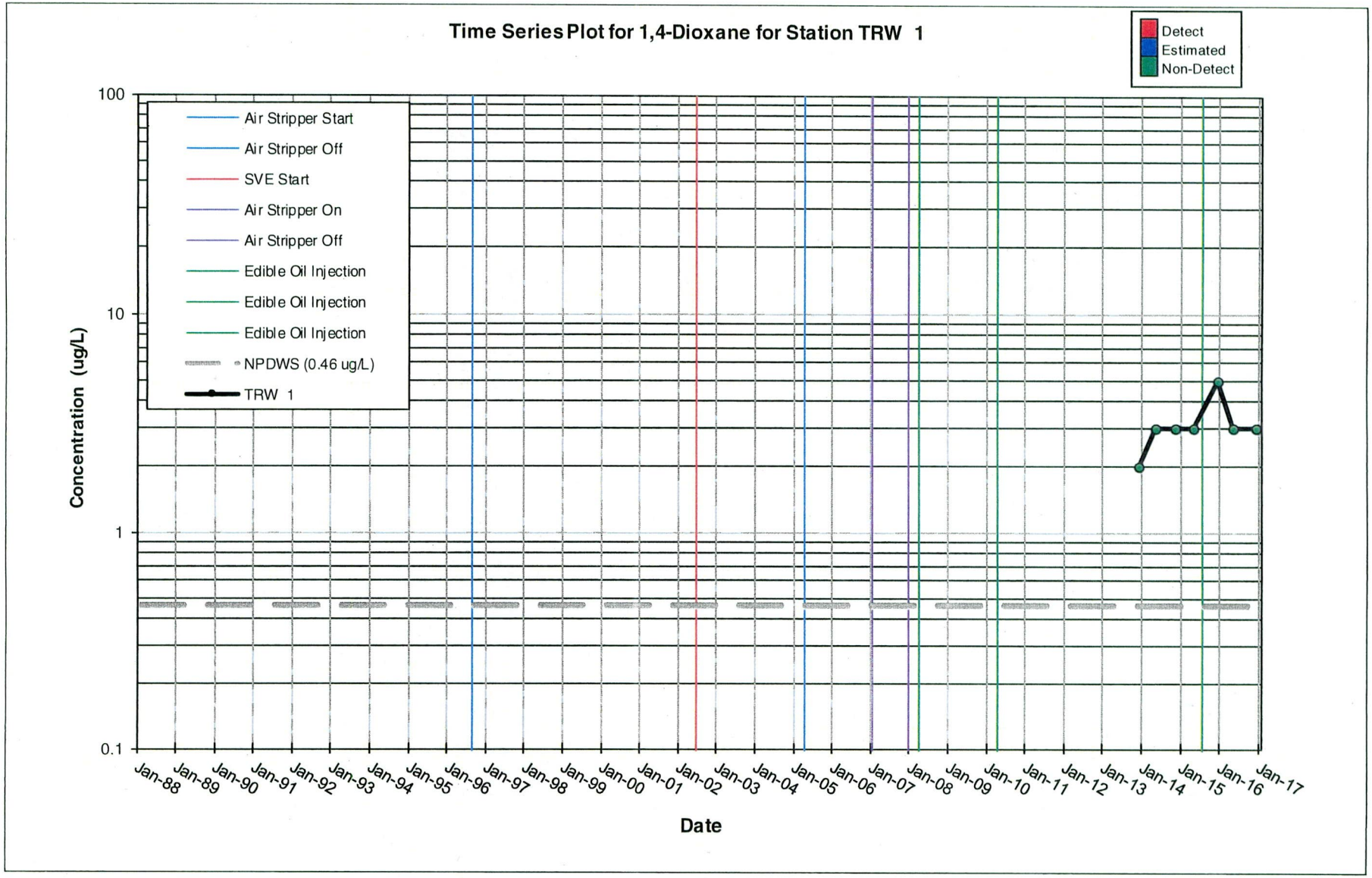
Jan-15
Jan-16
Jan-17
Date


Time Series Plot for 1,4-Dioxane for Station TRW 1
Detect
Estimated
Non-Detect
Air Stripper Start
Air Stripper Off
SVE Start
Air Stripper On
Air Stripper Off
Edible Oil Injection
Edible Oil Injection
Edible Oil Injection
NPDWS (0.46 ug/L)
TRW 1
Concentration (ug/L)
100
10
1
0.1
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
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Jan-16
Jan-17
Date

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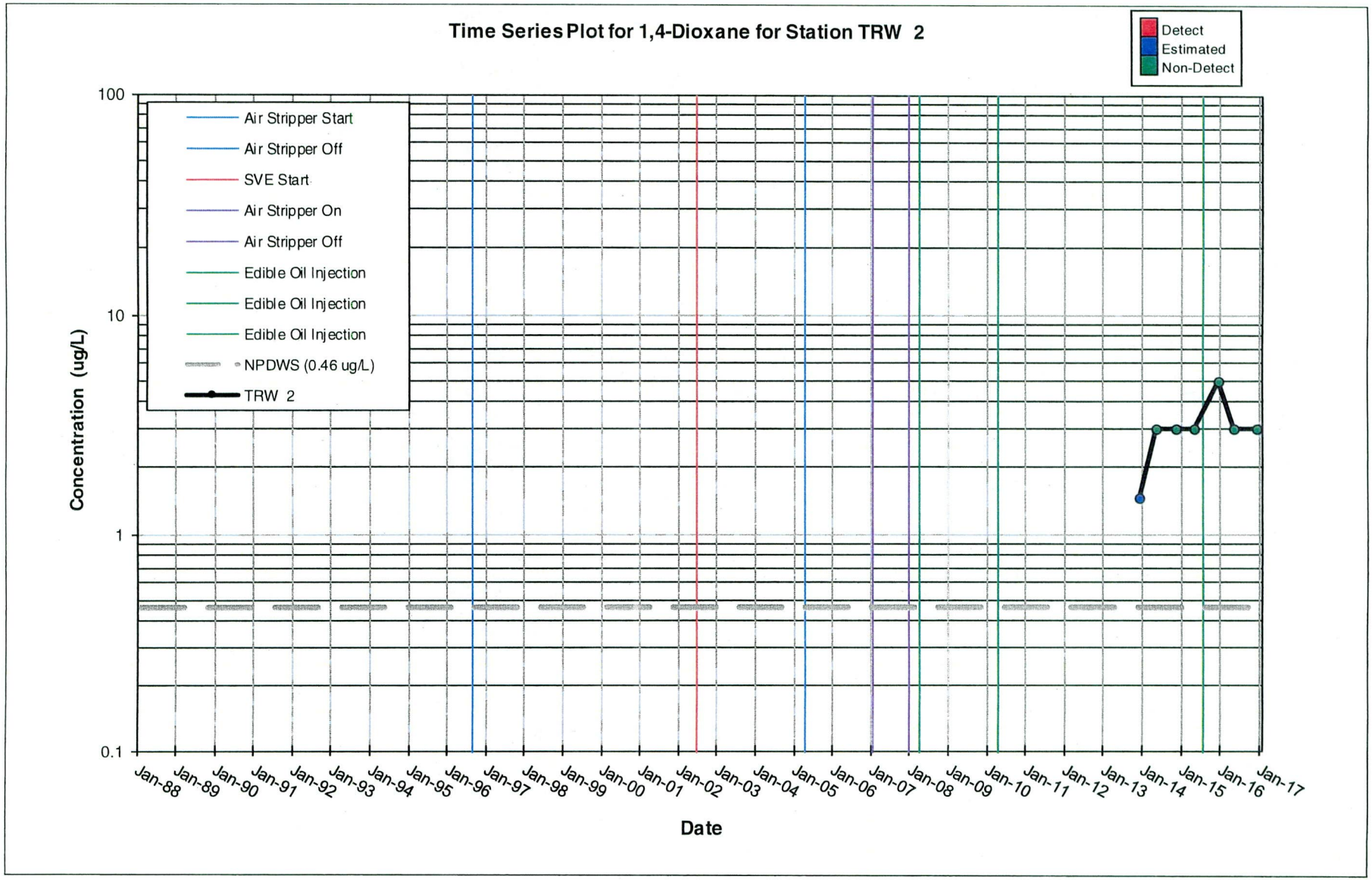

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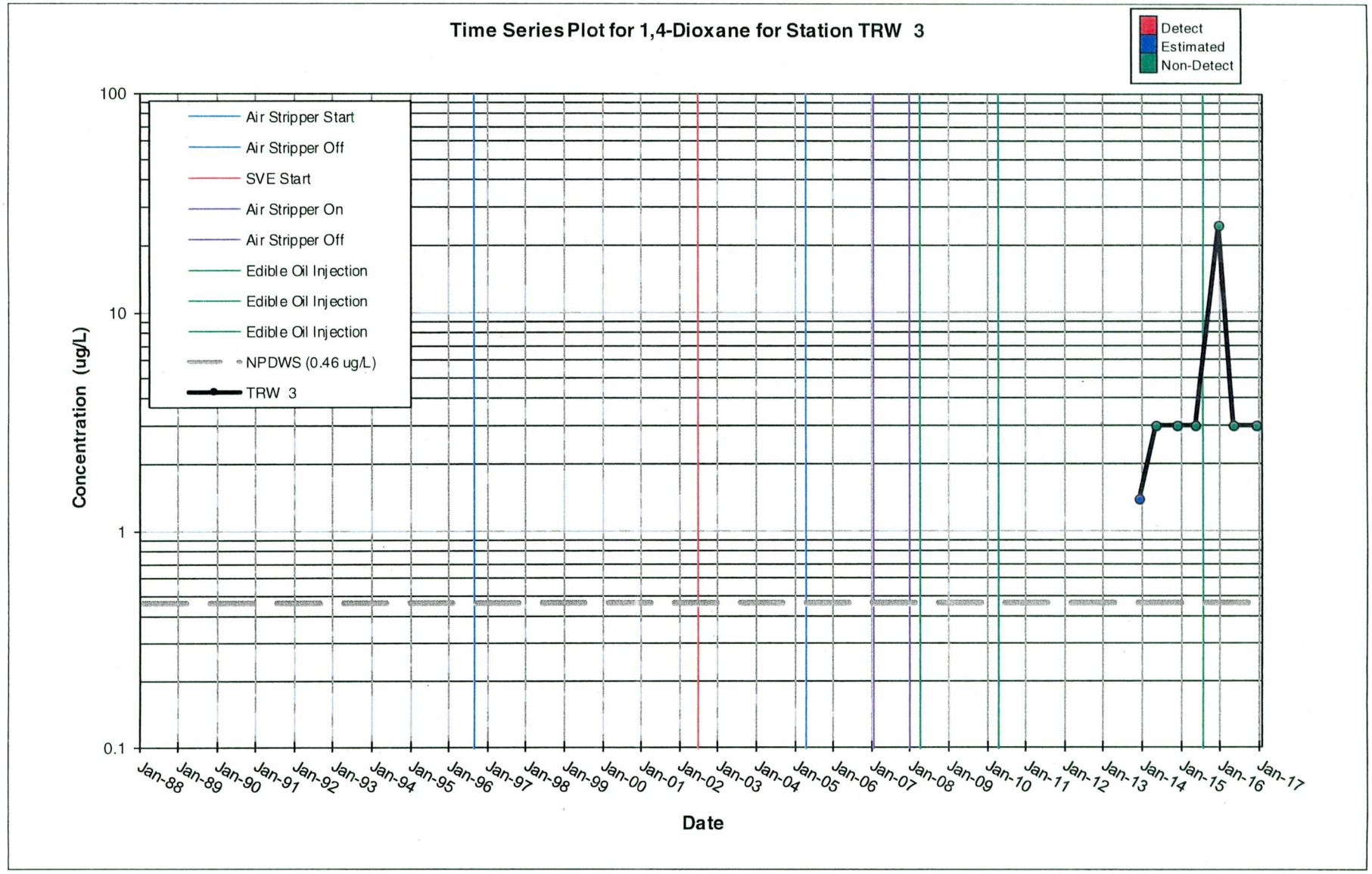

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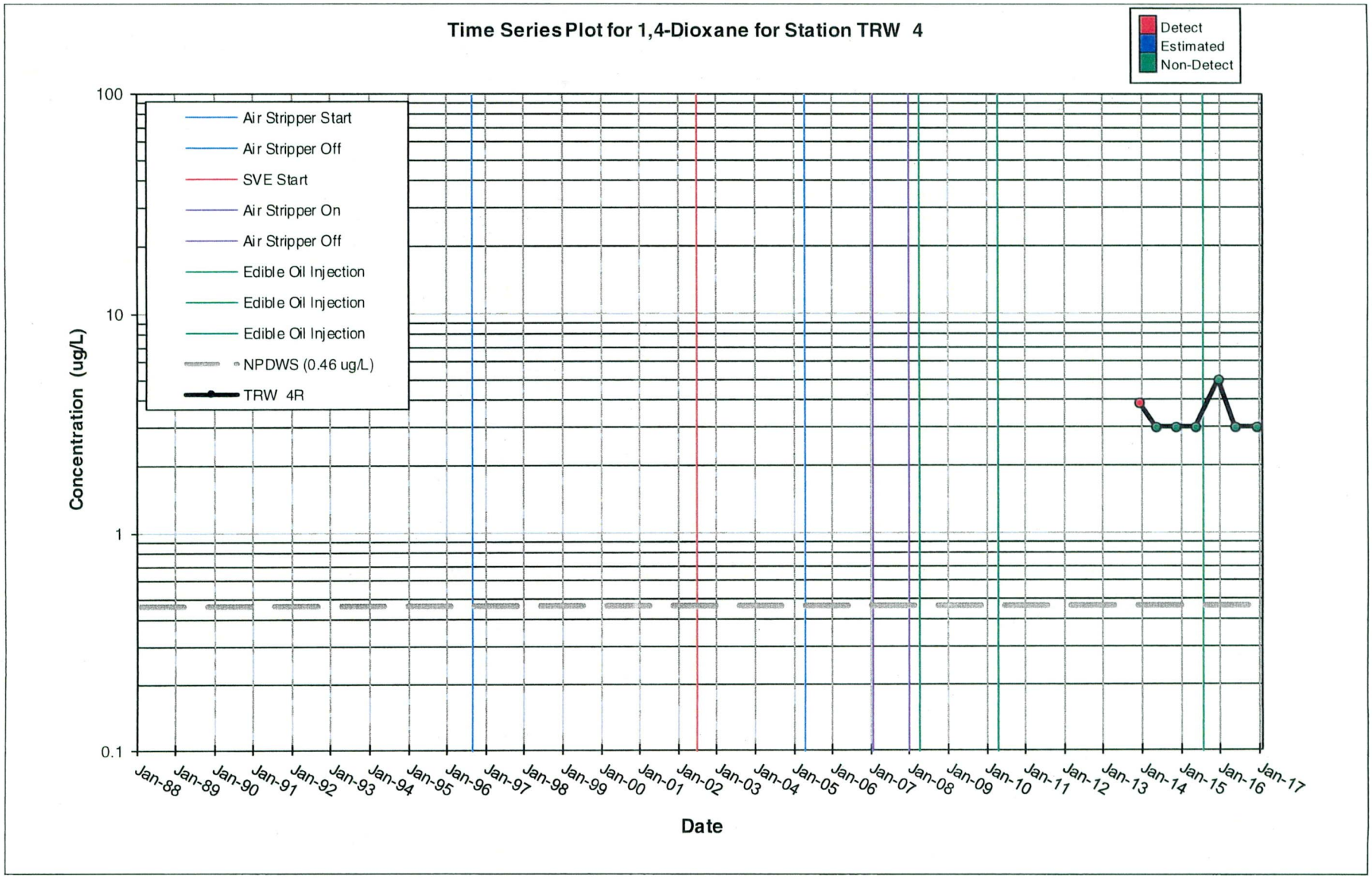

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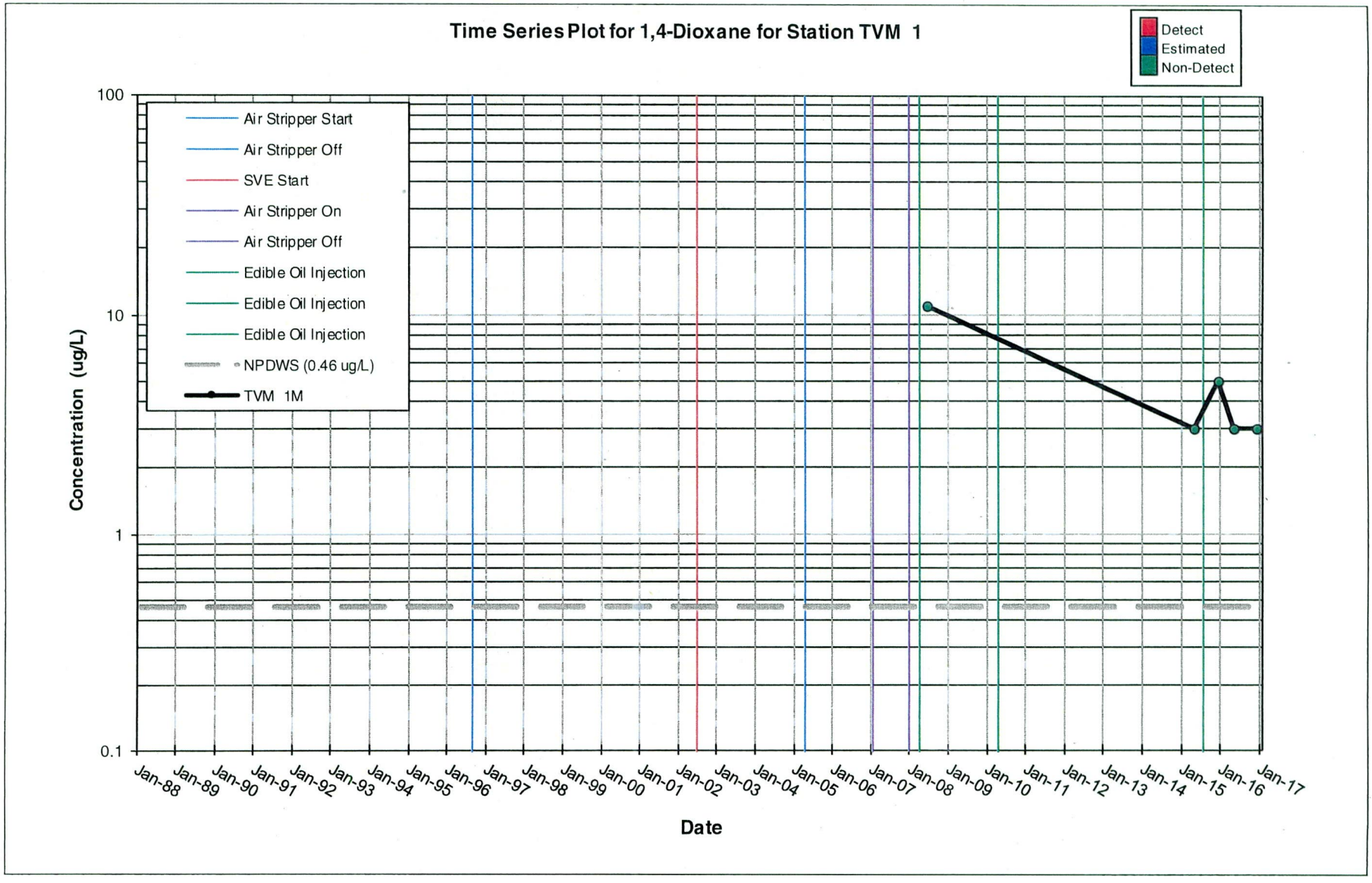

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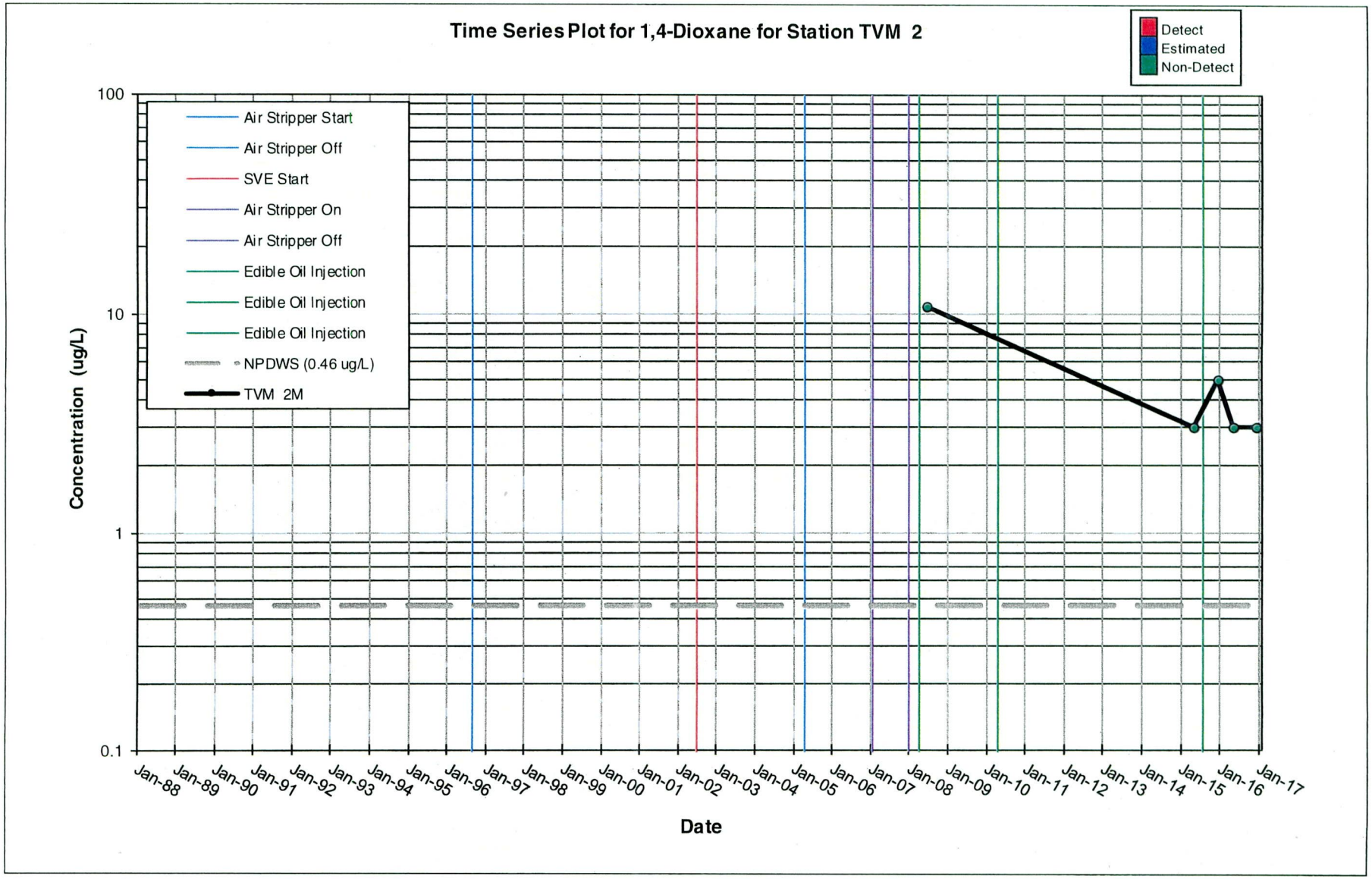

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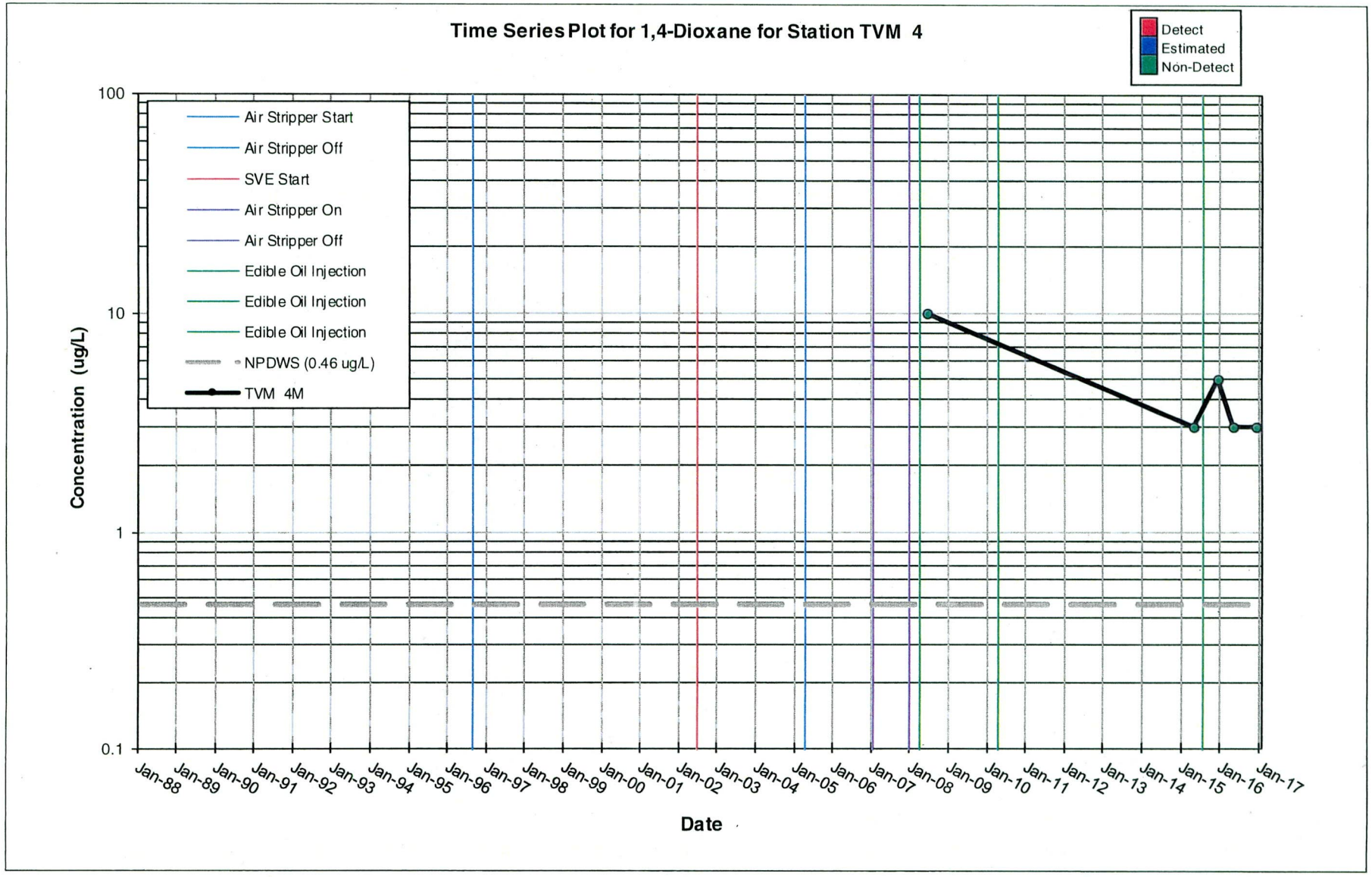

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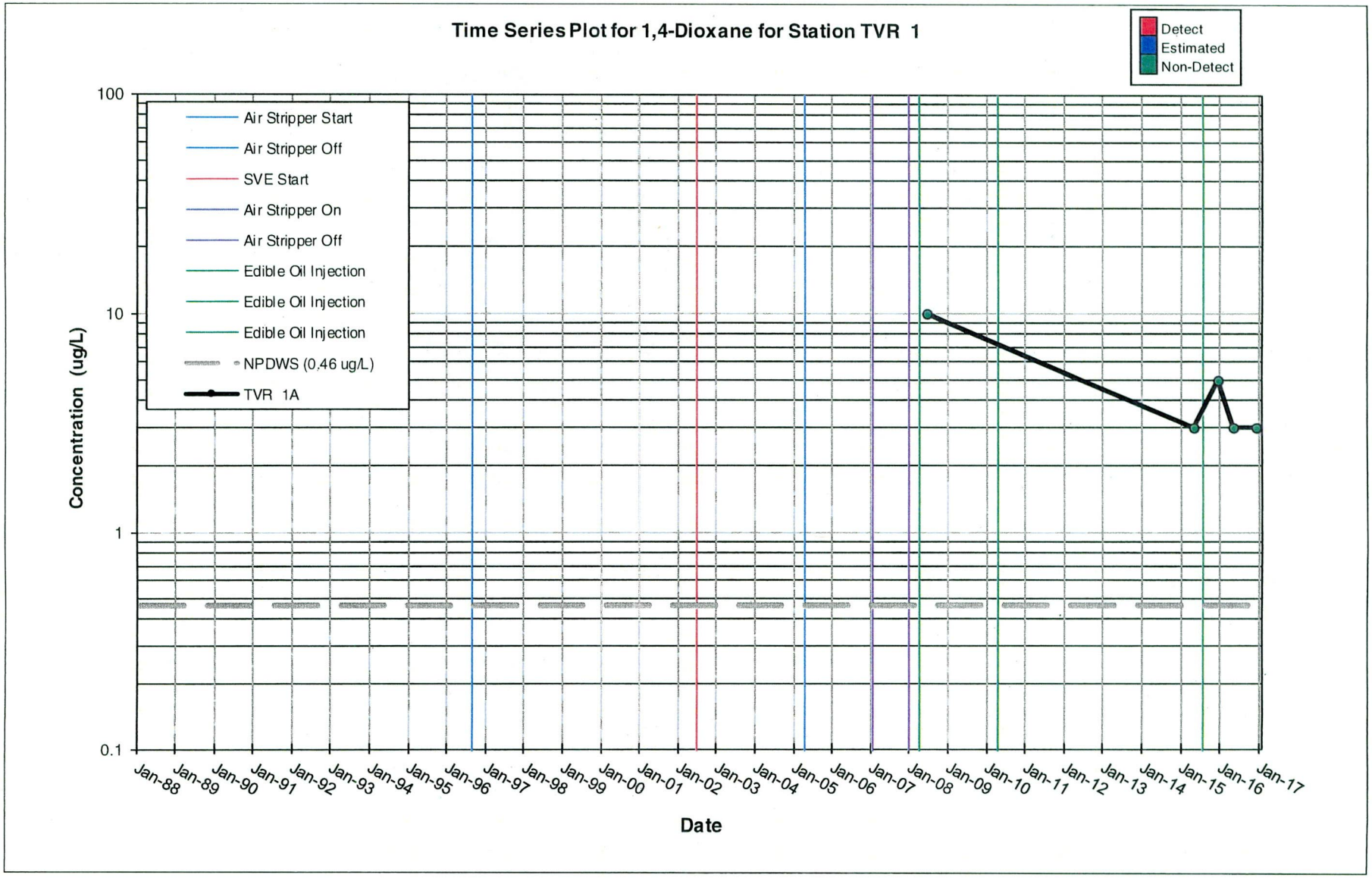

Attachment 3. Gross Alpha Results for TBG 4 from 2014 to 2016.

SAMPLING EVENT	COLLECTION DATE	STATION ID	ANALYTE NAME	METHOD DETECTION LIMIT	ESTIMATED QUANTITATION LIMIT	RESULT	RESULT UNITS	LAB QUALIFIER	REVIEW QUALIFIER
4Q16TNX	13-Dec-16	TBG 4	GROSS ALPHA	25.4	55.8	7.95	pCi/L	U	U
2Q16TNX	17-May-16	TBG 4	GROSS ALPHA	9.96	23.6	5	pCi/L	U	U
2Q15TNX	14-May-15	TBG 4	GROSS ALPHA	2.28	4.82	0.578	pCi/L	U	U
4Q14TNX	18-Nov-14	TBG 4	GROSS ALPHA	9.19	21	3.66	pCi/L	U	U
2Q14TNX	20-May-14	TBG 4	GROSS ALPHA	12.2	68.1	90.5	pCi/L		