# NORTH LOUISIANA TERRACE AQUIFER SUMMARY, 2019
# AQUIFER SAMPLING AND ASSESSMENT PROGRAM

## APPENDIX 6 TO THE 2021 TRIENNIAL SUMMARY REPORT

PARTIAL FUNDING PROVIDED BY THE CWA

# Contents

# BACKGROUND

The Louisiana Department of Environmental Quality's (LDEQ) Aquifer Sampling and Assessment Program (ASSET) is an ambient monitoring program established to determine and monitor the quality of groundwater produced from Louisiana's major freshwater aquifers. The ASSET Program samples approximately 200 water wells located in 14 aquifers across the state. The sampling process is designed so that all 14 aquifers are monitored on a rotating basis, within a three-year period so that each well is monitored every three years.

In order to better assess the water quality of a particular aquifer, an attempt is made to sample all ASSET Program wells producing from it in a narrow time frame. To more conveniently and economically promulgate those data collected, a summary report on each aquifer is prepared separately. Collectively, these aquifer summaries make up, in part, the ASSET Program's Triennial Summary Report.

Analytical and field data contained in this summary were collected from wells producing from the North Louisiana Terrace aquifer, during the 2019 state fiscal year (July 1, 2018 - June 30, 2019). This summary will become Appendix 6 of ASSET Program Triennial Summary Report for 2021.

These data show that nine wells were sampled which produce from the North Louisiana Terrace aquifer. Seven of these wells are classified as public supply, and two as domestic. The wells are located in five parishes in the central, northeast, and northwest areas of the state.

Figure 6-1 shows the geographic locations of the North Louisiana Terrace aquifer and the associated wells, whereas Table 6-1 lists the wells in the aquifer along with their total depths, use made of produced waters, and date sampled.

Well data for registered water wells were obtained from the Louisiana Department of Natural Resources water well registration data file.

# GEOLOGY

The Pleistocene Terrace aquifers that make up the North Louisiana Terrace aquifer occur as blanket terrace deposits in central Louisiana and as erosional remnants of dissected terraces northward. The Prairie, intermediate, and high terraces typically consist of unconsolidated, fining upward sequences of gravel, sand, silt, and clay and are overlain by Holocene alluvium in the valleys of the larger streams. The older terraces generally have a coarser texture and the fine-grained top stratum is often eroded. The aquifer deposits are typically poorly to well sorted and consist of coarse sand and gravel in the lower parts grading to fine sand toward the top. The North Louisiana Terrace is unconfined in most areas, but may be confined by silt and clay locally.

## HYDROGEOLOGY

Recharge is primarily from the direct infiltration of rainfall in interstream, upland outcrop areas and can be relatively rapid where the overlying silts and clays are thin or missing. Water in the terrace aquifers moves downgradient and laterally and is discharged into streams that have eroded valleys into the aquifer units. Water levels typically reflect variations in precipitation and seasonal withdrawals by wells. The hydraulic conductivity of the North Louisiana Terrace varies between 150 and 270 feet/day.

The maximum depths of occurrence of freshwater in the North Louisiana Terrace range from 100 feet above sea level, to 100 feet below sea level. The range of thickness of the fresh water interval in the North Louisiana Terrace is 50 to 150 feet. The depths of the North Louisiana Terrace wells that were monitored in conjunction with the ASSET Program range from 85 to 154 feet.

## PROGRAM PARAMETERS

The field parameters checked at each ASSET well sampling site and the list of conventional parameters analyzed in the laboratory are shown in Table 6-2. The inorganic parameters analyzed in the laboratory are listed in Table 6-3. These tables also show the field and analytical results determined for each analyte. For quality control, a duplicate sample was taken for each parameter at well RR-254.

In addition to the field, conventional, and inorganic analytical parameters, the target analyte list includes three other categories of compounds: volatiles, semi-volatiles, and pesticides/PCBs. Due to the large number of analytes in these categories, tables were not prepared showing the analytical results for these compounds. A discussion of any detections from any of these three categories, if necessary, can be found in their respective sections. Tables 6-8, 6-9 and 6-10 list the target analytes for volatiles, semi-volatiles and pesticides/PCBs, respectively.

Tables 6-4 and 6-5 provide a statistical overview of field and conventional data, and inorganic data for the North Louisiana Terrace aquifer, listing the minimum, maximum, and average results for these parameters. Tables 6-6 and 6-7 compare these same parameter averages to historical ASSET-derived data for the North Louisiana Terrace aquifer, from previous fiscal years.

The average values listed in the above referenced tables are determined using all valid, reported results, including those reported as non-detect, or less than the detection limit (< DL). The average values listed in the above referenced tables are determined using all valid, reported results, including those reported as non-detect, or less than the detection limit (< DL). The method used to generate the descriptive statistics varies, depending on the dataset and the proportion of values that are <DL. When estimating a dataset with more than 50 observations, the Maximum Likelihood Estimation (MLE) method is used. This is used to describe Upper and Lower confidence intervals or historical descriptive statistics. For datasets of less than 50 observations, the Kapan-Meier method is used. This is used to calculate descriptive statistics of

a single sampling round. If all values for a particular analyte are reported as < DL, then the minimum, maximum, and average values are all reported as < DL.

Charts 6-1 through 6-18 represent the trend of the graphed parameter, based on the averaged value of that parameter for each three-year reporting period. Discussion of historical data and related trends is found in the **Water Quality Trends and Comparison to Historical ASSET Data** section.

# INTERPRETATION OF DATA

Under the Federal Safe Drinking Water Act, EPA has established maximum contaminant levels (MCLs) for pollutants that may pose a health risk in public drinking water. An MCL is the highest level of a contaminant that EPA allows in public drinking water. MCLs ensure that drinking water does not pose either a short-term or long-term health risk. While not all wells sampled were public supply wells, the ASSET Program does use the MCLs as a benchmark for further evaluation.

EPA has set secondary standards, which are defined as non-enforceable taste, odor, or appearance guidelines. Field and laboratory data contained in Tables 6-2 and 6-3 show that one or more secondary MCL (SMCL) was exceeded in six of the nine wells sampled in the North Louisiana Terrace aquifer, with a total of eight SMCLs exceeded.

## *Field and Conventional Parameters*

Table 6-2 shows the field and conventional parameters for which samples are collected at each well and the analytical results for those parameters. Table 6-4 provides an overview of this data for the North Louisiana Terrace aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analysis listed in Table 6-2 shows that no primary MCL was exceeded for field or conventional parameters for this reporting period. Those ASSET wells reporting turbidity levels greater than 1.0 NTU do not exceed the Primary MCL of 1.0, as this standard applies to public supply water wells that are under the direct influence of surface water. The Louisiana Department of Health has determined that no public water supply well in Louisiana was in this category.

Federal Secondary Drinking Water Standards: A review of the analysis listed in Table 6-2 shows that two wells exceeded the SMCL for pH and one well exceeded the SMCL for chloride. Laboratory results override field results in exceedance determinations, thus only lab results will be counted in determining SMCL exceedance numbers for total dissolved solids. Following is a list of SMCL parameter exceedances with well number and results:

**pH (SMCL = 6.5 – 8.5 Standard Units):**

| | |
|---|---|
| MO-124 | 6.08 SU |
| RR-254 | 6.30 SU (Duplicate = 6.30 SU) |

**Chloride (SMCL = 250 mg/L):**

Mo-364 335 mg/L

## *Inorganic Parameters*

Table 6-3 shows the inorganic parameters for which samples are collected at each well and the analytical results for those parameters. Table 6-5 provides an overview of inorganic data for the North Louisiana Terrace aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analyses listed in Table 6-3 shows that no primary MCL was exceeded for inorganics.

Federal Secondary Drinking Water Standards: Laboratory data contained in Table 6-3 shows that five wells exceeded the secondary MCL for iron:

**Iron (SMCL = 300 µg/L):**

| | |
|---|---|
| BO-578 | 738 µg/L |
| BO-7896Z | 1430 µg/L |
| MO-124 | 8520 µg/L |
| MO-364 | 567 µg/L |
| OU-5524Z | 355 µg/L |

## *Volatile Organic Compounds*

Table 6-8 shows the volatile organic compound (VOC) parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however detections of VOCs are discussed in this section.

No VOC was detected at or above its detection limit during the FY 2019 sampling of the North Louisiana Terrace aquifer.

## *Semi-Volatile Organic Compounds*

Table 6-9 shows the semi-volatile organic compound (SVOC) parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however any detection of a SVOC would be discussed in this section.

No SVOC was detected at or above its detection limit during the FY 2019 sampling of the North Louisiana Terrace aquifer.

## *Pesticides and PCBs*

Table 6-10 shows the pesticide and PCB parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however any detection of a pesticide or PCB would be discussed in this section.

No pesticide or PCB was detected at or above its detection limit during the FY 2019 sampling of the North Louisiana Terrace aquifer.

# WATER QUALITY TRENDS AND COMPARISON TO HISTORICAL ASSET DATA

Analytical and field data show that the quality and characteristics of groundwater produced from the North Louisiana Terrace aquifer exhibit some changes when comparing current data to that of the seven previous sampling. These comparisons can be found in Tables 6-6 and 6-7, and in Charts 6-1 to 6-18 of this summary. Increasing or decreasing trend statements made here are based on an R-square value of 0.03 or greater and a p-value of $< 0.05$.

Over the 24 year period specific conductivity exhibits an upward trend. Three analytes have exhibited a downward trend. These analytes are temperature, color, and ammonia.

Current sample results show that six wells reported one or more SMCL exceedances with a total of eight exceedances. Historical data show that in the FY 2016 sampling of the North Louisiana Terrace aquifer, there were seven wells with one or more SMCL exceedances for a total of 11 SMCL exceedances.

# SUMMARY AND RECOMMENDATIONS

In summary, the data show that the groundwater produced from this aquifer is moderately hard[1] and is of good quality when considering short-term or long-term health risk guidelines. Laboratory data show that no ASSET well that was sampled during the Fiscal Year 2019 monitoring of the North Louisiana Terrace aquifer exceeded an MCL. The data also show that this aquifer is of fair to good quality when considering taste, odor or appearance guidelines, with eight SMCLs exceeded in six wells.

Comparison to historical ASSET-derived data shows some change in the quality or characteristics of the North Louisiana Terrace aquifer, with one parameter showing consistent increasing trend in average concentration, three parameters decreasing in average concentration, while remaining parameters show no consistent change or remained below detection limits.

It is recommended that the wells assigned to the North Louisiana Terrace aquifer be resampled as planned, in approximately three years. In addition, several wells should be added to the nine currently in place to increase the well density for this aquifer.

[1] Classification based on hardness scale from: Peavy, H. S. et al. *Environmental Engineering*. New York: McGraw-Hill. 1985.

## *Table 6-1: List of Wells Sampled, North Louisiana Terrace Aquifer–FY 2019*

| Well ID | Parish | Date | Owner | Depth (Feet) | Well Use |
|---|---|---|---|---|---|
| BI-52 | Bossier | 5/9/2019 | Town of Ringgold | 112 | Public Supply |
| BO-434 | Bossier | 5/20/2019 | Red Chute Utilities | 94 | Public Supply |
| BO-578 | Bossier | 5/20/2019 | Village Water System | 85 | Public Supply |
| BO-7896Z | Bossier | 5/21/2019 | Private Owner | 96 | Domestic |
| LS-264 | La Salle | 1/24/2019 | City of Jena | 105 | Public Supply |
| MO-124 | Morehouse | 10/31/2018 | Texas Gas | 133 | Public Supply |
| MO-364 | Morehouse | 10/31/2018 | People Water Service | 154 | Public Supply |
| OU-5524Z | Ouachita | 10/31/2018 | Private Owner | 95 | Domestic |
| RR-254 | Red River | 5/9/2019 | East Cross Water System | 93 | Public Supply |

## *Table 6-2: Summary of Field and Conventional Data, North Louisiana Terrace Aquifer–FY 2019*

| Well ID | pH SU | Sal ppt | Sp Cond mmhos/cm | Temp Deg C | TDS g/L | Alk mg/L | Cl mg/L | Color PCU | Hard mg/L | Nitrite-Nitrate (as N) mg/L | NH3 mg/L | Tot P mg/L | Sp Cond µmhos/cm | SO4 mg/L | TDS mg/L | TKN mg/L | TSS mg/L | Turb NTU |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Laboratory Reporting Limits → | | | | | 2 | 1 | 5 | 5 | 0.05 | 0.1 | 0.05 | 1 | 1 | 10 | 0.1 | 4 | 0.1 |
| | Field Parameters | | | | | Laboratory Parameters | | | | | | | | | | | | |
| BI-52 | 8.32 | 0.17 | 0.36 | 17.85 | 0.24 | 169 | 6.90 | 10 | 50 | < DL | 0.92 | NA | 348 | 1.50 | 190 | 0.82 | < DL | 0.20 |
| BO-434 | 6.67 | 0.11 | 0.23 | 15.55 | 0.15 | 95 | 14.50 | 7 | 78 | 0.55 | < DL | 0.44 | 237 | 4.60 | 105 | 0.54 | < DL | 0.11 |
| BO-578 | 7.57 | 0.20 | 0.41 | 16.38 | 0.27 | 211 | 28.60 | 13 | 116 | < DL | 0.33 | 0.31 | 429 | < DL | 185 | 0.76 | < DL | 2.30 |
| BO-7896Z | 7.48 | 0.32 | 0.65 | 15.97 | 0.43 | 285 | 40.70 | < DL | 280 | < DL | 0.22 | 0.29 | 713 | 11.80 | 285 | 0.50 | 4 | 11.60 |
| LS-264 | NA | NA | NA | NA | NA | 72 | 10.50 | < DL | 26 | 0.64 | < DL | 0.71 | 206 | 6.60 | 185 | < DL | < DL | 0.32 |
| MO-124 | 6.08 | 0.16 | 0.33 | 18.33 | 0.21 | 105 | 38.50 | < DL | 146 | 0.98 | < DL | 0.46 | 308 | < DL | 300 | 0.20 | 20 | 29.20 |
| MO-364 | 7.19 | 0.83 | 1.64 | 17.85 | 1.07 | 270 | 335 | < DL | 220 | < DL | < DL | 0.70 | 1550 | 38.90 | 140 | 0.11 | < DL | 4.60 |
| OU-5524Z | 6.78 | 0.06 | 0.14 | 16.18 | 0.09 | 30 | 19.30 | < DL | 26 | 0.12 | < DL | 0.12 | 127 | 2.60 | 105 | < DL | < DL | 1.50 |
| RR-254 | 6.30 | 0.10 | 0.21 | 17.06 | 0.14 | 69 | 59.40 | 5 | 30 | 0.52 | 0.10 | NA | 346 | 11.50 | 220 | 0.17 | < DL | 0.20 |
| RR-254* | 6.30 | 0.10 | 0.21 | 17.06 | 0.14 | 75 | 71.60 | 6 | 32 | 0.48 | 0.14 | NA | 309 | 5.10 | 150 | 0.10 | < DL | 0.20 |

*Denotes Duplicate Sample NA – Not Analyzed Shaded cells exceed EPA Secondary Standards

## *Table 6-3: Summary of Inorganic Data, North Louisiana Terrace Aquifer–FY 2019*

| Well ID | Antimony ug/L | Arsenic ug/L | Barium ug/L | Beryllium ug/L | Cadmium ug/L | Chromium ug/L | Copper ug/L | Iron ug/L | Lead ug/L | Mercury ug/L | Nickel ug/L | Selenium ug/L | Silver ug/L | Thallium ug/L | Zinc ug/L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Laboratory Reporting Limits | 1 | 1 | 1 | 0.5 | 1 | 1 | 3 | 50 | 1 | 0.2 | 1 | 1 | 0.5 | 0.5 | 5 |
| BI-52 | < DL | < DL | 131 | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL |
| BO-434 | < DL | 1.30 | 76 | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL |
| BO-578 | < DL | < DL | 261 | < DL | < DL | < DL | < DL | 738 | < DL | < DL | < DL | < DL | < DL | < DL | < DL |
| BO-7896Z | < DL | 2.50 | 451 | < DL | < DL | < DL | < DL | 1430 | < DL | < DL | < DL | < DL | < DL | < DL | < DL |
| LS-264 | < DL | 1.00 | 26 | < DL | < DL | 1.30 | 3.90 | < DL | < DL | < DL | 1.10 | < DL | < DL | < DL | 9.10 |
| MO-124 | < DL | 2.10 | 197 | < DL | < DL | 2.20 | 57.20 | 8520 | 4 | < DL | < DL | < DL | < DL | < DL | 11.70 |
| MO-364 | < DL | < DL | 625 | < DL | < DL | 1.30 | 5.50 | 567 | < DL | < DL | 7.00 | < DL | < DL | < DL | 17.80 |
| OU-5524Z | < DL | < DL | 52 | < DL | < DL | < DL | 36.30 | 355 | < DL | < DL | 1.10 | < DL | < DL | < DL | 10.80 |
| RR-254 | < DL | < DL | 46 | < DL | < DL | < DL | 16.60 | 151 | < DL | < DL | 1.40 | < DL | < DL | < DL | 18.60 |
| RR-254* | < DL | < DL | 45 | < DL | < DL | < DL | 14.90 | 154 | < DL | < DL | 1.40 | < DL | < DL | < DL | 15.30 |

*Denotes Duplicate Sample NA – Not Analyzed Shaded cell exceed EPA Secondary Standards

## Table 6-4: FY 2019 Field and Conventional Statistics, ASSET Wells

| | PARAMETER | MINIMUM | MAXIMUM | AVERAGE |
|---|---|---|---|---|
| FIELD | pH (SU) | 6.08 | 8.32 | 6.97 |
| | Salinity (ppt) | 0.06 | 0.83 | 0.23 |
| | Specific Conductance (mmhos/cm) | 0.14 | 1.64 | 0.47 |
| | Temperature ($^{O}$C) | 15.55 | 18.33 | 16.91 |
| | Total Dissolved Solids (g/L) | 0.14 | 1.07 | 0.30 |
| LABORATORY | Alkalinity (mg/L) | 30.20 | 270.00 | 138.12 |
| | Chloride (mg/L) | 6.90 | 335.00 | 62.50 |
| | Color (PCU) | < DL | 13 | 6.60 |
| | Hardness (mg/L) | 26.00 | 280.00 | 100.40 |
| | Nitrite - Nitrate, as N (mg/L) | < DL | 0.98 | 0.35 |
| | Ammonia, as N (mg/L) | < DL | 0.92 | 0.22 |
| | Total Phosphorus (mg/L) | 0.12 | 0.71 | 0.43 |
| | Specific Conductance (µmhos/cm) | 127.00 | 1550.00 | 469.44 |
| | Sulfate (mg/L) | < DL | 38.90 | 8.46 |
| | Total Dissolved Solids (mg/L) | 105.00 | 300.00 | 186.11 |
| | Total Kjeldahl Nitrogen (mg/L) | < DL | 0.82 | 0.34 |
| | Total Suspended Solids (mg/L) | < DL | 20.00 | < DL |
| | Turbidity (NTU) | 0.20 | 29.20 | 5.02 |

## Table 6-5: FY 2019 Inorganic Statistics, ASSET Wells

| PARAMETER | MINIMUM | MAXIMUM | AVERAGE |
|---|---|---|---|
| Antimony (µg/L) | < DL | < DL | < DL |
| Arsenic (µg/L) | < DL | 2.50 | 1.29 |
| Barium (µg/L) | 26.30 | 451 | 191.08 |
| Beryllium (µg/L) | < DL | < DL | < DL |
| Cadmium (µg/L) | < DL | < DL | < DL |
| Chromium (µg/L) | < DL | 2.20 | 1.18 |
| Copper (µg/L) | < DL | 57.20 | 14.64 |
| Iron (µg/L) | < DL | 8520 | 1206.50 |
| Lead (µg/L) | < DL | 4.00 | < DL |
| Mercury (µg/L) | < DL | < DL | < DL |
| Nickel (µg/L) | < DL | < DL | < DL |
| Selenium (µg/L) | < DL | < DL | < DL |
| Silver (µg/L) | < DL | < DL | < DL |
| Thallium (µg/L) | < DL | < DL | < DL |
| Zinc (µg/L) | < DL | 18.60 | 10.33 |

## *Table 6-6: Triennial Field and Conventional Statistics, ASSET Wells*

| | PARAMETER | AVERAGE VALUES BY FISCAL YEAR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | FY 1995 | FY 1998 | FY 2001 | FY 2004 | FY 2007 | FY 2010 | FY 2013 | FY 2016 | FY 2019 |
| FIELD | pH (SU) | 6.27 | 5.88 | 6.81 | 6.51 | 6.19 | 6.55 | 6.63 | 6.68 | 6.97 |
| | Salinity (ppt) | 0.12 | 0.13 | 0.15 | 0.27 | 0.16 | 0.23 | 0.12 | 0.20 | 0.23 |
| | Specific Conductance (mmhos/cm) | 0.280 | 0.260 | 0.320 | 0.550 | 0.320 | 0.460 | 0.250 | 0.399 | 0.47 |
| | Temperature ($^{O}$C) | 20.18 | 19.79 | 18.97 | 19.43 | 19.43 | 18.71 | 17.84 | 14.54 | 16.91 |
| | Total Dissolved Solids (g/L) | - | - | - | 0.360 | 0.210 | 0.300 | 0.162 | 0.259 | 0.30 |
| LABORATORY | Alkalinity (mg/L) | 82 | 70 | 98 | 112 | 75 | 126 | 61 | 98 | 138.12 |
| | Chloride (mg/L) | 22.7 | 21.1 | 25.0 | 80.7 | 44.3 | 67.5 | 27.0 | 47.8 | 62.50 |
| | Color (PCU) | 18 | 6 | 9 | < DL | - | 9 | 2 | 5 | 6.60 |
| | Hardness (mg/L) | 49 | 64 | 90 | 152 | 75 | 124 | 71 | 111 | 100.40 |
| | Nitrite - Nitrate, as N (mg/L) | 0.67 | 1.27 | 0.68 | 0.43 | 0.88 | 0.48 | 0.67 | 0.69 | 0.35 |
| | Ammonia, as N (mg/L) | 0.19 | 0.25 | 0.18 | 0.18 | < DL | < DL | 0.08 | 0.13 | 0.22 |
| | Total Phosphorus (mg/L) | 0.24 | 0.14 | 0.15 | 0.15 | 0.12 | 0.19 | 0.15 | 0.19 | 0.43 |
| | Specific Conductance (µmhos/cm) | 278 | 268 | 353 | 558 | 315 | 477 | - | 214 | 469.44 |
| | Sulfate (mg/L) | 26.0 | 33.0 | 42.0 | 38.3 | 13.0 | 18.6 | 14.4 | 9.1 | 8.46 |
| | Total Dissolved Solids (mg/L) | 220 | 192 | 239 | 331 | 202 | 435 | 250 | 221 | 186.11 |
| | Total Kjeldahl Nitrogen (mg/L) | 0.69 | 0.36 | 0.24 | 0.25 | 0.11 | 0.28 | 0.42 | 0.29 | 0.34 |
| | Total Suspended Solids (mg/L) | 7 | < DL | < DL | 8 | < DL | 8 | < DL | < DL | < DL |
| | Turbidity (NTU) | 11.08 | 9.49 | 3.09 | 35.05 | 1.44 | 4.75 | 1.30 | 5.41 | 5.02 |

## *Table 6-7: Triennial Inorganic Statistics, ASSET Wells*

| PARAMETER | AVERAGE VALUES BY FISCAL YEAR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | FY 1995 | FY 1998 | FY 2001 | FY 2004 | FY 2007 | FY 2010 | FY 2013 | FY 2016 | FY 2019 |
| Antimony (µg/L) | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL |
| Arsenic (µg/L) | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | 1.29 |
| Barium (µg/L) | 117.3 | 90.5 | 93.9 | 202.2 | 166.6 | 256.0 | 113.0 | 154.3 | 191.08 |
| Beryllium (µg/L) | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL |
| Cadmium (µg/L) | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL |
| Chromium (µg/L) | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | 1.18 |
| Copper (µg/L) | 6.6 | 55.8 | 11.8 | 27.5 | 16.4 | 6.9 | 4.6 | 6.2 | 14.64 |
| Iron (µg/L) | 2244 | 1077 | 522 | 3624 | 453 | 839 | 377 | 737 | 1206.50 |
| Lead (µg/L) | < DL | < DL | < DL | 3.6 | 3.2 | 1.4 | 1.4 | 2.5 | < DL |
| Mercury (µg/L) | 0.07 | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL |
| Nickel (µg/L) | 7.2 | 3.4 | 6.9 | < DL | < DL | < DL | < DL | 1.2 | < DL |
| Selenium (µg/L) | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL |
| Silver (µg/L) | < DL | < DL | < DL | - | < DL | < DL | < DL | < DL | < DL |
| Thallium (µg/L) | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL | < DL |
| Zinc (µg/L) | 25.0 | 46.4 | 119.2 | 33.8 | 11.1 | 7.6 | 6.8 | 6.2 | 10.33 |

## *Table 6-8: VOC Analytical Parameters*

| VOC ANAYTICAL PARAMETERS | METHOD | REPORTING LIMIT (µg/L) |
|---|---|---|
| 1,1,1-TRICHLOROETHANE | 624 | 0.50 |
| 1,1,2,2-TETRACHLOROETHANE | 624 | 0.50 |
| 1,1,2-TRICHLOROETHANE | 624 | 0.50 |
| 1,1-DICHLOROETHANE | 624 | 0.50 |
| 1,1-DICHLOROETHENE | 624 | 0.50 |
| 1,2-DICHLOROBENZENE | 624 | 0.50 |
| 1,2-DICHLOROETHANE | 624 | 0.50 |
| 1,2-DICHLOROPROPANE | 624 | 0.50 |
| 1,3-DICHLOROBENZENE | 624 | 0.50 |
| 1,4-DICHLOROBENZENE | 624 | 0.50 |
| BENZENE | 624 | 0.50 |
| BROMODICHLOROMETHANE | 624 | 0.50 |
| BROMOFORM | 624 | 0.50 |
| BROMOMETHANE | 624 | 1.0 |
| CARBON TETRACHLORIDE | 624 | 0.50 |
| CHLOROBENZENE | 624 | 0.50 |
| CHLOROETHANE | 624 | 0.50 |
| CHLOROFORM | 624 | 0.50 |
| CHLOROMETHANE | 624 | 1.0 |
| CIS-1,3-DICHLOROPROPENE | 624 | 1.0 |
| DIBROMOCHLOROMETHANE | 624 | 0.50 |
| ETHYL BENZENE | 624 | 0.50 |
| METHYLENE CHLORIDE | 624 | 1.0 |
| O-XYLENE (1,2-DIMETHYLBENZENE) | 624 | 0.50 |
| STYRENE | 624 | 0.50 |
| TERT-BUTYL METHYL ETHER | 624 | 0.50 |
| TETRACHLOROETHYLENE (PCE) | 624 | 0.50 |
| TOLUENE | 624 | 0.50 |
| TRANS-1,2-DICHLOROETHENE | 624 | 0.50 |
| TRANS-1,3-DICHLOROPROPENE | 624 | 0.50 |
| TRICHLOROETHYLENE (TCE) | 624 | 0.50 |
| TRICHLOROFLUOROMETHANE (FREON-11) | 624 | 0.50 |
| VINYL CHLORIDE | 624 | 0.50 |
| XYLENES, M & P | 624 | 1.0 |

## *Table 6-9: SVOC Analytical Parameters*

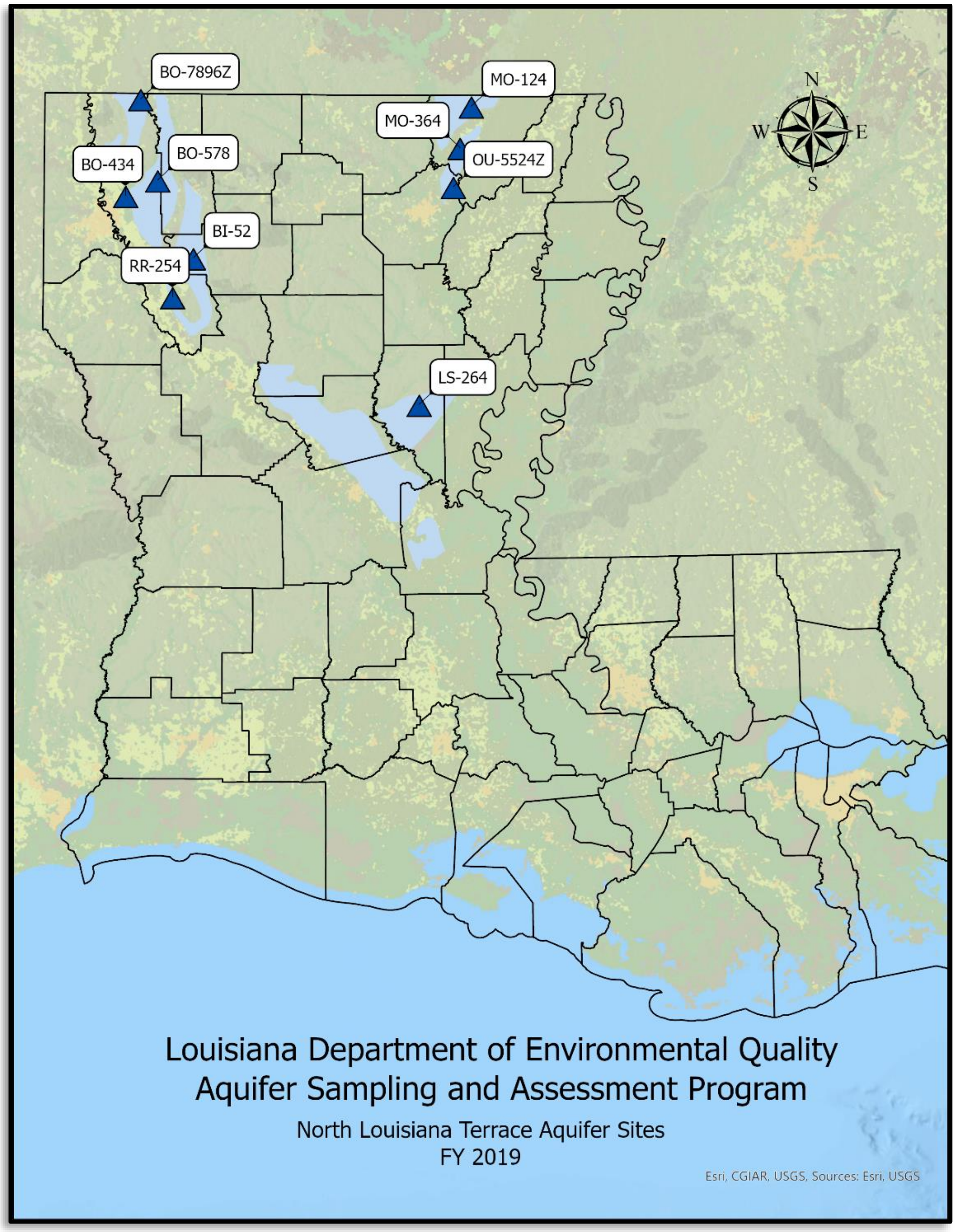
| SVOC ANAYTICAL PARAMETERS | METHOD | REPORTING LIMIT (µg/L) |
|---|---|---|
| 1,2,4-TRICHLOROBENZENE | 625 | 5.0 |
| 2,4,6-TRICHLOROPHENOL | 625 | 5.0 |
| 2,4-DICHLOROPHENOL | 625 | 5.0 |
| 2,4-DIMETHYLPHENOL | 625 | 5.0 |
| 2,4-DINITROPHENOL | 625 | 20.0 |
| 2,4-DINITROTOLUENE | 625 | 5.0 |
| 2,6-DINITROTOLUENE | 625 | 5.0 |
| 2-CHLORONAPHTHALENE | 625 | 5.0 |
| 2-CHLOROPHENOL | 625 | 5.0 |
| 2-NITROPHENOL | 625 | 5.0 |
| 3,3'-DICHLOROBENZIDINE | 625 | 5.0 |
| 4,6-DINITRO-2-METHYLPHENOL | 625 | 10.0 |
| 4-BROMOPHENYL PHENYL ETHER | 625 | 5.0 |
| 4-CHLORO-3-METHYLPHENOL | 625 | 5.0 |
| 4-CHLOROPHENYL PHENYL ETHER | 625 | 5.0 |
| 4-NITROPHENOL | 625 | 20.0 |
| ACENAPHTHENE | 625 | 0.20 |
| ACENAPHTHYLENE | 625 | 0.20 |
| ANTHRACENE | 625 | 0.20 |
| BENZIDINE | 625 | 20.0 |
| BENZO(A)ANTHRACENE | 625 | 0.20 |
| BENZO(A)PYRENE | 625 | 0.20 |
| BENZO(B)FLUORANTHENE | 625 | 0.20 |
| BENZO(G,H,I)PERYLENE | 625 | 0.20 |
| BENZO(K)FLUORANTHENE | 625 | 0.20 |
| BENZYL BUTYL PHTHALATE | 625 | 5.0 |
| BIS(2-CHLOROETHOXY) METHANE | 625 | 5.0 |
| BIS(2-CHLOROETHYL) ETHER (2-CHLOROETHYL ETHER) | 625 | 5.0 |
| BIS(2-ETHYLHEXYL) PHTHALATE | 625 | 5.0 |
| CHRYSENE | 625 | 0.20 |
| DIBENZ(A,H)ANTHRACENE | 625 | 0.20 |
| DIETHYL PHTHALATE | 625 | 5.0 |
| DIMETHYL PHTHALATE | 625 | 5.0 |
| DI-N-BUTYL PHTHALATE | 625 | 5.0 |
| DI-N-OCTYLPHTHALATE | 625 | 5.0 |
| FLUORANTHENE | 625 | 0.20 |
| FLUORENE | 625 | 0.20 |

| SVOC ANAYTICAL PARAMETERS | METHOD | REPORTING LIMIT (µg/L) |
|---|---|---|
| HEXACHLOROBENZENE | 625 | 5.0 |
| HEXACHLOROBUTADIENE | 625 | 5.0 |
| HEXACHLOROCYCLOPENTADIENE | 625 | 10.0 |
| HEXACHLOROETHANE | 625 | 5.0 |
| INDENO(1,2,3-C,D)PYRENE | 625 | 0.20 |
| ISOPHORONE | 625 | 5.0 |
| NAPHTHALENE | 625 | 0.20 |
| NITROBENZENE | 625 | 5.0 |
| N-NITROSODIMETHYLAMINE | 625 | 5.0 |
| N-NITROSODI-N-PROPYLAMINE | 625 | 5.0 |
| N-NITROSODIPHENYLAMINE | 625 | 5.0 |
| PENTACHLOROPHENOL | 625 | 5.00 |
| PHENANTHRENE | 625 | 0.20 |
| PHENOL | 625 | 5.0 |
| PYRENE | 625 | 0.20 |

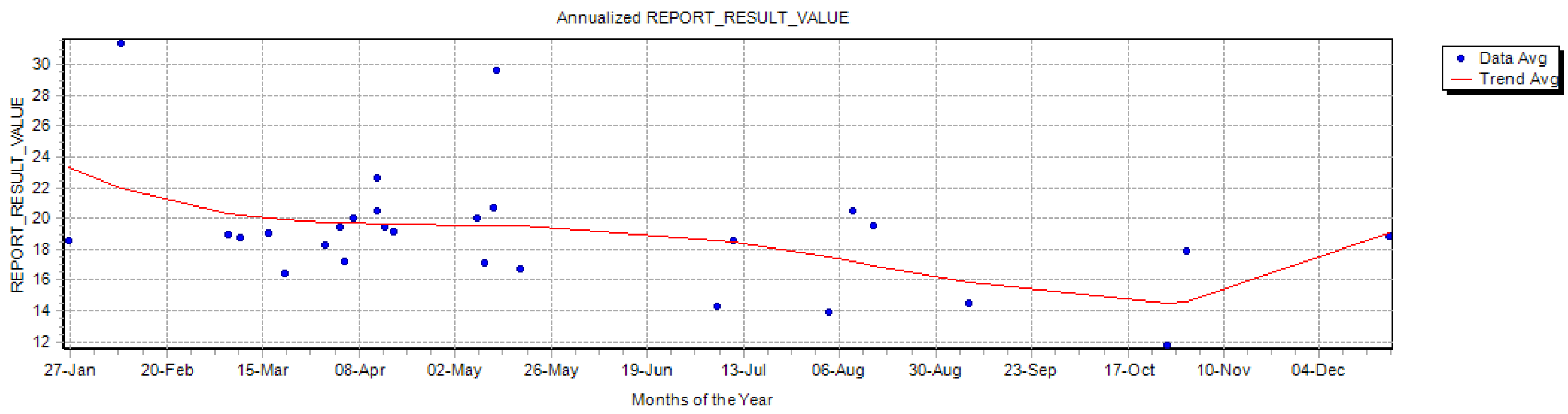
## *Table 6-10: Pesticides and PCBs*

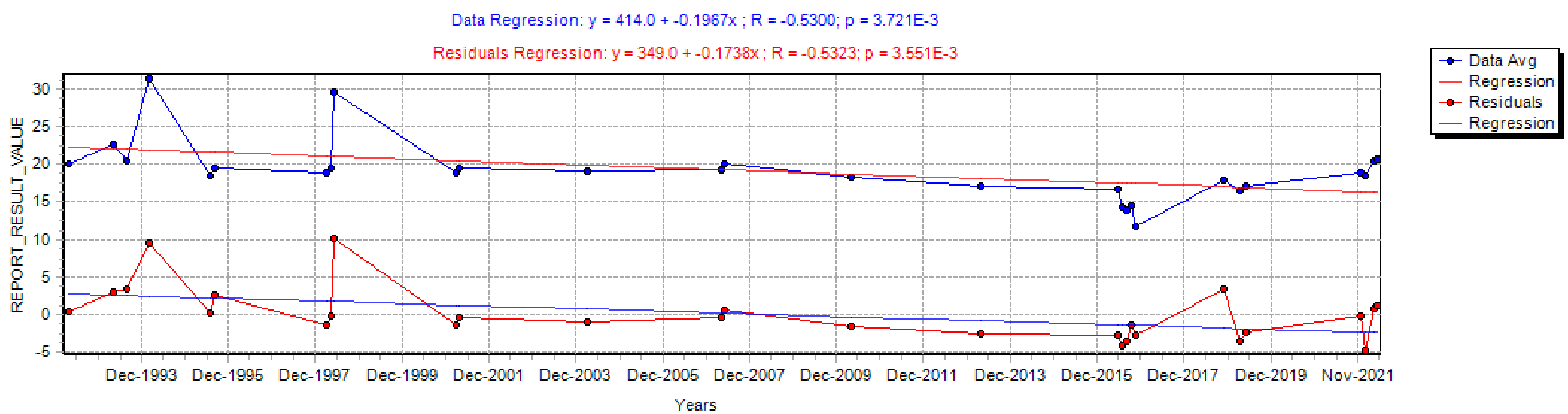
| Pest/PCB Analytical Parameters | METHOD | REPORTING LIMIT (µg/L) |
|---|---|---|
| ALDRIN | 608 | 0.025 |
| ALPHA BHC (ALPHA HEXACHLOROCYCLOHEXANE) | 608 | 0.025 |
| ALPHA ENDOSULFAN | 608 | 0.025 |
| ALPHA-CHLORDANE | 608 | 0.025 |
| BETA BHC (BETA HEXACHLOROCYCLOHEXANE) | 608 | 0.025 |
| BETA ENDOSULFAN | 608 | 0.025 |
| CHLORDANE | 608 | 0.20 |
| DELTA BHC (DELTA HEXACHLOROCYCLOHEXANE) | 608 | 0.025 |
| DIELDRIN | 608 | 0.025 |
| ENDOSULFAN SULFATE | 608 | 0.025 |
| ENDRIN | 608 | 0.025 |
| ENDRIN ALDEHYDE | 608 | 0.025 |
| ENDRIN KETONE | 608 | 0.025 |
| GAMMA-CHLORDANE | 608 | 0.025 |
| HEPTACHLOR | 608 | 0.025 |
| HEPTACHLOR EPOXIDE | 608 | 0.025 |
| METHOXYCHLOR | 608 | 0.25 |
| P,P'-DDD | 608 | 0.025 |
| P,P'-DDE | 608 | 0.025 |
| P,P'-DDT | 608 | 0.025 |
| PCB-1016 (AROCHLOR 1016) | 608 | 0.80 |
| PCB-1221 (AROCHLOR 1221) | 608 | 0.80 |
| PCB-1232 (AROCHLOR 1232) | 608 | 0.80 |
| PCB-1242 (AROCHLOR 1242) | 608 | 0.80 |
| PCB-1248 (AROCHLOR 1248) | 608 | 0.80 |
| PCB-1254 (AROCHLOR 1254) | 608 | 0.80 |
| PCB-1260 (AROCHLOR 1260) | 608 | 0.80 |
| TOXAPHENE | 608 | 1.0 |

## *Figure 6-1: Location Plat, North Louisiana Terrace Aquifer*

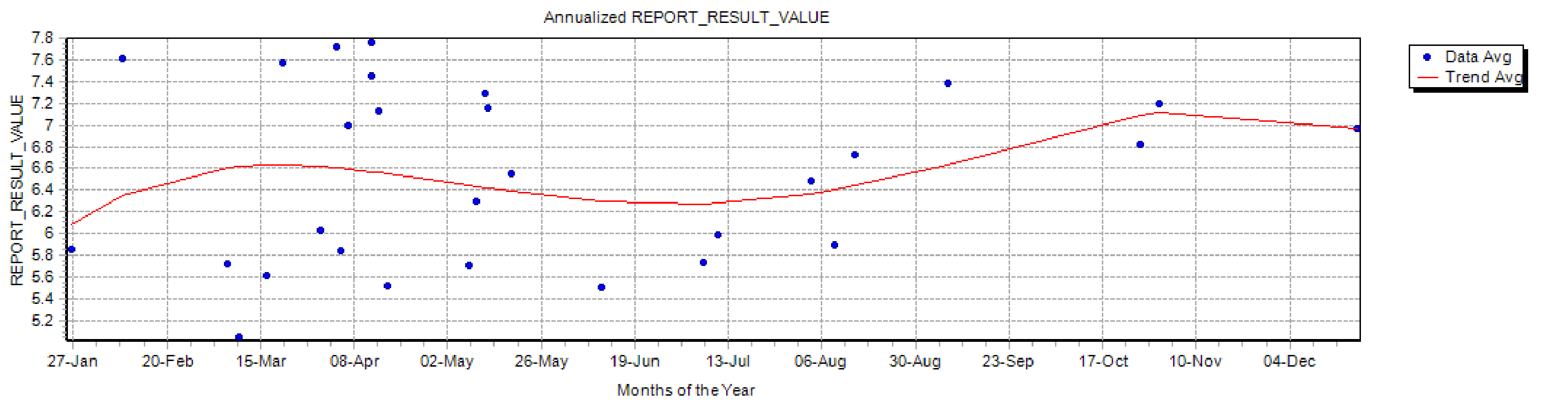


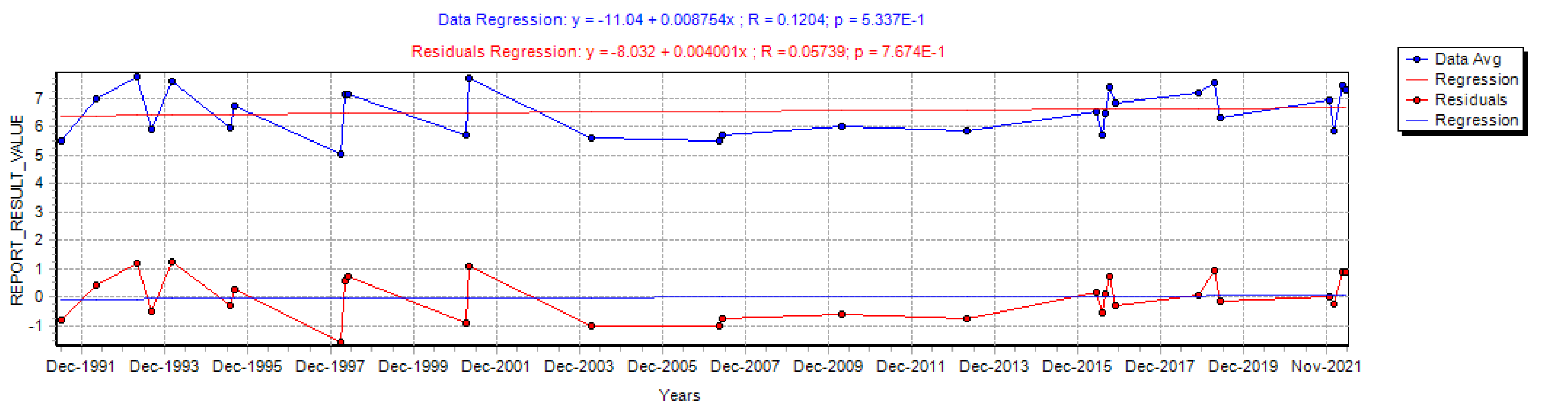
## *Chart 6-1: Temperature Trend*



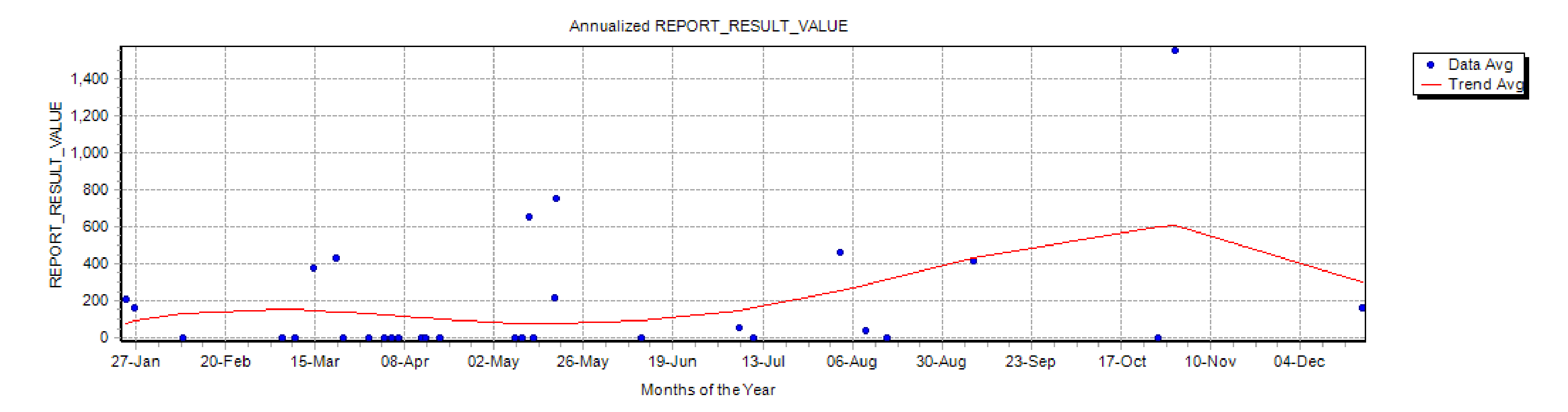



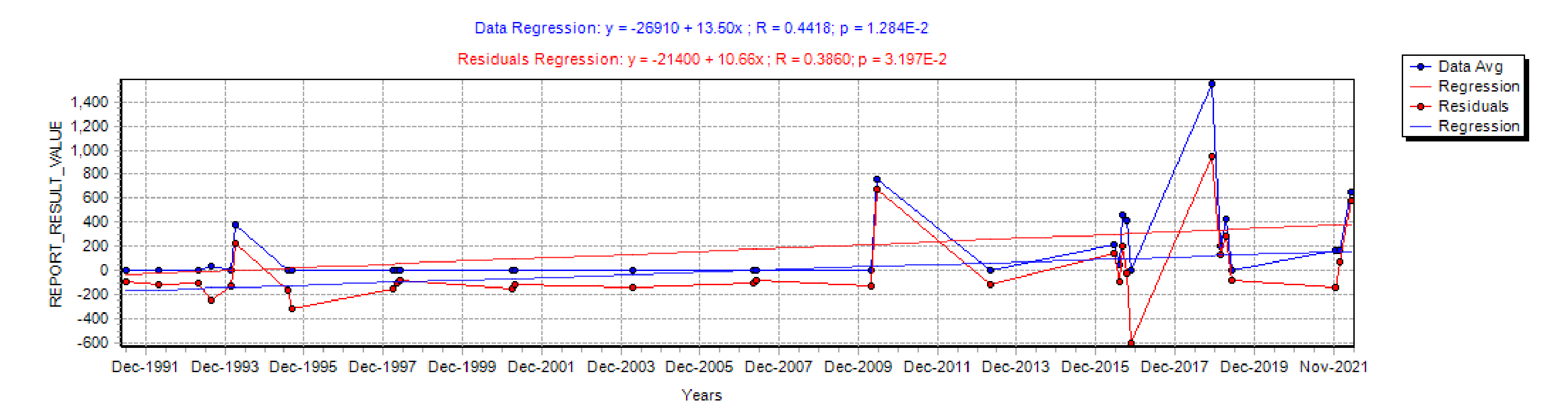
## Chart 6-2: pH Trend



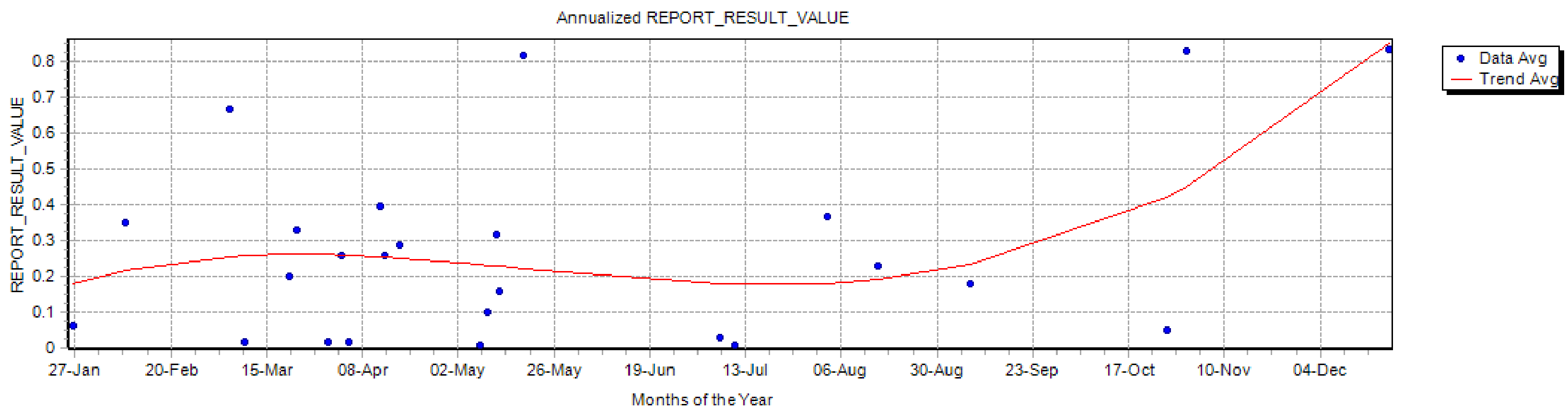



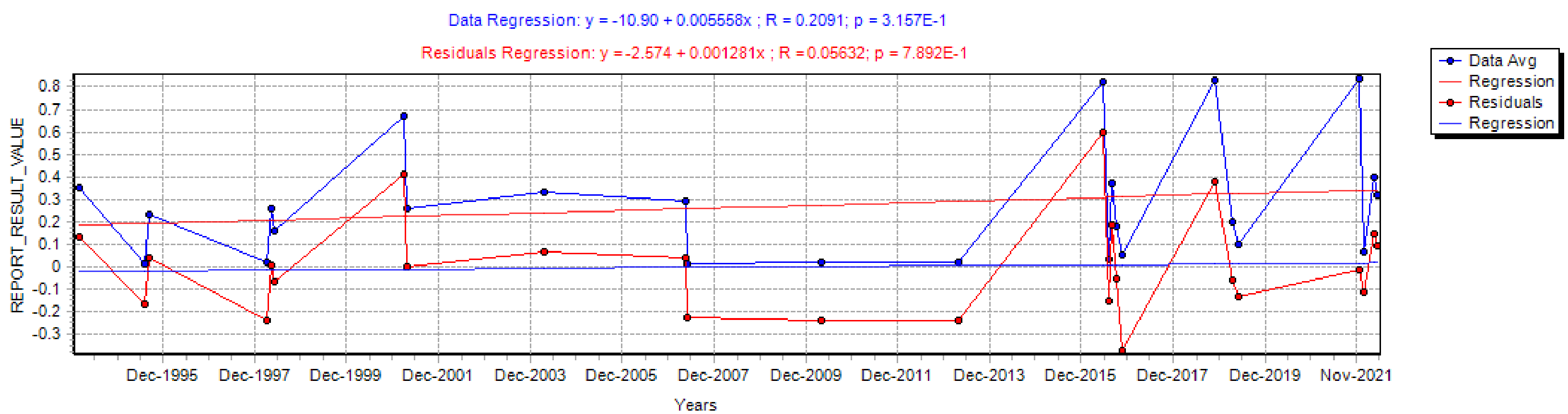
# Chart 6-3: Specific Conductance Trend



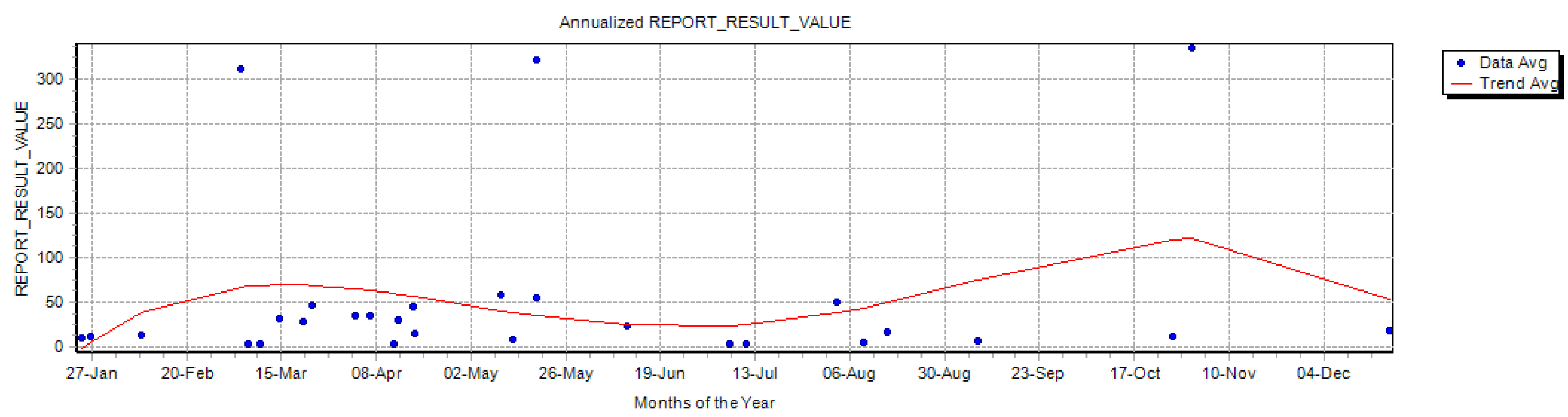



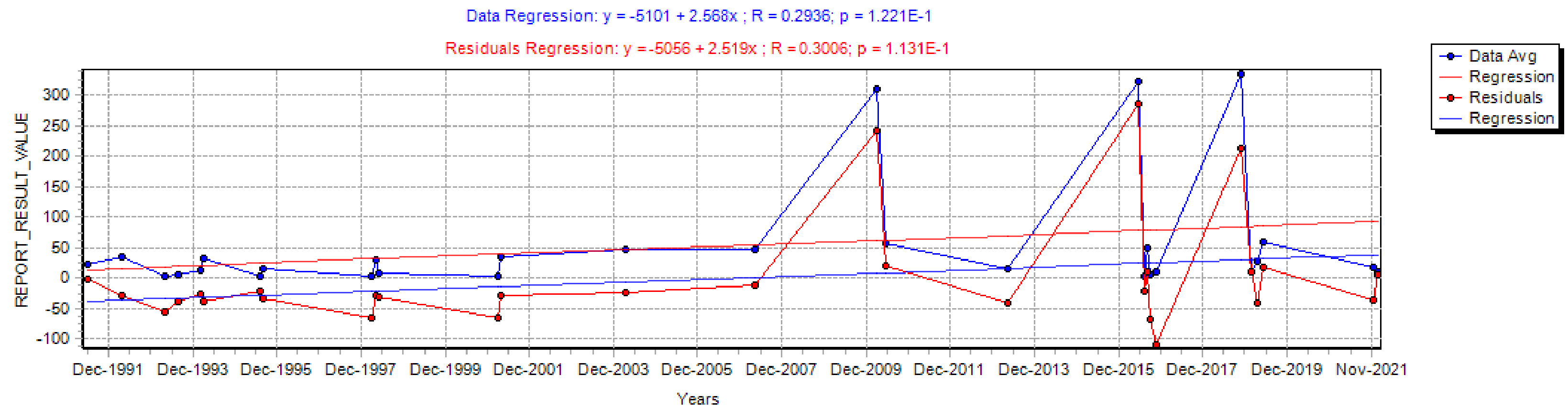
## *Chart 6-4: Field Salinity Trend*



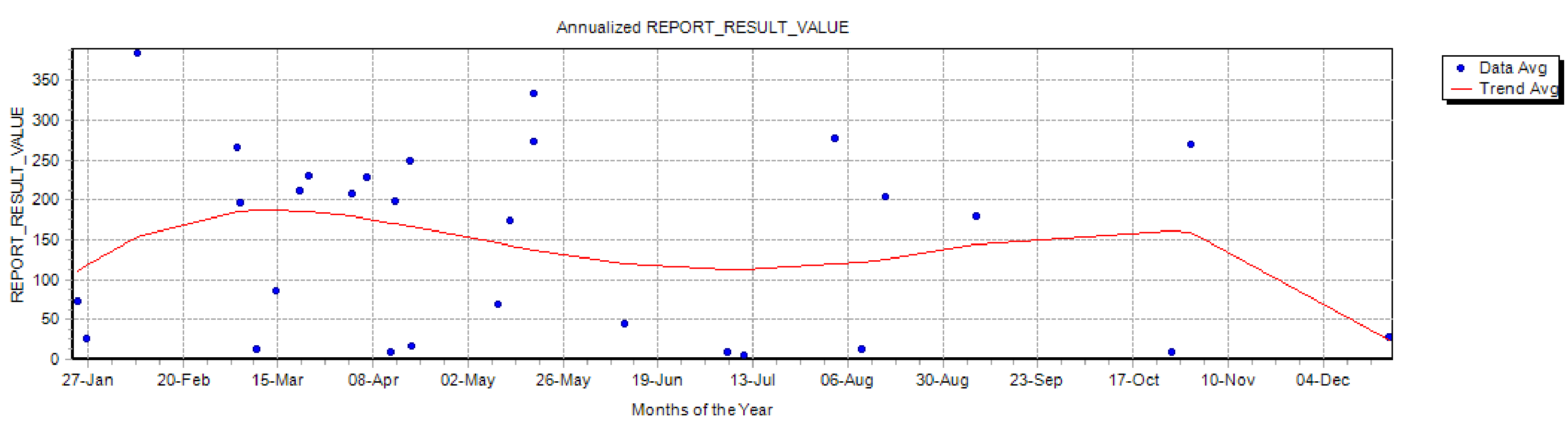



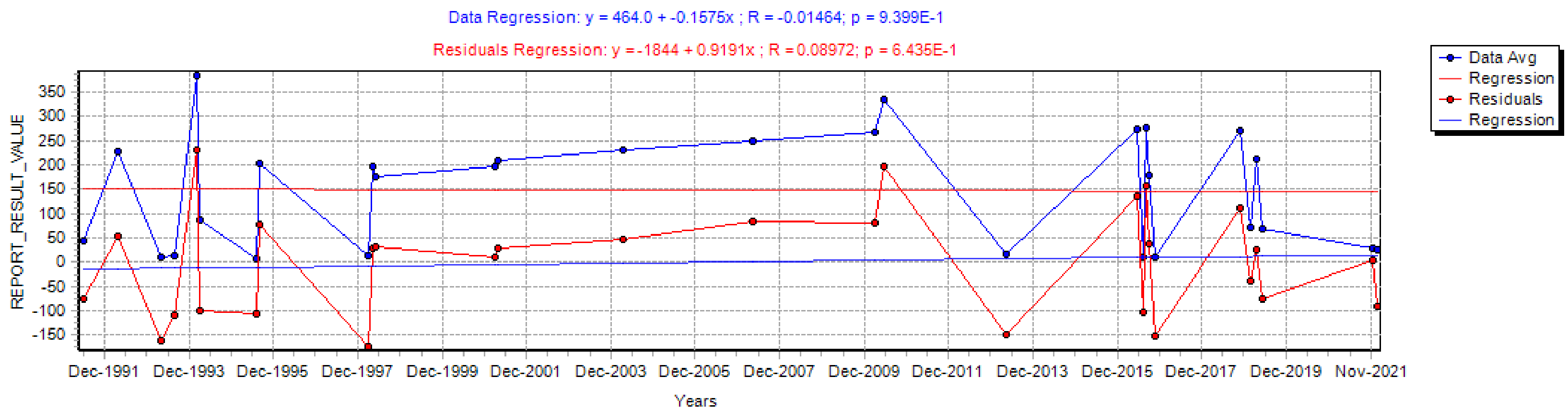
## Chart 6-5: Chloride Trend



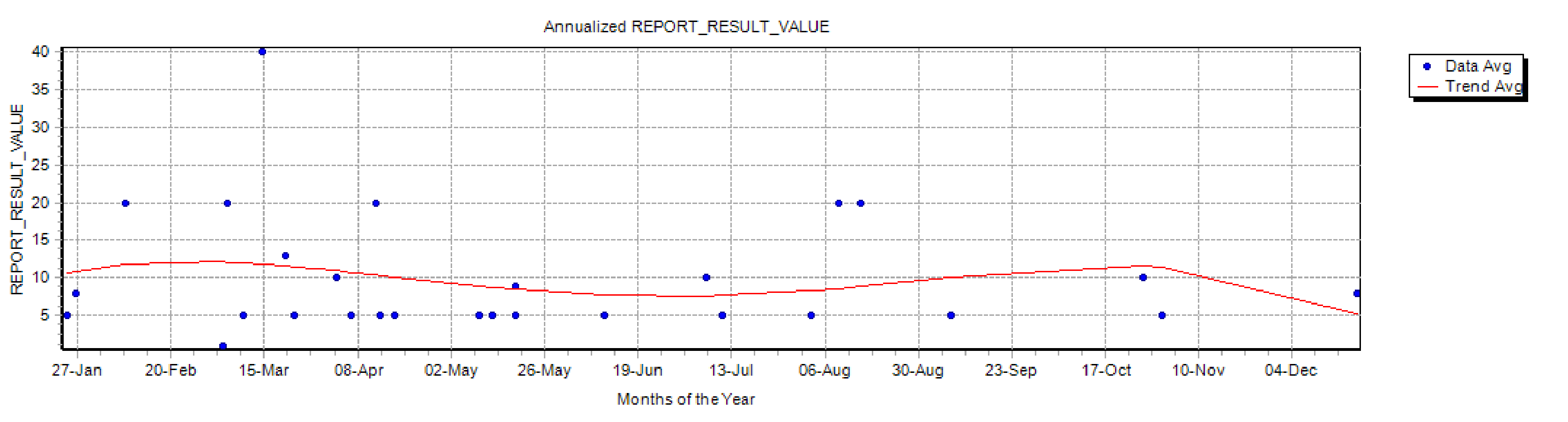



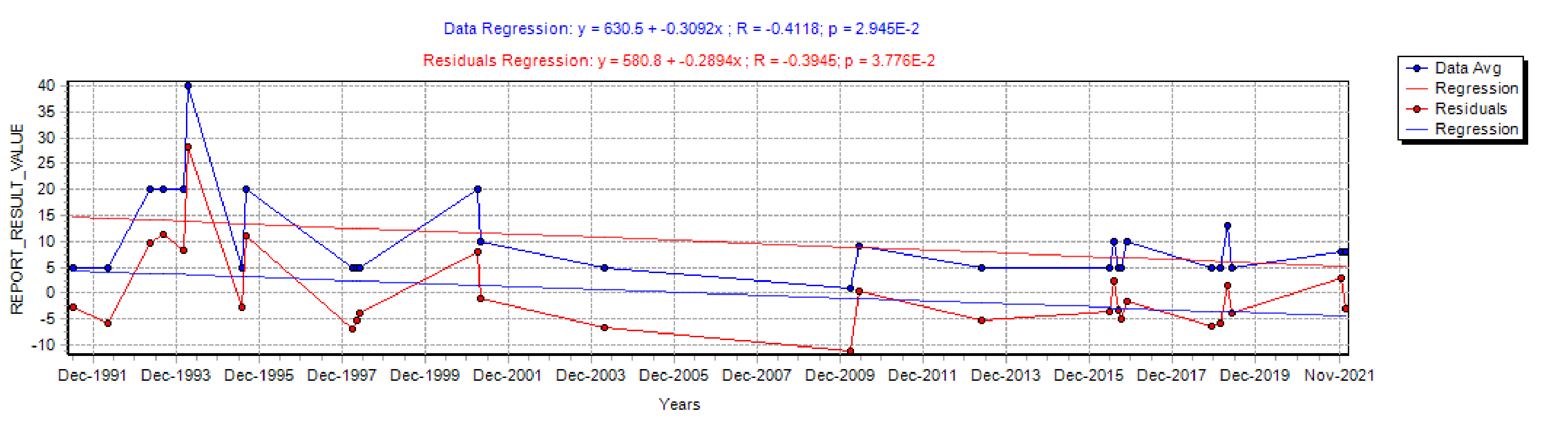
## Chart 6-6: Alkalinity Trend



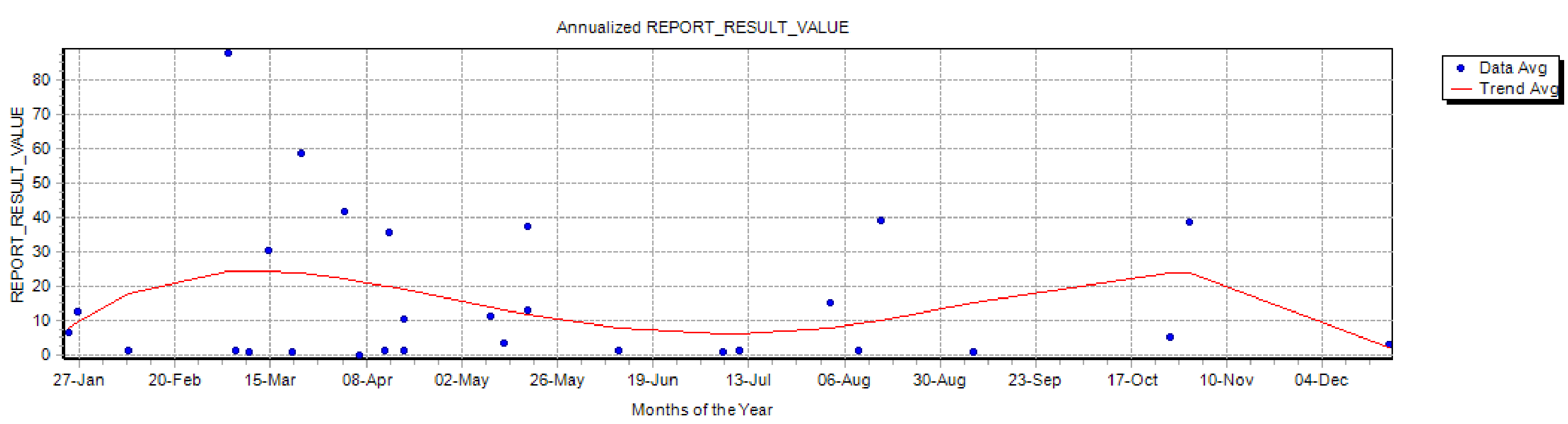



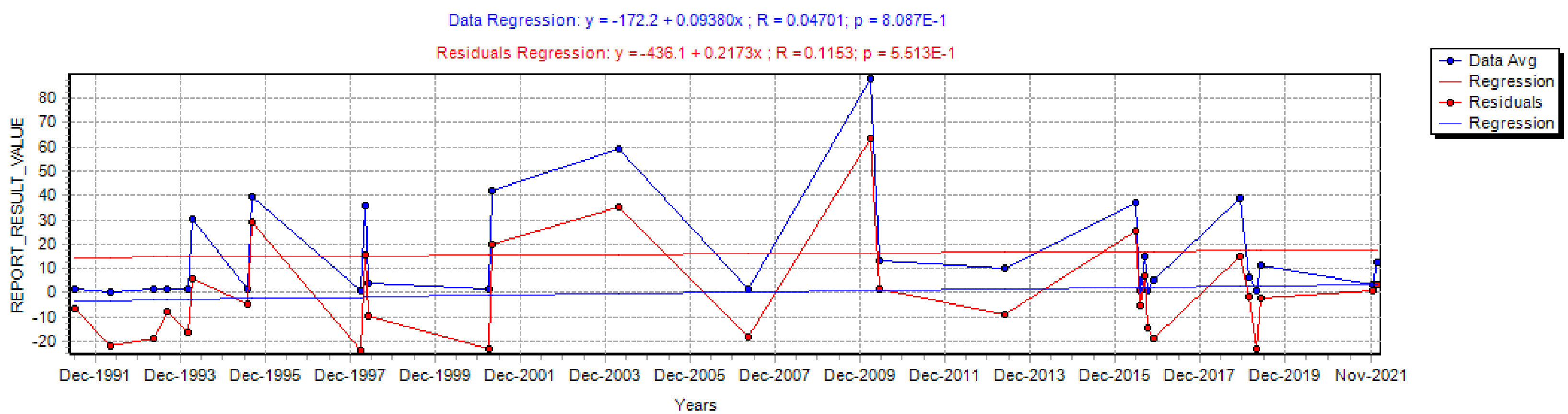
## Chart 6-7: Color Trend



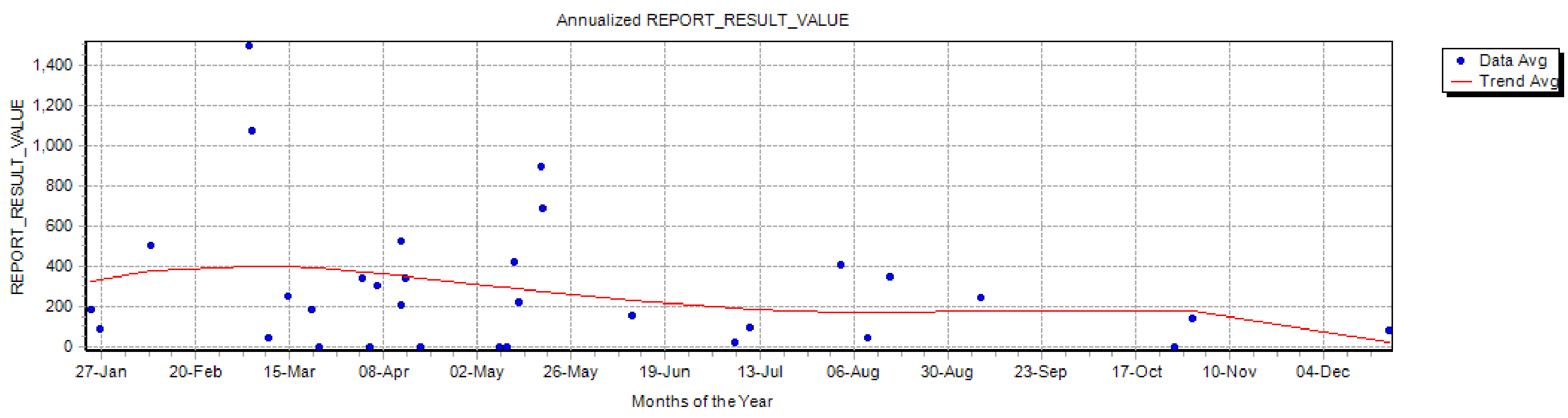



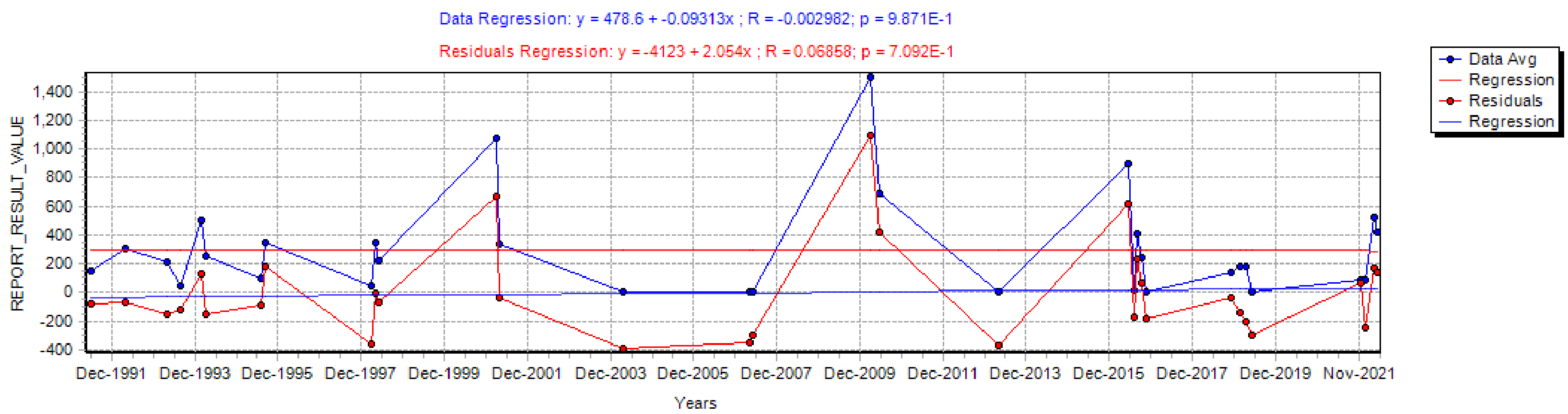
## *Chart 6-8: Sulfate Trend*



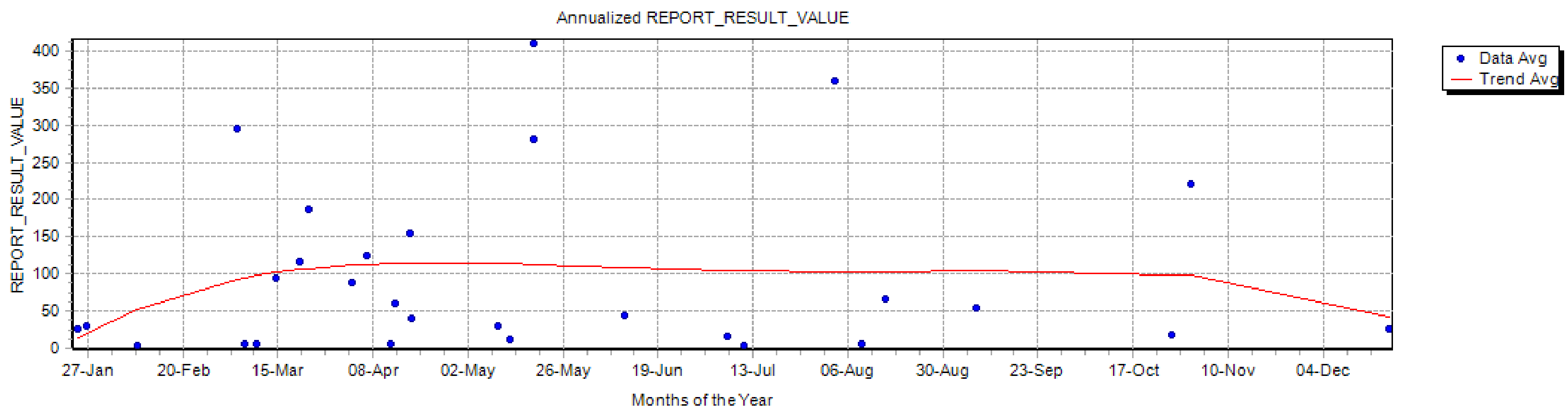



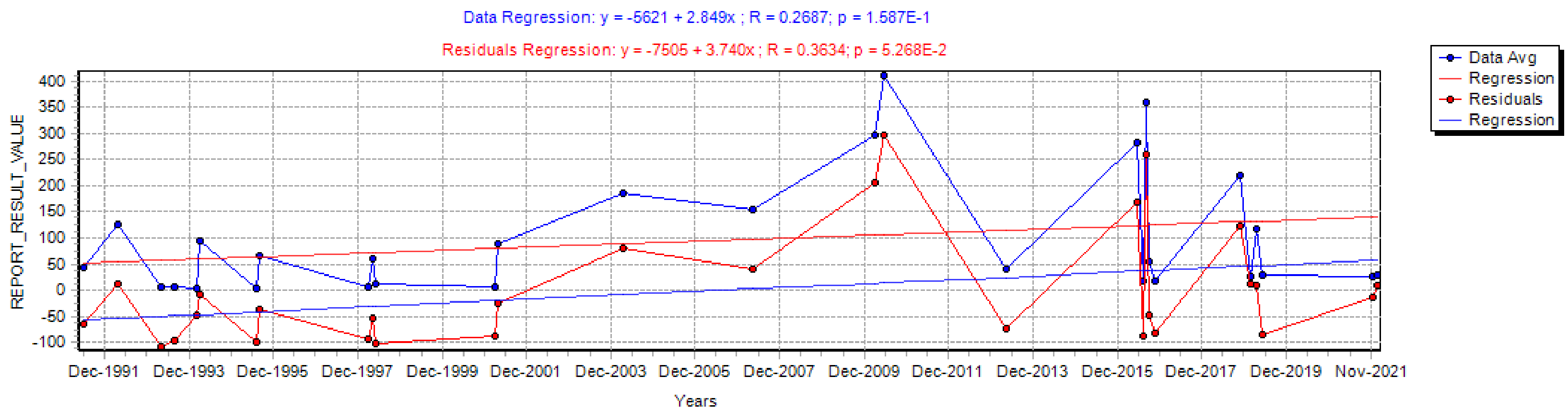
## *Chart 6-9: Total Dissolved Solids Trend*



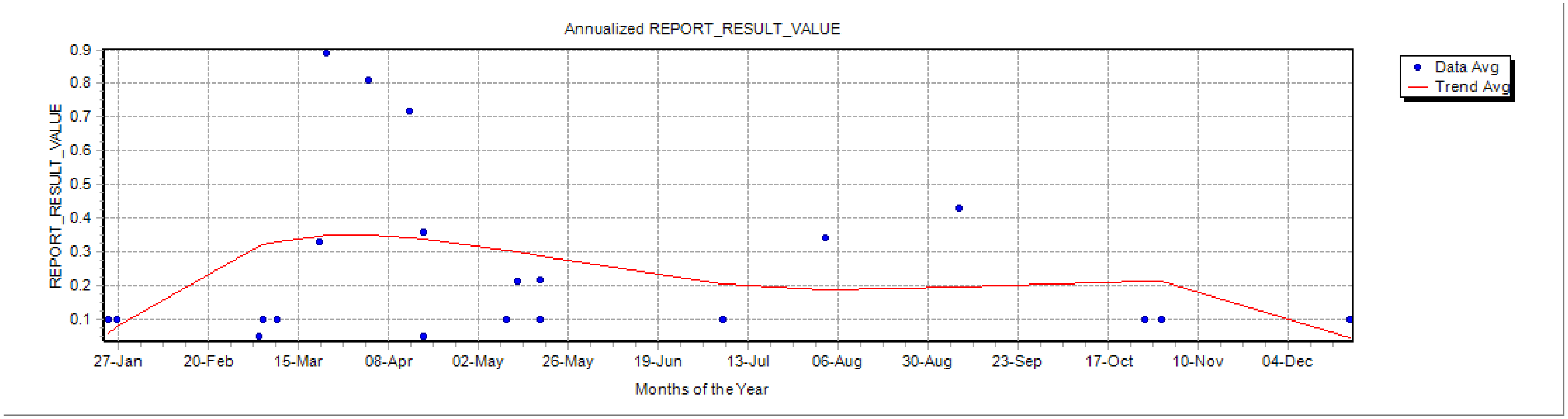



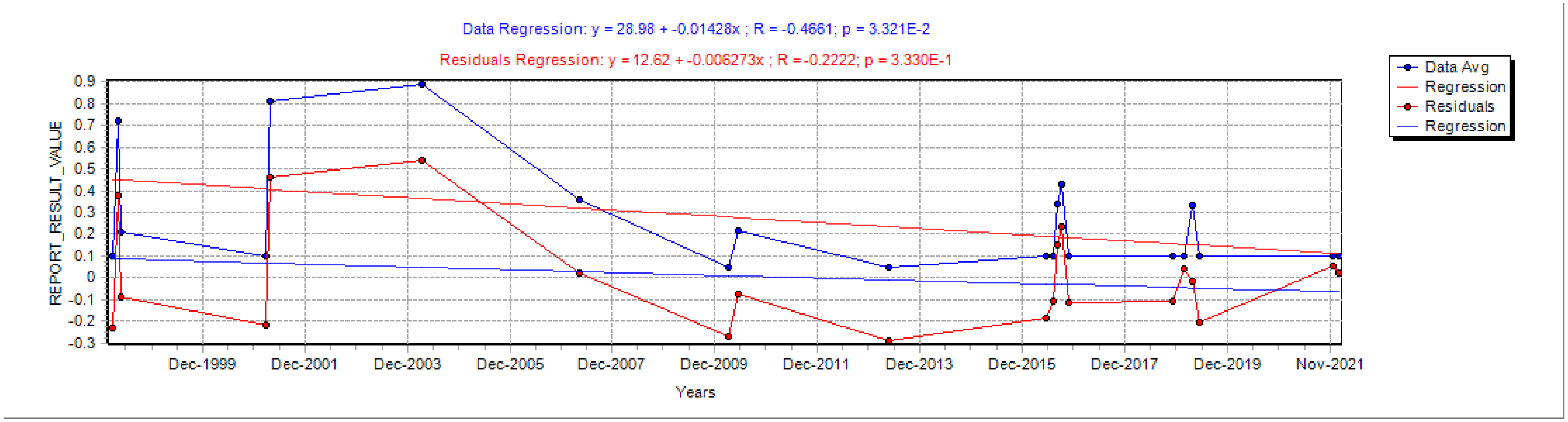
## Chart 6-10: Hardness Trend



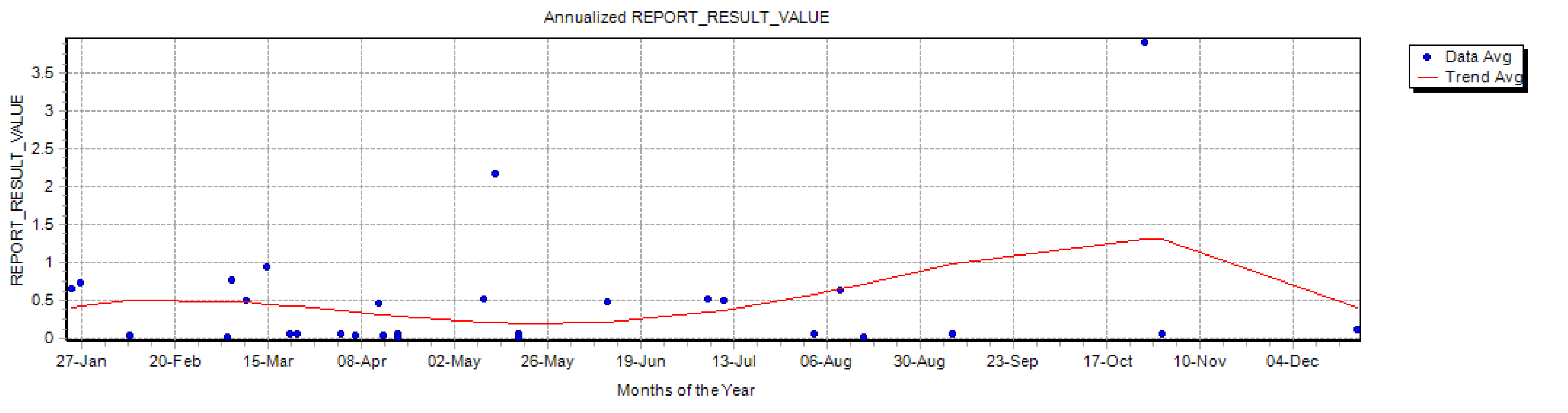



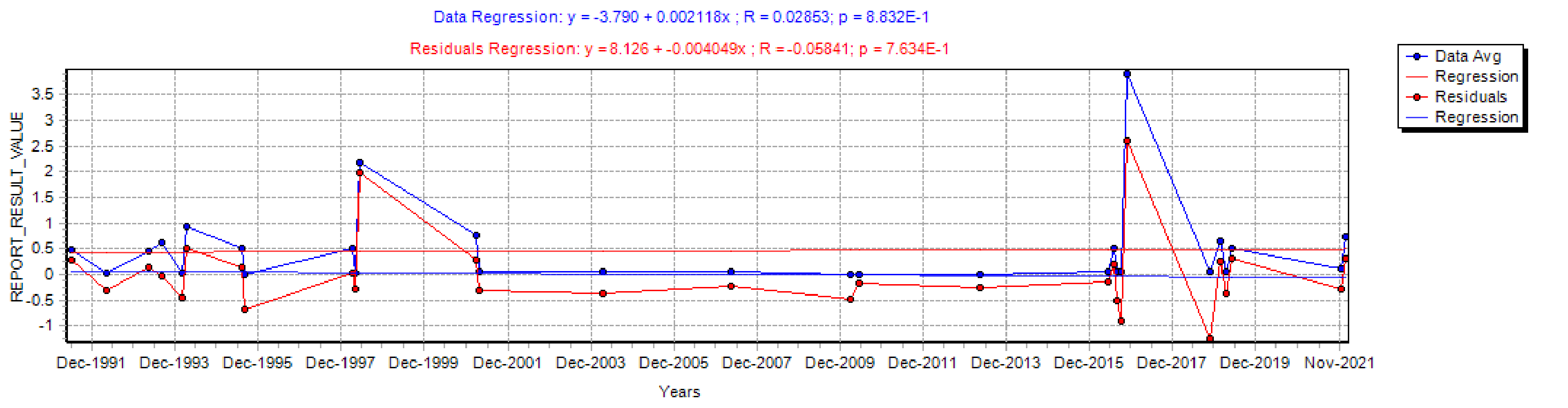
## *Chart 6-11: Ammonia Trend*



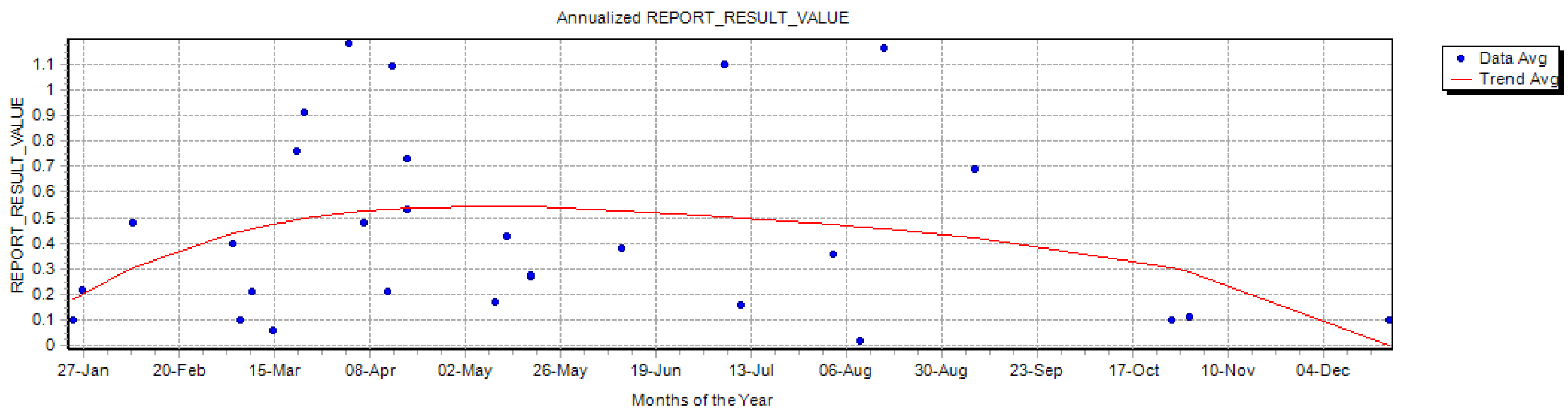



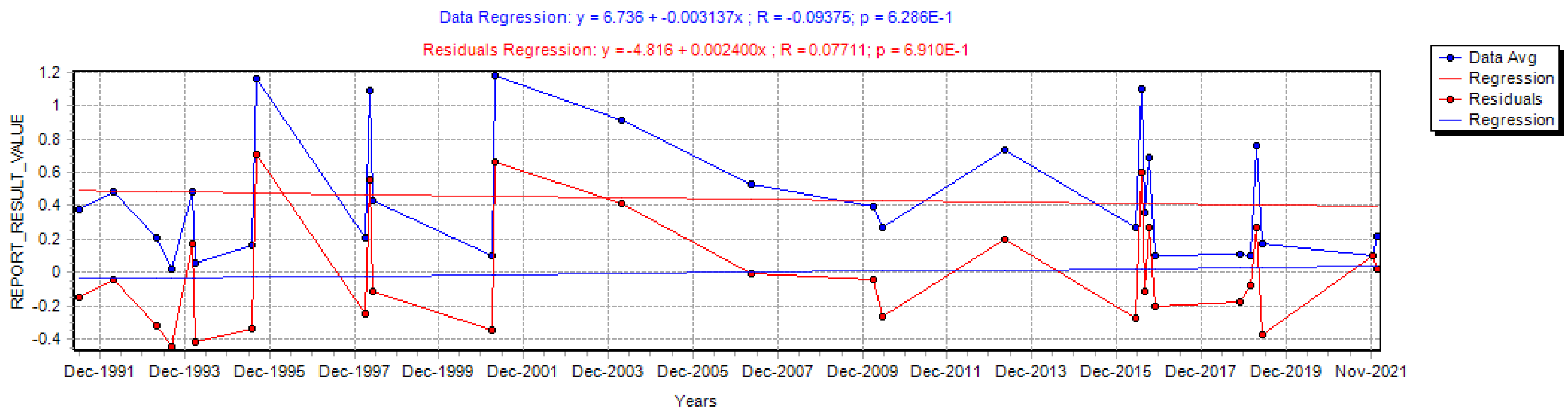
## *Chart 6-12: Nitrate – Nitrite Trend*



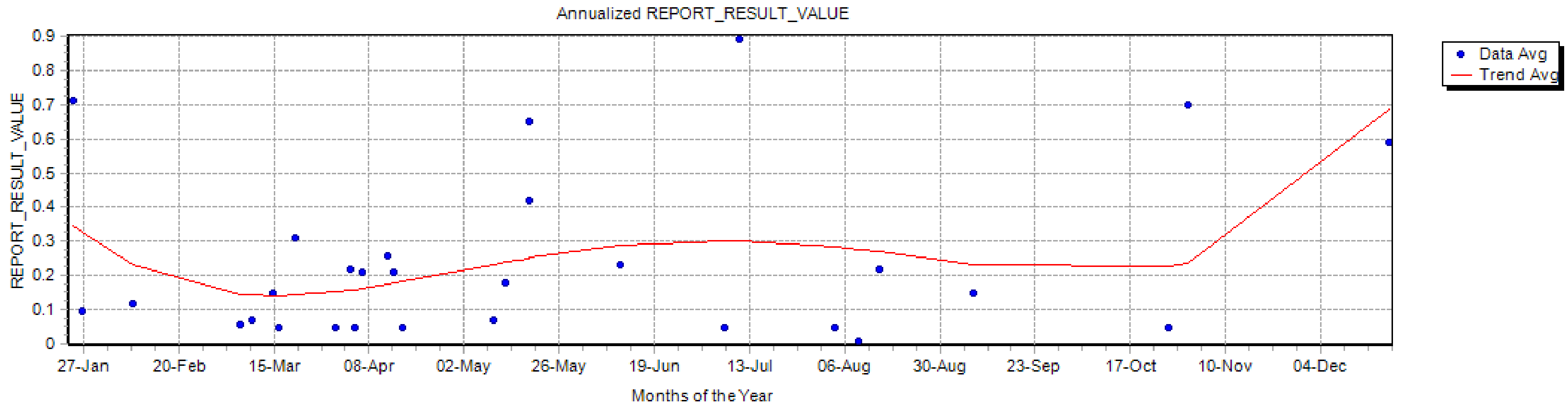



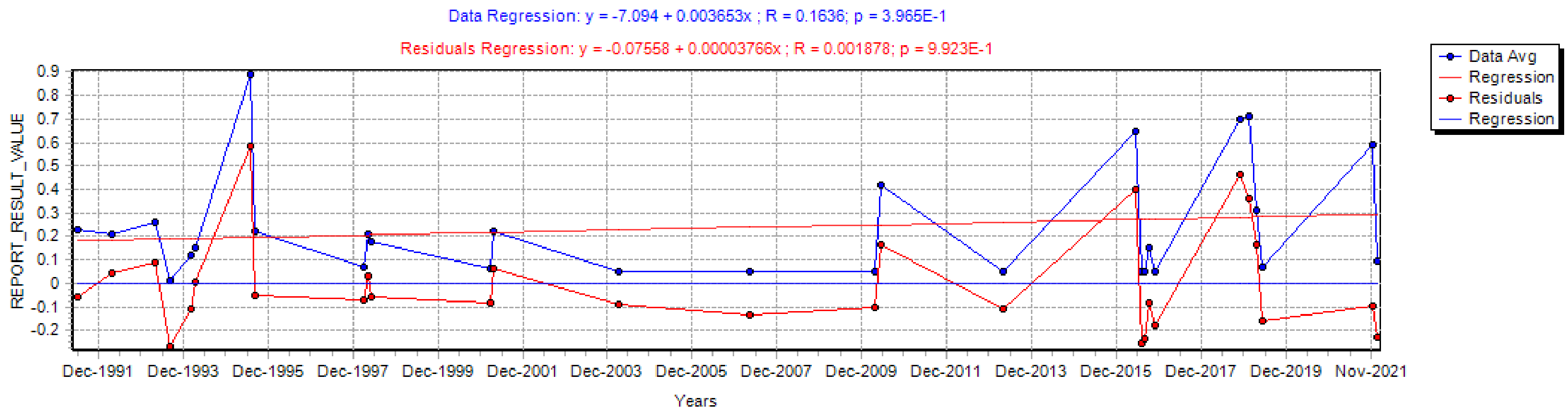
## Chart 6-13: Total Kjeldahl Nitrogen Trend



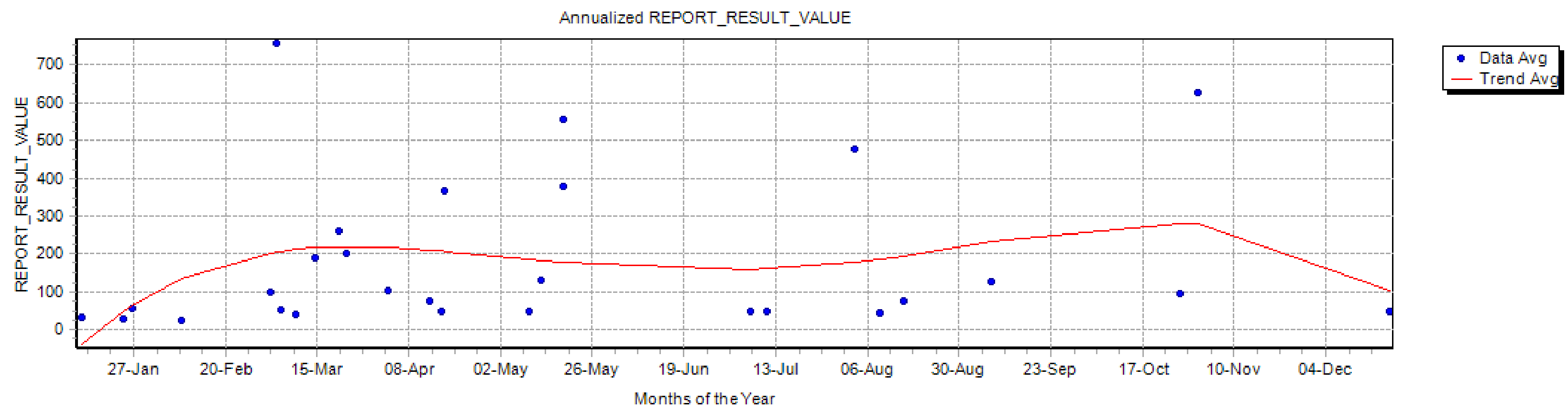



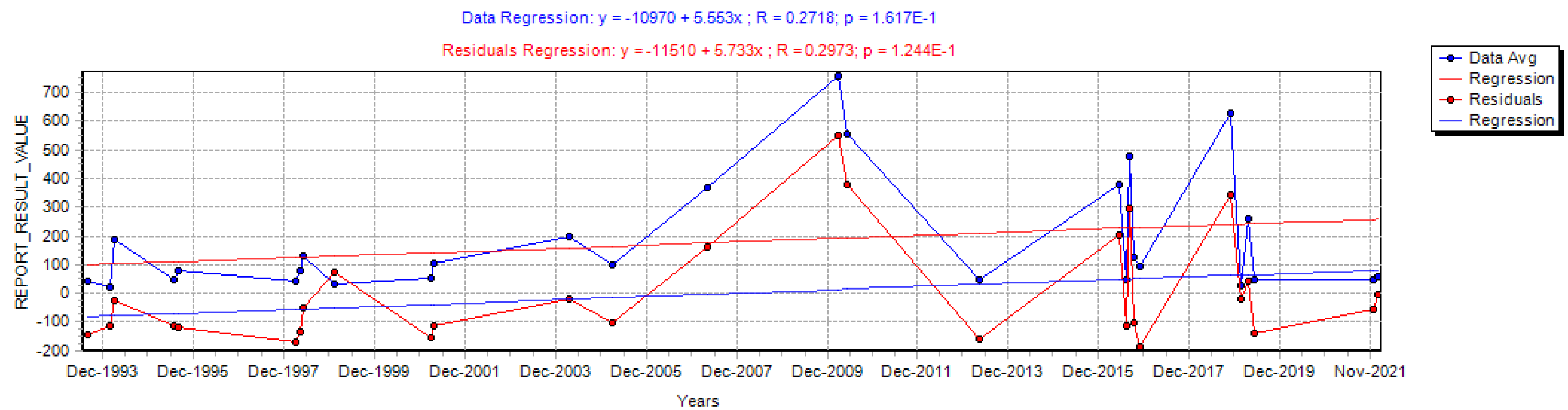
## *Chart 6-14: Total Phosphorus Trend*



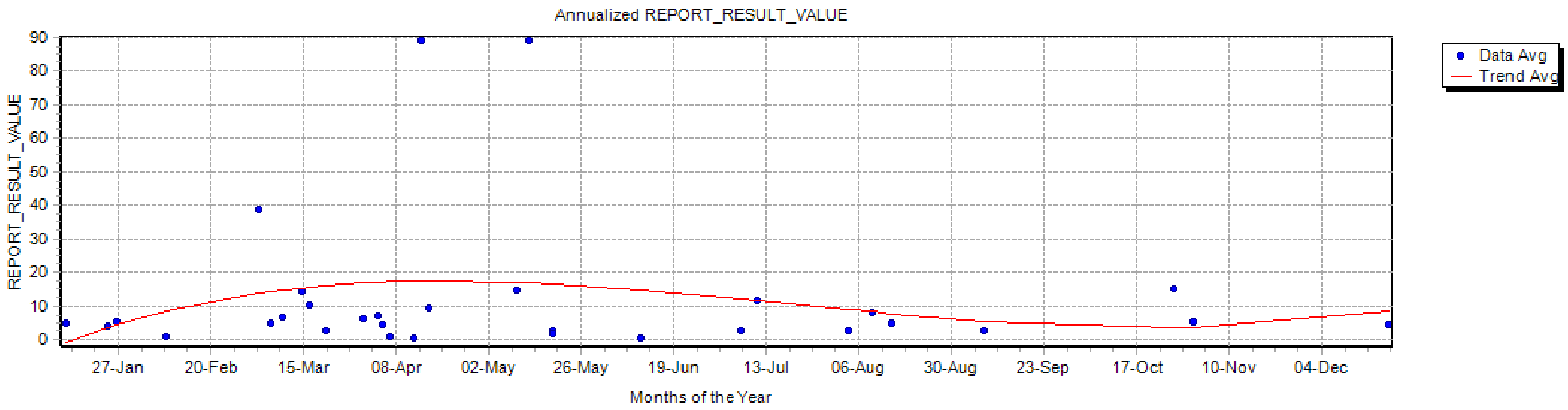



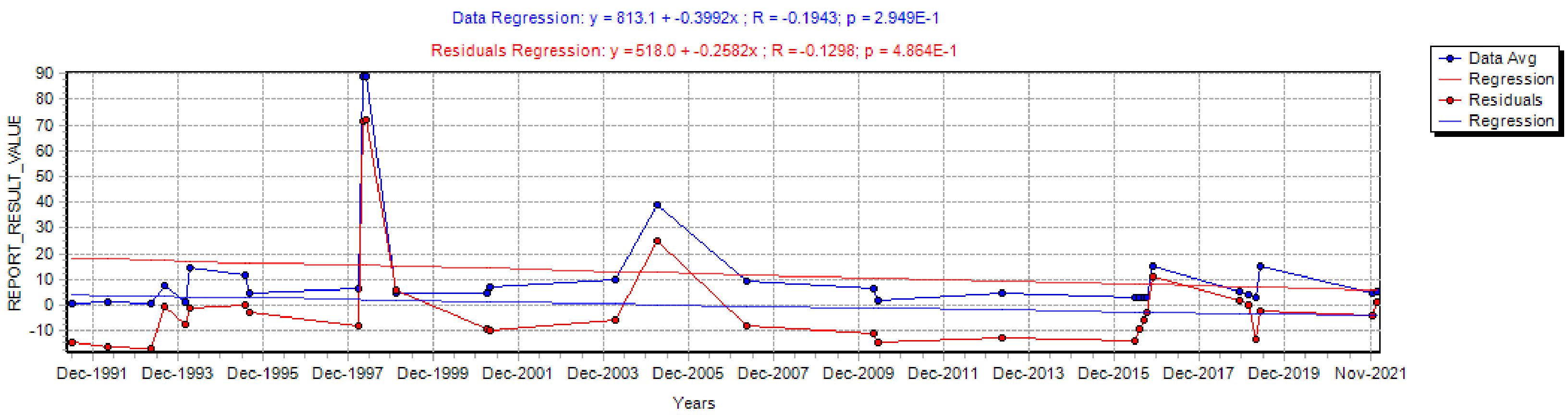
## Chart 6-15: Barium Trend



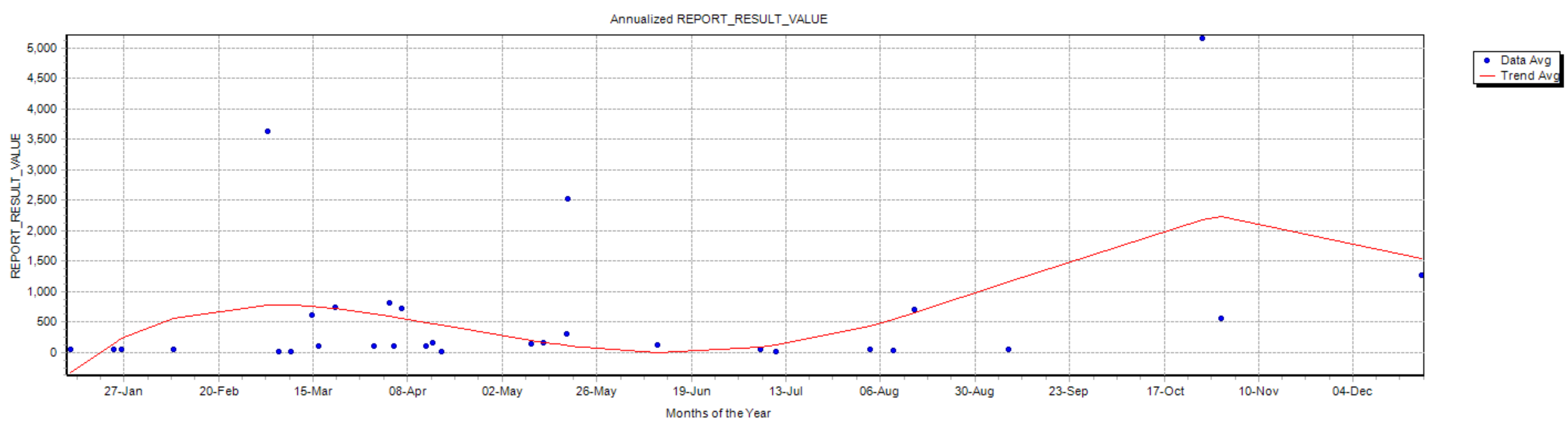



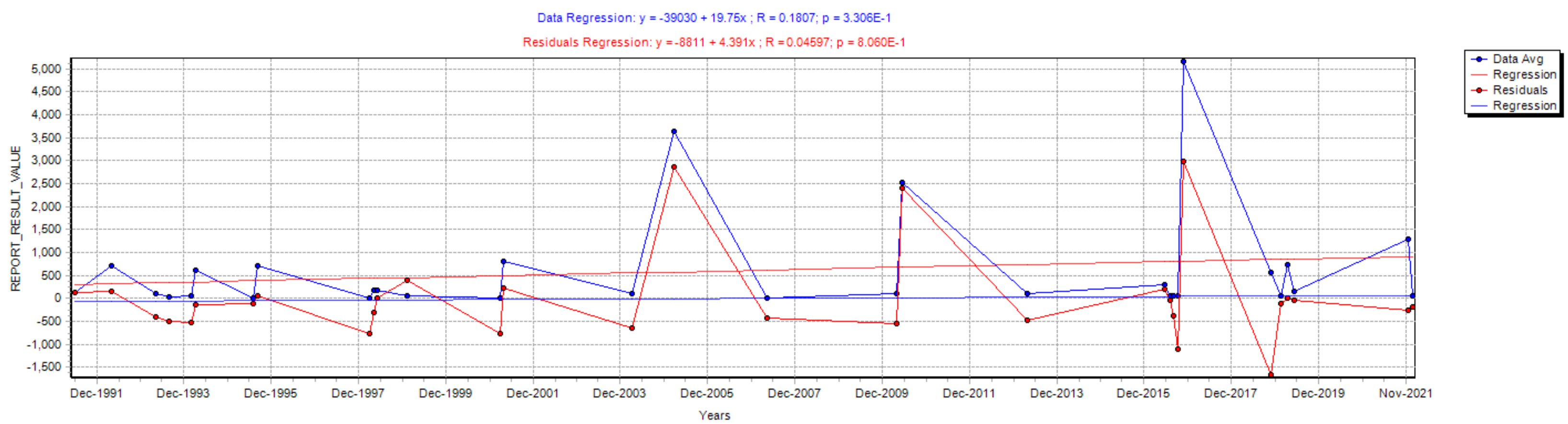
## *Chart 6-16: Copper Trend*



# Chart 6-17: Iron Trend



## *Chart 6-18: Zinc Trend*