CARNAHAN BAYOU AQUIFER SUMMARY, FY 19-20

AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ
LOUISIANA

APPENDIX 7 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 Carnahan Bayou aquifer, during the 2019 and 2020 state fiscal years (July 1, 2018 - June 30, 2020). This summary will become Appendix 7 of ASSET Program Triennial Summary Report for 2021.

The data show that eight wells were sampled which produce from the Carnahan Bayou aquifer. Five of the eight are classified as public supply, and one each is classified as industrial, power generation, and domestic use well. The wells are located in five parishes across the central area of the state.

Figure 7-1 shows the geographic locations of the Carnahan Bayou aquifer and the associated wells, whereas Table 7-1 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 Carnahan Bayou member consists of sands, silts, and clays, with some gravel. The Carnahan Bayou member, along with the Williamson Creek and Dough Hills, is grouped into the Jasper aquifer. The aquifer unit consists of fine to coarse sand, which may grade laterally and vertically to silt and clay.

HYDROGEOLOGY

Recharge takes place primarily as a result of the direct infiltration of rainfall in interstream, upland outcrop areas, movement of water through overlying terrace deposits, and leakage from other aquifers. The hydraulic conductivity of the Carnahan Bayou aquifer varies between 20 and 260 feet/day.

The maximum depths of occurrence of freshwater in the Carnahan Bayou aquifer range from 250 feet above sea level to 3,300 feet below sea level. The range of thickness of the fresh water interval in the Carnahan Bayou aquifer is 100 to 1,100 feet. The depths of the Carnahan Bayou aquifer wells that were monitored in conjunction with the ASSET Program range from 165 to 2,036 feet below land surface.

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 7-2. The inorganic parameters analyzed in the laboratory are listed in Table 7-3. These tables also show the field and analytical results determined for each analyte.

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 7-8, 7-9, and 7-10 list the target analytes for volatiles, semi-volatiles, and pesticides/PCBs, respectively.

Tables 7-4 and 7-5 provide a statistical overview of field, conventional, and inorganic data for the Carnahan Bayou aquifer, listing the minimum, maximum, and average results for these parameters collected in the FY 2019-2020 (FY19-20) sampling. Tables 7-6 and 7-7 compare these same parameter averages to historical ASSET-derived data for the Carnahan Bayou 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 7-1 through 7-18 represent the trend of the graphed parameter, based on the averaged values 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 uses 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 7-2 and 7-3 show that one or more secondary MCLs (SMCLs) were exceeded in three of the eight wells sampled in the Carnahan Bayou aquifer, with a total of four SMCLs being exceeded.

Field and Conventional Parameters

Table 7-2 shows the field and conventional parameters for which samples are collected at each well and the analytical results for those parameters. Table 7-4 provides an overview of this data for the Carnahan Bayou aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analysis listed in Table 7-2 shows that no 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 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 7-2 shows that one well exceeded the SMCL for pH, and one exceeded the SMCL for chloride. Another well exceeded the SMCL for total dissolved solids. Laboratory results override field results in exceedance determinations, thus only laboratory results will be counted in determining SMCL exceedance numbers for TDS. Following is a list of SMCL parameter exceedances with well number and results:

pH (SMCL = 6.5 – 8.5 Standard Units):

BE-405	8.52 SU

Chloride (SMCL = 250 mg/L):

R-1210	361 mg/L

Total Dissolved Solids (SMCL = 500 mg/L or 0.5 g/L):

	LAB RESULTS (in mg/L)	FIELD MEASURES (in g/L)
R-1210	795 mg/L	1.11 g/L

Inorganic Parameters

Table 7-3 shows the inorganic parameters for which samples are collected at each well and the analytical results for those parameters. Table 7-5 provides an overview of inorganic data for the Carnahan Bayou aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analyses listed on Table 7-3 shows that no MCL was exceeded for inorganics.

Federal Secondary Drinking Water Standards: Laboratory data contained in Table 7-3 shows that one well exceeded the SMCL for iron:

Iron (SMCL = 300 µg/L):

CO-47	1180 µg/L

Volatile Organic Compounds

Table 7-8 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, any detection of a VOC would be discussed in this section.

There was no confirmed detection of a VOC at or above its detection limit during the FY19-20 sampling of the Carnahan Bayou aquifer.

Semi-Volatile Organic Compounds

Table 7-9 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.

There was no confirmed detection of a SVOC at or above its detection limit during the FY19-20 sampling of the Carnahan Bayou aquifer.

Pesticides and PCBs

Table 7-10 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.

There was no confirmed detection of a pesticide or PCB at or above its detection limit during the FY19-20 sampling of the Carnahan Bayou 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 Carnahan Bayou aquifer exhibit some changes when comparing current data to that of the seven previous sampling rotations. These comparisons can be found in Tables 7-6 and 7-7, and in Charts 7-1 to 7-18 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, two analytes have shown a general increase in average concentration. These analytes are: pH and specific conductivity. For this same period, five analytes have demonstrated a decrease in average concentration. These are; alkalinity, color, total dissolved solids, salinity, and zinc. The remaining analytes have shown no consistent change or have stayed at or below their respective detection limits.

In FY 2016, four wells reported five SMCL exceedances. For FY19-20, three wells reported four SMCL exceedances.

SUMMARY AND RECOMMENDATIONS

In summary, the data show that the groundwater produced from this aquifer is soft[1]. The data also show that the groundwater 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 FY19-20 monitoring of the Carnahan Bayou aquifer exceeded an MCL. The data also show that this aquifer is of good quality when considering taste, odor, or appearance guidelines, with only four SMCLs exceeded in three wells.

Comparison to historical ASSET-derived data shows some change in the quality or characteristics of the Carnahan Bayou aquifer, with two parameters showing consistent increases in concentration, five parameters decreasing in concentration, with the remaining parameters showing no consistent change over the previous 24 years.

It is recommended that the wells assigned to the Carnahan Bayou aquifer be re-sampled as planned, in approximately three years. In addition, several wells should be added to the eight currently in place to increase the well density for this aquifer.

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

Table 7-1: List of Wells Sampled, Carnahan Bayou Aquifer– FY19-20

Well ID	Parish	Date	Owner	Depth (Feet)	Well Use
BE-405	Beauregard	06/13/2019	Boise	1,016	Industrial
CO-47	Concordia	11/01/2018	City of Vidalia	310	Public Supply
G-5178Z	Grant	1/24/2019	Private Owner	165	Domestic
R-1001	Rapides	5/22/2019	Gardner Water System	1,080	Public Supply
R-1172	Rapides	5/22/2019	Cleco-Rodemacher	298	Power Generation
R-1210	Rapides	5/22/2019	City of Alexandria	2,036	Public Supply
V-496	Vernon	7/1/2019	U.S. Army/Fort Polk	1,415	Public Supply
V-656	Vernon	7/1/2019	East Central Vernon Water System	1,477	Public Supply

Table 7-2: Summary of Field and Conventional Data, Carnahan Bayou Aquifer– FY19-20

Well ID	pH SU	Sal. ppt	Sp. Cond. mmhos per 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. µmmhos per cm	SO4 mg/L	TDS mg/L	TKN mg/l	TSS mg/L	Turb. NTU
LABORATORY DETECTION LIMITS →						2	1	5	5	0.05	0.1	0.05	1	1	10	0.1	4	0.1
	FIELD PARAMETERS					LABORATORY PARAMETERS												
BE-405	8.52	0.18	0.38	23.23	0.25	176	6.80	ND	56	ND	0.22	ND	369	8.20	200	ND	ND	0.41
CO-47	7.90	0.23	0.46	15.74	0.30	147	17.30	ND	28	ND	0.63	ND	447	36.00	280	1.10	ND	ND
G-5178Z	ND	ND	ND	ND	ND	21.40	5.40	9.00	10	ND	0.21	ND	82	4.80	65	0.58	ND	0.21
R-1001	8.22	0.22	0.45	23.45	0.29	180	11.60	11.00	6	ND	0.35	ND	467	12.90	240	0.79	ND	0.16
R-1172	7.87	0.16	0.33	18.60	0.22	121	13.40	7.00	8	ND	0.54	ND	339	16.30	210	0.76	ND	0.24
R-1210	8.07	0.85	1.70	31.51	1.11	305	361	8.00	18	ND	0.70	ND	1770	ND	795	0.74	ND	0.16
V-496	7.47	0.20	0.42	25.51	0.27	160	22.30	ND	108	ND	0.49	ND	339	6.10	295	0.61	ND	0.81
V-656	8.26	0.15	0.32	27.19	0.21	126	10.30	ND	ND	ND	0.24	ND	311	ND	190	0.44	4.00	ND

*Denotes Duplicate Sample Shaded cells exceed EPA Secondary Standards

Table 7-3: Summary of Inorganic Data, Carnahan Bayou Aquifer– FY19-20

Well ID	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Cadmium µg/L	Chromium µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Mercury µg/L	Nickel µg/L	Selenium µg/L	Silver µg/L	Thallium µg/L	Zinc µg/L
Laboratory Detection Limits	1	1	1	0.5	1	1	3	50	1	0.2	1	1	0.5	0.5	5
BE-405	1.50	ND	49.50	ND	ND	ND	ND	88.90	ND	ND	ND	ND	ND	ND	ND
CO-47	ND	ND	331	ND	ND	ND	ND	1180	ND	ND	ND	ND	ND	ND	ND
G-5178Z	ND	ND	13.30	ND	ND	ND	5.90	249	ND	ND	ND	ND	ND	ND	ND
R-1001	ND	ND	14.40	ND	ND	ND	ND	93	ND	ND	ND	ND	ND	ND	ND
R-1172	ND	ND	16.40	ND	ND	ND	ND	50	2	ND	ND	ND	ND	ND	ND
R-1210	2.40	ND	49.80	ND	ND	ND	ND	76.30	ND	ND	ND	ND	ND	ND	ND
V-496	ND	ND	112	ND	ND	ND	27.00	156	ND	ND	ND	ND	ND	ND	ND
V-656	ND	ND	1.80	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.40

*Denotes Duplicate Sample. Shaded cells exceed EPA Secondary Standards

Table 7-4: FY19-20 Field and Conventional Statistics, ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	pH (SU)	7.47	8.52	8.04
	Salinity (ppt)	0.15	0.85	0.28
	Specific Conductance (mmhos/cm)	0.32	1.70	0.58
	Temperature (^{O}C)	15.74	31.51	23.60
	Total Dissolved Solids (g/L)	0.21	1.11	0.38
LABORATORY	Alkalinity (mg/L)	21.40	305	151.49
	Chloride (mg/L)	5.40	361	63.04
	Color (PCU)	< DL	11	6.88
	Hardness (mg/L)	< DL	108	26.14
	Nitrite - Nitrate, as N (mg/L)	< DL	< DL	< DL
	Ammonia, as N (mg/L)	0.21	0.63	0.45
	Total Phosphorus (mg/L)	< DL	0.11	< DL
	Specific Conductance (µmhos/cm)	81.50	1770	544.93
	Sulfate (mg/L)	< DL	36.00	10.79
	Total Dissolved Solids (mg/L)	65.00	295	296.43
	Total Kjeldahl Nitrogen (mg/L)	< DL	1.10	0.64
	Total Suspended Solids (mg/L)	< DL	4.00	< DL
	Turbidity (NTU)	< DL	4.00	<DL

Table 7-5: FY19-20 Inorganic Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (µg/L)	< DL	2.40	1.24
Arsenic (µg/L)	< DL	< DL	< DL
Barium (µg/L)	1.80	49.80	76.96
Beryllium (µg/L)	< DL	< DL	< DL
Cadmium (µg/L)	< DL	< DL	< DL
Chromium (µg/L)	< DL	< DL	< DL
Copper (µg/L)	< DL	27.00	6.36
Iron (µg/L)	< DL	1180.00	242.90
Lead (µg/L)	< DL	2.00	< 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	5.40	< DL

Table 7-6: 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 16-17	FY 18-19
FIELD	pH (SU)	6.90	7.11	7.66	7.57	7.61	7.61	7.82	7.61	8.04
	Salinity (ppt)	0.21	0.19	0.17	.23	0.23	0.22	0.21	0.17	0.28
	Specific Conductance (mmhos/cm)	0.468	0.389	0.346	0.480	0.480	0.463	0.425	0.356	0.58
	Temperature (^{O}C)	27.54	24.53	23.58	23.76	25.99	23.61	25.46	21.31	23.60
	Total Dissolved Solids (g/L)	-	-	-	0.310	0.310	0.300	0.277	0.231	0.38
LABORATORY	Alkalinity (mg/L)	203	186	176	202	174	124	139	150	151.49
	Chloride (mg/L)	41.5	13.0	33.9	27.1	42.3	43.4	37.9	12.6	63.04
	Color (PCU)	16	9	5	7	Data Invalid	4	3	7	6.88
	Hardness (mg/L)	63	70	48	67	51	15	56	40	26.14
	Nitrite - Nitrate, as N (mg/L)	< DL	0.11	< DL	0.06	< DL	0.01	< DL	< DL	< DL
	Ammonia, as N (mg/L)	0.41	0.38	0.32	0.43	0.33	0.37	0.51	0.32	0.45
	Total Phosphorus (mg/L)	0.27	0.33	0.36	0.25	0.32	< DL	0.34	0.22	< DL
	Specific Conductance (µmhos/cm)	492	406	443	471	478	384	434	356	544.93
	Sulfate (mg/L)	12.8	10.2	8.6	12.4	11.8	10.0	11.1	12.0	10.79
	Total Dissolved Solids (mg/L)	327	247	326	303	312	359	390	255	296.43
	Total Kjeldahl Nitrogen (mg/L)	0.29	0.65	0.50	0.63	0.40	0.50	0.68	0.46	0.64
	Total Suspended Solids (mg/L)	5.1	< DL	< DL	< DL	5.3	< DL	< DL	< DL	< DL
	Turbidity (NTU)	203	186	176	202	174	124	139	1.58	<DL

Table 7-7: 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	FY16-17	FY18-19
Antimony (µg/L)	< DL	< DL	< DL	No inorganic statistics for this period. Program QC limits were exceeded	< DL	< DL	< DL	< DL	1.24
Arsenic (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL	< DL	< DL
Barium (µg/L)	110.9	197.1	80.9		105.6	64.8	89.2	54.9	76.96
Beryllium (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL	< DL	< DL
Cadmium (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL	< DL	< DL
Chromium (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL	0.5	< DL
Copper (µg/L)	5.5	7.5	5.7		5.9	15.5	4.5	10.7	6.36
Iron (µg/L)	1068	1542	532		960	226	709	293	242.90
Lead (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL	1.3	< DL
Mercury (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL	< DL	< DL
Nickel (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL	< DL	< DL
Selenium (µg/L)	< 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
Zinc (µg/L)	560.6	607.8	26.5		79.3	17.2	9.0	< DL	< DL

Table 7-8: Volatile Organic Compound List

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 7-9: Semi-Volatile Organic Compound List

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

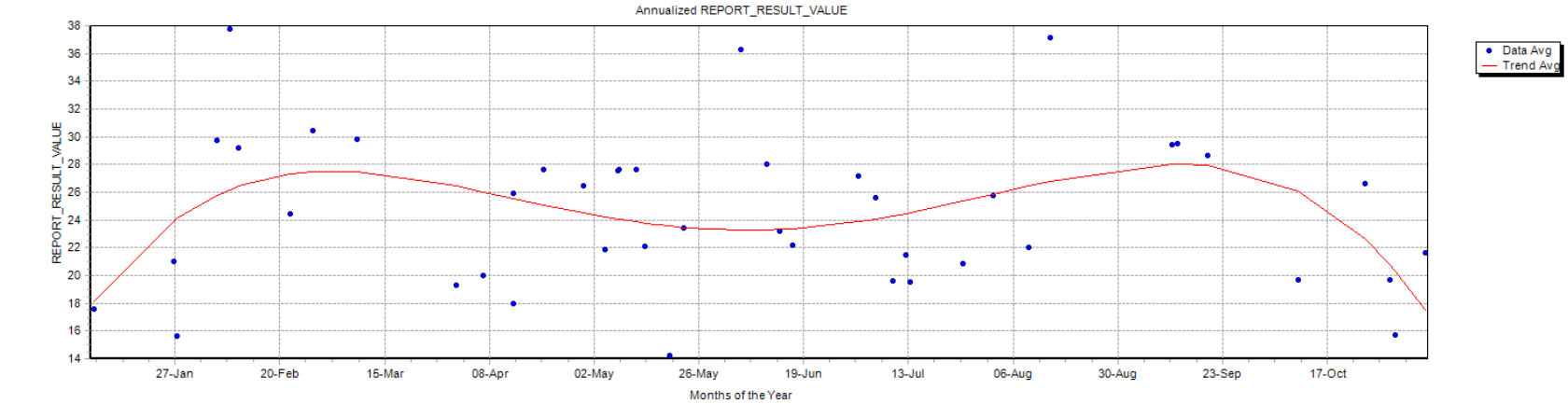
SVOC ANAYTICAL PARAMETERS	METHOD	REPORTING LIMIT (µg/L)
HEXACHLOROBENZENE	625	5.0
HEXACHLOROBUTADIENE	625	5.0
HEXACHLOROCYCLOPENTADIENE	625	10.0
HEXACHLOROETHANE	625	5.0
INDENO(1,2,3-C,D)PYRENE	625	0.20
ISOPHORONE	625	5.0
NAPHTHALENE	625	0.20
NITROBENZENE	625	5.0
N-NITROSODIMETHYLAMINE	625	5.0
N-NITROSODI-N-PROPYLAMINE	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 7-10: Pesticide and PCB List

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 7-1: Location Plat, Carnahan Bayou Aquifer

Chart 7-1: Temperature Trend



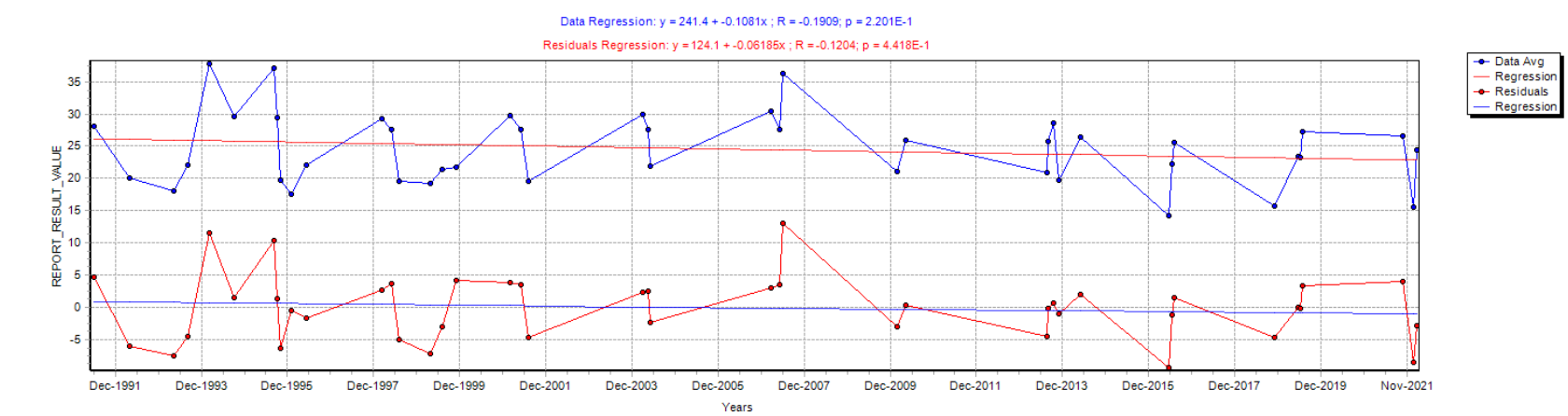


Chart 7-2: pH Trend

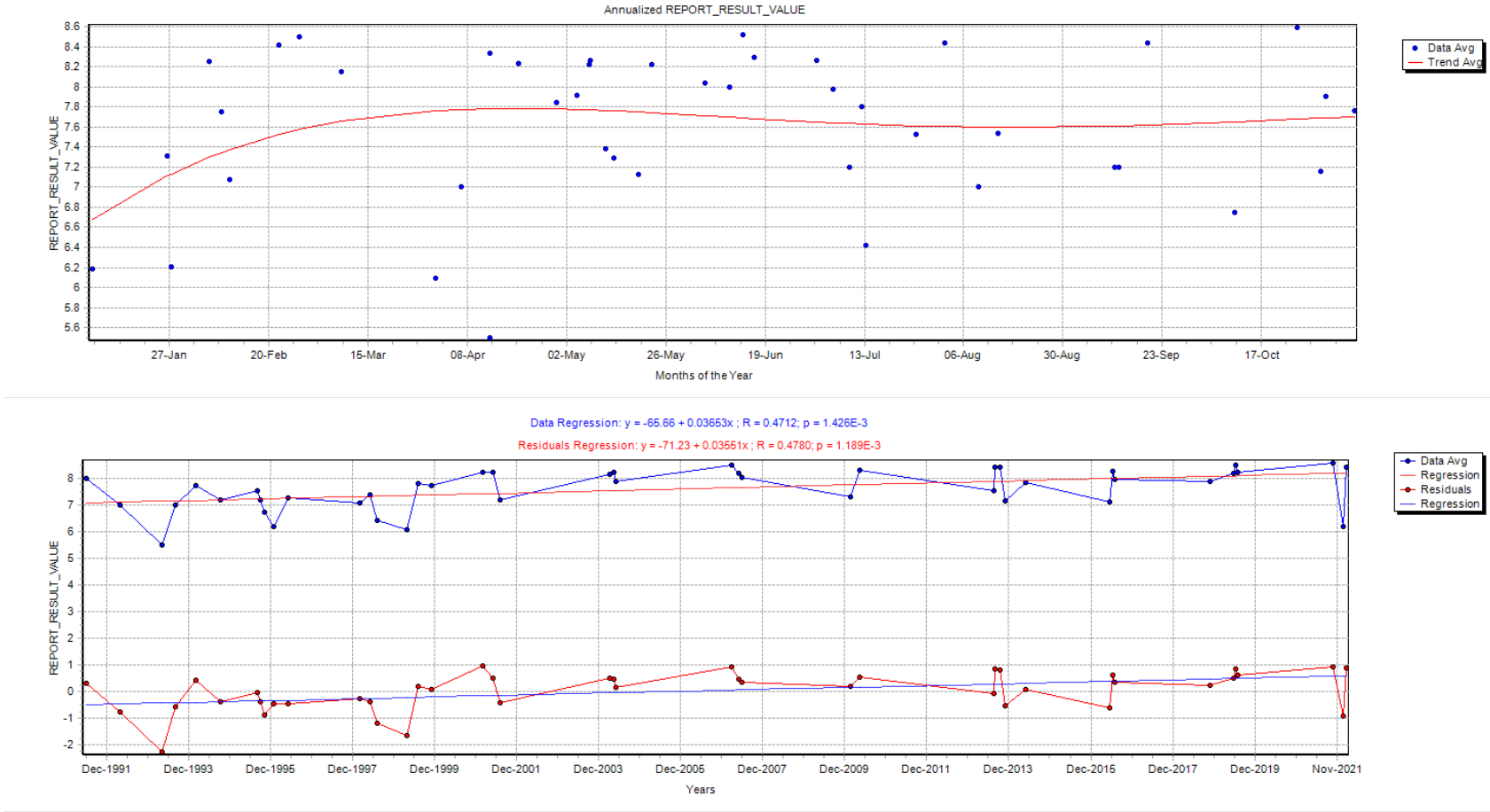


Chart 7-3: Specific Conductance Trend

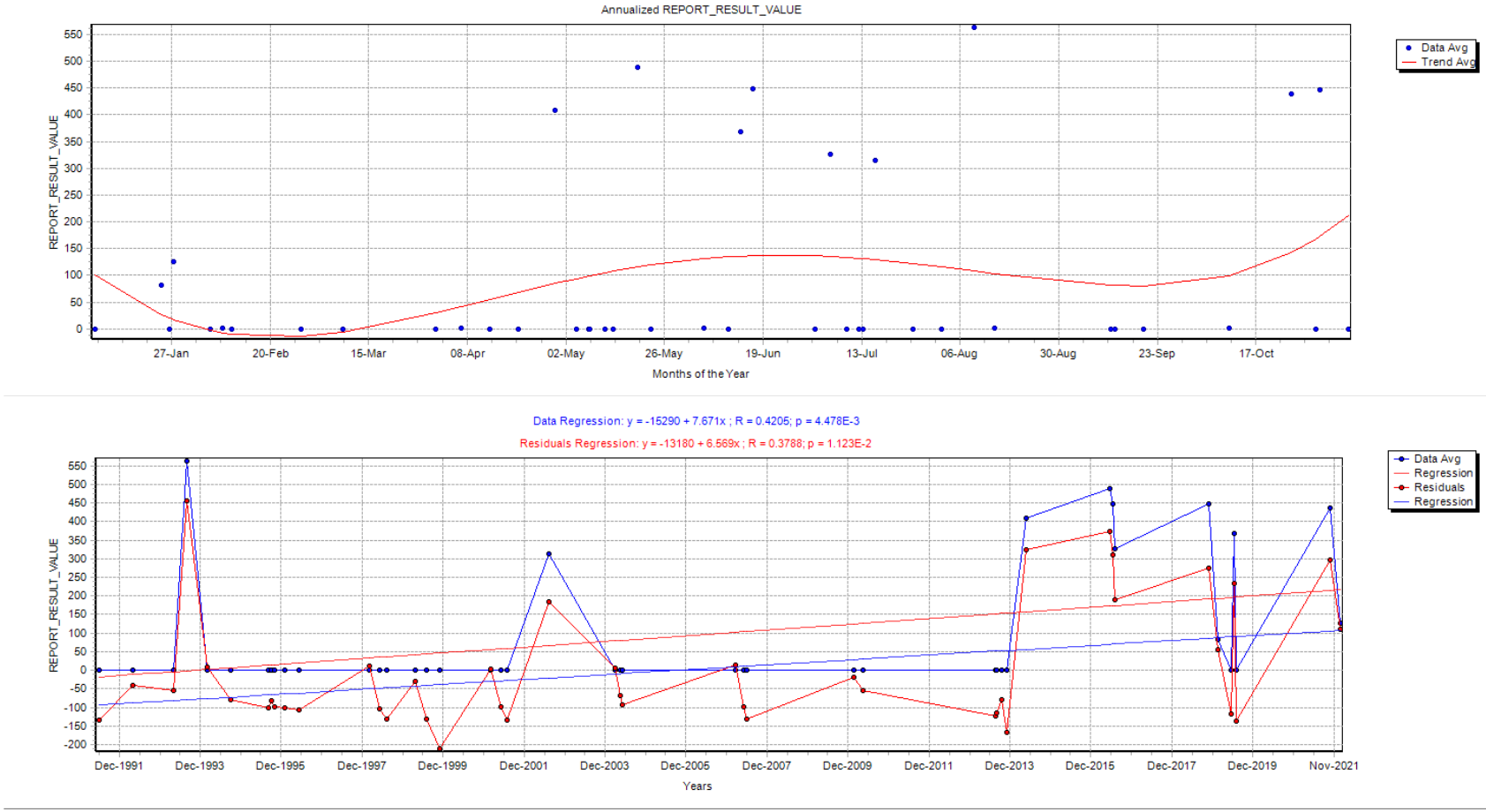


Chart 7-4: Field Salinity Trend

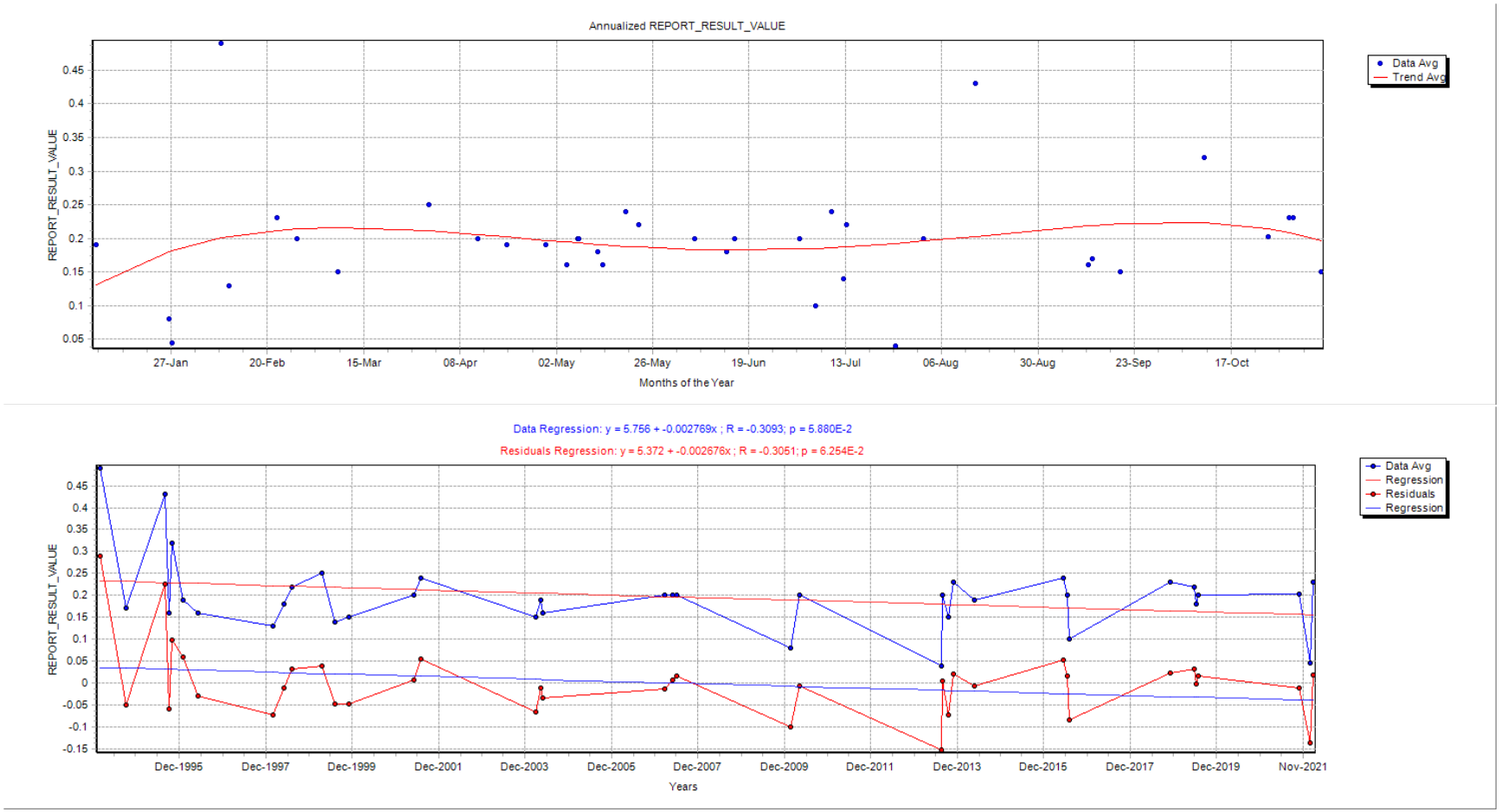


Chart 7-5: Chloride Trend

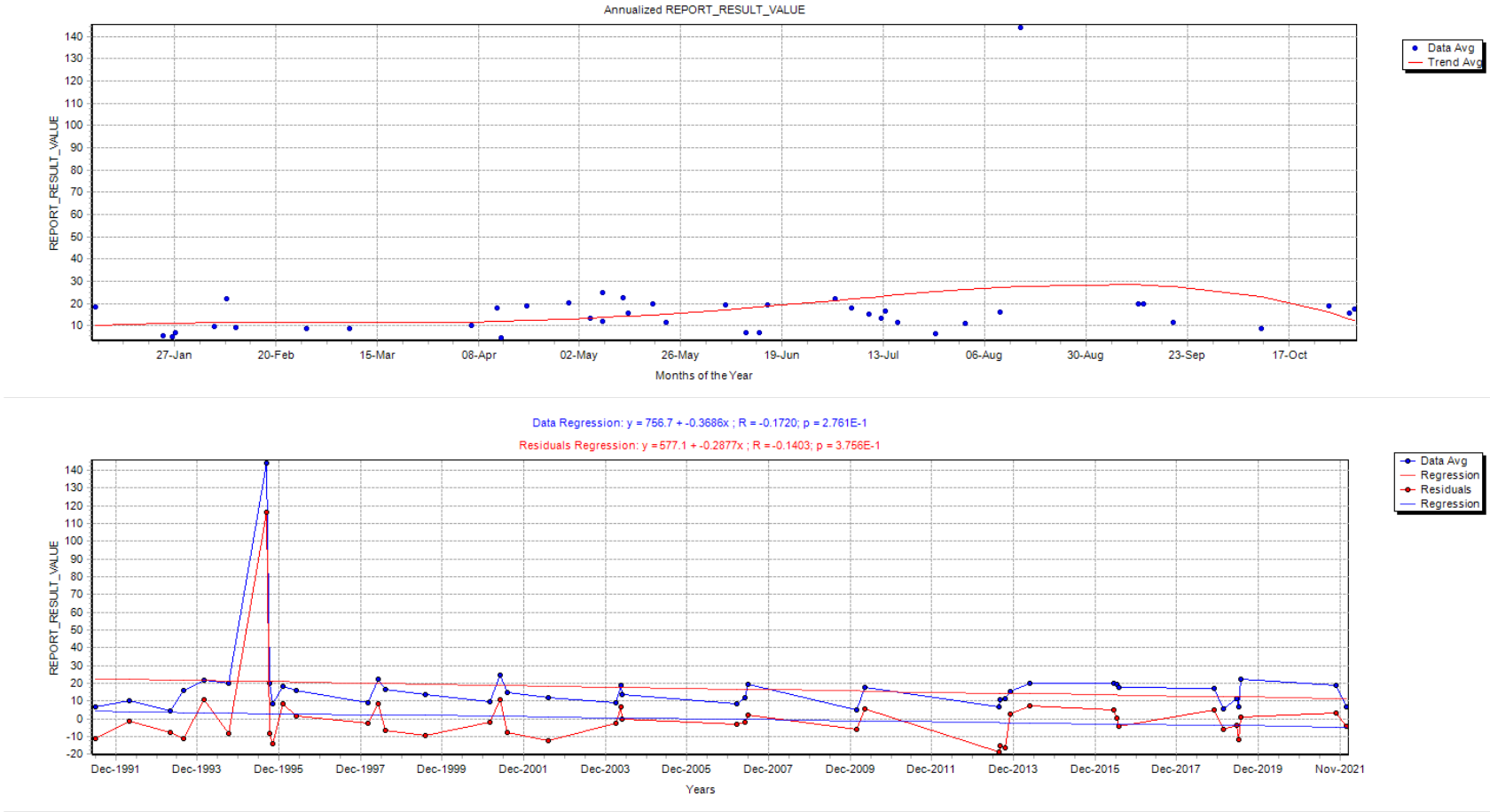


Chart 7-6: Total Dissolved Solids Trend

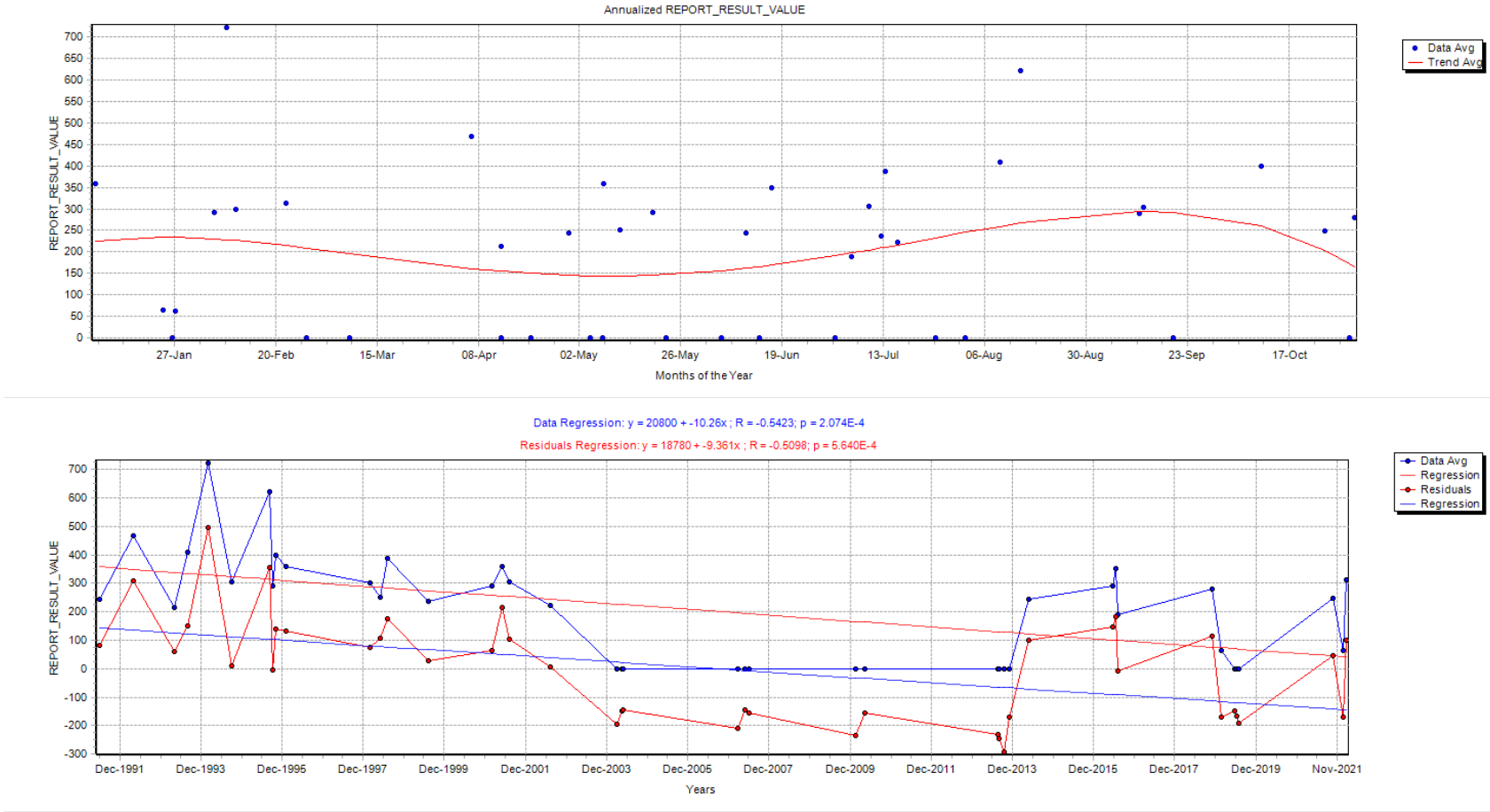


Chart 7-7: Alkalinity Trend

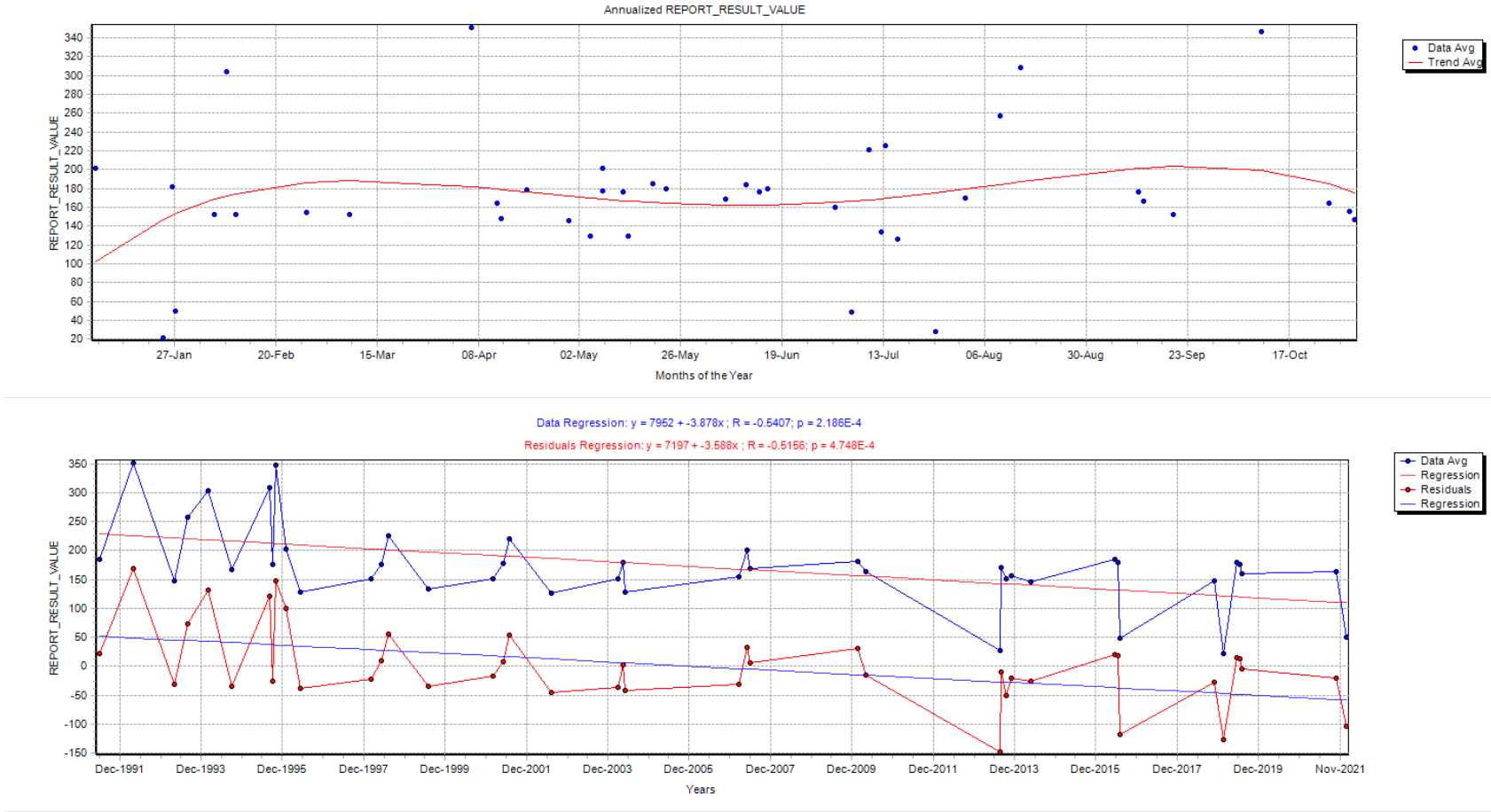
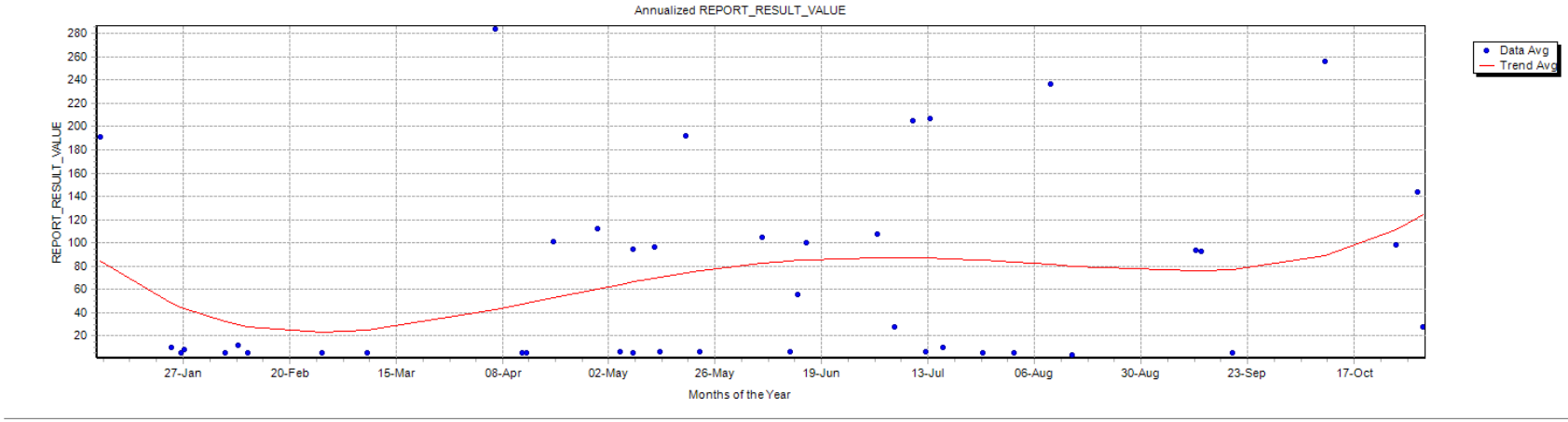


Chart 7-8: Hardness Trend



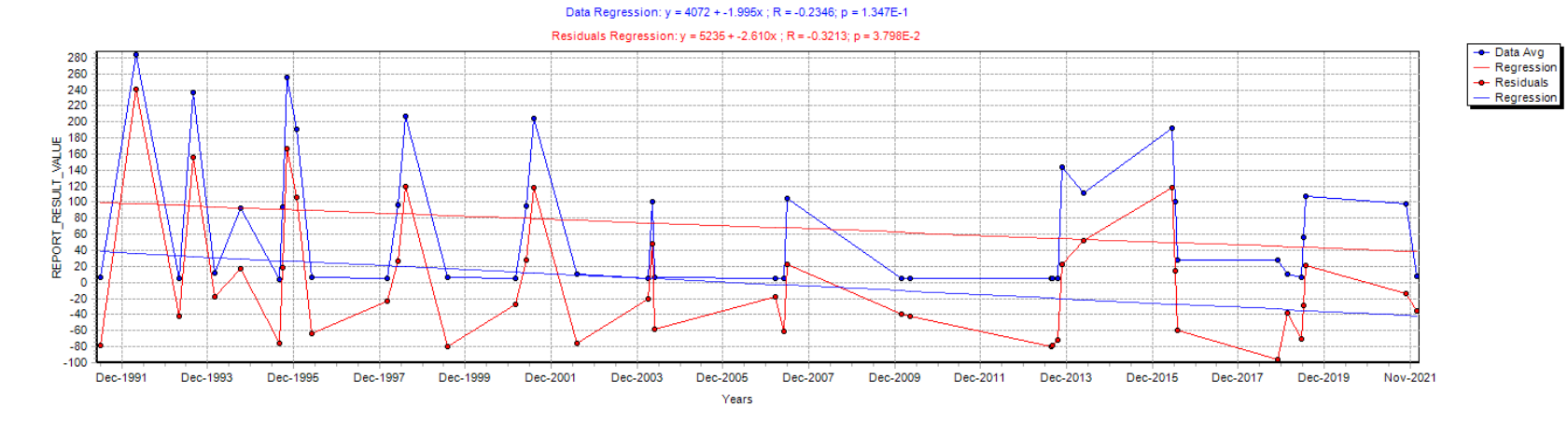


Chart 7-9: Sulfate Trend

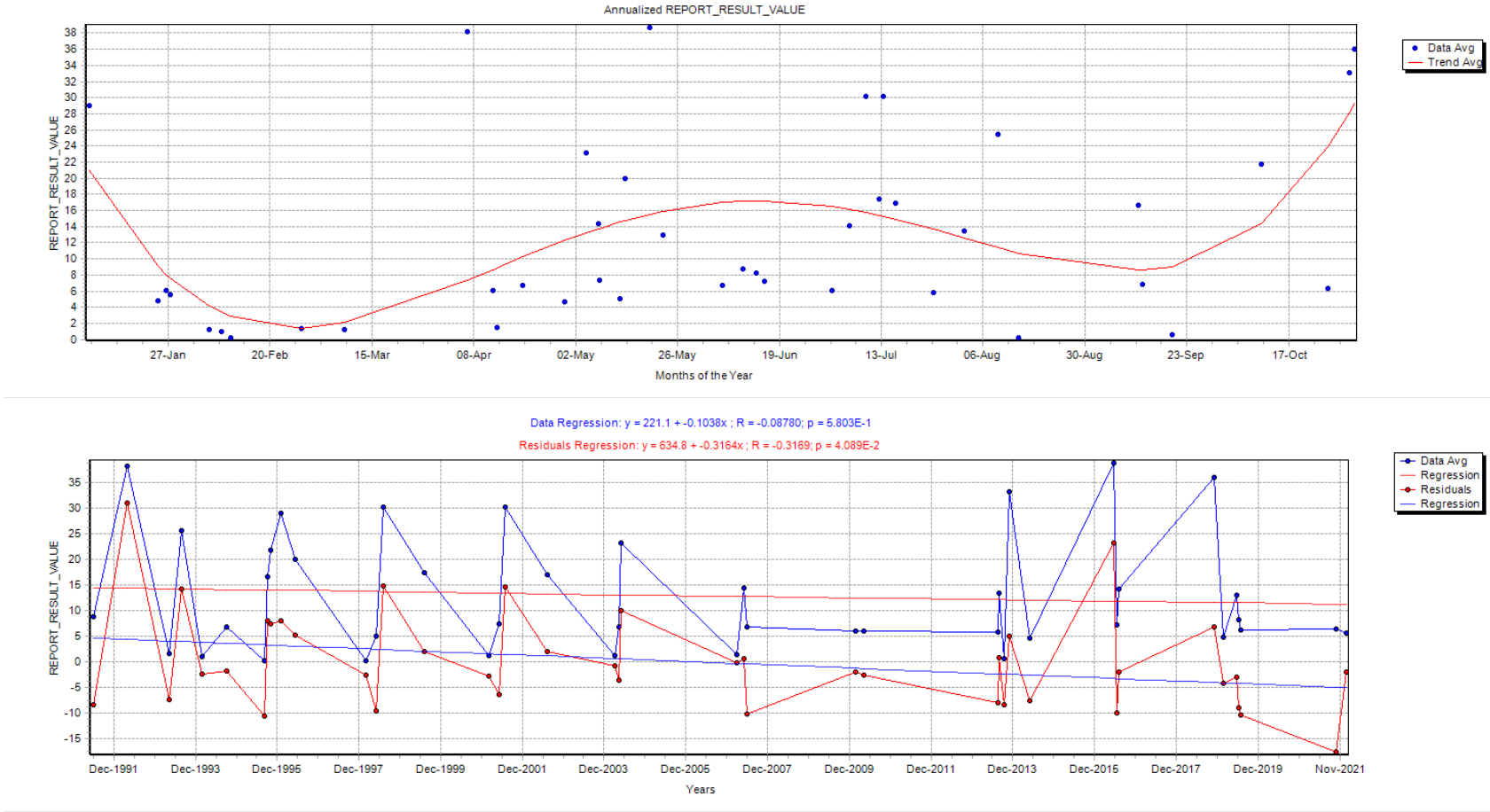


Chart 7-10: Color Trend

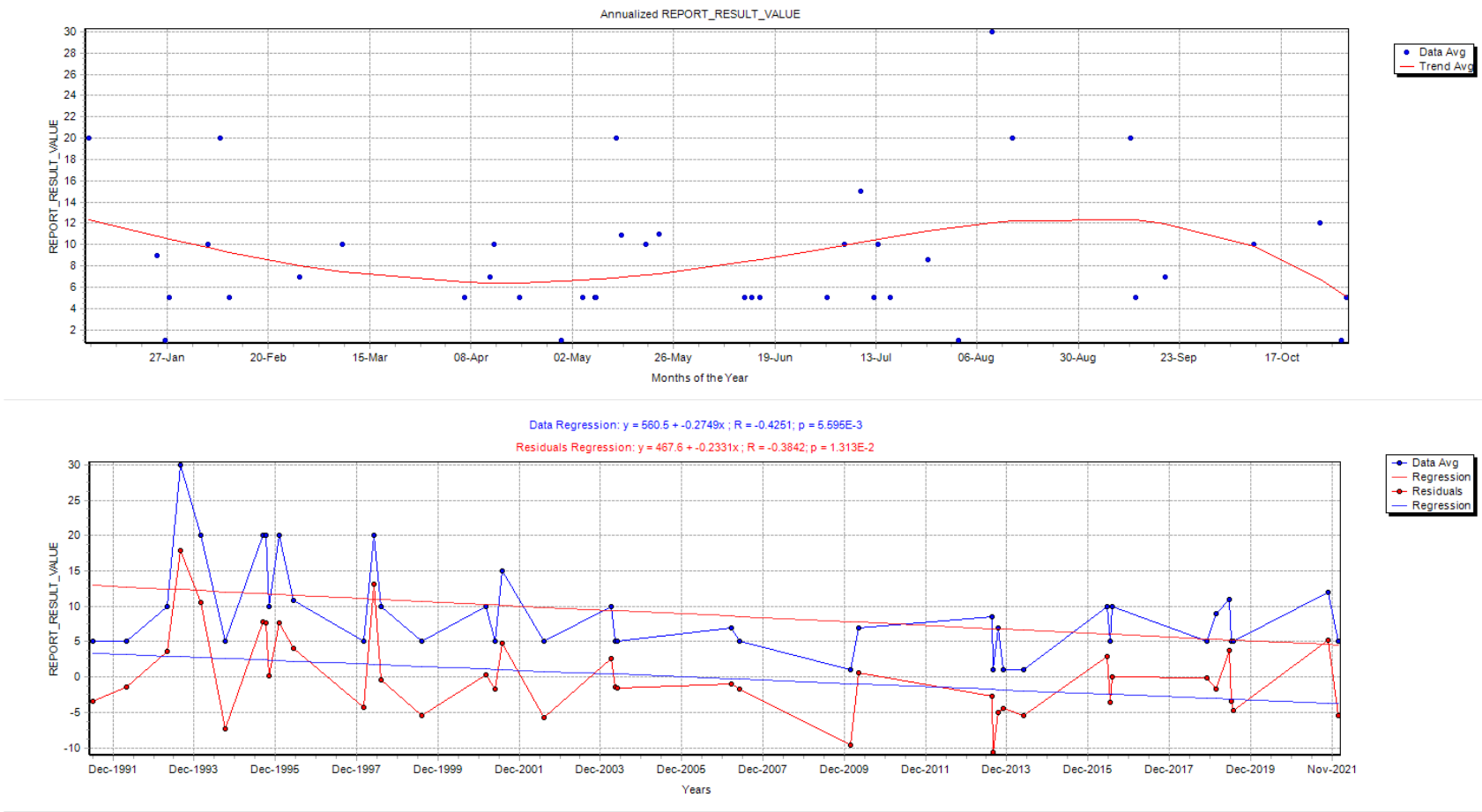
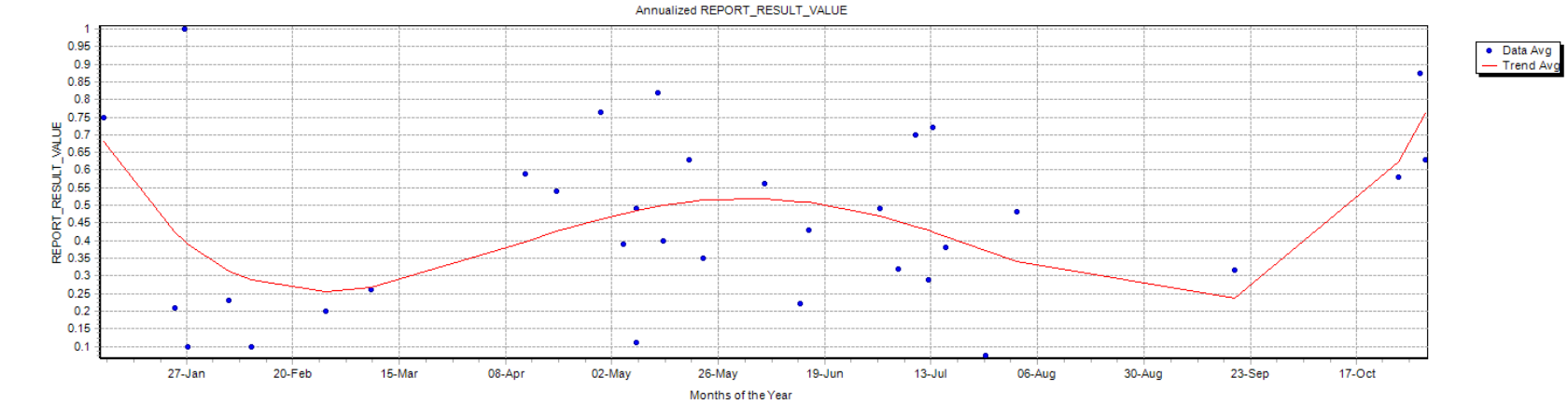


Chart 7-11: Ammonia Trend



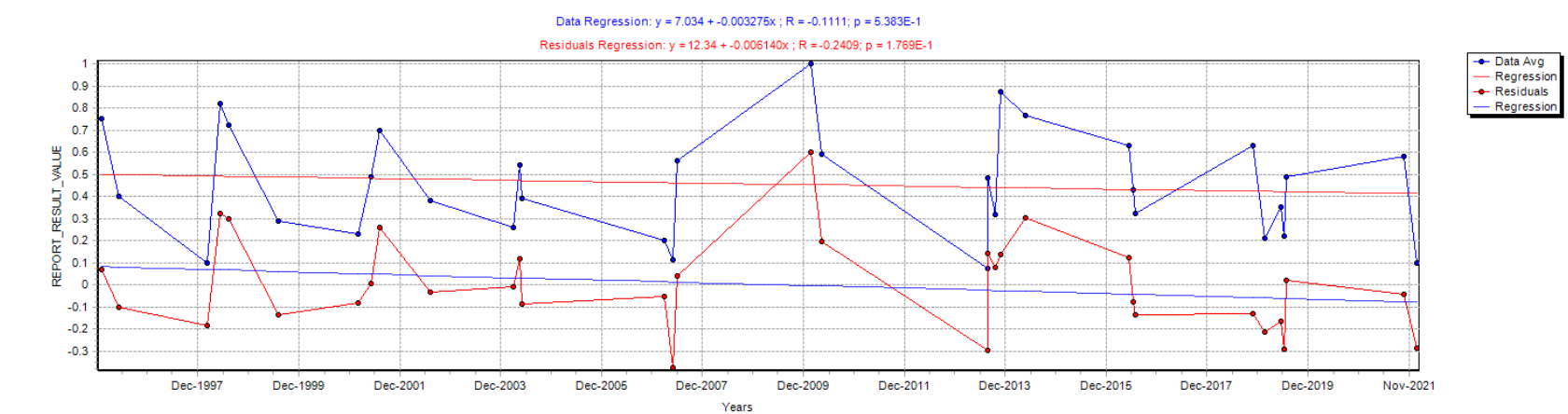


Chart 7-12: Nitrate – Nitrite Trend

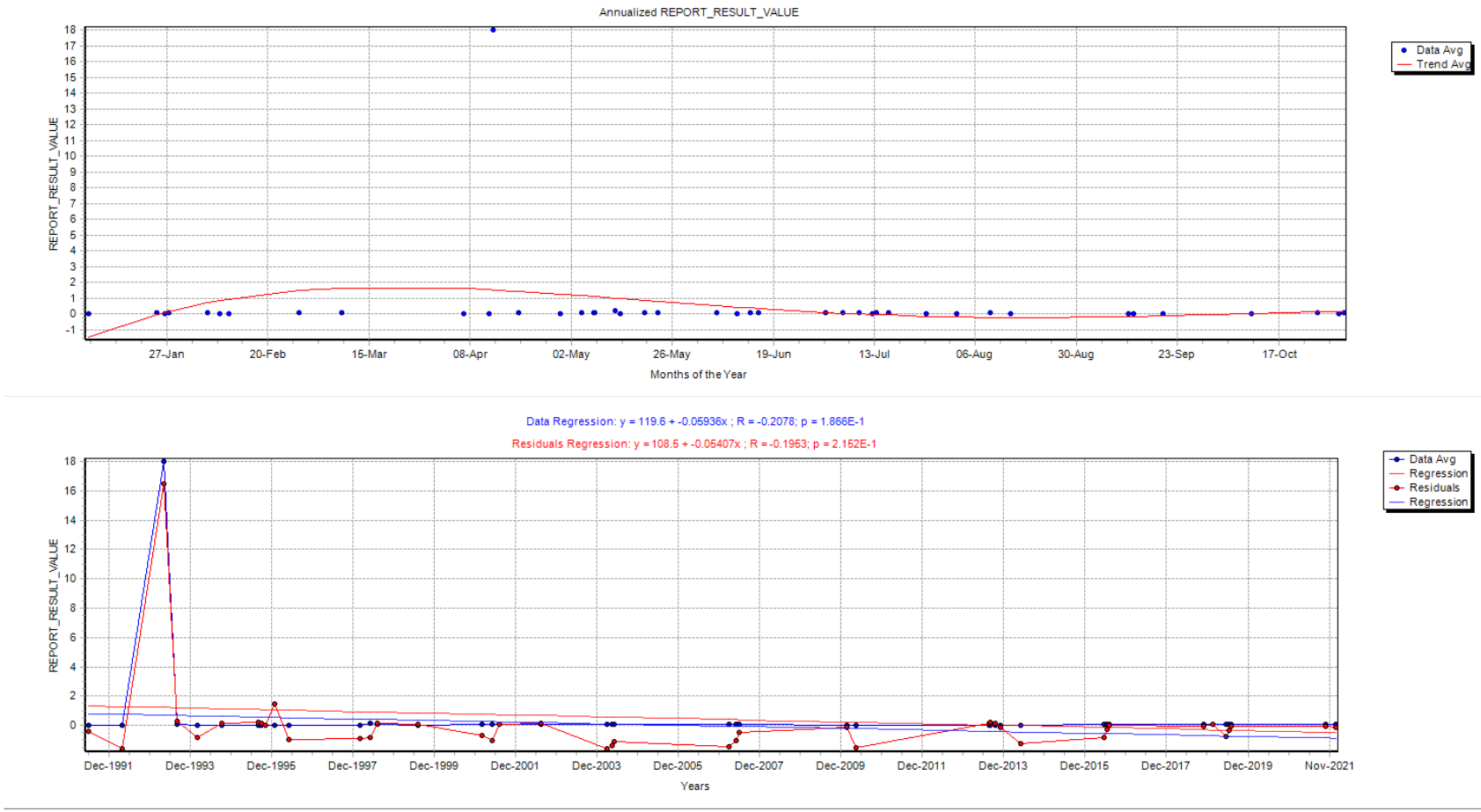


Chart 7-13: Total Kjeldahl Nitrogen Trend

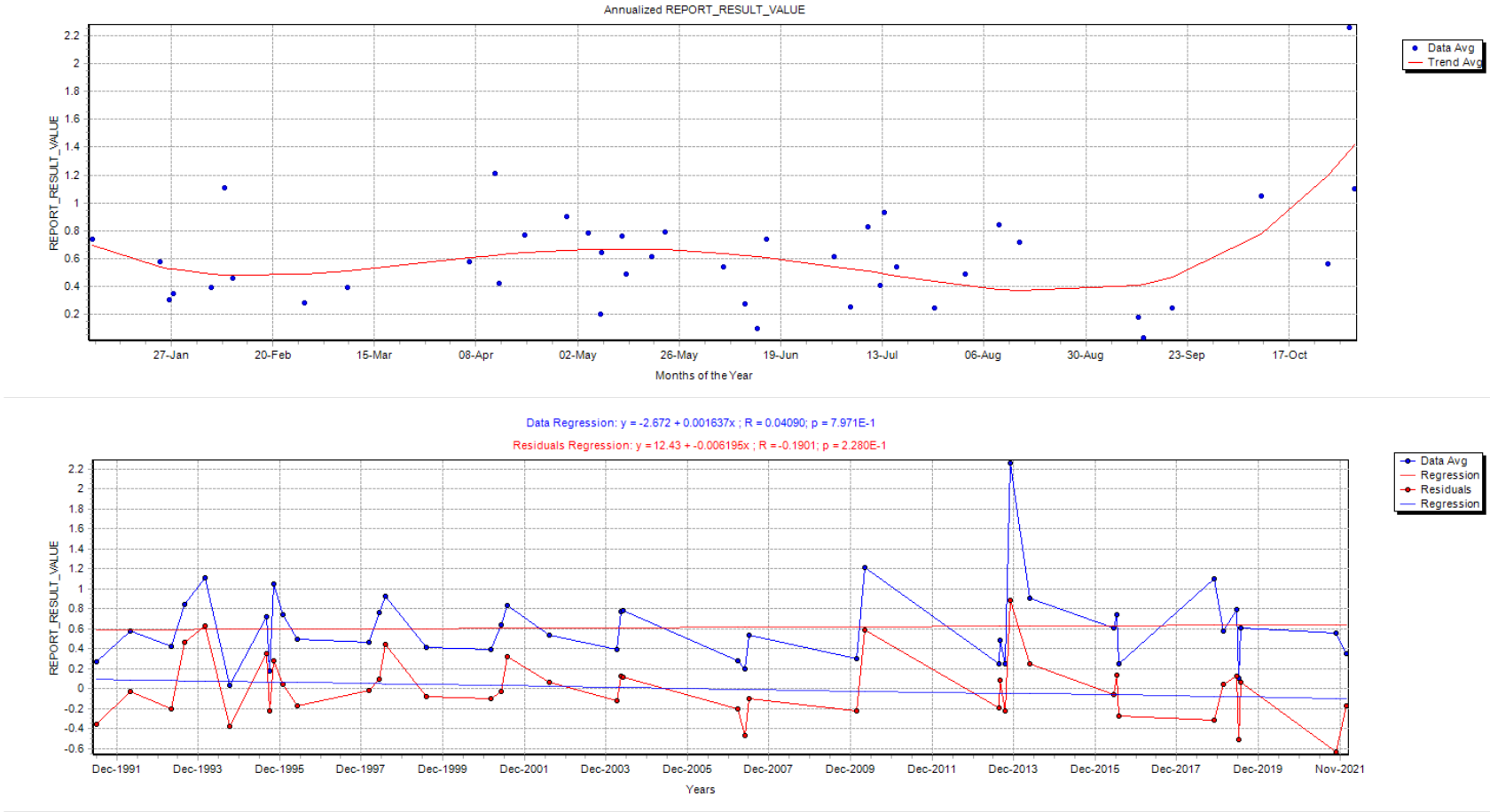


Chart 7-14: Total Phosphorus Trend

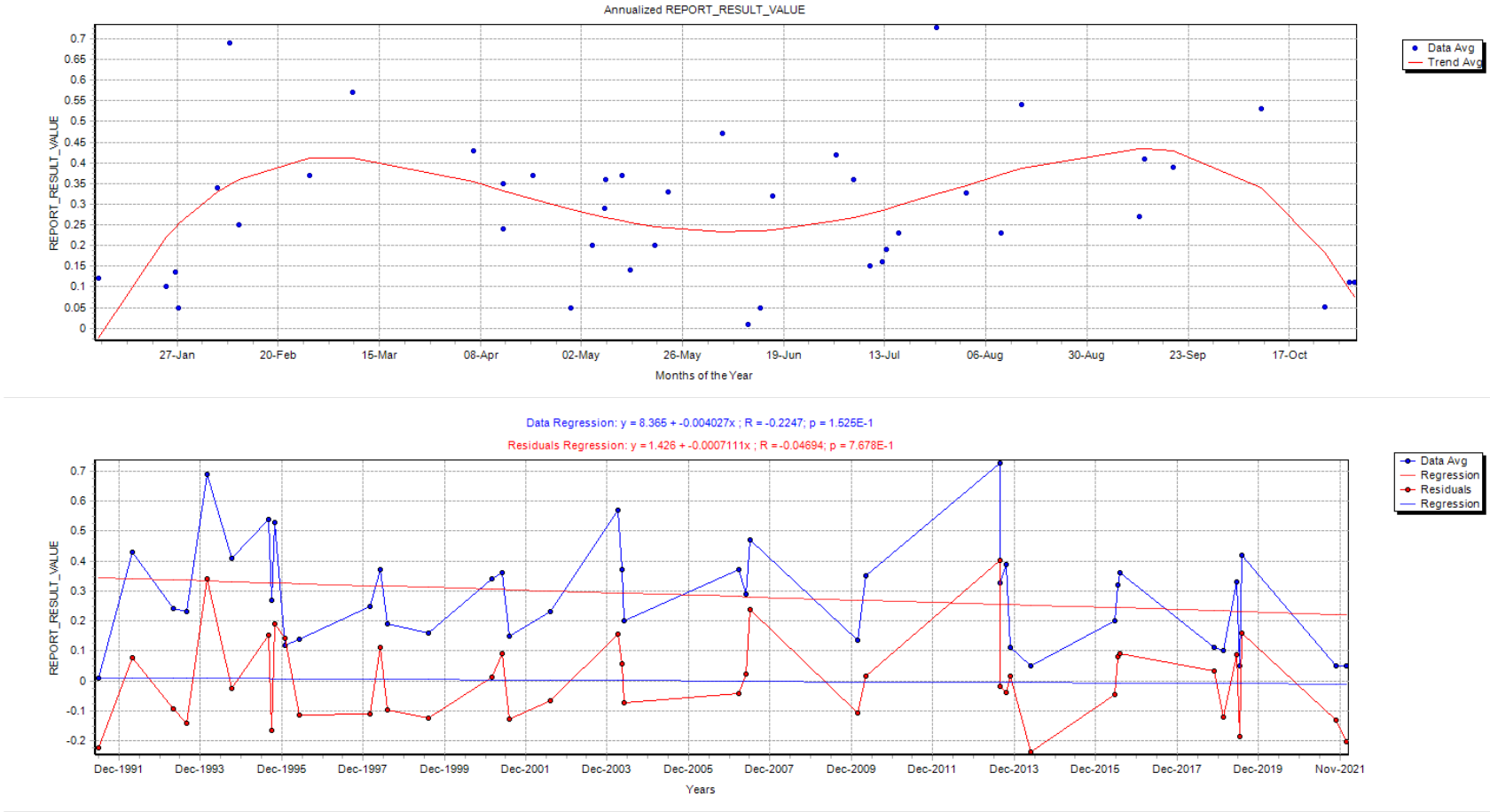
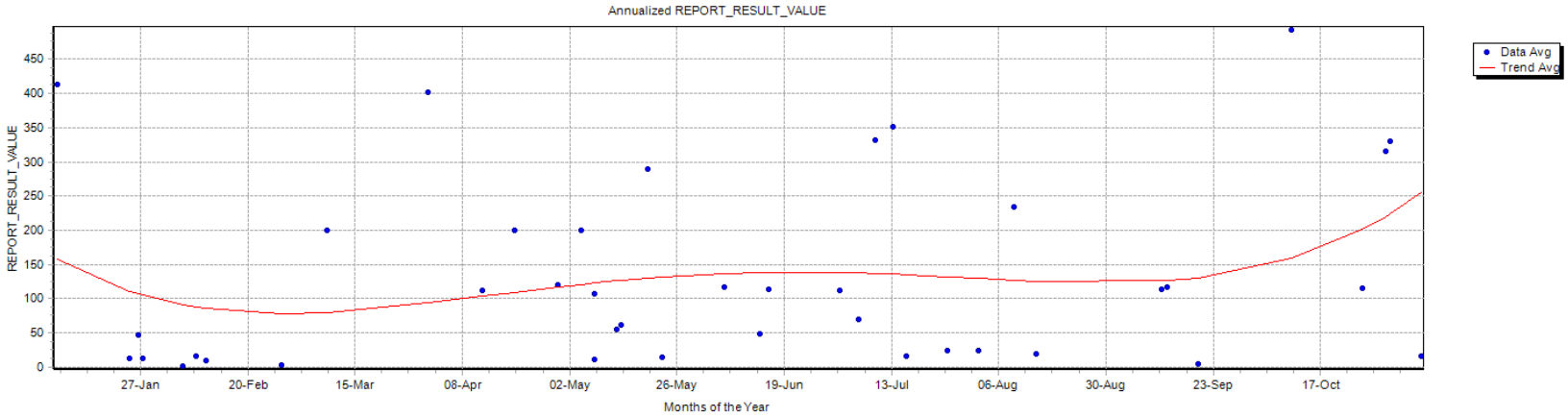


Chart 7-15: Barium Trend



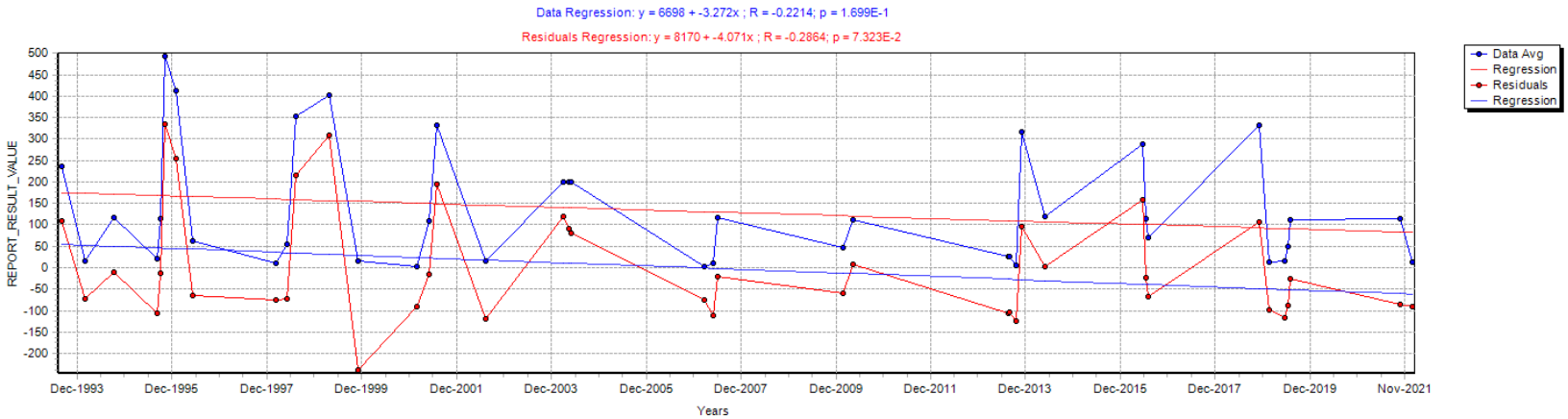
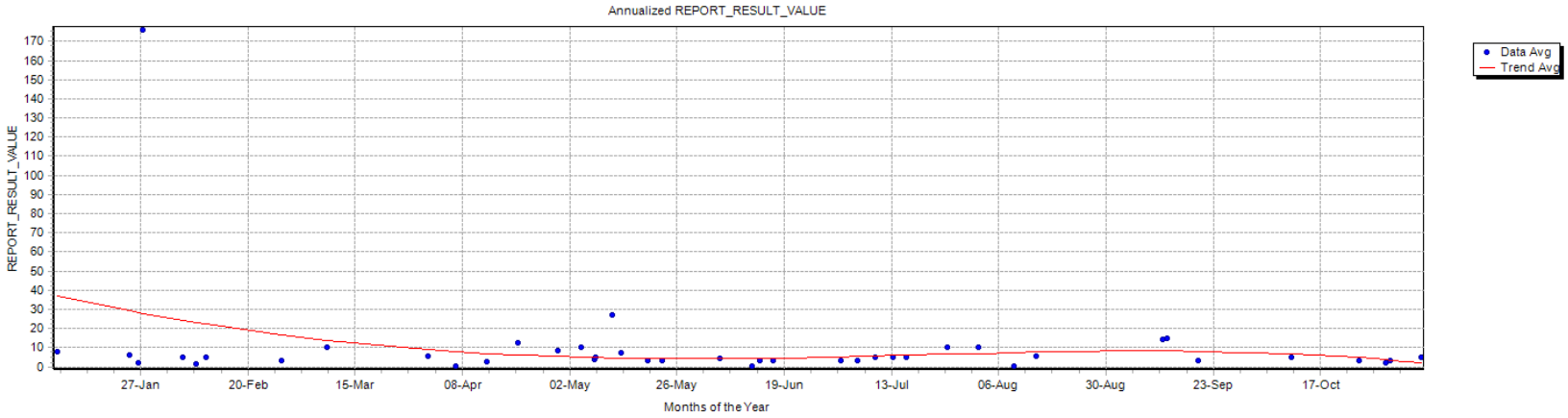


Chart 7-16: Copper Trend



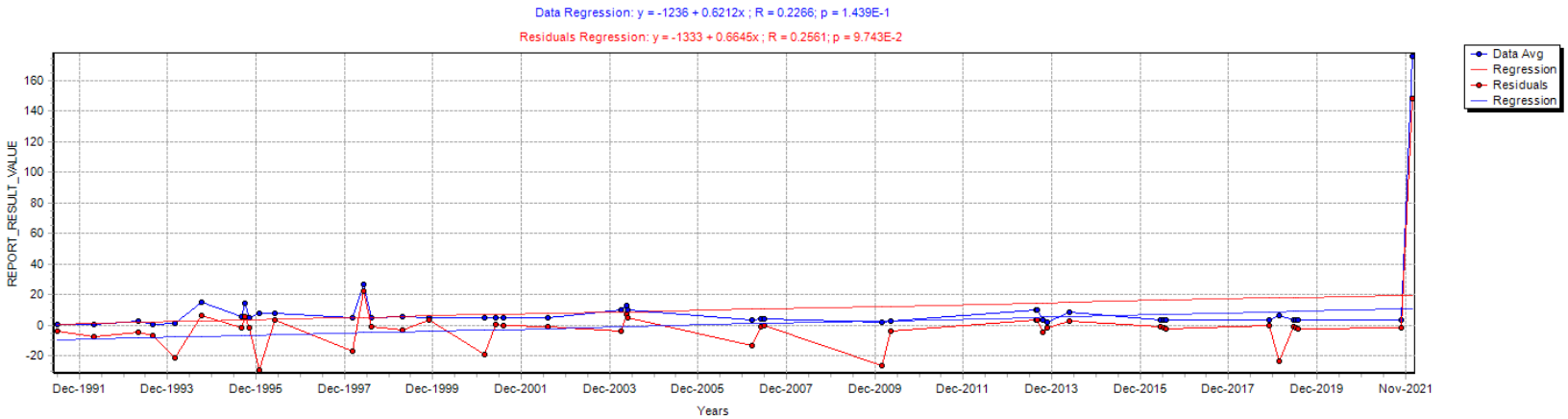
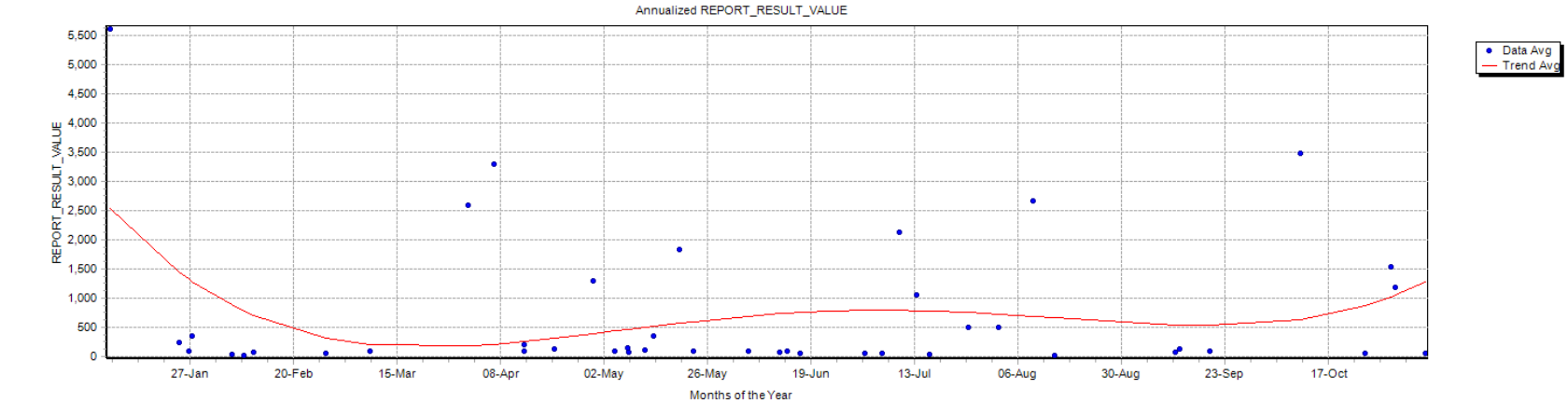


Chart 7-17: Iron Trend



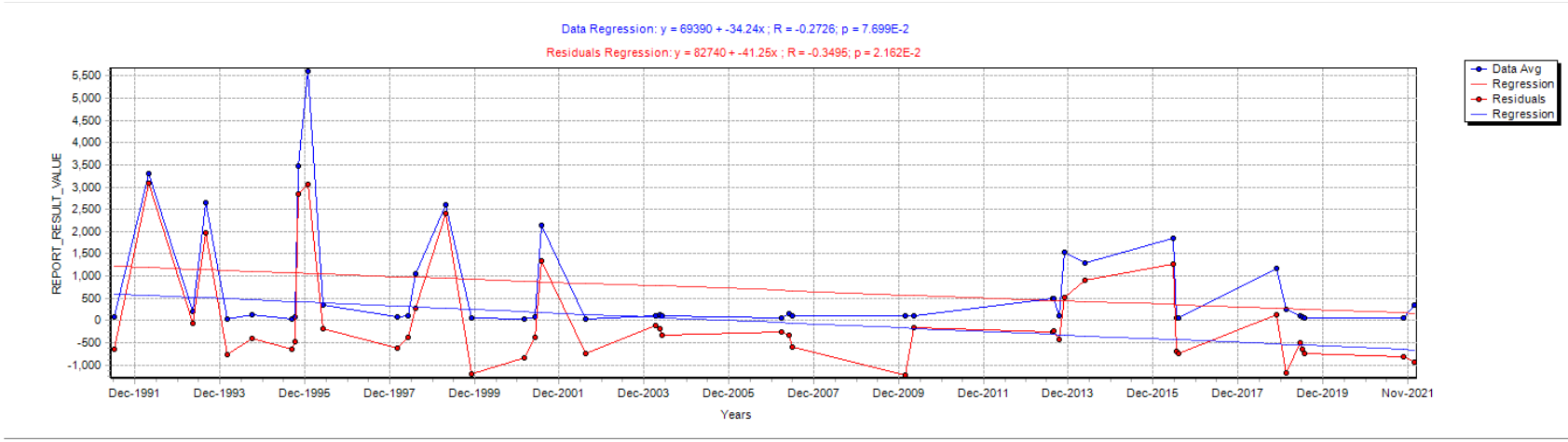


Chart 7-18: Zinc Trend