TULARE LAKE SUBBASIN ANNUAL REPORT

Reporting Period: Water Year 2022

PREPARED BY

Geosyntec consultants

PREPARED FOR

Tulare Lake Subbasin, Mid-Kings River GSA, South Fork Kings GSA, Southwest Kings GSA, El Rico GSA, and Tri-County Water Authority.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ABBREVIATIONS & ACRONYMS

AF	Acre-Feet
CDWR	California Department of Water Resources
CEQA	California Environmental Quality Act
CFS	Cubic Feet Per Second
CVP	Central Valley Project
CWD	County Water District
DDW	Division of Drinking Water
DMS	Data Management System
DWR	Department of Water Resources
ET	Evapotranspiration
GAMA	Groundwater Ambient Monitoring and Assessment
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
ILRP	Irrigated Lands Regulatory Program
InSAR	Interferometric Synthetic Aperture Radar
ITRC	Irrigation Training and Research Center
LMT	Lateral movement tolerance
MCL	Maximum Contaminant Level
MKRGSA	Mid-Kings River Groundwater Sustainability Agency
MT	Minimum Threshold
MO	Measurable Objective
RMS	representative monitoring sites
SB	Senate Bill
SWKGSA	Southwest Kings Groundwater Sustainability Agency
SFKGSA	South Fork Kings Groundwater Sustainability Agency
SGMA	Sustainable Groundwater Management Act
SMC	Sustainable Management Criteria
SWP	State Water Project
SWRCB	State Water Resources Control Board
TCWA	Tri-County Water Authority
TLSB	Tulare Lake Subbasin
USGS	United States Geological Survey
WY	Water Year

EXECUTIVE SUMMARY

§356.2(a) General information, including an executive summary and a location map depicting the basin covered by the report.

This Annual Report was prepared for the Tulare Lake Subbasin (TLSB or Subbasin) in compliance with the requirements of the Sustainable Groundwater Management Act (SGMA) under Title 23 of the California Code of Regulations, Division 2, Chapter 1.5, subchapter 2, Article 7, Section 356.2 (see **Table ES-1**). The five Groundwater Suitability Agencies (GSA) have worked concurrently to submit one annual report that collectively addresses the status of the Groundwater Sustainability Plan (GSP) originally submitted to DWR on January 29, 2020. This Annual Report provides data for Water Year 2022 (WY22) from October 1, 2021, to September 30, 2022, and evaluates these data based on implementation of the GSP.

The original TLSB GSP received an Incomplete Determination Letter from DWR on January 28, 2022. To address the identified deficiencies, an update to the GSP was submitted to DWR on July 27, 2022 (2022 GSP). The 2022 GSP provided revised Sustainable Management Criteria and defined new proactive steps to identifying and addressing undesirable results. This WY22 Annual Report is the fourth annual report submitted to DWR on behalf of the TLSB and is the first annual report to be based on implementation of the 2022 GSP.

Groundwater Conditions

The WY22 was classified as a "dry year" with the TLSB having received 6.34 inches of precipitation which is approximately 28% lower than the historic average water year precipitation. Dry conditions followed the end of calendar year 2021 as California experienced its driest January through April on record. Imported surface water amounted to 204,458 acre-feet (AF) with an additional 83,177 AF of precipitation fell over the Subbasin in WY22 (PRISM Climate Group, 2022). Groundwater pumping total volumes for WY22 were classified into three pumping classifications of Agricultural, Urban, or Other. The sum of groundwater pumping for all three sectors for WY22 totaled 549,066 AF, with 516,716 AF attributed to agricultural, 24,160 AF to urban, and 8,190 AF to the other category.

Monitoring points within the Subbasin's water quality monitoring network are generally below the maximum contamination limit (MCL). In one monitoring well, Arsenic had two consecutive measurements above the MCL and exhibited an increasing trend. The well has been identified for potential management actions. Application of management actions will be discussed in the next annual report.

During the WY22 reporting period, the Subbasin's two RMS subsidence points measured by the Continuous Global Position System (LEMA and CRCN) decreased in elevation by 0.21 feet and 0.32 feet, respectively. DWR's InSAR data shows that since 2015, the elevation at the LEMA and CRCN stations has decreased 3.13 feet and 3.93 feet respectively.

The effect of the dry year resulted in lower groundwater elevations across most of the subbasin. Based on water level measurements and changes in land surface elevation collected in spring 2022, an approximate net decrease of 115,759 AF in storage volume occurred from spring 2021.

Implementation Progress

The first annual report submittal provided an update on the TLSB within the 2015 to 2019 calendar range. Subsequent annual reports present updates on groundwater conditions and implementation progress using the water year system from October of the previous reporting year to September of the submitting year (e.g., WY22, October 2021 through September 2022). Following the submission of the 2022 GSP, Annual Reports will continue to use information contained within the 2022 GSP, in addition to data collected throughout the implementation period to evaluate the progress towards achieving sustainability.

Projects and Management Actions

The Subbasin continues to work towards GSP implementation through coordinated efforts amongst the GSAs and cooperation with surrounding Subbasins. Several project and management actions listed in the 2022 GSP are in progress and are on track to completion by 2040. A detailed list of each GSA's status towards implementation is presented in Chapter 7.

Data Gaps

The TLSB continues to address data gaps as funding becomes available. Additional monitoring wells have been installed and an evaluation is underway to install transducers in select wells. The TLSB has earmarked monies from the Sustainable Groundwater Management grant to specifically install additional monitoring wells.

Table ES-1: Regulatory Codes and Affiliated Sections Required for Annual Report

California Code of Regulations, - GSP Regulation Sections	Annual Report Elements	Report Section for Elements
Article 7	**Annual Reports and Periodic Evaluations by Agency**	
§356.2	**Annual Reports**	
Each Agency shall submit an annual report to the Department by April 1 of each year following the adoption of the Plan. The annual report shall include the following components for the preceding water year:		
(a) General information, including an executive summary and a location map depicting the basin covered by the report. (b) A detailed description and graphical representation of the following conditions of the basin managed in the Plan:		**Table ES-1**
(1) Groundwater elevation data from monitoring wells identified in the monitoring network shall be analyzed and displayed as follows:		
(a) Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions (b) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.		**Appendix B** **Appendix E**
(2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.		**Section 2.3, Table 2-3, Figure 2-3**
(3) Surface water supply used or available for use, for groundwater recharge, or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water year.		**Section 2.2, Table 2-2**
(4) Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.		**Chapter 2, Table 2-1**
(5) Change in groundwater in storage shall include the following:		
(a) Change in groundwater in storage maps for each principal aquifer in the basin.		**Appendix D**
(b) A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater in storage for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.		**Figure 6-1**
(c) A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.		**Chapters 3, 4, 5**

1. INTRODUCTION

The Tulare Lake Subbasin (TLSB or Subbasin) has been identified as a critically over drafted Subbasin by the California Department of Water Resources (DWR). In response to this classification, TLSB submitted a Groundwater Sustainability Plan (GSP) on January 29, 2020, which included all five Groundwater Sustainability Agencies (GSAs). The following GSAs are located within the Tulare Lake Subbasin (**Figure 1-1**):

- Mid-Kings River GSA
- South Fork Kings GSA
- Southwest GSA
- El Rico GSA
- Tri-County Water Authority

The TLSB GSP received an Incomplete Determination Letter from DWR on January 28, 2022. To address the identified deficiencies, an addendum to the GSP was submitted to DWR on July 27, 2022 (2022 GSP). This Water Year 2022 (WY22) Annual Report is the first to utilize the updated Sustainable Management Criteria (SMC) presented in the 2022 GSP along with the proactive steps to identifying and addressing undesirable outcomes.

1.1 Purpose and Scope of this Annual Report

Since submission of the GSP, three subsequent Annual Reports [Water Year 2019, Water Year 2020, and Water Year 2021] have been submitted on behalf of the Subbasin's GSAs. This is the fourth annual report submitted by TLSB and presents information collected for WY22 between October 1, 2021 to September 30, 2022 along with historical data presented in the GSP and the previous annual reports. The annual report serves as a critical component of the ongoing SGMA compliance process, providing stakeholders with a comprehensive update on the progress towards achieving sustainable groundwater management objectives and addressing undesirable outcomes. According to the DWR guidelines, a clear and concise sustainability goal should be included in the annual report. This report outlines the objectives and desired conditions for the groundwater basin, provides details on how the basin intends to achieve these conditions, and explains the rationale behind the planned measures and their likelihood of success. The chapters of this WY22 Annual Report present the following:

- **Chapter 1 - Introduction**: Discussion of previously submitted reports and factors that influence the plan area.
- **Chapter 2 - Total Water Available**: Discussion of how water volumes were determined.
- **Chapter 3 - Groundwater Elevations**: Description of monitoring network and Subbasin's progress towards groundwater elevation sustainable goals.

- **Chapter 4 - Groundwater Quality**: Description of monitoring network and Subbasin's progress towards groundwater quality sustainable goals.
- **Chapter 5 - Land Subsidence**: Description of monitoring network and Subbasin's progress towards land subsidence sustainable goals.
- **Chapter 6 - Groundwater Storage Change**: Description of utilized datasets and the calculation method.
- **Chapter 7 - Project and Management Actions**: Update on each GSA's projects and actions
- **Chapter 8 - Data Gaps**: Discussion of the Subbasin's data gaps.

Data gathered for the WY22 Annual Report has been imported into the Data Management System (DMS) which houses historical and current information for all five GSAs. WY22 data is also provided in various tables, maps, figures, and appendices within this annual report.

1.2 Tulare Lake Subbasin Background

The TLSB covers an area of approximately 535,869 acres (about half the area of Rhode Island) and encompasses the majority of Kings County, while a small portion resides in Tulare County. According to the United States Census Bureau, Kings County is extremely rural, with approximately 46,758 housing units and an average population density of 110 people per square mile. Land use within the Subbasin and surrounding areas is predominantly classified as agricultural with various crops such as field crops, grain and hay crops, pasture, citrus, and deciduous fruits and nuts. There are six localized urban areas with the cities of Hanford, Lemoore, and Corcoran and the communities of Armona, Kettleman City and Stratford.

The regional freshwater aquifer that underlies the TLSB is separated into three zones: an unconfined perched aquifer (referred to as the A-zone), a second unconfined aquifer situated beneath the perched aquifer (referred to as the B-zone), and a confined deep aquifer below the B-zone aquifer (referred to as the C-zone). The base of the B-zone is defined by the Corcoran Clay, which extends across the majority of the Subbasin and serves as the confining unit for the C-zone. Based on to the 1995 estimates provided by the DWR (DWR, 2016b), the total groundwater storage capacity of the TLSB is estimated to be around 17.1 million acre-feet (AF) up to a depth of 300 feet, and 82.5 million AF up to the base of fresh groundwater.

The Subbasin does not believe a surface to groundwater interconnection exists as the connection was severed many decades ago (Owen et al., 2019). The Subbasin will continue to review and consider information as it becomes available.

The TLSB is situated approximately 85 miles east of the coastline and east of the coast ranges. Given the distance and geologic structure between the coastline and the Subbasin, sea water intrusion is not a concern and will not be monitored.

2. TOTAL WATER AVAILABLE

§356.2(b) A detailed description and graphical representation of the following conditions of the basin managed by the Plan:

(4) Total water use shall be collected using the best available measurement methods and shall be reported in a table that summarizes total water use by sector, water source type, and identifies the method of measurement (direct or estimate) and accuracy of measurements. Existing water use data from the most recent Urban Water Management Plans or Agricultural Water Management Plans within the basin may be used, as long as the data are reported by water year.

Total water use across the subbasin during WY22 is reported in **Table 2-1**. For reporting purposes, applicational water use within the TLSB has been categorized into three sectors: Agricultural, Urban and Other. The following is a brief description of these sectors.

- Agricultural Sector: Waters supplying agricultural purposes such as irrigated crop and dairy uses. Agricultural water can be sourced from surface water and groundwater.
- Urban Sector: Waters used within the municipalities and special districts within the Subbasin.
- Other Sector: Waters used outside of municipal service areas typically considered rural domestic areas.

Water use from 2015 through 2019 presented in **Table 2-1** is based on the calendar year. As of Water Year 2020 (WY20) Annual Report, the Subbasin reported based on the water-year reporting structure. WY22 values are provided for the period between October 2021 to September 2022. **Tables 2-1** and **2-3** report water use by calendar year for years 2015 through 2019, and water year since 2020.

Table 2-1: Tulare Lake Subbasin – Total Water Use by Sector

Sector	CY2015	CY2016	CY2017	CY2018	CY2019	WY20	WY21	WY22	Average
Ag	705,300	788,500	1,101,800	1,063,500	1,138,400	738,708	846,110	818,965	**900,160**
Urban	23,765	23,152	24,192	26,420	26,571	27,118	27,105	24,160	**25,310**
Other	8,400	8,400	9,500	9,500	9,500	8,701	8,221	8,190	**8,802**
Total	**737,465**	**820,052**	**1,135,492**	**1,099,420**	**1,174,471**	**774,527**	**881,436**	**851,315**	**934,272**

Note: CY = Calendar Year; WY = Water Year

2.1 Water Year Classification

Total precipitation for WY22 was 6.34 inches, approximately 28% lower than the historic average water year precipitation within TLSB. The historic average water year precipitation (8.28 inches/year) presented in the TSLB GSP (pg 3-3) was calculated from the total water year precipitation recorded by the Hanford Weather Station over a 118-year period recorded from water years 1900 to 2018. Precipitation across the subbasin typically decreases from northeast to southwest, due to the rain shadow effect from the adjacent Coast Ranges.

As defined by the GSP, WY22 is classified as a “dry” year. The water year type is an index based on the Kings River Water Association diversion classification that categorizes the Subbasin's water year as Dry (<75%), Normal (75-125%), and Wet (>125%) depending on the average annual Kings River diversions to the TLSB. This index is used due to the significant reliance on surface water deliveries from the Kings River. The base period for the Kings River's normal hydrology is from 1998 to 2010 and resembles the 50-year historical averages. The index indicates the hydrological "wetness" of a year, which is correlated with the amount of groundwater pumped, as wet years historically result in lower groundwater pumping totals. The water year classification for each water year since 2015 is provided in **Table 2-2**.

The KRWA diversion classification differs from the State Water Resources Control Board (SWRCB) water year type classification. The SWRCB measures a water year based on unimpaired runoff, or natural water production from other basins with a five-tier classification. As noted above, the Subbasin is using the KRWA index to describe the water year type because the TLSB is significantly reliant on surface water deliveries from the Kings River.

2.2 Surface Water Supplies

§356.2(b) A detailed description and graphical representation of the following conditions of the basin managed by the Plan:
(3) Surface water supply used or available for use, for groundwater recharge, or in-lieu use shall be reported based on quantitative data that describes the annual volume and sources for the preceding water

Surface water imported into the TLSB comes from a variety of sources as listed in **Table 2-2**. The Kings River provides the largest source of surface water to the Subbasin followed by the Tule River, then the State Water Project (SWP). SWP water includes both state and federal water transferred through the California Aqueduct. In wet years, the Subbasin can also receive surface water deliveries from Deer Creek, White River, Poso Creek, the Kern River, and Central Valley Project (CVP) water. For the purposes of this report, groundwater extracted outside the TLSB but utilized within the TLSB is treated as a surface water delivery for the purpose of calculating groundwater pumping within the TLSB.

Table 2-2: Surface Water Supplies and Water Year Types

Source	WY15	WY16	WY17	WY18	WY19	WY20	WY21	WY22	Average
	Dry	Dry	Wet	Normal	Wet	Dry	Dry	Dry	
Kings River	54,074	195,642	504,934	316,536	418,544	212,594	66,866	113,117	**235,288**
Kaweah River	0	356	44,063	0	21,939	0	0	0	**8,295**
Tule River	0	0	73,456	2,923	13,615	0	0	1,682	**11,460**
Deer Creek	0	0	22,452	5,006	8,199	0	0	0	**4,457**
Poso Creek	0	0	16,334	727	902	0	0	0	**2,245**
SWP	16,698	13,909	28,216	73,793	41,592	45,190	41,212	21,010	**35,203**
CVP	0	0	0	0	0	0	0	0	**0**
Imported	71,956	84,439	54,704	59,119	21,730	57,478	48,776	68,649	**58,356**
Total:	**142,728**	**294,346**	**744,159**	**458,104**	**526,521**	**315,262**	**156,854**	**204,458**	**355,304**

Notes: Surface Water Delivery includes a conveyance efficiency correction to account for on-farm surface water delivery. Seepage losses are assumed to occur between the headgates of these sources and the farm turnouts. Conveyance efficiency is incorporated into the farm demand calculations described in **Chapter 2-3**.

Surface water supplies, or canal deliveries for WY22 were provided by the GSAs and various water agencies, irrigation districts, or private mutual water companies. Surface water supplies within the Subbasin are directly measured with flumes or weirs with an accuracy consistent with reporting requirements.

Surface water deliveries are mainly calculated using measurements taken at the main headgates. However, there is often seepage loss during conveyance along unlined canals, and this is usually not measured. To account for this unmeasured seepage loss, an eighty-five percent (85%) conveyance efficiency is applied to diversions that do not report seepage. The conveyance efficiency adjustment was not applied to canals that are known to be concrete-lined. The Southwest Kings GSA area had a ninety percent (90%) conveyance efficiency adjustment applied due to the regional clay rich lithology. Acquired and estimated seepage as well as recovery volumes are accounted for in the surface water deliveries presented in **Table 2-2**.

The SWP has several contractors within the Subbasin. Entities that received SWP water deliveries for WY22 include Tulare Lake Basin Water Storage District (El Rico GSA), and Dudley Ridge Water District (Southwest Kings GSA).

Imported groundwater supplies can be delivered from the adjacent Tule and Kaweah Subbasins. Imported water for WY22 was pumped from the multiple sources including the Angiola Water District and Creighton Ranch well fields and was delivered to Southwest Kings and El Rico GSAs (TLSB GSP, pg 3-39).

2.3 Groundwater Pumping

§356.2(b) A detailed description and graphical representation of the following conditions of the basin managed by the Plan:

(2) Groundwater extraction for the preceding water year. Data shall be collected using the best available measurement methods and shall be presented in a table that summarizes groundwater extractions by water use sector and identifies the method of measurement (direct or estimate) and accuracy of measurements, and a map that illustrates the general location and volume of groundwater extractions.

Groundwater extraction by sector across the TLSB is summarized below on **Table 2-3** and visually represented on **Figure 2-3**. Methods for how these groundwater volumes were calculated are described below.

Table 2-3: Tulare Lake Subbasin – Groundwater Extraction by Sector

Groundwater Extraction by Sector (Acre-Feet)									
Sector	**CY15**	**CY16**	**CY17**	**CY18**	**CY19**	**WY20**	**WY21**	**WY22**	**Average**
Agricultural	502,745	405,747	132,418	677,695	444,319	339,474	617,161	516,716	**454,532**
Urban	23,765	23,152	24,192	26,240	26,571	27,118	27,105	24,160	**25,288**
Other	8,400	8,400	9,500	9,500	9,500	8,701	8,221	8,190	**8,802**
Total	**534,910**	**437,299**	**166,110**	**713,615**	**480,390**	**375,293**	**652,488**	**549,066**	**488,624**

2.3.1 Agricultural Groundwater Use

Water use associated with agricultural demand is an estimated value determined from surface water supply, precipitation, and groundwater extraction. Most agricultural wells in the TLSB are either not metered or the values are not reported, therefore, agricultural pumping for the TLSB is estimated by combining cropping data, evapotranspiration coefficients (ETc), irrigation efficiencies, and effective precipitation estimates then subtracting surface water deliveries. The following equations presented in the TLSB GSP (GSP, pg 3-43) were used to estimate agricultural groundwater extraction within the Subbasin.

Step 1: Determine cropping pattern.

Spatial agriculture cropping information was obtained from LandIQ satellite imagery in order to classify/quantify crop acreage across most of the TLSB except for the El Rico GSA. The El Rico GSA provided cropping information and does not utilize LandIQ services. The total acreage for each crop type was summed across the entire Subbasin and for each GSA. Historic and current land use and cropping data for the Subbasin are provided in **Appendix A**.

The LandIQ data was initially utilized in the WY20 Annual Report which provides in-depth analysis of land use and cropping data as reported by LandIQ. In WY22, the overall acreage of land in active agriculture production experienced a decline of 18,149 acres compared to the previous water year (refer to **Appendix A** for details). Concurrently, 11,608 acres of land classified as fallow in Water Year 2021 (WY21) were reintroduced into active production.

Step 2: Determine total crop demand.

Total crop demand for the four GSAs utilizing LandIQ's evapotranspiration (ETa) data is produced on a series of raster datasets displayed over an approximate 10-meter by 10-meter grid for the TLSB area. ETa rasters were overlain by a shapefile containing known agricultural parcel and the spatially weighted average ETa value was then calculated for each parcel. LandIQ uses remotely sensed data from satellites calibrated against in-situ measurements from ground-based climate stations to create spatially continuous ETa data (LandIQ, 2021). Fallow land was excluded in the total crop demand calculation as it is not irrigated.

Total crop demand for El Rico GSA is not based on LandIQ and instead references Cal Poly's Irrigation Training and Research (ITRC) Center evapotranspiration coefficients for each respective crop type within the GSA. The ETc values utilized are listed in Appendix D Table D2-6 of the GSP and based on ITRC published ETc rates. Based on surface water deliveries from the Kings River in WY22, the "normal" values were selected from Table D2-6 (GSP, Appendix D). El Rico provided ET values for six various crop types (sorghum, safflower, pistachio, triticale, and pomegranates) that differed from the GSP values. ETc values for the crops are reported measured values and are listed in **Appendix A, Table A-1**.

The effective precipitation value for each parcel is then subtracted from the Annual Crop ET. Effective precipitation is calculated using actual precipitation estimates from PRISM data multiplied by effective precipitation ratios as described in the TLSB GSP (GSP, Page 3-38; Brouwer & Heibloem, 1985 Chapter 3, Table 6; PRISM Climate Group, Oregon State University). To keep consistency, PRISM precipitation values were used for all GSAs rather than utilizing precipitation values from LandIQ and PRISM.

Total crop demand was calculated using the following equation:

$$Total\ Crop\ Demand\ \left(\frac{AF}{WY}\right) = Annual\ Crop\ Acreage\ (Acres) * \left(Annual\ Crop\ ETc\ \left(\frac{ft}{WY}\right) - Effective\ Precipitation\ \left(\frac{ft}{WY}\right)\right)$$

Where WY = reporting period water year.

The irrigation efficiencies used in the TLSB groundwater model assumed an 85% irrigation efficiency for the Subbasin with a 95% irrigation efficiency for the Lake Bottom Area (also referred to as Lakebed) as discussed in the TLSB Groundwater Model Report (GSP Appendix D, pg 26). The Farm Demand equation is therefore:

$$Farm\ Demand\ \left(\frac{AF}{WY}\right) = \frac{Total\ Crop\ Demand\ \left(\frac{AF}{WY}\right)}{Irrigation\ Efficiency\ (\%)}$$

Step 3: Calculate Un-met Demand.

The term “un-met demand” is used in the GSP to describe Farm Demand that is met by groundwater pumping. It is determined by subtracting farm-level surface water deliveries from Farm Demand, as shown in the equation below (GSP, pg 3-44).

$$Un-met\ Demand\ \left(\frac{AF}{WY}\right) = Farm\ Demand\ \left(\frac{AF}{WY}\right) - Surface\ Water\ Deliveries\ \left(\frac{AF}{WY}\right)$$

Data on surface water deliveries were provided by the GSAs and affiliated water agencies. Details of surface water deliveries are provided in **Section 2.2**.

Step 4: Apply Special Adjustment for Lake Bottom Water Storage.

Farming practices in the southern portion of the El Rico GSA (commonly referred to as the “Lake Bottom” or “Lakebed”) differ from the rest of the subbasin. This step would only apply to El Rico GSA’s total agricultural pumping volume. During “wet” years, flood water and return flows are diverted for storage in the Lake Bottom area and are then used for irrigation throughout the year. The Lakebed storage is treated as an additional surface water supply for

El Rico GSA (GSP Appendix D, pg 26). WY22 was not a "wet" year and did not receive Lakebed storage, therefore no additional adjustment was needed to calculate groundwater pumping in El Rico GSA.

2.3.2 Urban Groundwater Use

Municipalities and member agencies reported measured extracted groundwater volumes for WY22 which included the City of Hanford, City of Lemoore, City of Corcoran, Stratford Public Utilities District (PUD), Kettleman City Community Services District (CSD), Armona CSD, and Home Garden CSD. As stated in the WY20 Annual Report, Kettleman City CSD no longer relies on groundwater and primarily uses surface water received from the California Aqueduct when available. The TLSB will report in a future Annual Report if Kettleman City CSD returns to utilizing groundwater supplies.

2.3.3 Other Groundwater Use

Domestic water use that occurred outside the areas of municipal service are categorized as "Other" to differentiate from metered urban supply. Rural domestic water use is generally de minimis and not reported. Therefore, an estimate was developed based on population and typical per capita demand. The source of all rural domestic water use was assumed to be extracted groundwater.

To estimate the Subbasin's "Other" water-use category, the following steps were performed:

Step 1: Find "Other" Population.

Chapter 2 of the TLSB GSP provides the Subbasin population for 2010 and projected population for 2030. The population for WY22 is obtained by interpolating the values between the 2010 population and the population projected to persist in 2030. Thereafter, the population for the Subbasin's municipalities and communities were then searched using the United States Census Bureau's American Community Survey 5-Year Data which falls between 2009 to 2020. This total is subtracted from the interpolated Subbasin population. The Municipalities/Communities searched are listed under the Urban Groundwater Use Section above.

Step 2: Apply typical per capita demand.

An assumed 179 gallons per capita annual demand was multiplied by the "Other" population value and then converted to AF. This assumed value was taken from the Public Policy Institute of California's Water and the Future of the San Joaquin Valley February 2019 report which notes urban water use within the 2017 drought period.

3. GROUNDWATER ELEVATIONS

§356.2(b) (1) (A) Groundwater elevation contour maps for each principal aquifer in the basin illustrating, at a minimum, the seasonal high and seasonal low groundwater conditions.
§356.2(b) (1) (B) Hydrographs of groundwater elevations and water year type using historical data to the greatest extent available, including from January 1, 2015, to current reporting year.

This Chapter offers an overview of the data sources and applications employed to evaluate groundwater elevations within the subbasin. Groundwater level monitoring is achieved through a network of wells referred to as representative monitoring sites (RMS). Many of the RMS wells that compose the current monitoring network were carried over from the network first identified in the GSP. Data from the RMS network showed that groundwater levels across much of the Subbasin were generally lower in WY22 as compared to WY21. Recent dry conditions, limited surface water supplies and groundwater pumping have contributed to the overall lower groundwater levels.

3.1 GSA Groundwater Level Monitoring Network

The 2022 GSP identified fifty-seven (57) RMS wells for groundwater level monitoring, and their data is considered in this report. Alterations to the groundwater level monitoring network may become necessary as new wells are added to fill data gaps and others are removed (i.e., destroyed, collapse, or become inaccessible). The groundwater level RMS network as presented in the 2022 GSP is provided in **Appendix E Table E-1** along with water level measurements collected in WY22. Data limitations or troubleshooting procedures are reported if they occurred.

Of the 57 RMS wells, six (6) did not provide Fall 2021 water level data and three (3) did not provide Spring 2022 water level data. The Mid-Kings River GSA learned this year that one of its RMS wells had been destroyed. Efforts to replace this well are underway. All other GSAs RMS wells listed in **Appendix E Table E-1** were measured during the WY22 fall and spring.

3.2 Groundwater Level SMC Implementation

The 2022 GSP established a new groundwater level SMC, which was based on a regional analysis of aquifer geometry and a statistical analysis of surrounding well completion depth based on DWR's Online System of Well Completion Reports (OSCWR) database of well completions in the Subbasin. The groundwater level MT were set to be protective of 90% of wells listed in the OSCWR database.

During WY22, the average spring groundwater elevations were observed to be 99.4 feet above the MT. A limited number of wells, twenty-six (26) in total, had spring measurements that exceeded the MO and an additional six (6) exhibited spring measurements that exceeded the MT. It is important to note that all six of these wells were screened in the B-zone aquifer. In line with the Subbasin's commitment to establishing early warning systems, the spatial distribution of the Representative Monitoring Site (RMS) wells can be viewed in **Appendix E Figure E-2**.

In addition to RMS wells, domestic wells were also evaluated. As per the DWR's Household Water Supply Shortage Reporting System, thirty-eight (38) domestic wells within the TLSB have reported issues since 2019. Among these reports, two wells have collapsed, and thirty-six (36) wells have gone dry. Wells that reported dry within this time frame had a total well depth ranging from 14 feet to 400 feet. Most of the dry wells were completed within the A-zone. Nineteen (19) were located in Hanford, sixteen (16) were in Lemoore, two (2) were in Laton, and one was located in Stratford (1). The spatial distribution of the domestic wells with reported issues is also shown on **Appendix E Figure E-2**.

3.3 Hydrographs

For each RMS well, hydrographs were plotted using groundwater elevation data collected semi-annually, with measurements collected once in the fall and once in the early spring. Groundwater Elevation Hydrographs generated for all three hydrostratigraphic zones are presented in **Appendix E**. **Appendix E Figure E-1** presents the RMS well locations across the Subbasin, and **Table E-1** provides WY22 measurement details and reasons for missing measurements at some wells. Each hydrograph includes the assigned Interim Milestone, Measurable Objective (MO), and Minimum Threshold (MT).

3.4 Contour Maps

Groundwater surface elevation contour maps for fall 2021 and spring 2022 were generated for each hydrostratigraphic zone using RMS water level measurements and data collected from other wells monitored by various entities within and surrounding the Subbasin. The maps include data to generate groundwater level contour maps from approximately one hundred nineteen (119) wells. Contouring was performed using a statistical kriging method under the Surfer contouring and 3-D mapping software. The fall 2021 and spring 2022 groundwater elevation contour maps for each zone are presented in **Appendix B**.

The groundwater contour maps exhibit flow patterns that are consistent with WY21. The flow patterns are characterized by groundwater moving from areas of natural recharge along major streams around the northern Subbasin boundary towards depressions in the water table resulting from groundwater pumping. Many of these spots of depressed water levels experience some recovery by the following Spring (**Appendix B, Figures B-1** through **B-6**).

4. GROUNDWATER QUALITY

In the 2022 GSP, the GSAs developed an “early warning” approach to identifying undesirable results for degraded water quality. The new approach determines significant and unreasonable degradation of water quality by observing representative monitoring wells within an individual aquifer zone. If the MT is exceeded for two consecutive measurements with an observable upward trend and a causal nexus between GSP-related activities and water quality, it triggers an undesirable result. Alternatively, if 25% of representative monitoring wells exceed the MT for two consecutive measurements with a causal nexus between GSP-related activities and water quality, even without an observable upward trend, it also triggers the undesirable result. This 25% value is selected because it would indicate non-GSP-related activity at an individual well and provides an added factor of safety. Trends in COC concentrations are assessed during each annual reporting period using the Mann-Kendall trend analysis for each well with six or more measurements collected since 2020.

Based on the information presented in the 2022 GSP, SMCs were developed for arsenic, chloride, nitrate, sulfate, total dissolved solids (TDS), uranium, and 1,2,3-Trichloropropane (1,2,3-TCP). Water quality graphs displaying available WY22 data are presented in **Appendix F**.

4.1 Groundwater Quality Monitoring Network

The water quality monitoring network described in the 2022 GSP is listed on **Table F-1** and shown on **Figure F-1** in **Appendix F**. The network consists of thirty-five (35) wells with coverage in the B-zone and C-zone aquifers. The GSAs will continue to expand the groundwater quality monitoring network in all three aquifers and look for additional monitoring locations within areas for domestic and environmental uses as well as outside of de-designated areas.

Data used for groundwater quality monitoring is from the Groundwater Ambient Monitoring & Assessment Groundwater Information (GAMA) System available from the California State Water Resources Control Board GeoTracker™ system (GAMA, 2023). Wells within the groundwater quality monitoring network are under the oversight of existing regulatory agencies or groundwater quality coalitions that determine constituents and sample frequencies according to drinking water standards. The monitoring program is designed and implemented by the SWRCB-DDW.

Alterations made to the monitoring network since submission of the TLSB GSP were primarily due to the well being removed from regulatory oversight, destroyed, or well rehabilitation. Monitoring wells recently installed by GSAs to resolve data gaps by South Fork Kings and Mid-Kings include wells “SL-1”, “1610006-007” and “1610001-001”, “1610001-007”, “1610001-010”, and “1610003-044”. In WY22, twenty-Five (25) out of thirty-six (36) RMS wells provided water quality analytical data. Sampling frequencies for each COC are listed in **Appendix F**, **Table F-1**.

4.2 Groundwater Quality SMC Implementation

Elevated concentrations of Nitrate, Chloride, TDS, Sulfate and Uranium have generally occurred in the western portion of the Subbasin in the South Fork Kings GSA area. However, analytical results for Nitrate, Chloride, TDS, Sulfate and Uranium were below the MCL in WY22.

1,2,3-Trichloropropane (1,2,3-TCP) is a manmade chlorinated hydrocarbon generally found at industrial or hazardous waste sites. Of the thirty-six (36) RMS wells, seventeen (17) had WY22 data for 1,2,3-TCP. All 1,2,3-TCP results were non-detect in WY22 and no trends were detected in any of the 1,2,3-TCP data.

Trend analysis for arsenic was performed at thirteen (13) C-zone wells. Of the 13 wells, eleven (11) exhibited no trend, one well exhibited a decreasing trend, and one well exhibited an increasing trend (well 1610005-011). Arsenic exceeded the MT at four wells while only one well (1610005-011) exhibited an increasing trend. Further, well 1610005-011 analytical data provides six analytical datapoints that surpassed the MT since September 2022. Based on these assessments, well 1610005-011 triggers an undesirable result. Management actions being considered by the GSAs for degraded groundwater quality at RMS well 1610005-011 include:

- Coordination with agencies and coalitions responsible for groundwater quality concerns
- Perform additional testing to assess potential water/sediment interactions that could result in increases of the COC
- Aquifer testing to assess transport mechanisms
- Zonal testing to assess if there are specific areas of the aquifer where the increases are occurring
- Restrictions in pumping both laterally and vertically to assess if these changes will reduce or eliminate the increased trend.

As stated in the 2022 GSP, the TLSB may conduct supplemental groundwater quality sampling as needed. The efforts at well 1610005-011 will be discussed in the next annual report.

5. LAND SUBSIDENCE

In the 2022 GSP, a regional-scale, risk-based approach was developed to identify and monitor the impacts of subsidence. The risk framework provides a tool for evaluating where land subsidence risks to individual infrastructure are most likely occurring. The approach will be used to focus further investigation or analysis to evaluate whether a specific piece of infrastructure is at risk of experiencing an impact. The framework evaluates both total and differential subsidence, where total subsidence refers to the overall sinking of the ground surface, while differential subsidence represents the relative movement between adjacent areas. The risk framework is used in conjunction with the SMC thresholds designated for each of the RMS subsidence benchmarks.

5.1 Land Subsidence Monitoring Network

Subsidence monitoring for the TLSB relies on existing monitoring programs. Benchmarks throughout the Subbasin are measured by the Kings River Conservation District (KRCD) Subsidence Network, California Department of Transportation, Kaweah Delta Water Conservation District, and California High Speed Rail. Currently, the subsidence monitoring network consists of twenty-five (25) RMS stations from KRCD that are measured annually, and two long-term Continuous Global Positioning System (CGPS) stations located in the South Fork Kings GSA in the City of Lemoore (LEMA) and in the El Rico GSA located near the city of Corcoran (CRCN) for a total of twenty-seven (27) site-specific RMS subsidence monitoring stations (**Appendix C, Table C-1**). Additional monitoring data provided by KRCD are included when data are available. Since WY21, a network of forty-one (41) land surface elevation monitoring benchmarks composed of RMS sites and stations with available data have been utilized for localized subsidence monitoring (**Appendix C, Figure C-1**). Not all of the subsidence monuments are measured regularly and discussions with monitoring agencies, such as California High-Speed Rail and CalTrans have indicated plans to measure subsidence points more regularly in the near future.

5.2 Regional Land Subsidence Monitoring

Regional subsidence monitoring is accomplished using satellite imagery, also known as Interferometric Synthetic Aperture Radar (InSAR). InSAR data for the subbasin are collected by the European Space Agency (ESA) Sentinel-1A satellite and processed by TRE ALTAMIRA Inc. (TRE). Sentinel-1A InSAR data coverage within the Subbasin began on June 13, 2015. The datasets include raster files showing displacement for 100 meter by 100 meter areas. Raster data are available for total vertical displacement relative to 2015, and for annual vertical displacement. Maps displaying InSAR measurements of total displacement since 2015 in WY22 and WY21 are shown on **Appendix C Figures C-2** and **C-3.**

5.3 Land Subsidence SMC Implementation

5.3.1 Subsidence RMS Station Monitoring

Annual change in elevation recorded at each subsidence benchmark during WY22 is displayed on **Appendix C Figures C-1** and **C-2**. During WY22, the CGPS reported ground surface elevation decreased by 0.32 feet at the CRCN station and 0.21 feet at the LEMA station. DWR's InSAR data reported 3.67 feet decrease at LEMA and 4.7 feet decrease at CRCN between June 13, 2015 and October 1, 2022. Along the portion of the California Aqueduct (Aqueduct) that passes through the TLSB, benchmarks exhibit annual change of +0.0068 feet in the northern portion to a change of +0.057 feet along the southern portion. **Figures C-2** and **C-3** of **Appendix C** provide a visual of InSAR data for WY21 and 22.

5.3.2 Regional-Scale Risk Framework

The regional-scale early-warning system developed in the 2022 GSP is based on a Township/Range/Section (TRS) geographic framework. The regional-scale approach considers infrastructure and subsidence in aggregate. A simple risk assessment formula was applied to each TRS grid cell to define aggregate risk of undesirable results. The aggregate risk in each TRS cell can also be depicted in map format and used to evaluate where the risk of undesirable results is high versus where it is low. The definition of Aggregate Risk is as follows:

$Aggregate\ Risk\ (\mathrm{R}) = Hazard\ (\mathrm{H}) - Vulnerability\ (\mathrm{V}),$ where

- H = the observed subsidence at a point in time over a given time period for a given TRS grid cell.
- V = the aggregate vulnerability of infrastructure to the hazard (H).

To assess hazard (H), average total subsidence and differential subsidence values were calculated for each Township Range Section (TRS). WY22 InSAR satellite data was used to calculate the aggregate risk for total subsidence and differential subsidence. To assess vulnerability, infrastructure density maps, which reflect the total sum of infrastructure and the aggregate vulnerability of infrastructure to the hazard in each TRS, were utilized. Infrastructure vulnerability was calculated by multiplying the magnitude of each infrastructure type by its associated lateral movement tolerance (LMT) for that infrastructure type. LMTs for each infrastructure type are listed in the 2022 GSP. The resulting aggregate total subsidence risk and differential subsidence risk maps indicate areas of potential high risk for subsidence-related damage to infrastructure in the Subbasin (see **Appendix C Figures C-4** and **C-5**).

Based on the regional-scale risk assessment results, high-risk areas (i.e., those in the upper 2 red/orange risk categories) shown in **Figures C-4** and **C-5** indicate areas that are potentially approaching MTs and thus require a localized assessment of differential subsidence values relative to LMTs. Both risk maps show a general concentration of higher risk areas in the northern and eastern portions of the Subbasin, where both higher subsidence and more concentrated infrastructure areas overlap.

Potential GSA actions to address land subsidence include:

- In areas identified as being at high-risk, more detailed assessments including visual inspection and field monitoring of targeted infrastructure to identify LMTs.
- Underlying causes for impacts (including groundwater pumping) will be managed to minimize further impacts.
- The MT for the California Aqueduct will be set at a rate of 0.01 feet per year until 2040 and limited to residual subsidence thereafter.
- The GSAs require all new wells within three miles of the Aqueduct to provide a subsidence evaluation and appropriate coordination with DWR as part of the requirement to obtain a permit.

All high risk TRS locations will be subject to a localized assessment as discussed in the 2022 GSP. The results of these assessments will be discussed in the WY23 Annual Report.

6. GROUNDWATER STORAGE CHANGE

§356.2(b) (5) (A) Change in groundwater in storage maps for each principal aquifer in the basin.
§356.2(b) (5) (B) A graph depicting water year type, groundwater use, the annual change in groundwater in storage, and the cumulative change in groundwater for the basin based on historical data to the greatest extent available, including from January 1, 2015, to the current reporting year.

The method for estimating storage change in the A- and B-zones relies on observed water levels from spring measurements. The method calculates the volume change by subtracting the current and previous year's elevation surfaces and multiplying the result by a specific yield of 7% for the A-zone and 2% for the B-zone. In the C-zone, the method uses spring InSAR land surface elevation maps to estimate storage change from the preceding year. The change in ground surface elevation is equated to groundwater storage loss in the C-zone at a 1:1 ratio, meaning that one foot of subsidence is equivalent to one foot of storage loss. However, the method has some limitations, such as not differentiating which clay layers are compacting and potentially underestimating or overestimating storage loss in a specific year due to the time-lag that occurs between pore-pressure loss and grain rearrangement in the clay zones. Additionally, the distribution of water-levels for A- and B-zone storage calculation is limited.

To address these limitations, we applied an updated method for estimating storage loss using both InSAR and measured water levels. The change in land elevation estimated from InSAR is equated to the total compaction of finer-grained sediments across all three aquifer zones, recognizing that changes in land surface elevation could be associated with compaction of clay layers in shallower semi-confined aquifer zones above the E-clay. The volumetric change in aquifer storage is then distributed based on observed water levels in the semi-confined and unconfined aquifer zones above the E-clay. The updated method calculates the distribution of storage change in each zone by subtraction and solves for the C-zone volumetric storage change as the difference between total storage and the A- and B-zone changes by:

$$
\begin{aligned}
C_{Zone}Storage\ Change \\
&= Total\ Storage\ Change \\
&- (A_{Zone}Storage\ Change + B_{Zone}Storage\ Change)
\end{aligned}
$$

The updated method has some advantages, such as improved accuracy in estimating C-zone storage change, better spatial accuracy using InSAR, and improved distribution of water-levels for B-zone storage calculation. However, the subsidence data still contains time-lag inaccuracy, potentially underestimating or overestimating storage loss in a specific year depending on previous years.

6.1 Total Groundwater Storage Change

Total groundwater storage change is estimated using DWR's monthly InSAR data, which consists of raster grids of ground surface deformations that provide coverage over the TLSB.

An annual volume change is calculated by comparing InSAR rasters for the current seasonal high (Spring 2022) to the previous year seasonal high (Spring 2021). Before performing the calculations, gaps in the InSAR raster coverage are interpolated using a kriging method to produce two continuous elevation surfaces over the entire subbasin. The interpolation is based on kriging applied in Surfer, a contouring and 3-D surface mapping software. The change in volume between groundwater elevation grids was then calculated in ArcGIS using a cut fill functionality under the ESRI Spatial Analysist tool. The tool finds the difference in vertical displacement at each grid point and converts this to acre-feet by multiplying the area of the grid cell by the difference in elevation, which is then summed to find the total change in volume. Storage change values did not account for influences of inflow and outflow outside of the Subbasin and will be reevaluated during the five-year GSP update.

Groundwater pumping during WY22 totaled 548,361 AF and corresponded to a Spring-to-Spring storage decline of -115,759 AF. Compared to the previous water year, groundwater pumping in WY22 decreased by 104,127 AF while the volume of annual storage loss decreased by 60,187 AF. On a cumulative basis, pumping of an estimated 3,360,095 AF since 2015 has resulted in approximately 753,556 AF of aquifer storage loss.

The historical storage change values in **Table 6-1** have been updated based on the new storage change method using data provided in the previous annual reports. **Figures C-2 and C-3 of Appendix C** display InSAR data used to calculate storage. A graphical presentation of the annual change in storage estimates, cumulative change in storage, the preceding water year percent, and preceding water year estimated total groundwater pumping for the Subbasin is provided in **Figure 6-1.**

Table 6-1: Storage Change within the Subbasin – Historical and Current

CHG in Storage	Spring 2015	Spring 2016	Spring 2017	Spring 2018	Spring 2019	Spring 2020	Spring 2021	Spring 2022
Annual GW Storage CHG (AF)	baseline	(153,278)	(100,927)	(57,662)	(84,640)	(65,344)	(175,946)	(115,759)
CML CHG in GW Storage (AF)	baseline	(153,278)	(254,205)	(311,867)	(396,507)	(461,851)	(637,797)	(753,556)
Total GW Pumping (AF)	(534,910)	(437,299)	(166,100)	(713,615)	(480,390)	(375,293)	(652,488)	(549,066)
CML GW Pumping (AF)	baseline	(534,910)	(972,209)	(1,138,309)	(1,851,924)	(2,332,314)	(2,707,607)	(3,256,673)

CHG = Change; CML = Cumulative

2015 – 2019 values reported in the Tulare Lake Subbasin Annual Report, Reporting Period 2015-2019 (Provost & Pritchard, 2020).

2020 storage volumes have been altered from the WY20 submittal to include inelastic storage loss based on InSAR data.

Annual storage change is determined from Spring to Spring. Storage change is listed under the ending year evaluated.

6.2 Groundwater Storage Change in the A and B Zones

Groundwater storage change within the A- and B-zones for WY22 was determined by comparing spring 2022 groundwater elevation data and maps to the spring 2021 groundwater elevation maps that were included in the WY21 Annual Report (see **Appendix B**). The change in groundwater elevation was then multiplied by specific yield values.

Elevation grid surfaces for each zone were created by interpolating spring groundwater surface elevation measurements. The interpolation is based on kriging applied in Surfer. The change in volume between groundwater elevation grids was calculated in ArcGIS using the ESRI cut fill functionality. Specific yield determination for the A- and B- zones included a review of the specific yield range listed in the TLSB GSP (1% to 30% for the unconfined, 1x10-5/ft and 4.5x10-2 for the semi-confined) and general aquifer material specific yields (0-5% for clay; 3-12% for sandy clay; 3-19% for silt; 10-28% for fine sand, etc.) listed in hydrogeology publications and other USGS articles to estimate a specific yield (GSP, pg 3-29; Fetter, 2018; Johnson, 1967).

The specific yield calculated for the A zone using the first method (7%) falls within the specific yield range listed in the TLSB GSP and was used to find groundwater storage change in the A-zone. Specific yield for the B-zone used the median specific yield of 2% presented in the TLSB GSP. In some areas of the Subbasin, particularly the Mid-Kings River GSA, the B-zone is unconfined and likely has a specific yield closer to the average specific yield of 8.5% reported in the TLSB GSP (GSP, pg 3-30). Applying a 2% specific yield for the Subbasin is reasonable as it is representative across the entire Subbasin.

The following general equation was used to calculate estimated groundwater storage change within the A- and B-zones:

$$\begin{aligned} &Change\ in\ Groundwater\ Storage\ (A\ \&\ B\ Zones) \\ &\quad = (Current\ Year\ Seasonal\ High\ Groundwater\ Levels \\ &\quad - Previous\ Year\ Seasonal\ High\ Groundwater\ Levels) * Specific\ Yield \end{aligned}$$

There is limited available data to analyze groundwater storage in both the A- and B-zone. With each reporting year, the analysis area grows and begins to cover areas considered data gaps such as the El Rico, Southwest Kings, Tri-County Water Authority GSAs. The different zone analysis area extents are constrained by data gaps that generally occur in areas where little to no water is extracted and surface waters are mostly relied upon. For WY22, the B-zone analysis area's southern boundary was extended southward to encompass all the of the areas north of the Tulare Lake Canal and Lone Oak Canal confluence. The B-zone analysis is shown in **Appendix D Figure D-1b.** Visual representation of the analysis areas where groundwater storage change was calculated for each zone is displayed on **Figures D-1a** through **D-1c** in **Appendix D.**

7. PROJECTS AND MANAGEMENT ACTIONS STATUS

§356.2(b) (5) (C) A description of progress towards implementing the Plan, including achieving interim milestones, and implementation of projects or management actions since the previous annual report.

7.1 Mid-Kings River GSA

Progress towards GSP implementation by the Mid-Kings River GSA (MKRGSA) included the following activities.

TLSB GSP, Section 7.2.1.2 – New Basins

- Esajian Basin by Kings CWD (top priority project for MKRGSA)
  - Construction of the basin facility began in 2020. The new 80-acre recharge basin is roughly 70% excavated at the time of reporting.
  - Surveying and Design continue for diversion facilities and the realignment of Peoples Ditch on the basin site to maximize the basin area. The project is expected to be in construction in 2023.
- Griswold Basin by Kings CWD (next priority project for MKRGSA)
  - Project concept was redesigned to utilize more of the available property for groundwater recharge. Project concept also minimized the number of diversion facilities needed from Riverside Ditch
  - Lease with local farmer was revised so that District has access to southern half of the property for construction this year.
  - Included in 2022 SGM Implementation Grant Round 2 submittal.
  - CEQA application and design for facilities is underway
- New Basin Project Development
  - Several new recharge basin projects are currently in various stages of development. These projects are currently described as follows:
    - Ramboll Geophysical Investigation
    - Investigations considered the Esajian Basin, Last Chance Basin, Railsback Basin, and Garner Basin locations.
    - All locations were determined to be excellent locations for recharge basins except for Garner Basin.
    - Last Chance Basin – KCWD continues to work with Last Chance Water Ditch Company on property that they own that could be developed into a recharge basin. The property is currently being leased until 2023, and discussions continue about what could be possible after that.
    - North Hanford Basin

- There have been two locations being considered for this basin. Both are along Peoples Ditch.
- KCWD has gained access to one site and a TowTEM Geophysical Investigation through Ramboll has been scheduled for March 2022. The owner at that location is agreeable to selling the property for basin development. At this site historic documents have been researched to locate sloughs that were known to run through the property
- KCWD is just beginning discussions with the owner at the other site.
- Two other potential locations are being identified

TLSB GSP, Section 7.2.1.2 – System Improvements

- Everett Recharge Basin was put into service in 2022. The turnout facilities are functioning far more efficiently since the modifications and were used for flood management in January and February and is currently being used for recharge.
- Expansion of Existing Recharge Basins
  - Cody Slough – The project is funded by SGM Implementation Round 1 grant, with the CEQA document and design underway and looking at potential temporary facilities
    - Discussions have begun and are on-going with the current landowner on the potential expansion of the Cody Slough.
    - Conceptual Design and Cost Estimates have been developed for the basin expansion, improved turnouts, and metering facilities.
    - The improved and expanded basin facilities were included in the SGM Round II Implementation Grant.
  - Railsback Basin is receiving improvements through grant funding
    - Discussions with the current landowner have begun on the potential expansion of the Railsback Basin. Currently it appears the owner is looking for a price significantly above fair market value for the expansion area. For that reason, KCWD has ceased pursuing an expansion and will wait to see if things change.
    - KCWD is pursuing the development of improved diversion and measurement facilities for the existing basin. There improvements are anticipated to make the basin significantly more productive for recharge efforts. The conceptual design for these facilities is very similar to the Everett Basin modifications in 2020.
    - The improved basin facilities were included in the SGM Round II Implementation Grant.
  - Lopez Basin is being improved through grant funding

    - Discussions with the current landowner have begun on the potential expansion of the Lopez Basin.
    - Currently KCWD is pursuing the development of improved diversion and measurement facilities for the existing basin. There improvements are anticipated to make the basin significantly more productive for recharge efforts. The conceptual design for these facilities is very similar to the Everett Basin modifications in 2020.
    - The improved basin facilities were included in the SGM Round II Implementation Grant application.
  - System Evaluations – Independent Ditch – The Ditch Company continues discussions with KCWD on efforts to develop easements and right-of-way so that the facility can be preserved long-term. There is a need for a measurement facility and diversion structure at the head of this system. As previously mentioned, it appears that some differential subsidence has impacted diversion capacity over time.

TLSB GSP, Section 7.2.1.4 – Meter Requirements

- The MKRGSA Board considered a draft groundwater Well Registration policies along with a draft policy to require Flow Meters on new and existing groundwater wells. The Well Registration policy and Flow Meter requirement policy were adopted by the MKRGSA Board in November 2022.

TLSB GSP, Section 7.2.1.4 – Pumping Restrictions

- Work continues on CAFO evaluations and crop Et from LandIQ. Generally, what has been learned is that CAFO facilities pump more groundwater at the barn facilities than was previously understood, and crop Et is slightly less than what was estimated in the GSP.
- Several other local GSAs have considered pumping restriction policies. As these have become public, the MKRGSA staff and Board has discussed them to consider their strengths and weaknesses.
- The MKRGSA Board continues to discuss how and why pumping restrictions would be implemented. The current general concept of implementation involves setting thresholds that would be monitored for periods of time and they adjusted down, as justified by monitoring information.
- In accordance with the Governors Executive Order N-7-22, the MKRGSA implemented a process with Kings County to review applications for new water wells.

TLSB GSP, Section 7.2.1.5 – Grant Funds

- The TLSB is pursuing the SGM Implementation Grant Round 1 with various projects benefitting the Subbasin. The Kings County Water District has submitted two recharge basin projects. One project to build the Griswold Basin and make improvements to three existing recharge basins (Cody Slough, Smith Basin, and Lopez Basin. The second project consists of construction of the new North Hanford Basin.

- As part of the SGM Implementation Grant Round 1 submittal, the TLSB has opted to include 2022 GSP Updates, Groundwater Studies, and to help fill Data Gaps. As part of the 2022 GSP Updates, the TLSB has opted to include funding to be used to respond to DWR's comments and a groundwater quality study. Groundwater Studies include an update on the groundwater model, regional subsidence study and a native yield study. Lastly, the TLSB has decided to request funding to install a monitoring well to help fill a data gap area.

- The GSAs are waiting to hear back from DWR regarding the funding from SGM Implementation Round II grant.

7.2 El Rico GSA

Progress towards GSP implementation by the El Rico GSA included the following activities.

TLSB GSP, Section 6.3.1 – Conveyance Facilities Modifications and Construction of New Facilities

- El Rico continues work with Water Blueprint for the San Joaquin Valley with the intent to augment supplies to reduce groundwater overdraft.
- Corcoran Irrigation District (CID) continues their project to create an efficient conveyance system. For conservation purposes, CID has enclosed roughly 1.75 miles of open channel in its well field conveyance system in 2021. There is a total of approximately 3.75 miles of enclosed well ditch conveyance. CID's goal over the next 10 years is to enclose over 20 miles of conveyance channels for conservation purposes.
- CID plans to modify existing conveyance systems within the CID boundary to supply water for recharge as well as storage. The goal is to have the capacity to divert water around the CID, to areas where the water can be used for On Farm Flood Capture, Aquifer Storage and Recovery, Above Ground Storage as well as irrigation when water is available and groundwater recharge. This project will increase the volume of water that can be captured and utilized within CID boundaries.
- CID plans to construct new pipelines and replace inefficient canal systems with large diameter pipelines. These pipelines will be used to convey water with a higher efficiency than gravity canal systems and are proposed to service a greater area within the district. The proposed project is estimated to add up to twenty miles of pipelines. The pipe diameters in the range of 24-inch to 60-inches. The underutilized lands are approximately 800 acres to 1,500 acres of lands where water can be stored and or infiltrated when water is available.
- CID's Reservoir Construction project proposes to construct new reservoirs within the Corcoran Irrigation District to store water in times when water is available as well as recharge in the area. It is proposed to construct 300 acres to 900 acres of additional

ponds, capable of storing water six feet deep, for an annual average storage benefit in the range of 900 AF/yr to 1,800 AF/yr. This water would reduce the groundwater pumping demand, annually as well as in the following year.

TLSB GSP, Section 6.3.3 – Recharge Basins/Water Banking

- CID continues to excavate Salyer Reservoir (Section 1 Reservoir) to create additional flood water storage and groundwater percolation benefits. CID's goal over the next 10 years is to increase storge between 10,000 to 15,000 acre-feet and provide additional groundwater recharge.

TLSB GSP, Section 6.3.4 – On-Farm Recharge

- CID's Flood Capture and Basin Recharge and Storage Project plans to increase conveyance capacity to maximize the unused intentional recharge capacity of existing ponds. The key component is to increase the size of the conveyance system utilizing additional unused but available flood flows for recharged. The increased flows will be recharged in an area with existing recharge capabilities that will also be modified to allow for increased percolation abilities in existing ponds. This project proposed to increase the flood delivery system from approximately 650 cfs to approximately 1,200 cfs creating an additional 550 cfs or 1,090 AF/day compared to existing conditions.

TLSB GSP, Section 6.3.5 – Aquifer Storage and Recovery

- CID has proposed an Aquifer Storage and Recovery project that will use Scheduled and Flood water to recharge the lower aquifer utilizing existing wells that are perforated below the Corcoran clay layers. An assumption of 1.5 cfs per well can recharge back into the lower aquifer. This project proposes to use 50 wells for 20 days. The benefit from this project would be 3,000 AF/yr.

TLSB GSP, Section 6.4 Management Actions

- In El Rico GSA, more than 53,000 acres were fallowed in 2022 by using flexible cropping patterns to adjust to available water supply, as opposed to overplanting permanent crops that create a fixed demand in excess of average sustainable supplies.
- The El Rico GSA has implemented a program to request pumping data and cropping patterns from all owners in the GSA. Initially voluntary, due to the intensive data needs and time requirements, responses were a significant portion of the GSA. Ongoing efforts with mandates to respond are expected in the future to better model the path to sustainability for the El Rico GSA portion of the subbasin.

TLSB GSP, Section 7.3 Identify Funding Alternatives

The TLSB was awarded the SGM Implementation Grant Round 1 grant with various projects benefitting the Subbasin. Corcoran ID has begun the engineering design of a recharge and storage project on behalf of the El Rico GSA. As part of the SGM Implementation Grant Round 1 submittal, the TLSB opted to include GSP Updates, and groundwater studies, to help fill data gaps. The El Rico GSA has taken the lead in preparing the update to the regional groundwater model TLSB GSP, Section 7.0 Plan Implementation

- El Rico GSA continues to meet with the Kaweah Subbasin and Tule Subbasin. Meetings are held with the goal of better understanding, defining, and resolving disputes over the artificial boundaries where the three subbasins intersect.

7.3 Tri-County Water Authority

The Tri-County Water Authority (TCWA) continued to make progress implementing the 2022 GSP's proactive-approach to identifying and mitigating undesirable results during WY22. Some of the key projects and management actions included the following:

TLSB GSP, Section 6.3.1 – Conveyance Facilities Modifications and Construction of New Facilities

- The Water Blueprint for the San Joaquin Valley has restructured the organization to focus on education and advocacy. TCWA's Executive Director, Deanna Jackson continues to sit on the Board of Directors for the Water Blueprint for the San Joaquin Valley and is a representative for irrigated areas outside of water district or irrigation district services boundaries, also known as 'White Areas'. TCWA continues participation in the Water Blueprint for the San Joaquin Valley with intent to advance water infrastructure projects and increase water supply. The San Joaquin Valley Blueprint has prepared a new strategic plan to address the water needs in the area.

TLSB GSP, Section 7.2.4.3 Management Actions

- A groundwater allocation policy, which specifies the amount of sustainable yield per acre and is designed to substantially increase demand reduction over time, continues to be implemented and enforced with penalties. The funds collected from these exceedances are earmarked to support future projects that will decrease demand and increase supply, such as land fallowing programs, metering programs, and domestic well mitigation programs. These reductions in demand are expected to have a positive effect groundwater level and reducing subsidence.
- TCWA continues to utilize evapotranspiration and land use data provided by LandIQ to monitor groundwater pumping across the GSA.
- A web-based accounting program providing groundwater use data to the landowners continues to operate and is regularly updated.
- Tri-County Water Authority is to develop Multibenefit Lands Repurposing Plans using monies from DOC.
- Additional activities reported in the Tule subbasin are updated in the Tule WY22 Annual Report and it's encouraged this document be reviewed in tandem to gain a full picture of these actions

TLSB GSP, Section 7.4 Data Management System

- Four-Creeks Subbasin data management system continues to be updated

TLSB GSP, Section 7.0 Plan Implementation

- TCWA continue to participate in coordination meetings between the Kaweah and Tulare Lake subbasins. These meetings are expected to continue to help provide common solutions to regional issues. Ground subsidence has been one of several issues focused on during these meetings.

7.4 South Fork Kings GSA

Progress towards GSP implementation by the South Fork Kings GSA (SFKGSA) included the following activities:

TLSB GSP, Section 6.3.1 – Conveyance Facilities Modifications and Construction of New Facilities

- SFKGSA continues work with the Water Blueprint for the San Joaquin Valley with intent to gain rights to increased water supplies to reduce groundwater overdraft.

TLSB GSP, Section 6.4 – Management Actions

- The SFKGSA is producing a simple and easy-to-use interactive map that is broken down to the parcel level. This tool will be able to estimate groundwater pumping based on LandIQ's ET data and surface water consumption. Parcel owners will also be able to review the data, input metered pumping values if they so choose, and confirm pumping estimates.
- The SFKGSA will conduct a well survey requesting landowners to provide information on existing wells including well construction and meter details which will be used to evaluate the need for metering.

TLSB GSP, Section 7.2.2.3 – Groundwater Monitoring Program

- SFKGSA continues to evaluate their groundwater monitoring program by reevaluating wells within the program and searching for opportunities to add more wells to monitor.
- The SFKGSA continues to pursue monitoring well installment through DWR's Technical Support Services (TSS). The well will be located within the City of Lemoore and approximately 0.5 miles south of a C-zone data gap recognized in the TLSB GSP (Figure 5-3). The SFKGSA has worked closely with the City of Lemoore to find an optimal location. The well is expected to monitor both B and C hydrostratigraphic zones.

TLSB GSP, Section 7.2.2.8 – Supply Enhancement Program

- The SFKGSA was awarded a grant from the California Resilience Challenge to implement an Aquifer Storage and Recovery (ASR) Pilot Test. The final report for the ASR Pilot Test is complete and has been submitted to SFKGSA and the RWQCB.

TLSB GSP, Section 7.0 – Plan Implementation

- SFKGSA and the TLSB continues discussions with GSAs/Subbasins to the north and west to help coordinate inter-basin coordination. This coordination included on-going data exchanges and technical discussions regarding boundary conditions.

TLSB GSP, Section 7.3 – Identify Funding Alternatives

- The TLSB was awarded the SGM Implementation Grant Round 1 with various projects benefitting the Subbasin. KRCD began implementation of the Kings River Channel Reclamation Project on behalf of the SFKGSA. Through previous grant awarded efforts, KRCD has identified sections along the Kings River in need of reclamation to restore 100-year flood capacity along the channel. Through this grant, KRCD will remove an approximate 280,000 cubic yards of accumulated sediments along the South Fork Section located between Jackson Avenue bridge and Empire Weir 1. Removing accumulated sediments will reclaim capacity for water flows and bring entitled irrigation and floodwaters to be used in lieu of groundwater pumping. The engineering design drawings for the project were completed in WY 22 and construction activities are underway.
    - As part of the SGM Implementation Grant Round 1 submittal, the TLSB included an update to GSP and several groundwater studies to help fill data gaps. As part of the GSP Updates, the grant funding was used to respond to DWR's comments. Groundwater studies include an update on the groundwater model, regional subsidence study and a native yield study. Lastly, the TLSB has decided to request funding to install a monitoring well to help fill a data gap area.

7.5 Southwest Kings GSA

Progress towards GSP implementation by the Southwest Kings GSA (SWKGSA) included the following activities.

TLSB GSP, Section 6.3.1 – Conveyance Facilities Modifications and Construction of New Facilities

- Participated in discussions with the Water Blueprint for the San Joaquin Valley with intent to increase water supplies to the area.

TLSB GSP, Section 6.4 – Management Actions

- The GSA-wide meter policy which required the installation of meters on all active production wells is seeking to gain more compliance. LandIQ data is being relied on to provide additional insights to groundwater pumping.

TLSB GSP, Section 7.0 – Plan Implementation

- Continue to engage with the neighboring Subbasin to the west to help coordinate inter-basin coordination. The agreement between two agencies has been extended to February 2023.

8. DATA GAPS

The TLSB continues to evaluate the plan area and intends to provide further coverage as data becomes available. Data gaps discussed below are based on information presented in the 2022 GSP.

8.1 Water Quality

Data gaps for the degraded groundwater quality include the following:

- Currently, regulatory programs do not sample domestic wells for COCs within the A-zone
- B-zone RMS wells do not include domestic wells

To fill these data gaps, the GSAs will coordinate with other agencies such as the RWQCB and SWRCB-DDW to identify wells that are already monitored within the areas identified as data gaps. For identified wells that are sampled but not for the COCs, the GSAs will request the COCs be added to the sampling list. If wells cannot be identified through these programs, the GSAs will identify existing domestic wells that can be sampled and sample them on an annual basis for the COCs.

8.2 Water Levels

Well Registry - The GSAs recognize that there is limited information on the currently active wells across the area. While some GSAs have implemented well registry programs there has not been a consistent requirement across the Subbasin resulting in a significant data gap. A comparison of the OSWR database with Kings County well permit information clearly showed the need for a comprehensive well registry. In particular, the information on active domestic well operations are limited and inconsistent. Working with local agencies and stakeholders, a comprehensive well registry is being prepared for the 2025 GSP update.

Updated Groundwater Model – As part of the SGMA Implementation Grant recently awarded to the Subbasin, an updated groundwater model will be prepared utilizing the data that has been collected since the submittal of the 2020 GSP, including updates to well locations, stratigraphy, pumping rates by aquifer zone, and observed subsidence. The results of the updated model will be incorporated into the 2025 GSP.

Native Yield Study – The SGMA Implementation Grant also included funds for the proposed native yield study. The Native Yield Study will link hydrogeologic analyses of sustainable yield to policy decisions and management programs to manage groundwater pumping in the TLSB GSAs. The goal of the study is to provide a foundation to manage pumping within each GSA that is coordinated at a basin scale through mutually agreed-upon definitions of terms, hydrogeologic settings, and allocation criteria. The study will be prepared concurrently with other activities currently underway in preparation for the 2025 GSP update, such as updates to the groundwater flow model, well inventories, groundwater monitoring, consumptive use and pumping estimates, and PMAs.

8.3 Subsidence

Correlation Analyses - Subsidence has been compared to many different monitored conditions (groundwater levels, groundwater storage, pumping, well collapse, etc.) and no good correlation has been found given available data. Additional subsidence data and/or analysis is needed to correlate the amount of observed subsidence (instantaneous, cumulative, and differential) with the distribution and volume of groundwater pumping.

Subsiding Zone - Although it is understood that the majority of subsidence is being developed below the Corcoran Clay in fine grained sediments that are depressurized, it is not understood whether it is a specific zone (of clay lenses) that is subsiding or a very broad zone (of clay lenses) in that aquifer. Additional extensiometer data is needed to understand which clay zones are associated with the most compaction.

Well Collapse – Reporting of well failures is now possible through DWR's dry well portal (https://mydrywell.water.ca.gov/report/). Several dry well entries indicated "well collapse". Additional data and analysis of well collapse is needed to determine whether well collapse from subsidence is causing a loss in beneficial use.

Flood Zones – Additional data and analysis of subsidence in the vicinity of flood channels is needed to better map where subsidence may affect the extent and severity of flooding on surface features or infrastructure. The high snowpack for WY2023 will provide additional observations of where flooding occurs and its severity, which can be compared to the distribution of subsidence (instantaneous, cumulative and differential).

9. REFERENCES

Brouwer, C. & Heibloem, M. 1985, Introduction to Irrigation. Irrigation Water Management Training Manual No 3, Part 1 Principles of Irrigation Water Needs (Chapter 3, Table 6). http://www.fao.org/3/S2022E/s2022e03.htm#chapter%203:%20effective%20rainfall

California Natural Resources Agency, DWR Tre Altamira InSAR Subsidence Data (DWR InSAR). (2023). https://data.cnra.ca.gov/dataset/tre-altamira-insar-subsidence

California State Water Board's GAMA Groundwater Information System (GAMA), 2023. https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/

Department of Water Resources (DWR), 2016. Best Management Practices for the Sustainable Groundwater Management of Groundwater – Monitoring Protocols, Standards, and Sites. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-1-Monitoring-Protocols-Standards-and-Sites_ay_19.pdf

Department of Water Resources (DWR), 2016. California Bulletin 118 Interim Update. (DWR, 2016b)

Department of Water Resources (DWR), 2017. DRAFT Best Management Practices for the Sustainable Groundwater Management of Groundwater – Sustainable Management Criteria. https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Best-Management-Practices-and-Guidance-Documents/Files/BMP-6-Sustainable-Management-Criteria-DRAFT_ay_19.pdf

Department of Water Resources (DWR), 2022. Incomplete Determination of the 2020 Tulare Lake Subbasin Groundwater Sustainability Plan. January 28, 2022.

Fetter, C. W. 2018. Applied Hydrogeology, Fourth Edition (4th ed.). Waveland Press, Inc.

Geosyntec Consultants, 2021. Tulare Lake Subbasin Annual Report, Reporting Period – Water Year 2020. April 1, 2020.

Geosyntec Consultants, 2022. Tulare Lake Subbasin Annual Report, Reporting Period – Water Year 2021. April 1, 2021.

Johnson, A. I. 1967. Specific yield-Compilation of specific yields for various materials. U.S. Geological Survey Water-Supply Paper 1662-D.

LandIQ, 2023. Actual Evapotranspiration Analysis, Tri-County Water Authority Groundwater Sustainability Agency. February 01, 2023.

Owen, D., Cantor, A., Nylen, N. G., Harter, T., & Kiparsky, M. (2019, April 17). California Groundwater Management, Science-policy Interfaces, and the Legacies of Artificial Legal Distinctions. UCHastings.Edu. https://repository.uchastings.edu/cgi/viewcontent.cgi?article=2734&context=faculty_scholarship

PRISM Climate Group, Oregon State U. (2023). https://prism.oregonstate.edu/

Provost & Pritchard, 2020. Tulare Lake Subbasin Annual Report (TLSB Annual Report), Reporting Period 2015-2019. May 5.

Public Policy Institute of California, 2019. Water and the Future of the San Joaquin Valley, February 2019 Report, pg 20.

Safe Drinking Water Information System (SDWIS) (2023). https://sdwis.waterboards.ca.gov/PDWW/

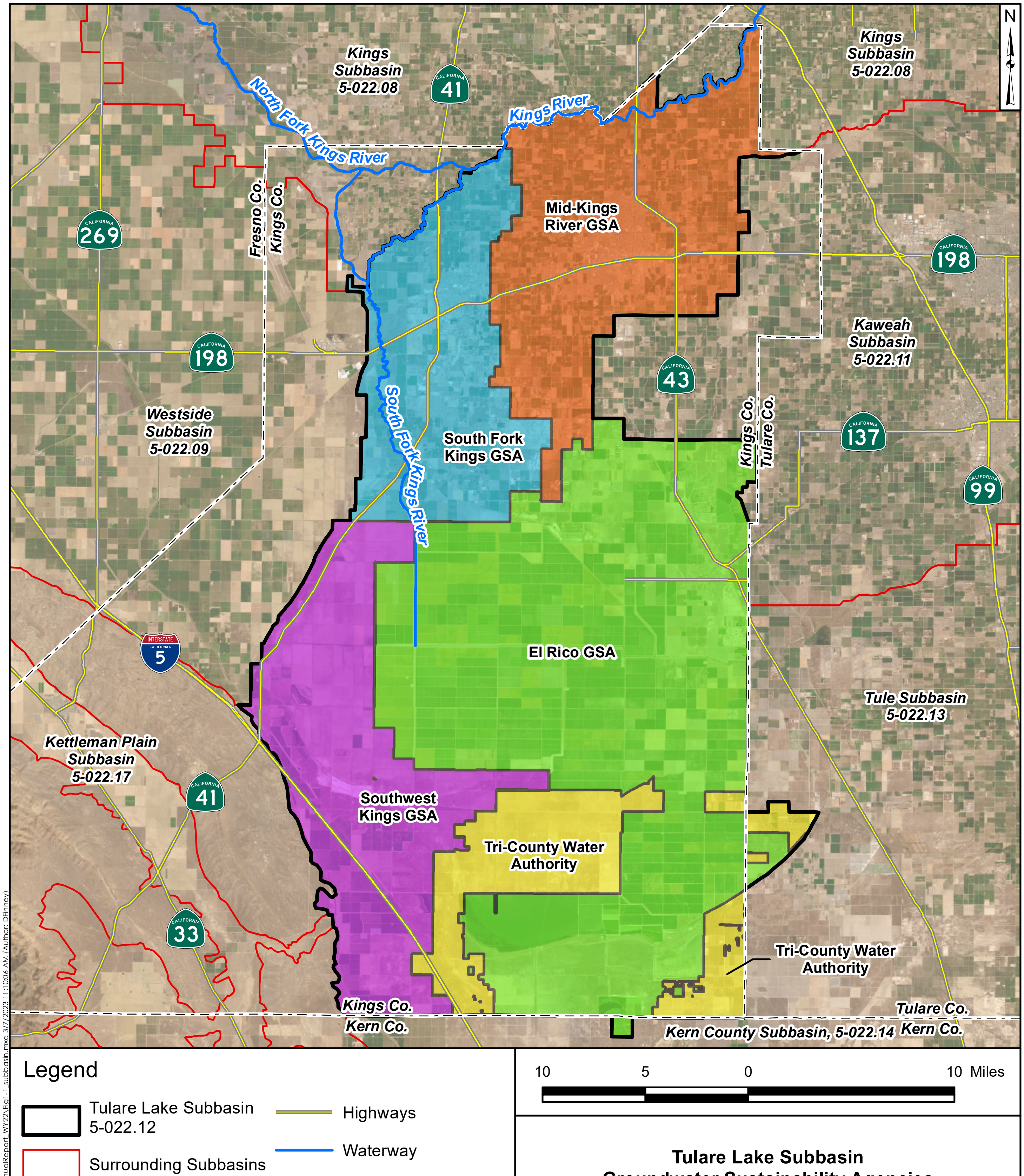
Tulare Lake Subbasin Groundwater Sustainability Plan (TLSB 2020 GSP), 2020. Volume 1. January.

Tulare Lake Subbasin Groundwater Sustainability Plan Addendum (TLSB 2022 GSP), 2022. July 27th.

United States Census Bureau, American Community Survey 5-Year Data (2009-2019). (2022) https://www.census.gov/data/developers/data-sets/acs-5year.html

Williamson, A.K., Prudic, D.E., & Swain, L.A., 1989, Ground-Water Flow in the Central Valley, California, USGS Professional Paper 1401-D.

FIGURES



Tulare Lake Subbasin
Groundwater Sustainability Agencies
WY 2022 Annual Report

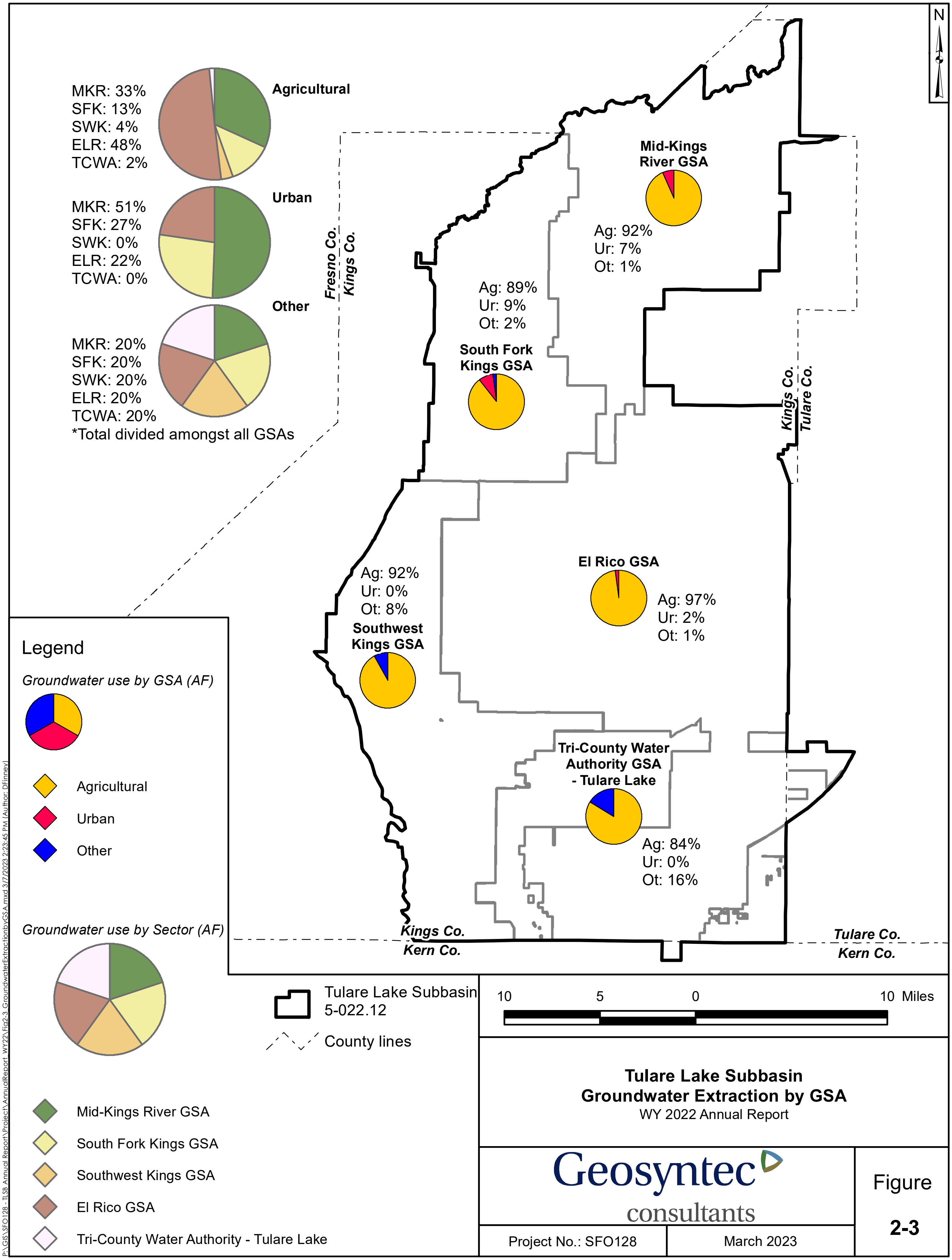
Geosyntec consultants

Figure **1-1**

Project No.: SFO128B

March 2023

P:\GIS\SFO128 - TLSB Annual Report\Project\AnnualReport_WY22\Fig1-1_subbasin.mxd 3/7/2023 11:10:06 AM (Author: DFinney)

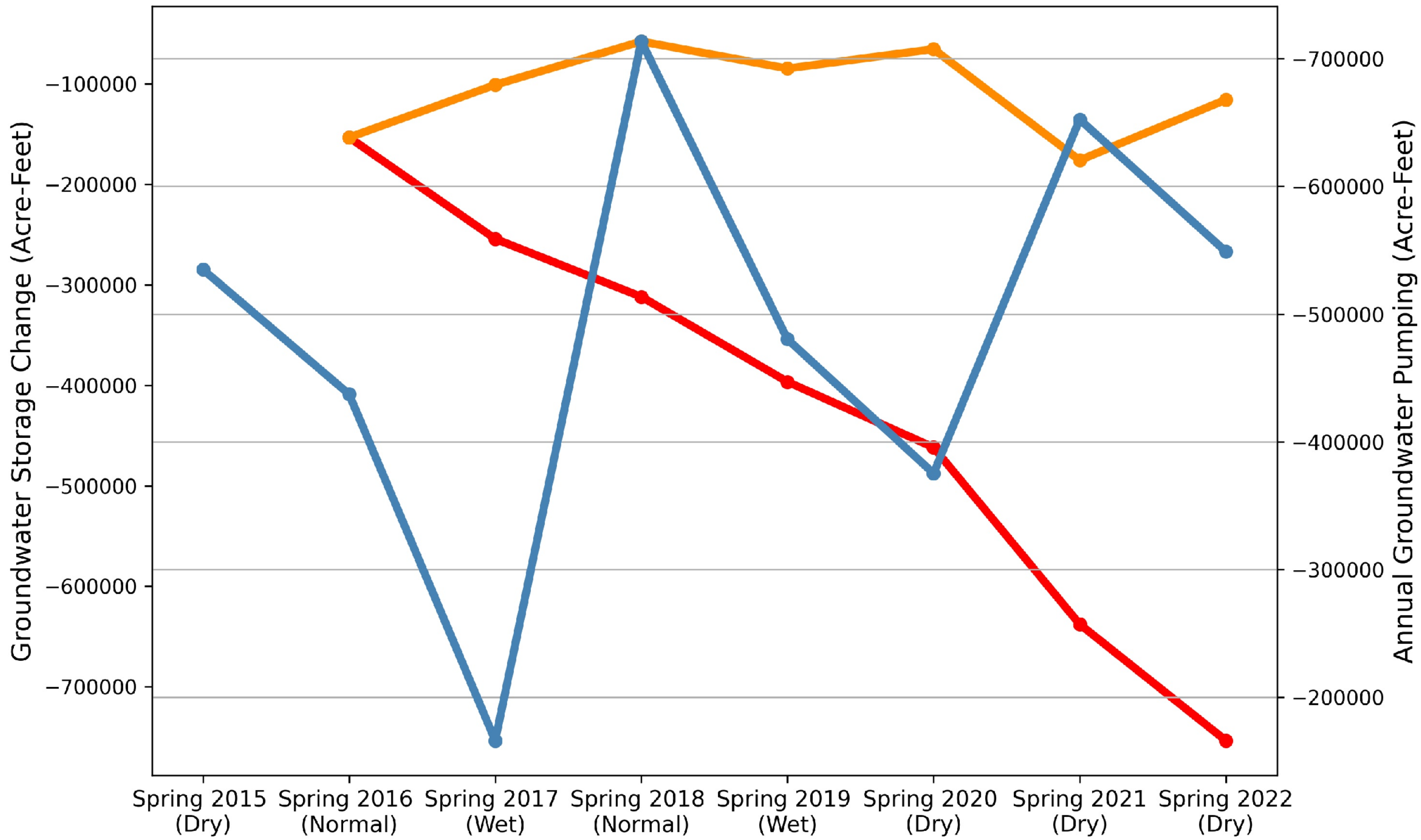


Tulare Lake Subbasin
Groundwater Extraction by GSA
WY 2022 Annual Report

Geosyntec consultants

Project No.: SFO128 | March 2023

Figure 2-3



Legend	Spring 2015	Spring 2016	Spring 2017	Spring 2018	Spring 2019	Spring 2020	Spring 2021	Spring 2022
Water Year Type:	*DRY*	*DRY*	*WET*	*NORMAL*	*WET*	*DRY*	*DRY*	*DRY*
Annual GW Storage Change	0	-153,278	-100,927	-57,662	-84,640	-65,344	-175,946	-115,759
Cumulative Change in GW Storage	0	-153,278	-254,205	-311,867	-396,507	-461,851	-637,797	-753,556
Annual GW Pumping	-534,910	-437,299	-166,100	-713,615	-480,390	-375,293	-652,488	-549,066

Notes:
1) Kings River Water Year Types - Less than 75% = Dry, from 75% to 125% = Normal, greater than 125% = Wet.
2) Annual storage change is determined from Spring to Spring. Storage change is listed under the ending year evaluated.
3) WY22 values were based on water-level changes in wells with measurements for both Spring 2021 and 2022. Storage coefficients and areas used to calculate storage volumes are described in Section 6.

Estimated Annual and Cumulative Groundwater Storage Change

Tulare Lake Subbasin
WY22 Annual Report

Geosyntec consultants

Project No.: SFO128 | March 2023

Figure 6-1

P:\GIS\SFO128 - TLSB Annual Report\Project\AnnualReport_WY22\Fig6-1_EstimatedStorageChange.mxd 3/13/2023 4:06:06 PM (Author: DFinney)

APPENDIX A
Land Use

Appendix A - Land Use
Table A-1
El Rico GSA Non-standard Evapotranspiration Coefficients
Tulare Lake Subbasin
Annual Report Water Year 2022

Crop Category	Non-Standard ETc (Acre-Feet/Acre)	Notes
Sorghum	1.5	
Safflower	0.9	Not full crop, but used for soil health
Other Crops	1	Cover crop
Pistachios	2.5	Many in GSA are immature
Triticale	1.75	Same as wheat
Pomegranates	2	

Note: Table lists the Evapotranspiration coefficients (Etc) provided by El Rico GSA. The provided Etc values differ from the values listed in the TLSB GSP Appendix D, Table D2-6. Provided ETc values were used to calculate WY22 Farm Demand for six crops. Farm demand calculations for all other crops were based on the ETc values listed in the TLSB GSP Appendix D, Table D2-6.

Appendix A - Land Use
Tulare Lake Subbasin

Historical & Current Land Use Tulare Lake Subbasin Hydrologic Model Kings, County, California								
Land Use	Year							
	2015[1] (ac)	2016[1] (ac)	2017[2] (ac)	2018[2] (ac)	2019[2] (ac)	WY 2020[3] (ac)	WY 2021[3] (ac)	WY 2022[3] (ac)
Alfalfa	-	-	26,632	20,258	27,112	19,773	15,942	14,914
Almonds (Adolescent)	6,222	5,365	-	-	-	-	-	-
Almonds (Mature)	15,046	15,105	-	-	-	-	-	-
Almonds (Young)	16,983	21,576	-	-	-	-	-	-
Almonds	-	-	32,439	24,804	23,759	24,755	20,991	14,097
Apples	-	-	0	11	67	-	-	-
Barley	-	-	30,188	12,492	12,379	6,956	6,498	6,498
Barren	-	-	1,833	1,437	7,741	6,032	6,032	6,032
Beans (Dry)	-	-	-	-	-	194	-	-
Berries	0	0	-	-	-	-	-	-
Blueberries	-	-	0	148	0	-	-	-
Broccoli	-	-	0	93	4	3	3	3
Bush Berries	-	-	-	-	-	17	-	-
Cantaloupes	-	-	91	113	145	123	123	123
Carrots	2	16	935	174	166	151	636	306
Cherries	-	-	416	2,010	2,208	1,845	209	209
Chick Peas	-	-	0	0	70	1	1	1
Citrus	22	9	0	17	39	92	2	2
Clover/Wildflowers	-	-	0	2	0	0	0	0
Cole Crops	-	-	-	-	-	27	-	-
Corn and Grain Sorghum	18,826	17,400	-	-	-	-	-	-
Corn, Sorghum and Sudan	-	-	-	-	-	6,462	66	703
Corn	-	-	3,170	14,516	11,385	4,188	3,549	3,549
Cotton	44,532	73,720	86,210	80,879	93,212	85,822	36,821	45,343
Dairy Single Crop	0	0	-	-	-	-	-	-
Dbl Crop Barley/Corn	-	-	1,405	119	448	39	39	39
Dbl Crop Oats/Corn	-	-	20	79	281	32	32	32
Dbl Crop Triticale/Corn	-	-	0	0	4,223	1,013	1,013	1,013
Dbl Crop WinWht/Corn	-	-	20,886	19,304	12,607	2,485	2,485	2,485
Dbl Crop WinWht/Cotton	-	-	491	-	19	-	-	-
Dbl Crop WinWht/Sorghum	-	-	7,383	3,251	3,694	1,948	1,948	1,948
Developed/High Intensity	-	-	2,791	2,800	2,613	917	917	917
Developed/Low Intensity	-	-	7,763	7,441	9,038	2,660	2,660	2,660
Developed/Medium Intensity	-	-	13,089	13,192	11,636	3,432	3,432	3,432
Developed/Open Space	-	-	8,878	8,788	10,611	2,038	2,038	2,038
Dry Beans	-	-	212	293	1	-	-	-
Durum Wheat	-	-	0	104	2,858	2,207	1,331	1,331
Evergreen Forest	-	-	10	0	3	-	-	-
Fallow/Idle Cropland	237,790	200,972	92,681	157,577	131,280	97,651	146,144	134,536
Flowers, Nursery and Christmas Tree Farms	-	-	-	-	-	8	-	-
Forest	4	0	-	-	-	-	-	-
Garlic	-	-	84	697	636	334	334	334
Grain and Grain Hay	21,196	19,069	-	-	-	-	-	-
Grapes	-	-	6,568	5,427	6,215	4,623	5,606	3,723
Grass/Pasture	-	-	17,944	16,858	18,733	9,113	9,113	9,113
Greens	-	-	0	6	0	-	-	-
Hemp	-	-	26	15	73	-	-	-
Herbaceous Wetlands	-	-	99	336	4,722	4,037	4,037	4,037
Herbs	-	-	0	5	36	-	-	-
Honeydew Melons	-	-	443	40	41	23	23	23
Kiwis	-	-	-	-	-	315	-	-
Lettuce	-	-	274	219	325	61	61	61
Melons	18	86	-	-	-	-	-	-
Miscellaneous Deciduous	-	-	-	-	-	54	2	2
Miscellaneous Field Crops	0	0	-	-	-	23	-	-
Miscellaneous Grain and Hay	-	-	-	-	-	29,656	9,517	5,770
Miscellaneous Grasses	-	-	-	-	-	321	540	31
Miscellaneous Truck Crops	-	-	-	-	-	129	-	-
Miscellaneous Vegs & Fruits	-	-	0	9	101	91	91	115
Mixed Pasture	-	-	-	-	-	2,111	726	588
Nectarines	-	-	55	479	308	-	4	4

Appendix A - Land Use
Tulare Lake Subbasin

Historical & Current Land Use Tulare Lake Subbasin Hydrologic Model								
Land Use	Year							
	2015[1] (ac)	2016[1] (ac)	2017[2] (ac)	2018[2] (ac)	2019[2] (ac)	WY 2020[3] (ac)	WY 2021[3] (ac)	WY 2022[3] (ac)
Oats	-	-	1,515	466	3,372	2,315	2,315	2,315
Olives	-	-	0	81	124	815	1,560	816
Onions	-	-	-	-	-	2,464	2,464	2,464
Onions and Garlic	149	644	2,634	4,089	2,735	380	1,202	240
Open Water	5,919	5,435	11,321	11,333	7,458	5,639	-	5,639
Oranges	-	-	2	246	717	125	125	125
Other Crops	-	-	-	-	-	7	223	223
Other Hay/Non Alfalfa	-	-	7,749	1,821	1,738	1,389	1,254	1,254
Other Tree Crops	-	-	158	6,361	2,418	108	108	108
Pasture and Misc. Grasses	15,744	13,743	-	-	-	-	9,113	-
Peaches/Nectarines	-	-	-	-	-	1,398	30	30
Peaches	-	-	108	1,057	564	-	2	2
Peas	-	-	0	280	144	143	143	143
Pecans	-	-	0	29	25	-	-	-
Peppers	-	-	152	9	8	72	1	1
Pistachio (Adolescent)	3,575	3,836	-	-	-	-	-	-
Pistachio (Mature)	485	469	-	-	-	-	-	-
Pistachio (Young)	22,678	22,570	-	-	-	-	-	-
Pistachios	-	-	49,902	22,977	24,514	28,961	39,440	41,050
Plums, Prunes and Apricots	-	-	-	-	-	1,503	308	39
Plums	-	-	240	292	1,582	-	25	25
Pomegranates (Adolescent)	16	27	-	-	-	-	-	-
Pomegranates (Young)	1,312	3,111	-	-	-	-	-	-
Pomegranates	-	-	3,838	3,472	3,769	3,110	5,170	3,216
Potatoes, Sugar beets, Turnip etc..	2	2	-	-	-	-	-	-
Potatoes	-	-	0	4	14	9	9	9
Radishes	-	-	0	6	0	-	-	-
Rice	-	-	2	3	26	6	6	6
Riparian	248	194	-	-	-	-	-	-
Rye	-	-	2	361	1,264	197	197	197
Safflower	-	-	20,522	17,633	18,006	6,069	23,014	26,622
Shrubland	-	-	244	447	492	205	205	205
Small Vegetables	78	198	-	-	-	-	-	-
Sod/Grass Seed	-	-	118	16	33	9	130	0
Sorghum	-	-	3,175	6,698	1,324	691	1,216	1,401
Spring Wheat	-	-	954	0	196	60	60	60
Squash	-	-	0	0	12	11	11	11
Stone Fruit (Adolescent)	191	170	-	-	-	-	-	-
Stone Fruit (Mature)	27	39	-	-	-	-	-	-
Stone Fruit (Young)	1,183	713	-	-	-	-	-	-
Strawberries	-	-	0	2	1	3	0	0
Sugarcane	-	-	0	0	0	-	-	-
Sunflowers	-	-	0	2	1	-	-	-
Tomatoes and Peppers	19,211	23,420	13,795	16,127	18,961	-	-	-
Tomatoes	-	-	-	-	-	17,824	17,221	19,350
Triticale	-	-	3,273	4,550	2,100	765	1,787	1,787
Urban, Industrial	30,530	30,930	-	-	-	-	-	-
Walnuts	-	-	19,549	14,826	18,698	15,255	5,585	1,401
Watermelons	-	-	30	27	1	1	1	1
Wheat	-	-	-	-	-	17,158	8,398	4,662
Wine Grapes with 80% canopy	4,672	10,985	-	-	-	-	-	-
Winter Wheat	19,420	21,690	32,896	27,902	26,022	9,450	9,450	9,450
Woody Wetlands	-	-	34	119	94	13	13	13
Young Perennials	-	-	-	-	-	4,950	360	141
Total	**486,081**	**491,494**	**535,223**	**535,233**	**535,223**	**442,866**	**414,111**	**389,012**

Notes:
ac = Acres
Crop and Land use data compiled from multiple sources. See below notes for source information.

References:
1. Department of Water Resources (DWR)
2. CropScape
3. LandIQ & Provided by El Rico

Appendix A - Land Use
Tulare Lake Subbasin

Historical & Current Cropping Tulare Lake Subbasin Hydrologic Model
Kings, County, California

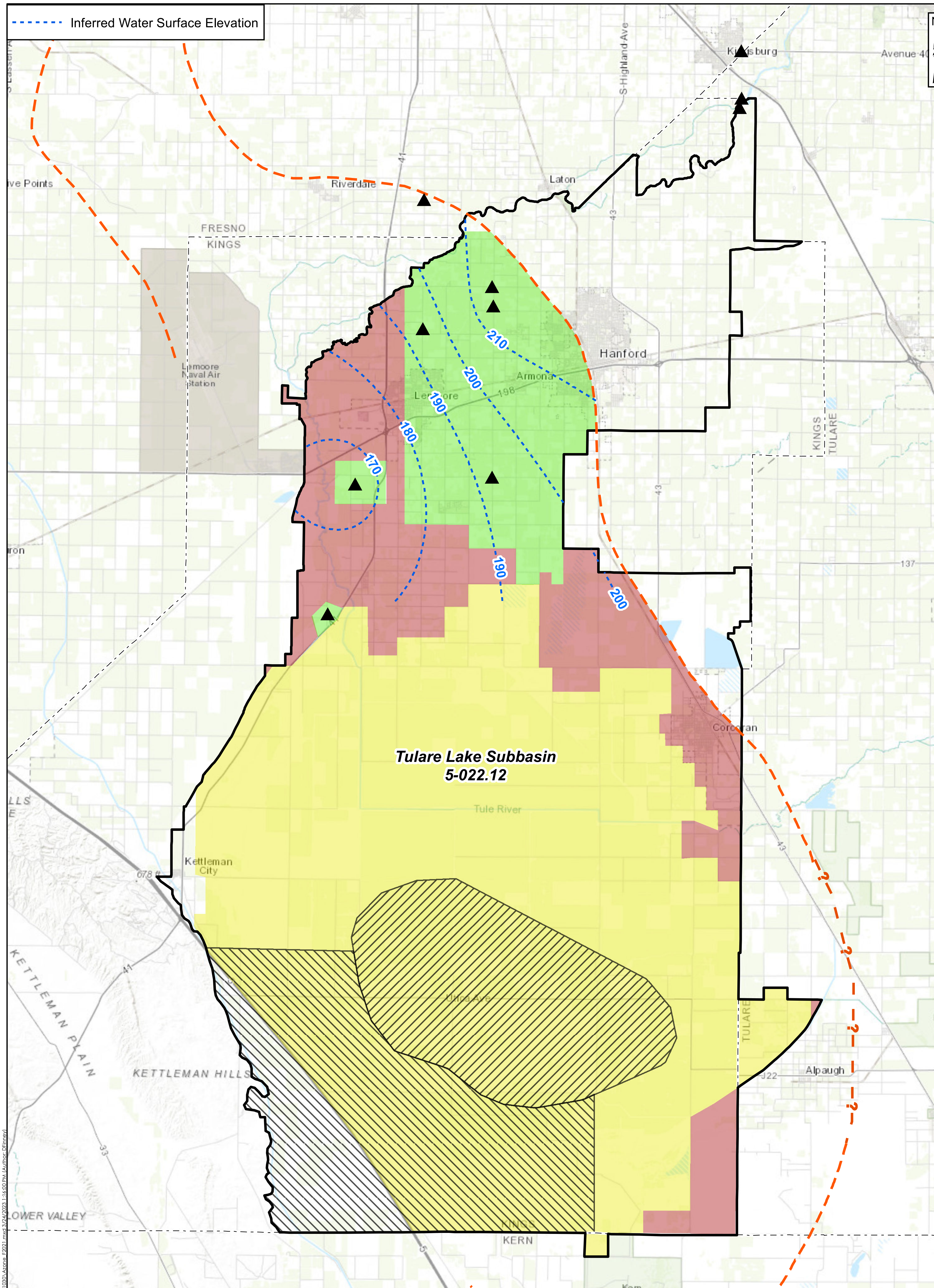
Crop Use	2015[1] (ac)	2016[1] (ac)	2017[2] (ac)	2018[2] (ac)	2019[2] (ac)	WY 2020[3] (ac)	WY 2021[3] (ac)	WY 2022[3] (ac)
Alfalfa Hay and Clover	29,665	24,245	-	-	-	-	-	-
Alfalfa	-	-	26,632	20,258	27,112	19,773	15,942	14,914
Almonds (Adolescent)	6,222	5,365	-	-	-	-	-	-
Almonds (Mature)	15,046	15,105	-	-	-	-	-	-
Almonds (Young)	16,983	21,576	-	-	-	-	-	-
Almonds	-	-	32439	24804	23759	24,755	20,991	14,097
Apples	-	-	0	11	67	-	-	-
Barley	-	-	30,188	12,492	12,379	6,956	6,498	6,498
Beans (Dry)	-	-	-	-	-	194	-	-
Berries	0	0	-	-	-	-	-	-
Blueberries	-	-	0	148	0	-	-	-
Broccoli	-	-	0	93	4	3	3	3
Bush Berries	-	-	-	-	-	17	-	-
Cantaloupes	-	-	91	113	145	123	123	123
Carrots	2	16	935	174	166	151	636	306
Cherries	-	-	416	2,010	2,208	1,845	209	209
Chick Peas	-	-	0	0	70	1	1	1
Citrus	22	9	0	17	39	92	2	2
Clover/Wildflowers	-	-	-	-	-	0	0	0
Cole Crops	-	-	-	-	-	27	-	-
Corn and Grain Sorghum	18,826	17,400	-	-	-	-	-	-
Corn, Sorghum and Sudan	-	-	-	-	-	6,462	66	703
Corn	-	-	3,170	14,516	11,385	4,188	3,549	3,549
Cotton	44,532	73,720	86,210	80,879	93,212	85,822	36,821	45,343
Dbl Crop Barley/Corn	-	-	1,405	119	448	39	39	39
Dbl Crop Oats/Corn	-	-	20	79	281	32	32	32
Dbl Crop Triticale/Corn	-	-	0	0	4,223	1,013	1,013	1,013
Dbl Crop WinWht/Corn	-	-	20,886	19,304	12,607	2,485	2,485	2,485
Dbl Crop WinWht/Cotton	-	-	491	-	19	-	-	-
Dbl Crop WinWht/Sorghum	-	-	7,383	3,251	3,694	1,948	1,948	1,948
Dry Beans	-	-	212	293	1	-	-	-
Durum Wheat	-	-	0	104	2,858	2,207	1,331	1,331
Flowers, Nursery and Christmas Tree Farms	-	-	-	-	-	8	-	-
Garlic	-	-	84	697	636	334	334	334
Grain and Grain Hay	21,196	19,069	-	-	-	-	-	-
Grapes	-	-	6,568	5,427	6,215	4,623	5,606	3,723
Grass/Pasture	-	-	17,944	16,858	18,733	9,113	9,113	9,113
Greens	-	-	0	6	0	-	-	-
Hemp	-	-	26	15	73	-	-	-
Herbs	-	-	0	5	36	-	-	-
Honeydew Melons	-	-	443	40	41	23	23	23
Kiwis	-	-	-	-	-	315	-	-
Lettuce	-	-	274	219	325	61	61	61
Melons	18	86	-	-	-	-	-	-
Miscellaneous Deciduous	-	-	-	-	-	54	2	2
Miscellaneous field crops	-	-	-	-	-	23	-	-
Miscellaneous Grain and Hay	-	-	-	-	-	29,656	9,517	5,770
Miscellaneous Grasses	-	-	-	-	-	321	540	24
Miscellaneous Truck Crops	-	-	-	-	-	129	-	-
Miscellaneous Vegs & Fruits	-	-	0	9	101	91	91	-
Nectarines	-	-	55	479	308	-	4	4
Oats	-	-	1,515	466	3,372	2,315	2,315	2,315
Olives	-	-	0	81	124	815	1,560	816
Onions and Garlic	149	644	-	-	-	380	2,464	240
Onions	-	-	2,634	4,089	2,735	2,464	240	2,464
Oranges	-	-	2	246	717	125	125	125
Other Crops	-	-	-	-	-	7	223	223
Other Hay/Non Alfalfa	-	-	7,749	1,821	1,738	1,389	1,254	1,254
Other Tree Crops	-	-	158	6,361	2,418	108	108	108
Pasture and Misc. Grasses	15,744	13,743	-	-	-	-	9,113	-
Peaches	-	-	108	1,057	564	-	2	2

Appendix A - Land Use
Tulare Lake Subbasin

Historical & Current Cropping Tulare Lake Subbasin Hydrologic Model								
Crop Use	Year							
	2015[1] (ac)	2016[1] (ac)	2017[2] (ac)	2018[2] (ac)	2019[2] (ac)	WY 2020[3] (ac)	WY 2021[3] (ac)	WY 2022[3] (ac)
Peaches/Nectarines	-	-	-	-	-	1,398	30	30
Peas	-	-	0	280	144	143	143	143
Pecans	-	-	0	29	25	-	-	-
Peppers	-	-	152	9	8	72	1	1
Pistachio (Adolescent)	3,575	3,836	-	-	-	-	-	-
Pistachio (Mature)	485	469	-	-	-	-	-	-
Pistachio (Young)	22,678	22,570	-	-	-	-	-	-
Pistachios	16	27	49,902	22,977	24,514	28,961	39,440	41,050
Plums	1,312	3,111	240	292	1,582	-	25	25
Plums, Prunes and Apricots	-	-	-	-	-	1,503	308	39
Pomegranates (Adolescent)	-	-	-	-	-	-	-	-
Pomegranates (Young)	-	-	-	-	-	-	-	-
Pomegranates	-	-	3,838	3,472	3,769	3,111	5,170	3,216
Potatoes, Sugar beets, Turnip etc..	2	2	-	-	-	-	-	-
Potatoes	-	-	0	4	14	9	9	9
Radishes	-	-	0	6	0	-	-	-
Rice	-	-	2	3	26	6	6	6
Rye	-	-	2	361	1,264	197	197	197
Safflower	-	-	20,522	17,633	18,006	6,069	23,014	26,622
Small Vegetables	78	198	-	-	-	-	-	-
Sod/Grass Seed	-	-	118	16	33	9	130	0
Sorghum	-	-	3,175	6,698	1,324	691	1,216	1,401
Spring Wheat	-	-	954	0	196	60	60	60
Squash	-	-	0	0	12	11	11	11
Stone Fruit (Adolescent)	191	170	-	-	-	-	-	-
Stone Fruit (Mature)	27	39	-	-	-	-	-	-
Stone Fruit (Young)	1,183	713	-	-	-	-	-	-
Strawberries	-	-	0	2	1	3	0.2	0
Sugarcane	-	-	0	0	0	-	-	-
Sunflowers	-	-	0	2	1	-	-	-
Tomatoes and Peppers	19,211	23,420	-	-	-	-	-	-
Tomatoes	-	-	13,795	16,127	18,961	17,824	17,221	19,350
Triticale	-	-	3,273	4,550	2,100	765	1,787	1,787
Walnuts	-	-	19,549	14,826	18,698	15,255	5,585	1,401
Watermelons	-	-	30	27	1	1	1	1
Wheat	-	-	-	-	-	17,158	8,398	4,662
Wine Grapes with 80% canopy	4,672	10,985	-	-	-	-	-	-
Winter Wheat	19,420	21,690	32,896	27,902	26,022	9,450	9,450	9,450
Young Perennials	-	-	-	-	-	4,950	360	141
Total	**241,255**	**278,208**	**396481**	**331,751**	**349,508**	**318,132**	**246,946**	**228,797**

Notes:	References:
ac = Acres	1. Department of Water Resources (DWR)
Crop and Land use data compiled from multiple sources. See below notes for source information.	2. CropScape
	3. LandIQ & Provided by El Rico

APPENDIX B
Groundwater Contour Maps



Legend

- Tulare Lake Subbasin
- A Clay Extent
- County lines
- Wells Used for Analysis
- Management Area A
- Management Area B
- A zone Analysis Area (59,561 ac)[2]
- A zone Limited Data Area (77,605 ac)
- Delisted Area To Top of A,C,& E Clay (282,376 ac)

Notes:
1) 10 foot groundwater elevation contour interval.
2) Analysis area used to determine groundwater storage change.

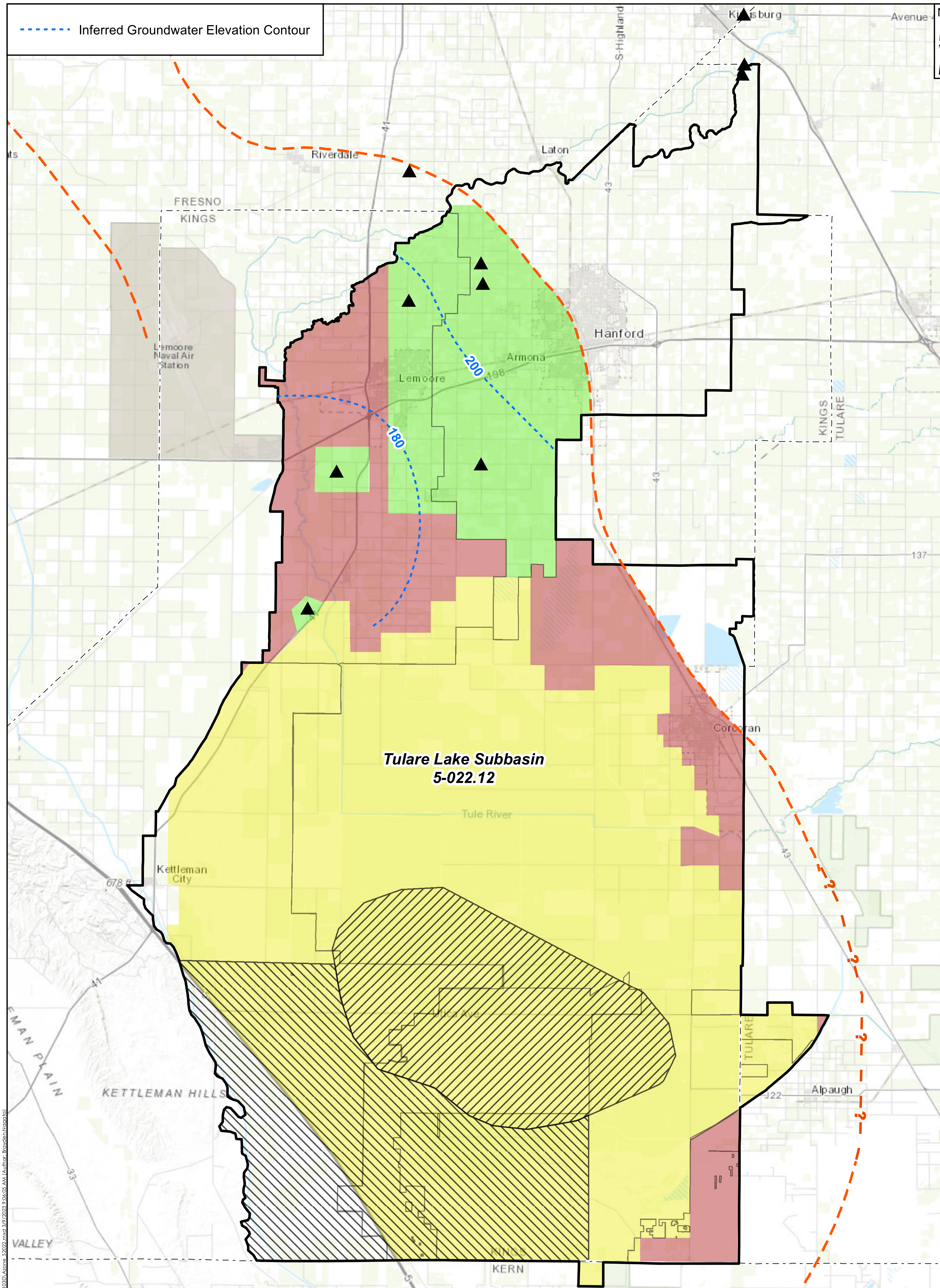
4 2 0 4 Miles

Groundwater Elevations, A Zone Fall 2021
Tulare Lake Subbasin
WY22 Annual Report

Geosyntec consultants

Project No.: SFO128B | March 2023

Figure
B-1



Legend

Tulare Lake Subbasin	Management Area A	A zone Analysis Area (59,561 ac)[2]
GSA Boundaries	Management Area B	A zone Limited Data Area (77,605 ac)
A Clay Extent		Delisted Area To Top of A,C,& E Clay (282,376 ac)
County lines		
Wells Used for Analysis		

Notes:
1) 20 foot groundwater elevation contour interval.
2) Analysis area used to determine groundwater storage change.

4 2 0 4 Miles

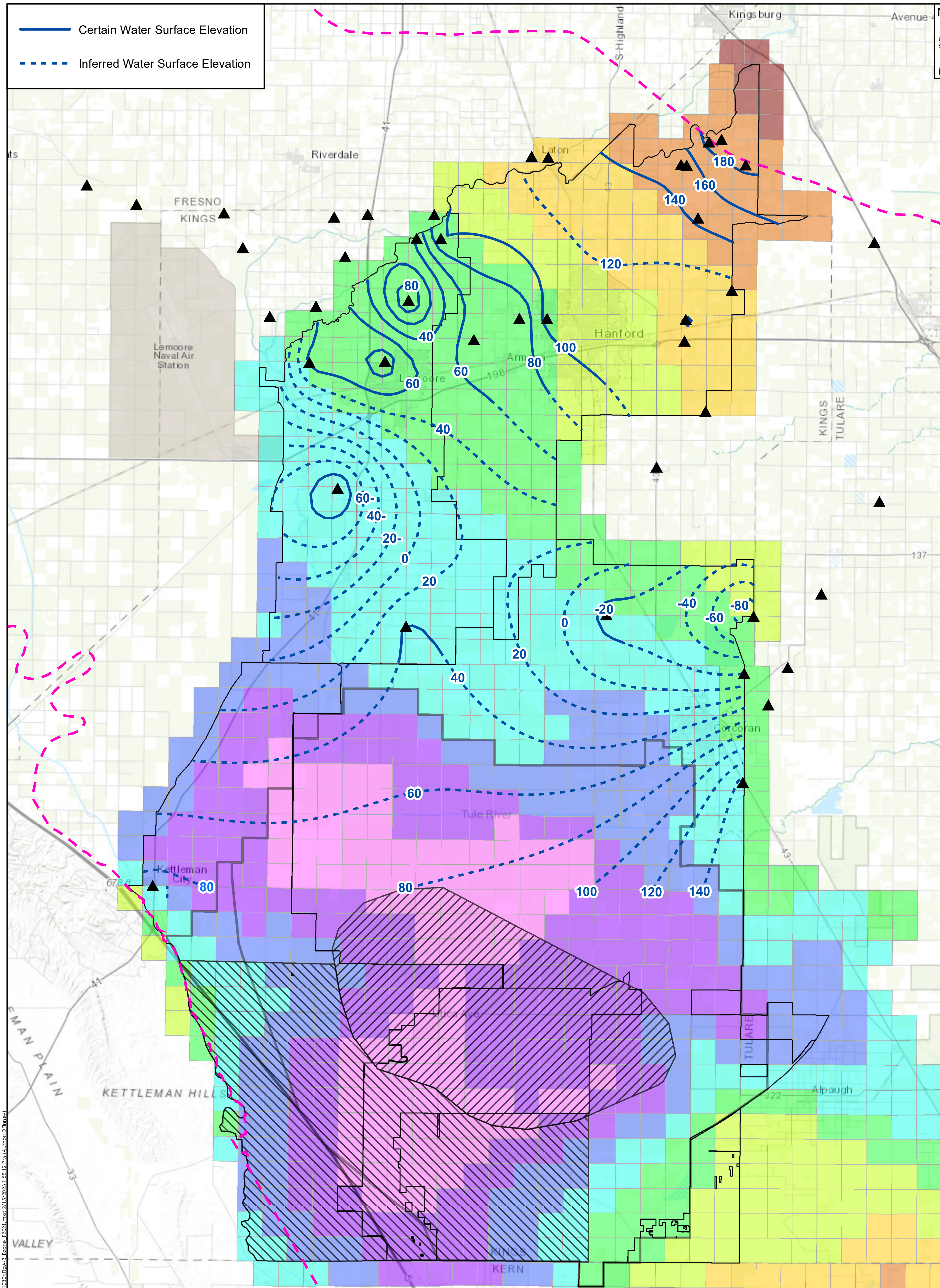
Groundwater Elevations, A Zone Spring 2022
Tulare Lake Subbasin
WY 22 Annual Report

Geosyntec consultants

Project No.: SFO128B

March 2023

Figure B-2



Legend

Average elevation of top of E-clay per section (feet msl)

- < -600
- -599 - -500
- -499 - -400
- -399 - -300
- -299 - -200
- -199 - -100
- -99 - 0
- 1 - 100
- > 100

- Wells Used for Analysis
- Tulare Lake Subbasin
- GSA Boundaries
- E Clay Extent
- Management Area A
- Management Area B
- Delisted Area To Top of E Clay
- County lines

Notes:
1) 20 foot groundwater elevation contour interval.

4 2 0 4 Miles

Groundwater Elevations, B Zone Fall 2021

Tulare Lake Subbasin

WY22 Annual Report

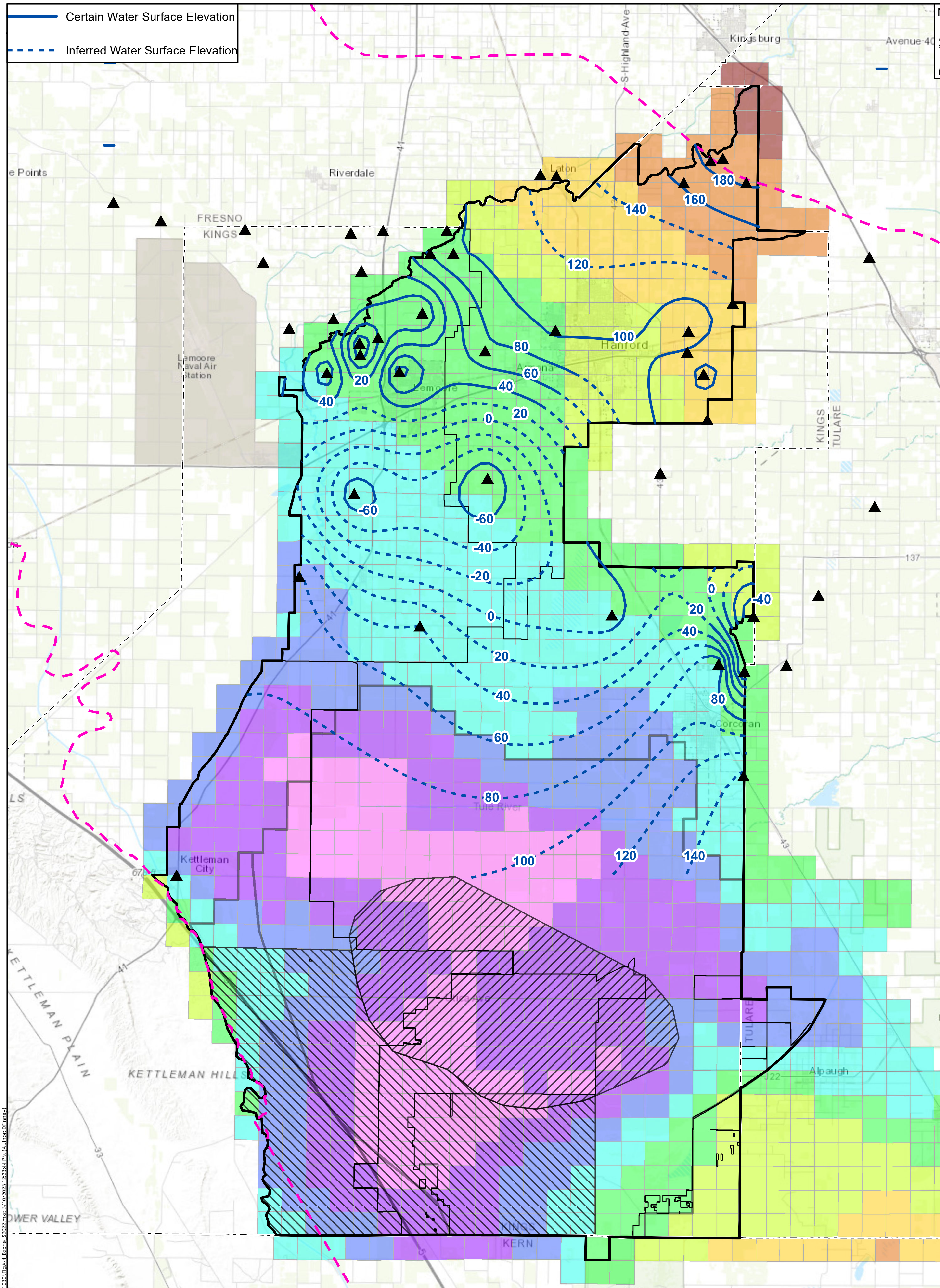
Geosyntec consultants

Project No.: SFO128B

March 2023

Figure

B-3



Legend

Average elevation of top of E-clay per section (feet msl)

- < -600
- -599 - -500
- -499 - -400
- -399 - -300
- -299 - -200
- -199 - -100
- -99 - 0
- 1 - 100
- > 100

- Wells Used for Analysis
- Tulare Lake Subbasin
- GSA Boundaries
- E Clay Extent
- Management Area A
- Management Area B
- Delisted Area To Top of E Clay
- County lines

Notes:
1) 20 foot groundwater elevation contour interval.
2) Analysis area used to determine groundwater storage change.

4 2 0 4 Miles

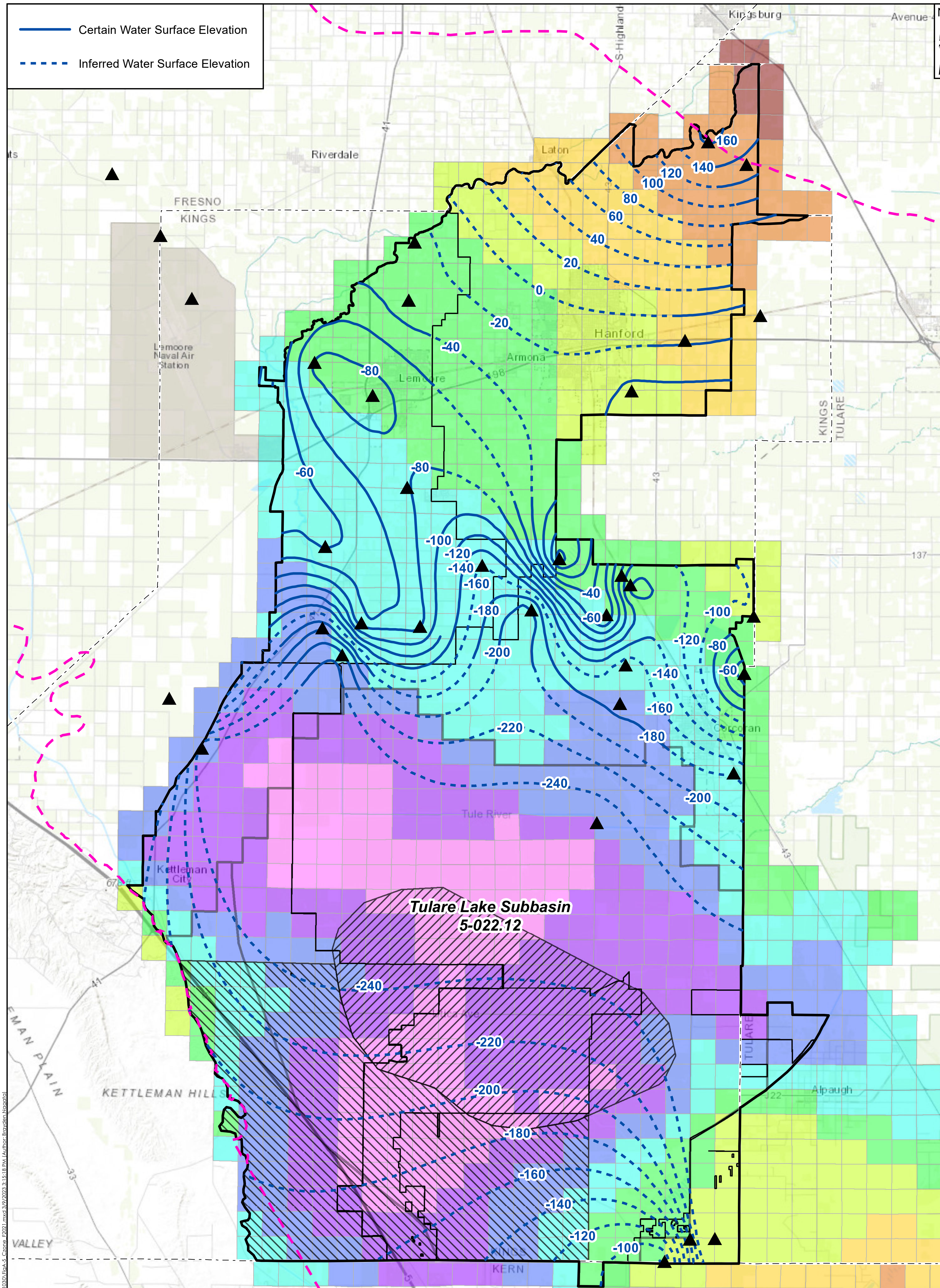
Groundwater Elevations, B Zone Spring 2022
Tulare Lake Subbasin
WY 22 Annual Report

Geosyntec consultants

Project No.: SFO128B

March 2023

Figure **B-4**



Legend

Average elevation of top of E-clay per section (feet msl)

- < -600
- -599 - -500
- -499 - -400
- -399 - -300
- -299 - -200
- -199 - -100
- -99 - 0
- 1 - 100
- > 100

- Wells Used for Analysis
- Tulare Lake Subbasin
- GSA Boundaries
- E Clay Extent
- Management Area A
- Management Area B
- Delisted Area To Top of E Clay
- County lines

Notes:
1) 20 foot groundwater elevation contour interval.

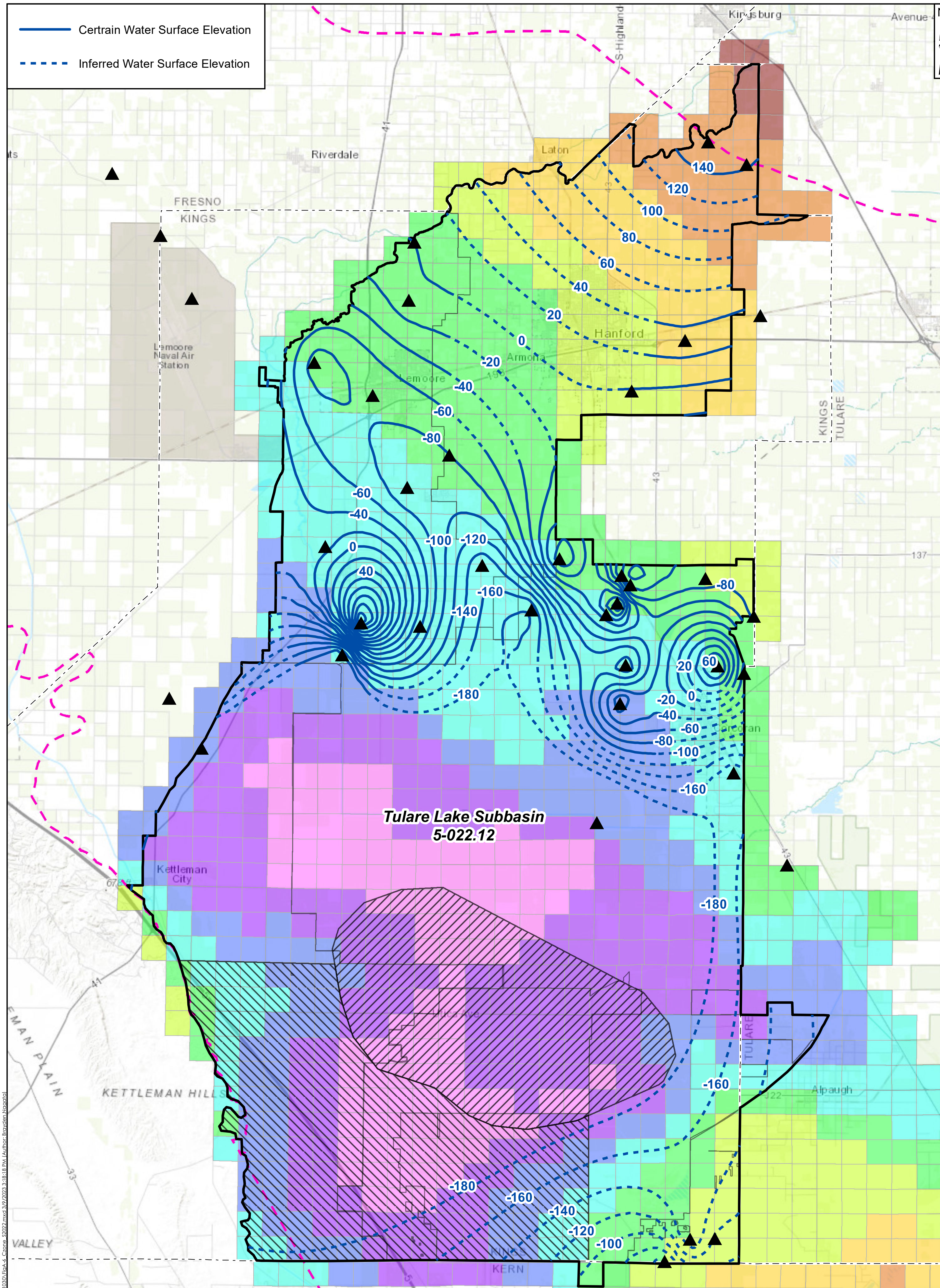
4 2 0 4 Miles

Groundwater Elevations, C Zone Fall 2021
Tulare Lake Subbasin
WY 22 Annual Report

Geosyntec consultants

Figure **B-5**

Project No.: SFO128B | March 2023



Legend

Average elevation of top of E-clay per section (feet msl)

- < -600
- -599 - -500
- -499 - -400
- -399 - -300
- -299 - -200
- -199 - -100
- -99 - 0
- 1 - 100
- > 100

- Wells Used for Analysis
- Tulare Lake Subbasin
- GSA Boundaries
- E Clay Extent
- Management Area A
- Management Area B
- County lines

Notes:
1) 20 foot groundwater elevation contour interval.

4 2 0 4 Miles

Groundwater Elevations, C Zone Spring 2022
Tulare Lake Subbasin
WY 22 Annual Report

Geosyntec consultants

Project No.: SFO128B | March 2023

Figure B-6

APPENDIX C
Land Subsidence

Appendix C - Land Subsidence

Table C-1 Vertical Displacement RMS Network

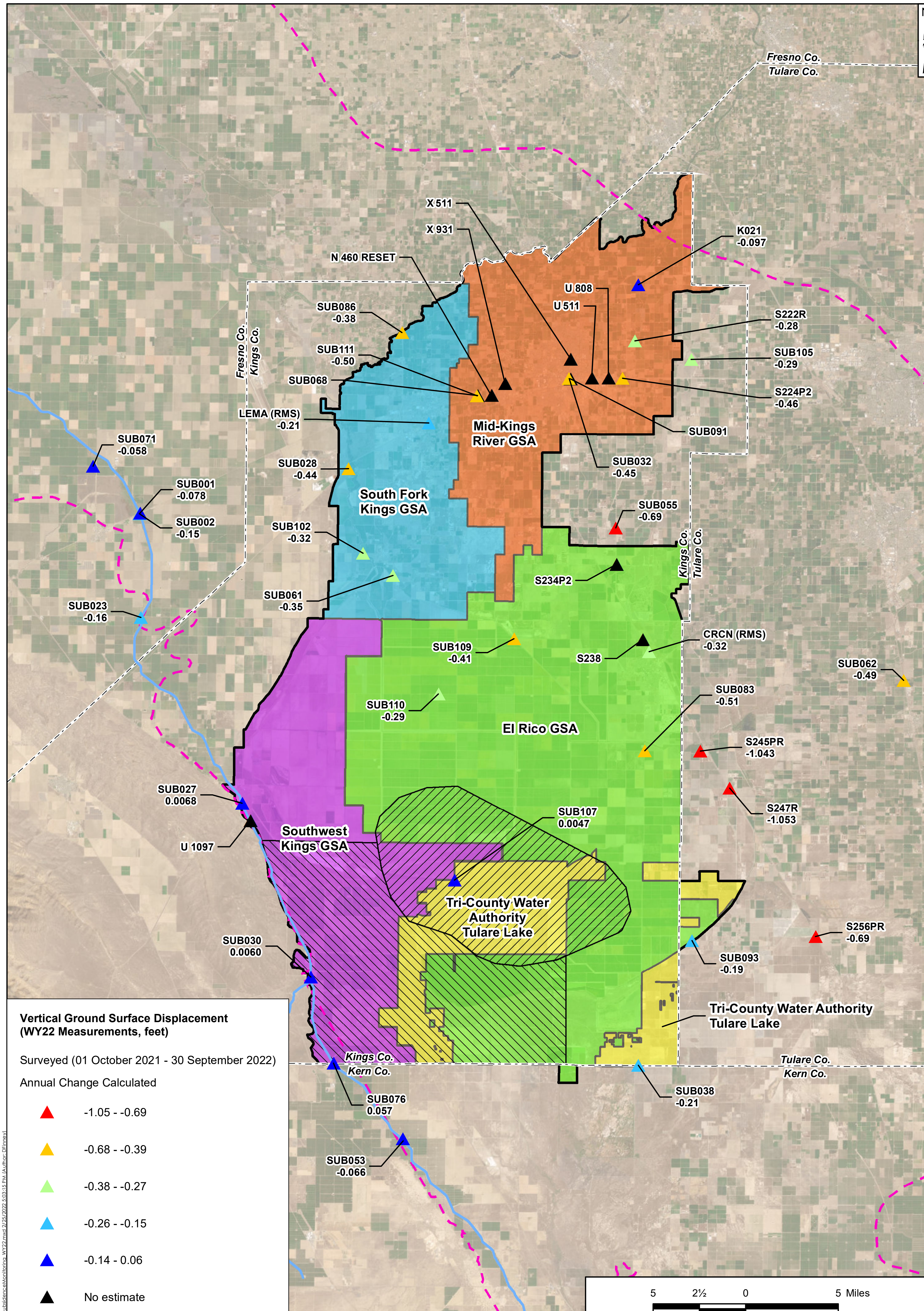
Tulare Lake Subbasin

Water Year 2022 Annual Report

Monitoring Station	Baseline (feet)	With GSP Implementation (feet)
CRCN	11.07	4.34
LEMA	8.98	3.70
SUB001 [2]	Limited data	1.60
SUB002 [2]	Limited data	1.60
SUB023	2.41	1.91
SUB027 [2]	Limited data	0.80
SUB028	8.87	4.38
SUB030 [2]	Limited data	0.70
SUB032	9.49	4.25
SUB036	5.88	2.88
SUB037	3.49	2.27
SUB038	2.61	1.83
SUB053 [2]	Limited data	1.10
SUB055	14.07	6.09
SUB061 [1]	6.35	3.37
SUB062	10.49	4.80
SUB071 [2]	Limited data	1.30
SUB076 [2]	Limited data	0.80
SUB083	12.60	5.58
SUB086	8.63	3.96
SUB093	2.87	1.81
SUB102 [1]	4.55	2.41
SUB105	7.34	3.47
SUB107 [2]	Limited data	0.70
SUB109 [1]	4.32	2.28
SUB110	no data	no data
SUB111	11.62	5.08

Notes:

1. InSAR data was incomplete. Subsidence calculations utilized available data.
2. Values for "With GSP implementation" estimated based on nearby sites due to limited data.



Legend

County lines

Subbasin

California Aqueduct

E Clay Extent

Management Area A

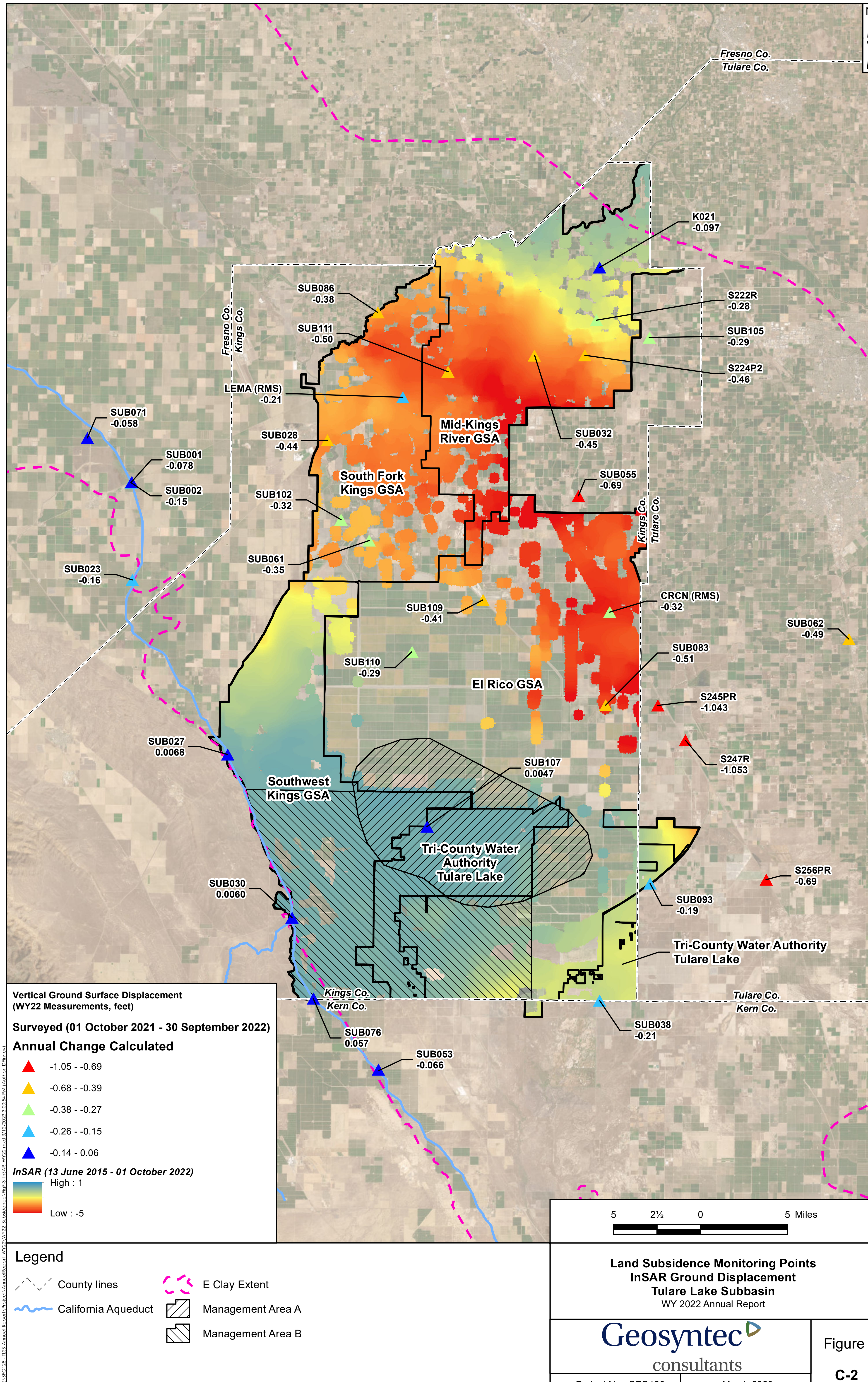
Management Area B

Land Subsidence Monitoring Points
Tulare Lake Subbasin
WY 2022 Annual Report

Geosyntec consultants

Figure **C-1**

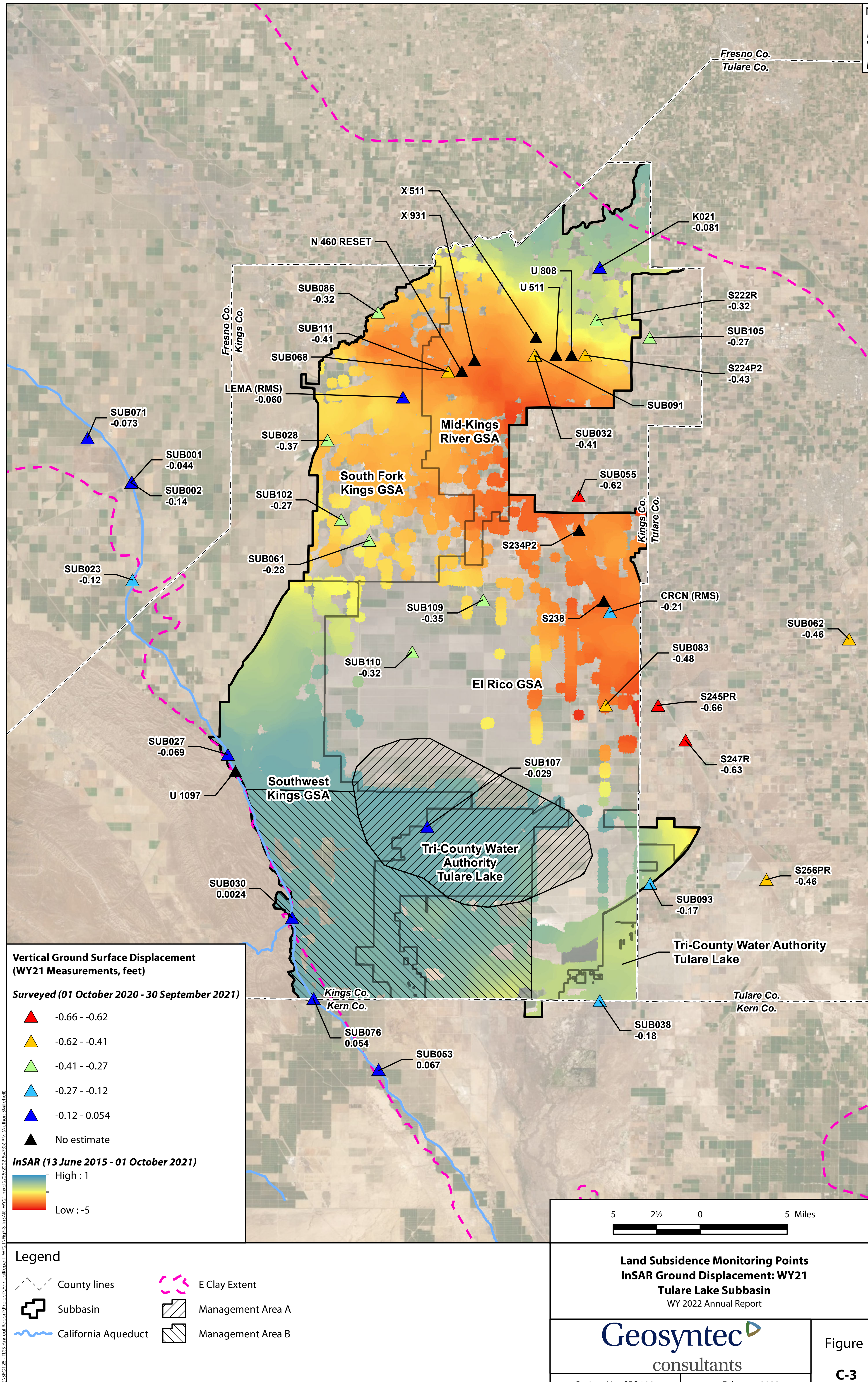
Project No.: SFO128 | December 2022



Land Subsidence Monitoring Points
InSAR Ground Displacement
Tulare Lake Subbasin
WY 2022 Annual Report

Project No.: SFO128 | March 2023

Figure **C-2**

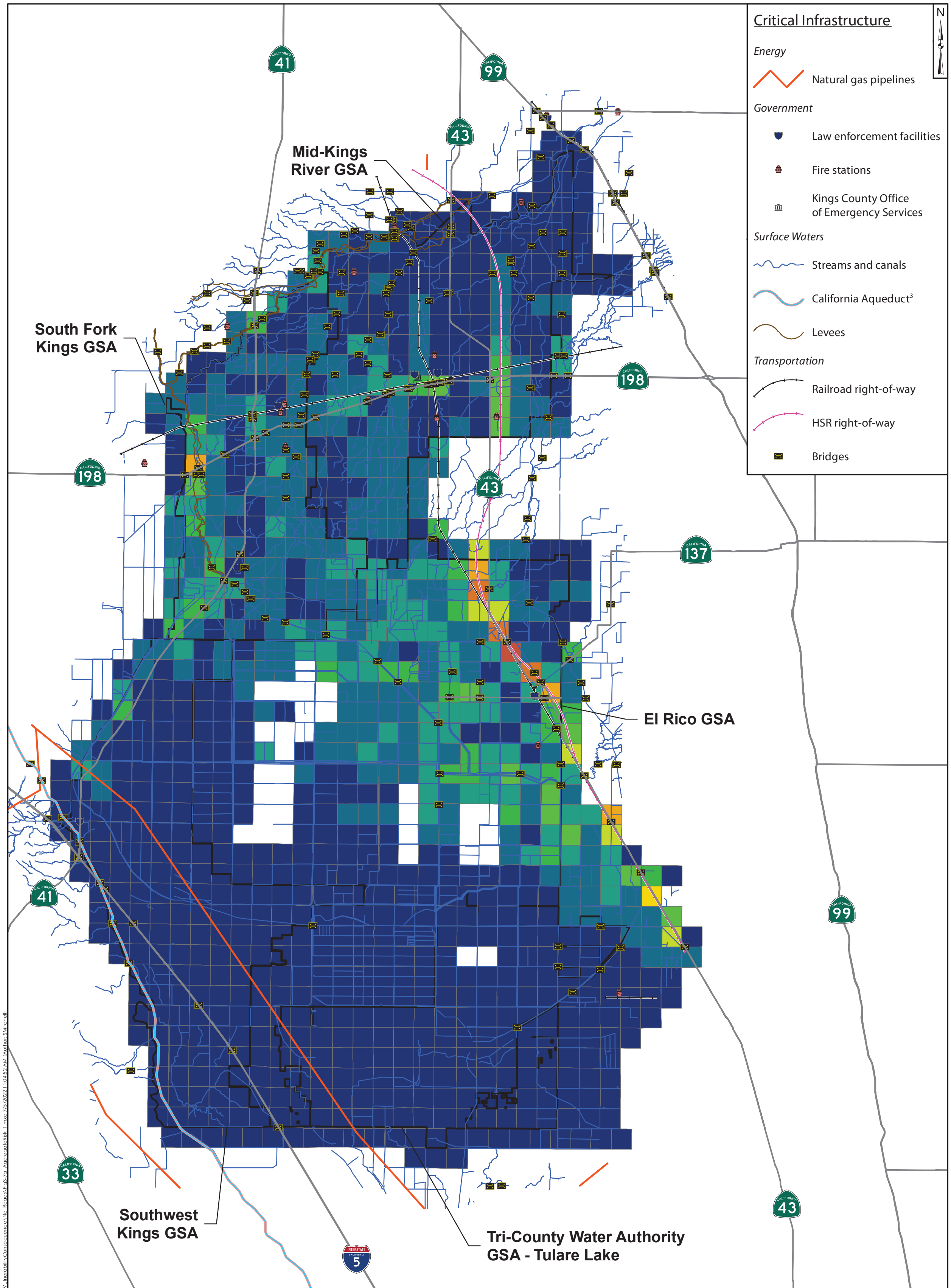


Land Subsidence Monitoring Points
InSAR Ground Displacement: WY21
Tulare Lake Subbasin
WY 2022 Annual Report

Geosyntec consultants

Project No.: SFO128 | February 2022

Figure C-3



Legend

Aggregate risk score per section

-0.021115 - -0.018942	-0.010246 - -0.008073
-0.018941 - -0.016768	-0.008072 - -0.005900
-0.016767 - -0.014594	-0.005899 - -0.003726
-0.014593 - -0.012421	-0.003725 - -0.001552
-0.012420 - -0.010247	-0.001551 - 0.000622

Groundwater Sustainability Agency (GSA) boundary[1]

Highways[2]

California Aqueduct[3]

Notes:
- Risk score per section calculated as: H-Map (1) x V-Map (1) = R-Map (1)
- White areas represent areas with no data.

References:
1) California Department of Water Resources.
2) U.S. Census Bureau.
3) U.S. Geological Survey.

4 2 0 4 Miles

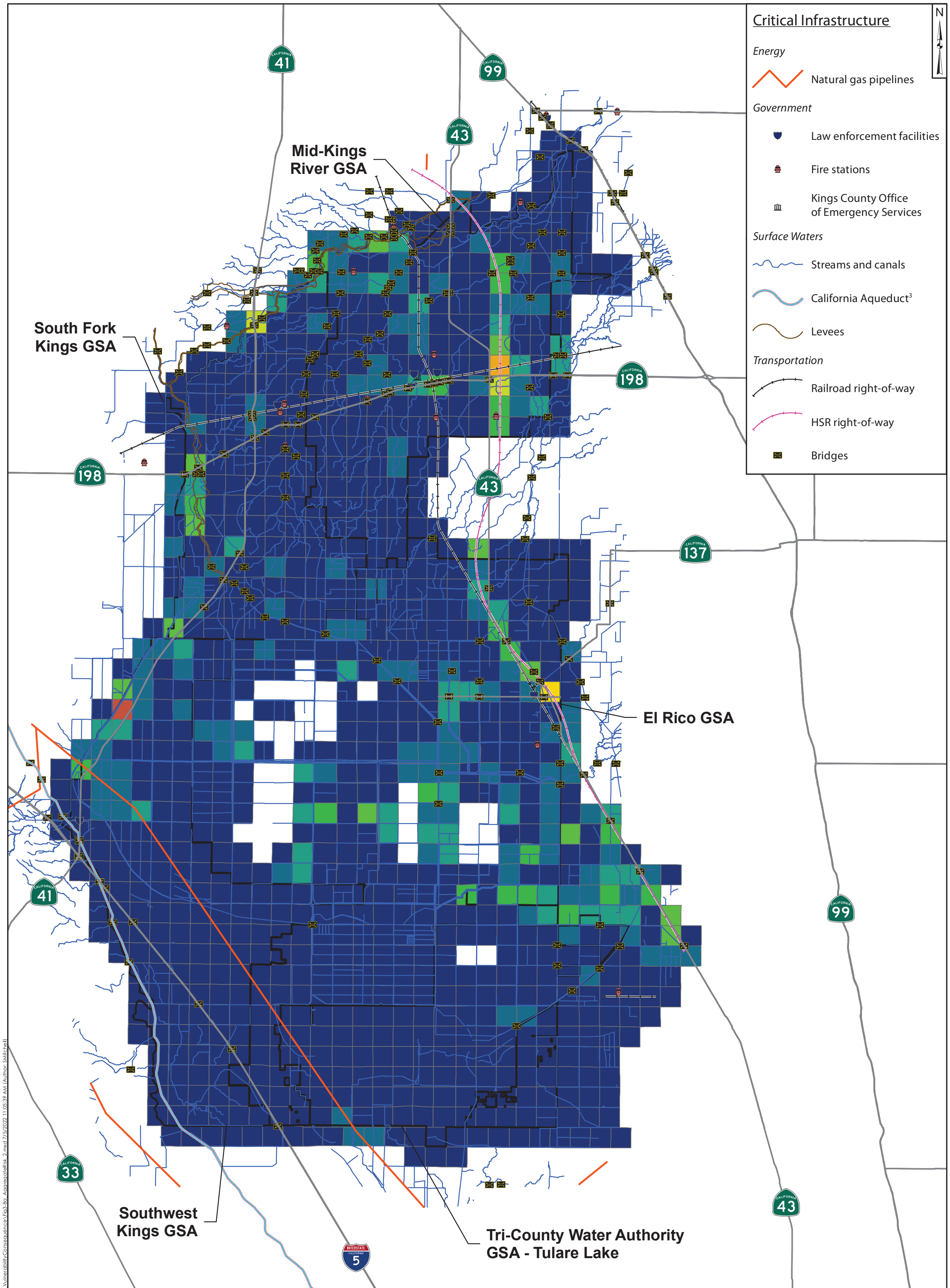
TRS Aggregate Total Subsidence Risk Map R-Map (1)
Water Year 2022 Annual Report
Tulare Lake Subbasin

Geosyntec consultants

Figure C-4

Project No.: SFO128

February 2023



Legend

Aggregate risk score per section, based on differential ground surface vertical displacement

- 0.00000 - 0.00002
- 0.00003 - 0.00005
- 0.00006 - 0.00007
- 0.00008 - 0.00009
- 0.00010 - 0.00012
- 0.00013 - 0.00014
- 0.00015 - 0.00016
- 0.00017 - 0.00019
- 0.00020 - 0.00021
- 0.00022 - 0.00024

- Groundwater Sustainability Agency (GSA) boundary[1]
- Highways[2]
- California Aqueduct[3]

Notes:
- Risk score per section calculated as: H-Map (2) x V-Map (2) = R-Map (2)
- White areas represent areas with no data.

References:
1) California Department of Water Resources.
2) U.S. Census Bureau.
3) U.S. Geological Survey.

4 2 0 4 Miles

TRS Aggregate Differential Subsidence Risk Map
R-Map (2)
Water Year 2022 Annual Report
Tulare Lake Subbasin

Geosyntec consultants

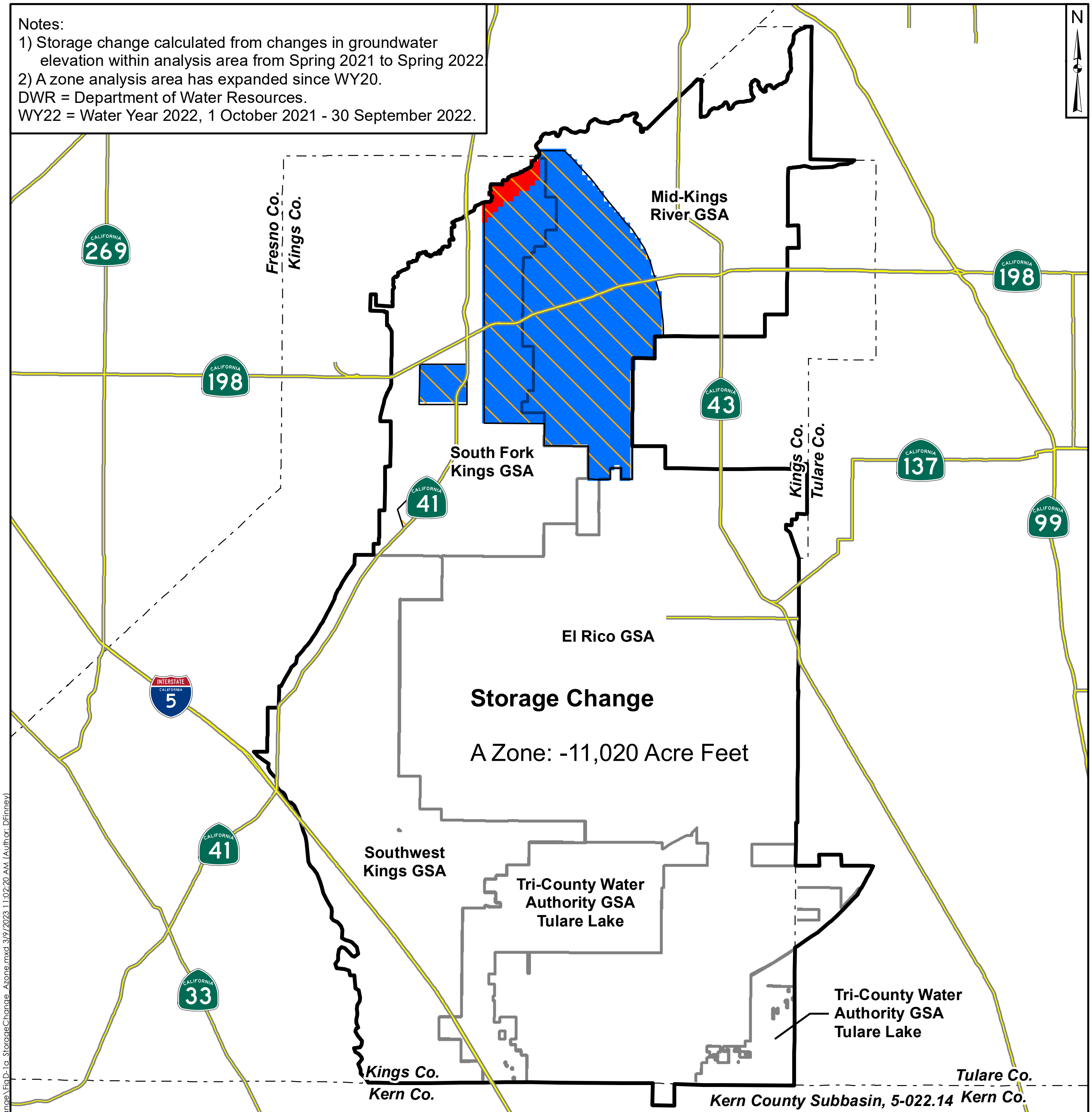
Project No.: SFO128

February 2023

Figure **C-5**

APPENDIX D
Groundwater Storage Change

Notes:
1) Storage change calculated from changes in groundwater elevation within analysis area from Spring 2021 to Spring 2022.
2) A zone analysis area has expanded since WY20.
DWR = Department of Water Resources.
WY22 = Water Year 2022, 1 October 2021 - 30 September 2022.



Legend

Analysis Areas

A zone Analysis Area (59,561 ac)

Groundwater Storage Change, A zone

Net Gain

Unchanged

Net Loss

Tulare Lake Subbasin 5-022.12

Highways

County lines

10 5 0 10 Miles

Groundwater Storage Change
A zone, WY22
Tulare Lake Subbasin
WY22 Annual Report

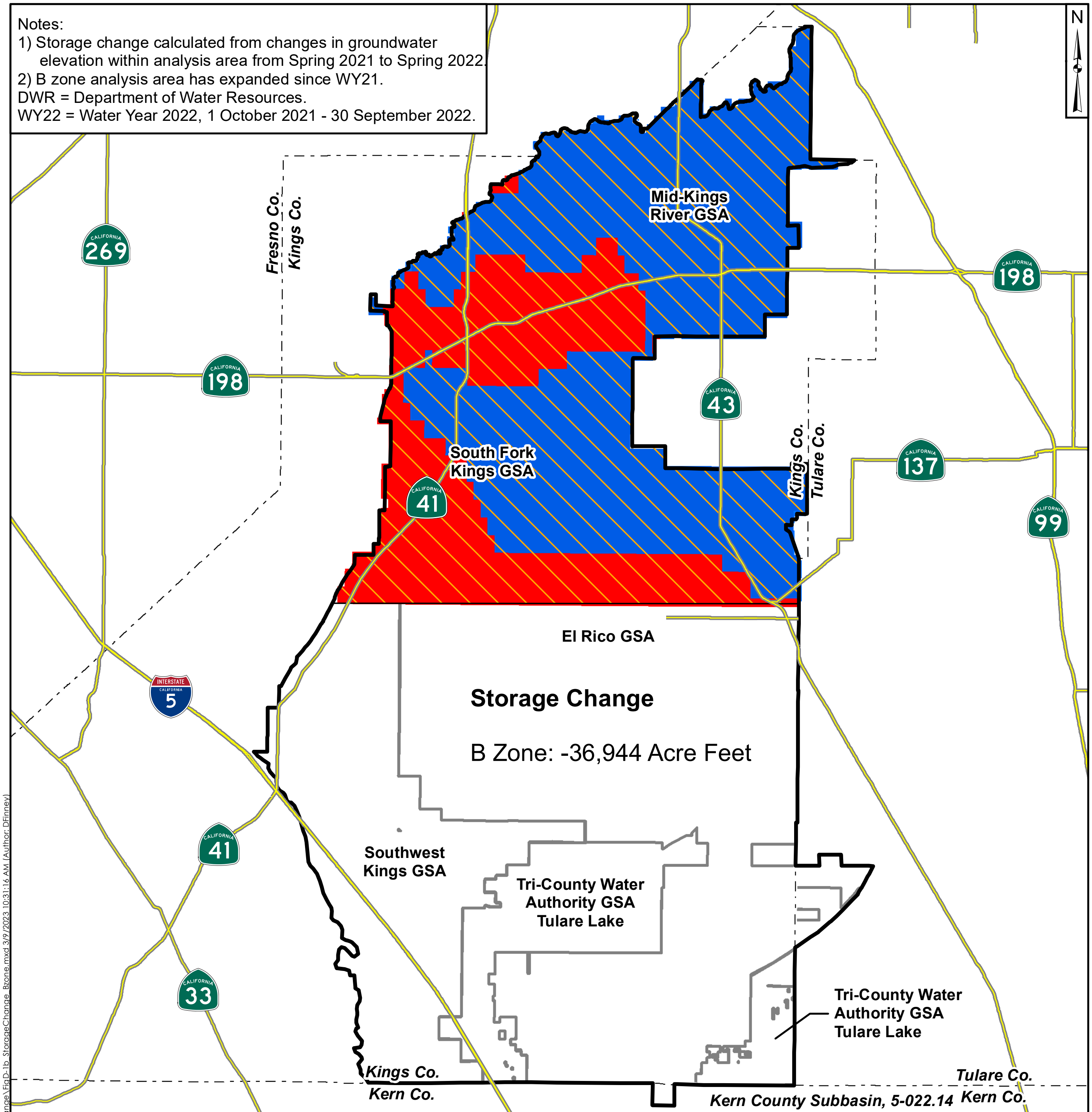
Geosyntec consultants

Figure **D-1a**

Project No.: SFO128

March 2023

P:\GIS\SFO128 - TLSB Annual Report\Project\AnnualReport_WY22\WY22_StorageChange\FigD-1a_StorageChange_Azone.mxd 3/9/2023 11:02:20 AM (Author: DFinney)



Legend

Analysis Areas

B zone Analysis Area (223,514 Acres)

Groundwater Storage Change, B zone

Net Gain

Unchanged

Net Loss

Tulare Lake Subbasin 5-022.12

Highways

County lines

10 5 0 10 Miles

Groundwater Storage Change
B zone, WY22
Tulare Lake Subbasin
WY22 Annual Report

Geosyntec consultants

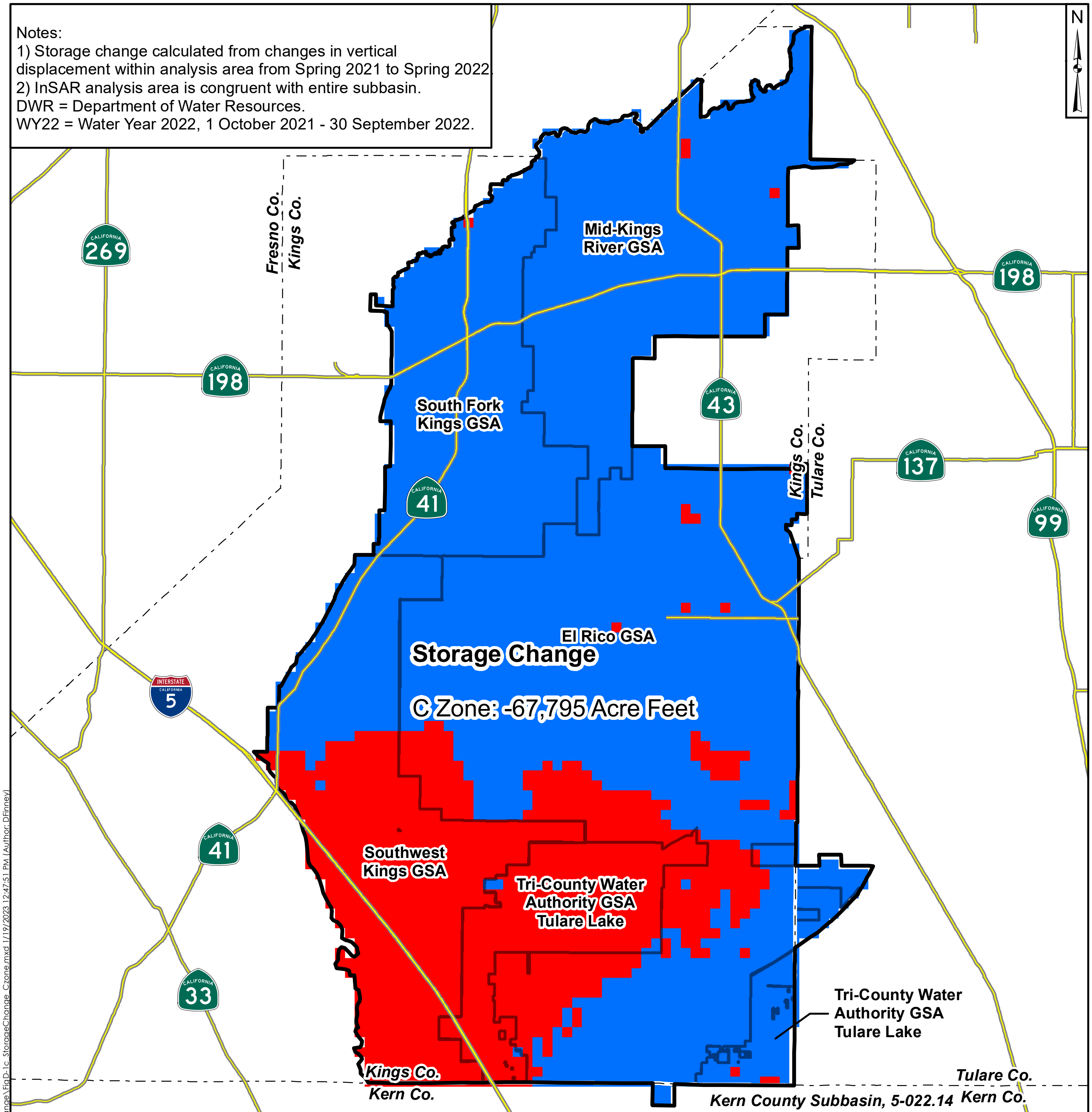
Project No.: SFO128

March 2023

Figure **D-1b**

P:\GIS\SFO128 - TLSB Annual Report\Project\AnnualReport_WY22\WY22_StorageChange\FigD-1b_StorageChange_Bzone.mxd 3/9/2023 10:31:16 AM (Author: DFinney)

Notes:
1) Storage change calculated from changes in vertical displacement within analysis area from Spring 2021 to Spring 2022.
2) InSAR analysis area is congruent with entire subbasin.
DWR = Department of Water Resources.
WY22 = Water Year 2022, 1 October 2021 - 30 September 2022.



Legend

Groundwater Storage Change, C zone

- Net Gain
- Unchanged
- Net Loss

- Tulare Lake Subbasin 5-022.12
- Highways
- County lines

10 5 0 10 Miles

Groundwater Storage Change
Total Subsidence Change, WY22
Tulare Lake Subbasin
WY22 Annual Report

Geosyntec consultants

Project No.: SFO128

March 2023

Figure **D-1c**

P:\GIS\SFO128 - TLSB Annual Report\Project\AnnualReport_WY22\WY22_StorageChange\FigD-1c_StorageChange_Czone.mxd 1/19/2023 12:47:51 PM (Author: DFinney)

APPENDIX E
Groundwater Level Monitoring Network and Hydrographs

Appendix E: Groundwater Level Monitoring Network and Hydrographs
Table E-1 RMS Network
Representative Monitoring Sites - Groundwater Levels Water Year 2022

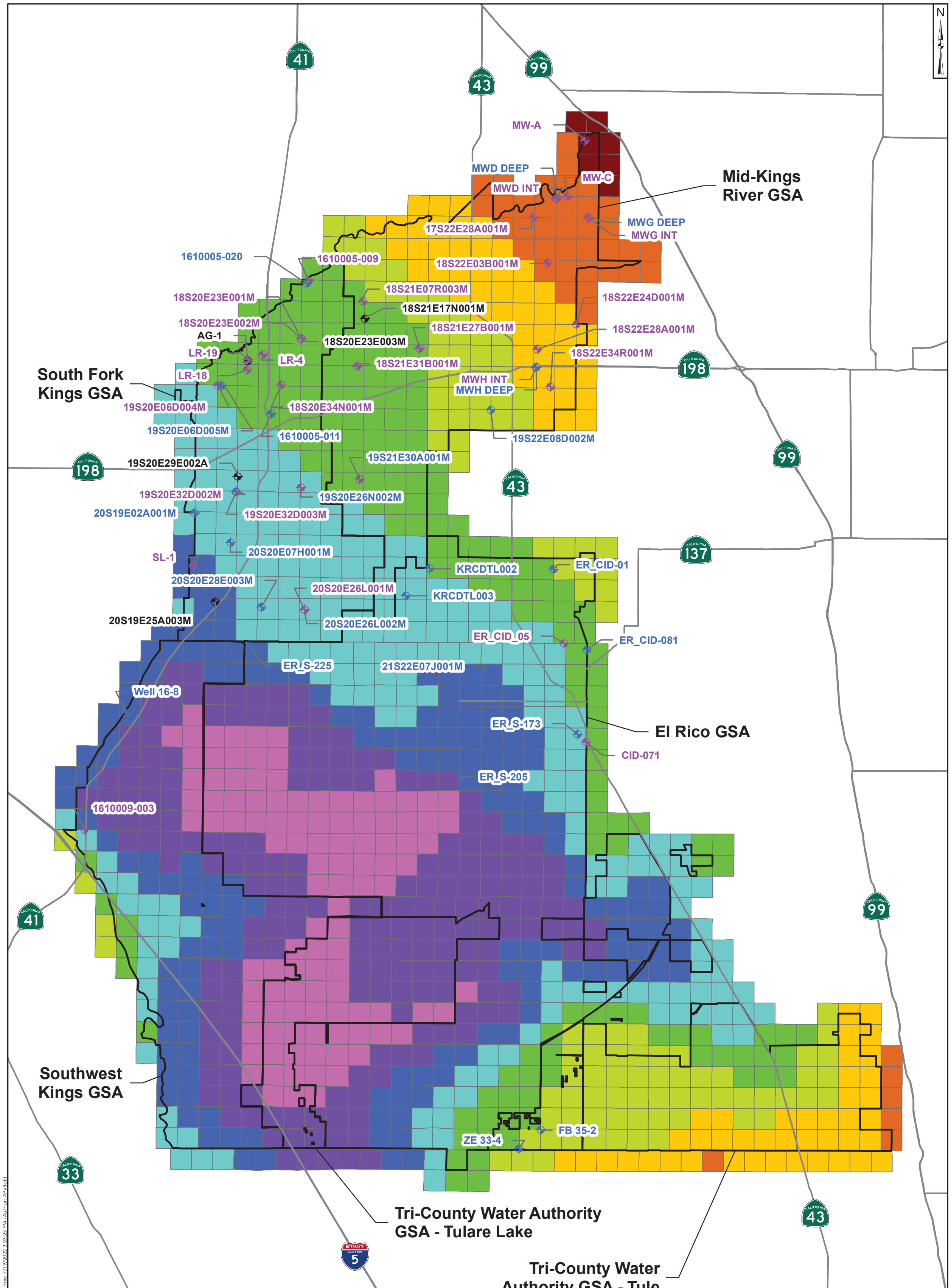
GSA	Site Code	Local Well Name	StatewellID	GSE	RPE	Date	Fall 2020 DTW	Date	Spring 2021 DTW	Date	Fall 2021 DTW	Date	Spring 2022 DTW	Aquifer Zone
SFK	363500N1197800W003	KRCDAC1S	18S20E23E003M	217	217.13	10/7/2020	21.1	3/11/2021	21.7	10/11/2021	23	3/15/2022	25.62	A
SFK	362500N1198310W001	19S20E29E002M	19S20E29E002M	197.3	197.25	10/13/2020	31.82	3/23/2021	31.85	10/13/2021	32.8	3/16/2022	32.42	A
SFK	361700N1198510W001	20S19E25A003M	20S19E25A003M	189.5	189.51	10/13/2020	7.27	3/23/2021	7.09	10/12/2021	9.5	3/16/2022	9.52	A
SFK	363305N1198258W001	AG-1		206.8	206.83			3/21/2021	7.64	10/12/2021	11.9	3/16/2022	12.35	A
SFK	363863N1197745W001	1610005-009	18S20E11C002M	229	229.43	10/12/2020	181.84	3/24/2021	162	10/12/2021	187	3/23/2022	146	B
SFK	363500N1197800W001	KRCDAC1D	18S20E23E001M	217	217.308	10/7/2020	214.9	3/11/2021	202	10/11/2021	241	3/15/2022	221.79	B
SFK	363500N1197800W002	KRCDAC1M	18S20E23E002M	217.5	217.487	10/7/2020	211.5	3/11/2021	199.7	10/11/2021	Dry	3/15/2022	218.7	B
SFK	363144N1197968W001	18S20E34N001M	18S20E34N001M	212.9	212.89	10/12/2020	116.35	3/23/2021	116.52	10/12/2021	117.3	3/16/2022	117.85	B
SFK	363133N1198512W001	19S20E06D004M	19S20E06D004M	202.4	202.42	10/12/2020	164.8	3/23/2021	136.67	10/12/2021	135.4	3/16/2022	123.8	B
SFK	363315N1198269W001	LR-19		207.14	207.14			3/21/2021	215.91	10/12/2021	New Well	3/16/2022	245.48	B
SFK	363244N1198264W001	LR-18		208.44	208.44			3/21/2021	216.61	10/12/2021	257.03	3/16/2022	241.22	B
SFK	363349N1198129W001	LR-4		210.68	210.68			3/21/2021	162.15	10/12/2021	New Well	3/16/2022	149.3	B
SFK	362400N1198300W002	KRCDAC3M	19S20E32D002M	196.8	196.812	10/7/2020	261.6	3/11/2021	247.3	10/11/2021	No Access	3/15/2022	276.19	B
SFK	361600N1197800W001	KRCDAC5M	20S20E26L001M	182.1	182.086	10/7/2020	134.2	3/11/2021	135	10/11/2021	139.7	3/15/2022	140.98	B
SFK	362410N1197802W001	CU ELEMENTARY SCHOOL	19S20E26N002M	203	202.62	10/20/2020	277.31	2/2/2021	263.5	10/12/2021	282	3/16/2022	304.52	B
SFK	361893N1198706W001	SL-1		196.00	196					10/12/2021	138.64	3/16/2022	131.43	B
SFK	363840N1197762W002	1610005-020	18S20E11C003M	229.32	229.32	10/13/2020	204	3/24/2021	205.98	10/15/2021	260.00	3/23/2022	230	C
SFK	363133N1198477W002	19S20E06D005M	19S20E06D005M	203.79	203.79	10/12/2020	245.95	3/23/2021	231.04	10/12/2021	289.82	3/16/2022	296.4	C
SFK	362944N1198055W001	1610005-011	19S20E09G001M	208.3	208.32	10/13/2020	264	3/24/2021	251.96	10/12/2021	297.9	3/23/2022	284	C
SFK	362400N1198300W001	KRCDAC3D	19S20E32D003M	196.7	196.696	10/7/2020	261	3/11/2021	247.3	10/11/2021	299.5	3/15/2022	276.42	C
SFK	361600N1197700W001	KRCDAC5D	20S20E26L002M	182.6	182.576	10/7/2020	224.1	3/11/2021	216.7	10/11/2021	254.4	3/15/2022	240.17	C
SFK	362258N1198699W001	20S19E02A001M	20S19E02A001M	210.90	210.9	11/15/2020	313	3/8/2021		10/29/2021	Pumping	3/16/2022	Pumping	C
SFK	362061N1198388W001	20S20E07H001M	20S20E07H001M	195.67	195.67	10/12/2020	217.54	3/23/2021	244.19	10/13/2021	229.70	3/16/2022	224.95	C
SFK	361617N1198124W001	20S20E28E003M	20S20E28E003M	186.60	186.6	10/12/2020	224.64	3/23/2021	223.5	10/12/2021	245.78	3/16/2022	14.24	C
SWK	360074N1199605W001	Becky Pease Well	Becky Pease Well	250.41	250.41	10/13/2020	165.04	3/24/2021	159.99	10/13/2021	164.83	3/16/2022	153.42	B
SWK	360879N1199263W001	Well 16-8	Well 16-8	207.27	207.27	10/13/2020	370.03	3/24/2021	372.25	10/13/2021	467.1	3/16/2022	465.93	C
TCWA	358036N1195732W001	FB 35-2	FB 35-2	179.00	179	10/9/2020	367.7	3/24/2021	320.38	10/13/2021	373.30	3/16/2022	344.75	C
TCWA	357906N1195913W001	ZE 33-4	ZE 33-4	277.00	277	10/9/2020	338.09	4/12/2021	328.01	10/13/2021	354.90	3/16/2022	318.85	C

Appendix E: Groundwater Level Monitoring Network and Hydrographs

Table E-1 RMS Network

Representative Monitoring Sites - Groundwater Levels Water Year 2022

GSA	Site Code	Local Well Name	StatewellID	GSE	RPE	Date	Fall 2020 DTW	Date	Spring 2021 DTW	Date	Fall 2021 DTW	Date	Spring 2022 DTW	Aquifer Zone
El Rico	361381N1195558W001	ER_CID_05		192.37	193.03	11/17/2020	84	7/1/2021	100	9/1/2021	90.00	3/5/2022	92	B
El Rico	360702N1195369W001	CID-071		188.15	189.08			3/19/2021	168	10/5/2021	42.00	3/11/2022	45	B
El Rico	361890N1195650W001	ER_CID-01		200.79	202.04			3/19/2021	280	9/1/2021	264.00	3/17/2022	296	C
El Rico	361338N1195366W001	ER_CID-081		198.180	199.78	10/15/2020	200	3/4/2021	246	10/19/2021	220.000	3/6/2022	230	C
El Rico	362000N1196700W001	KRCDTL002		195.300	197	12/15/2020		2/6/2021	162	10/1/2021	166.000	2/4/2022	153	C
El Rico	360757N1195438W001	ER_S-173		208.00	208	10/2/2020	359	2/4/2021	264	10/1/2021	387.00	5/3/2022	389	C
El Rico	361700N1196900W001	KRCDTL003		193.10	195.6	12/15/2020	354	5/7/2021	336	10/1/2021	411.00	2/4/2022	382	C
El Rico	361429N1198259W001	ER_S-225		189.00	189	10/2/2020	342	2/6/2021	351	10/1/2021	426.00	5/4/2022	406	C
El Rico	360462N1196418W001	ER_S-205		188.00	188	10/2/2020	369	2/4/2021	339	10/1/2021	445.00	1/3/2022	475	C
El Rico	361158N1196258W001	21S22E07J001M	21S22E07J001M	205.10	204.6	12/15/2020		3/2/2021	335	10/8/2021	375.00	2/8/2022	198	C
MKR	363603N1197266W001	18S21E17N001M	18S21E17N001M	240.78	240.98	11/1/2020	23.8	2/15/2021	23.7	11/2/2021	25.20	2/18/2022	24.5	A
MKR	364834N1195404W001	MW-A		284.160	285.47	10/12/2020	47.5	3/8/2021	51.2	10/14/2021	62.300	2/22/2022	63.19	B
MKR	363572N1195468W001	18S22E24D001M	18S22E24D001M	258.000	259	10/19/2020	142.1	3/9/2021	149.1	10/28/2021	145.100	2/16/2022	150.1	B
MKR	363992N1195716W001	18S22E03B001M	18S22E03B001M	268.7	268.72	10/24/2020	114.3	2/13/2021	113.6	10/28/2021	125.0	2/15/2022	Pumping	B
MKR	364303N1195841W001	KRCDKCWD01	17S22E28A001M	272.50	274.8	10/12/2020	100.3	3/9/2021	100.1	10/27/2021	128.00	2/15/2022	110	B
MKR	364304N1195373W001	MWG INT		277.00	278.3	10/12/2020	87.3	3/8/2021	87.7	10/14/2021	93.80	2/22/2022	94.4	B
MKR	364436N1195641W001	MWD INT		278.1	279.35	10/12/2020	81.8	3/8/2021	80.6	10/14/2021	92.8	2/22/2022	92.52	B
MKR	364452N1195550W001	MW-C		279.330	280.71	10/12/2020	78.8	3/8/2021	78.5	10/14/2021	91.900	2/22/2022	92.12	B
MKR	364436N1195648W001	MWD DEEP		278.070	279.35	10/12/2020	89.4	3/8/2021	97.6	10/14/2021	114.700	2/22/2022	118.22	B
MKR	364306N1195370W001	MWG DEEP		277.00	278.3	10/12/2020	132	3/8/2021	123.1	10/14/2021	144.70	2/22/2022	134.2	B
MKR	363142N1195685W001	18S22E34R001M	18S22E34R001M	250.40	250.9	10/12/2020	107.3	2/18/2021	114.1	12/29/2021	124.80	2/18/2022	122.7	B
MKR	363274N1195809W001	MWH INT		246	248.19	10/12/2020	134	3/8/2021	134.7	10/14/2021	145	2/22/2022	142.26	B
MKR	363393N1195832W001	KRCDKCWD08	18S22E28A001M	249	250.5	10/13/2020	143.8	3/9/2021	120.1	10/28/2021	152	2/17/2022	167	B
MKR	363722N1197282W001	18S21E07R003M	18S21E07R003M	243	242.77	10/20/2020	27.5	2/16/2021	26.9	11/2/2021	Destroyed	2/15/2022	Destroyed	B
MKR	363274N1197327W001	18S21E31B001M	18S21E31B001M	242	241.79	10/22/2020	164.5	2/14/2021	160.6	11/3/2021	170	2/17/2022	165.7	B
MKR	363419N1196799W001	KRCDKCWD05	18S21E27B001M	232	236.6	10/24/2020	121.8	2/15/2021	126.3	11/3/2021	128	2/15/2022	127.9	B
MKR	363277N1195806W001	MWH DEEP		246.1	248.19	10/12/2020	249.6	3/8/2021	221.1	10/14/2021	265.8	2/22/2022	213.56	C
MKR	362981N1196189W001	19S22E08D002M	19S22E08D002M	243.7	243.2	10/8/2020	263.5	3/1/2021	223.1	10/7/2021	288.8	3/14/2022	244.9	C
MKR	362618N1197496W001	KRCDKCWD06	19S21E30A001M	211.90	211.9	10/15/2020	284.7	3/9/2021	281.3	12/29/2021	292.20	2/22/2022	294	C



Legend

Average elevation of top of E-clay per section (feet msl)

- < -600
- -599 - -500
- -499 - -400
- -399 - -300
- -299 - -200
- -199 - -100
- -99 - 0
- 1 - 100
- > 100
- Groundwater Sustainability Agency (GSA) boundary

Representative Monitoring Sites

- A-zone
- B-zone
- C-zone

5 2½ 0 5 Miles

Groundwater Level RMS Well Locations

WY22 Annual Report

Tulare Lake Subbasin, Kings County

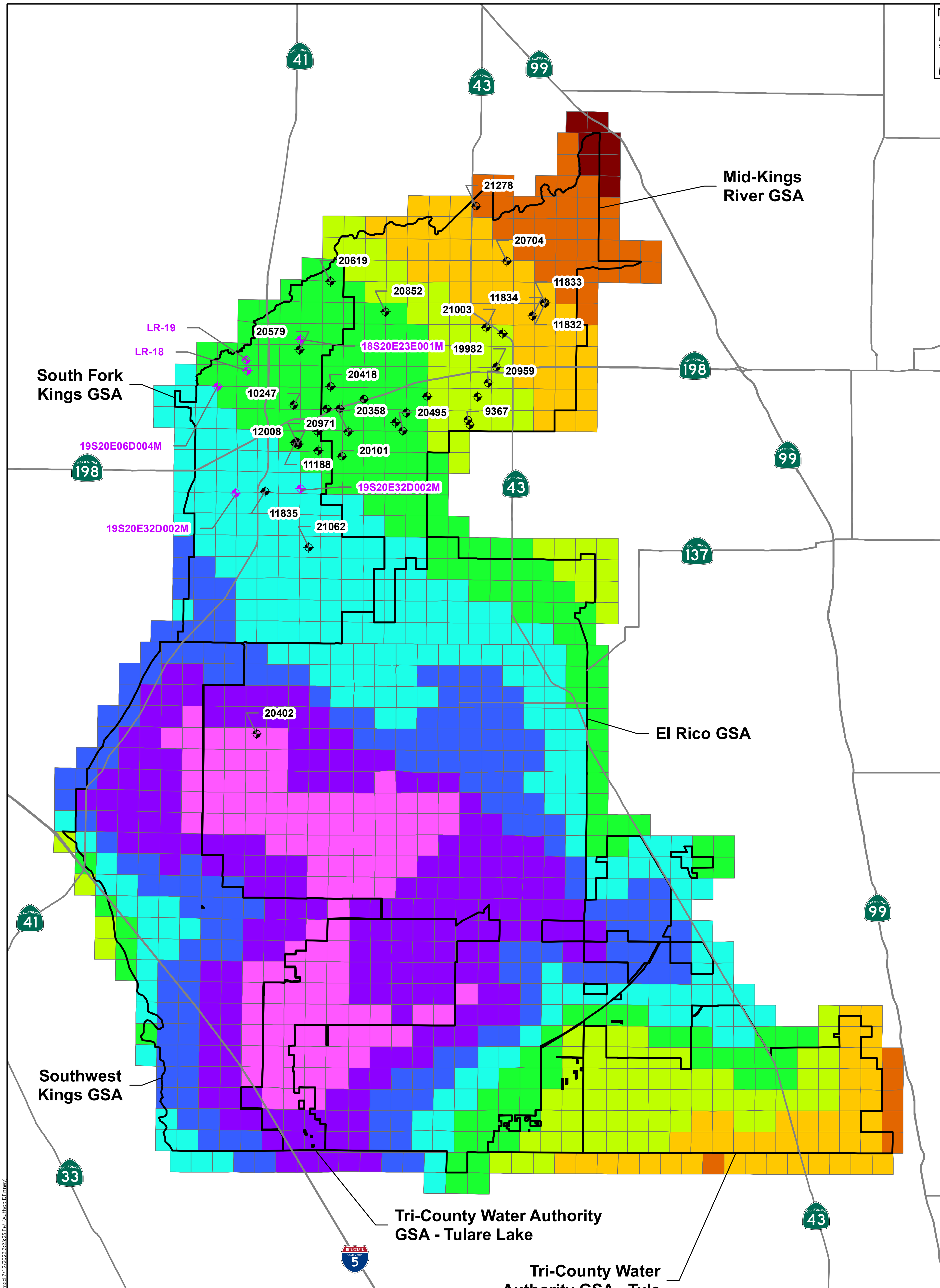
Geosyntec consultants

Project No.: SFO128

February 2022

Figure

E-1



Legend

Average elevation of top of E-clay per section (feet msl)

- < -600
- -599 - -500
- -499 - -400
- -399 - -300
- -299 - -200
- -199 - -100
- -99 - 0
- 1 - 100
- > 100
- Groundwater Sustainability Agency (GSA) boundary

Wells

- Domestic Dry Wells
- B-zone Water Level RMS wells

Notes:
Six B-zone wells exceeded their minimum thresholds during Water Year 2022

Thirty-six Domestic wells have gone dry and two have collapsed since 2019. Downloaded from: https://mydrywell.water.ca.gov/report/

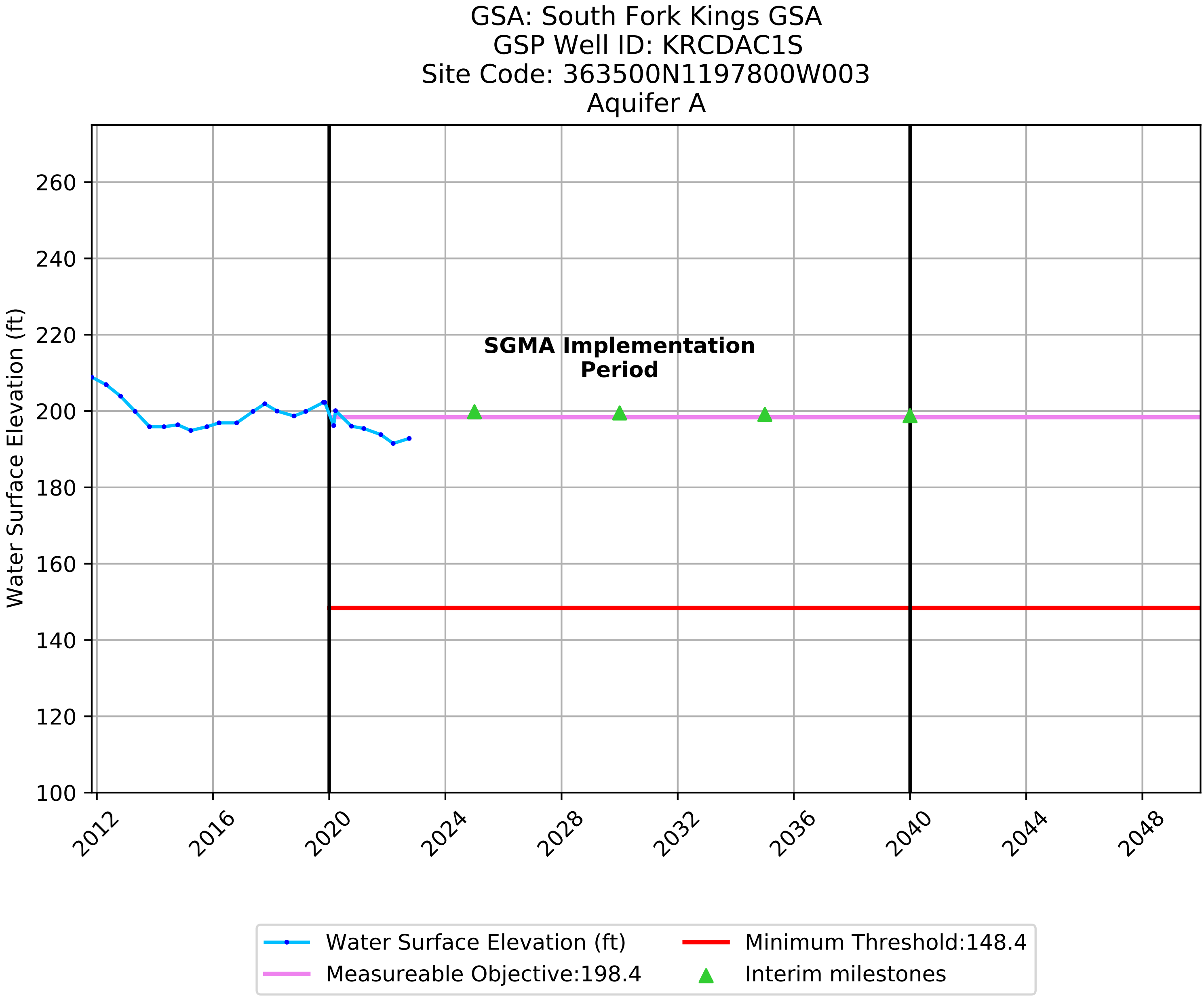
5 2½ 0 5 Miles

MT exceedances and Domestic Dry Wells
Water Year 2022 Annual Report
Tulare Lake Subbasin, Kings County

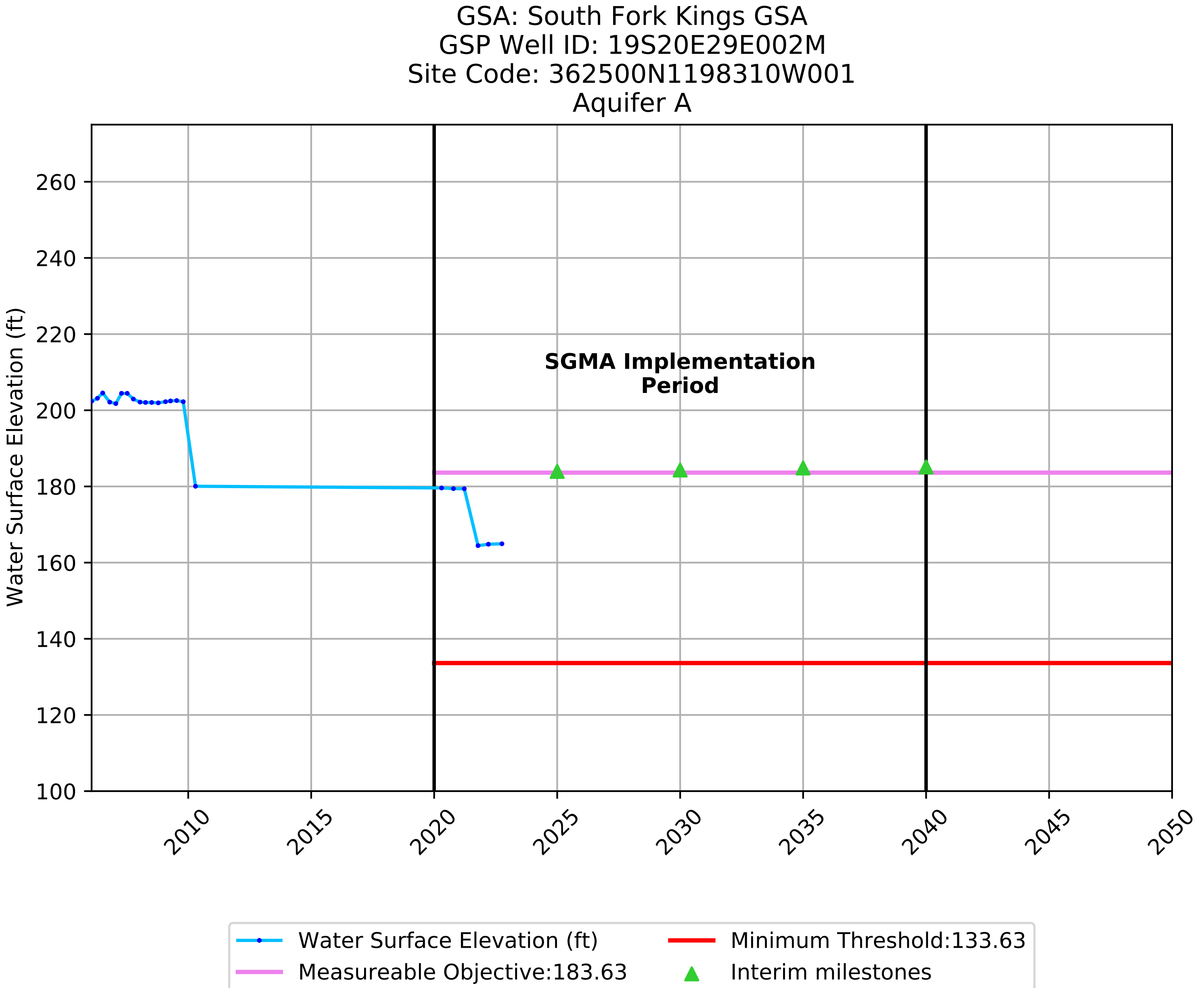
Geosyntec consultants

Project No.: SFO128 | March 2023

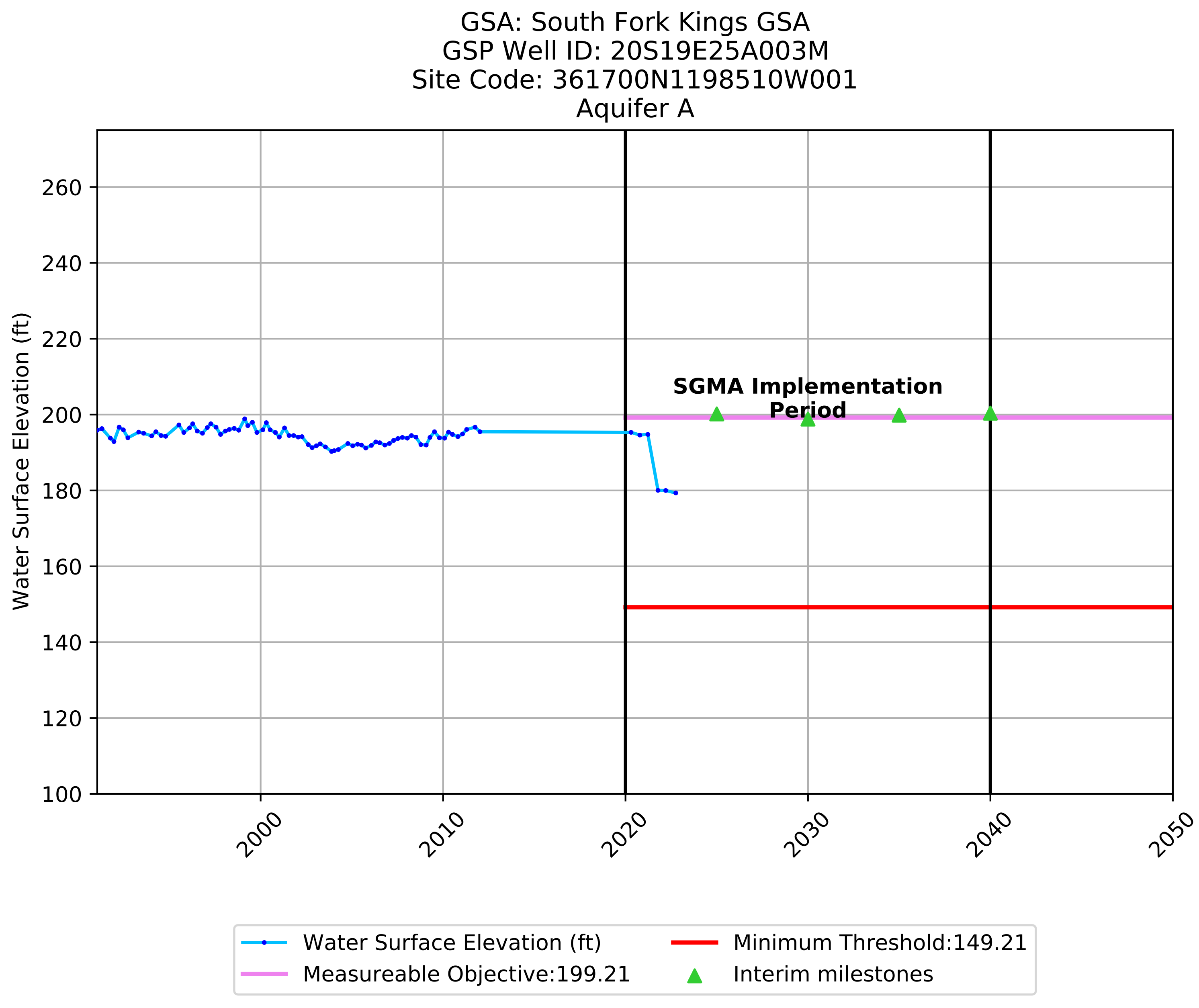
Figure E-2



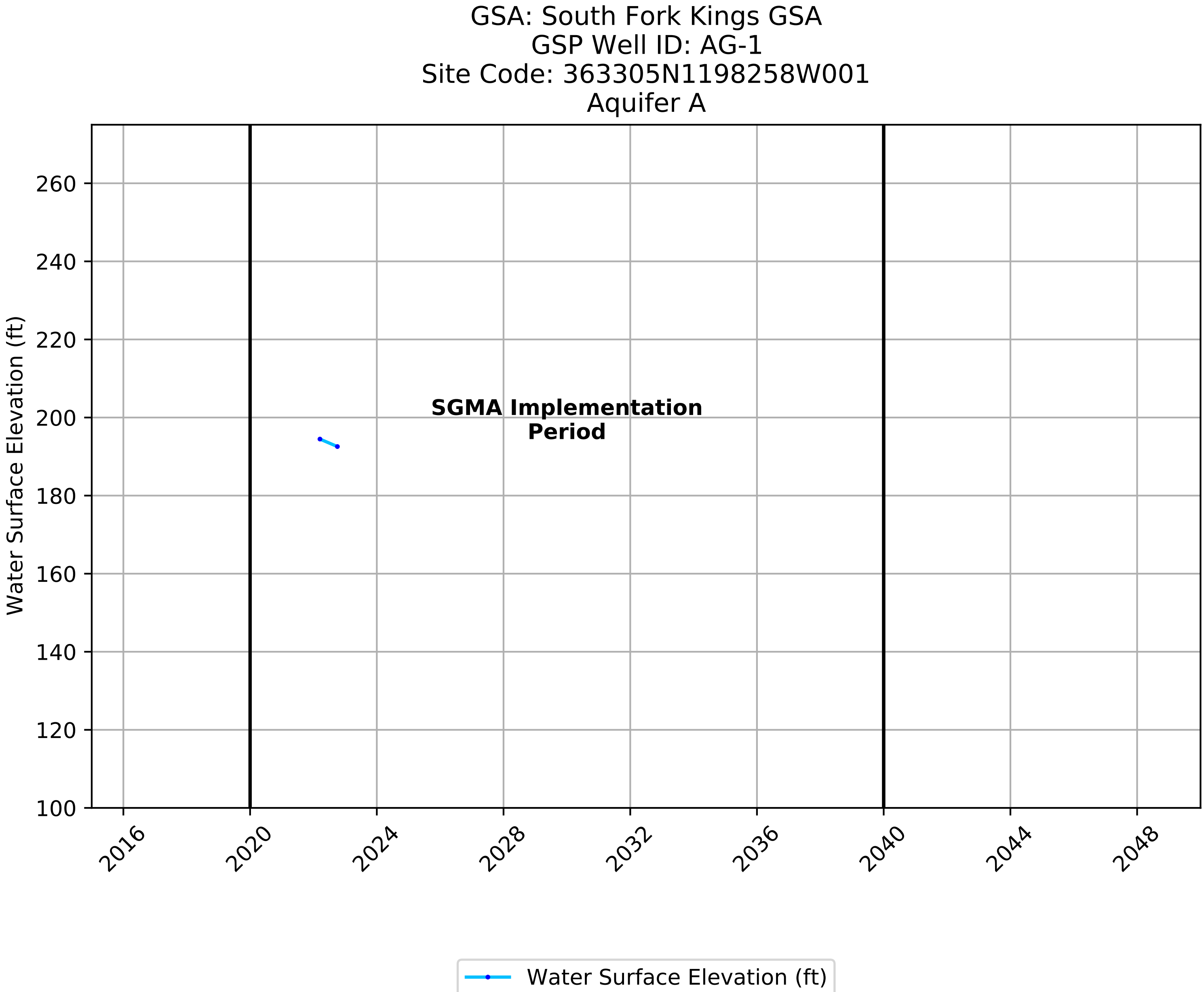
GSA: South Fork Kings GSA
GSP Well ID: KRCDAC1S
Site Code: 363500N1197800W003
Aquifer A
SGMA Implementation Period
Water Surface Elevation (ft)
260
240
220
200
180
160
140
120
100
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:198.4
Minimum Threshold:148.4
Interim milestones

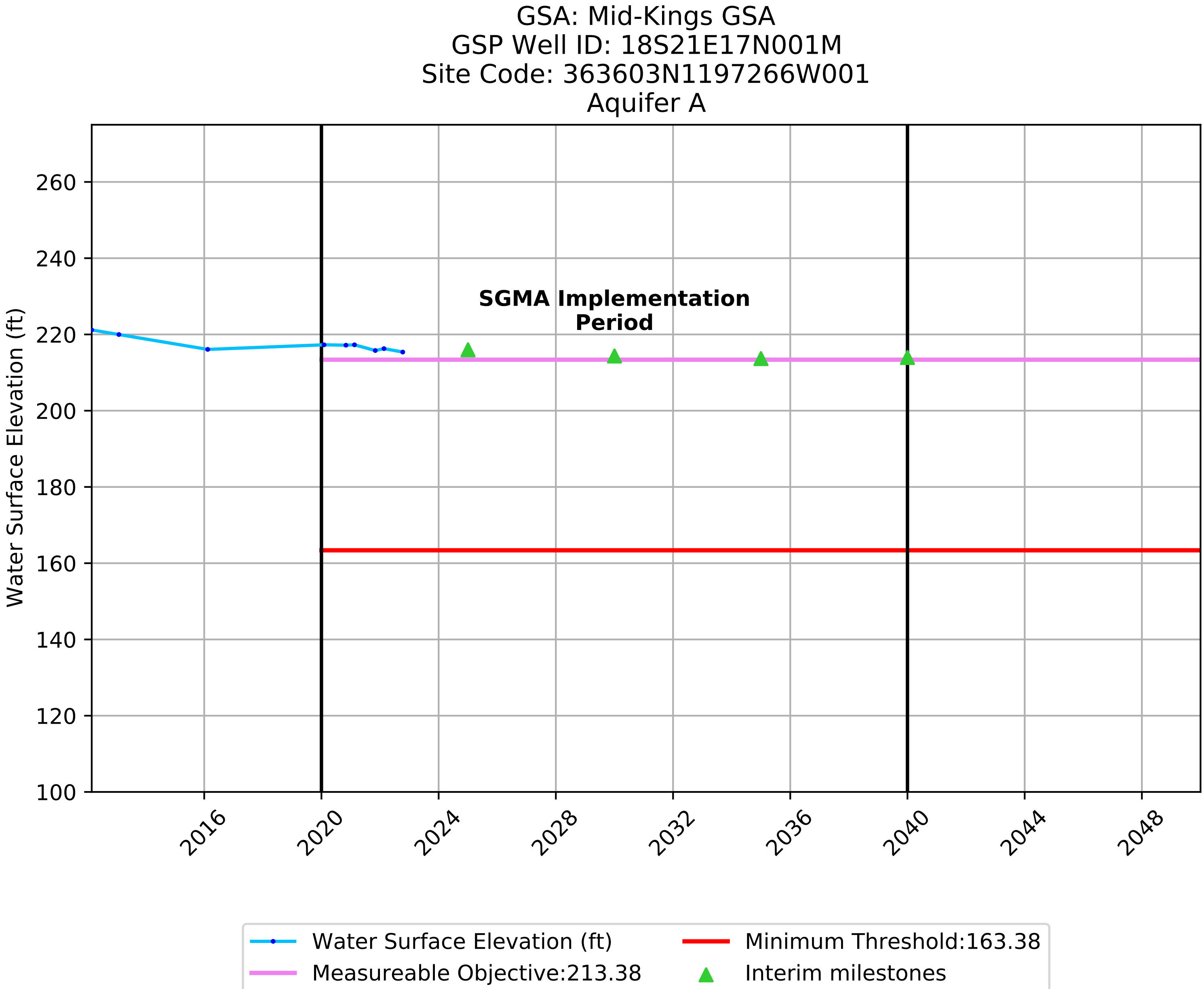


GSA: South Fork Kings GSA
GSP Well ID: 19S20E29E002M
Site Code: 362500N1198310W001
Aquifer A
SGMA Implementation Period
Water Surface Elevation (ft)
100
120
140
160
180
200
220
240
260
2010
2015
2020
2025
2030
2035
2040
2045
2050
Water Surface Elevation (ft)
Measureable Objective:183.63
Minimum Threshold:133.63
Interim milestones

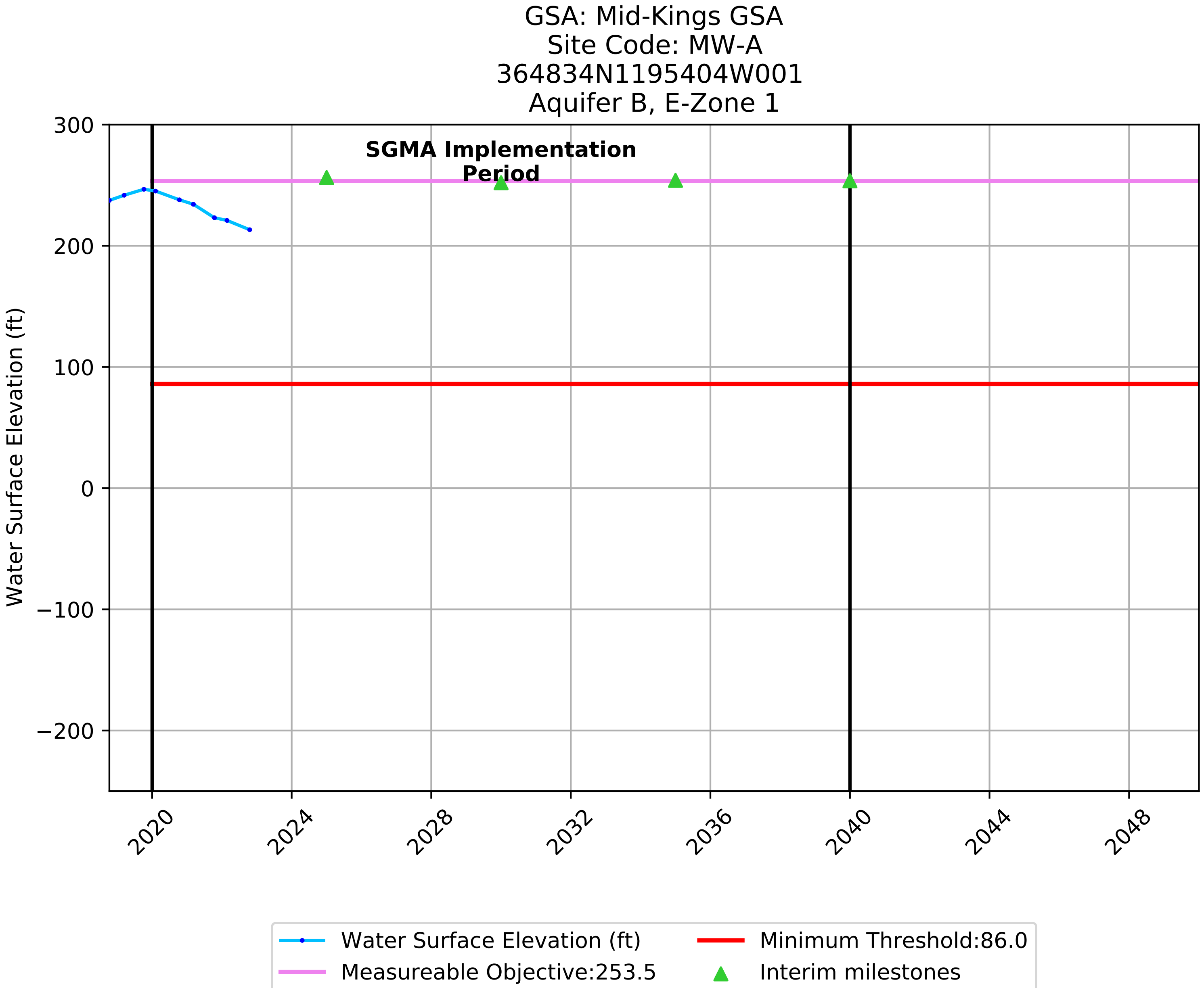


GSA: South Fork Kings GSA
GSP Well ID: 20S19E25A003M
Site Code: 361700N1198510W001
Aquifer A
Water Surface Elevation (ft)
SGMA Implementation Period
100
120
140
160
180
200
220
240
260
2000
2010
2020
2030
2040
2050
Water Surface Elevation (ft)
Measureable Objective:199.21
Minimum Threshold:149.21
Interim milestones

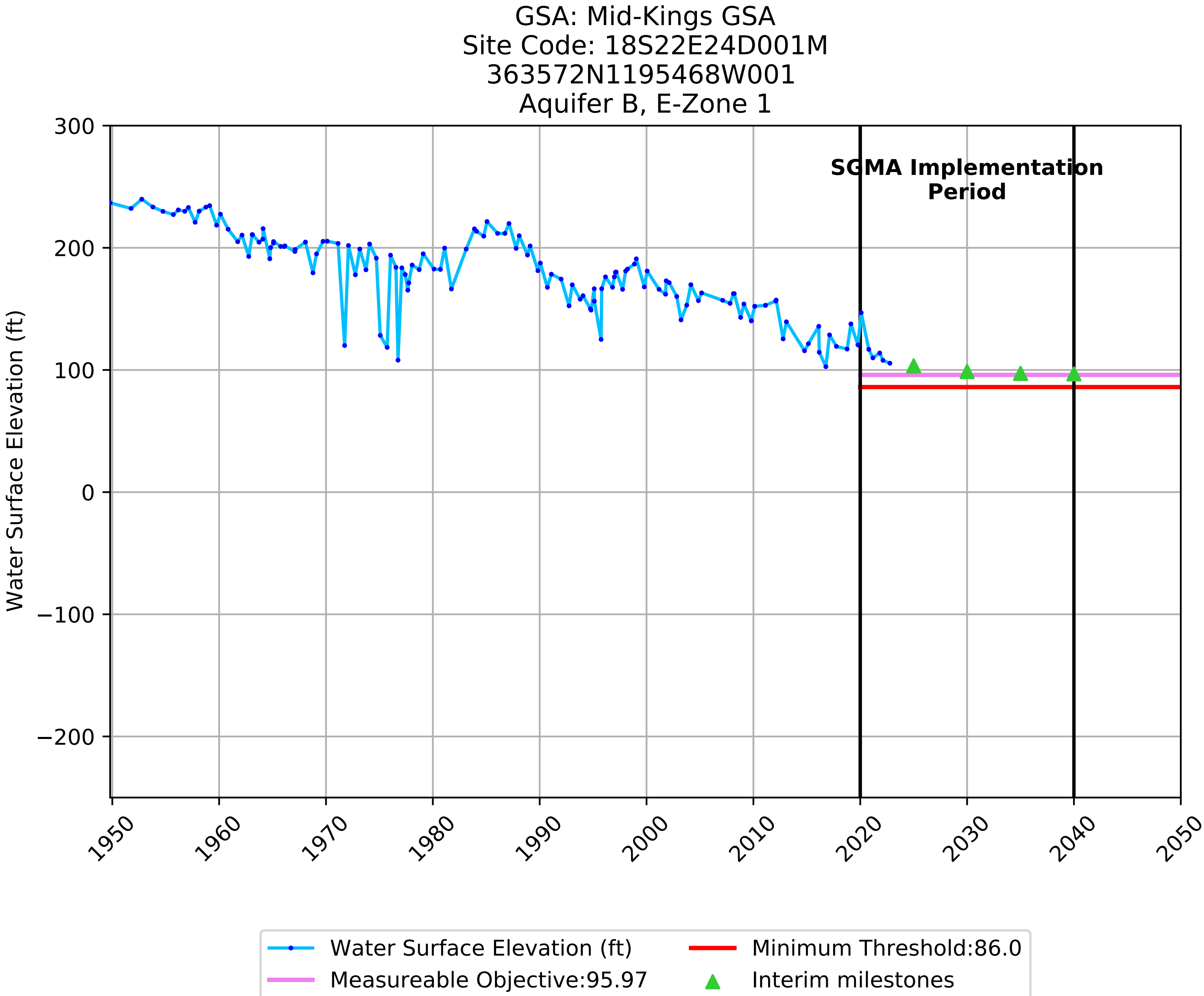

GSA: South Fork Kings GSA
GSP Well ID: AG-1
Site Code: 363305N1198258W001
Aquifer A
Water Surface Elevation (ft)
260
240
220
200
180
160
140
120
100
SGMA Implementation
Period
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)



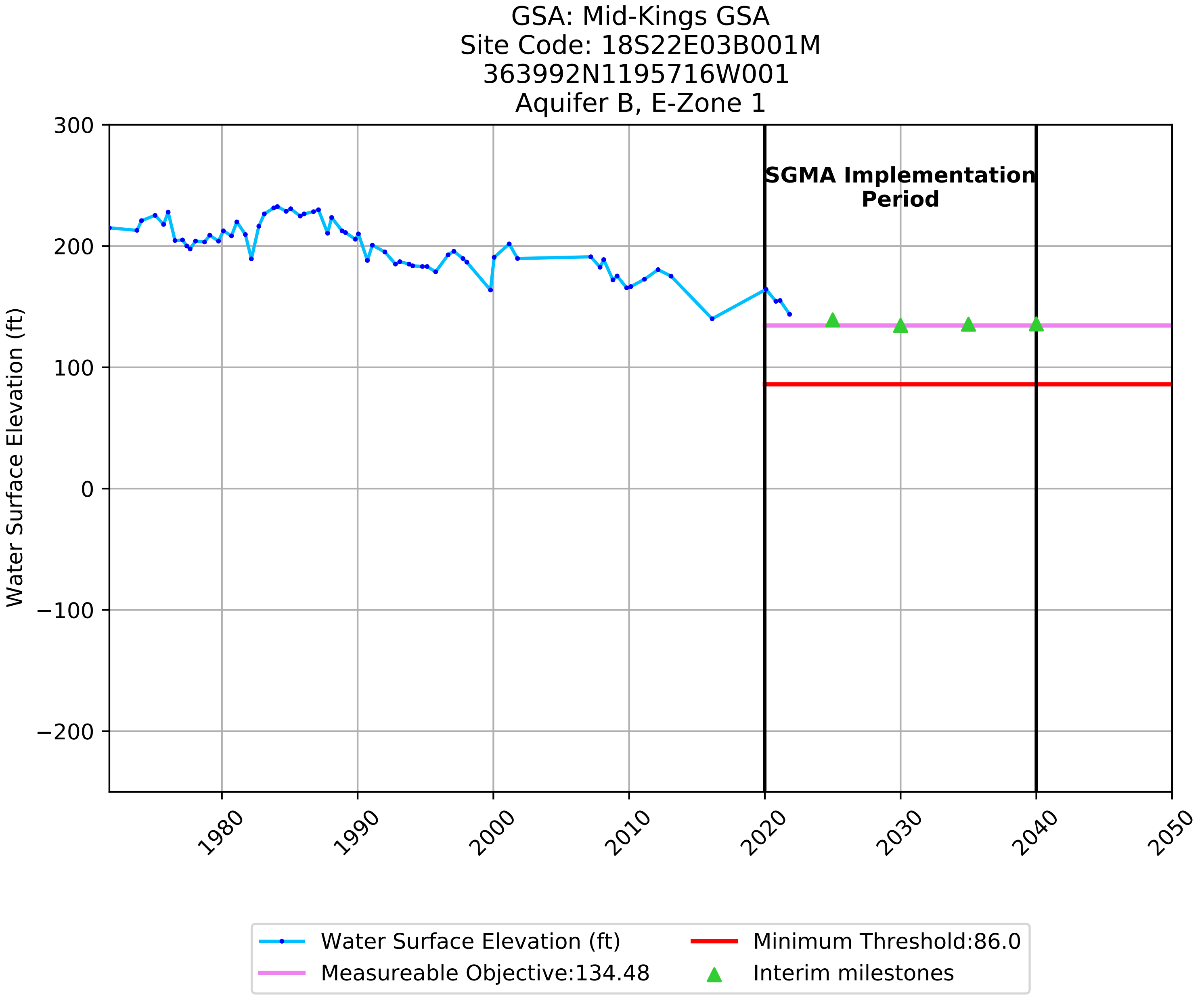
GSA: Mid-Kings GSA
GSP Well ID: 18S21E17N001M
Site Code: 363603N1197266W001
Aquifer A
SGMA Implementation Period
Water Surface Elevation (ft)
260
240
220
200
180
160
140
120
100
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:213.38
Minimum Threshold:163.38
Interim milestones



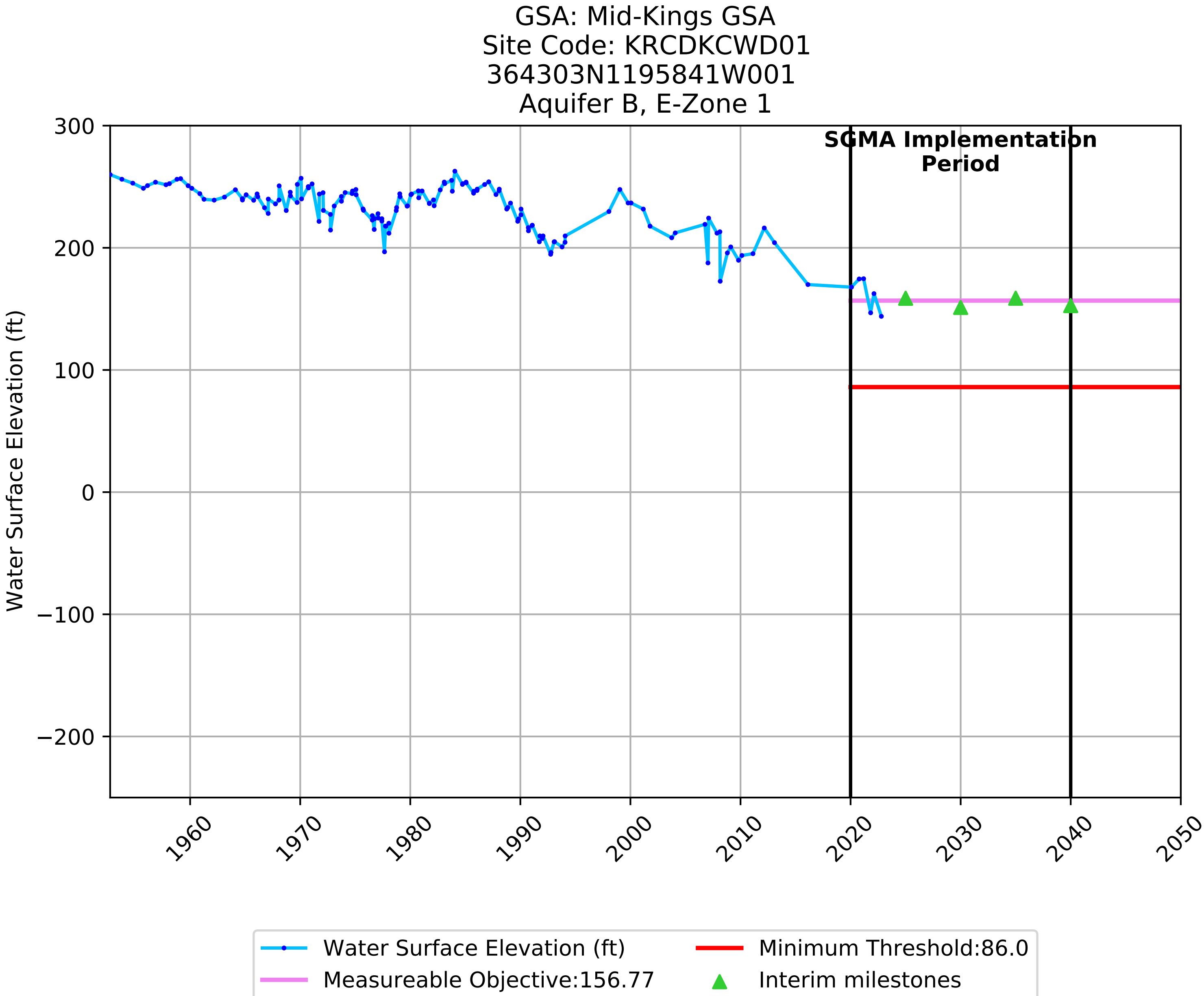
GSA: Mid-Kings GSA
Site Code: MW-A
364834N1195404W001
Aquifer B, E-Zone 1
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:253.5
Minimum Threshold:86.0
Interim milestones



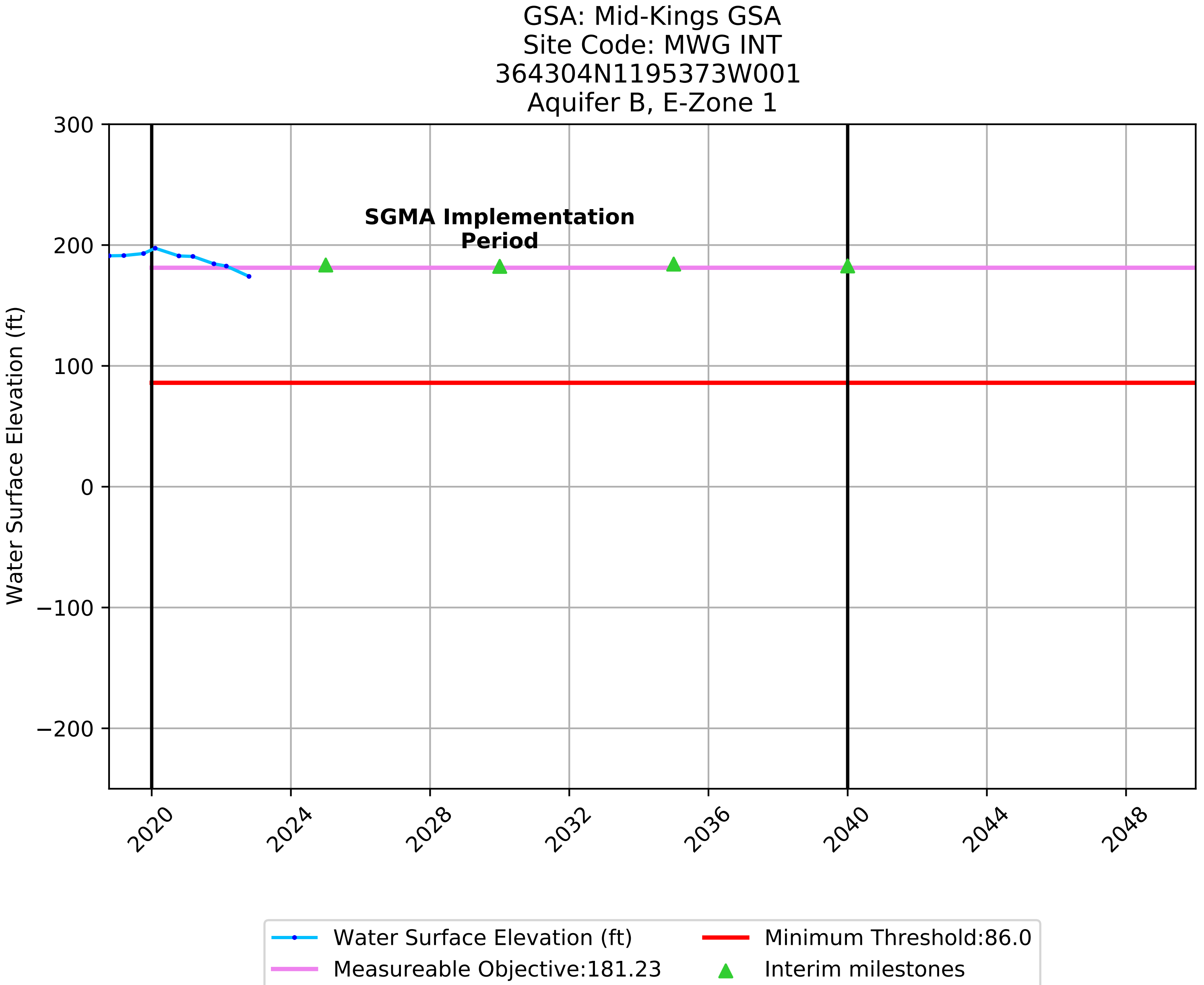
GSA: Mid-Kings GSA
Site Code: 18S22E24D001M
363572N1195468W001
Aquifer B, E-Zone 1
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
Water Surface Elevation (ft)
Measureable Objective:95.97
Minimum Threshold:86.0
Interim milestones



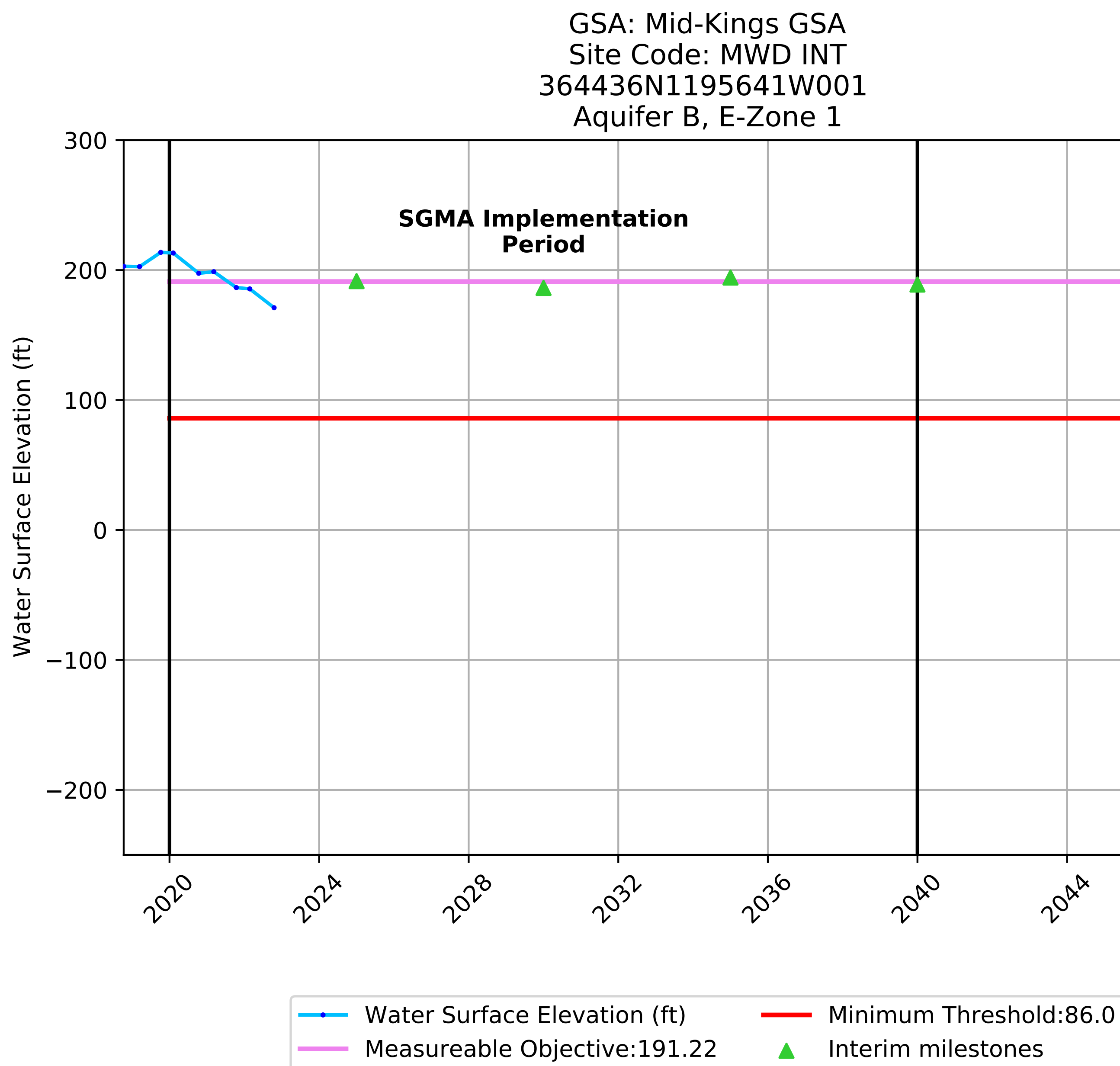
GSA: Mid-Kings GSA
Site Code: 18S22E03B001M
363992N1195716W001
Aquifer B, E-Zone 1
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
1980
1990
2000
2010
2020
2030
2040
2050
Water Surface Elevation (ft)
Measureable Objective:134.48
Minimum Threshold:86.0
Interim milestones



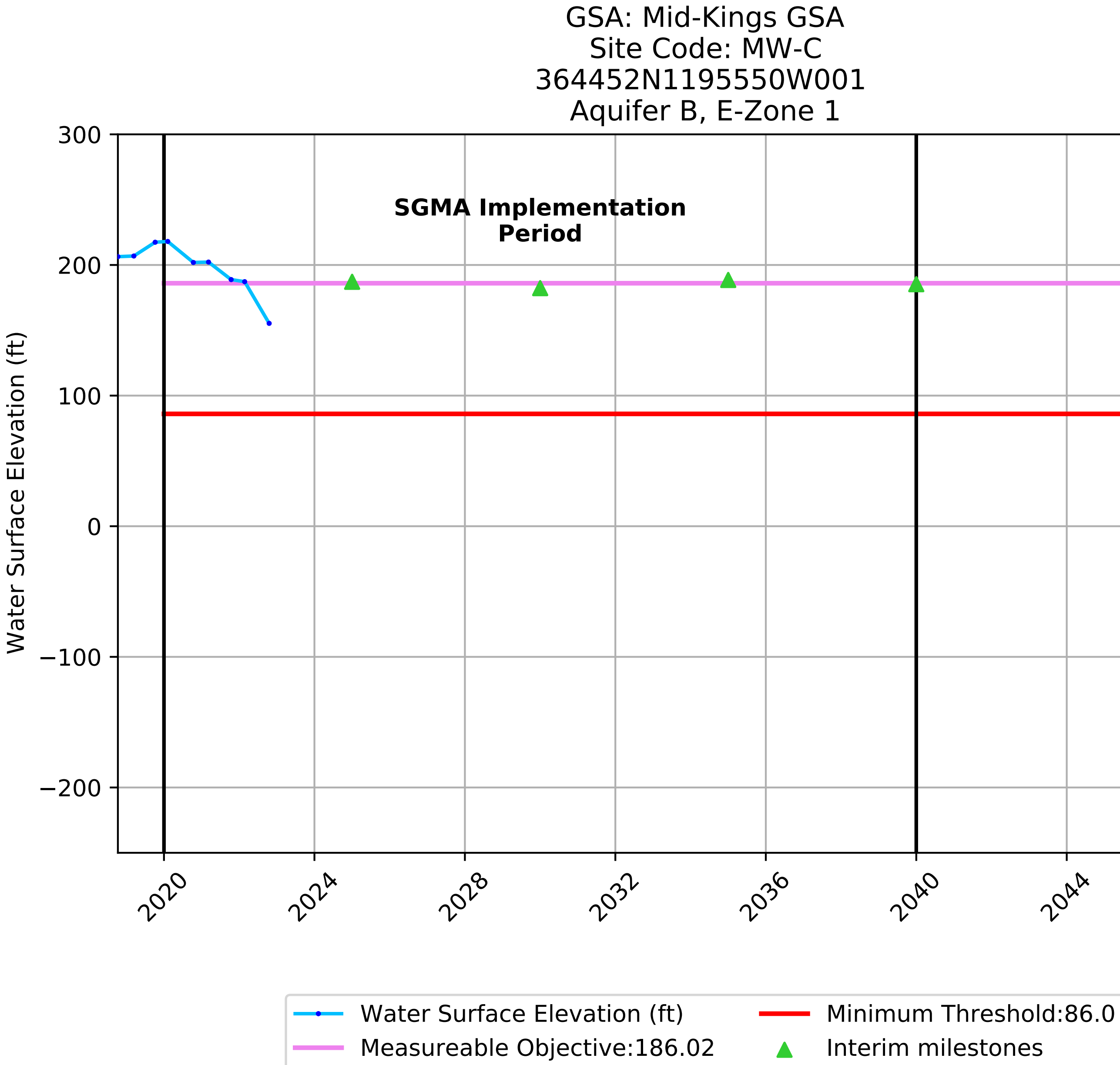
GSA: Mid-Kings GSA
Site Code: KRCDKCWD01
364303N1195841W001
Aquifer B, E-Zone 1
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
Water Surface Elevation (ft)
Measureable Objective:156.77
Minimum Threshold:86.0
Interim milestones



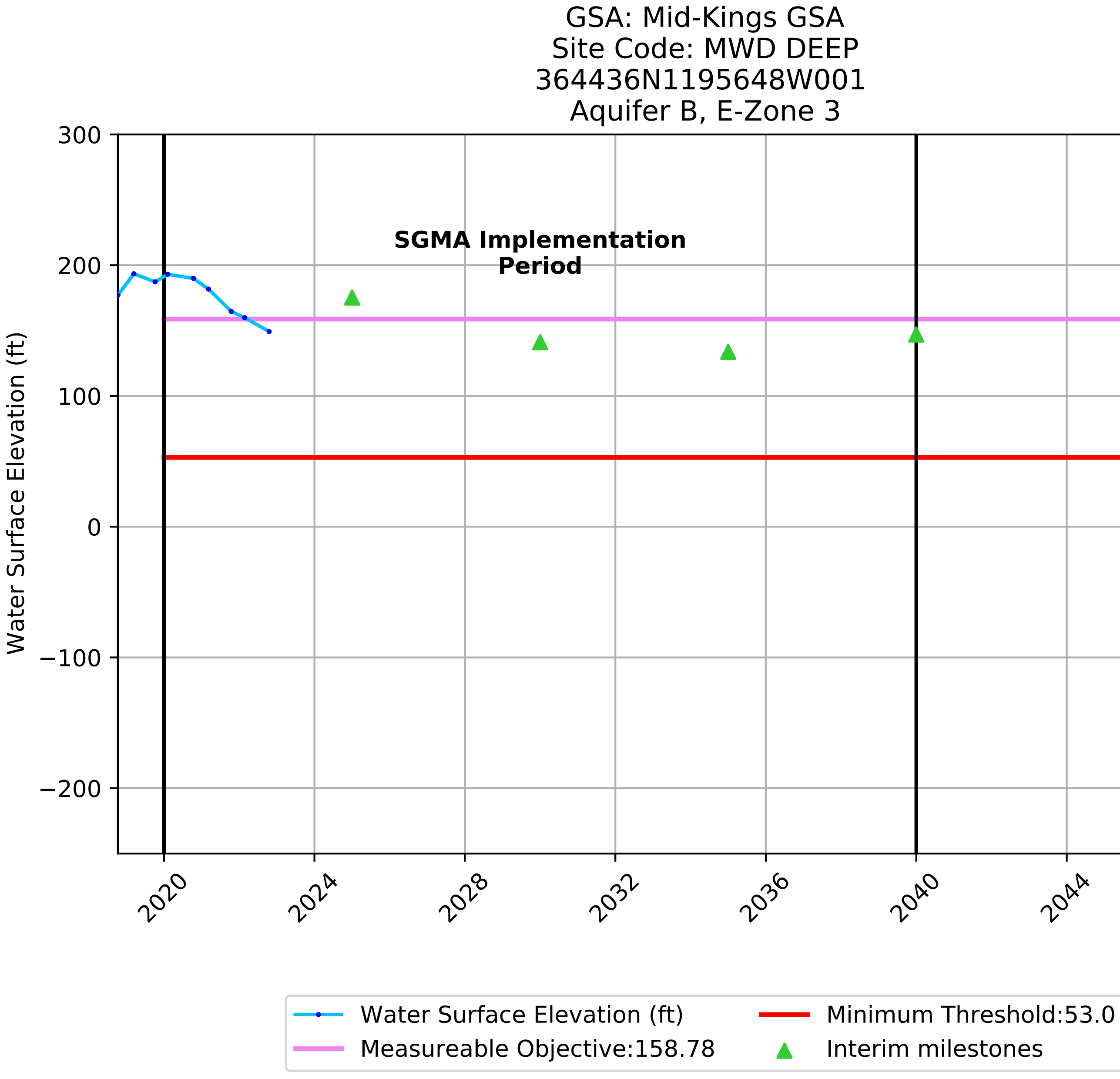
GSA: Mid-Kings GSA
Site Code: MWG INT
364304N1195373W001
Aquifer B, E-Zone 1
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:181.23
Minimum Threshold:86.0
Interim milestones

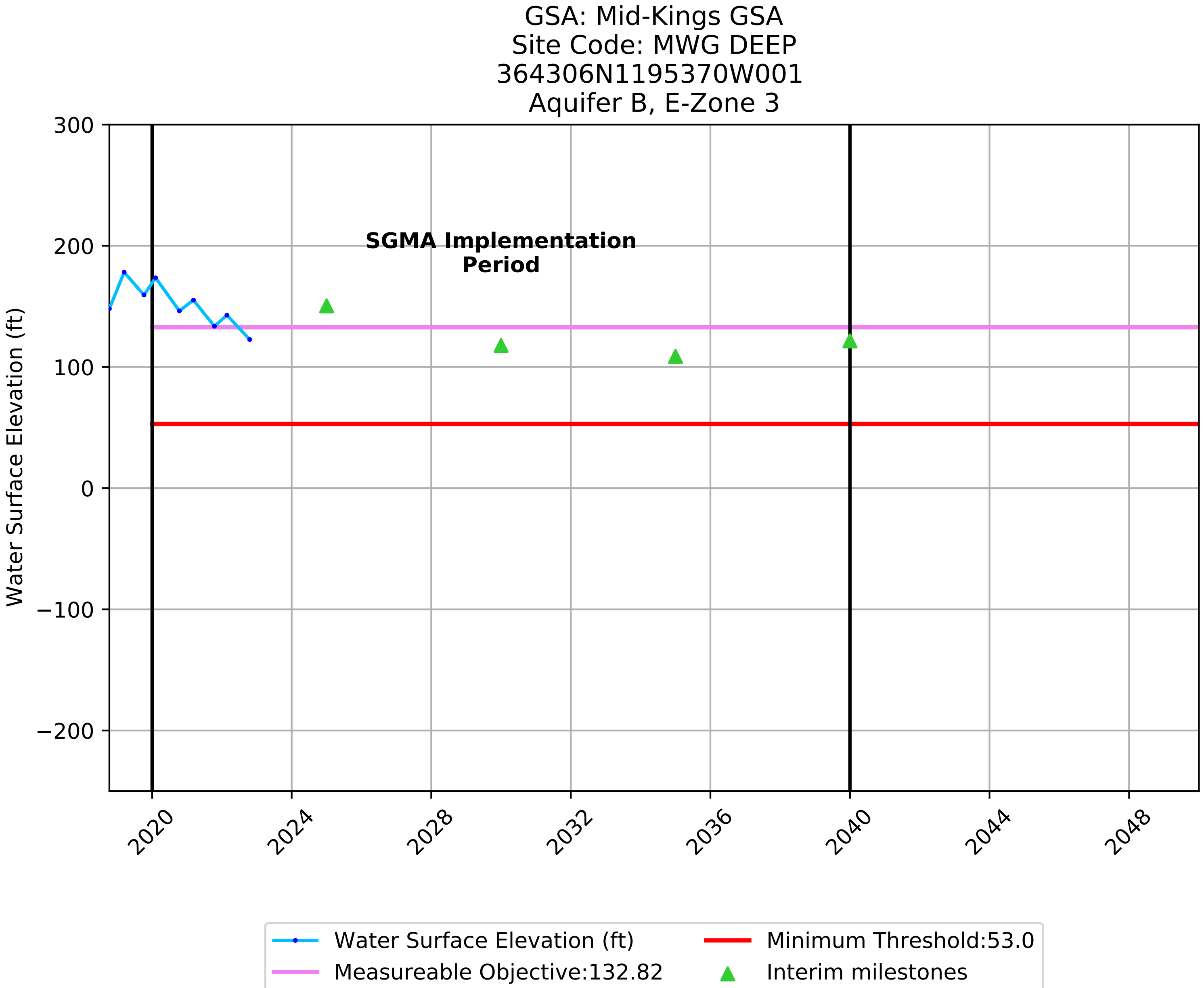


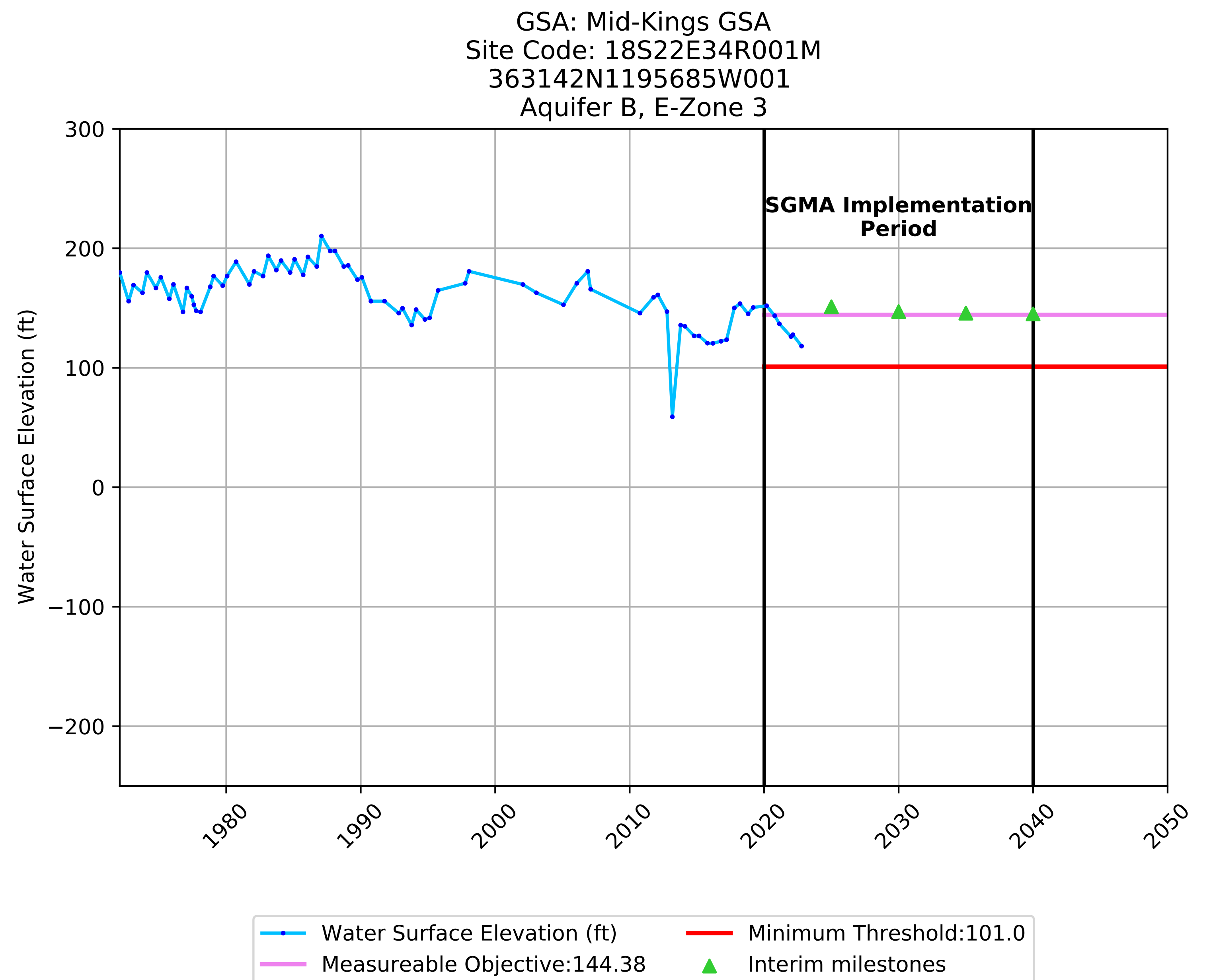
GSA: Mid-Kings GSA
Site Code: MWD INT
364436N1195641W001
Aquifer B, E-Zone 1
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:191.22
Minimum Threshold:86.0
Interim milestones



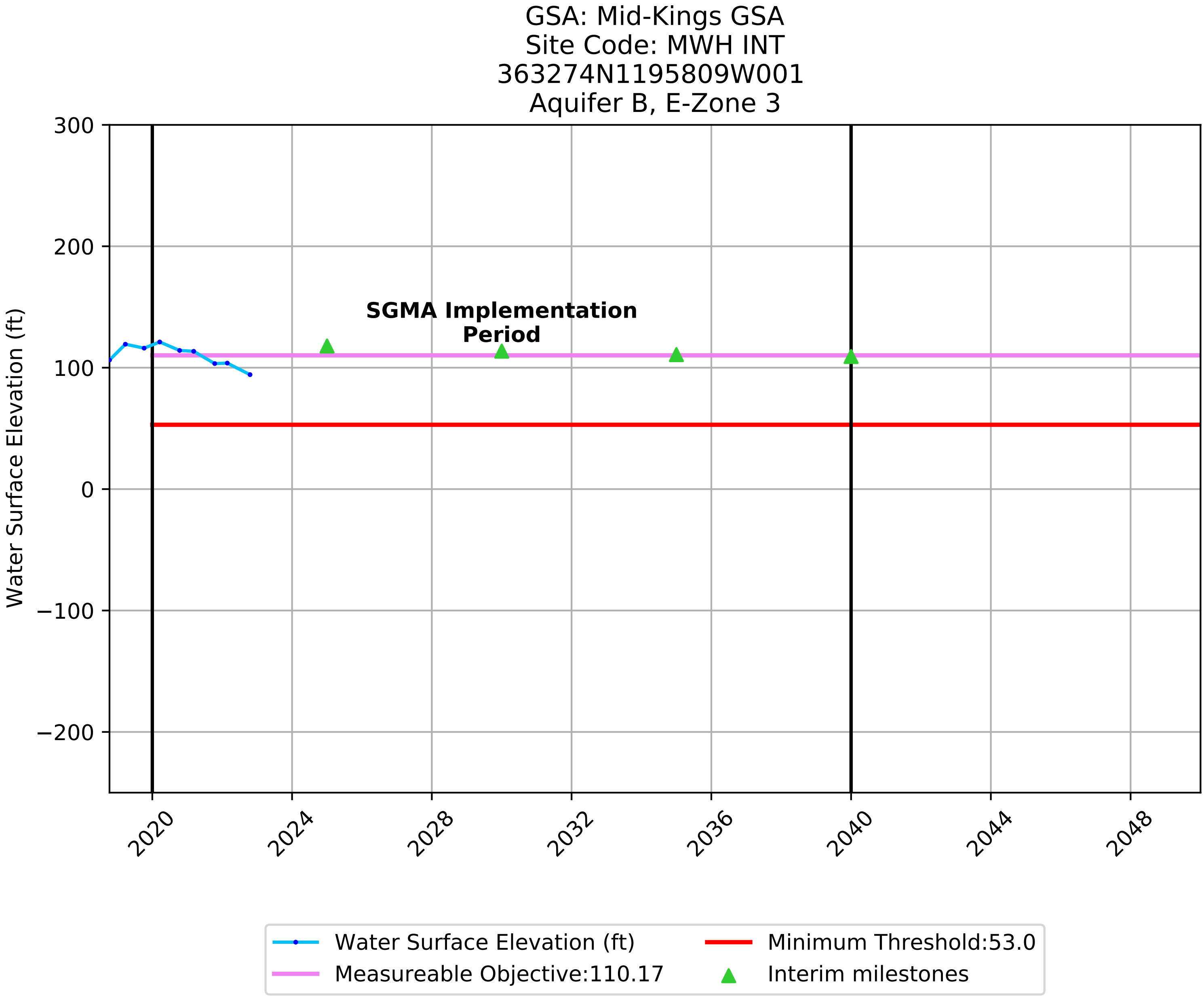
GSA: Mid-Kings GSA
Site Code: MW-C
364452N1195550W001
Aquifer B, E-Zone 1
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:186.02
Minimum Threshold:86.0
Interim milestones

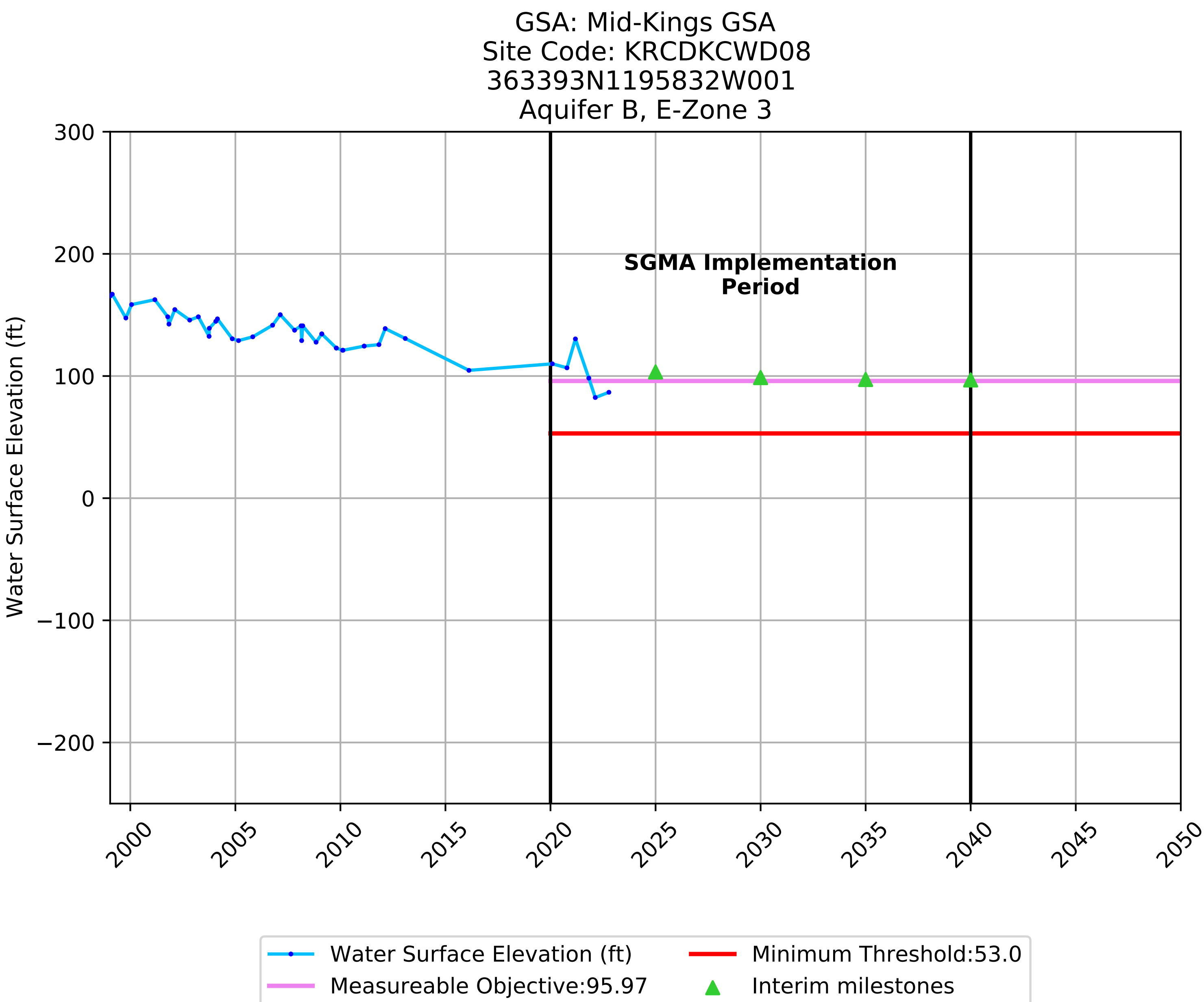

GSA: Mid-Kings GSA
Site Code: MWD DEEP
364436N1195648W001
Aquifer B, E-Zone 3
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:158.78
Minimum Threshold:53.0
Interim milestones

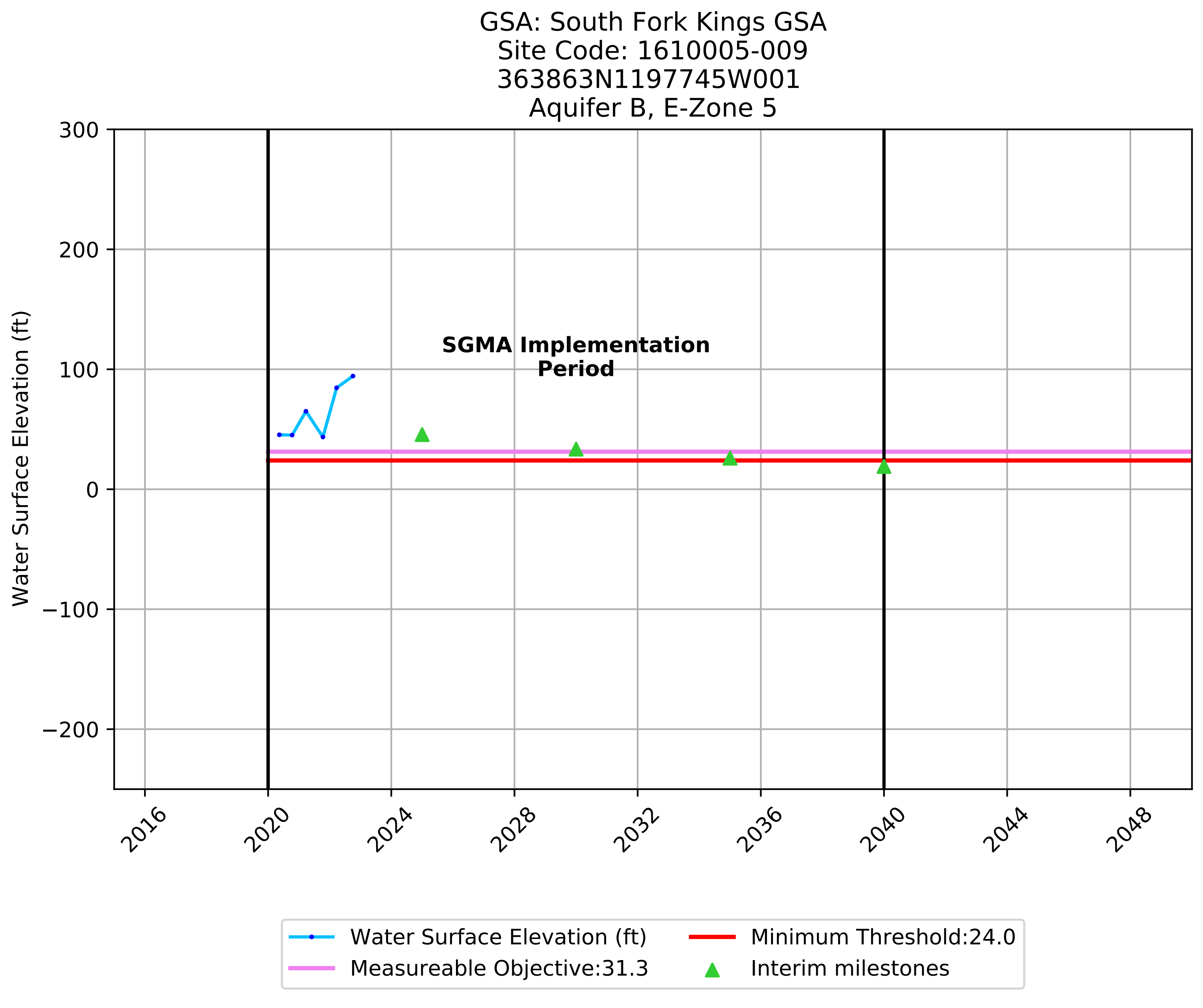

GSA: Mid-Kings GSA
Site Code: MWG DEEP
364306N1195370W001
Aquifer B, E-Zone 3
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:132.82
Minimum Threshold:53.0
Interim milestones



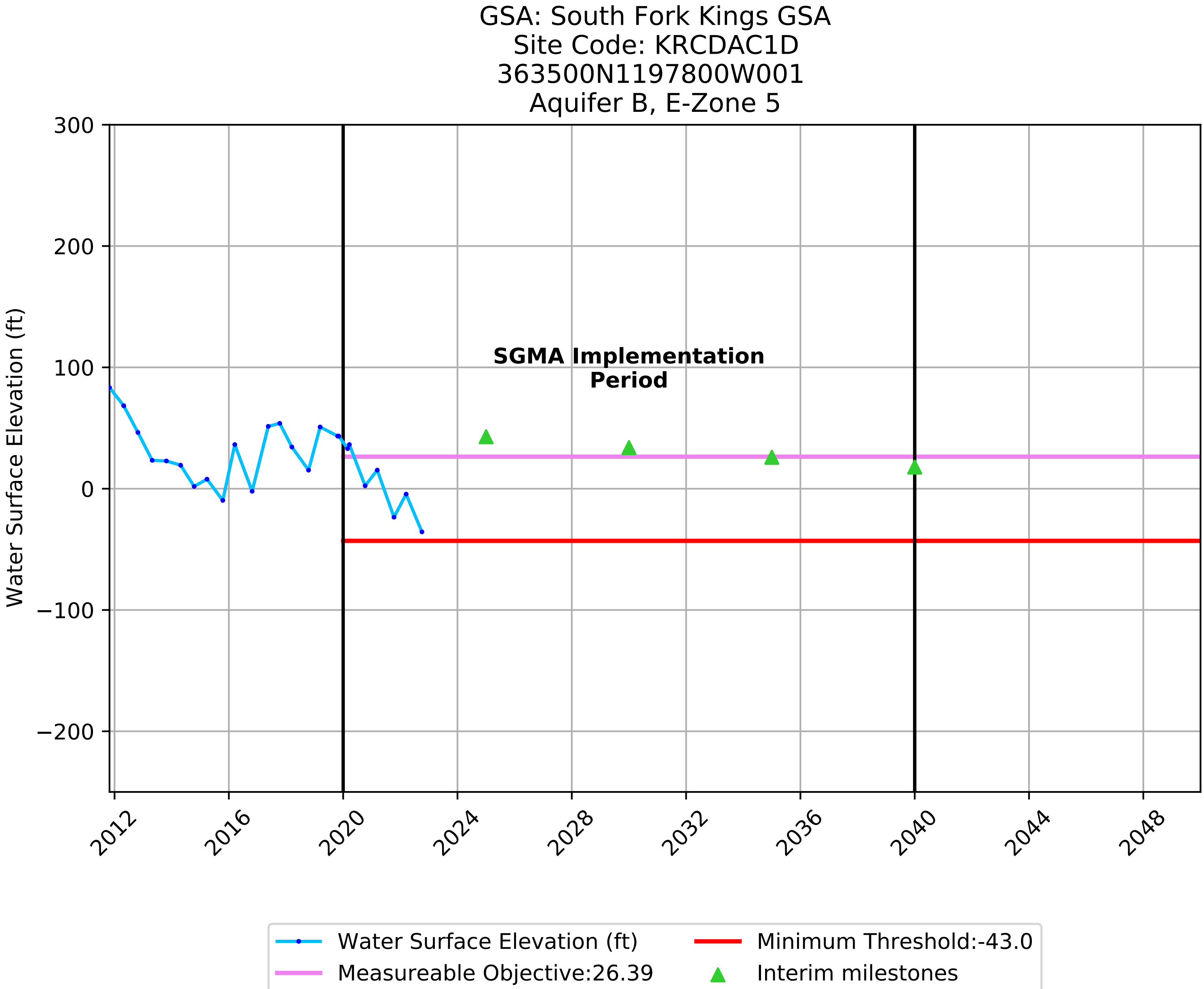
GSA: Mid-Kings GSA
Site Code: 18S22E34R001M
363142N1195685W001
Aquifer B, E-Zone 3
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
1980
1990
2000
2010
2020
2030
2040
2050
Water Surface Elevation (ft)
Measureable Objective:144.38
Minimum Threshold:101.0
Interim milestones

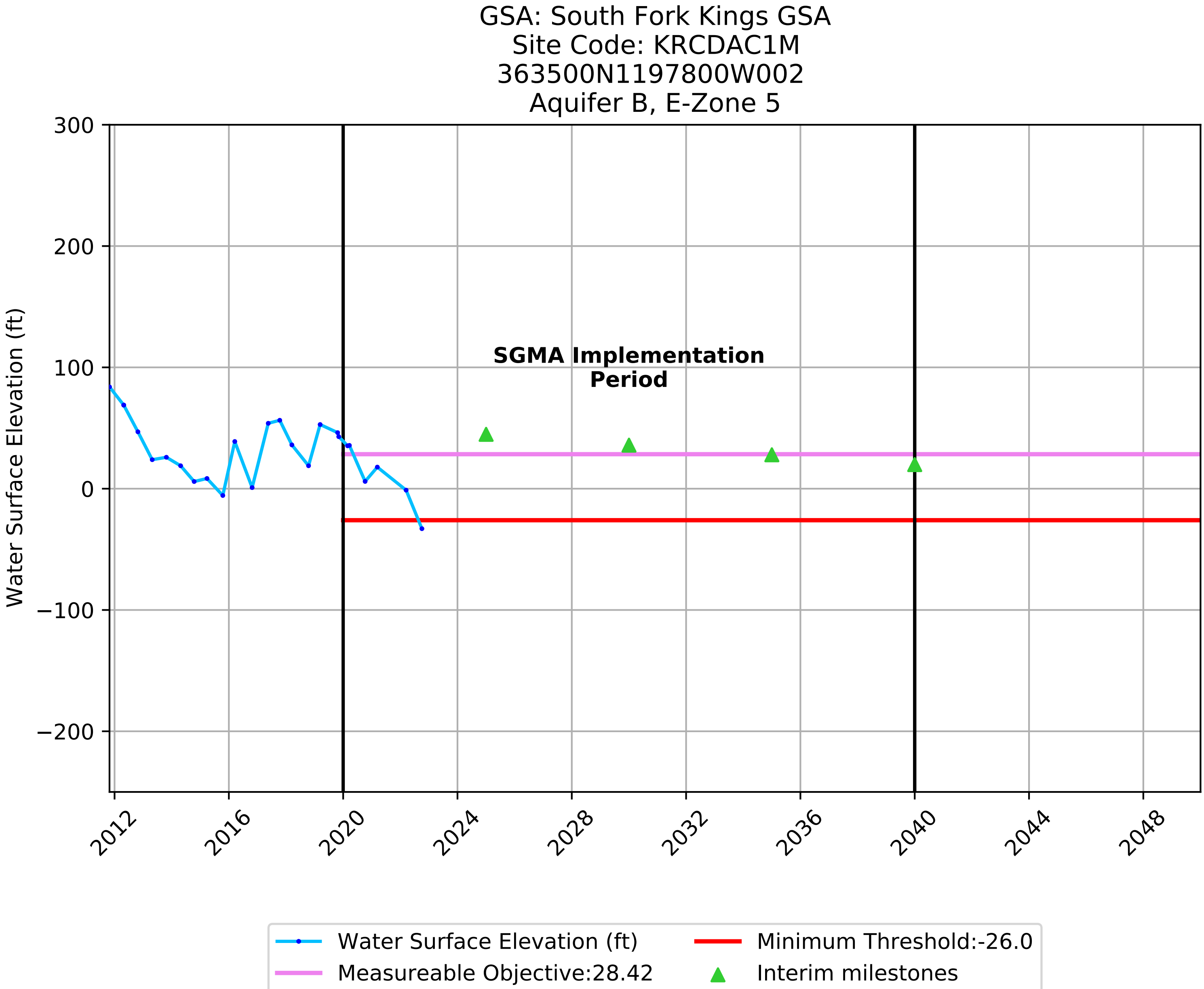

GSA: Mid-Kings GSA
Site Code: MWH INT
363274N1195809W001
Aquifer B, E-Zone 3
Water Surface Elevation (ft)
300
200
100
0
−100
−200
SGMA Implementation
Period
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:110.17
Minimum Threshold:53.0
Interim milestones


GSA: Mid-Kings GSA
Site Code: KRCDKCWD08
363393N1195832W001
Aquifer B, E-Zone 3
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2000
2005
2010
2015
2020
2025
2030
2035
2040
2045
2050
Water Surface Elevation (ft)
Measureable Objective:95.97
Minimum Threshold:53.0
Interim milestones

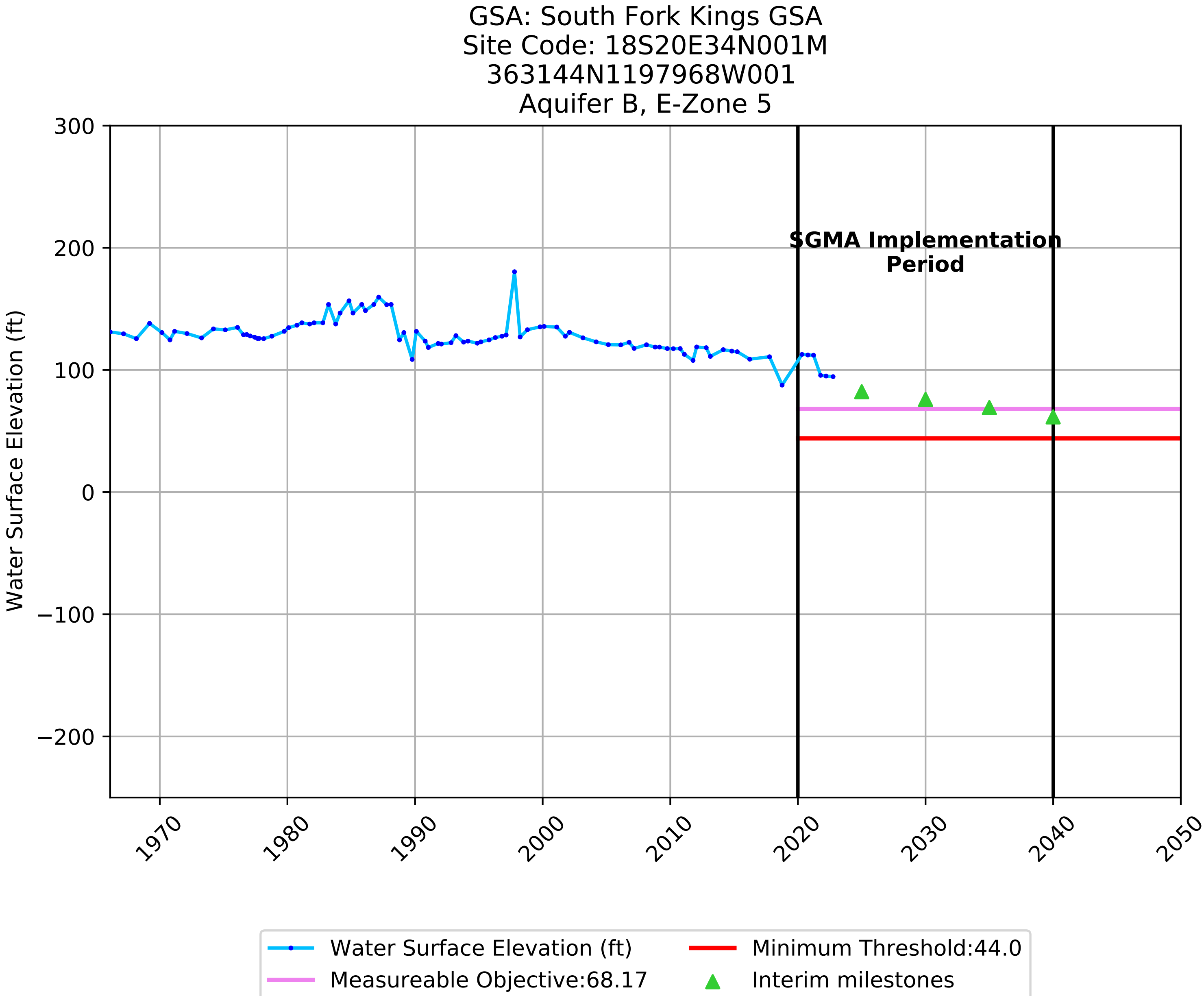


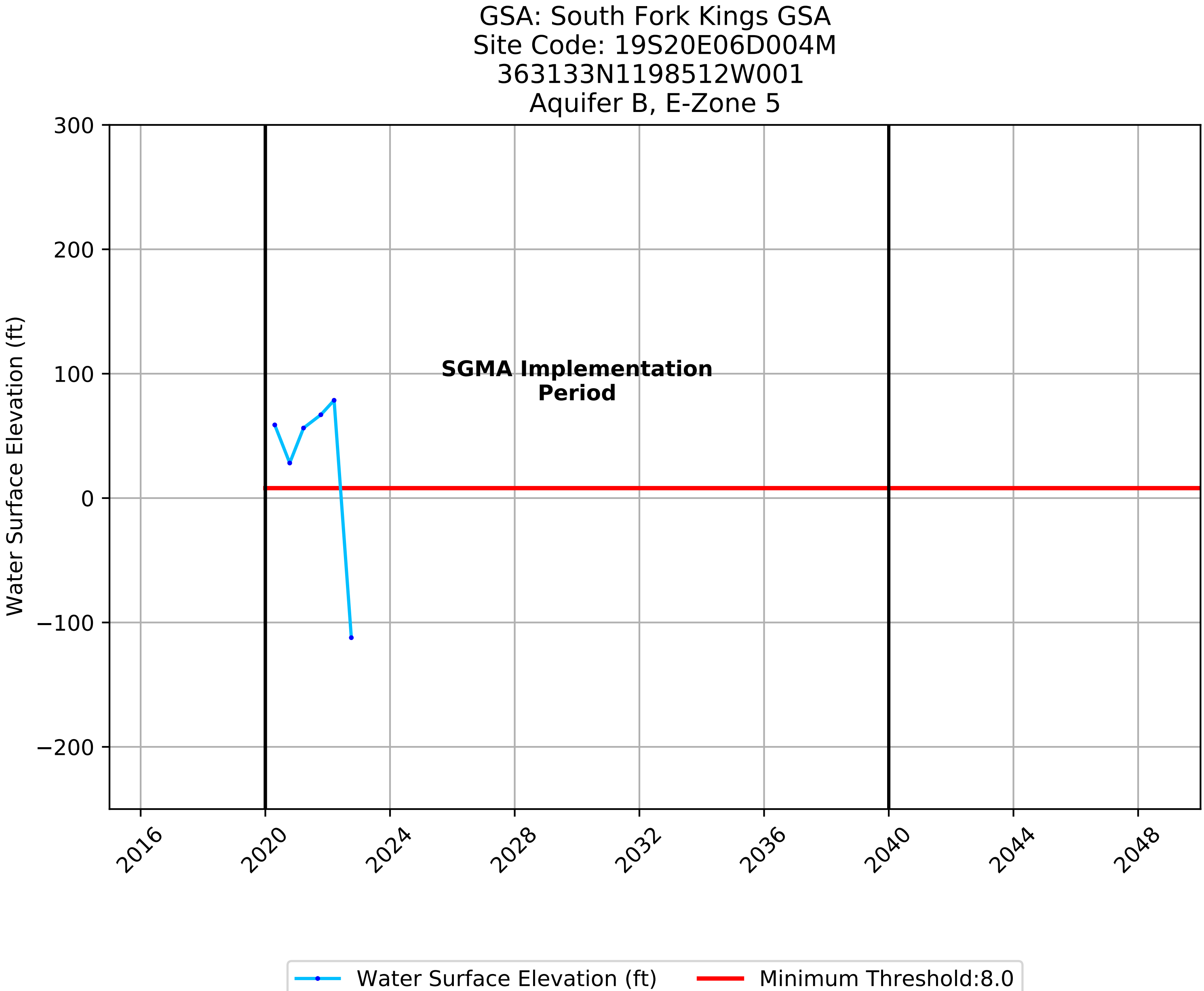
GSA: South Fork Kings GSA
Site Code: 1610005-009
363863N1197745W001
Aquifer B, E-Zone 5
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:31.3
Minimum Threshold:24.0
Interim milestones

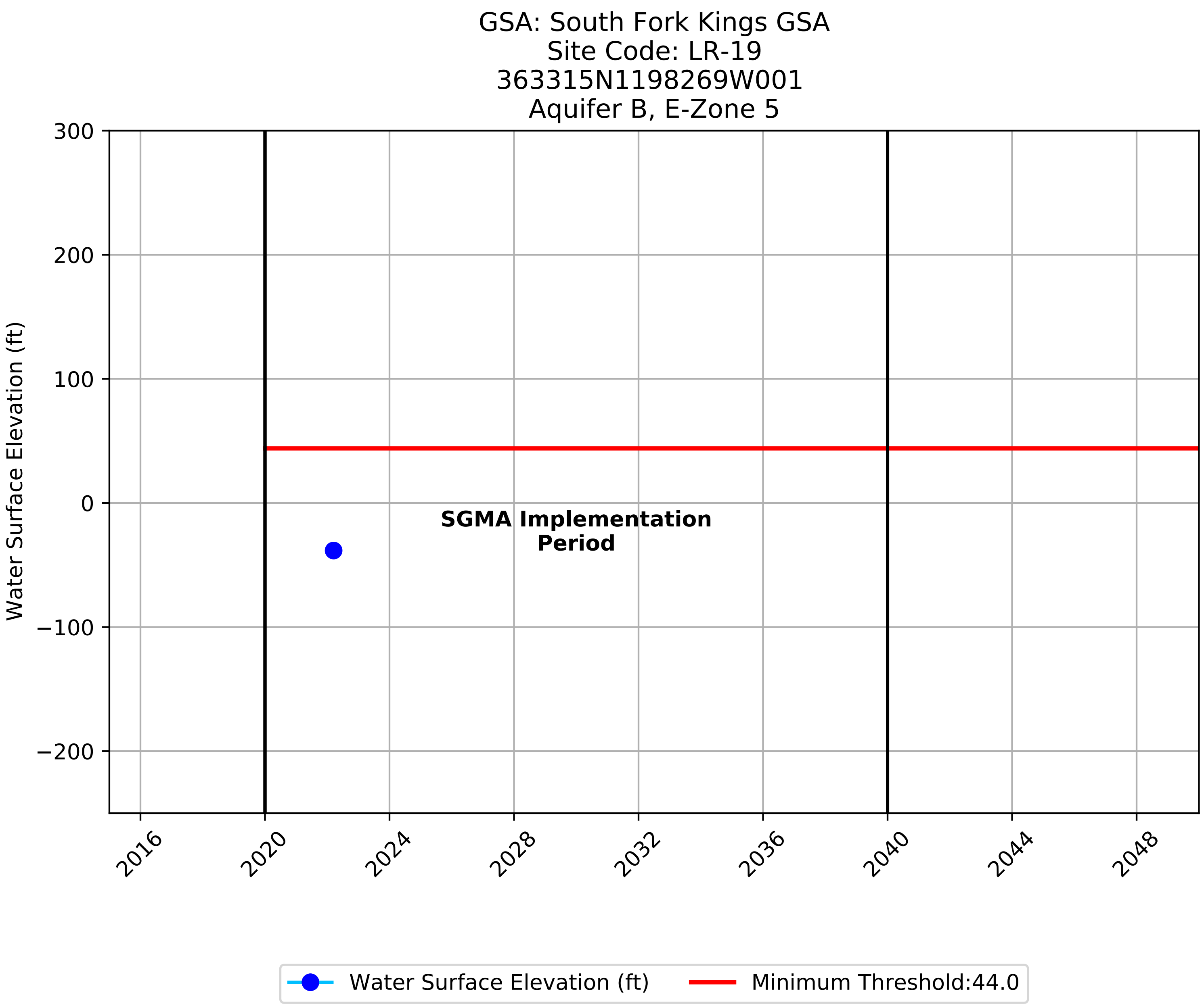

GSA: South Fork Kings GSA
Site Code: KRCDAC1D
363500N1197800W001
Aquifer B, E-Zone 5
Water Surface Elevation (ft)
SGMA Implementation Period
300
200
100
0
−100
−200
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:26.39
Minimum Threshold:-43.0
Interim milestones



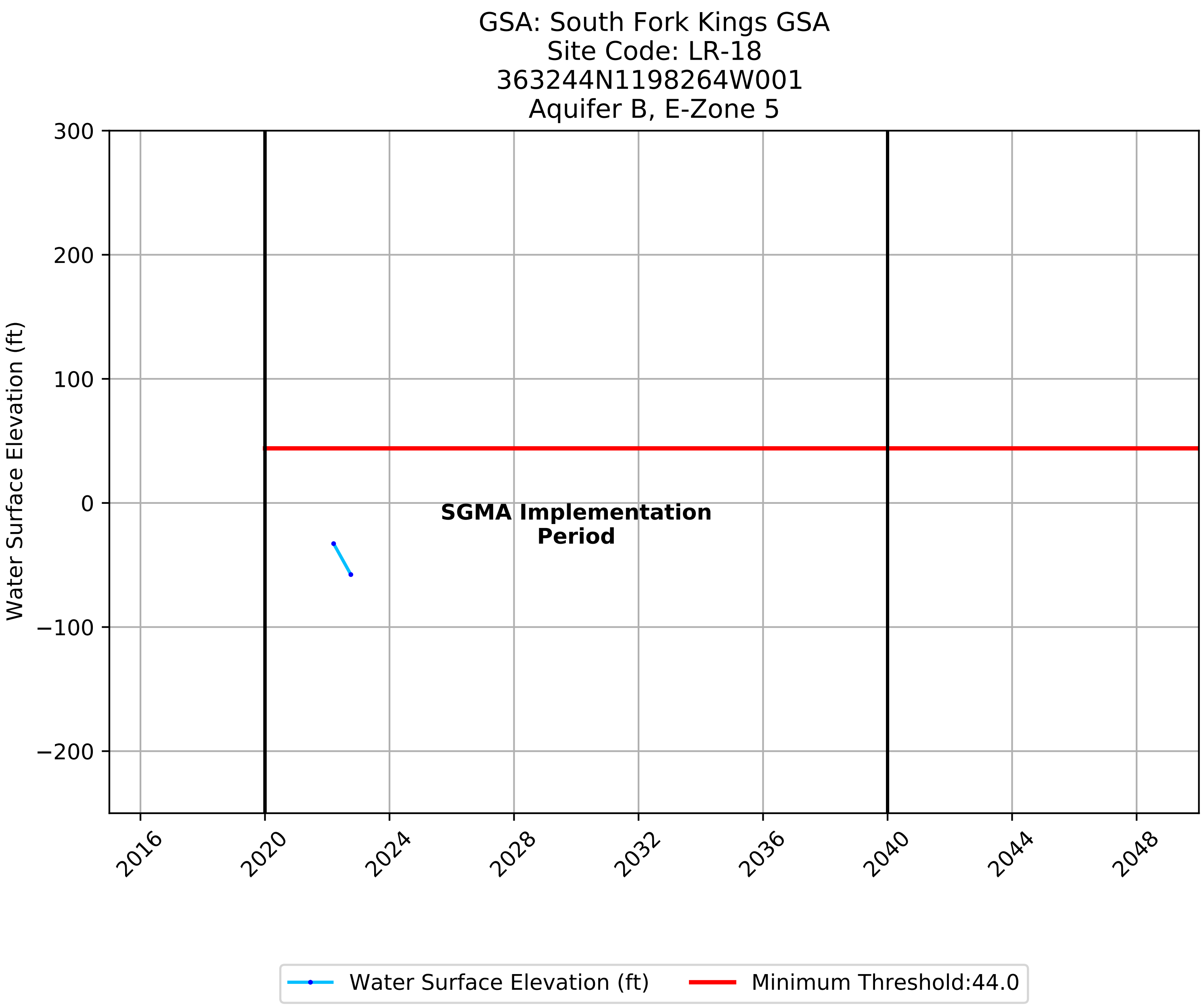
GSA: South Fork Kings GSA
Site Code: KRCDAC1M
363500N1197800W002
Aquifer B, E-Zone 5
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
SGMA Implementation Period
Water Surface Elevation (ft)
Minimum Threshold:-26.0
Measureable Objective:28.42
Interim milestones

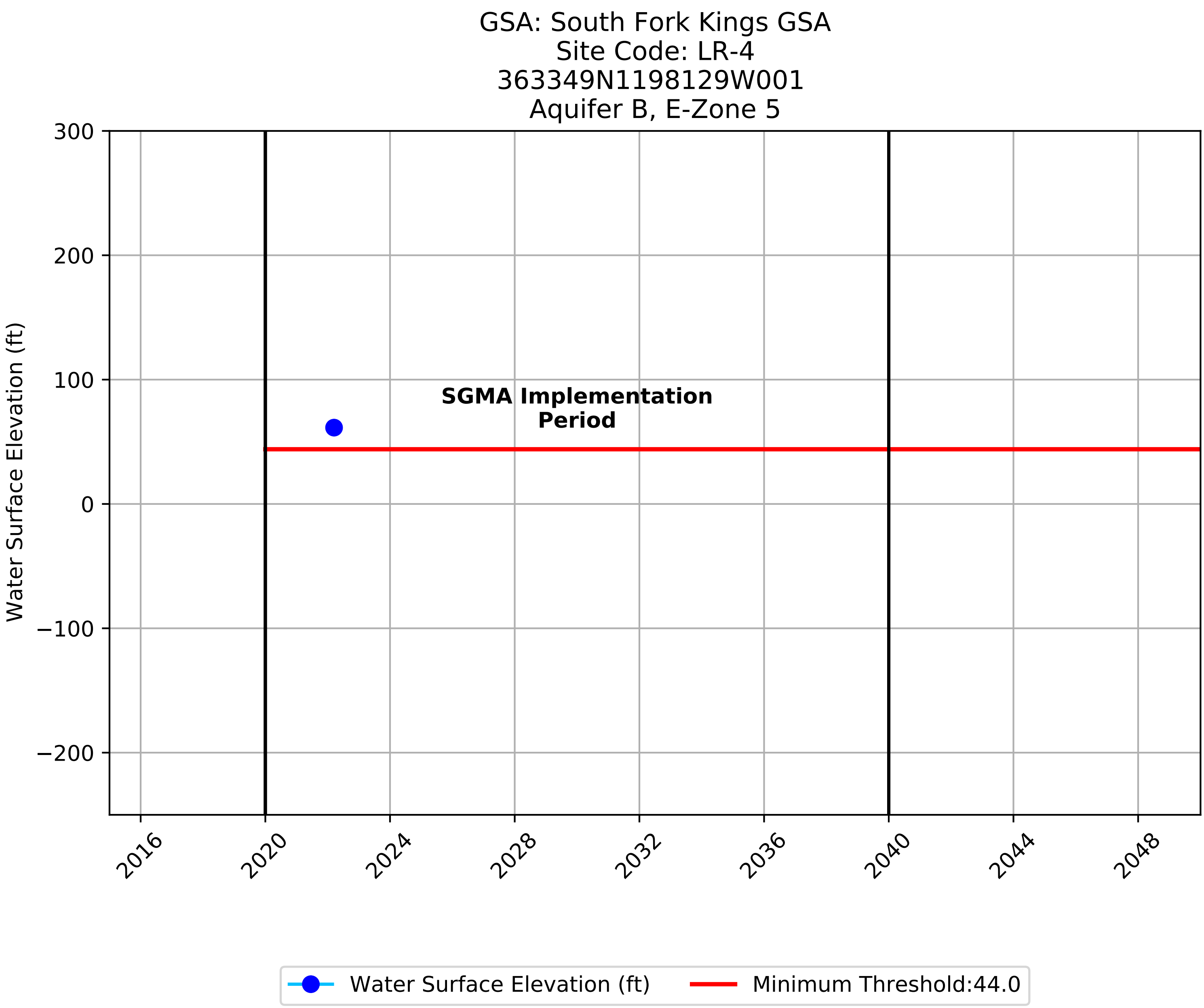

GSA: South Fork Kings GSA
Site Code: 18S20E34N001M
363144N1197968W001
Aquifer B, E-Zone 5
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
1970
1980
1990
2000
2010
2020
2030
2040
2050
Water Surface Elevation (ft)
Measureable Objective:68.17
Minimum Threshold:44.0
Interim milestones

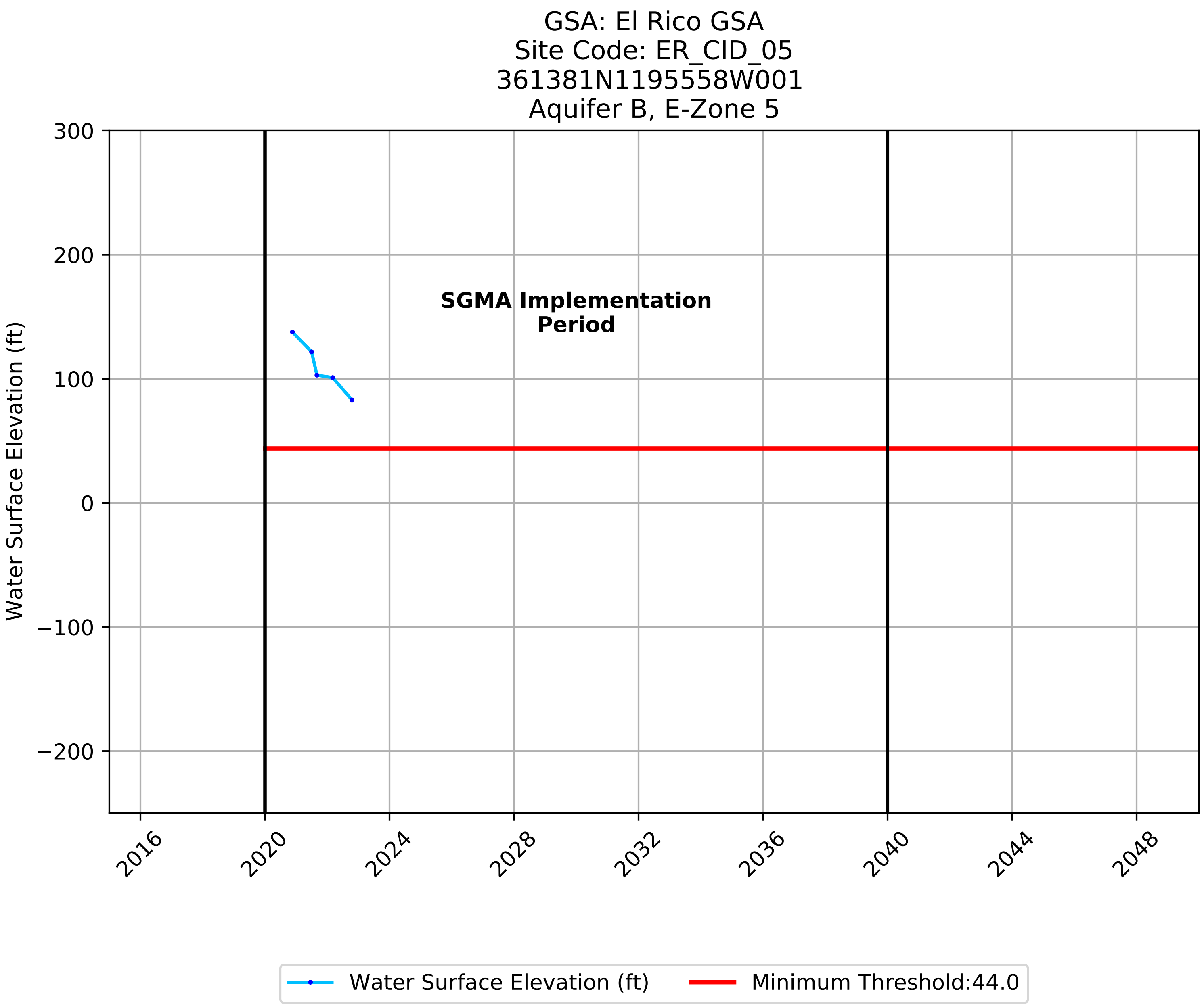

GSA: South Fork Kings GSA
Site Code: 19S20E06D004M
363133N1198512W001
Aquifer B, E-Zone 5
Water Surface Elevation (ft)
SGMA Implementation Period
300
200
100
0
−100
−200
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Minimum Threshold:8.0



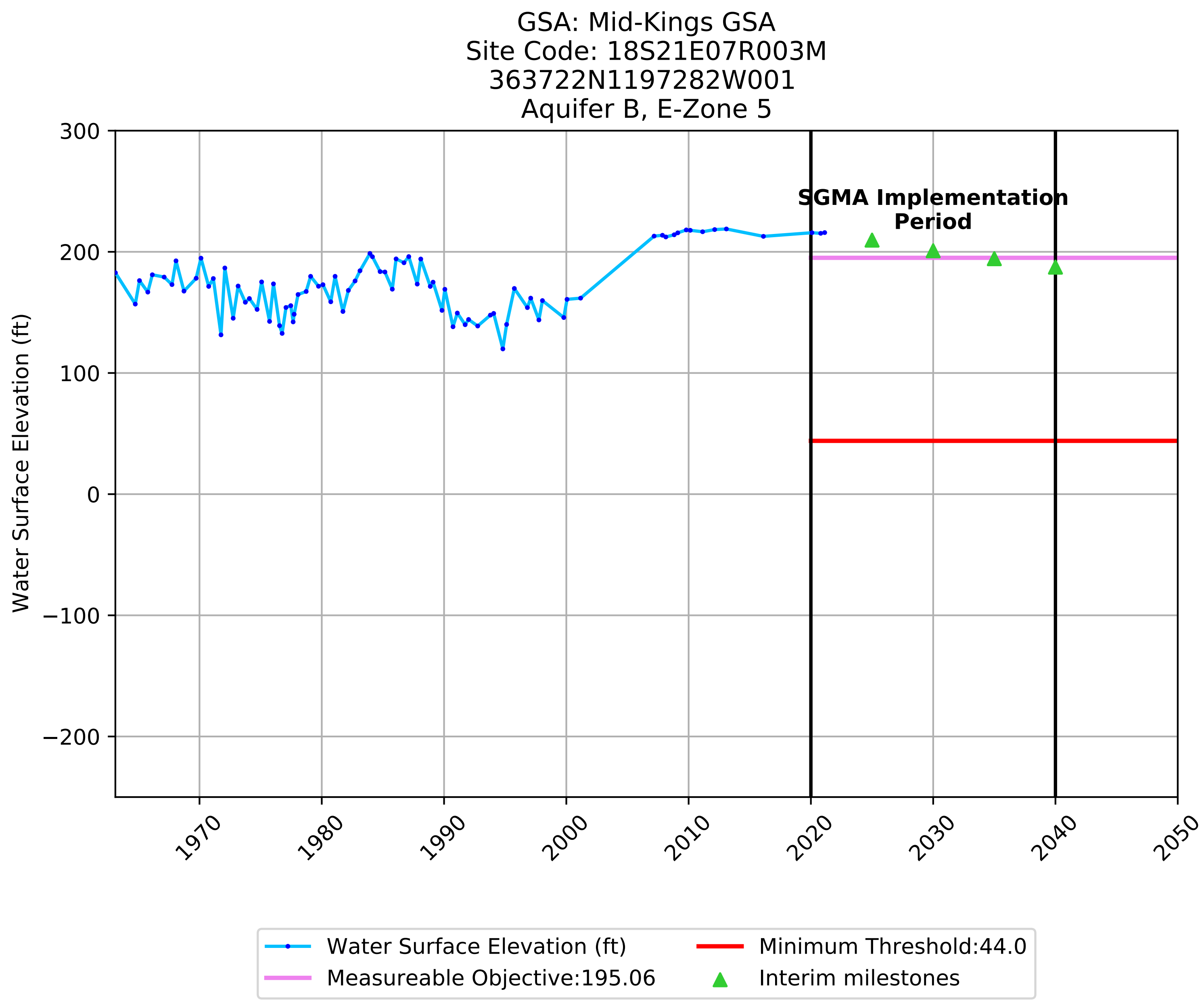
GSA: South Fork Kings GSA
Site Code: LR-19
363315N1198269W001
Aquifer B, E-Zone 5
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2016
2020
2024
2028
2032
2036
2040
2044
2048
SGMA Implementation Period
Water Surface Elevation (ft)
Minimum Threshold:44.0


GSA: South Fork Kings GSA
Site Code: LR-18
363244N1198264W001
Aquifer B, E-Zone 5
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2016
2020
2024
2028
2032
2036
2040
2044
2048
SGMA Implementation Period
Water Surface Elevation (ft)
Minimum Threshold:44.0

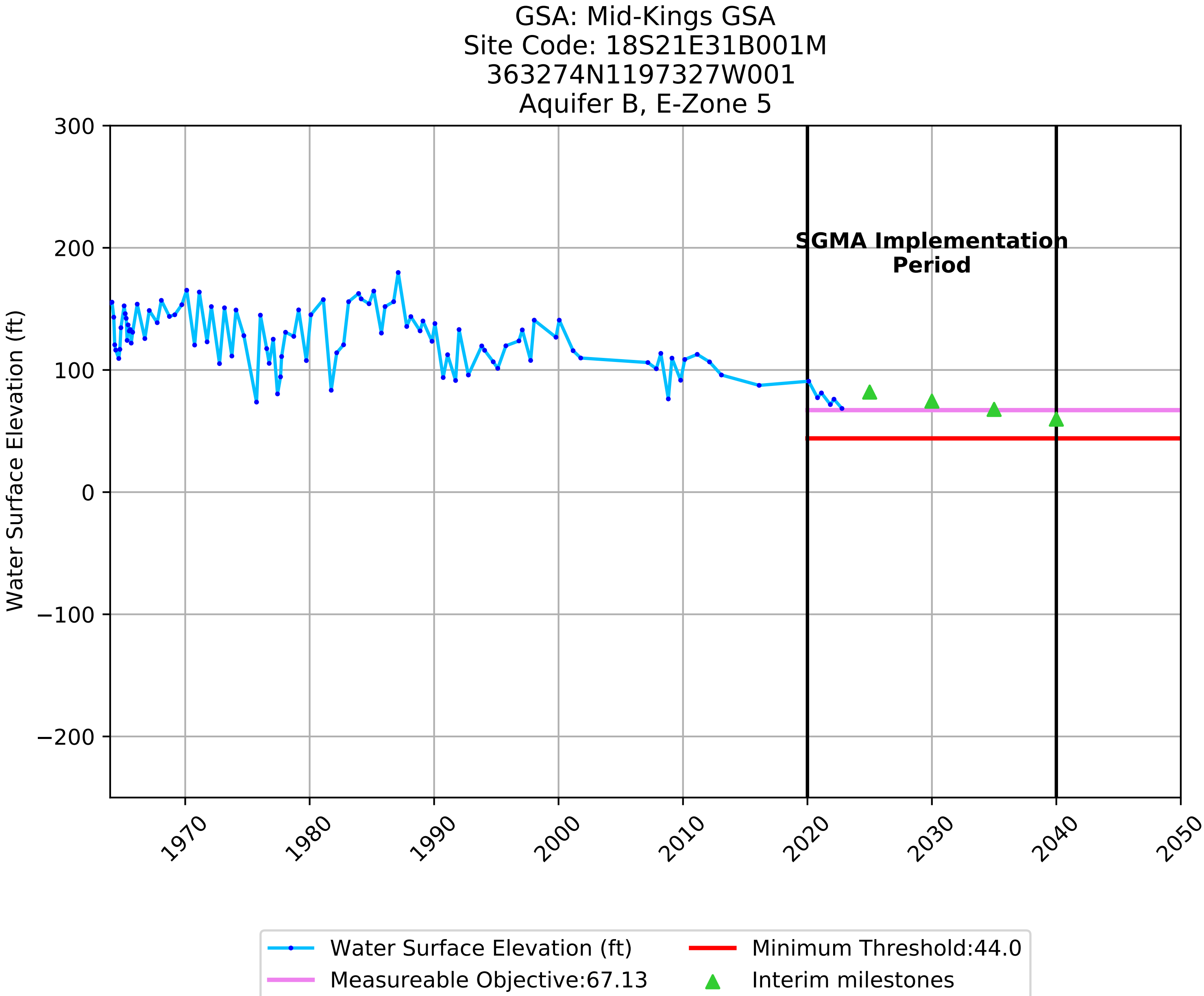

GSA: South Fork Kings GSA
Site Code: LR-4
363349N1198129W001
Aquifer B, E-Zone 5
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2016
2020
2024
2028
2032
2036
2040
2044
2048
SGMA Implementation Period
Water Surface Elevation (ft)
Minimum Threshold:44.0



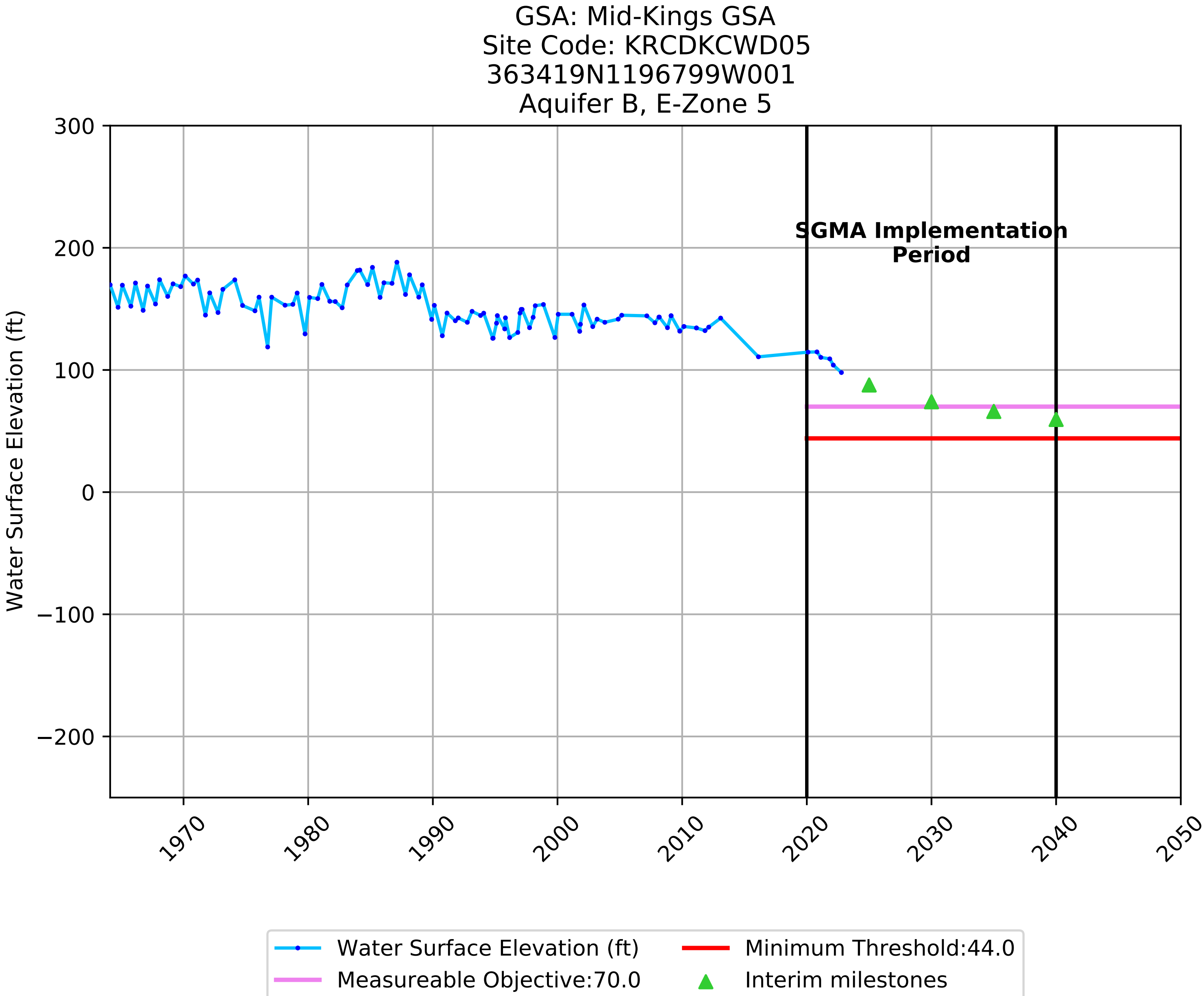
GSA: El Rico GSA
Site Code: ER_CID_05
361381N1195558W001
Aquifer B, E-Zone 5
SGMA Implementation
Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Minimum Threshold:44.0

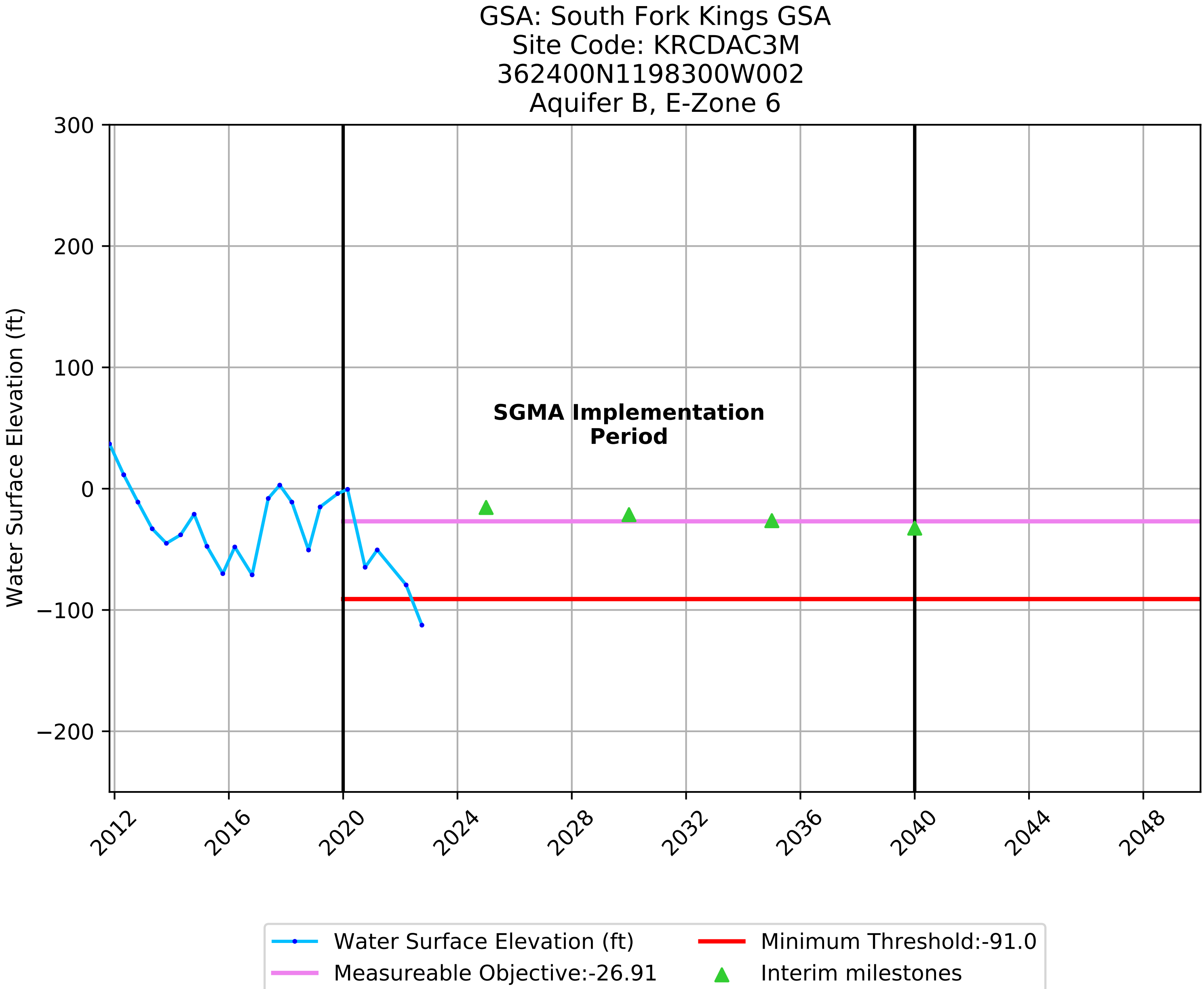


GSA: Mid-Kings GSA
Site Code: 18S21E07R003M
363722N1197282W001
Aquifer B, E-Zone 5
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
1970
1980
1990
2000
2010
2020
2030
2040
2050
Water Surface Elevation (ft)
Measureable Objective:195.06
Minimum Threshold:44.0
Interim milestones

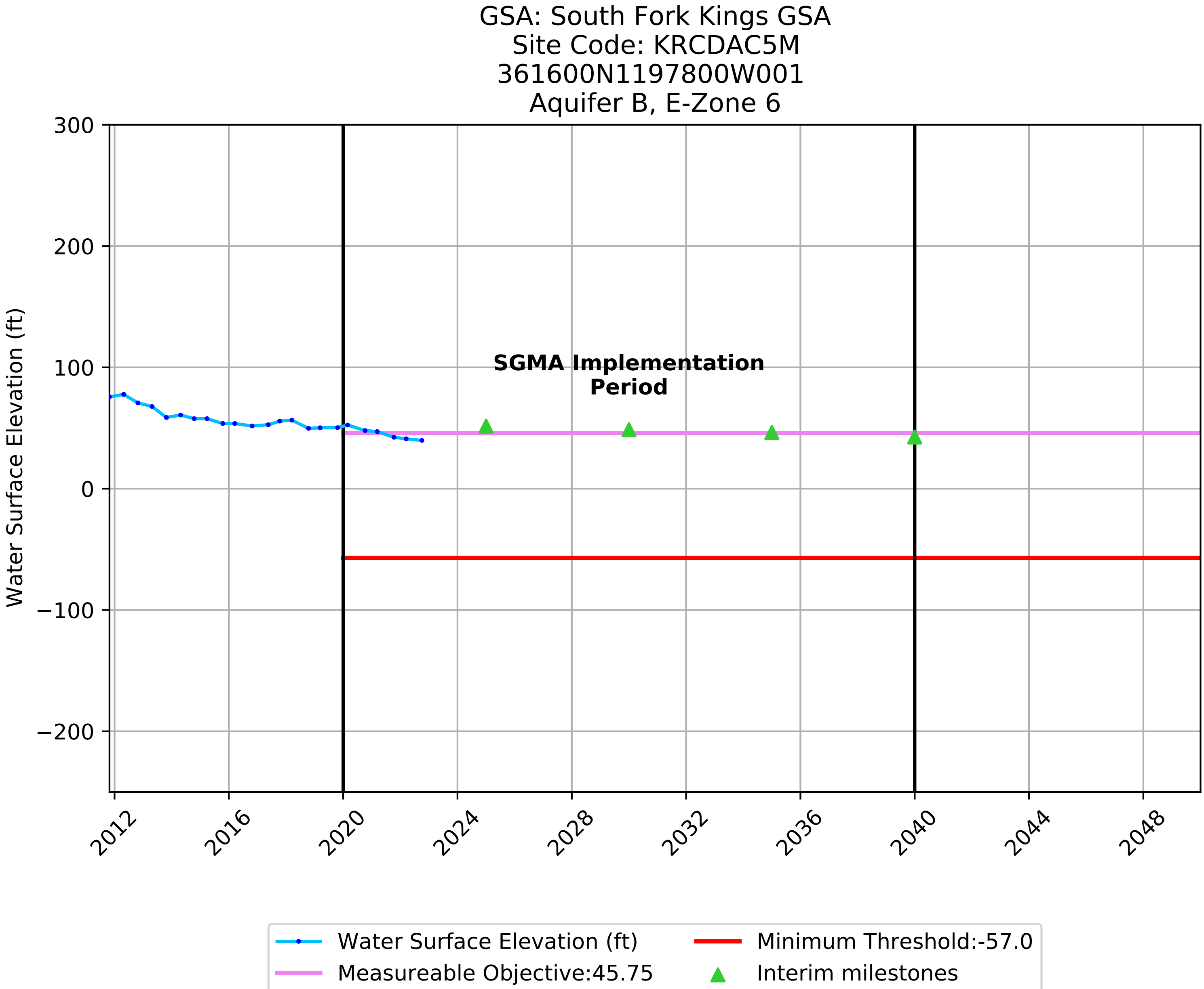


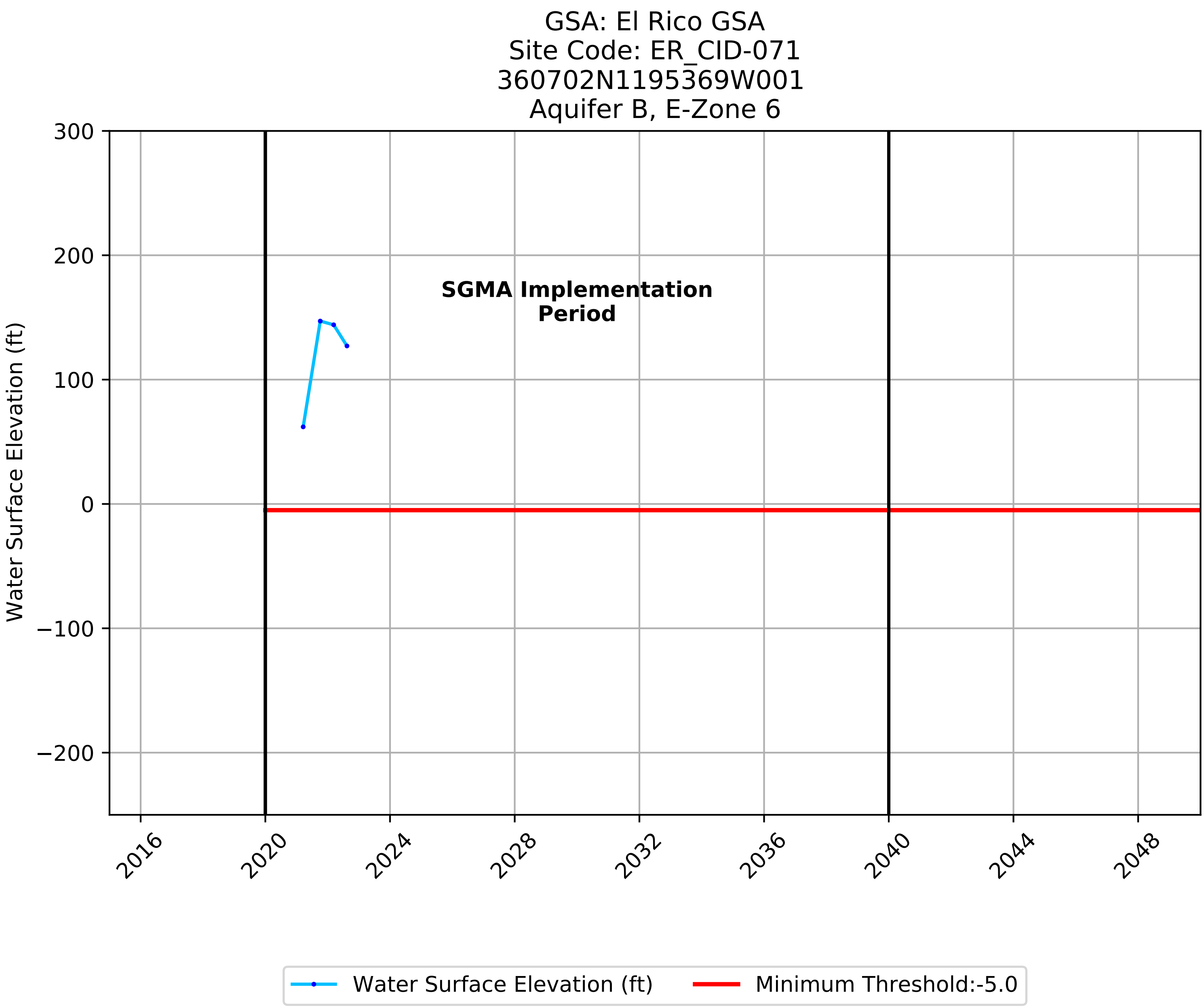
GSA: Mid-Kings GSA
Site Code: 18S21E31B001M
363274N1197327W001
Aquifer B, E-Zone 5
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
1970
1980
1990
2000
2010
2020
2030
2040
2050
Water Surface Elevation (ft)
Measureable Objective:67.13
Minimum Threshold:44.0
Interim milestones


GSA: Mid-Kings GSA
Site Code: KRCDKCWD05
363419N1196799W001
Aquifer B, E-Zone 5
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
1970
1980
1990
2000
2010
2020
2030
2040
2050
Water Surface Elevation (ft)
Measureable Objective:70.0
Minimum Threshold:44.0
Interim milestones

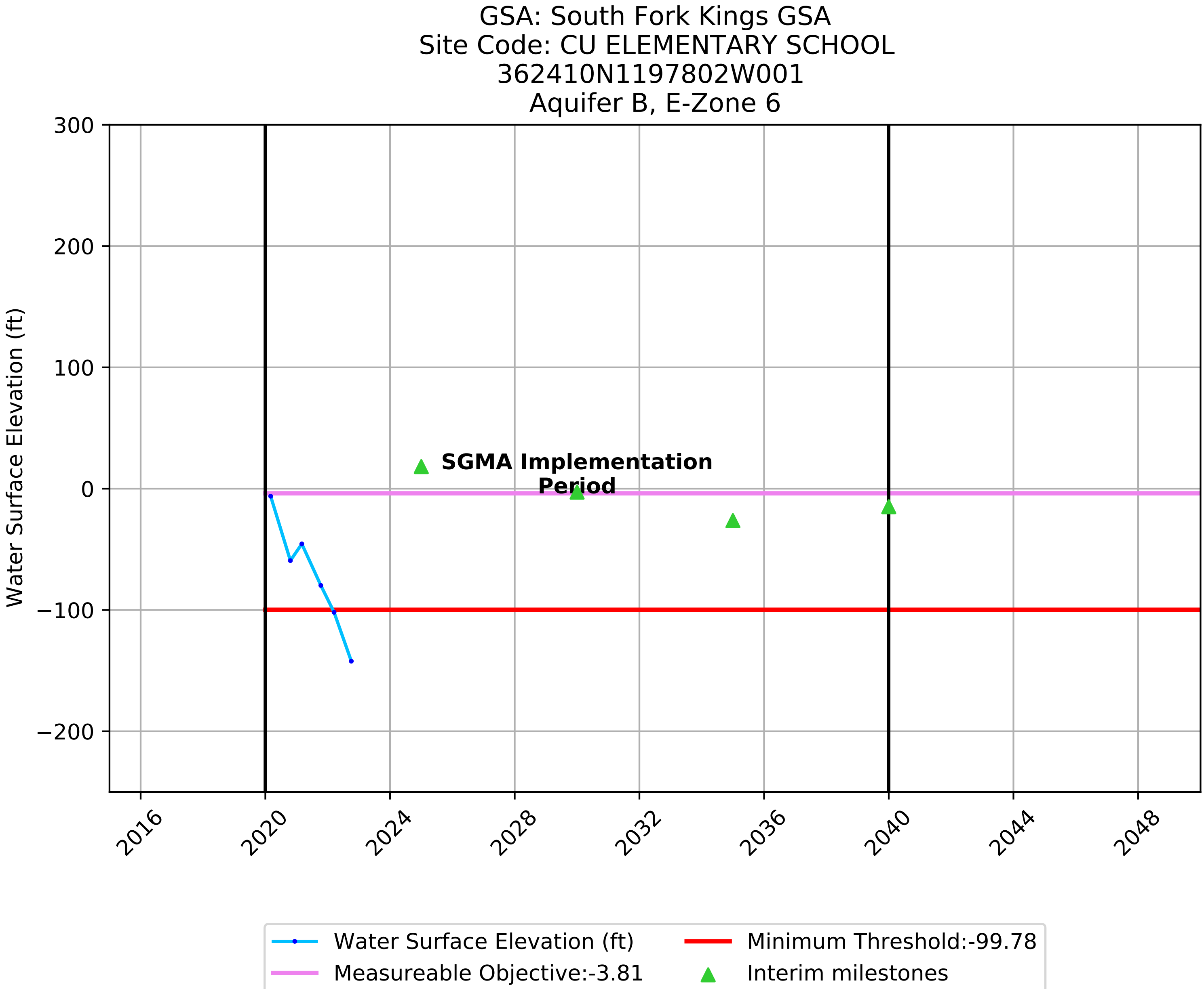


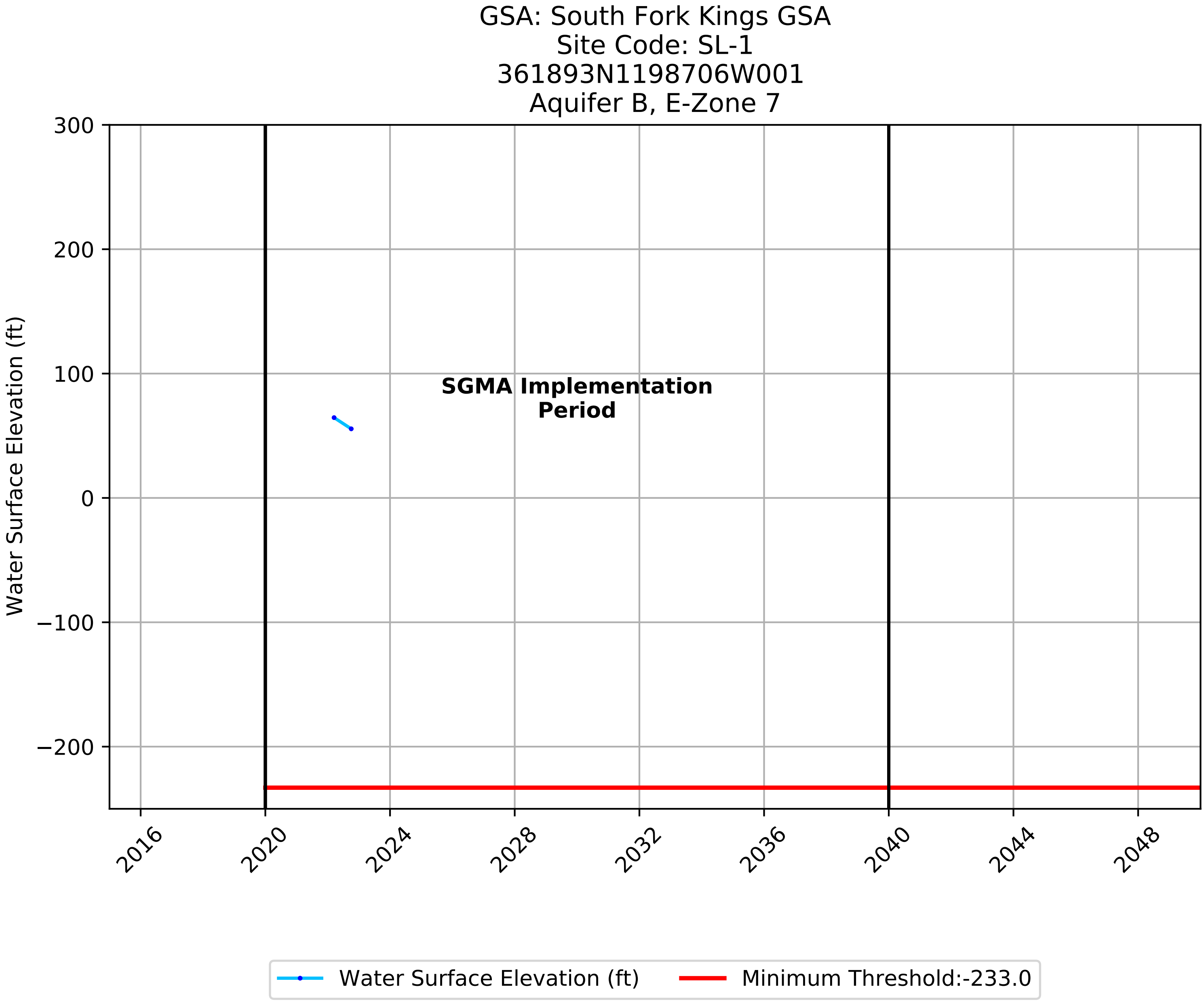
GSA: South Fork Kings GSA
Site Code: KRCDAC3M
362400N1198300W002
Aquifer B, E-Zone 6
Water Surface Elevation (ft)
300
200
100
0
−100
−200
SGMA Implementation Period
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:-26.91
Minimum Threshold:-91.0
Interim milestones


GSA: South Fork Kings GSA
Site Code: KRCDAC5M
361600N1197800W001
Aquifer B, E-Zone 6
Water Surface Elevation (ft)
300
200
100
0
−100
−200
SGMA Implementation Period
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:45.75
Minimum Threshold:-57.0
Interim milestones

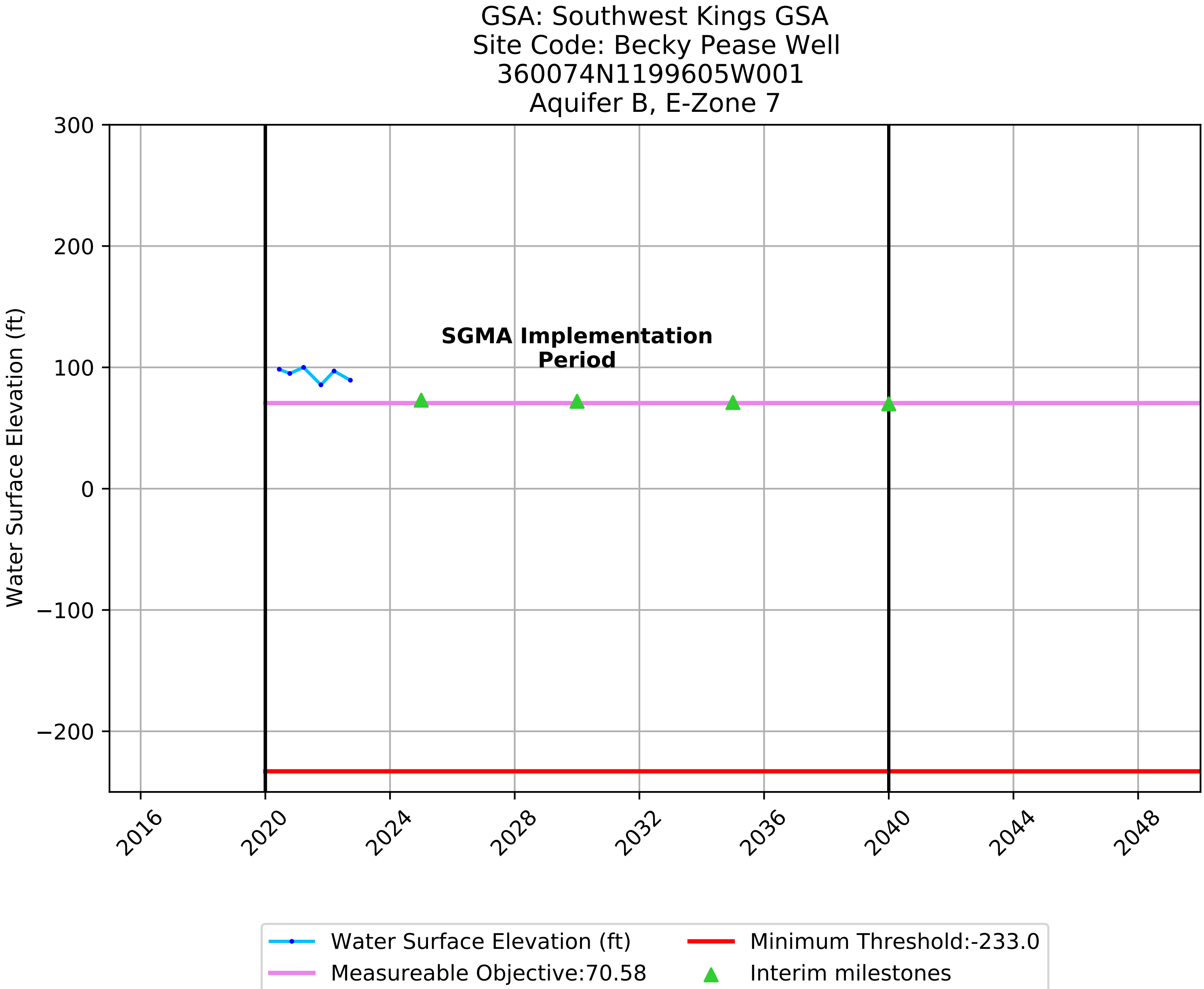


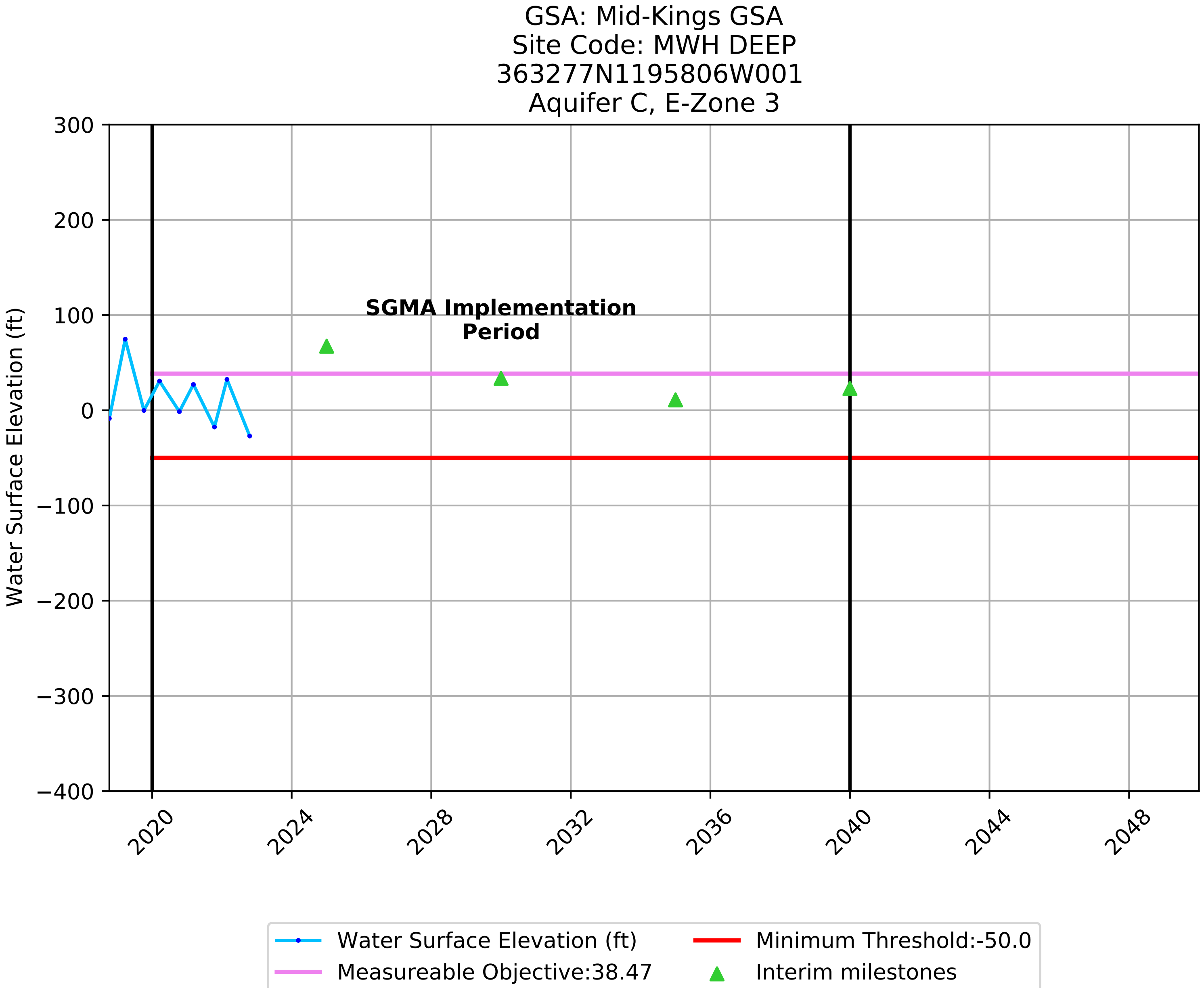
GSA: El Rico GSA
Site Code: ER_CID-071
360702N1195369W001
Aquifer B, E-Zone 6
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Minimum Threshold:-5.0


GSA: South Fork Kings GSA
Site Code: CU ELEMENTARY SCHOOL
362410N1197802W001
Aquifer B, E-Zone 6
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2016
2020
2024
2028
2032
2036
2040
2044
2048
SGMA Implementation Period
Water Surface Elevation (ft)
Measureable Objective:-3.81
Minimum Threshold:-99.78
Interim milestones

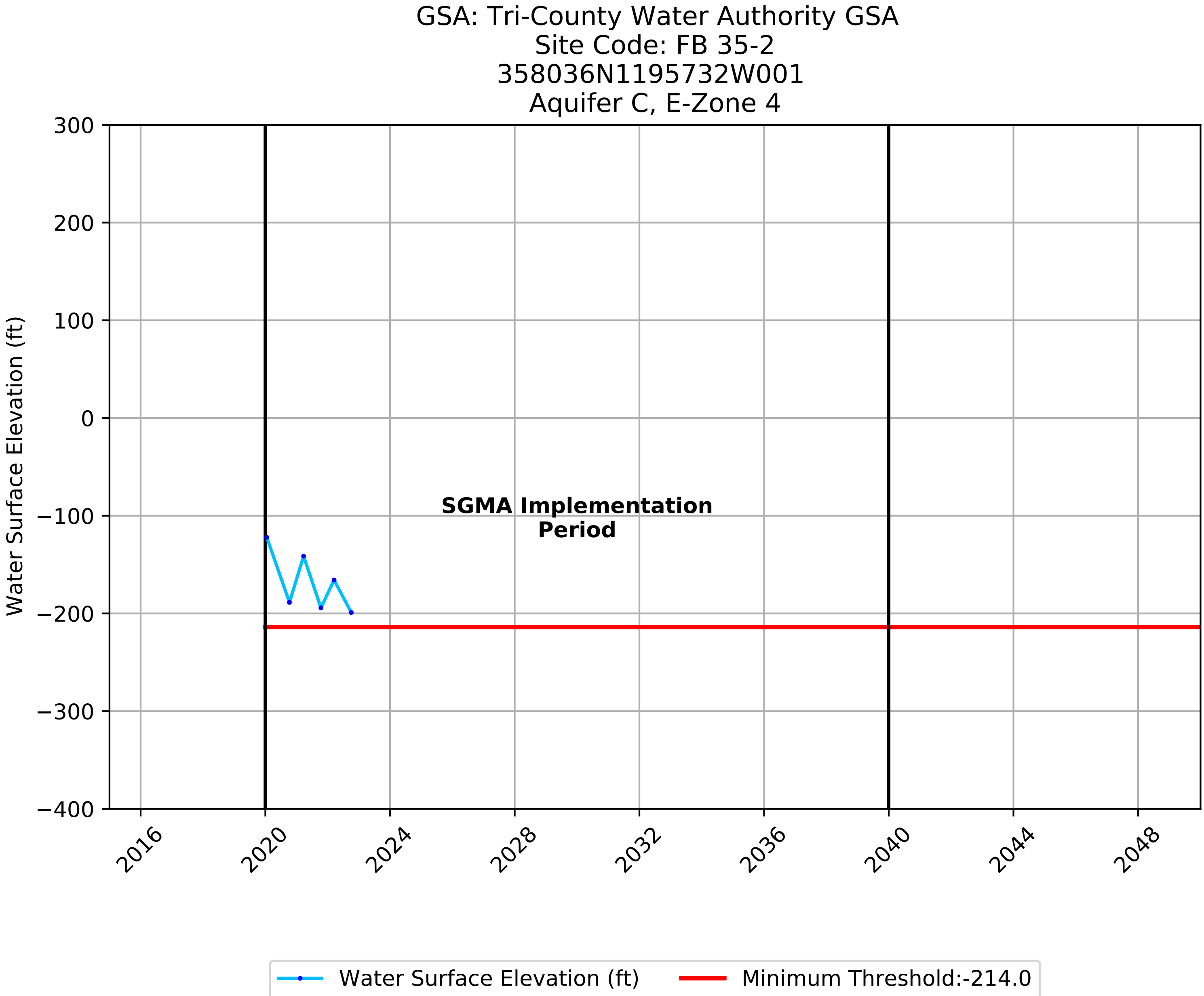


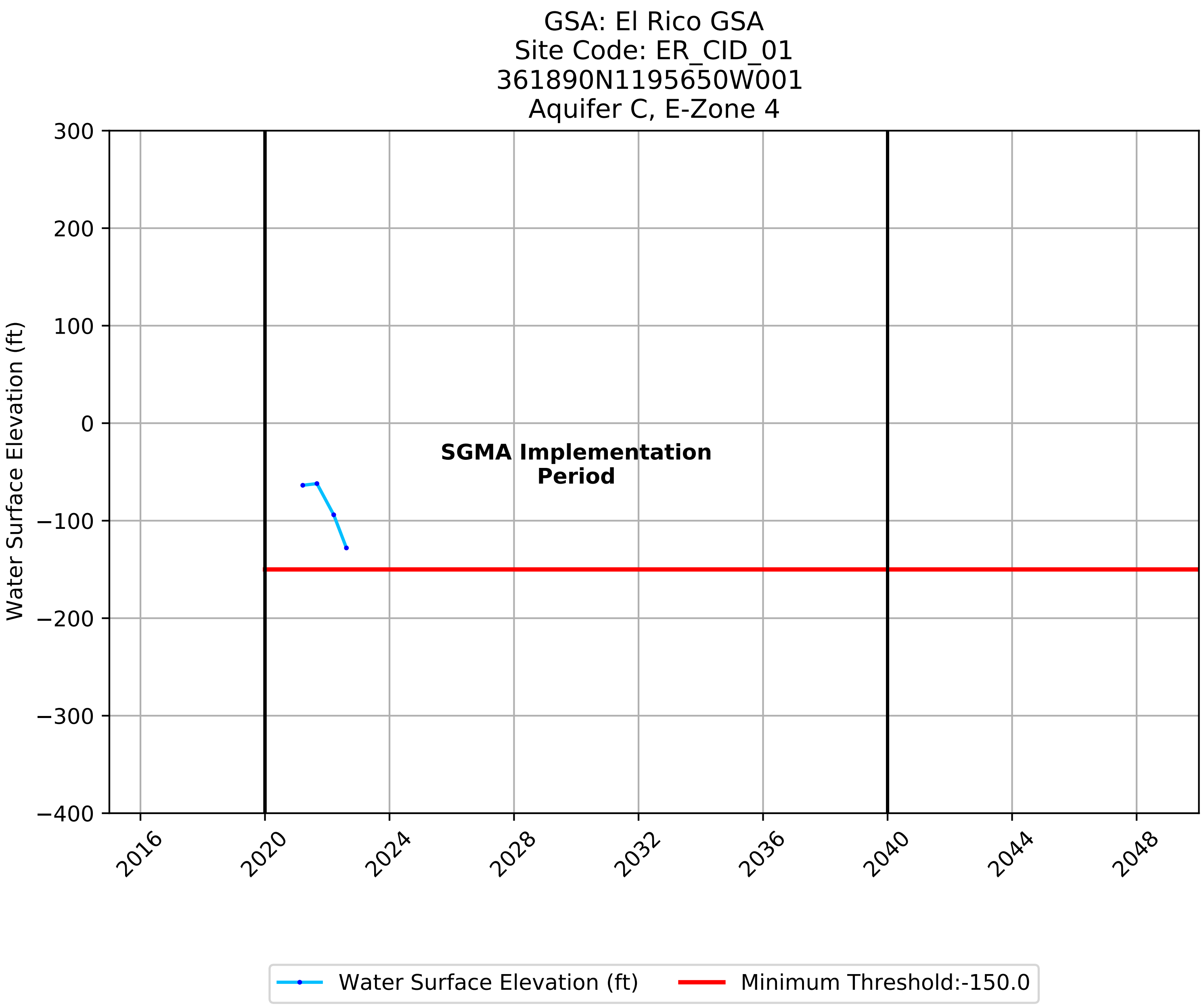
GSA: South Fork Kings GSA
Site Code: SL-1
361893N1198706W001
Aquifer B, E-Zone 7
Water Surface Elevation (ft)
300
200
100
0
−100
−200
2016
2020
2024
2028
2032
2036
2040
2044
2048
SGMA Implementation Period
Water Surface Elevation (ft)
Minimum Threshold:-233.0


GSA: Southwest Kings GSA
Site Code: Becky Pease Well
360074N1199605W001
Aquifer B, E-Zone 7
Water Surface Elevation (ft)
300
200
100
0
−100
−200
SGMA Implementation
Period
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:70.58
Minimum Threshold:-233.0
Interim milestones

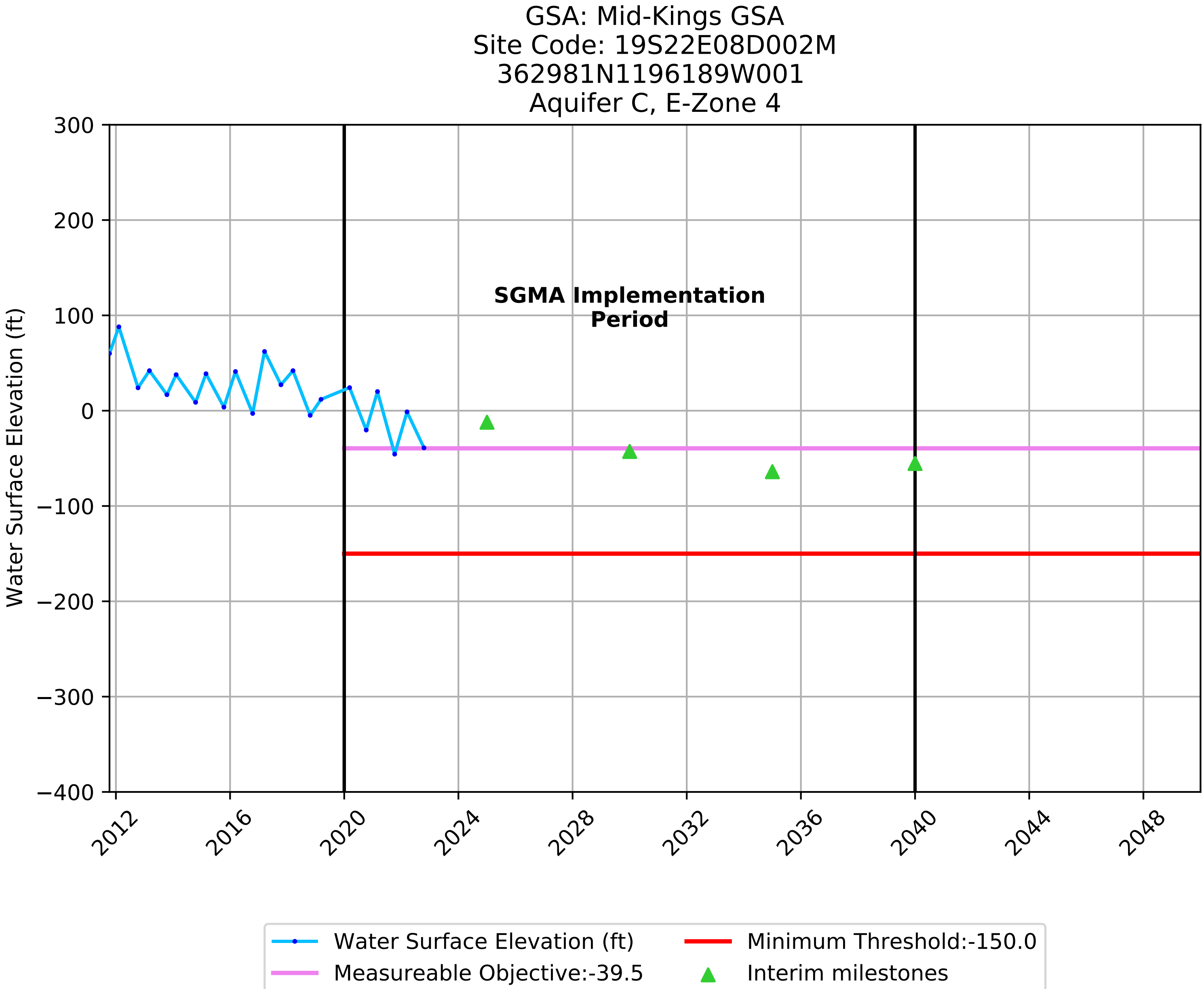


GSA: Mid-Kings GSA
Site Code: MWH DEEP
363277N1195806W001
Aquifer C, E-Zone 3
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:38.47
Minimum Threshold:-50.0
Interim milestones

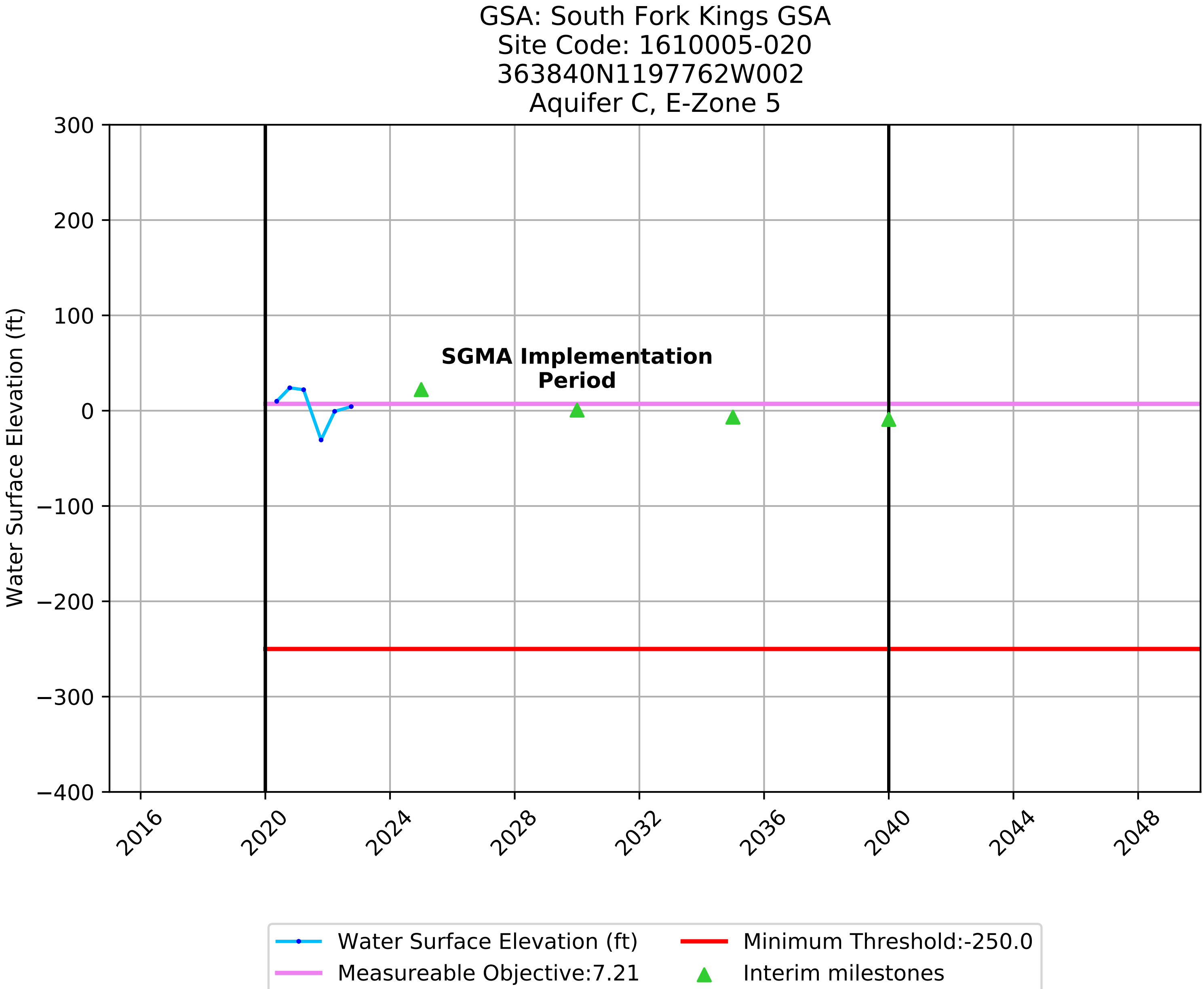

GSA: Tri-County Water Authority GSA
Site Code: FB 35-2
358036N1195732W001
Aquifer C, E-Zone 4
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2016
2020
2024
2028
2032
2036
2040
2044
2048
SGMA Implementation Period
Water Surface Elevation (ft)
Minimum Threshold:-214.0



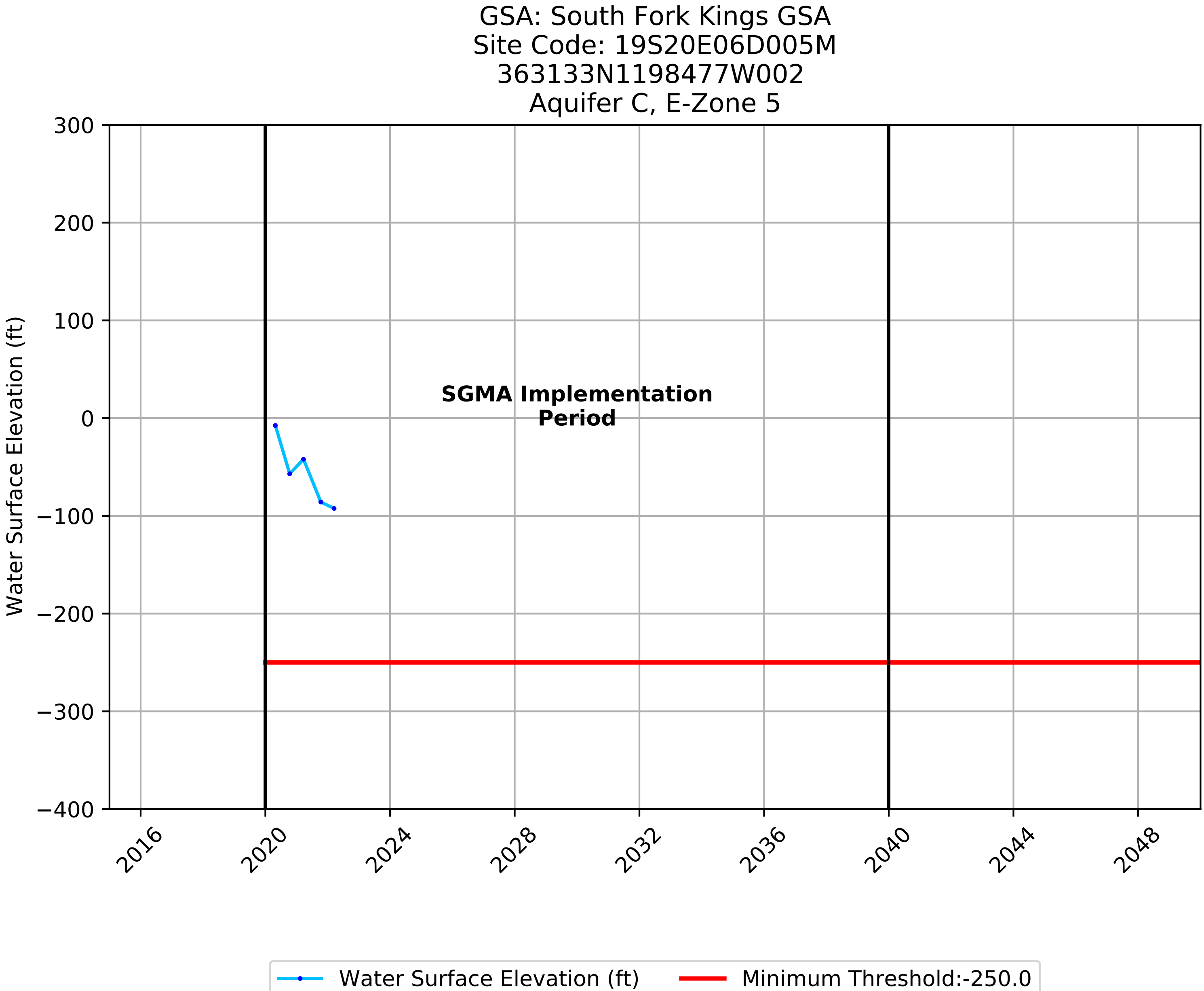
GSA: El Rico GSA
Site Code: ER_CID_01
361890N1195650W001
Aquifer C, E-Zone 4
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2016
2020
2024
2028
2032
2036
2040
2044
2048
SGMA Implementation Period
Water Surface Elevation (ft)
Minimum Threshold:-150.0

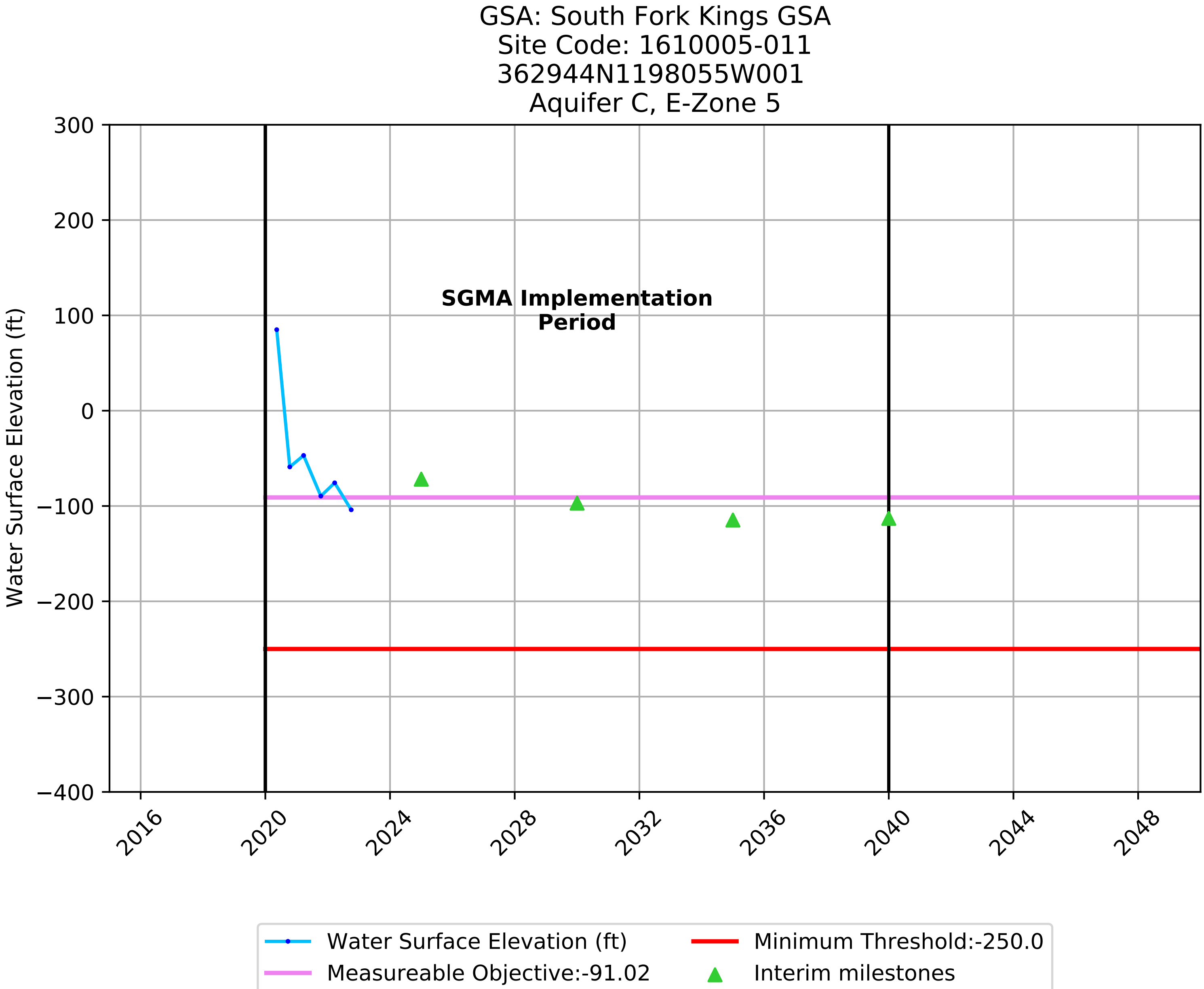


GSA: Mid-Kings GSA
Site Code: 19S22E08D002M
362981N1196189W001
Aquifer C, E-Zone 4
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:-39.5
Minimum Threshold:-150.0
Interim milestones

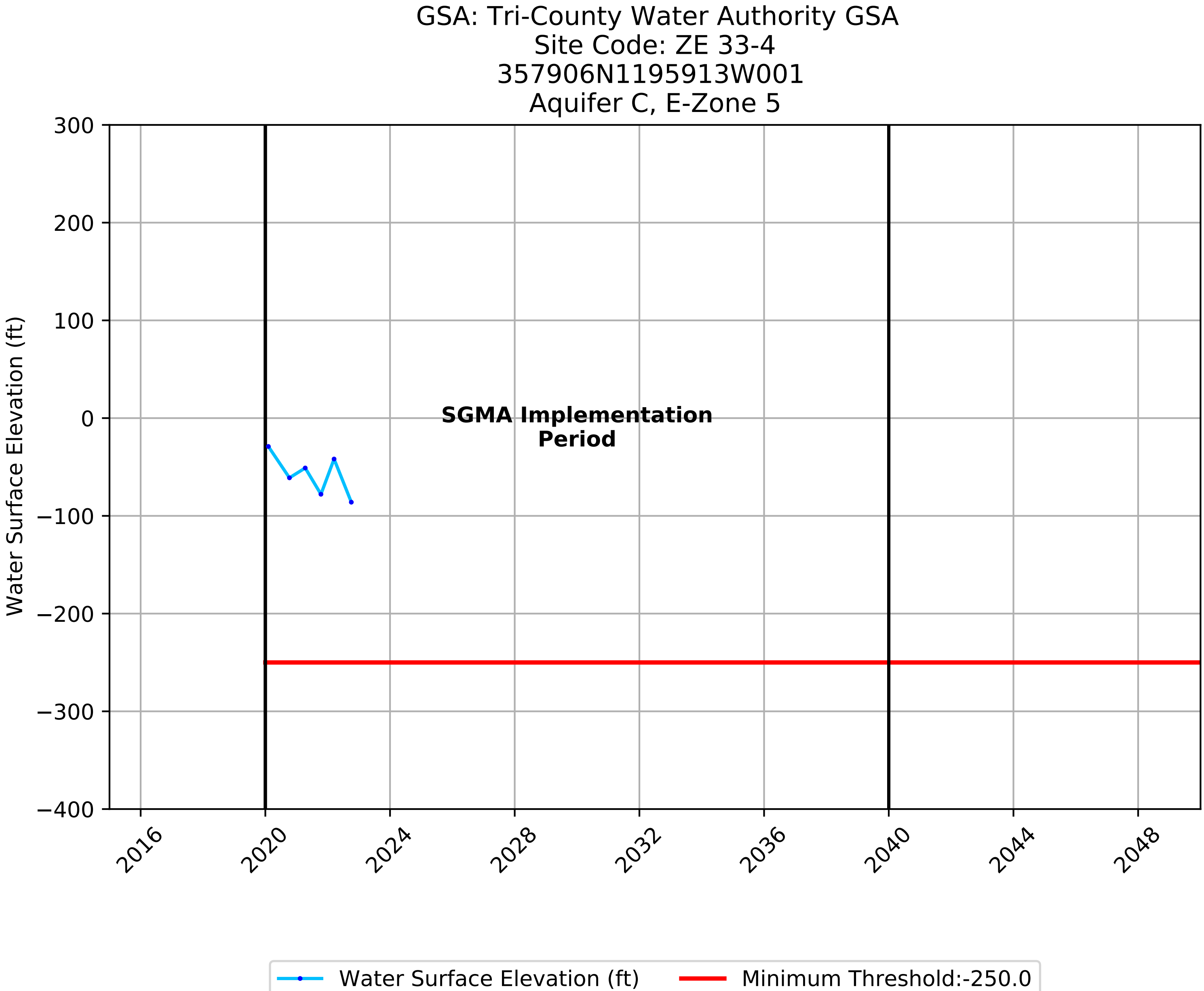


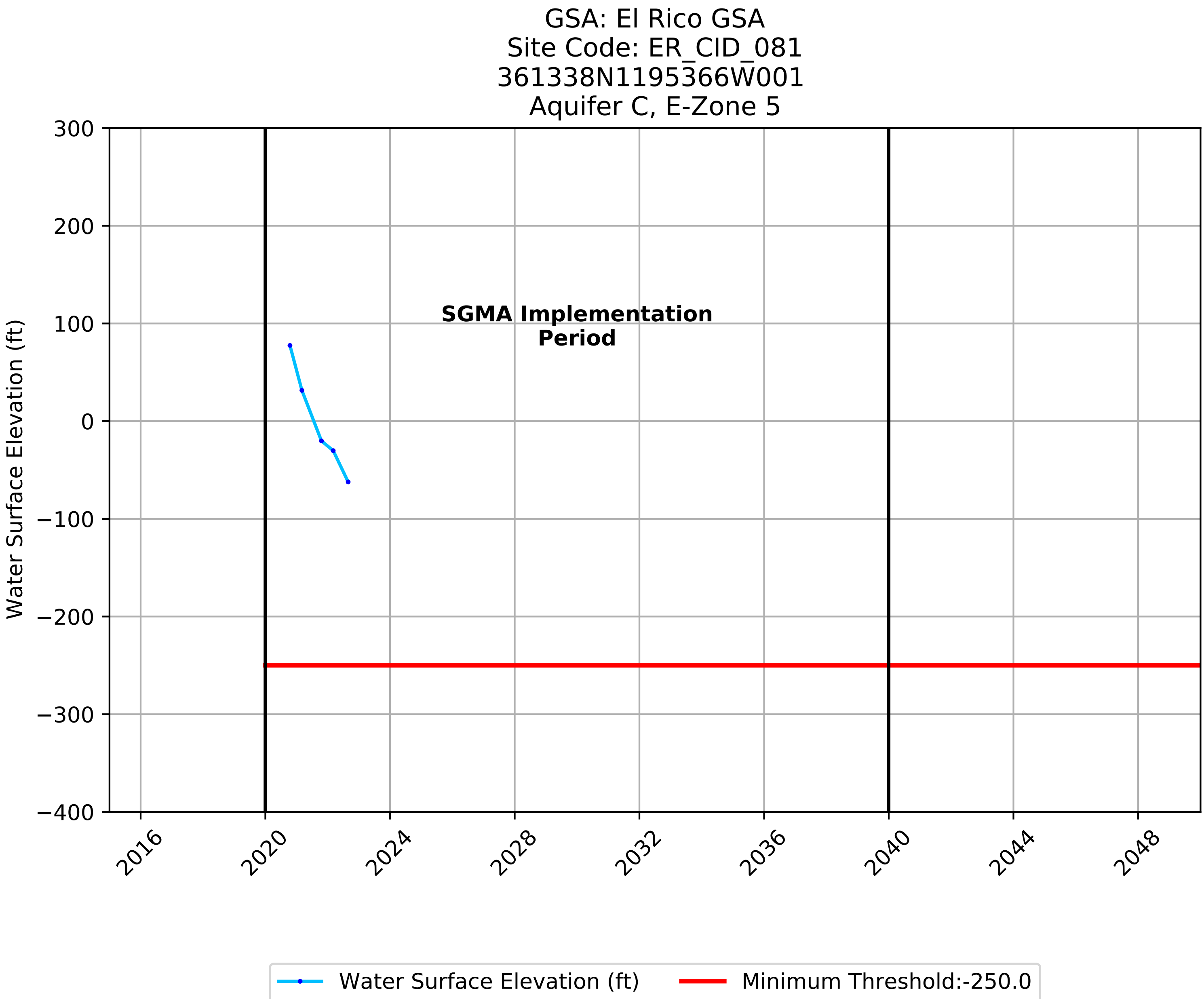
GSA: South Fork Kings GSA
Site Code: 1610005-020
363840N1197762W002
Aquifer C, E-Zone 5
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2016
2020
2024
2028
2032
2036
2040
2044
2048
SGMA Implementation Period
Water Surface Elevation (ft)
Measureable Objective:7.21
Minimum Threshold:-250.0
Interim milestones


GSA: South Fork Kings GSA
Site Code: 19S20E06D005M
363133N1198477W002
Aquifer C, E-Zone 5
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Minimum Threshold:-250.0

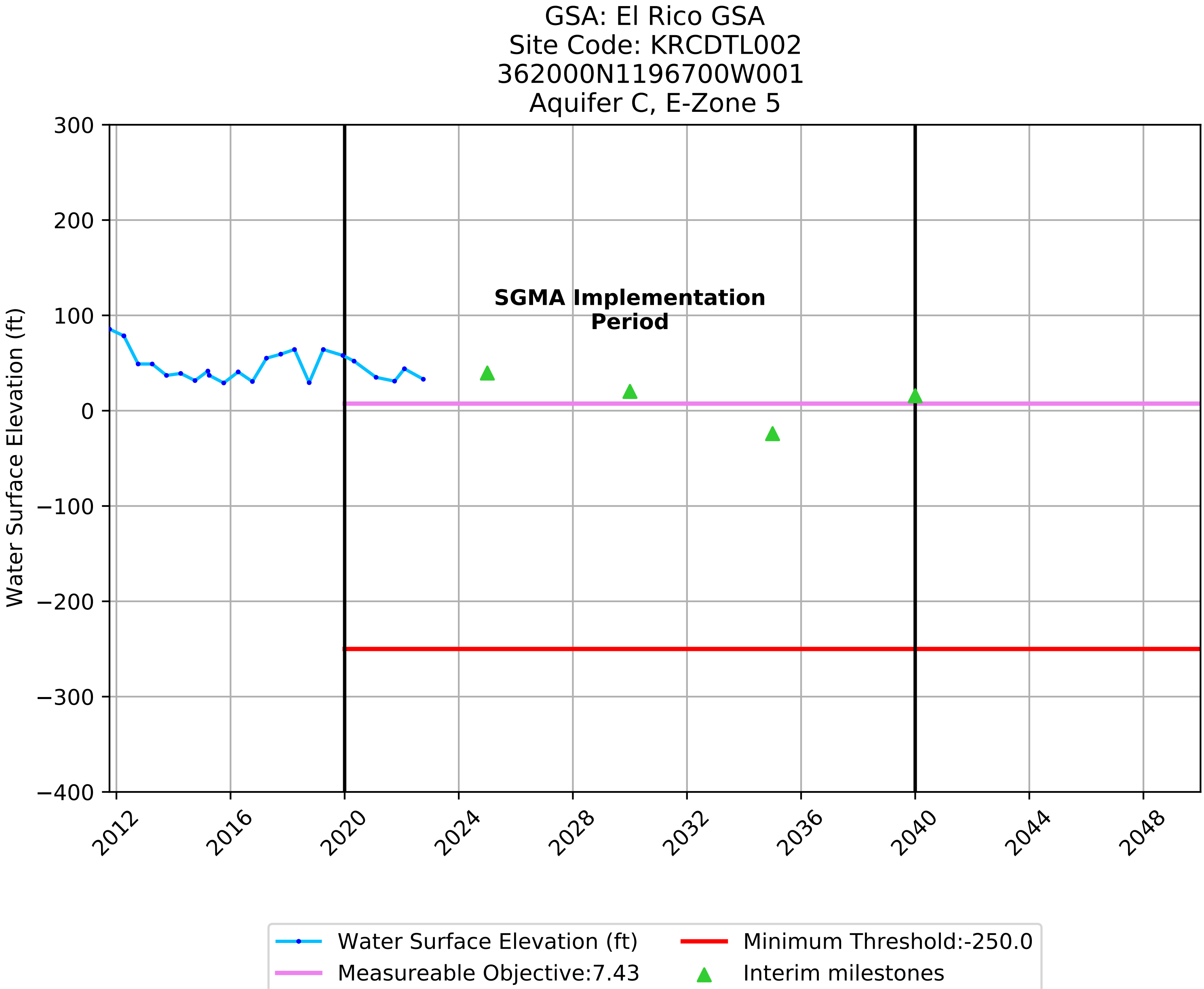


GSA: South Fork Kings GSA
Site Code: 1610005-011
362944N1198055W001
Aquifer C, E-Zone 5
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2016
2020
2024
2028
2032
2036
2040
2044
2048
SGMA Implementation Period
Water Surface Elevation (ft)
Measureable Objective:-91.02
Minimum Threshold:-250.0
Interim milestones

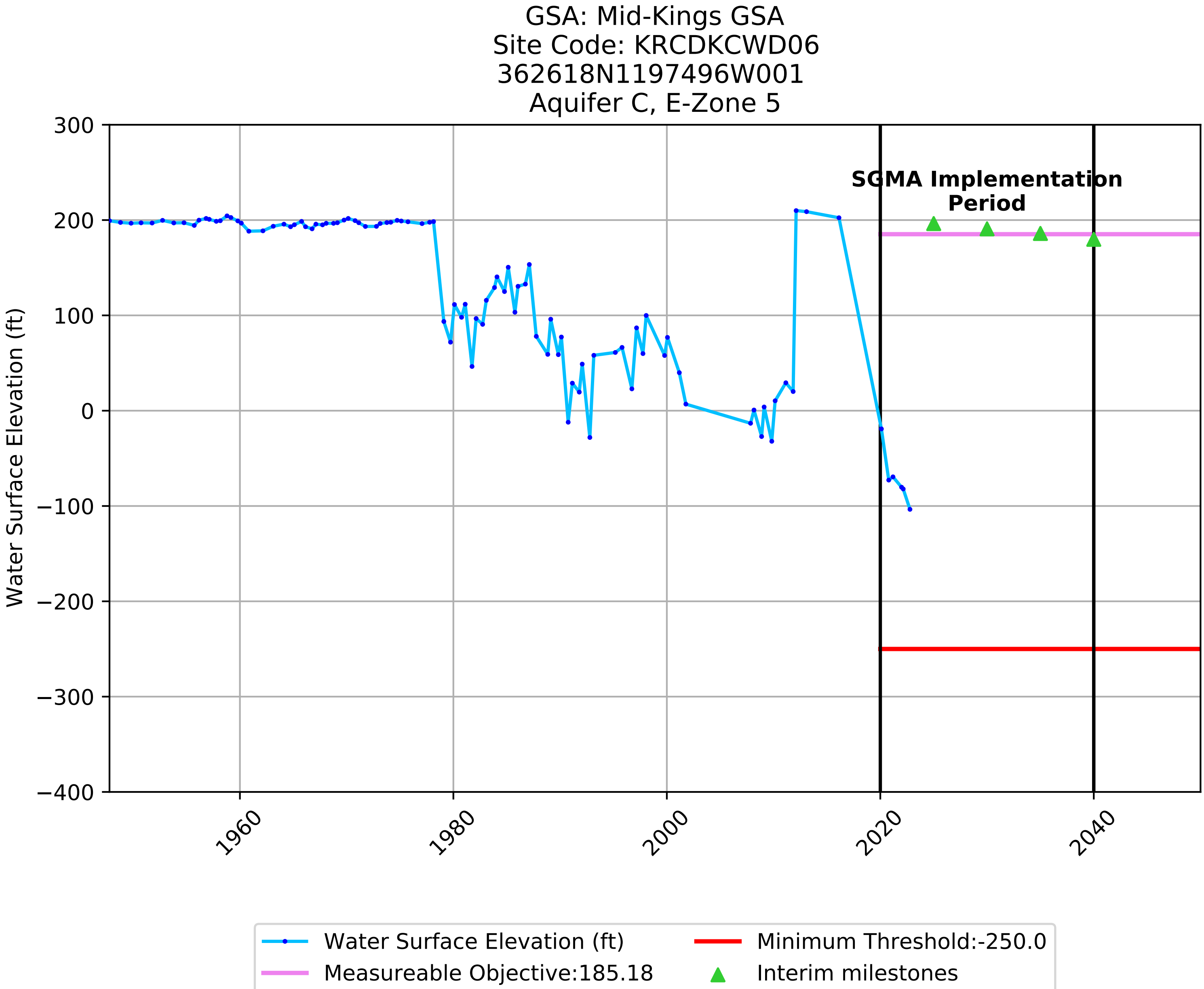

GSA: Tri-County Water Authority GSA
Site Code: ZE 33-4
357906N1195913W001
Aquifer C, E-Zone 5
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2016
2020
2024
2028
2032
2036
2040
2044
2048
SGMA Implementation Period
Water Surface Elevation (ft)
Minimum Threshold:-250.0

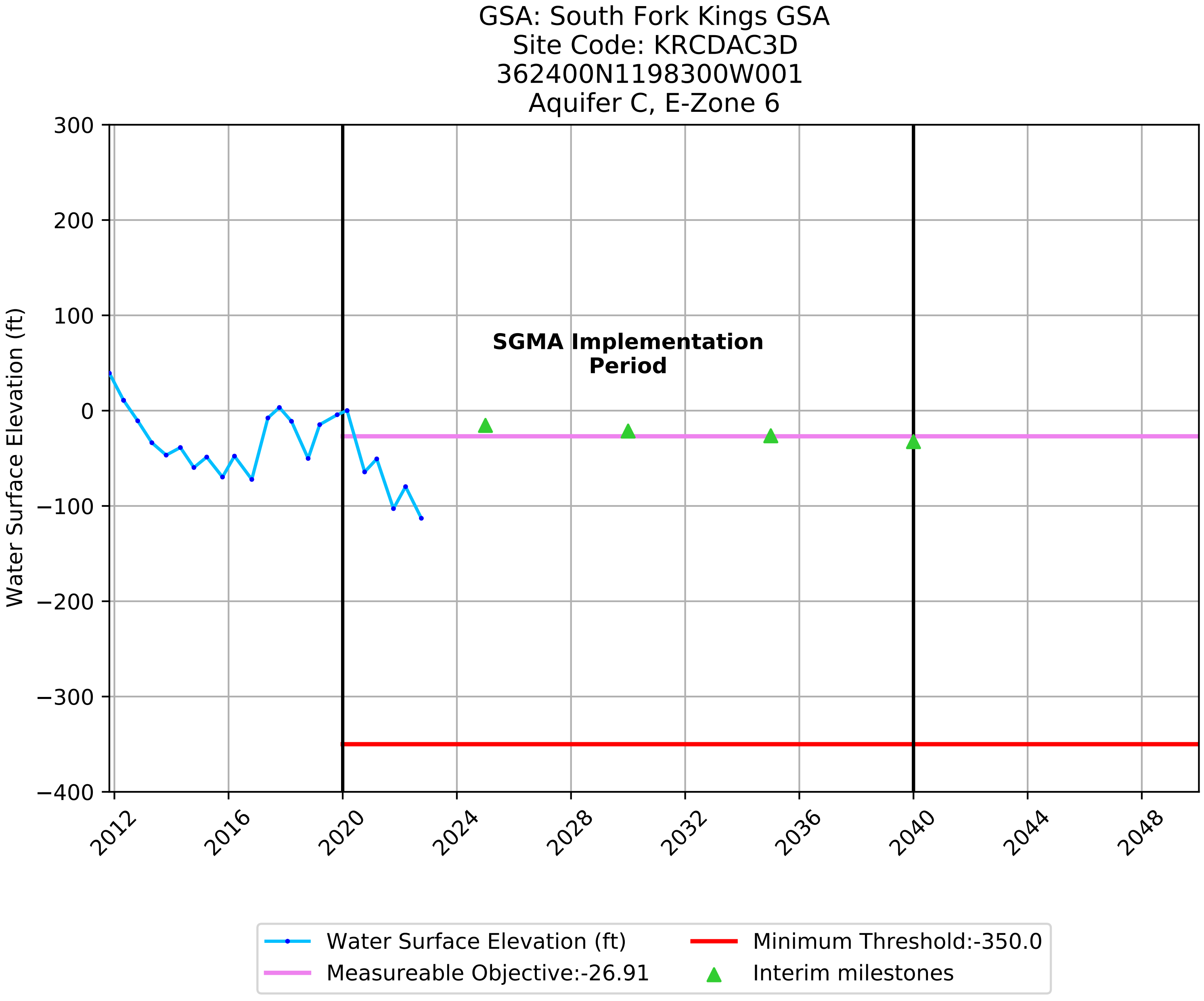


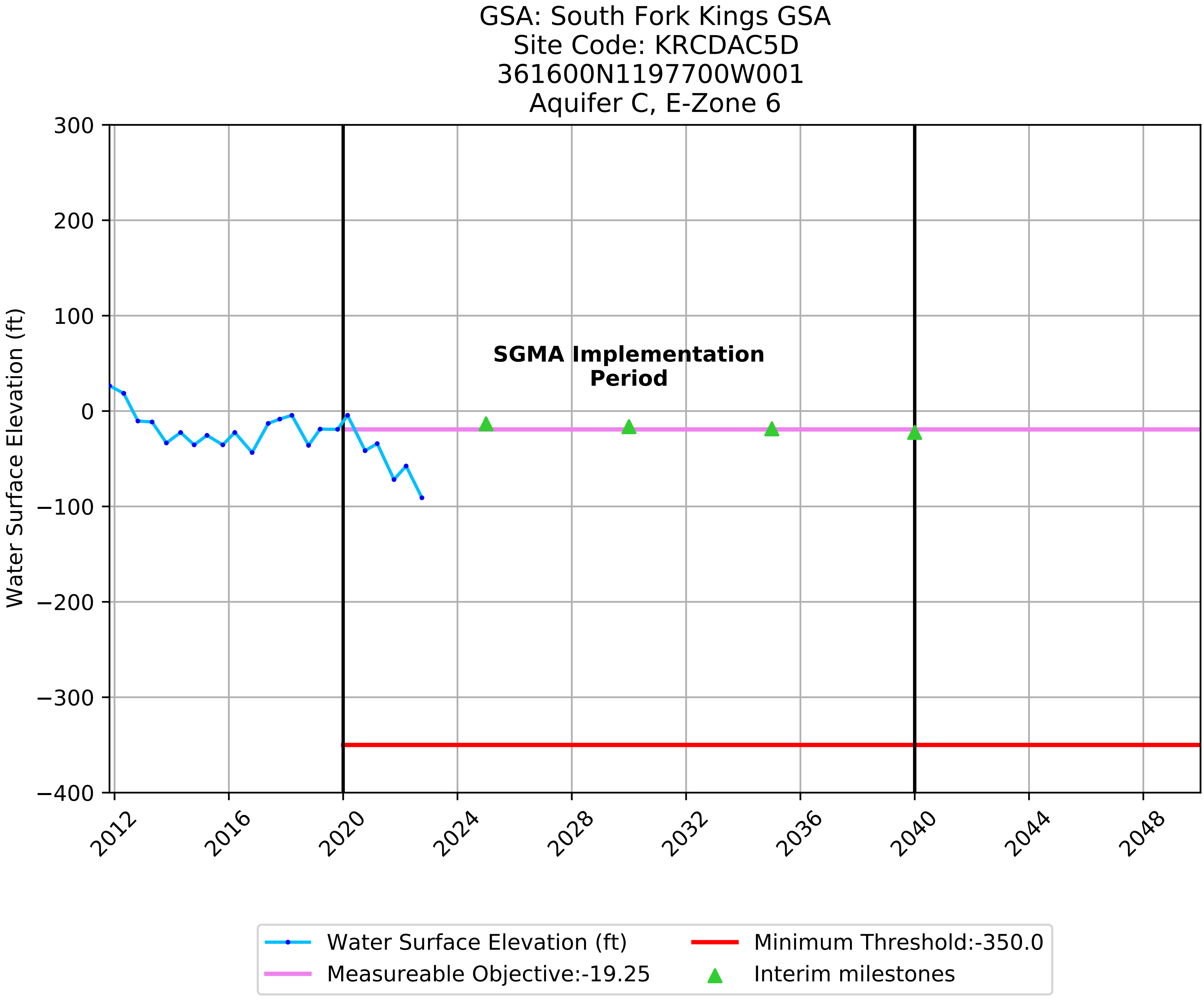
GSA: El Rico GSA
Site Code: ER_CID_081
361338N1195366W001
Aquifer C, E-Zone 5
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Minimum Threshold:-250.0



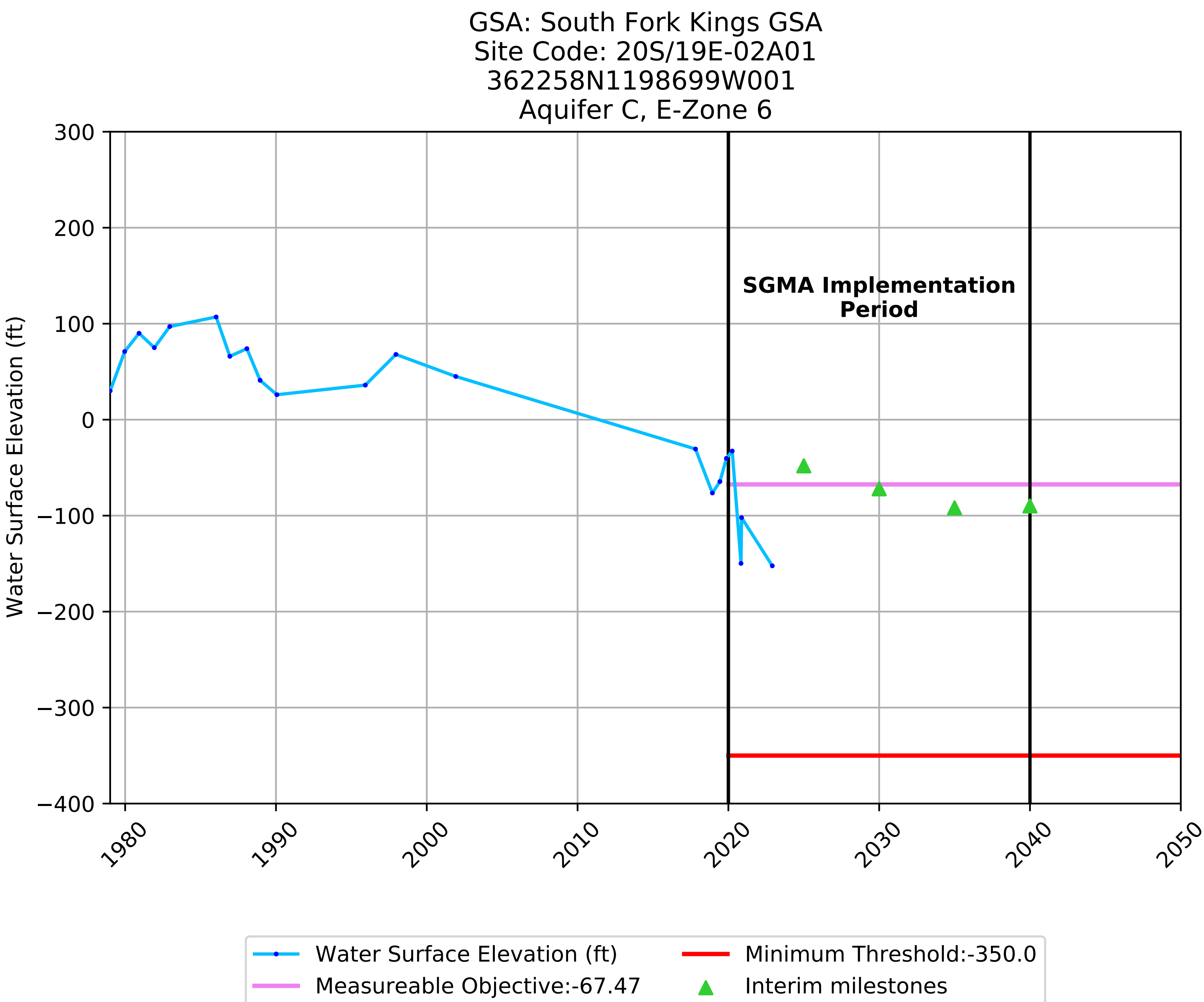
GSA: El Rico GSA
Site Code: KRCDTL002
362000N1196700W001
Aquifer C, E-Zone 5
SGMA Implementation
Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:7.43
Minimum Threshold:-250.0
Interim milestones

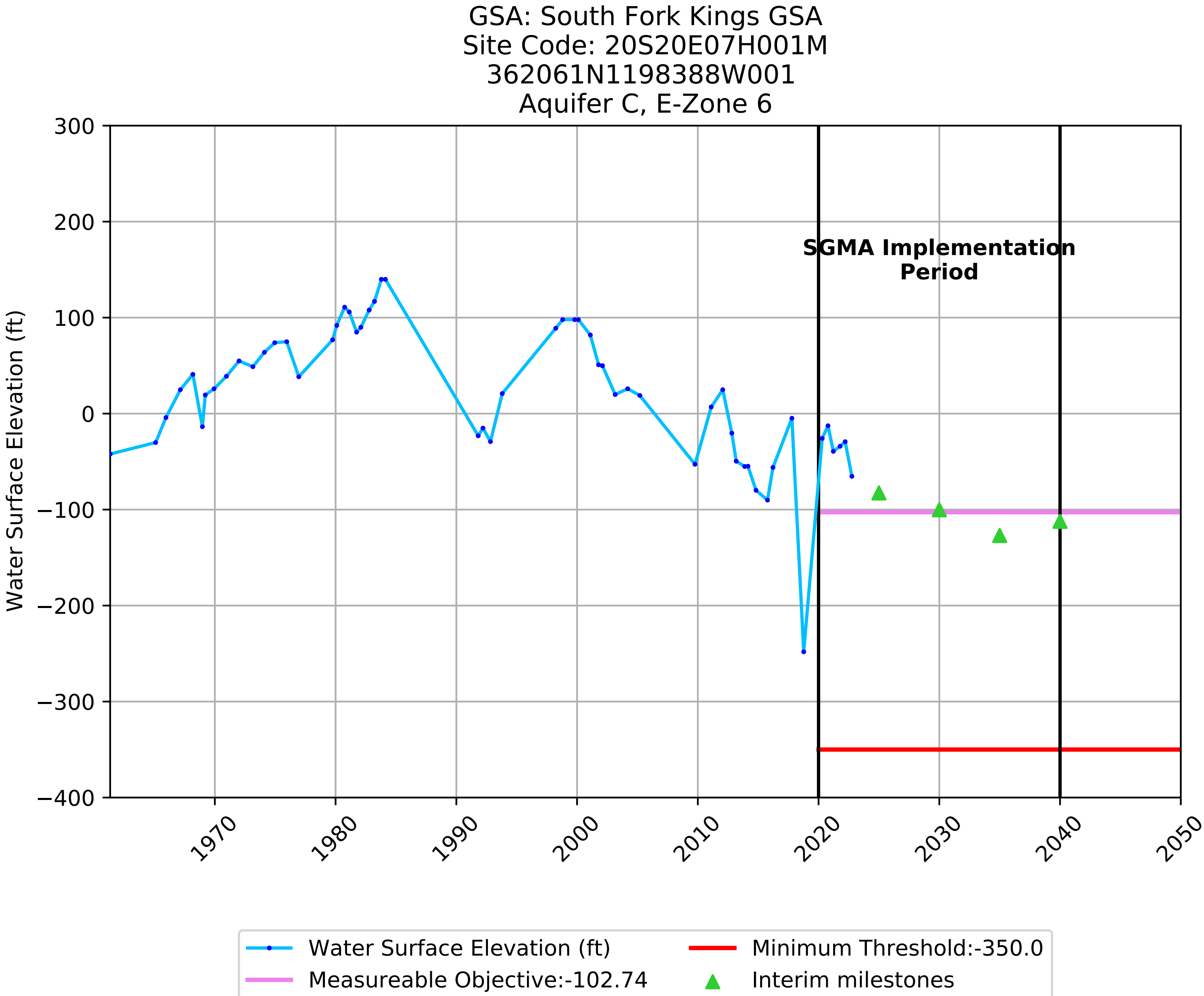

GSA: Mid-Kings GSA
Site Code: KRCDKCWD06
362618N1197496W001
Aquifer C, E-Zone 5
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
1960
1980
2000
2020
2040
Water Surface Elevation (ft)
Measureable Objective:185.18
Minimum Threshold:-250.0
Interim milestones


GSA: South Fork Kings GSA
Site Code: KRCDAC3D
362400N1198300W001
Aquifer C, E-Zone 6
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
SGMA Implementation Period
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:-26.91
Minimum Threshold:-350.0
Interim milestones

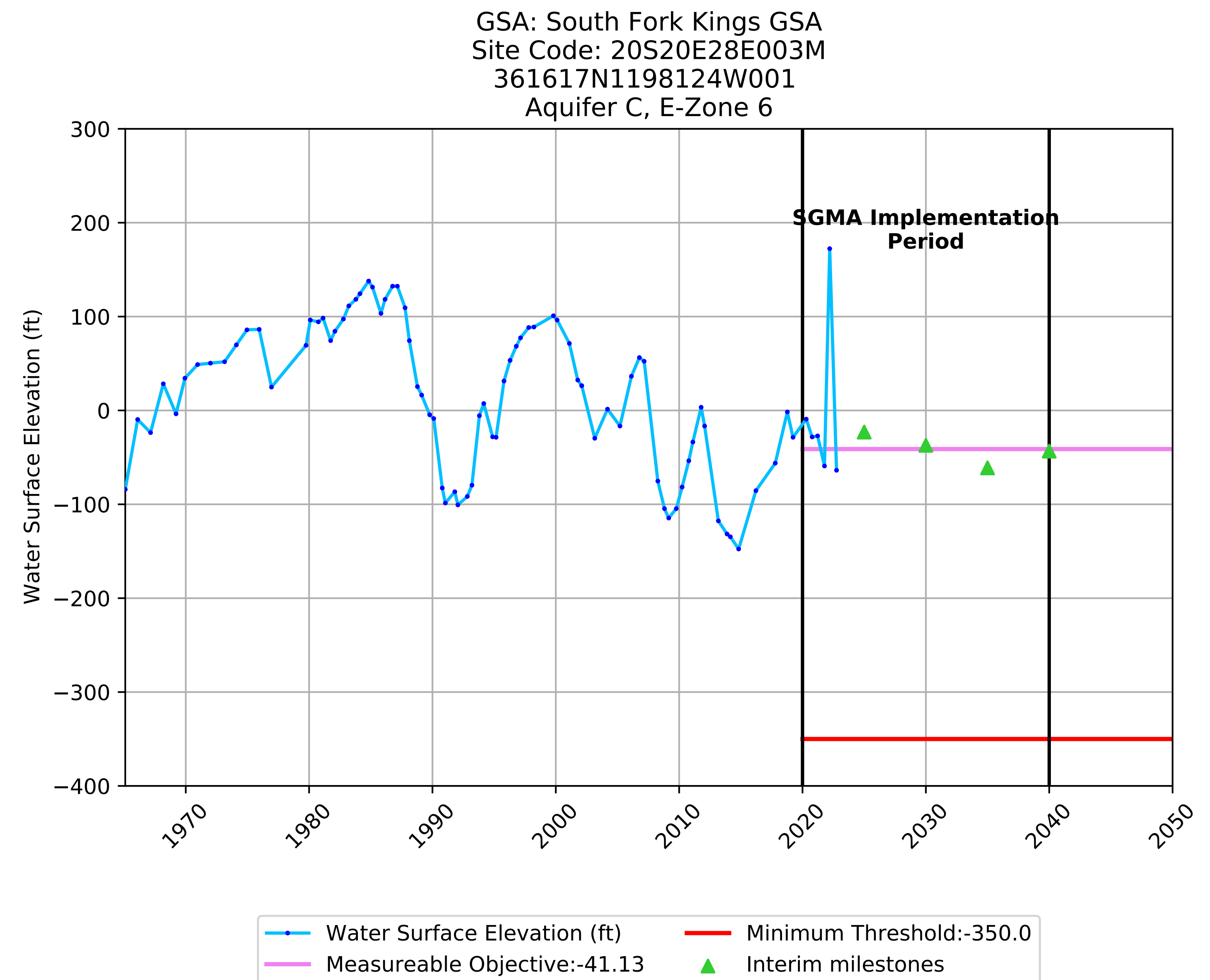


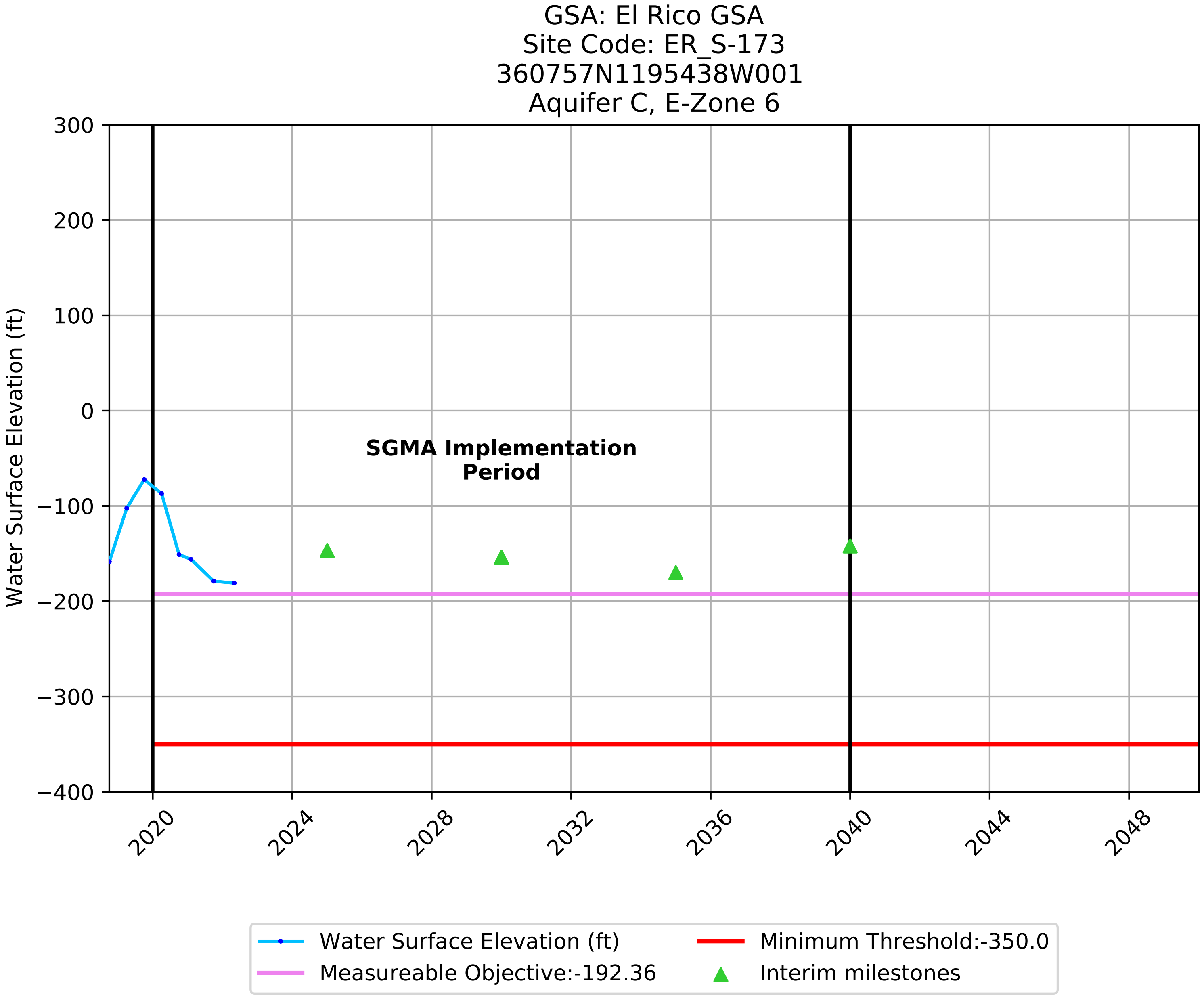
GSA: South Fork Kings GSA
Site Code: KRCDAC5D
361600N1197700W001
Aquifer C, E-Zone 6
SGMA Implementation
Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:-19.25
Minimum Threshold:-350.0
Interim milestones


GSA: South Fork Kings GSA
Site Code: 20S/19E-02A01
362258N1198699W001
Aquifer C, E-Zone 6
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
1980
1990
2000
2010
2020
2030
2040
2050
Water Surface Elevation (ft)
Minimum Threshold:-350.0
Measureable Objective:-67.47
Interim milestones

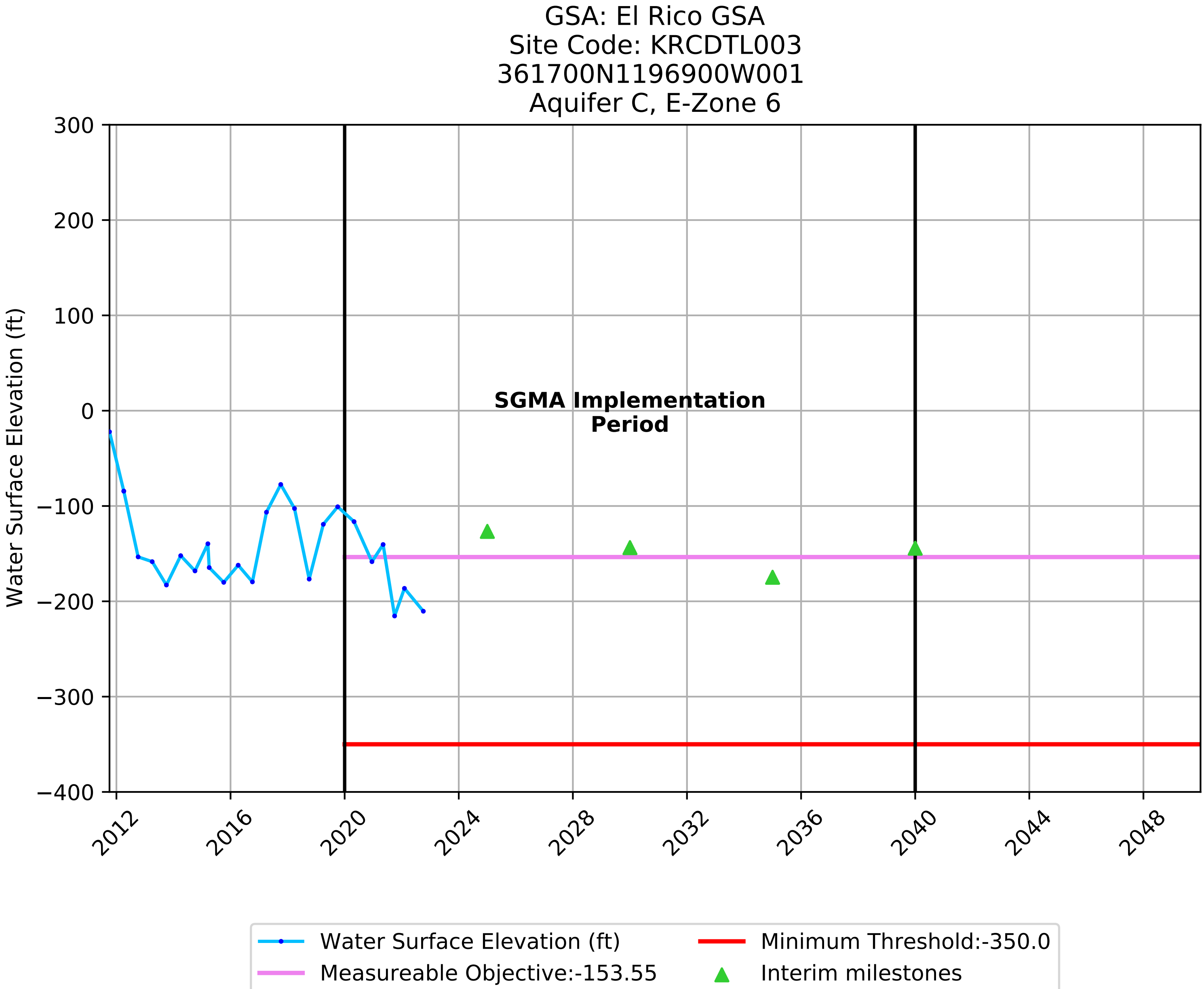


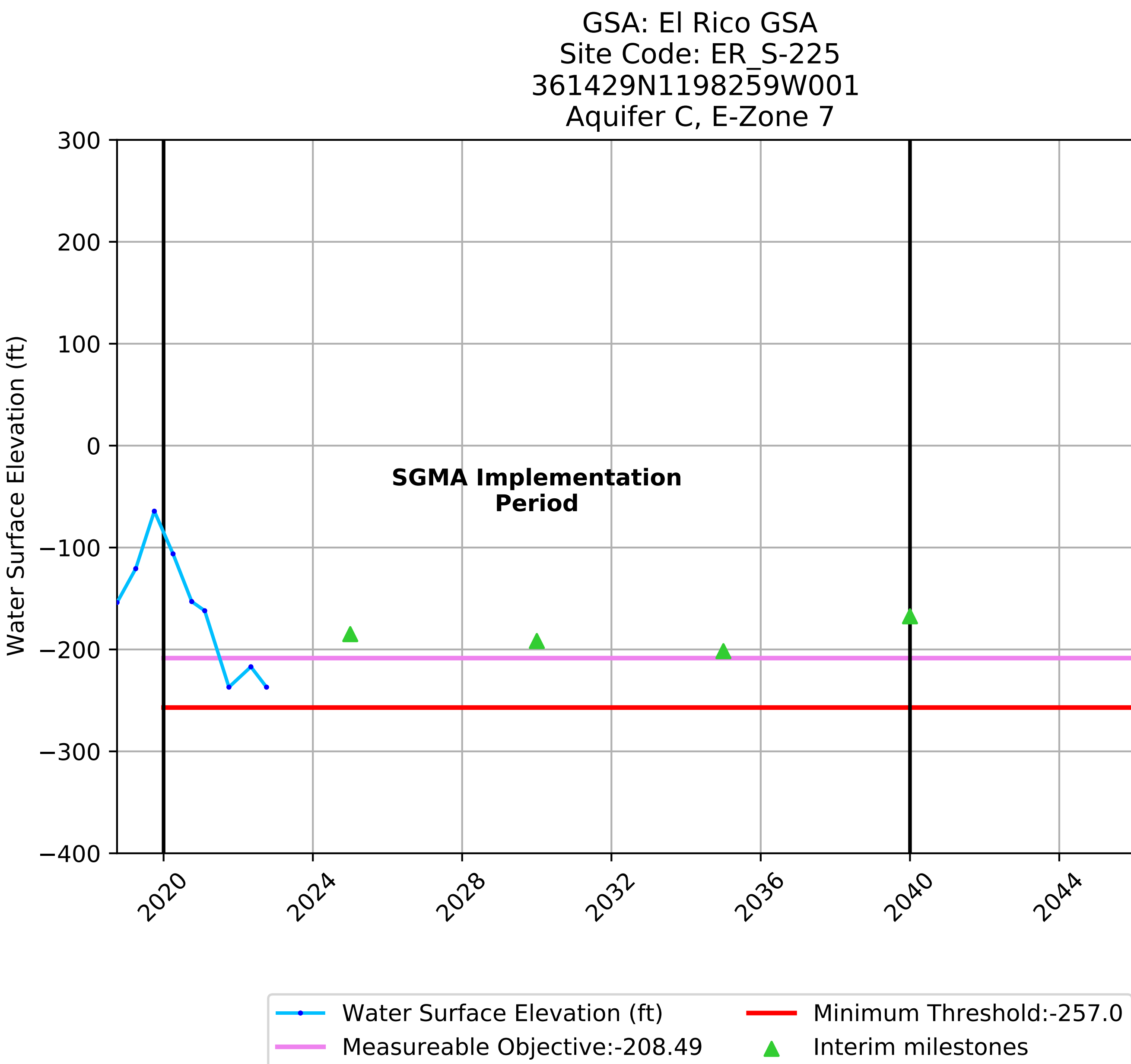
GSA: South Fork Kings GSA
Site Code: 20S20E07H001M
362061N1198388W001
Aquifer C, E-Zone 6
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
1970
1980
1990
2000
2010
2020
2030
2040
2050
Water Surface Elevation (ft)
Measureable Objective:-102.74
Minimum Threshold:-350.0
Interim milestones

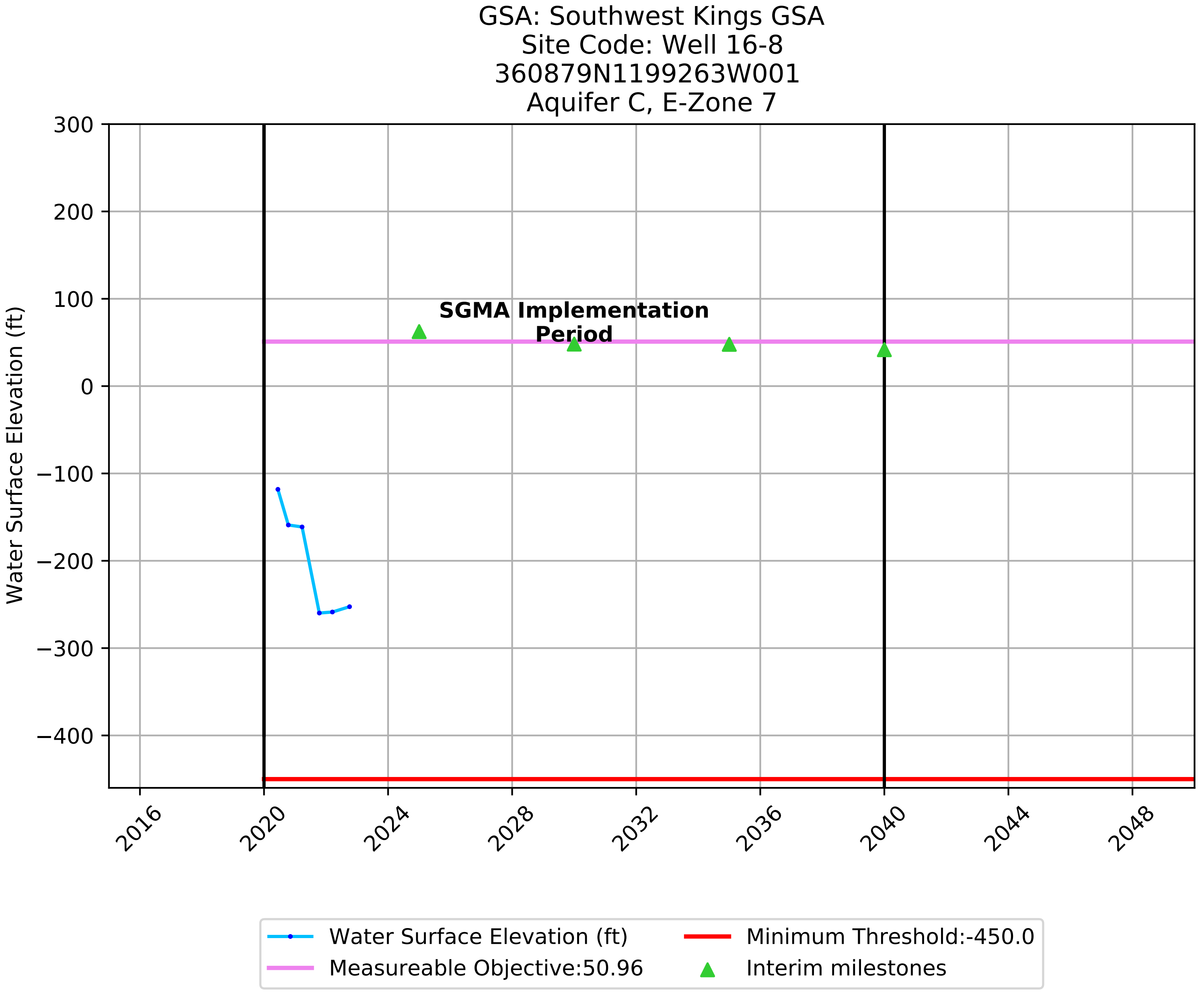

GSA: South Fork Kings GSA
Site Code: 20S20E28E003M
361617N1198124W001
Aquifer C, E-Zone 6
SGMA Implementation Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
1970
1980
1990
2000
2010
2020
2030
2040
2050
Water Surface Elevation (ft)
Measureable Objective:-41.13
Minimum Threshold:-350.0
Interim milestones

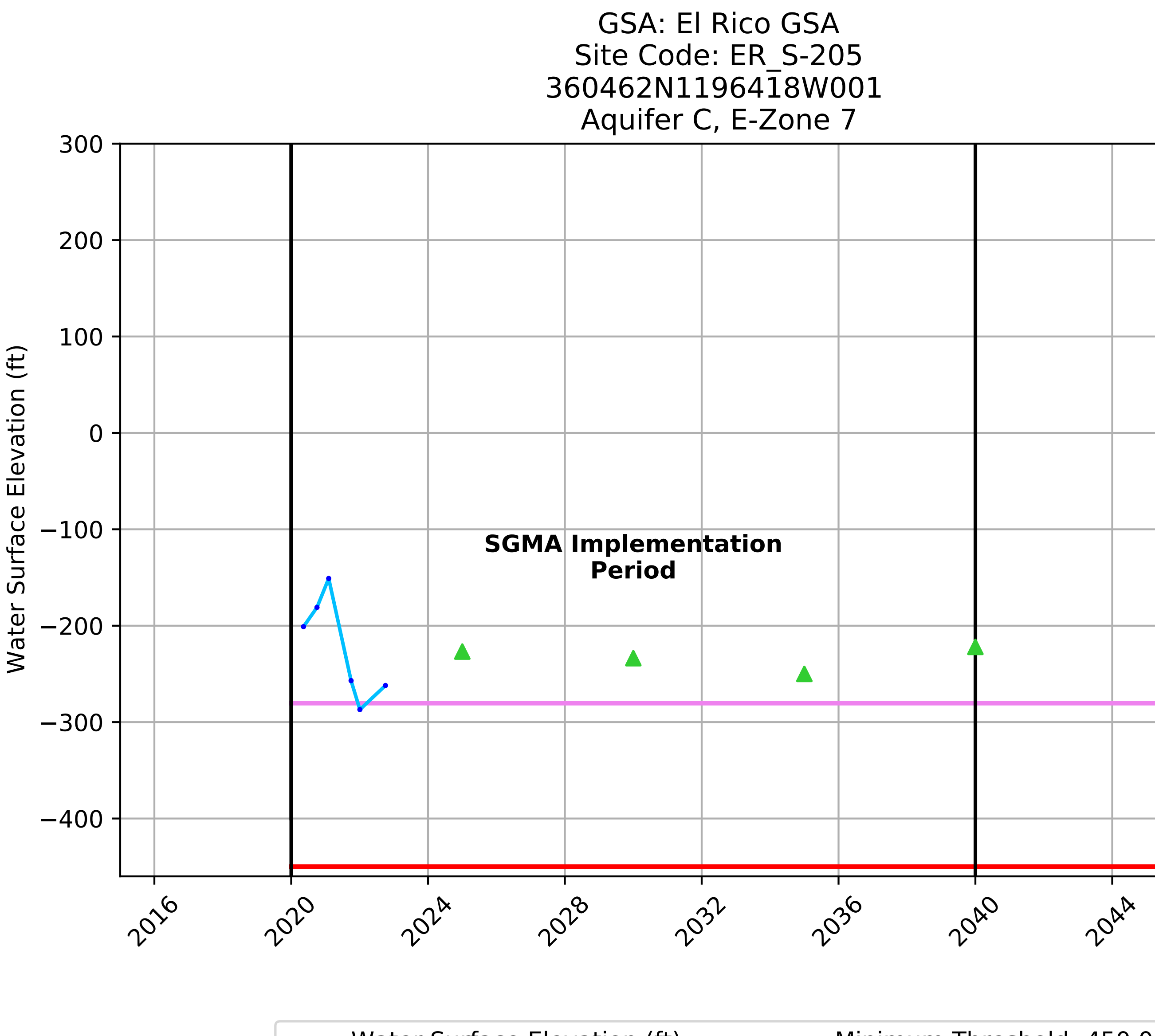


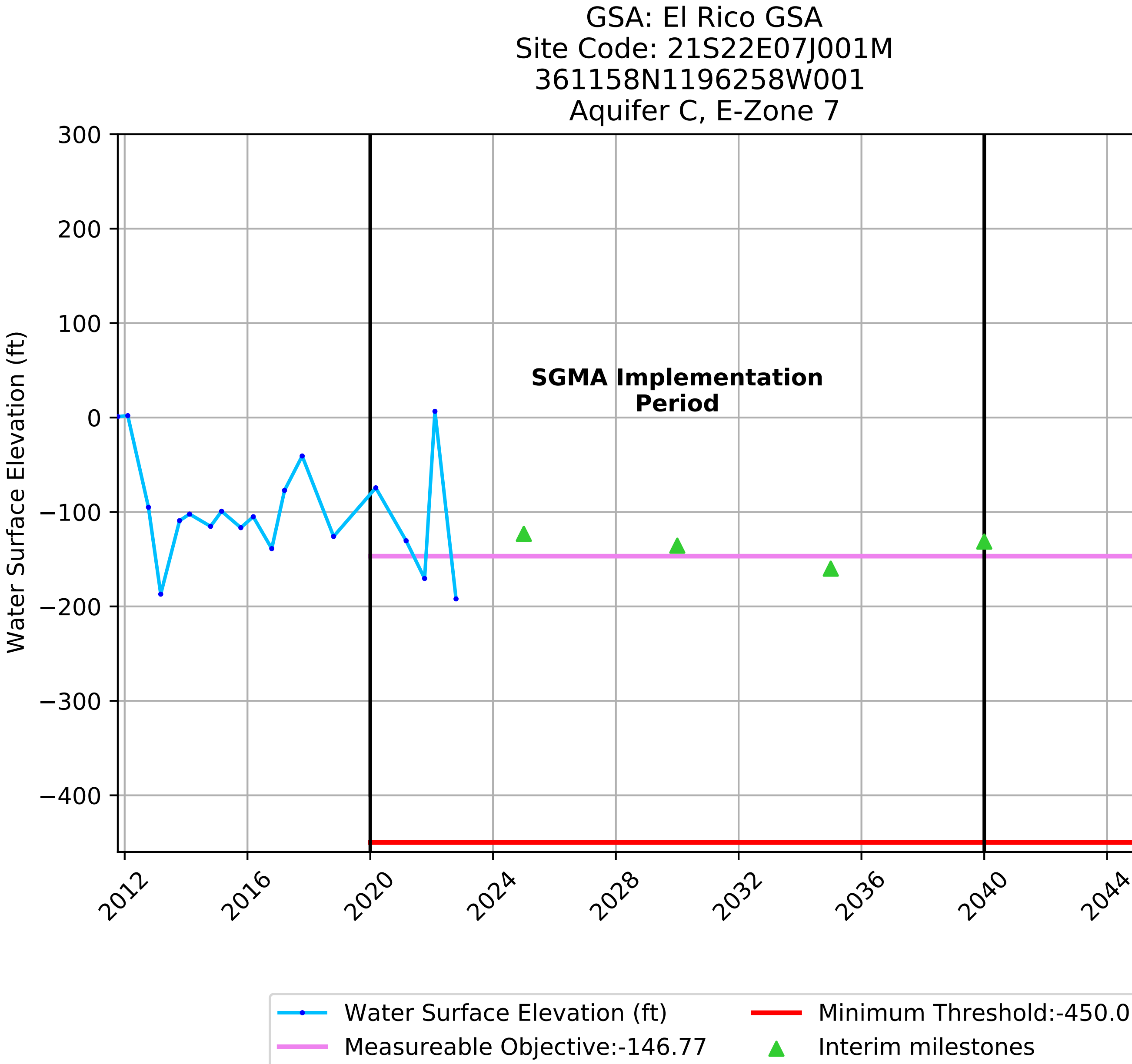
GSA: El Rico GSA
Site Code: ER_S-173
360757N1195438W001
Aquifer C, E-Zone 6
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2020
2024
2028
2032
2036
2040
2044
2048
SGMA Implementation Period
Water Surface Elevation (ft)
Measureable Objective:-192.36
Minimum Threshold:-350.0
Interim milestones


GSA: El Rico GSA
Site Code: KRCDTL003
361700N1196900W001
Aquifer C, E-Zone 6
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
SGMA Implementation Period
Water Surface Elevation (ft)
Measureable Objective:-153.55
Minimum Threshold:-350.0
Interim milestones


GSA: El Rico GSA
Site Code: ER_S-225
361429N1198259W001
Aquifer C, E-Zone 7
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
SGMA Implementation Period
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:-208.49
Minimum Threshold:-257.0
Interim milestones


GSA: Southwest Kings GSA
Site Code: Well 16-8
360879N1199263W001
Aquifer C, E-Zone 7
SGMA Implementation
Period
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:50.96
Minimum Threshold:-450.0
Interim milestones


GSA: El Rico GSA
Site Code: ER_S-205
360462N1196418W001
Aquifer C, E-Zone 7
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
2016
2020
2024
2028
2032
2036
2040
2044
2048
SGMA Implementation Period
Water Surface Elevation (ft)
Measureable Objective:-280.27
Minimum Threshold:-450.0
Interim milestones



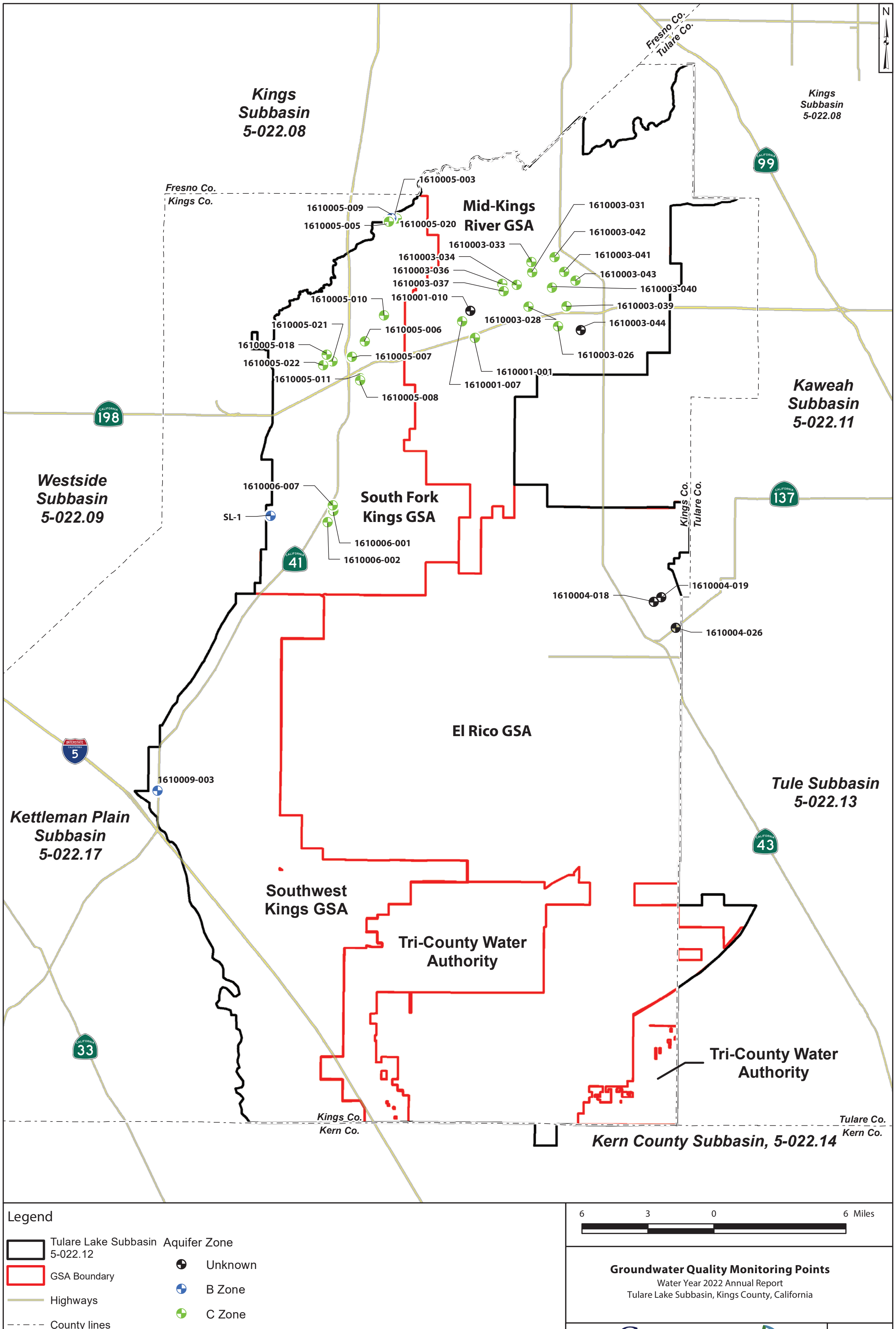
GSA: El Rico GSA
Site Code: 21S22E07J001M
361158N1196258W001
Aquifer C, E-Zone 7
Water Surface Elevation (ft)
300
200
100
0
−100
−200
−300
−400
SGMA Implementation
Period
2012
2016
2020
2024
2028
2032
2036
2040
2044
2048
Water Surface Elevation (ft)
Measureable Objective:-146.77
Minimum Threshold:-450.0
Interim milestones

APPENDIX F
Groundwater Quality Monitoring Network and Graphs

Appendix F: Groundwater Quality Network and Graphs
Table F-1: Groundwater Quality RMS Network
and Sampling Frequency
Water Year 2022 Annual Report
Tulare Lake Subbasin

Well Name	GSA	Aquifer Zone	TDS	Nitrate as N	Arsenic	Uranium	Sulfate	TCP	Chloride
1610001-001	MKR	C	NA	9	9	NA	NA	9	NA
1610001-007	MKR	C	NA	9	9	NA	NA	9	NA
1610001-010	MKR	Unk	NA	1	0.25	NA	3	3	3
1610003-031	MKR	C	3	1	3	NA	3	3	3
1610003-039	MKR	C	3	1	3	NA	3	3	3
1610003-036	MKR	C	3	2	3	NA	3	3	3
1610003-041	MKR	C	3	1	3	NA	3	3	3
1610003-033	MKR	C	3	1	3	NA	3	3	3
1610003-040	MKR	C	3	1	3	NA	3	3	3
1610003-026	MKR	C	NA	9	3	NA	NA	9	NA
1610003-028	MKR	C	NA	1	3	NA	3	3	3
1610003-043	MKR	C	3	1	3	NA	3	3	3
1610003-042	MKR	C	3	1	3	NA	3	3	3
1610003-037	MKR	C	3	1	3	NA	3	3	3
1610003-044	MKR	Unk	3	1	3	NA	3	3	3
1610003-034	MKR	C	3	1	3	NA	3	3	3
1610006-001	SFK	C	1	1	3	3	3	3	3
1610006-002	SFK	C	NA	DUE	9	NA	NA	9	NA
1610006-007	SFK	C	1	1	3	NA	3	0.25	3
1610005-021	SFK	C	3	1	0.25	NA	3	3	3
1610005-010	SFK	C	3	1	0.25	NA	3	3	3
1610005-003	SFK	unk	NA	9	9	NA	NA	9	NA
1610005-022	SFK	C	3	1	0.25	NA	3	3	3
1610005-005	SFK	C	3	1	0.25	NA	3	3	3
1610005-018	SFK	C	3	1	0.25	NA	3	3	3
1610005-008	SFK	C	NA	9	0.25	NA	NA	9	NA
1610005-006	SFK	C	3	1	0.25	NA	3	3	3
1610005-009	SFK	B	3	1	0.25	NA	3	3	3
1610005-020	SFK	C	3	1	0.25	NA	3	3	3
1610005-011	SFK	C	3	1	0.25	NA	3	3	3
SL-1	SFK	B	2	2	2	2	2	2	2
1610009-003	SWK	B	NA	9	9	9	NA	9	NA
1610004-026	ELR	Unk	3	1	0.25	NA	3	3	3
1610004-018	ELR	Unk	3	1	0.25	NA	3	3	3
1610004-019	ELR	Unk	3	1	3	NA	3	3	3

Notes:
DUE = Sampling Event due
GSA = Groundwater Sustainability Agency
MKR = Mid-Kings River GSA
NA = Not Available
SFK = South Fork Kings GSA
SWK = Southwest Kings GSA
Unk = Unknown Aquifer Zone.
All Numbers are reported in years.
Bold well names are newly added to the Groundwater Quality Monitoring Network.
Wells no longer monitored by existing regulatory agencies have been removed from the monitoring network.



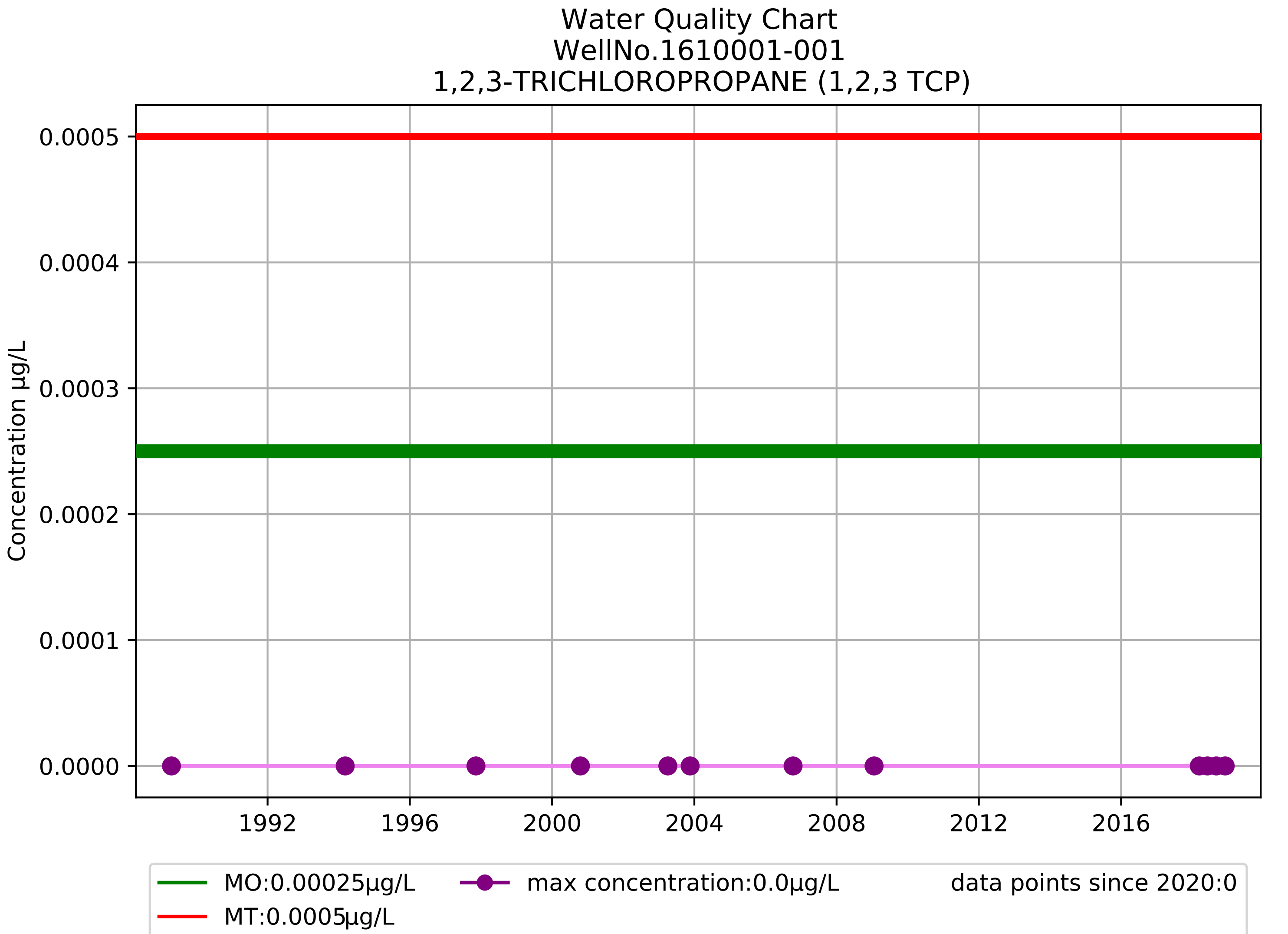
Groundwater Quality Monitoring Points
Water Year 2022 Annual Report
Tulare Lake Subbasin, Kings County, California

Geosyntec consultants

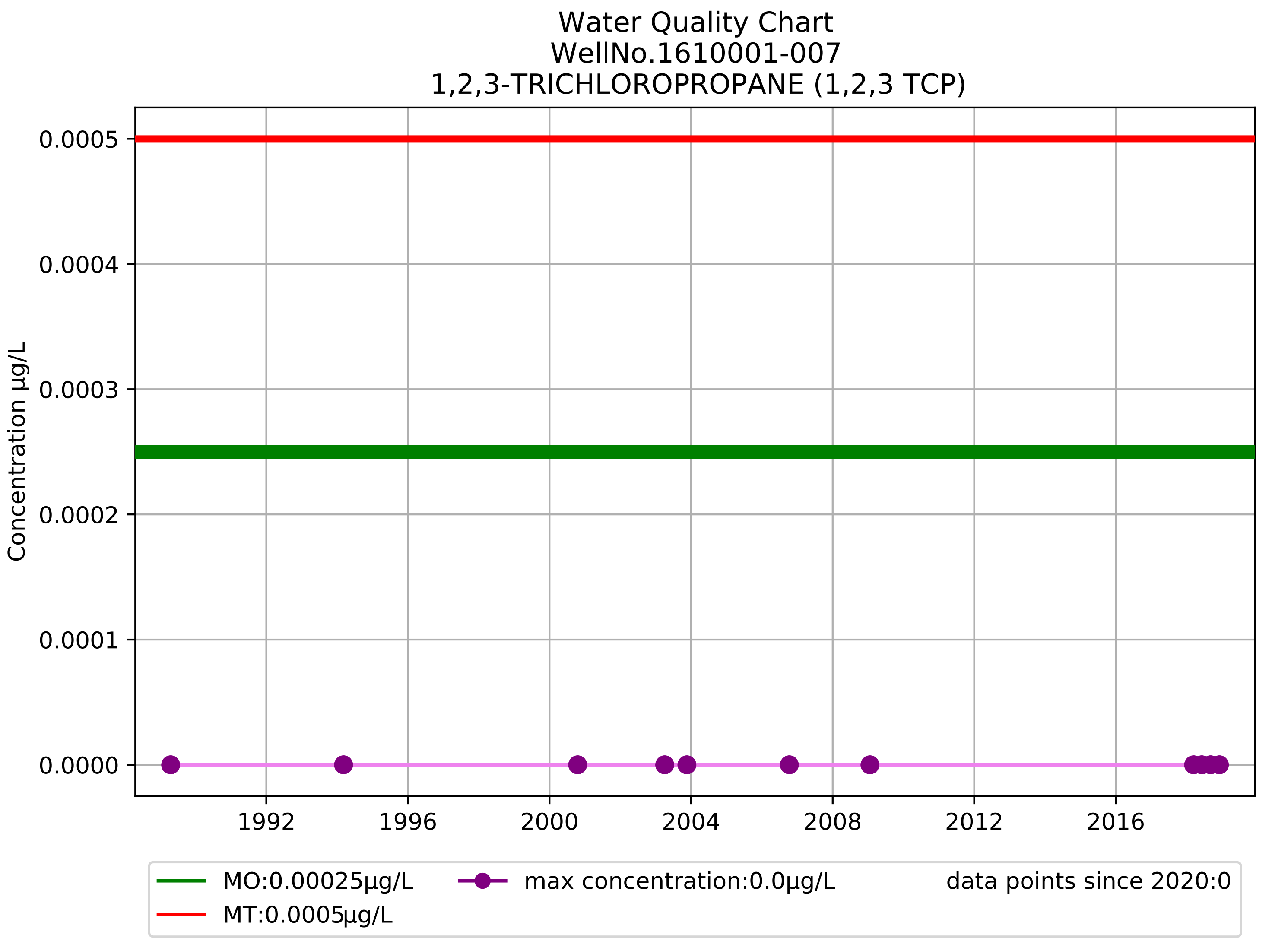
Figure F-1

Project No.: SFO128 | February 2023

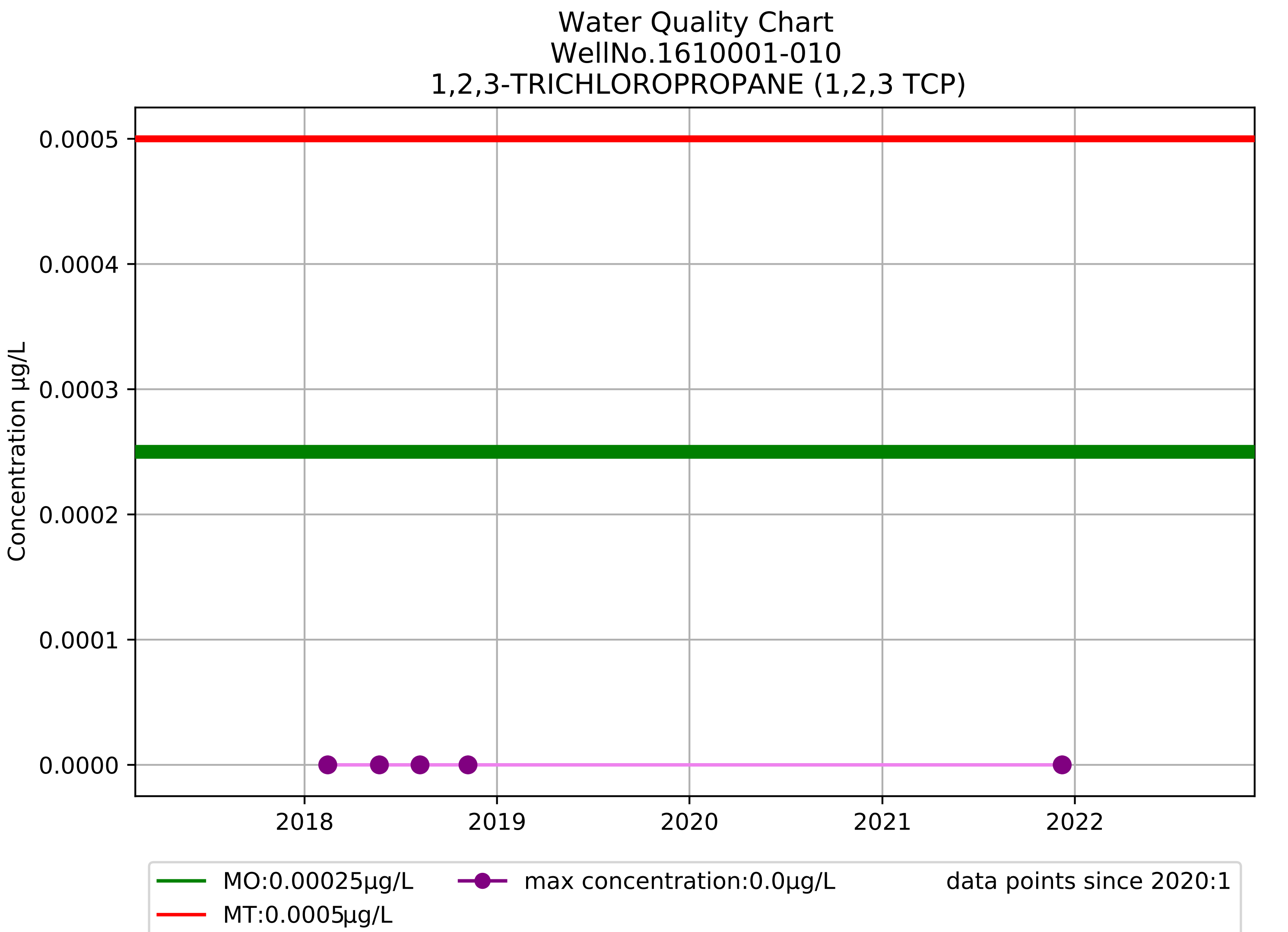
P:\GIS\SFO128 - Tulare Lake GSP Update 2022\Projects\RMS WQ monitoring points\Fig4-10_RMS WQ Monitoring Points.mxd 6/3/2022 12:18:57 PM (Author: SPrice)

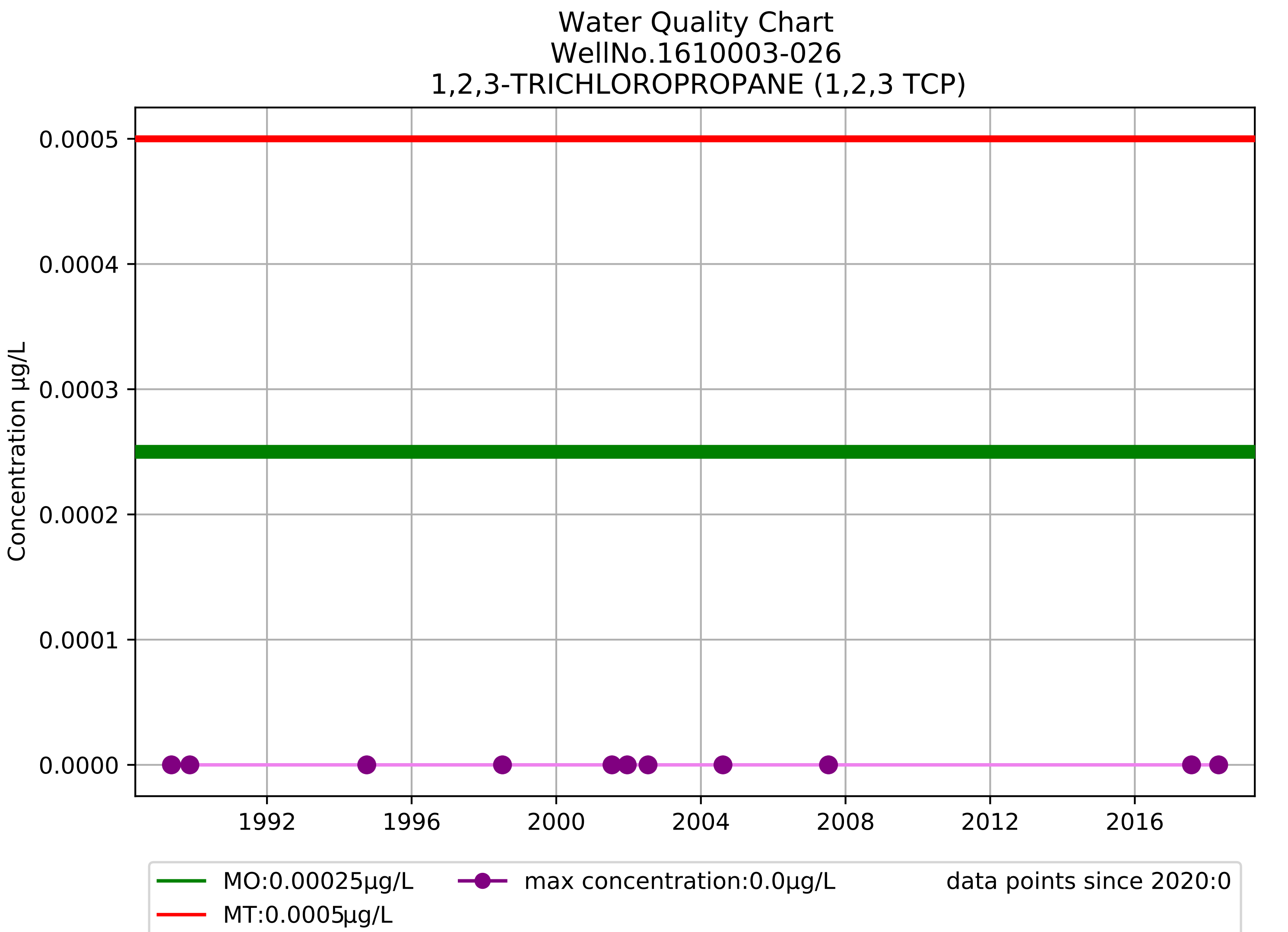


Water Quality Chart
WellNo.1610001-001
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
1992
1996
2000
2004
2008
2012
2016
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:0

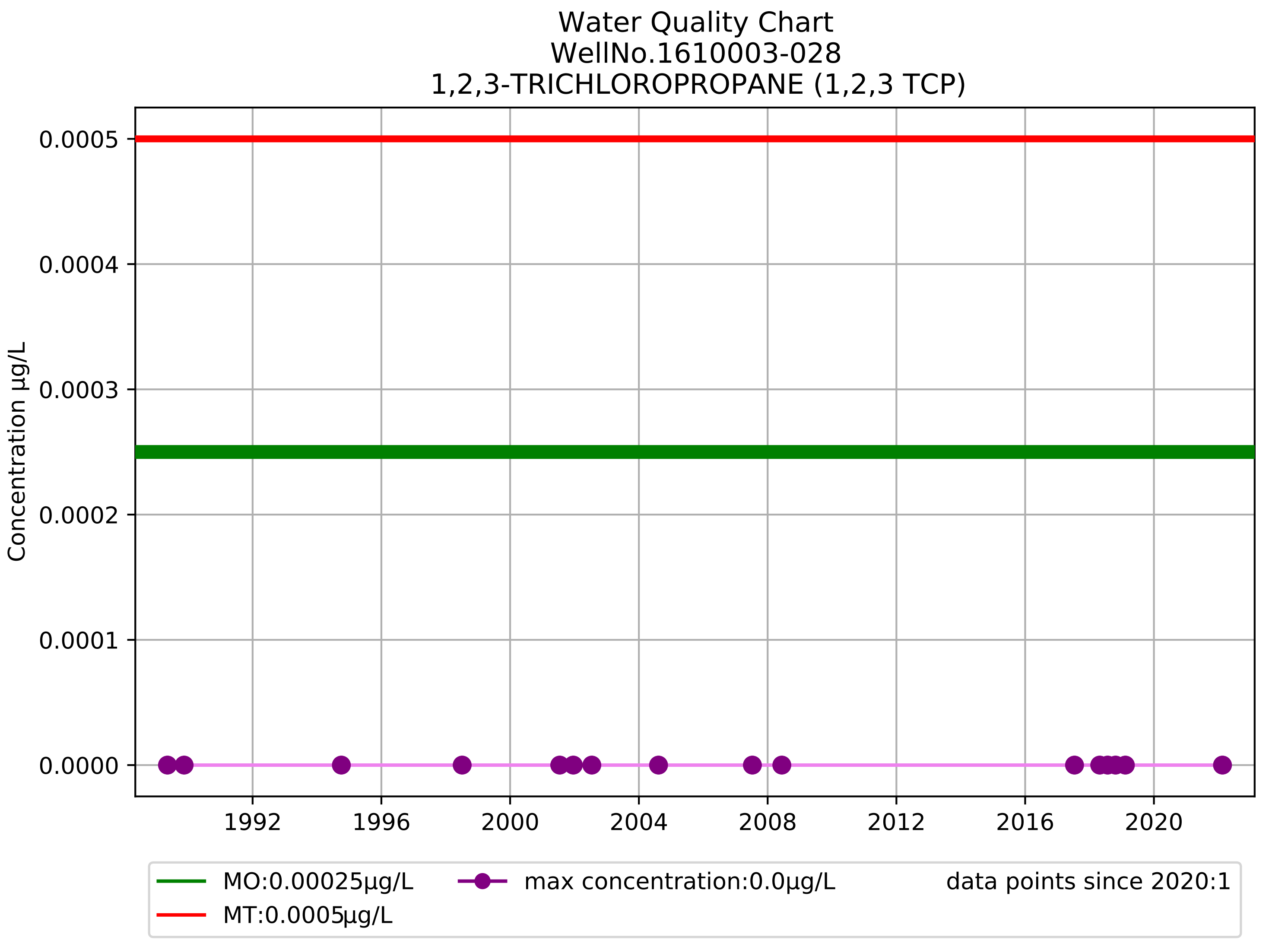


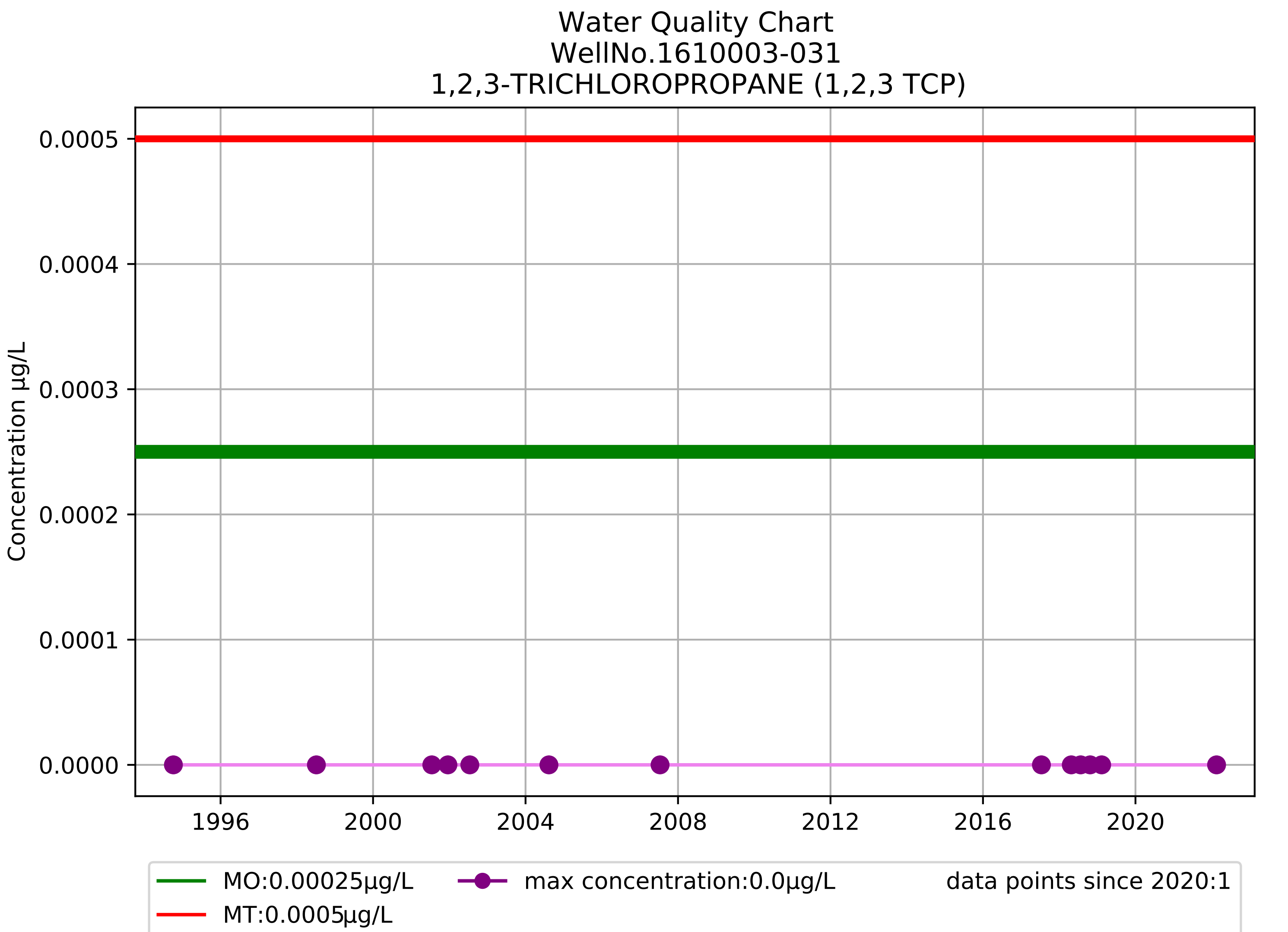
Water Quality Chart
WellNo.1610001-007
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
1992
1996
2000
2004
2008
2012
2016
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:0


Water Quality Chart
WellNo.1610001-010
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2018
2019
2020
2021
2022
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1

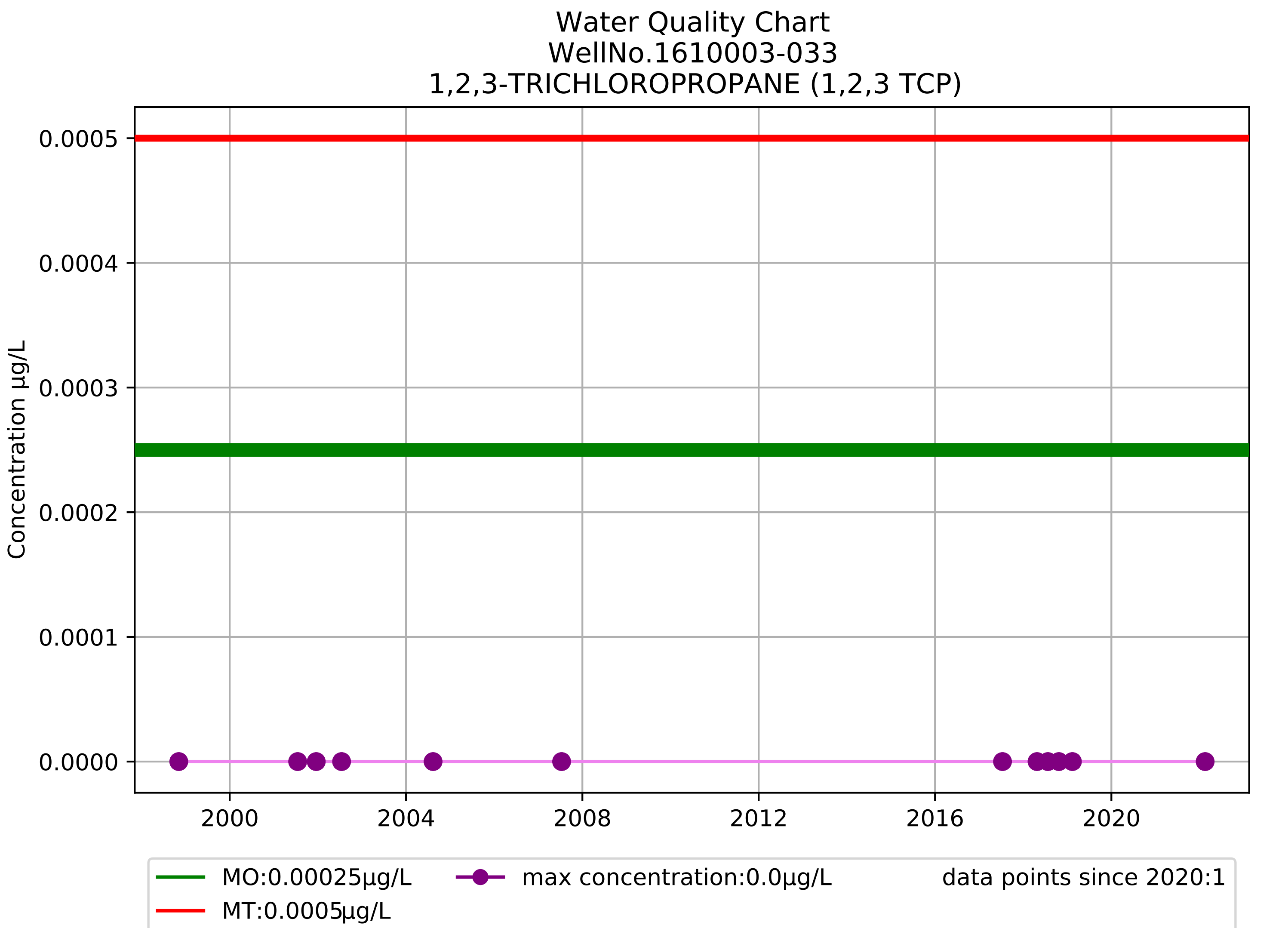


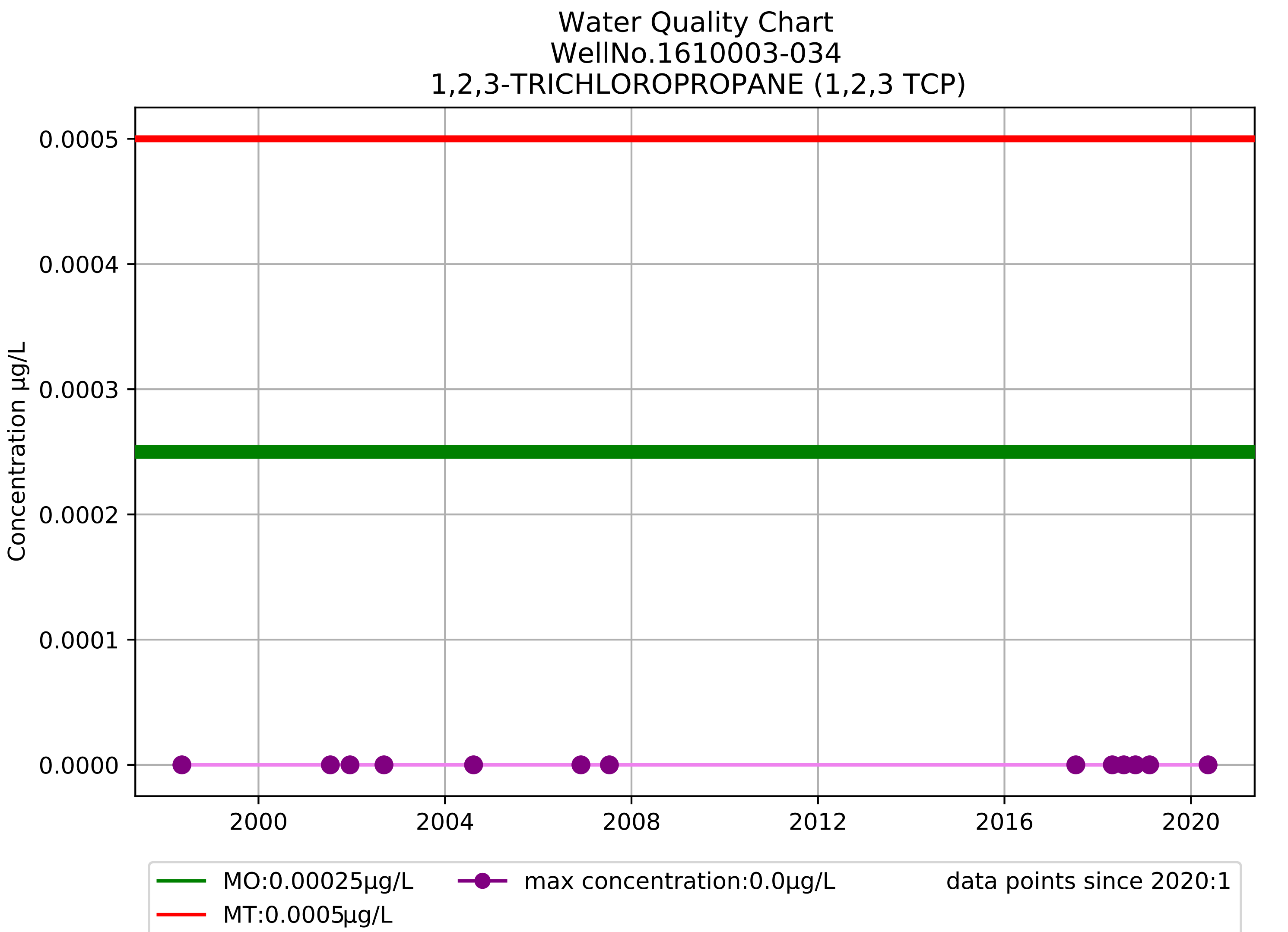
Water Quality Chart
WellNo.1610003-026
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
1992
1996
2000
2004
2008
2012
2016
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:0


Water Quality Chart
WellNo.1610003-028
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
1992
1996
2000
2004
2008
2012
2016
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1

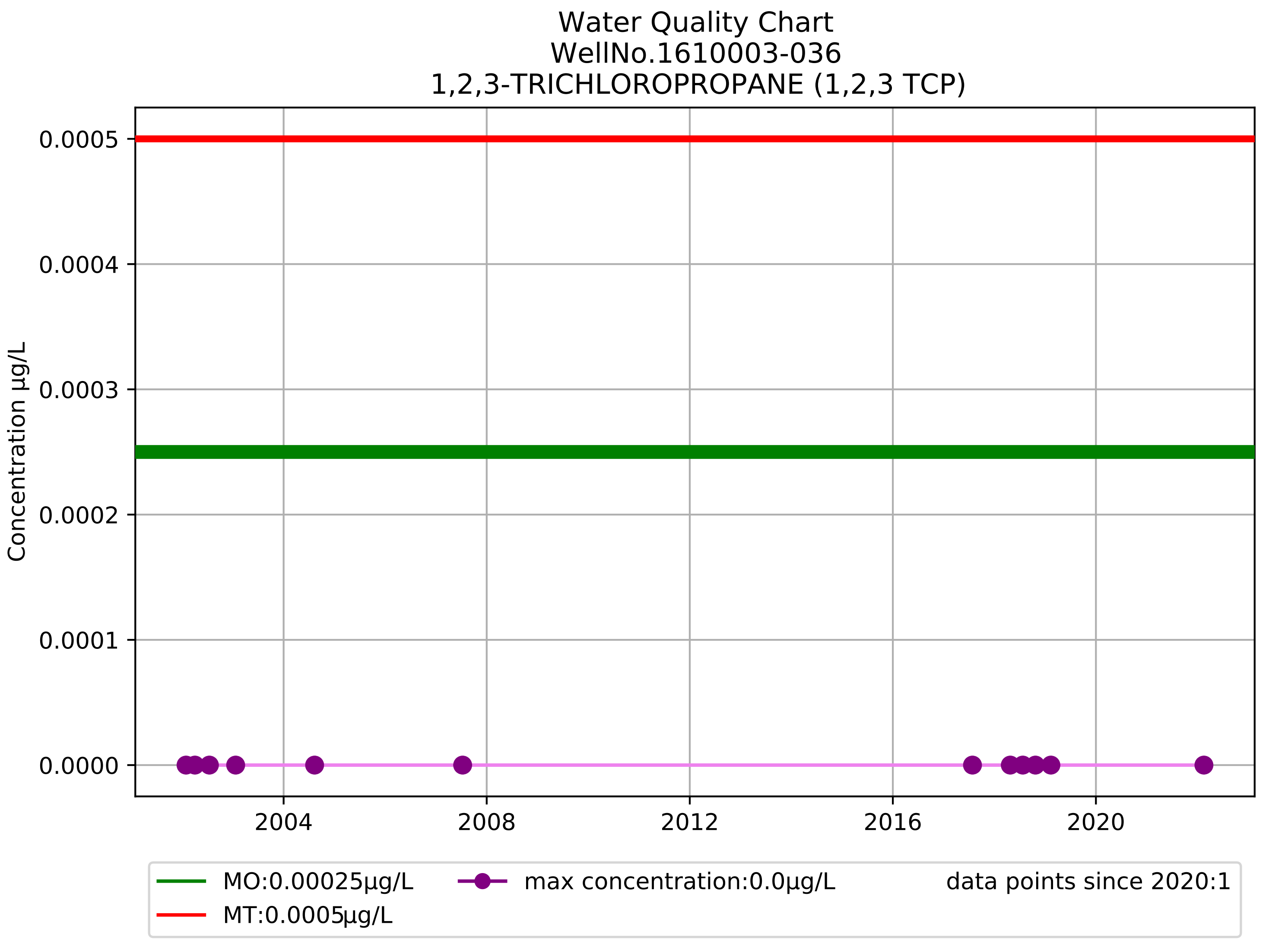


Water Quality Chart
WellNo.1610003-031
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
1996
2000
2004
2008
2012
2016
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1

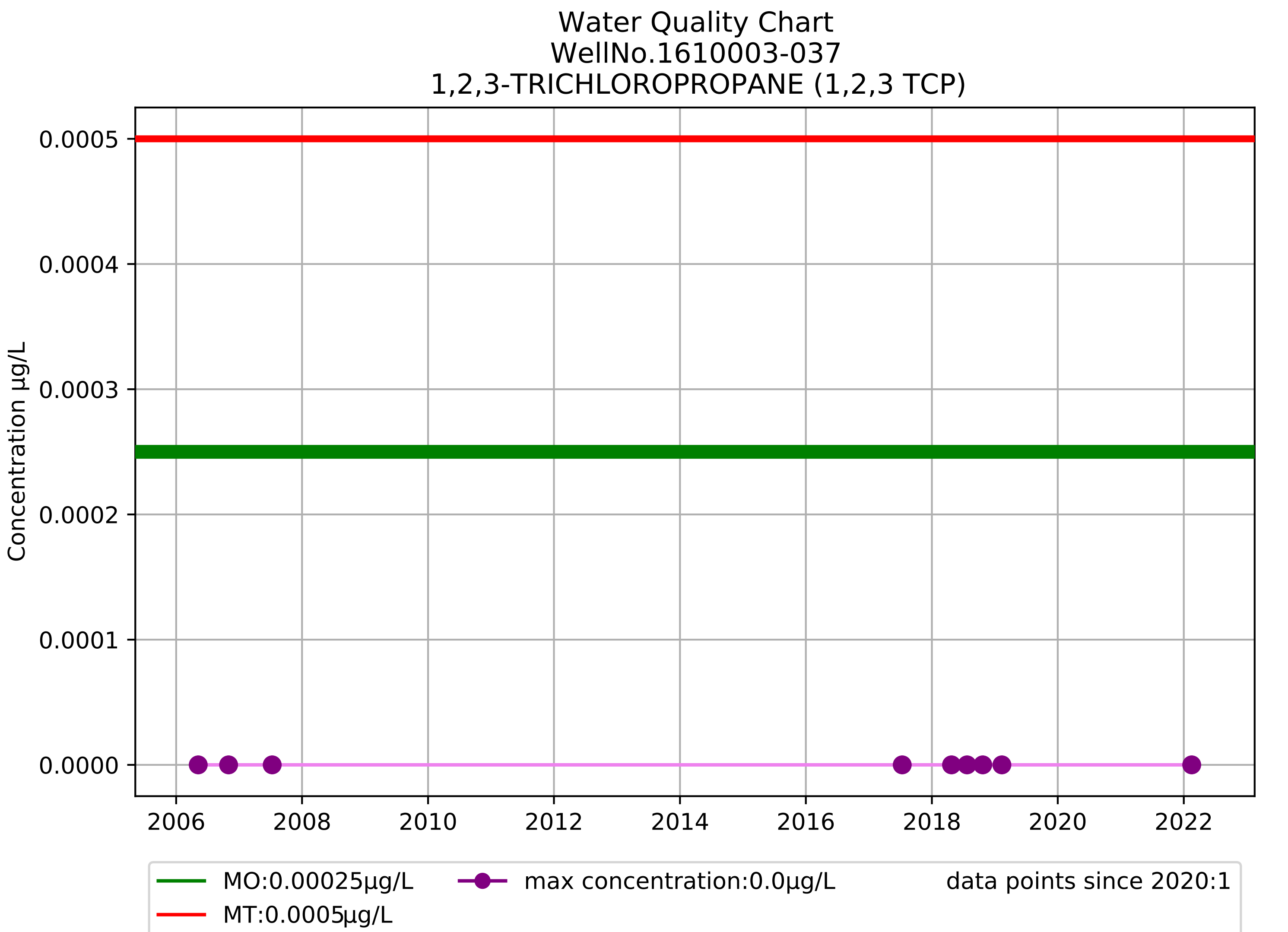

Water Quality Chart
WellNo.1610003-033
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2000
2004
2008
2012
2016
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1



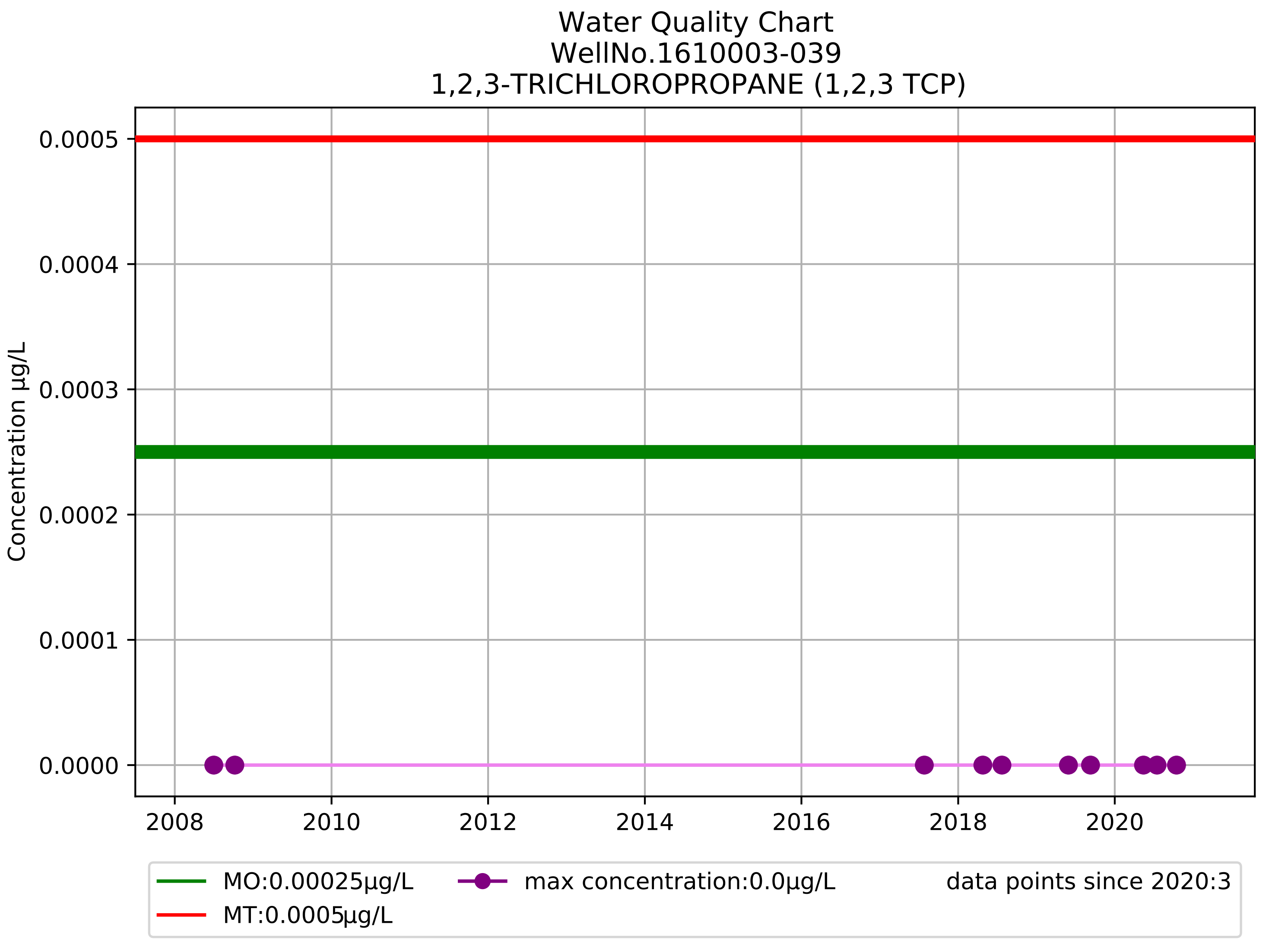
Water Quality Chart
WellNo.1610003-034
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2000
2004
2008
2012
2016
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1



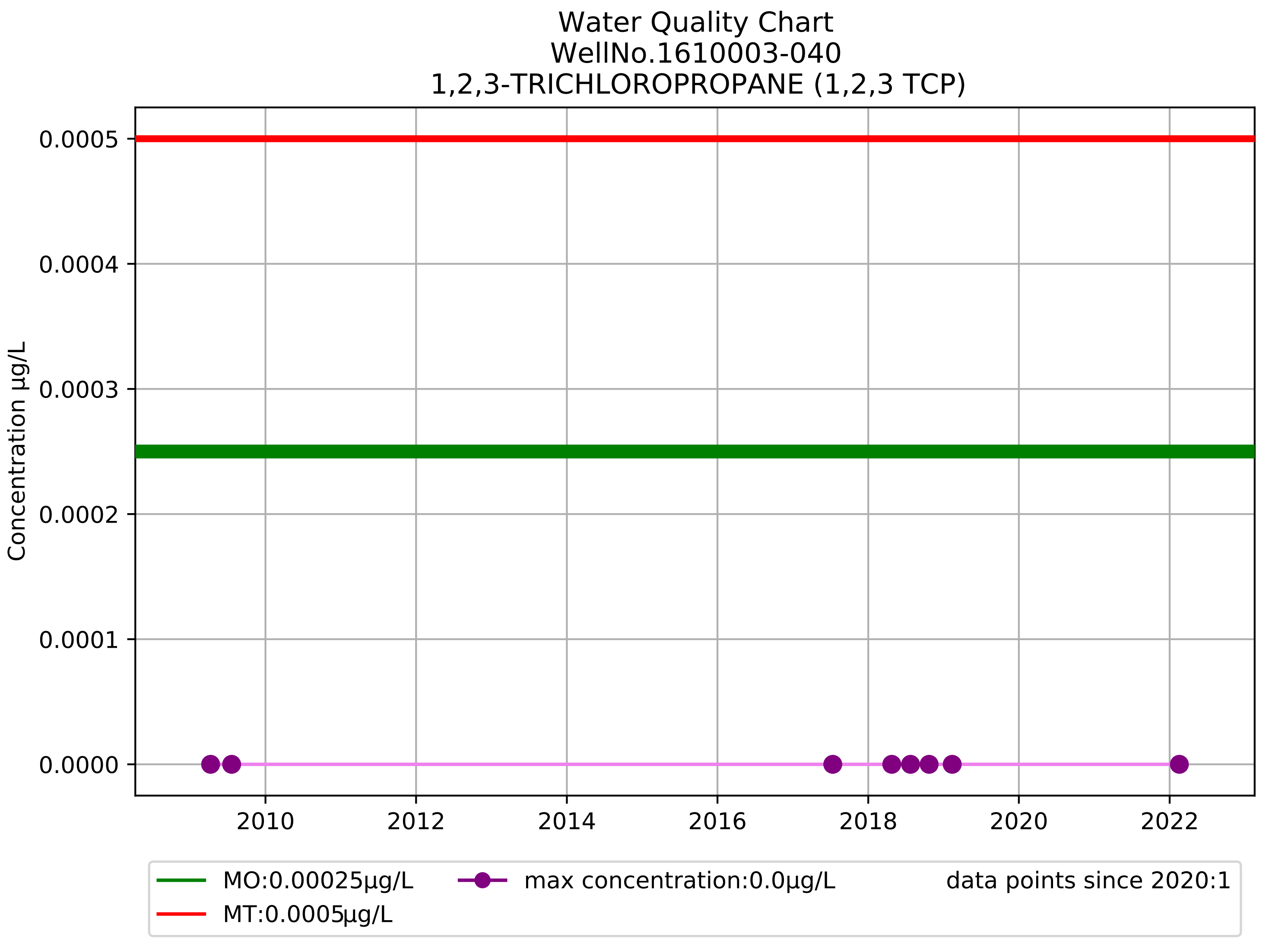
Water Quality Chart
WellNo.1610003-036
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2004
2008
2012
2016
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1



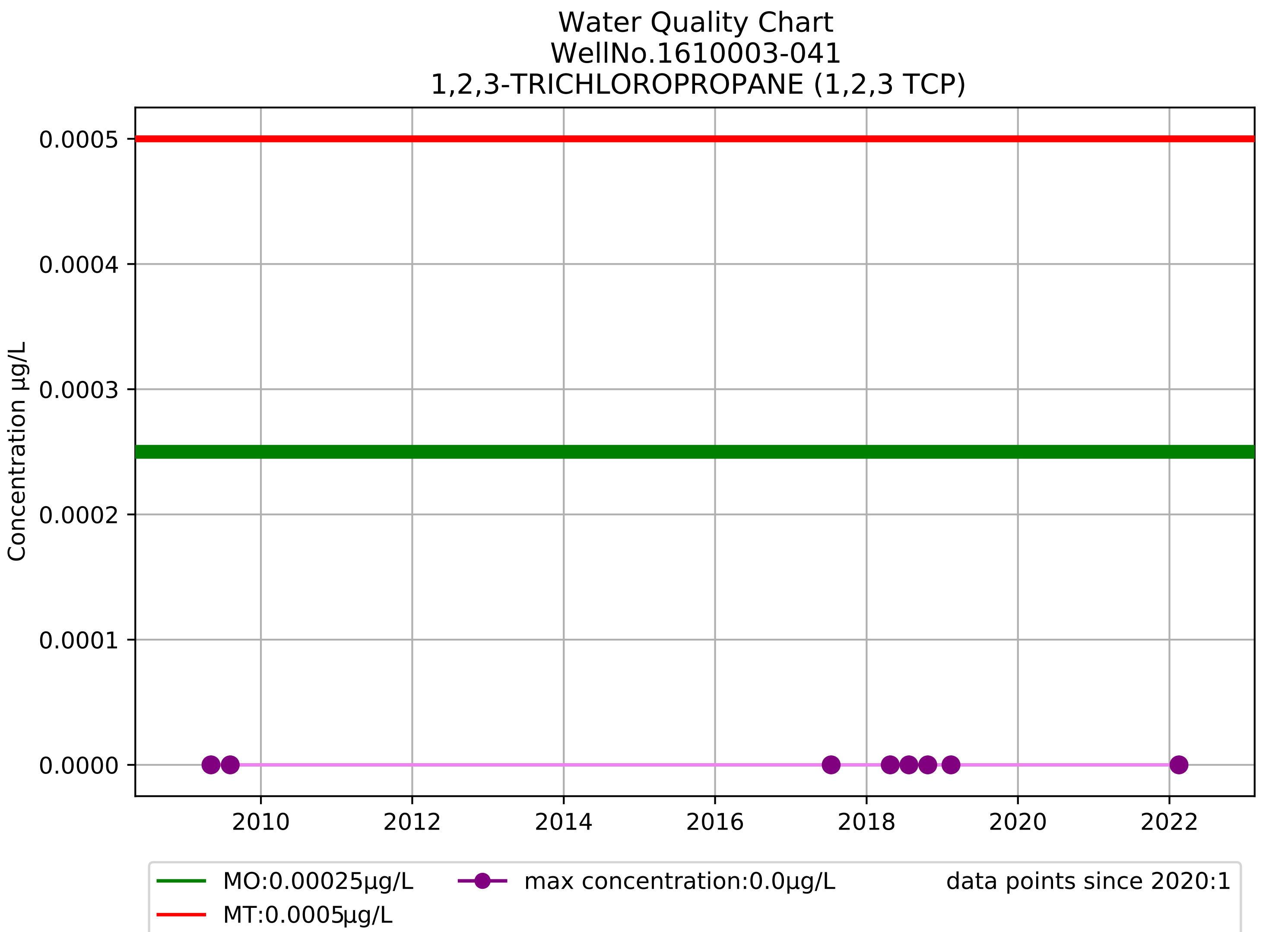
Water Quality Chart
WellNo.1610003-037
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1



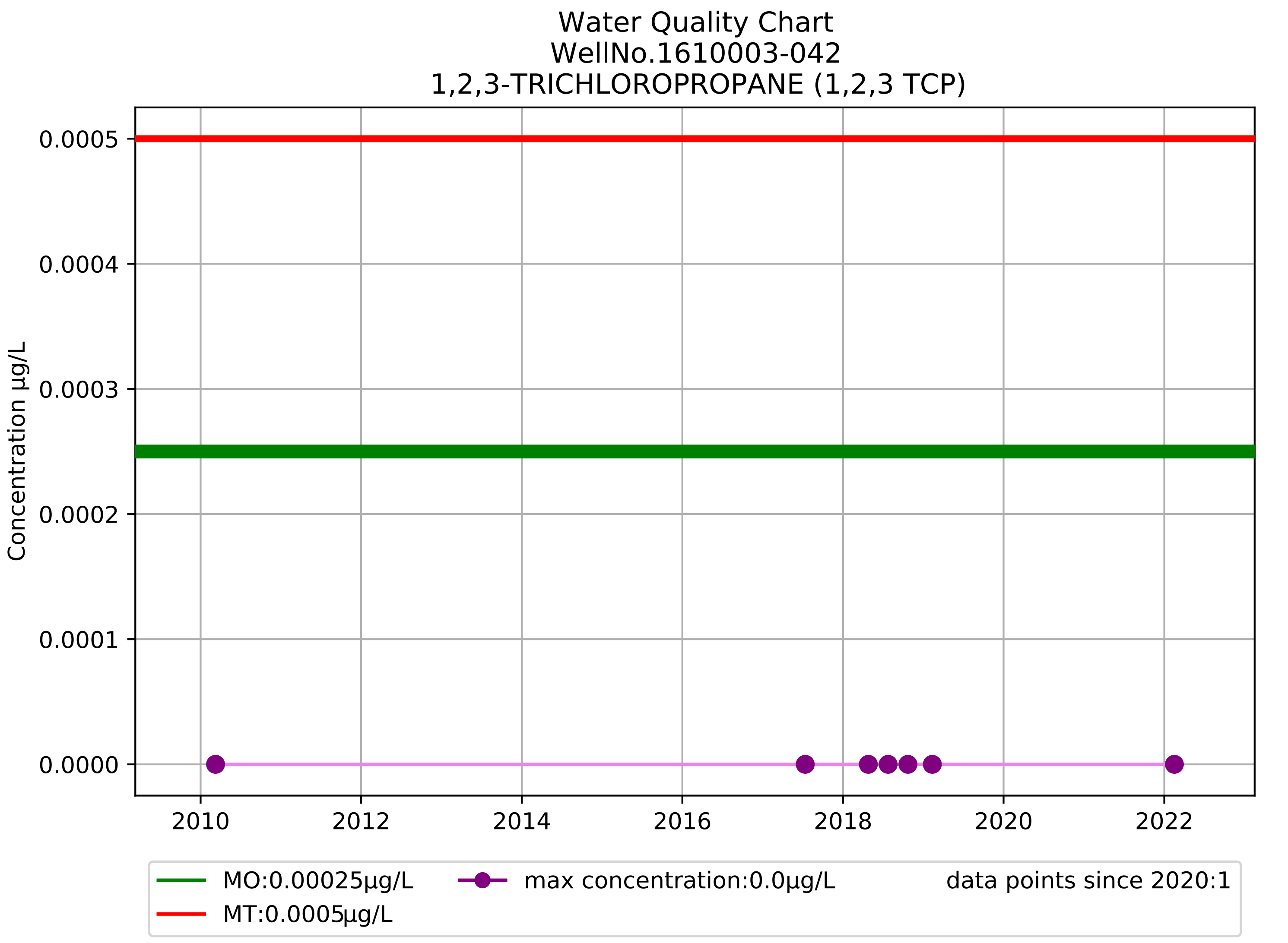
Water Quality Chart
WellNo.1610003-039
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2008
2010
2012
2014
2016
2018
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:3



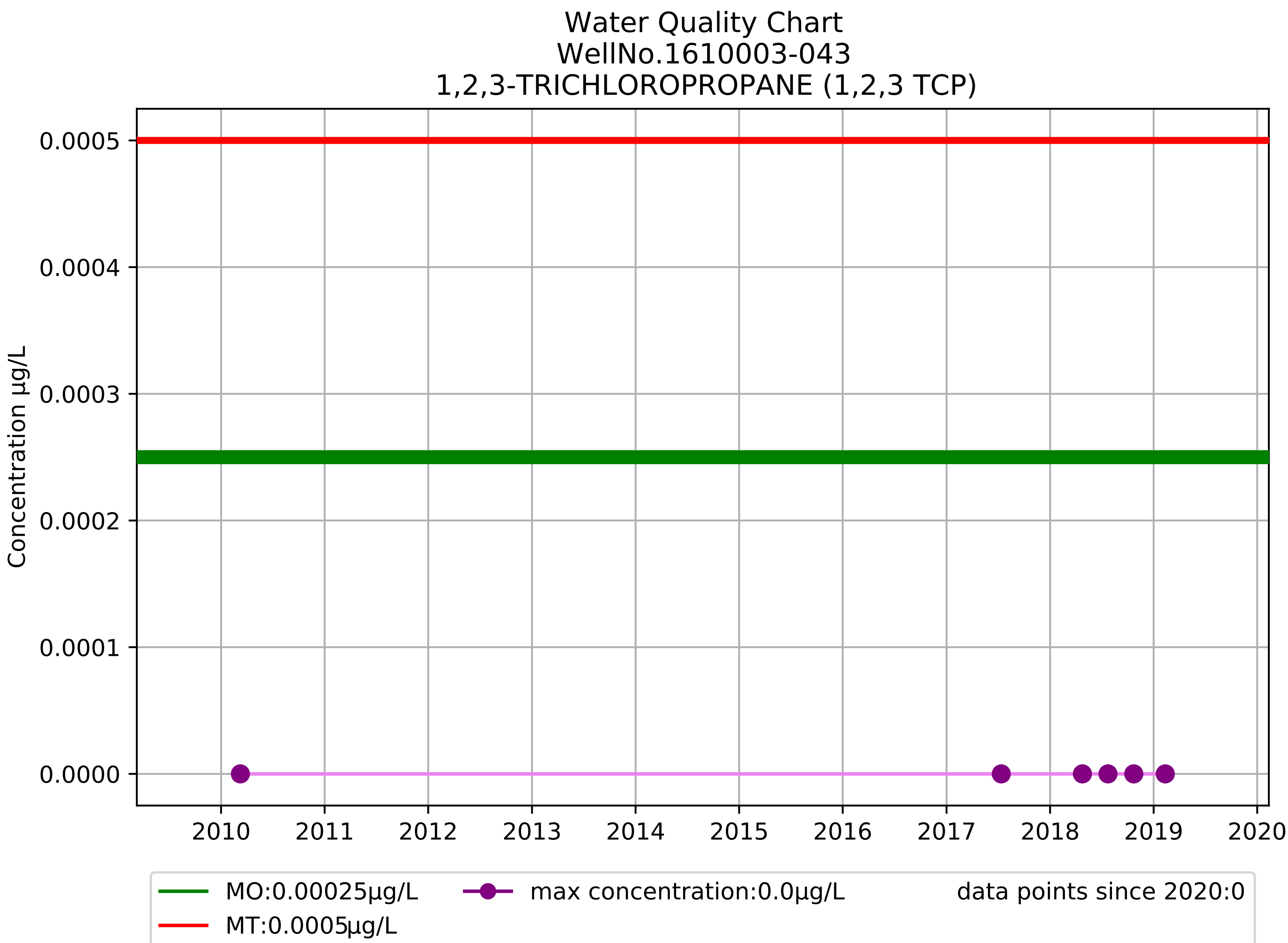
Water Quality Chart
WellNo.1610003-040
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2010
2012
2014
2016
2018
2020
2022
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1



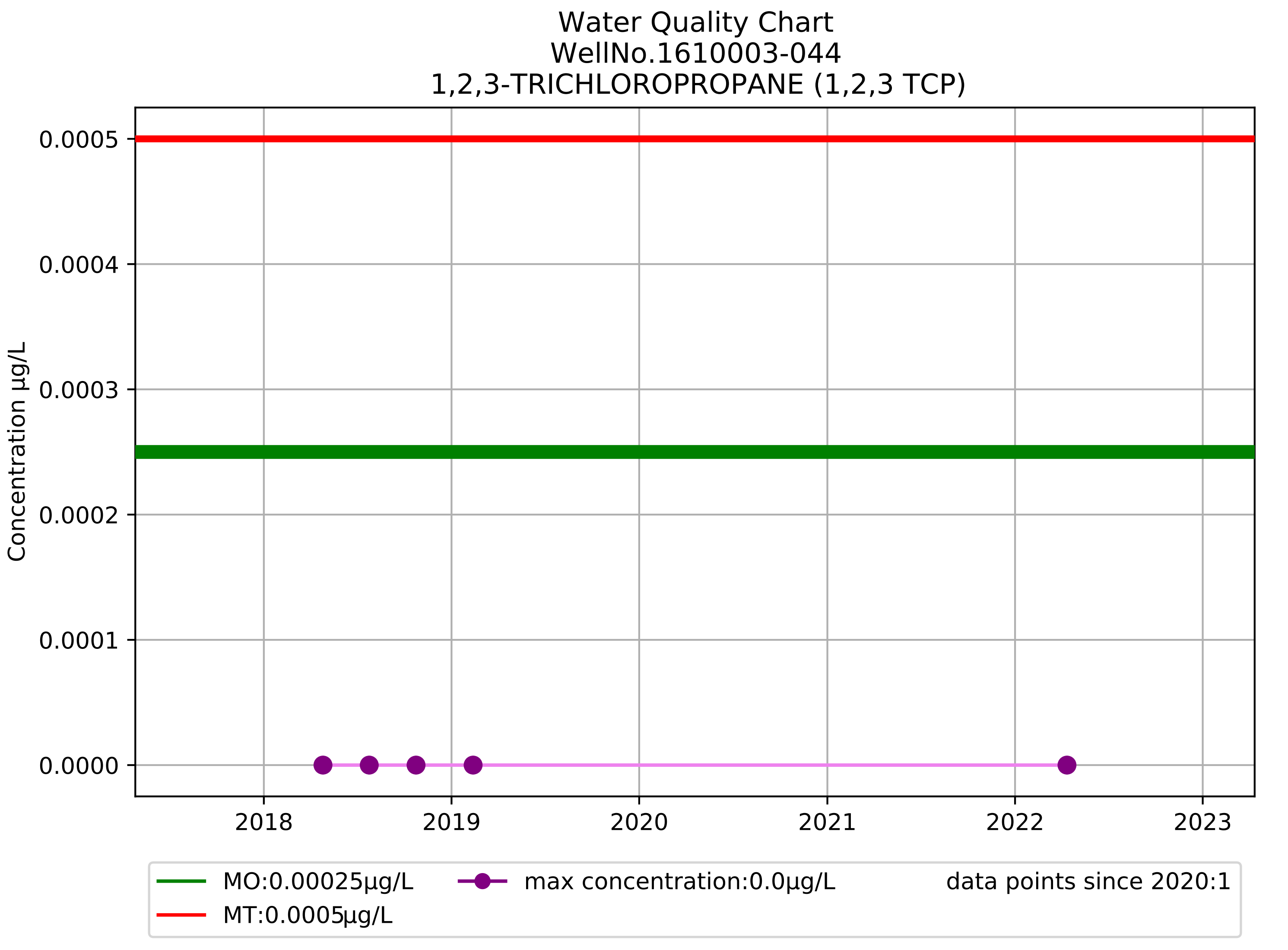
Water Quality Chart
WellNo.1610003-041
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2010
2012
2014
2016
2018
2020
2022
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1



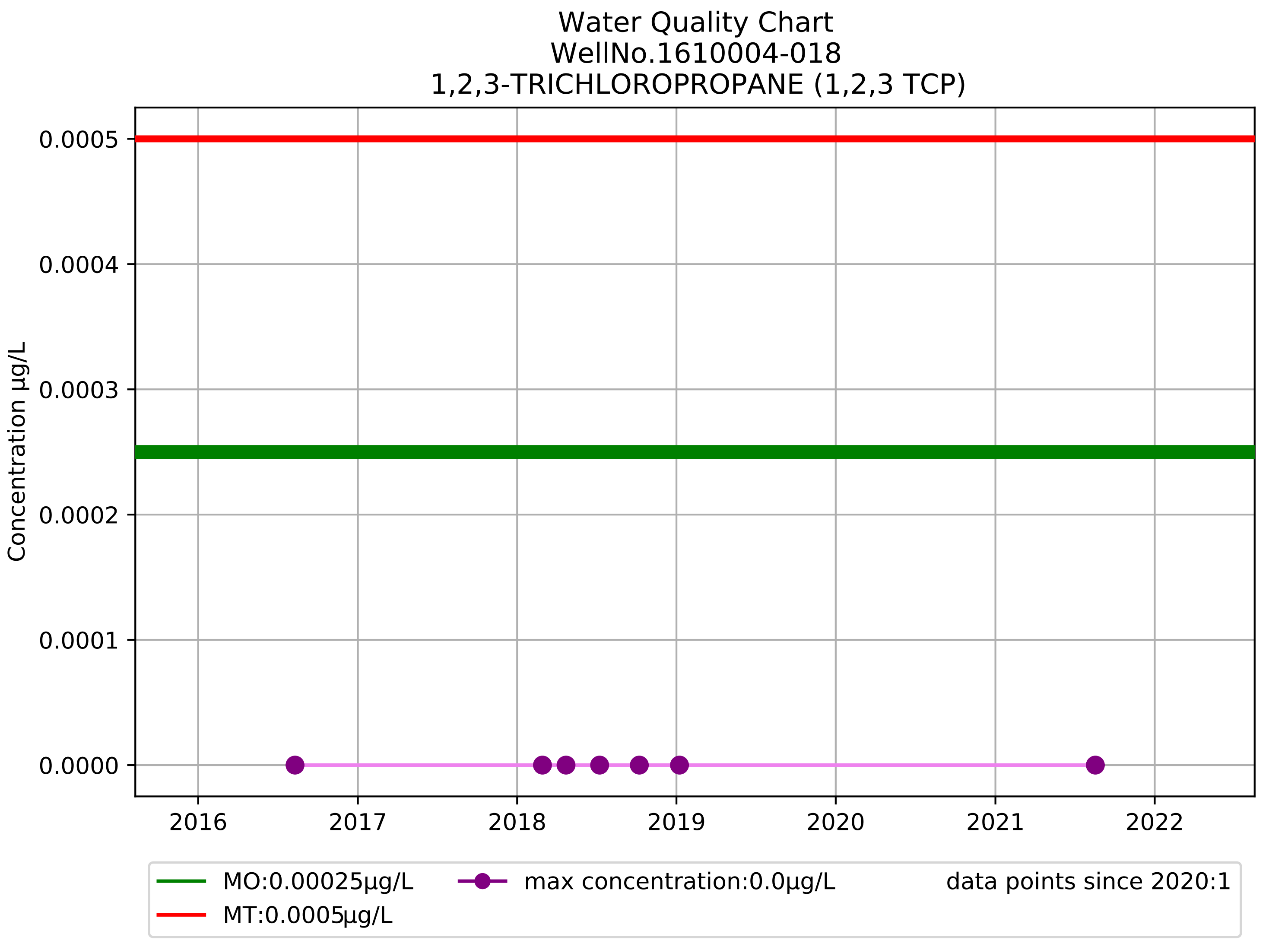
Water Quality Chart
WellNo.1610003-042
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2010
2012
2014
2016
2018
2020
2022
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1

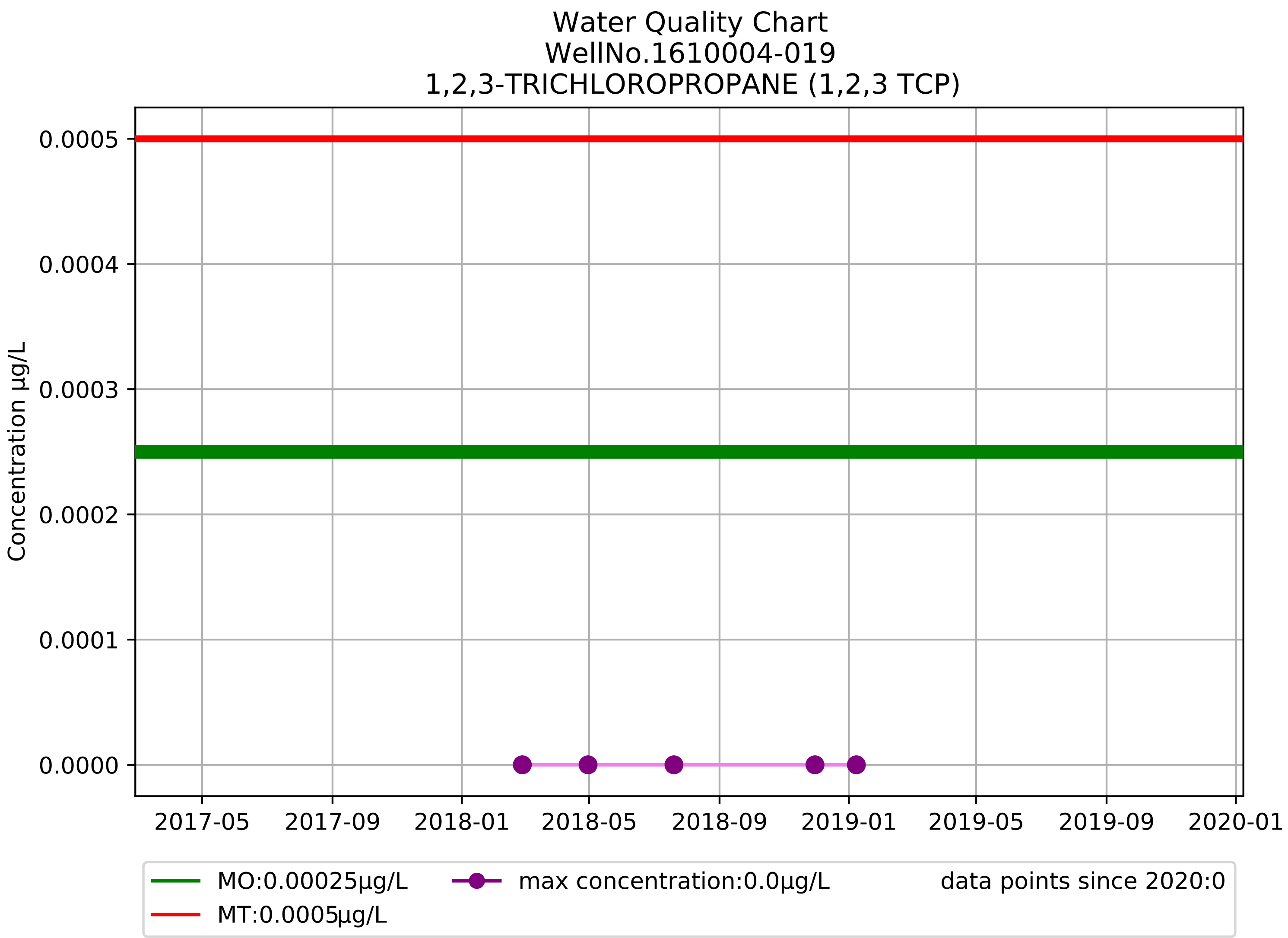


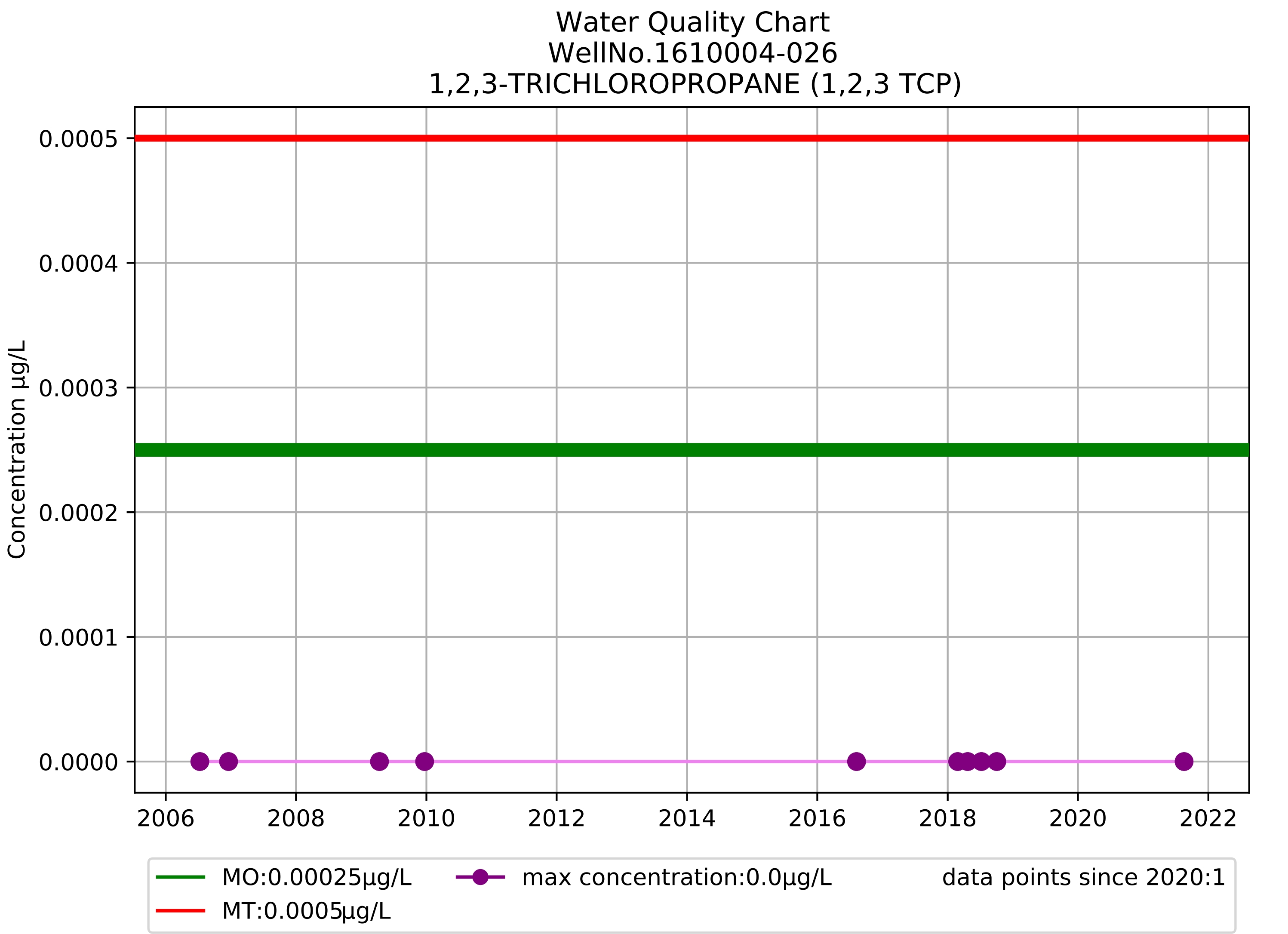
Water Quality Chart
WellNo.1610003-043
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:0

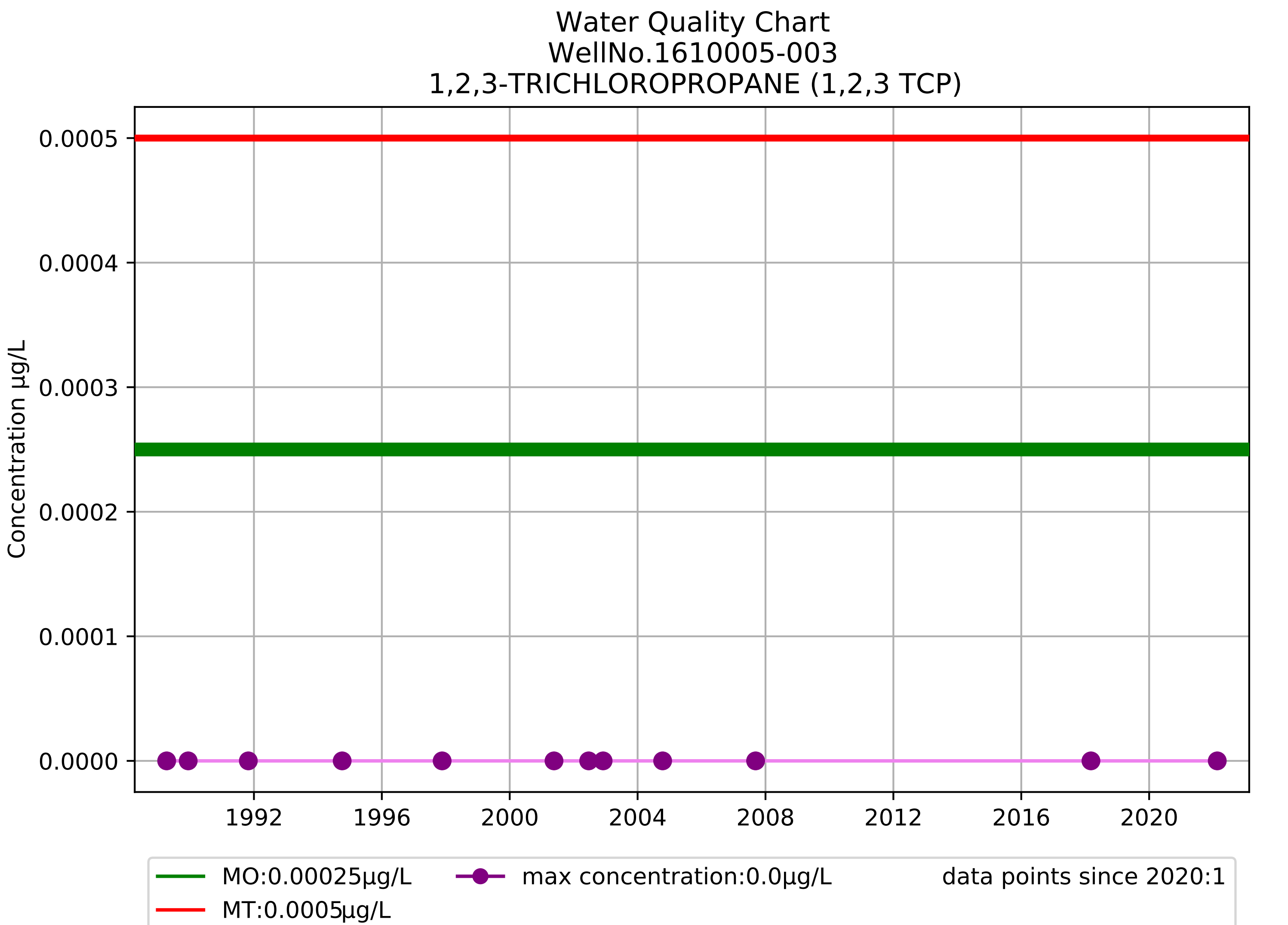


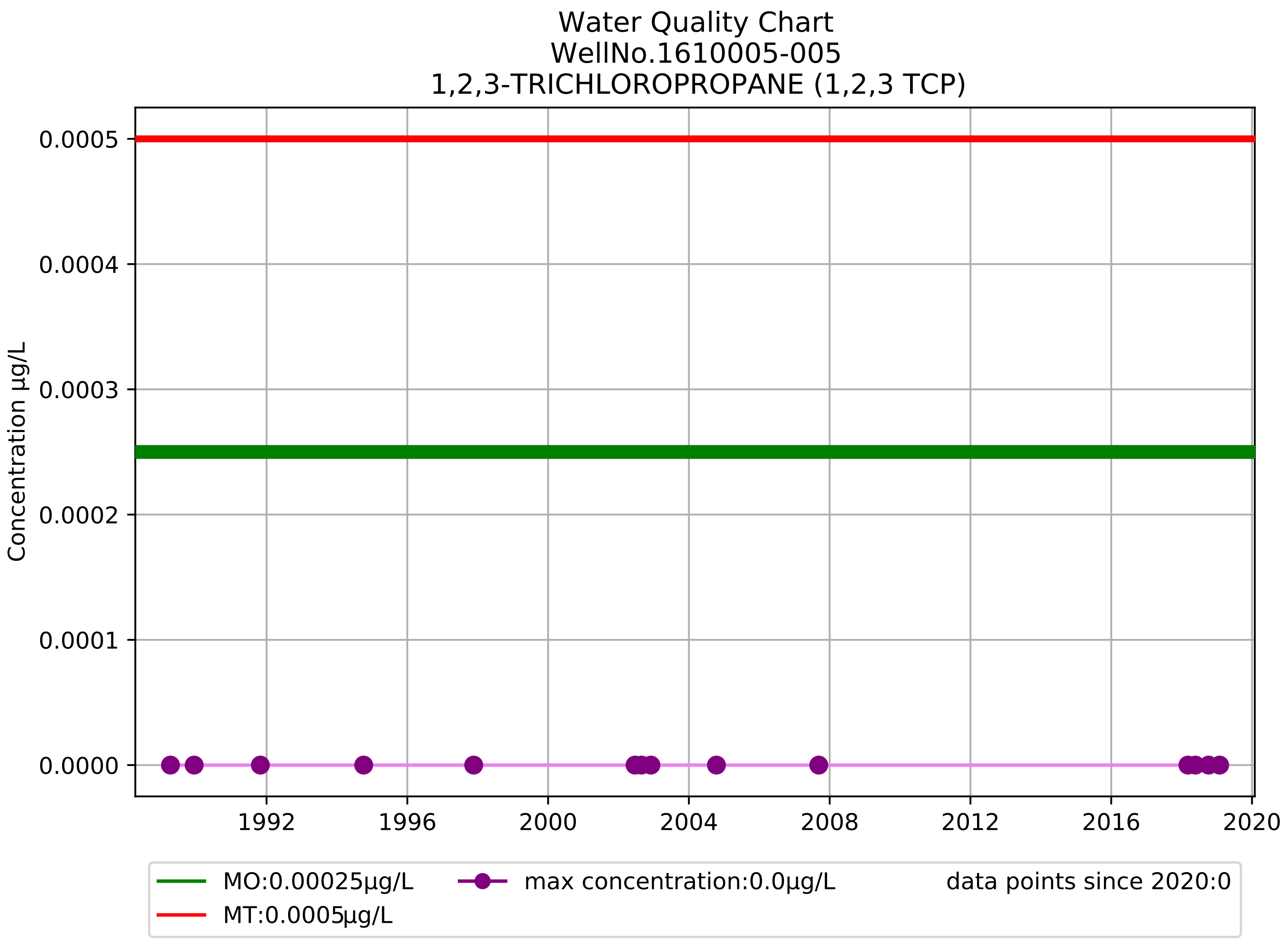
Water Quality Chart
WellNo.1610003-044
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2018
2019
2020
2021
2022
2023
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1

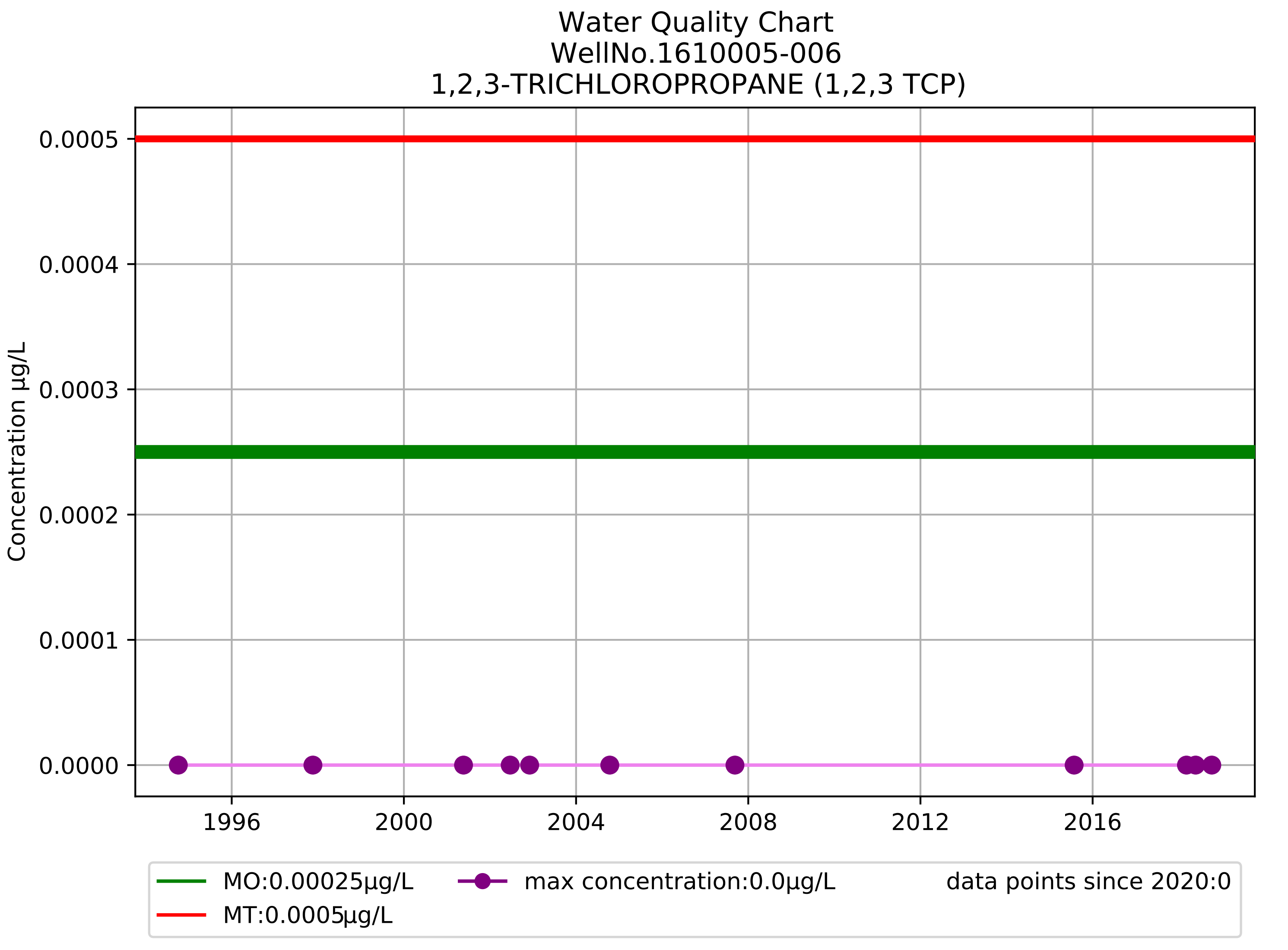

Water Quality Chart
WellNo.1610004-018
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2016
2017
2018
2019
2020
2021
2022
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1


Water Quality Chart
WellNo.1610004-019
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2017-05
2017-09
2018-01
2018-05
2018-09
2019-01
2019-05
2019-09
2020-01
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:0


Water Quality Chart
WellNo.1610004-026
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1

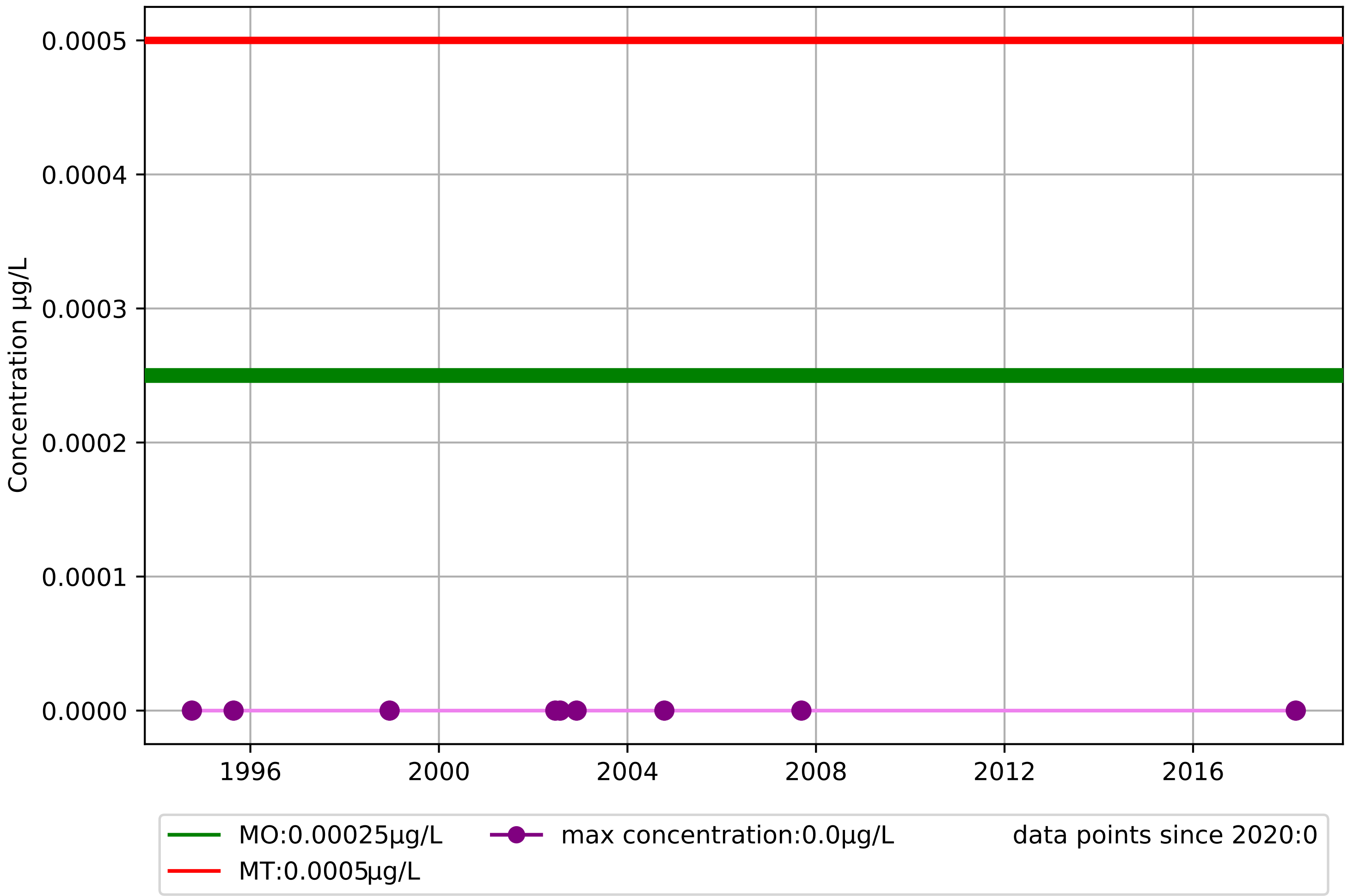

Water Quality Chart
WellNo.1610005-003
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
1992
1996
2000
2004
2008
2012
2016
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1

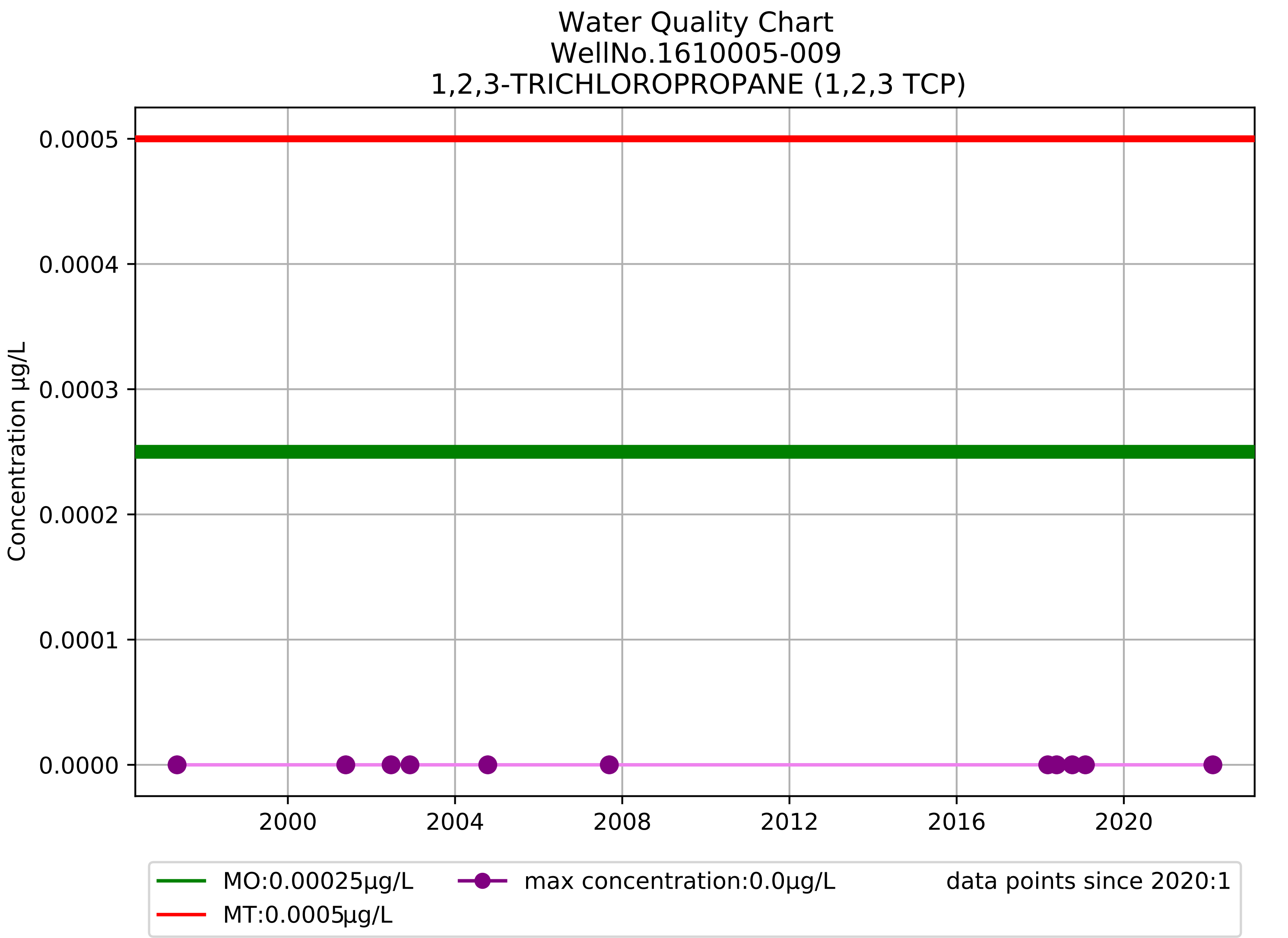

Water Quality Chart
WellNo.1610005-005
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
1992
1996
2000
2004
2008
2012
2016
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:0



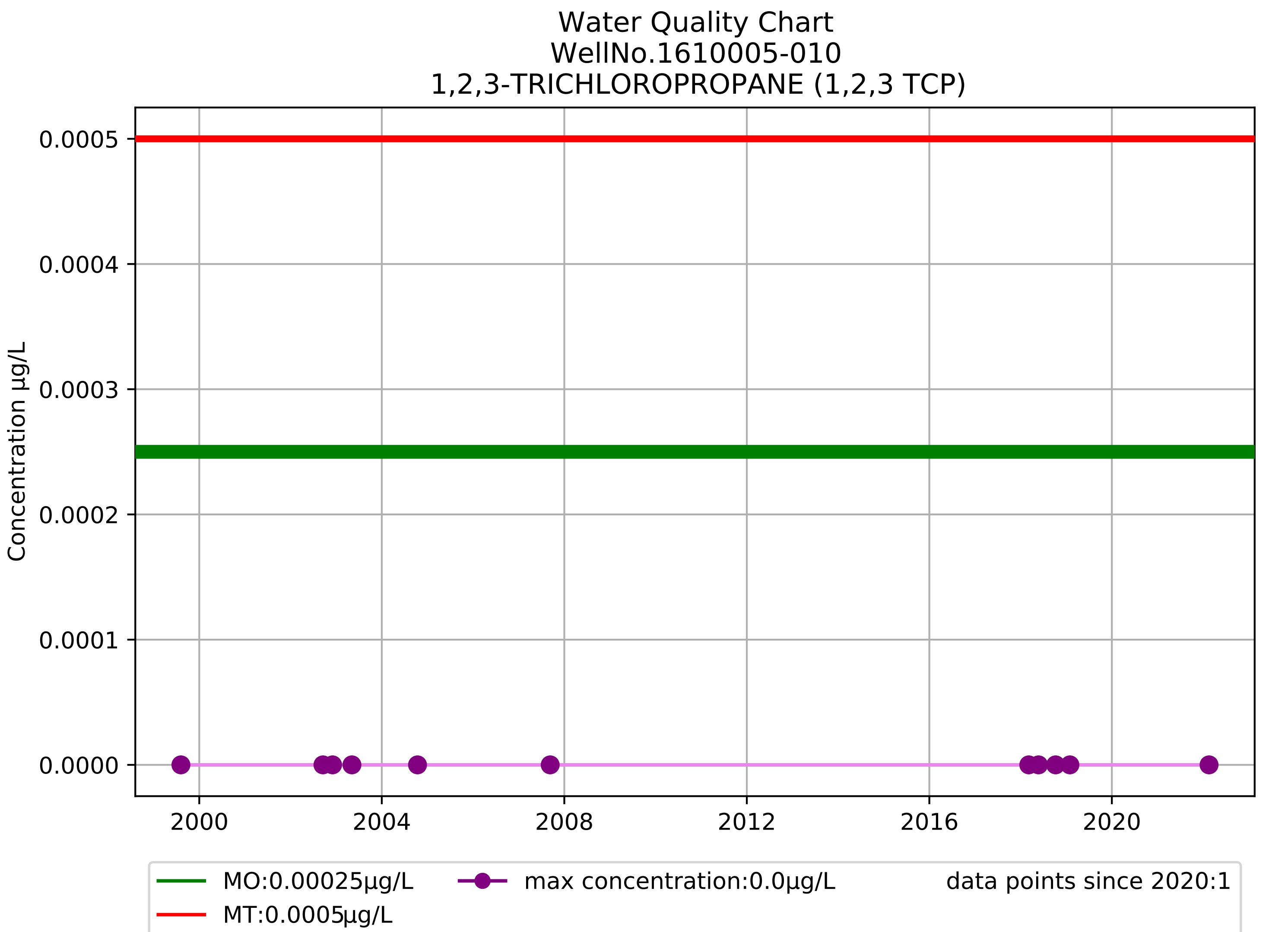
Water Quality Chart
WellNo.1610005-006
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
1996
2000
2004
2008
2012
2016
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:0

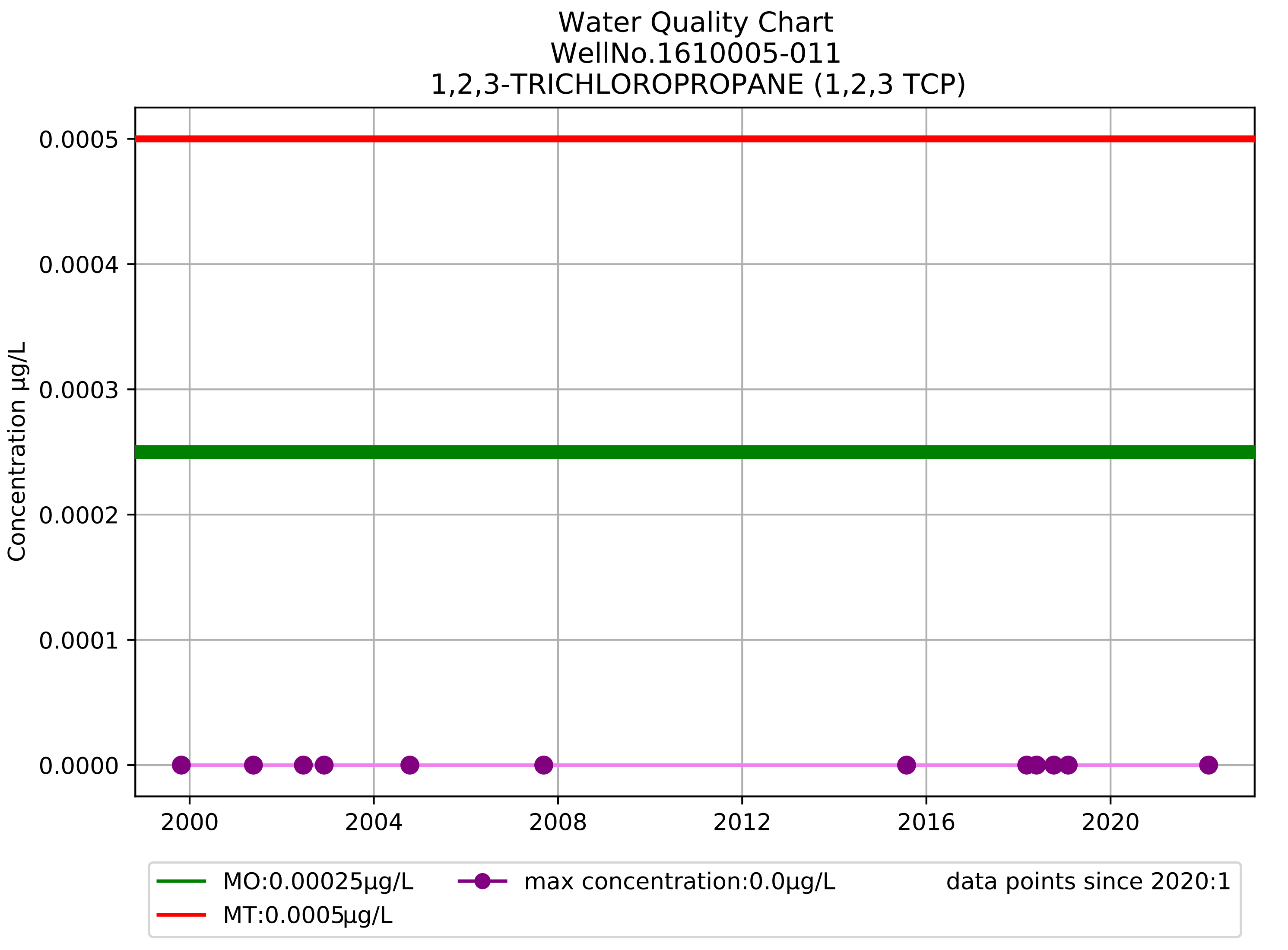
Water Quality Chart
WellNo.1610005-008
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)

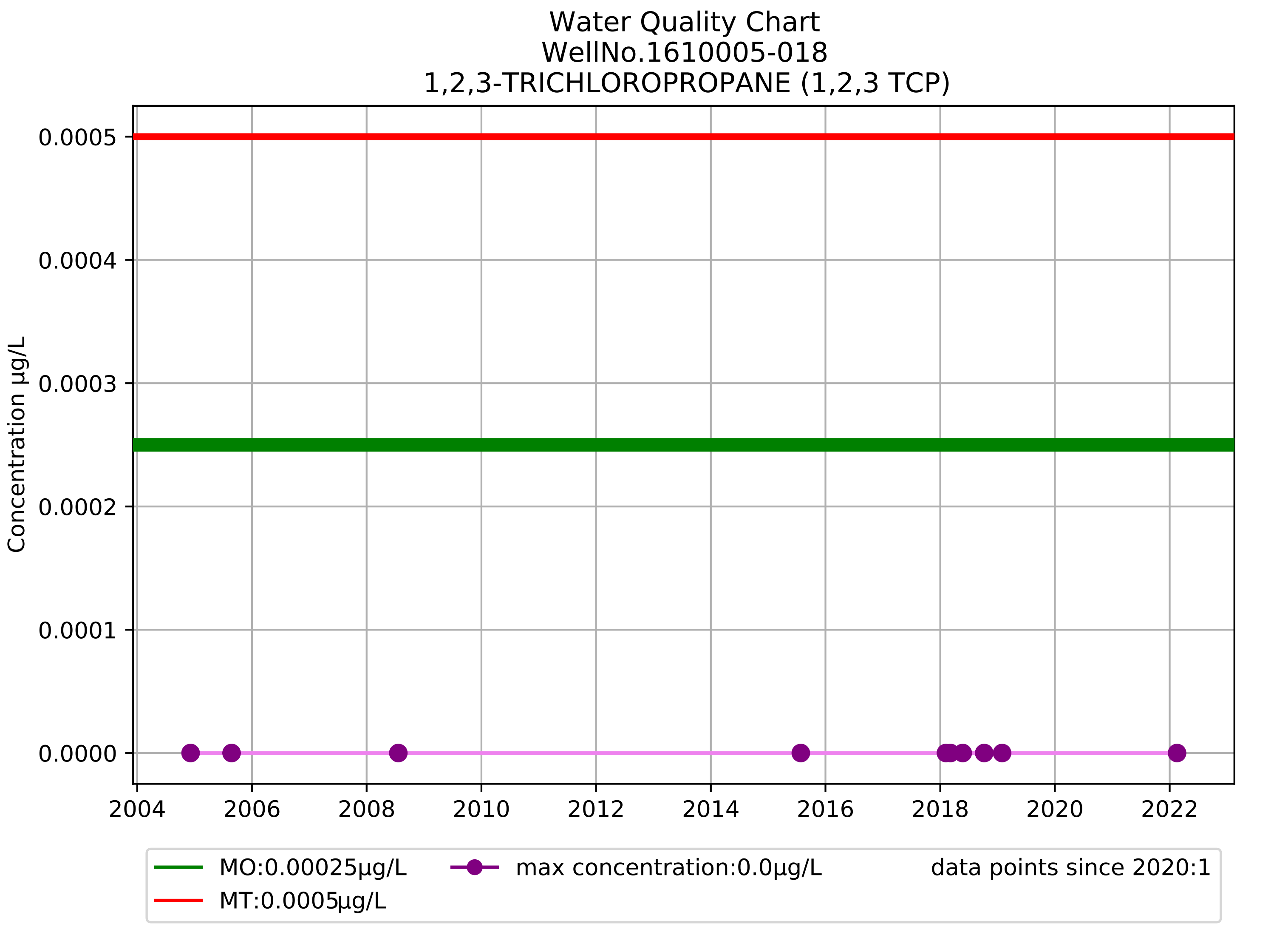


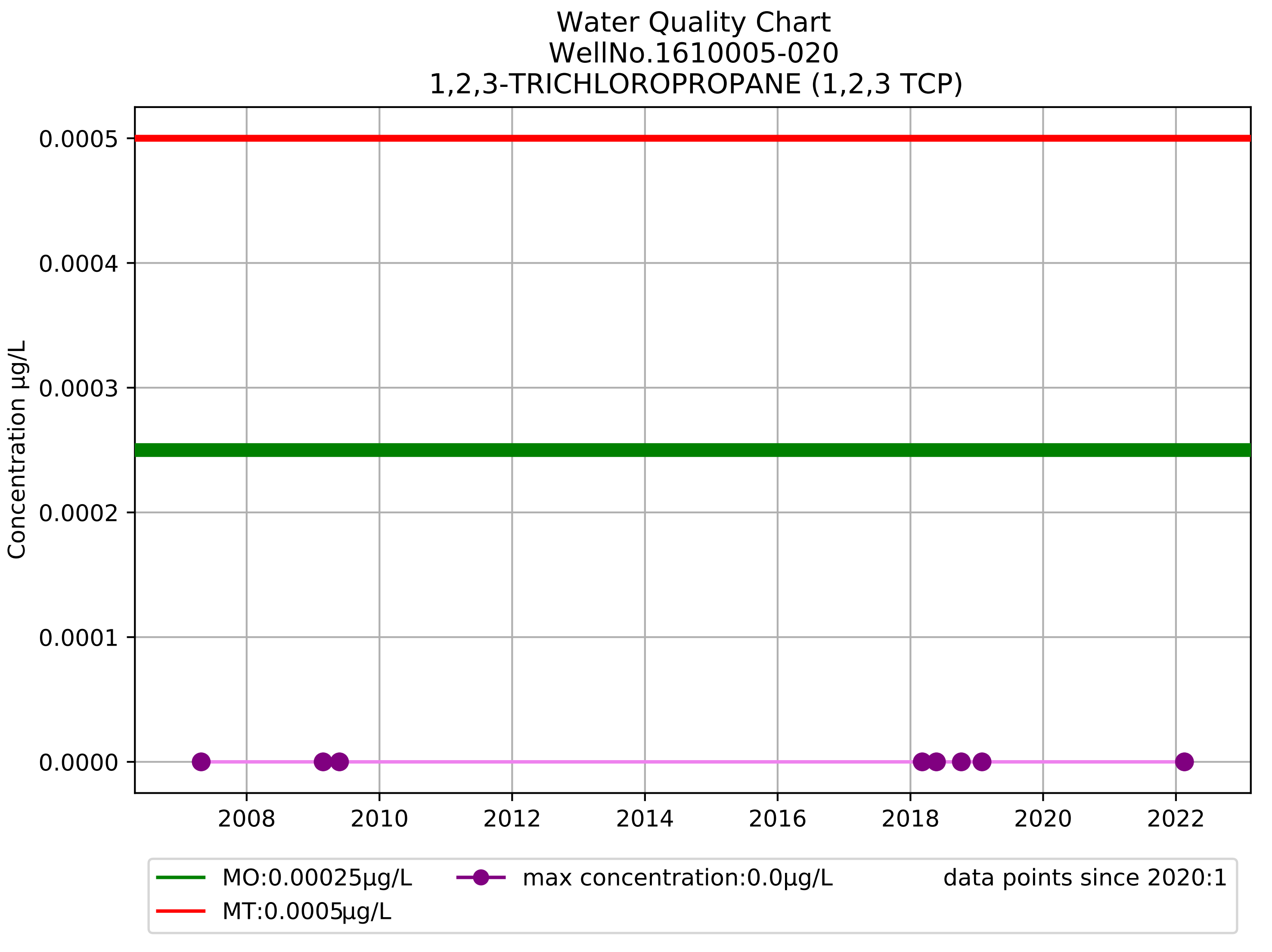


Water Quality Chart
WellNo.1610005-009
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2000
2004
2008
2012
2016
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1

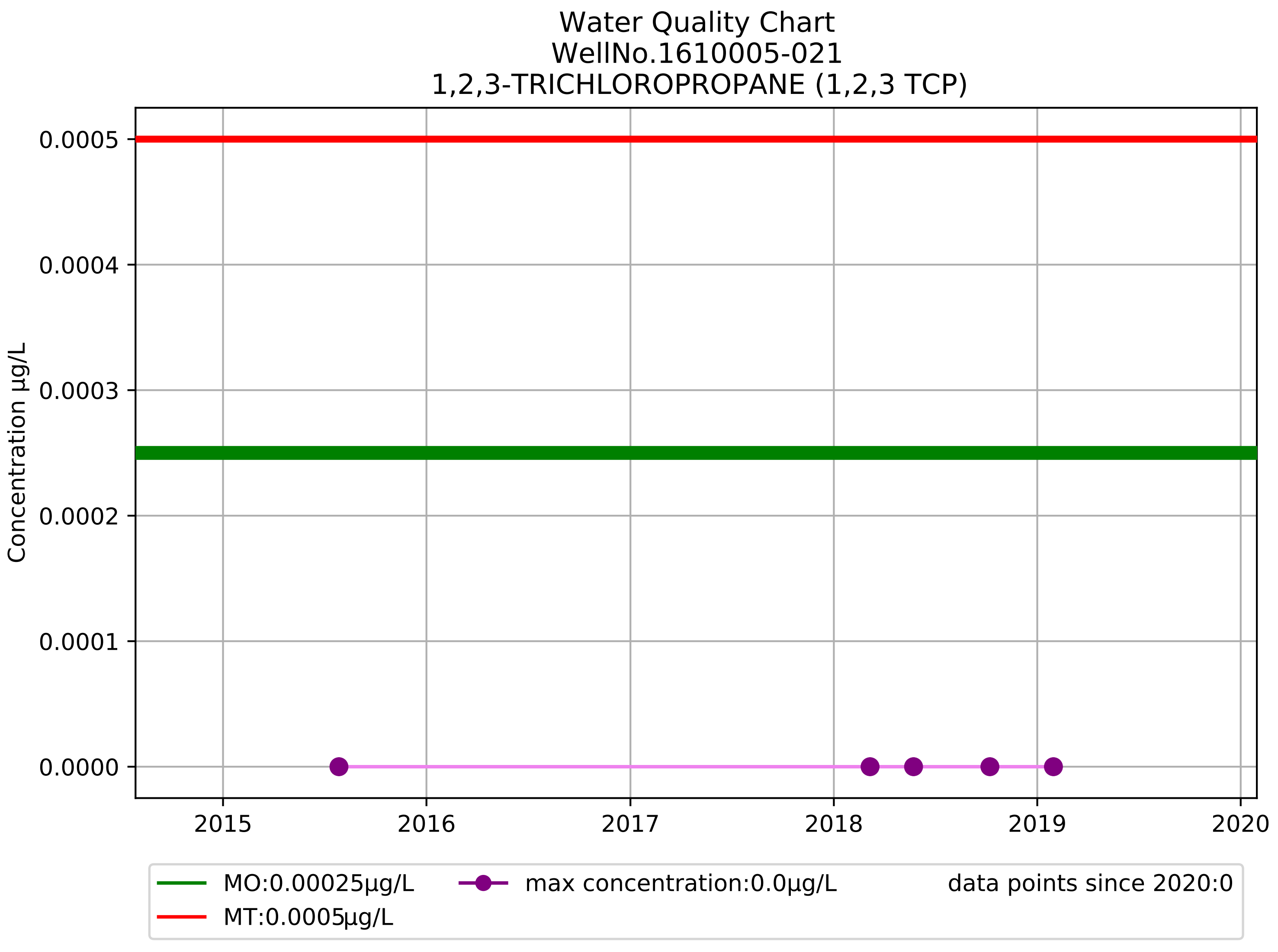

Water Quality Chart
WellNo.1610005-010
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2000
2004
2008
2012
2016
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1


Water Quality Chart
WellNo.1610005-011
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2000
2004
2008
2012
2016
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1

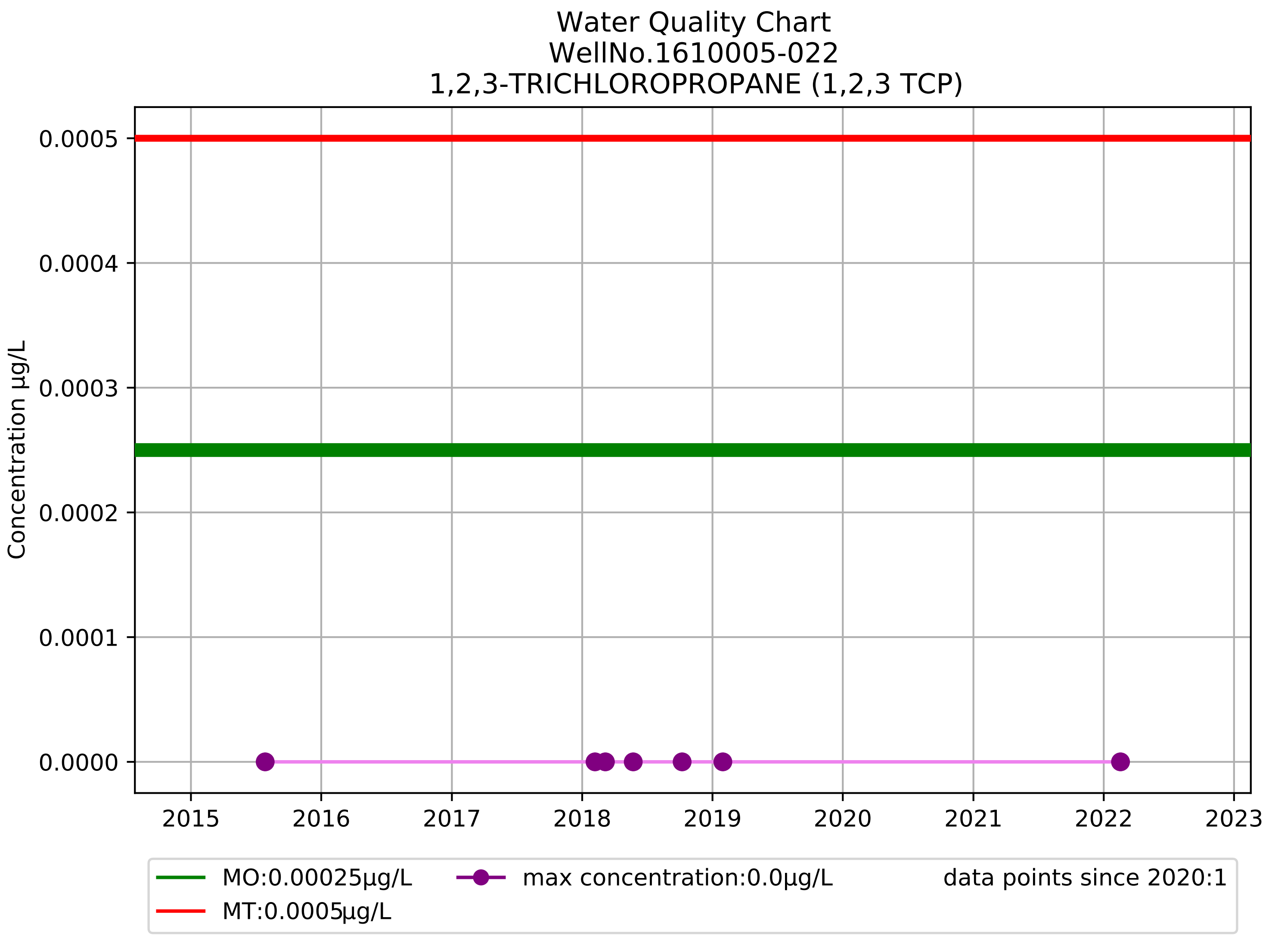

Water Quality Chart
WellNo.1610005-018
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1

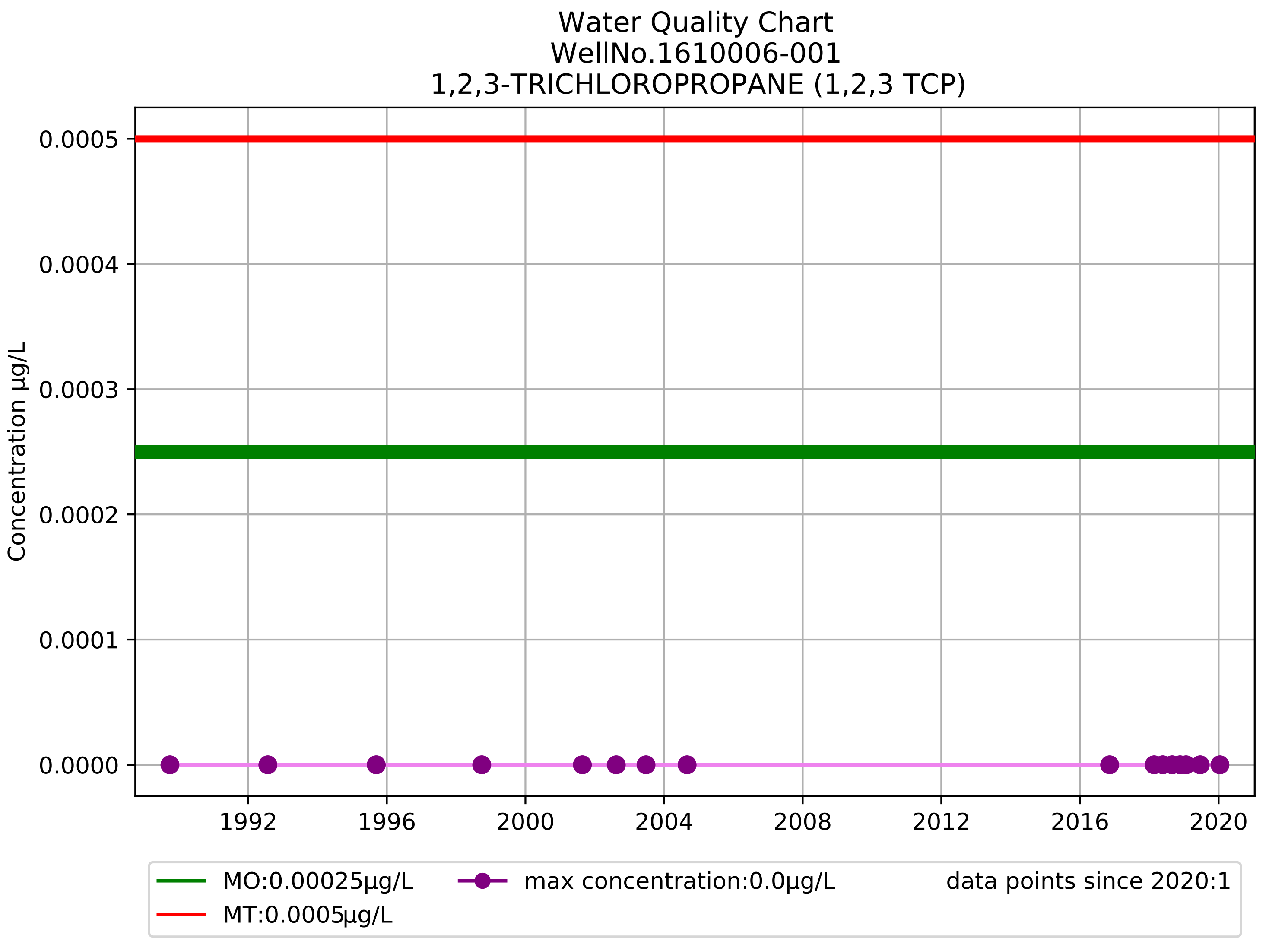


Water Quality Chart
WellNo.1610005-020
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2008
2010
2012
2014
2016
2018
2020
2022
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1

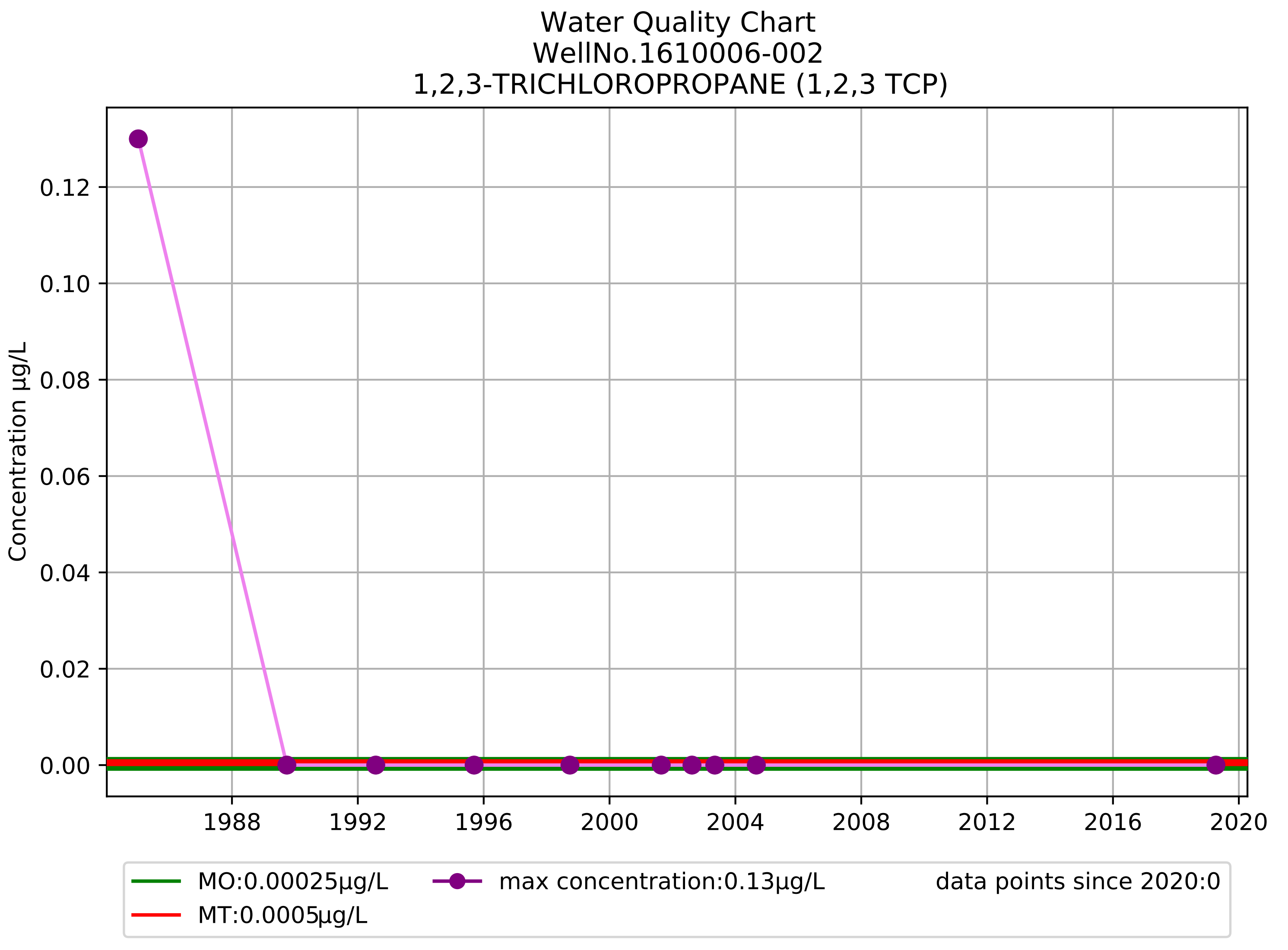


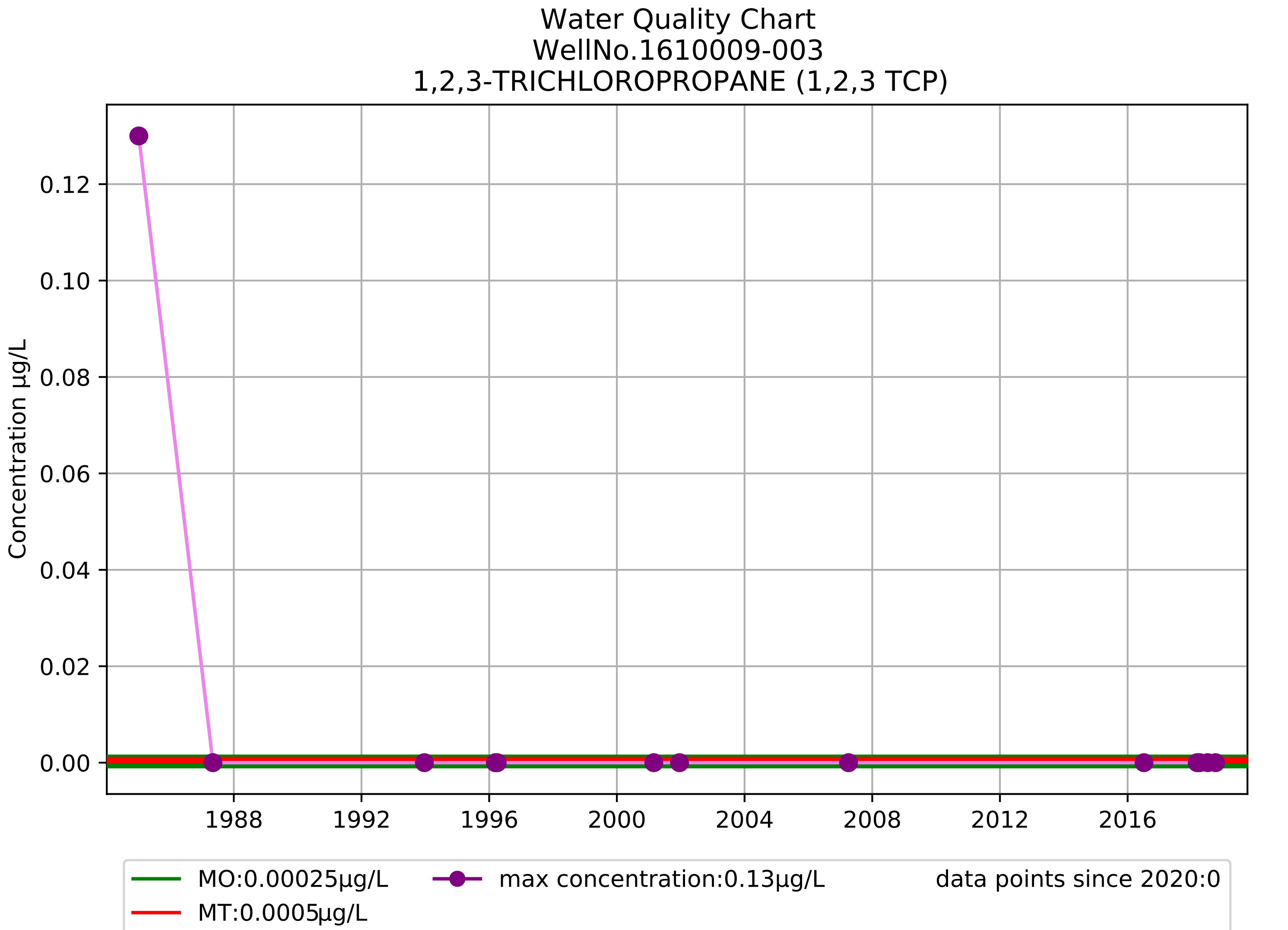
Water Quality Chart
WellNo.1610005-021
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2015
2016
2017
2018
2019
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:0


Water Quality Chart
WellNo.1610005-022
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
2015
2016
2017
2018
2019
2020
2021
2022
2023
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1

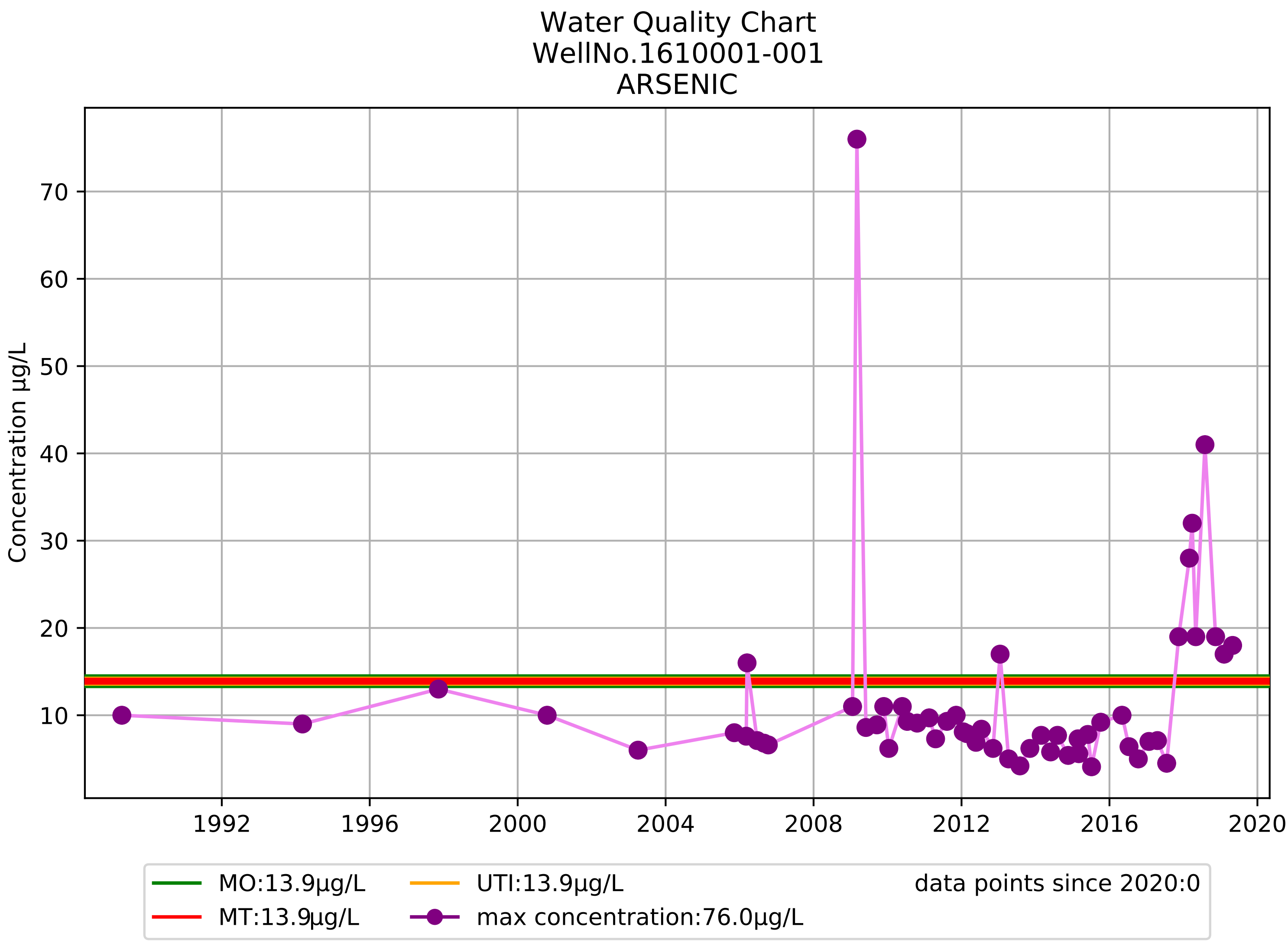


Water Quality Chart
WellNo.1610006-001
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.0005
0.0004
0.0003
0.0002
0.0001
0.0000
1992
1996
2000
2004
2008
2012
2016
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.0µg/L
data points since 2020:1

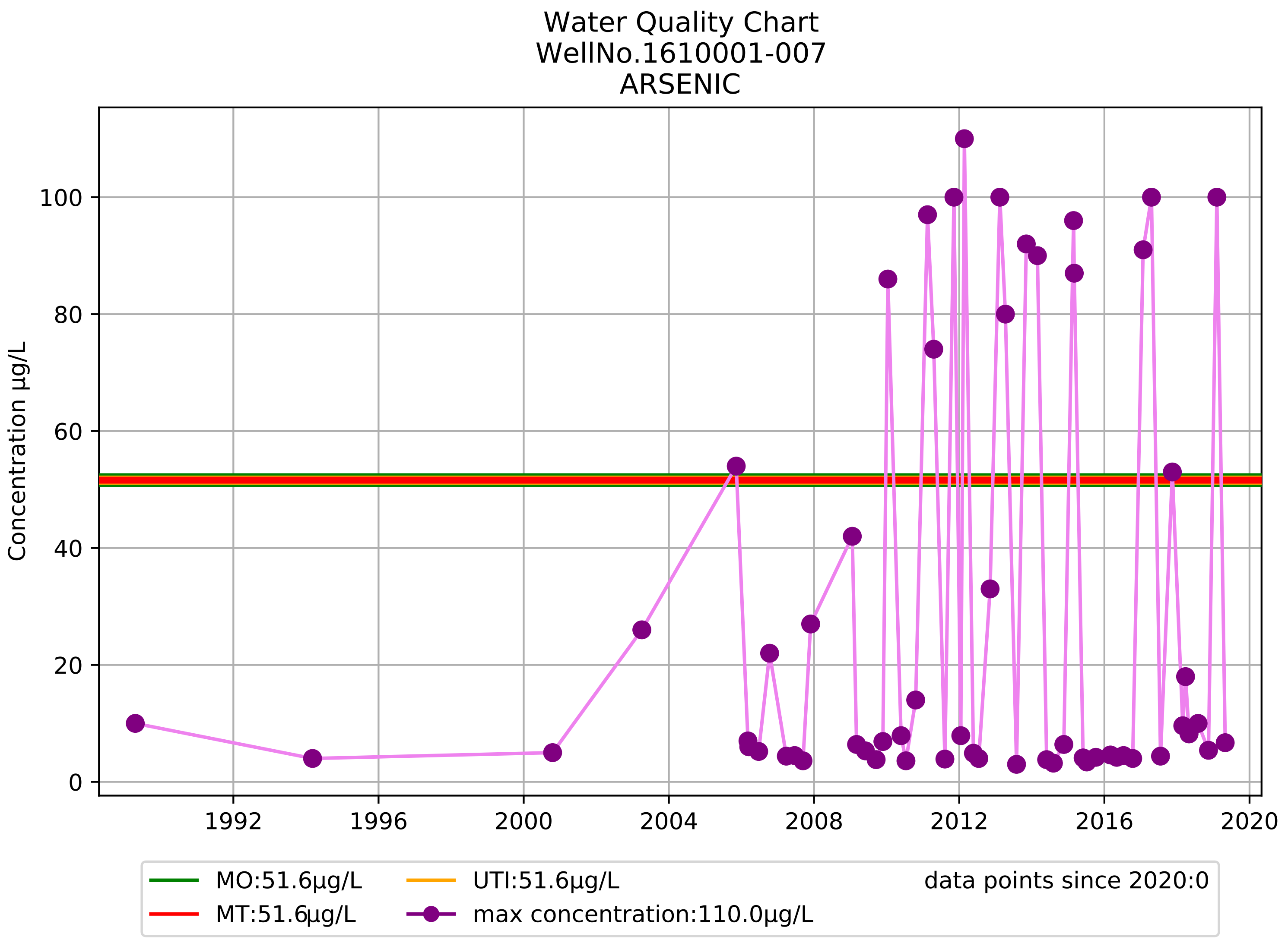

Water Quality Chart
WellNo.1610006-002
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.12
0.10
0.08
0.06
0.04
0.02
0.00
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.13µg/L
data points since 2020:0



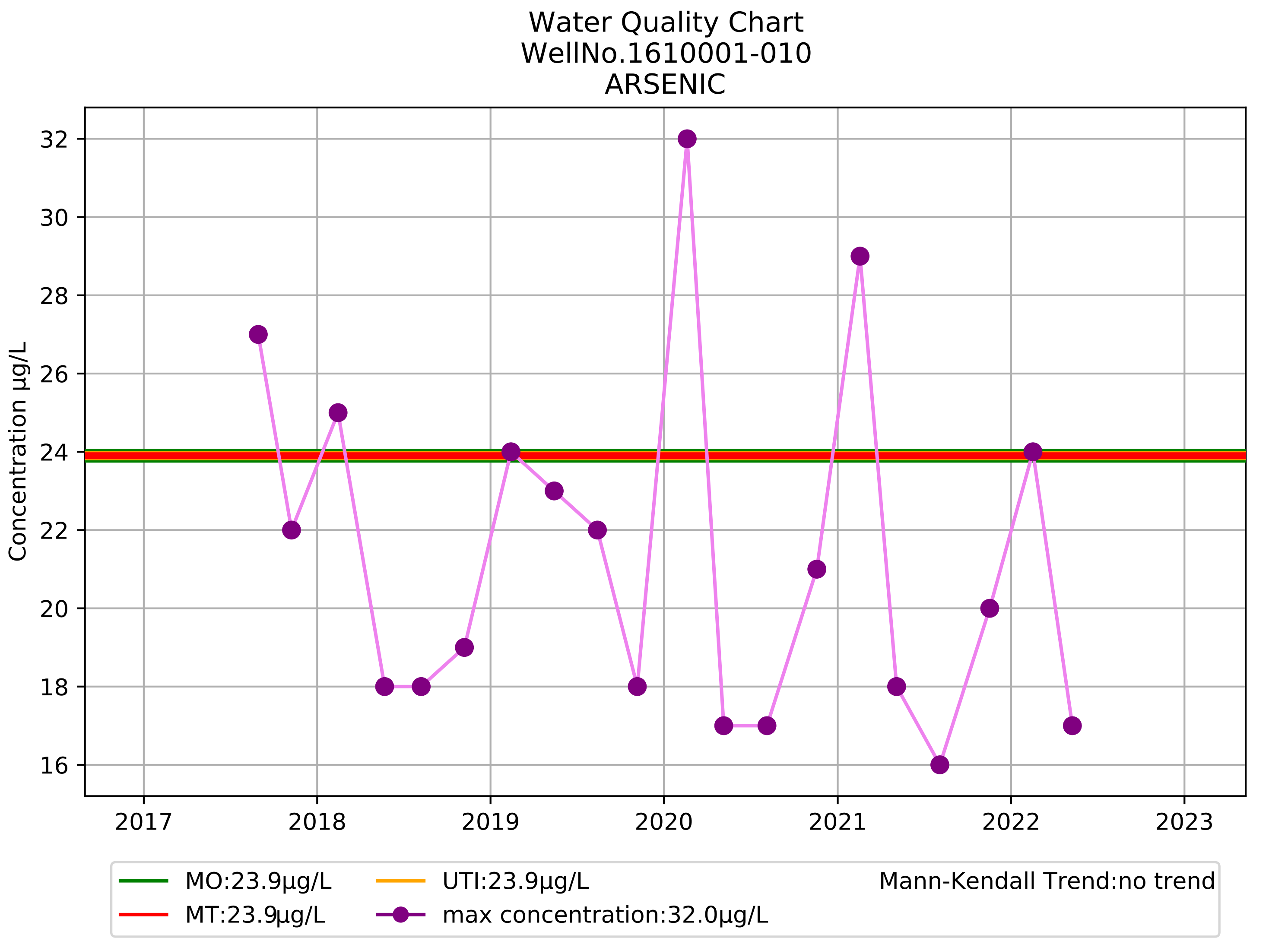
Water Quality Chart
WellNo.1610009-003
1,2,3-TRICHLOROPROPANE (1,2,3 TCP)
Concentration µg/L
0.12
0.10
0.08
0.06
0.04
0.02
0.00
1988
1992
1996
2000
2004
2008
2012
2016
MO:0.00025µg/L
MT:0.0005µg/L
max concentration:0.13µg/L
data points since 2020:0



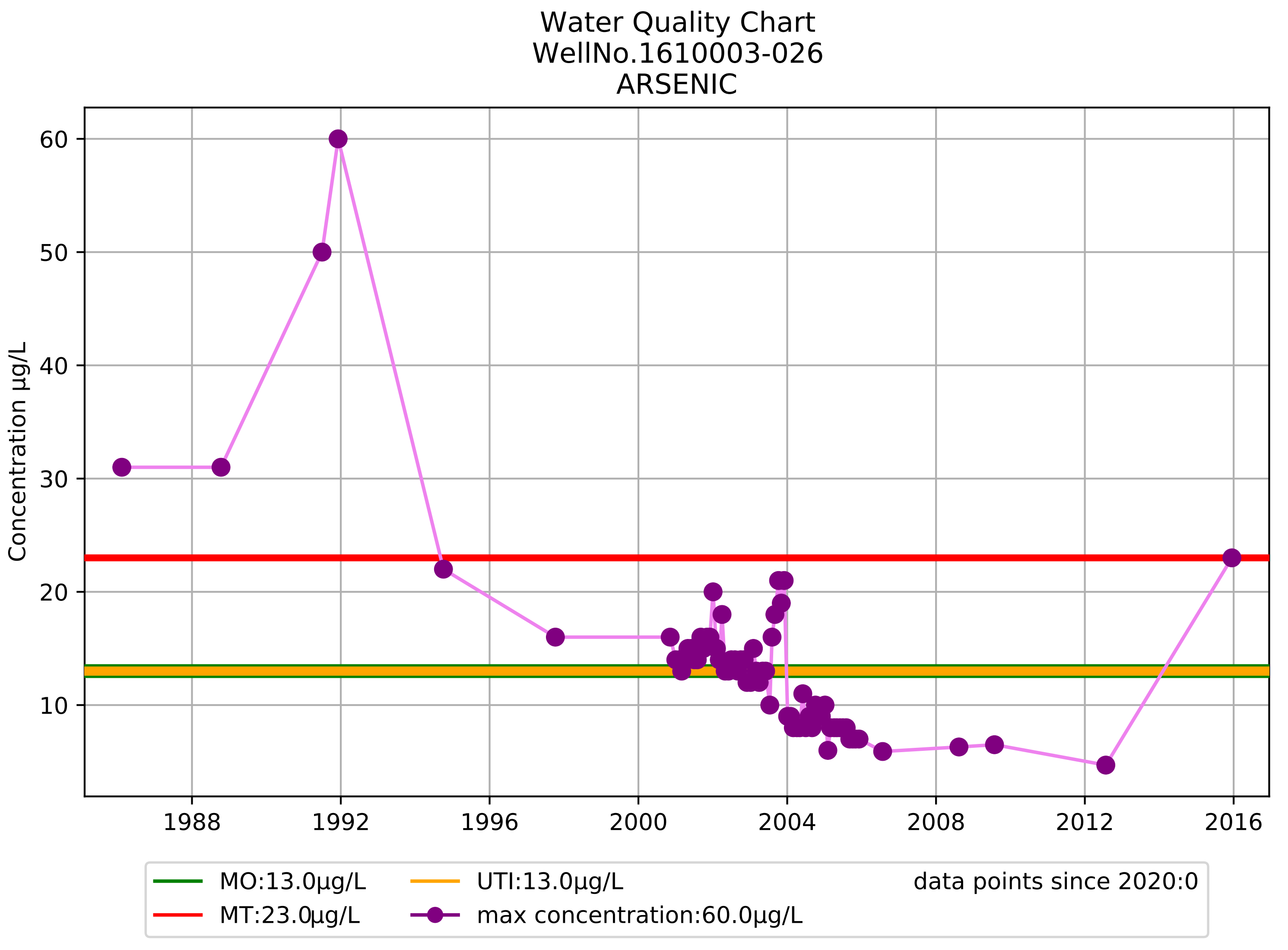
Water Quality Chart
WellNo.1610001-001
ARSENIC
Concentration µg/L
70
60
50
40
30
20
10
1992
1996
2000
2004
2008
2012
2016
2020
MO:13.9µg/L
MT:13.9µg/L
UTI:13.9µg/L
max concentration:76.0µg/L
data points since 2020:0

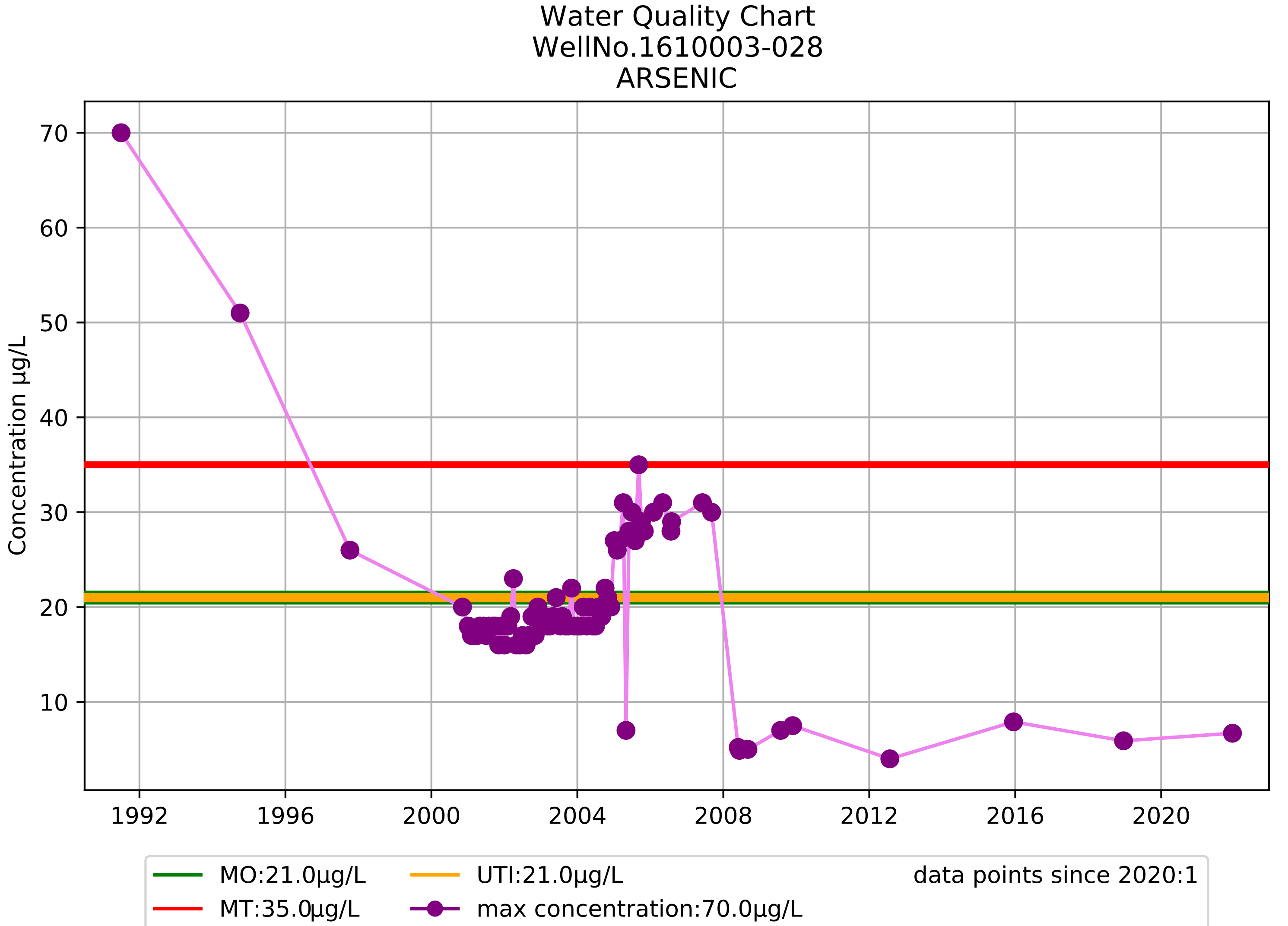


Water Quality Chart
WellNo.1610001-007
ARSENIC
Concentration µg/L
0
20
40
60
80
100
1992
1996
2000
2004
2008
2012
2016
2020
MO:51.6µg/L
MT:51.6µg/L
UTI:51.6µg/L
max concentration:110.0µg/L
data points since 2020:0

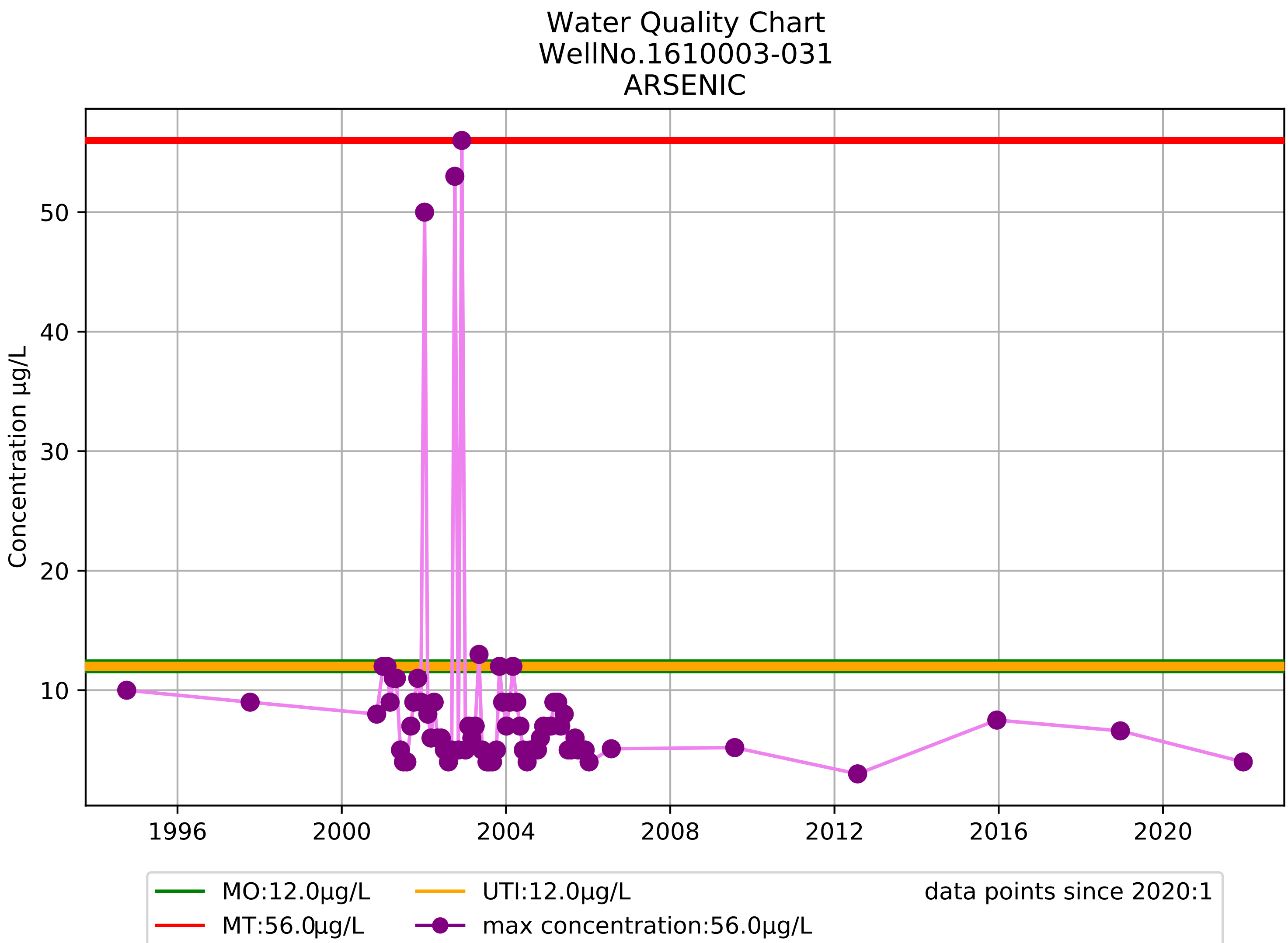


Water Quality Chart
WellNo.1610001-010
ARSENIC
Concentration µg/L
32
30
28
26
24
22
20
18
16
2017
2018
2019
2020
2021
2022
2023
MO:23.9µg/L
MT:23.9µg/L
UTI:23.9µg/L
max concentration:32.0µg/L
Mann-Kendall Trend:no trend

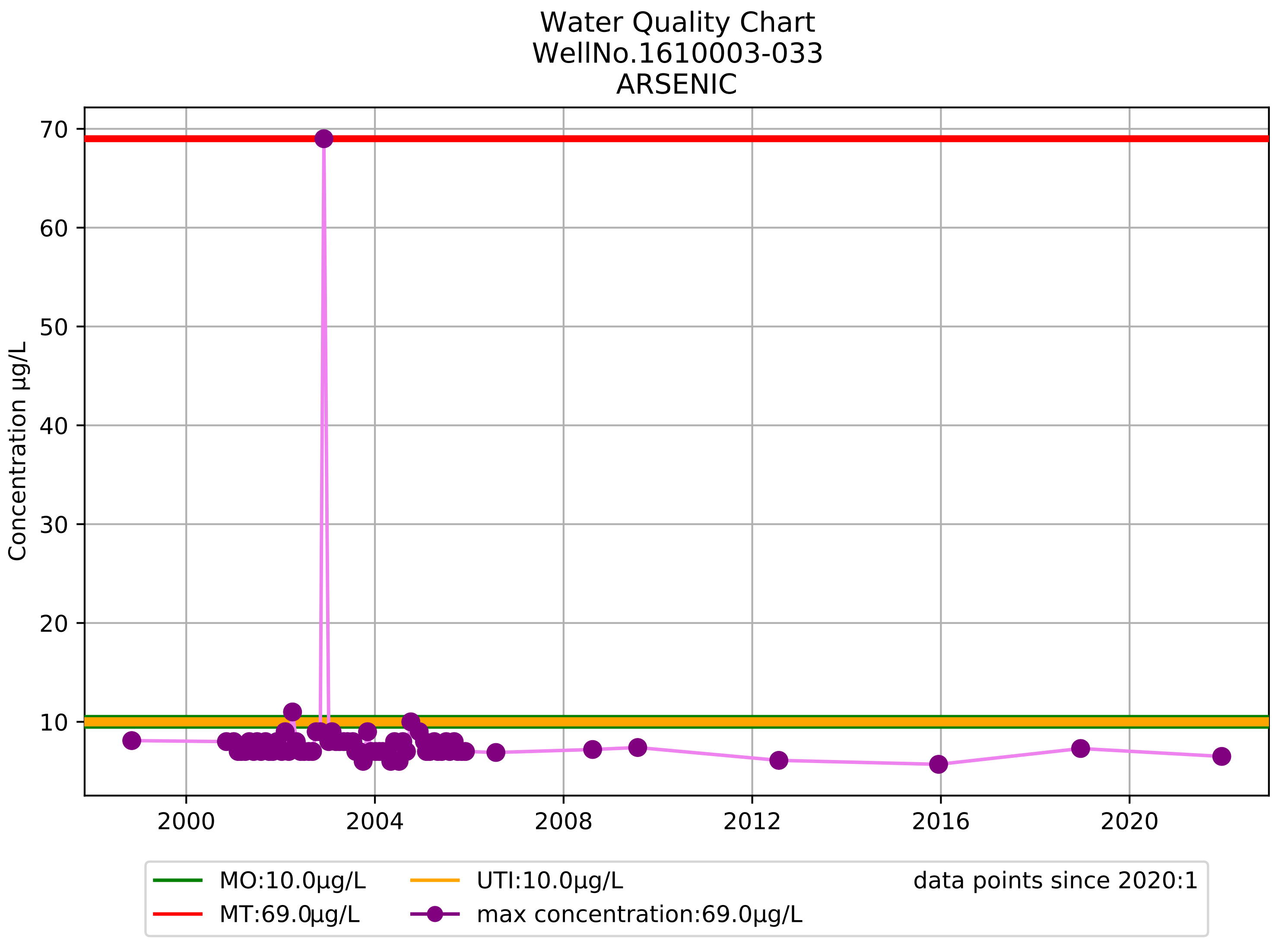

Water Quality Chart
WellNo.1610003-026
ARSENIC
Concentration µg/L
60
50
40
30
20
10
1988
1992
1996
2000
2004
2008
2012
2016
MO:13.0µg/L
MT:23.0µg/L
UTI:13.0µg/L
max concentration:60.0µg/L
data points since 2020:0



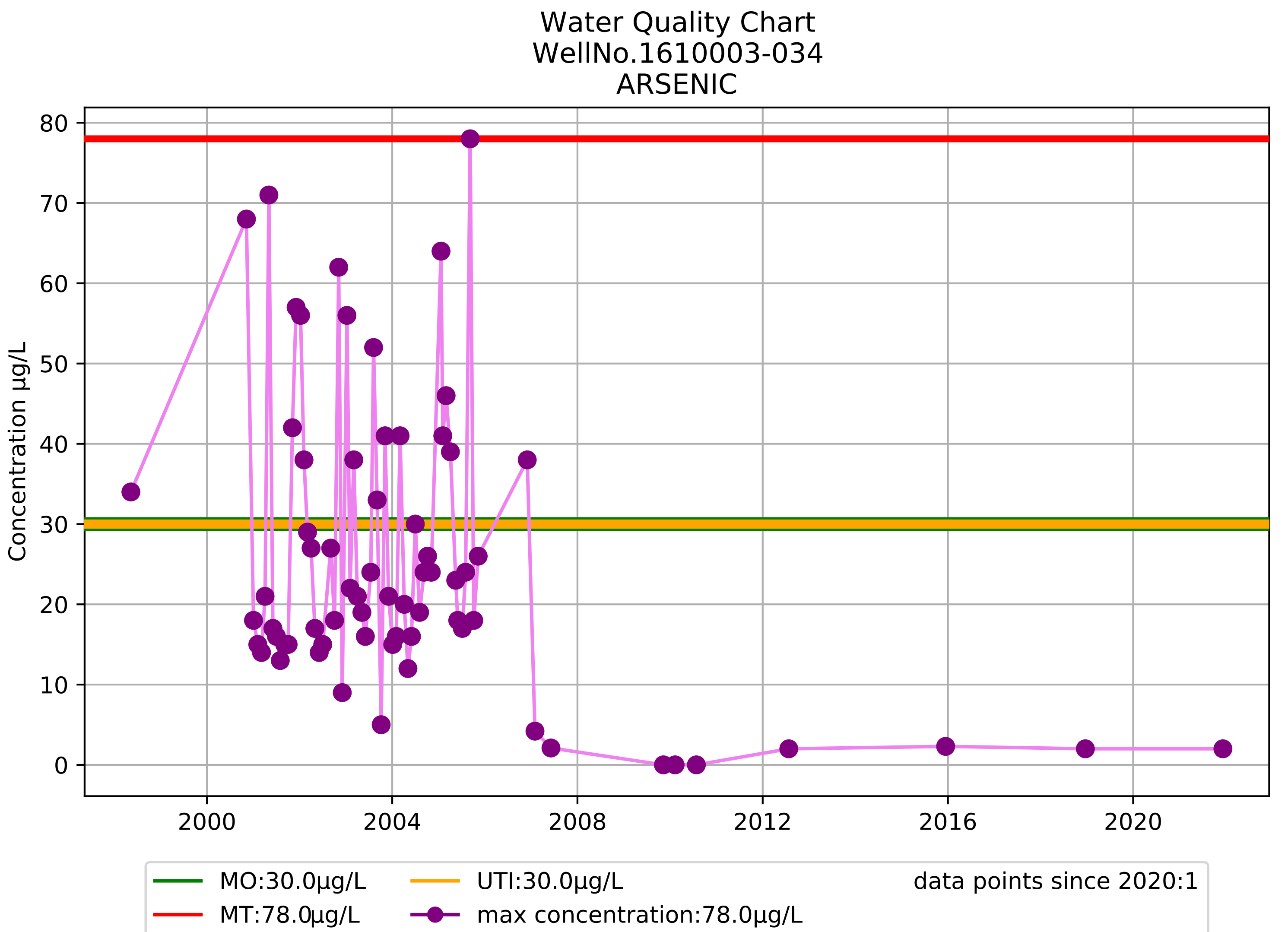
Water Quality Chart
WellNo.1610003-028
ARSENIC
Concentration µg/L
70
60
50
40
30
20
10
1992
1996
2000
2004
2008
2012
2016
2020
MO:21.0µg/L
MT:35.0µg/L
UTI:21.0µg/L
max concentration:70.0µg/L
data points since 2020:1

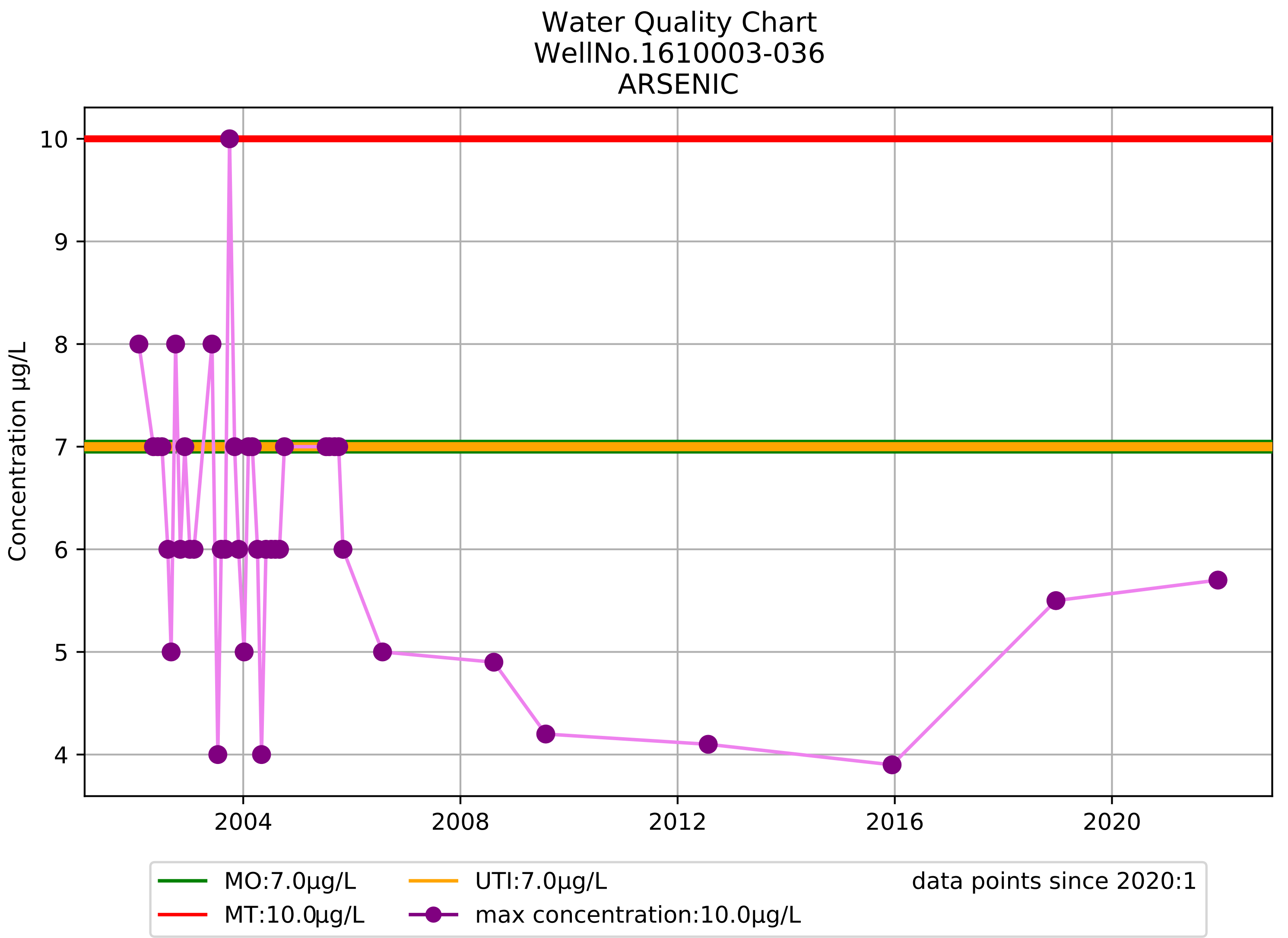


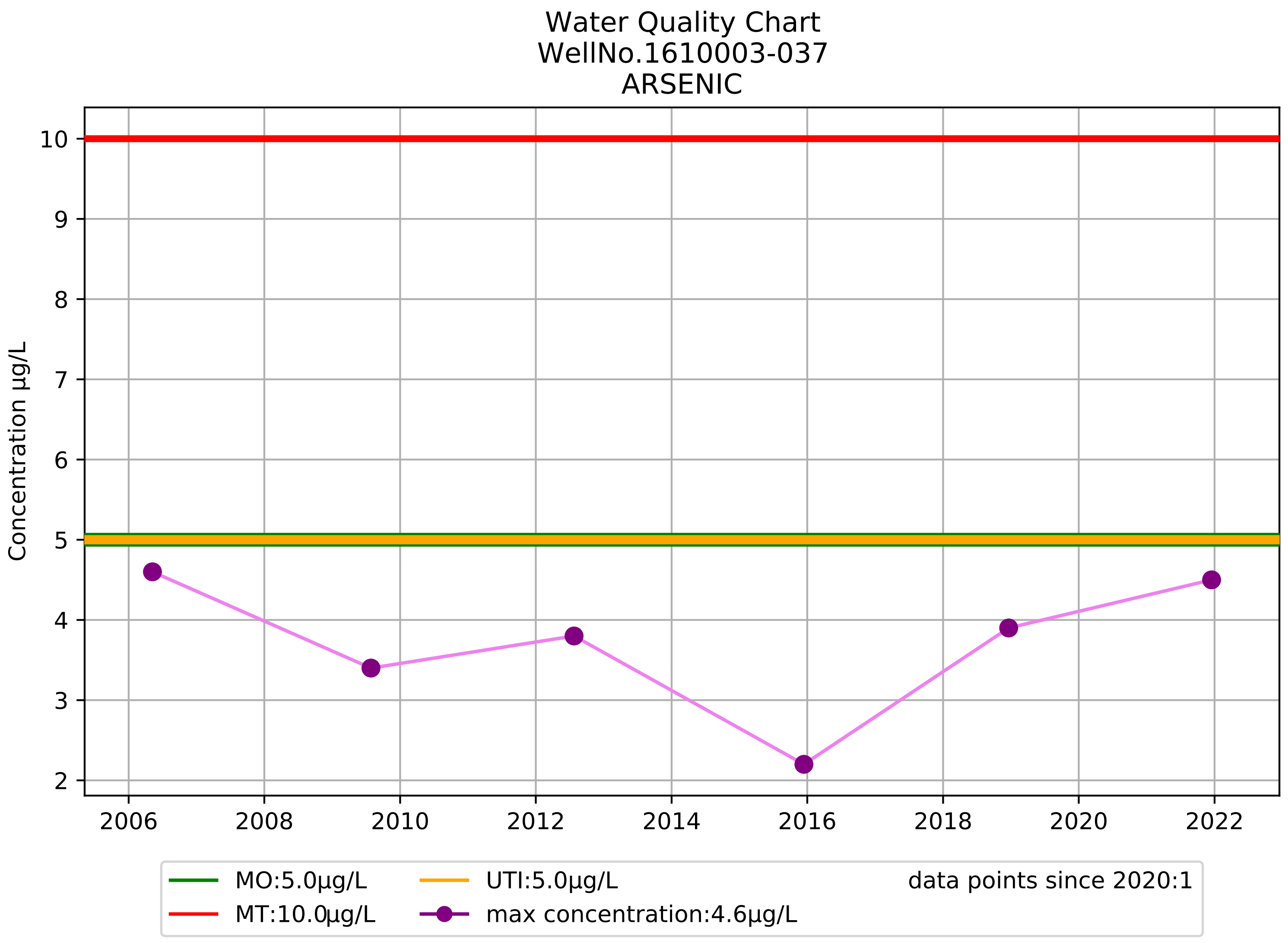
Water Quality Chart
WellNo.1610003-031
ARSENIC
Concentration µg/L
10
20
30
40
50
1996
2000
2004
2008
2012
2016
2020
MO:12.0µg/L
MT:56.0µg/L
UTI:12.0µg/L
max concentration:56.0µg/L
data points since 2020:1

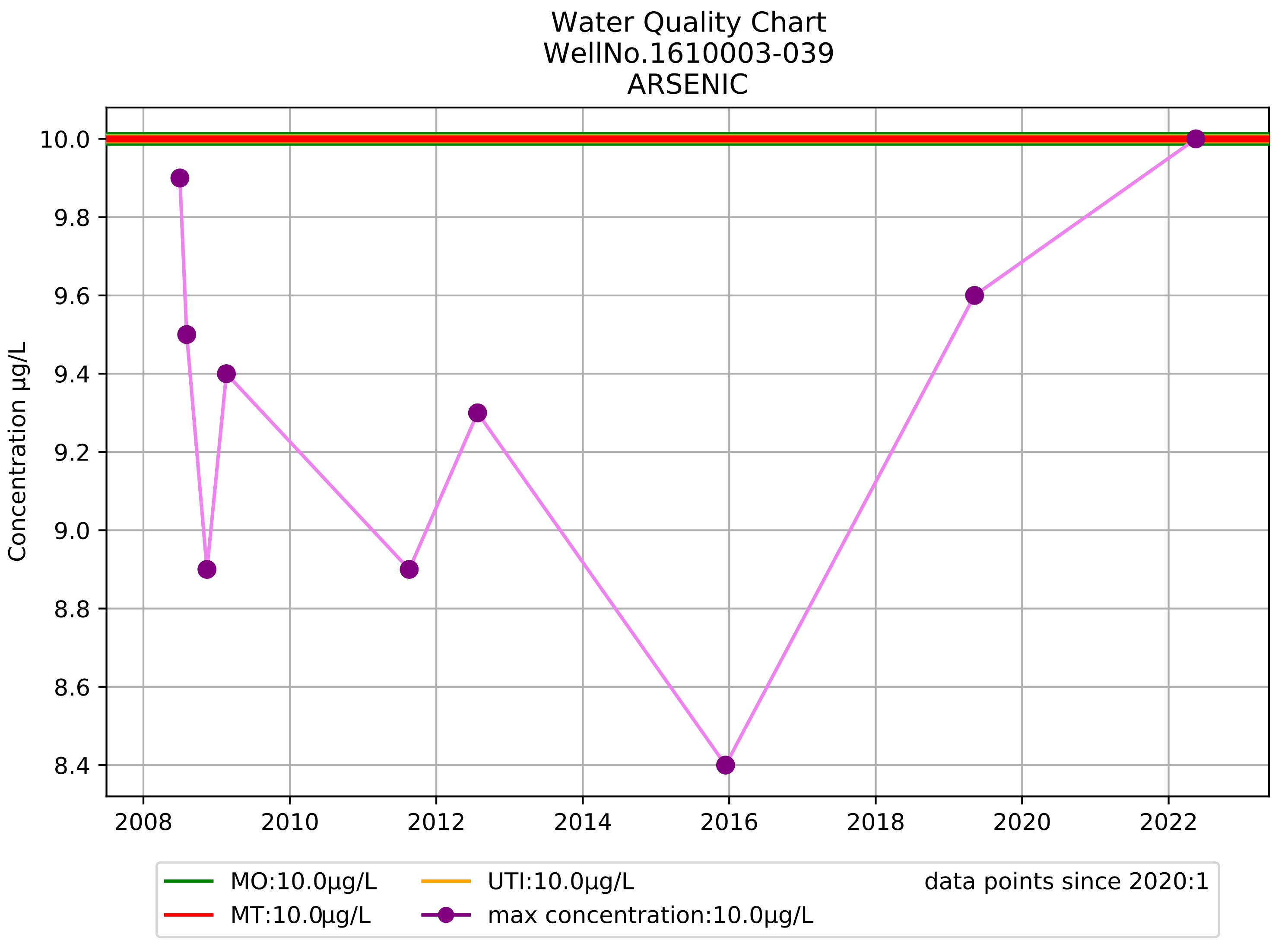


Water Quality Chart
WellNo.1610003-033
ARSENIC
Concentration µg/L
70
60
50
40
30
20
10
2000
2004
2008
2012
2016
2020
MO:10.0µg/L
MT:69.0µg/L
UTI:10.0µg/L
max concentration:69.0µg/L
data points since 2020:1

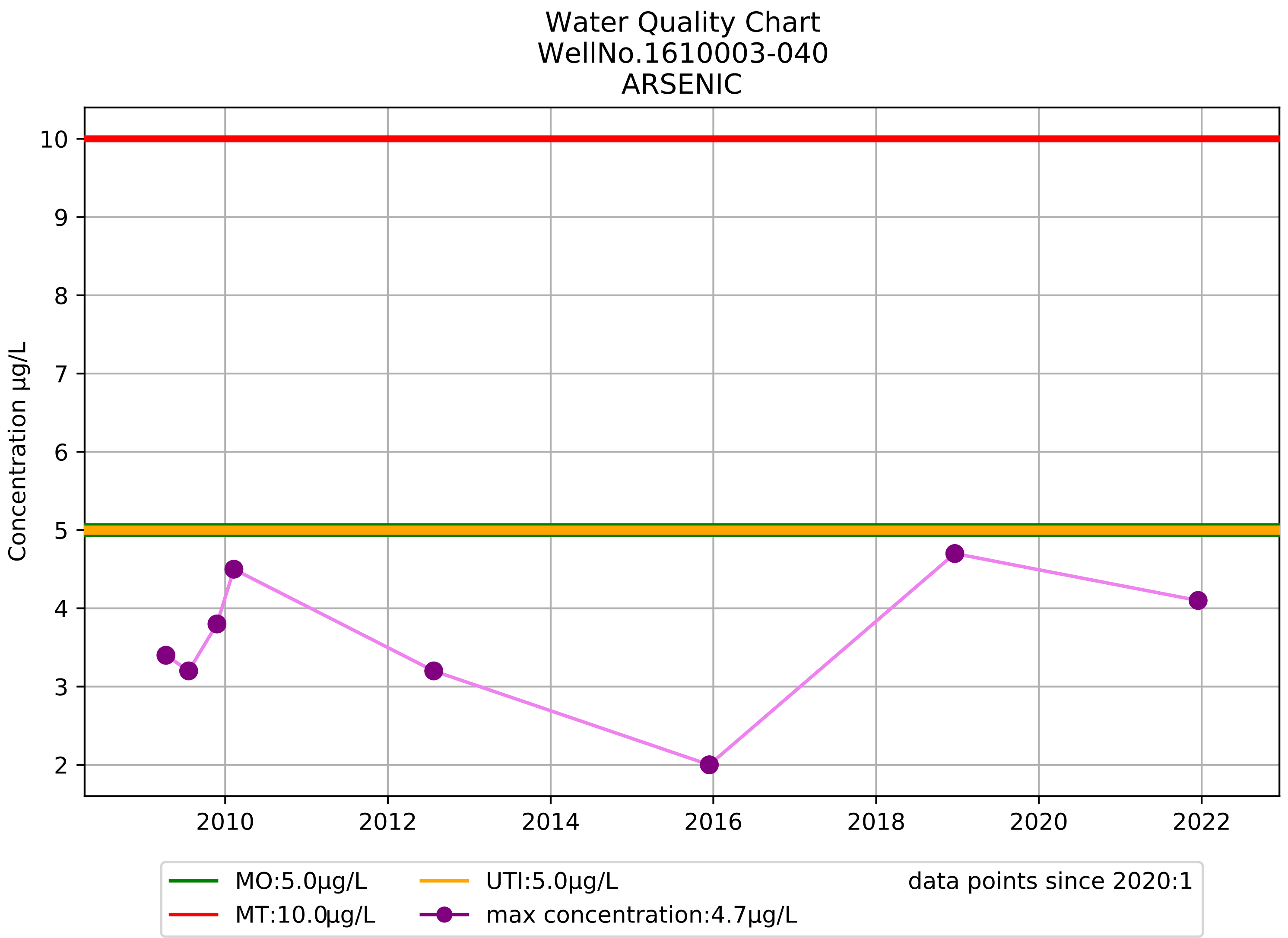

Water Quality Chart
WellNo.1610003-034
ARSENIC
Concentration µg/L
0
10
20
30
40
50
60
70
80
2000
2004
2008
2012
2016
2020
MO:30.0µg/L
MT:78.0µg/L
UTI:30.0µg/L
max concentration:78.0µg/L
data points since 2020:1

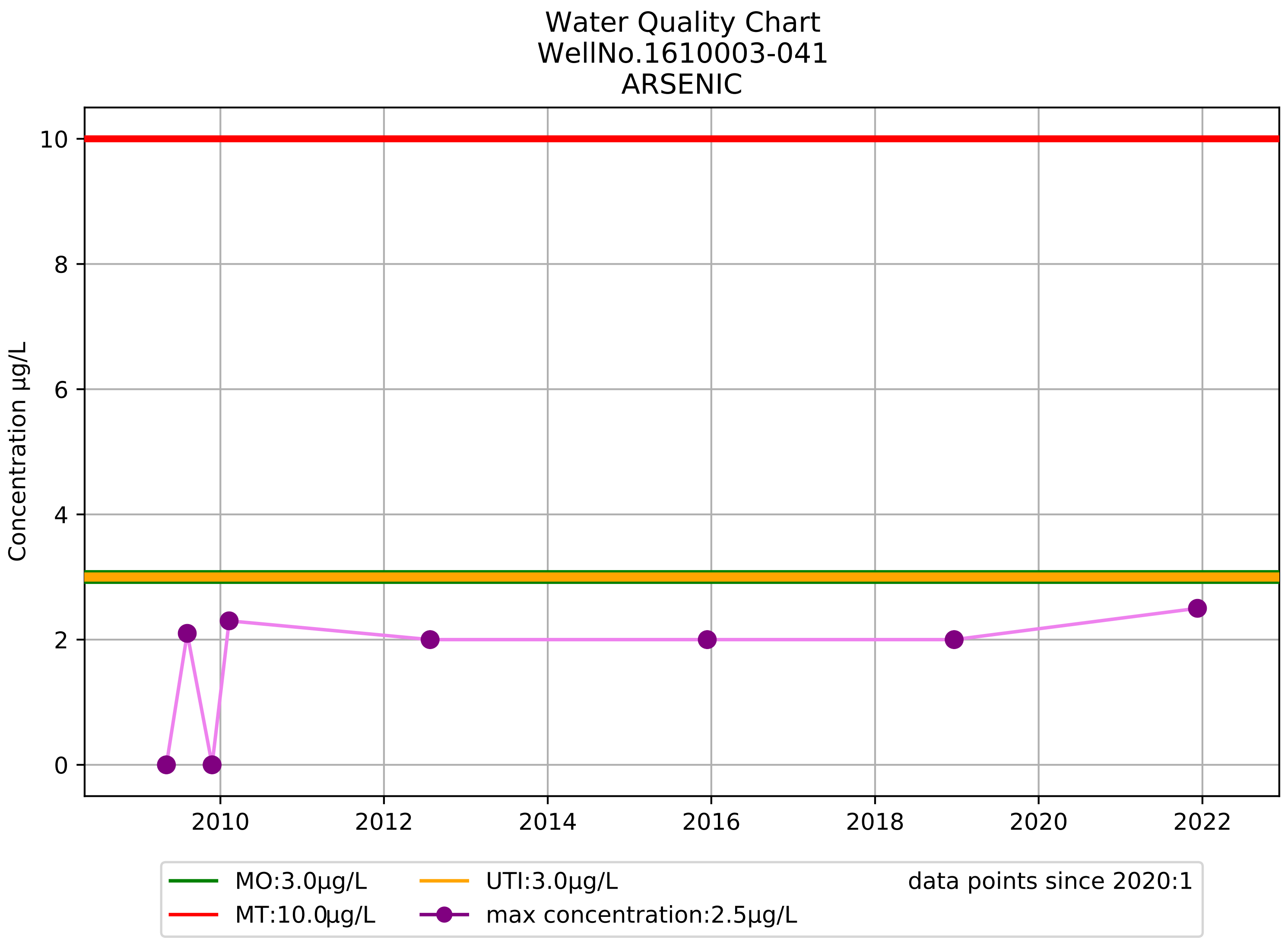

Water Quality Chart
WellNo.1610003-036
ARSENIC
Concentration µg/L
10
9
8
7
6
5
4
2004
2008
2012
2016
2020
MO:7.0µg/L
UTI:7.0µg/L
data points since 2020:1
MT:10.0µg/L
max concentration:10.0µg/L


Water Quality Chart
WellNo.1610003-037
ARSENIC
Concentration µg/L
10
9
8
7
6
5
4
3
2
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:5.0µg/L
MT:10.0µg/L
UTI:5.0µg/L
max concentration:4.6µg/L
data points since 2020:1

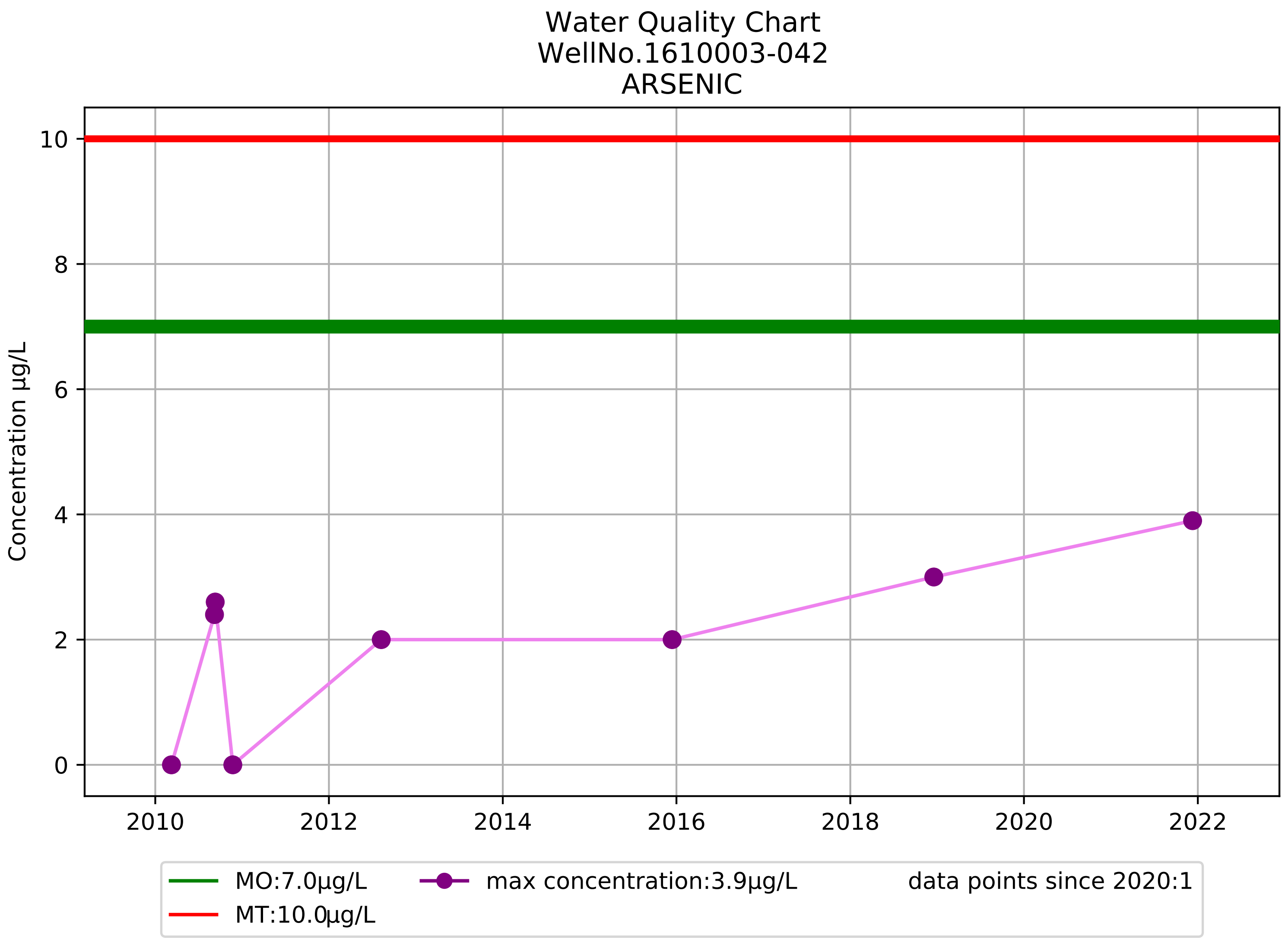


Water Quality Chart
WellNo.1610003-039
ARSENIC
Concentration µg/L
10.0
9.8
9.6
9.4
9.2
9.0
8.8
8.6
8.4
2008
2010
2012
2014
2016
2018
2020
2022
MO:10.0µg/L
MT:10.0µg/L
UTI:10.0µg/L
max concentration:10.0µg/L
data points since 2020:1

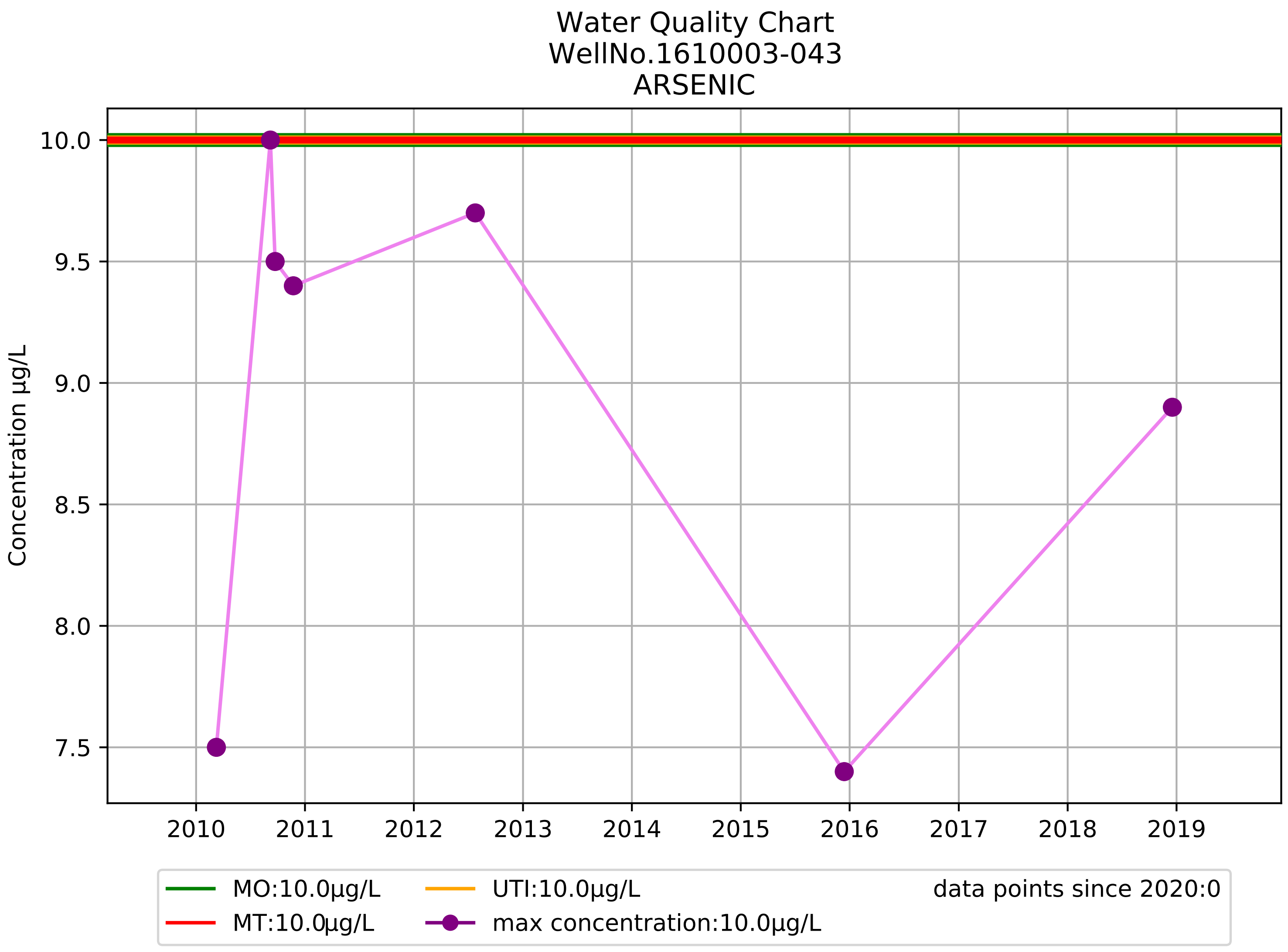

Water Quality Chart
WellNo.1610003-040
ARSENIC
Concentration µg/L
10
9
8
7
6
5
4
3
2
2010
2012
2014
2016
2018
2020
2022
MO:5.0µg/L
MT:10.0µg/L
UTI:5.0µg/L
max concentration:4.7µg/L
data points since 2020:1



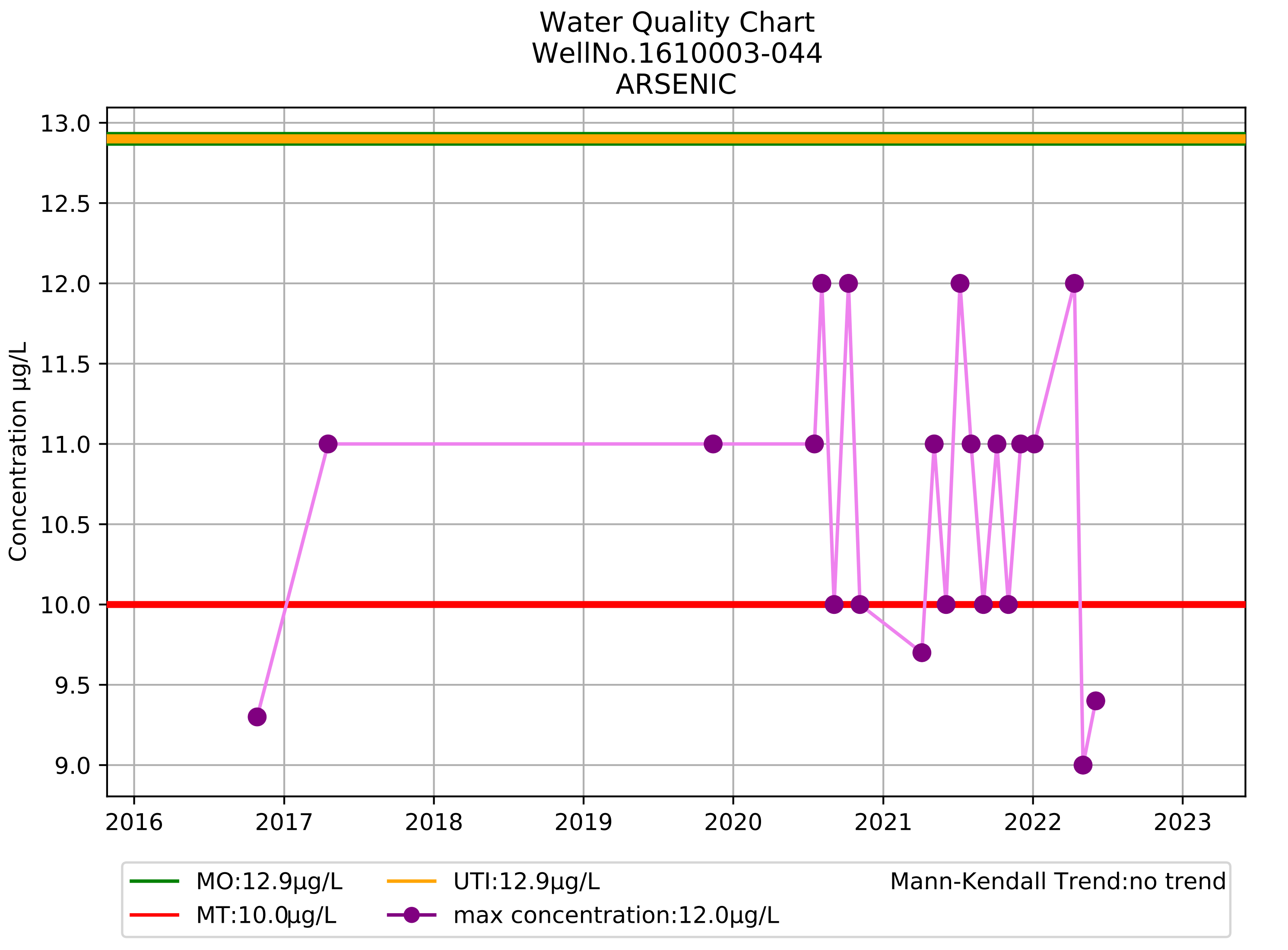
Water Quality Chart
WellNo.1610003-041
ARSENIC
Concentration µg/L
10
8
6
4
2
0
2010
2012
2014
2016
2018
2020
2022
MO:3.0µg/L
MT:10.0µg/L
UTI:3.0µg/L
max concentration:2.5µg/L
data points since 2020:1



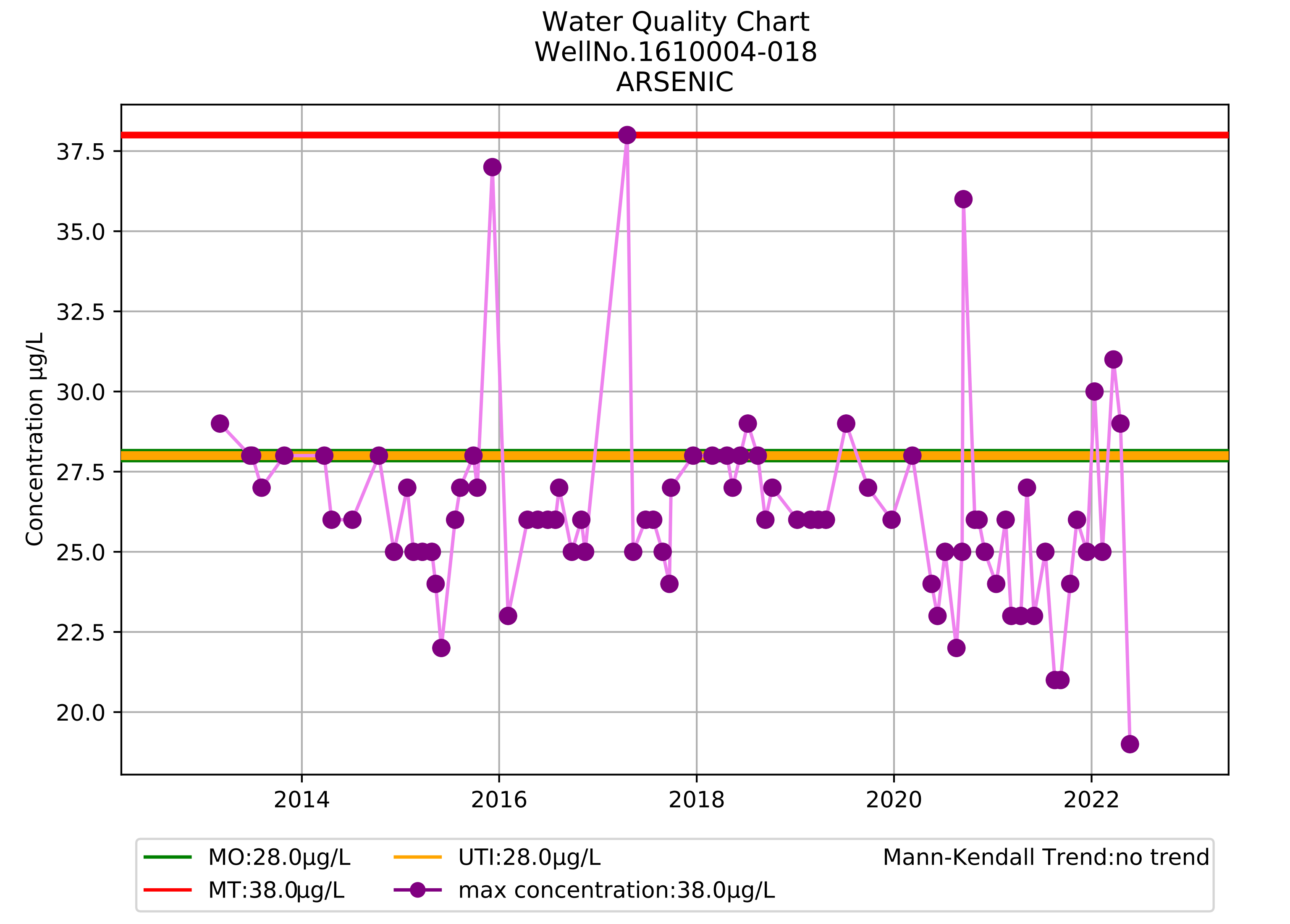
Water Quality Chart
WellNo.1610003-042
ARSENIC
Concentration µg/L
10
8
6
4
2
0
2010
2012
2014
2016
2018
2020
2022
MO:7.0µg/L
MT:10.0µg/L
max concentration:3.9µg/L
data points since 2020:1



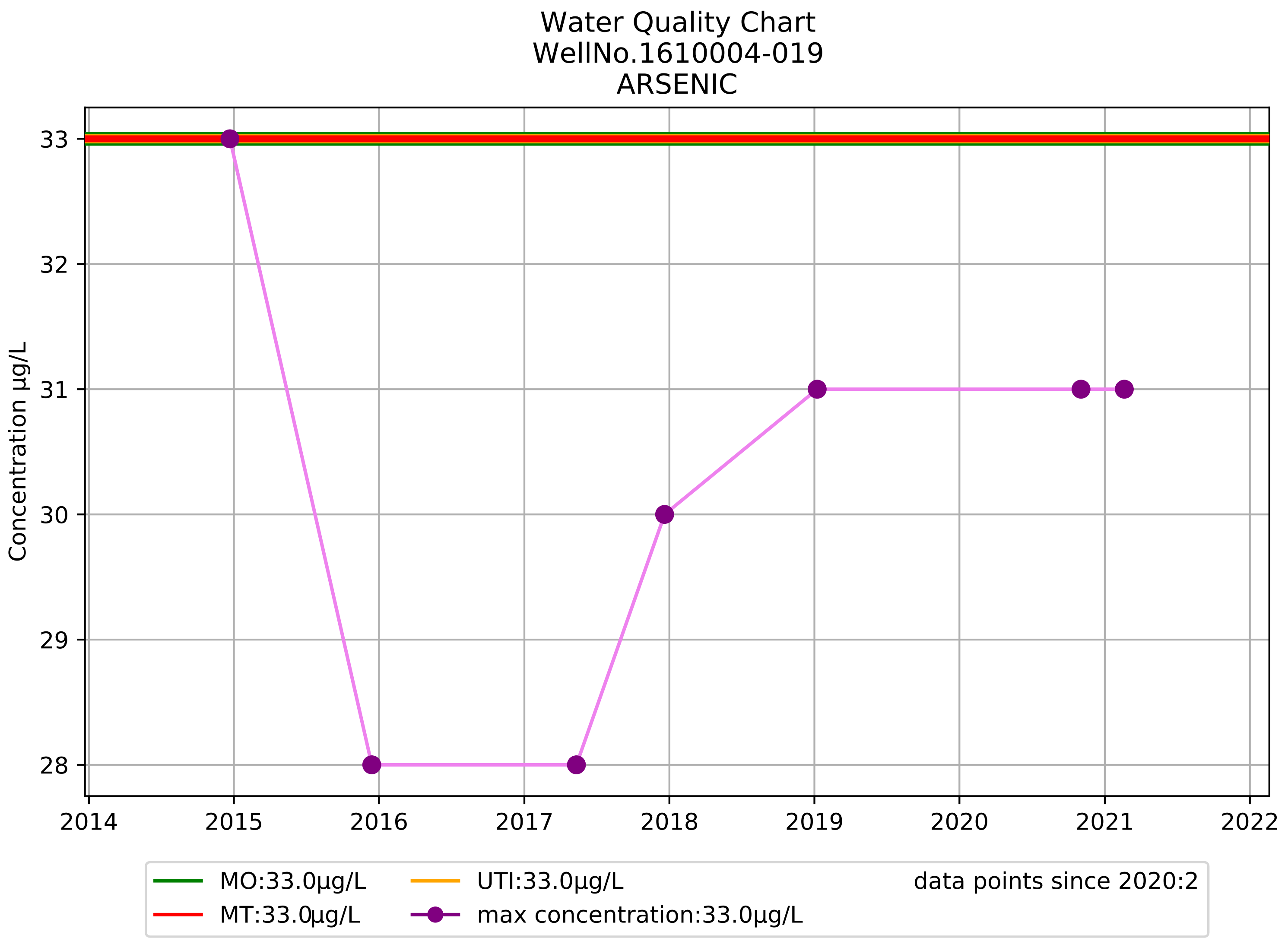
Water Quality Chart
WellNo.1610003-043
ARSENIC
Concentration µg/L
10.0
9.5
9.0
8.5
8.0
7.5
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MO:10.0µg/L
MT:10.0µg/L
UTI:10.0µg/L
max concentration:10.0µg/L
data points since 2020:0



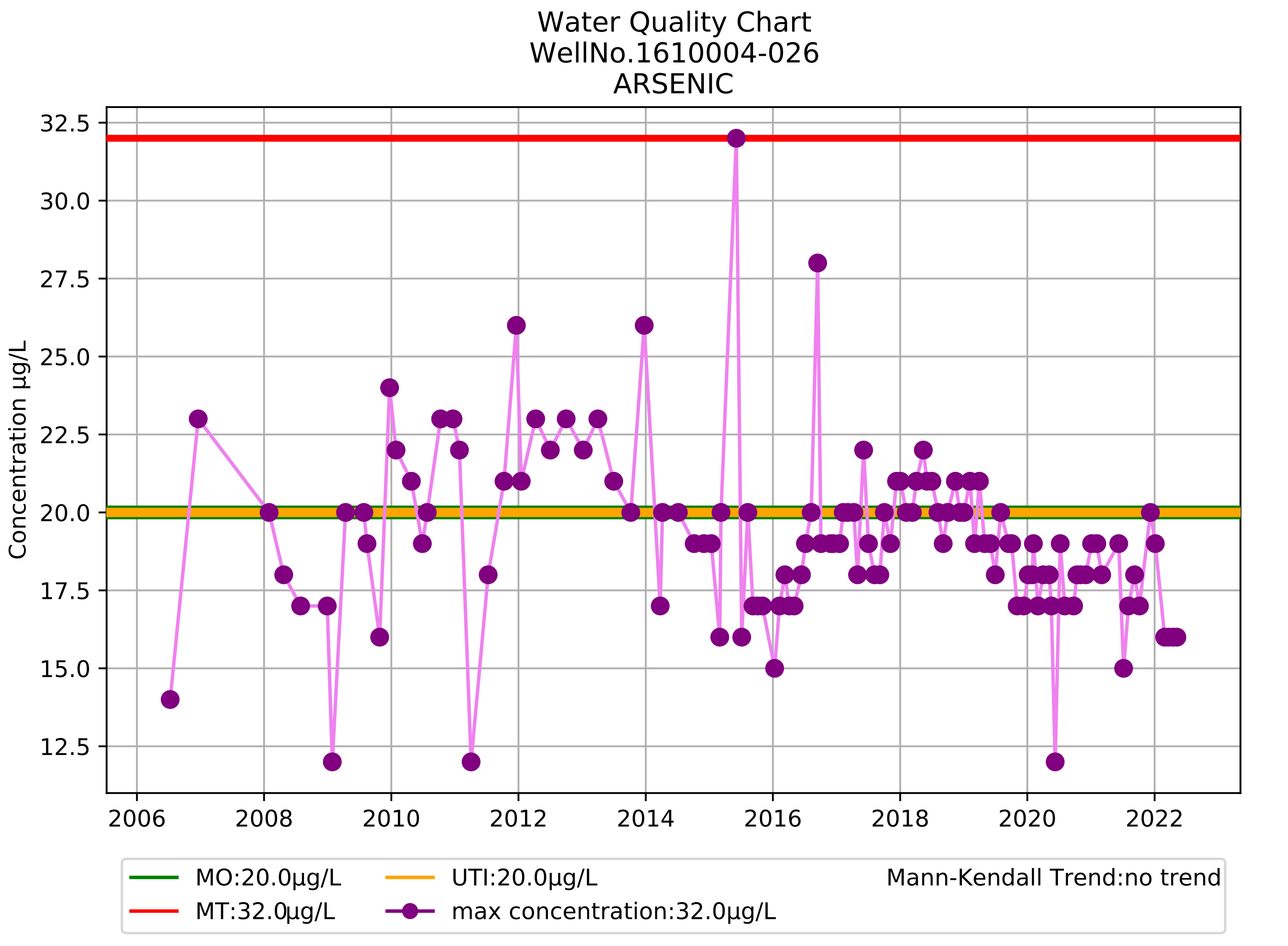
Water Quality Chart
WellNo.1610003-044
ARSENIC
Concentration µg/L
13.0
12.5
12.0
11.5
11.0
10.5
10.0
9.5
9.0
2016
2017
2018
2019
2020
2021
2022
2023
MO:12.9µg/L
UTI:12.9µg/L
MT:10.0µg/L
max concentration:12.0µg/L
Mann-Kendall Trend:no trend



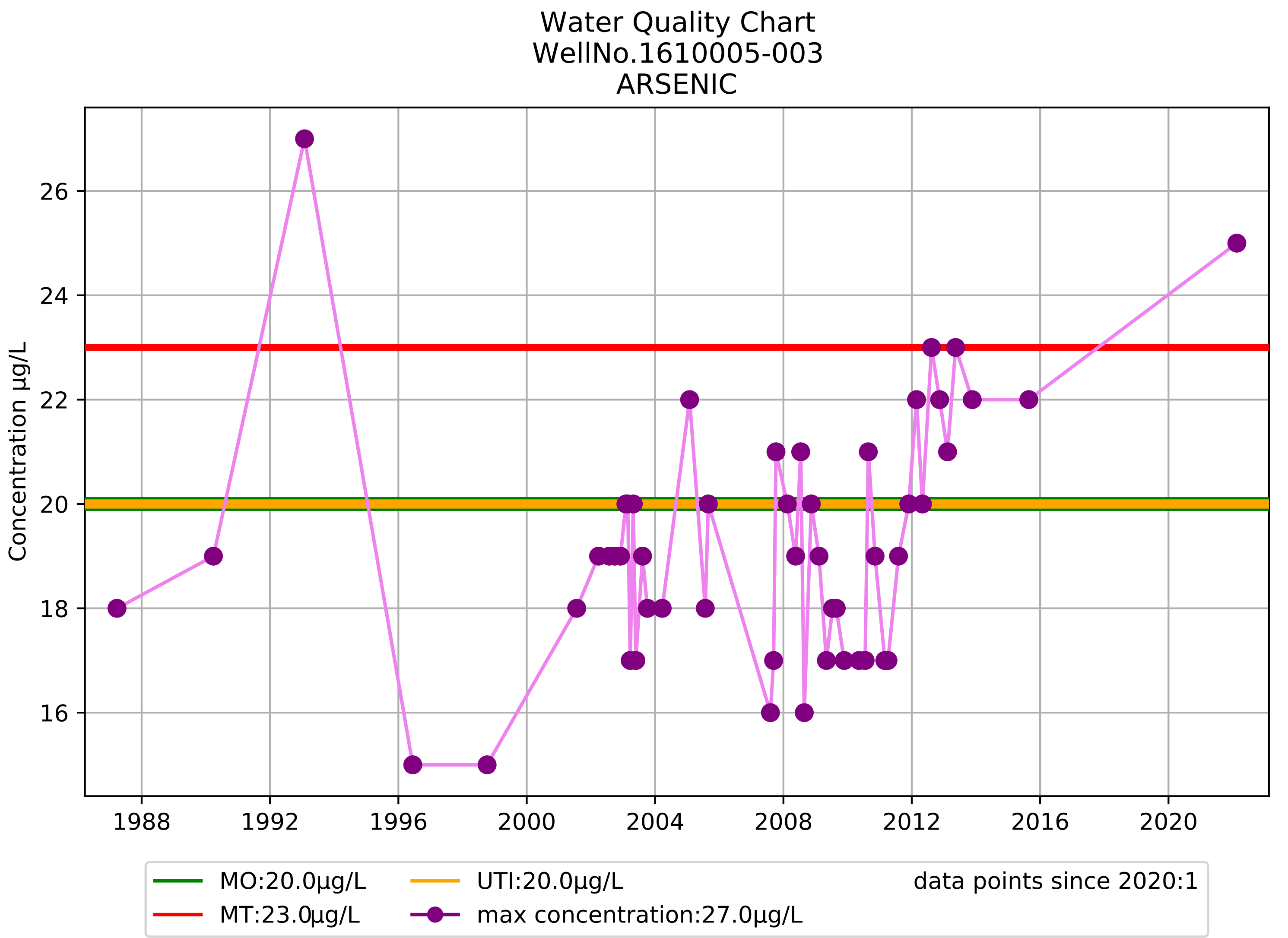
Water Quality Chart
WellNo.1610004-018
ARSENIC
Concentration µg/L
37.5
35.0
32.5
30.0
27.5
25.0
22.5
20.0
2014
2016
2018
2020
2022
MO:28.0µg/L
UTI:28.0µg/L
Mann-Kendall Trend:no trend
MT:38.0µg/L
max concentration:38.0µg/L



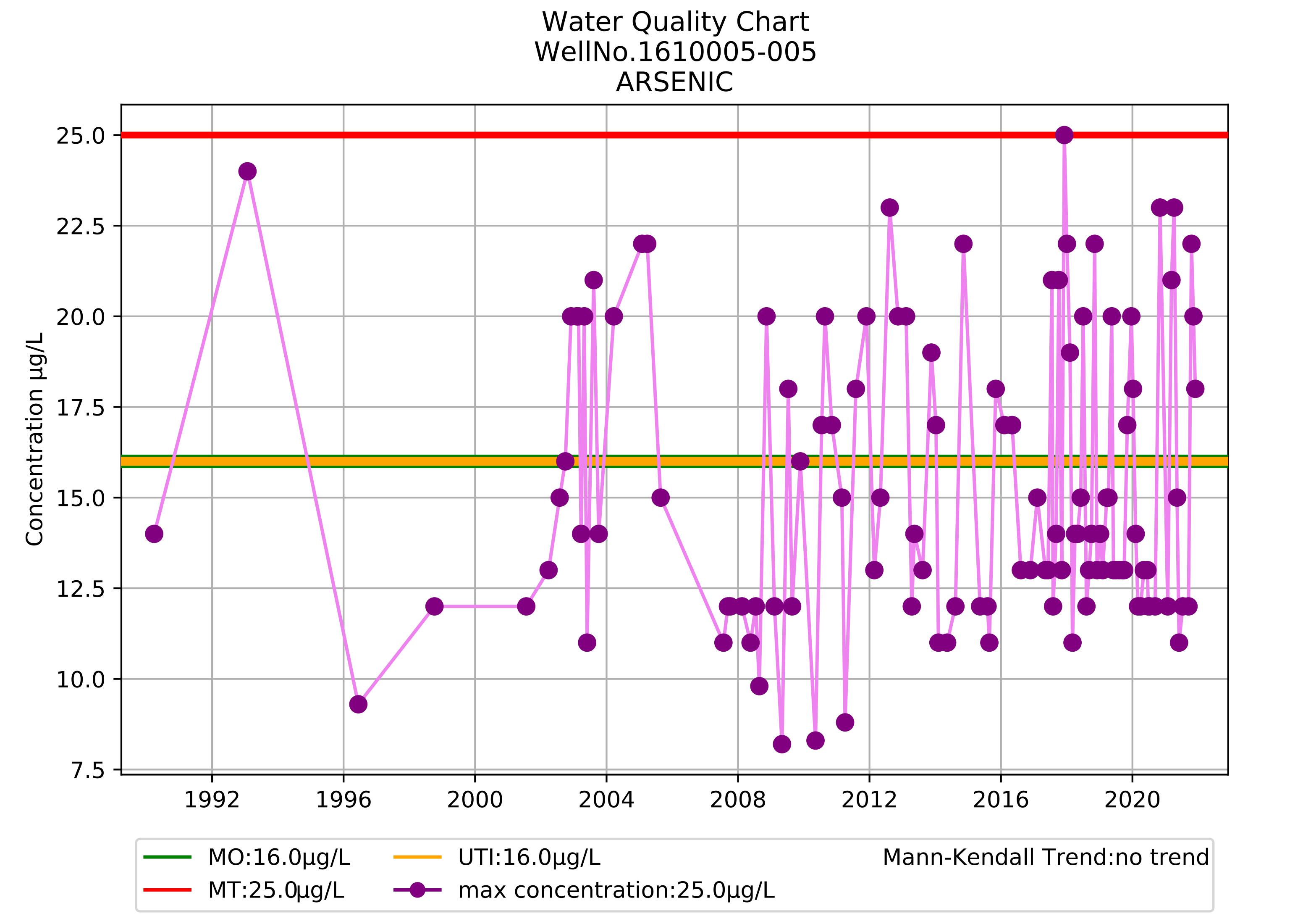
Water Quality Chart
WellNo.1610004-019
ARSENIC
Concentration µg/L
33
32
31
30
29
28
2014
2015
2016
2017
2018
2019
2020
2021
2022
MO:33.0µg/L
MT:33.0µg/L
UTI:33.0µg/L
max concentration:33.0µg/L
data points since 2020:2



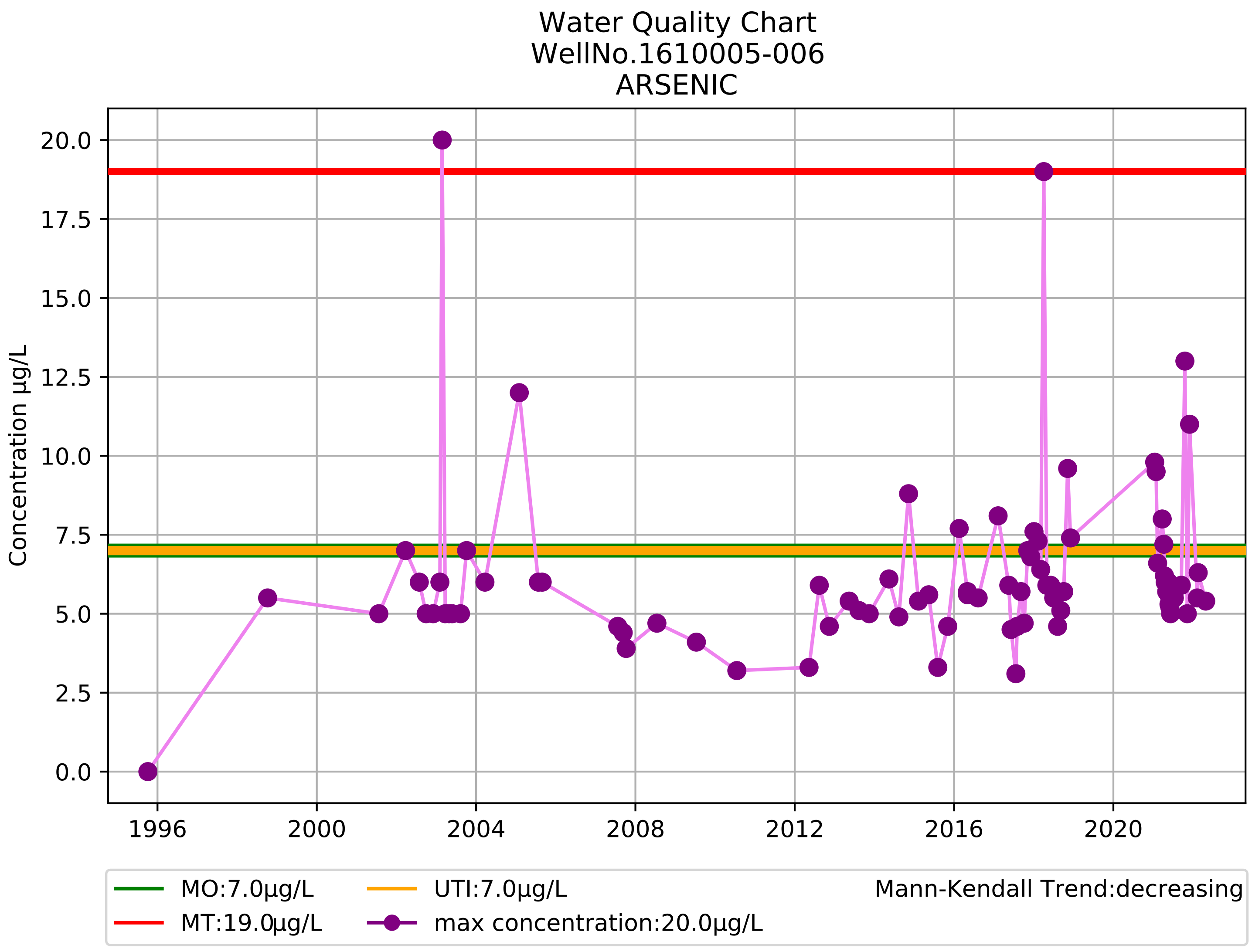
Water Quality Chart
WellNo.1610004-026
ARSENIC
Concentration µg/L
32.5
30.0
27.5
25.0
22.5
20.0
17.5
15.0
12.5
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:20.0µg/L
UTI:20.0µg/L
Mann-Kendall Trend:no trend
MT:32.0µg/L
max concentration:32.0µg/L



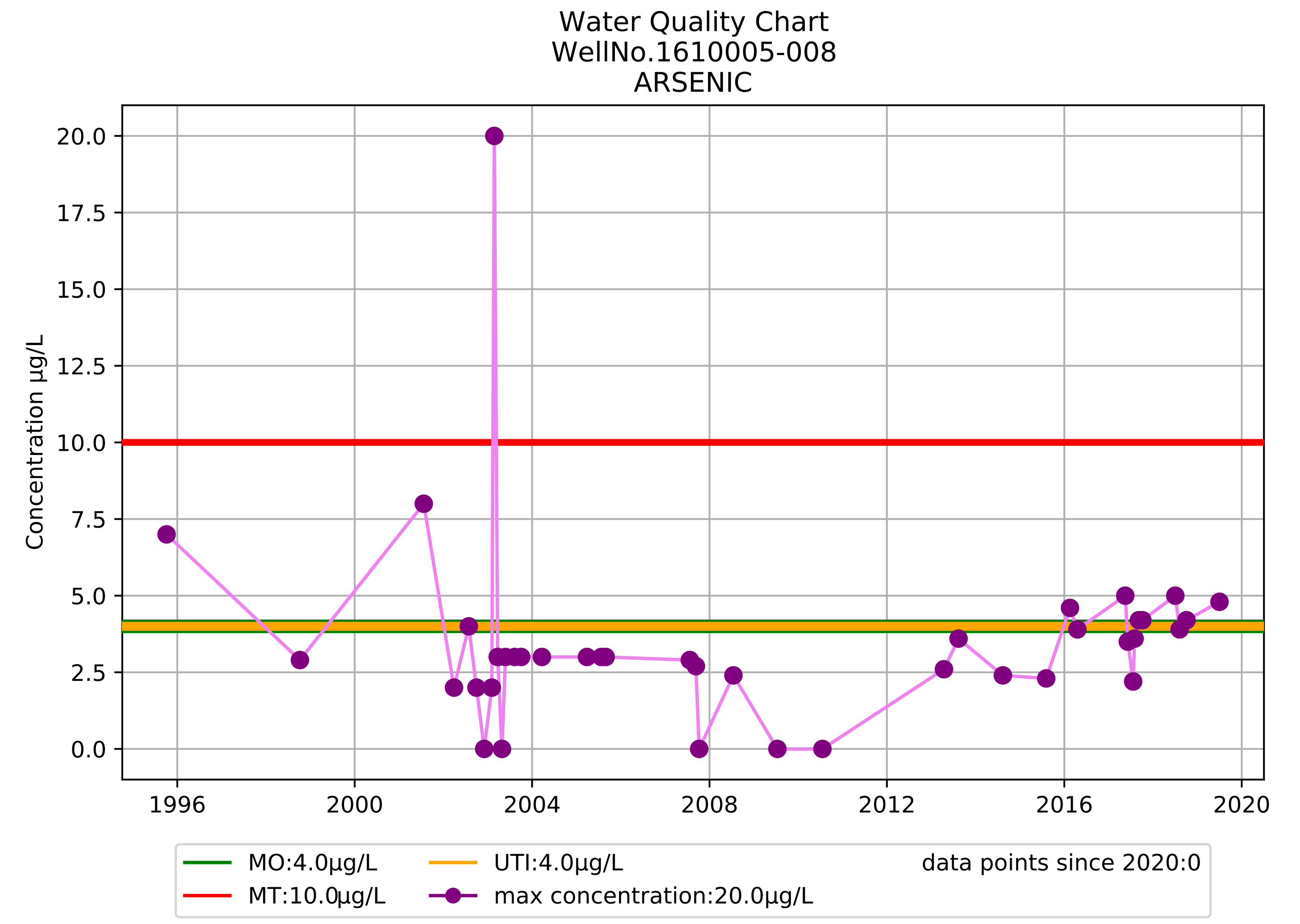
Water Quality Chart
WellNo.1610005-003
ARSENIC
Concentration µg/L
16
18
20
22
24
26
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:20.0µg/L
MT:23.0µg/L
UTI:20.0µg/L
max concentration:27.0µg/L
data points since 2020:1

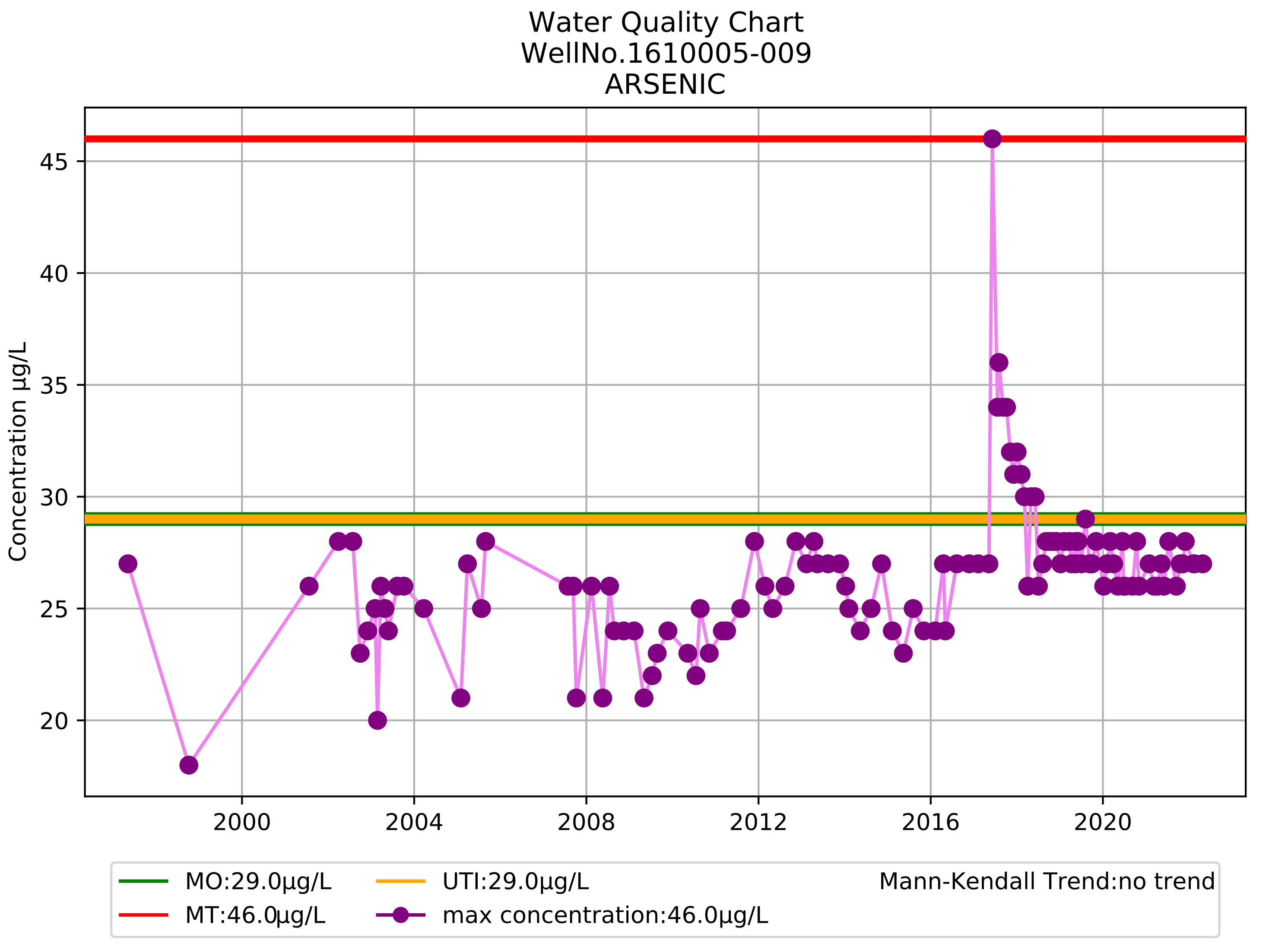


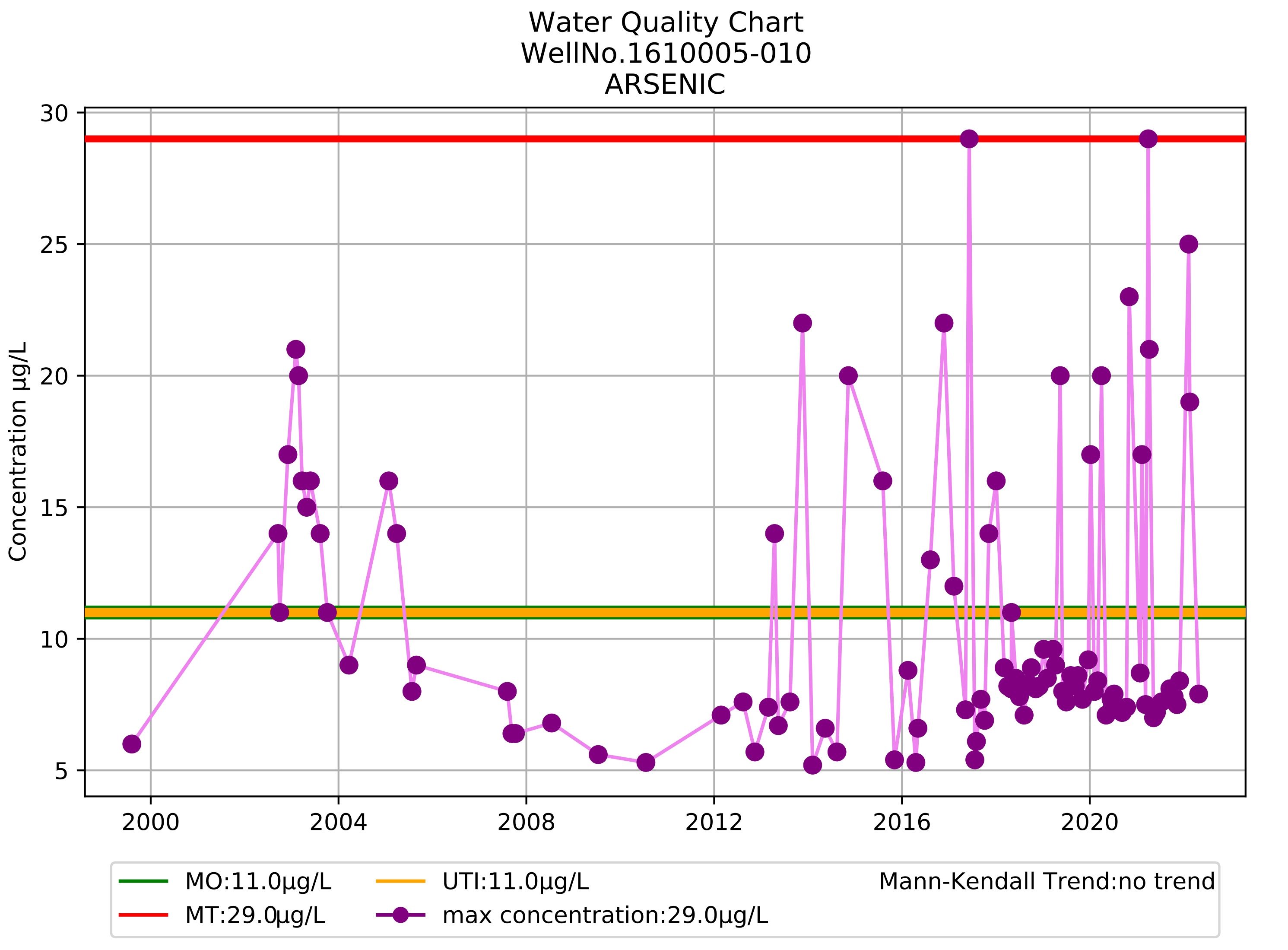
Water Quality Chart
WellNo.1610005-005
ARSENIC
Concentration µg/L
25.0
22.5
20.0
17.5
15.0
12.5
10.0
7.5
1992
1996
2000
2004
2008
2012
2016
2020
MO:16.0µg/L
MT:25.0µg/L
UTI:16.0µg/L
max concentration:25.0µg/L
Mann-Kendall Trend:no trend



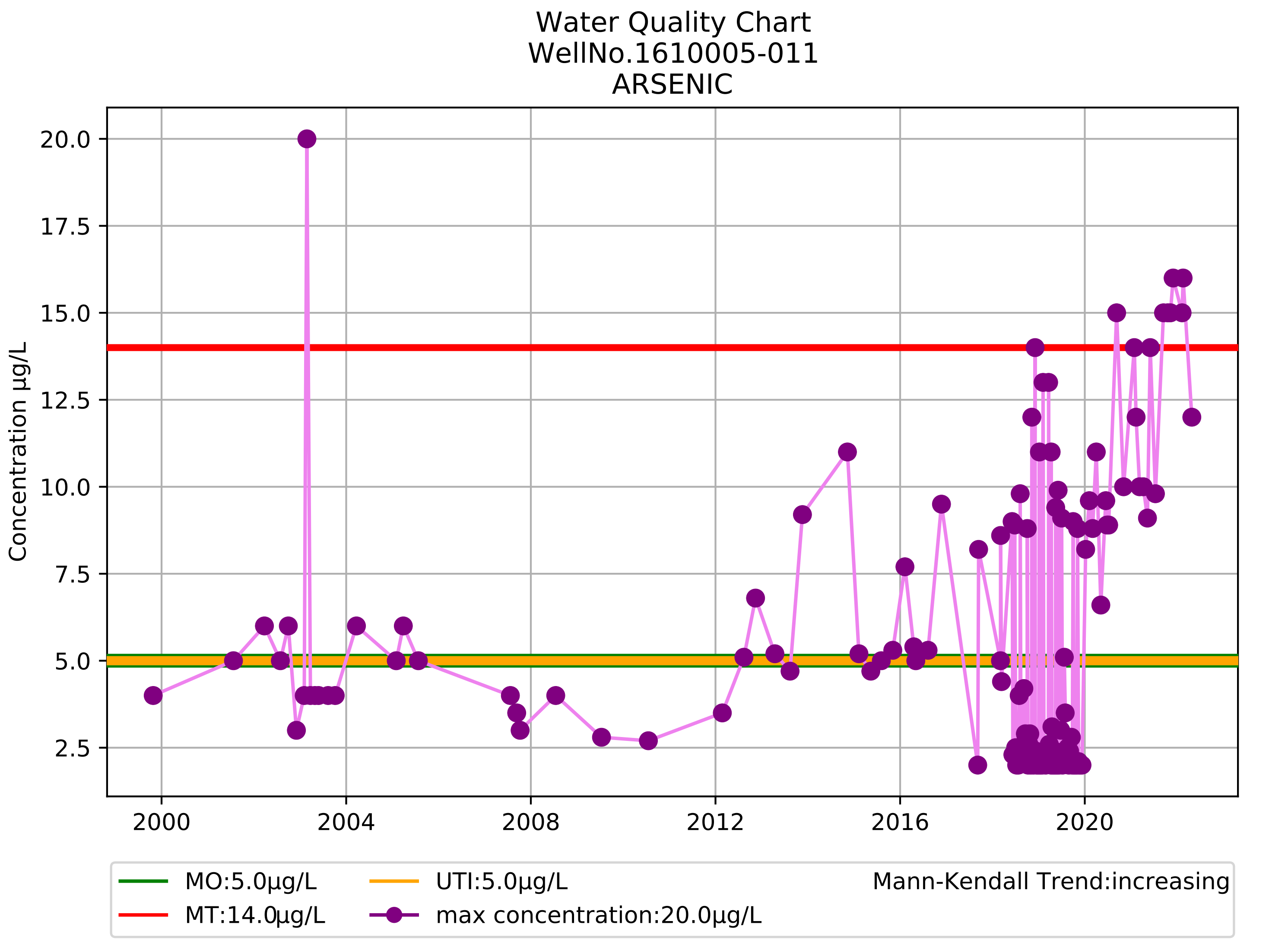
Water Quality Chart
WellNo.1610005-006
ARSENIC
Concentration µg/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1996
2000
2004
2008
2012
2016
2020
MO:7.0µg/L
MT:19.0µg/L
UTI:7.0µg/L
max concentration:20.0µg/L
Mann-Kendall Trend:decreasing


Water Quality Chart
WellNo.1610005-008
ARSENIC
Concentration µg/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1996
2000
2004
2008
2012
2016
2020
MO:4.0µg/L
MT:10.0µg/L
UTI:4.0µg/L
max concentration:20.0µg/L
data points since 2020:0

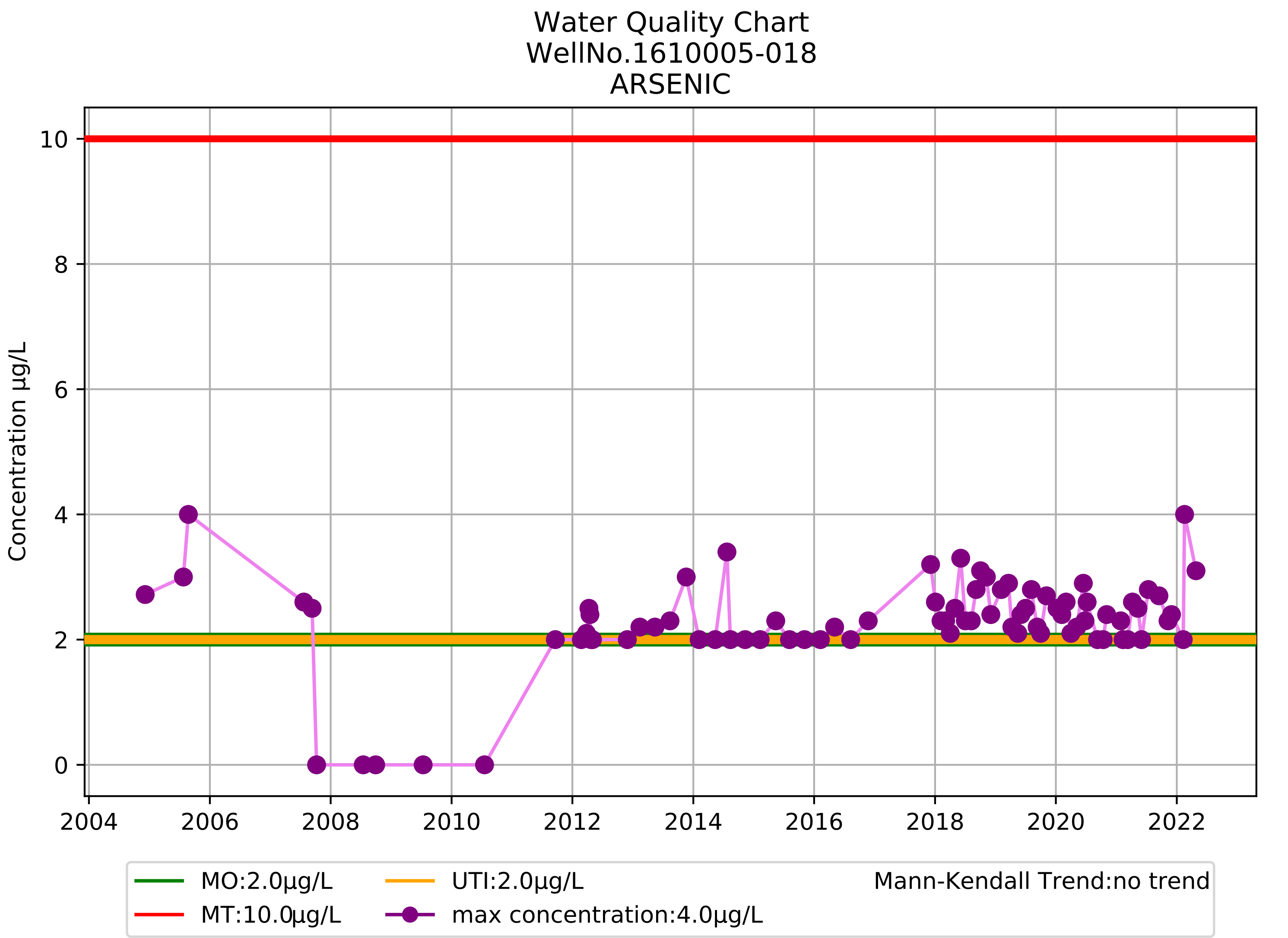

Water Quality Chart
WellNo.1610005-009
ARSENIC
Concentration µg/L
45
40
35
30
25
20
2000
2004
2008
2012
2016
2020
MO:29.0µg/L
MT:46.0µg/L
UTI:29.0µg/L
max concentration:46.0µg/L
Mann-Kendall Trend:no trend

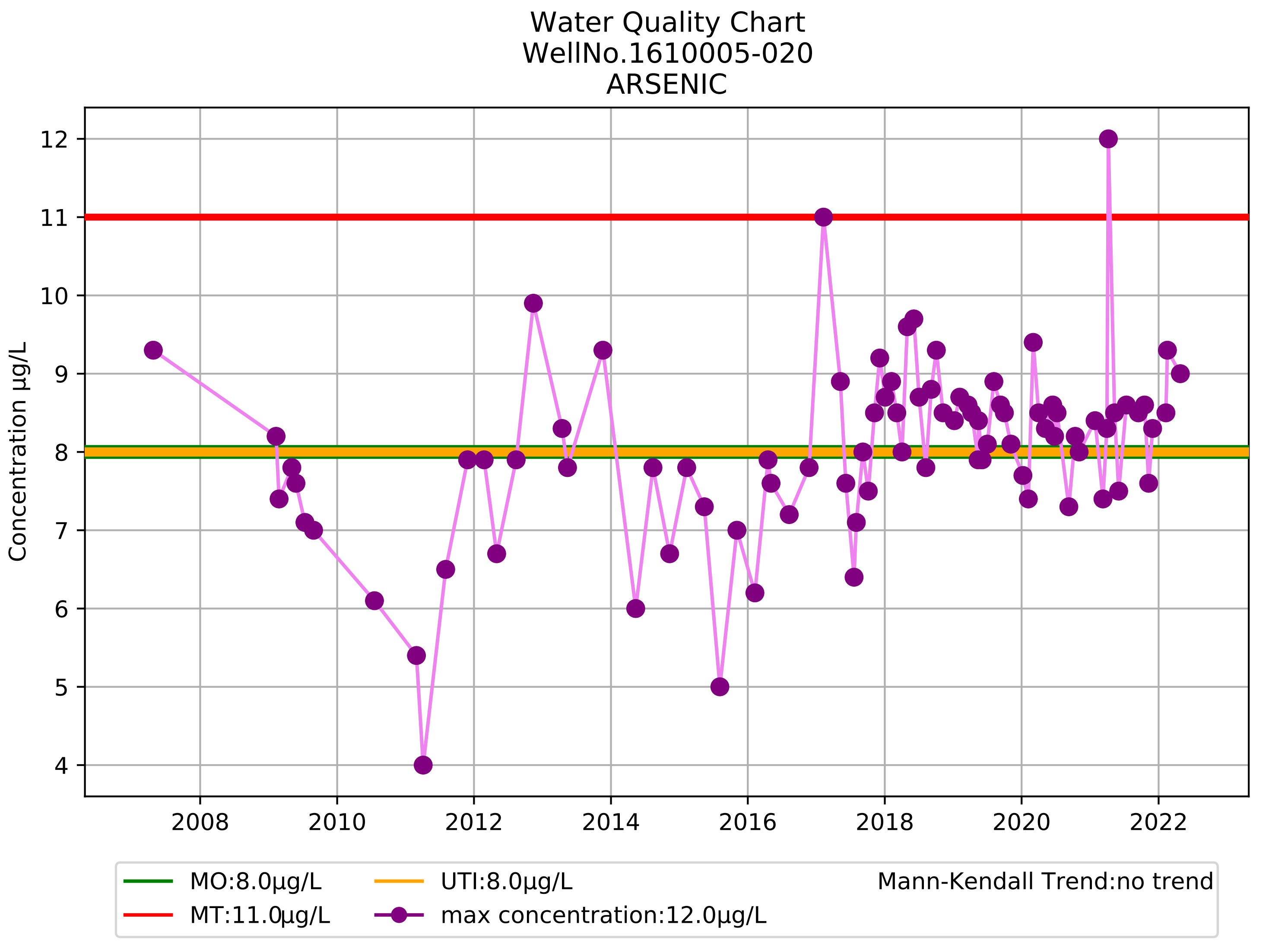


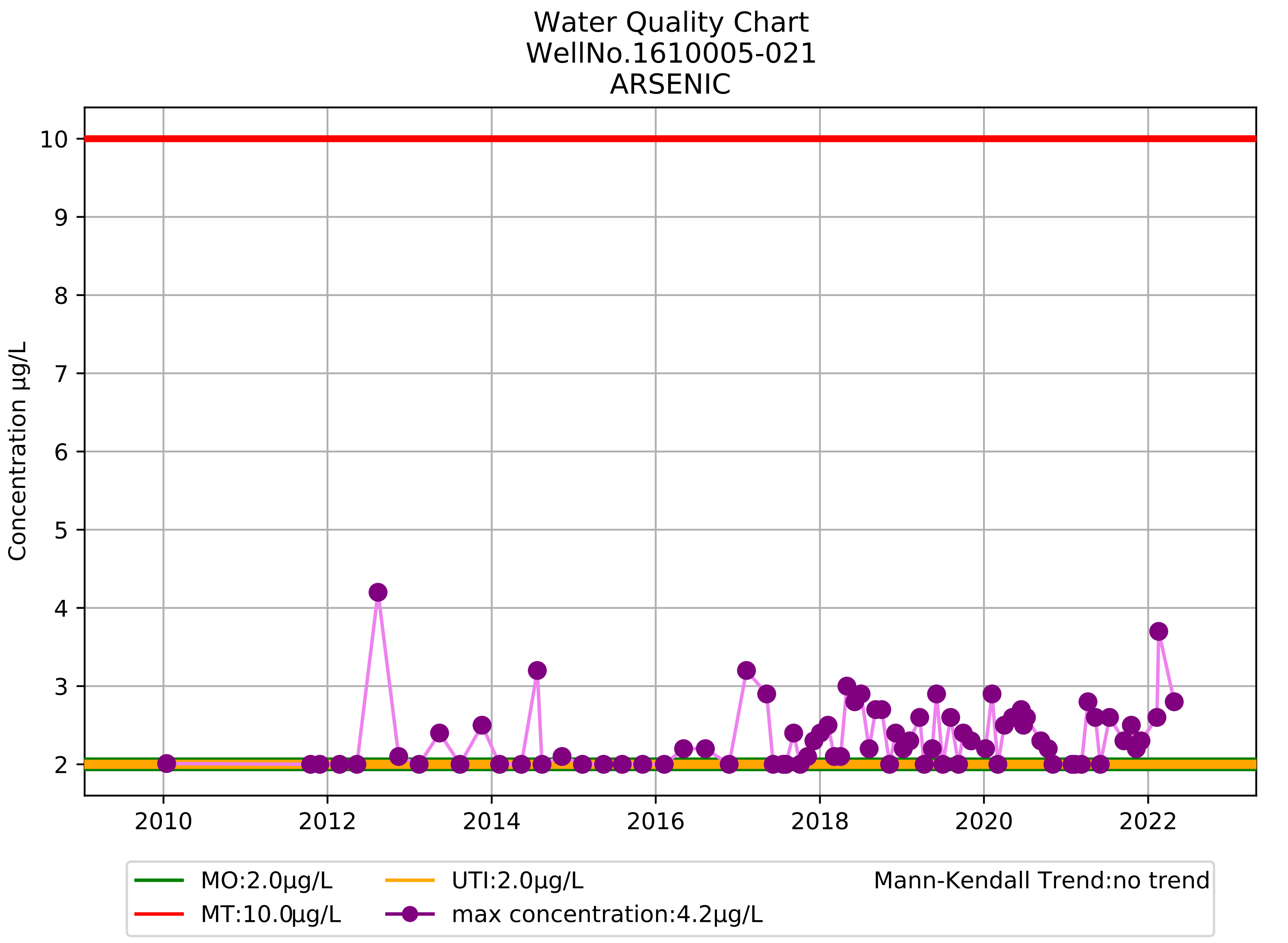
Water Quality Chart
WellNo.1610005-010
ARSENIC
Concentration µg/L
30
25
20
15
10
5
2000
2004
2008
2012
2016
2020
MO:11.0µg/L
MT:29.0µg/L
UTI:11.0µg/L
max concentration:29.0µg/L
Mann-Kendall Trend:no trend



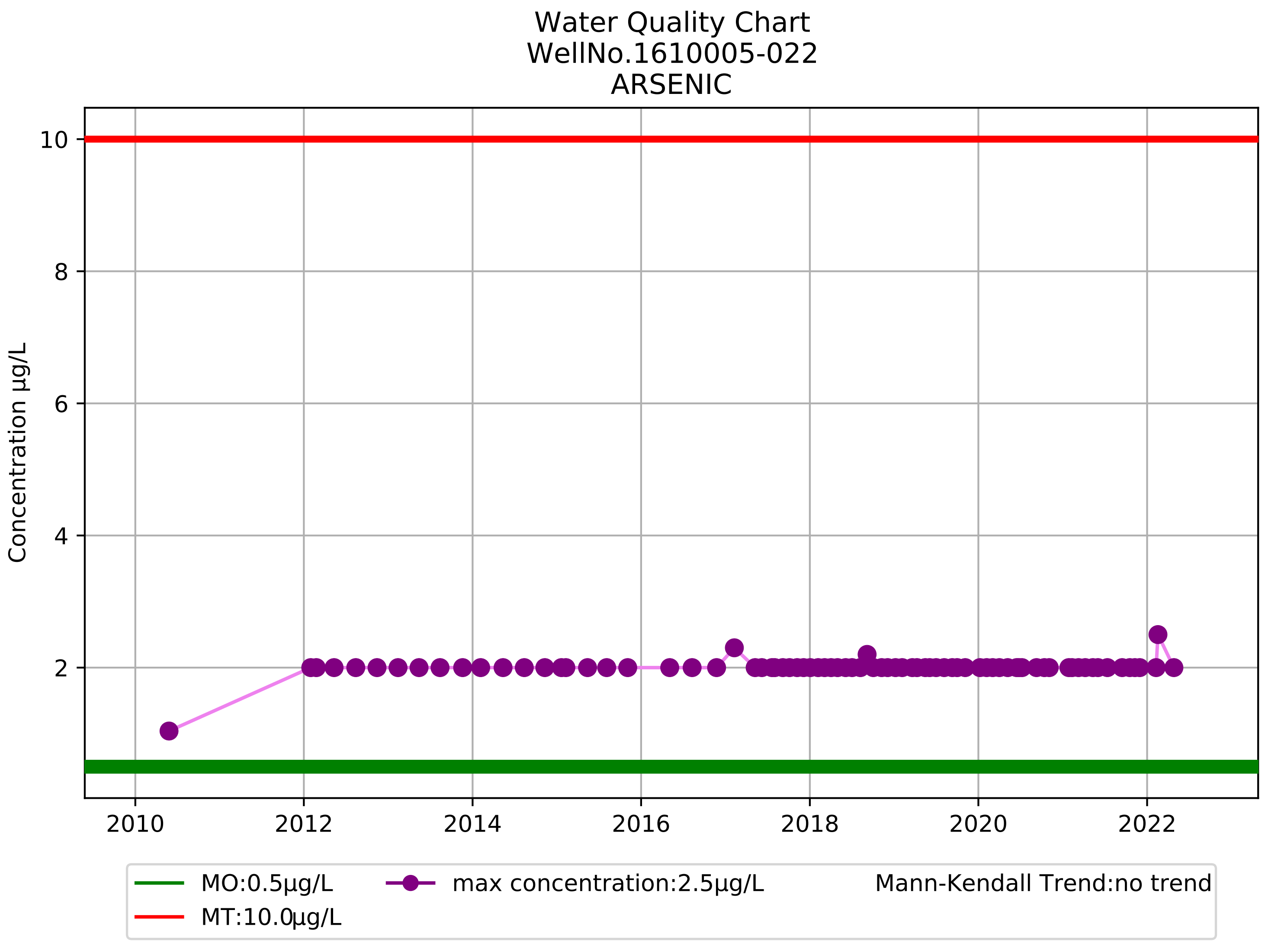
Water Quality Chart
WellNo.1610005-011
ARSENIC
Concentration µg/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
2000
2004
2008
2012
2016
2020
MO:5.0µg/L
UTI:5.0µg/L
Mann-Kendall Trend:increasing
MT:14.0µg/L
max concentration:20.0µg/L


Water Quality Chart
WellNo.1610005-018
ARSENIC
Concentration µg/L
0
2
4
6
8
10
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:2.0µg/L
MT:10.0µg/L
UTI:2.0µg/L
max concentration:4.0µg/L
Mann-Kendall Trend:no trend

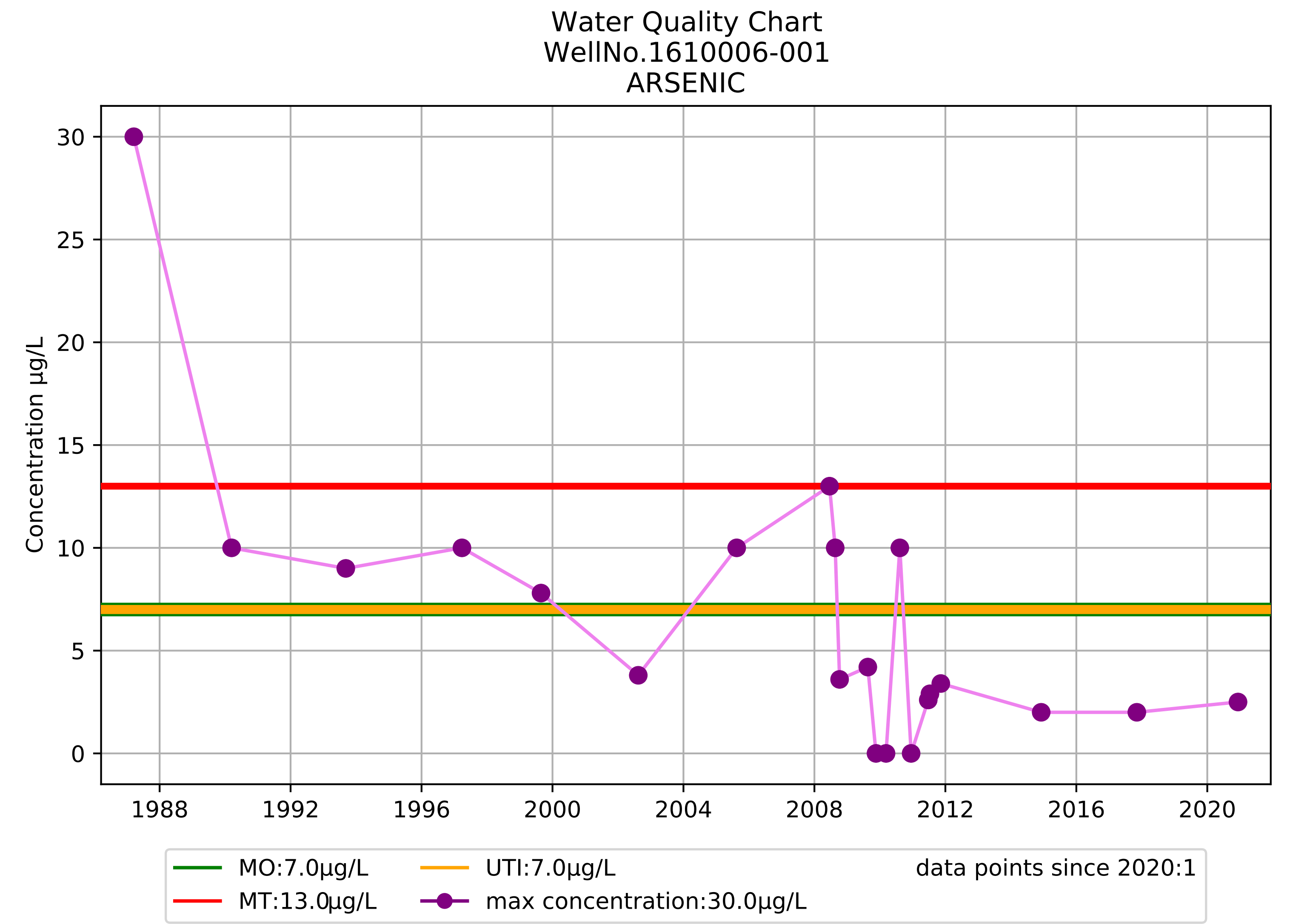

Water Quality Chart
WellNo.1610005-020
ARSENIC
Concentration µg/L
12
11
10
9
8
7
6
5
4
2008
2010
2012
2014
2016
2018
2020
2022
MO:8.0µg/L
MT:11.0µg/L
UTI:8.0µg/L
max concentration:12.0µg/L
Mann-Kendall Trend:no trend



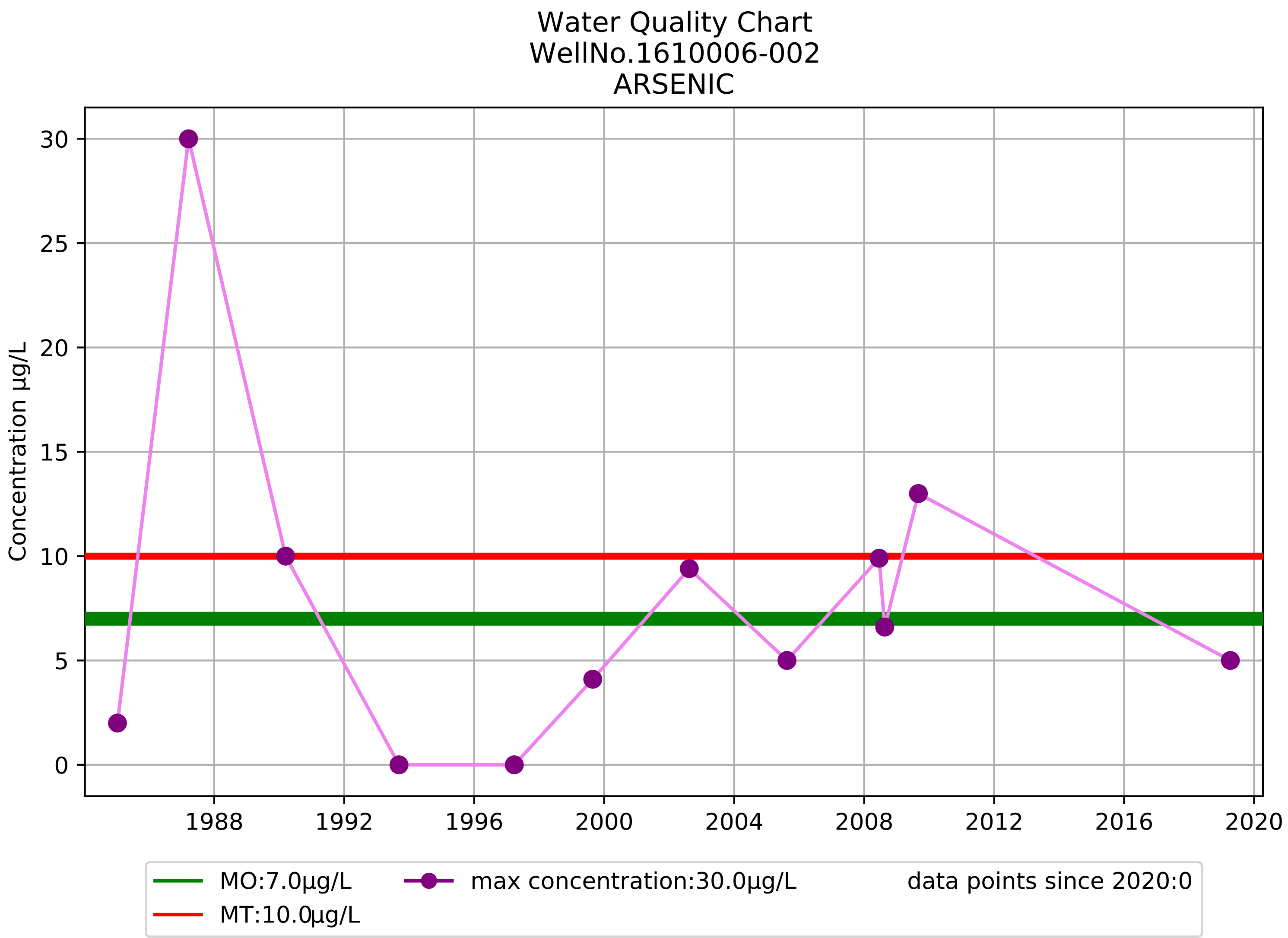
Water Quality Chart
WellNo.1610005-021
ARSENIC
Concentration µg/L
10
9
8
7
6
5
4
3
2
2010
2012
2014
2016
2018
2020
2022
MO:2.0µg/L
MT:10.0µg/L
UTI:2.0µg/L
max concentration:4.2µg/L
Mann-Kendall Trend:no trend

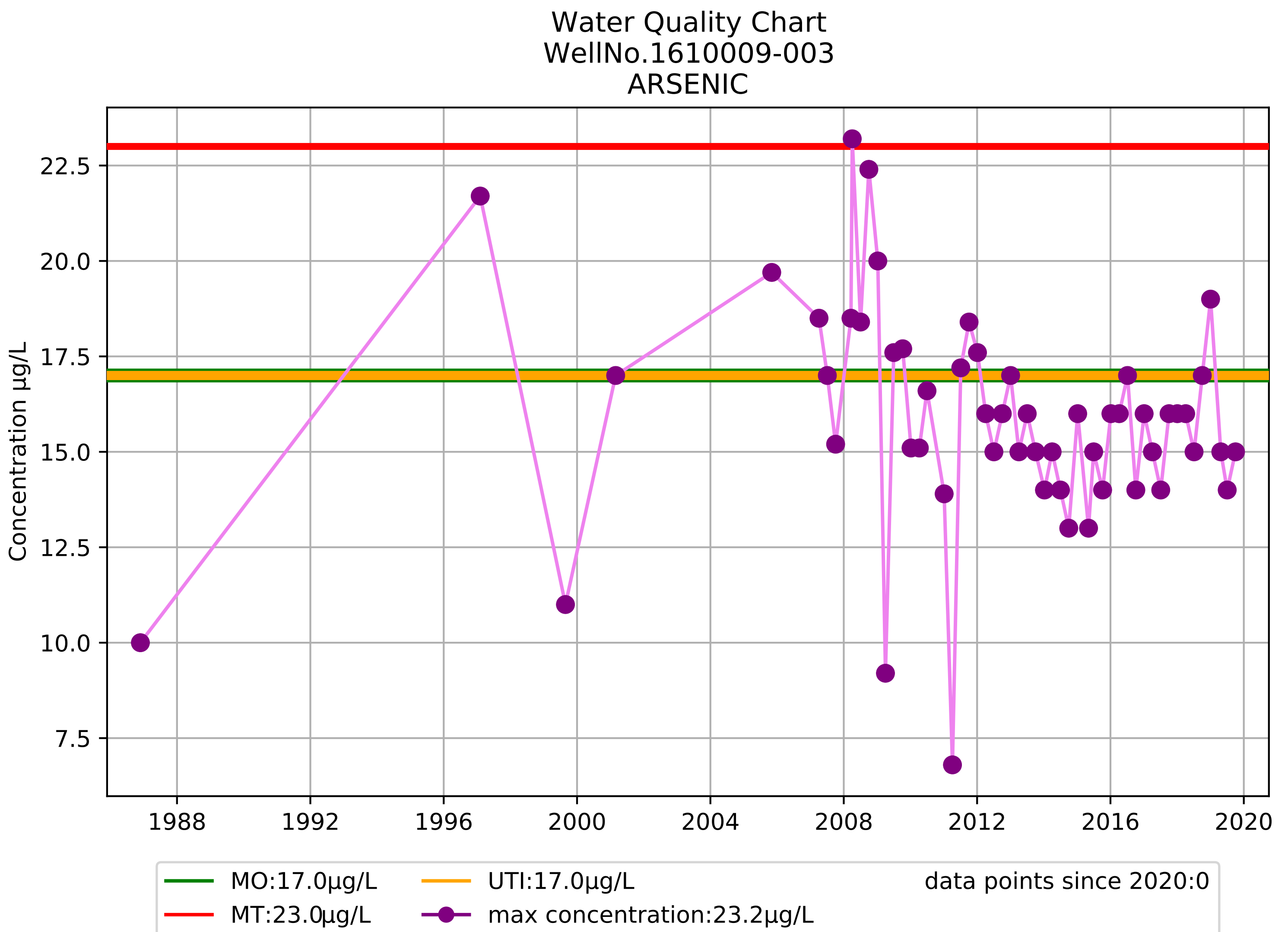


Water Quality Chart
WellNo.1610005-022
ARSENIC
Concentration µg/L
10
8
6
4
2
2010
2012
2014
2016
2018
2020
2022
MO:0.5µg/L
MT:10.0µg/L
max concentration:2.5µg/L
Mann-Kendall Trend:no trend

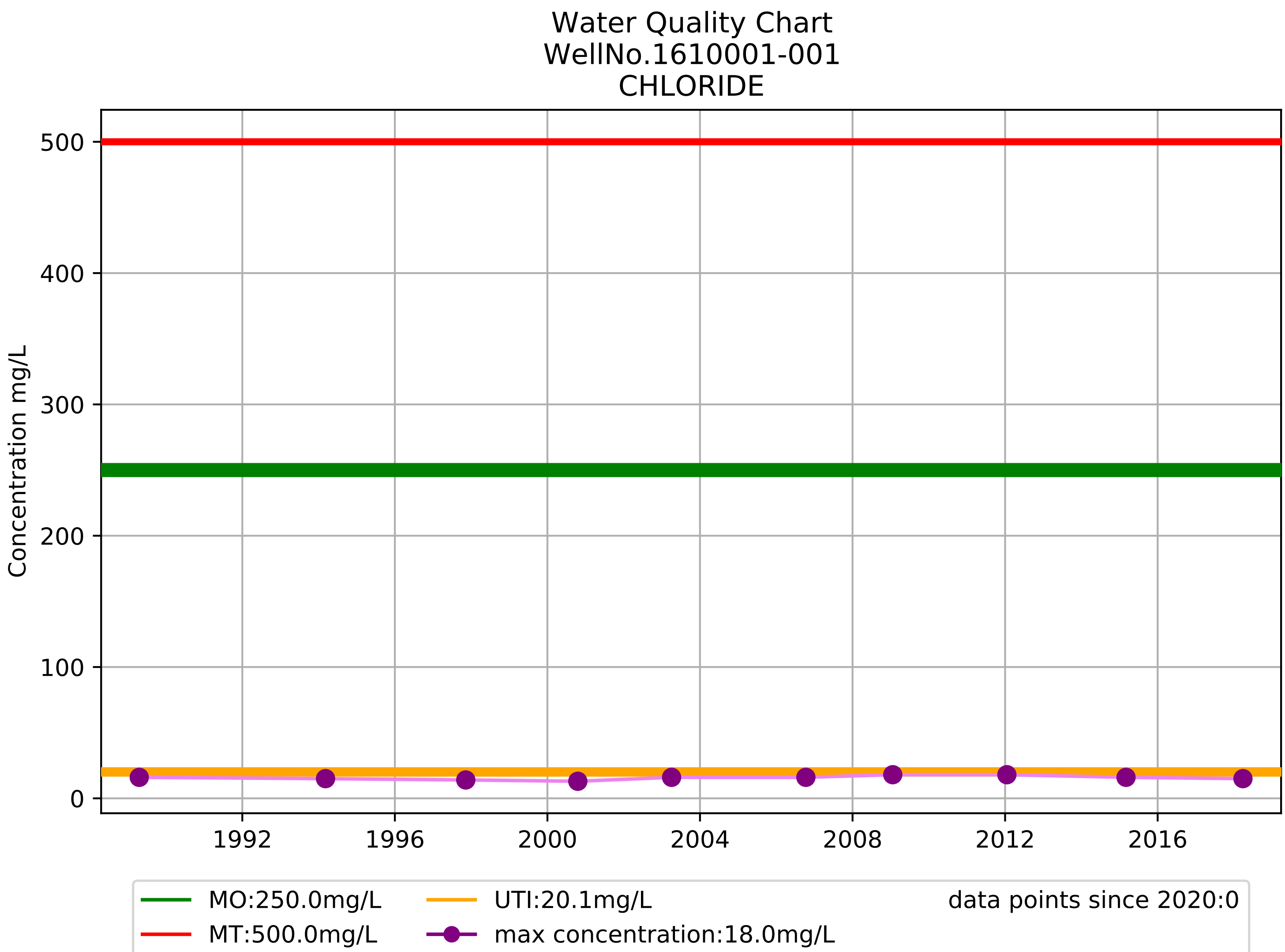


Water Quality Chart
WellNo.1610006-001
ARSENIC
Concentration µg/L
30
25
20
15
10
5
0
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:7.0µg/L
UTI:7.0µg/L
data points since 2020:1
MT:13.0µg/L
max concentration:30.0µg/L

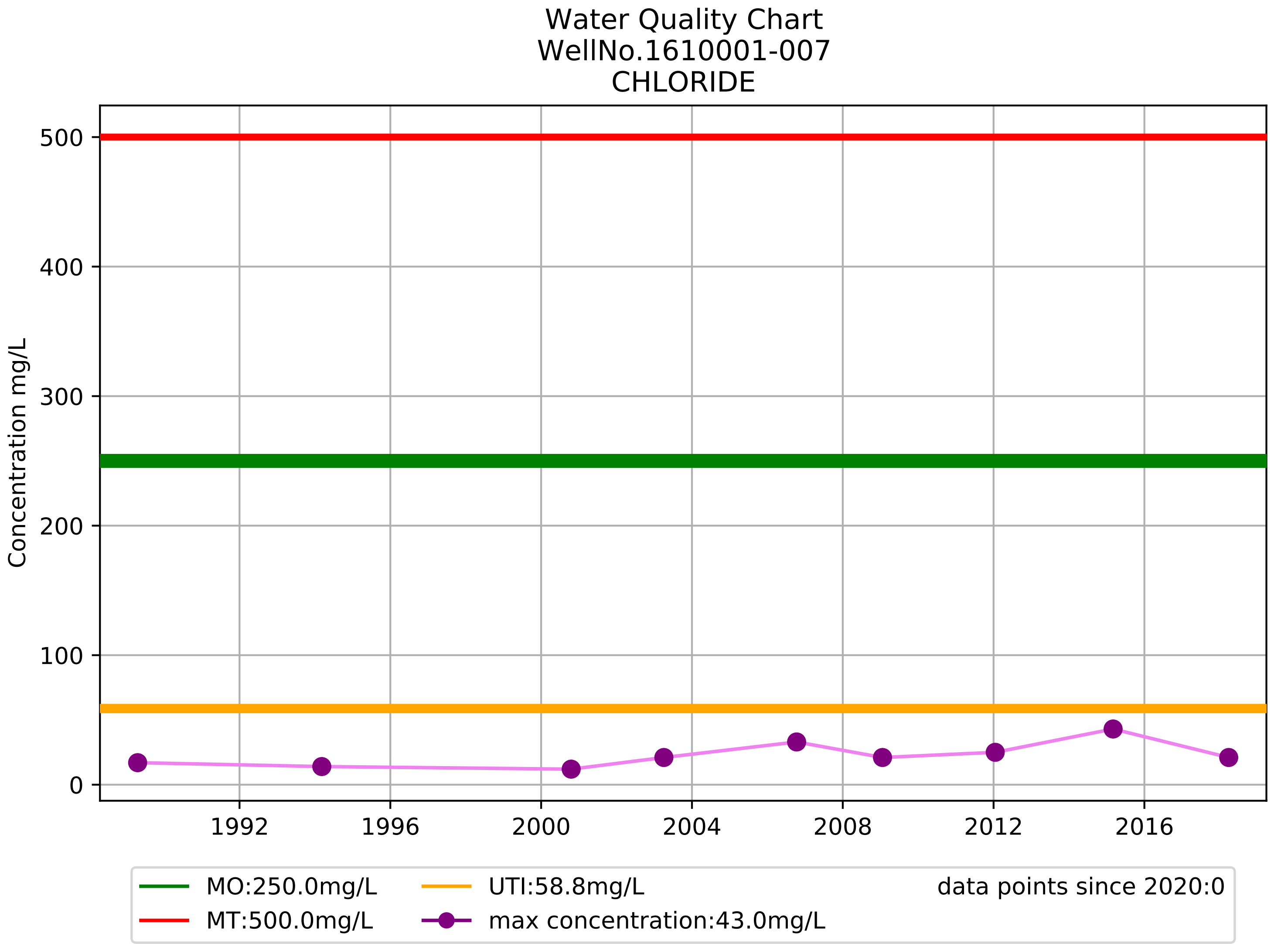

Water Quality Chart
WellNo.1610006-002
ARSENIC
Concentration µg/L
30
25
20
15
10
5
0
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:7.0µg/L
MT:10.0µg/L
max concentration:30.0µg/L
data points since 2020:0

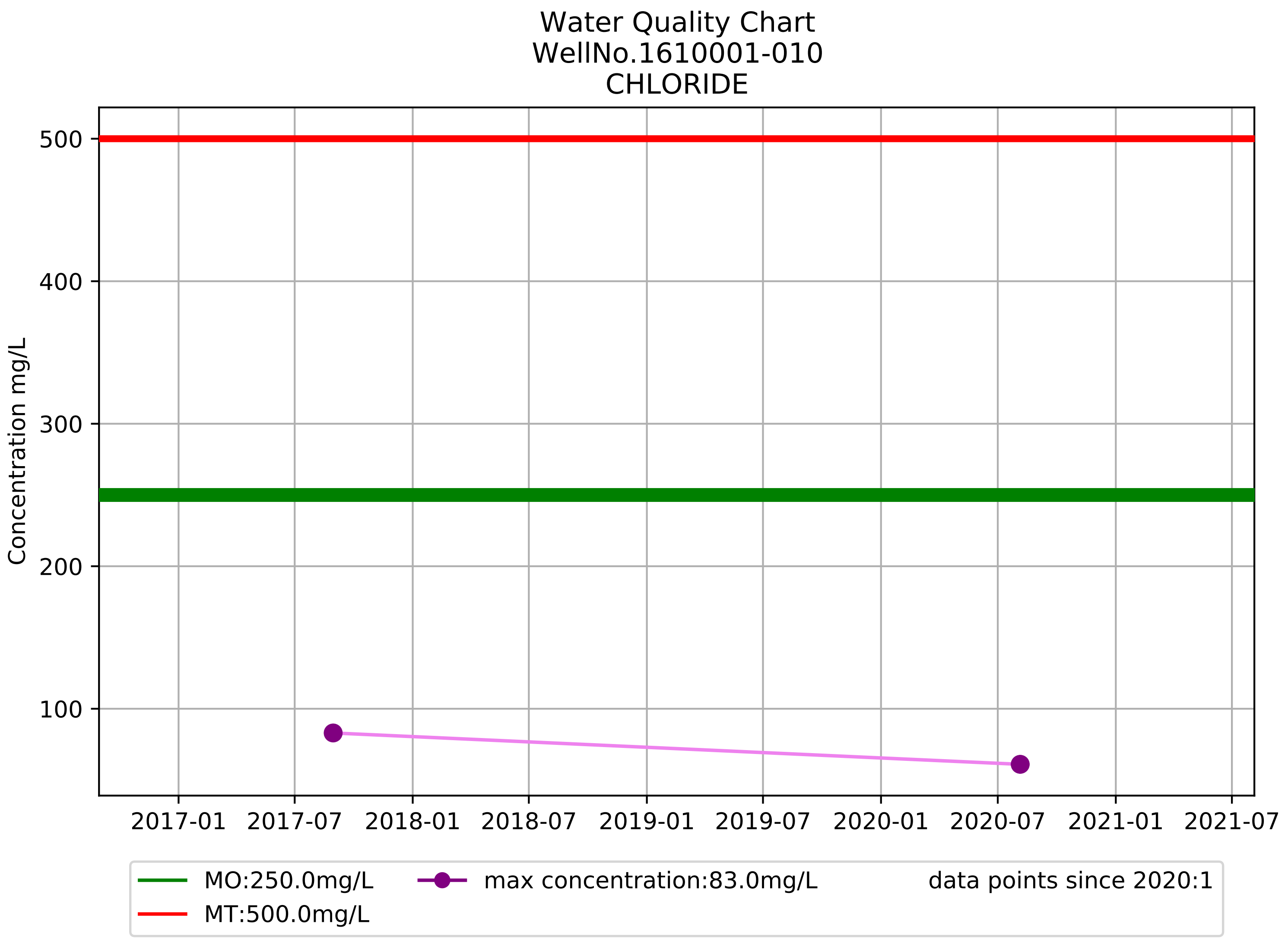


Water Quality Chart
WellNo.1610009-003
ARSENIC
Concentration µg/L
22.5
20.0
17.5
15.0
12.5
10.0
7.5
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:17.0µg/L
MT:23.0µg/L
UTI:17.0µg/L
max concentration:23.2µg/L
data points since 2020:0

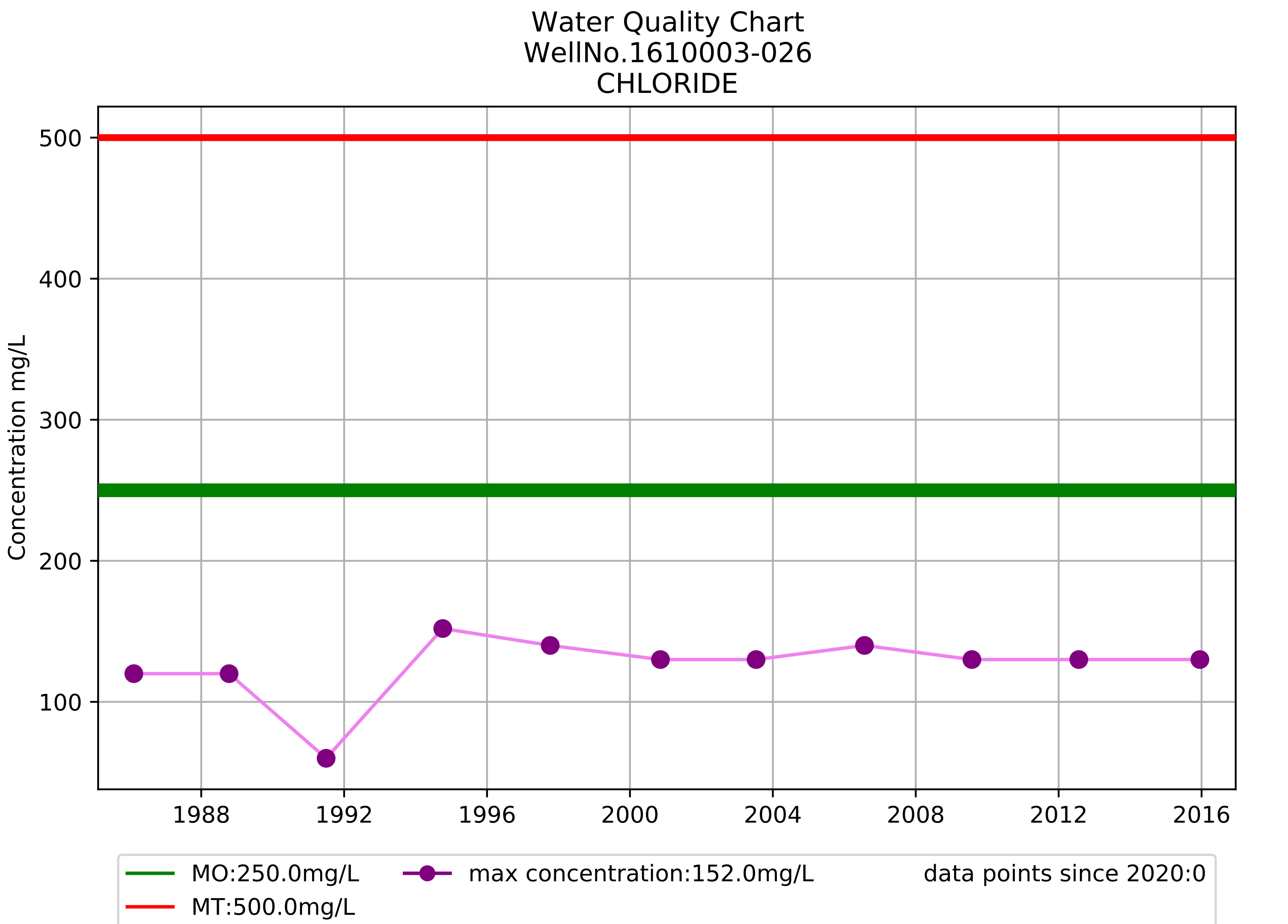


Water Quality Chart
WellNo.1610001-001
CHLORIDE
Concentration mg/L
0
100
200
300
400
500
1992
1996
2000
2004
2008
2012
2016
MO:250.0mg/L
MT:500.0mg/L
UTI:20.1mg/L
max concentration:18.0mg/L
data points since 2020:0

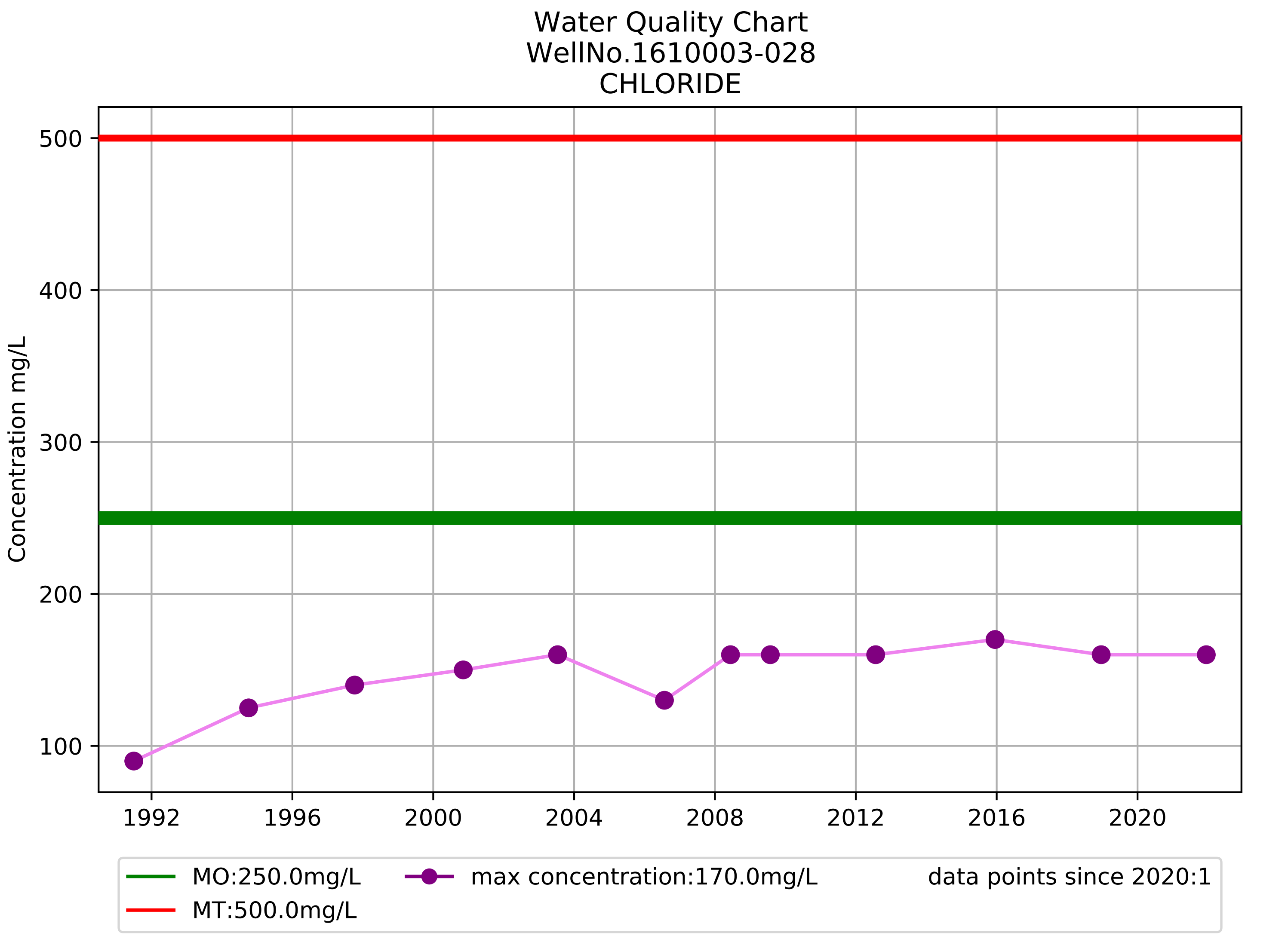

Water Quality Chart
WellNo.1610001-007
CHLORIDE
Concentration mg/L
0
100
200
300
400
500
1992
1996
2000
2004
2008
2012
2016
MO:250.0mg/L
MT:500.0mg/L
UTI:58.8mg/L
max concentration:43.0mg/L
data points since 2020:0

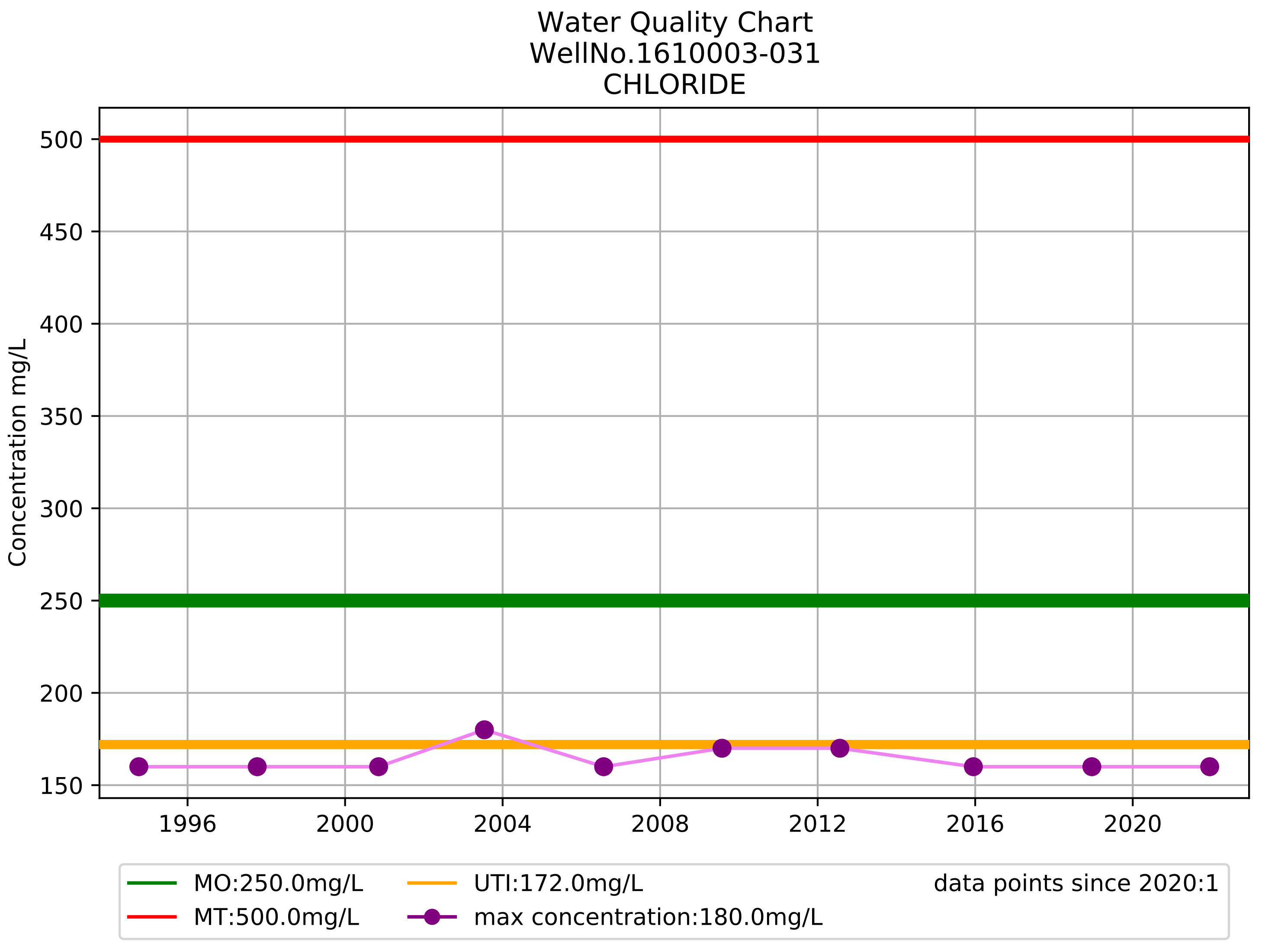


Water Quality Chart
WellNo.1610001-010
CHLORIDE
Concentration mg/L
500
400
300
200
100
2017-01
2017-07
2018-01
2018-07
2019-01
2019-07
2020-01
2020-07
2021-01
2021-07
MO:250.0mg/L
MT:500.0mg/L
max concentration:83.0mg/L
data points since 2020:1

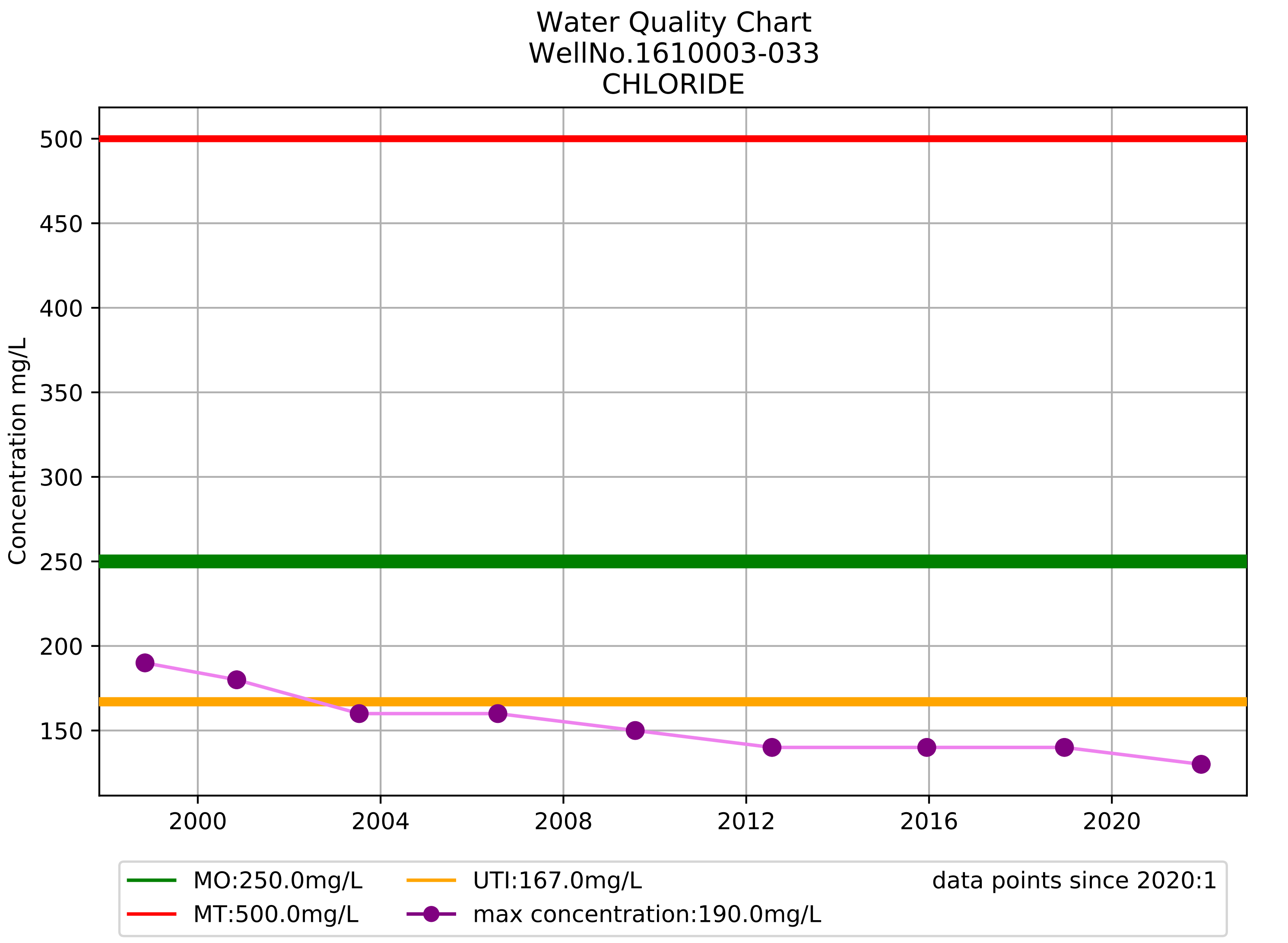


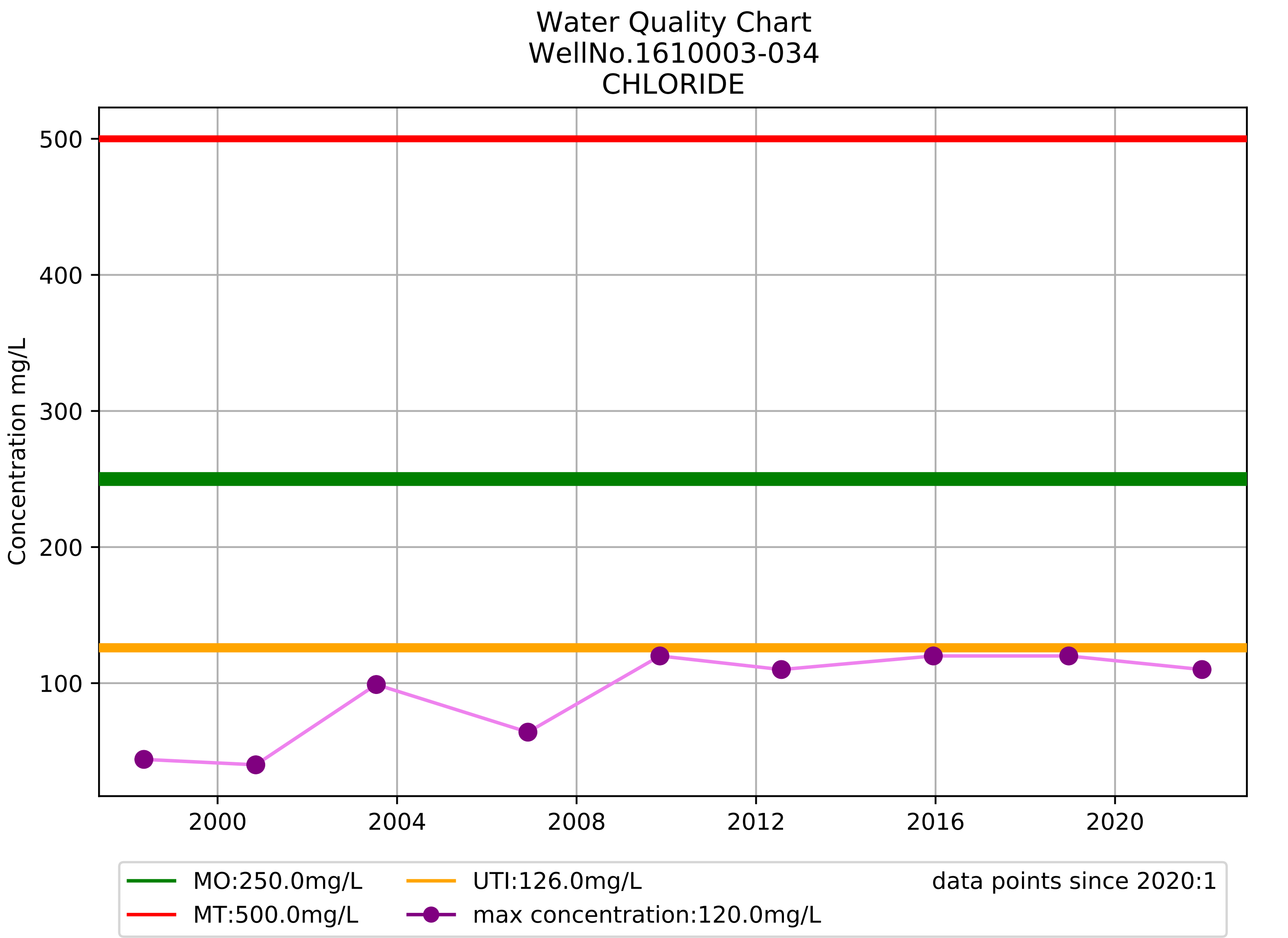
Water Quality Chart
WellNo.1610003-026
CHLORIDE
Concentration mg/L
500
400
300
200
100
1988
1992
1996
2000
2004
2008
2012
2016
MO:250.0mg/L
MT:500.0mg/L
max concentration:152.0mg/L
data points since 2020:0

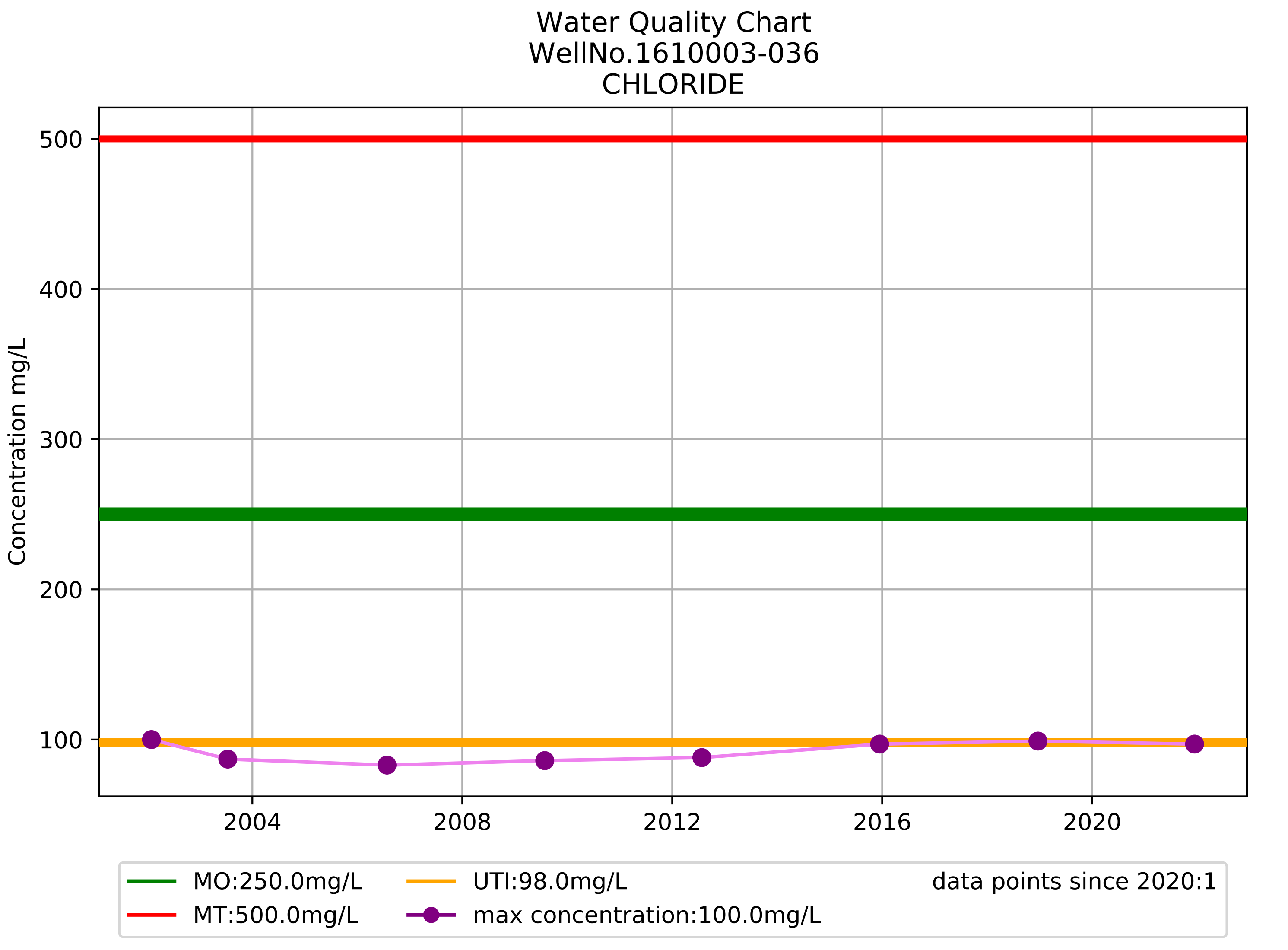

Water Quality Chart
WellNo.1610003-028
CHLORIDE
Concentration mg/L
500
400
300
200
100
1992
1996
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
max concentration:170.0mg/L
data points since 2020:1

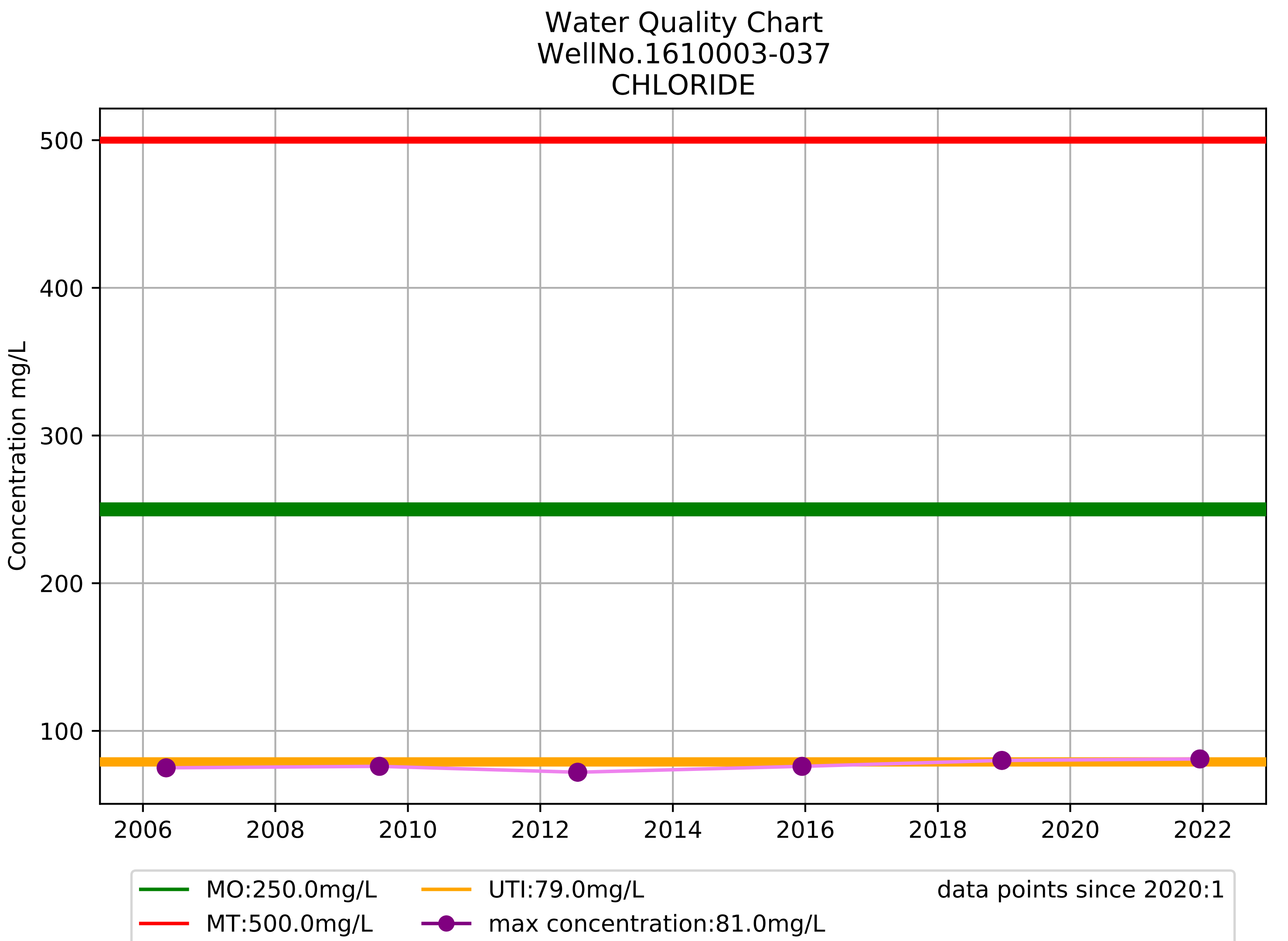


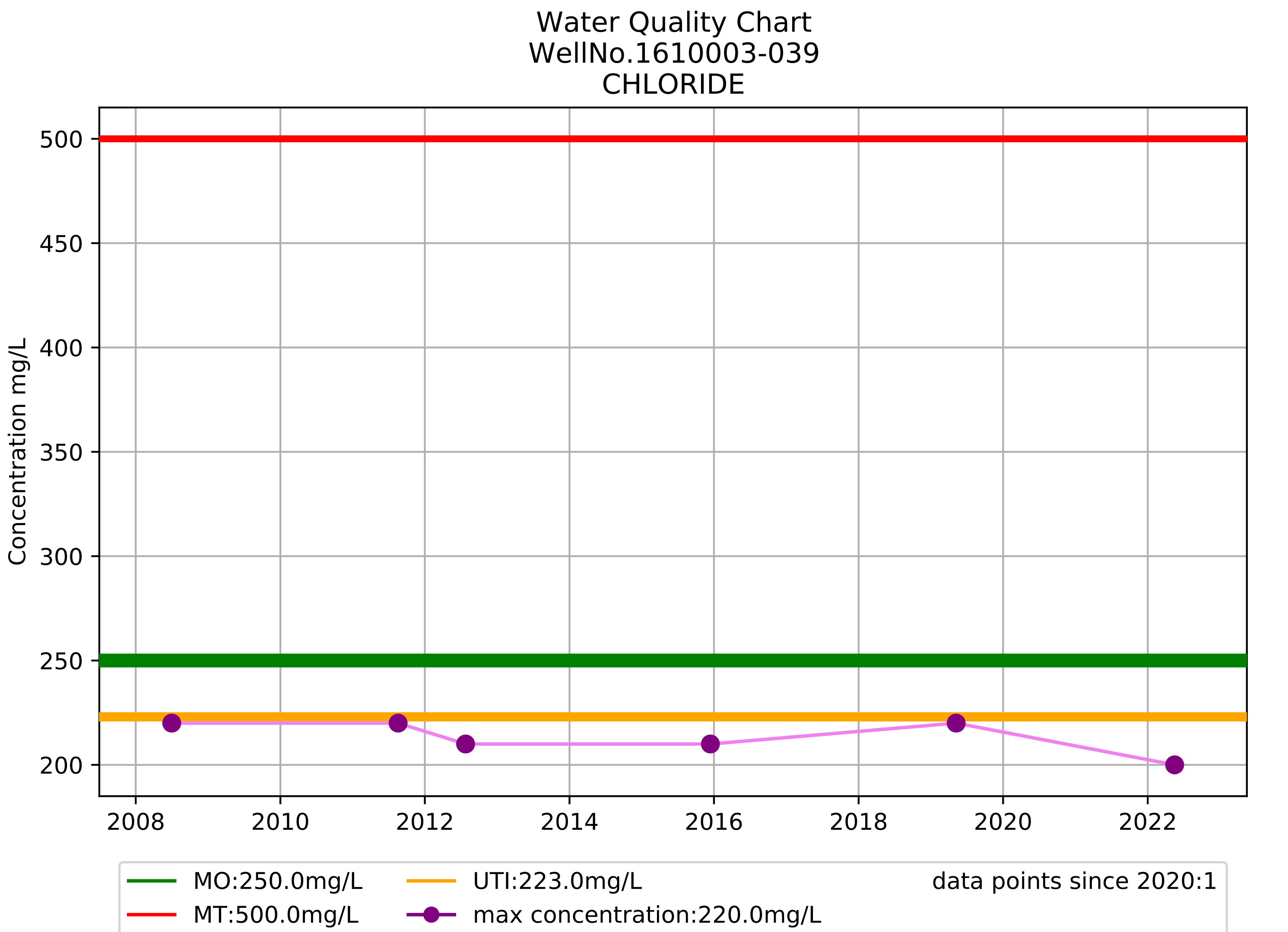
Water Quality Chart
WellNo.1610003-031
CHLORIDE
Concentration mg/L
500
450
400
350
300
250
200
150
1996
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:172.0mg/L
max concentration:180.0mg/L
data points since 2020:1


Water Quality Chart
WellNo.1610003-033
CHLORIDE
Concentration mg/L
500
450
400
350
300
250
200
150
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:167.0mg/L
max concentration:190.0mg/L
data points since 2020:1

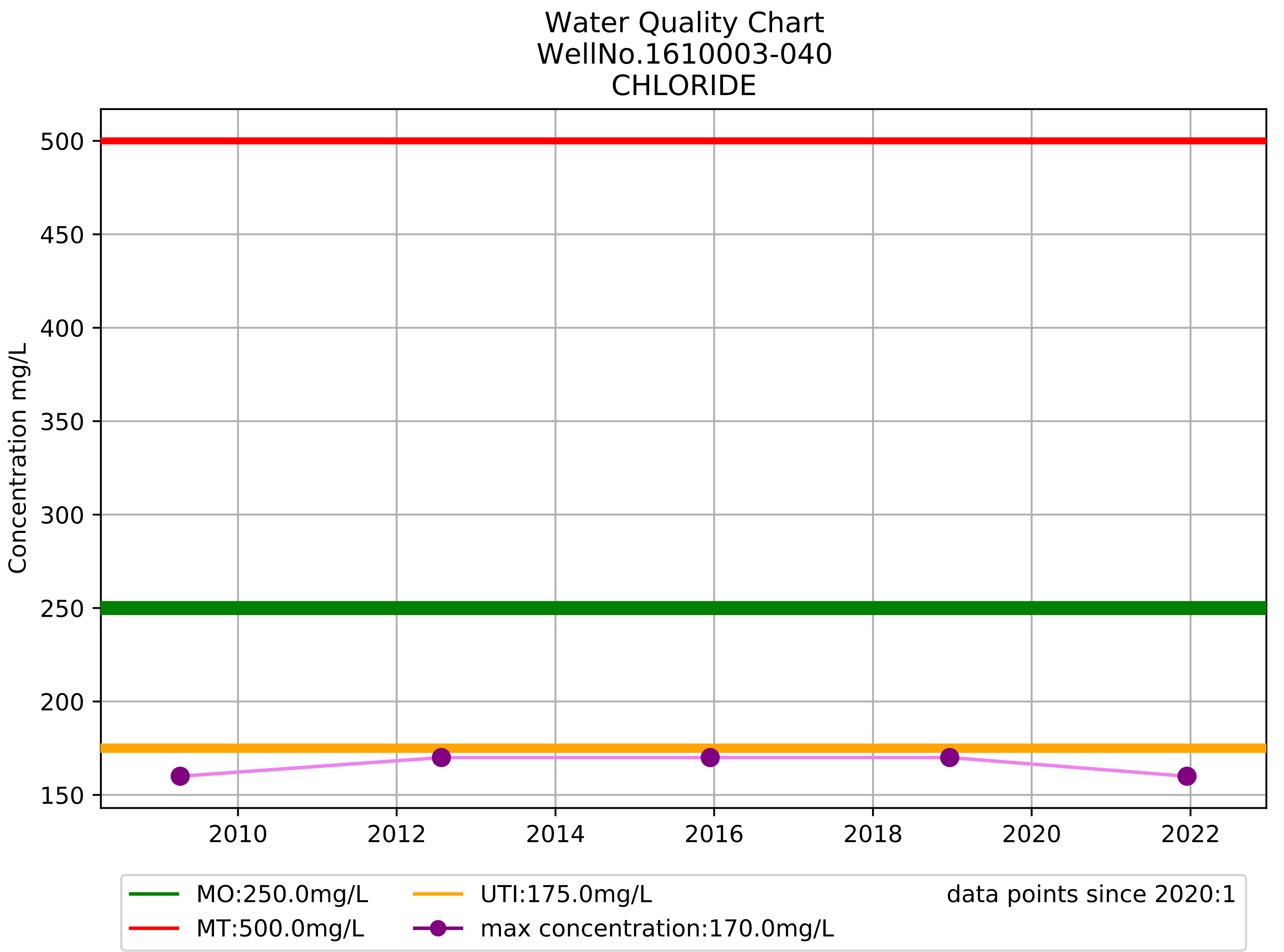

Water Quality Chart
WellNo.1610003-034
CHLORIDE
Concentration mg/L
500
400
300
200
100
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:126.0mg/L
max concentration:120.0mg/L
data points since 2020:1


Water Quality Chart
WellNo.1610003-036
CHLORIDE
Concentration mg/L
500
400
300
200
100
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:98.0mg/L
max concentration:100.0mg/L
data points since 2020:1

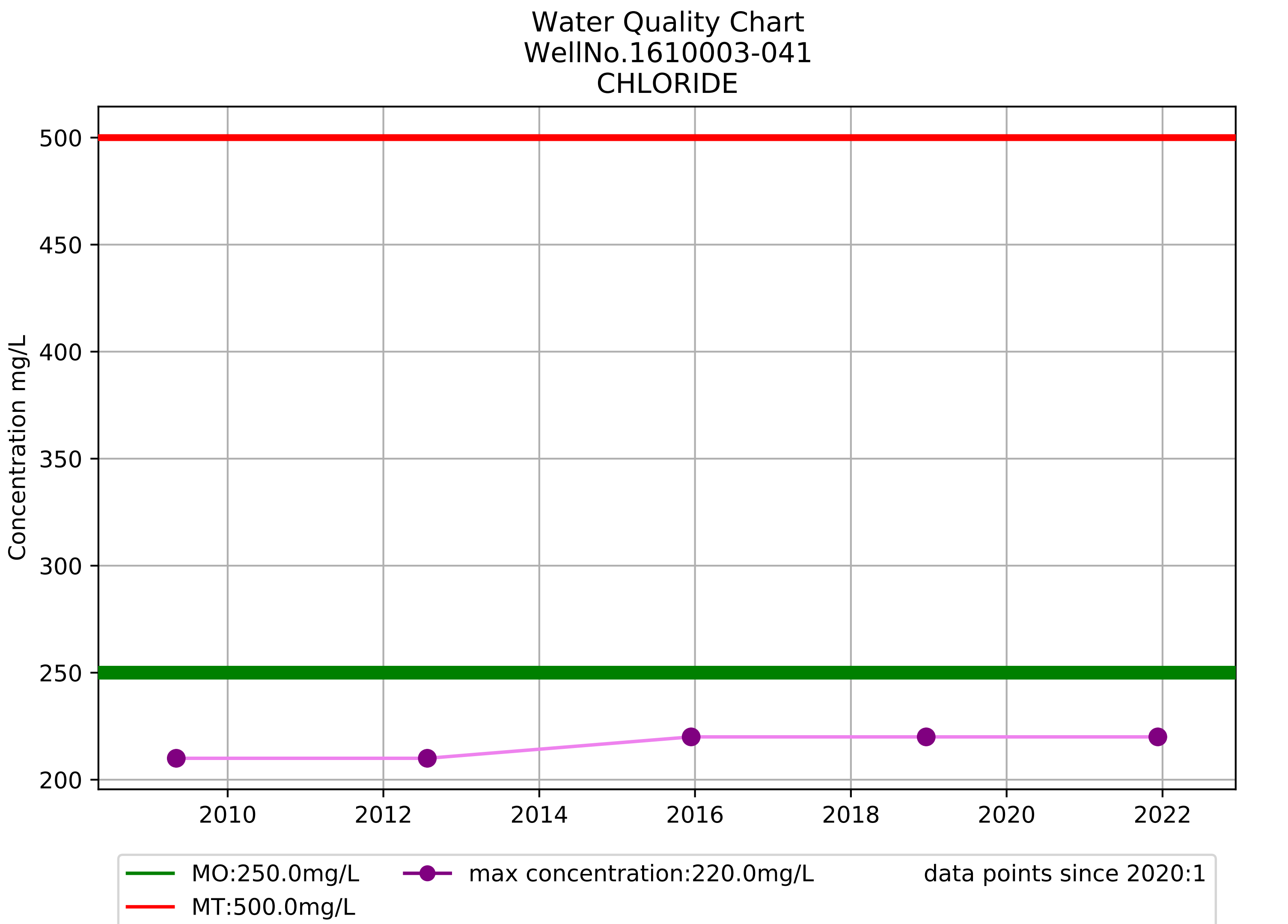

Water Quality Chart
WellNo.1610003-037
CHLORIDE
Concentration mg/L
500
400
300
200
100
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
UTI:79.0mg/L
max concentration:81.0mg/L
data points since 2020:1

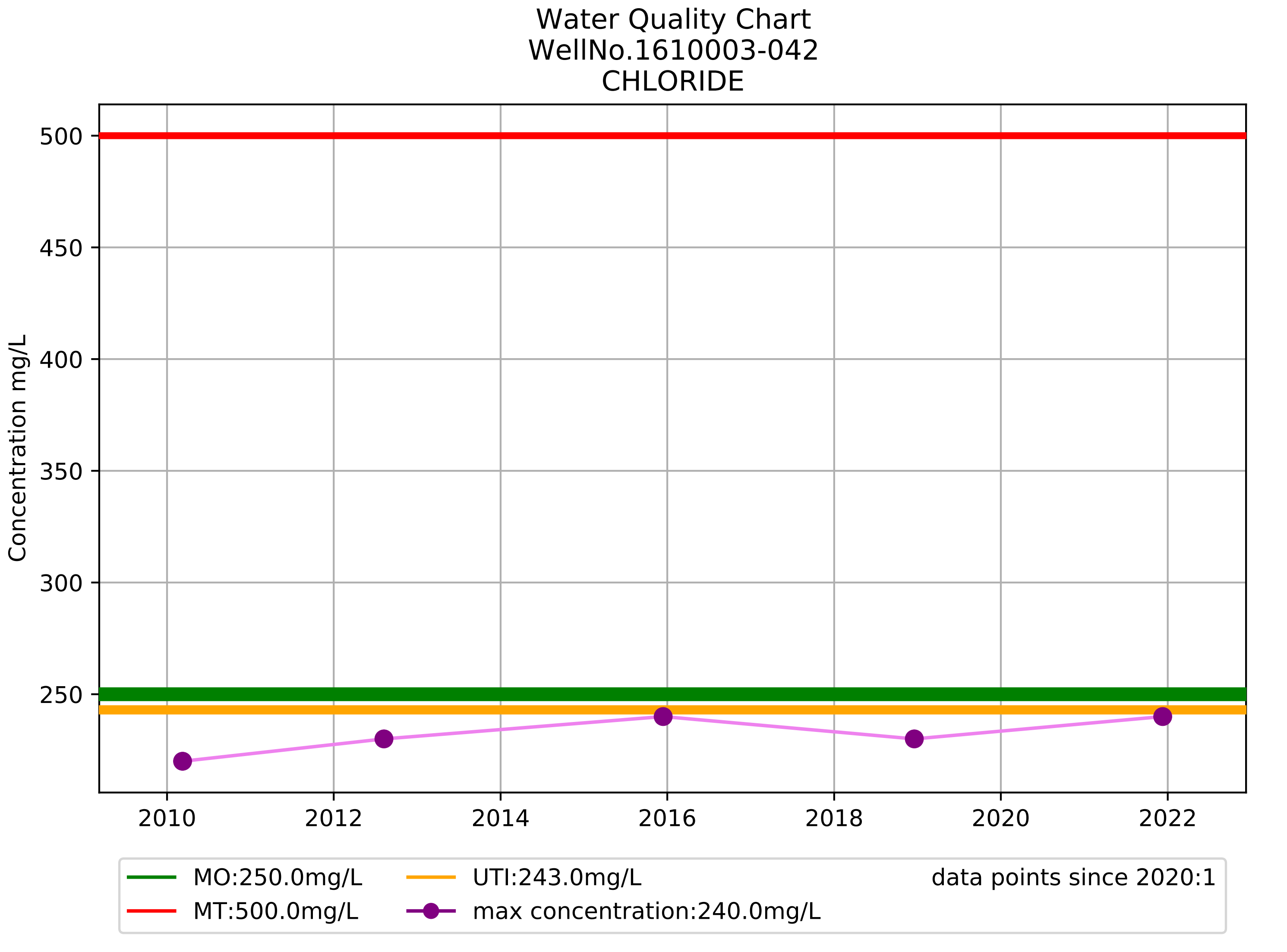


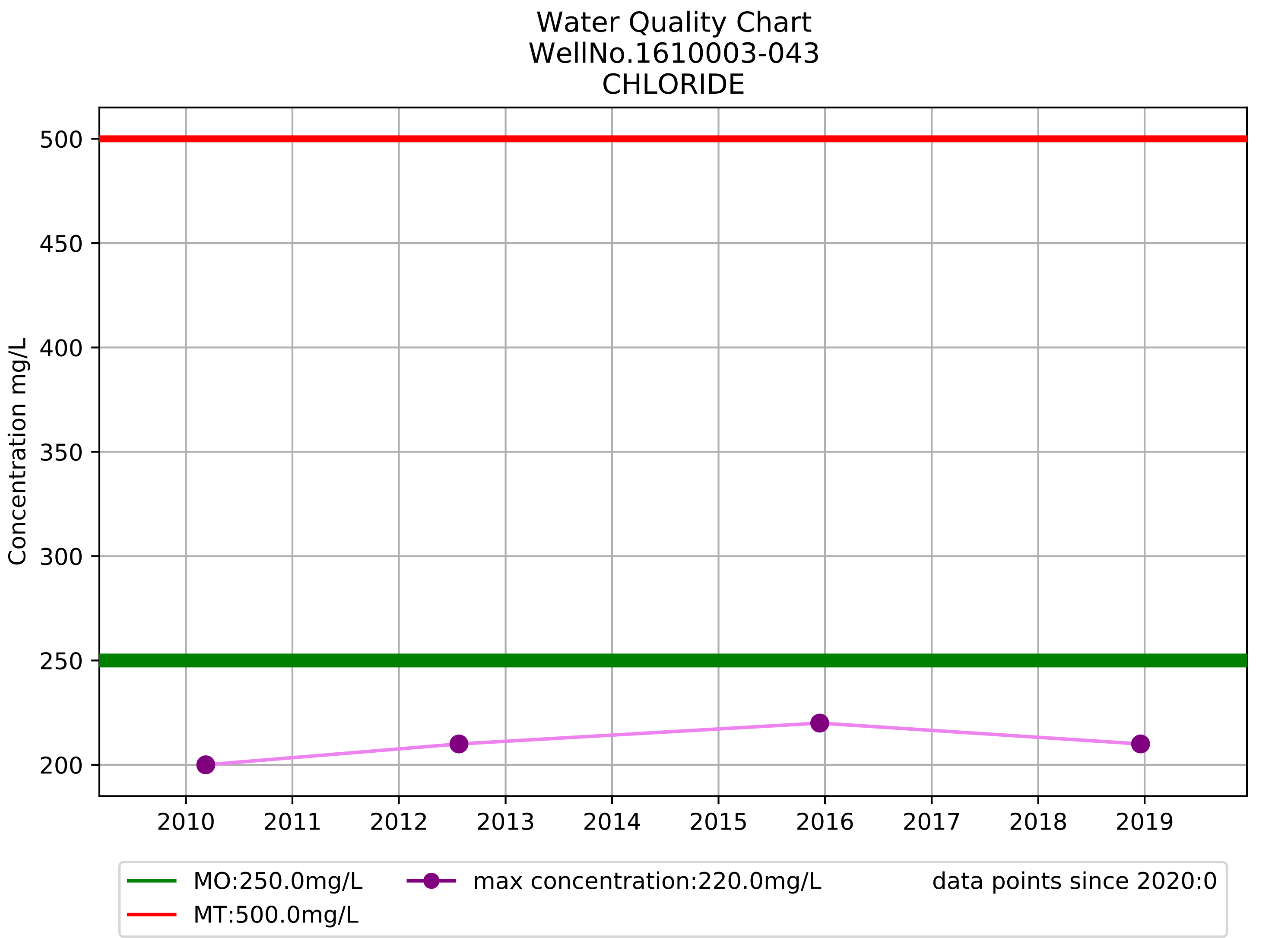
Water Quality Chart
WellNo.1610003-039
CHLORIDE
Concentration mg/L
500
450
400
350
300
250
200
2008
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
UTI:223.0mg/L
max concentration:220.0mg/L
data points since 2020:1



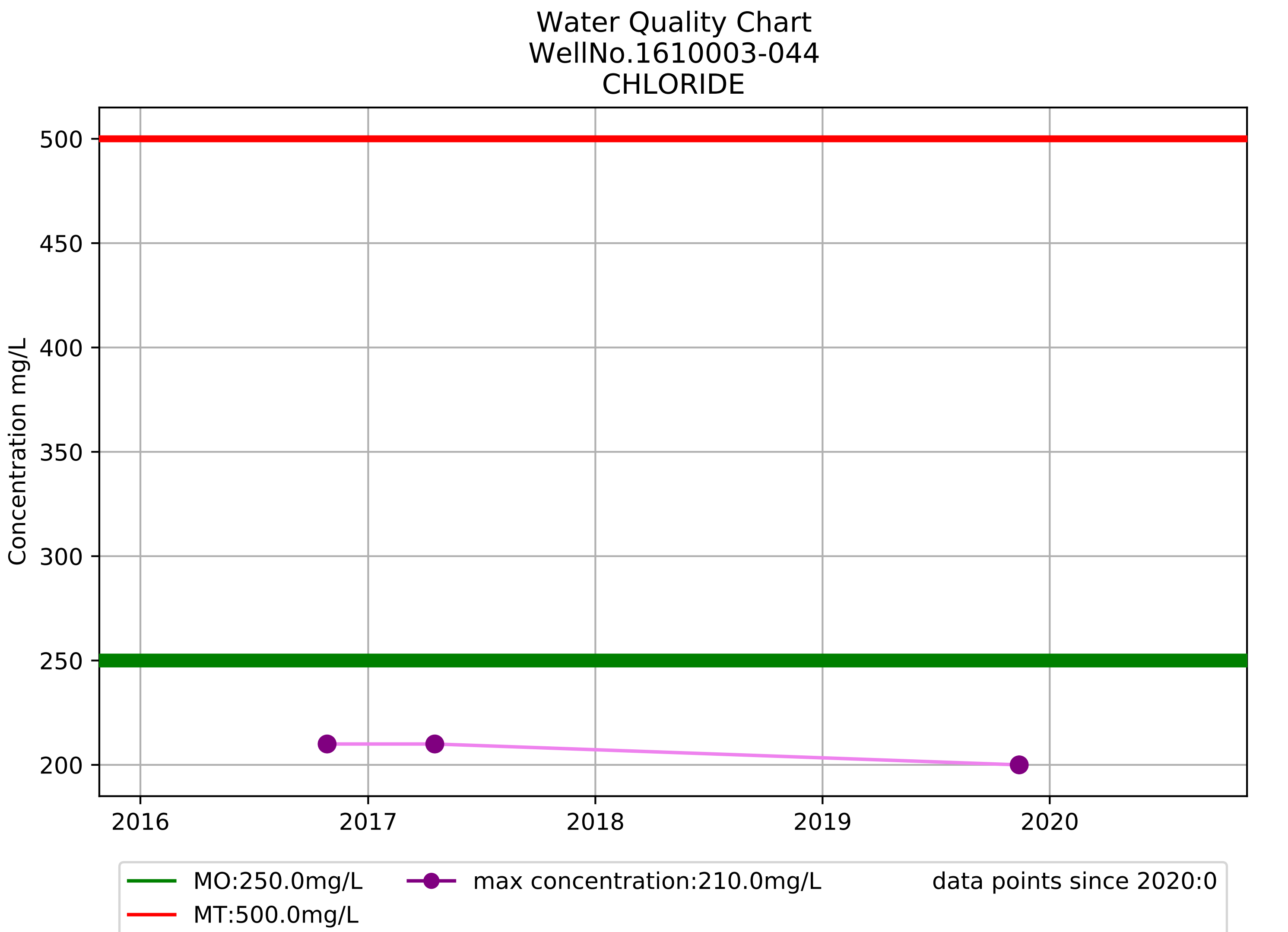
Water Quality Chart
WellNo.1610003-040
CHLORIDE
Concentration mg/L
500
450
400
350
300
250
200
150
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
UTI:175.0mg/L
max concentration:170.0mg/L
data points since 2020:1

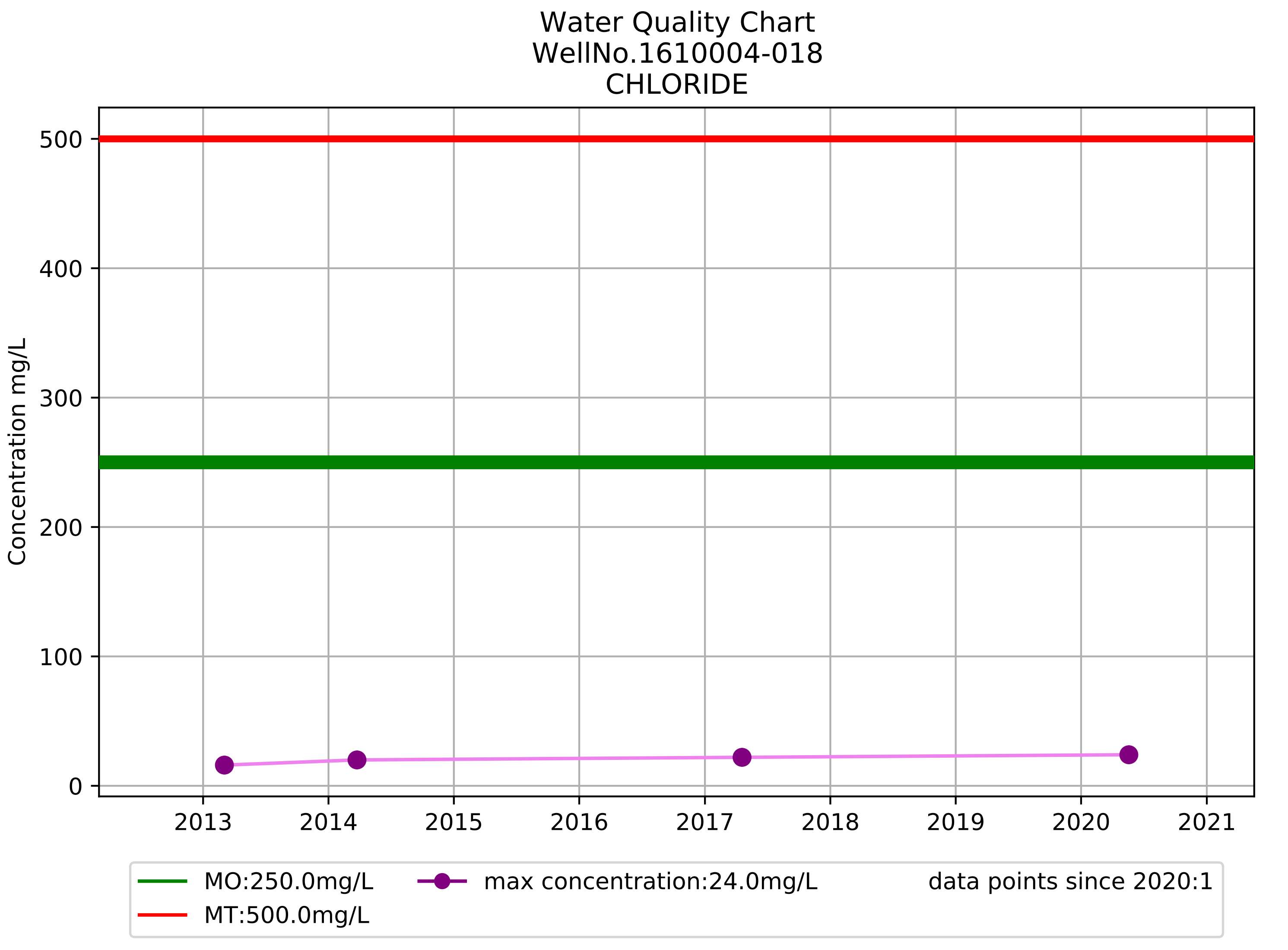

Water Quality Chart
WellNo.1610003-041
CHLORIDE
Concentration mg/L
500
450
400
350
300
250
200
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
max concentration:220.0mg/L
data points since 2020:1

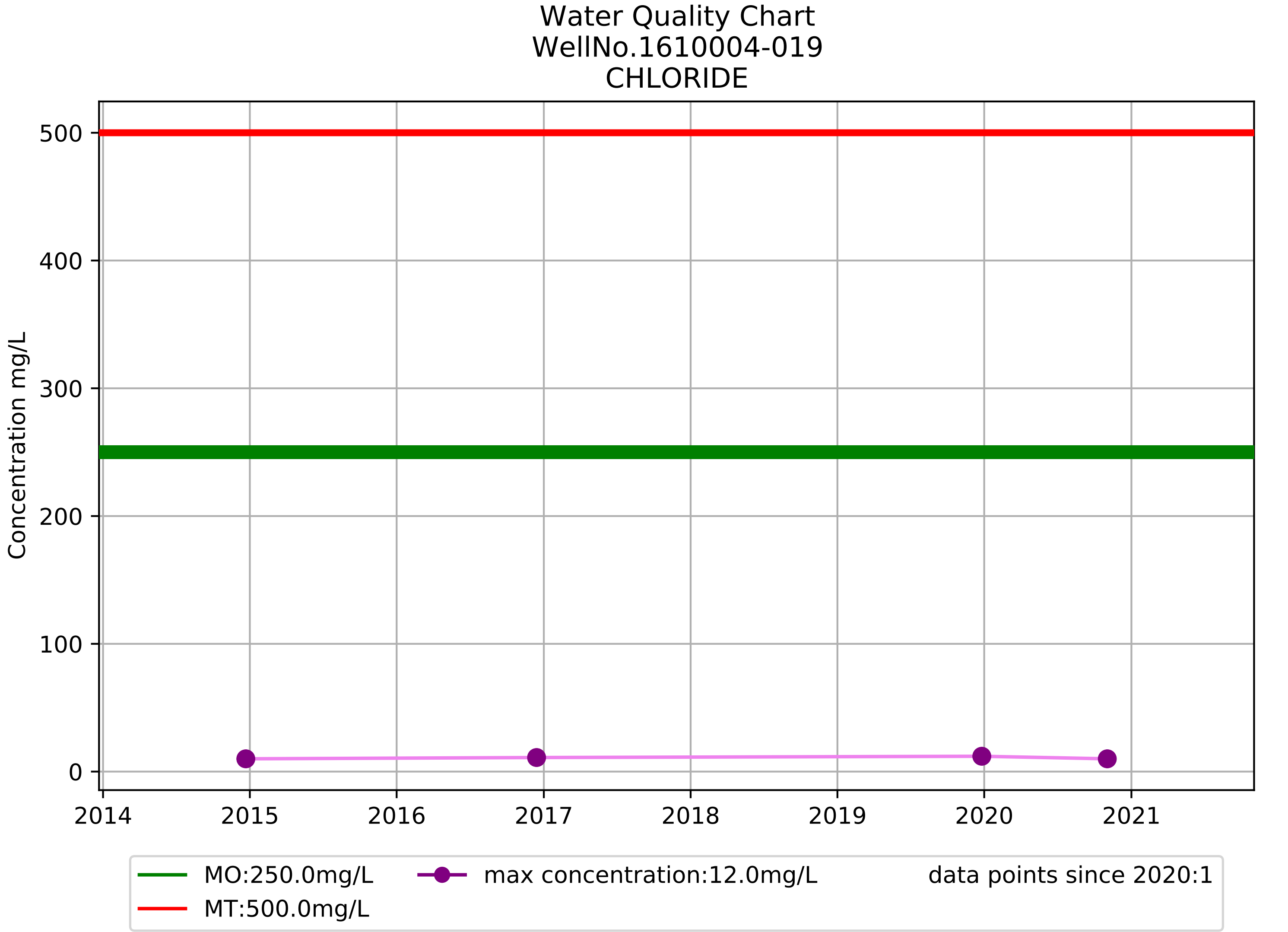

Water Quality Chart
WellNo.1610003-042
CHLORIDE
Concentration mg/L
500
450
400
350
300
250
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
UTI:243.0mg/L
max concentration:240.0mg/L
data points since 2020:1

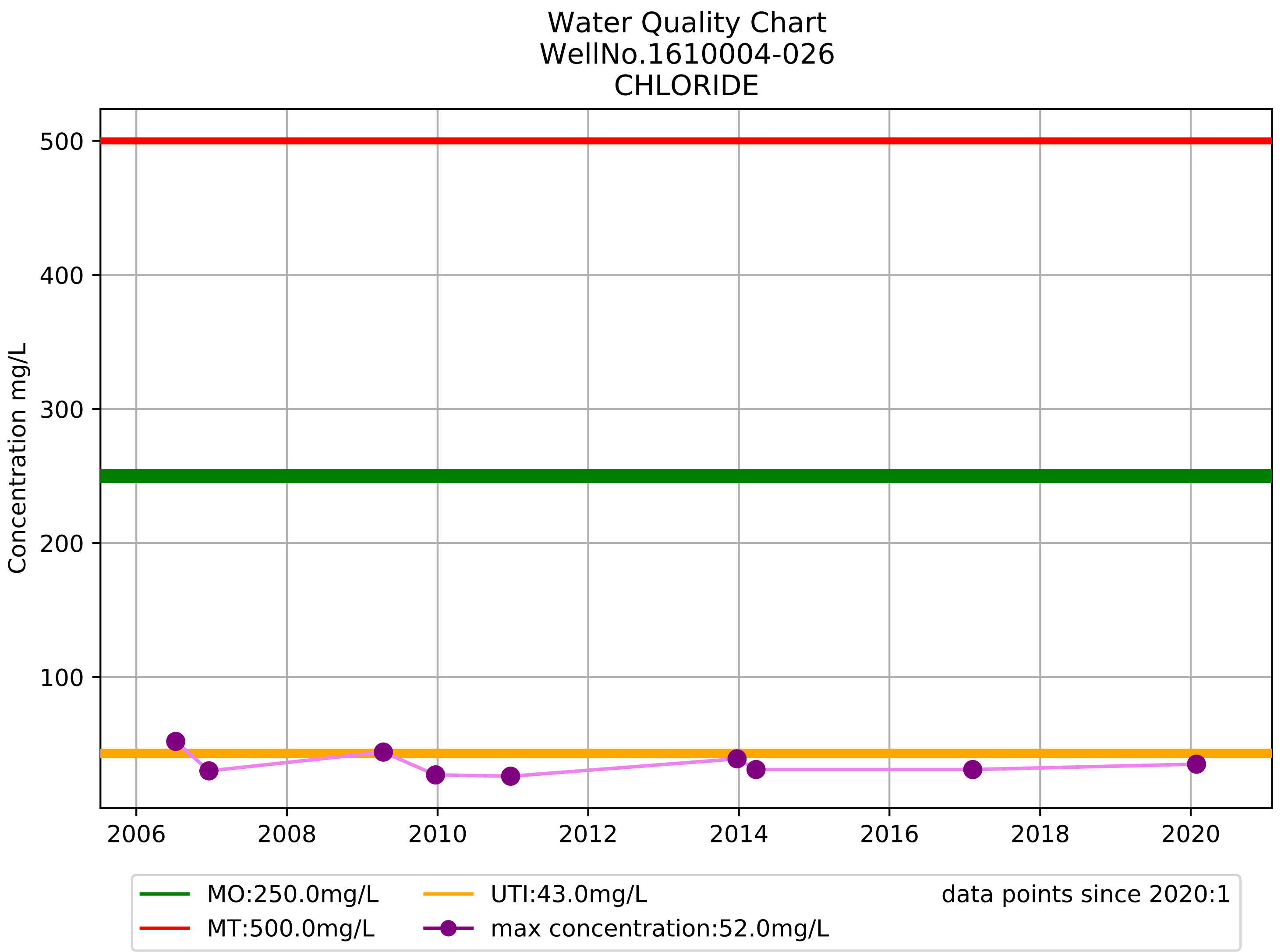


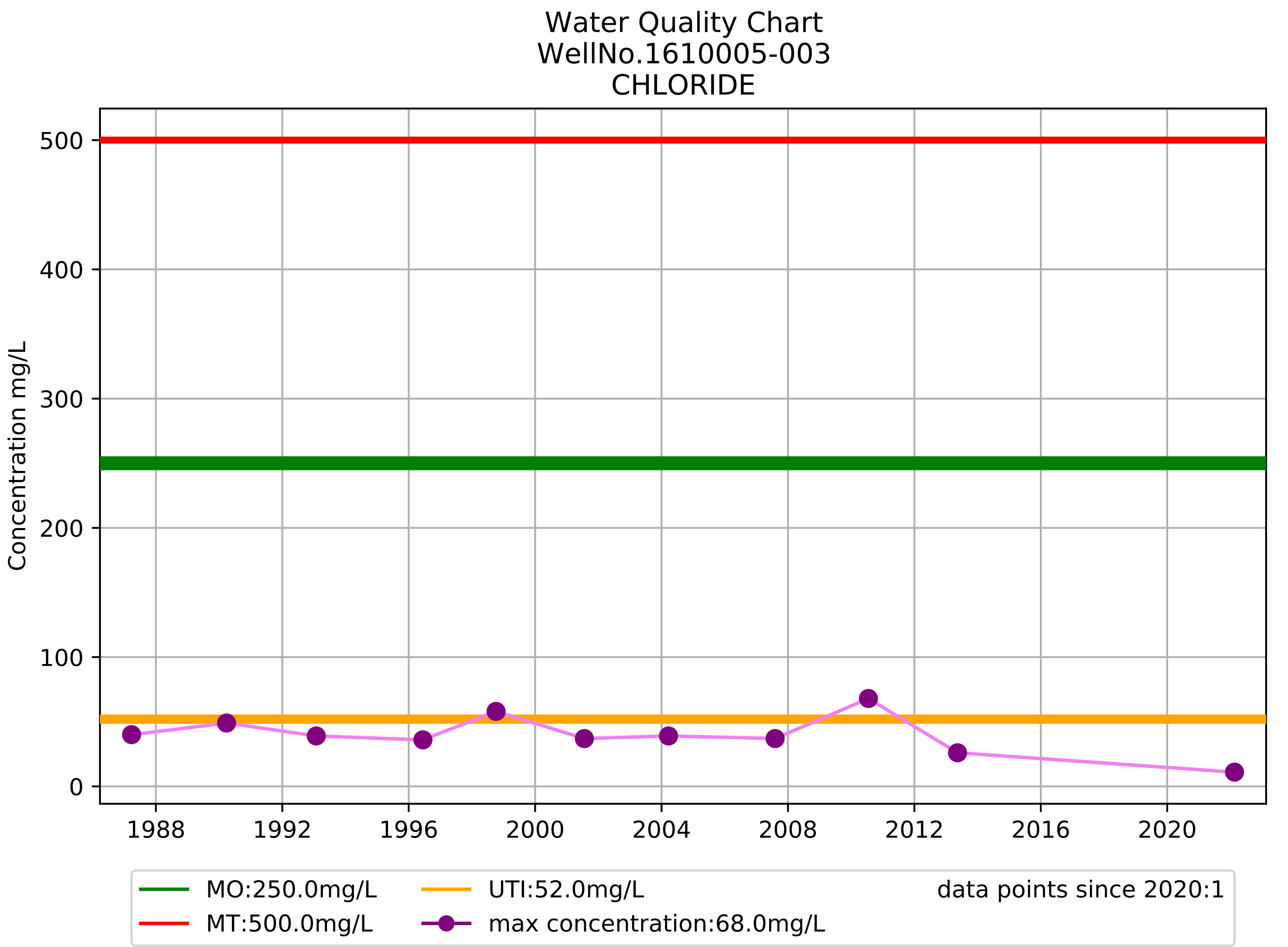
Water Quality Chart
WellNo.1610003-043
CHLORIDE
Concentration mg/L
500
450
400
350
300
250
200
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MO:250.0mg/L
MT:500.0mg/L
max concentration:220.0mg/L
data points since 2020:0

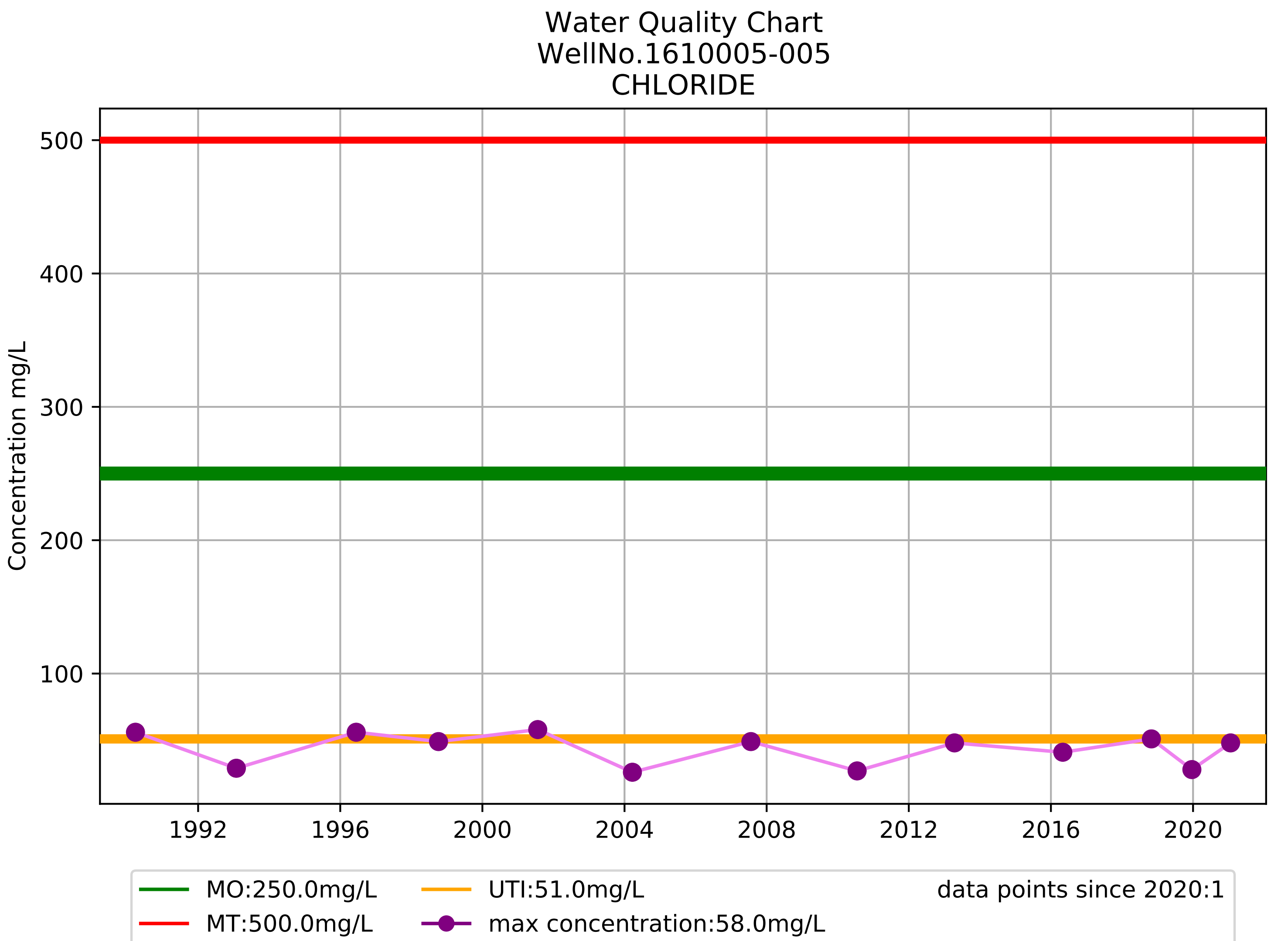

Water Quality Chart
WellNo.1610003-044
CHLORIDE
Concentration mg/L
500
450
400
350
300
250
200
2016
2017
2018
2019
2020
MO:250.0mg/L
MT:500.0mg/L
max concentration:210.0mg/L
data points since 2020:0

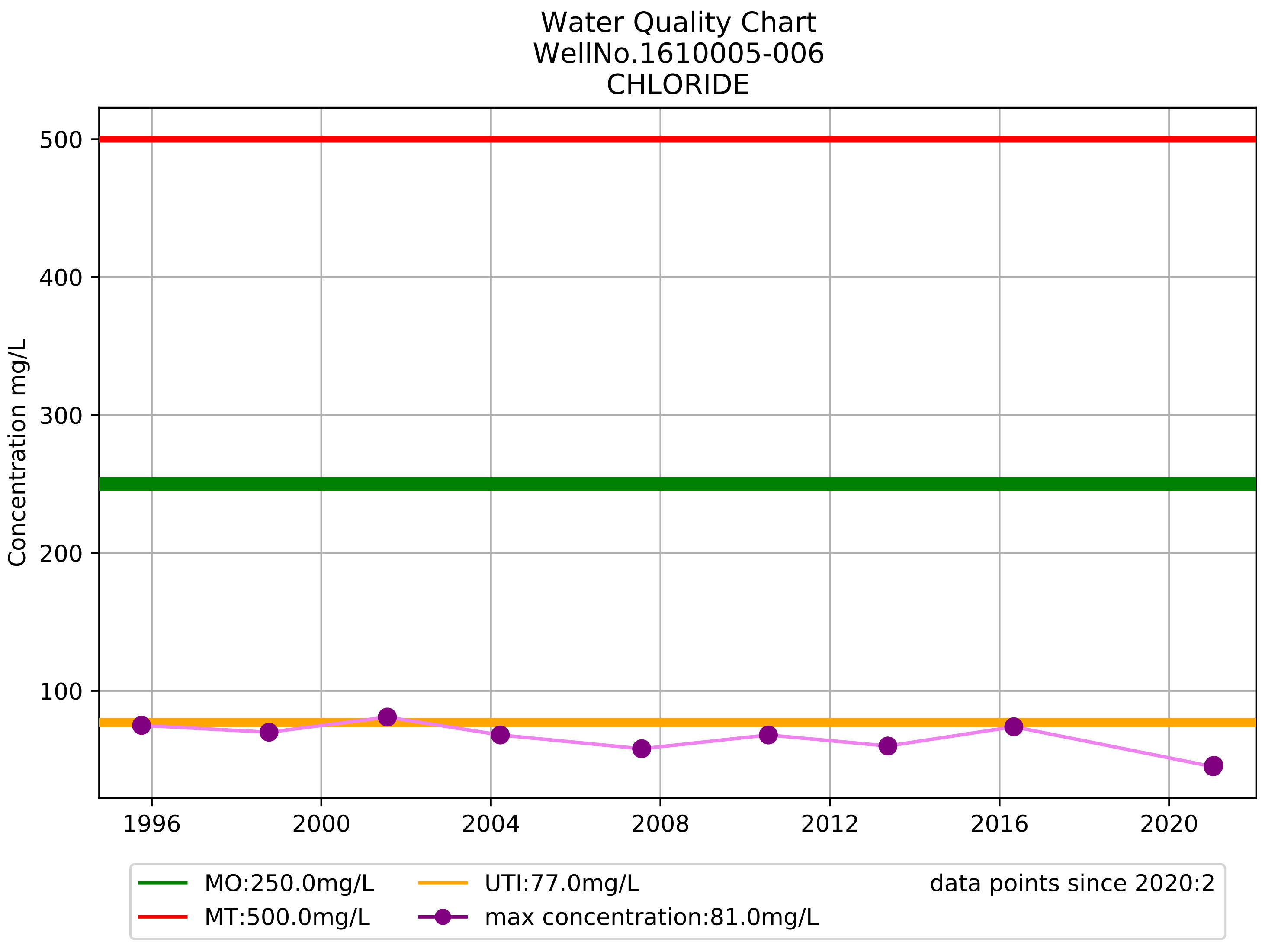

Water Quality Chart
WellNo.1610004-018
CHLORIDE
Concentration mg/L
0
100
200
300
400
500
2013
2014
2015
2016
2017
2018
2019
2020
2021
MO:250.0mg/L
MT:500.0mg/L
max concentration:24.0mg/L
data points since 2020:1

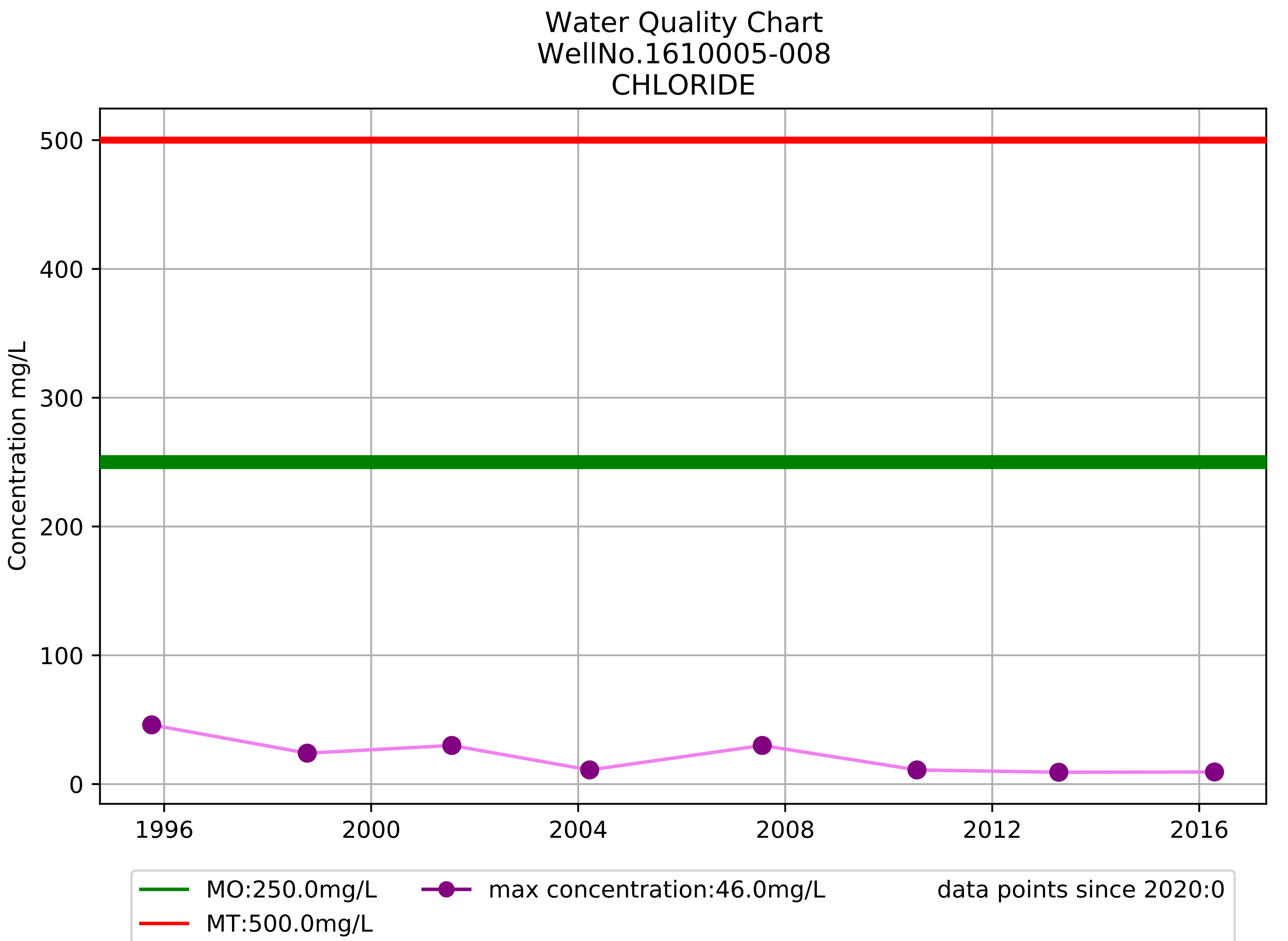

Water Quality Chart
WellNo.1610004-019
CHLORIDE
Concentration mg/L
500
400
300
200
100
0
2014
2015
2016
2017
2018
2019
2020
2021
MO:250.0mg/L
MT:500.0mg/L
max concentration:12.0mg/L
data points since 2020:1


Water Quality Chart
WellNo.1610004-026
CHLORIDE
Concentration mg/L
500
400
300
200
100
2006
2008
2010
2012
2014
2016
2018
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:43.0mg/L
max concentration:52.0mg/L
data points since 2020:1

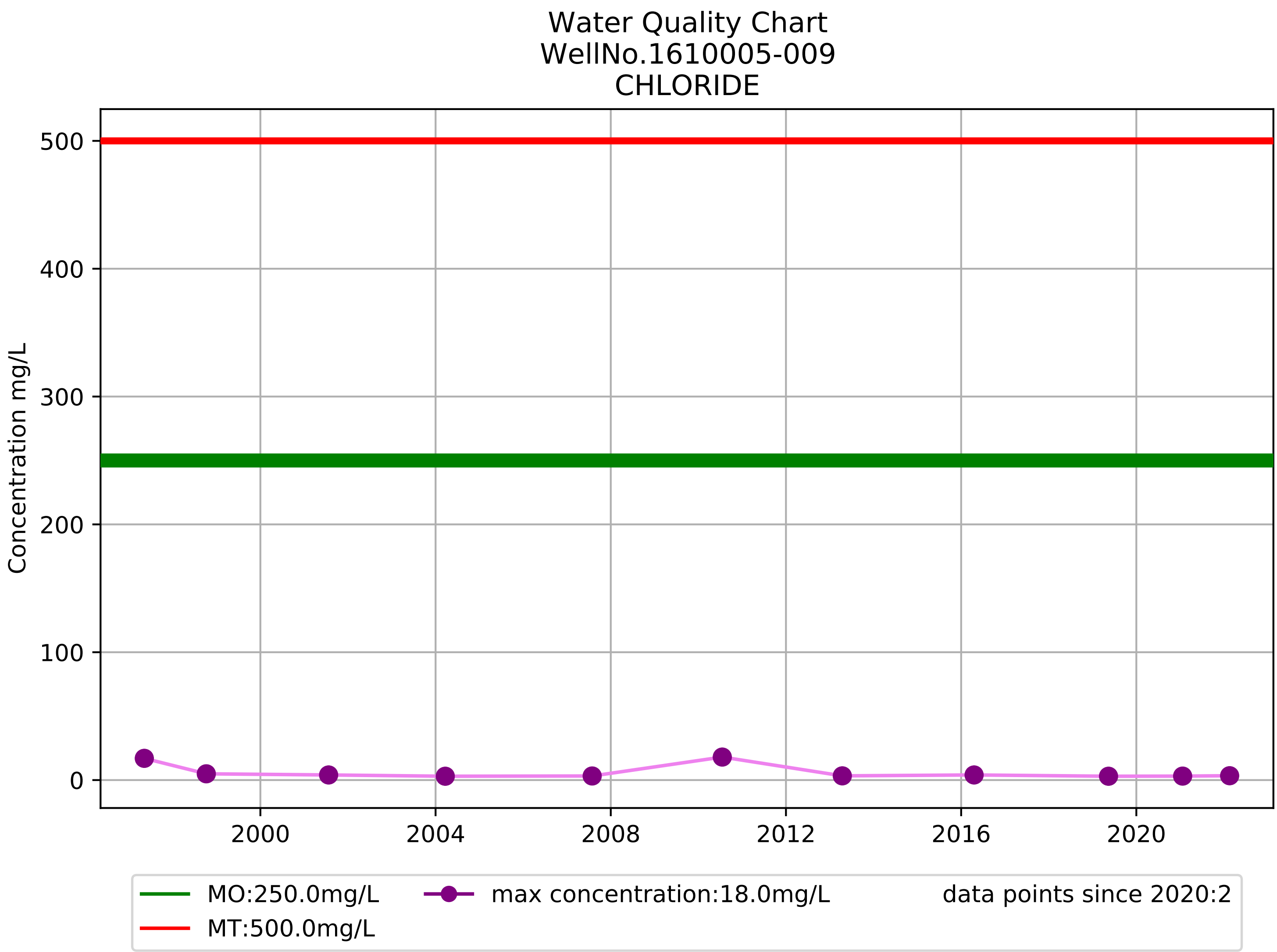

Water Quality Chart
WellNo.1610005-003
CHLORIDE
Concentration mg/L
0
100
200
300
400
500
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:52.0mg/L
max concentration:68.0mg/L
data points since 2020:1

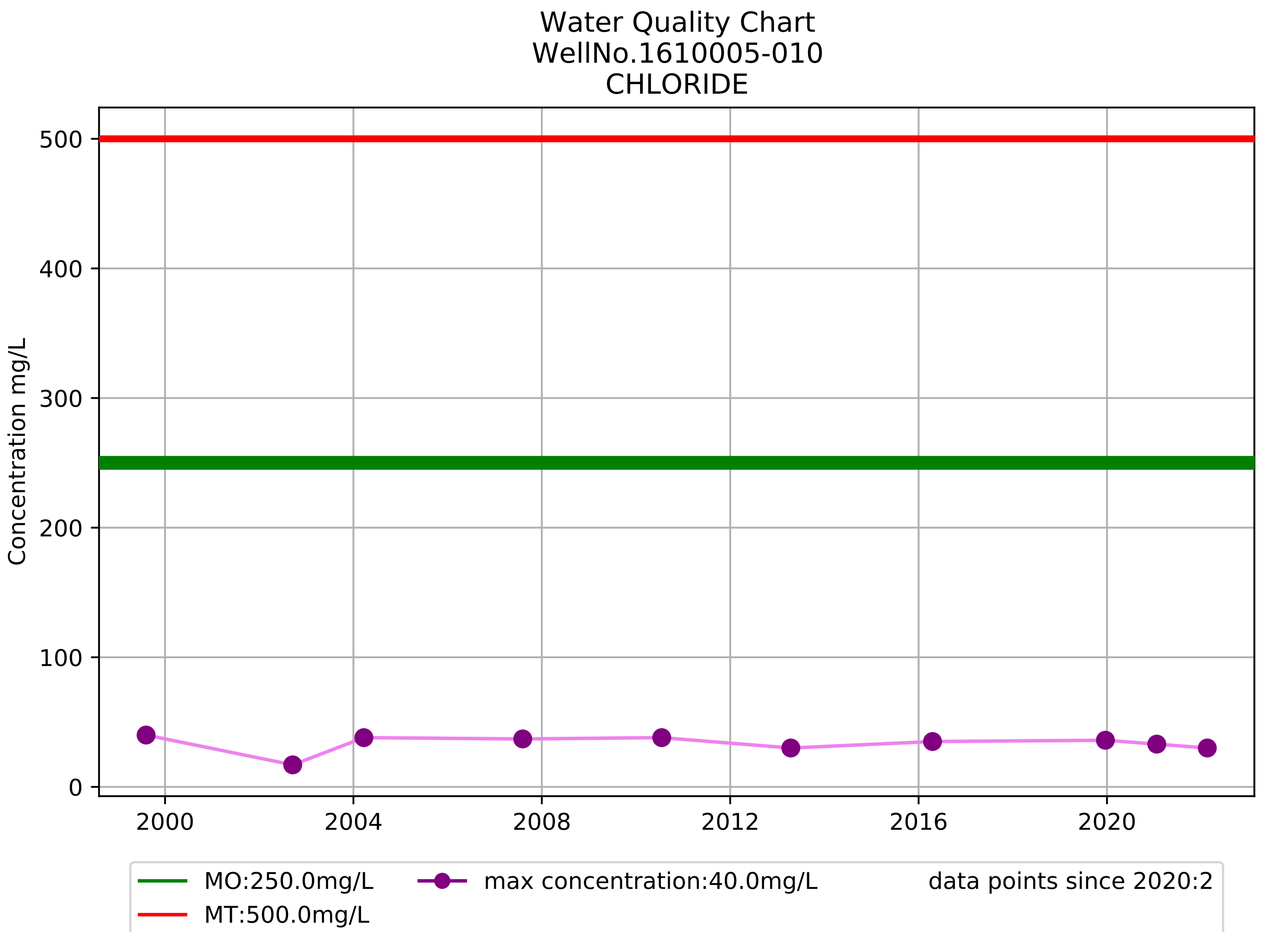

Water Quality Chart
WellNo.1610005-005
CHLORIDE
Concentration mg/L
500
400
300
200
100
1992
1996
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:51.0mg/L
max concentration:58.0mg/L
data points since 2020:1


Water Quality Chart
WellNo.1610005-006
CHLORIDE
Concentration mg/L
500
400
300
200
100
1996
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:77.0mg/L
max concentration:81.0mg/L
data points since 2020:2

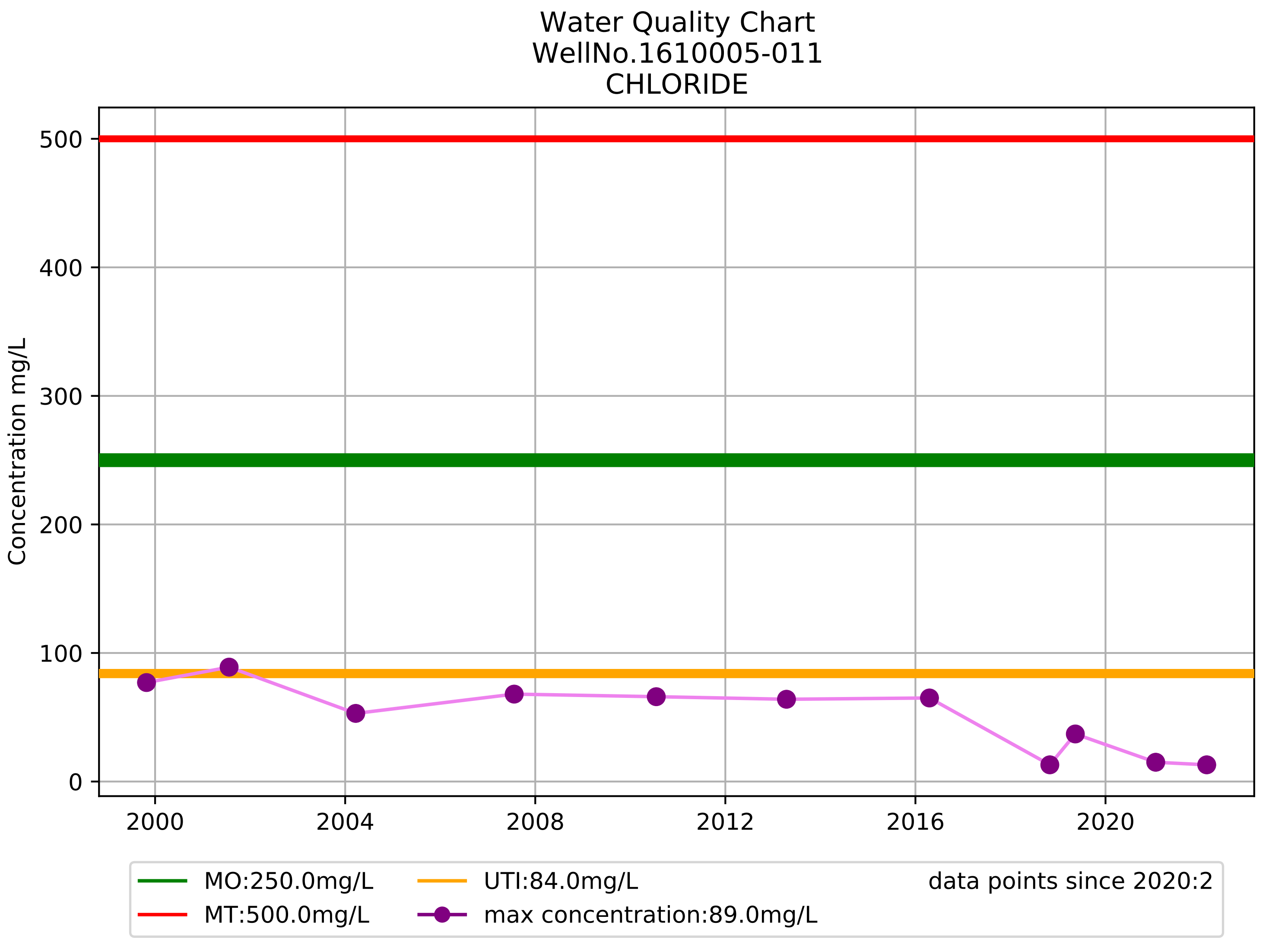


Water Quality Chart
WellNo.1610005-008
CHLORIDE
Concentration mg/L
500
400
300
200
100
0
1996
2000
2004
2008
2012
2016
MO:250.0mg/L
MT:500.0mg/L
max concentration:46.0mg/L
data points since 2020:0

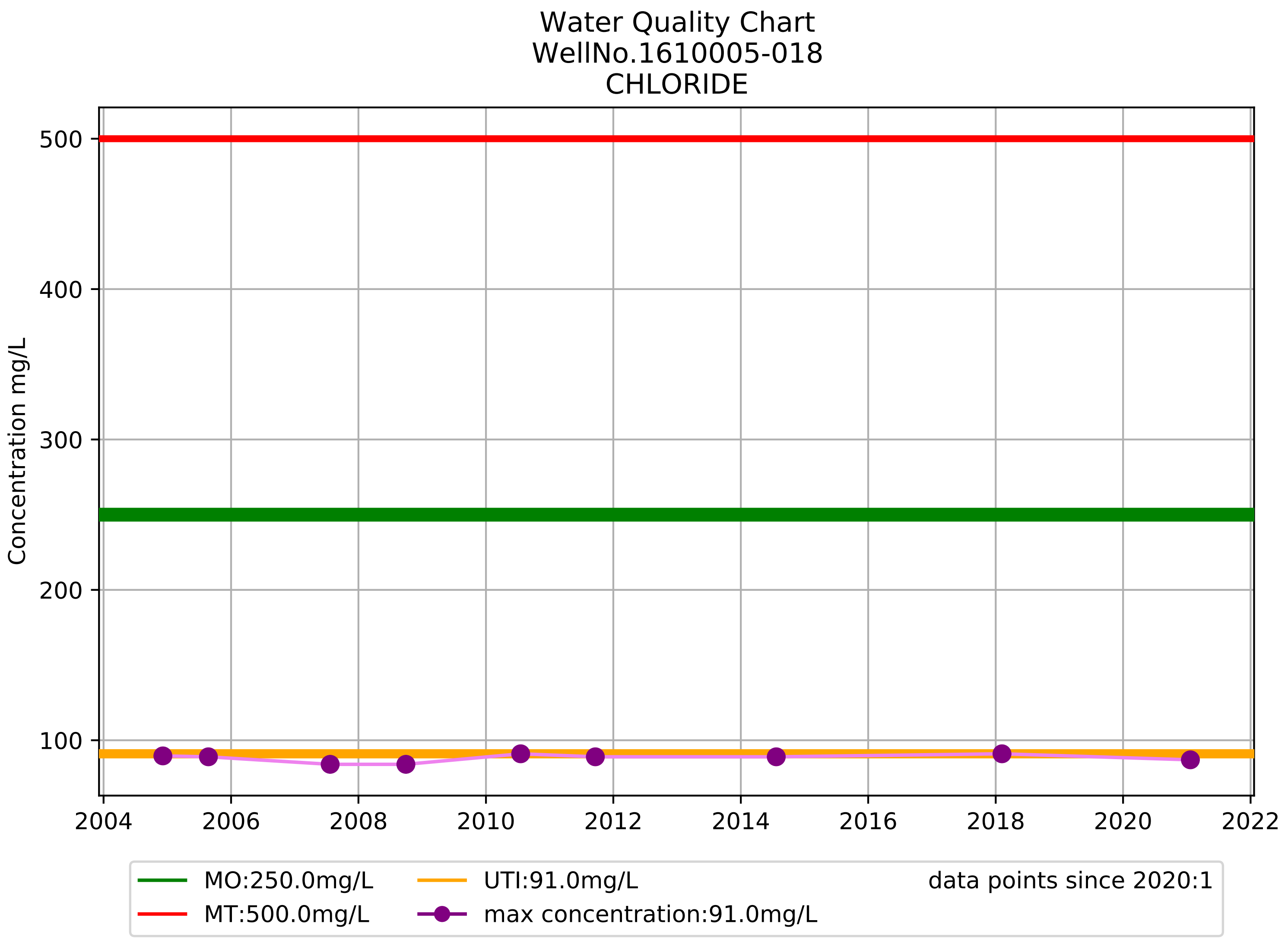

Water Quality Chart
WellNo.1610005-009
CHLORIDE
Concentration mg/L
500
400
300
200
100
0
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
max concentration:18.0mg/L
data points since 2020:2

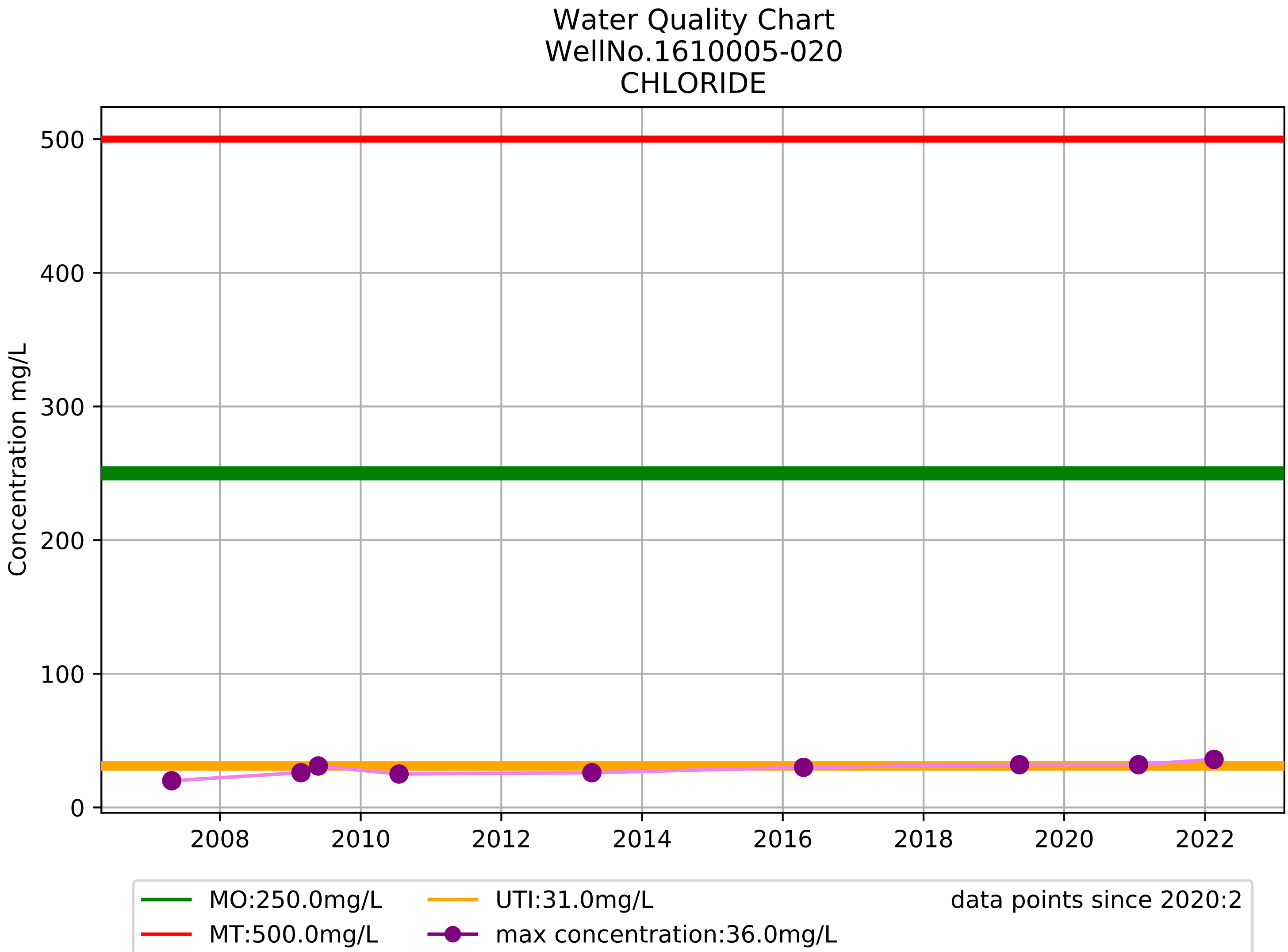


Water Quality Chart
WellNo.1610005-010
CHLORIDE
Concentration mg/L
0
100
200
300
400
500
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
max concentration:40.0mg/L
data points since 2020:2

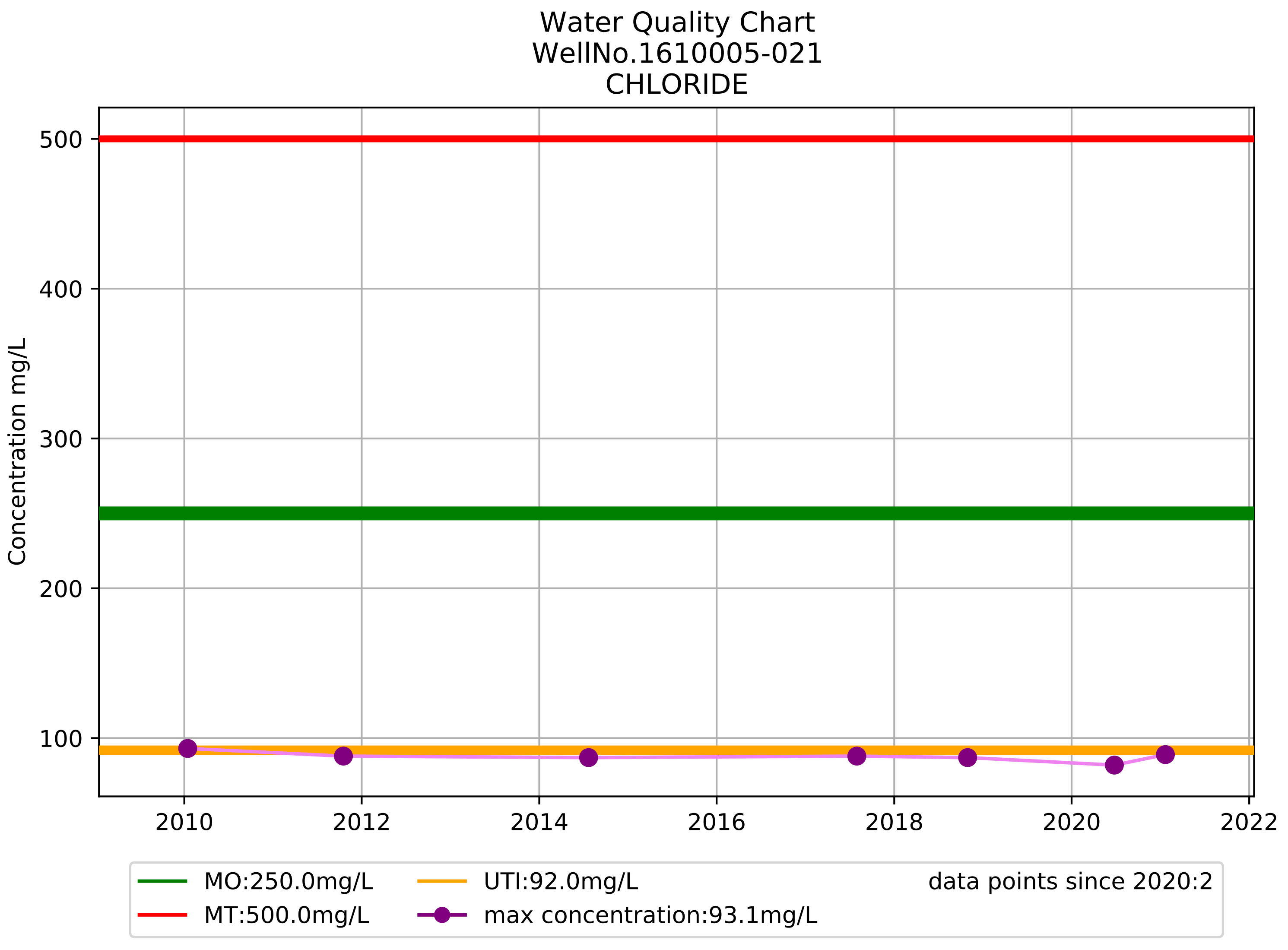


Water Quality Chart
WellNo.1610005-011
CHLORIDE
Concentration mg/L
0
100
200
300
400
500
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:84.0mg/L
max concentration:89.0mg/L
data points since 2020:2

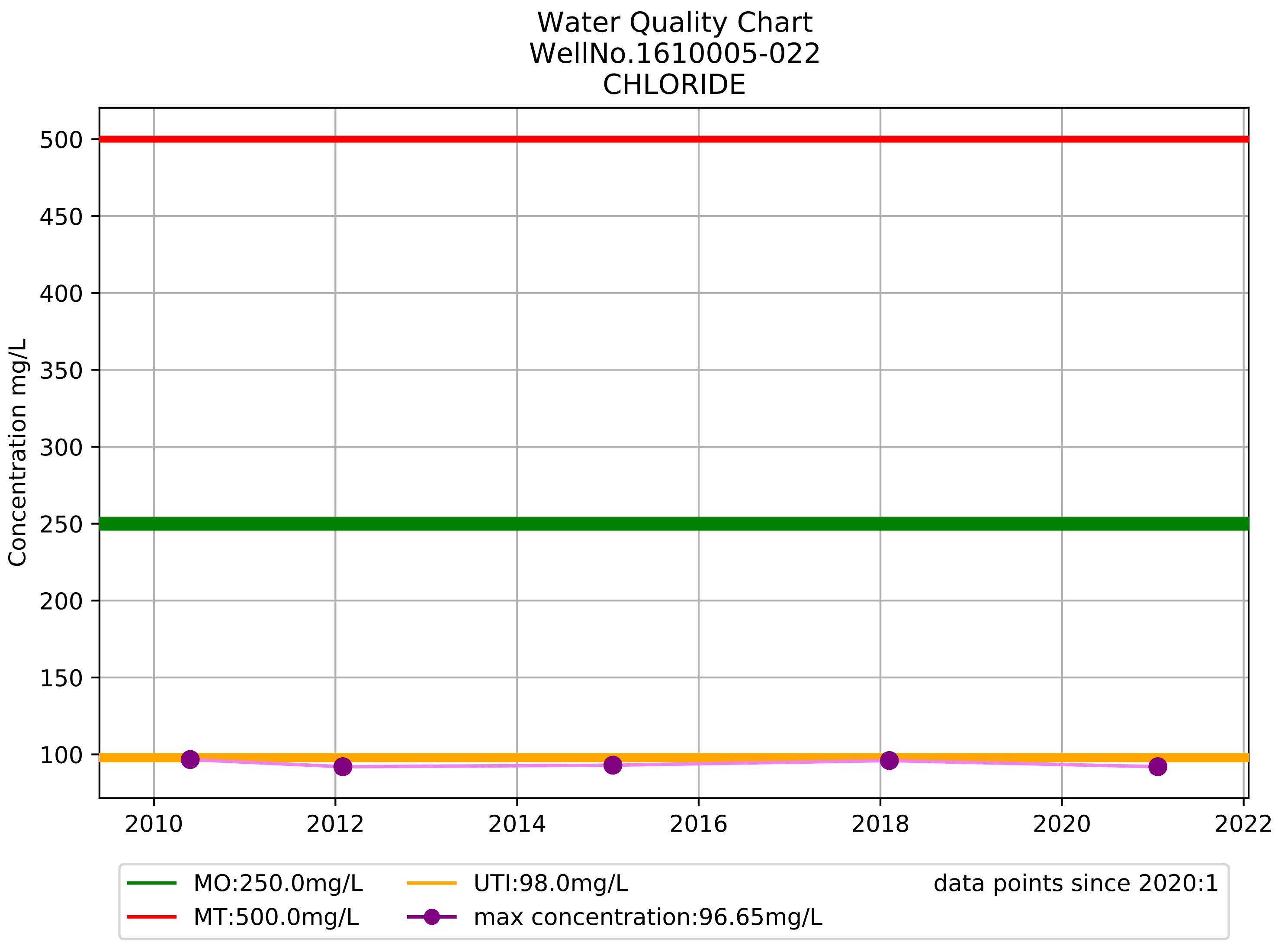

Water Quality Chart
WellNo.1610005-018
CHLORIDE
Concentration mg/L
500
400
300
200
100
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
UTI:91.0mg/L
max concentration:91.0mg/L
data points since 2020:1



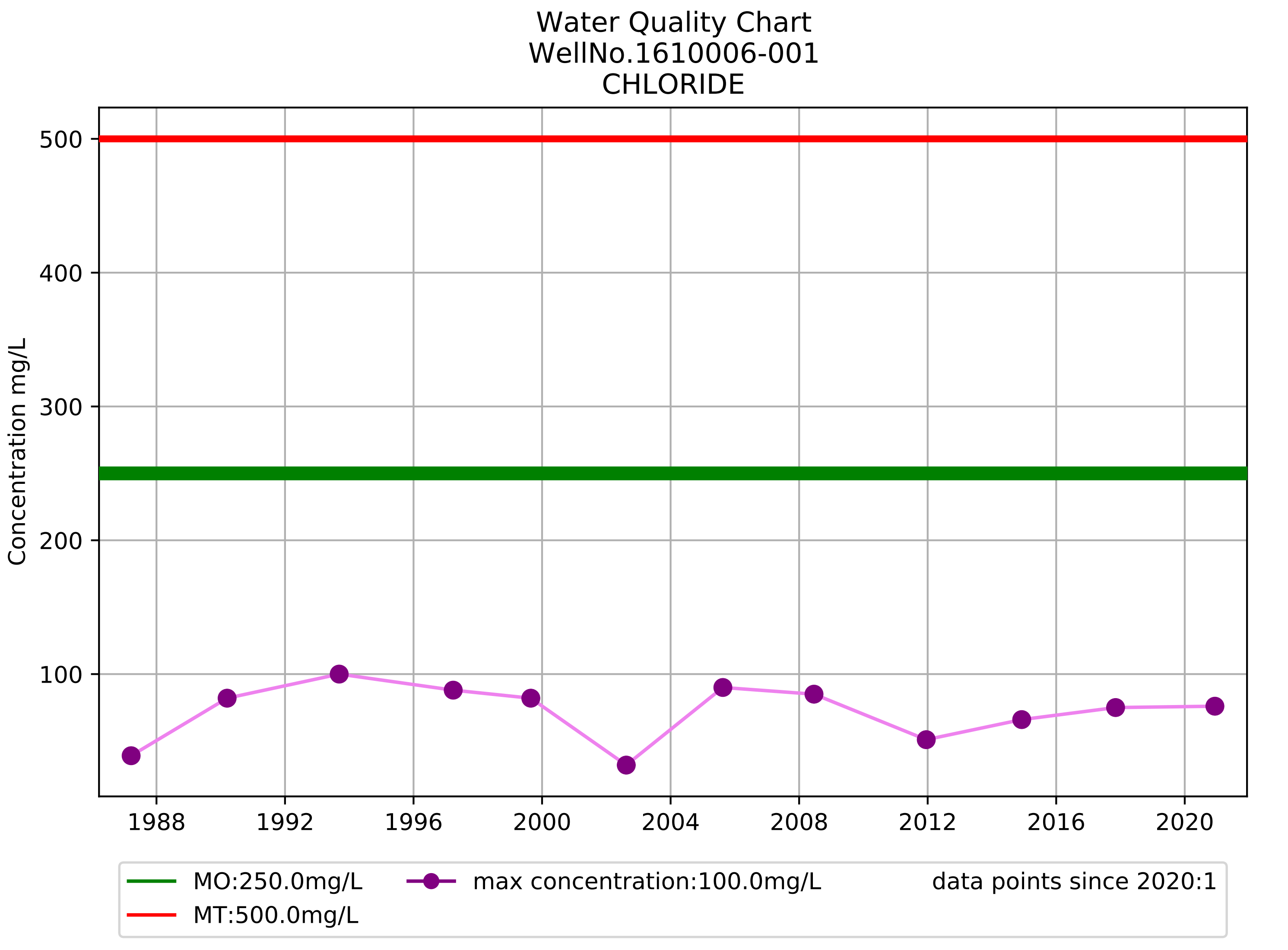
Water Quality Chart
WellNo.1610005-020
CHLORIDE
Concentration mg/L
0
100
200
300
400
500
2008
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
UTI:31.0mg/L
max concentration:36.0mg/L
data points since 2020:2



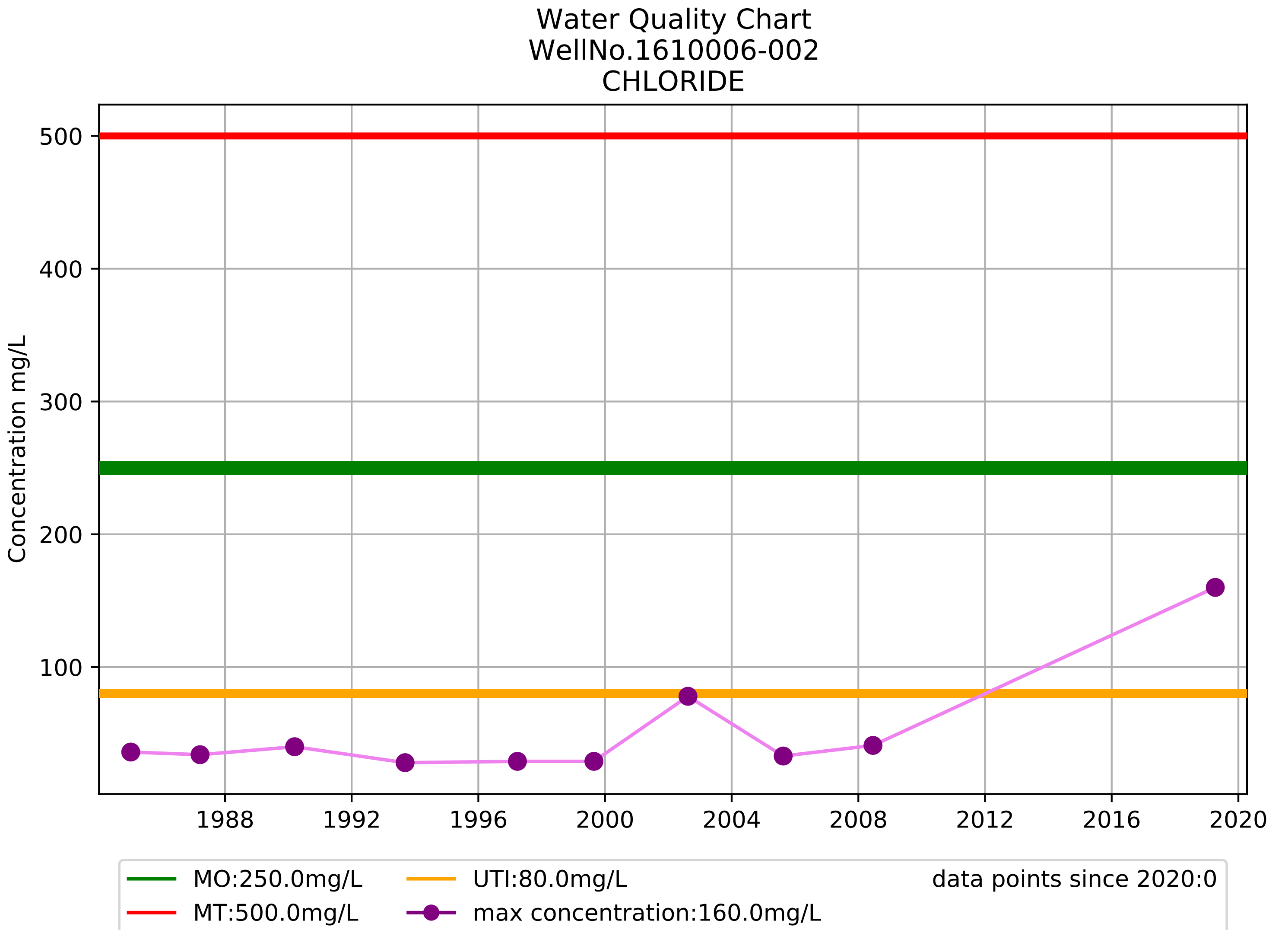
Water Quality Chart
WellNo.1610005-021
CHLORIDE
Concentration mg/L
500
400
300
200
100
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
UTI:92.0mg/L
max concentration:93.1mg/L
data points since 2020:2



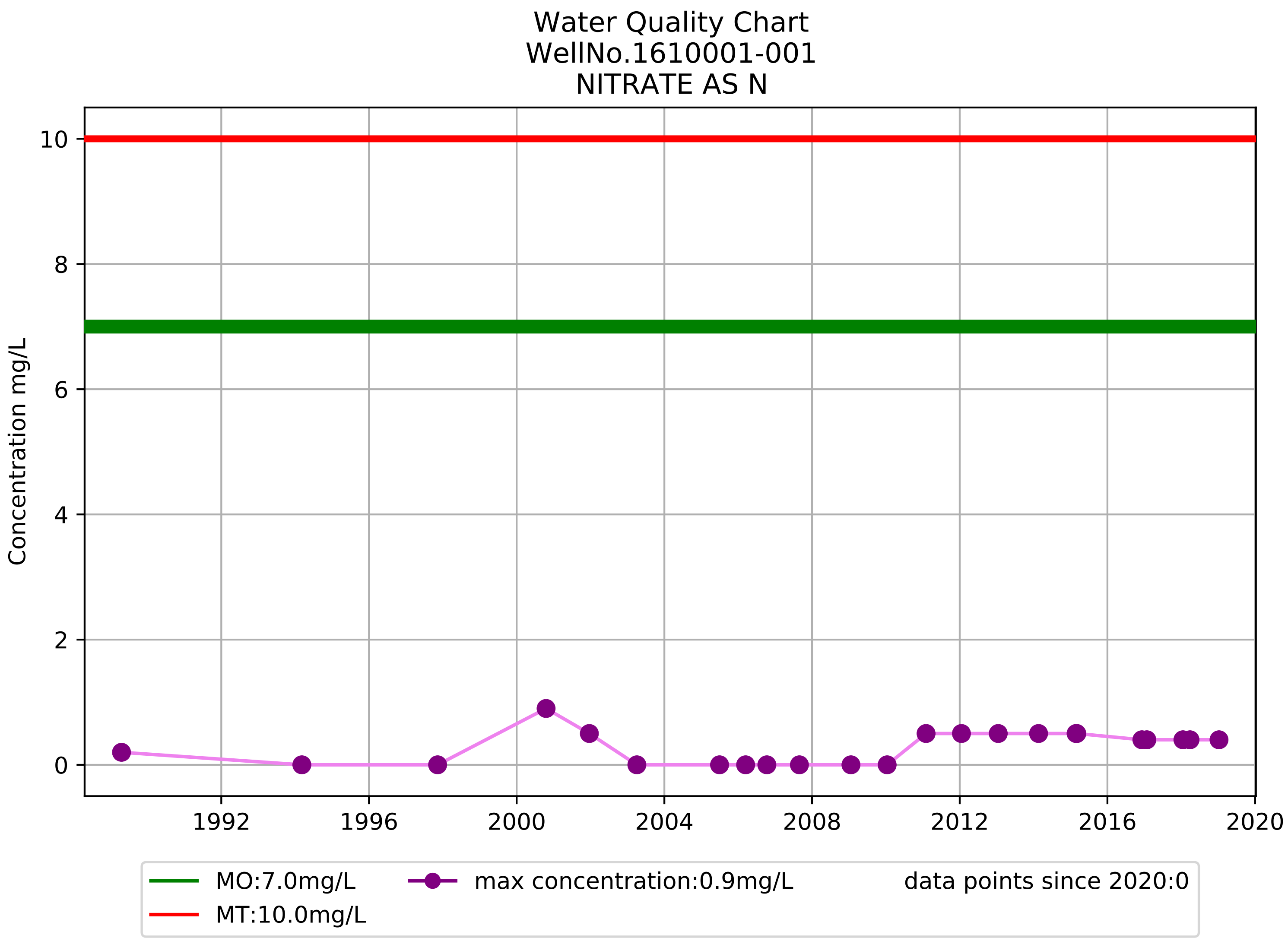
Water Quality Chart
WellNo.1610005-022
CHLORIDE
Concentration mg/L
500
450
400
350
300
250
200
150
100
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
UTI:98.0mg/L
max concentration:96.65mg/L
data points since 2020:1



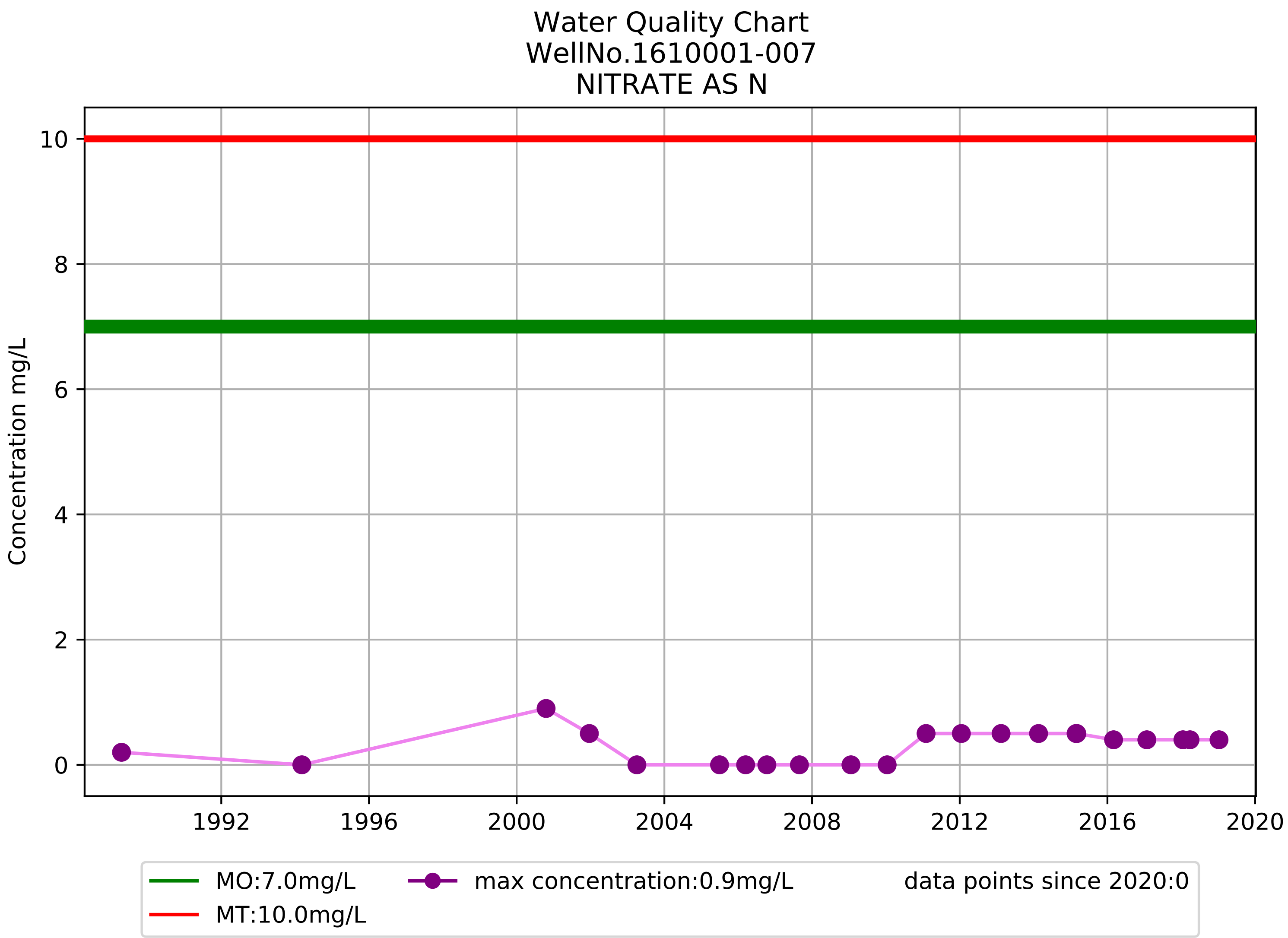
Water Quality Chart
WellNo.1610006-001
CHLORIDE
Concentration mg/L
500
400
300
200
100
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
max concentration:100.0mg/L
data points since 2020:1

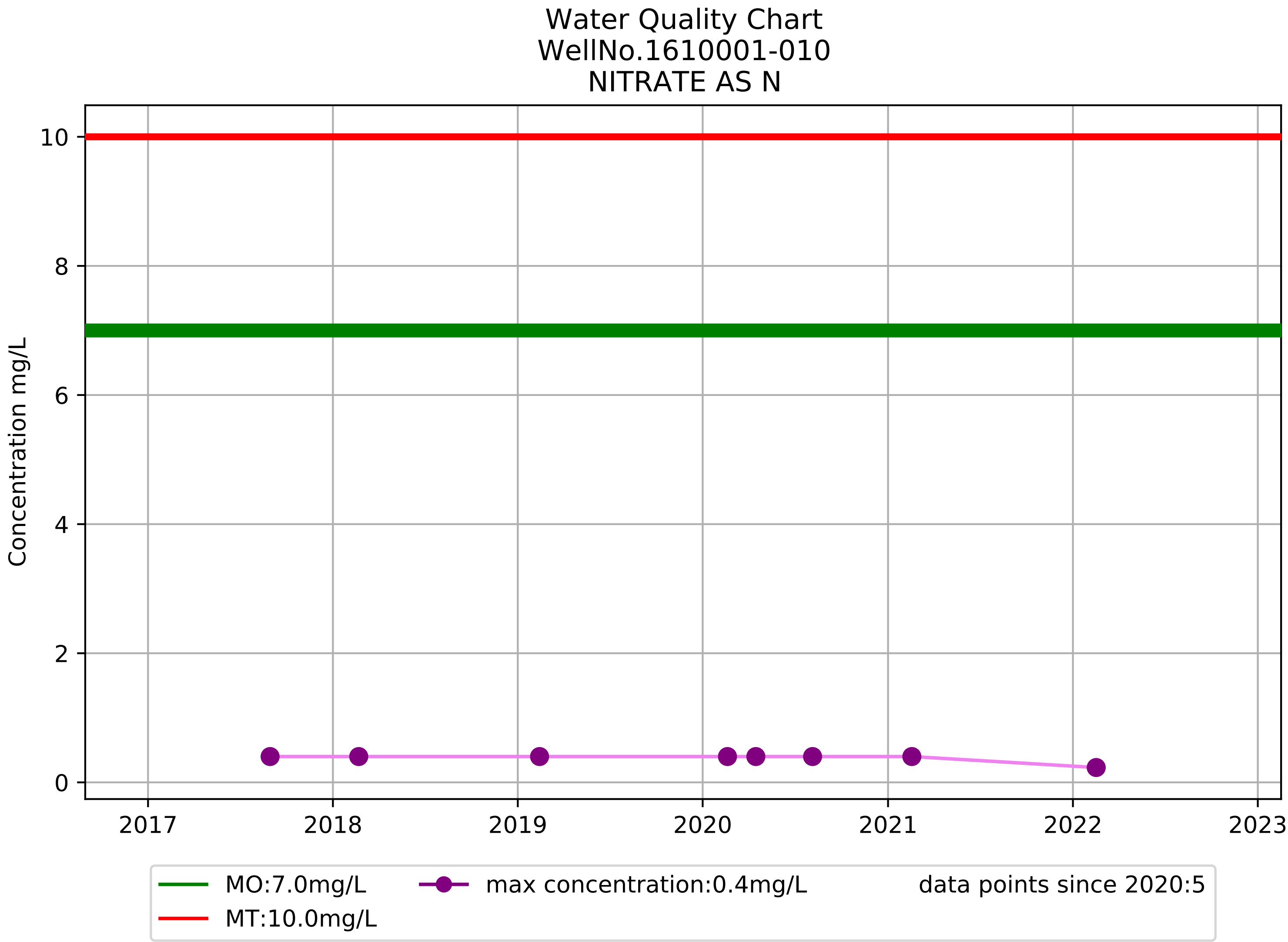

Water Quality Chart
WellNo.1610006-002
CHLORIDE
Concentration mg/L
500
400
300
200
100
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:80.0mg/L
max concentration:160.0mg/L
data points since 2020:0

Water Quality Chart
WellNo.1610009-003
CHLORIDE
Concentration mg/L
500
400
300
200
100
1988
1992
1996
2000
2004
2008
2012
2016
MO:250.0mg/L
MT:500.0mg/L
max concentration:450.0mg/L
data points since 2020:0

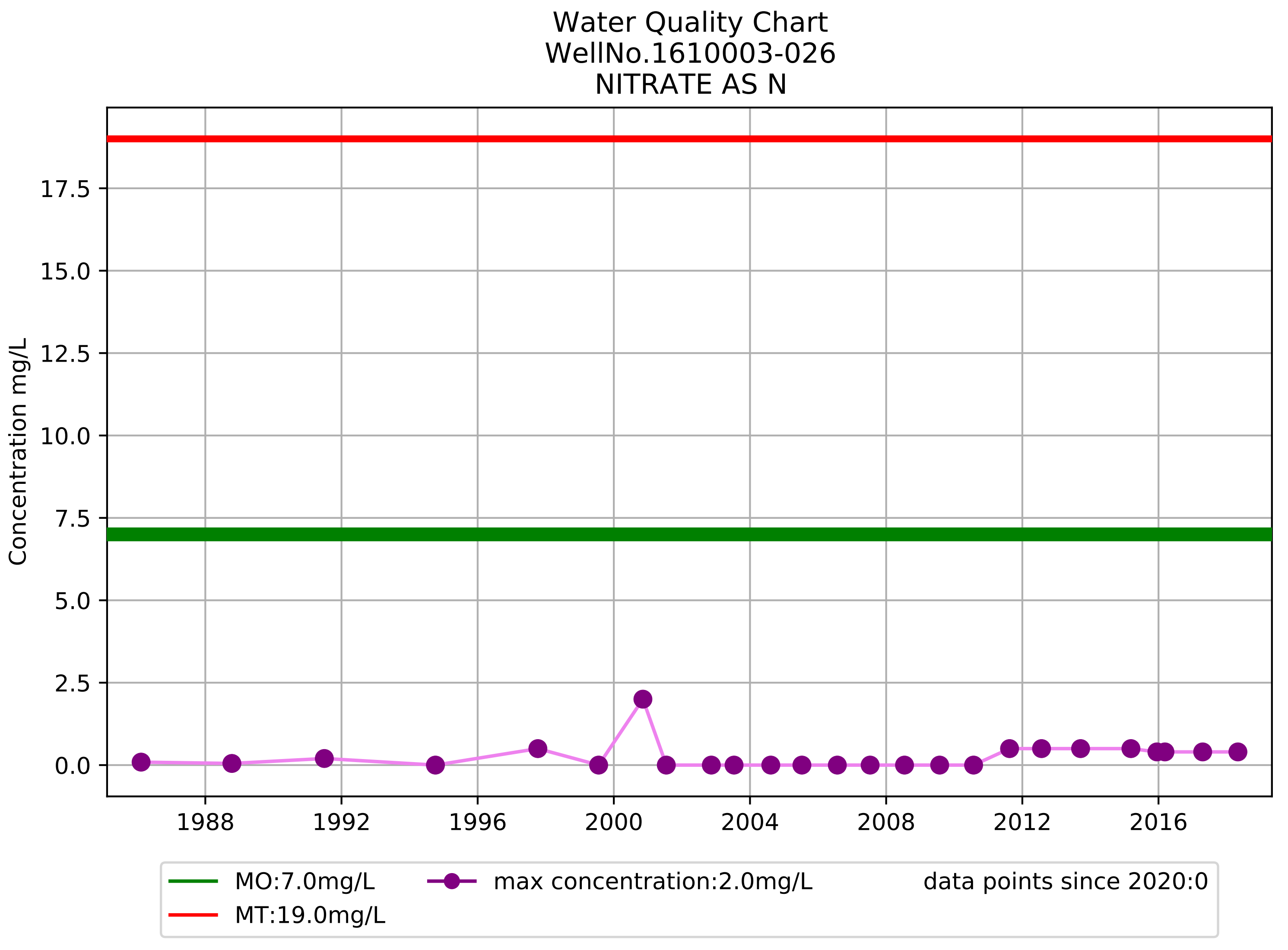


Water Quality Chart
WellNo.1610001-001
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
1992
1996
2000
2004
2008
2012
2016
2020
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.9mg/L
data points since 2020:0

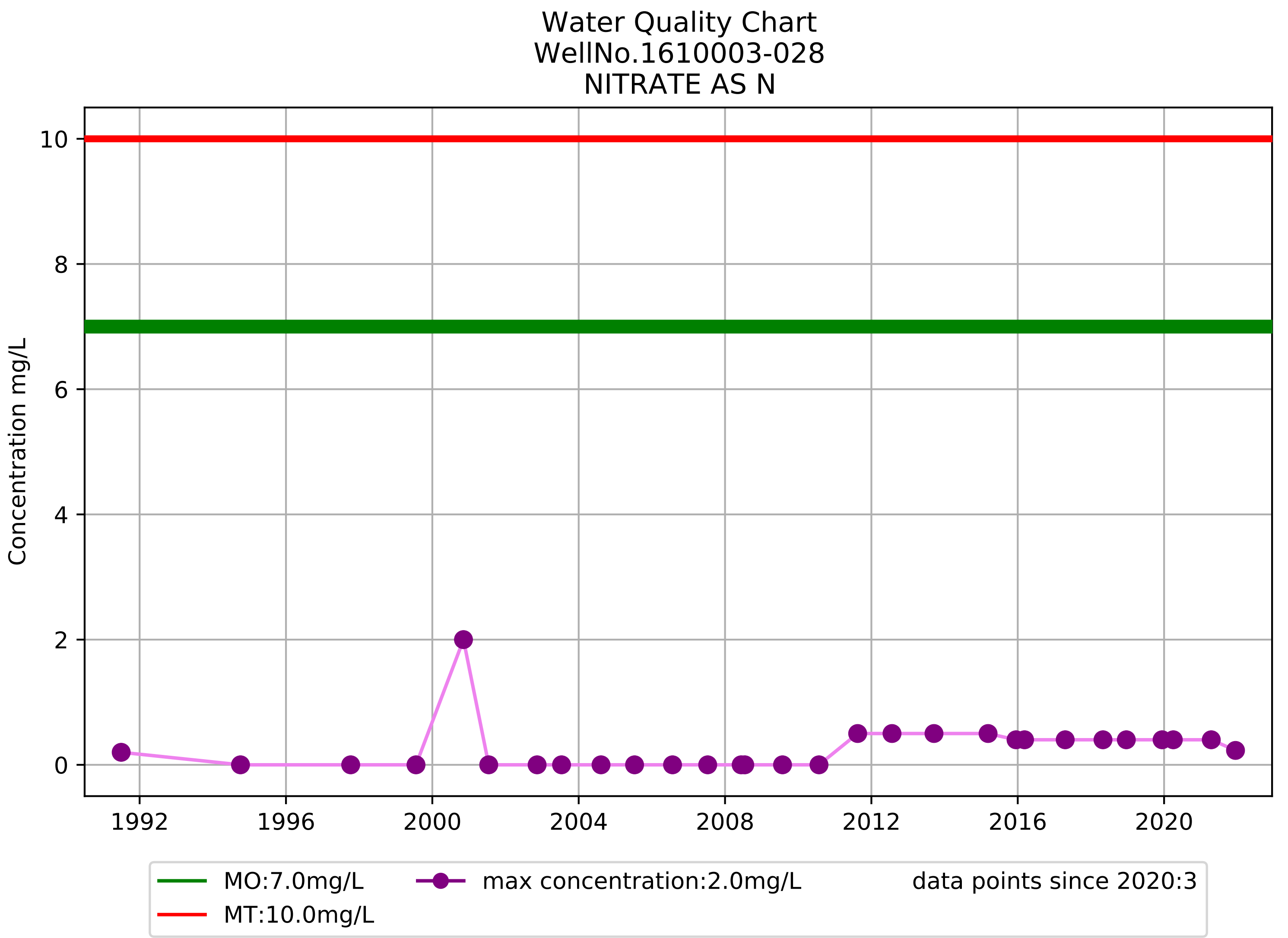

Water Quality Chart
WellNo.1610001-007
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
1992
1996
2000
2004
2008
2012
2016
2020
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.9mg/L
data points since 2020:0



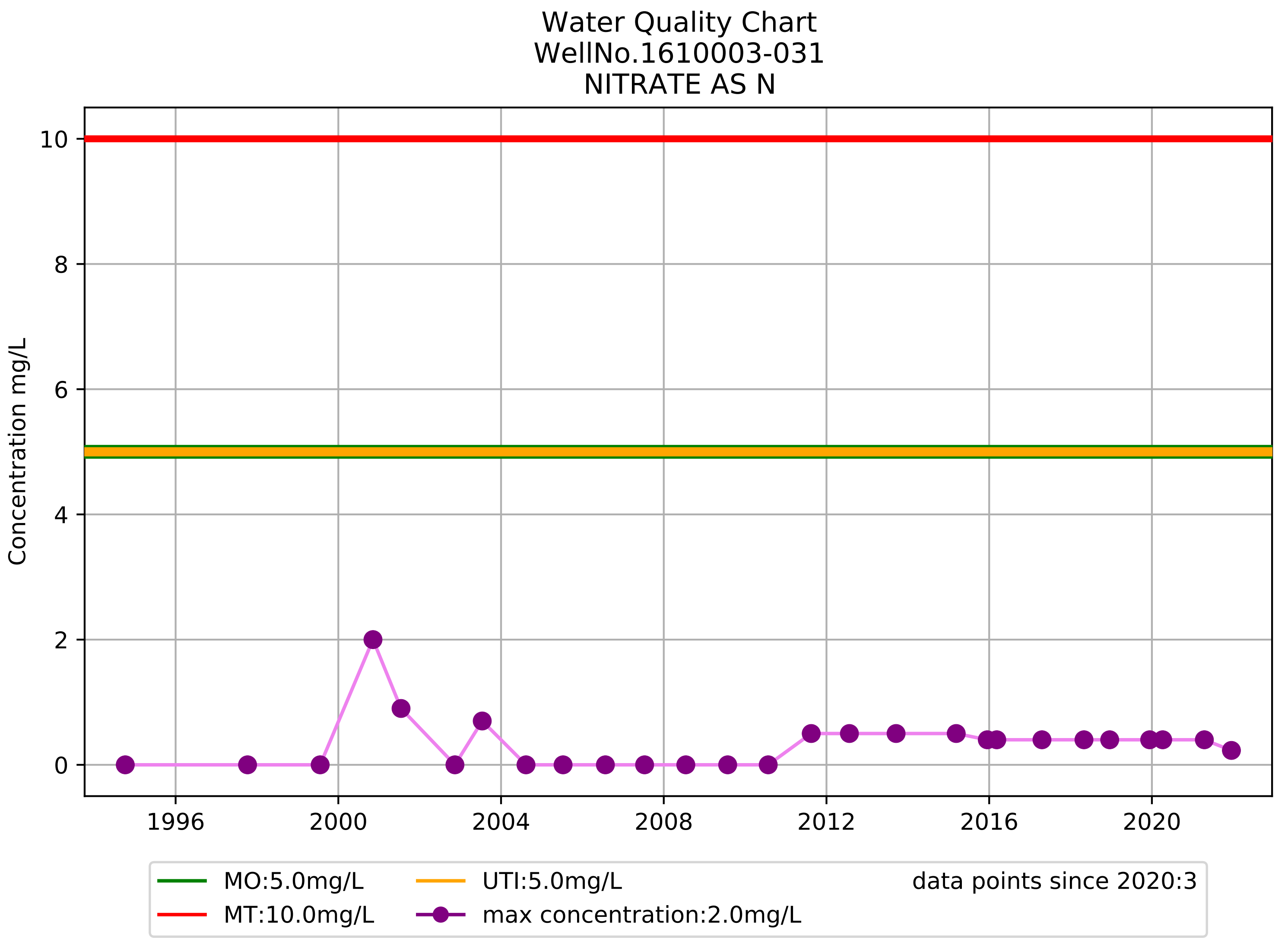
Water Quality Chart
WellNo.1610001-010
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
2017
2018
2019
2020
2021
2022
2023
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.4mg/L
data points since 2020:5

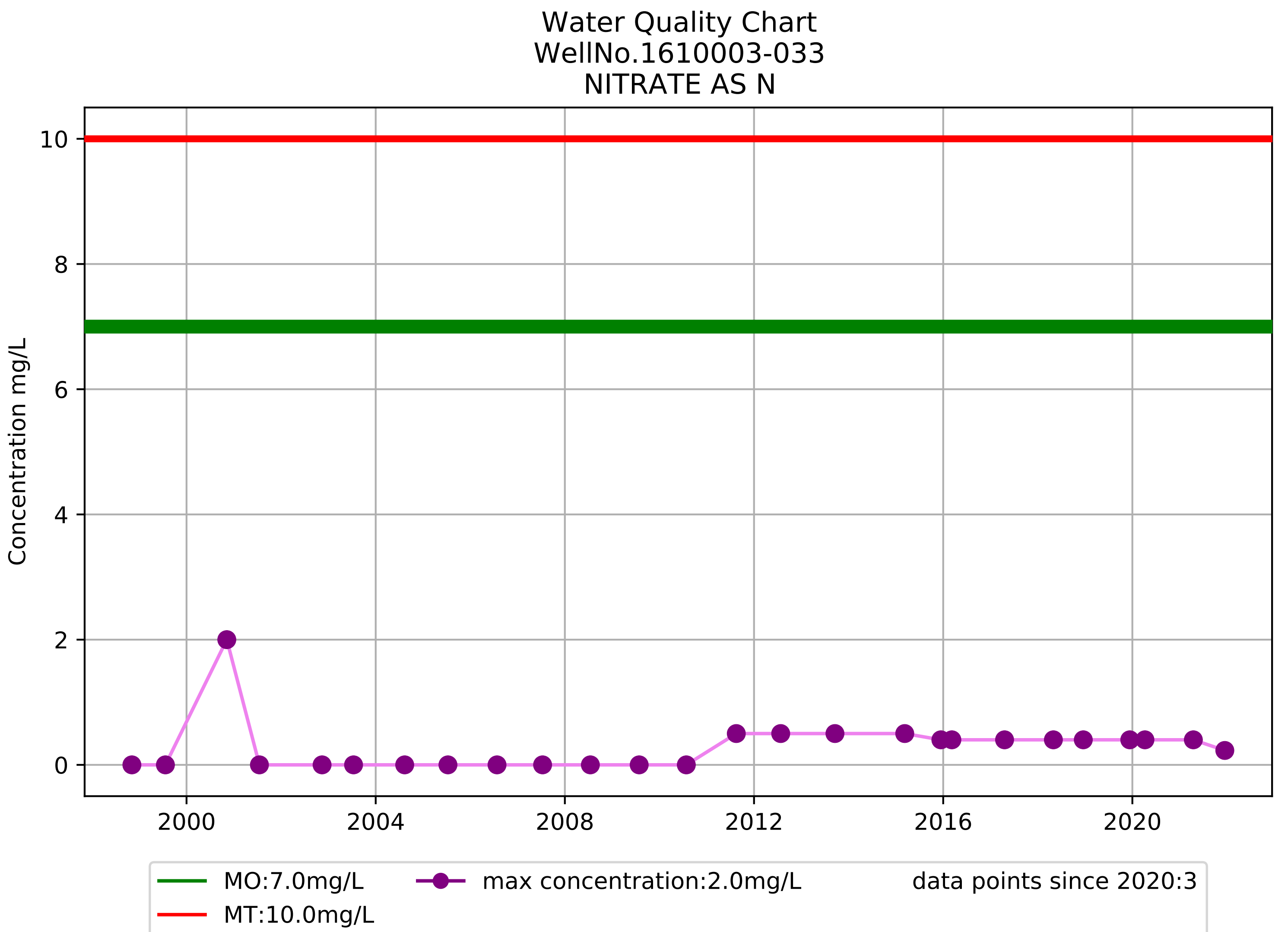


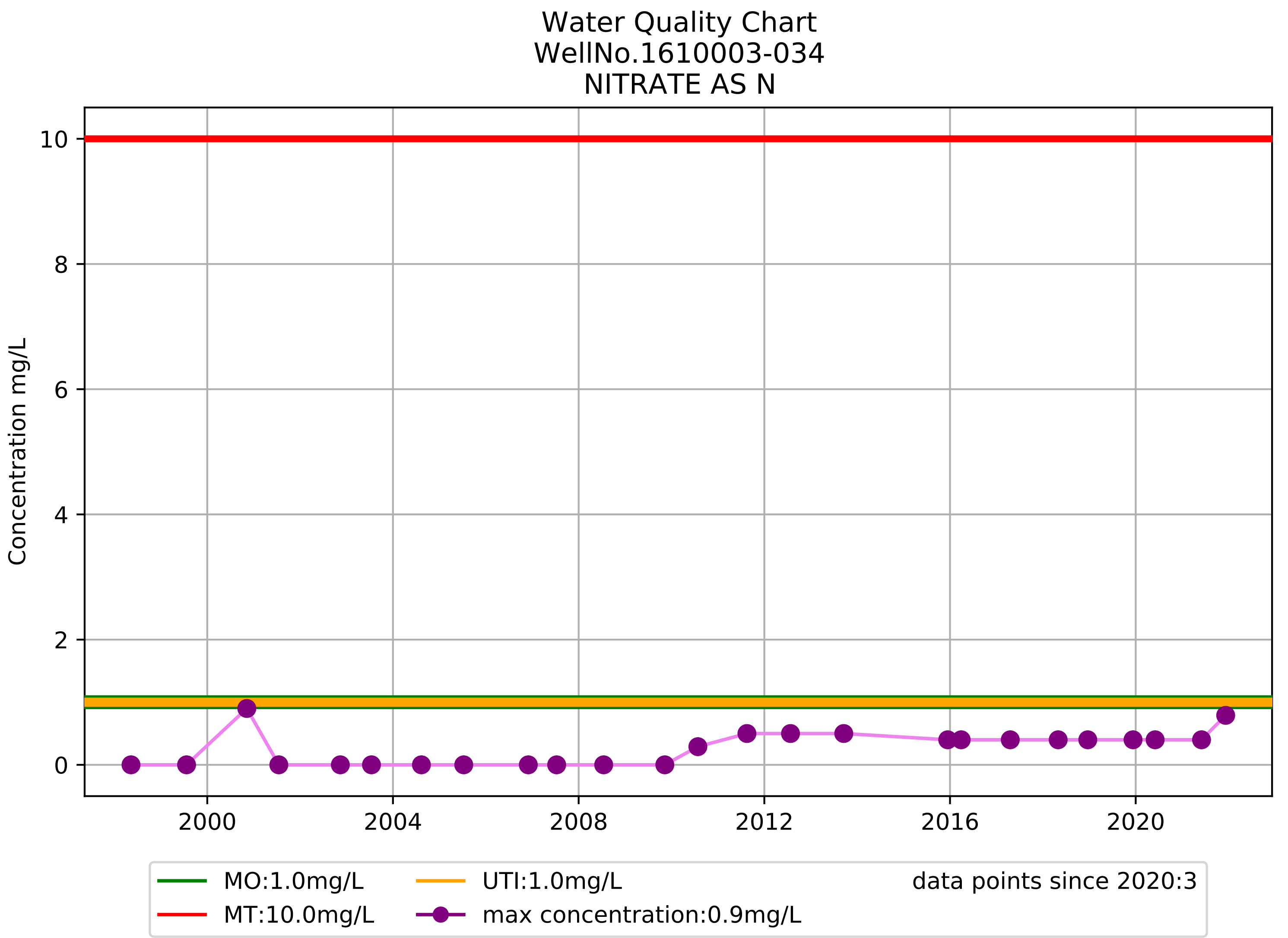
Water Quality Chart
WellNo.1610003-026
NITRATE AS N
Concentration mg/L
0.0
2.5
5.0
7.5
10.0
12.5
15.0
17.5
1988
1992
1996
2000
2004
2008
2012
2016
MO:7.0mg/L
MT:19.0mg/L
max concentration:2.0mg/L
data points since 2020:0

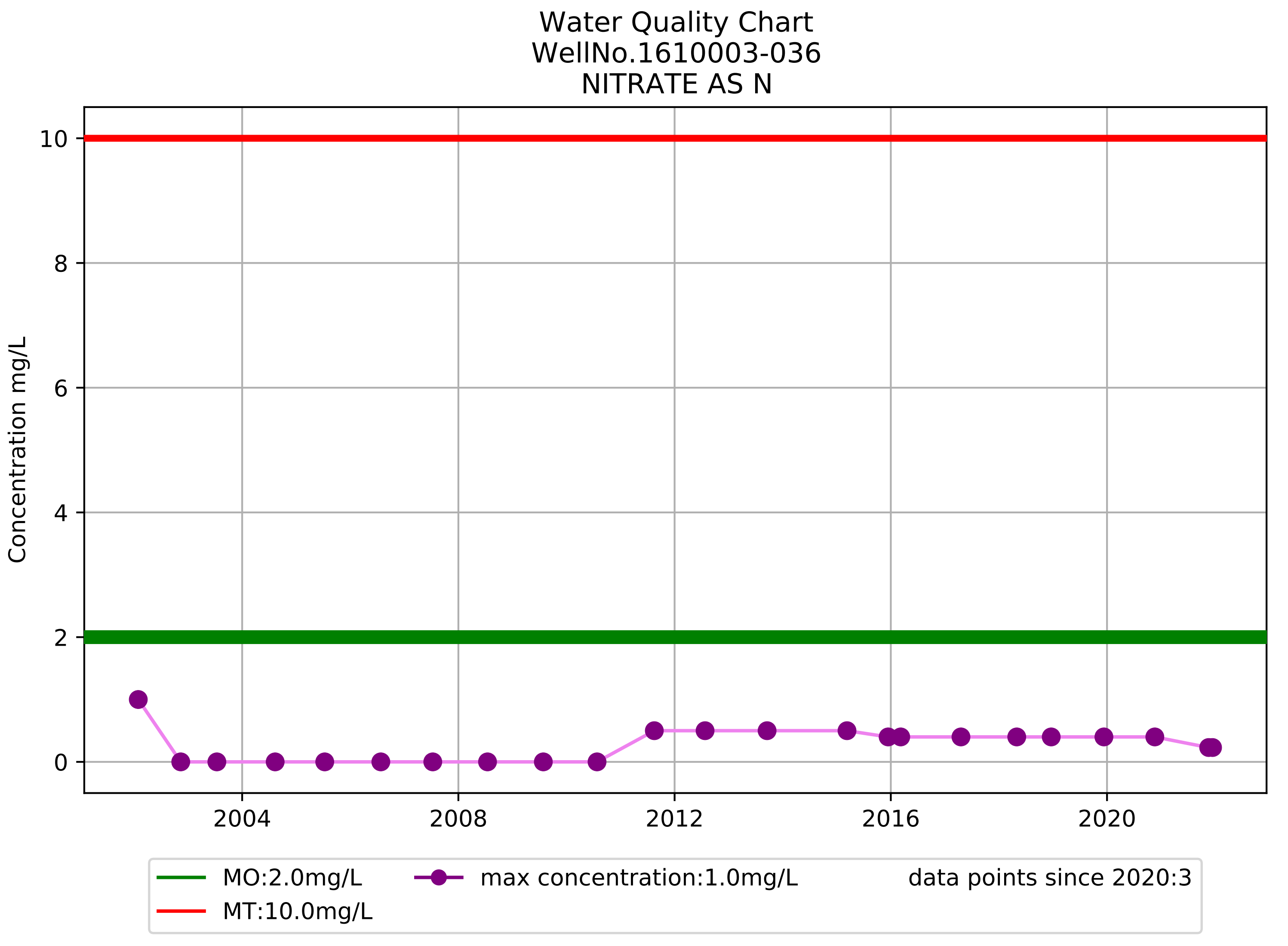


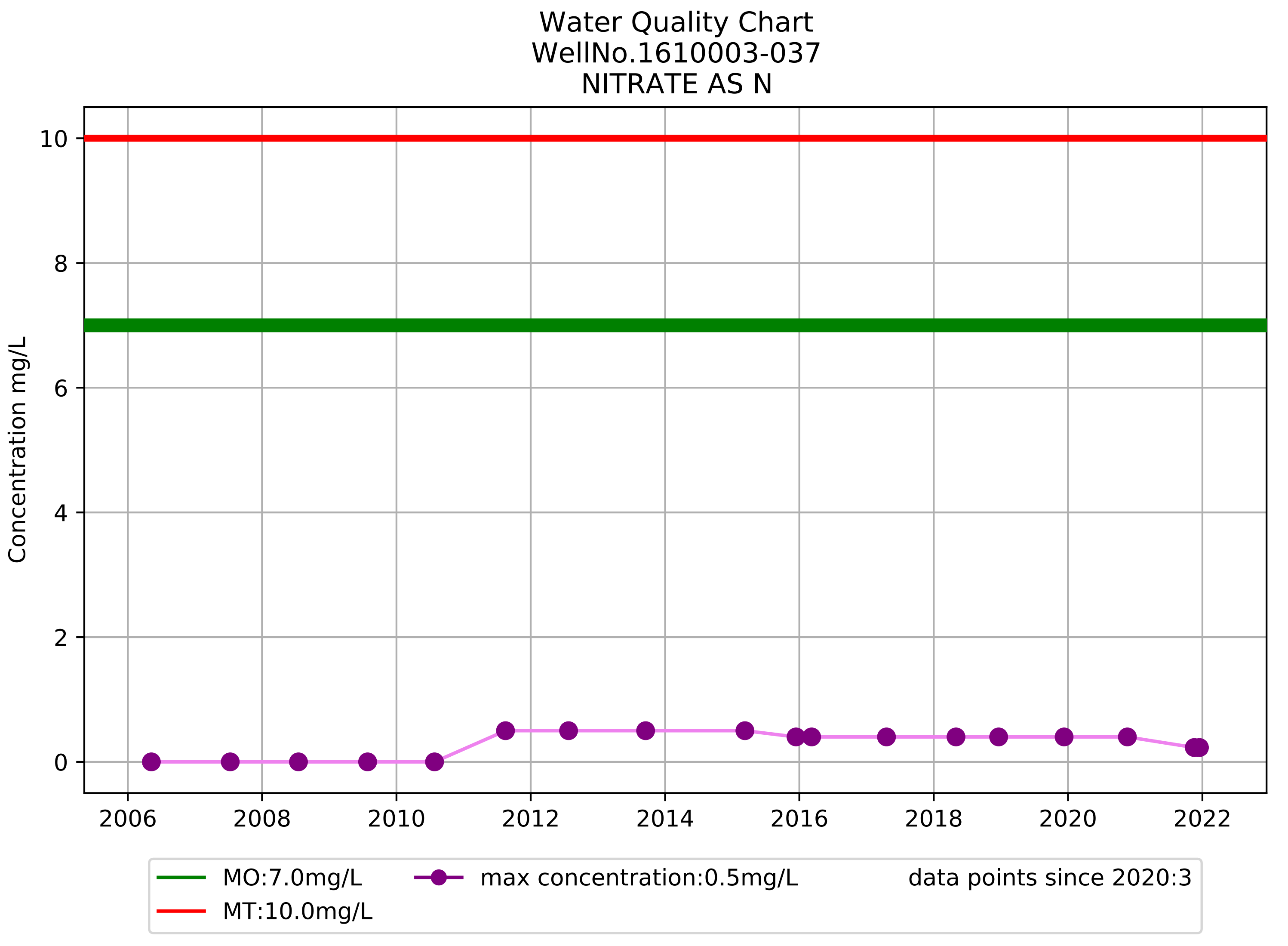
Water Quality Chart
WellNo.1610003-028
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
1992
1996
2000
2004
2008
2012
2016
2020
MO:7.0mg/L
MT:10.0mg/L
max concentration:2.0mg/L
data points since 2020:3

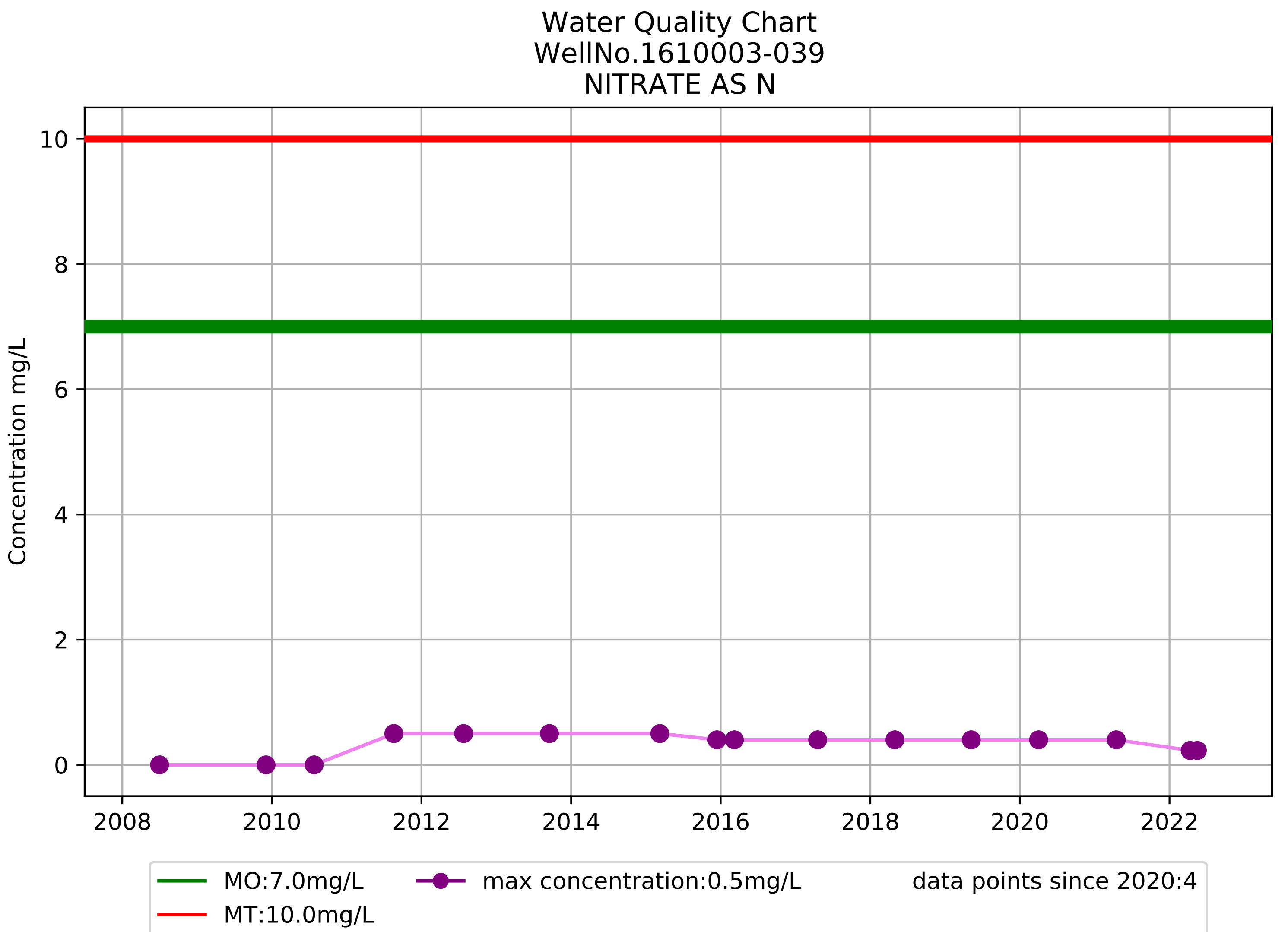

Water Quality Chart
WellNo.1610003-031
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
1996
2000
2004
2008
2012
2016
2020
MO:5.0mg/L
MT:10.0mg/L
UTI:5.0mg/L
max concentration:2.0mg/L
data points since 2020:3


Water Quality Chart
WellNo.1610003-033
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
2000
2004
2008
2012
2016
2020
MO:7.0mg/L
MT:10.0mg/L
max concentration:2.0mg/L
data points since 2020:3

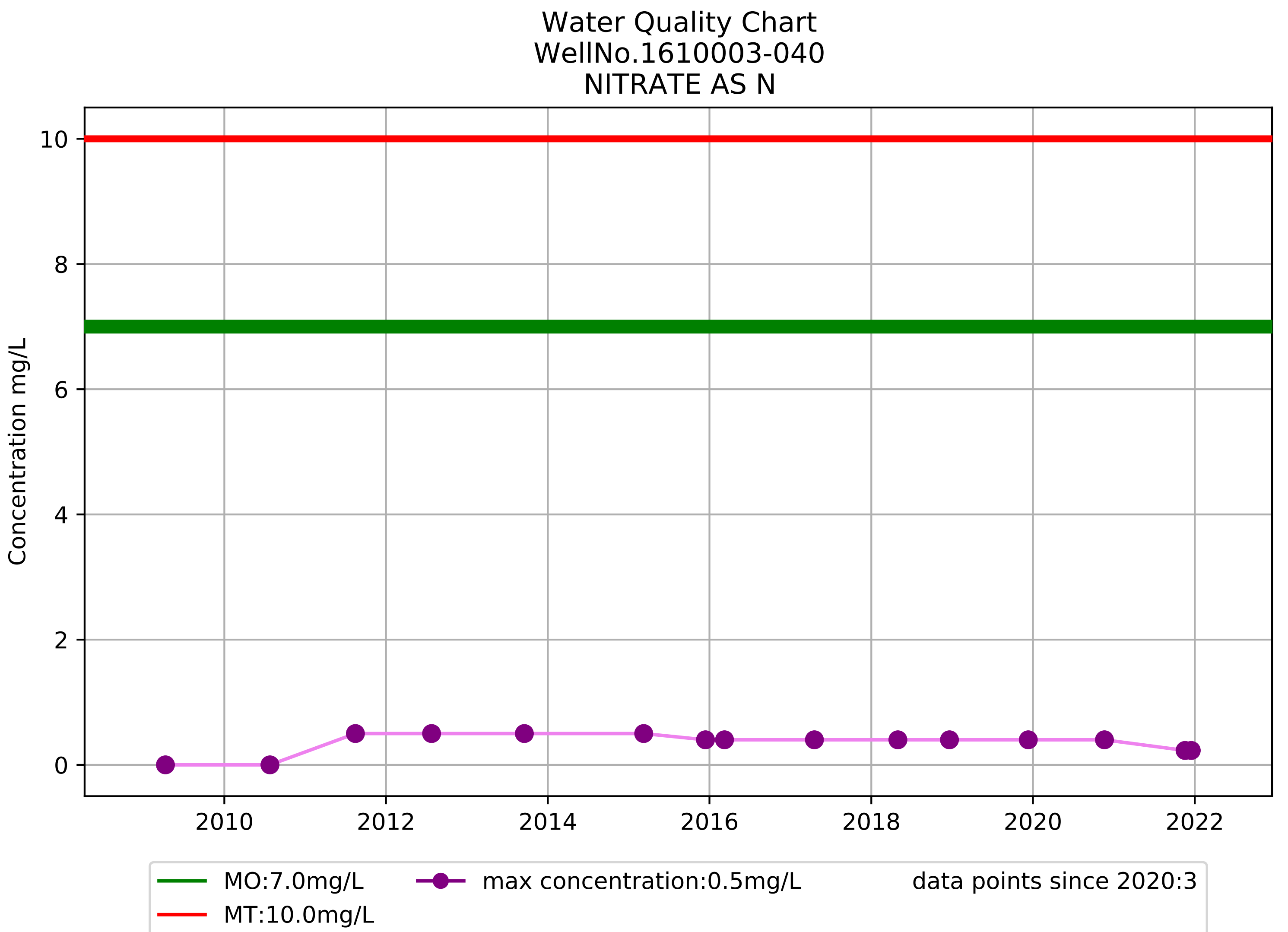

Water Quality Chart
WellNo.1610003-034
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
2000
2004
2008
2012
2016
2020
MO:1.0mg/L
MT:10.0mg/L
UTI:1.0mg/L
max concentration:0.9mg/L
data points since 2020:3


Water Quality Chart
WellNo.1610003-036
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
2004
2008
2012
2016
2020
MO:2.0mg/L
MT:10.0mg/L
max concentration:1.0mg/L
data points since 2020:3

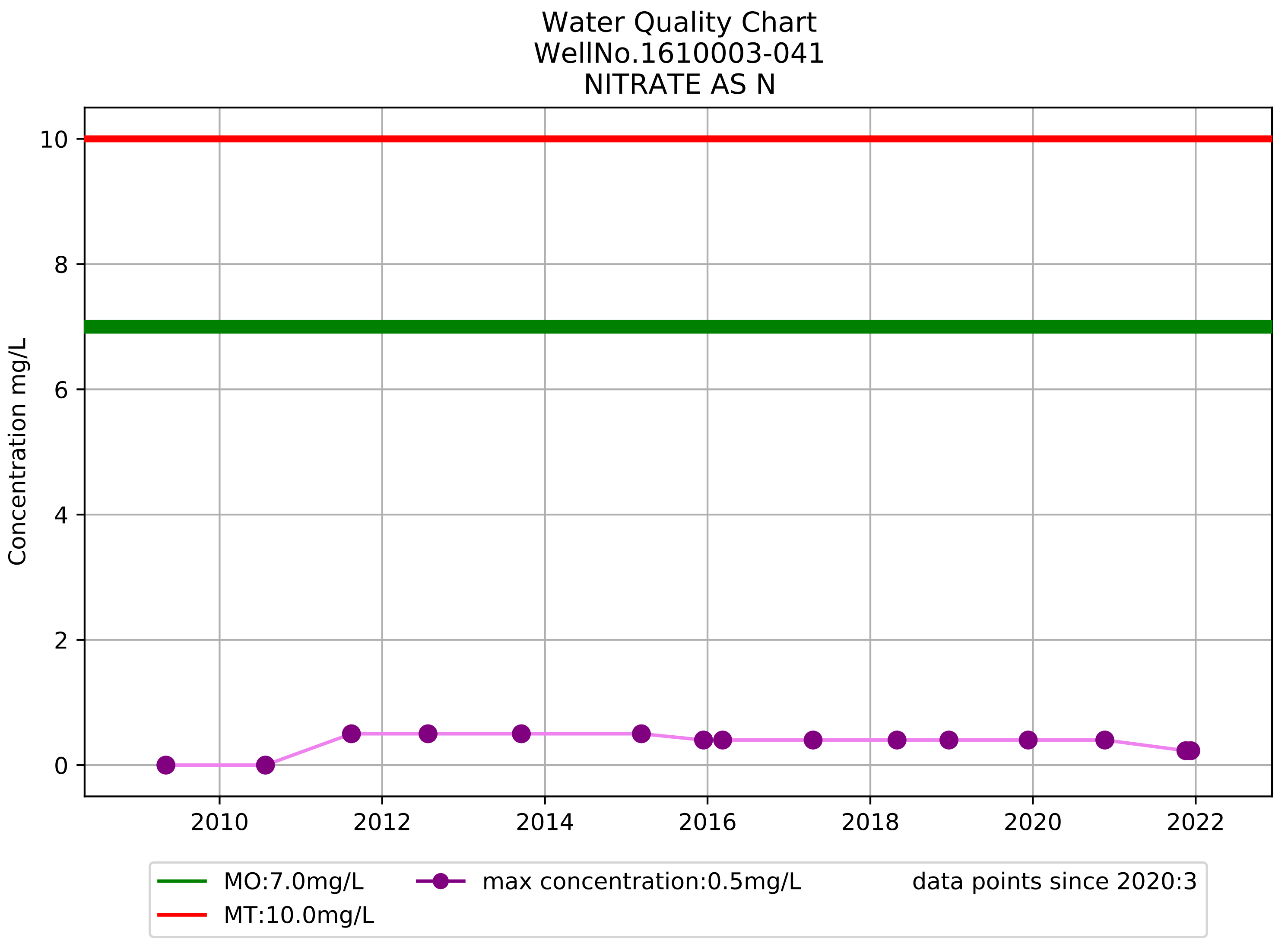

Water Quality Chart
WellNo.1610003-037
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.5mg/L
data points since 2020:3

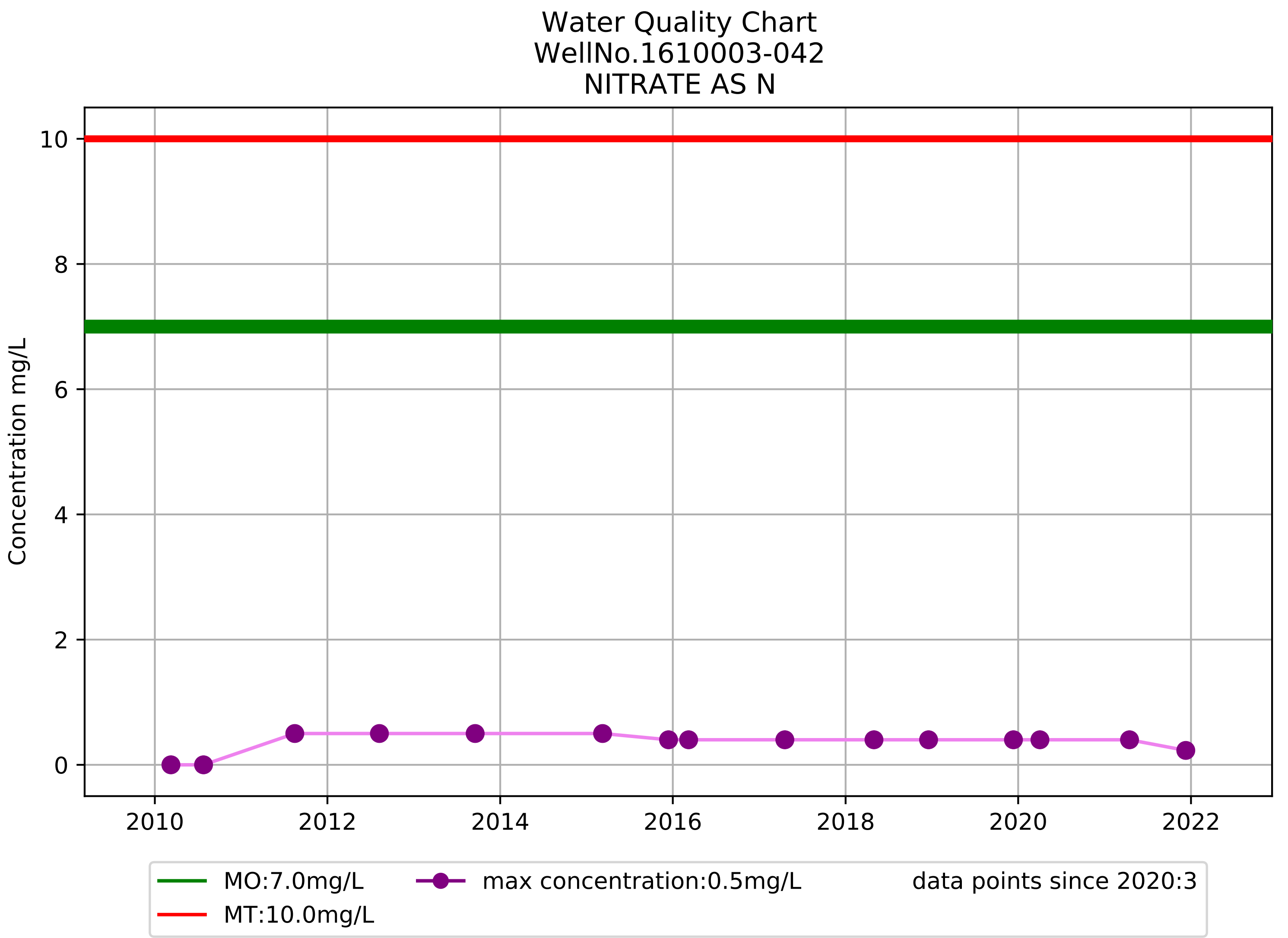


Water Quality Chart
WellNo.1610003-039
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
2008
2010
2012
2014
2016
2018
2020
2022
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.5mg/L
data points since 2020:4

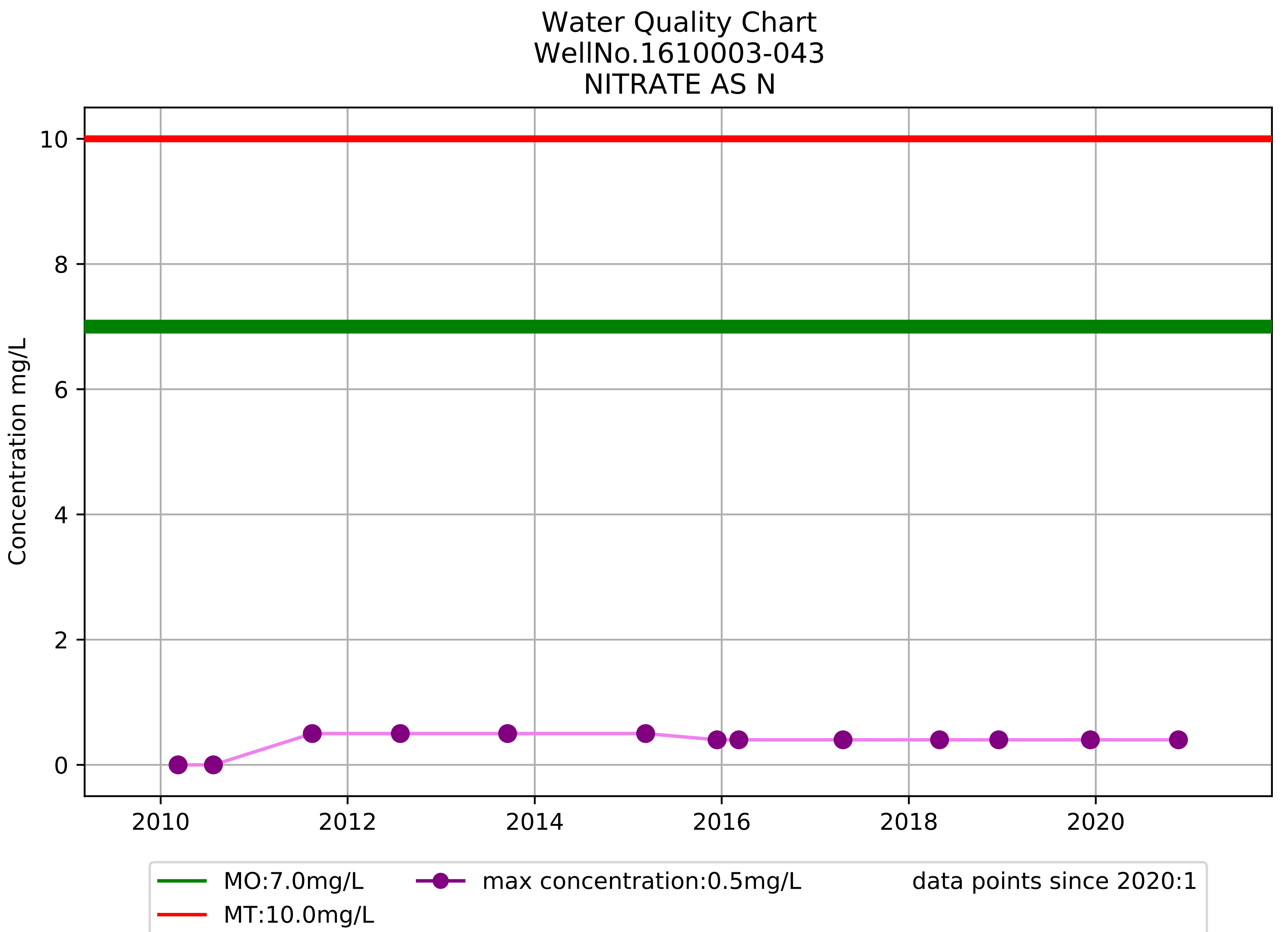


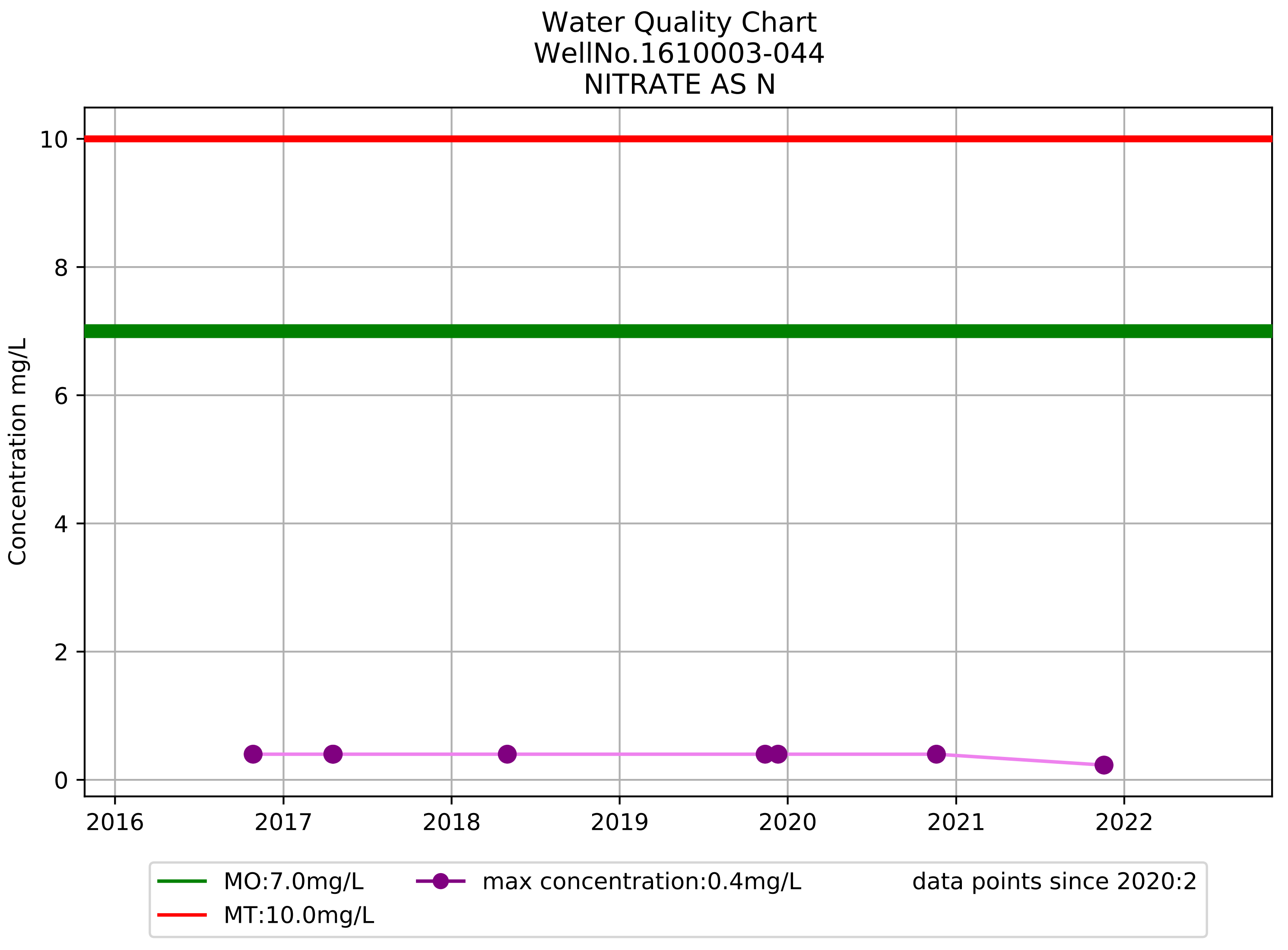
Water Quality Chart
WellNo.1610003-040
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
2010
2012
2014
2016
2018
2020
2022
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.5mg/L
data points since 2020:3

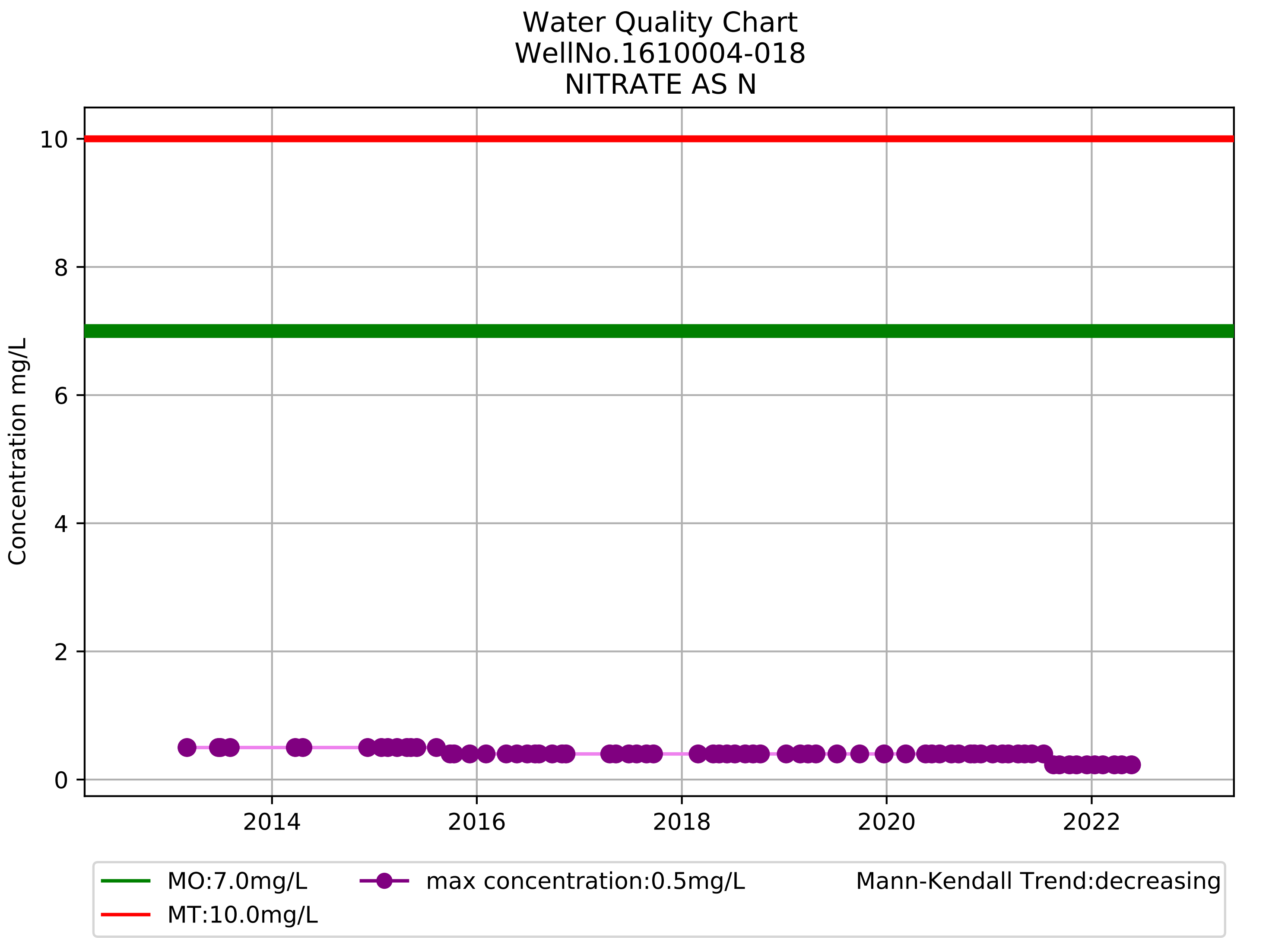

Water Quality Chart
WellNo.1610003-041
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
2010
2012
2014
2016
2018
2020
2022
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.5mg/L
data points since 2020:3

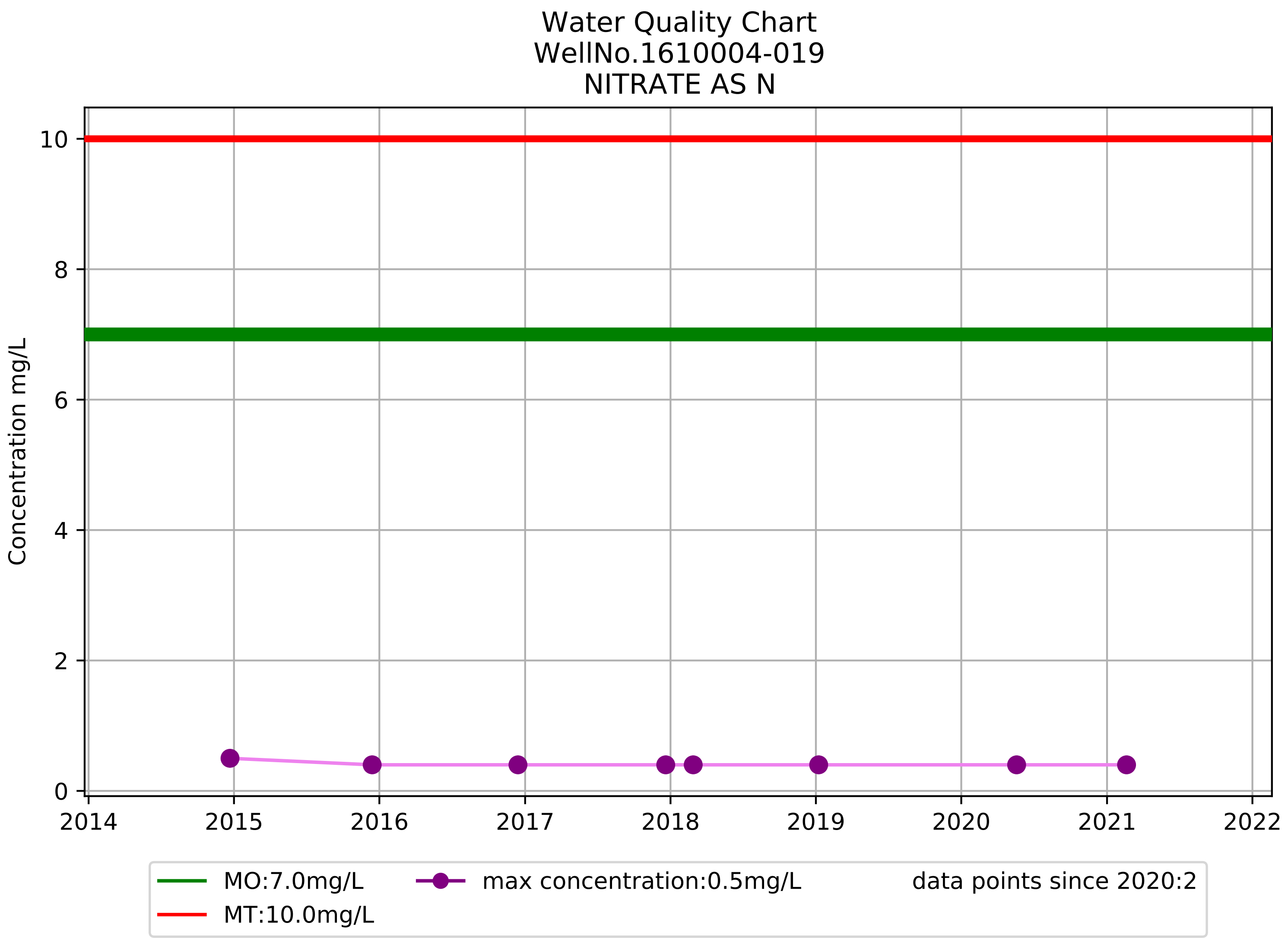


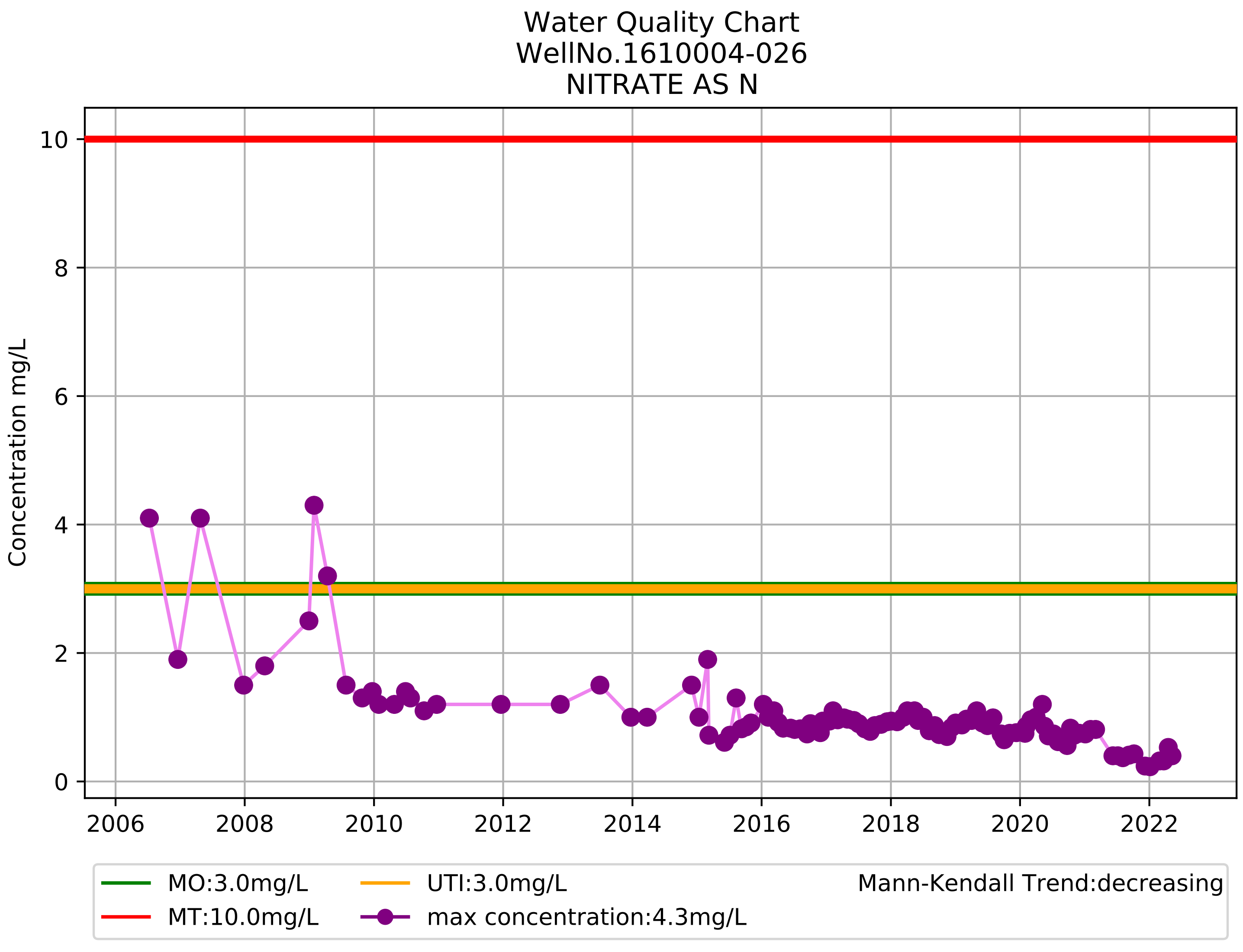
Water Quality Chart
WellNo.1610003-042
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
2010
2012
2014
2016
2018
2020
2022
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.5mg/L
data points since 2020:3

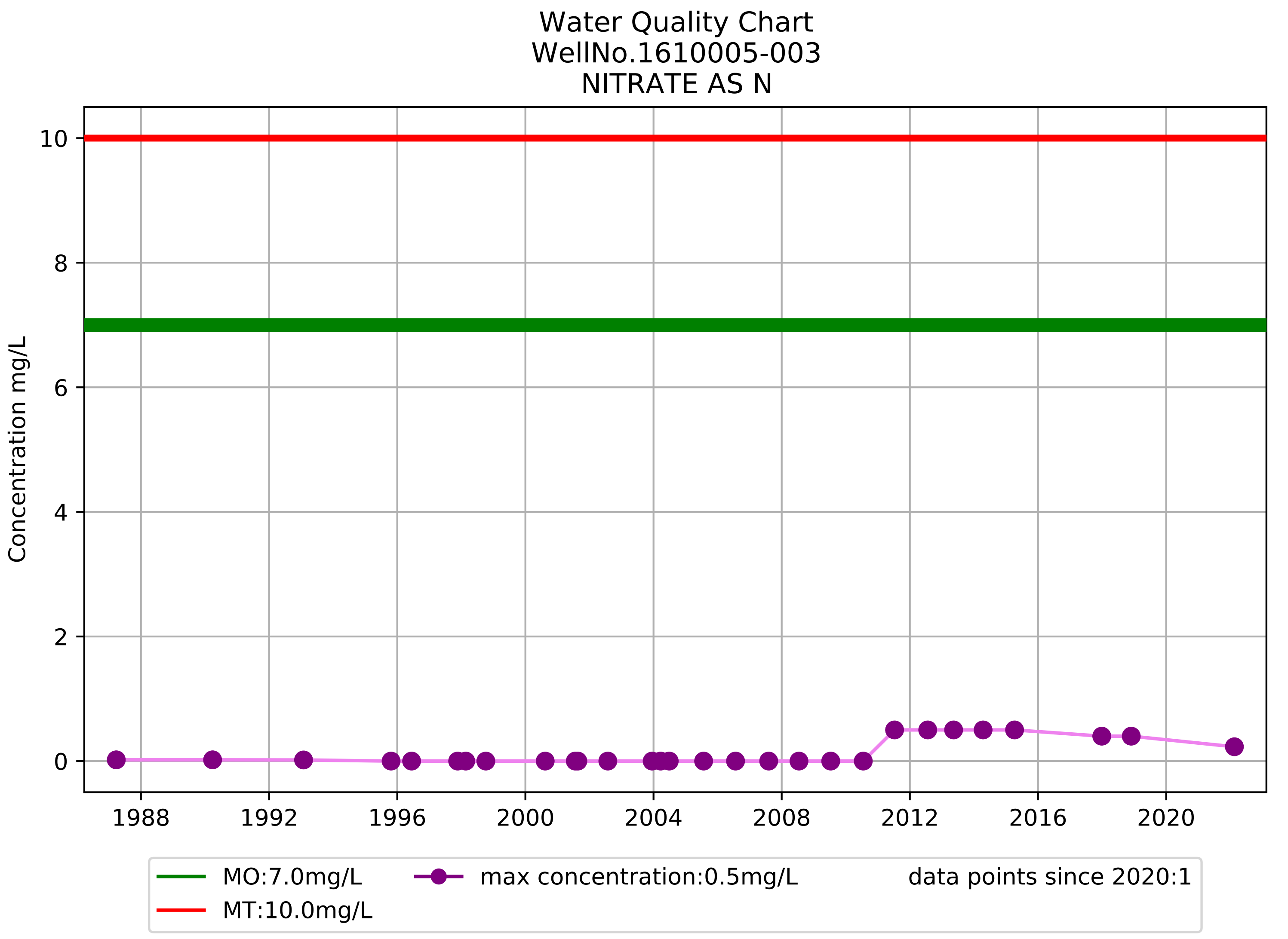

Water Quality Chart
WellNo.1610003-043
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
2010
2012
2014
2016
2018
2020
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.5mg/L
data points since 2020:1


Water Quality Chart
WellNo.1610003-044
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
2016
2017
2018
2019
2020
2021
2022
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.4mg/L
data points since 2020:2

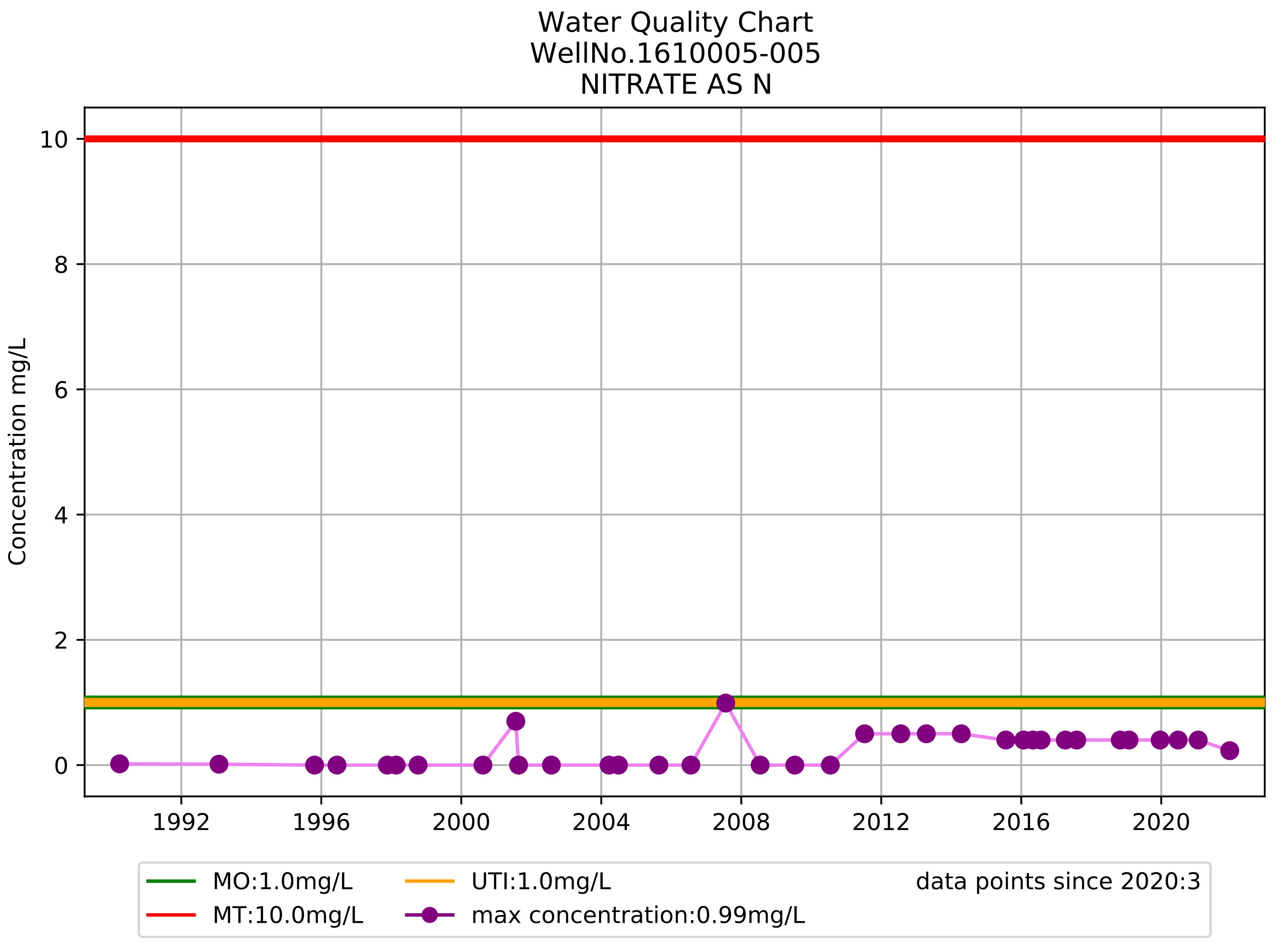

Water Quality Chart
WellNo.1610004-018
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
2014
2016
2018
2020
2022
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.5mg/L
Mann-Kendall Trend:decreasing


Water Quality Chart
WellNo.1610004-019
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
2014
2015
2016
2017
2018
2019
2020
2021
2022
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.5mg/L
data points since 2020:2

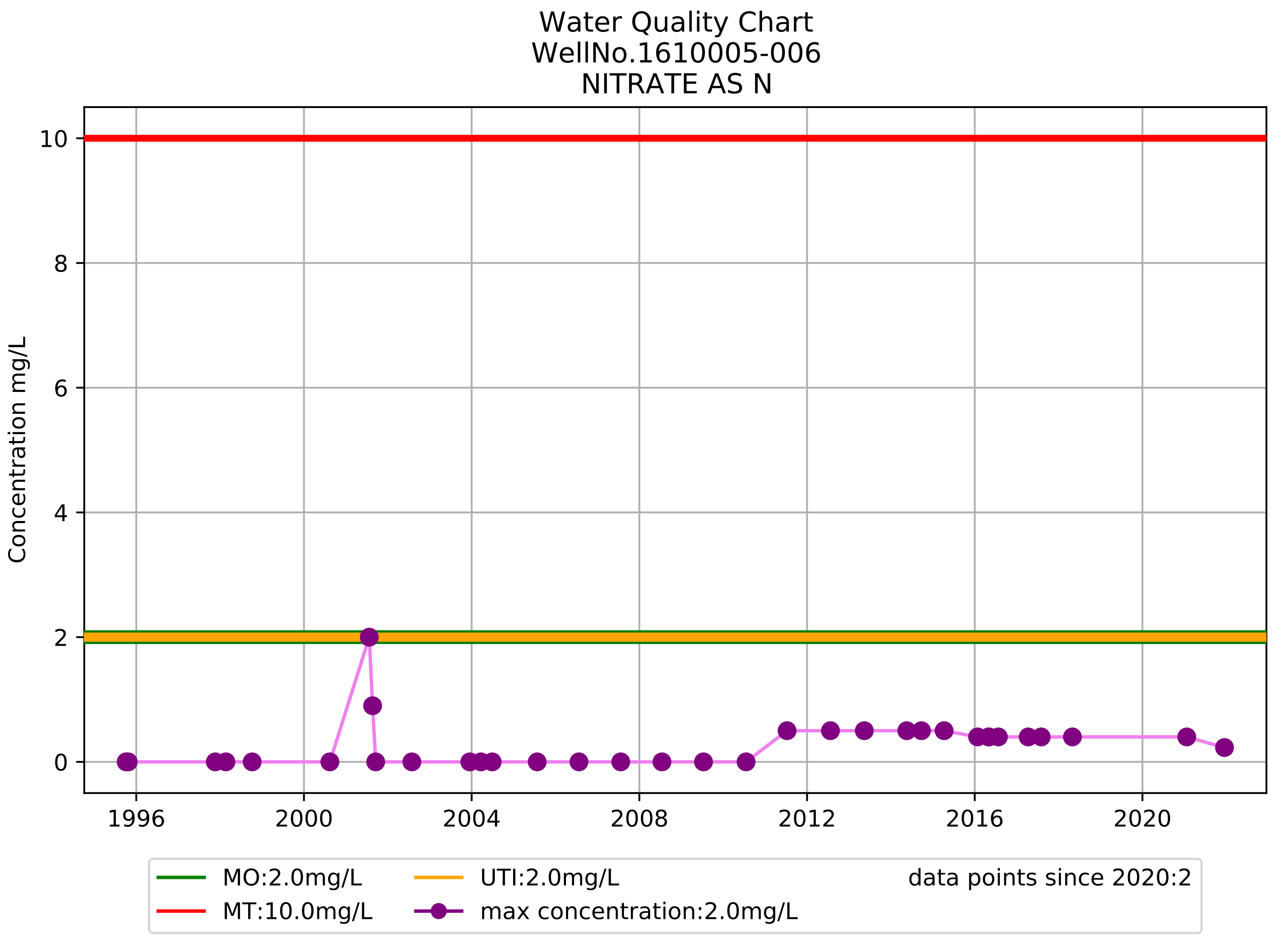

Water Quality Chart
WellNo.1610004-026
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:3.0mg/L
MT:10.0mg/L
UTI:3.0mg/L
max concentration:4.3mg/L
Mann-Kendall Trend:decreasing



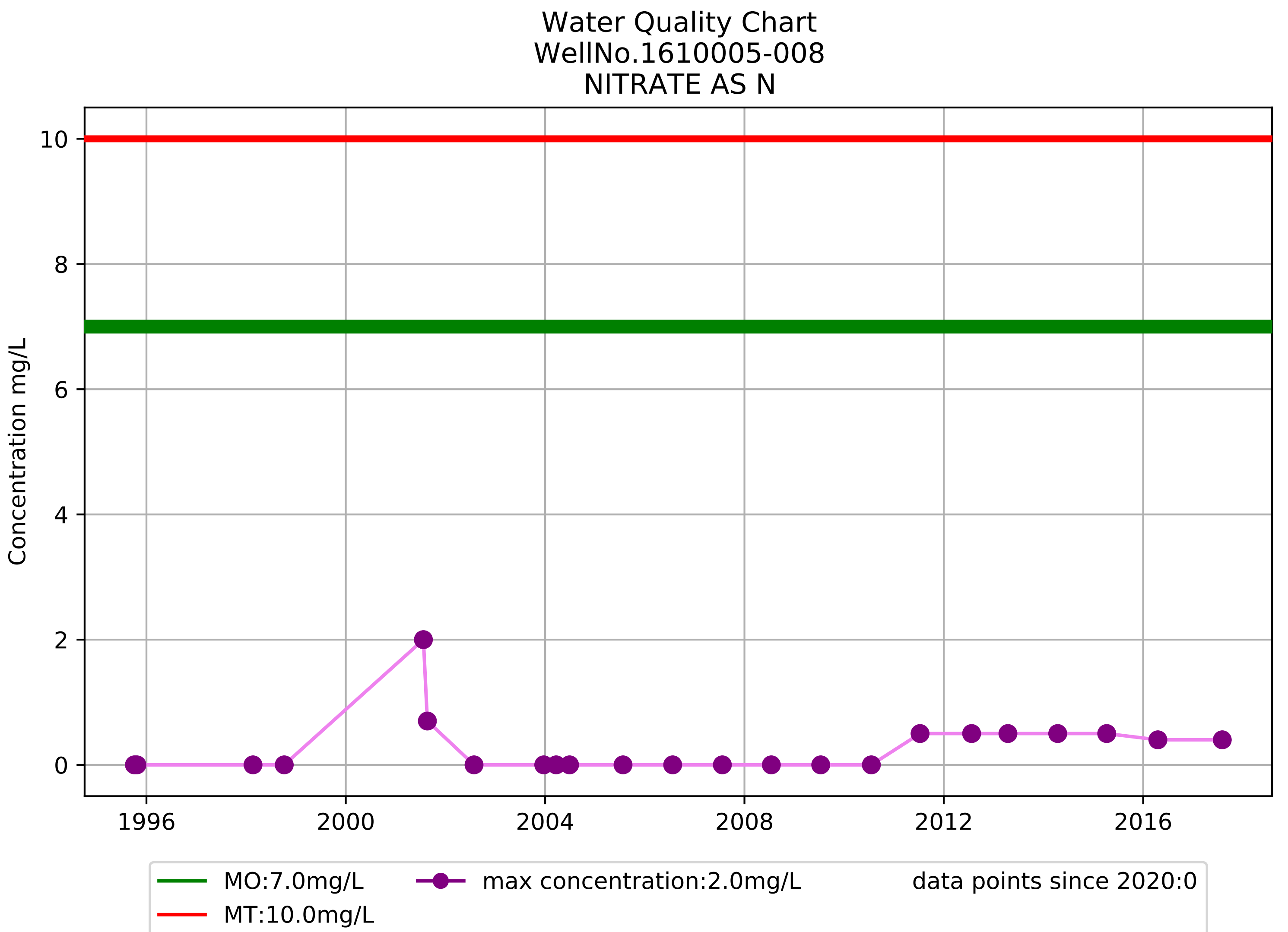
Water Quality Chart
WellNo.1610005-003
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.5mg/L
data points since 2020:1



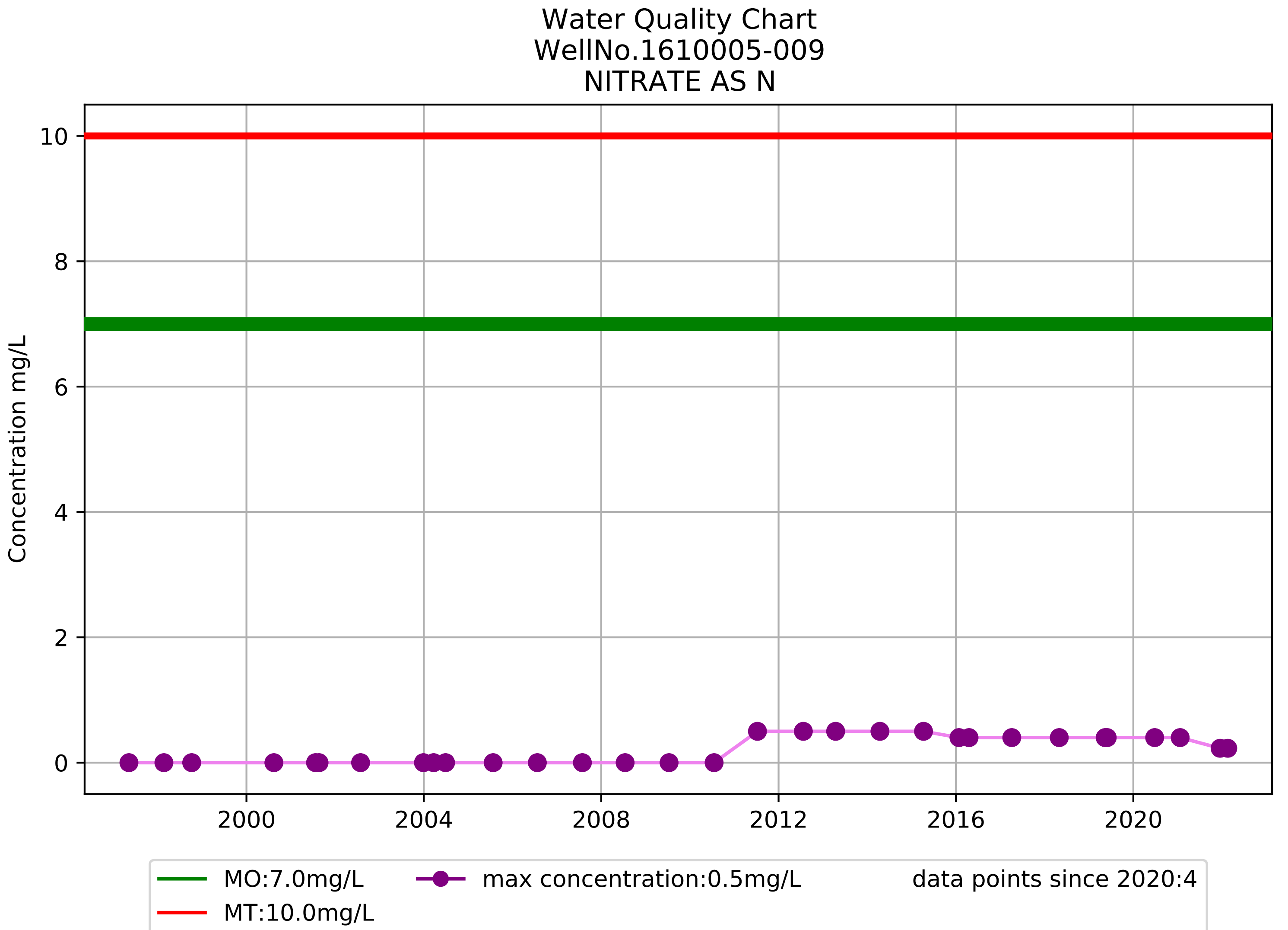
Water Quality Chart
WellNo.1610005-005
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
1992
1996
2000
2004
2008
2012
2016
2020
MO:1.0mg/L
MT:10.0mg/L
UTI:1.0mg/L
max concentration:0.99mg/L
data points since 2020:3

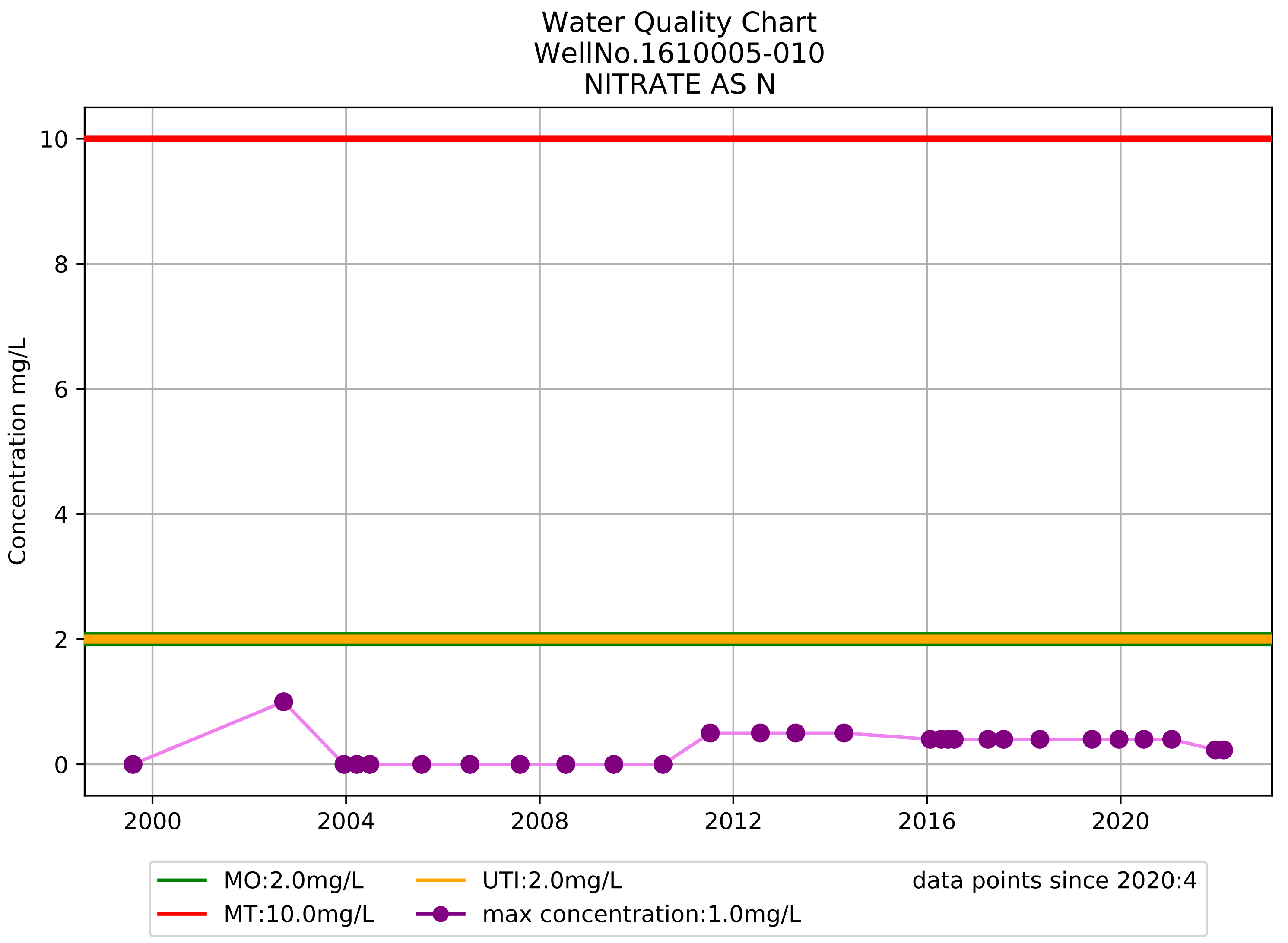


Water Quality Chart
WellNo.1610005-006
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
1996
2000
2004
2008
2012
2016
2020
MO:2.0mg/L
MT:10.0mg/L
UTI:2.0mg/L
max concentration:2.0mg/L
data points since 2020:2

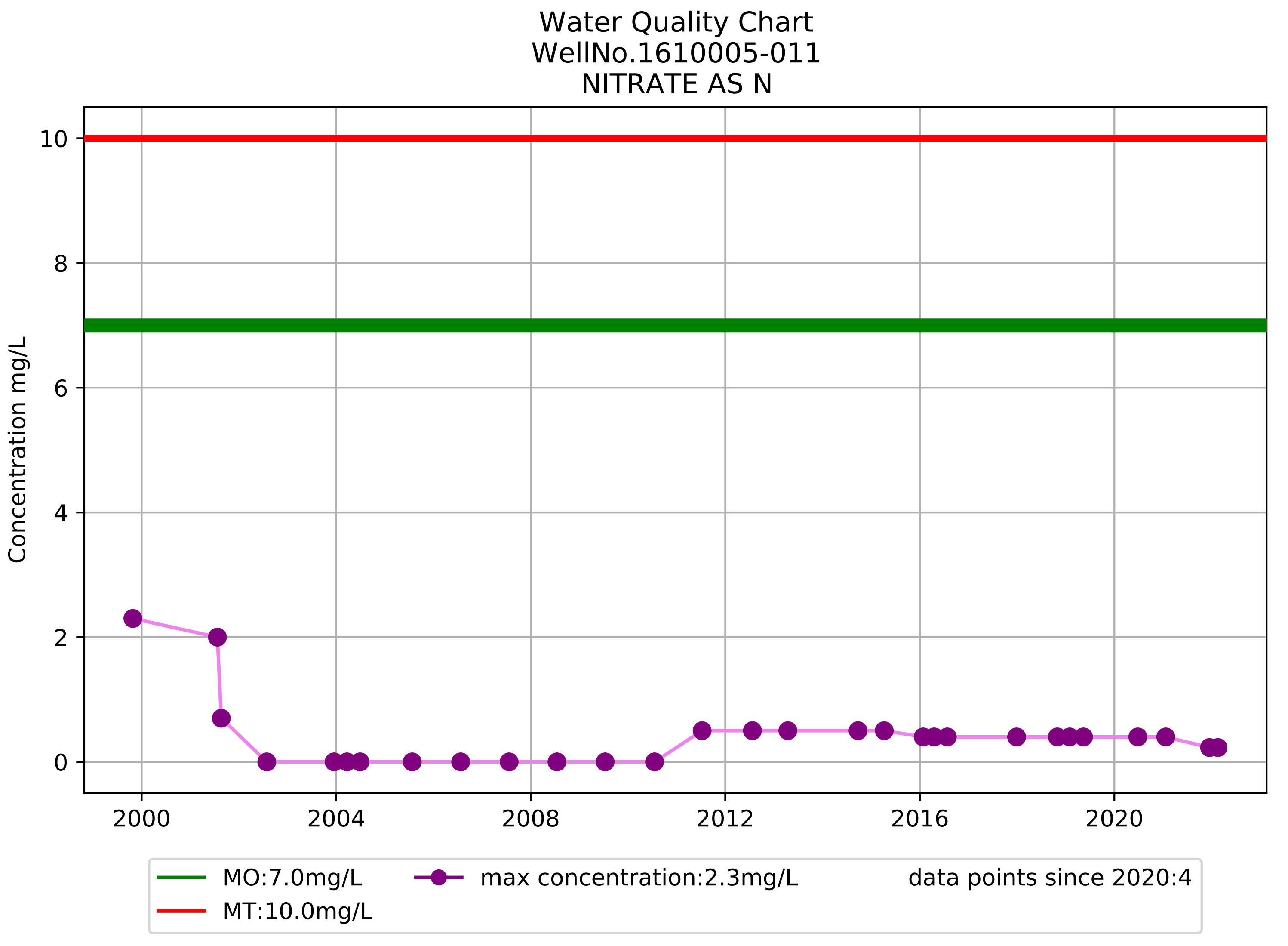


Water Quality Chart
WellNo.1610005-008
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
1996
2000
2004
2008
2012
2016
MO:7.0mg/L
MT:10.0mg/L
max concentration:2.0mg/L
data points since 2020:0

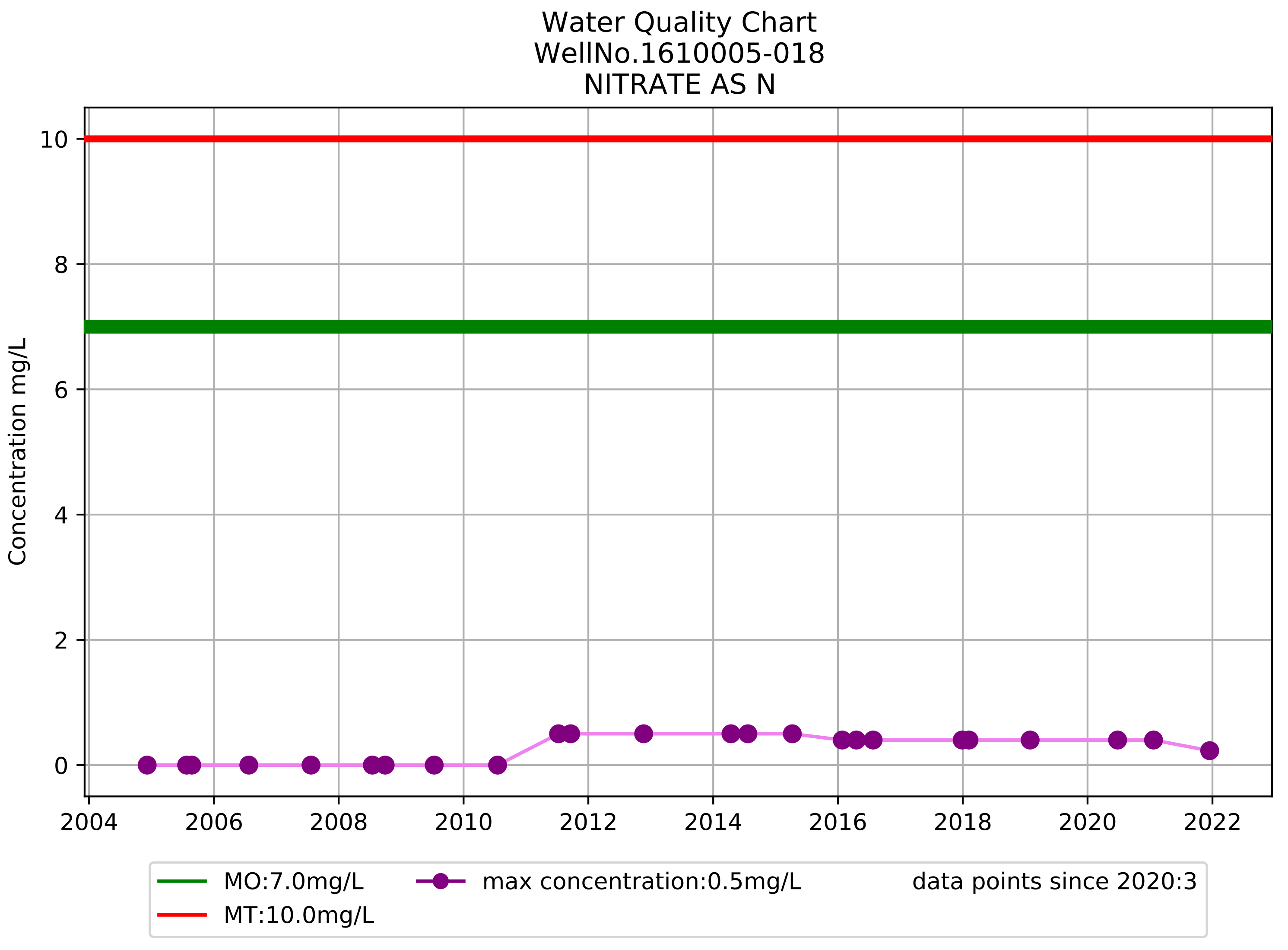

Water Quality Chart
WellNo.1610005-009
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
2000
2004
2008
2012
2016
2020
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.5mg/L
data points since 2020:4



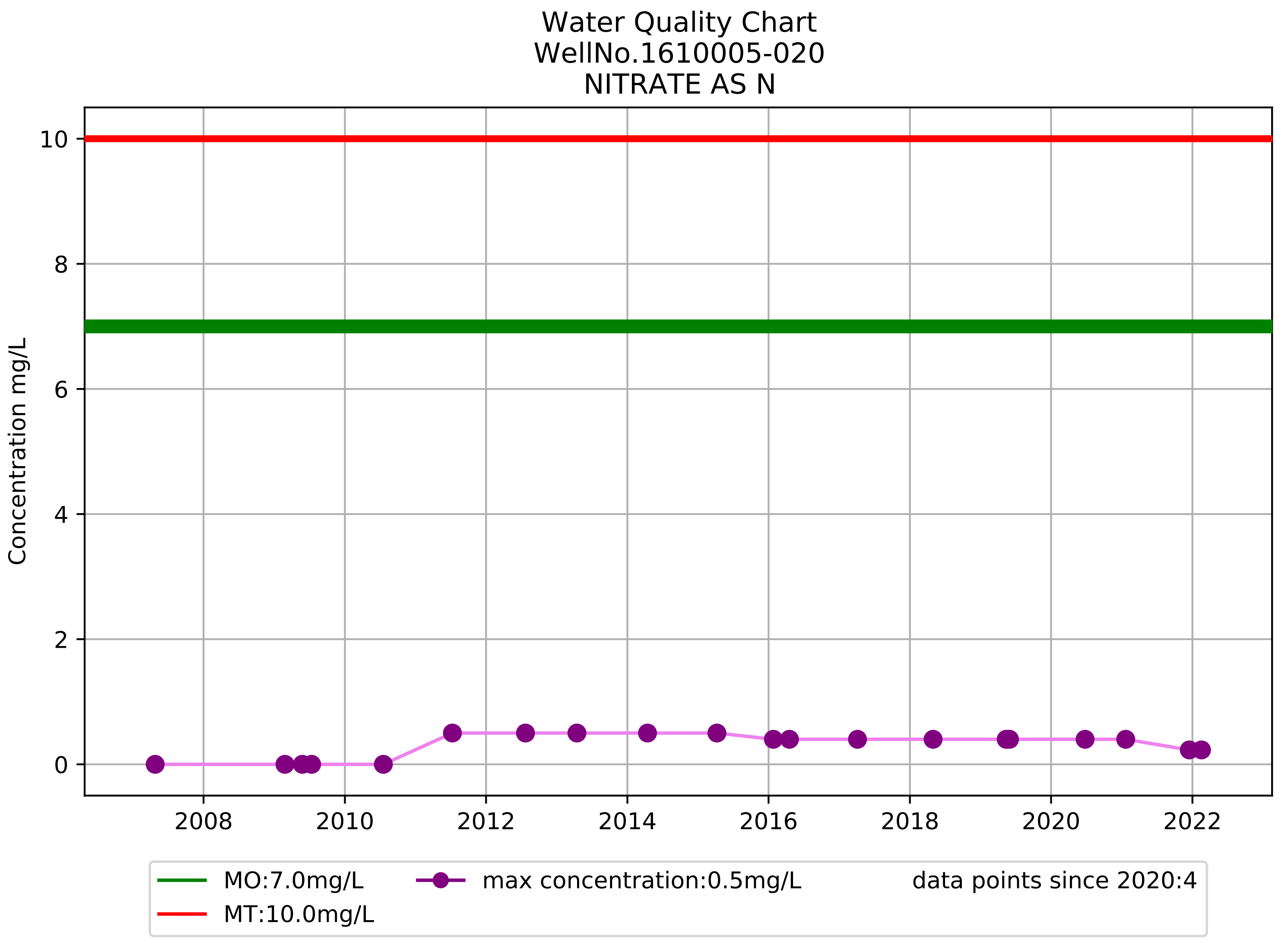
Water Quality Chart
WellNo.1610005-010
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
2000
2004
2008
2012
2016
2020
MO:2.0mg/L
MT:10.0mg/L
UTI:2.0mg/L
max concentration:1.0mg/L
data points since 2020:4



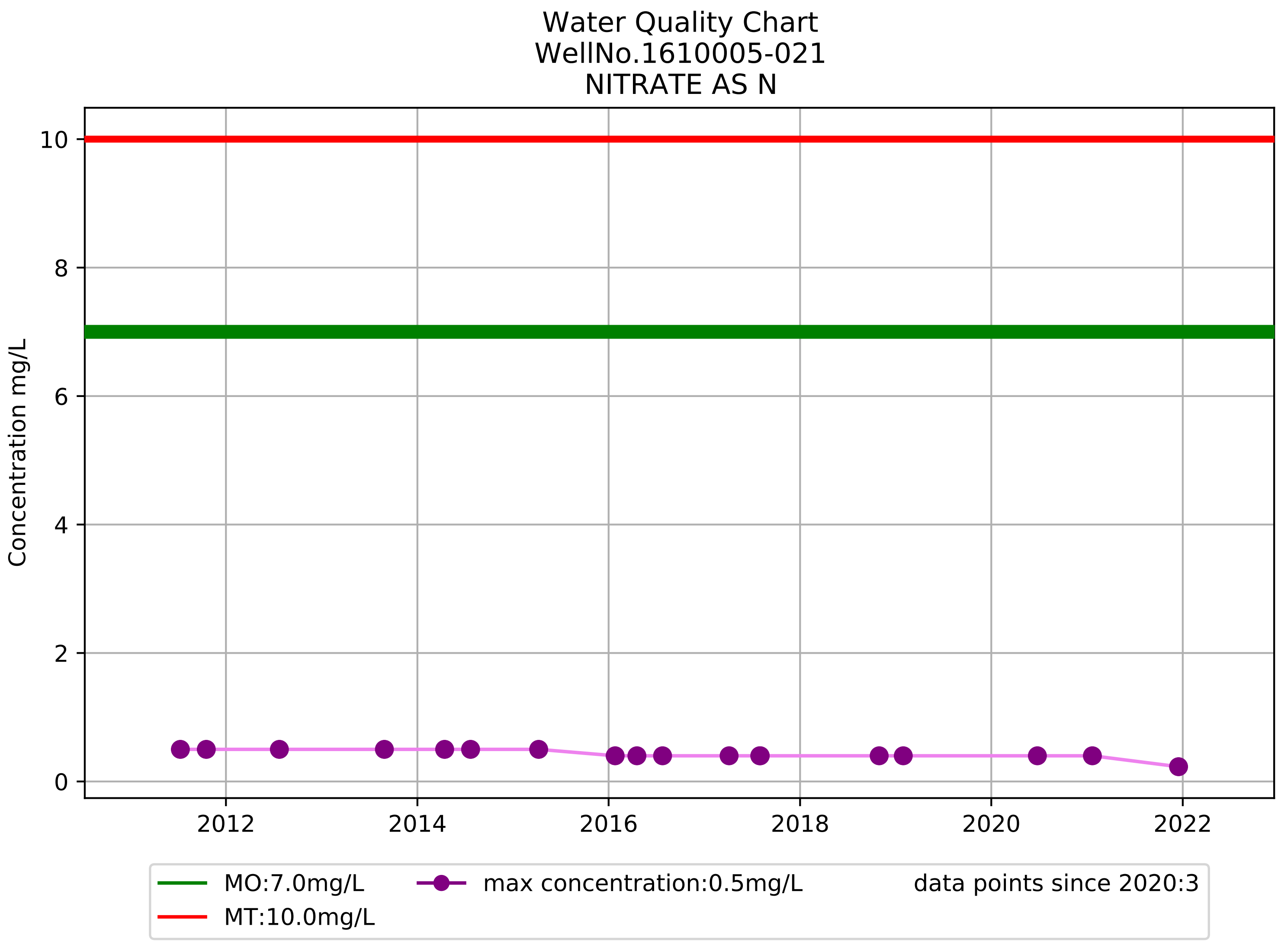
Water Quality Chart
WellNo.1610005-011
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
2000
2004
2008
2012
2016
2020
MO:7.0mg/L
MT:10.0mg/L
max concentration:2.3mg/L
data points since 2020:4

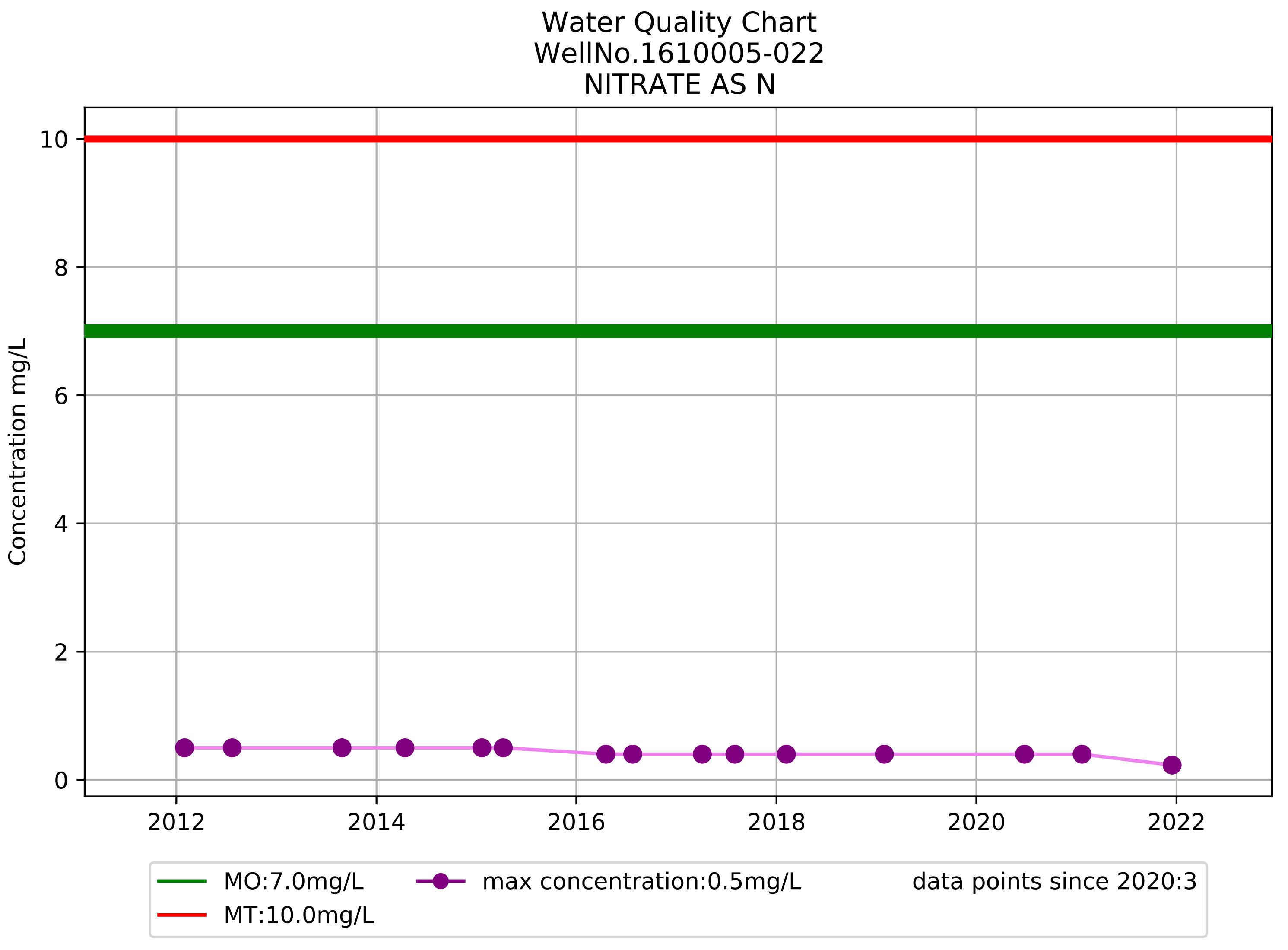


Water Quality Chart
WellNo.1610005-018
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.5mg/L
data points since 2020:3

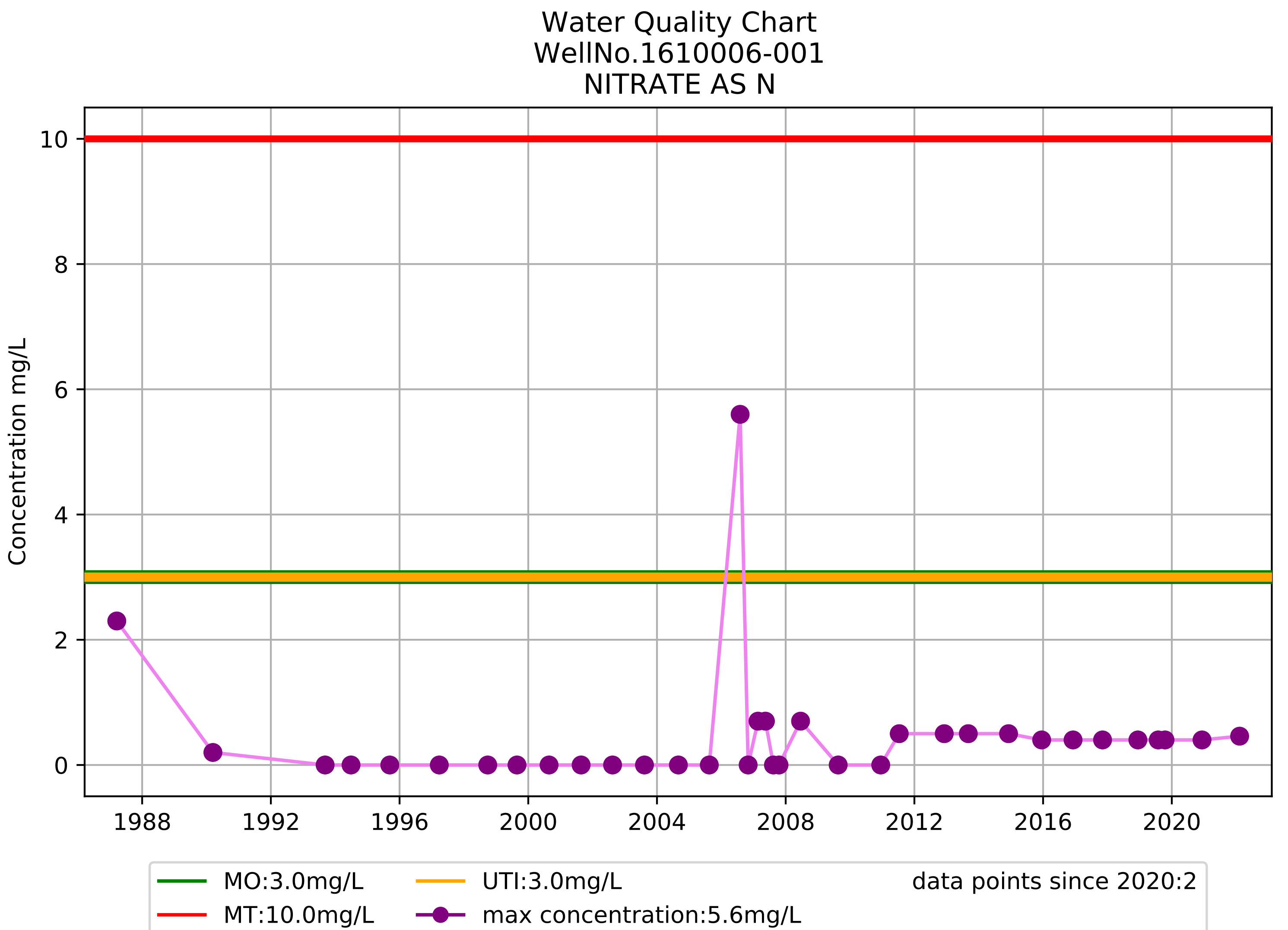


Water Quality Chart
WellNo.1610005-020
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
2008
2010
2012
2014
2016
2018
2020
2022
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.5mg/L
data points since 2020:4

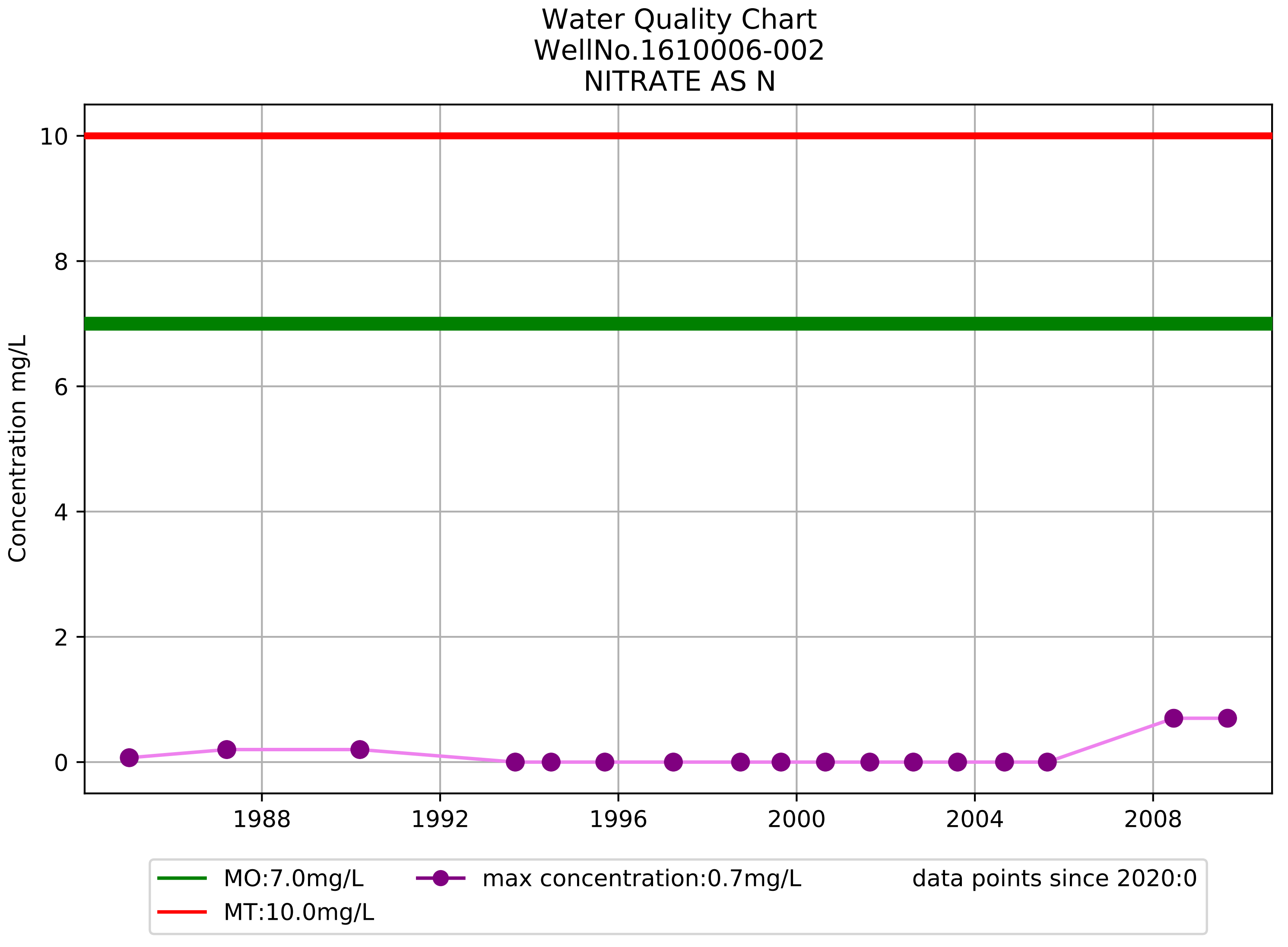

Water Quality Chart
WellNo.1610005-021
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
2012
2014
2016
2018
2020
2022
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.5mg/L
data points since 2020:3



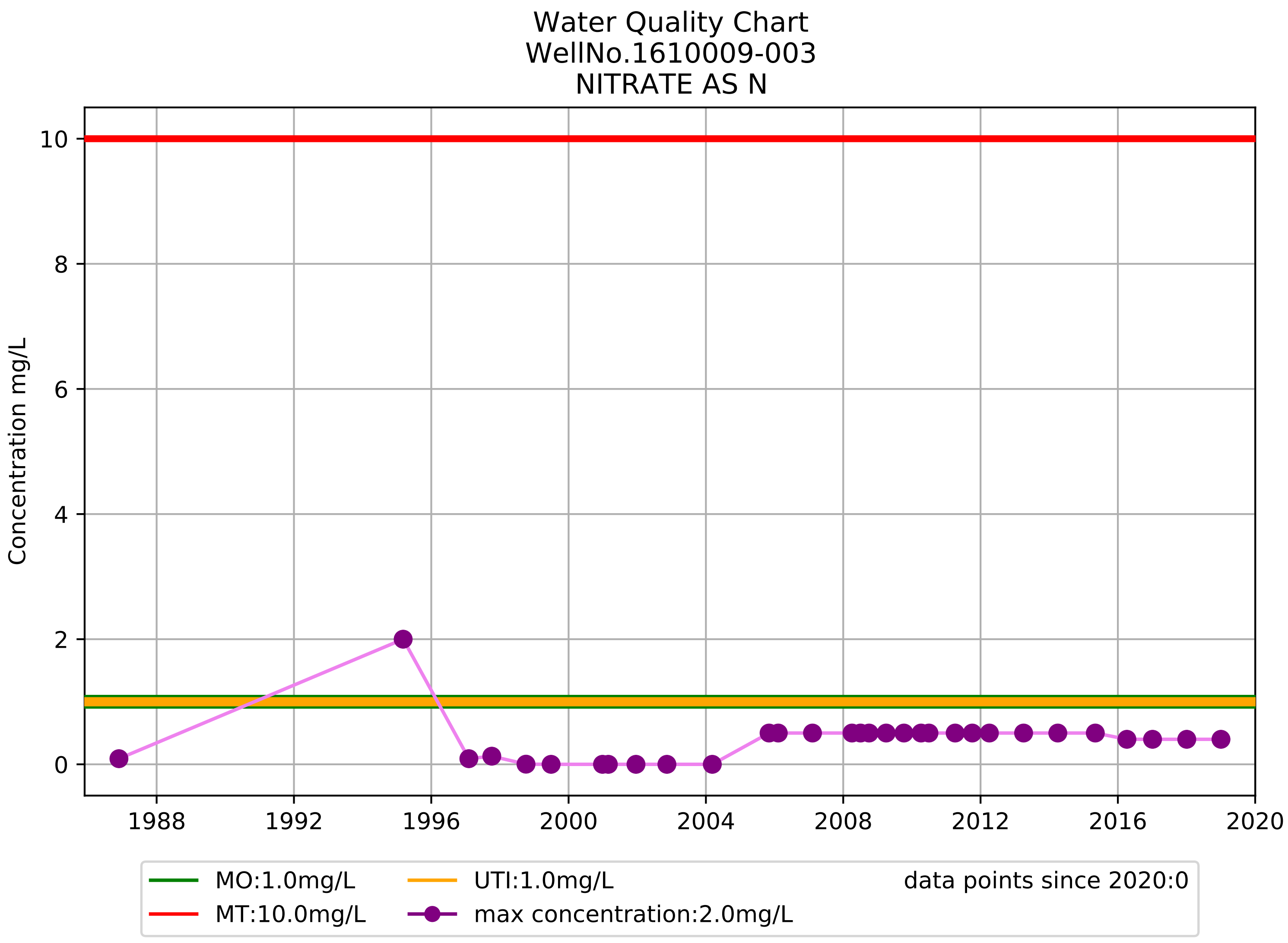
Water Quality Chart
WellNo.1610005-022
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
2012
2014
2016
2018
2020
2022
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.5mg/L
data points since 2020:3



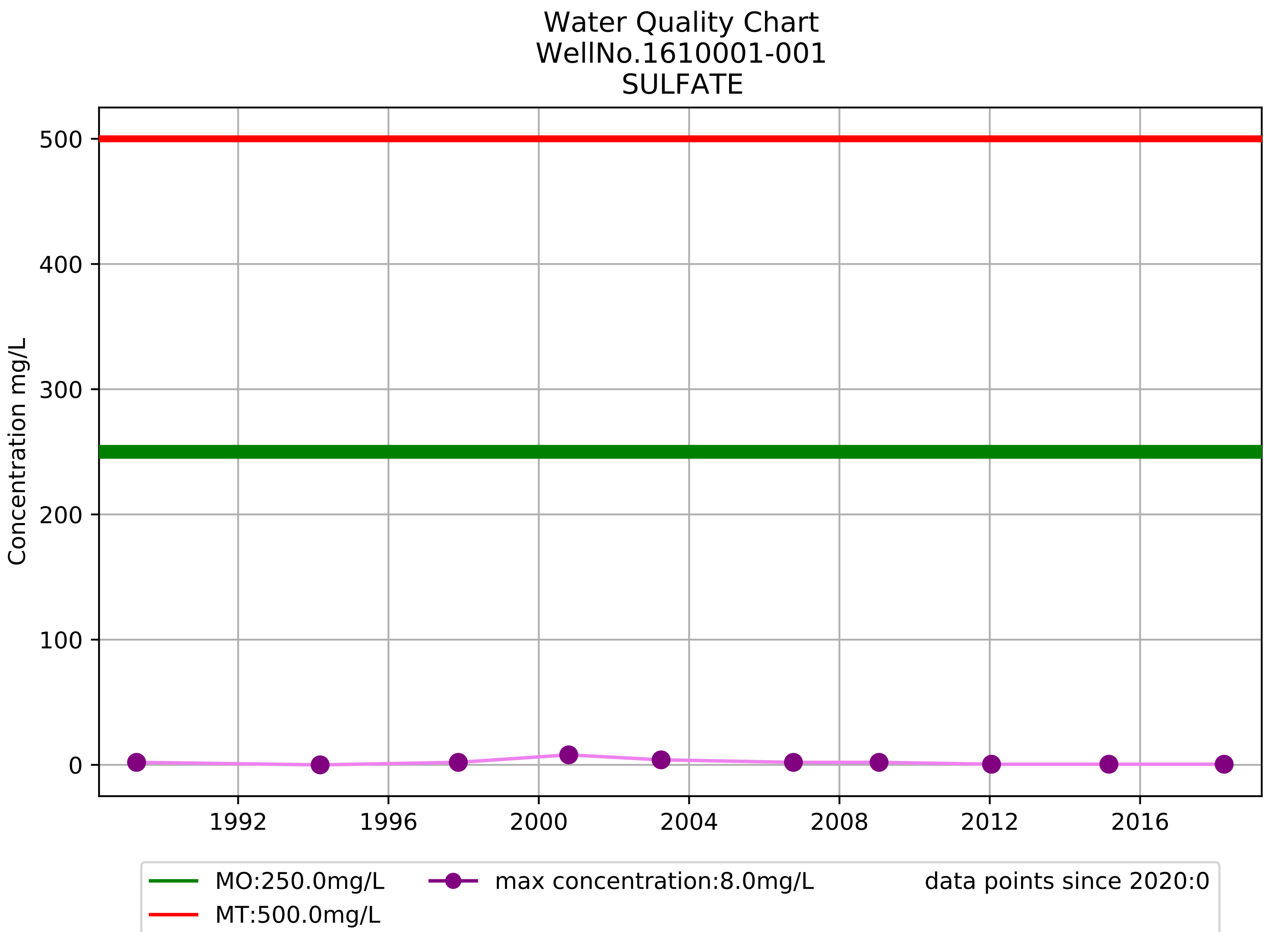
Water Quality Chart
WellNo.1610006-001
NITRATE AS N
Concentration mg/L
10
8
6
4
2
0
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:3.0mg/L
UTI:3.0mg/L
data points since 2020:2
MT:10.0mg/L
max concentration:5.6mg/L



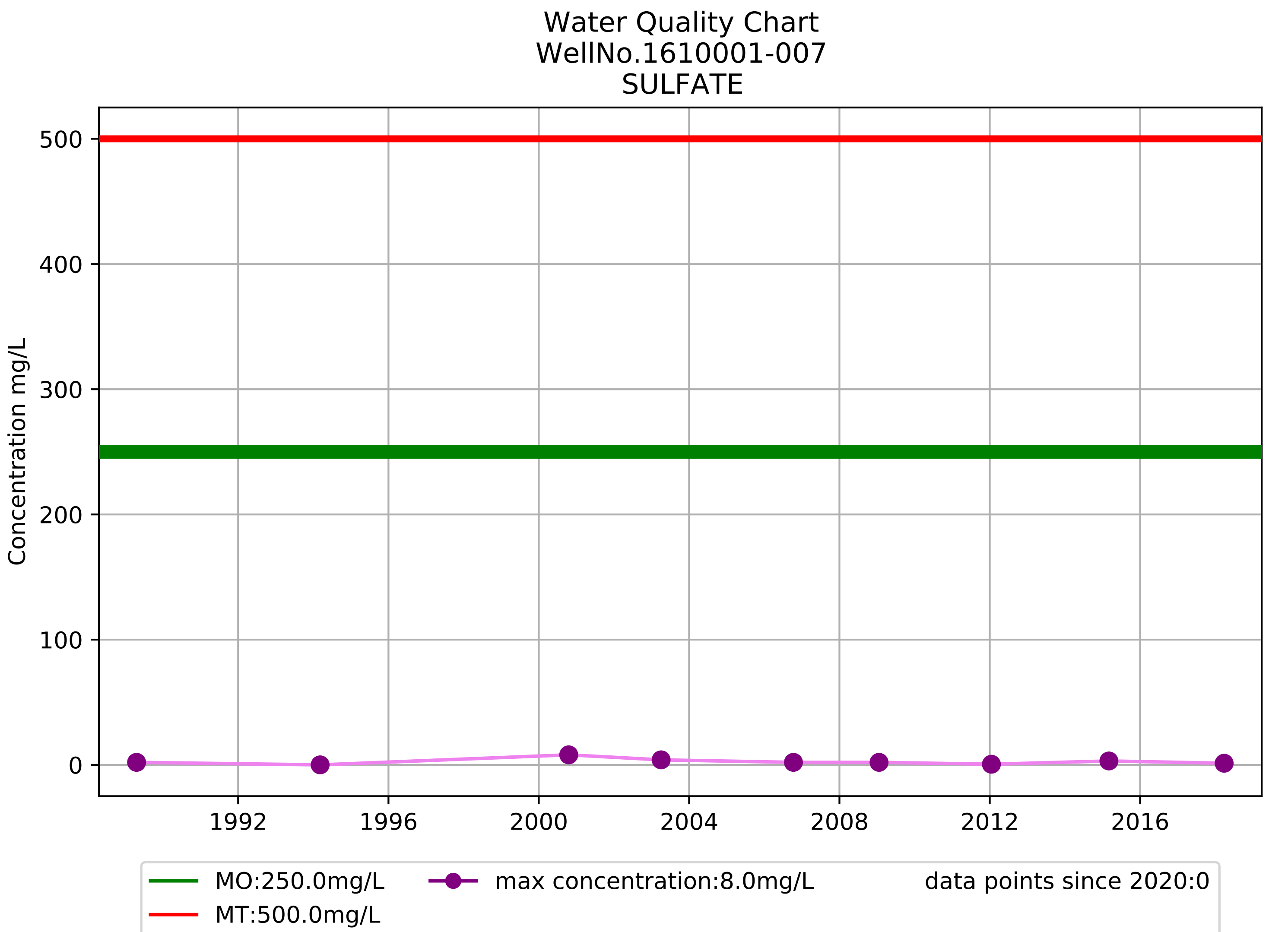
Water Quality Chart
WellNo.1610006-002
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
1988
1992
1996
2000
2004
2008
MO:7.0mg/L
MT:10.0mg/L
max concentration:0.7mg/L
data points since 2020:0

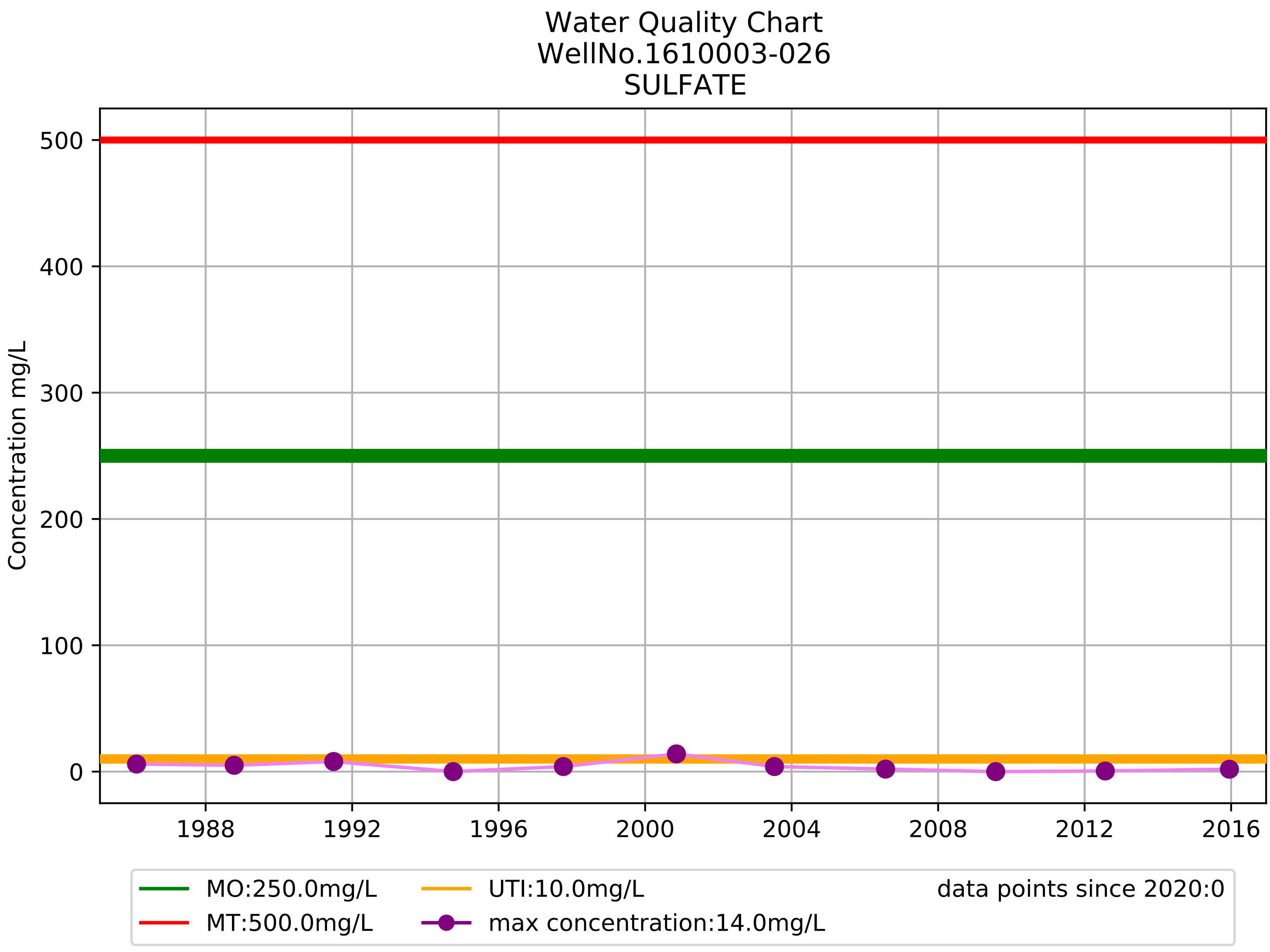


Water Quality Chart
WellNo.1610009-003
NITRATE AS N
Concentration mg/L
0
2
4
6
8
10
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:1.0mg/L
MT:10.0mg/L
UTI:1.0mg/L
max concentration:2.0mg/L
data points since 2020:0

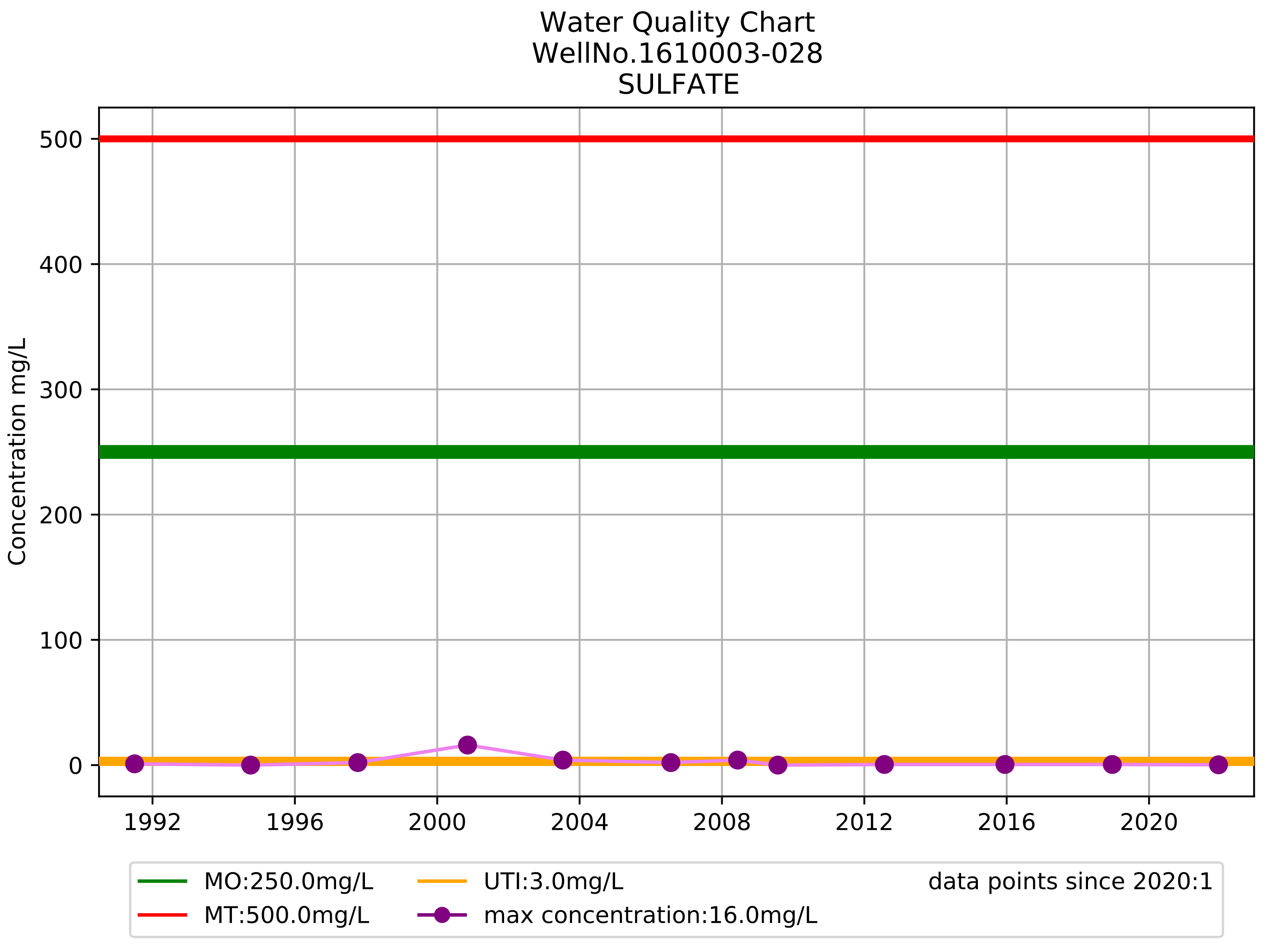


Water Quality Chart
WellNo.1610001-001
SULFATE
Concentration mg/L
500
400
300
200
100
0
1992
1996
2000
2004
2008
2012
2016
MO:250.0mg/L
MT:500.0mg/L
max concentration:8.0mg/L
data points since 2020:0

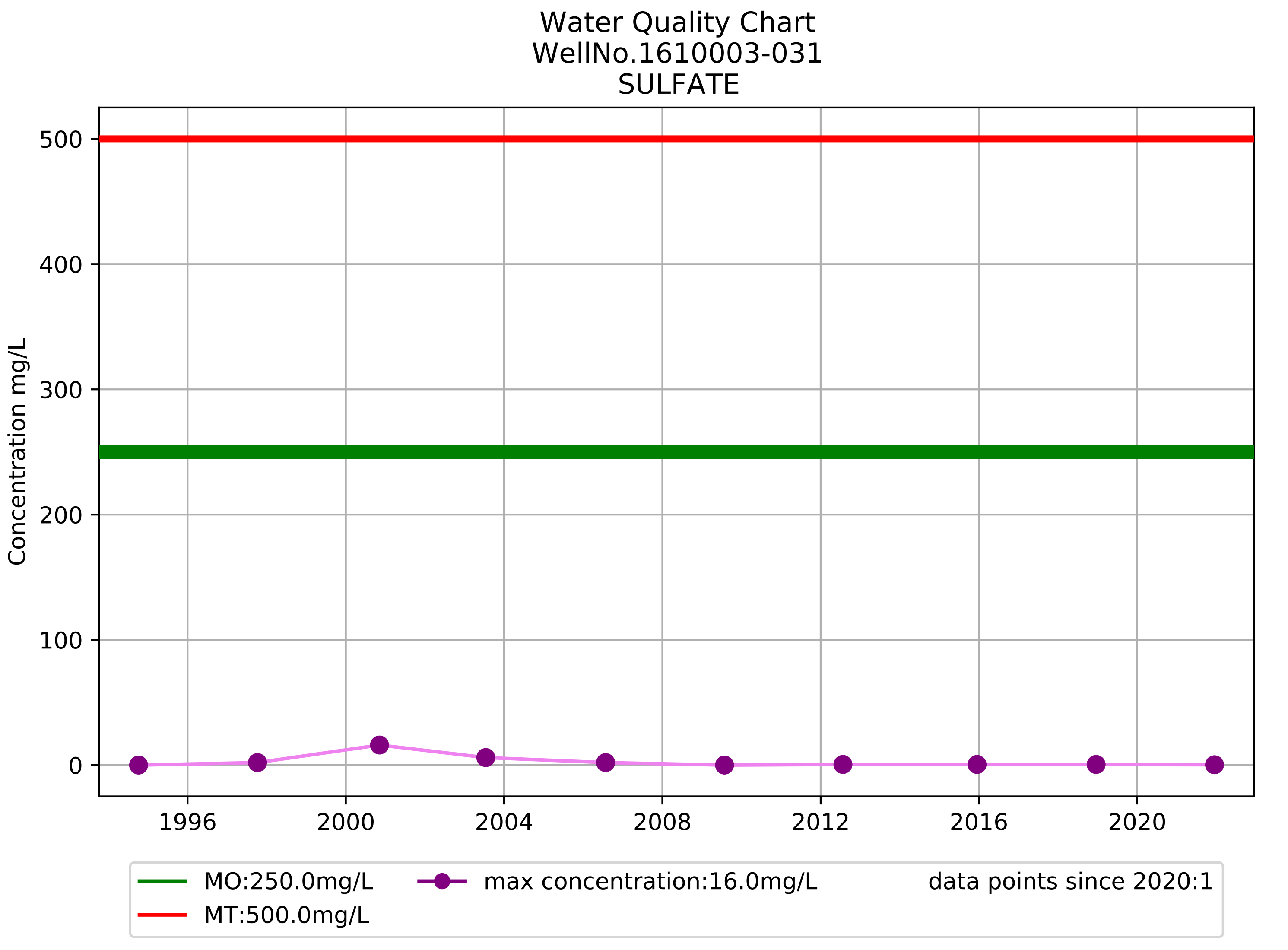

Water Quality Chart
WellNo.1610001-007
SULFATE
Concentration mg/L
500
400
300
200
100
0
1992
1996
2000
2004
2008
2012
2016
MO:250.0mg/L
MT:500.0mg/L
max concentration:8.0mg/L
data points since 2020:0

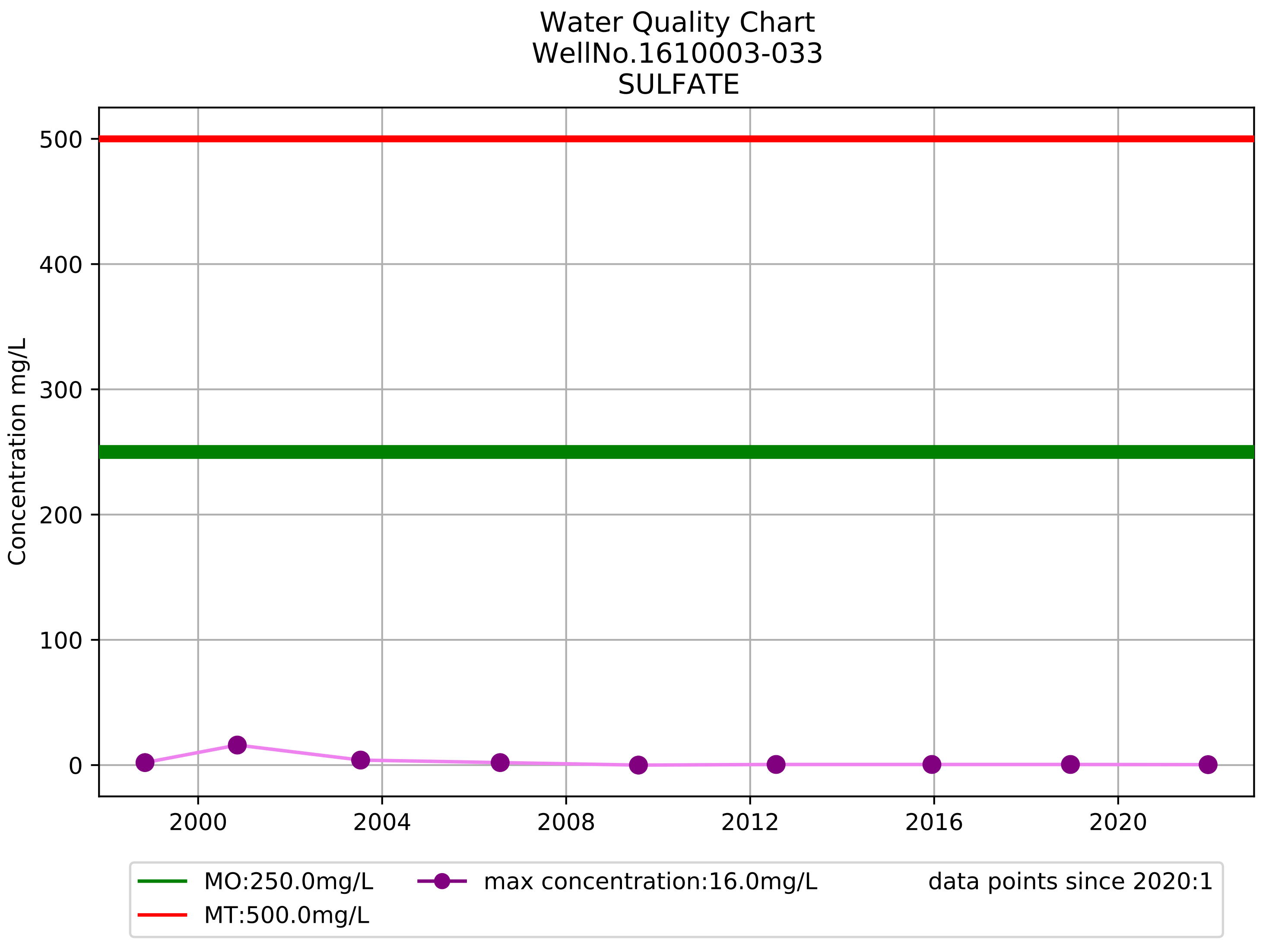


Water Quality Chart
WellNo.1610003-026
SULFATE
Concentration mg/L
500
400
300
200
100
0
1988
1992
1996
2000
2004
2008
2012
2016
MO:250.0mg/L
MT:500.0mg/L
UTI:10.0mg/L
max concentration:14.0mg/L
data points since 2020:0

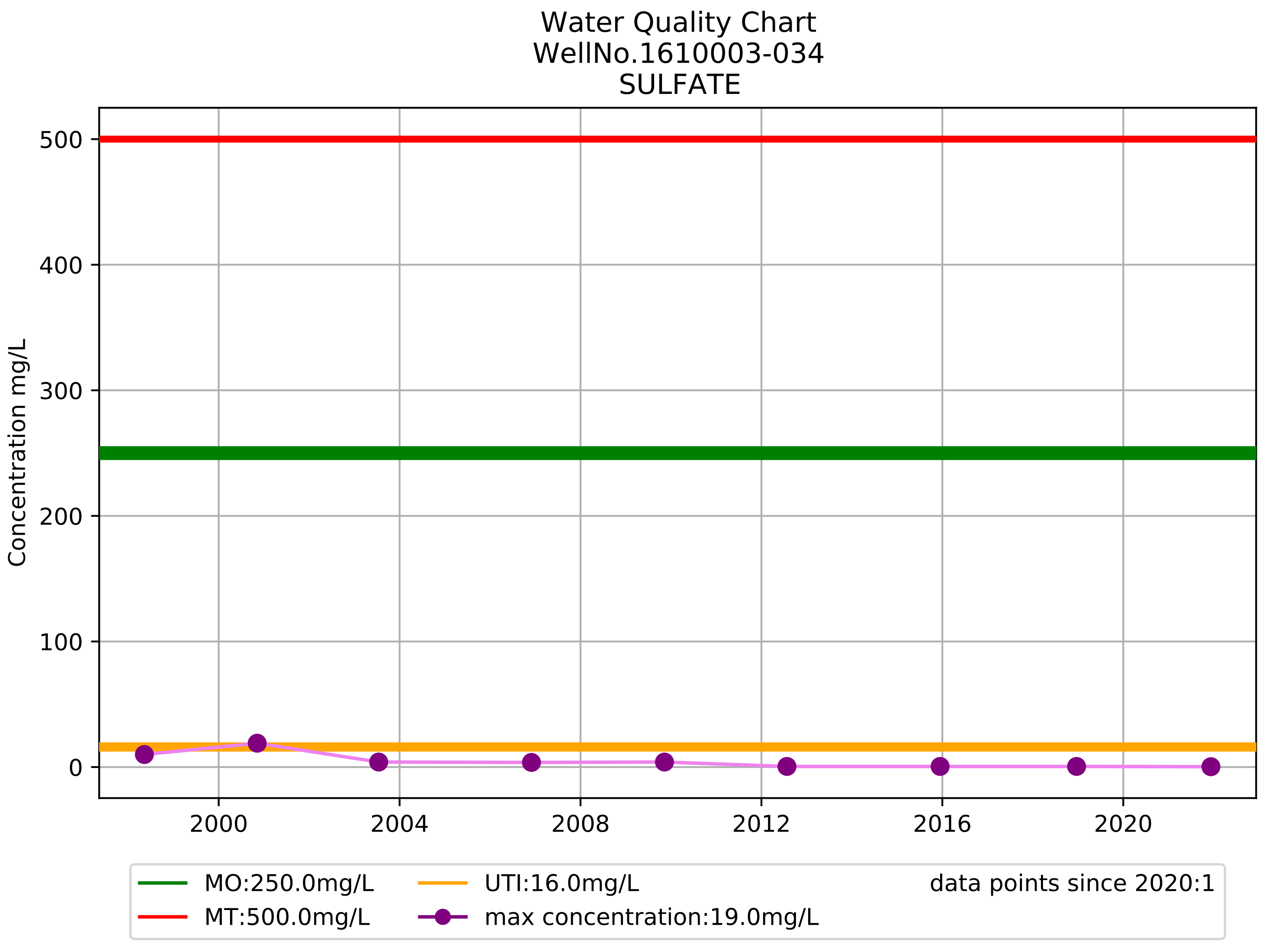


Water Quality Chart
WellNo.1610003-028
SULFATE
Concentration mg/L
500
400
300
200
100
0
1992
1996
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:3.0mg/L
max concentration:16.0mg/L
data points since 2020:1

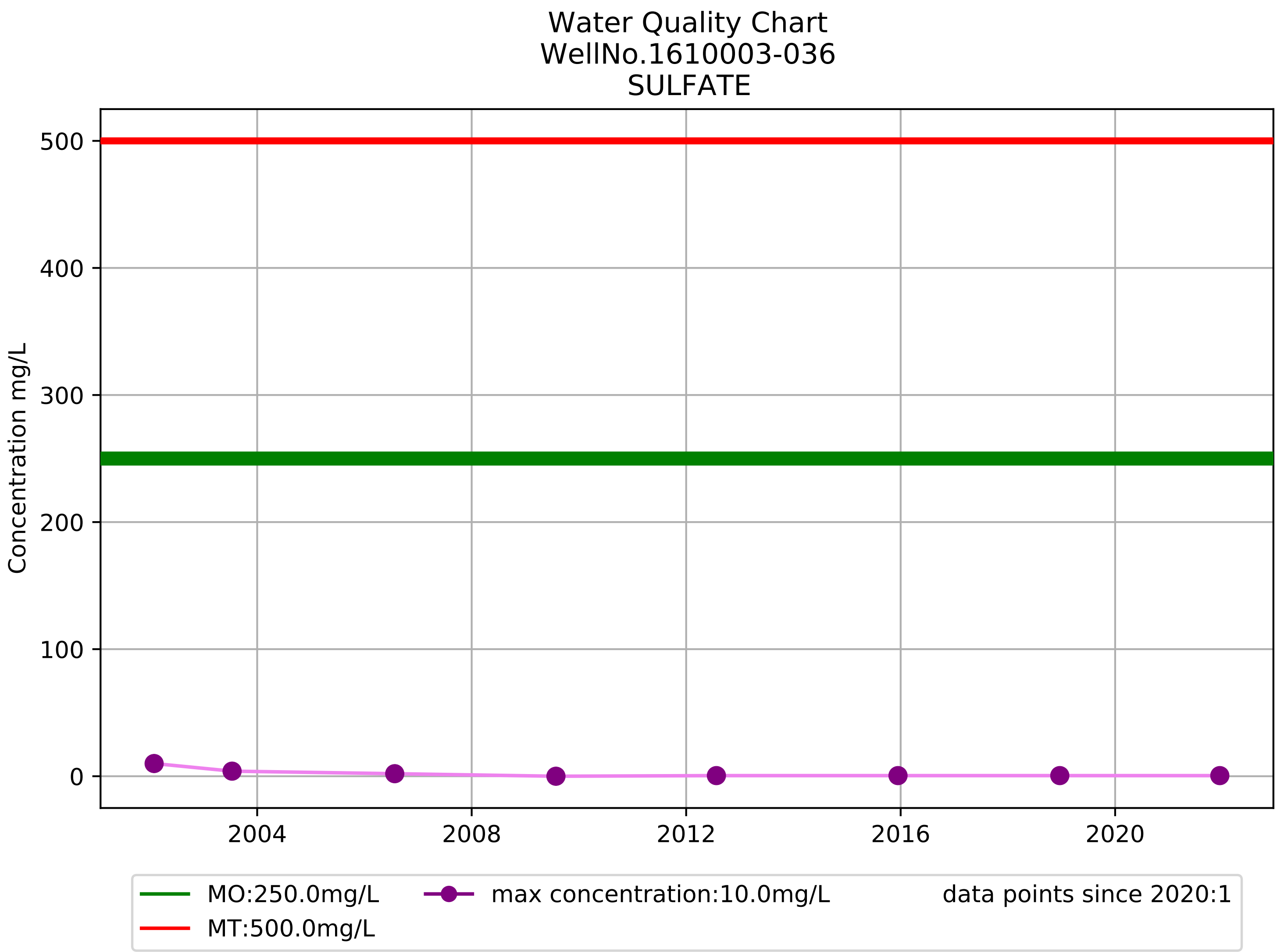

Water Quality Chart
WellNo.1610003-031
SULFATE
Concentration mg/L
500
400
300
200
100
0
1996
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
max concentration:16.0mg/L
data points since 2020:1

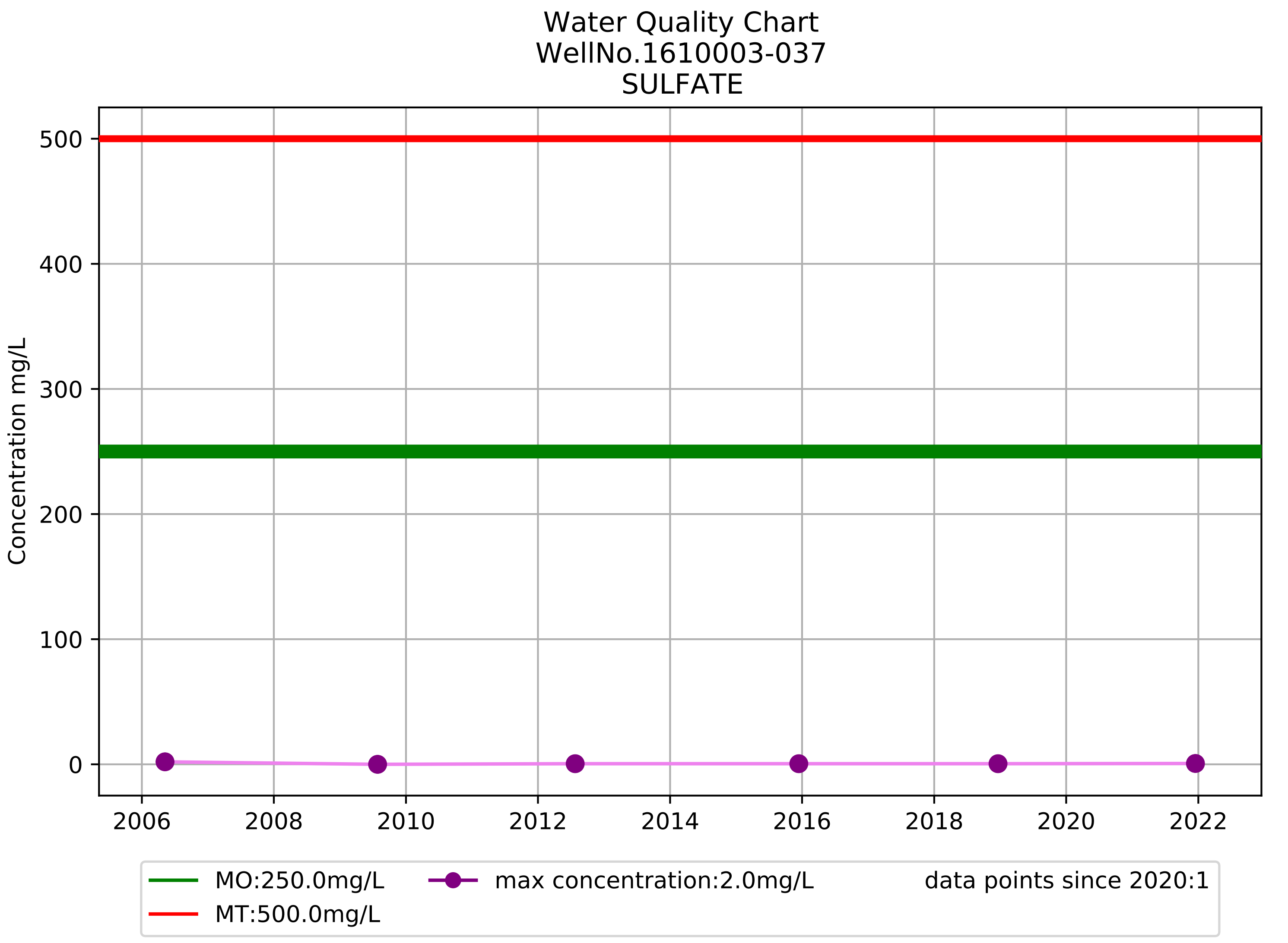


Water Quality Chart
WellNo.1610003-033
SULFATE
Concentration mg/L
500
400
300
200
100
0
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
max concentration:16.0mg/L
data points since 2020:1

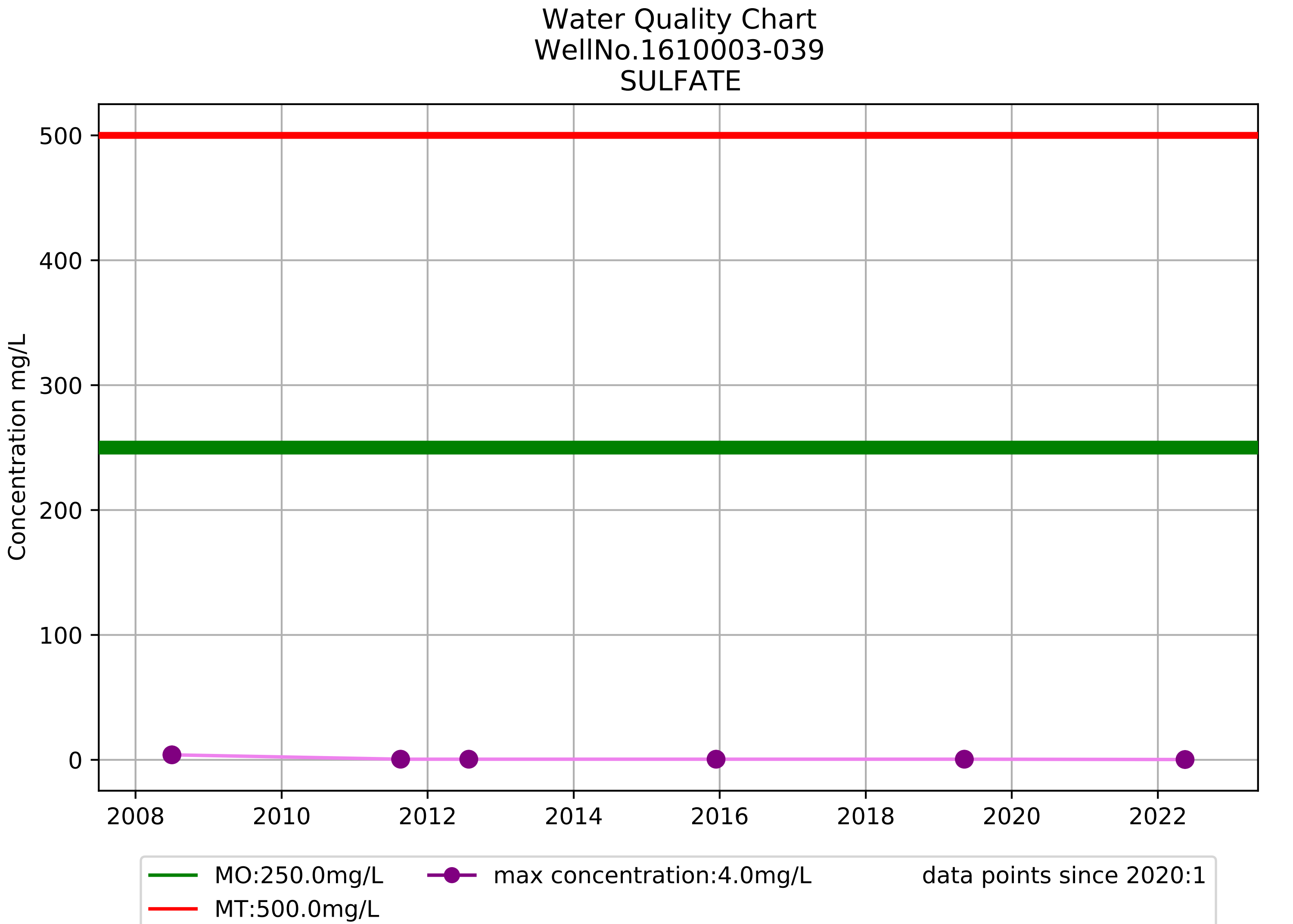


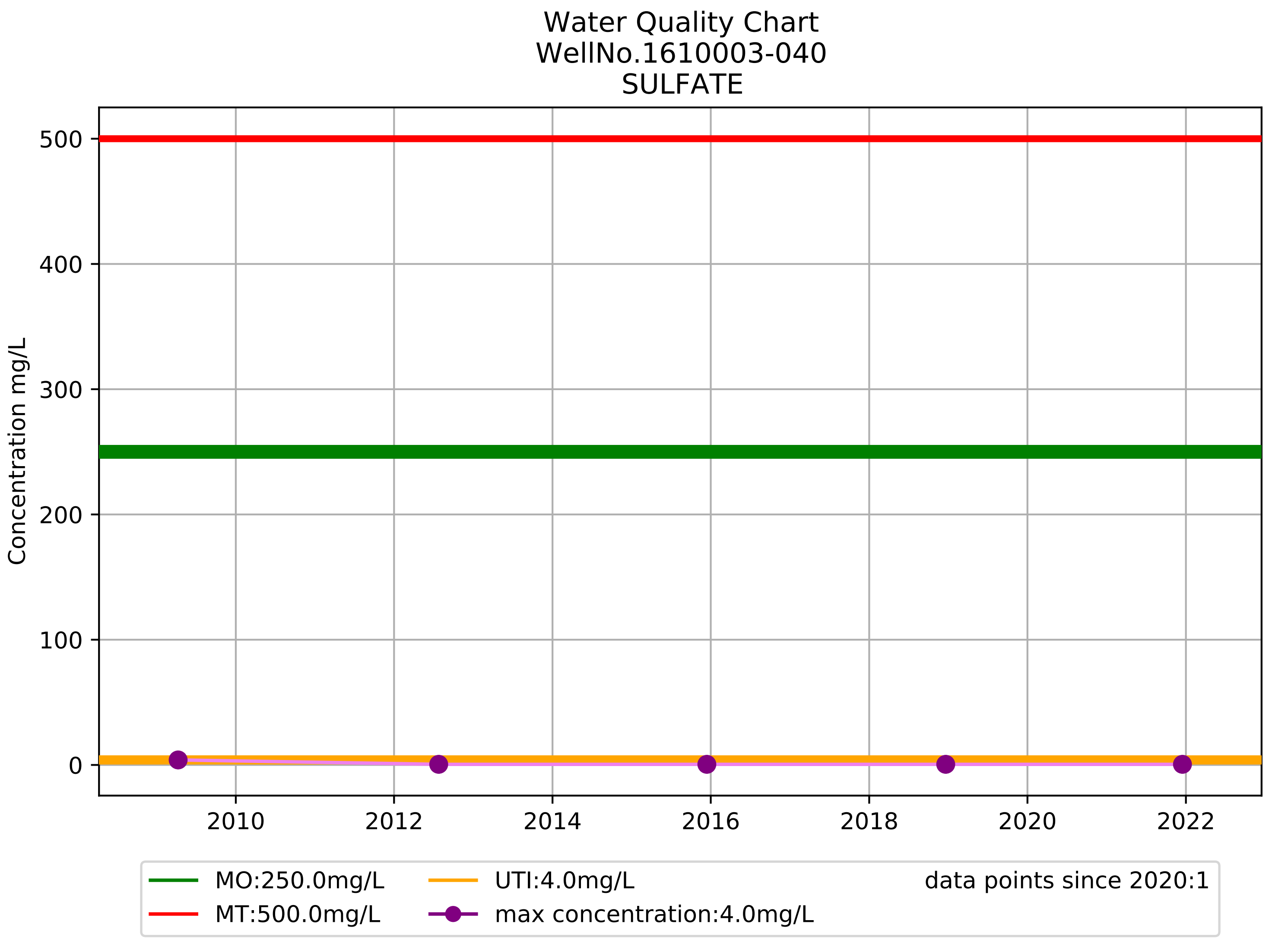
Water Quality Chart
WellNo.1610003-034
SULFATE
Concentration mg/L
500
400
300
200
100
0
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:16.0mg/L
max concentration:19.0mg/L
data points since 2020:1


Water Quality Chart
WellNo.1610003-036
SULFATE
Concentration mg/L
500
400
300
200
100
0
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
max concentration:10.0mg/L
data points since 2020:1

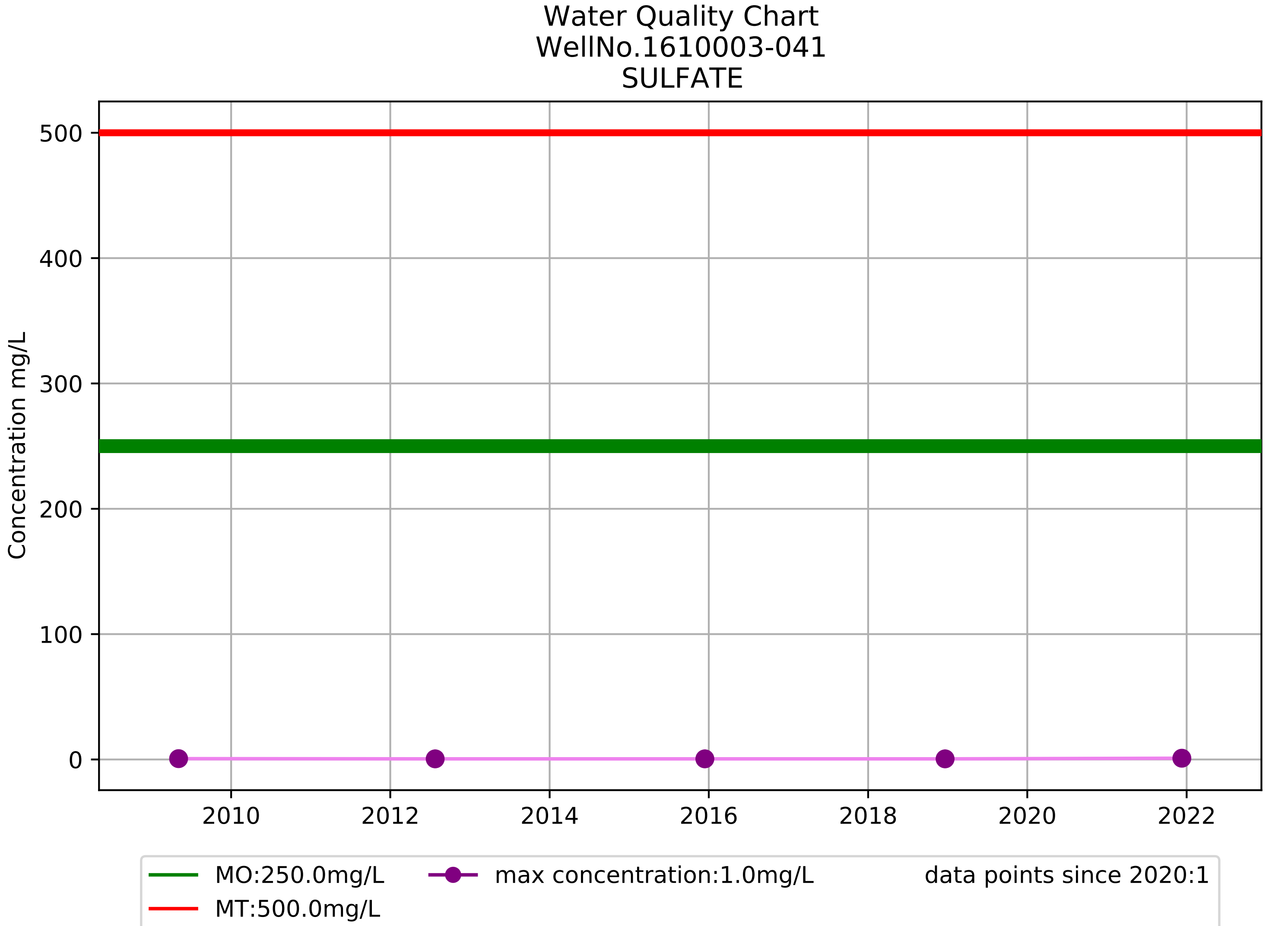


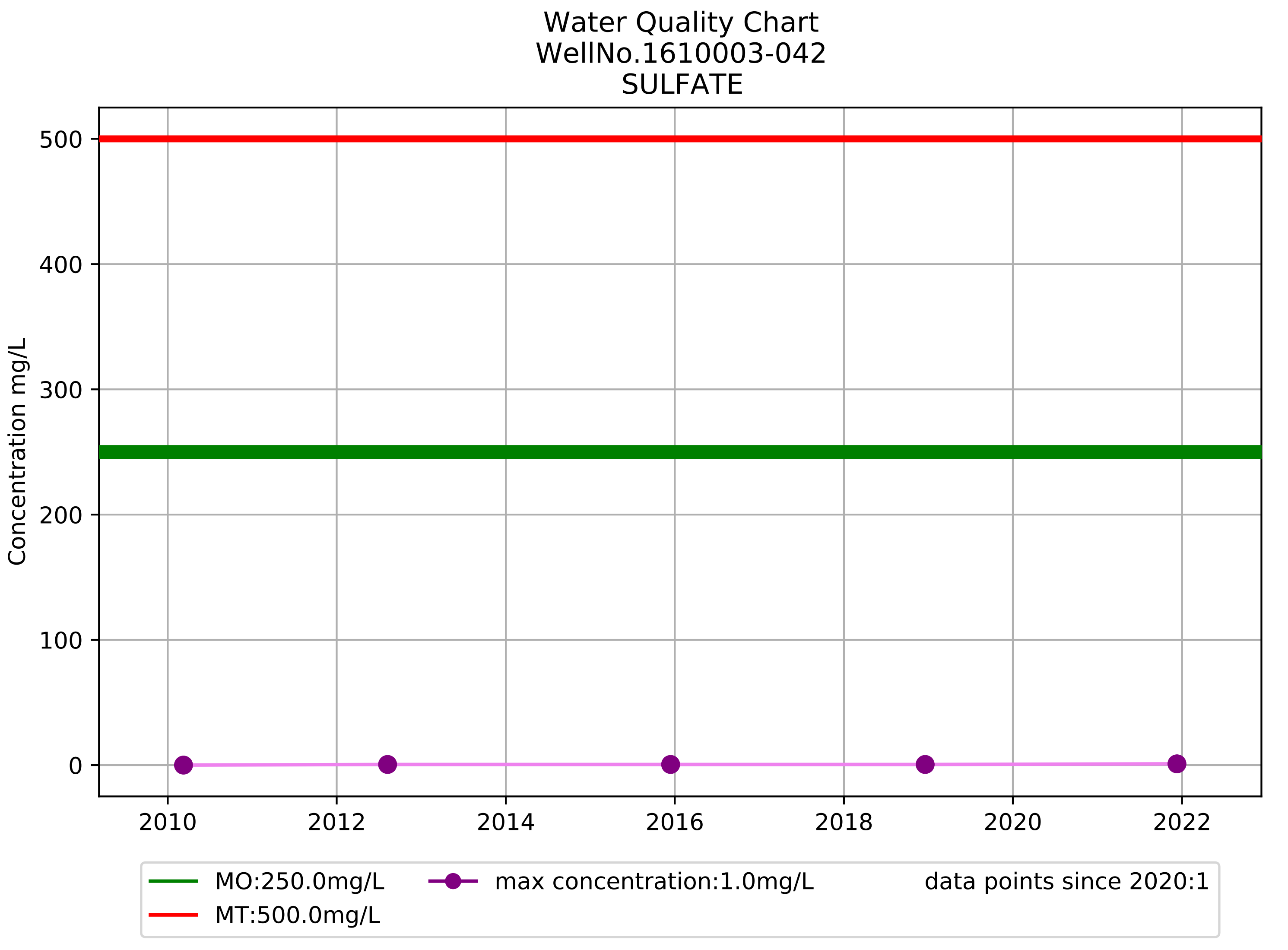
Water Quality Chart
WellNo.1610003-037
SULFATE
Concentration mg/L
500
400
300
200
100
0
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
max concentration:2.0mg/L
data points since 2020:1


Water Quality Chart
WellNo.1610003-039
SULFATE
Concentration mg/L
500
400
300
200
100
0
2008
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
max concentration:4.0mg/L
data points since 2020:1

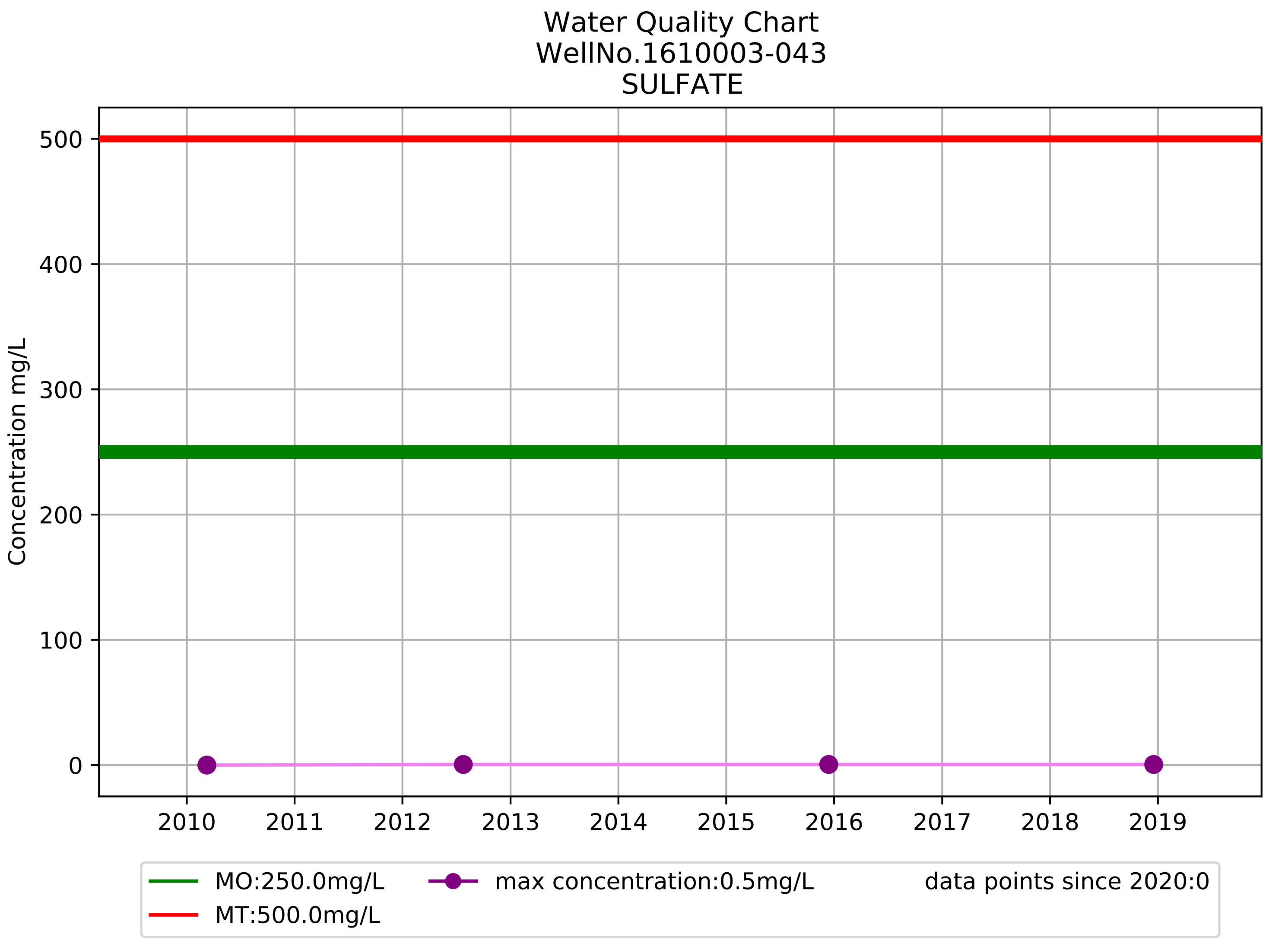


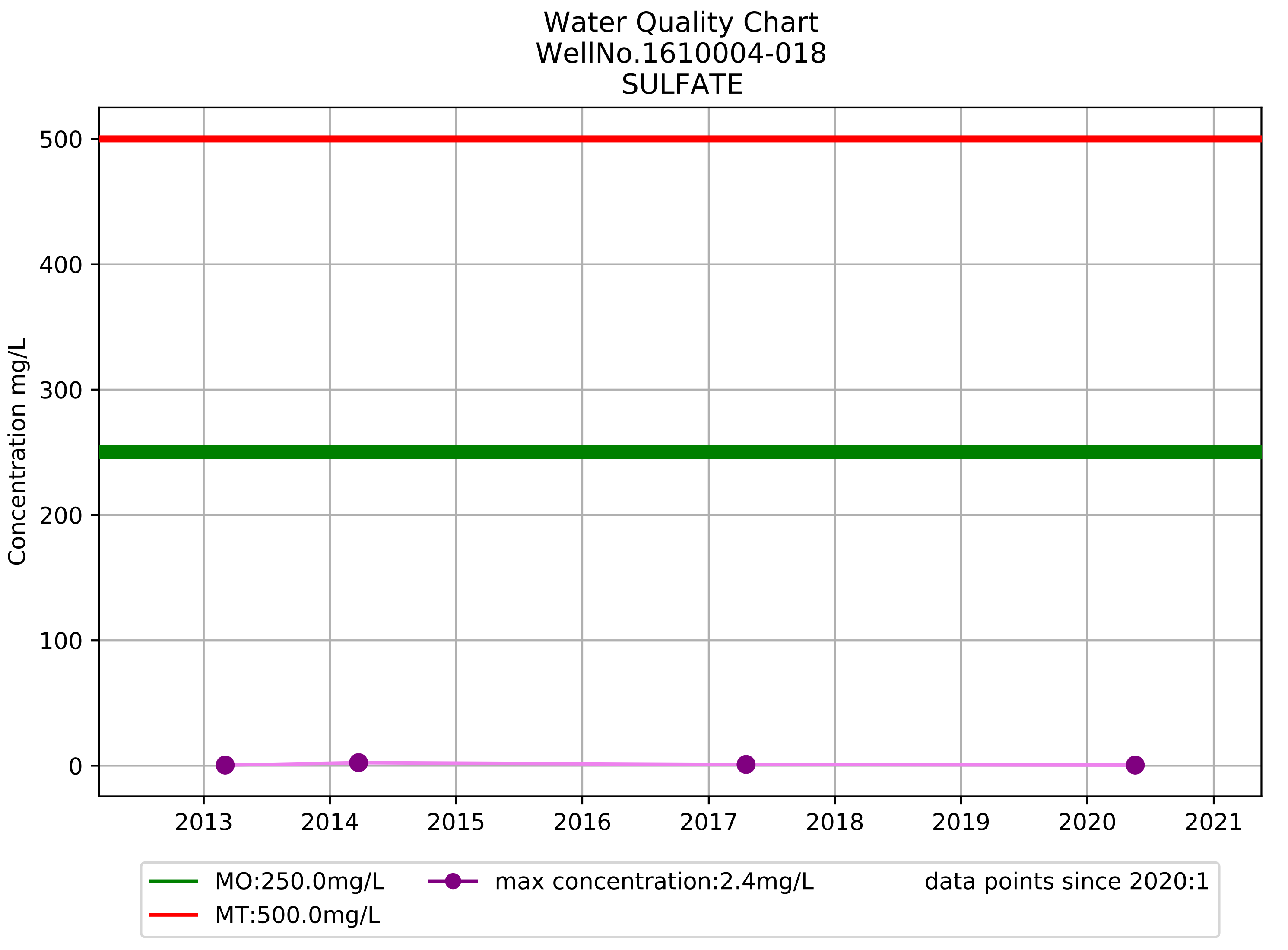
Water Quality Chart
WellNo.1610003-040
SULFATE
Concentration mg/L
0
100
200
300
400
500
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
UTI:4.0mg/L
max concentration:4.0mg/L
data points since 2020:1


Water Quality Chart
WellNo.1610003-041
SULFATE
Concentration mg/L
500
400
300
200
100
0
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
max concentration:1.0mg/L
data points since 2020:1

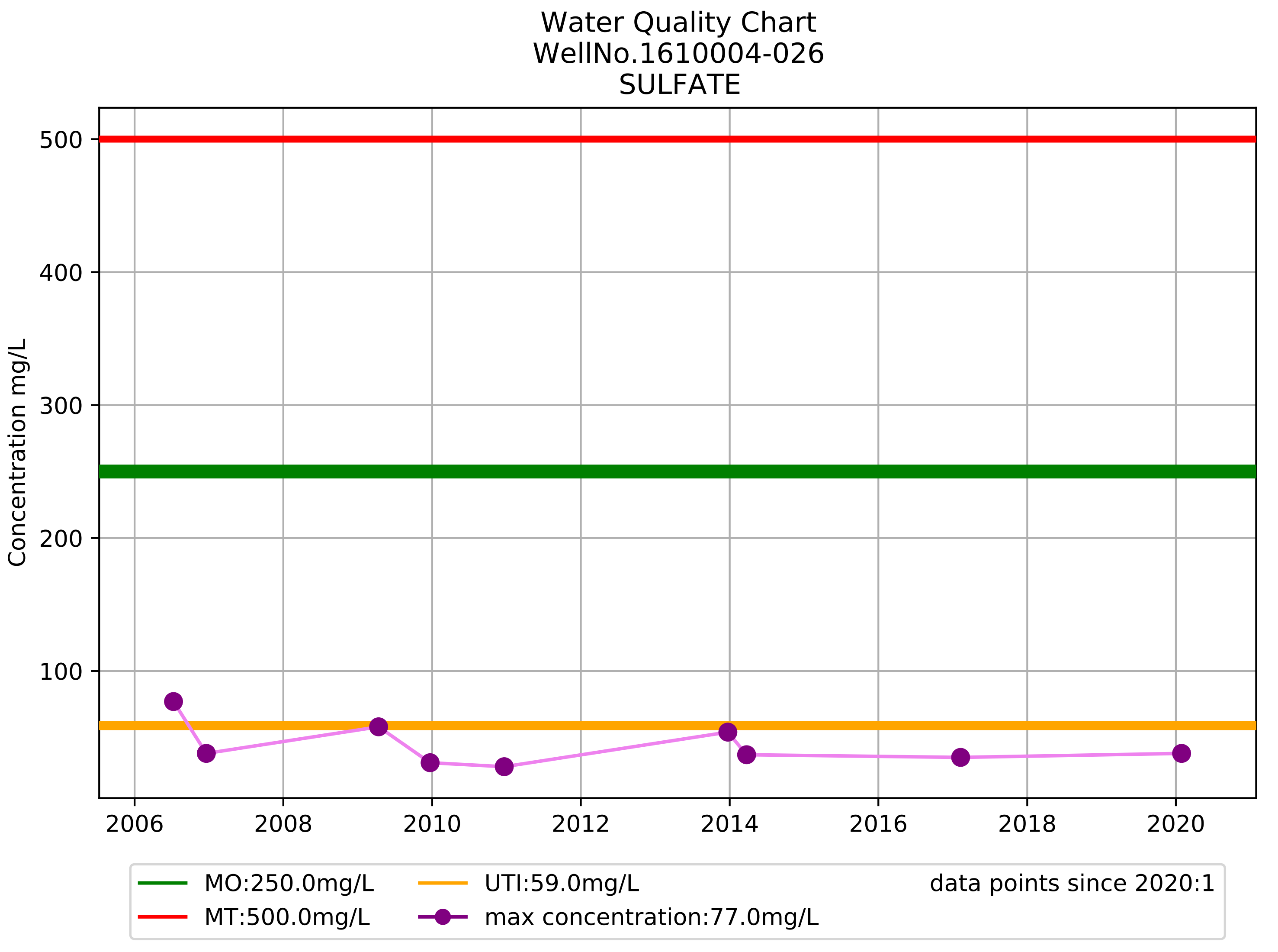


Water Quality Chart
WellNo.1610003-042
SULFATE
Concentration mg/L
500
400
300
200
100
0
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
max concentration:1.0mg/L
data points since 2020:1

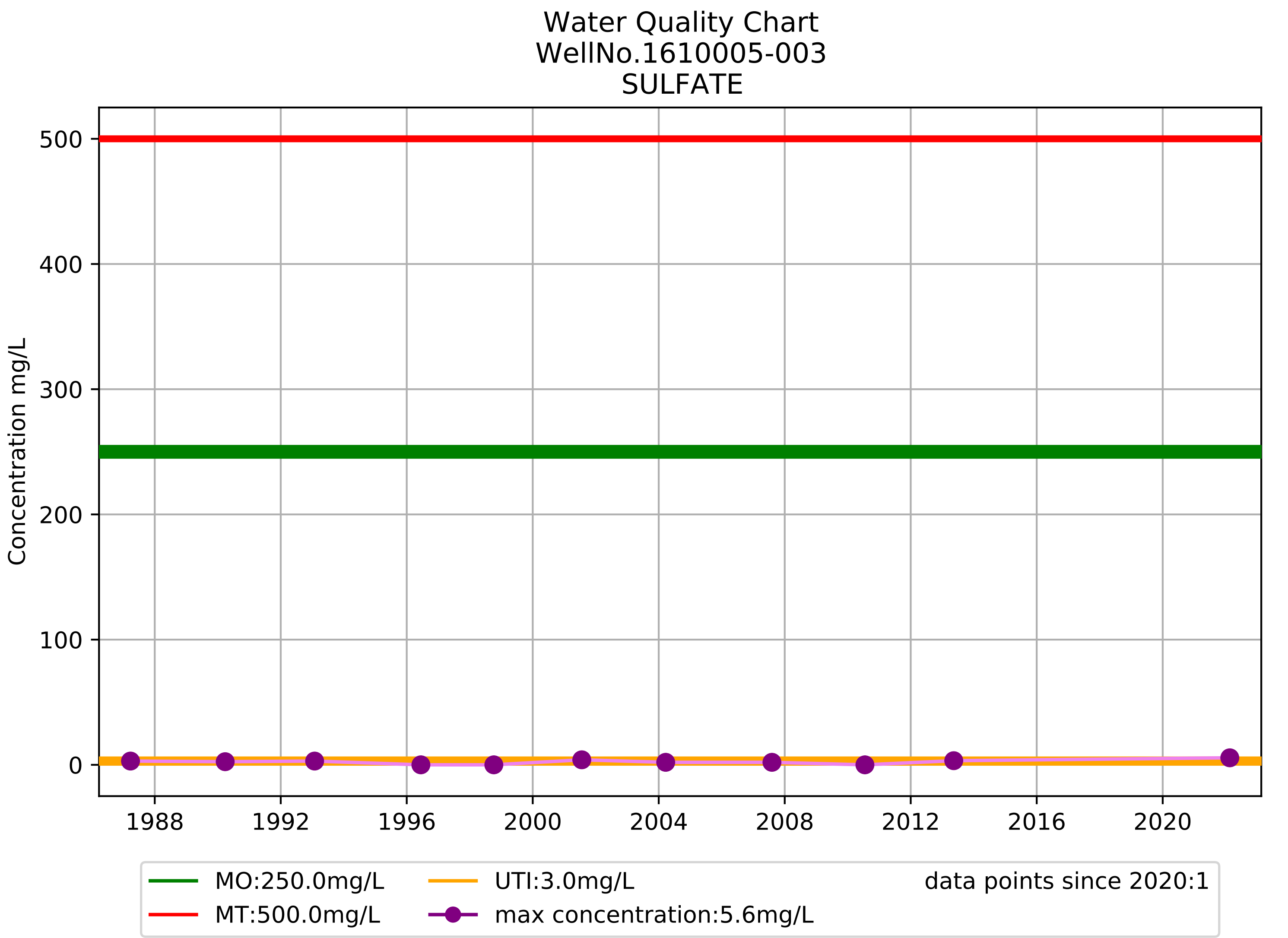

Water Quality Chart
WellNo.1610003-043
SULFATE
Concentration mg/L
500
400
300
200
100
0
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MO:250.0mg/L
MT:500.0mg/L
max concentration:0.5mg/L
data points since 2020:0



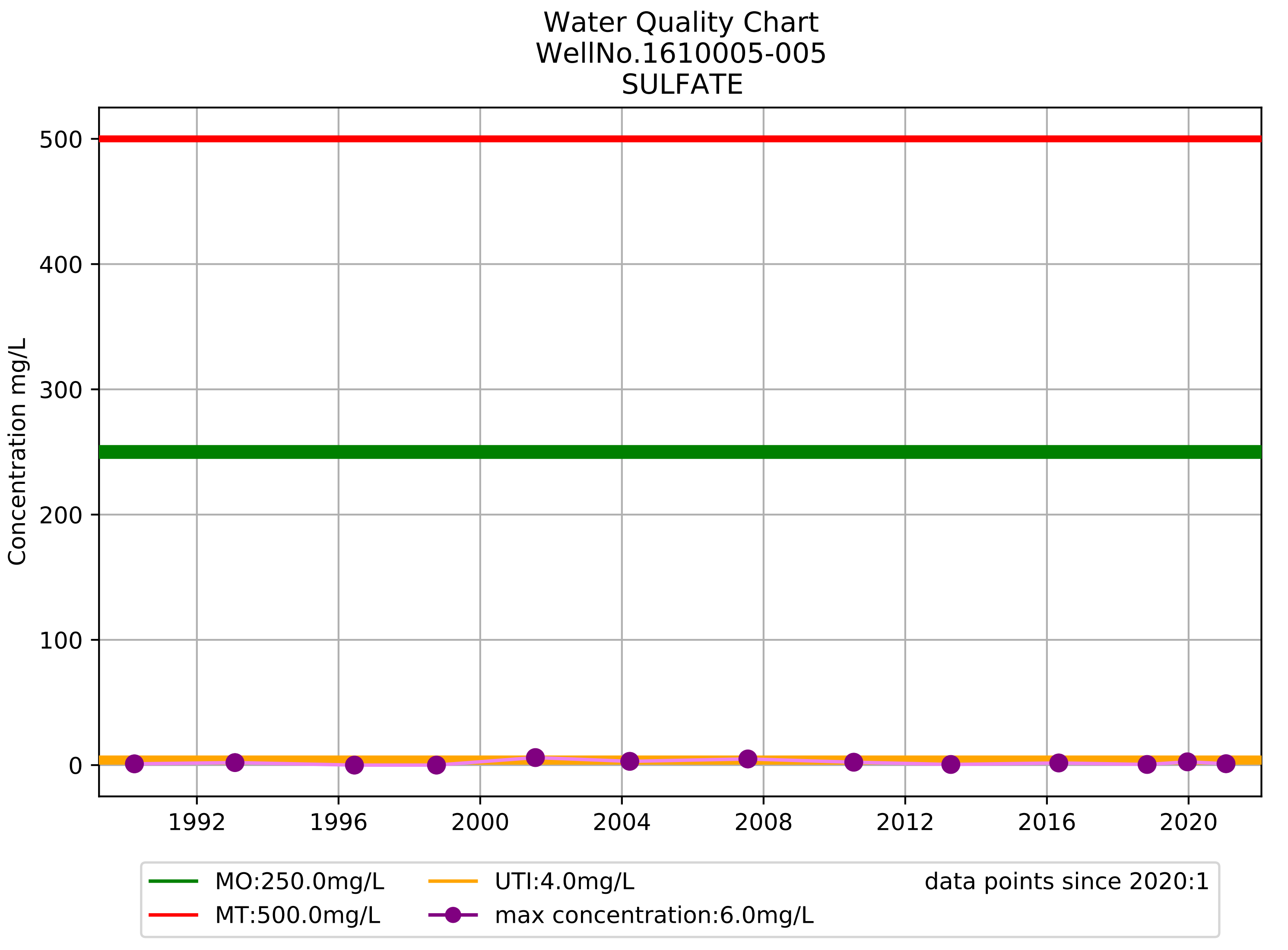
Water Quality Chart
WellNo.1610004-018
SULFATE
Concentration mg/L
500
400
300
200
100
0
2013
2014
2015
2016
2017
2018
2019
2020
2021
MO:250.0mg/L
MT:500.0mg/L
max concentration:2.4mg/L
data points since 2020:1

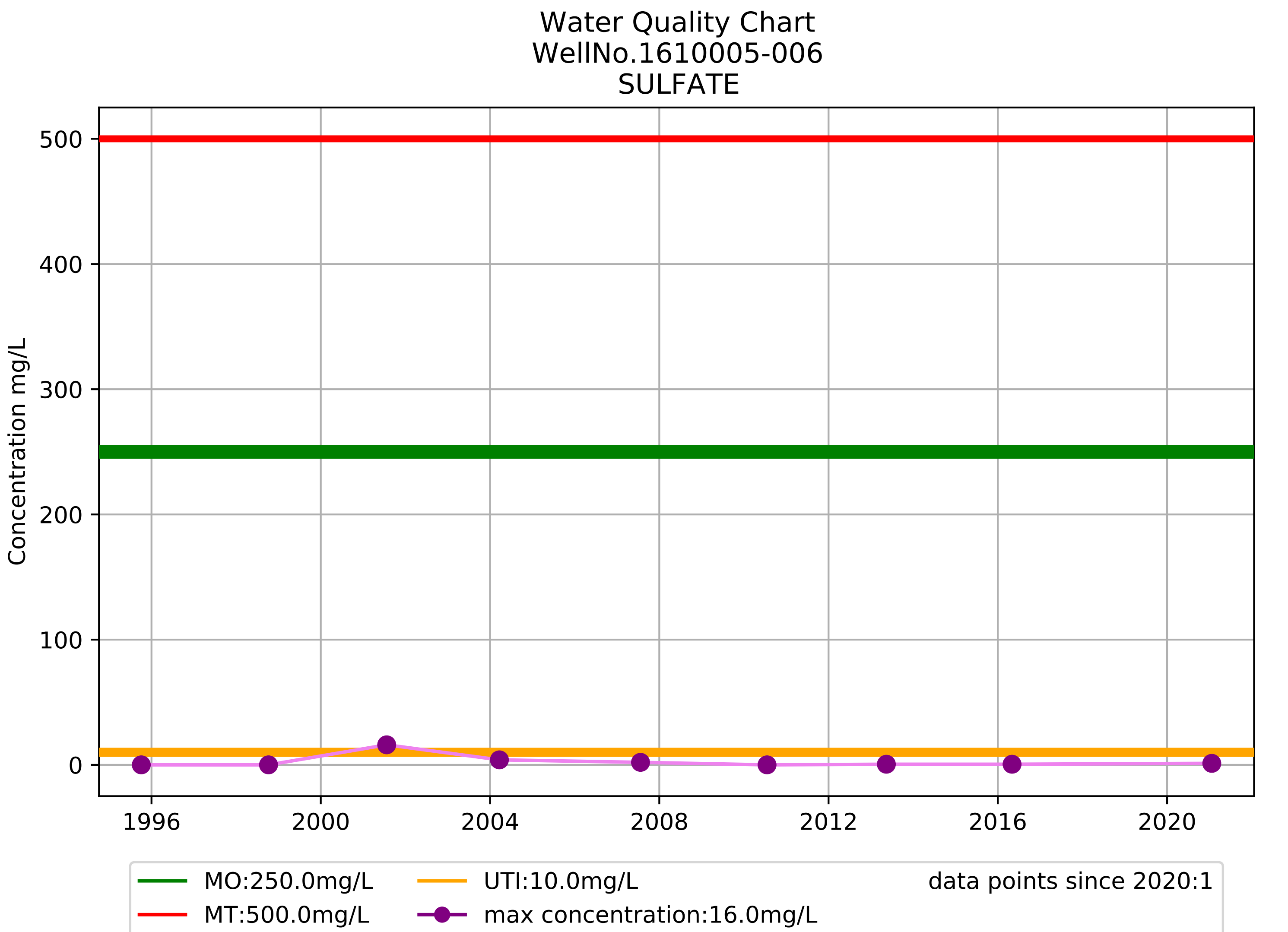


Water Quality Chart
WellNo.1610004-026
SULFATE
Concentration mg/L
500
400
300
200
100
2006
2008
2010
2012
2014
2016
2018
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:59.0mg/L
max concentration:77.0mg/L
data points since 2020:1

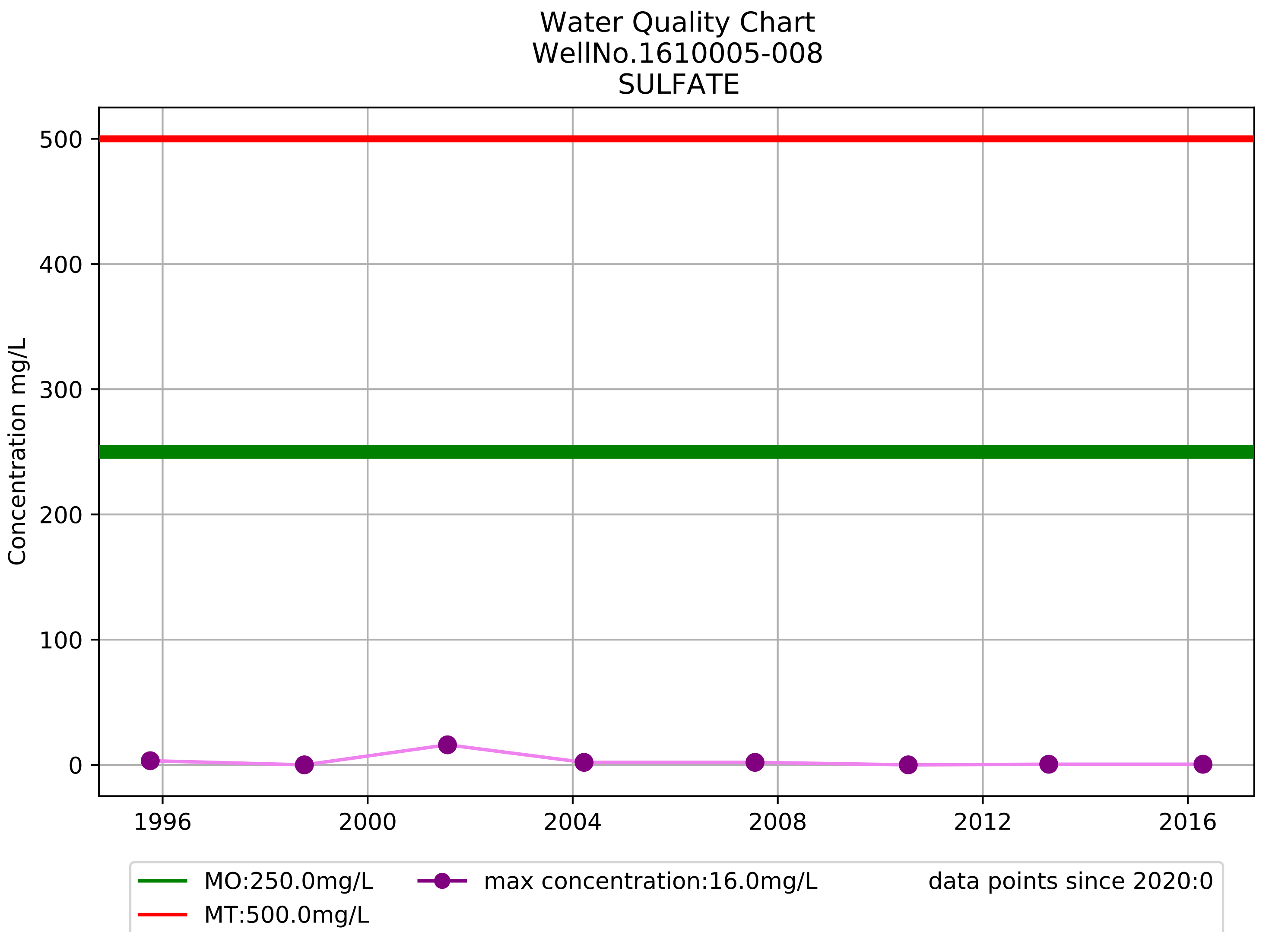


Water Quality Chart
WellNo.1610005-003
SULFATE
Concentration mg/L
500
400
300
200
100
0
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:3.0mg/L
max concentration:5.6mg/L
data points since 2020:1

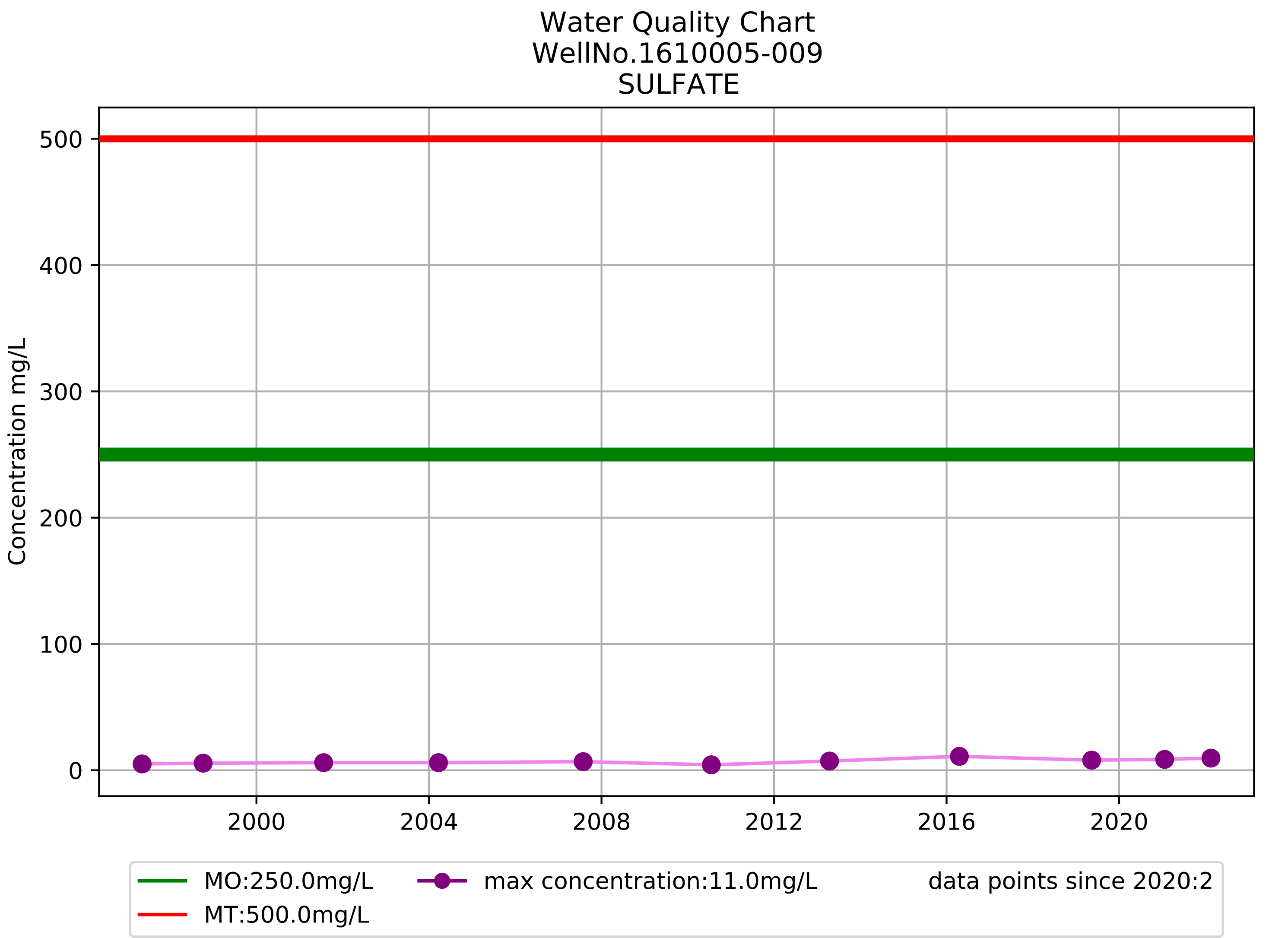

Water Quality Chart
WellNo.1610005-005
SULFATE
Concentration mg/L
500
400
300
200
100
0
1992
1996
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:4.0mg/L
max concentration:6.0mg/L
data points since 2020:1



Water Quality Chart
WellNo.1610005-006
SULFATE
Concentration mg/L
500
400
300
200
100
0
1996
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
UTI:10.0mg/L
max concentration:16.0mg/L
data points since 2020:1

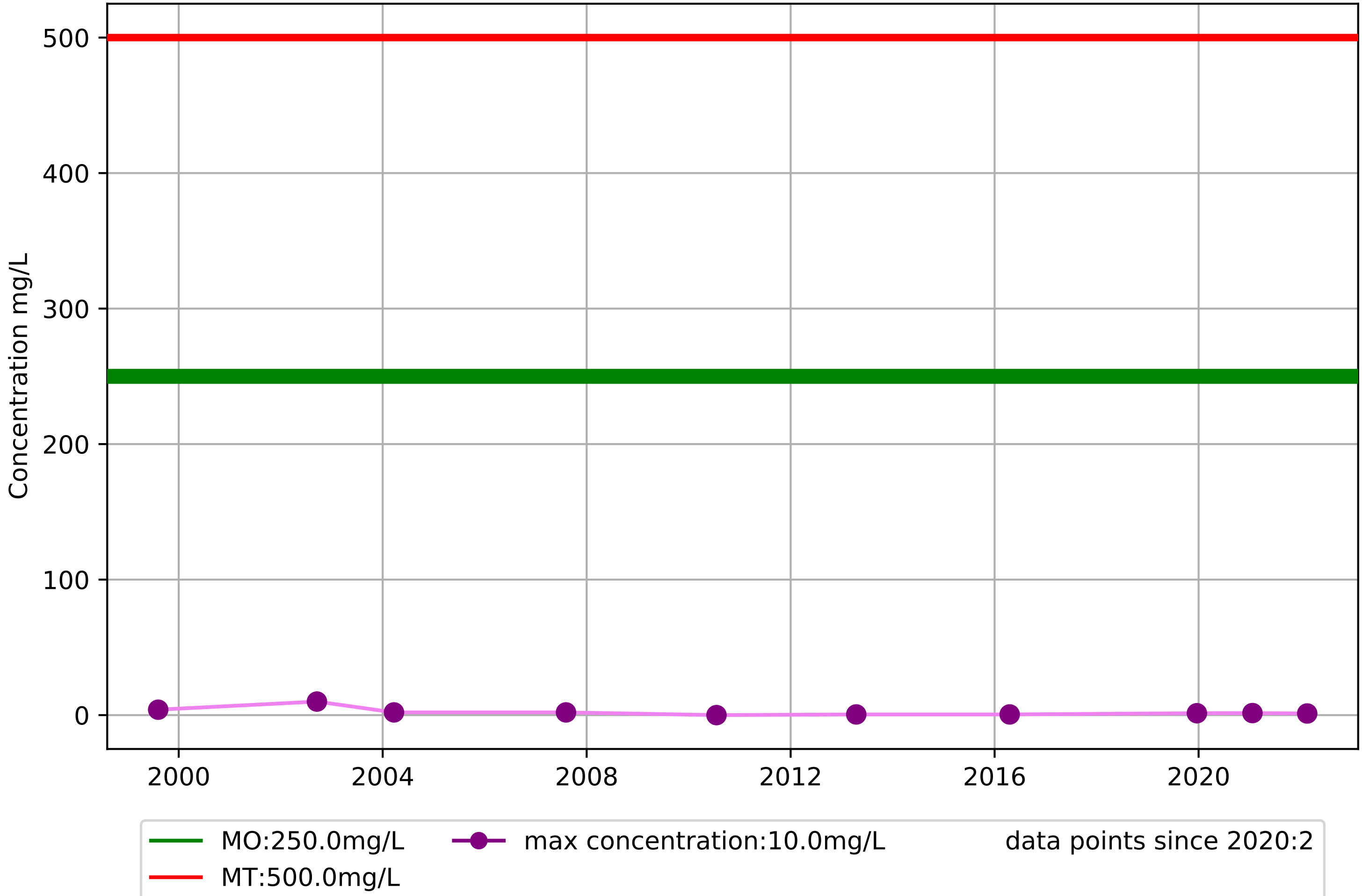


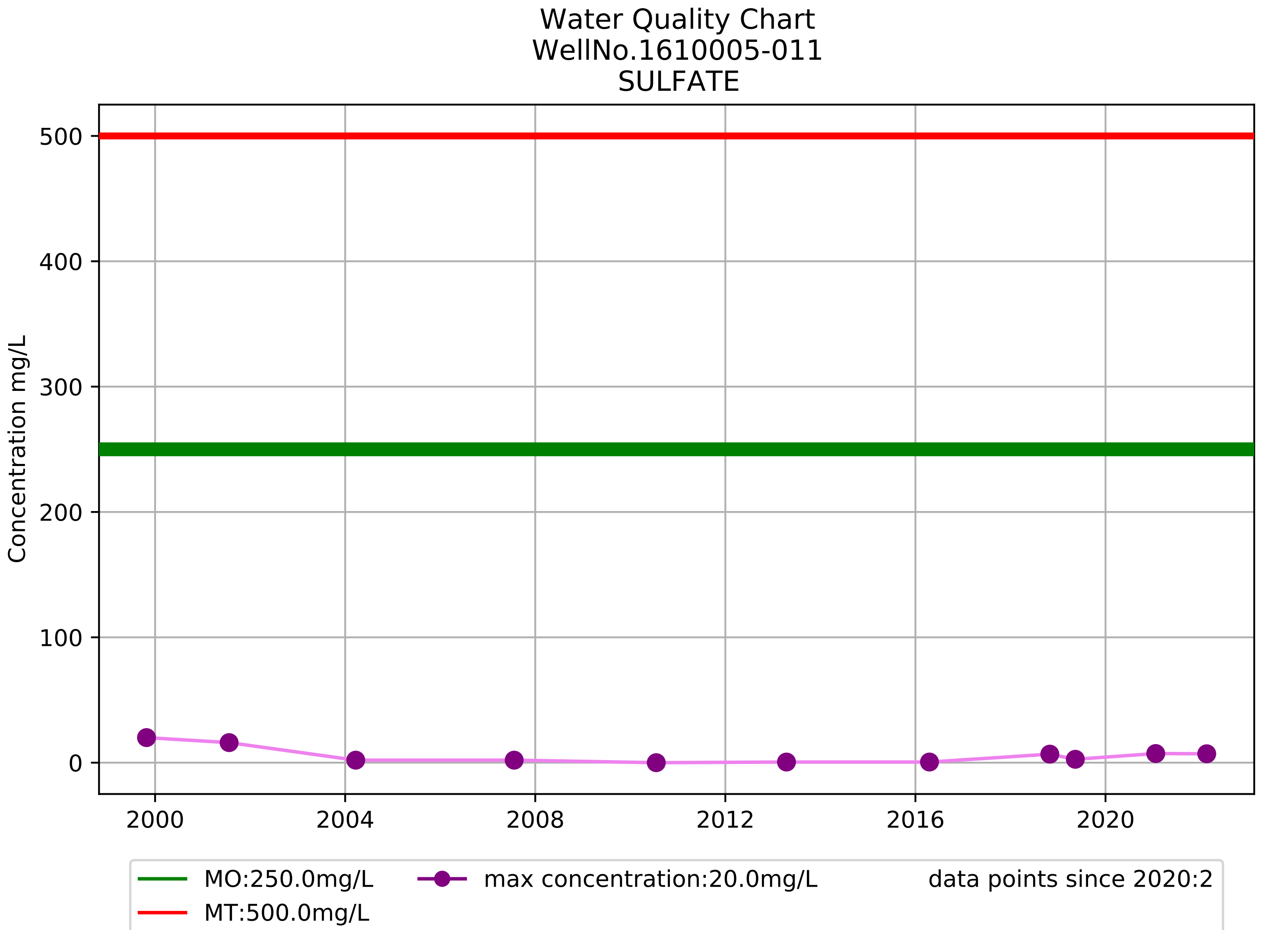
Water Quality Chart
WellNo.1610005-008
SULFATE
Concentration mg/L
500
400
300
200
100
0
1996
2000
2004
2008
2012
2016
MO:250.0mg/L
MT:500.0mg/L
max concentration:16.0mg/L
data points since 2020:0

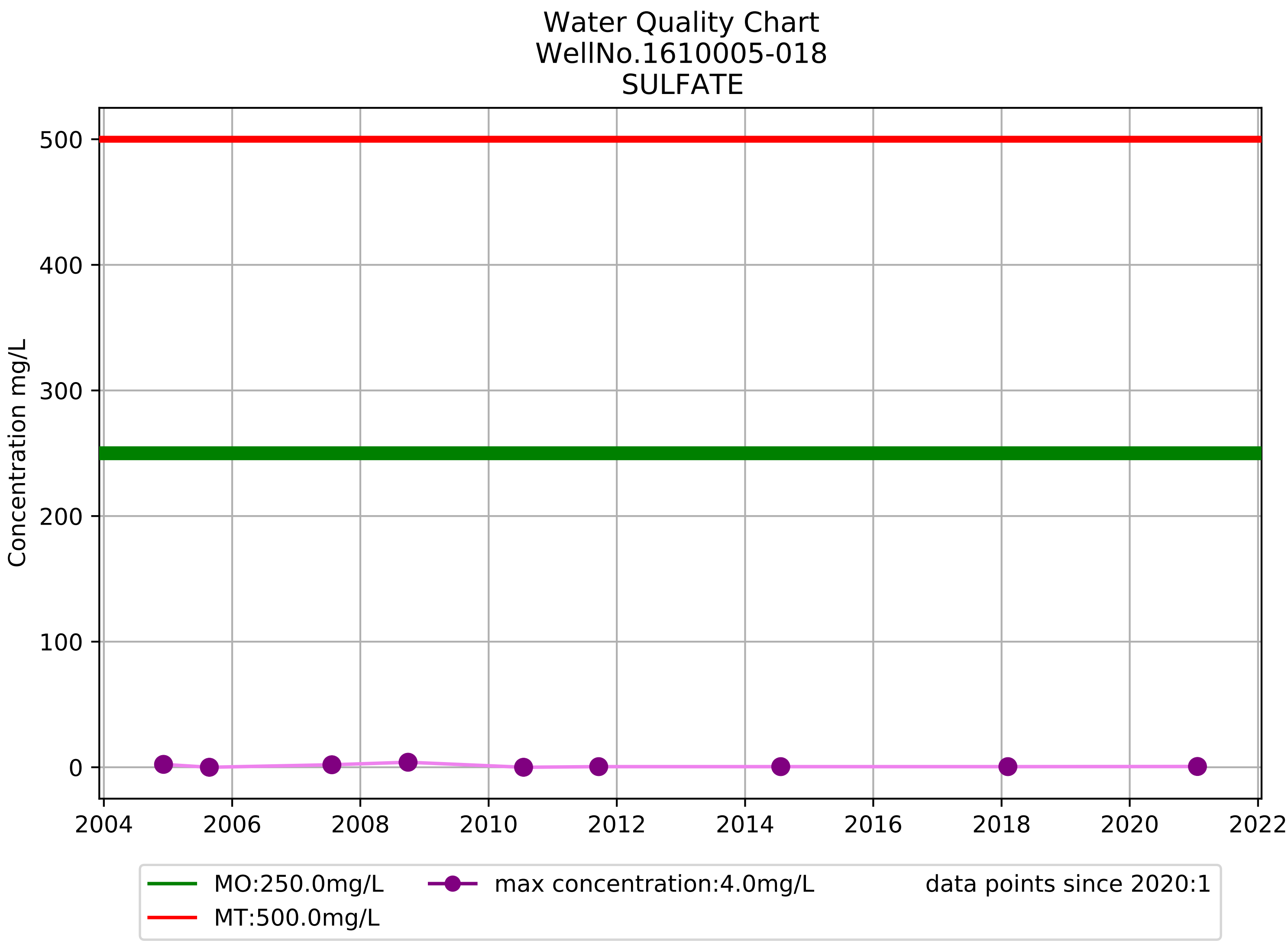


Water Quality Chart
WellNo.1610005-009
SULFATE
Concentration mg/L
0
100
200
300
400
500
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
max concentration:11.0mg/L
data points since 2020:2

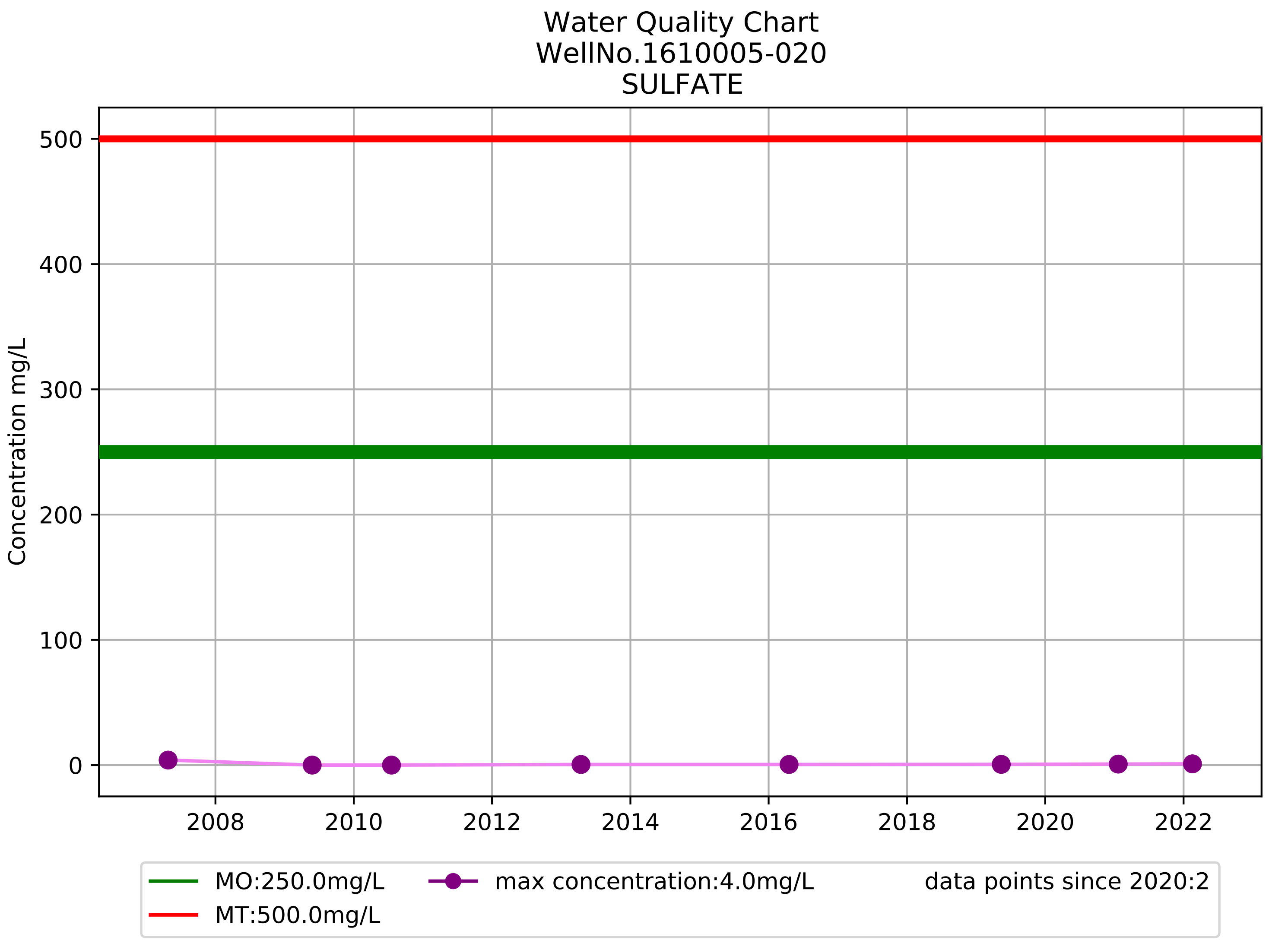
Water Quality Chart
WellNo.1610005-010
SULFATE



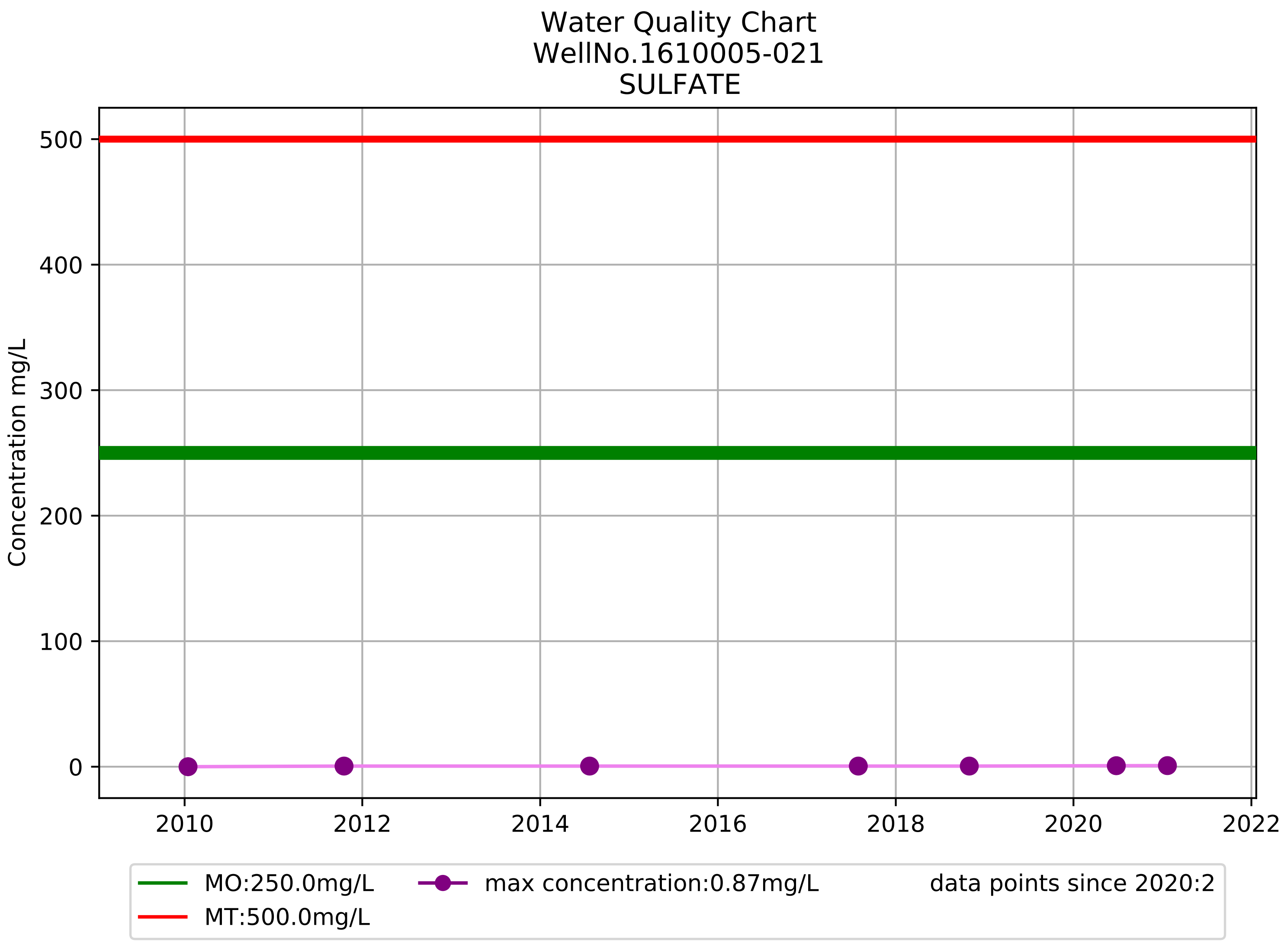

Water Quality Chart
WellNo.1610005-011
SULFATE
Concentration mg/L
0
100
200
300
400
500
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
max concentration:20.0mg/L
data points since 2020:2



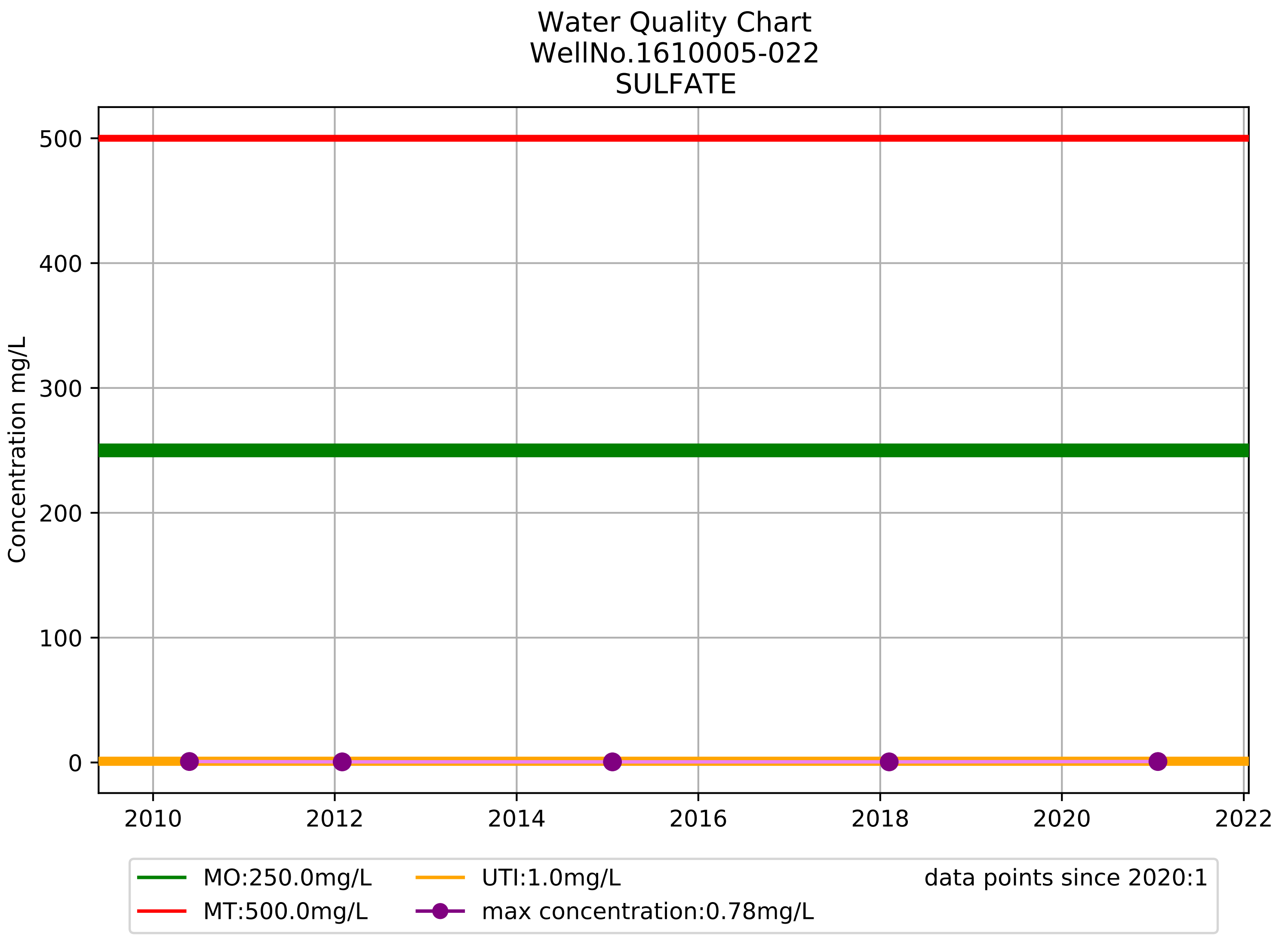
Water Quality Chart
WellNo.1610005-018
SULFATE
Concentration mg/L
500
400
300
200
100
0
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
max concentration:4.0mg/L
data points since 2020:1

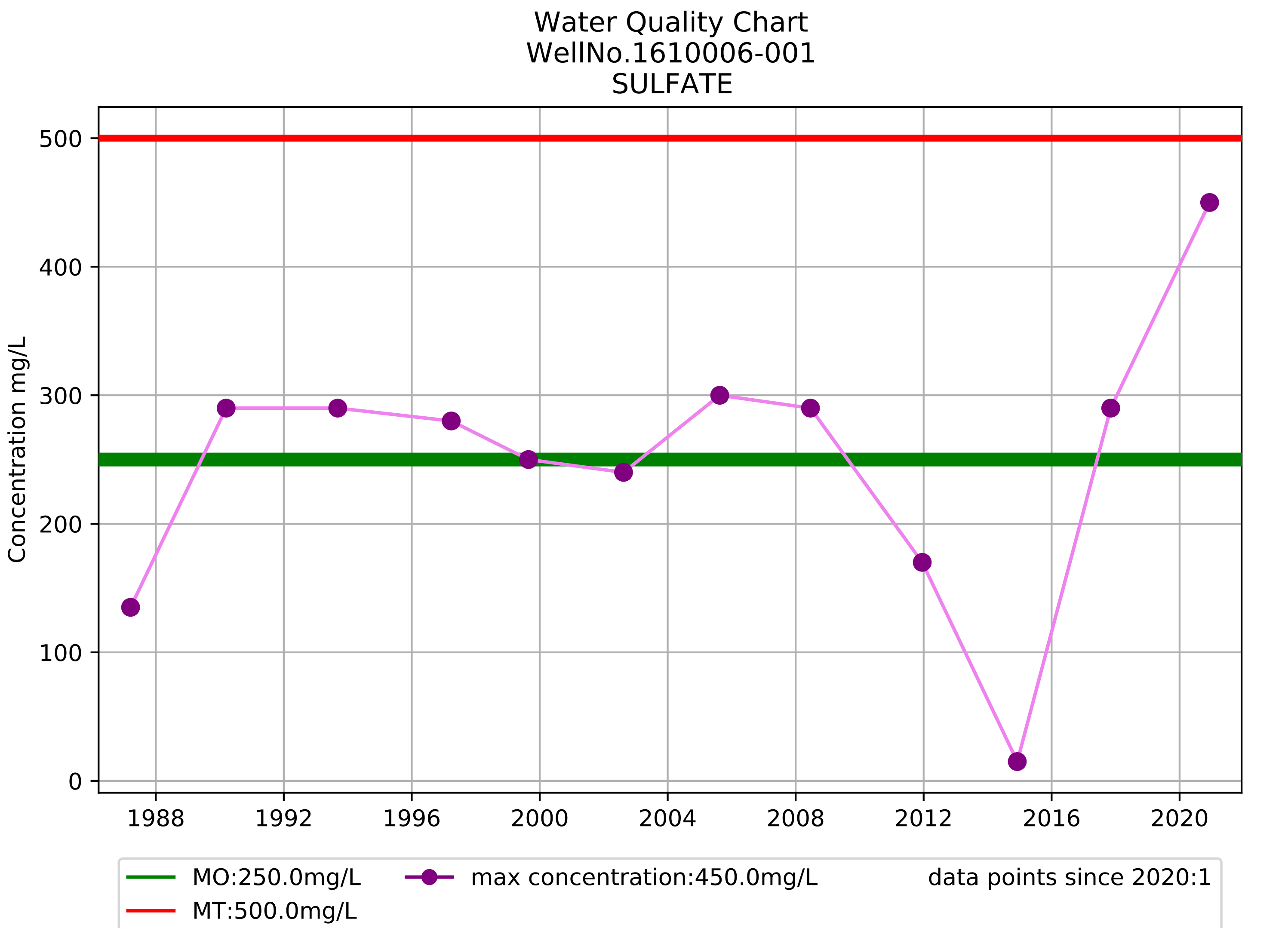


Water Quality Chart
WellNo.1610005-020
SULFATE
Concentration mg/L
500
400
300
200
100
0
2008
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
max concentration:4.0mg/L
data points since 2020:2

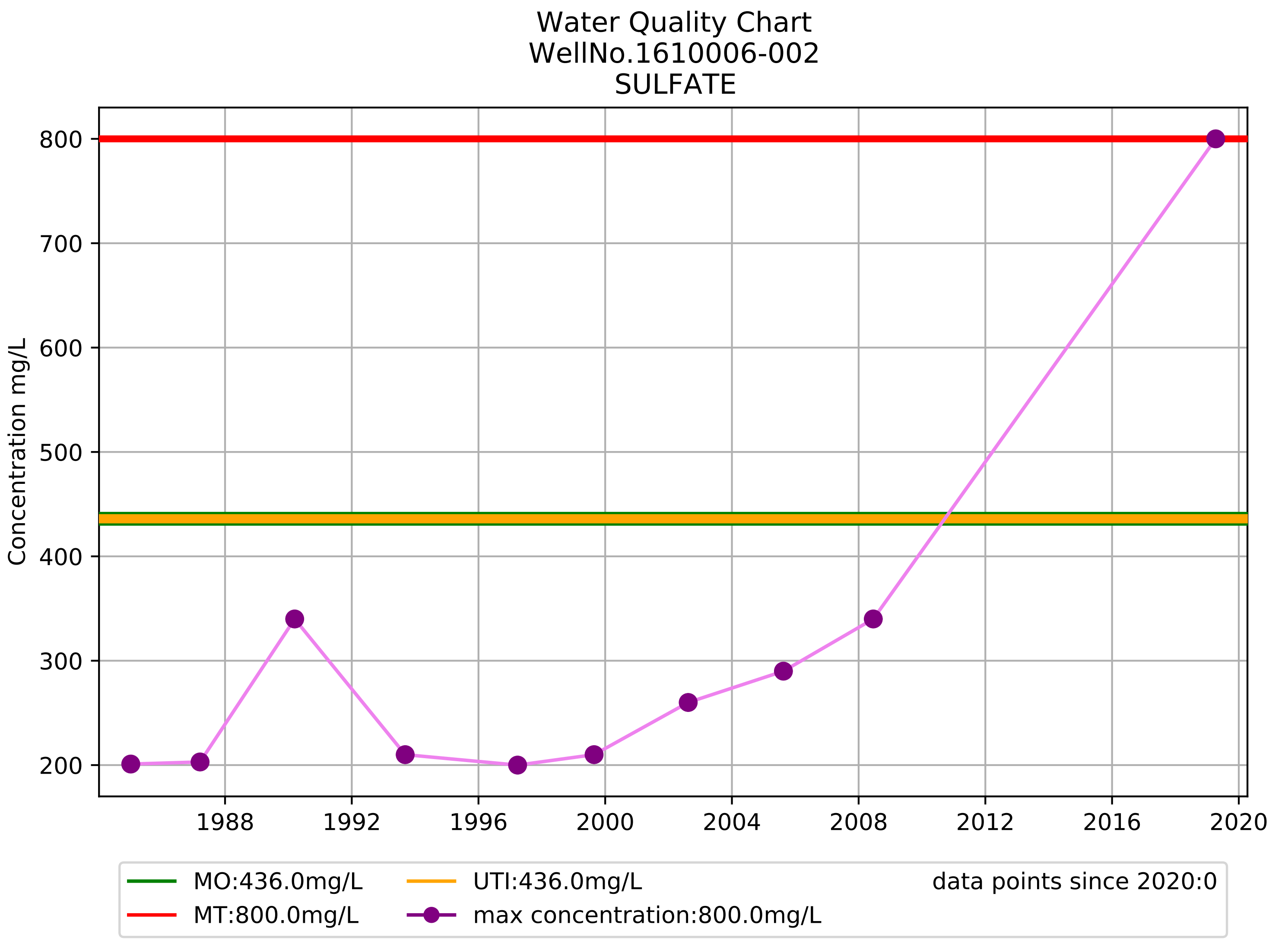


Water Quality Chart
WellNo.1610005-021
SULFATE
Concentration mg/L
500
400
300
200
100
0
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
max concentration:0.87mg/L
data points since 2020:2

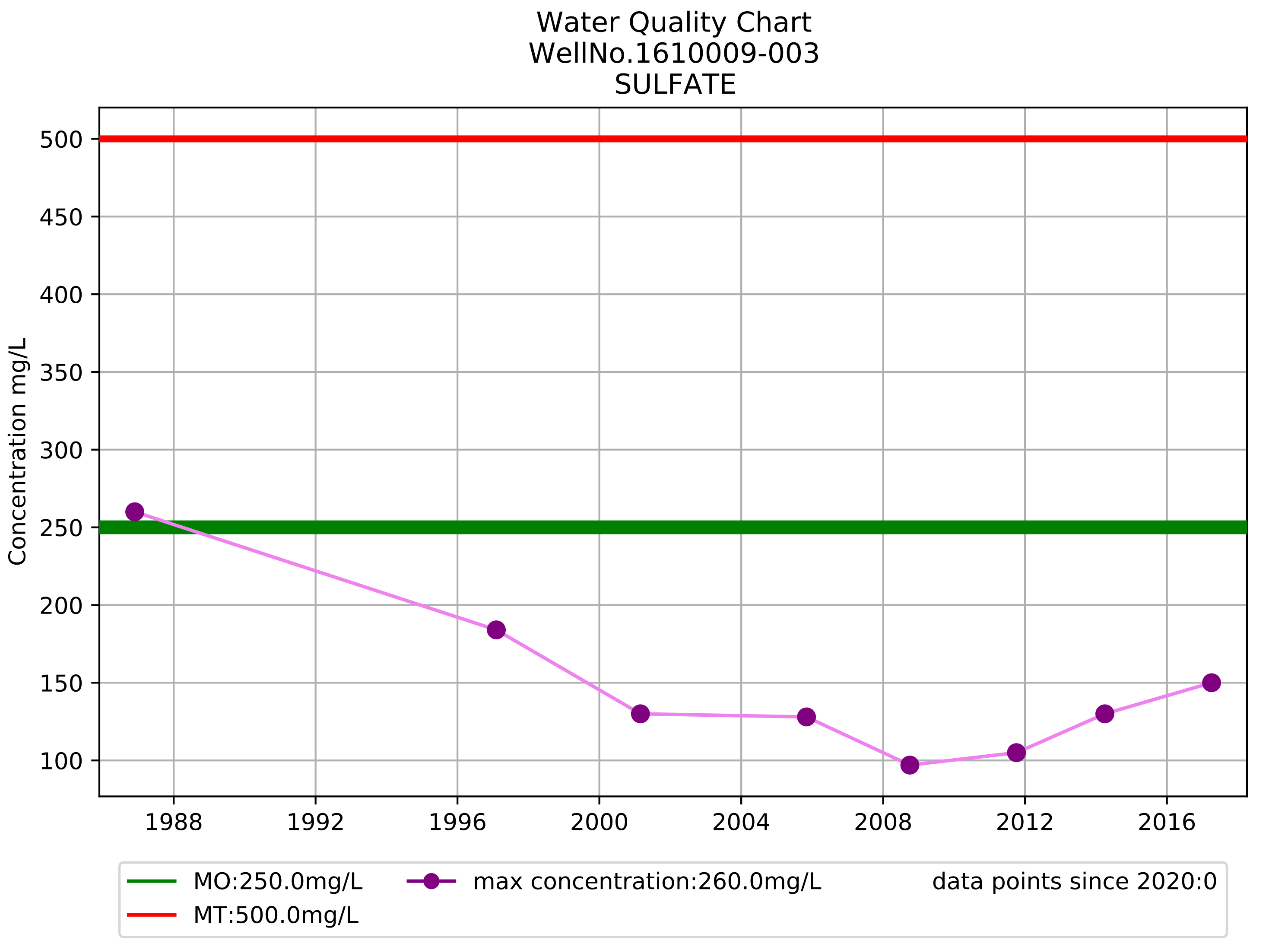

Water Quality Chart
WellNo.1610005-022
SULFATE
Concentration mg/L
500
400
300
200
100
0
2010
2012
2014
2016
2018
2020
2022
MO:250.0mg/L
MT:500.0mg/L
UTI:1.0mg/L
max concentration:0.78mg/L
data points since 2020:1

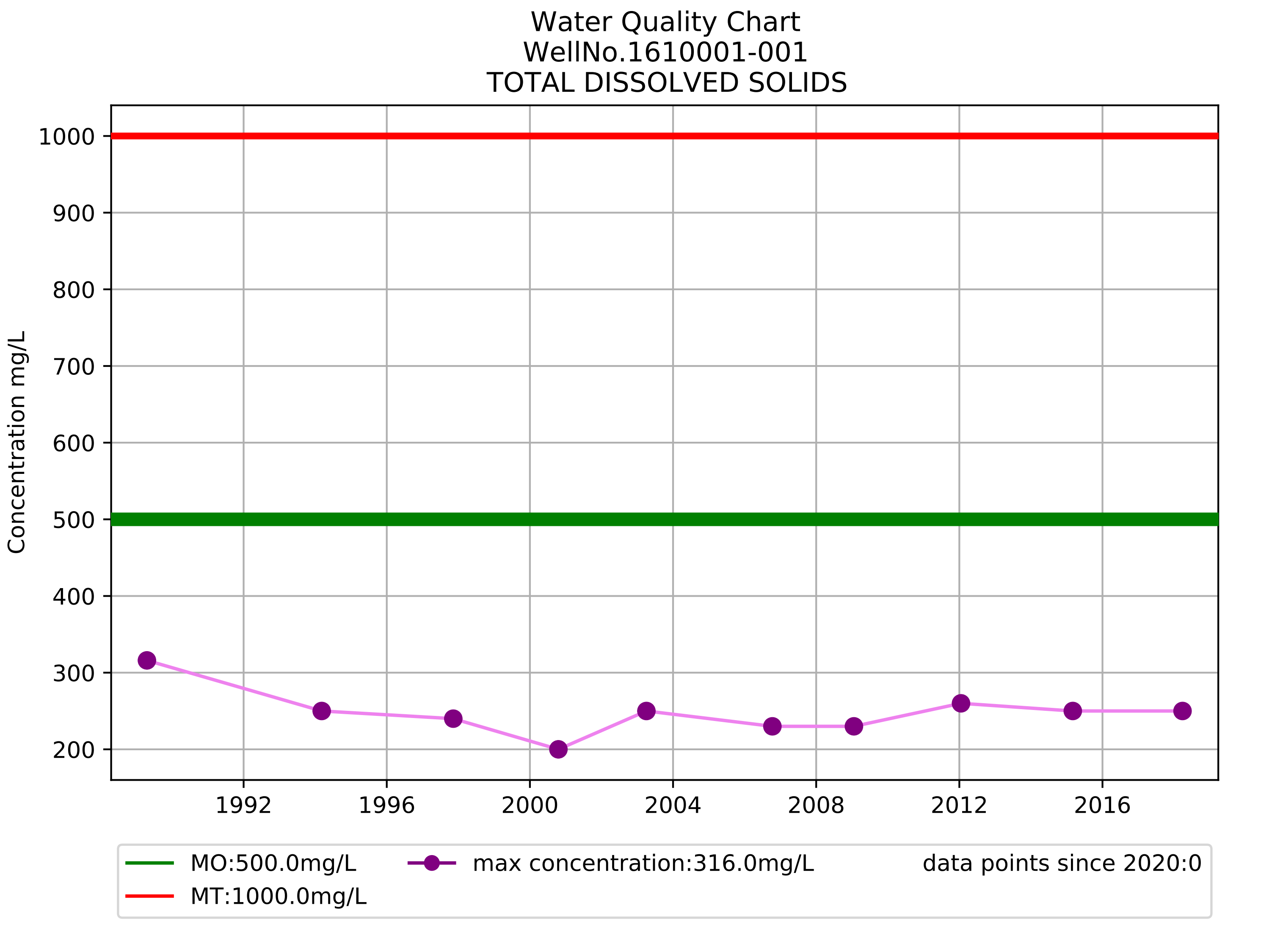


Water Quality Chart
WellNo.1610006-001
SULFATE
Concentration mg/L
0
100
200
300
400
500
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:250.0mg/L
MT:500.0mg/L
max concentration:450.0mg/L
data points since 2020:1

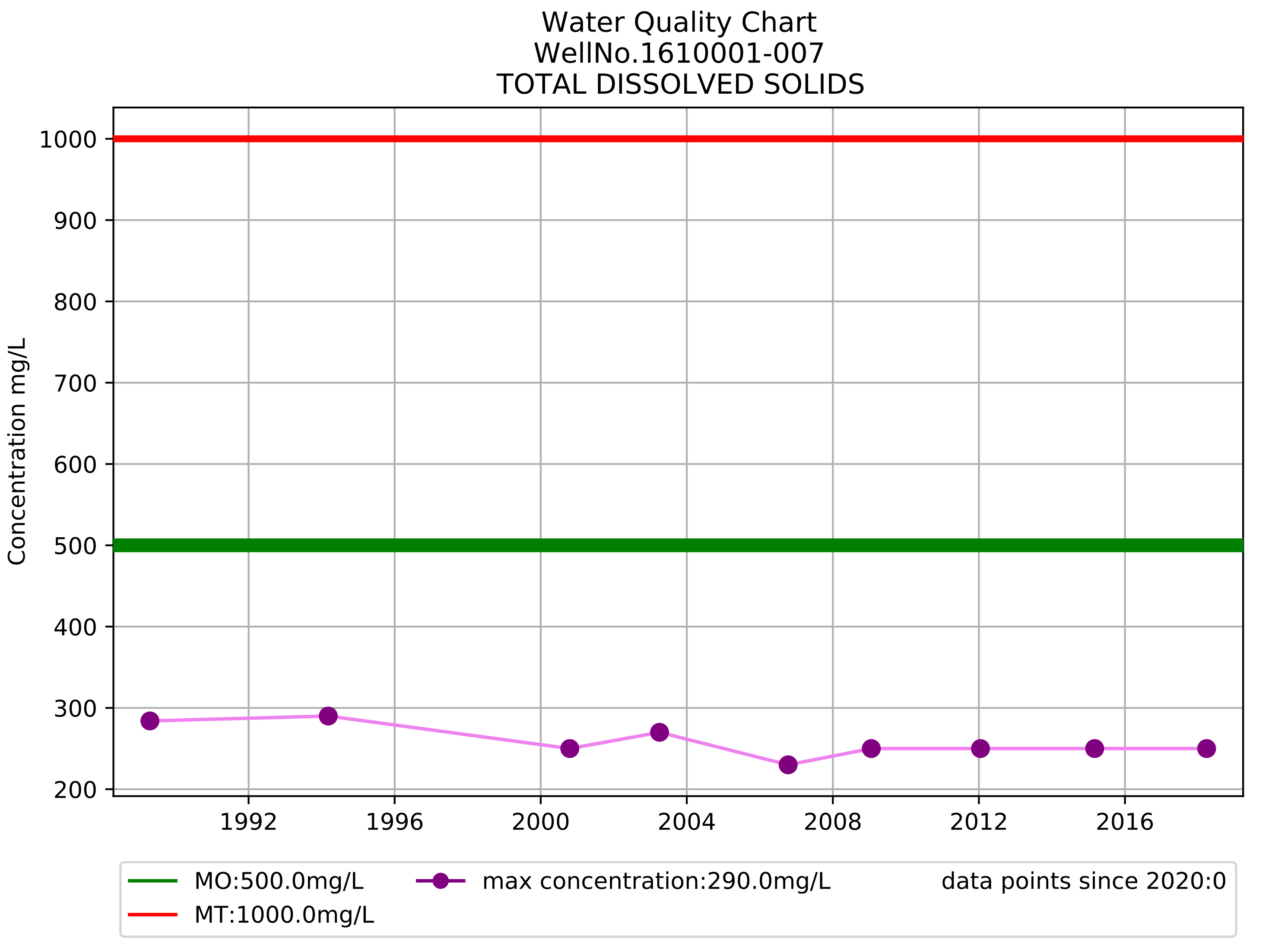


Water Quality Chart
WellNo.1610006-002
SULFATE
Concentration mg/L
800
700
600
500
400
300
200
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:436.0mg/L
UTI:436.0mg/L
data points since 2020:0
MT:800.0mg/L
max concentration:800.0mg/L

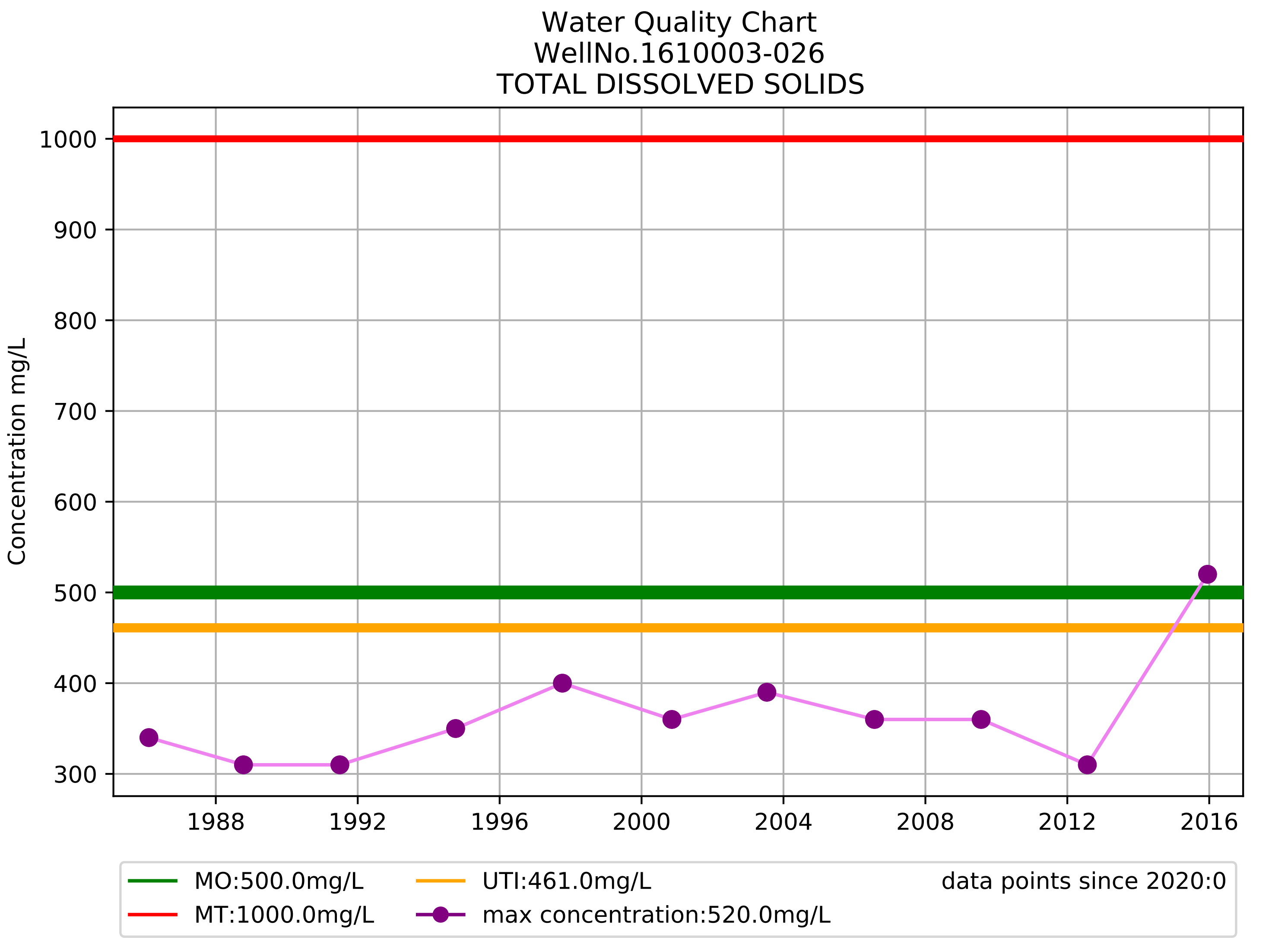

Water Quality Chart
WellNo.1610009-003
SULFATE
Concentration mg/L
500
450
400
350
300
250
200
150
100
1988
1992
1996
2000
2004
2008
2012
2016
MO:250.0mg/L
MT:500.0mg/L
max concentration:260.0mg/L
data points since 2020:0



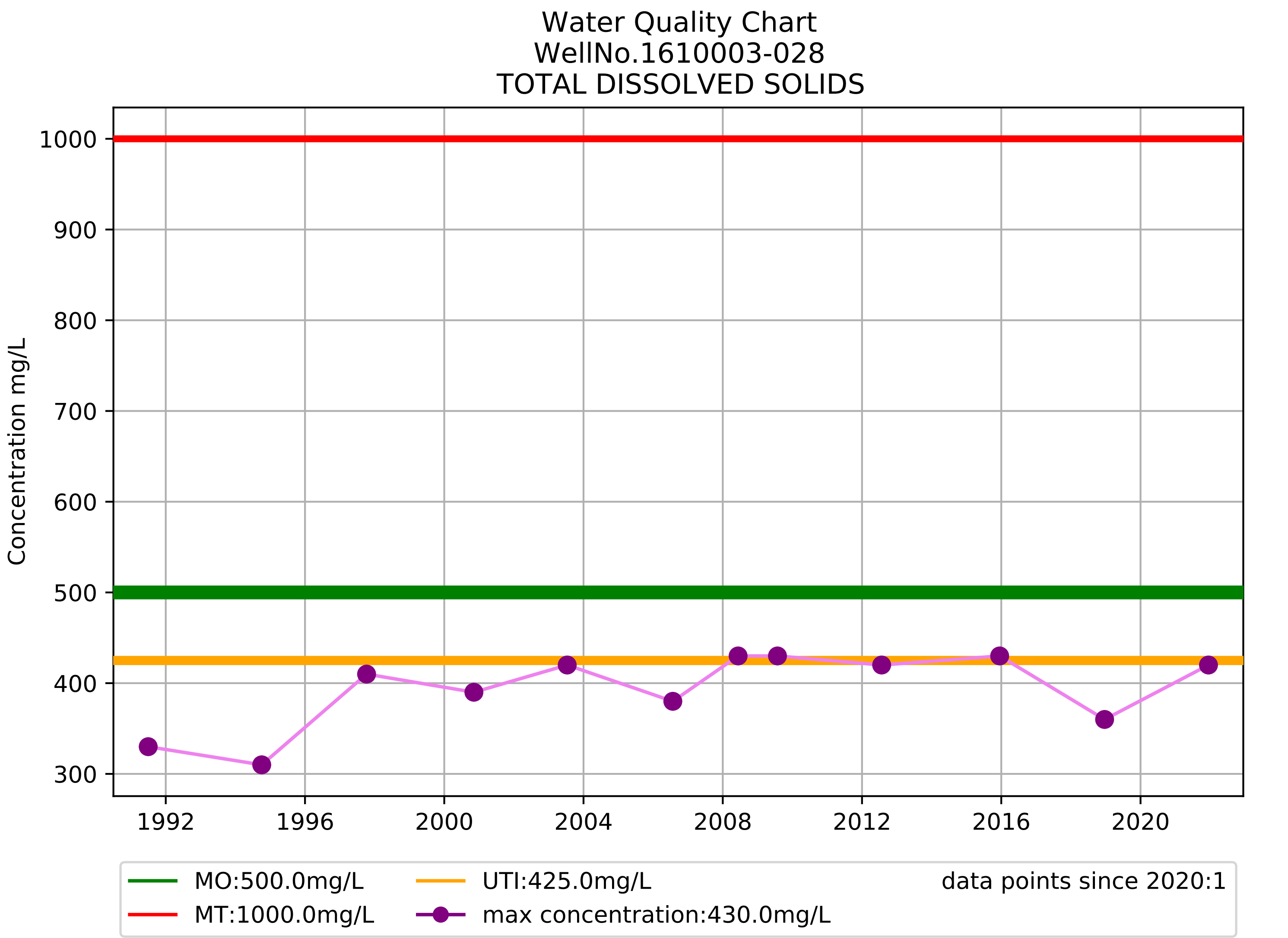
Water Quality Chart
WellNo.1610001-001
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
300
200
1992
1996
2000
2004
2008
2012
2016
MO:500.0mg/L
MT:1000.0mg/L
max concentration:316.0mg/L
data points since 2020:0

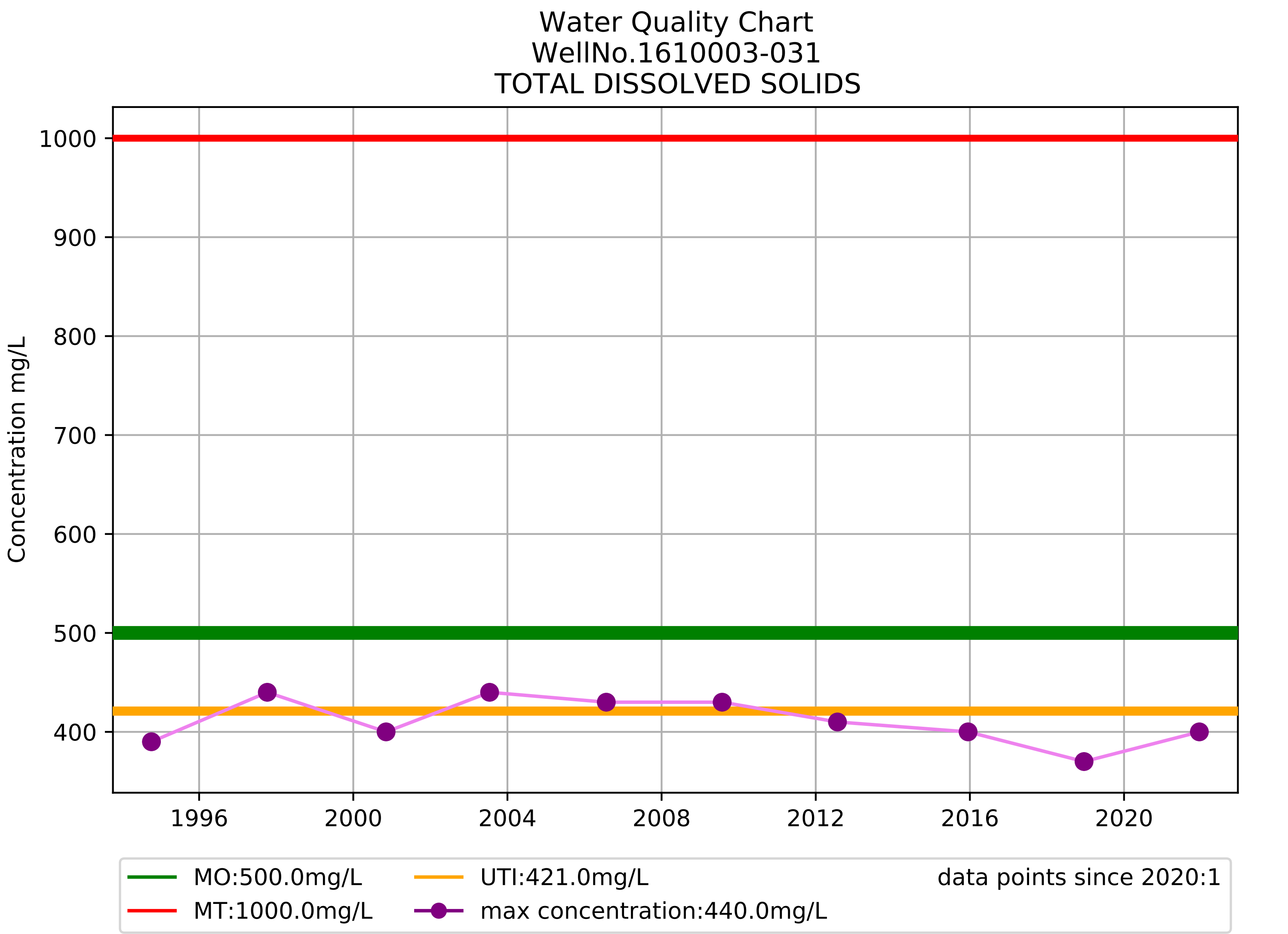


Water Quality Chart
WellNo.1610001-007
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
300
200
1992
1996
2000
2004
2008
2012
2016
MO:500.0mg/L
MT:1000.0mg/L
max concentration:290.0mg/L
data points since 2020:0

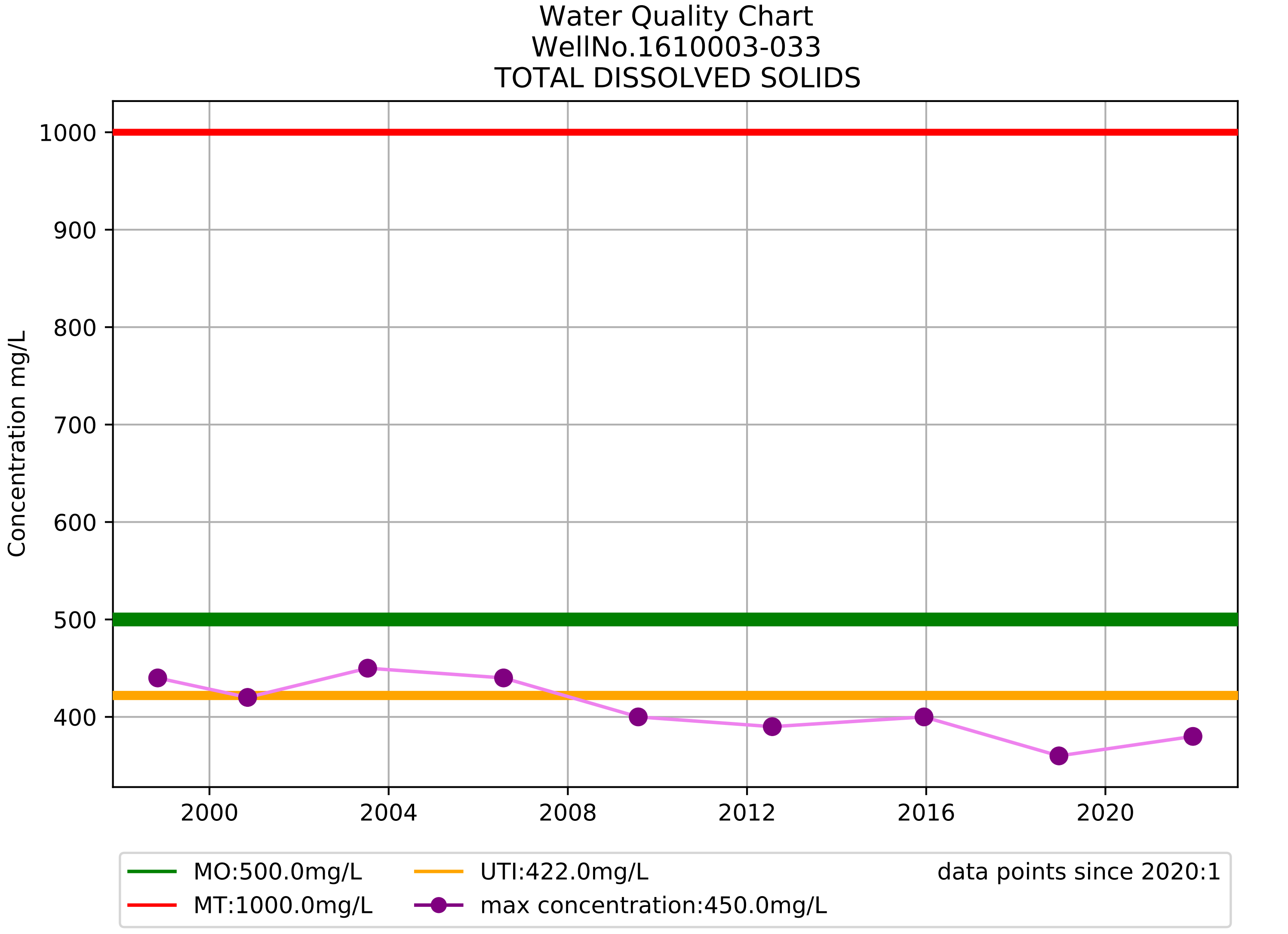


Water Quality Chart
WellNo.1610003-026
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
300
1988
1992
1996
2000
2004
2008
2012
2016
MO:500.0mg/L
MT:1000.0mg/L
UTI:461.0mg/L
max concentration:520.0mg/L
data points since 2020:0

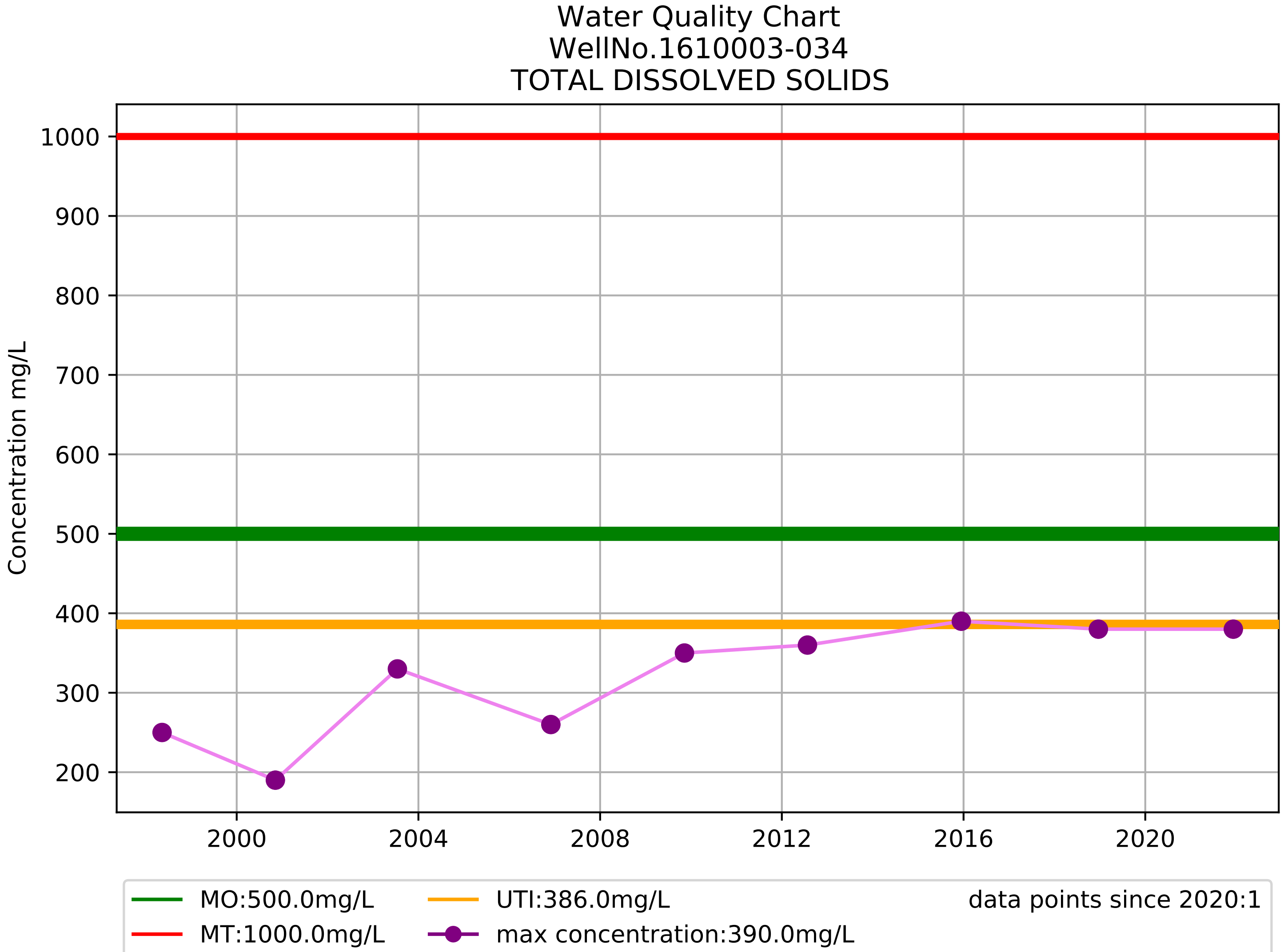

Water Quality Chart
WellNo.1610003-028
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
300
1992
1996
2000
2004
2008
2012
2016
2020
MO:500.0mg/L
MT:1000.0mg/L
UTI:425.0mg/L
max concentration:430.0mg/L
data points since 2020:1



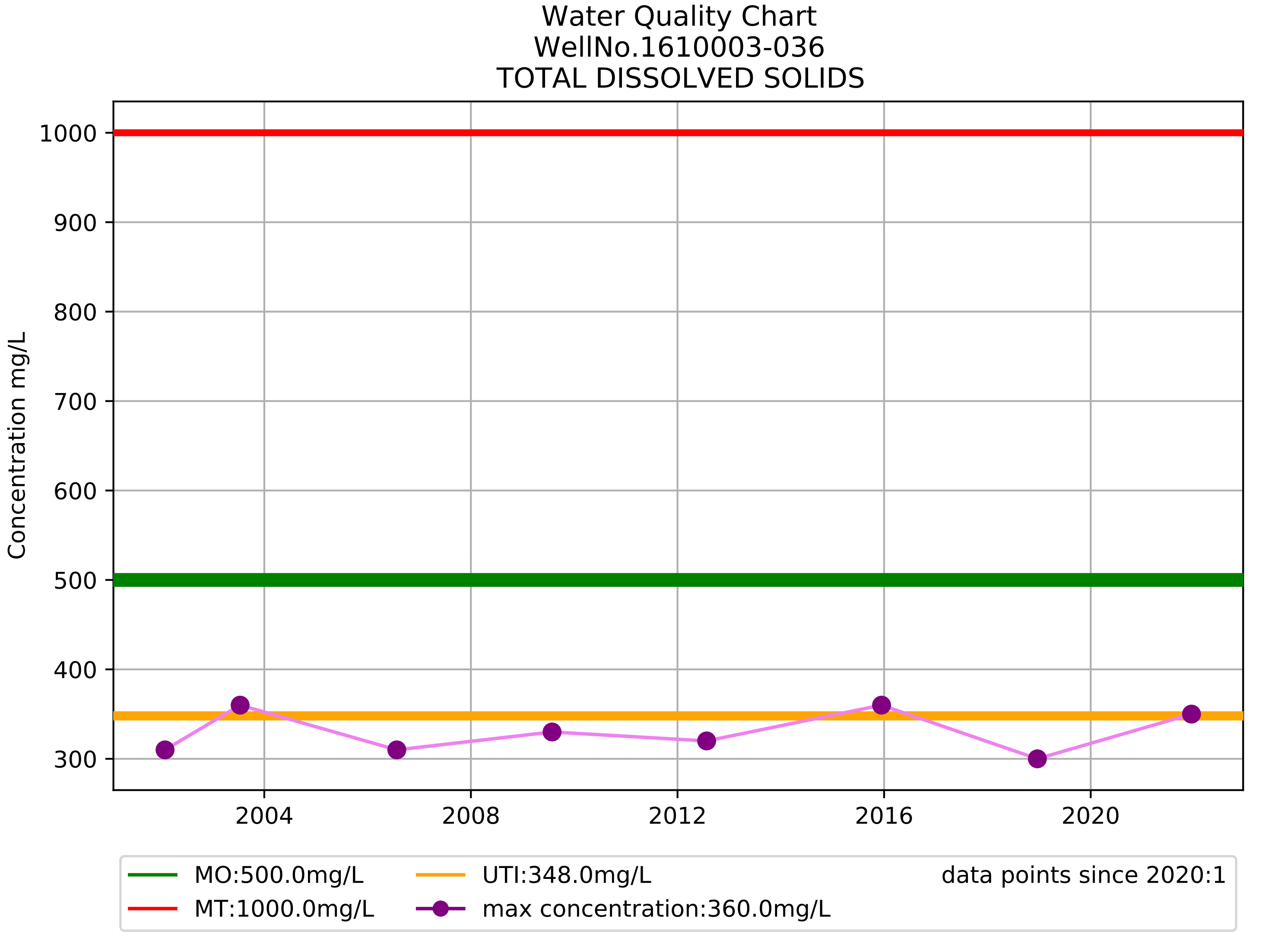
Water Quality Chart
WellNo.1610003-031
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
1996
2000
2004
2008
2012
2016
2020
MO:500.0mg/L
MT:1000.0mg/L
UTI:421.0mg/L
max concentration:440.0mg/L
data points since 2020:1



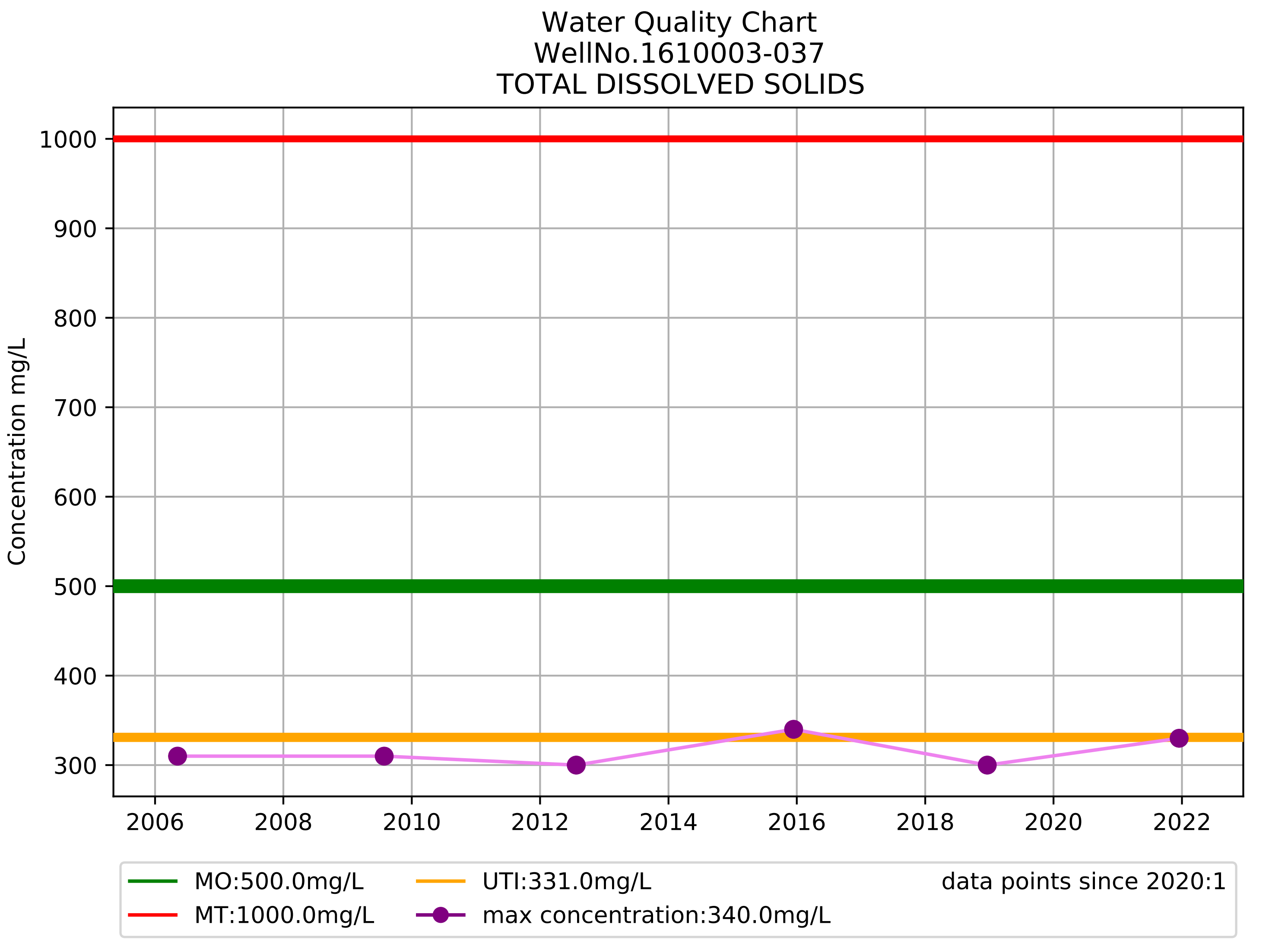
Water Quality Chart
WellNo.1610003-033
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
2000
2004
2008
2012
2016
2020
MO:500.0mg/L
MT:1000.0mg/L
UTI:422.0mg/L
max concentration:450.0mg/L
data points since 2020:1



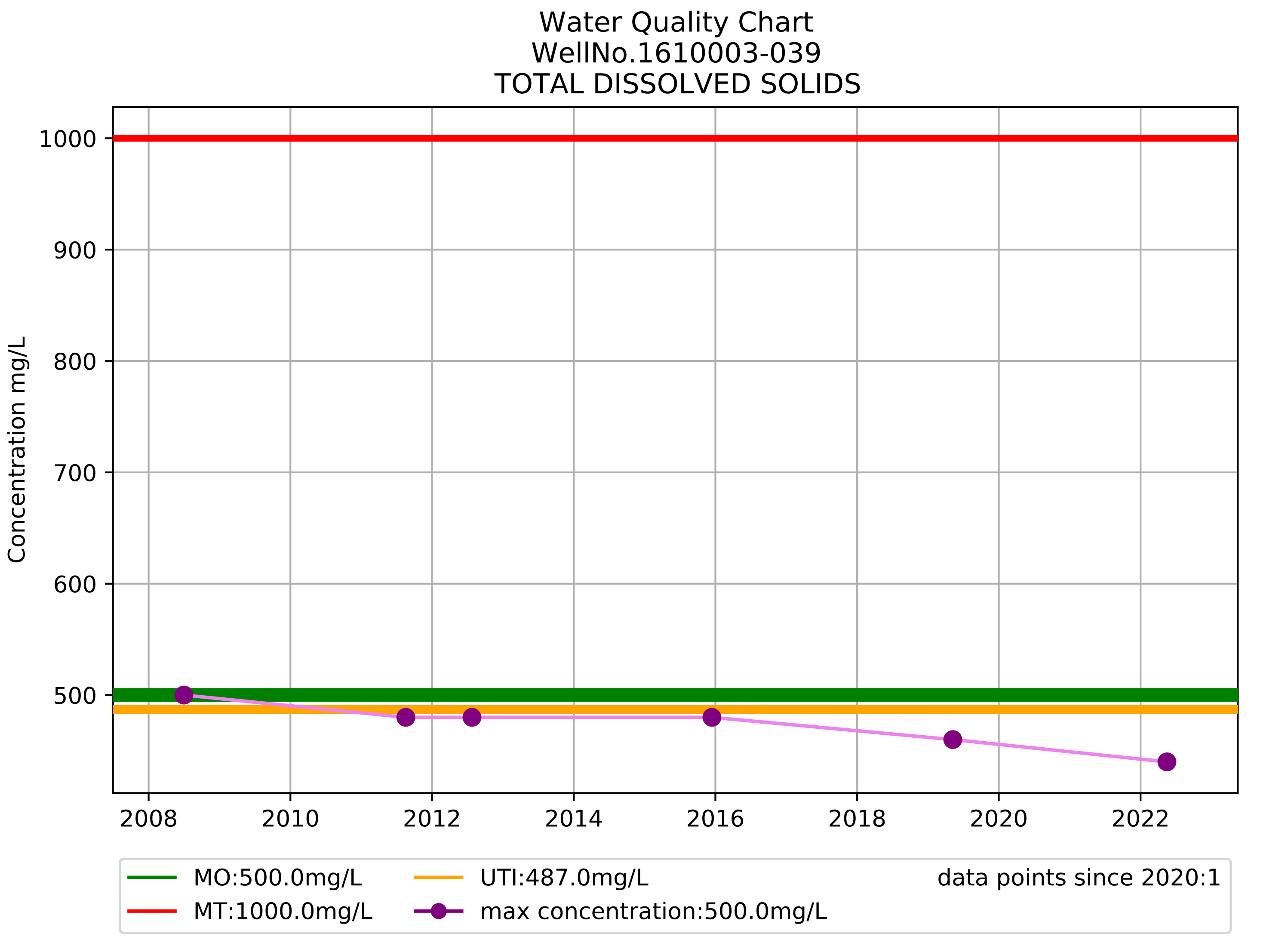
Water Quality Chart
WellNo.1610003-034
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
300
200
2000
2004
2008
2012
2016
2020
MO:500.0mg/L
MT:1000.0mg/L
UTI:386.0mg/L
max concentration:390.0mg/L
data points since 2020:1

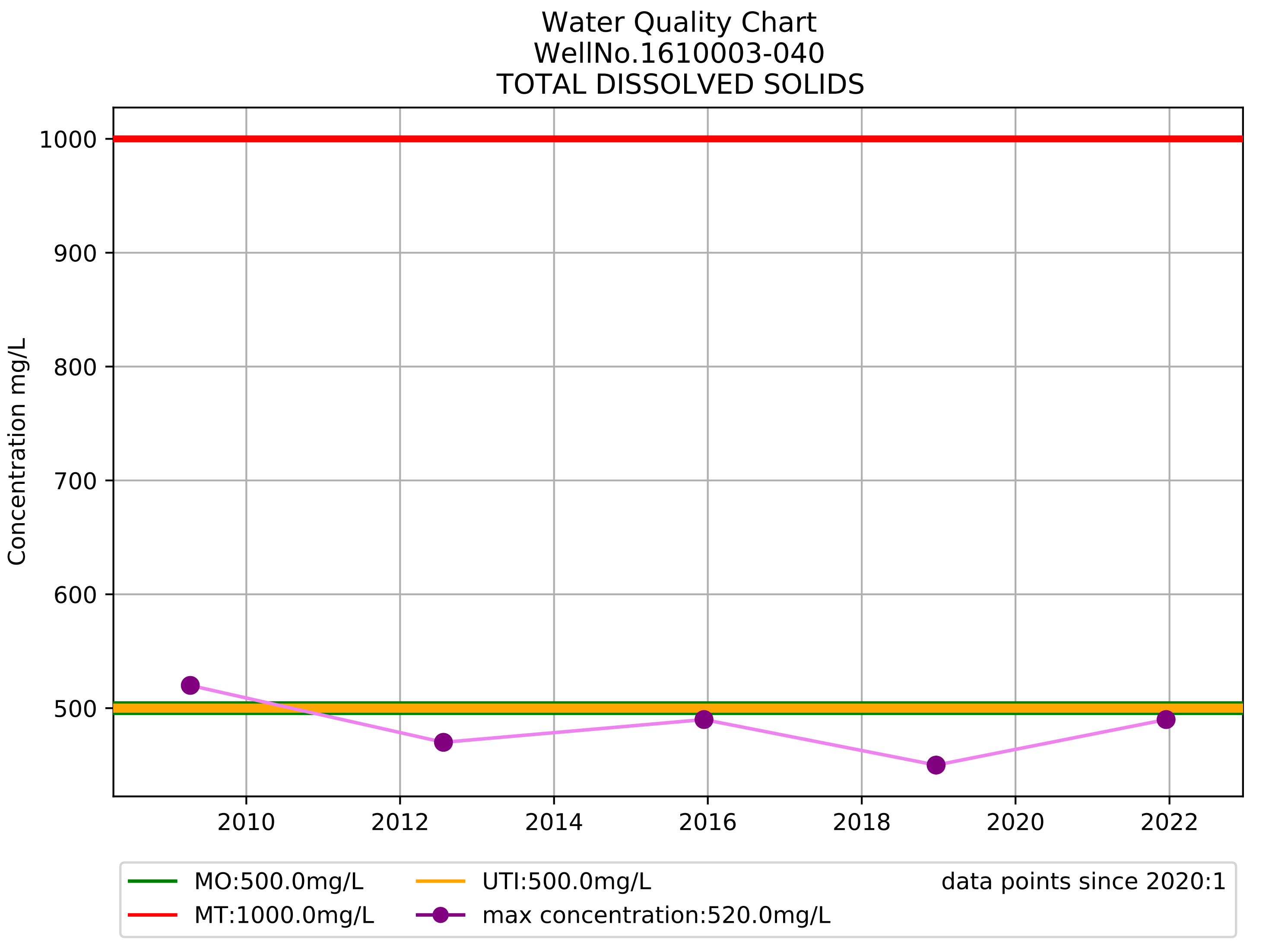


Water Quality Chart
WellNo.1610003-036
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
300
2004
2008
2012
2016
2020
MO:500.0mg/L
MT:1000.0mg/L
UTI:348.0mg/L
max concentration:360.0mg/L
data points since 2020:1

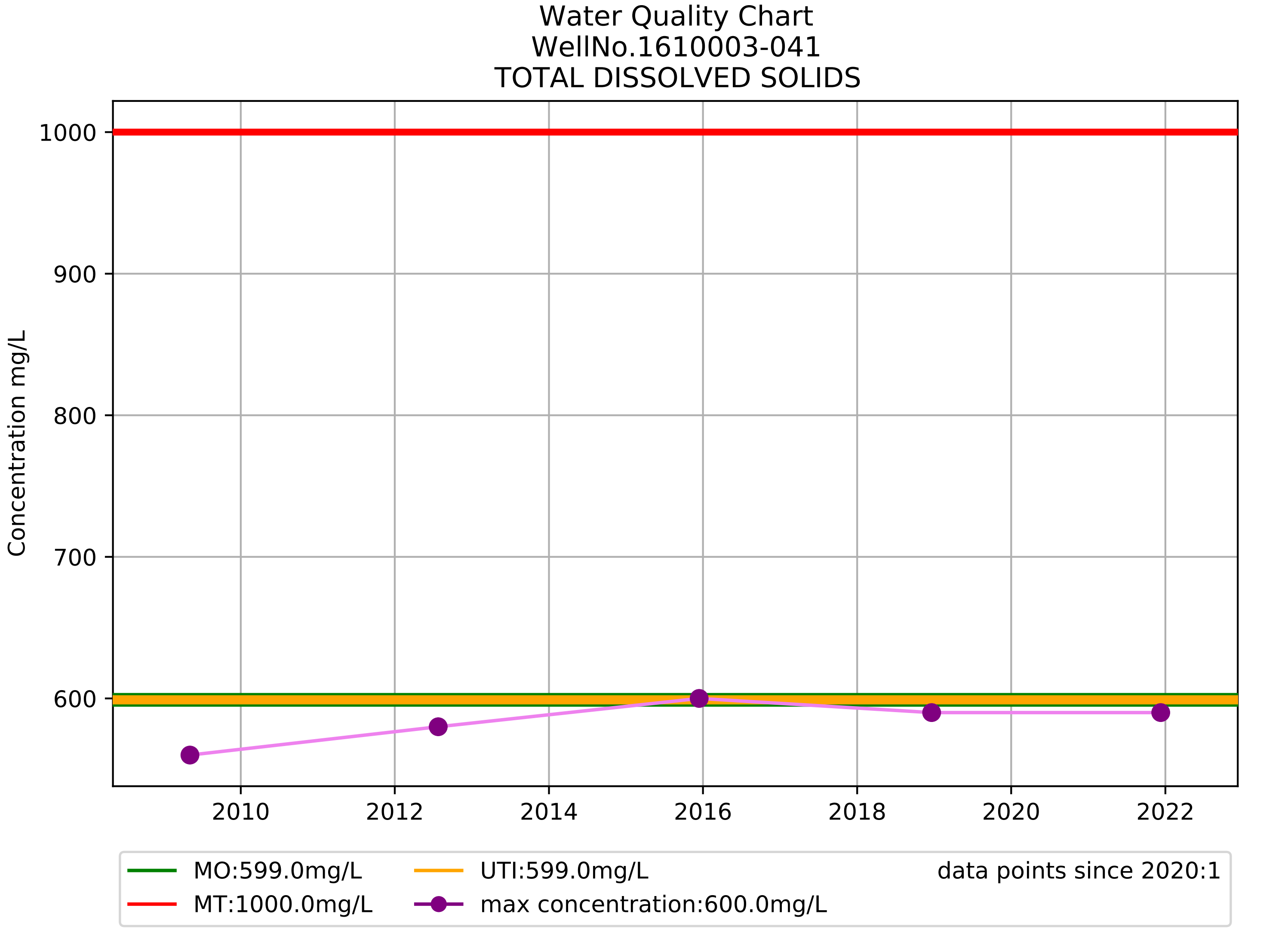


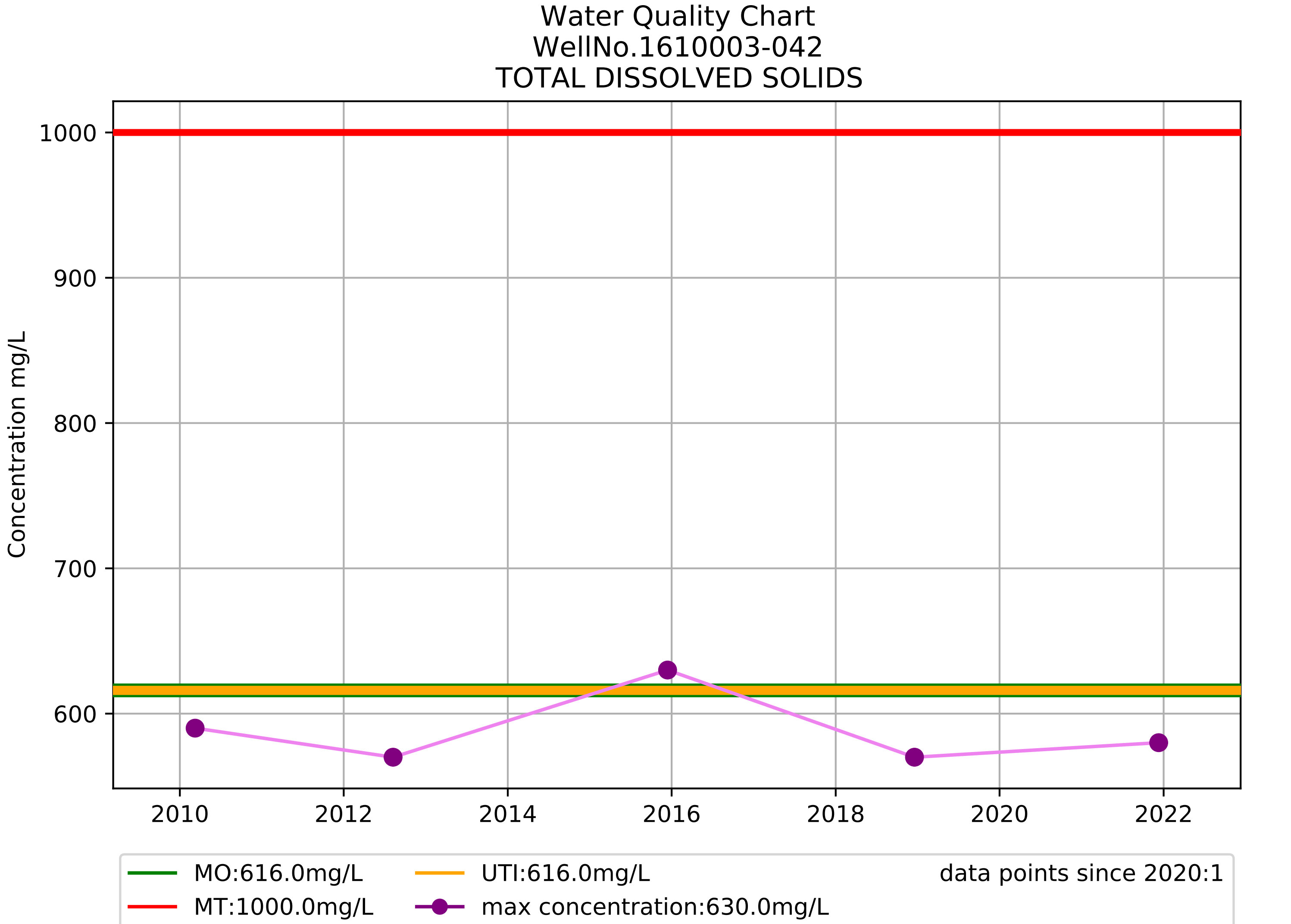
Water Quality Chart
WellNo.1610003-037
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
300
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:500.0mg/L
MT:1000.0mg/L
UTI:331.0mg/L
max concentration:340.0mg/L
data points since 2020:1


Water Quality Chart
WellNo.1610003-039
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
2008
2010
2012
2014
2016
2018
2020
2022
MO:500.0mg/L
MT:1000.0mg/L
UTI:487.0mg/L
max concentration:500.0mg/L
data points since 2020:1

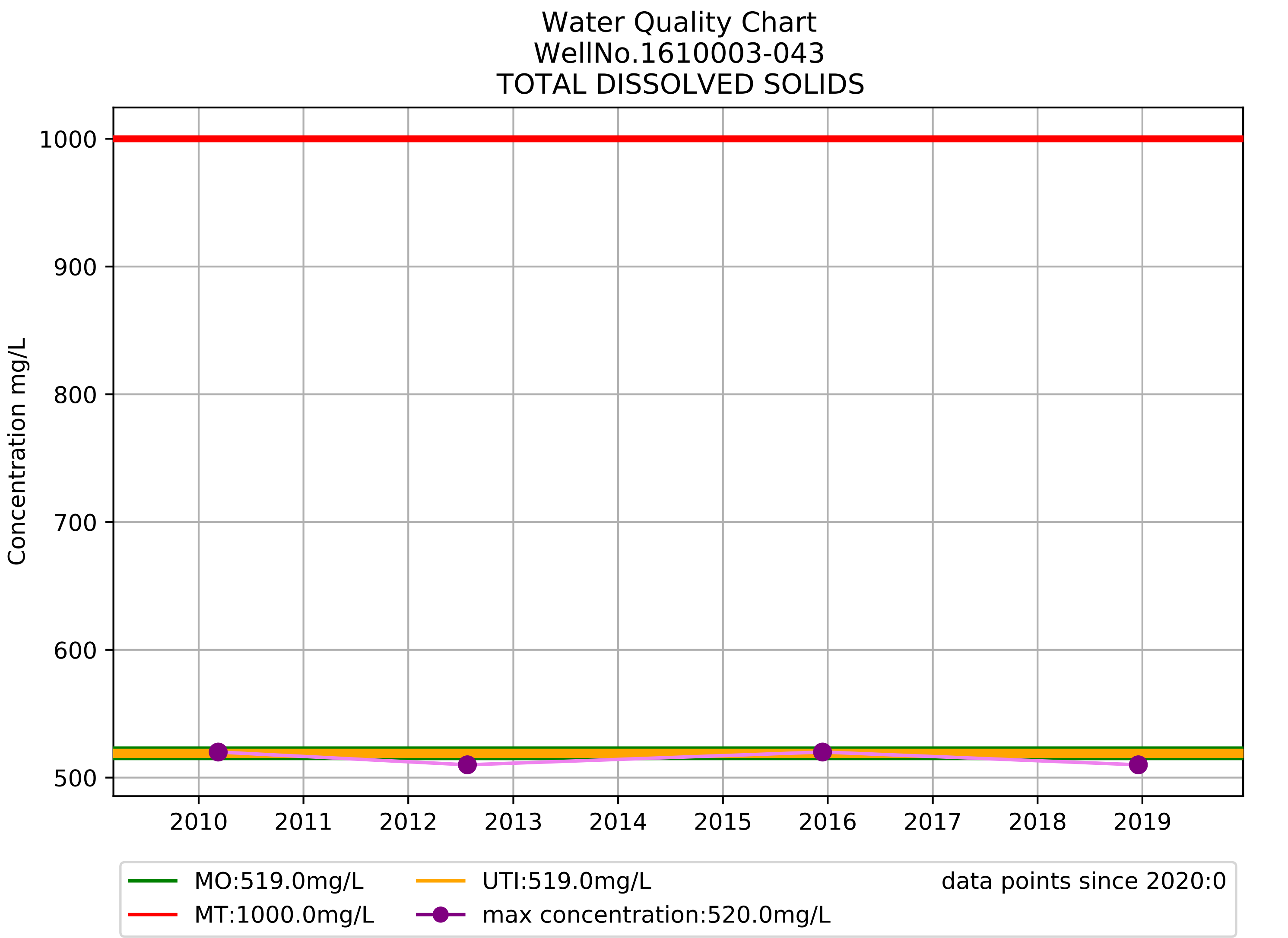


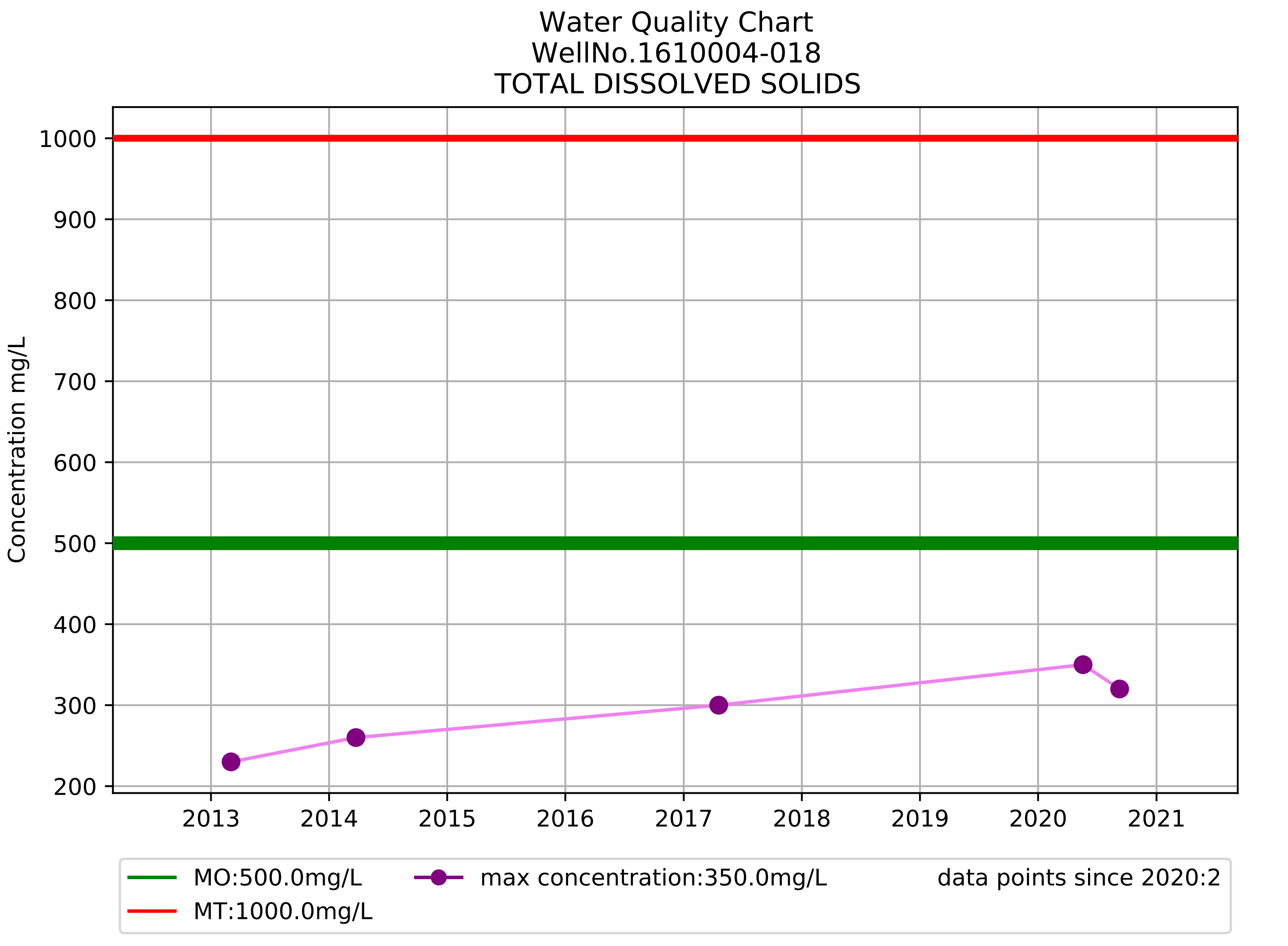
Water Quality Chart
WellNo.1610003-040
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
2010
2012
2014
2016
2018
2020
2022
MO:500.0mg/L
UTI:500.0mg/L
data points since 2020:1
MT:1000.0mg/L
max concentration:520.0mg/L

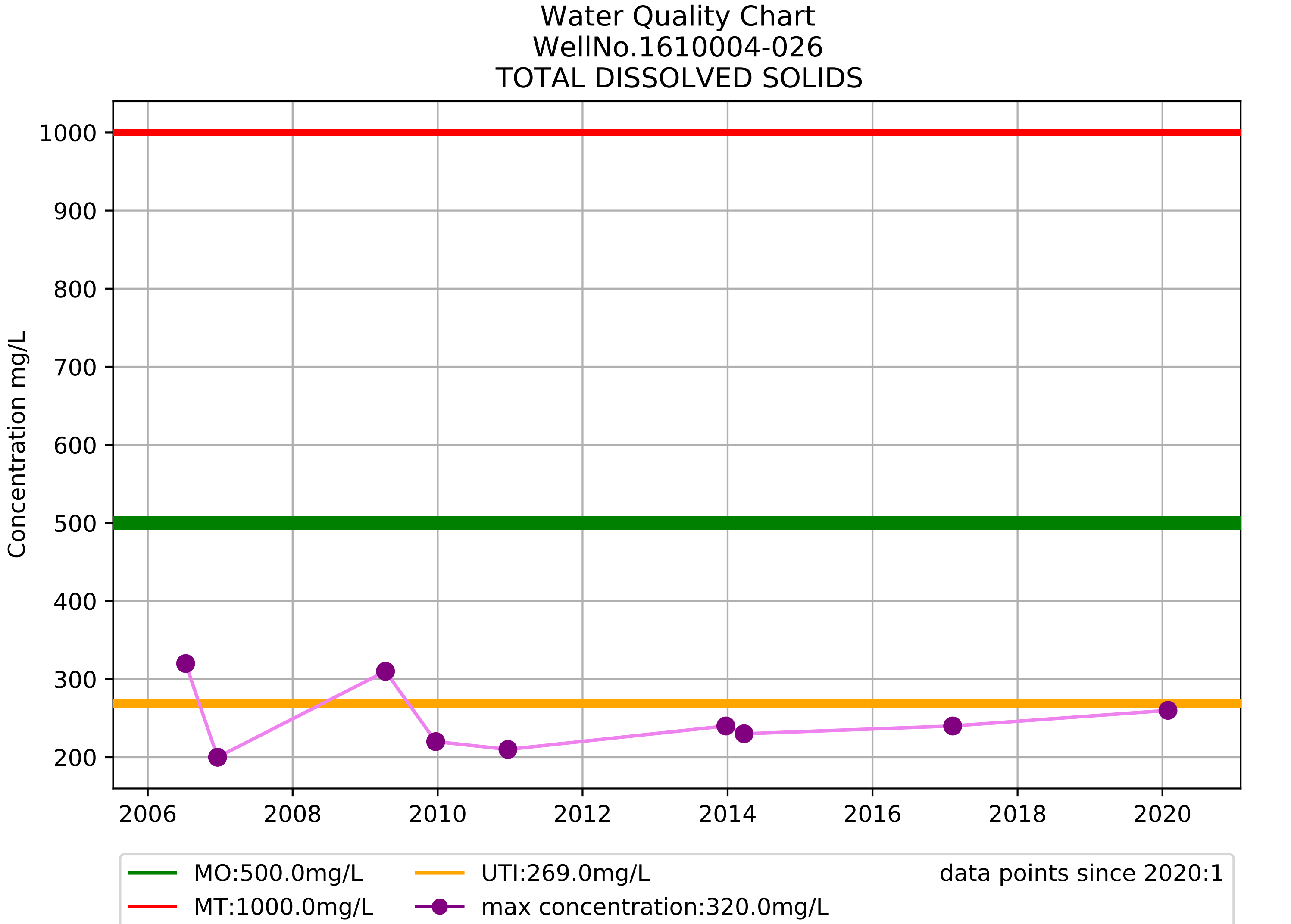

Water Quality Chart
WellNo.1610003-041
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
2010
2012
2014
2016
2018
2020
2022
MO:599.0mg/L
UTI:599.0mg/L
data points since 2020:1
MT:1000.0mg/L
max concentration:600.0mg/L



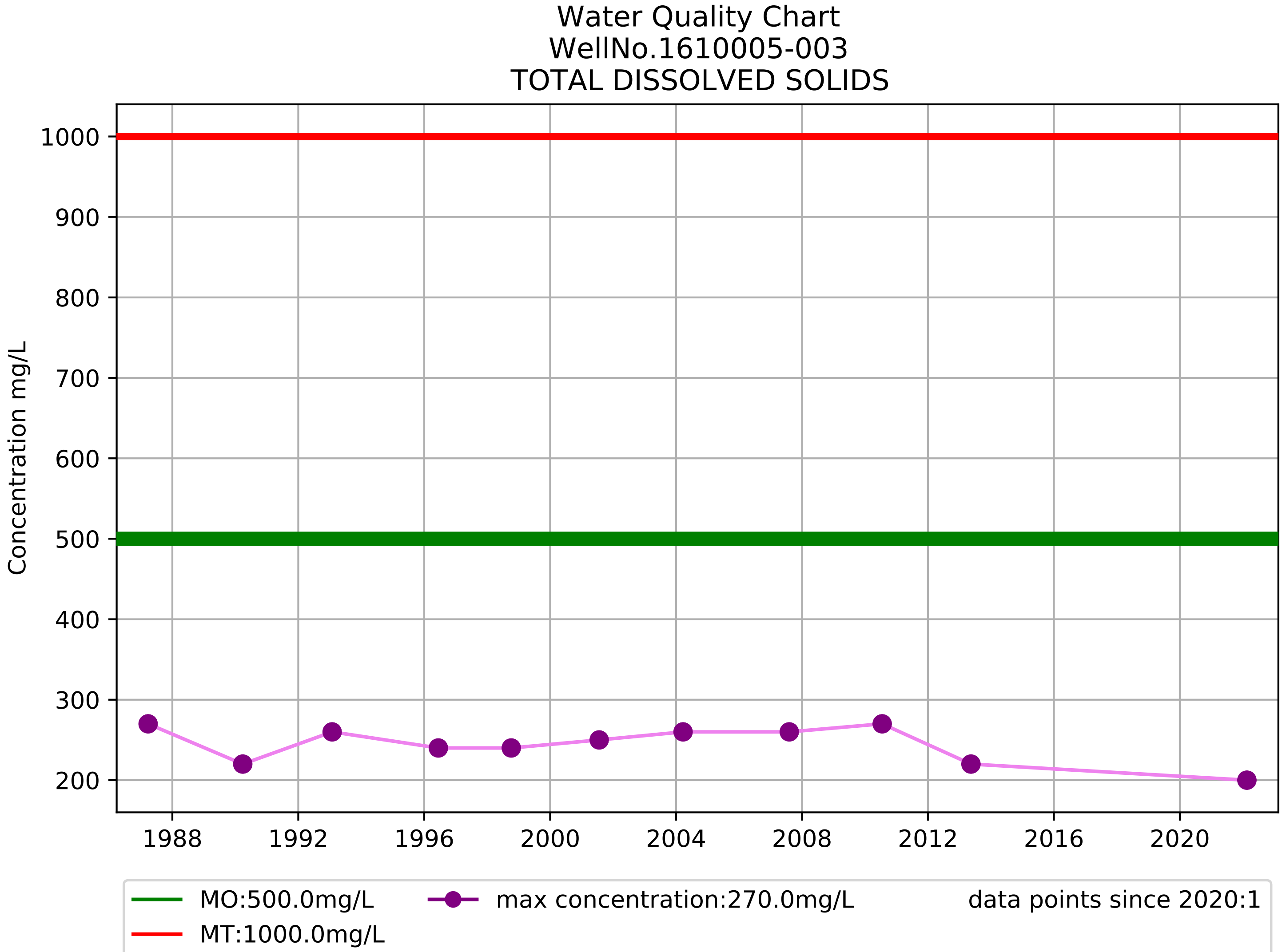
Water Quality Chart
WellNo.1610003-042
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
2010
2012
2014
2016
2018
2020
2022
MO:616.0mg/L
UTI:616.0mg/L
data points since 2020:1
MT:1000.0mg/L
max concentration:630.0mg/L

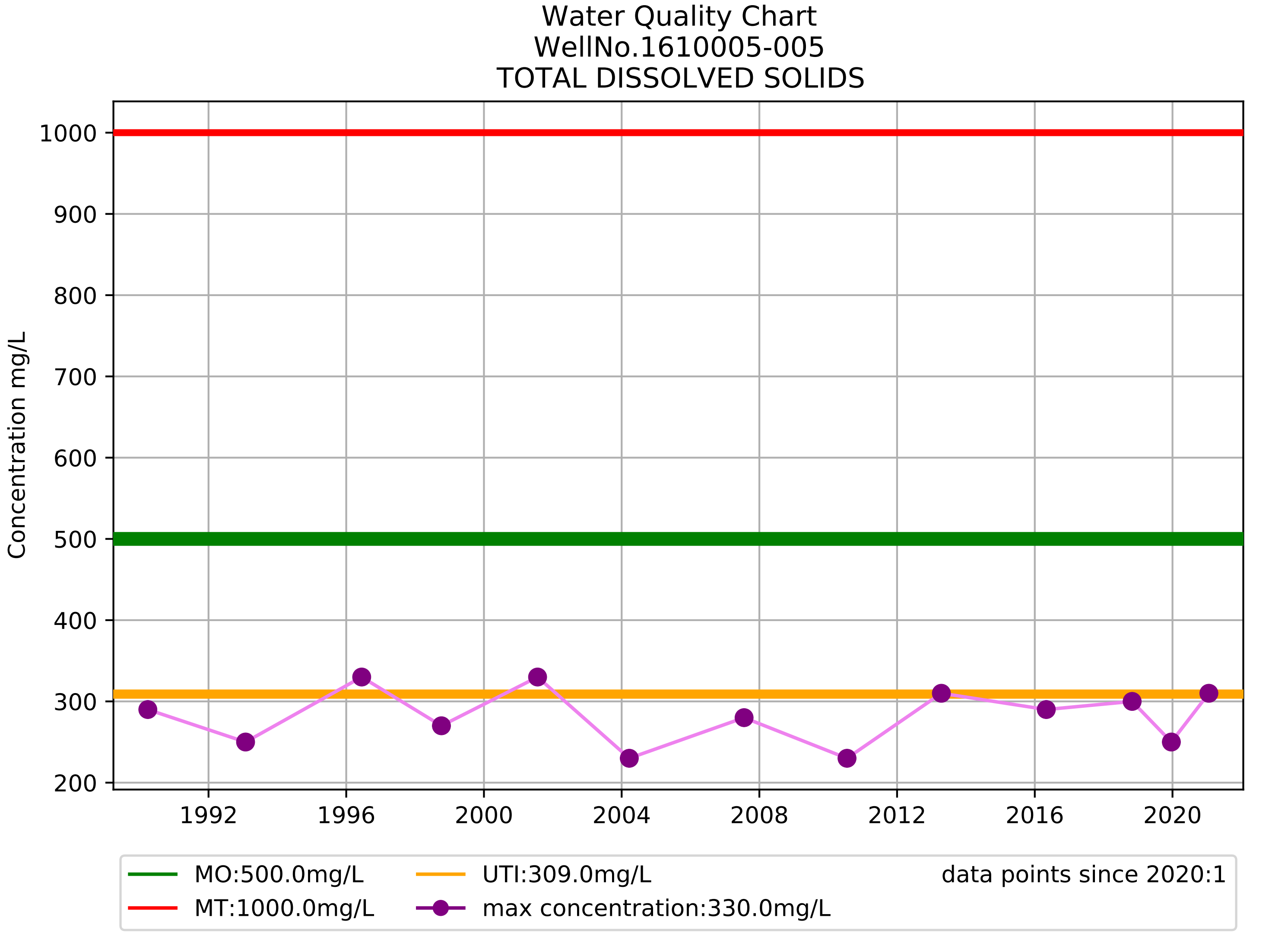

Water Quality Chart
WellNo.1610003-043
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
MO:519.0mg/L
MT:1000.0mg/L
UTI:519.0mg/L
max concentration:520.0mg/L
data points since 2020:0


Water Quality Chart
WellNo.1610004-018
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
300
200
2013
2014
2015
2016
2017
2018
2019
2020
2021
MO:500.0mg/L
MT:1000.0mg/L
max concentration:350.0mg/L
data points since 2020:2

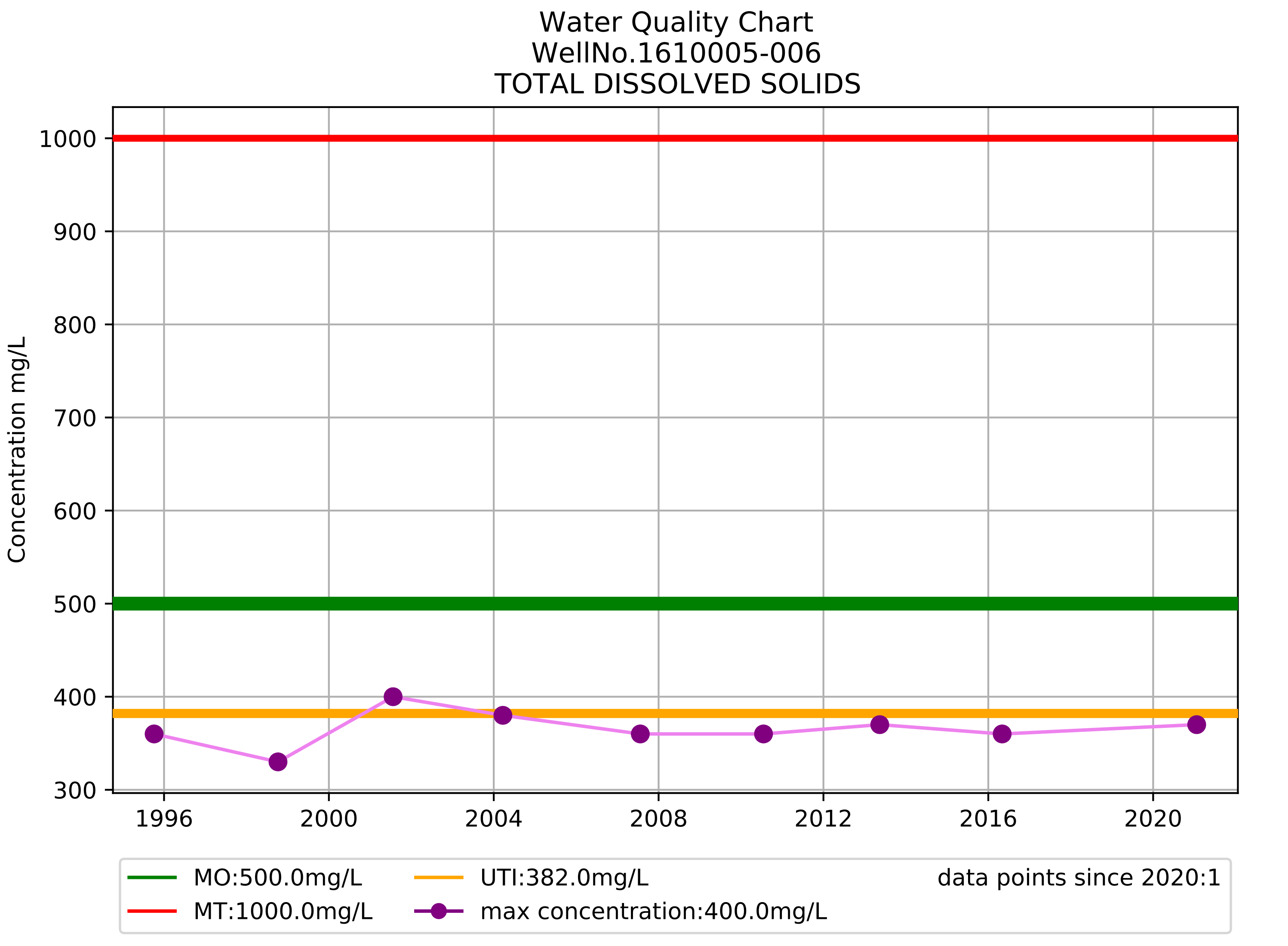


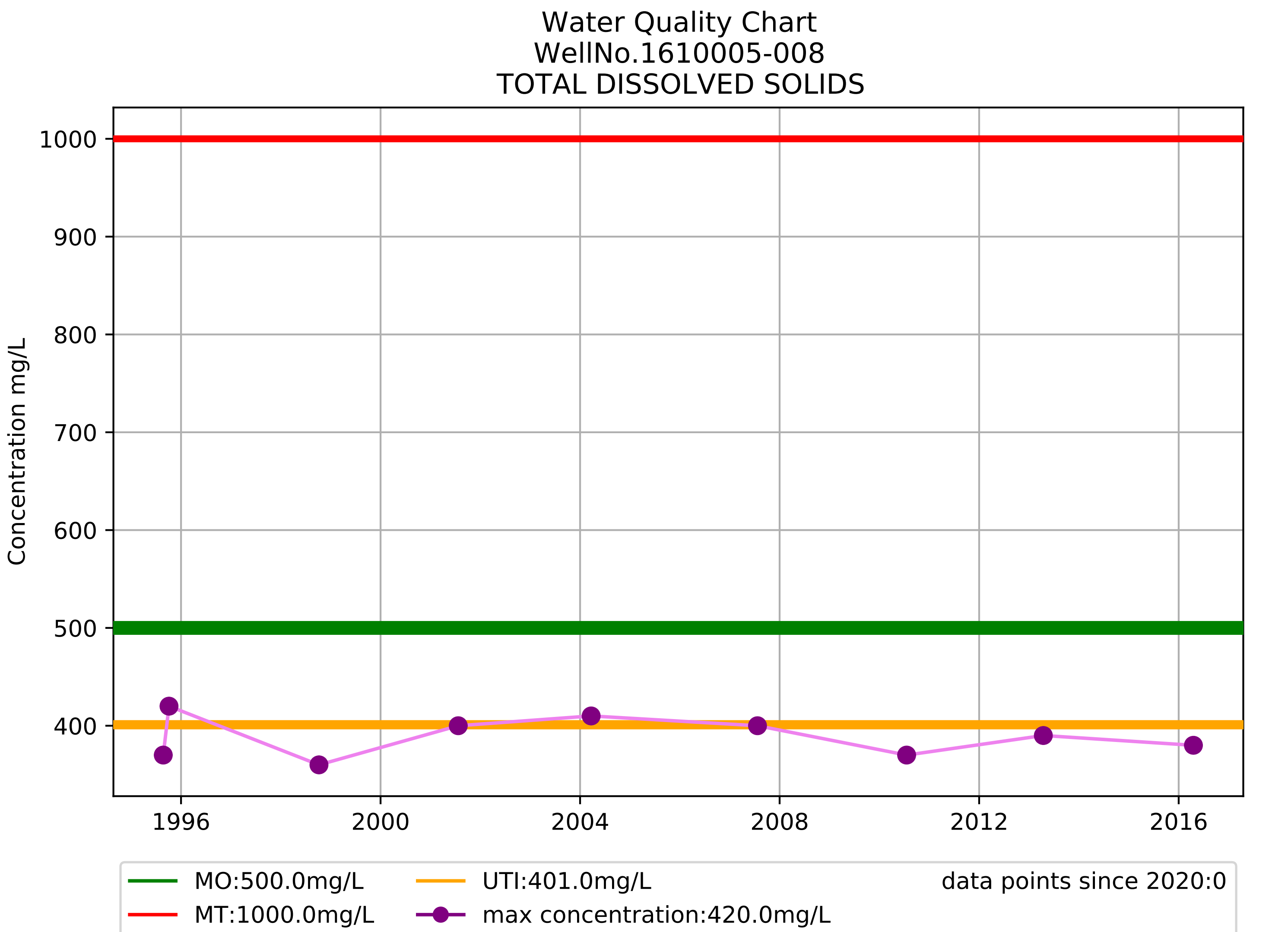
Water Quality Chart
WellNo.1610004-026
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
300
200
2006
2008
2010
2012
2014
2016
2018
2020
MO:500.0mg/L
MT:1000.0mg/L
UTI:269.0mg/L
max concentration:320.0mg/L
data points since 2020:1


Water Quality Chart
WellNo.1610005-003
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
300
200
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:500.0mg/L
MT:1000.0mg/L
max concentration:270.0mg/L
data points since 2020:1

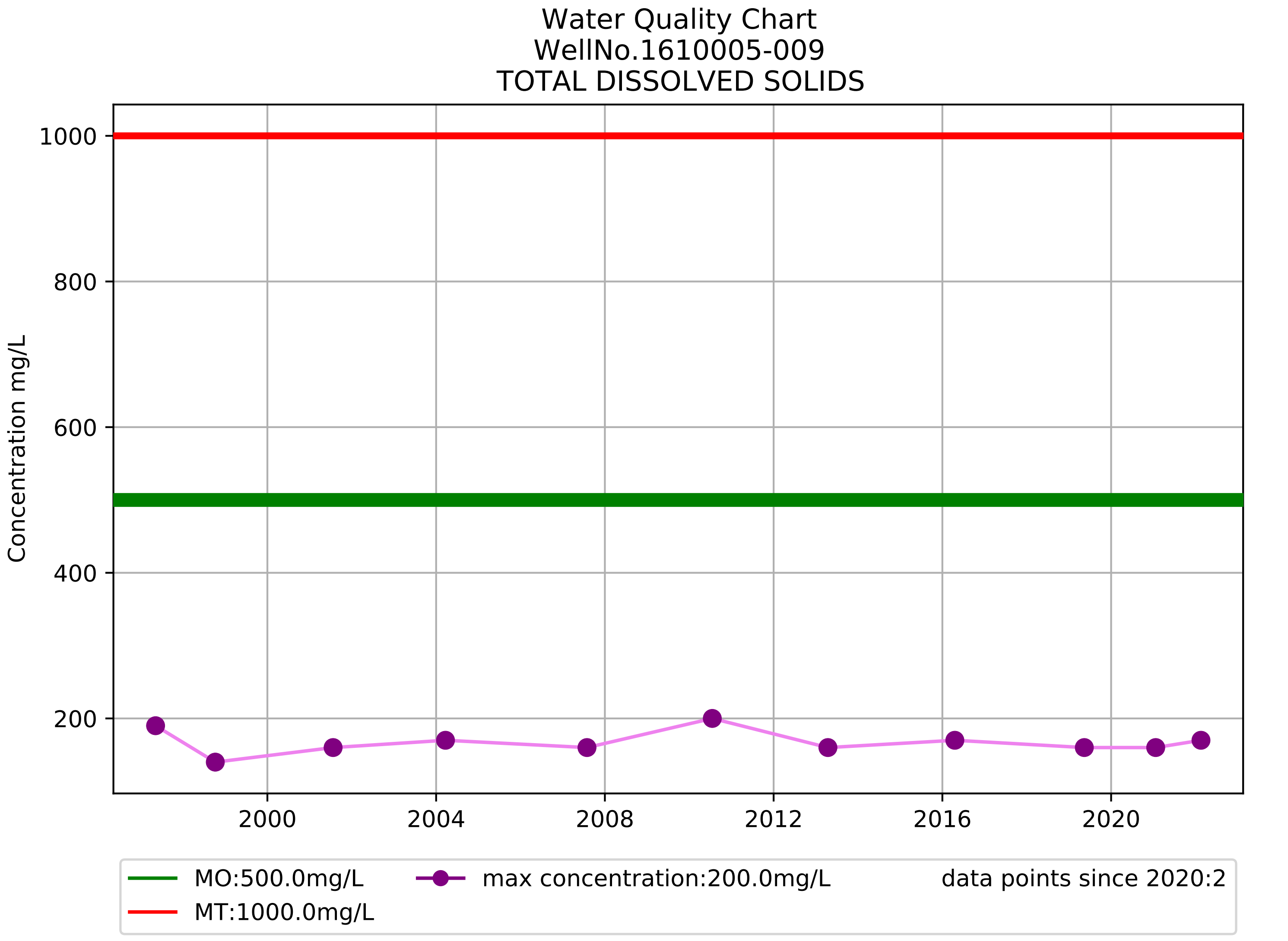


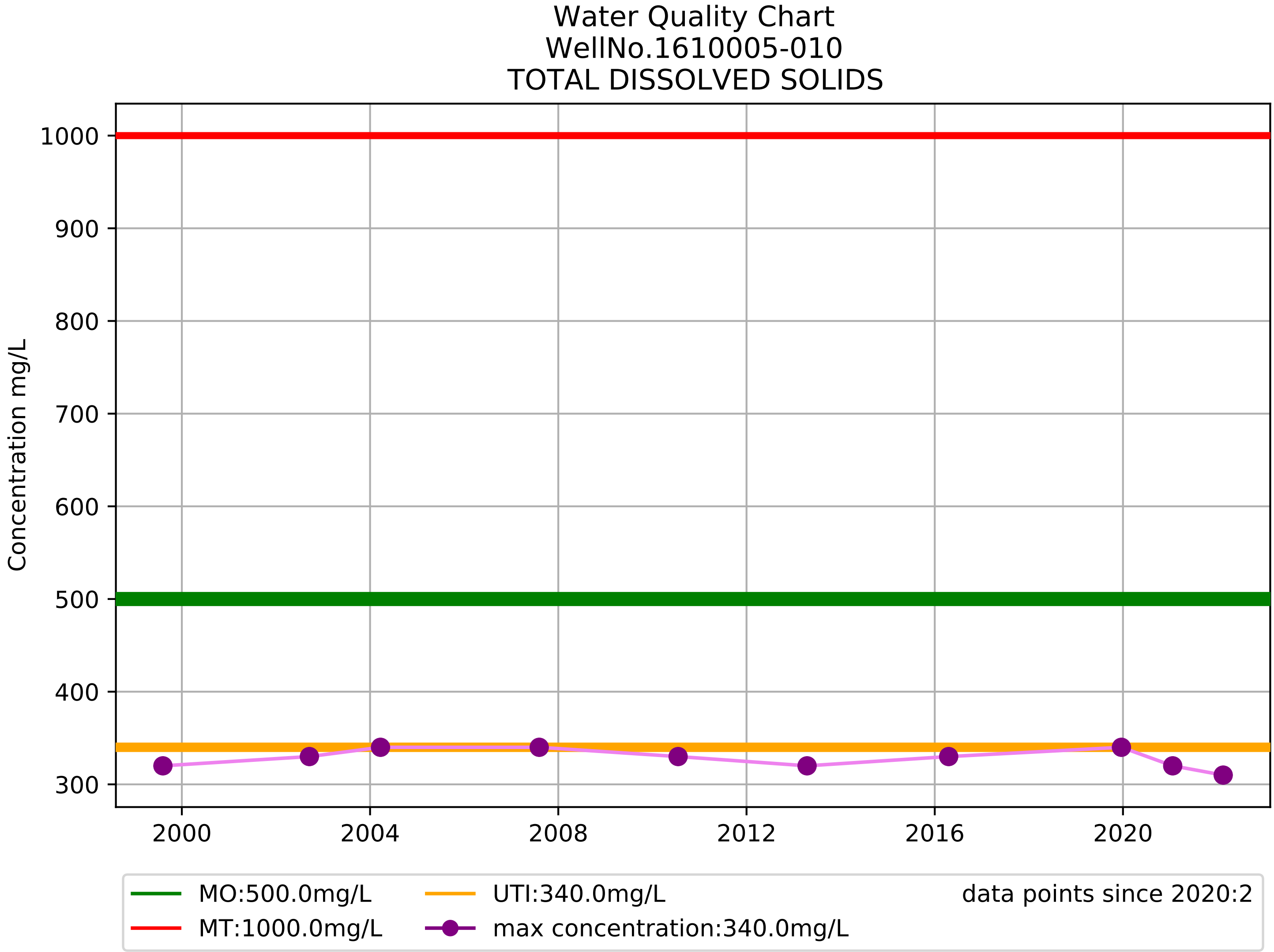
Water Quality Chart
WellNo.1610005-005
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
300
200
1992
1996
2000
2004
2008
2012
2016
2020
MO:500.0mg/L
MT:1000.0mg/L
UTI:309.0mg/L
max concentration:330.0mg/L
data points since 2020:1

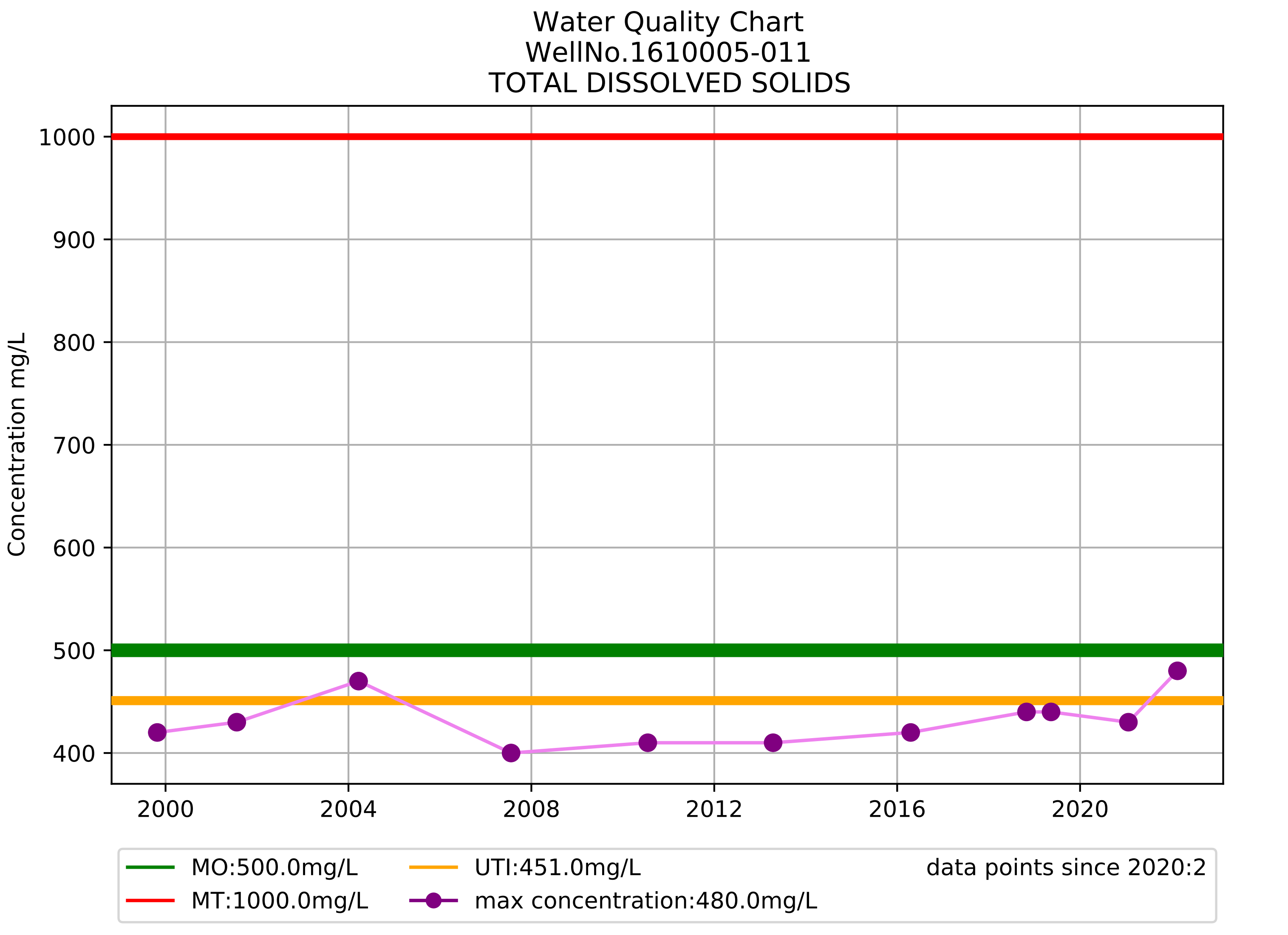

Water Quality Chart
WellNo.1610005-006
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
300
1996
2000
2004
2008
2012
2016
2020
MO:500.0mg/L
MT:1000.0mg/L
UTI:382.0mg/L
max concentration:400.0mg/L
data points since 2020:1

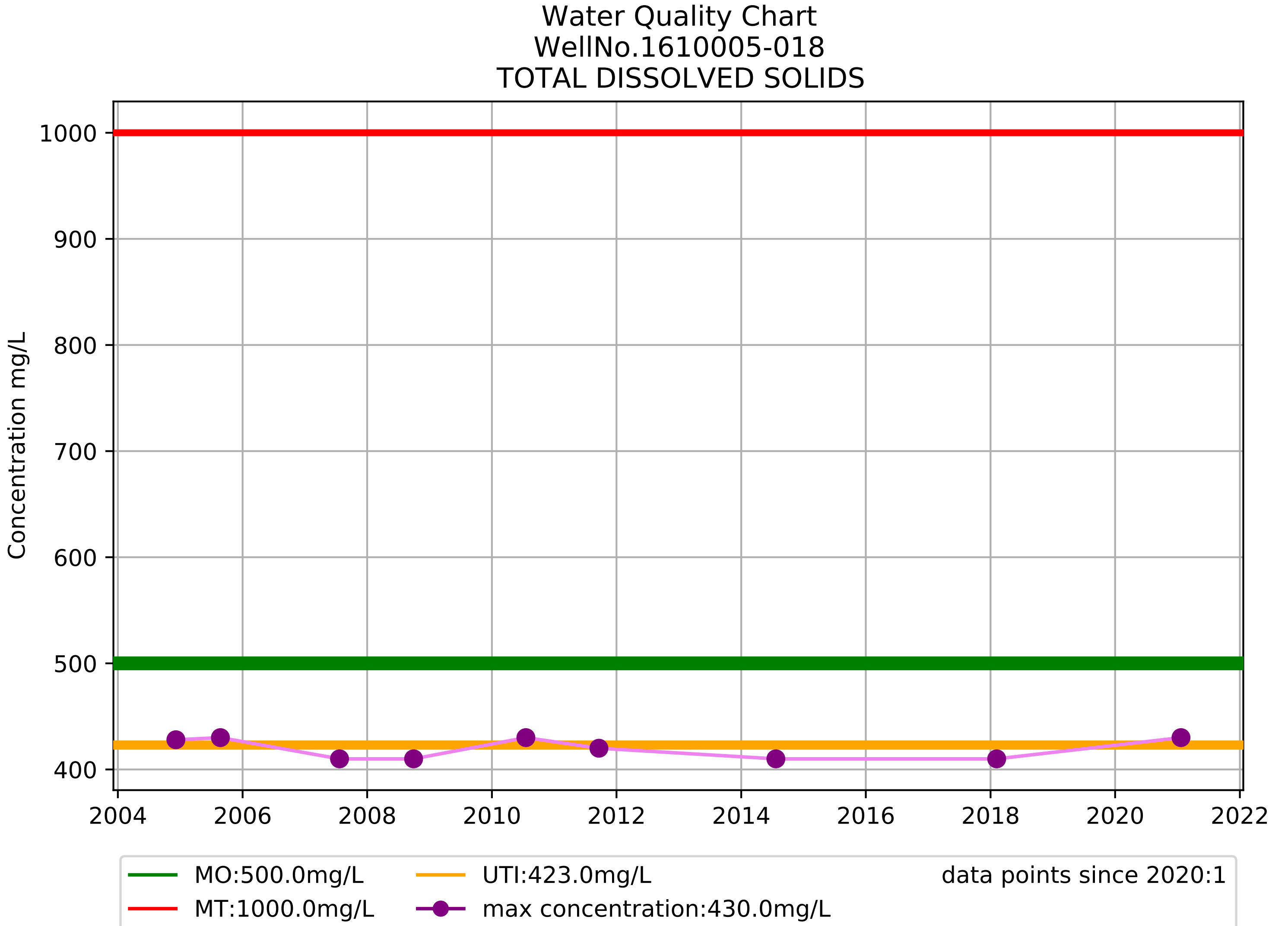


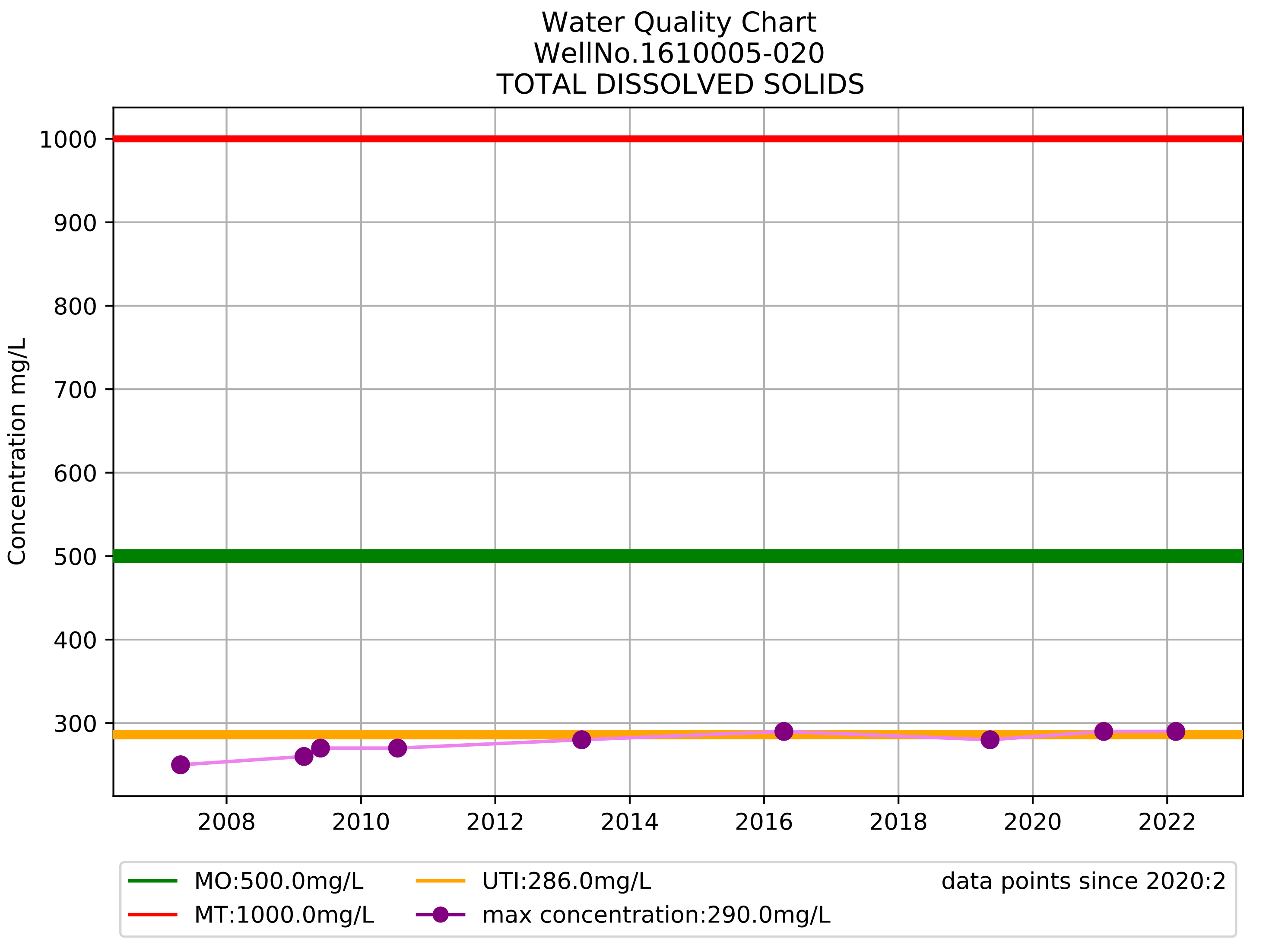
Water Quality Chart
WellNo.1610005-008
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
1996
2000
2004
2008
2012
2016
MO:500.0mg/L
MT:1000.0mg/L
UTI:401.0mg/L
max concentration:420.0mg/L
data points since 2020:0


Water Quality Chart
WellNo.1610005-009
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
800
600
400
200
2000
2004
2008
2012
2016
2020
MO:500.0mg/L
MT:1000.0mg/L
max concentration:200.0mg/L
data points since 2020:2

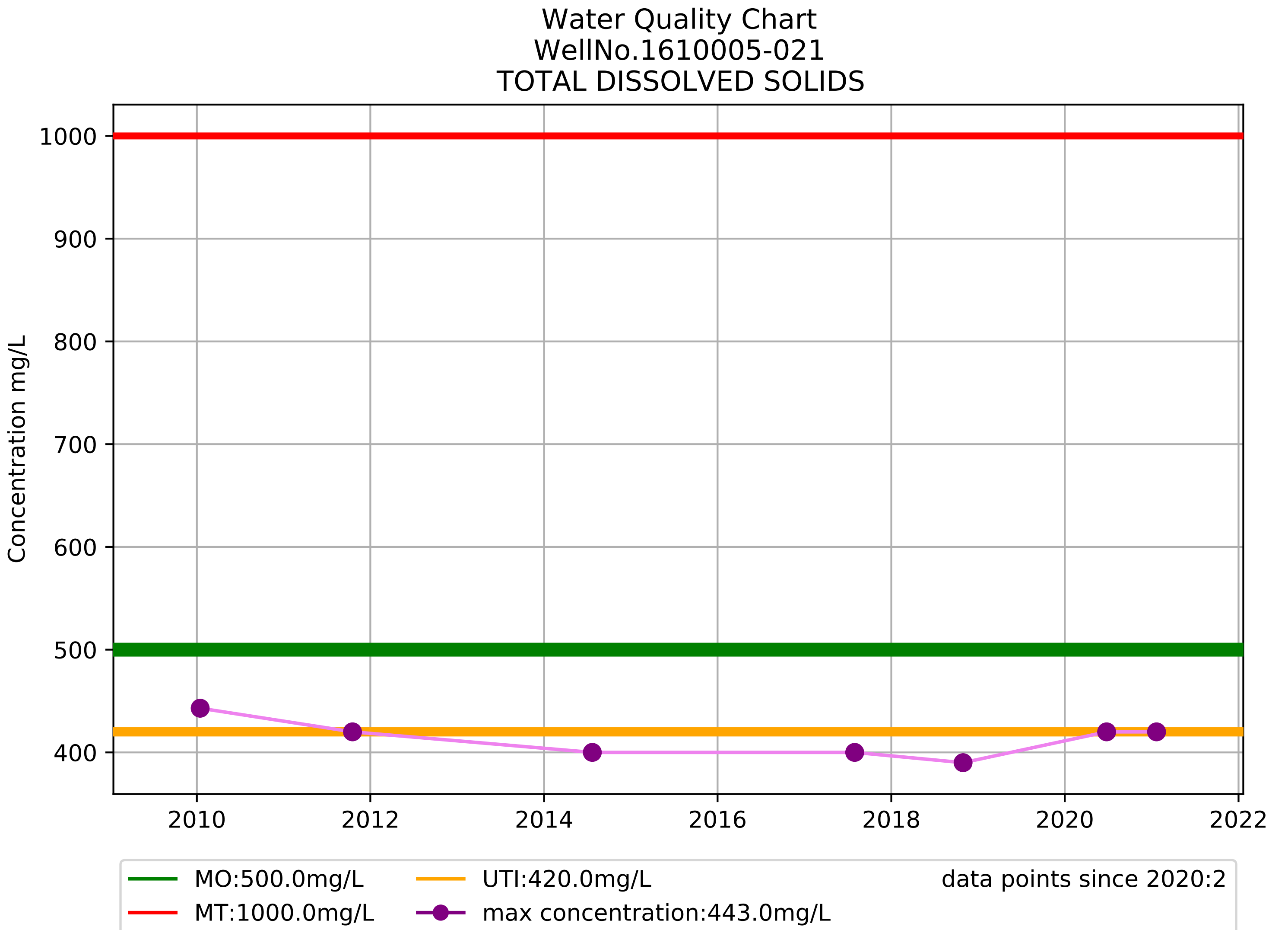

Water Quality Chart
WellNo.1610005-010
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
300
2000
2004
2008
2012
2016
2020
MO:500.0mg/L
MT:1000.0mg/L
UTI:340.0mg/L
max concentration:340.0mg/L
data points since 2020:2

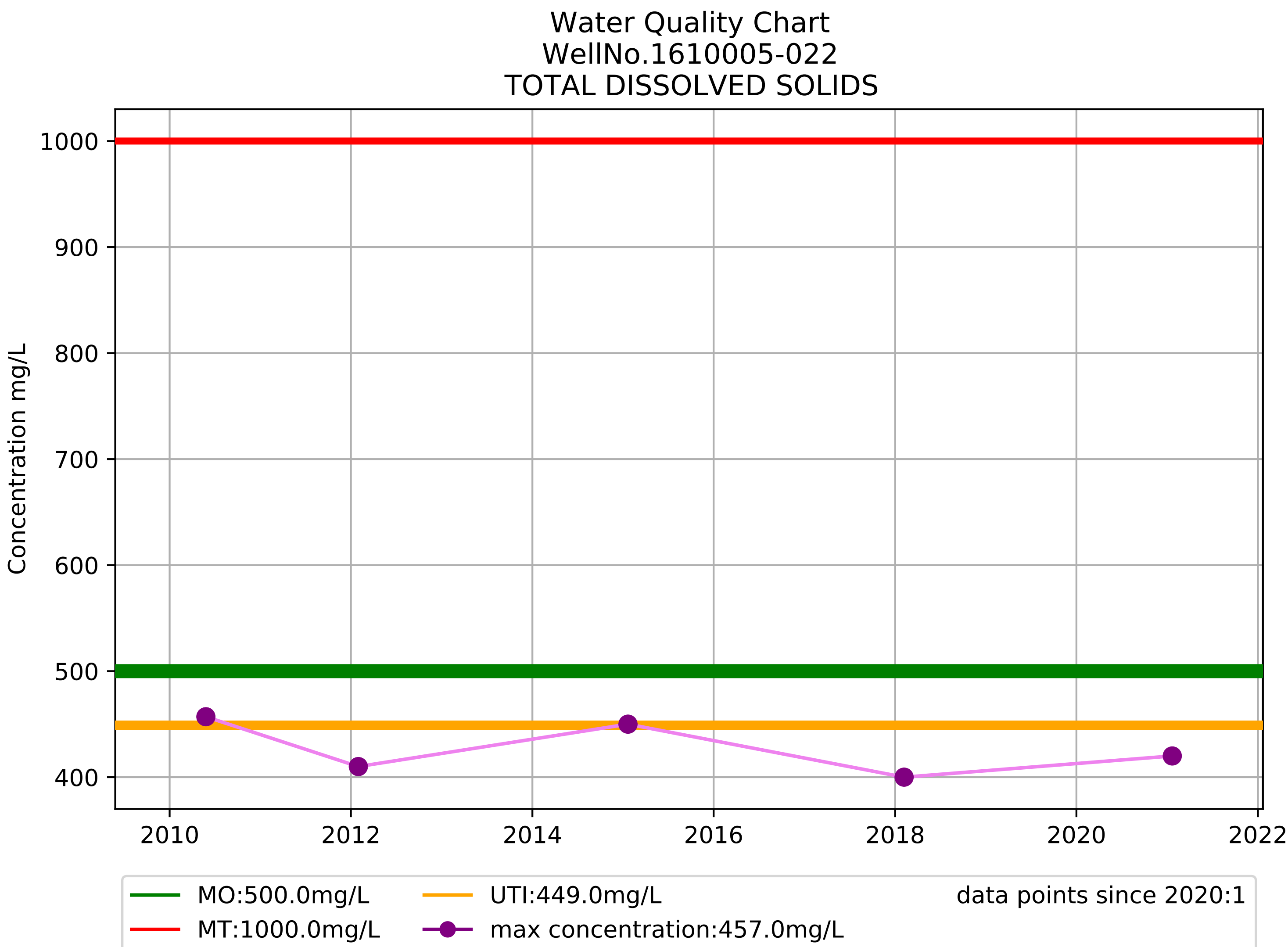

Water Quality Chart
WellNo.1610005-011
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
2000
2004
2008
2012
2016
2020
MO:500.0mg/L
MT:1000.0mg/L
UTI:451.0mg/L
max concentration:480.0mg/L
data points since 2020:2

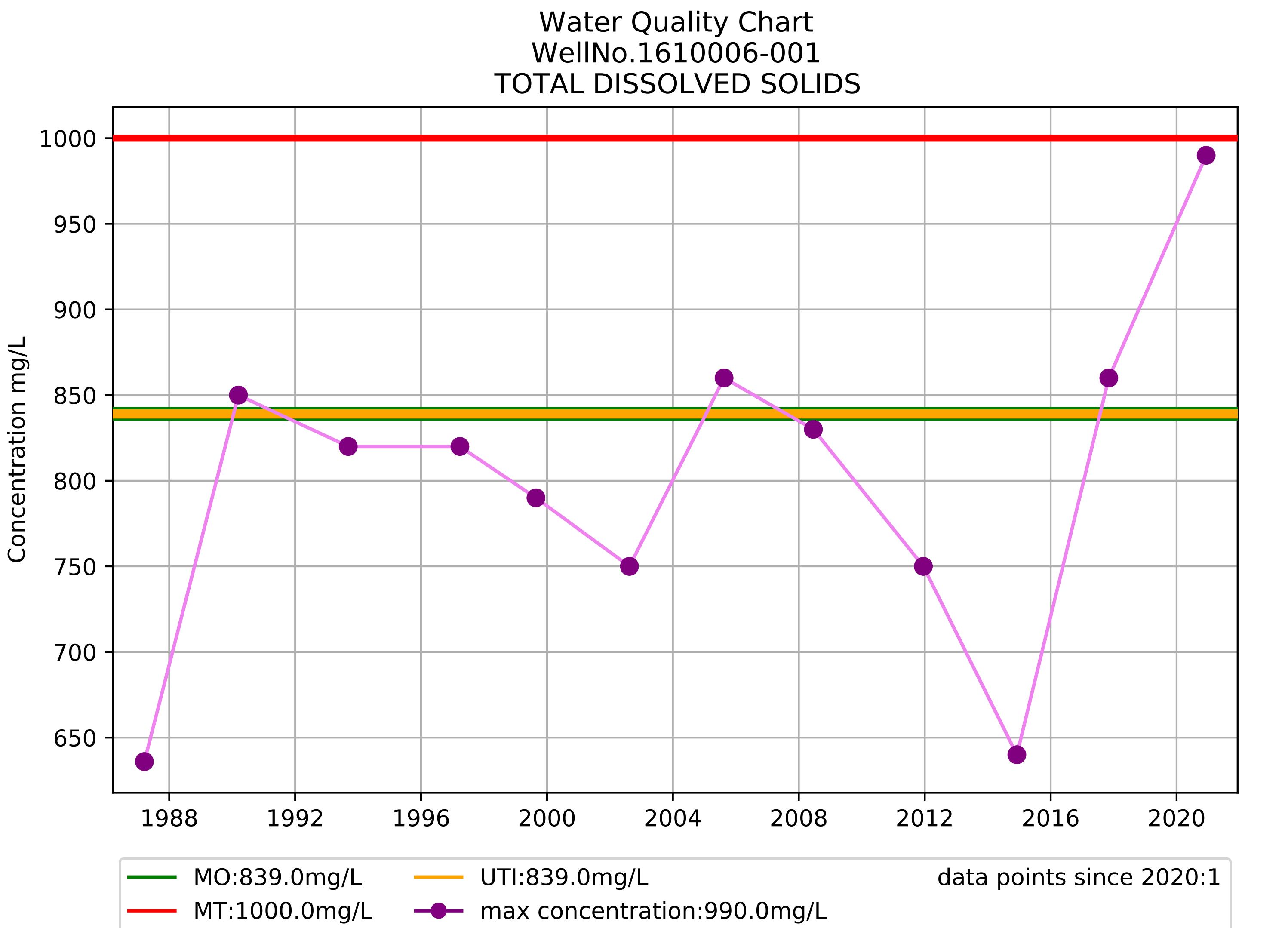

Water Quality Chart
WellNo.1610005-018
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
MO:500.0mg/L
MT:1000.0mg/L
UTI:423.0mg/L
max concentration:430.0mg/L
data points since 2020:1



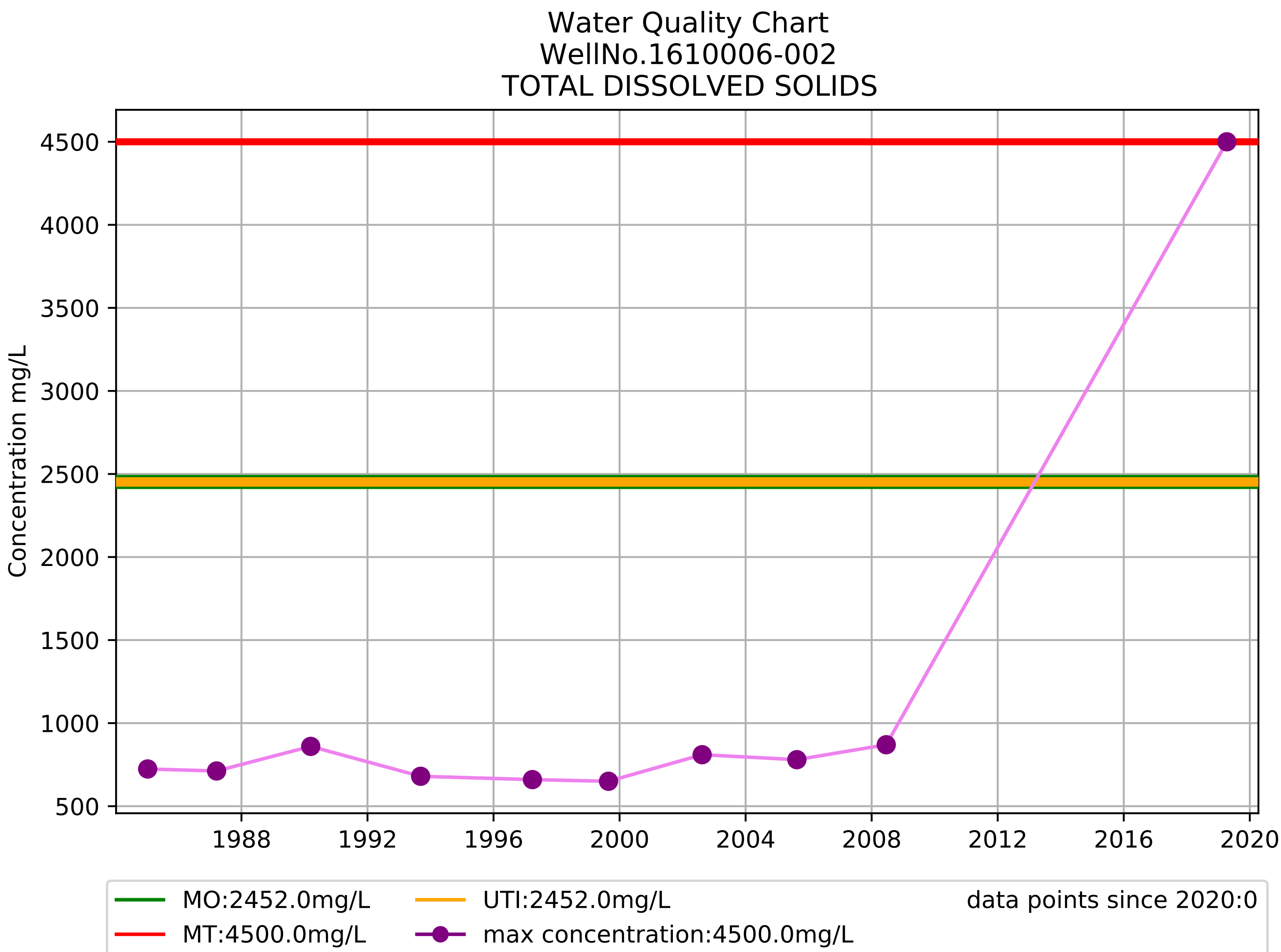
Water Quality Chart
WellNo.1610005-020
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
300
2008
2010
2012
2014
2016
2018
2020
2022
MO:500.0mg/L
MT:1000.0mg/L
UTI:286.0mg/L
max concentration:290.0mg/L
data points since 2020:2

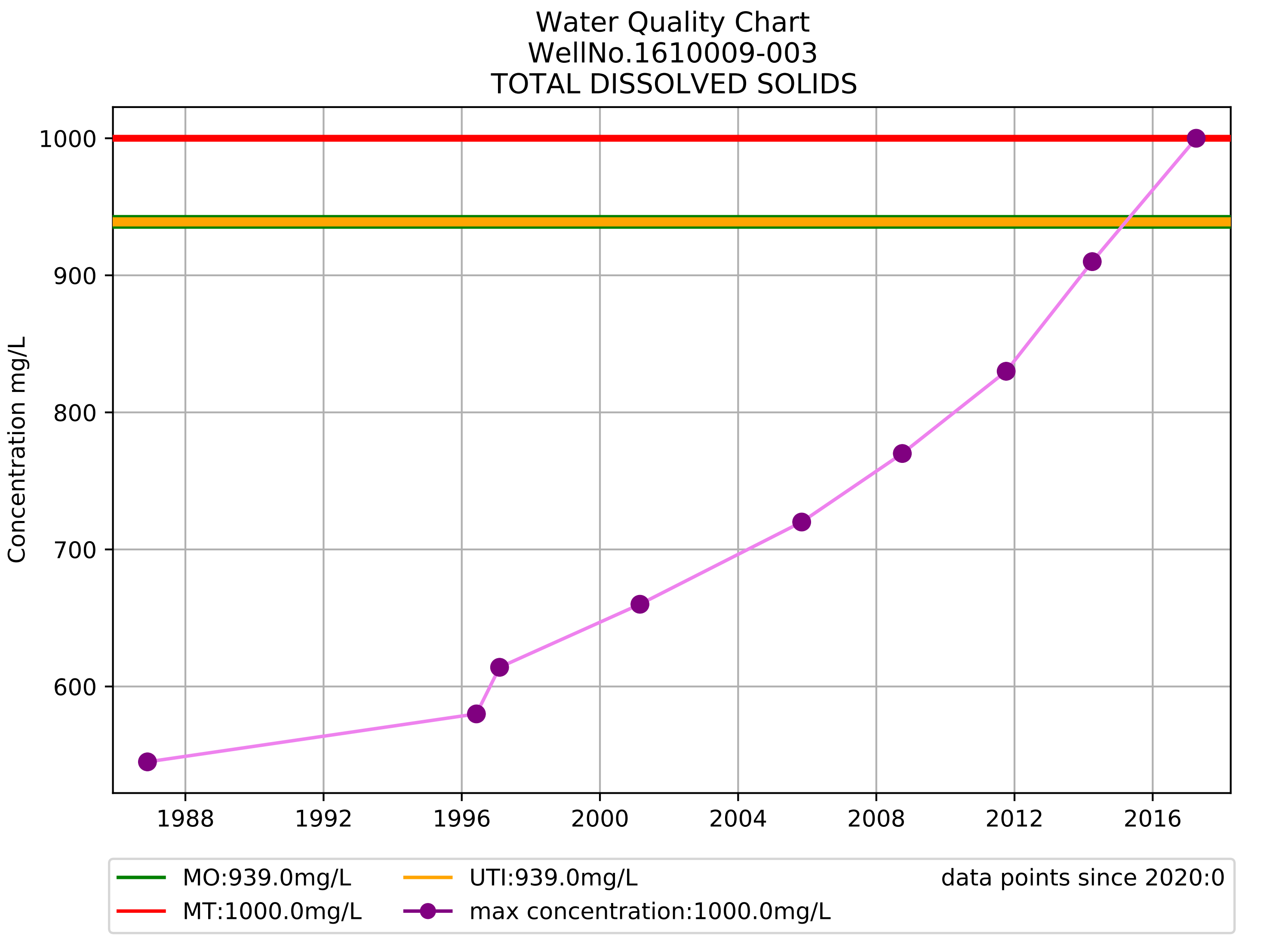

Water Quality Chart
WellNo.1610005-021
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
2010
2012
2014
2016
2018
2020
2022
MO:500.0mg/L
MT:1000.0mg/L
UTI:420.0mg/L
max concentration:443.0mg/L
data points since 2020:2

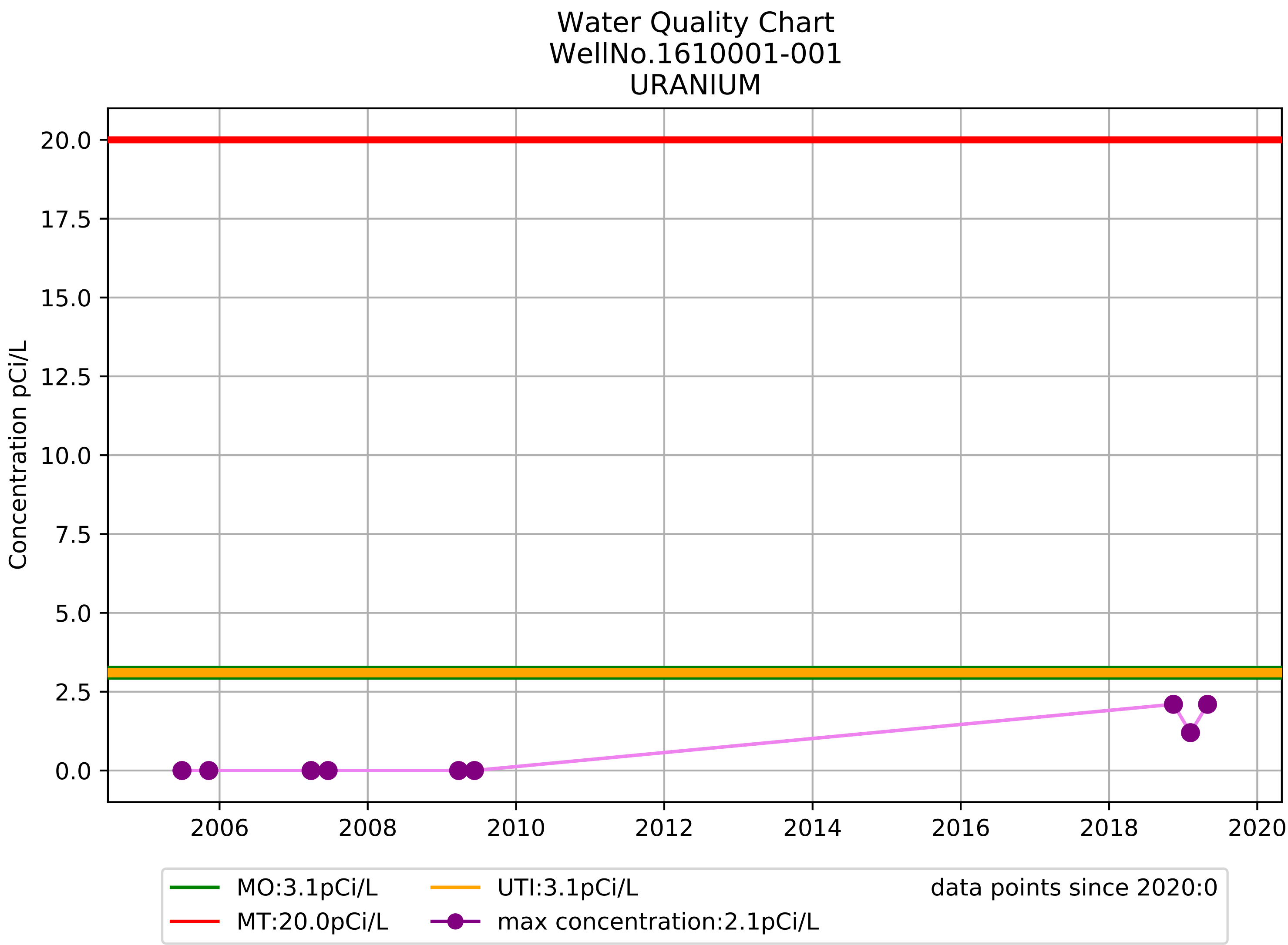

Water Quality Chart
WellNo.1610005-022
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
500
400
2010
2012
2014
2016
2018
2020
2022
MO:500.0mg/L
MT:1000.0mg/L
UTI:449.0mg/L
max concentration:457.0mg/L
data points since 2020:1



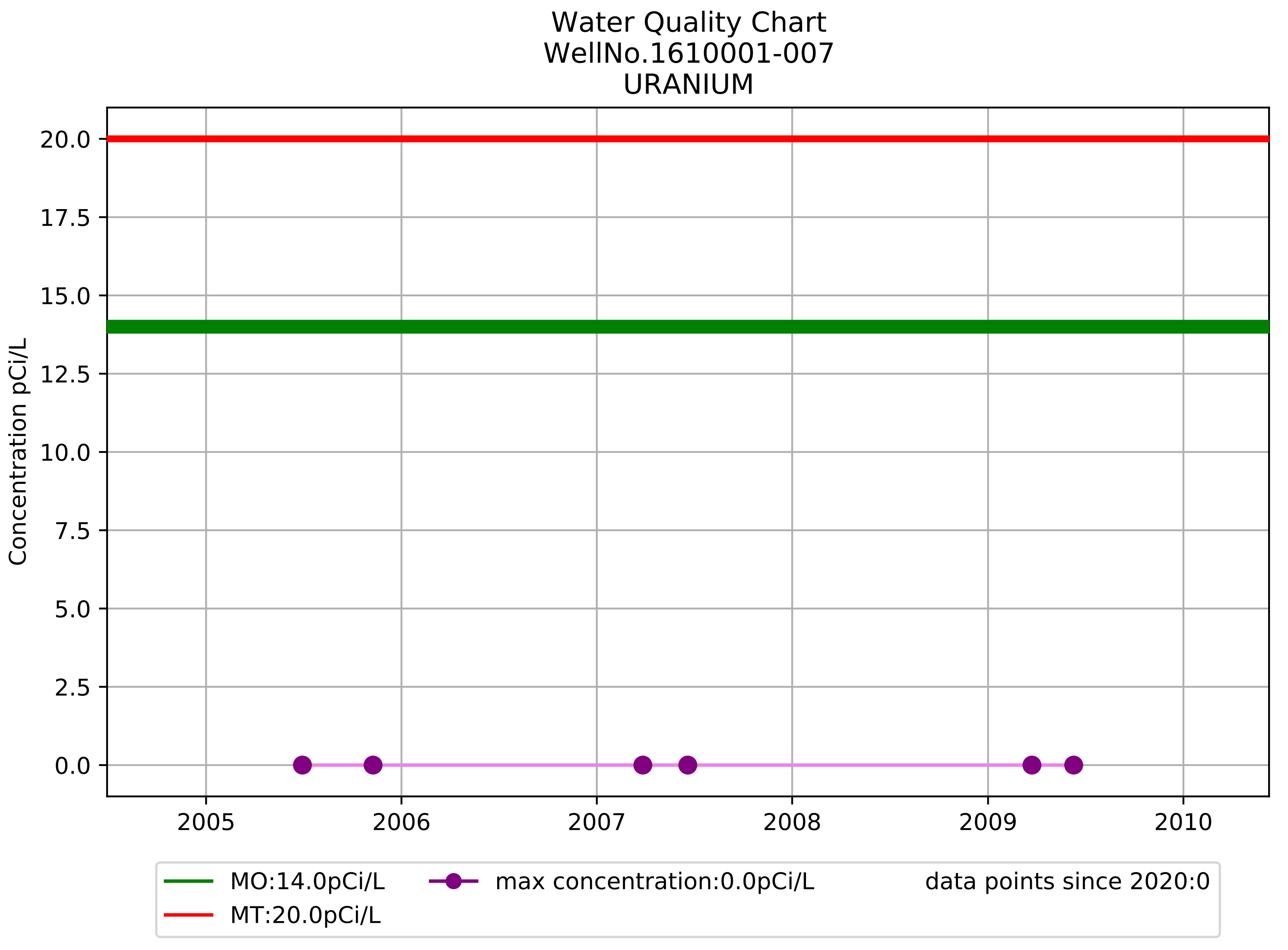
Water Quality Chart
WellNo.1610006-001
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
950
900
850
800
750
700
650
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:839.0mg/L
UTI:839.0mg/L
data points since 2020:1
MT:1000.0mg/L
max concentration:990.0mg/L


Water Quality Chart
WellNo.1610006-002
TOTAL DISSOLVED SOLIDS
Concentration mg/L
4500
4000
3500
3000
2500
2000
1500
1000
500
1988
1992
1996
2000
2004
2008
2012
2016
2020
MO:2452.0mg/L
UTI:2452.0mg/L
data points since 2020:0
MT:4500.0mg/L
max concentration:4500.0mg/L

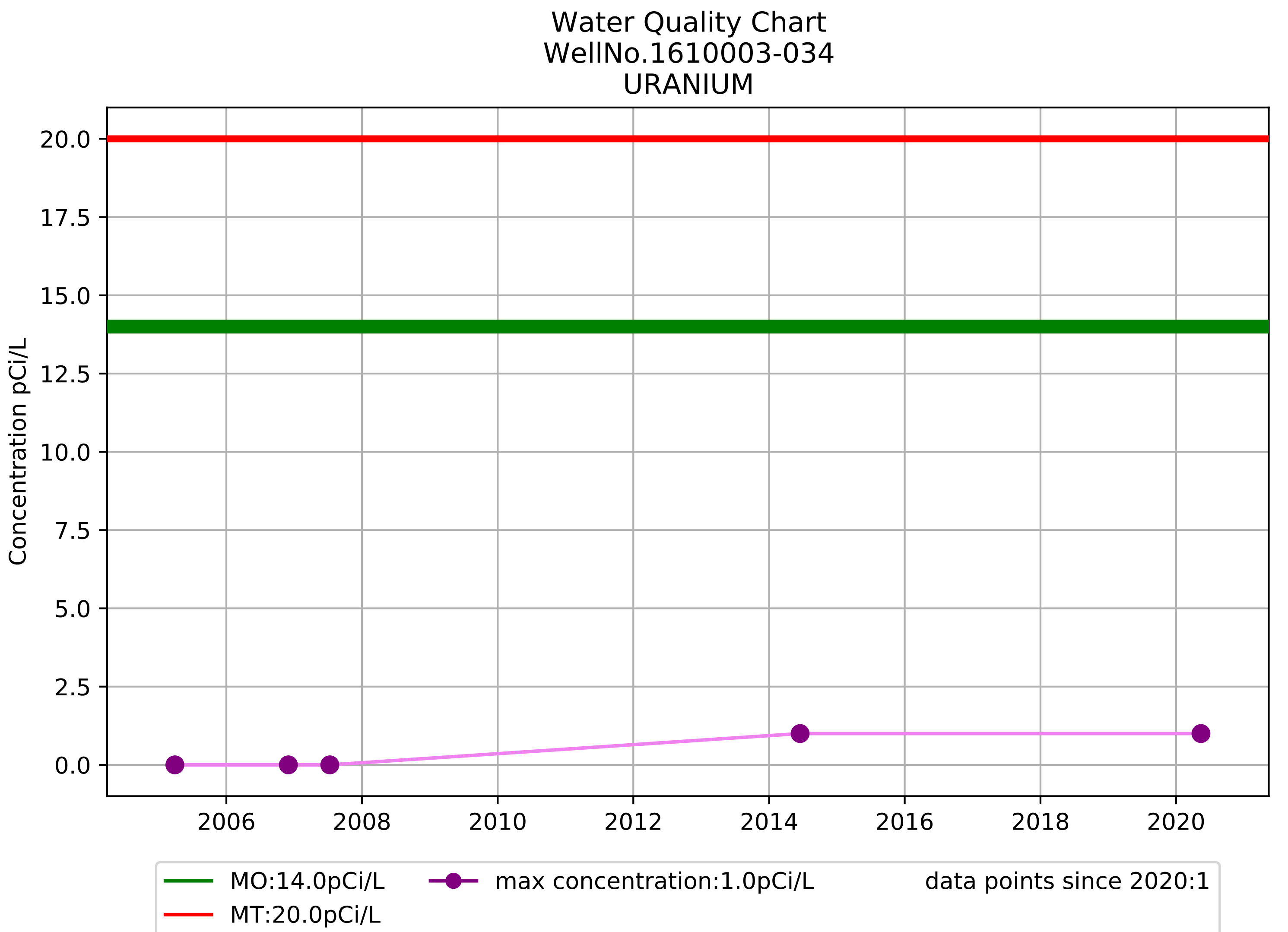

Water Quality Chart
WellNo.1610009-003
TOTAL DISSOLVED SOLIDS
Concentration mg/L
1000
900
800
700
600
1988
1992
1996
2000
2004
2008
2012
2016
MO:939.0mg/L
MT:1000.0mg/L
UTI:939.0mg/L
max concentration:1000.0mg/L
data points since 2020:0



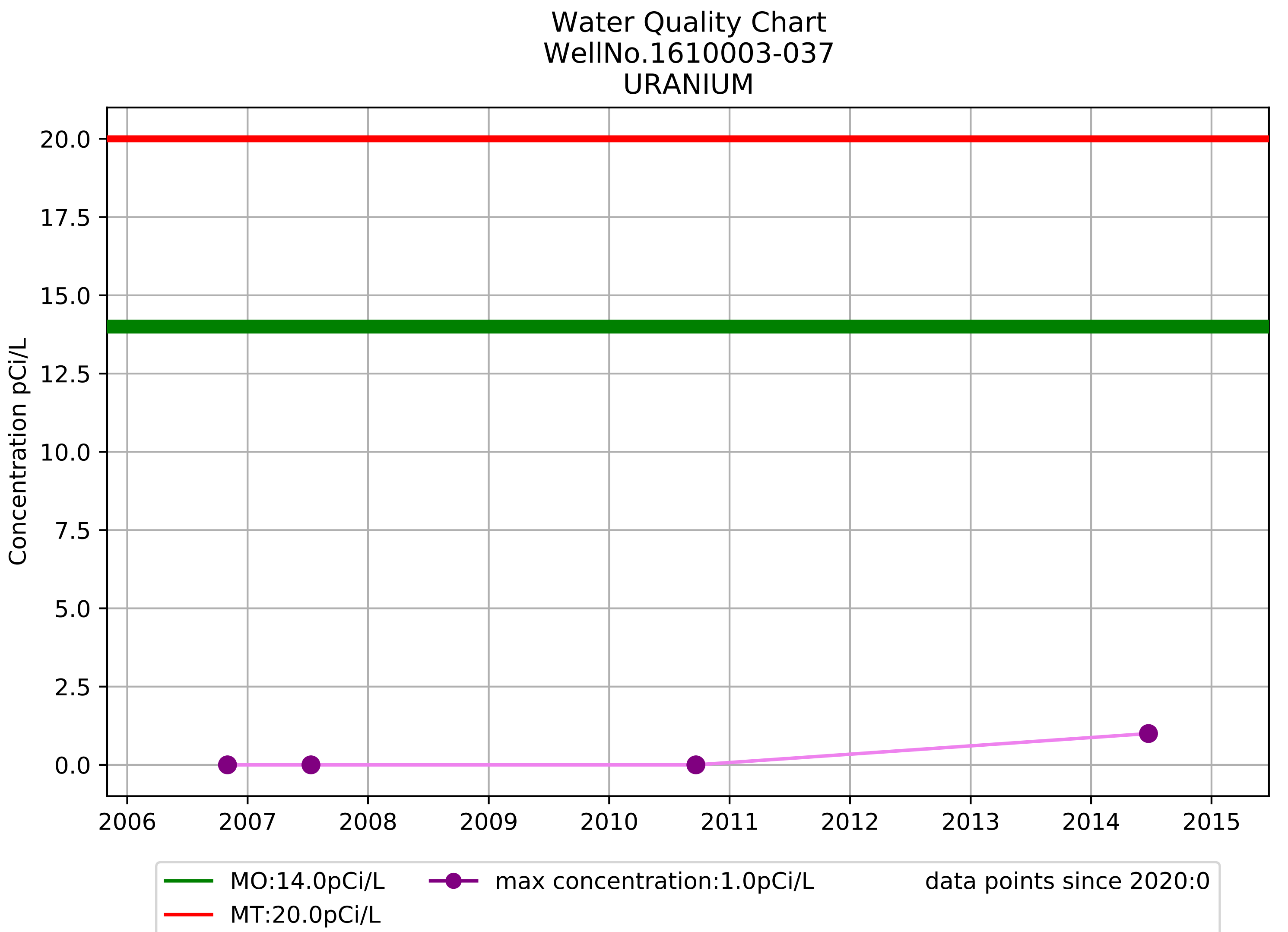
Water Quality Chart
WellNo.1610001-001
URANIUM
Concentration pCi/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
2006
2008
2010
2012
2014
2016
2018
2020
MO:3.1pCi/L
MT:20.0pCi/L
UTI:3.1pCi/L
max concentration:2.1pCi/L
data points since 2020:0

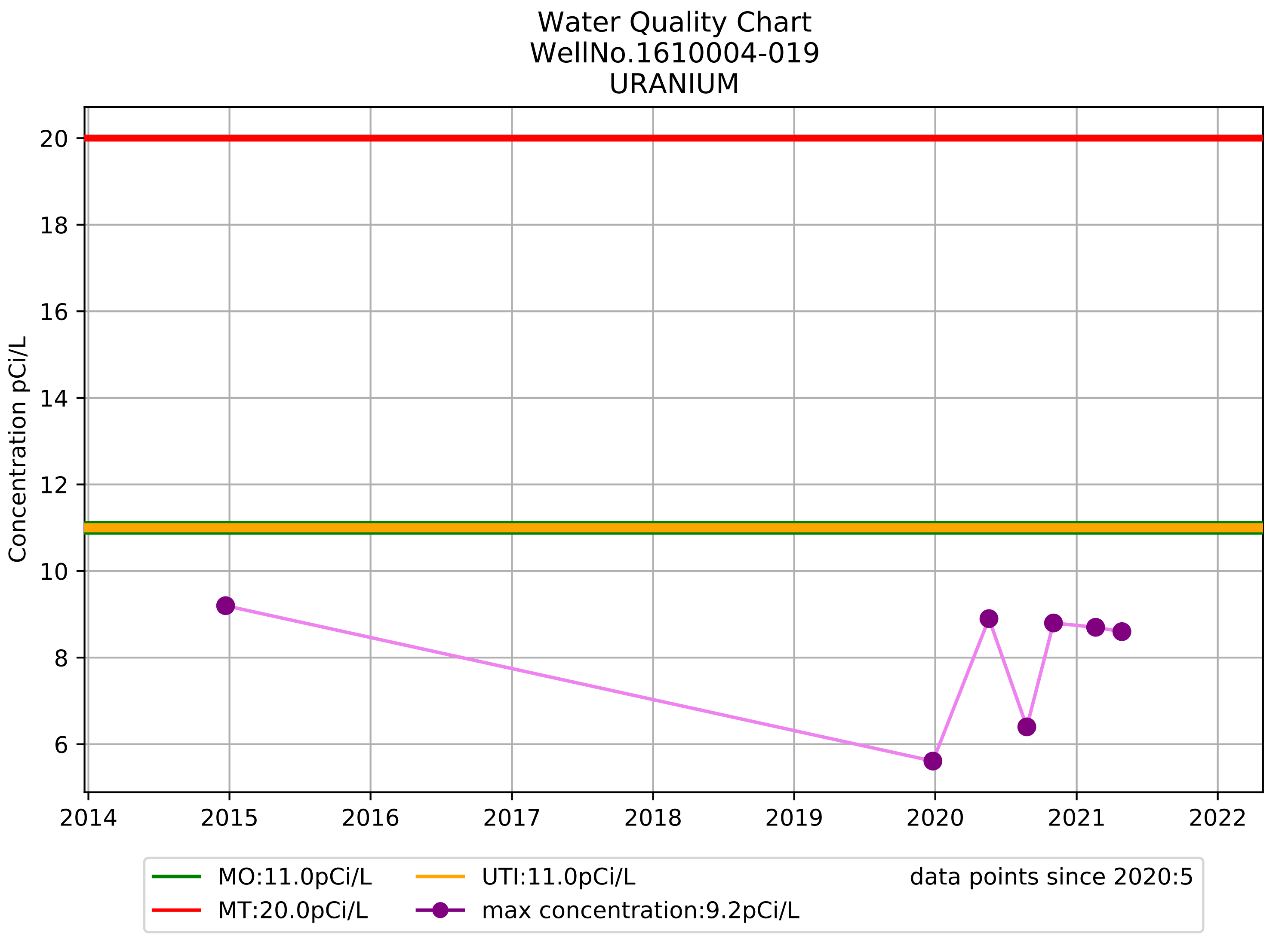


Water Quality Chart
WellNo.1610001-007
URANIUM
Concentration pCi/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
2005
2006
2007
2008
2009
2010
MO:14.0pCi/L
MT:20.0pCi/L
max concentration:0.0pCi/L
data points since 2020:0

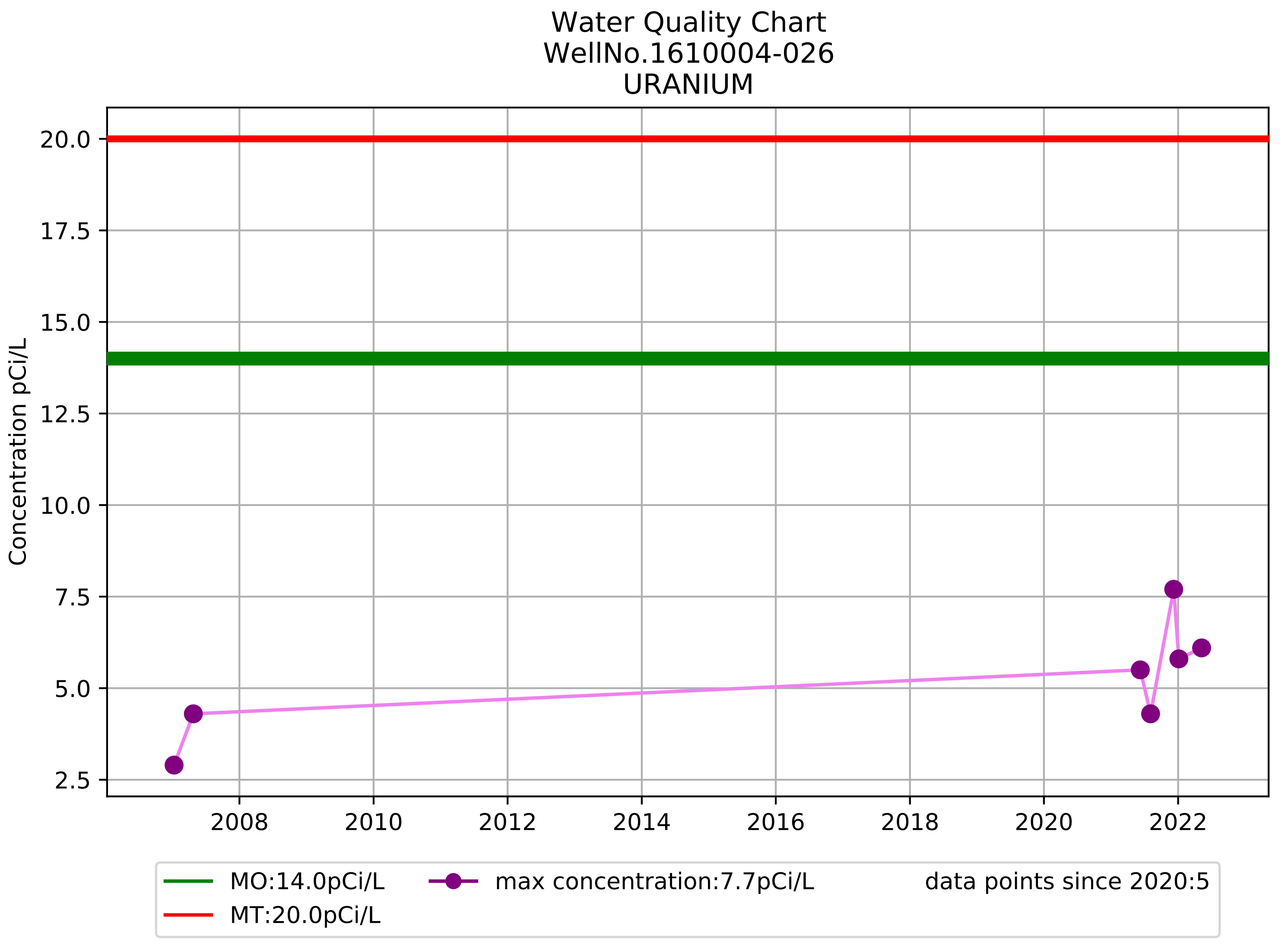


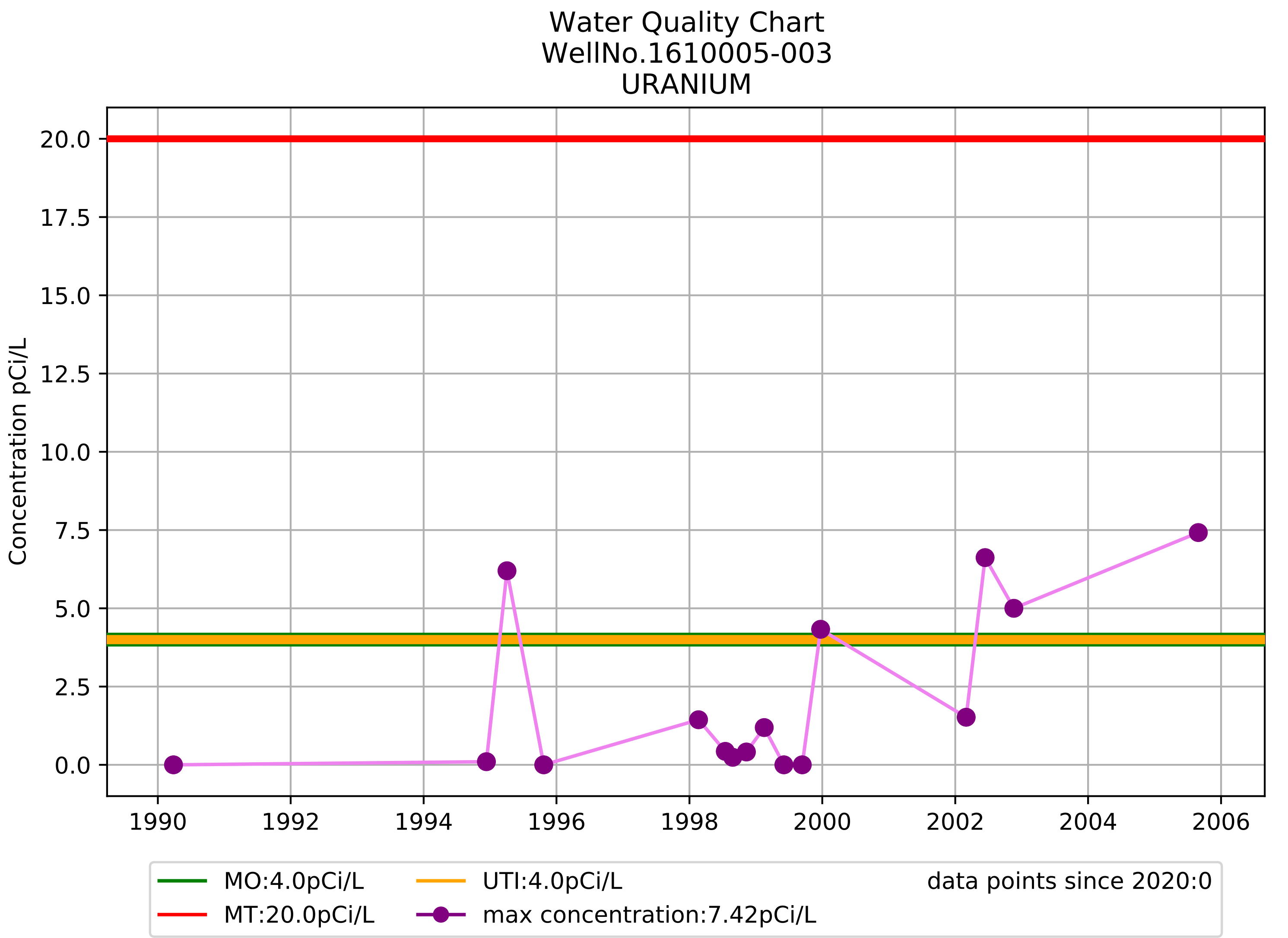
Water Quality Chart
WellNo.1610003-034
URANIUM
Concentration pCi/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
2006
2008
2010
2012
2014
2016
2018
2020
MO:14.0pCi/L
MT:20.0pCi/L
max concentration:1.0pCi/L
data points since 2020:1

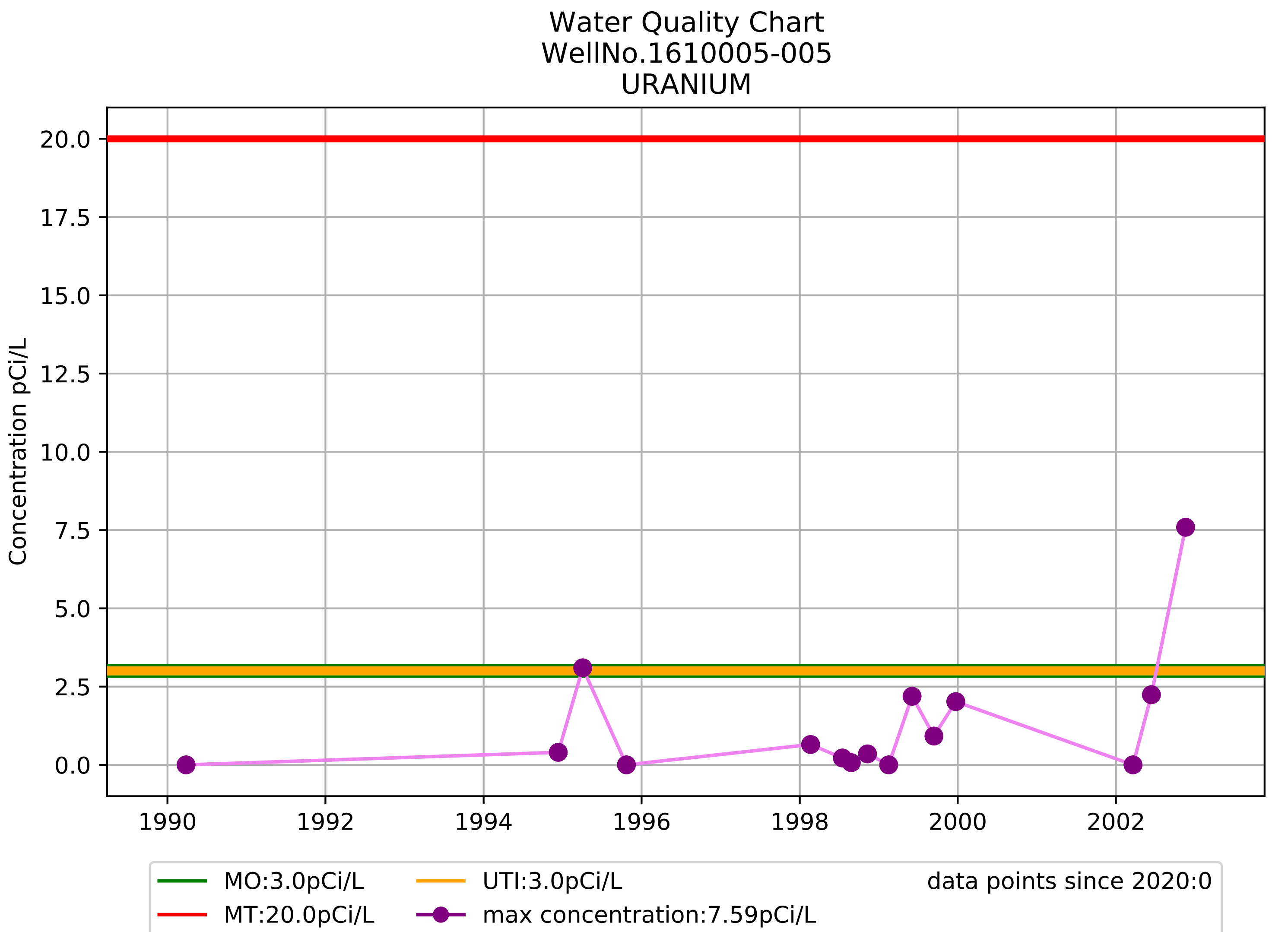

Water Quality Chart
WellNo.1610003-037
URANIUM
Concentration pCi/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
MO:14.0pCi/L
MT:20.0pCi/L
max concentration:1.0pCi/L
data points since 2020:0



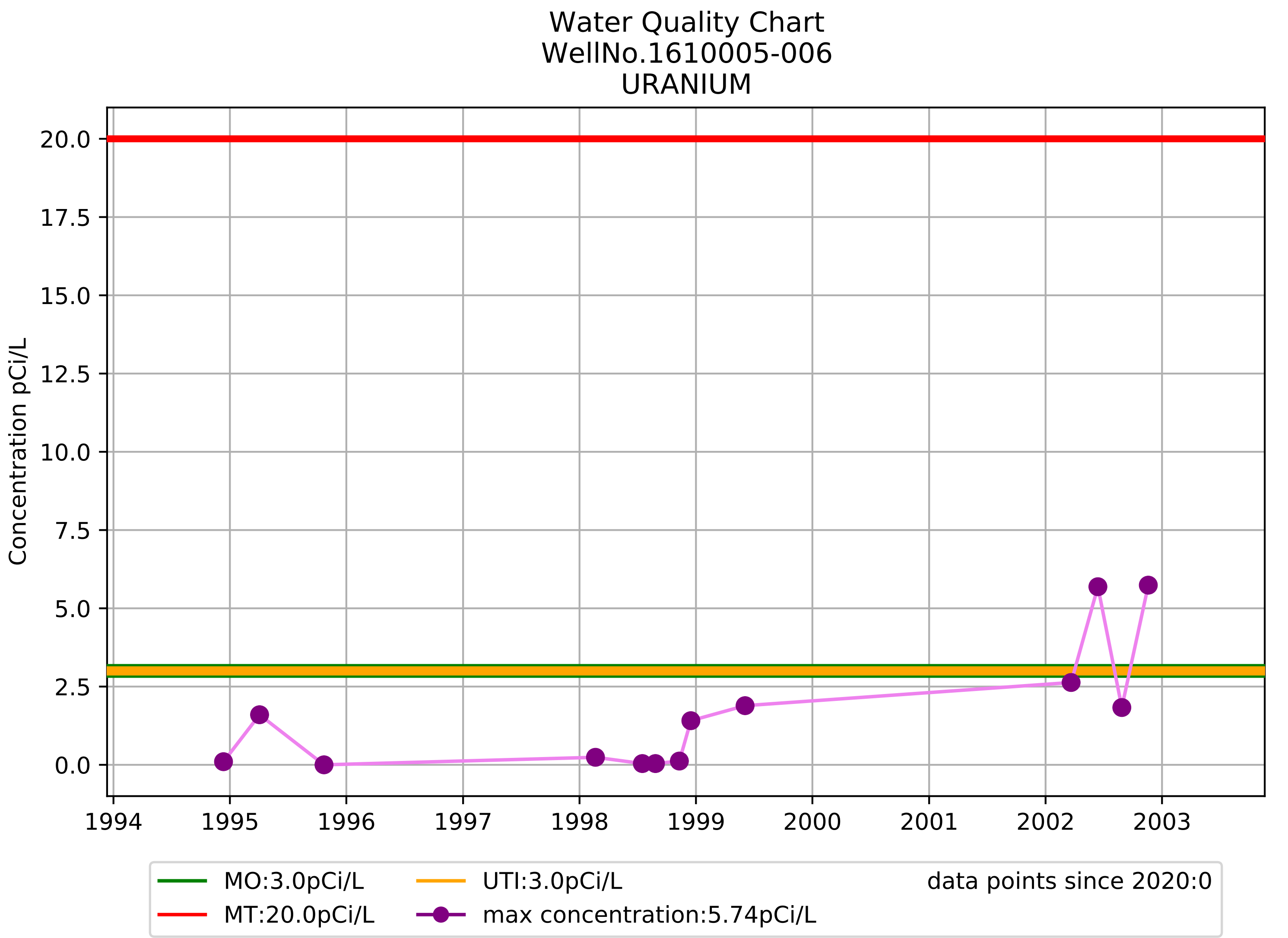
Water Quality Chart
WellNo.1610004-019
URANIUM
Concentration pCi/L
20
18
16
14
12
10
8
6
2014
2015
2016
2017
2018
2019
2020
2021
2022
MO:11.0pCi/L
UTI:11.0pCi/L
data points since 2020:5
MT:20.0pCi/L
max concentration:9.2pCi/L


Water Quality Chart
WellNo.1610004-026
URANIUM
Concentration pCi/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
2008
2010
2012
2014
2016
2018
2020
2022
MO:14.0pCi/L
MT:20.0pCi/L
max concentration:7.7pCi/L
data points since 2020:5

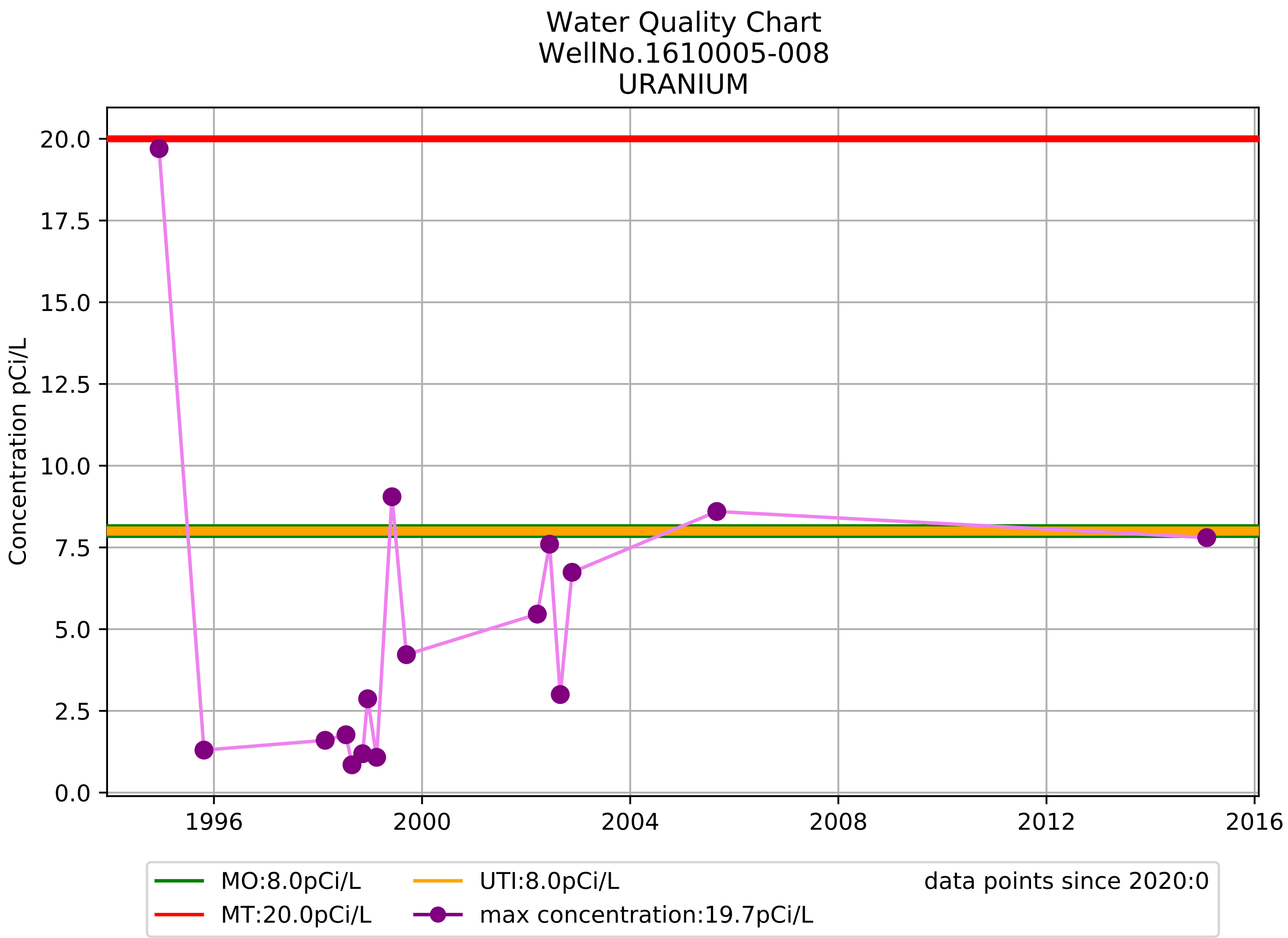

Water Quality Chart
WellNo.1610005-003
URANIUM
Concentration pCi/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
2004
2006
MO:4.0pCi/L
MT:20.0pCi/L
UTI:4.0pCi/L
max concentration:7.42pCi/L
data points since 2020:0

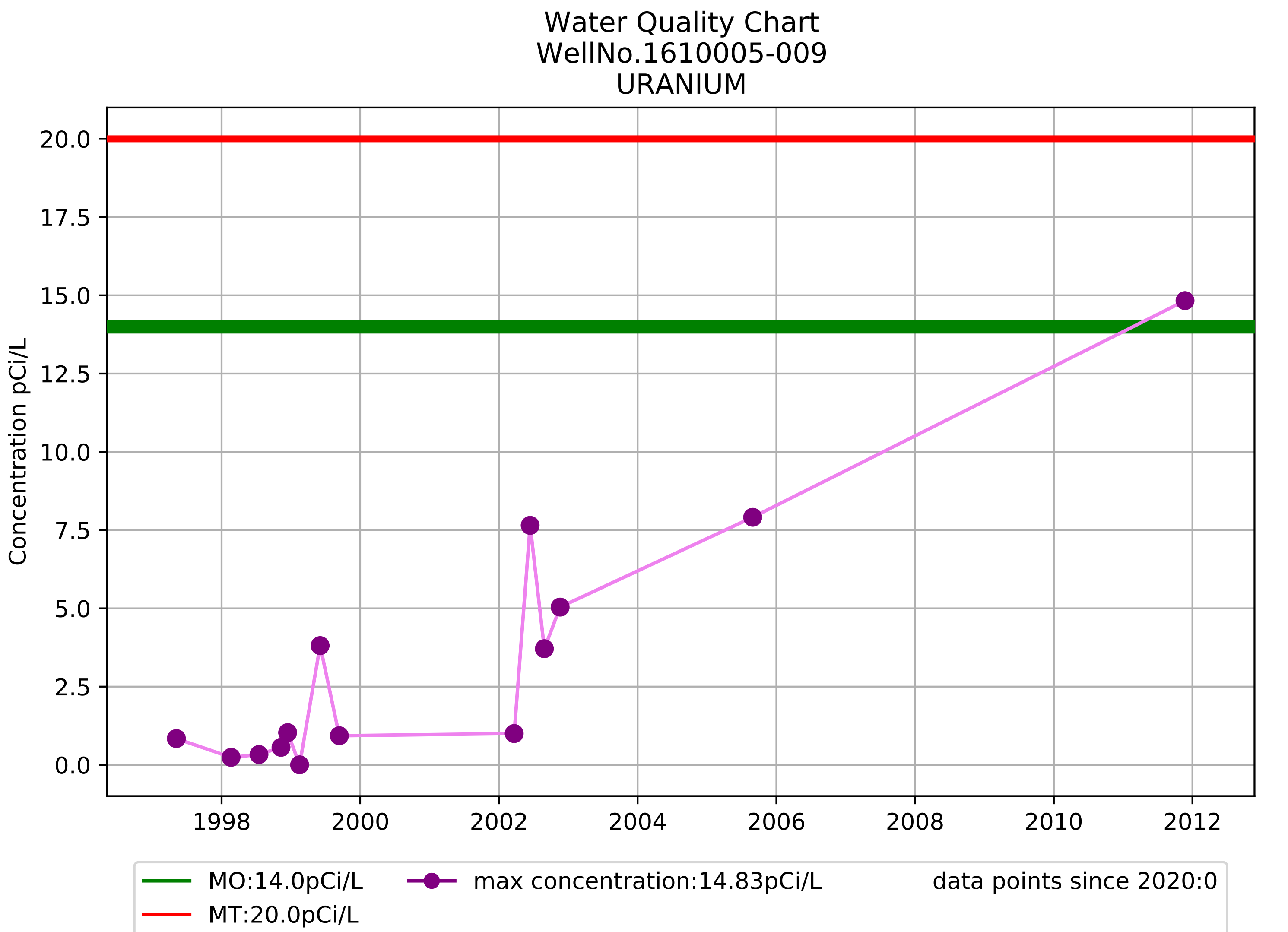


Water Quality Chart
WellNo.1610005-005
URANIUM
Concentration pCi/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1990
1992
1994
1996
1998
2000
2002
MO:3.0pCi/L
MT:20.0pCi/L
UTI:3.0pCi/L
max concentration:7.59pCi/L
data points since 2020:0

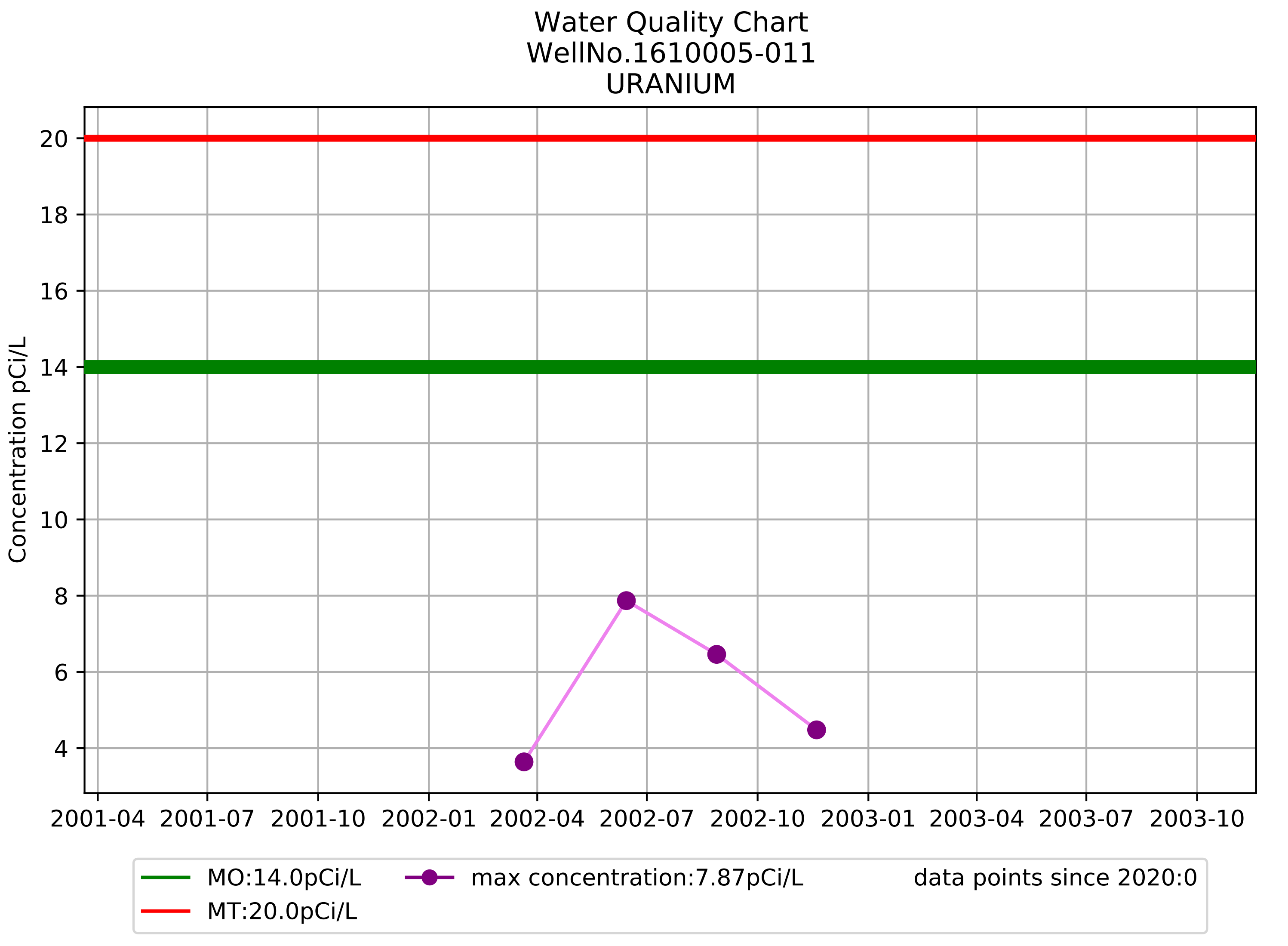


Water Quality Chart
WellNo.1610005-006
URANIUM
Concentration pCi/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
MO:3.0pCi/L
MT:20.0pCi/L
UTI:3.0pCi/L
max concentration:5.74pCi/L
data points since 2020:0

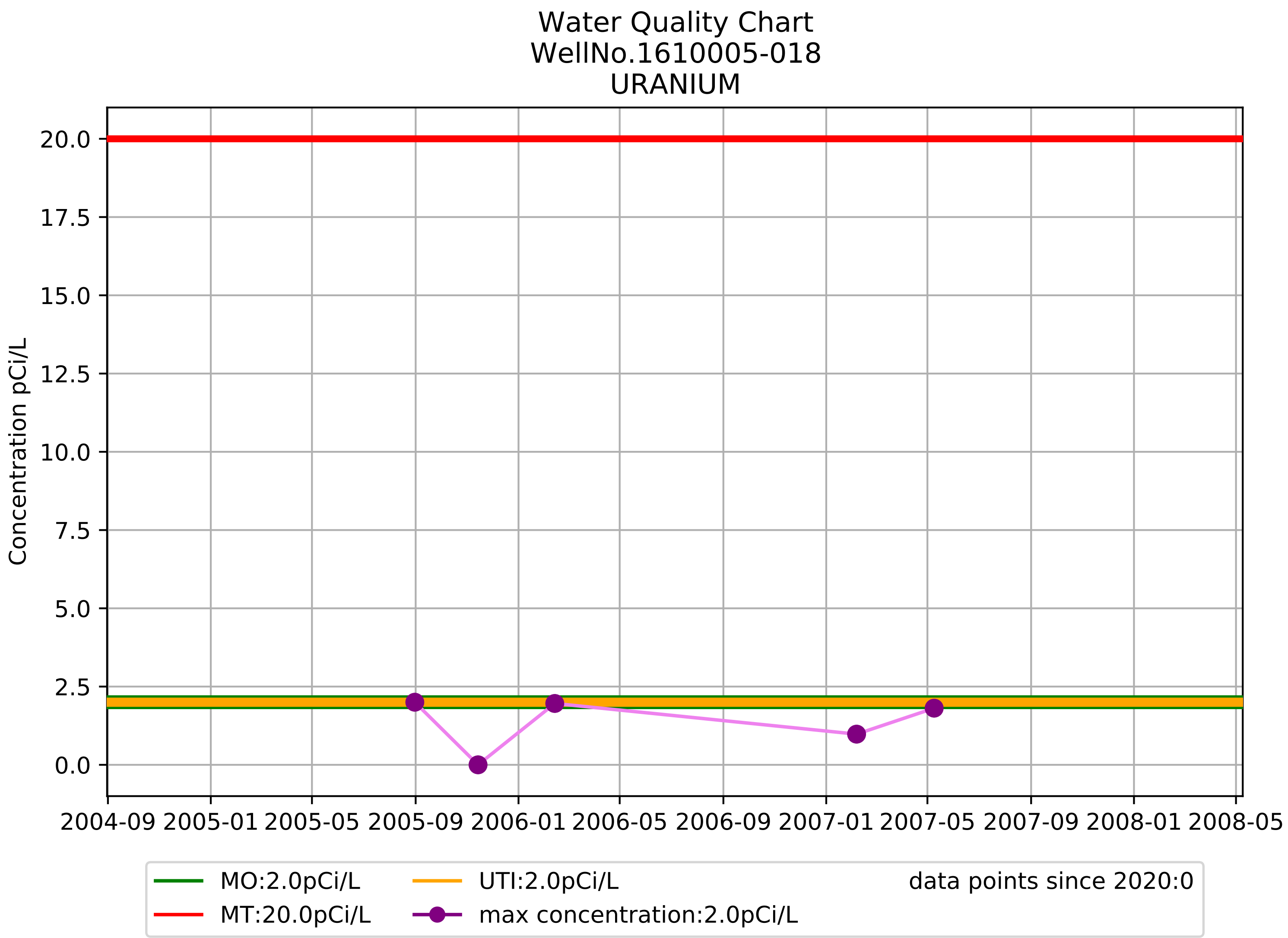

Water Quality Chart
WellNo.1610005-008
URANIUM
Concentration pCi/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1996
2000
2004
2008
2012
2016
MO:8.0pCi/L
MT:20.0pCi/L
UTI:8.0pCi/L
max concentration:19.7pCi/L
data points since 2020:0



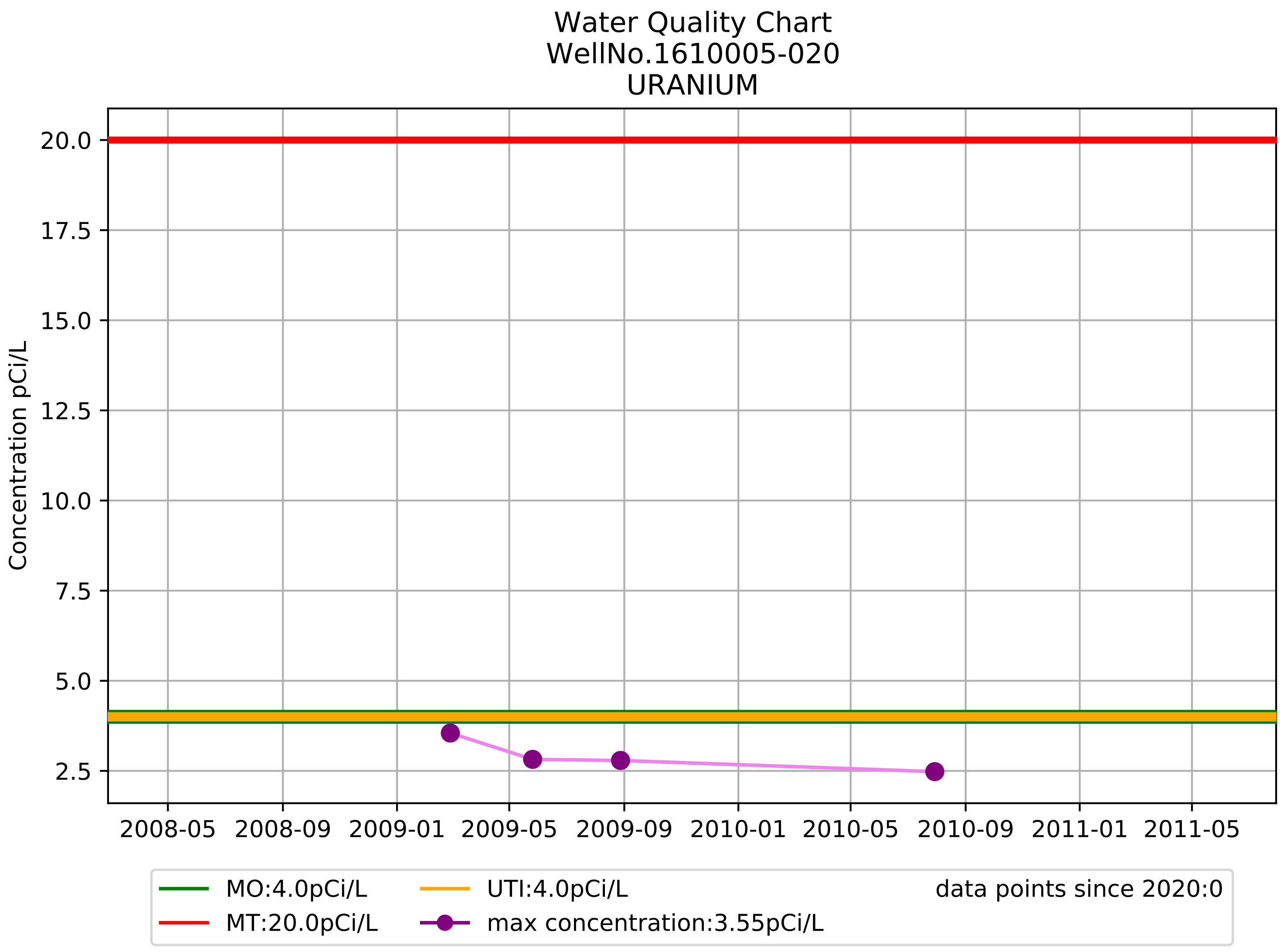
Water Quality Chart
WellNo.1610005-009
URANIUM
Concentration pCi/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
1998
2000
2002
2004
2006
2008
2010
2012
MO:14.0pCi/L
MT:20.0pCi/L
max concentration:14.83pCi/L
data points since 2020:0



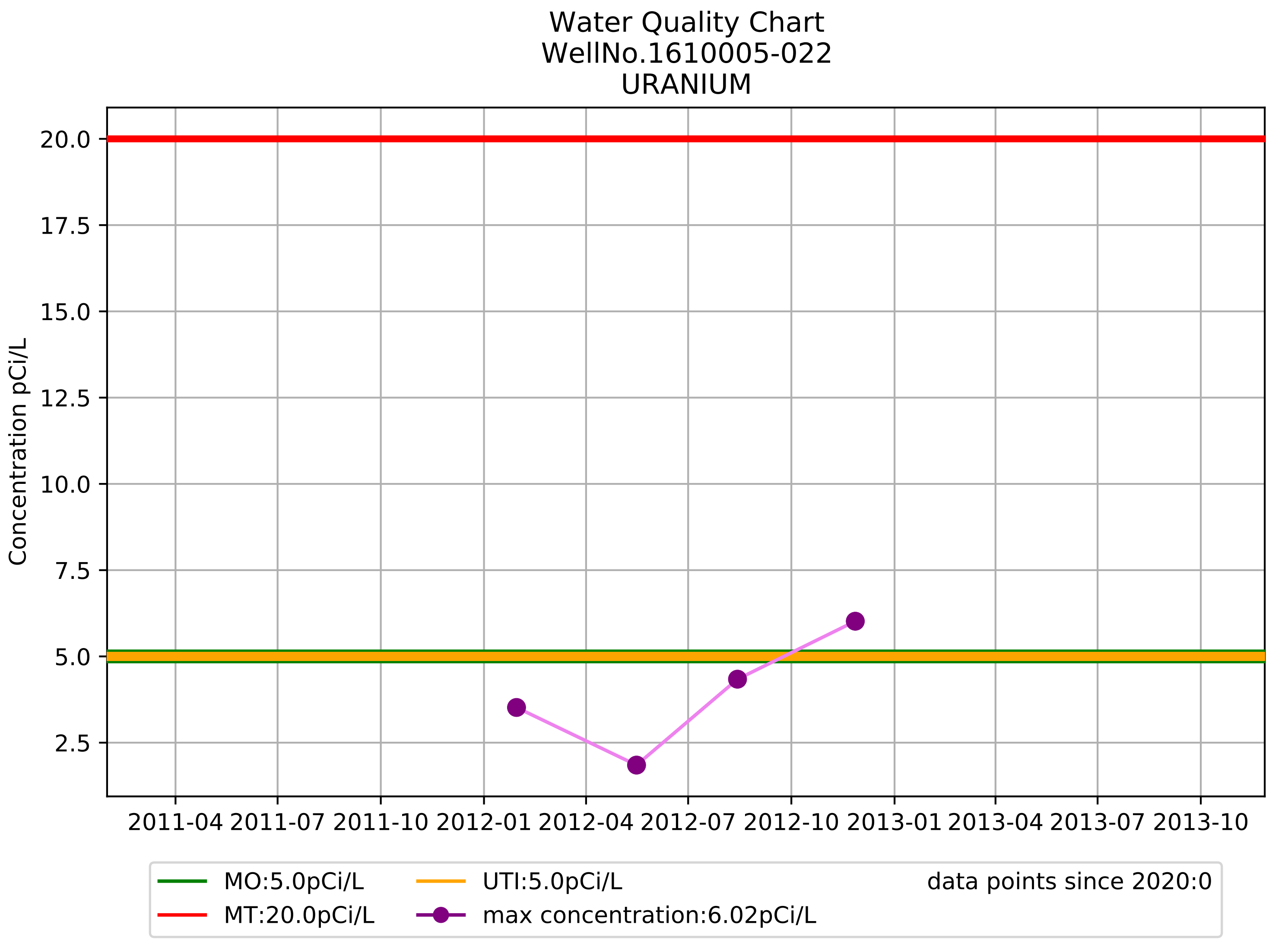
Water Quality Chart
WellNo.1610005-011
URANIUM
Concentration pCi/L
20
18
16
14
12
10
8
6
4
2001-04
2001-07
2001-10
2002-01
2002-04
2002-07
2002-10
2003-01
2003-04
2003-07
2003-10
MO:14.0pCi/L
MT:20.0pCi/L
max concentration:7.87pCi/L
data points since 2020:0



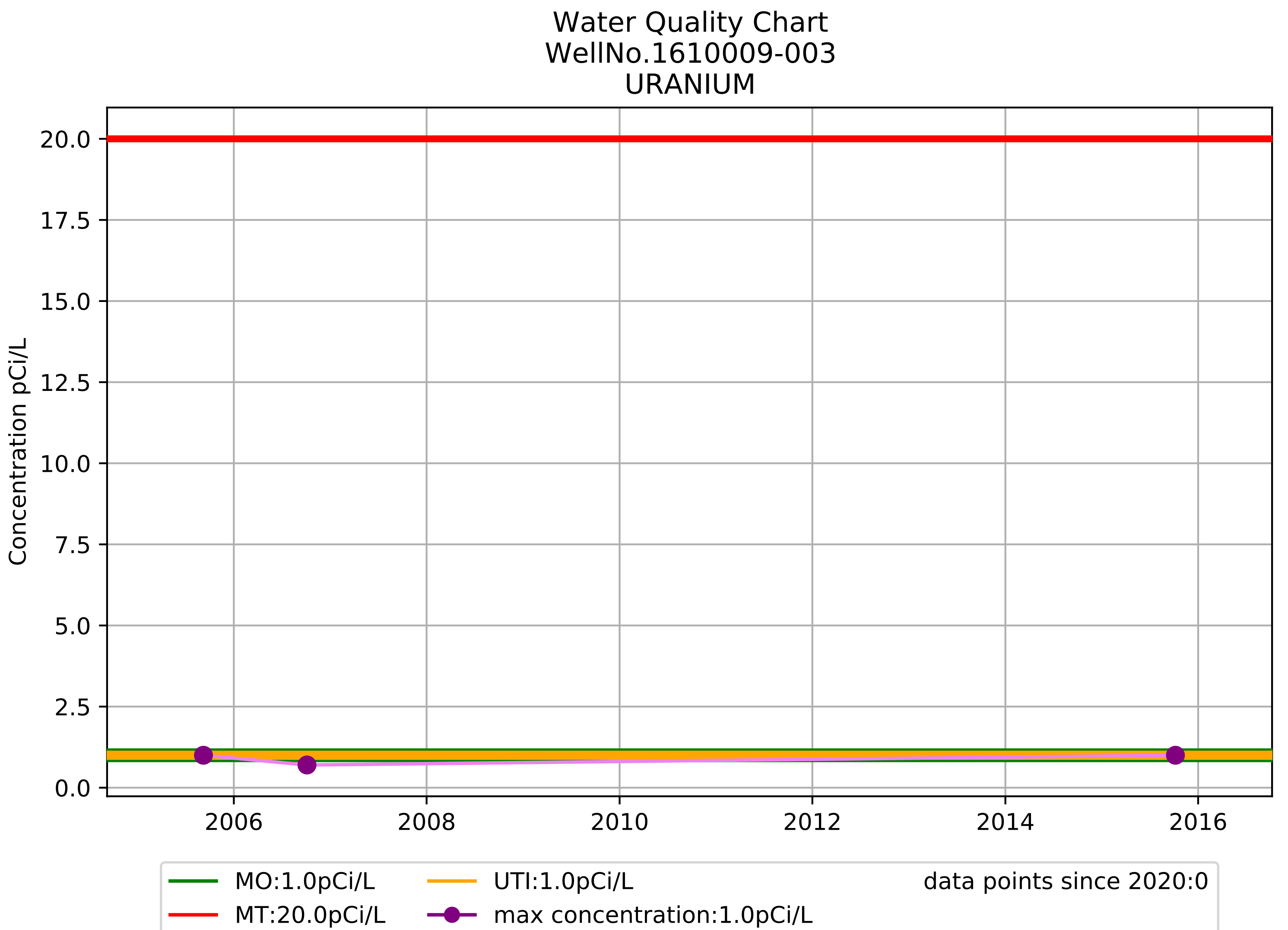
Water Quality Chart
WellNo.1610005-018
URANIUM
Concentration pCi/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
2004-09
2005-01
2005-05
2005-09
2006-01
2006-05
2006-09
2007-01
2007-05
2007-09
2008-01
2008-05
MO:2.0pCi/L
MT:20.0pCi/L
UTI:2.0pCi/L
max concentration:2.0pCi/L
data points since 2020:0



Water Quality Chart
WellNo.1610005-020
URANIUM
Concentration pCi/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
2008-05
2008-09
2009-01
2009-05
2009-09
2010-01
2010-05
2010-09
2011-01
2011-05
MO:4.0pCi/L
UTI:4.0pCi/L
data points since 2020:0
MT:20.0pCi/L
max concentration:3.55pCi/L



Water Quality Chart
WellNo.1610005-022
URANIUM
Concentration pCi/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
2011-04
2011-07
2011-10
2012-01
2012-04
2012-07
2012-10
2013-01
2013-04
2013-07
2013-10
MO:5.0pCi/L
MT:20.0pCi/L
UTI:5.0pCi/L
max concentration:6.02pCi/L
data points since 2020:0


Water Quality Chart
WellNo.1610009-003
URANIUM
Concentration pCi/L
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
2006
2008
2010
2012
2014
2016
MO:1.0pCi/L
MT:20.0pCi/L
UTI:1.0pCi/L
max concentration:1.0pCi/L
data points since 2020:0