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June 10, 2022

To: Mr. Patrick Chavez, PE  
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2600 Prospect Ave NE  
Albuquerque, NM 87107

From: Mr. David "Sonny" Cooper, PE  
Weston Solutions, Inc.  
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**Re: First Quarter (January – March) 2022 In-Stream Water Quality Monitoring Memo**

## 1 Background

The Albuquerque Metropolitan Arroyo Flood Control Authority (AMAFCA) maintains a broad collection of field instrumentation within their jurisdictional watershed to monitor surface water quality. Surface water quality monitoring is performed to comply with the Middle Rio Grande Watershed Based Municipal Separate Storm Sewer System (MS4) permit (NMR 04A000) issued in December 2014. This data is collected, evaluated, and analyzed related to MS4 requirements, and presented as applicable in AMAFCA's MS4 Annual Report to the U.S. Environmental Protection Agency (EPA), Region 6. The following describes the duties and responsibilities fulfilled by Weston Solutions, Inc. (Weston) in support of instrument operation, maintenance, and data reporting tabulations for the first quarter of 2022.

AMAFCA maintains several water quality sondes within the Rio Grande. The locations of the four sondes were chosen to monitor the Rio Grande from US-550 to Isleta Pueblo. Surface water quality data is collected from four sites using Aqua Troll 600 sondes (manufactured by In-Situ) with remote transmission. Current locations along the Rio Grande include, from north (upstream) to south (downstream):

- US Highway 550 bridge in Bernalillo, NM
- Sandia Pueblo boundary just upstream of the North Diversion Channel outfall
- Central Avenue bridge spanning the Rio Grande
- Isleta Dam site at the northern Isleta Pueblo boundary.

These four sondes monitor and transmit several water quality parameter measurements near real-time. Data is transmitted to In-Situ's online dashboard at approximately 30-minute intervals. The data can be viewed and downloaded from the Hydro-Vu website operated by In-Situ. Access to data is shared with downstream stakeholders via the Hydro-Vu website (<https://www.hydrovu.com>).

The data is collected and reported by AMAFCA's current Stormwater Management Program (SWMP), dated December 1, 2018. Per SWMP Table ID #8, and to comply with the MS4 Permit Part I.C.1.c, AMAFCA monitors dissolved oxygen (DO) and temperature at these locations. The document providing guidance for surface water quality exceedances is New Mexico Administrative Code Title 20, Chapter 6,



Part 4 (20.6.4 NMAC) *Environmental Protection Water Quality Standards for Interstate and Intrastate Surface Waters*. Under 20.6.4 NMAC and the Pueblo of Isleta *Surface Water Quality Standards* for the reach of the Rio Grande under the jurisdiction of the MS4 permit, the Rio Grande has a designed use of “Marginal Warm water Aquatic Life”. 20.6.4.900 H (6) NMAC provides the following guidance for marginal warm water for aquatic life, for both non-stormwater and stormwater flow conditions:

*Dissolved oxygen 5mg/L or more. pH within the range of 6.6 to 9.0 and maximum temperature 32.2 °C (90 °F). Where a segment-specific temperature criterion is indicated in 20.6.4.101-899 NMAC, it is the maximum temperature.*

Per 20.6.4 NMAC, DO and temperature have established surface water quality standards while turbidity does not. In addition to 20.6.4 NMAC, the Pueblo of Isleta *Surface Water Quality Standards* also governs surface water quality standards under the MS4 Permit. The standards described in the *Surface Water Quality Standards* are the same as those described in 20.6.4 NMAC in regards to DO and temperature. Regarding turbidity, the Pueblo of Isleta *Surface Water Quality Standards* provides the following guidance under Section III, Paragraph G:

*Turbidity attributable to other than natural causes shall not reduce light transmission to a point where aquatic biota are inhibited or to a point that causes an unaesthetic and substantial visible contrast with the natural appearance of the water. Specifically, turbidity shall not exceed 5 NTU over background when background turbidity is 50 NTU or less, with no more than 10 percent increase when background turbidity is more than 50 NTU.*

This memorandum provides the collected data for all three surface water quality parameters at all four sonde locations.

## 2 Sonde Data Discussion

Data from Community Collaborative Rain, Hail, and Snow Network (CoCoRaHS) was used to determine if a storm event occurred within the Middle Rio Grande MS4 Permit watershed. During the First Quarter (January – March) of 2022, 23 storm events occurred, however, 13 of these events only produced trace amounts of precipitation in the watershed. The storm event dates were used to determine if variations in data from the sondes were potentially related to runoff entering the Rio Grande or if data collected were erroneous due to equipment issues (such as a fouled sensor, data transmission failure, or random anomaly).

The tables below list the average, minimum, and maximum DO, temperature, and turbidity measurements for each sonde during 2022 Quarter 1. Data that appeared to be inaccurate were purged from the dataset. Graphs of each parameter recorded by the sondes are shown in Attachment 1.

### 2.1 Dissolved Oxygen

Parameter		US 550 Bridge	Sandia Boundary	Central Ave Bridge	Isleta Dam
DO (mg/L)	Average	10.23	10.31	9.78	8.53
	Minimum	7.87	8.42	6.63	7.51
	Maximum	11.85	12.23	12.17	9.74

## 2.2 Temperature

Parameter		US 550 Bridge	Sandia Boundary	Central Ave Bridge	Isleta Dam
Temperature (°C)	Average	5.70	5.81	5.99	12.39
	Minimum	0.51	0.10	-0.37	7.50
	Maximum	12.33	14.66	17.72	18.81

## 2.3 Turbidity

Parameter		US 550 Bridge	Sandia Boundary	Central Ave Bridge	Isleta Dam
Turbidity (NTU)	Average	471.22	228.48	422.37	141.79
	Minimum	12.58	26.93	41.27	25.10
	Maximum	1992.25	1885.31	4029.87	436.66

The surface water quality standards discussed in Section 1, along with storm event dates and daily sonde record keeping, allowed Weston to determine if apparent exceedances were attributed to a natural phenomenon or were erroneous data points. If data appeared to be unrelated to a natural phenomenon, it was removed from the data set collected by the sonde. The following summaries are based upon review of the data, storm events, trends in the data collected, and sonde maintenance efforts:

Sonde	Parameter	Start Date	Start Time	End Date	End Time	Notes
US Highway 550 Bridge	Turbidity	01/06/2022	0200	01/06/2022	1030	Data appeared erroneous due to a fouling sensor. Removed from data set.
	Turbidity	01/24/2022	0600	01/27/2022	1300	Data appeared erroneous due to a fouling sensor. Removed from data set.
	Turbidity, Temperature, and DO	01/27/2022	1330	02/02/2022	0030	Sonde not deployed due to equipment issues.
	Turbidity	02/05/2022	0300	02/07/2022	2030	Data appeared erroneous due to a fouling sensor. Removed from data set.



Sonde	Parameter	Start Date	Start Time	End Date	End Time	Notes
<b>US Highway 550 Bridge</b>	Turbidity	02/08/2022	0400	02/08/2022	0600	Data appeared erroneous. Removed from the data set.
	Turbidity	02/09/2022	0300	02/09/2022	1800	Data appeared erroneous due to a fouling sensor. Removed from data set.
	Turbidity	02/24/2022	0000	02/25/2022	0500	Data appeared erroneous due to a fouling sensor. Removed from data set.
	Turbidity	03/08/2022	1330	03/10/2022	2030	Data appeared erroneous due to a fouling sensor. Removed from data set.
	Turbidity	03/14/2022	0230	03/17/2022	1900	Data appeared erroneous due to a fouling sensor. Removed from data set.
<b>Sandia Boundary</b>	Turbidity	01/06/2022	0730	01/06/2022	1630	Data appeared erroneous due to a fouling sensor. Removed from data set.
	Turbidity	01/28/2022	0900	02/01/2022	2200	Data appeared erroneous. Removed from the data set.
	Turbidity	02/08/2022	1000	02/08/2022	1500	Data appeared erroneous. Removed from the data set.

Sonde	Parameter	Start Date	Start Time	End Date	End Time	Notes
<b>Sandia Boundary</b>	Turbidity	02/09/2022	1000	02/09/2022	1400	Data appeared erroneous. Removed from the data set.
	Turbidity	02/10/2022	0800	02/10/2022	1500	Data appeared erroneous due to a fouling sensor. Removed from data set.
	Turbidity	02/17/2022	0700	02/17/2022	1100	Data appeared erroneous due to a fouling sensor. Removed from data set.
	Turbidity, Temperature, and DO	03/10/2022	2200	03/22/2022	1900	Sonde not deployed due to equipment issues.
	Turbidity	3/22/2022	1500	03/22/2022	2100	Data appeared erroneous due to a fouling sensor. Removed from data set.
<b>Central Ave Bridge</b>	Turbidity	02/04/2022	2200	02/07/2022	1700	Data appeared erroneous. Removed from the data set.
	Turbidity	02/12/2022	1500	02/16/2022	0600	Data appeared erroneous. Removed from the data set.
	Turbidity	02/17/2022	2200	02/18/2022	1000	Data appeared erroneous. Removed from the data set.
<b>Isleta Dam</b>	Turbidity, Temperature, and DO	01/01/2022	0000	03/22/2022	1900	Sonde not deployed due to equipment issues.



Sonde	Parameter	Start Date	Start Time	End Date	End Time	Notes
Isleta Dam	Temperature	03/22/2022	1900	03/28/2022	1200	Data appeared erroneous. Removed from the data set.

### 3 Sonde Maintenance

Maintenance of the sonde generally consists of cleaning the sonde to ensure reliable data was being collected.

Sonde	Maintenance Dates	Maintenance Performed	Performed By	Equipment / Inventory Used
US 550 Bridge	01/04/2022	The sonde was cleaned.	AMAFCA	None
	01/06/2022	The sonde was cleaned.	AMAFCA	None
	01/11/2022	The sonde was cleaned.	AMAFCA	None
	01/18/2022	The sonde was cleaned.	AMAFCA	None
	01/27/2022	The sonde was removed due to broken hardware.	AMAFCA	None
	02/01/2022	The sonde was deployed.	AMAFCA	None
	02/07/2022	The sonde was cleaned.	AMAFCA	None
	02/09/2022	The sonde was cleaned.	AMAFCA	None
	02/17/2022	The sonde was cleaned.	AMAFCA	None
	02/24/2022	The sonde was cleaned and the Vulink batteries were changed.	AMAFCA	None
	03/04/2022	The sonde was cleaned.	AMAFCA	None
	03/10/2022	The sonde was cleaned.	AMAFCA	None
	03/17/2022	The sonde was cleaned.	AMAFCA	None
	03/22/2022	The sonde was cleaned.	AMAFCA	None
	03/28/2022	The sonde was cleaned.	AMAFCA	None
Sandia Boundary	01/04/2022	The sonde was cleaned.	AMAFCA	None
	01/06/2022	The sonde was cleaned.	AMAFCA	None
	01/11/2022	The sonde was cleaned.	AMAFCA	None
	01/13/2022	The sonde was cleaned.	AMAFCA	None
	01/18/2022	The sonde was cleaned.	AMAFCA	None
	01/20/2022	The sonde was cleaned.	AMAFCA	None
	01/24/2022	The sonde was cleaned.	AMAFCA	None
	01/27/2022	The sonde was cleaned.	AMAFCA	None
	02/01/2022	The sonde was cleaned.	AMAFCA	None
02/07/2022	The sonde was cleaned.	AMAFCA	None	

<b>Sonde</b>	<b>Maintenance Dates</b>	<b>Maintenance Performed</b>	<b>Performed By</b>	<b>Equipment / Inventory Used</b>
<b>Sandia Boundary</b>	02/10/2022	The sonde was cleaned.	AMAFCA	None
	02/14/2022	The sonde was cleaned.	AMAFCA	None
	02/17/2022	The sonde was cleaned.	AMAFCA	None
	02/24/2022	The sonde was cleaned.	AMAFCA	None
	03/04/2022	The sonde was cleaned.	AMAFCA	None
	03/10/2022	The sonde was calibrated but ultimately removed due to a failing turbidity sensor.	AMAFCA	None
	03/22/2022	The sonde was deployed.	AMAFCA	None
	03/28/2022	The sonde was cleaned.	AMAFCA	None
<b>Central Ave Bridge</b>	01/05/2022	The sonde was cleaned.	AMAFCA	None
	01/13/2022	The sonde was cleaned.	AMAFCA	None
	01/20/2022	The sonde was cleaned and calibrated.	AMAFCA	None
	01/26/2022	The sonde was cleaned.	AMAFCA	None
	02/07/2022	The sonde was cleaned and the Vulink batteries were changed.	AMAFCA	None
	02/17/2022	The sonde was cleaned.	AMAFCA	None
	02/24/2022	The sonde was cleaned.	AMAFCA	None
	03/04/2022	The sonde was cleaned.	AMAFCA	None
	03/10/2022	The sonde was cleaned.	AMAFCA	None
	03/24/2022	The sonde was cleaned.	AMAFCA	None
	03/31/2022	The sonde was cleaned.	AMAFCA	None
<b>Isleta Dam</b>	03/21/2022	The sonde and transmitter were deployed.	AMAFCA	None
	03/28/2022	The sonde was cleaned.	AMAFCA	None

## 4 Exceedances

### 4.1 Dissolved Oxygen

There were no dissolved oxygen exceedances for the first quarter of 2022.

### 4.2 Temperature

There were no temperature exceedances for the first quarter of 2022.



Mr. Chavez

June 10, 2022

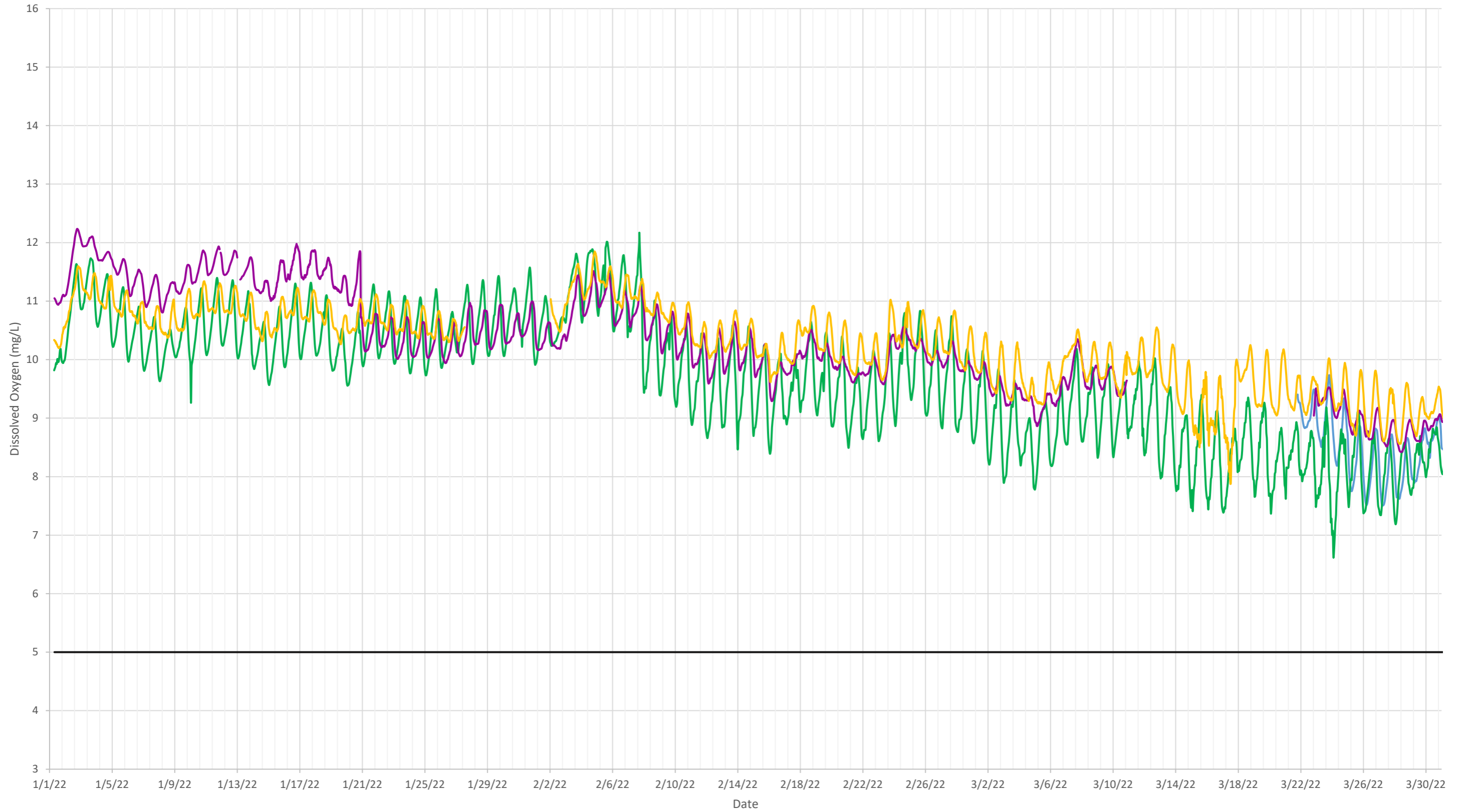
## **5 Attachments**

Attachment 1: First Quarter Data Graphs for Dissolved Oxygen, Temperature, and Turbidity.



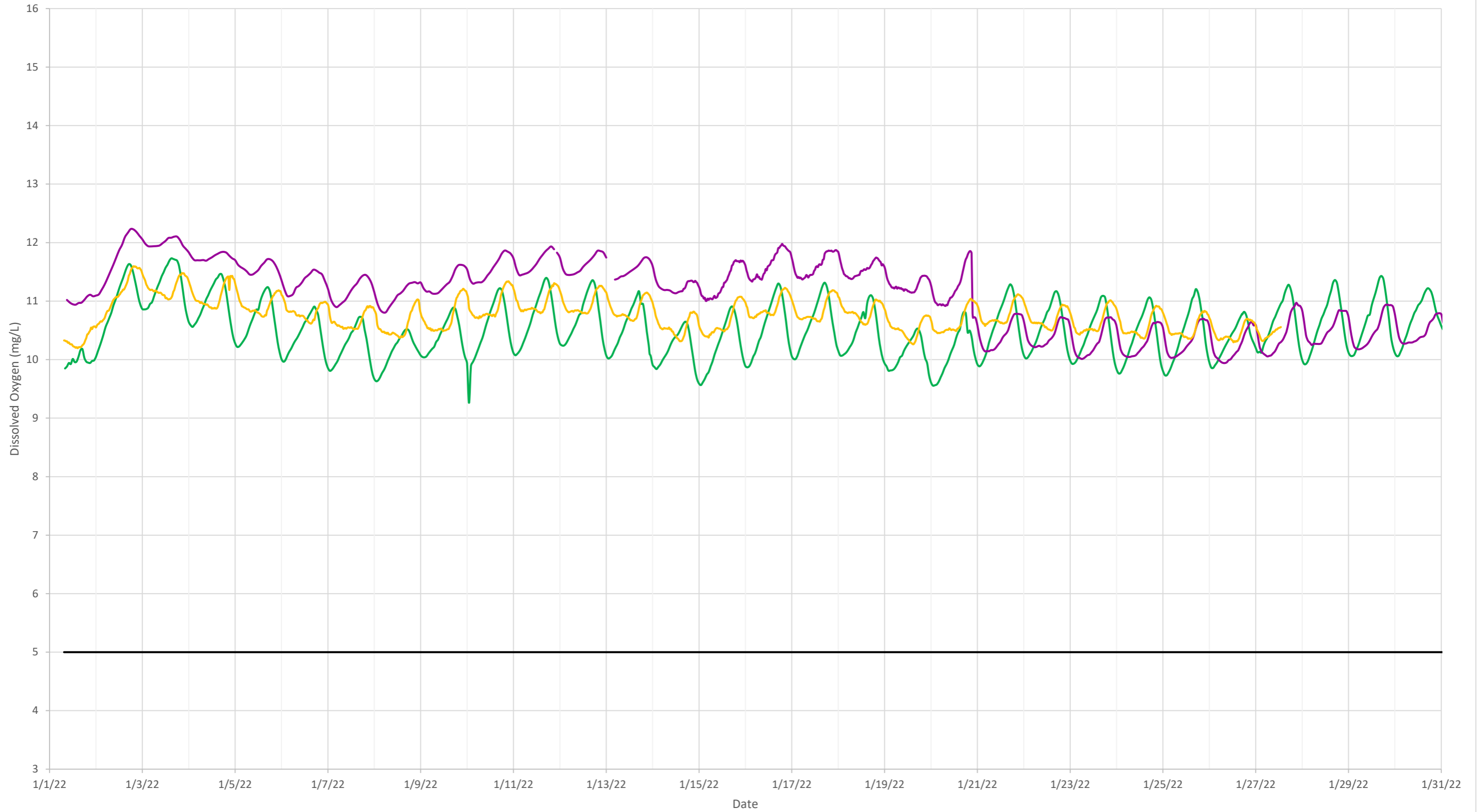
Dissolved Oxygen - All Sondes - Quarter 1, 2021

Isleta Central Sandia 550 DO Exceedance (5 mg/L)



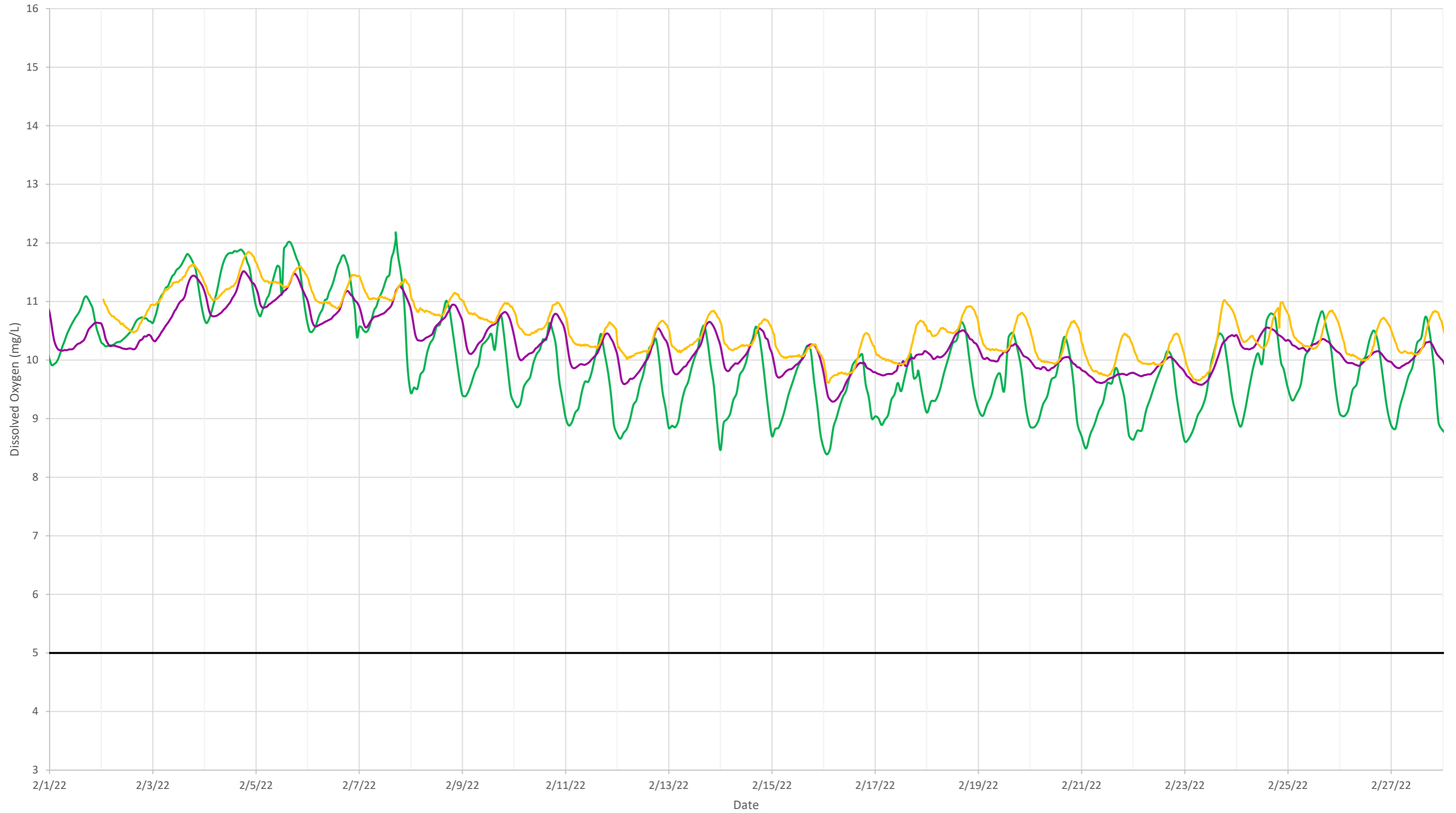
### Dissolved Oxygen - All Sondes - January 2021

— Isleta — Central — Sandia — 550 — DO Exceedance (5 mg/L)



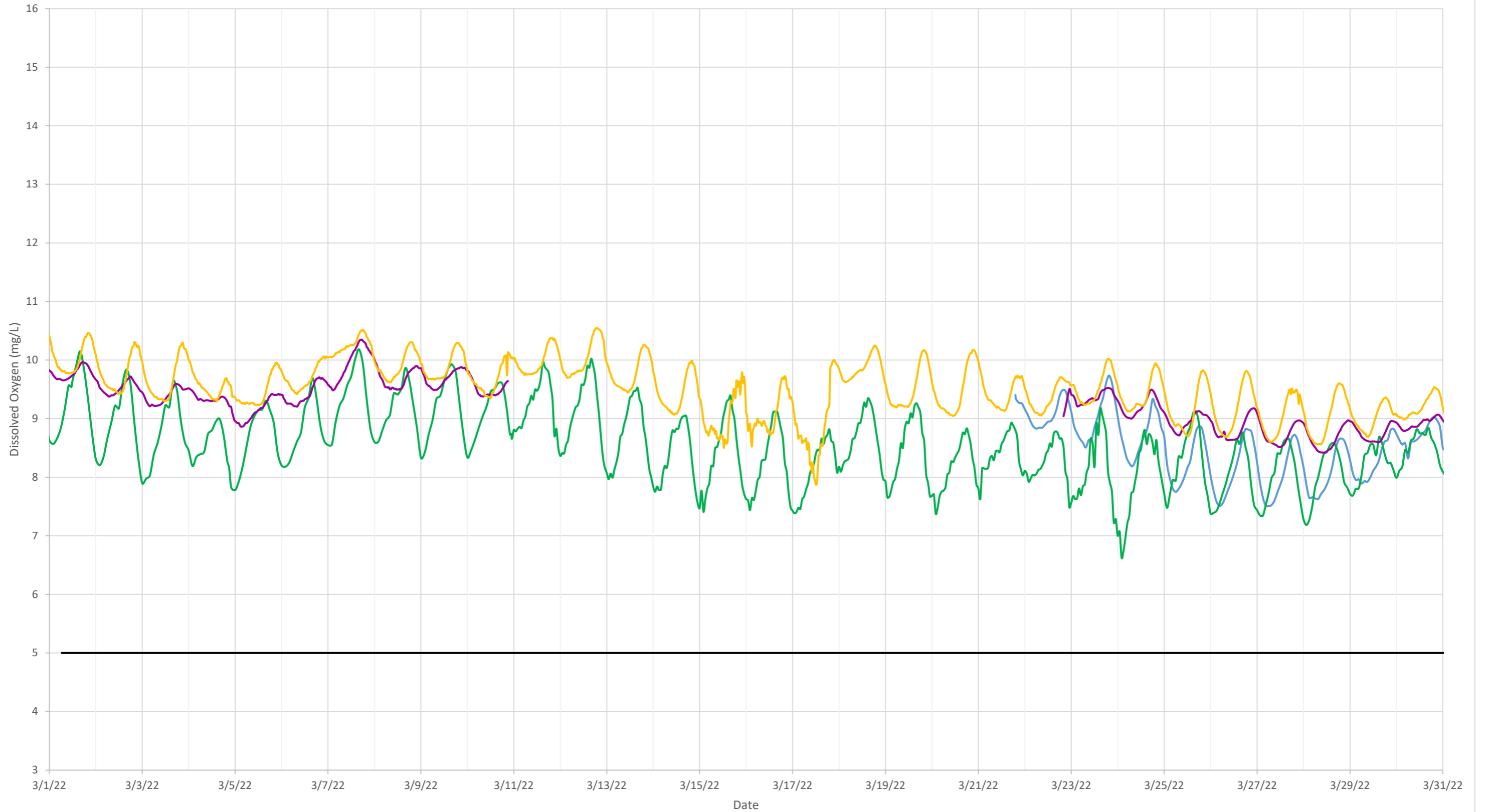
### Dissolved Oxygen - All Sondes - February 2021

— Isleta — Central — Sandia — 550 — DO Exceedance (5 mg/L)



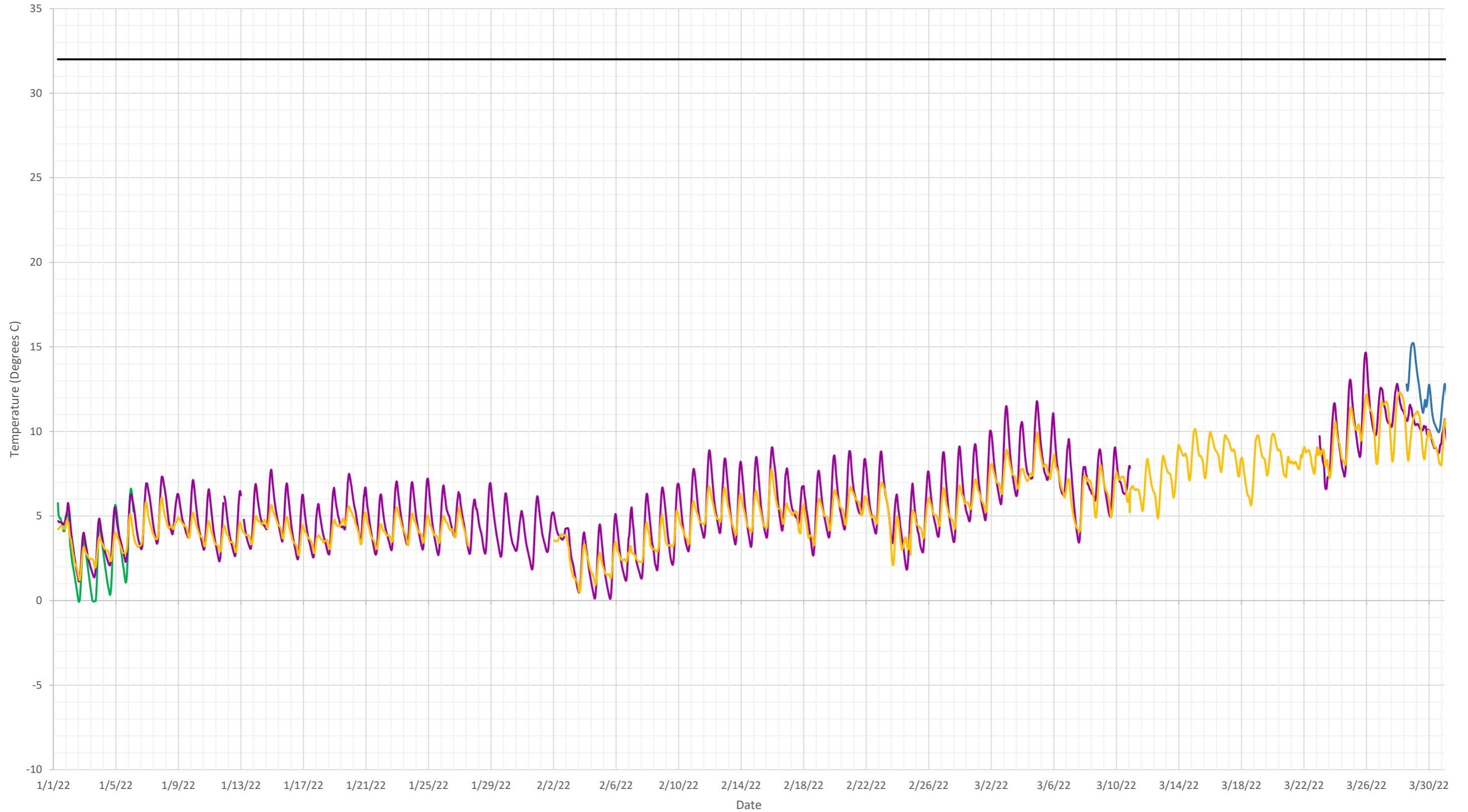
### Dissolved Oxygen - All Sondes - March 2021

— Isleta — Central — Sandia — 550 — DO Exceedance (5 mg/L)



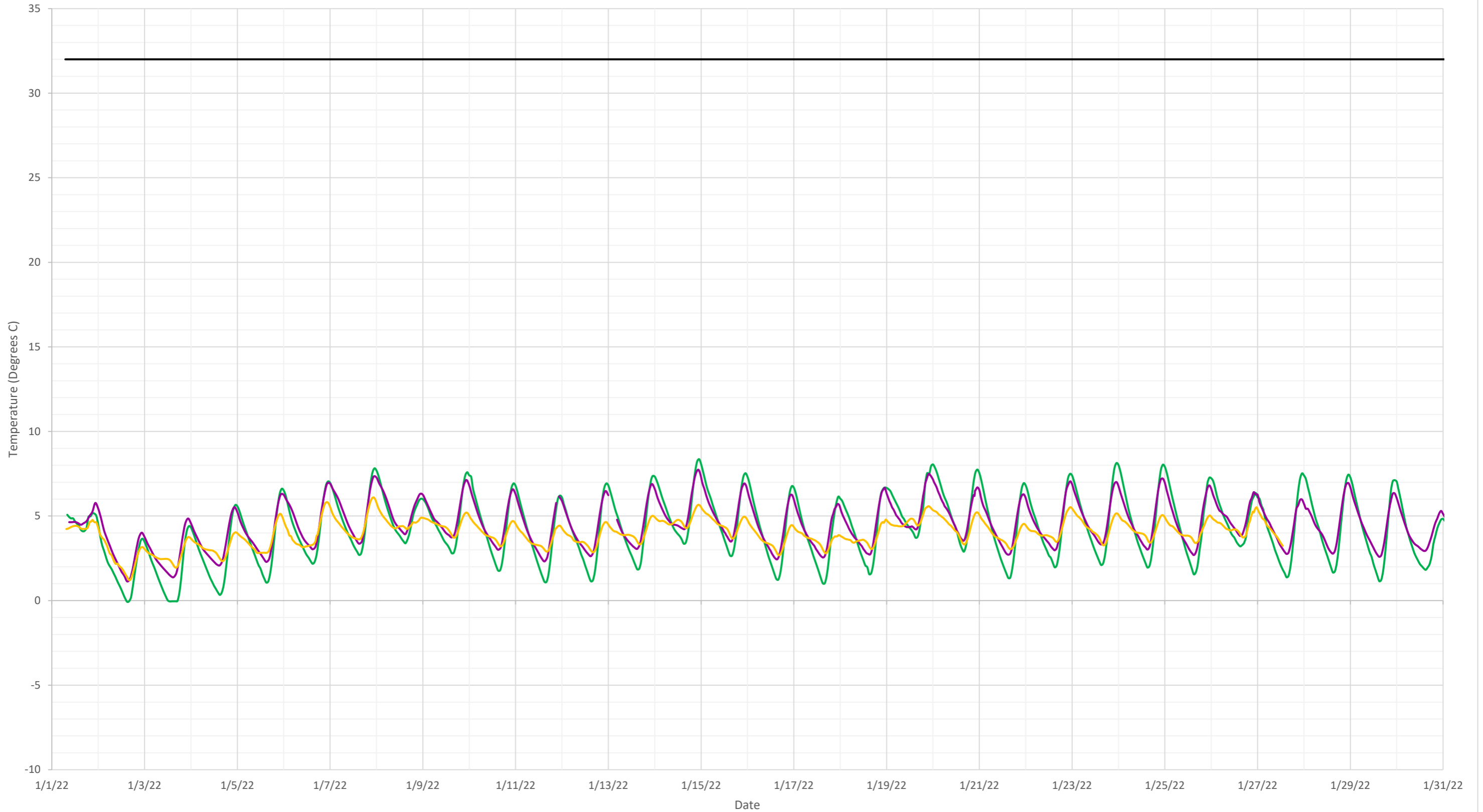
Temperature - All Sondes - Quarter 1, 2021

Isleta Central Sandia 550 Temperature Exceedance (32F)



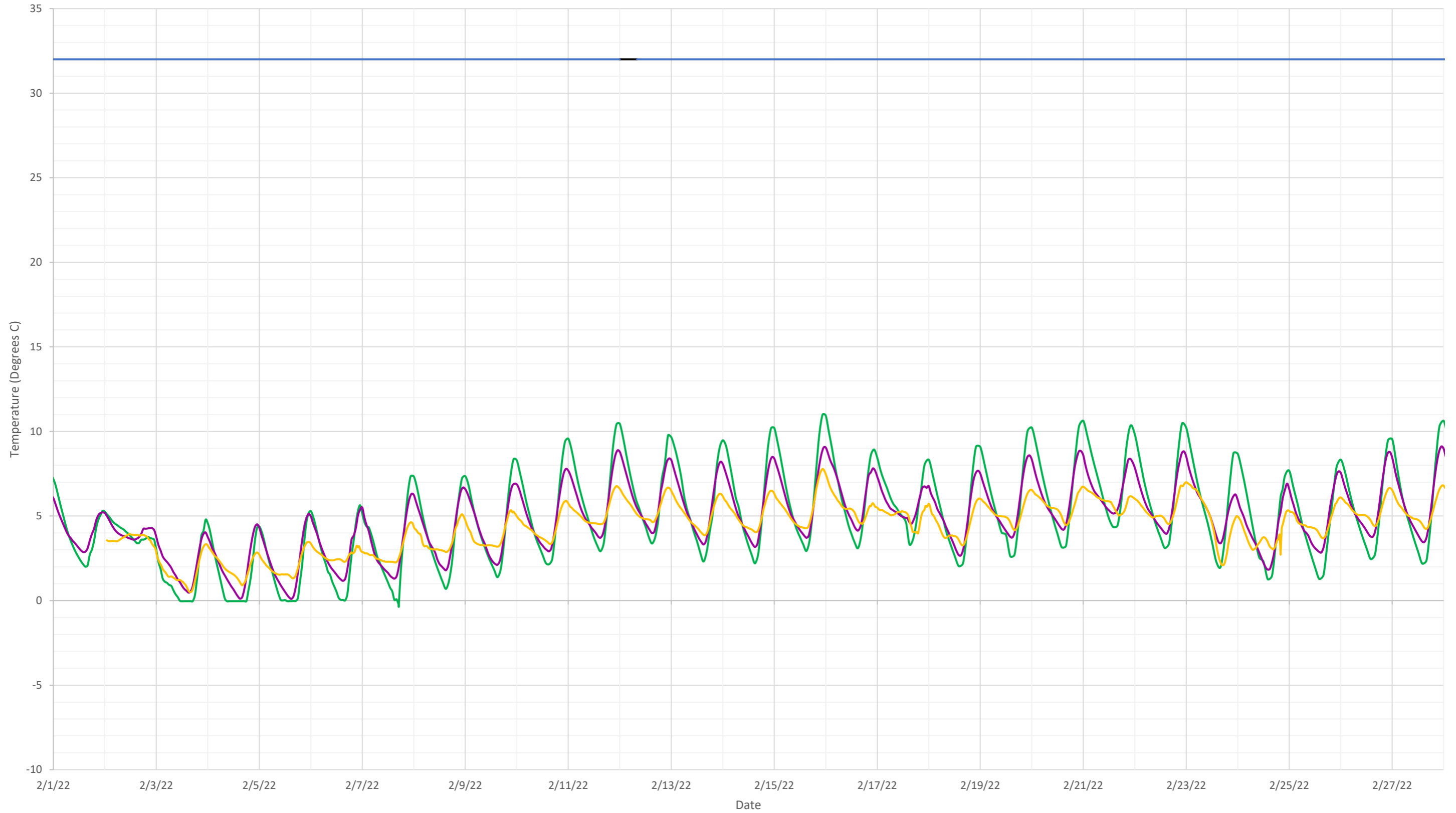
### Temperature - All Sondes - January 2021

Isleta Central Sandia 550 Temperature Exceedance (32F)



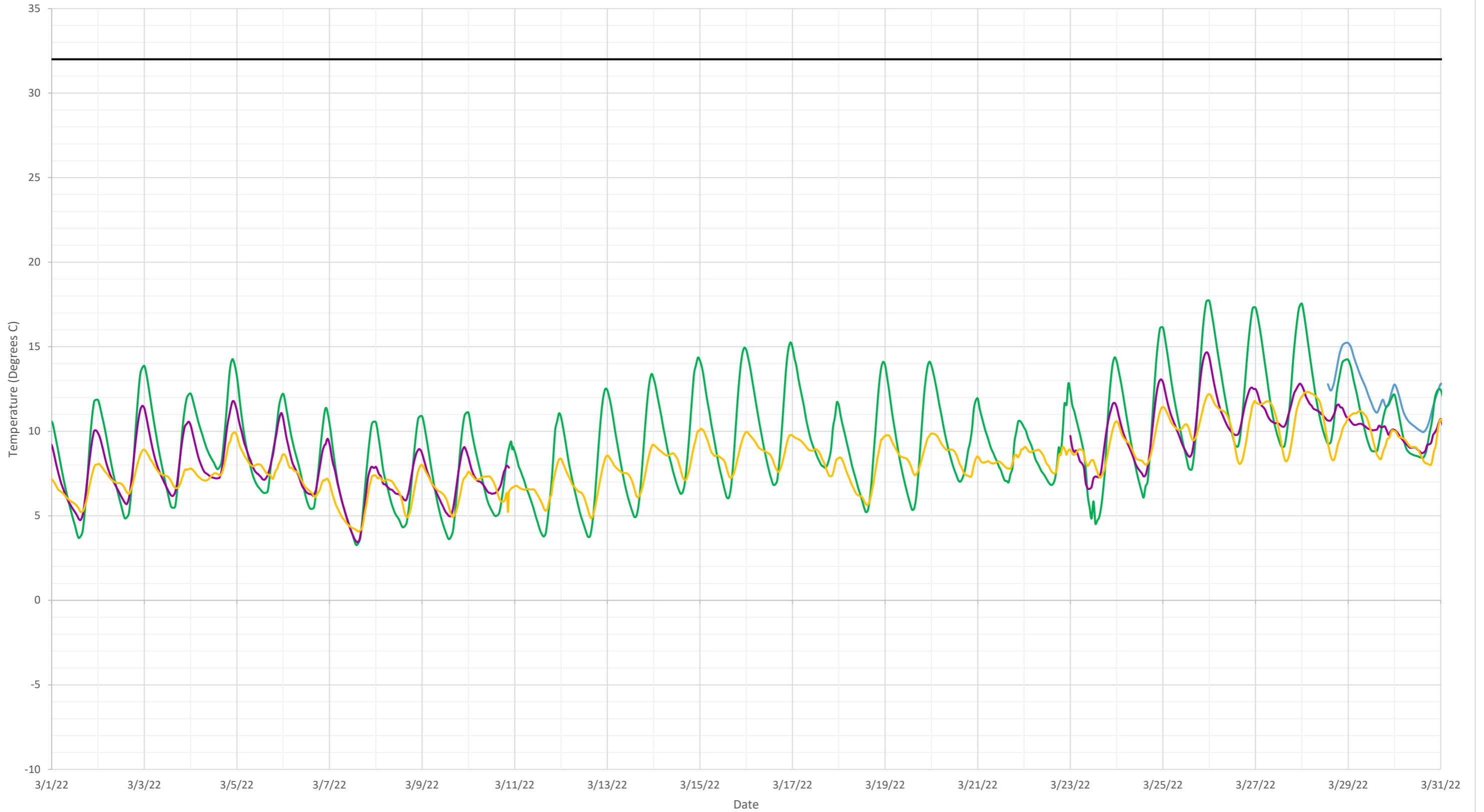
### Temperature - All Sondes - February 2021

Isleta Central Sandia 550 Temperature Exceedance (32F)



### Temperature - All Sondes - March 2021

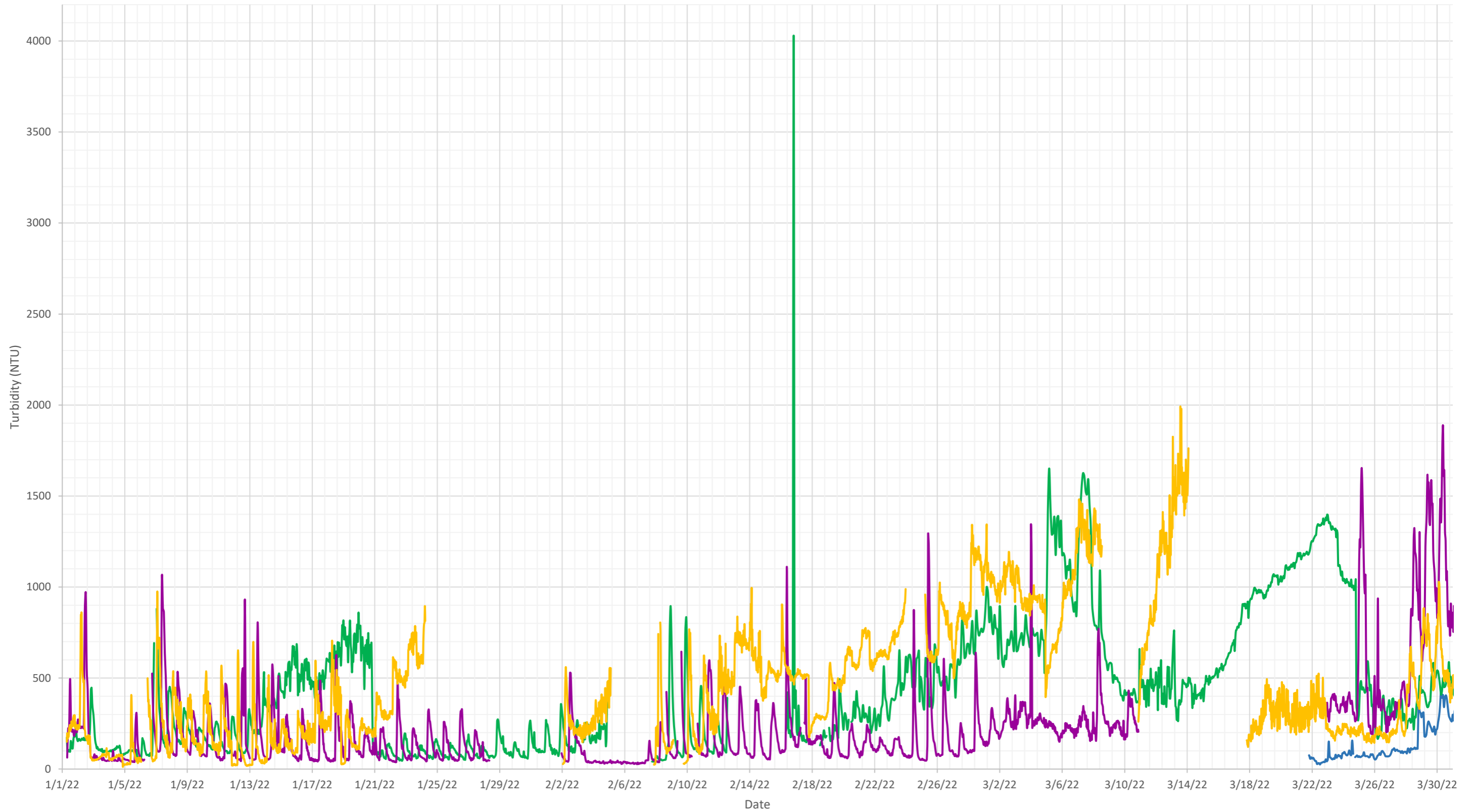
Isleta Central Sandia 550 Temperature Exceedance (32F)





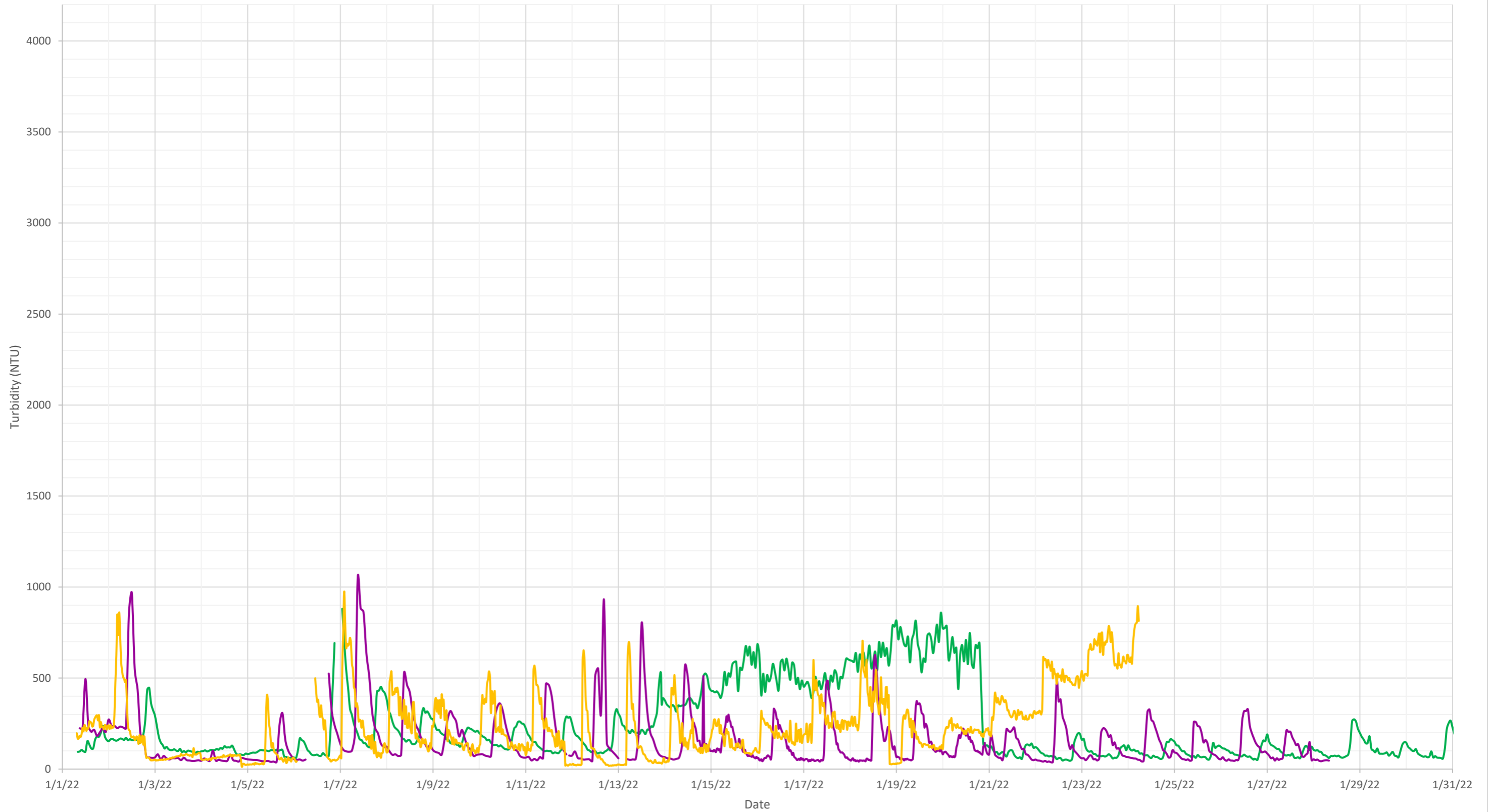
Turbidity - All Sondes - Quarter 1, 2021

Isleta Central Sandia 550



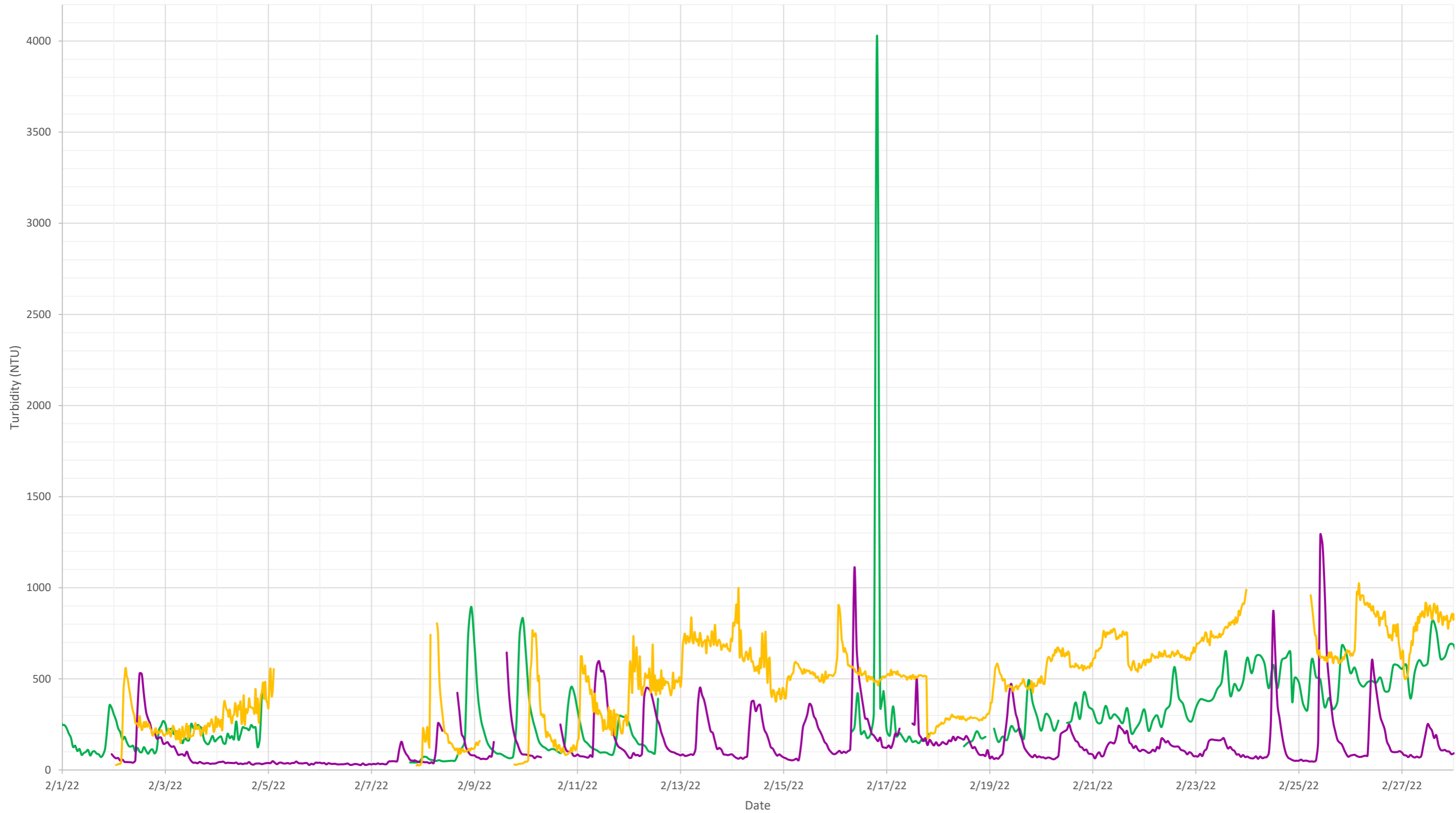
Turbidity - All Sondes - January 2021

Isleta Central Sandia 550



Turbidity - All Sondes - February 2021

Isleta Central Sandia 550



Turbidity - All Sondes -March 2021

Isleta Central Sandia 550

