CA SWRB monitoring and compliance data

Sandy Sum

2021-09-08

Contaminants

Nitrate | Arsenic

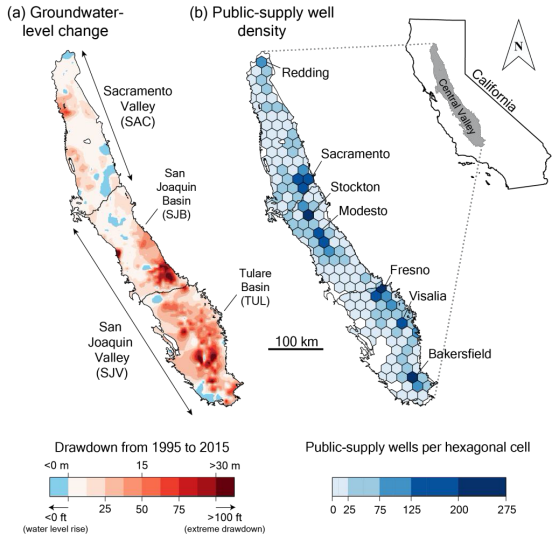
Estimate PWS wells nitrate levels interacted with land use and groundwater level. Does groundwater pollution move laterally underground? If so that means that the groundwater drawdown is non-excludable and non-rivarous and hence a form of unseen pollution that is exercabated by drought.

$$
\begin{aligned}
N_{it} = \hat{\alpha}_i + \hat{\beta}_1 Drought_t \cdot LandUse_i \cdot GW_{it} \\
+ \hat{\beta}_2 Drought_t \cdot LandUse_i + \beta_3 LandUse_i \cdot GW_{it} \\
+ \beta_4 Drought_t \cdot GW_{it} + \mathbf{x}_{it}\hat{\gamma} + \hat{f}_i(t) + \hat{\epsilon}_i
\end{aligned}
$$

where $\hat{\alpha}_i$ are unit-specific fixed effects that absorb the effect of all time-invariant factors that differ between units, including unobservables that could not be accounted for in the cross-sectional research design. $\hat{f}_i(t)$ are trends in the outcome data, often accounted for using period fixed-effects and/or linear or polynomial time trends, which may be region- or unit-specific. $Drought_i$ is some measure of the extend of drought, GW_{it} is groundwater drawdown, a measure of human adaptive behavior.

Now, I need to think about this equation more. But should $Drought$ be also a unit/region varying factor? I think it should be due to the paper I just ready by Levy et al (2021) form USGS.

Also thinking of aggregating each unit to a hexagonal grid patter a la Levy et al. For this I have to contact Xander on spatial dynamics of groundwater pollution.



The EPA's standardized monitoring framework

Datasets and Notes

EPA Six-Year Review Monitoring and Compliance Data

- 1998-2005; 2006-2011
- Super set of the following

CA SWRB Drinking Water Quality Data

- 1974-2021
- unbalanced

EPA Enforcement and Compliance History Data for the Safe Water Drinking Act

The Safe Drinking Water Information System (SDWIS) contains information on public water systems from the Public Water System Supervision (PWSS) Program, including monitoring, enforcement, and violation data related to requirements established by the Safe Drinking Water Act (SDWA).

CA CA Drinking Water System Area Boundaries

Obtained via email

Please be advised that this copy of the System Area Boundary Layer data is a snapshot of the CA drinking water system area boundaries provided to the State Board by individual water systems. A water system may have provided accurate, up-to-date boundaries, or may have provided boundaries that are only approximate. This layer does not contain all Public Water System boundaries. The dataset is in the process of being reviewed and verified. In addition, new boundaries are being added. Please note that these definitions are NOT a legal definition and should NOT be used to settle boundary disputes. Because the Water Board is targeting different information, there is no conflict with other authoritative agencies' definitions.

USGS NWIS water monitoring data

- 1995-2020
- Small dataset and geographical coverage

Compliance, Reporting, and Enforcement Rules

Standardized Monitoring Framework

Legend for the SMF Tables

* = 1 sample at each entry point to distribution system (EPTDS).

** = 2 quarterly samples at each EPTDS. Samples must be taken during 1 calendar year during each 3-year compliance period.

**** = 4 quarterly samples at each EPTDS within time frame designated by the primacy agency.

X = No sample required unless specified by primacy agency. However, waivers must be renewed at the frequency shown and system must demonstrate that the sources are not vulnerable.

= Systems must monitor at a frequency specified by the primacy agency. Detect = Federally defined detection limit.

STANDARDIZED MONITORING FRAMEWORK

		Fourth Cycle									Fifth Cycle								
		1st Period			2nd Period			3rd Period			1st Period			2nd Period			3rd Period		
Inorganic Contaminants (IOCs)	CWSs & NTNCWSs	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
	Ground Water																		
	Waiver[1]					*									*				
	≤ MCL and No Waiver		*			*			*			*			*			*	
	Reliably and Consistently < MCL[2]		*			*			*			*			*			*	
	> MCL or Not Reliably and Consistently < MCL[3]	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****
	Surface Water																		
	Waiver[1]					*									*				
	≤ MCL and No Waiver	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Reliably and Consistently < MCL[2]	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	> MCL or Not Reliably and Consistently < MCL[3]	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****	****

The EPA's standardized monitoring framework

(SMF) for inorganic contaminants (40CFR141.23) - the same rule applies to inorganic Nitrate NO_3.

- At each entry point of the distribution system
  - *Entry Point to the Distribution System*: is where any source or treated water enters the system of pipes or other fixtures used to provide drinking water to persons served by the public water system
- Ground water systems – one sample every three years - must complete sampling by December 31, 2007
- Surface water systems – one sample every year - must complete sampling by December 31, 2006
- Repeated values may mean for each entry point
- If a system is collecting samples more than once a year (i.e., quarterly or more), then compliance with the MCL is determined by calculating a Running Annual Average (RAA).
- If a system is collecting samples more than once a year (i.e., quarterly or more), then compliance with the MCL is determined by calculating a Running Annual Average (RAA).
- Although it is not clearly stated in the rule, it is EPA's position that systems triggered into increased monitoring will not be considered in violation of the MCL until they have completed one year of quarterly sampling. However, if any sample result causes the RAA to exceed the MCL at any sampling point (e.g., the sampling result is four times the MCL), the system is out of compliance with the MCL immediately.

The 2001 Final Arsenic Rule (FAR)

General Description

Changes the arsenic MCL from 50 µg/L to 10 µg/L; Sets arsenic MCLG at 0; Requires monitoring for new systems and new drinking water sources; Clarifies the procedures for determining compliance with the MCLs for IOCs, SOCs, and VOCs.

Timeline

The new Arsenic Rule applies to all community water systems (CWSs) and nontransient non-community water systems (NTNCWSs).

- By, January 22, 2004, all NEW systems/sources must collect initial monitoring samples for all IOCs, SOCs, and VOCs within a period and frequency determined by the State
- The MCL will remain at 50 ug/L until January 22, 2006

- On January 23, 2006, the revised MCL of 10 ug/L becomes enforceable, and all systems must begin monitoring or submit data that meets grandfathering requirements
- On December 31, 2006 Surface water systems must complete initial monitoring or have a State approved waiver.
- On December 31, 2007 Ground water systems must complete initial monitoring or have a State approved waiver

Monitoring Requirements for Total Arsenic (1)

1. **Initial Monitoring** One sample after the effective date of the MCL (January 23, 2006). Surface water systems must take annual samples. Ground water systems must take one sample between 2005 and 2007.
2. **Reduced Monitoring** If the initial monitoring result for arsenic is less than the MCL:

- Ground water systems must collect one sample every 3 years.
- Surface water systems must collect annual samples.

3. **Increased Monitoring** A system with a sampling point result above the MCL must collect quarterly samples at that sampling point, until the system is reliably and consistently below the MCL.

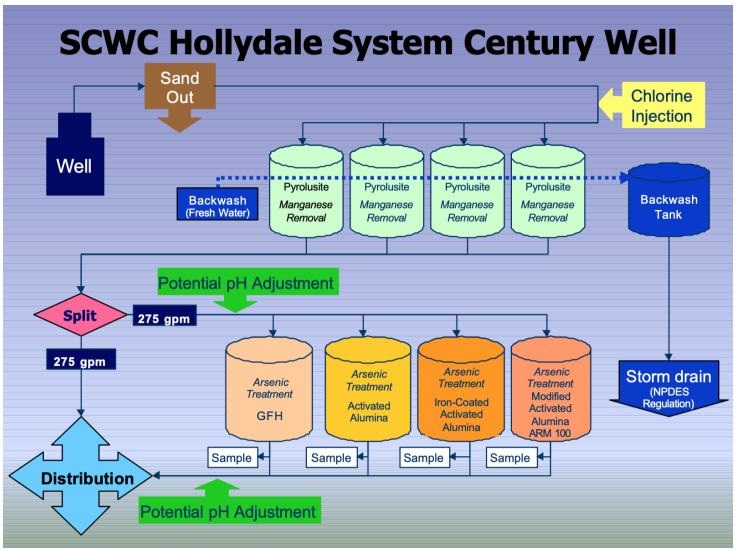
(1) All samples must be collected at each entry point to the distribution system, unless otherwise specified by the State.

Some thoughts regarding leveraging the FAR

- This means that the rule applies to communities served by CWSs and NTNCWSs and not communities served by private wells
- The rule is only binding for CWSs who are experiencing Arsenic level $> 10\ ug/L$ in 2001, who likely had to upgrade their treatment systems
    - EPA estimates that 3,024 CWSs and 1,080 NTNCWSs will have to install treatment to comply with the revised MCL
- This rule is non-binding for CWSs who are not in the Arsenic “hot spot” which could be correlated to CWSs that has a portfolio of mainly surface water
- Identify CWSs that were non-binding at 2001 or prior to policy enforcement at 2006

CWSs and monitoring in California

Each PWS (in dataset `sys`) has many monitoring locations denoted by their sampling point ID (in dataset `loc`). These monitoring locations can be anywhere in the system and are denoted in the dataset by their status number.



The EPA’s standardized monitoring framework

- Abandoned – AB A source which is no longer being used, with no intention of being used in the future, and which is not destroyed.
- Destroyed – DS A source which is filled and capped with no possibility of being used in the future.
- Inactive Raw – IR A source which is not in service for periods of one year or greater and which provides raw water which is sampled before any treatment.
- Inactive Treated – IT A source which is not in service for periods of one year or greater and which provides treated water to a system.
- Inactive Untreated – IU A source which is not in service for periods of one year or greater and which provides raw water to a system without any treatment.
- Standby Raw – SR A source which is used less than 15 calendar days per year, with periods not to exceed five consecutive days and which provides raw water which is sampled before any treatment.
- Standby Treated – ST A source which is used less than 15 calendar days per year, with periods not to exceed five consecutive days and which provides raw water which is sampled after treatment.
- Standby Untreated – SU A source which is used less than 15 calendar days per year, with periods not to exceed five consecutive days and which provides raw water without any treatment.
- Active Raw – AR An active source which is sampled before any treatment.

- Active Treated – AT An active source which is sampled after any treatment.
- Active Untreated – AU An active source which is not treated.
- Monitoring – MW A source, which is not a drinking water source and which is utilized only for monitoring water quality.
- Agricultural/Irrigation Well – AG Not a drinking water well; utilized only for agriculture.
- Distribution system sample point, Treated – DT Sample point within the distribution system after treatment.
- Distribution system sample point, Raw – DR Sample point within the distribution system before treatment.
- Combined Treated - CT Combined sources which are treated.
- Combined Untreated - CU Combined sources which are not treated.
- Combined Raw - CR Combined raw sources.
- Combined Mixed - CM Combined sources.
- Pending – PN Source not yet established.
- Purchased Raw – PR Purchased source water which is sampled before any treatment.
- Purchased Treated – PT Purchased source water which is sampled after any treatment.
- Purchased Untreated - PU Purchased source water which is not treated.
- Waste Water – WW Not for drinking

There are a lot more systems in the CA SWRB data than in the file from the CA open data portal

```
## Rows: 362,950
## Columns: 27
## $ samplePointID <chr> "0103039-002", "0103039-004", "0103039-004", "0103040-00…
## $ sampleDate    <date> 2006-07-10, 2003-05-20, 2006-05-24, 2001-03-14, 2005-06…
## $ ar_ugl        <dbl> 0.0, 0.0, 0.0, 0.0, 0.0, 0.0, 6.0, 6.0, 1.0, 2.0, 5.0, 0…
## $ year          <dbl> 2006, 2003, 2006, 2001, 2005, 2006, 2002, 2005, 2003, 20…
## $ labNum        <int> 1675, 1675, 1675, 1675, 1675, 1675, 5867, 5810, 5113, 79…
## $ FRDS_NO       <chr> "0103039002", "0103039004", "0103039004", "0103040001", …
## $ DISTRICT      <chr> "04", "04", "04", "04", "04", "04", "04", "04", "04", "0…
## $ USER_ID       <chr> "ENG", "ENG", "ENG", "ENG", "ENG", "ENG", "ENG", "ENG", …
## $ SYSTEM_NO     <chr> "0103039", "0103039", "0103039", "0103040", "0103040", "…
## $ WATER_TYPE    <chr> "G", "G", "G", "G", "G", "G", "G", "G", "G", "G", "G", "…
## $ SOURCE_NAM    <chr> "WELL 02 - STANDBY", "WELL 04", "WELL 04", "SPRING 01 - …
## $ STATION_TY    <chr> "WELL/AMBNT/MUN/SUPPLY", "WELL/AMBNT/MUN/INTAKE/SUPPLY",…
## $ STATUS        <chr> "SU", "AU", "AU", "AR", "AR", "DR", "AR", "AR", "IR", "A…
## $ countyNumber  <dbl> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,…
## $ countyName    <chr> "ALAMEDA", "ALAMEDA", "ALAMEDA", "ALAMEDA", "ALAMEDA", "…
## $ countyID      <chr> "ENG", "ENG", "ENG", "ENG", "ENG", "ENG", "ENG", "ENG", …
## $ SYSTEM_NAM    <chr> "MOHRLAND MUTUAL WATER SYSTEM", "MOHRLAND MUTUAL WATER S…
## $ HQNAME        <chr> "MOHRLAND MUTUAL", "MOHRLAND MUTUAL", "MOHRLAND MUTUAL",…
## $ ADDRESS       <chr> "24927 Mohr Drive", "24927 Mohr Drive", "24927 Mohr Driv…
## $ CITY          <chr> "HAYWARD", "HAYWARD", "HAYWARD", "CASTRO VALLEY", "CASTR…
## $ STATE         <chr> "CA", "CA", "CA", "CA", "CA", "CA", "CA", "CA", "CA", "C…
## $ ZIP           <chr> "94545", "94545", "94545", "94552", "94552", "94552", "9…
## $ ZIP_EXT       <chr> "tt", "tt", "tt", "S", "S", "S", "6058", "6058", "538", …
## $ POP_SERV      <dbl> 116, 116, 116, 50, 50, 50, 543, 543, 0, 10, 10, 45, 70, …
## $ CONNECTION    <dbl> 99, 99, 99, 19, 19, 19, 200, 200, 1, 1, 1, 3, 1, 1, 1, 3…
## $ AREA_SERVE    <chr> NA, NA, NA, NA, NA, NA, "Trailer Haven Mobilehome Park",…
## $ raw           <dbl> 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,…
```

Looking at plausibly drinking water trends

How to identify drinking water from untreated water?

For this I filtered to `STATUS %in% c("CT", "AT", "DT")`. To be more conservative I should have just looked at `DT` but that has very little data.

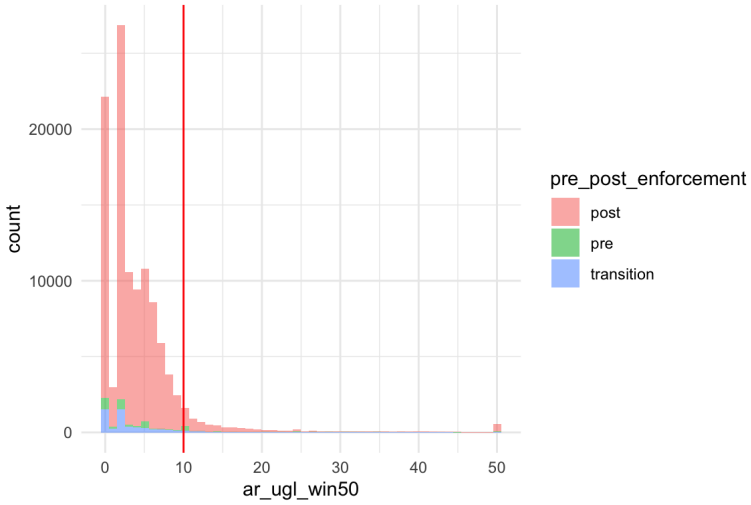
```
kable(table(ar$STATUS), format = "html")
```

Var1	Freq
AB	3029
AG	275
AR	163332
AT	84806
AU	41541
CM	2108
CR	8993
CT	21113
CU	798
DR	274
DT	5837
IR	12738

Var1	Freq
IT	1567
IU	4986
MW	572
PR	223
PT	1116
PU	15
SR	4765
ST	754
SU	2284

Looking at density of monitoring measures before and after the enforcement of the policy. Just a lot more observations after the policy in 2001.

Need to run event study regression in R.

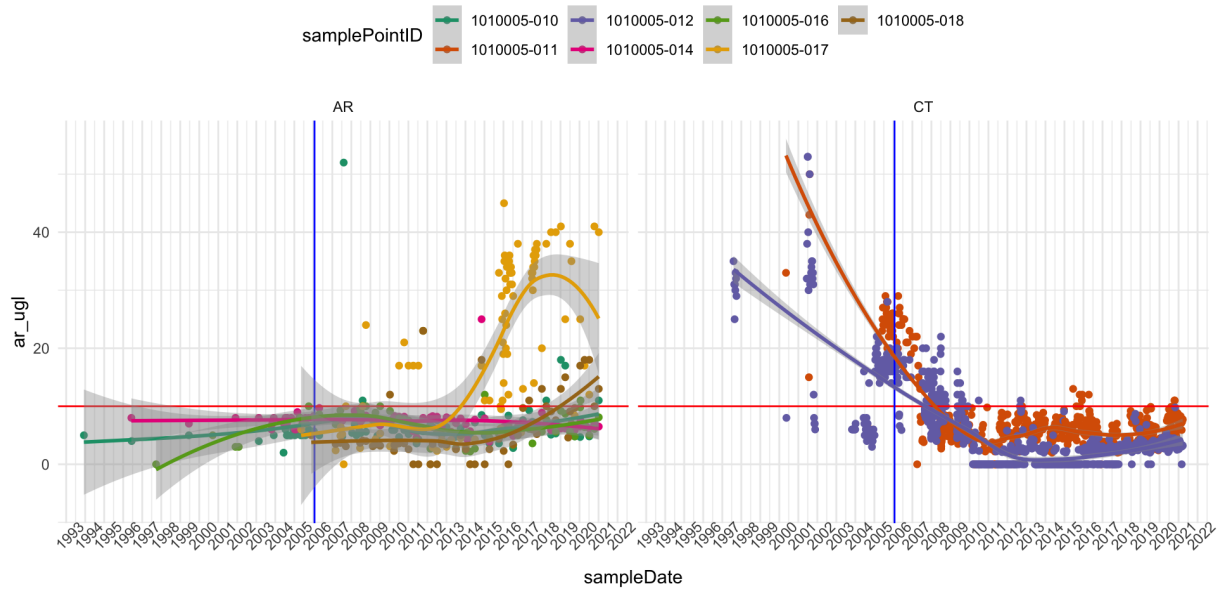


Firebaugh City

Let's look at the time series of a single system/PWSID, serving 7,619 people that mainly sources from groundwater.

samplePointID	STATUS	STATION_TY	n_obs_each_pt
1010005-007	IR	WELL/AMBNT/MUN/INTAKE	64
1010005-008	AB	WELL/AMBNT/MUN/INTAKE	2
1010005-009	IR	WELL/AMBNT/MUN/INTAKE	37
1010005-010	AR	WELL/AMBNT/MUN/INTAKE	80
1010005-011	CT	COMB/WELL/AMBNT	713
1010005-012	CT	COMB/WELL/AMBNT	892
1010005-014	AR	WELL/AMBNT	80
1010005-016	AR	WELL/AMBNT/MUN/INTAKE	67
1010005-017	AR	WELL	100
1010005-018	AR	WELL	60

We can keep just the `CT` and `AR`



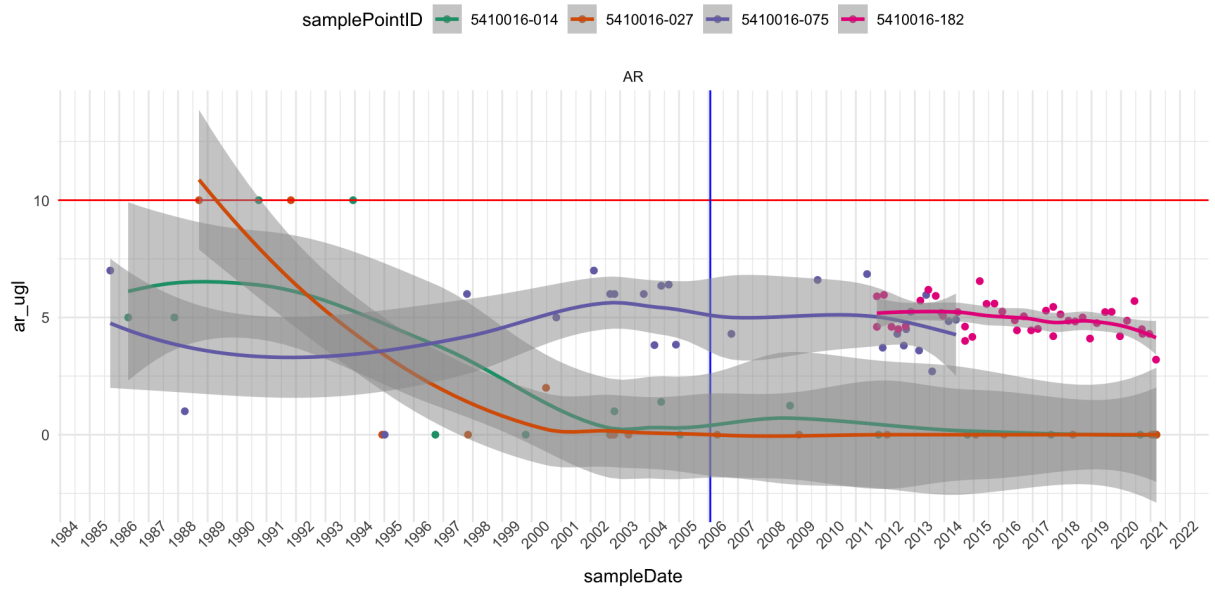
Visalia City

Serves 140,868. There are many sampling points for this location! But many are destroyed. Have to do guesswork as to which one is plausibly going into drinking water.

samplePointID	STATUS	STATION_TY	n_obs_each_pt
5410016-002	IU	WELL/AMBNT/MUN/INTAKE/SUPPLY	6
5410016-003	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	13
5410016-008	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	12
5410016-009	IR	WELL/AMBNT/MUN/INTAKE/SUPPLY	7
5410016-010	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	16
5410016-012	AU	WELL/AMBNT/MUN/INTAKE/SUPPLY	14
5410016-014	AR	WELL/AMBNT/MUN/INTAKE	17
5410016-015	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	13
5410016-016	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	16
5410016-017	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	15
5410016-018	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	13
5410016-021	IR	WELL/AMBNT/MUN/INTAKE/SUPPLY	5
5410016-022	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	14
5410016-023	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	15
5410016-024	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	15
5410016-025	SR	WELL/AMBNT/MUN/INTAKE/SUPPLY	10
5410016-026	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	14
5410016-027	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	17
5410016-028	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	15
5410016-029	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	10
5410016-030	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	13
5410016-031	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	14
5410016-035	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	14
5410016-036	AU	WELL/AMBNT/MUN/INTAKE/SUPPLY	14
5410016-037	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	15
5410016-040	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	16
5410016-043	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	12
5410016-044	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	13
5410016-045	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	12
5410016-046	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	14
5410016-047	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	15
5410016-048	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	16
5410016-049	AT	WELL	2
5410016-050	IR	WELL/AMBNT/MUN/INTAKE/SUPPLY	7
5410016-051	IR	WELL/AMBNT/MUN/INTAKE/SUPPLY	9
5410016-052	IU	WELL/AMBNT/MUN/INTAKE/SUPPLY	9
5410016-053	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	13
5410016-054	AR	WELL/AMBNT/MUN/INTAKE	13
5410016-055	AR	WELL/AMBNT/MUN/INTAKE	14
5410016-056	AR	WELL/AMBNT/MUN/INTAKE	15
5410016-057	AR	WELL/AMBNT/MUN/INTAKE	14
5410016-058	AR	WELL/AMBNT/MUN/INTAKE	13
5410016-059	AR	WELL/AMBNT/MUN/INTAKE	14
5410016-060	AR	WELL/AMBNT/MUN/INTAKE	15
5410016-061	AR	WELL/AMBNT/MUN/INTAKE	15
5410016-062	IU	WELL/AMBNT/MUN/INTAKE	4
5410016-064	AR	WELL/AMBNT	14
5410016-065	AU	WELL/AMBNT/MUN/INTAKE	14
5410016-066	AU	WELL/AMBNT/MUN/INTAKE	13
5410016-067	AU	WELL/AMBNT/MUN/INTAKE	13
5410016-069	AR	WELL/AMBNT	15
5410016-070	AR	WELL/AMBNT/MUN/INTAKE	13
5410016-072	IU	WELL/AMBNT/MUN/INTAKE/SUPPLY	4
5410016-074	IU	WELL/AMBNT/MUN/INTAKE/SUPPLY	14
5410016-075	AR	WELL/AMBNT/MUN/INTAKE	27
5410016-076	AR	WELL/AMBNT/MUN/INTAKE	6
5410016-077	AT	WELL	11
5410016-080	AR	WELL/AMBNT/MUN/INTAKE	15
5410016-081	AR	WELL/AMBNT/MUN/INTAKE	12
5410016-083	IR	WELL/AMBNT/MUN/INTAKE	15
5410016-084	IR	WELL/AMBNT/MUN/INTAKE	14
5410016-085	IR	WELL/AMBNT/MUN/INTAKE	7
5410016-086	IU	WELL/AMBNT/MUN/INTAKE	5
5410016-087	AR	WELL/AMBNT/MUN/INTAKE	16
5410016-088	AT	WELL/AMBNT/MUN/INTAKE/SUPPLY	2
5410016-089	AR	WELL/AMBNT/MUN/INTAKE	10
5410016-090	AR	WELL/AMBNT/MUN/INTAKE	11

samplePointID	STATUS	STATION_TY	n_obs_each_pt
5410016-091	AR	WELL/AMBNT/MUN/INTAKE	14
5410016-092	AR	WELL/AMBNT/MUN/INTAKE	15
5410016-093	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	11
5410016-094	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	12
5410016-095	IU	WELL/AMBNT/MUN/INTAKE/SUPPLY	9
5410016-096	IU	WELL/AMBNT/MUN/INTAKE/SUPPLY	4
5410016-097	IU	WELL/AMBNT/MUN/INTAKE/SUPPLY	6
5410016-098	AR	WELL/AMBNT	12
5410016-099	AU	WELL/AMBNT	11
5410016-100	IU	WELL/AMBNT/MUN/INTAKE/SUPPLY	11
5410016-103	IU	WELL/AMBNT/MUN/INTAKE/SUPPLY	6
5410016-118	AT	WELL	2
5410016-119	AT	WELL	2
5410016-124	AT	WELL	2
5410016-132	AT	WELL	2
5410016-136	AT	WELL	2
5410016-142	AT	WELL	2
5410016-147	AT	WELL	6
5410016-150	IR	WELL/AMBNT/MUN/INTAKE	5
5410016-151	IR	WELL/AMBNT/MUN/INTAKE	4
5410016-152	IR	WELL/AMBNT/MUN/INTAKE	9
5410016-153	IU	WELL/AMBNT/MUN/INTAKE	1
5410016-154	AR	WELL	15
5410016-155	AT	WELL	2
5410016-156	AR	WELL	8
5410016-157	AR	WELL	3
5410016-158	AR	WELL	6
5410016-159	AR	WELL/AMBNT/MUN/INTAKE	14
5410016-161	AT	WELL	2
5410016-162	IR	WELL	2
5410016-166	AR	WELL	5
5410016-167	AR	WELL	6
5410016-177	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	13
5410016-178	AU	WELL/AMBNT/MUN/INTAKE/SUPPLY	12
5410016-179	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	13
5410016-182	AR	WELL/AMBNT/MUN/INTAKE/SUPPLY	41

There are too many sample points, so let's filter to those with more than 16. But this runs the risk of sampling only the high arsenic or flouting ones. It could be flouting the MCL of *other* contaminants too, because under the SMF, the resampling schedule applies to other contaminants.



This city doesn't have a lot of treated data. but maybe it has a working treatment plant and has obtained the waiver.

samplePointID	sampleDate	ar_ugl	yearlabNum	FRDS_NO	DISTRICT	USER_ID	SYSTEM_NO	WATER_TYPE	SOURCE_NAM	STATION_TY
5410016-049	2021-02-18	02021	5810541001604912	CYA	5410016	G		WELL 79-01 - AFTER_GAC-TCP	WELL	
5410016-049	2021-03-05	02021	5810541001604912	CYA	5410016	G		WELL 79-01 - AFTER_GAC-TCP	WELL	

samplePointID	sampleDate	ar_ugl year	labNum	FRDS_NO	DISTRICT	USER_ID	SYSTEM_NO	WATER_TY	PESOURCE_NAM	STATION_TY
5410016-077	2020-09-15	02020	5810541001607712	CYA	5410016	G		WELL 77-01 - CL2		WELL
5410016-077	2020-09-21	02020	5810541001607712	CYA	5410016	G		WELL 77-01 - CL2		WELL
5410016-077	2020-09-28	02020	5810541001607712	CYA	5410016	G		WELL 77-01 - CL2		WELL
5410016-077	2020-10-05	02020	5810541001607712	CYA	5410016	G		WELL 77-01 - CL2		WELL
5410016-077	2020-10-08	02020	5701541001607712	CYA	5410016	G		WELL 77-01 - CL2		WELL
5410016-077	2020-10-13	22020	5810541001607712	CYA	5410016	G		WELL 77-01 - CL2		WELL
5410016-077	2020-11-02	02020	5701541001607712	CYA	5410016	G		WELL 77-01 - CL2		WELL
5410016-077	2020-12-15	02020	5701541001607712	CYA	5410016	G		WELL 77-01 - CL2		WELL
5410016-077	2021-01-13	02021	5810541001607712	CYA	5410016	G		WELL 77-01 - CL2		WELL
5410016-077	2021-02-18	02021	5810541001607712	CYA	5410016	G		WELL 77-01 - CL2		WELL
5410016-077	2021-03-02	02021	5810541001607712	CYA	5410016	G		WELL 77-01 - CL2		WELL
5410016-088	2021-02-17	02021	5810541001608812	CYA	5410016	G		WELL 13-01 - AFTER_GAC-TCP DBCP & PCE		WELL/AMBNT/MUN/INTAKE/SUPPI
5410016-088	2021-03-15	02021	5810541001608812	CYA	5410016	G		WELL 13-01 - AFTER_GAC-TCP DBCP & PCE		WELL/AMBNT/MUN/INTAKE/SUPPI
5410016-118	2021-02-25	02021	5810541001611812	CYA	5410016	G		WELL 41-01 - CL2		WELL
5410016-118	2021-03-13	02021	5810541001611812	CYA	5410016	G		WELL 41-01 - CL2		WELL
5410016-119	2021-02-25	02021	5810541001611912	CYA	5410016	G		WELL 40-01 - BEFORE_GAC-TCP		WELL
5410016-119	2021-03-15	02021	5810541001611912	CYA	5410016	G		WELL 40-01 - BEFORE_GAC-TCP		WELL
5410016-124	2021-02-14	02021	5810541001612412	CYA	5410016	G		WELL 34-01 - AFTER_GAC-TCP		WELL

samplePointID	sampleDate	ar_ugl year	labNum	FRDS_NO	DISTRICT	USER_ID	SYSTEM_NO	WATER_TY	PESOURCE_NAM	STATION_TY
5410016-124	2021-03-21	02021	5810541001612412	CYA	5410016	G			WELL 34-01 - AFTER_GAC-TCP	WELL
5410016-132	2021-02-14	02021	5810541001613212	CYA	5410016	G			WELL 23-01 - AFTER_GAC-TCP	WELL
5410016-132	2021-03-14	02021	5810541001613212	CYA	5410016	G			WELL 23-01 - AFTER_GAC-TCP	WELL
5410016-136	2021-02-14	02021	5810541001613612	CYA	5410016	G			WELL 19-01 - AFTER_GAC-TCP	WELL
5410016-136	2021-03-15	02021	5810541001613612	CYA	5410016	G			WELL 19-01 - AFTER_GAC-TCP	WELL
5410016-142	2021-02-17	02021	5810541001614212	CYA	5410016	G			WELL 11-02 - AFTER_GAC-TCP	WELL
5410016-142	2021-03-15	02021	5810541001614212	CYA	5410016	G			WELL 11-02 - AFTER_GAC-TCP	WELL
5410016-147	2020-09-10	02020	5810541001614712	CYA	5410016	G			WELL 82-01 - GAC_EFF-TCP	WELL
5410016-147	2020-09-15	02020	5810541001614712	CYA	5410016	G			WELL 82-01 - GAC_EFF-TCP	WELL
5410016-147	2020-09-21	02020	5810541001614712	CYA	5410016	G			WELL 82-01 - GAC_EFF-TCP	WELL
5410016-147	2020-09-28	02020	5810541001614712	CYA	5410016	G			WELL 82-01 - GAC_EFF-TCP	WELL
5410016-147	2021-02-25	02021	5810541001614712	CYA	5410016	G			WELL 82-01 - GAC_EFF-TCP	WELL
5410016-147	2021-03-14	02021	5810541001614712	CYA	5410016	G			WELL 82-01 - GAC_EFF-TCP	WELL
5410016-155	2021-02-18	02021	5810541001615512	CYA	5410016	G			WELL 16-02 - AFTER_GAC-TCP	WELL
5410016-155	2021-03-05	02021	5810541001615512	CYA	5410016	G			WELL 16-02 - AFTER_GAC-TCP	WELL
5410016-161	2021-02-24	02021	5810541001616112	CYA	5410016	G			WELL 83-01 - AFTER_GAC-TCP	WELL
5410016-161	2021-03-13	02021	5810541001616112	CYA	5410016	G			WELL 83-01 - AFTER_GAC-TCP	WELL