
Database Integration: Leveraging Legacy Data for the Future

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USWAG CCR Workshop

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The Challenges

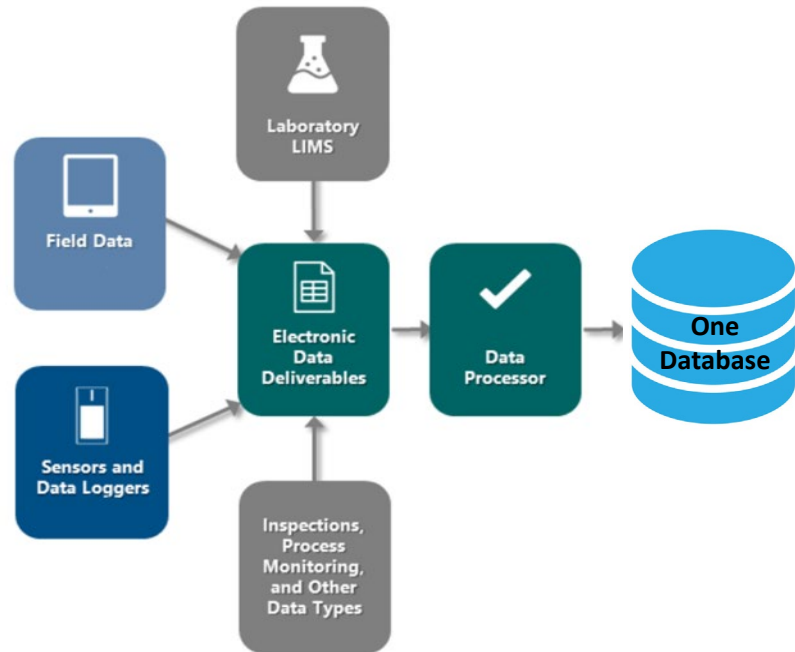
13 Facilities in 3 states

- + **3 TVA Programs**
 - + **Environmental Compliance and Operations**
 - + **Generation Projects and Fleet Services**
 - + **Asset Management/Well Inspection and Maintenance**
- + **7 Regulated Programs (CCR, Solid Waste Permit Compliance, Spill Response/Remediation, Litigation, Consent Order)**
- + **6+ Databases from Multiple Consultants/Sources**
- + **4 Sampling Companies**
- + **~ 15 Million Data Records**

= *Complexity, Inefficiency, and Cost*



The Solution: Develop One Data Management Process



- **Environmental Standards' Data Management and Quality Assurance program**
- **Single-point laboratory management**
- **Groundwater sampling alignment**
- **TVA Data Integration Plan**
 - **9-month effort to consolidate data and remove duplicate records**
 - **Select the “best” available data**
 - **Standardize nomenclature and schemes**
 - **Consolidate system access and security**
 - **Change Management policies**

= **One Database, One Plan**

= **Efficiency**

= **over \$150k / year in savings**

= **a platform for bigger and better things**



Planning: Get It RIGHT the First Time!

- Needs Assessment
 - *Begin the Conversation with the Entire Team!*
- Data Integration Plan (DIP)
 - Detailed process of how data would be merged into one dataset.
 - Fluid, and updated as the migration proceeds to accommodate new findings.



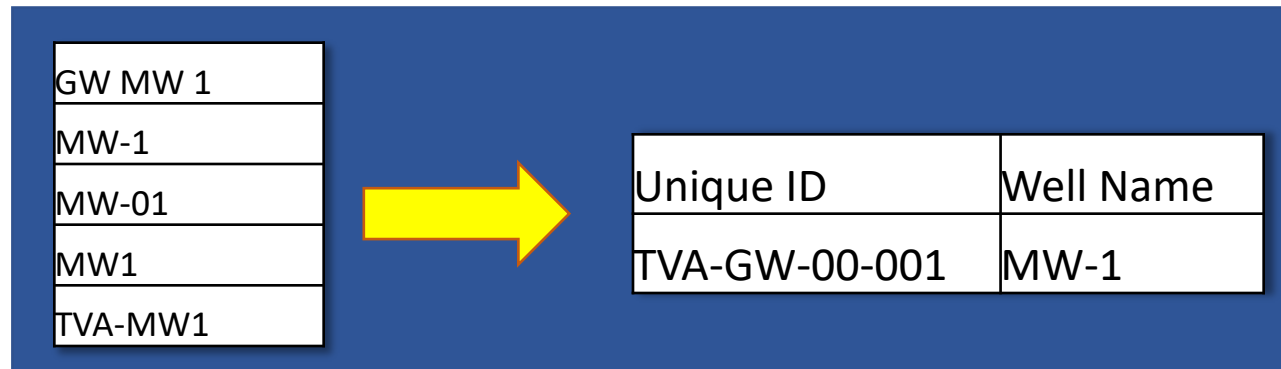
3.0	ROLES AND RESPONSIBILITIES	2
3.1	TVA Program Manager	2
3.2	EarthSoft Account Manager	3
3.3	Principal-in-Charge.....	3
3.4	Principal/Primary Point of Contact.....	3
3.5	Subject Matter Experts	3
3.6	ETL Developer	3
3.7	Database Administrator.....	4
3.8	Reviewer	4
4.0	PRE-MIGRATION PLANNING	4
4.1	Custom SQL Triggers.....	4
4.2	Database Auditing	5
4.3	Custom Migration EDD Specification	5
4.4	EQuIS Enterprise	6
4.5	Version	6
4.6	Custom Captions.....	6
4.7	Reference Values.....	7
5.0	PROPOSED ORDER OF DATABASE MIGRATION	8
6.0	DATA EXTRACTION.....	8
7.0	DATA TRANSFORMATION AND DATA MIGRATION	10
8.0	DATABASE POST-MIGRATION REVIEW	10
9.0	DATABASE MIGRATION TIMELINE/MILESTONES	11
10.0	DATA MANAGEMENT PLANNING	11

Planning: Standardize Valid Values

- Vital for Successfully Reporting, Analysis and Interpretation of Data

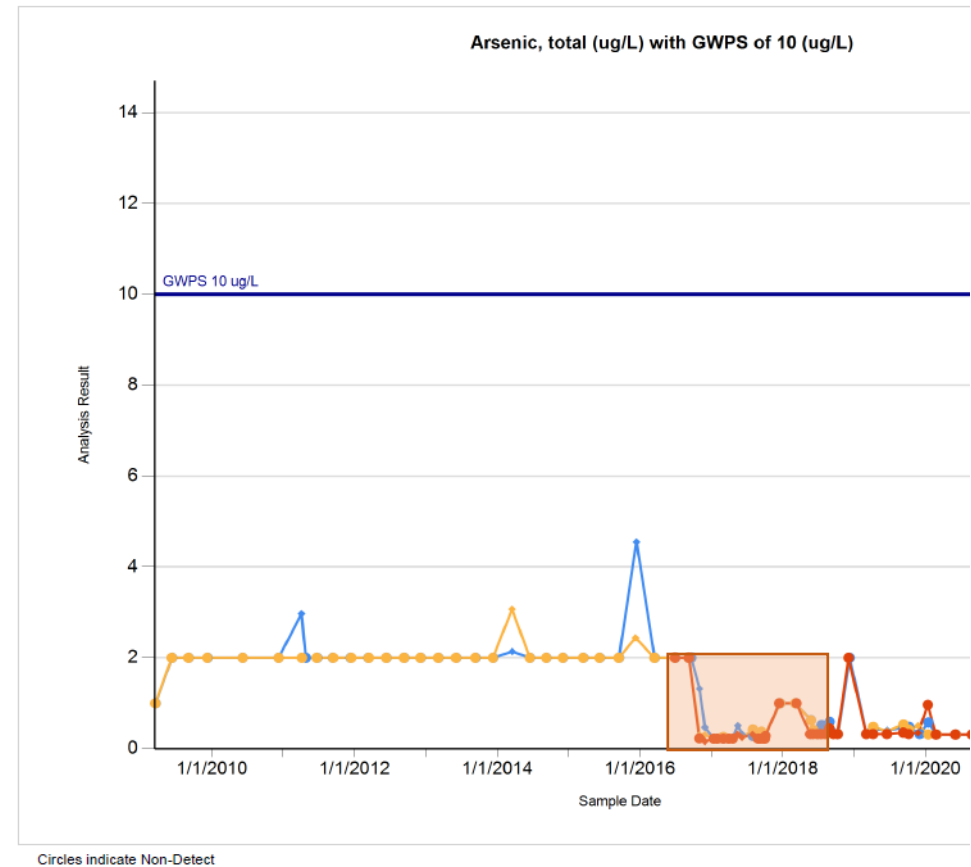
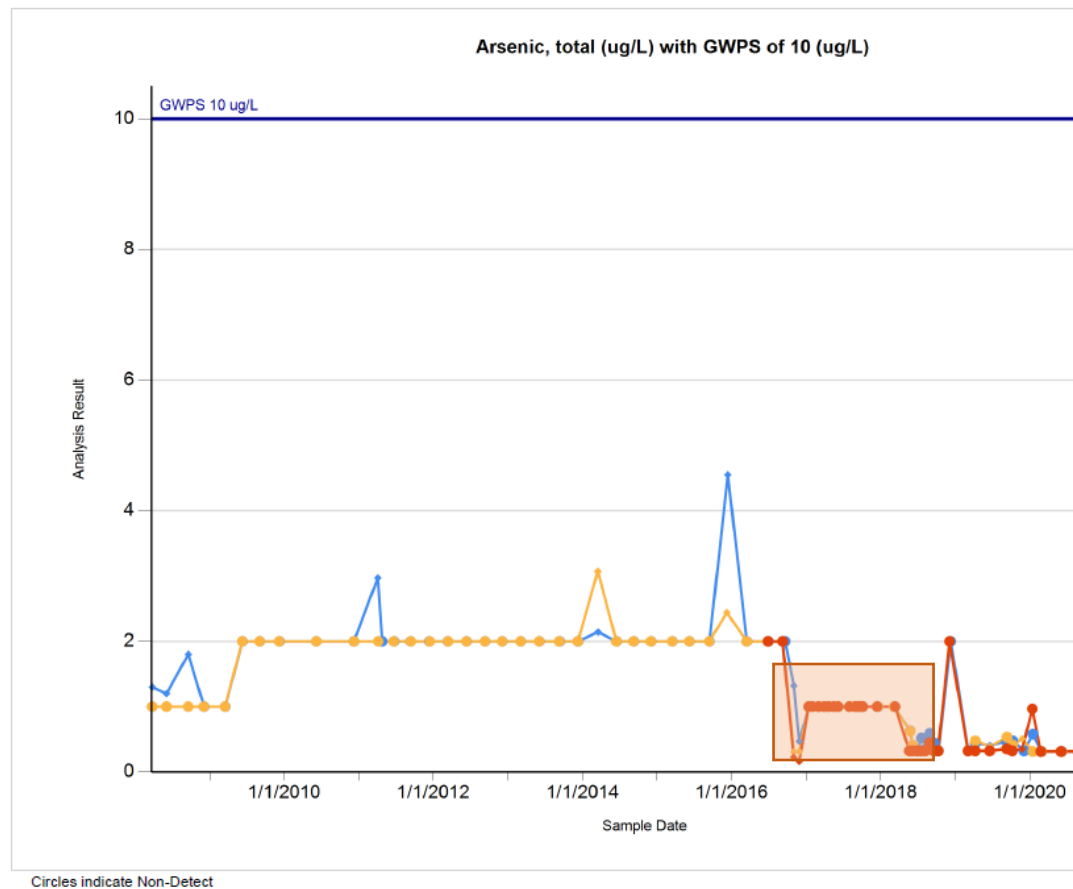
108394/106445	3 & 4 Methylphenol
15831-10-4	3&4-Methylphenol(m&p Cresol)
106-44-5	METHYLPHENOL, 3 & 4

E6020A
EPA 6020A
SW846 6020A
SW-846 6020A
SW846-6020A



- Alternate Values for Programs that cannot be aligned with the standards can be re-mapped in the database, while allowing for a standardized data structure.

Extraction, Migration and Review: Duplicate Data from Multiple Programs



Creation of a “Data Management Plan” (DMP)

Document to Define Universal Program Requirements:

- Define Roles and Responsibilities
- System and Access Requirements
 - User Types and Access Limitations
- Archiving and Backup Frequency
- Ensure adherence to Data Security
- Establish Cross-Program Valid Values
- Modify Existing SAP's/QAPP's/Program Documentation to reference the “DMP”





CCR Operations System

DEMONSTRATION OF TVA'S CURRENT SOLUTION



Engineers and Consultants



One Platform Solution; Single Sign On



The screenshot shows a SharePoint interface for the 'CCR Operations System'. The top navigation bar includes the SharePoint logo, a search bar, a zoom level of 110%, and a user profile icon labeled 'MB'. Below the navigation bar, the site title 'CCR Operations System' is displayed, along with 'Not following' and 'Share' options. A left-hand navigation pane lists various site sections: Home, ALF, BRF, COF, CUF, GAF, JOF, JSF, KIF, MSR, PAF, SHF, WBF, and WCF. The main content area features a dashboard with five tiles: a large blue tile for 'TVA GROUNDWATER PROGRAM', a teal tile for 'NEW WELL INSTALLATION', a blue tile for 'GROUNDWATER MONITORING', a dark blue tile for 'WELL INSPECTION & MAINTENANCE', and a green tile for 'WELL CLOSURE'. Each tile contains a relevant icon. The dashboard also includes '+ New', 'Page details', and 'Analytics' options, and a 'Published 10/27/2021' date with 'Edit' and 'Share' icons.

Centralized Multi-Media Team Collaboration Hub



Enterprise Content Management – Procedures & Drawings

TVA / Groundwater Activities
A PARTNERSHIP BETWEEN CIVIL PROJECTS & ENVIRONMENT

UPCOMING FIELD ACTIVITIES

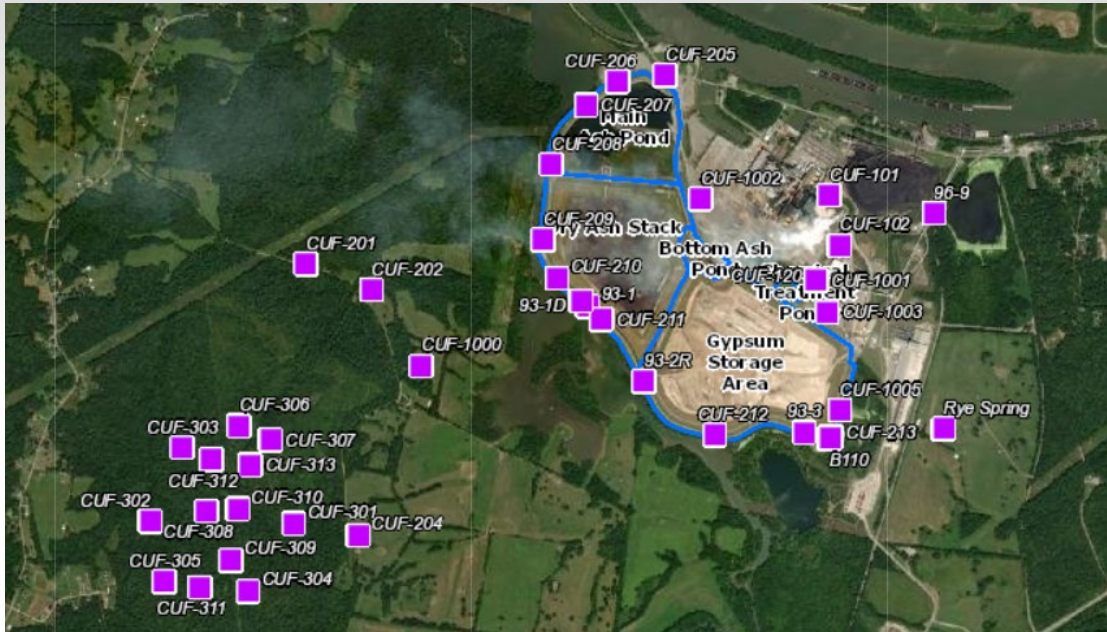
Site	Start Date	Finish Date	Network Code	Contractor	Activity Name	Activity Status	Last Schedule Update
CUF	04/12/22	04/12/22	NLF	Terracon	Gauging and Inspections, Event 2	Not Started	04/12/22
		04/14/22	State	TVA	CUF State GW Sampling Event 2 of 4	Not Started	04/08/22
GAF	04/12/22	04/12/22	CCR	AECOM	Well Gauging, Event 1	Not Started	04/12/22
			NEW	AECOM	Well Gauging and Inspection, Event 1	Not Started	04/12/22
					Well Gauging and Inspection, Event 1, SRL	Not Started	04/12/22
					Well Gauging and Inspection, Event 2, SRL	Not Started	04/12/22
JOF	04/12/22	05/08/22	CCR	Stantec	Soil Boring Installation for Geochem Sampling	Not Started	04/12/22
CUF	04/13/22	04/19/22	NLF	Terracon	Groundwater Sampling, Event 2	Not Started	04/12/22
GAF	04/13/22	04/13/22	NEW	AECOM	Groundwater Sampling, Event 1, SRL	Not Started	04/12/22
		04/17/22	CCR	AECOM	Groundwater Sampling, Event 1	Not Started	04/12/22
		04/26/22	NEW	AECOM	Groundwater Sampling, Event 2, SRL	Not Started	04/12/22
GAF	04/18/22	06/17/22	CCR	Terracon	GAF SRL Well Closure	Completed	04/12/22
WBF	04/18/22	04/18/22	IGM	Terracon	Well Gauging and Inspection, Event 1	Not Started	04/12/22
WBF	04/19/22	04/20/22	State	TVA	WBF State GW Sampling Event 1 of 2	Not Started	04/08/22
		04/25/22	IGM	Terracon	Groundwater Sampling, Event 1	Not Started	04/12/22
KIF	04/25/22	05/08/22	CCR	Terracon	Subsurface Well Inspections	Not Started	04/12/22
CUF	04/25/22	05/04/22	CCR	Terracon	Subsurface Well Inspections	Not Started	04/12/22

Dashboard & Connection to Scheduling Tools

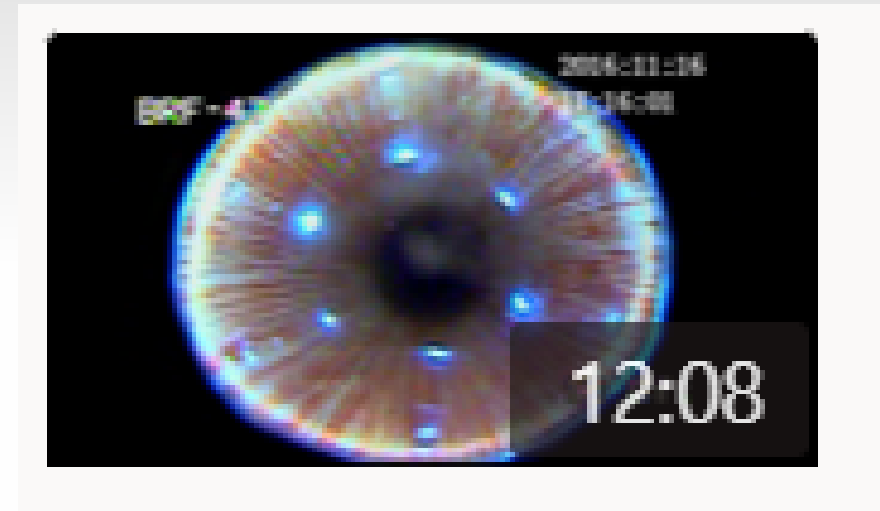


Document Collaboration/Storage

Utilizing ESRI/GIS Tools & Media Stream

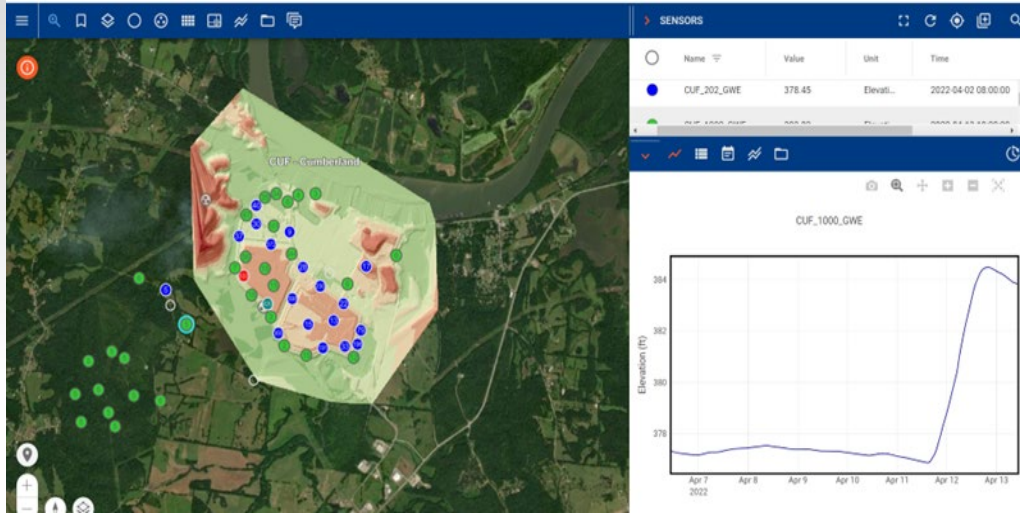


Dynamic Maps Connected
to ESRI ArcGIS



Down Hole Videos

Centralized Connection To Apps



Compatible to R Shiny
For
Statistical Analysis

Single login Connection to Apps

GET

- Introduction
- Data Summary
- Statistics
- Detection Monitoring
- Assessment

Select Facility:
BRF

Select Chemical:
Antimony

Select Statistics Event:
BRF_GW_CCRVAC_2021_11

Statistical Analysis and Reports

The GET Tool is designed to provide statistical analysis of groundwater monitoring data required under State regulatory programs and the federal Coal Combustion Residuals (CCR) rule. It uses state-of-the-art statistical methods to evaluate data under three phases of groundwater monitoring: Detection, Assessment, and Corrective Action.

In Detection, background data are used to construct prediction limits for use in identifying statistically significant changes from background levels. In Assessment and Corrective Action, compliance data are used to compute confidence intervals and confidence bands to assess violations of groundwater protection standards (GWPS).

Historical Statistical Reports

2022

Phase 0 now

BRF all programs and all years.

Visualization & Data Analytics



Engineers and Consultants

TVA TENNESSEE VALLEY AUTHORITY / Cumberland
WELL INSPECTION & MAINTENANCE STATISTICS

Facility: CUF Task Code: All Well ID: All Measurement Date: 9/11/2020 - 4/12/2022 Count Of Issues: 114

Site	Well ID	task_code	measurement_date	Issue Type	Issue	Comment
CUF	CUF-209	CUF_GW_2020_10	10/05/2020 11:43	Bollards	Bollards: Damaged?	Bollard cracked at top
CUF	CUF-206	CUF_GW_2021_08	08/02/2021 12:08	Bollards	Bollards: In Need of Maintenance?	Not yet painted
CUF	CUF-207	CUF_GW_2021_08	08/02/2021 11:20	Notify/Expedite	Notify/Expedite: Was TVA Notified?	
CUF	93-1	CUF_GW_2020_10	10/05/2020 11:21	Well Deficiency	Well Deficiency: Is a deficiency observed at the well?	NA
CUF	93-1	CUF_GW_2021_07	07/12/2021 13:05	Well Deficiency	Well Deficiency: Is a deficiency observed at the well?	cracked pad, and wasp nest
CUF	93-1	CUF_GW_2021_08	08/16/2021 12:12	Well Deficiency	Well Deficiency: Is a deficiency observed at the well?	Wasps in well casing, crack in well pad
CUF	93-1	CUF_GW_2022_01	01/17/2022 15:13	Well Deficiency	Well Deficiency: Is a deficiency observed at the well?	well pad cracked
CUF	93-1	CUF_GW_2022_02	02/28/2022 12:26	Well Deficiency	Well Deficiency: Is a deficiency observed at the well?	No blue cap cover or dedicated tubing
CUF	93-1	CUF_GW_2022_04	04/11/2022 14:40	Well Deficiency	Well Deficiency: Is a deficiency observed at the well?	well pad cracked

DEPLOYING VARIOUS TECHNOLOGIES

TVA TENNESSEE VALLEY AUTHORITY / Cumberland
DRY FLY ASH STACK AND GYPSUM DISPOSAL AREA TIME SERIES

Analyte Group: CUF_Reporting Limit: CUF_GWPS Chemical: Fluoride Location Group: All Well Id: All Sample Date: 1/19/2000 - 3/8/2022

Fluoride GWPS 4.00 mg/L
 Chemical Standard Limit Value Reporting Unit

Detect Flag	Chemical	Well Id	Results	Units	SampleDate	Validation Status
N	Fluoride	93-1	0.52	mg/L	07/11/2007	
N	Fluoride	93-1	0.52	mg/L	01/23/2008	
N	Fluoride	93-1	0.52	mg/L	07/16/2008	
N	Fluoride	93-1	0.52	mg/L	01/21/2009	Final QC Review
N	Fluoride	93-1	0.10	mg/L	10/07/2009	Final QC Review
N	Fluoride	93-1	0.10	mg/L	01/14/2010	
N	Fluoride	93-1	0.12	mg/L	04/07/2010	Final QC Review
N	Fluoride	93-1	0.12	mg/L	07/22/2010	
N	Fluoride	93-1	0.20	mg/L	04/05/2011	Validated
N	Fluoride	93-1	0.52	mg/L	10/04/2011	Final QC Review
N	Fluoride	93-1	0.52	mg/L	01/10/2012	Final QC Review
N	Fluoride	93-1	0.52	mg/L	10/17/2012	Validated
N	Fluoride	93-1	0.52	mg/L	01/15/2013	Validated
N	Fluoride	93-1	0.10	mg/L	04/03/2013	Final QC Review
N	Fluoride	93-1	0.10	mg/L	07/02/2013	
N	Fluoride	93-1	0.12	mg/L	10/09/2014	Final-Not QCD
N	Fluoride	93-1	0.12	mg/L	01/14/2015	Final QC Review

Report Generated at 7/22/2022 2:41:01 PM

Monitoring Well	10-51			10-52		
	Sample Date	12-Aug-21	07-Jan-22	16-Feb-22	11-Aug-21	06-Jan-22
Sample Type	N	N	N	N	N	N
Sample Round	BRF_GW_2021_08	BRF_GW_2022_01	BRF_GW_2022_02	BRF_GW_2021_08	BRF_GW_2022_01	BRF_GW_2022_02
Location/Well ID	BRF-09-GW-43-007	BRF-09-GW-43-007	BRF-09-GW-43-007	BRF-09-GW-43-008	BRF-09-GW-43-008	BRF-09-GW-43-008
Sample ID	BRF-GW-10-51-08122021	BRF-GW-10-51-01072022	BRF-GW-10-51-02102022	BRF-GW-10-52-08112021	BRF-GW-10-52-01062022	BRF-GW-10-52-02162022
Analyte	Units	Fraction	Result	Result	Result	Result
Alkalinity as CaCO3	mg/L	N	311	293	299	352
Aluminum	ug/L	T	102	32.1	< 15.5	18.6
Antimony	ug/L	T	< 0.378	< 0.504	0.58	< 0.378
Arsenic	ug/L	T	0.375	< 0.313	< 0.262	34.3
Barium	ug/L	T	127	125	127	611
Beryllium	ug/L	T	< 0.182	< 0.182	< 0.274	< 0.182
Bicarbonate as CaCO3	mg/L	N	311	293	299	352
Boron	ug/L	T	320	344	388	< 272
Cadmium	ug/L	T	0.4	0.246	< 0.217	< 0.217
Calcium	ug/L	T	167000	168000	176000	103000
Carbonate as CaCO3	mg/L	N	< 5	< 5	< 5	< 5
Chloride	mg/L	N	148	150	149	6.70
Chromium	ug/L	T	< 1.53	< 1.53	< 1.53	< 1.53
Cobalt	ug/L	T	0.474	0.502	0.495	1.74
Copper	ug/L	T	1.51	< 0.627	< 1.14	< 0.627
Depth to Water	ft	N	10.78	11.45	11.27	9.98



Questions?

