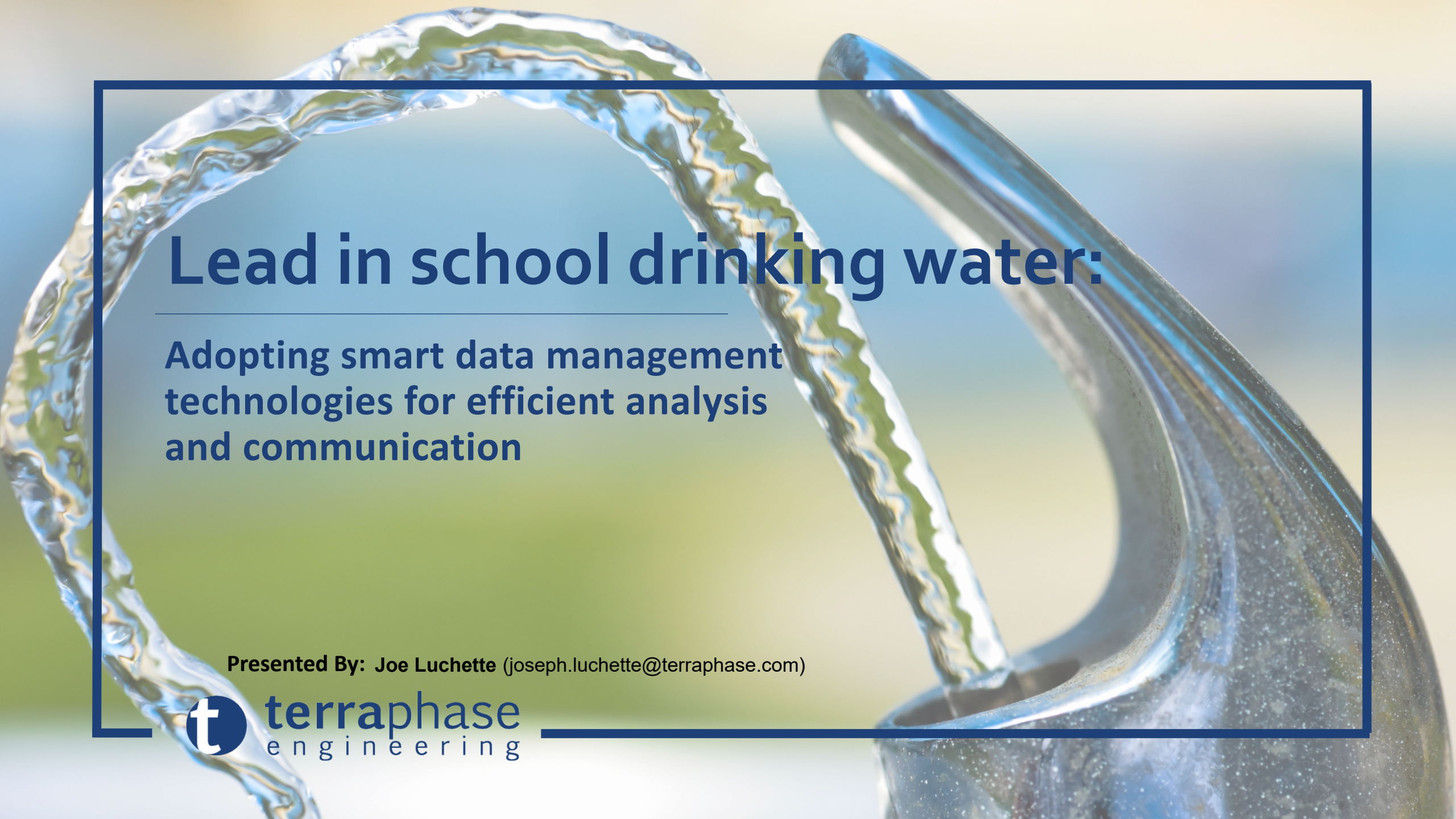




Lead in school drinking water:

Adopting smart data management technologies for efficient analysis and communication

Presented By: Joe Luchette (joseph.luchette@terrphase.com)



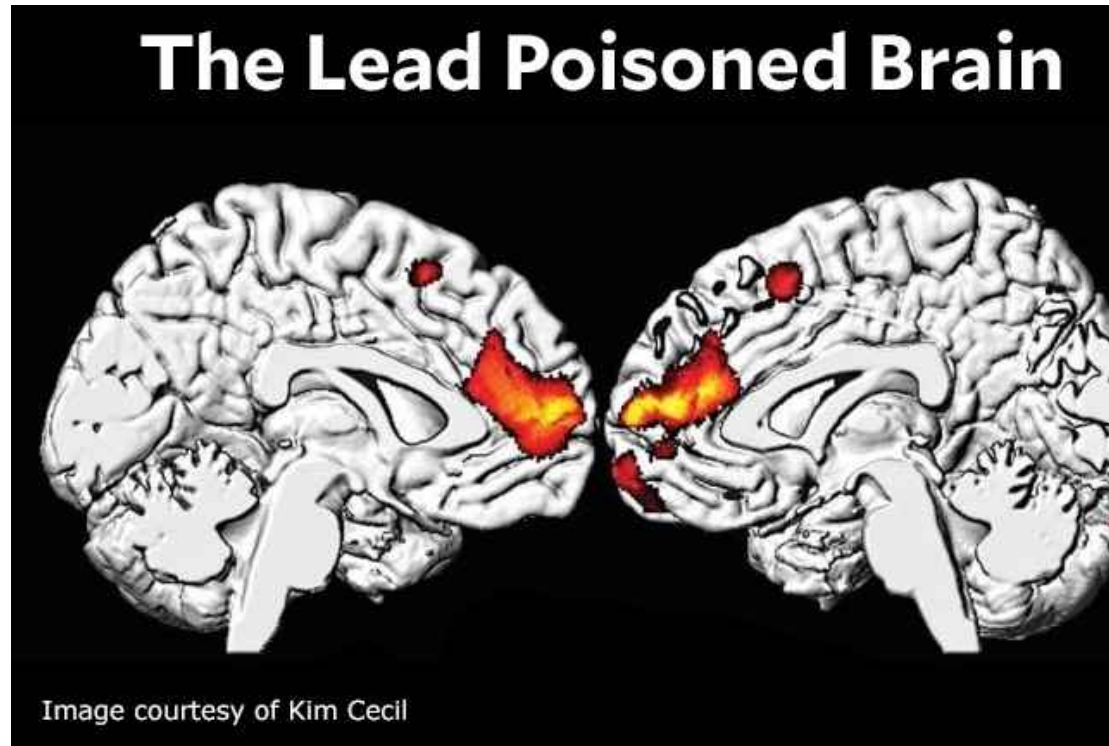
Outline

- Lead in School Drinking Water Background
- Terraphase Depth of Experience
- Data Workflow Evolution
- Case Study – leadfree.pa.gov



Why Test Drinking Water for Lead?

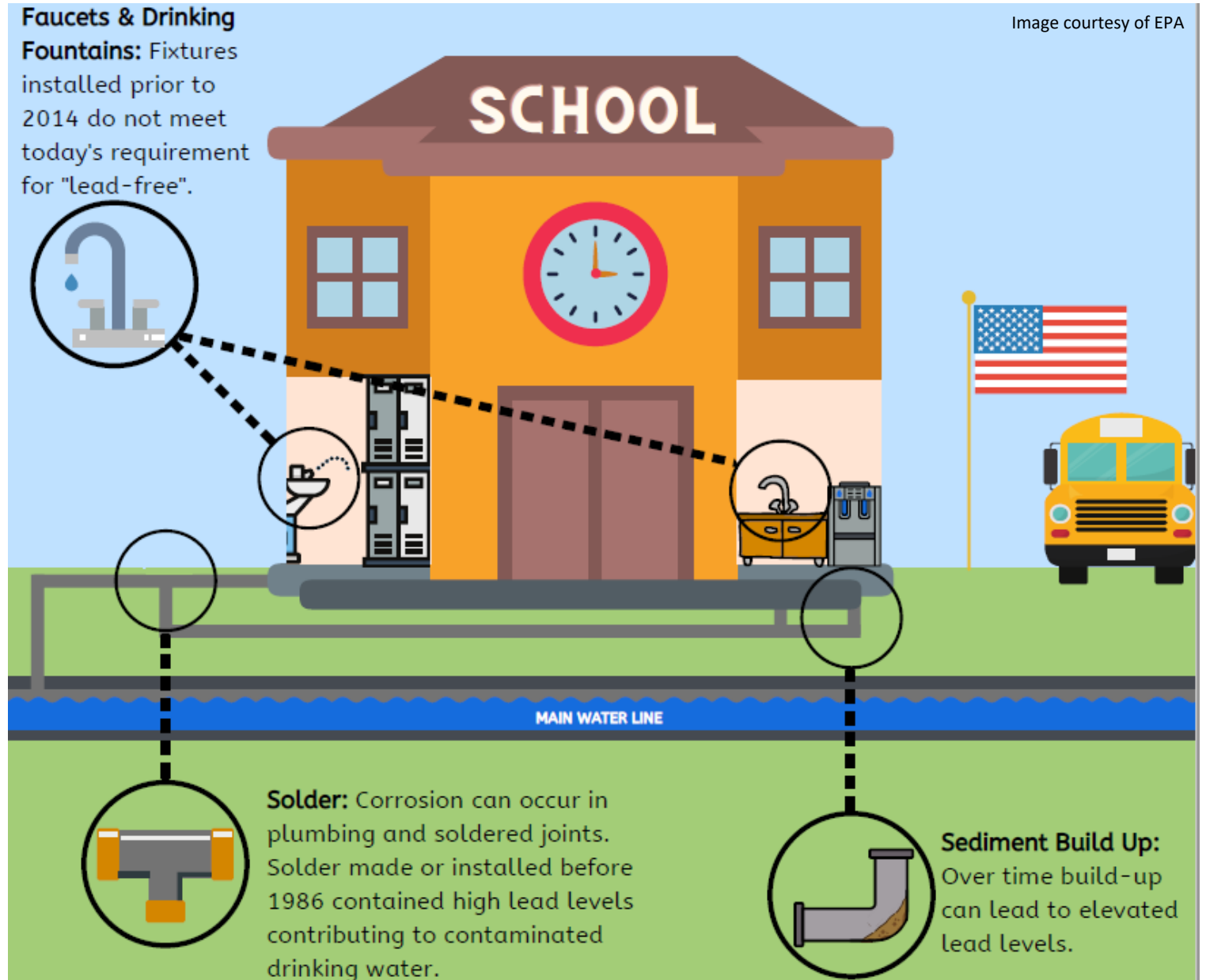
Health Impacts: Developmental Delay, Learning Difficulty, Irritability and more



Where is lead found? Most Commonly Paint and Soil but also Water

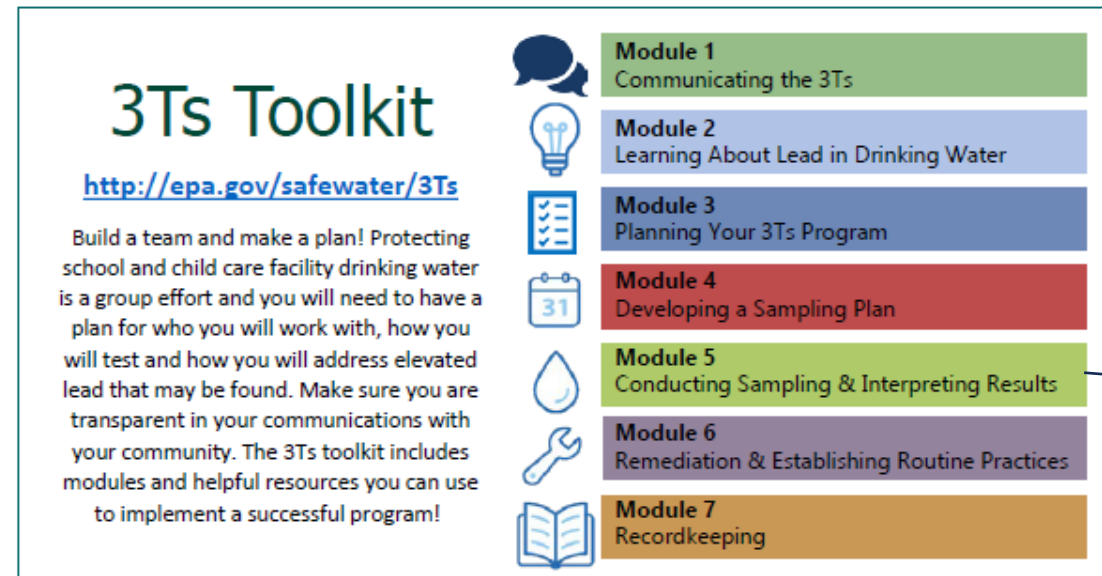
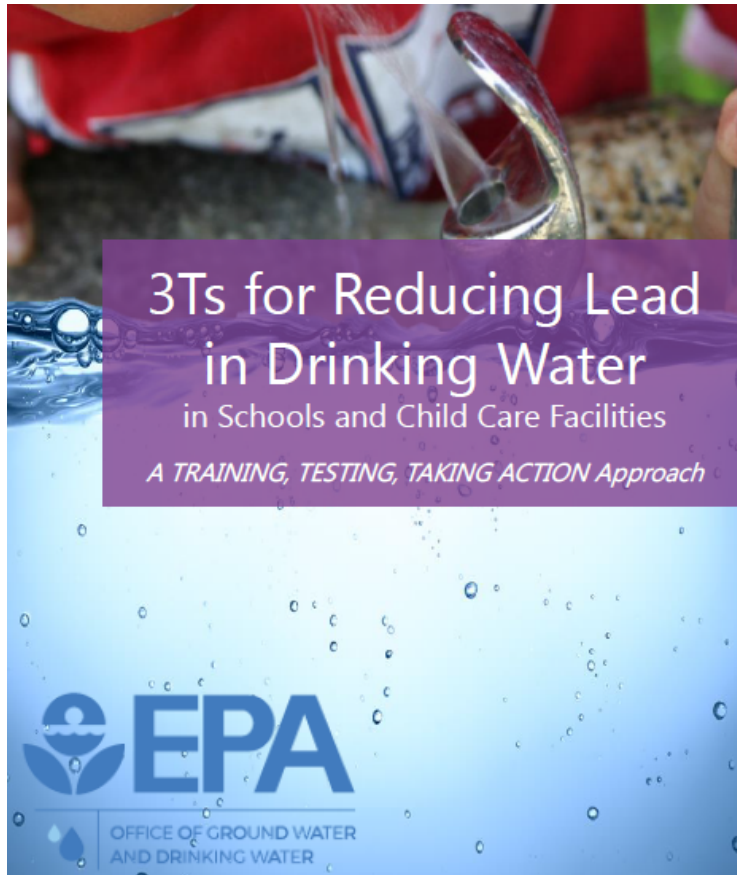


Exposure Pathways Exist Both Outside and Inside the Building



How to Sample?

Following the EPA 3Ts Recommended Approach



Common Misconception:

You don't "just test" drinking water in a school, sampling is step 5 of 7.

How to Sample?

Following the EPA 3Ts Recommended Approach

What to sample?

All Outlets Used For Drinking and Cooking:

- Water fountains, bubblers and coolers
- Cold faucets
- Kitchen prep sinks/pot fillers
- Ice making machines

STEP 1

250-mL First-Draw Sample

Take a 250-mL first-draw sample at all taps used for consumption to identify potential lead in the fixture.

STEP 2

250-mL Flush Sample

If the result of Step 1 is high, take a 30-second flush sample to identify lead in the plumbing behind the fixture.

*first draw after an 8 to 18 hour stagnation

Piping coloration indicates targeting by sample type

-  First draw
-  Flush

Exhibit 4. Targeted Locations of Water in Plumbing for Drinking Water Faucets

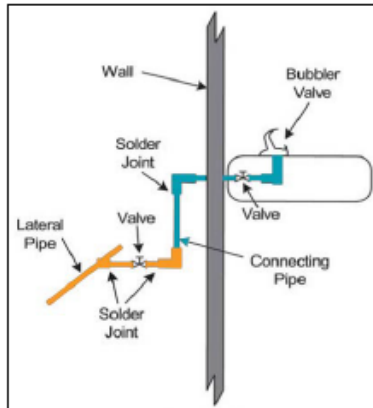


Exhibit 5. Targeted Locations of Water in Plumbing for Cold Water Faucets

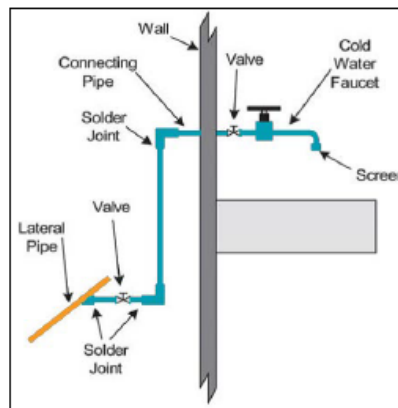
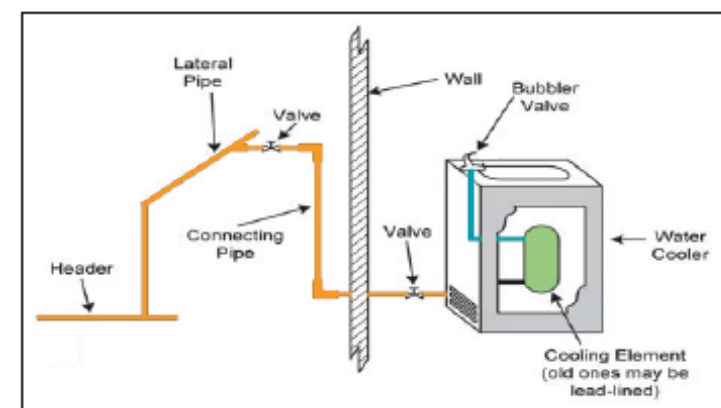


Exhibit 6. Targeted Locations of Water in Plumbing for Water Fountains with Coolers



Flint, MI Water Crisis (2016)

- *THE SPARK*
- Virginia Tech Quality Study
 - ✓ 40% of homes had elevated levels of lead
 - ✓ Flint water 19 times more corrosive than Detroit water
- EPA Report
 - ✓ Levels as high as 13,200ppb in home of Lee-Anna Walters
- Generated nationwide awareness and action regarding water quality issues and
- Government Accountability Office (GAO) Report:
“Lead Testing of School Drinking Water Would Benefit from Improved Federal Guidance”

State-to-State Lead Testing Regulatory Variability

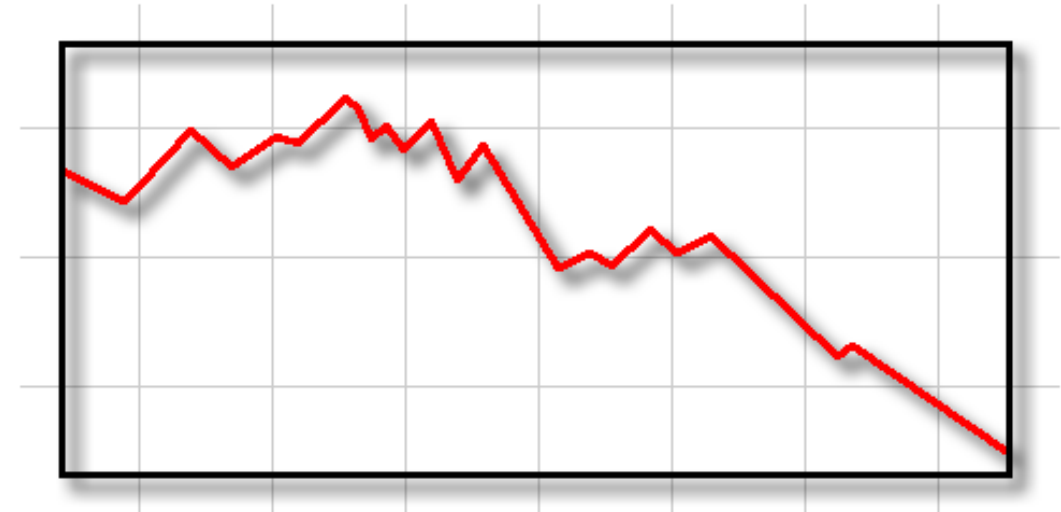
State	Applicable Schools	Action Level	Number of Samples	Frequency	Testing Responsibility
California	Public schools const. before 2010	15 ppb (1L sample)	5	Once before July 2019	<u>Water System</u>
Illinois	Public + private elementary schools const. before 2000	Any positive result (250mL sample)	All drinking water sources	-	School District
Maryland	Public + private schools	20 ppb (250mL sample)	All drinking water sources	Every 3 years	School District
New Jersey	Public schools	15 ppb (250mL sample)	All drinking water sources	Every 6 years	State + School District
New York	Public schools	15 ppb (250mL sample)	All drinking water sources	Every 3 years (changing to 1)	State + School District
Pennsylvania	Public schools	15 ppb	All drinking water sources	<u>Voluntary</u> (w/exception of Phila Ordinance)	School District
Virginia	Public schools	-	High priority drinking water sources	-	School District
District of Columbia	Public schools	5 ppb (250mL sample)	All drinking water sources	Annually	State

National Action Level Trending Downward

THE “STANDARD”: Lead Action Level = 15 parts per billion (ppb) | US EPA



- 20 ppb is used as an action level in some state programs, such as NV
- EPA’s 15 ppb is more typically followed, such as in CA, NJ, PA, NY and more
- 10 ppb World Health Organization (WHO), EU, Canada, Australia, VT, School District of Philadelphia
- 5 ppb is used in DC and is being considered in several proposed state assembly bills*
- <1 ppb American Academy of Pediatrics – “there is no safe level of lead”



*National trend is “Filter First”: To cost effectively reduce/eliminate lead at the fixture with point of use (POU) filters

Action in California



Assembly Bill No. 746

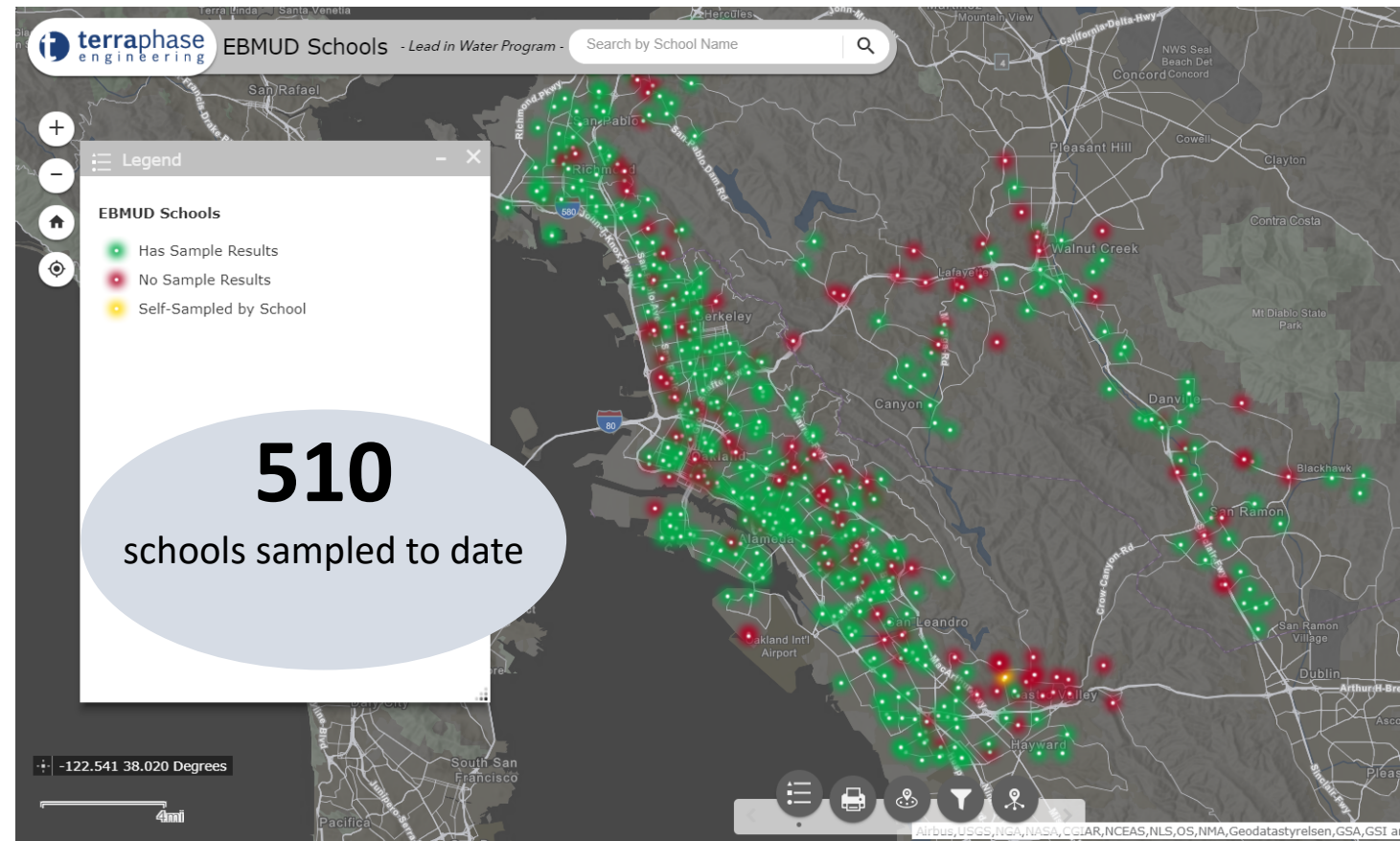
- Signed Oct 2017, effective Jan 2018
- Requires community water systems to test lead levels by Jul 2019 in all public K-12 schools constructed before Jan 2010

Division of Drinking Water's 2017 Permit Amendments

- Require public water systems to conduct lead testing at any K-12 schools that requests sampling
- Schools are not required to test and community water systems do not need to do outreach
- Requests must be made by November 1, 2019

Client #1: East Bay Municipal Utility District

- 500+ schools
- 5 samples per school
- Sampling to be conducted before 5am
- Lead results > 15ppb = immediate shutoffs confirmed, retested and remediated if necessary
 - DOCUMENTATION IS CRITICAL



Lead Sampling of Drinking Water in CA Schools

Lead Sampling Plan

Water System Name: East Bay Municipal Utility District (EBMUD)

Water System Number: 0110005

School District: West Contra Costa Unified School

School Name: Fairmont Elementary

School Address: 724 Kearney St. El Cerrito, CA 94530

School ID from DRINC:

Meeting Date: 10/31/17

The school district identified the busiest locations used for drinking and cooking. The school district considered all faucets, fountains, coolers, bubblers, bottle filling stations and filter water dispensers location on the exterior and interior of the buildings. This included and was no limited to hallways, playgrounds, classrooms and cafeterias. EBMUD reviewed the sample locations. EBMUD and the school district met and selected the outlets for sampling as shown in this Sampling Plan.

Water System Representative/Designee: School Representative/Designee:

Petra Eberspacher 10/31/17
Signature & Date

Ed Baker
Signature & Date

Petra Eberspacher
Print Name

Ed Baker
Print Name

(650) 384-5156
Phone No.

(510) 385-0721
Phone No.

petra.eberspacher@erapphase.com
Email Address

edwin.baker@wccusd.net
Email Address

PAPER FORMS:

- 6x signatures for Sampler
- 6x signatures for Site Rep
- No pics
- HAND WRITTEN!!
- Is this the stone age?



Device **Magic**

The iPad app that became our documentation savior



EBMUD Sample Form



Todays Date*

Select Date



Sampler Name*

Select item



Sampler Phone No.

Sampler Email

Sampler Signature*



Add Signature

Site Representative*

Answer

Site Rep Phone No.

Answer

Site Rep Email

Answer



Sample Recordkeeping Form

School District (id): San Ramon Valley Unified (020)
School Name (id): Rancho Romero Elementary (309)
School Address: 180 Hemme Avenue Alamo CA, 94507-2144
Sample ID: C005-020-309-A / 0110005-CEH-A
Location Type: Fountain
Location Description: Tap in in teachers
Sample Type: Initial
Date and Time Last Used: 2017-12-20 16:44:35
Site Representative: George Friend

Signature: 

Sample Date and Time: 04:44:52, 2017-12-21
Sampler: Easton Archibald

Signature: 

Collector Type: EBMUD Contractor
Lead Concentration (ppb) and Report Date: 0.23 J – 01/15/2018
Follow-up Action Taken by School and Date: NA
Sample Notes:

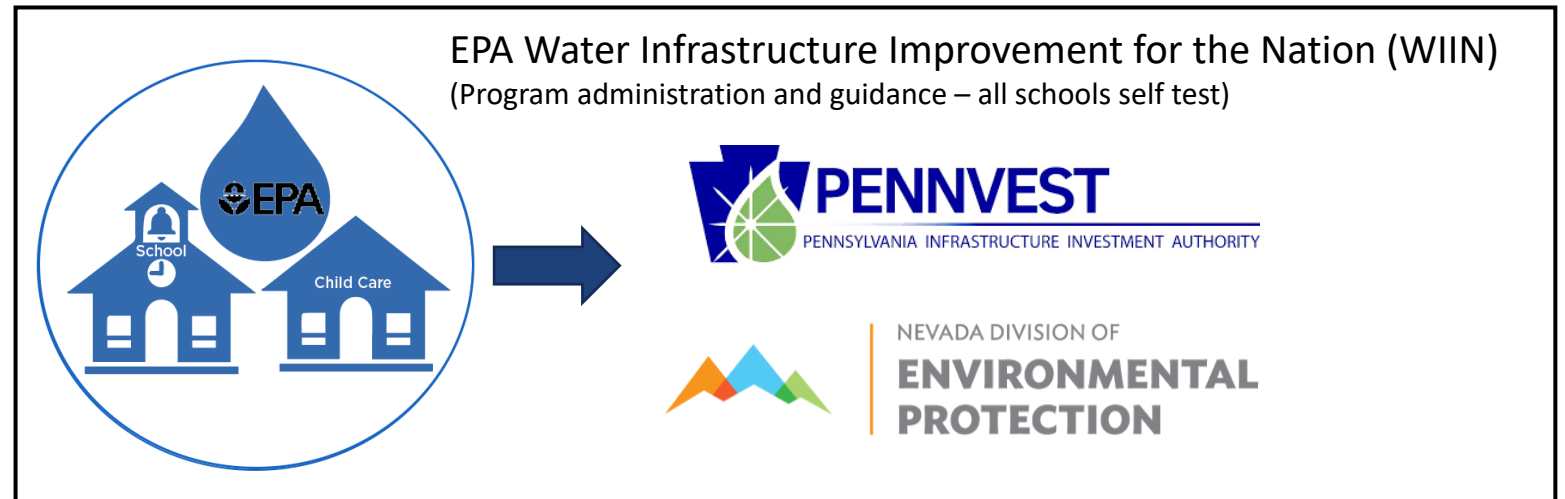
Sample Photos:



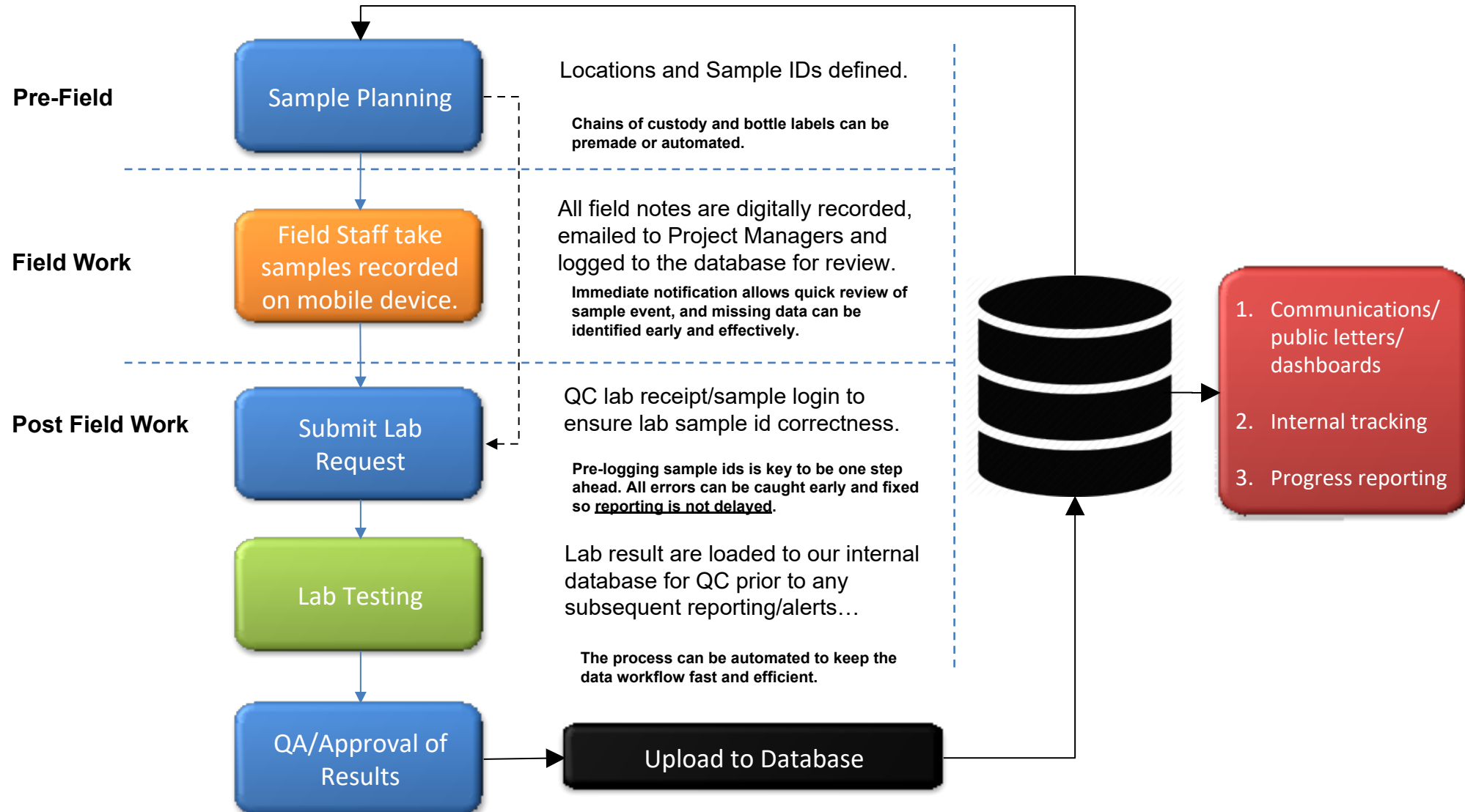
DIGITAL FORMS:

- Automated
- Connected
- Database

Clients



Data Workflow



Data Pipeline



Device Magic

Field forms collected and managed via Device Magic

ESdat

Analytical data imported and stored in ESdat SQL database environment

PowerBI

Data visualized and analyzed in PowerBI dashboard

SharePoint

PowerBI dashboard and project files stored in SharePoint creating hub for client and project team access

Case Study: LeadFree.PA.gov

BACKGROUND

- 2021: EPAs WIIN 2107 Grant (\$90M nationwide)
- **Free and Voluntary;**
- Self-testing kits
- Expert support
- *Quality Assurance and Program Mgmt*



Program Goals

To sample approximately 3,000 facilities, broken down by type as follows:

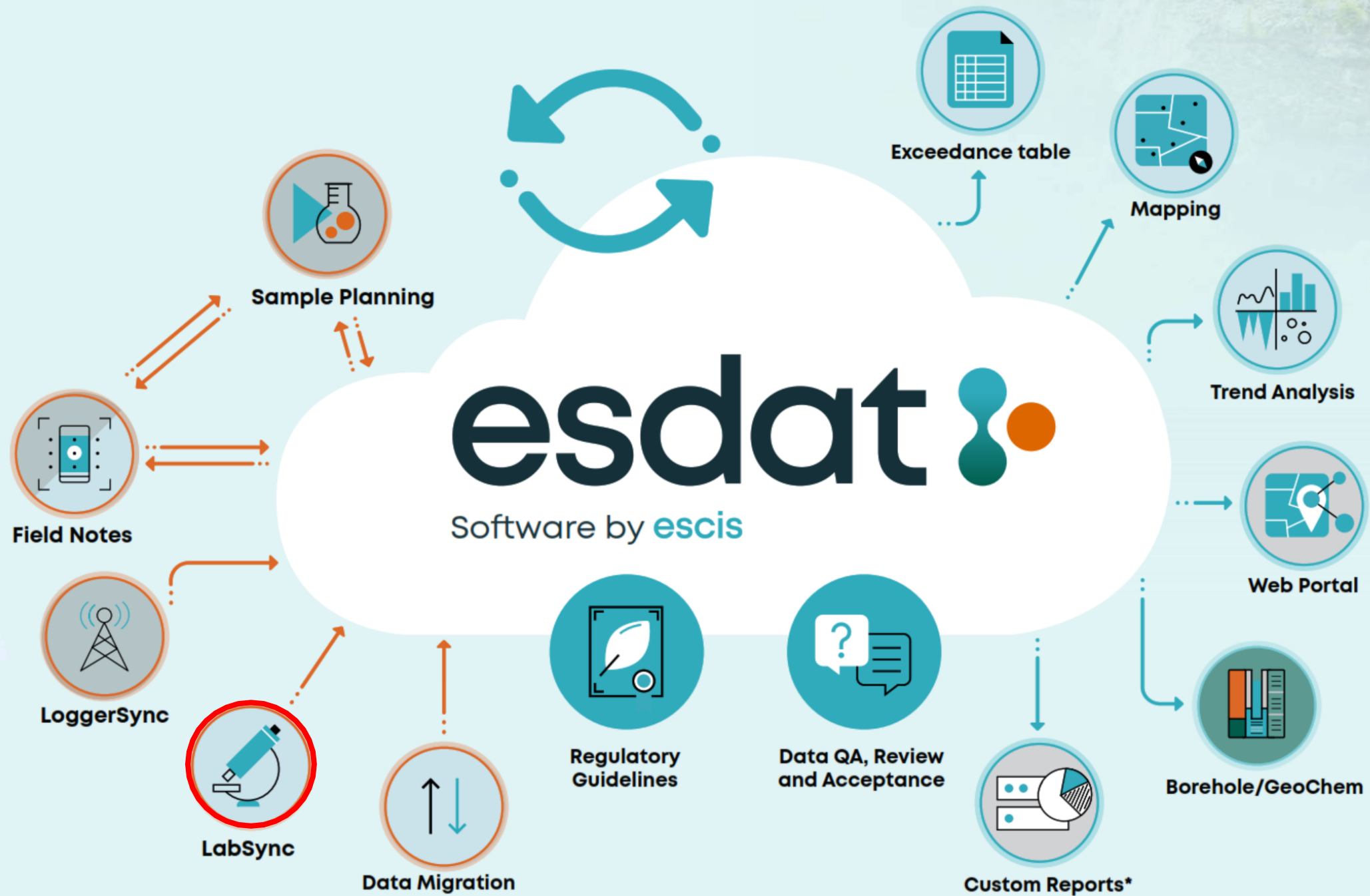
- Approximately 1,000 elementary schools with an average of 10 sample locations per site;
- Approximately 2,000 childcare (ECE) providers with an average of 5 sample locations per site;

20,000 SAMPLES!





The EDMS that became our EDD savior



ESDat LabSync

The screenshot displays the ESDat LabSync web application interface. The top navigation bar includes links for Projects & Sites, Lab Uploads, Lab Reports, and Data View. The Lab Reports section is active, showing a table of reports. A modal window titled "Lab Report / Details & Actions" is open, displaying details for a specific report.

LabSync email: terraphase@esdat.net

☒ Show only Lab Reports

Date/Time	Lab	Type	Project	Lab Ref	Error	
02 Feb 2023 8:22 PM	Pace	Lab Report	P042.001	70244492	✓	Details & Actions
25 Jan 2023 5:58 PM	Pace	Lab Report	P042.001	70237017	✓	Details & Actions
25 Jan 2023 5:58 PM	Pace	Lab Report	P042.001	70237017	✓	Details & Actions
25 Jan 2023 5:58 PM	Pace	Lab Report	P042.001	70237017	✓	Details & Actions
25 Jan 2023 5:58 PM	Pace	Lab Report	P042.001	70237017	✓	Details & Actions
22 Aug 2022 4:45 PM	Pace	Lab Report	P042.001	70220829	✓	Details & Actions

Lab Report / Details & Actions

Delete

Import Success

Comments

leave a note here

Save Comments

History (1)

Lab Report Details

Details: 70244492

Status: Pending Approval

Attached Files

- 70244492_ESDAT_TERRAPHASE.zip
- 70244492_frc.pdf



ESdat for Internal Analytical Mgmt

Projects & Sites Lab Uploads 6 Lab Reports Data View

Data View Chemistry Table

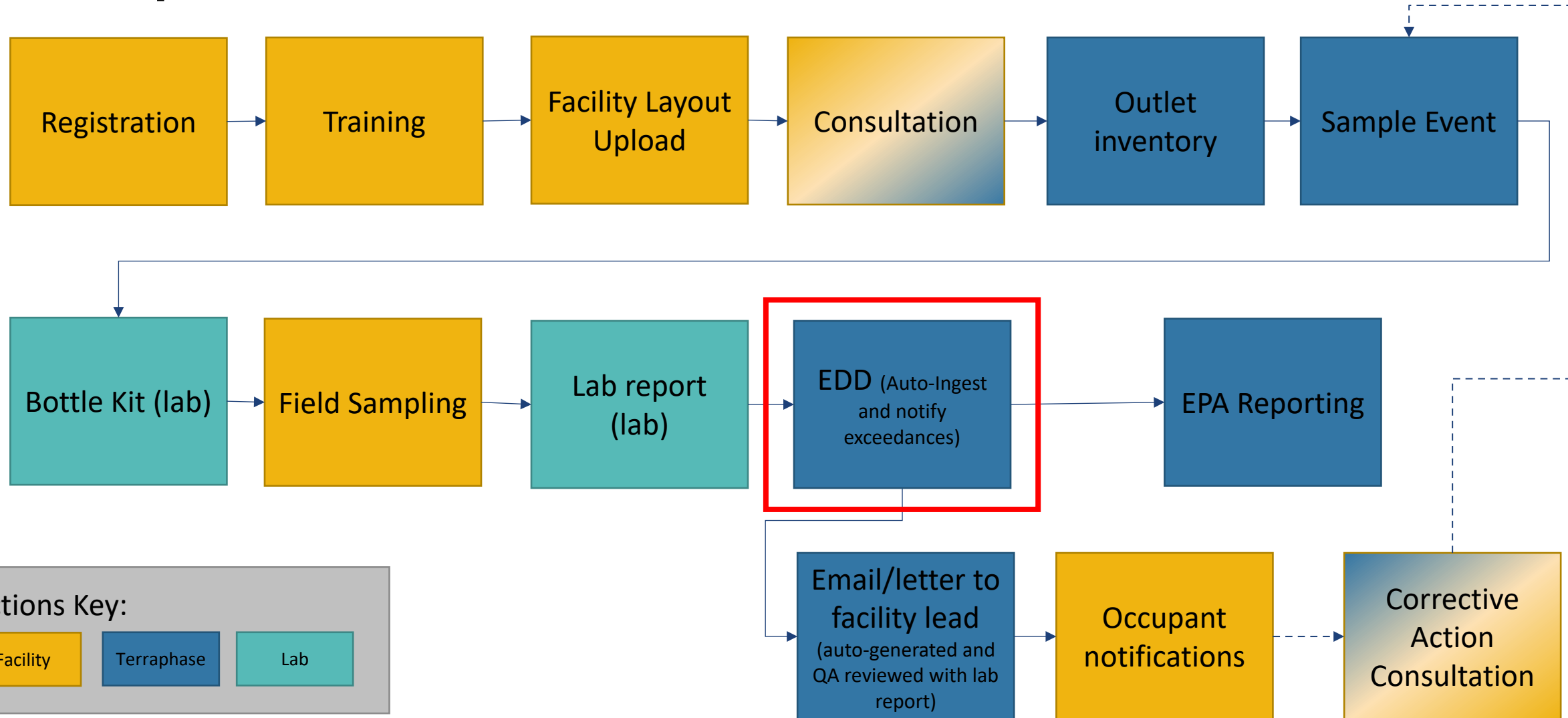
Projects: C048

Add Filter Search

Chem Profile Env Standards Sample Information Statistics Results Excel Export Result Details & Comments

				Metal	
				Copper	Lead
Environmental Standards				µg/L	µg/L
EPA RSL (Nov 2021, HQ=1.0) - Maximum Contaminant Levels				1300	15
EPA RSLs MCLs				1300	15
Location Code	Field ID	Date	SDG		
000276	000276 A30	03/11/2023	Pace 03/16/2023	13.6	0.41
000276	000276-A	03/11/2023	Pace 03/16/2023	122	6.8
000276	000276-D	03/11/2023	Pace 03/16/2023	20.7	<0.1
000276	A-000276 Tap	12/17/2022	Pace 12/20/2022	921	20.7
000276	B-000276 Tap	12/17/2022	Pace 12/20/2022	424	2.7
000276	C-000276 Tap	12/17/2022	Pace 12/20/2022	410	0.66
000389	000389-A	12/17/2022	Pace 12/20/2022	369	0.34
000389	000389-B	12/17/2022	Pace 12/20/2022	240	0.57
000389	000389-C	12/17/2022	Pace 12/20/2022	171	0.89
000389	000389-D	12/17/2022	Pace 12/20/2022	188	0.22
000411	000411-A	06/14/2022	Pace 06/16/2022	-	<0.10

Data Pipeline



Actions Key:

Facility

Terraphase

Lab



Public-Facing

Enroll @ leadfree.pa.gov

Free Testing for Lead in Child Care and School Drinking Water

A federally-funded Program providing voluntary drinking water testing and support to sensitive childcare facilities.

Program Goal

Reduce exposure to lead in school drinking water by providing free training, testing and expert assisted action.

Train @ terraperaseleadtestingprogram.thinkific.com

Pennvest Lead Testing Training

100% complete

VISIT COMPLETION PAGE

Search by lesson title

- Unit 1: Introduction 4/4
- Unit 2: Sampling Protocols 4/4
- Unit 3: Sampling Plan and Outlet Selection 2/2
- Unit 4: Communication 8/8
- Unit 5: Corrective Action Plans 2/2

TEACH ONLINE WITH THINKIFIC

Exposure Pathways

Vías de Exposición -

“Quizás se pregunte de dónde viene el plomo. Gracias a la Regla federal sobre el plomo y el cobre, la agua pública está altamente regulada para garantizar que no contenga plomo cuando se entrega a...

MARK INCOMPLETE CONTINUE

Booking a Consultation Meeting

Customer facing:

PENNVEST Lead in Drinking Water Sampling

Consult
30 minutes
Free

June 09

< > June 2023

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
					3	4
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

100 pm

All times are in: UTC-08:00 Pacific Time (US & Canada)

Add your details

Name *

Email *

Phone number (optional)

Admin facing:

Bookings

← Back to all booking pages

PENNVEST Lead in Dri...

Calendar

Booking page

Customers

Staff

Services

Business information

Integrations

CALENDAR FILTERS

> Services

▼ Staff

No staff assigned

David Bishop

Last changed: Thu 3/23/2023 3:44 PM

Email last sent: Thu 3/23/2023 3:44 PM

Show more contact information

Services

Show services

Bookings

← Back to all booking pages

NDEP Lead in Drinking ...

Calendar

Booking page

Customers

Staff

Services

Business information

Integrations

CALENDAR FILTERS

> Services

▼ Staff

No staff assigned

David Bishop

Last changed: Thu 3/23/2023 3:44 PM

Email last sent: Thu 3/23/2023 3:44 PM

Show more contact information

Services

Show services

Bookings

← Back to all booking pages

New booking

Today

←

→

...

Add time off

Month

Print

Export

Action

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Mar 28	29	30	31	Apr 1	2	3
	2 PM Initial consi	10 AM Initial con		11 AM Initial con		
4	5	6	7	8	9	10
	8 AM Initial cons		10 AM Initial con			
11	12	13	14	15	16	17
		11 AM Initial con				
18	19	20	21			
	11:30 AM Initial c	8 AM Consult	8 AM Consult			
			10:45 AM Consult			
25	26	27	28			
	10 AM Consult	10 AM Consult	11 AM Consult			

Consult

Wed 4/28/2021 11:00 AM - 11:30 AM

Buffer of 15 mins after

Julie Cartwright

PE Petra Eberspacher

Edit

Cancel



PowerApps Screenshots

Find a Facility

Search by Facility Name or ID Search by Contact Name Sort by Enrollment Date: *Newest to Oldest* ☐ Unverified Facilities Only ☐ Requires Follow Up

The Children's Community School
Primary Contact: Kat Lamb-Moody
Date Enrolled: 01/30/23

Little Viking Childcare/ Jefferson County DuBois AVTS
Primary Contact: Troy Frederick
Date Enrolled: 01/11/23

Barbara Thompson Early Learning Center
Primary Contact: David Irvin
Date Enrolled: 01/09/23

Derry Area School District (Grandview ES)
Primary Contact: David Irvin
Date Enrolled: 01/05/23

terraperase Data engineering Systems



Facility Details

Facility Name Seventh Street Elementary
Entity ID 106616203-8235
Ajera ID 130 [Edit](#)

Facility Type Elementary School
Primary Contact Susan Ace - BGD
(814)-547-3558 | sacel@mail.ocasd.org
Water Source Public
Building Built Prior to 1986

Address
102 West Seventh Street
Oil City, PA 16301

Follow Up Notes

Uploaded Sample Plans
doc03162103162021143121.pdf
3/16/2021

Scheduled Sample Events

Initial
Created: 3/19/2021 9:13 AM Sample Kit Fulfilled: 03/19/21 [>](#)

Follow-Up
Created: 4/16/2021 1:33 PM Sample Kit Fulfilled: 04/19/21 [>](#)

terraperase Data engineering Systems



Facility and Asset Management



Facility Enrollment Status

Allegheny Intermediate Unit Central Office

☒ Facility Verified☐ Facility Opted Out☐ Prior Testing Knowledge

☐ Facility Prioritized☐ Facility Ineligible

Facility Status

☒ Currently Requires Follow up

☒ Facility in Progress - Additional Action Required

☐ No Further Action Required - Initial Testing Clear

☐ No Further Action Required - Testing Results Had Exceedances; Corrective Actions Completed

 **terrphase** Data engineering Systems





Facility Outlets

Add an Outlet 

Water Fountain

Main | Floor - 1

Condition: Fair

Outside Rm 2



Water Fountain

Main | Floor - 1

Condition: Fair

Outside Rm 4



Water Fountain

Main | Floor - 1

Condition: Fair

Outside Rm 6



Water Fountain

Main | Floor - 2



Building

Main

Floor

0 = Basement, 1 = 1st Floor

1

Outlet Type

Water Fountain

Outlet Condition

Fair

Description of Outlet Location

Outside Rm 6

Internal Notes

Within 12 ft of another outlet

☐

POU Filtration

☐

Outlet Currently Off

☐

COC Sample Label

Water Fountain; Outside Rm 6; Floor 1

Save

 **terrphase** Data engineering Systems



Event Mgmt and Corrective Action Documentation

Sample Event Review

Facility: Allegheny Intermediate Unit Central Office
Bottle Order placed: 10/20/22
Bottle Order fulfilled: 10/26/22
Samples received by lab:
Results Email generated : 1/16/23

[Review Bottle Order Email](#)

[Review Lab Results Email](#)

Sample Event Type: Initial
Event Created By: Madison Ingling

Lab Report Attachment
[\(20221222\)AlleghenyIntermediate.pdf](#)

[Generate Results Email](#)
[Send Results Email](#)
[Corrective Actions](#)

Sample ID	Result	Outlet ID	Sample Details
1481	14.1	1310	Water Fountain ; 106 Jan; Floor 1
1482	< 1	1311	Kitchen Faucet; 123 kitchen storage; Floor 1
1483	< 1	1312	Kitchen Faucet; 123 dining room ; Floor 1
1484	< 1	1313	Water Fountain ; 112 Storage; Floor 1
1485	1	1314	Kitchen Faucet; 386 copy room; Floor 2
1486	< 1	1315	Water Fountain ; 369 custodial; Floor 2
1488	< 1	1317	Kitchen Faucet; 420 copy center; Floor 3
1489	22.1	1318	Water Fountain ; 423; Floor 3

Corrective Actions

ended action to and use
lations for those outlets.

[Submit](#)
[Send Corrective Actions Email](#)

Outlets & Recommended Actions				Select All ☐
Classroom Faucet				
Main Floor - 1				Apply Corrective Action ☐
Condition: Fair				
kdg Sink 1				Resample Outlet ☐
Sample ID	Sample Date	Result	Sample Procedure	
155	4/2/2021	24.3	First Draw	
Corrective Actions				
4/16/2021 - David Bishop				
Replacing water lines, replacing faucets, retesting outlets				
Classroom Faucet				
Main Floor - 1				
Condition: Fair				
kdg Sink 2				
Apply Corrective Action ☐				
Resample Outlet ☐				
Sample ID	Sample Date	Result	Sample Procedure	



Communication Documentation

Lab Results Email - Generated: 1/16/2023 5:06 PM

Facility Name

Allegheny Intermediate Unit Central Office

Facility Address

475 East Waterfront Dr Address Line 2
Homestead, PA 15120

The lab results from your lead in drinking water sampling event have arrived.

There were **9** samples collected at your facility.

1 sample was shown to have a lead in water **at concentrations above the action limit of 15 ppb.**

PRIORITY #1: The following water outlets should be turned off immediately and should remain off until further notice.

- Water Fountain - 423
 - Building - Main
 - Floor - 3

PRIORITY #2: Proceed with the communication plan. Let everyone know the test results using the downloadable letter templates and the summary table below. You may want to revisit training Unit 4 for review. You also may want to speak with an expert prior to proceeding with the communication plan. However, we recommend you do not wait longer than 10 days to communicate. A template letter to communicate with your community is attached to this email.

terraphase **Data**
engineering **Systems**



Automated Reporting Emails

- Action level specifications by region
- With attachments
- To specified recipients

Send

To

Cc

SubjectFW: Lead in Drinking Water Lab Results

Communication_Letter_Template.docx
25 KB

Your Lead Analysis Lab Report.pdf
229 KB

Dear Jane Doe from Example Child Care Facility:

The lab results from your lead in drinking water sampling event have arrived. There were 6 samples collected at your facility. 1 sample was shown to have a lead in water at concentrations above the action limit of 15 ppb.

Proceed with your communication plan and then Schedule a follow-up consultation to discuss results and next steps with an expert.

Sample Results

Sample Date	SampleID	Outlet Description	Lead Result (ppb)	Action Limit (15 ppb)
06-23-2021	678	Water Fountain ; Pre-School Hallway; Floor 1	< 1	Below
06-23-2021	679	Water Fountain ; In Hallway, Across from RM 17; Floor 1	< 1	Below
06-23-2021	680	Classroom Faucet; Pre-School RM; Floor 1	< 1	Below
06-23-2021	681	Kitchen Faucet;; Floor 1	24.4	Above
06-23-2021	682	Water Fountain ; Hallway, Floor 2	< 1	Below
06-23-2021	683	Kitchen Faucet; Kitchen; Floor 2	3.7	Below

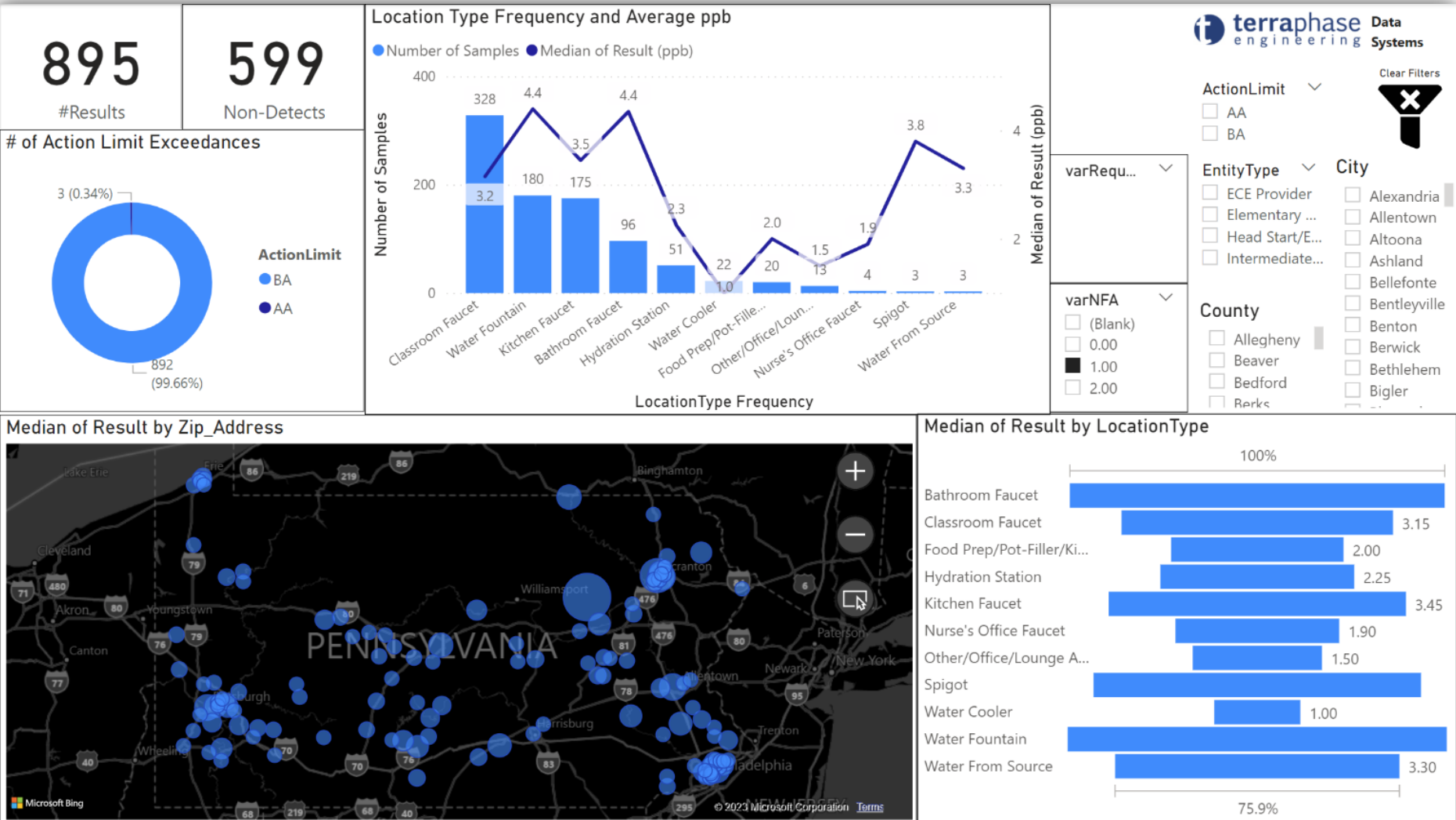
Notes:
< - not detected above detection limit
ppb - parts per billion

The laboratory analytical report is attached for your reference. All available resources (templates, guidance documents and signage) can be downloaded [here](#).





PM and EPA Reporting Dashboards



Terraphase's Lead in School Drinking Water Team



Michael Messina
Sacramento/Santa Barbara



Tomer Shetrit
Oakland



Petra Eberspacher
Oakland



Scott Renneisen
Philadelphia/Doylestown



Joe Luchette
Philadelphia/Doylestown



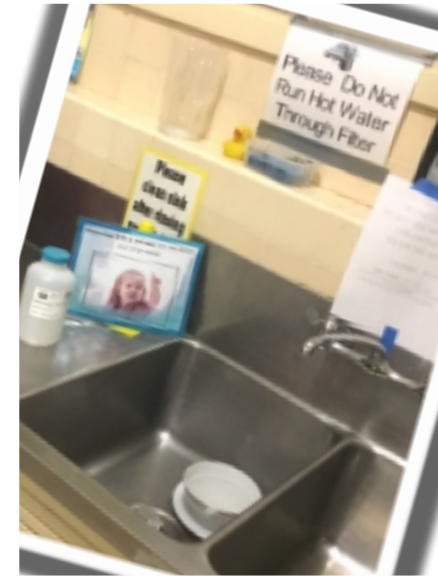
Dave Bishop
Philadelphia



Sam Starzynski
Oakland

Thank You

joseph.luchette@terraphase.com



#doit4AMthekids