



Department of  
Environmental  
Conservation

# Marble Quarry Landfill Site

## Draft Remedial Action Work Plan

April 14, 2016

# Former Marble Quarry Site



# Overview

- Site Background and History
- Remedial Investigation Results
- DEC & DOH actions
- Off-site Investigation
- Exposure Assessment
- Proposed Remedial Action





# Former Marble Quarry/Landfill Limits



# Site Location

- Located in the Village of Tuckahoe
- Vacant 3.5 acre lot, made of 2 tax parcels
- Residential Verdi Avenue to the west, commercial properties to the north, Marbledale Road and commercial properties to the east, and to the south a large parking area
- The current site zoning is commercial



# Site History

- marble quarry operated for approximately 100 years and ceased operation in 1930
- Vacant from 1930s to early 1950s as open pits
- Early 1950s to 1970s the site was used as a mix industrial waste dump
- Wastes include ash, C&D, automotive, industrial (i.e. Tuckahoe Ice, Bouroughs Wellcome, US Vitamins, Lee Oil and Chemicals, etc.)
- 1970s -1990s the site was used for auto repair and auto storage

# Site Geology and Hydrogeology

- 0-6 feet of sand fill material
- Below sand fill from 3-150 feet is a marble unit composed of dolomite marble
- Two marble pits are found on-site which were mined to a depth of approximately 100 feet below ground surface
- The two pits are filled with mix industrial wastes and comprise most of the site

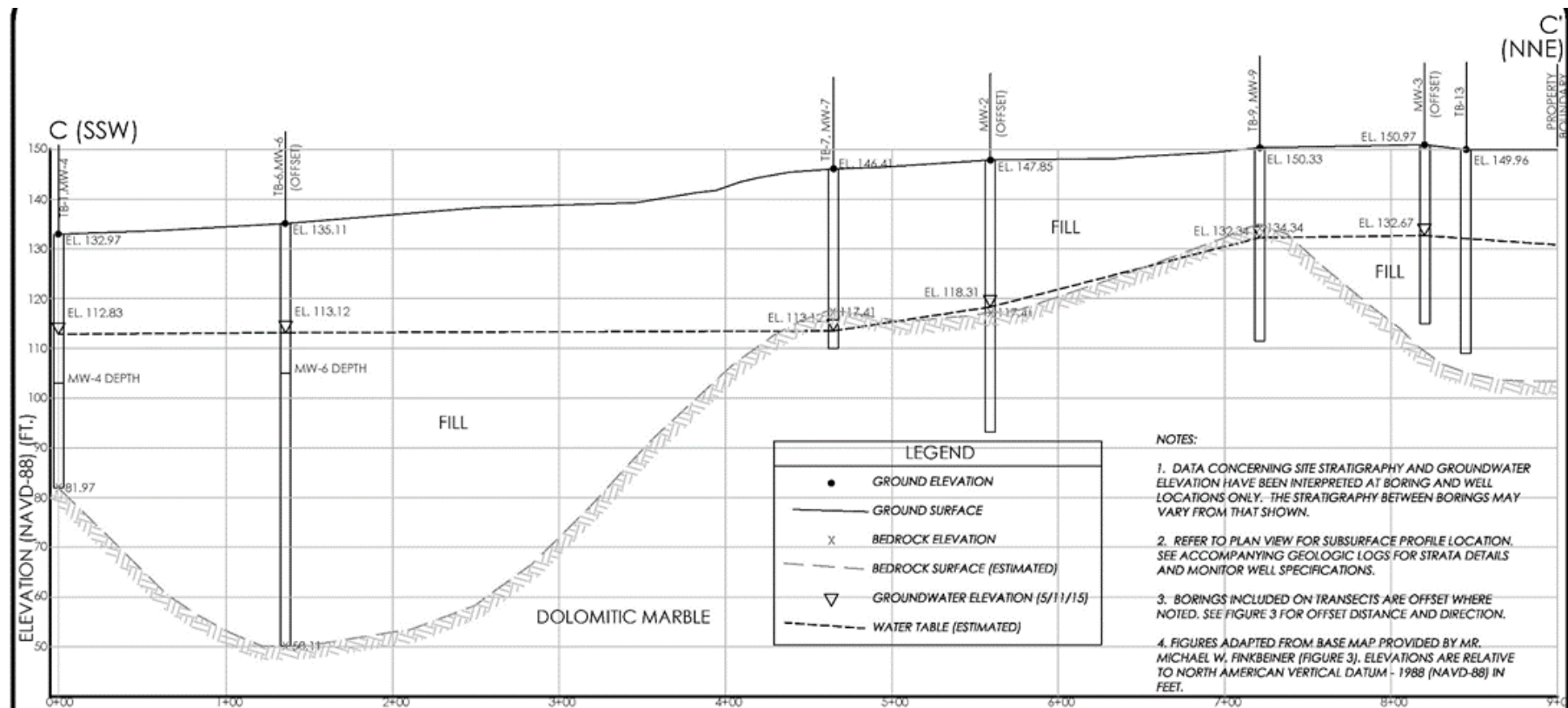


# Site Geology and Hydrogeology cont.

- Two pits separated by marble bedrock rise and portions of the pits' sidewalls are within the site boundaries.
- Fractured bedrock units below the marble layer. The site is surrounded by shallow bedrock outcrops.
- Pits act as pools and fill with rain and runoff water.
- Groundwater pools release to bedrock and flows downgradient to south/southwest.
- Regional groundwater flow is to the south-southwest toward Bronx River.



# Site Cross section S/SW to N/NE



# Groundwater Flow Direction

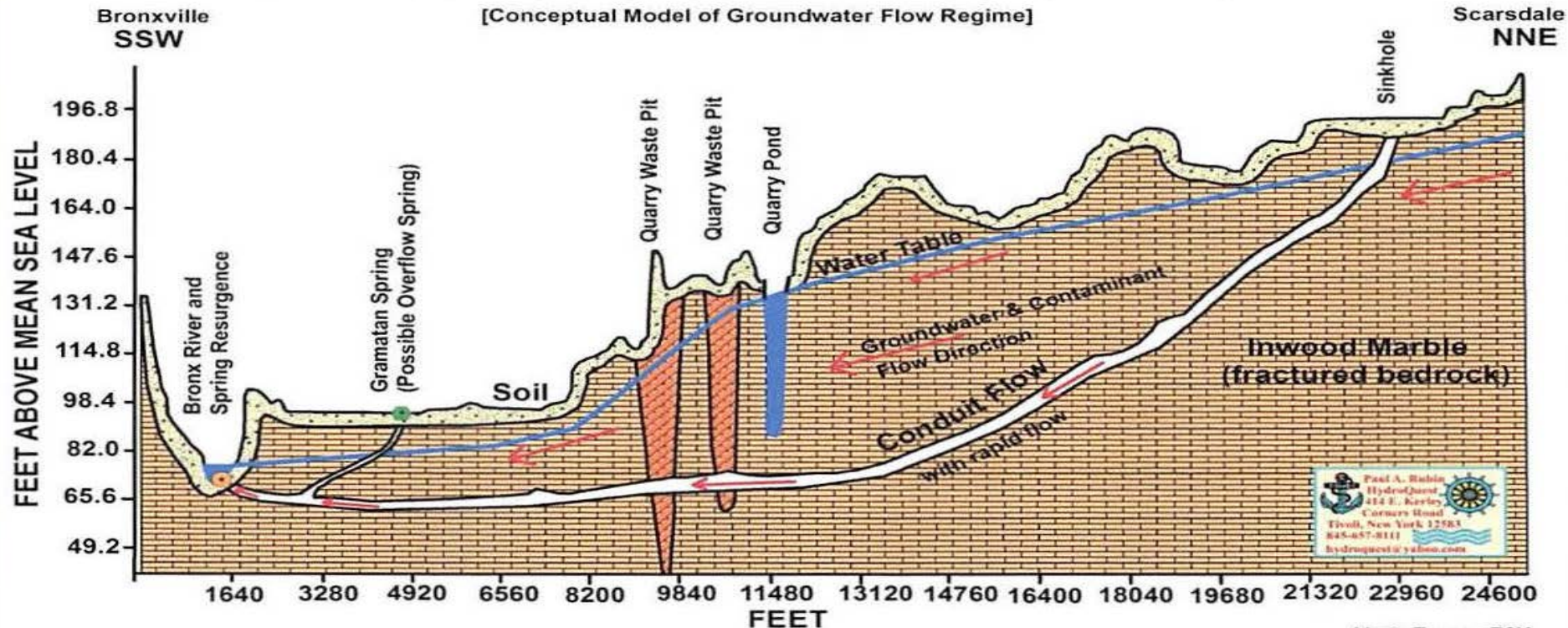




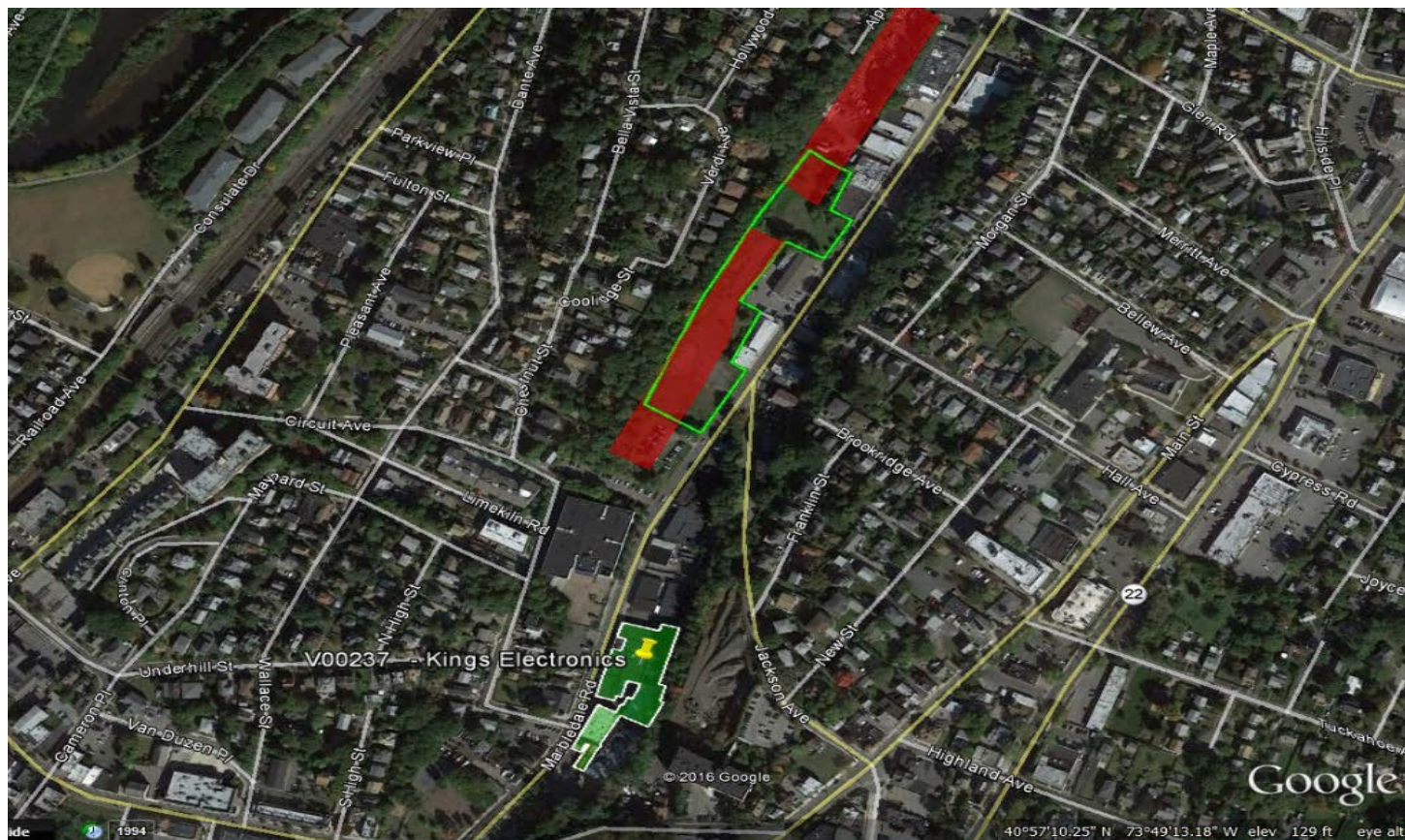
# Off-site Groundwater Flow

## BRONXVILLE TO SCARSDALE GEOLOGIC CROSS SECTION

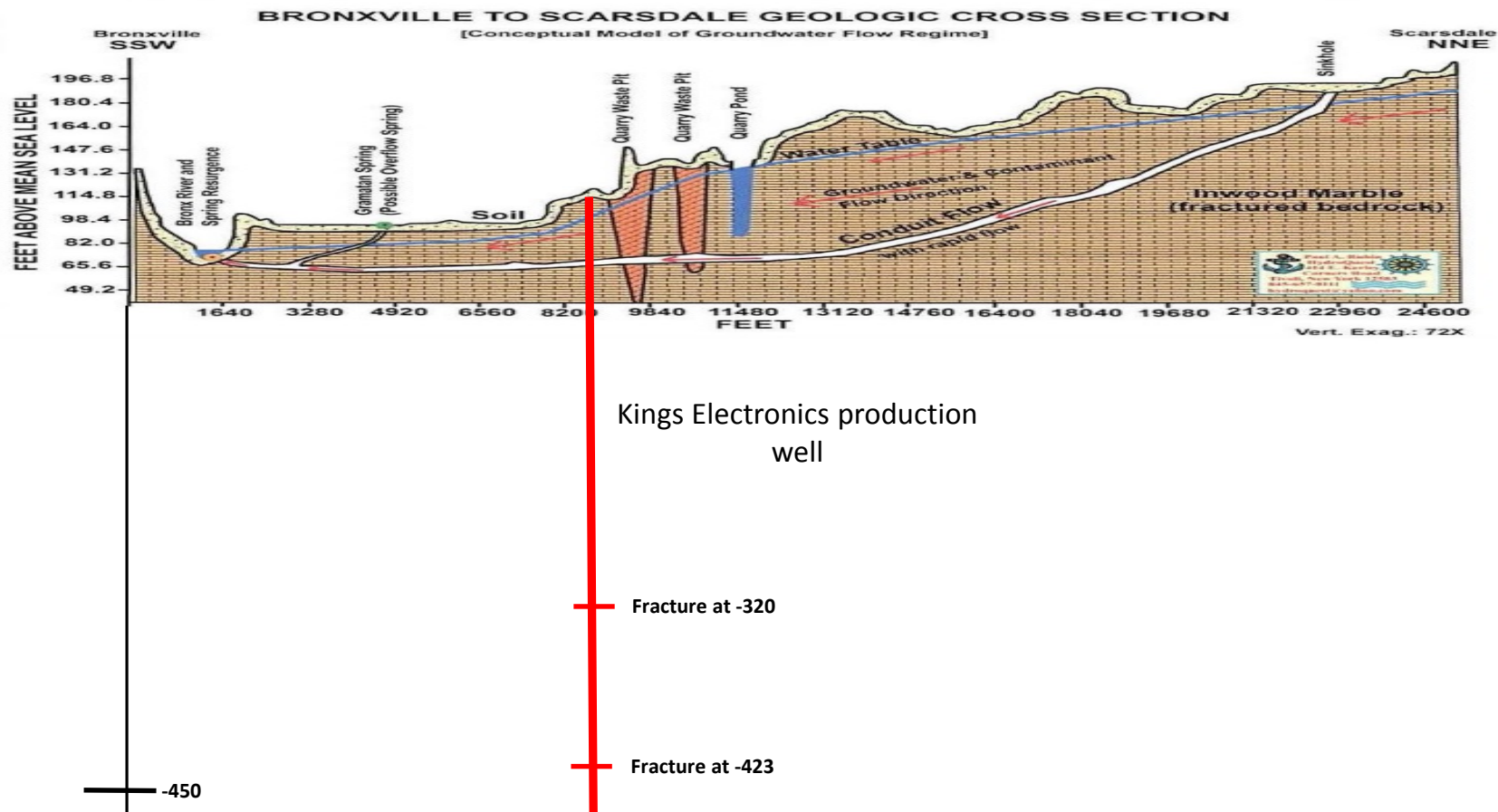
[Conceptual Model of Groundwater Flow Regime]



# Down Gradient Site Kings Electronics





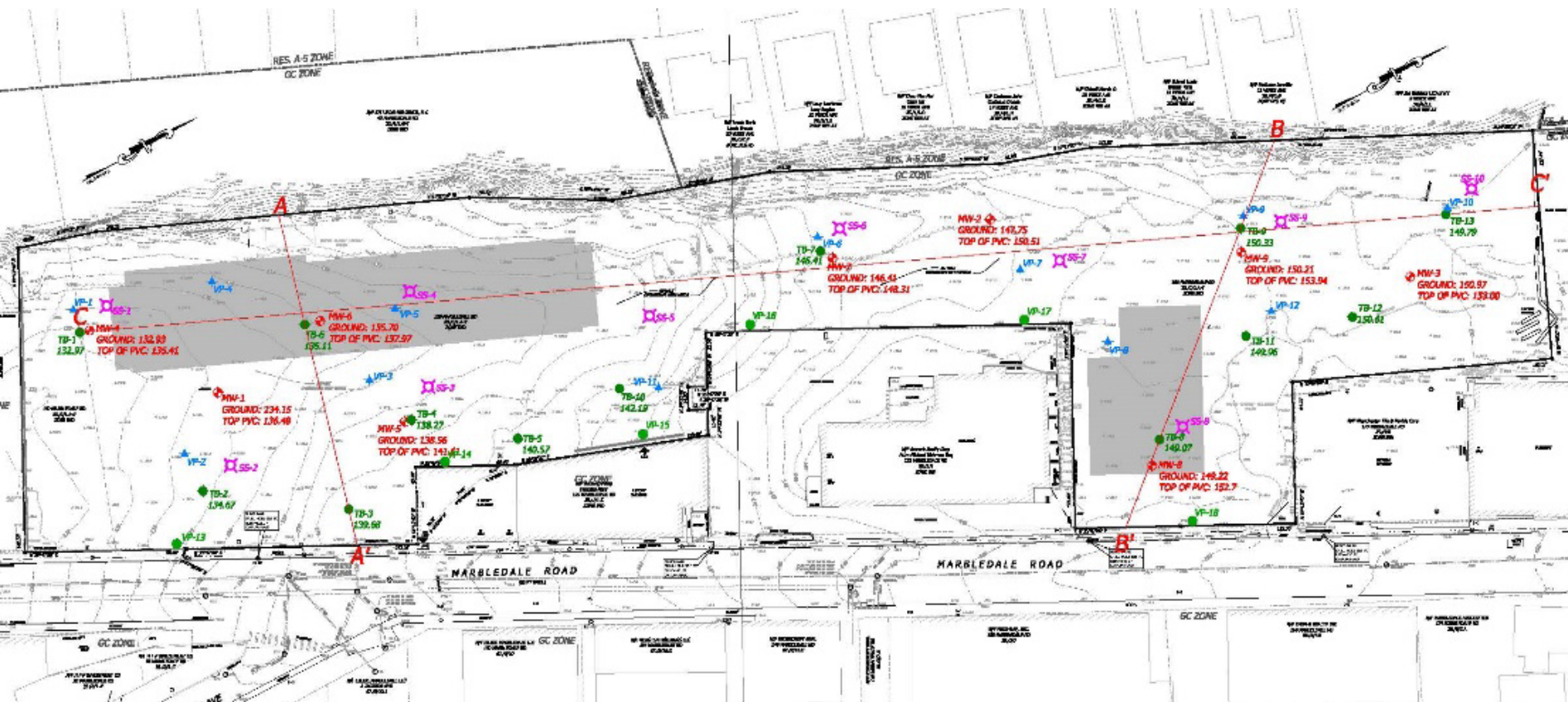




# Remedial Investigation

- Thirteen (13) soil borings;
- Collection and analysis of twenty-five (25) subsurface soil samples;
- Collection of analysis of ten (10) surface soil samples
- Installation of six (6) groundwater wells and groundwater sampling of nine (9) groundwater wells; and
- Installation and sampling of eighteen (18) soil vapor probes.

# Sampling Locations



# Soil results

- Soil results are compared to the Commercial Soil Cleanup Objectives
- Soil results reported in parts per million (ppm)

# VOCs in Soil

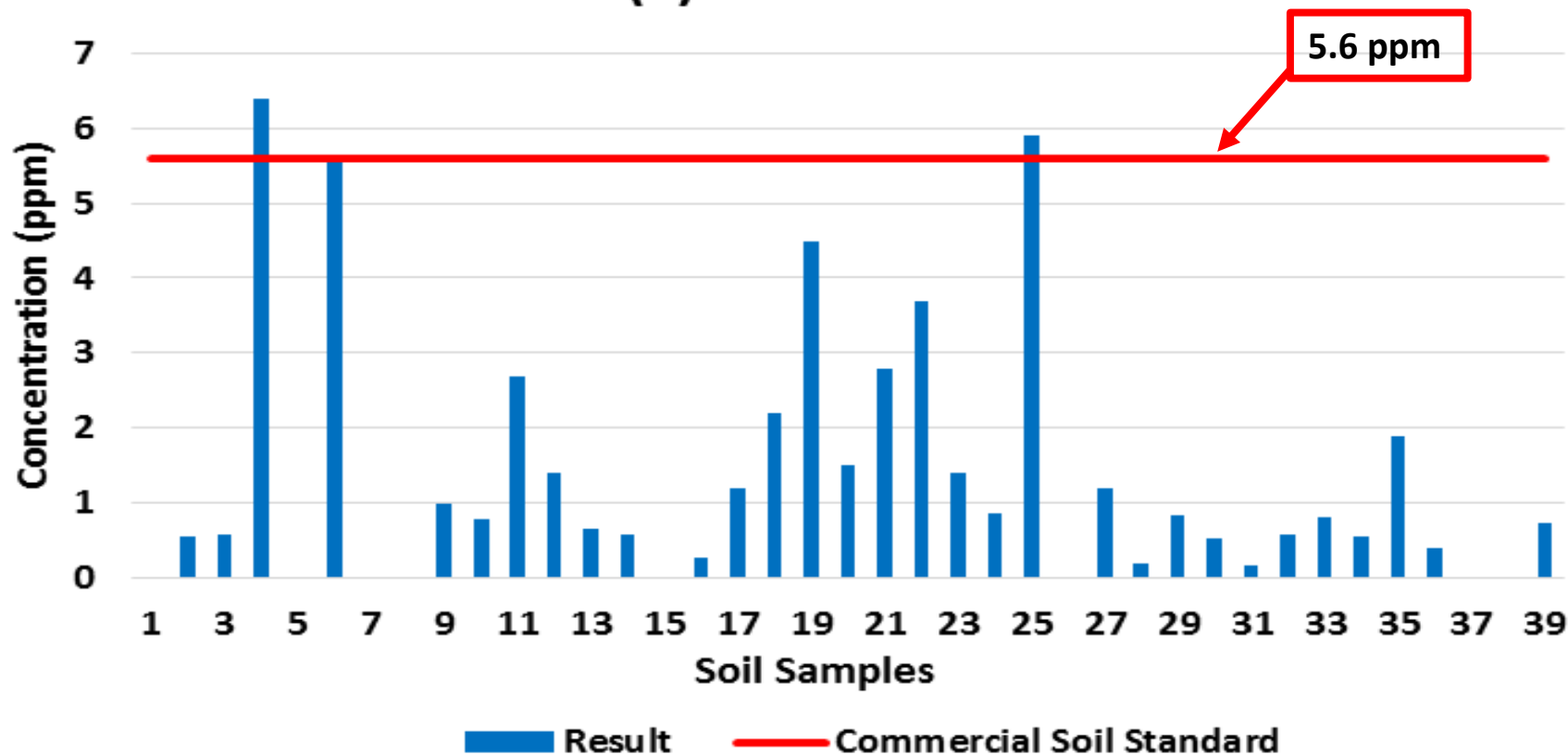
VOCs	RCSCO	Min. Concentration	Max. Concentration	Detections	Exceed RCSCO
acetone	500	0.02	2.5	18 of 39	0 of 39
benzene	44	0.0058	1.8	7 of 39	0 of 39
1,2-dichlorobenzene	500	0.15	0.15	1 of 39	0 of 39
methyl ethyl ketone	500	0.011	1.5	8 of 39	0 of 39
dichlorodifluoromethane	-	0.081	0.42	4 of 39	0 of 39
ethylbenzene	390	0.023	1.2	5 of 39	0 of 39
TCE	200	0.33	0.33	1 of 39	0 of 39
trichlorofluoromethane	-	0.046	0.075	2 of 39	0 of 39
toluene	500	0.0049	1	6 of 39	0 of 39
xlenes	500	0.0135	4.5	7 of 39	0 of 39
1,4-dioxane	130	0.13	17	4 of 39	0 of 39

# SVOCs in Soil

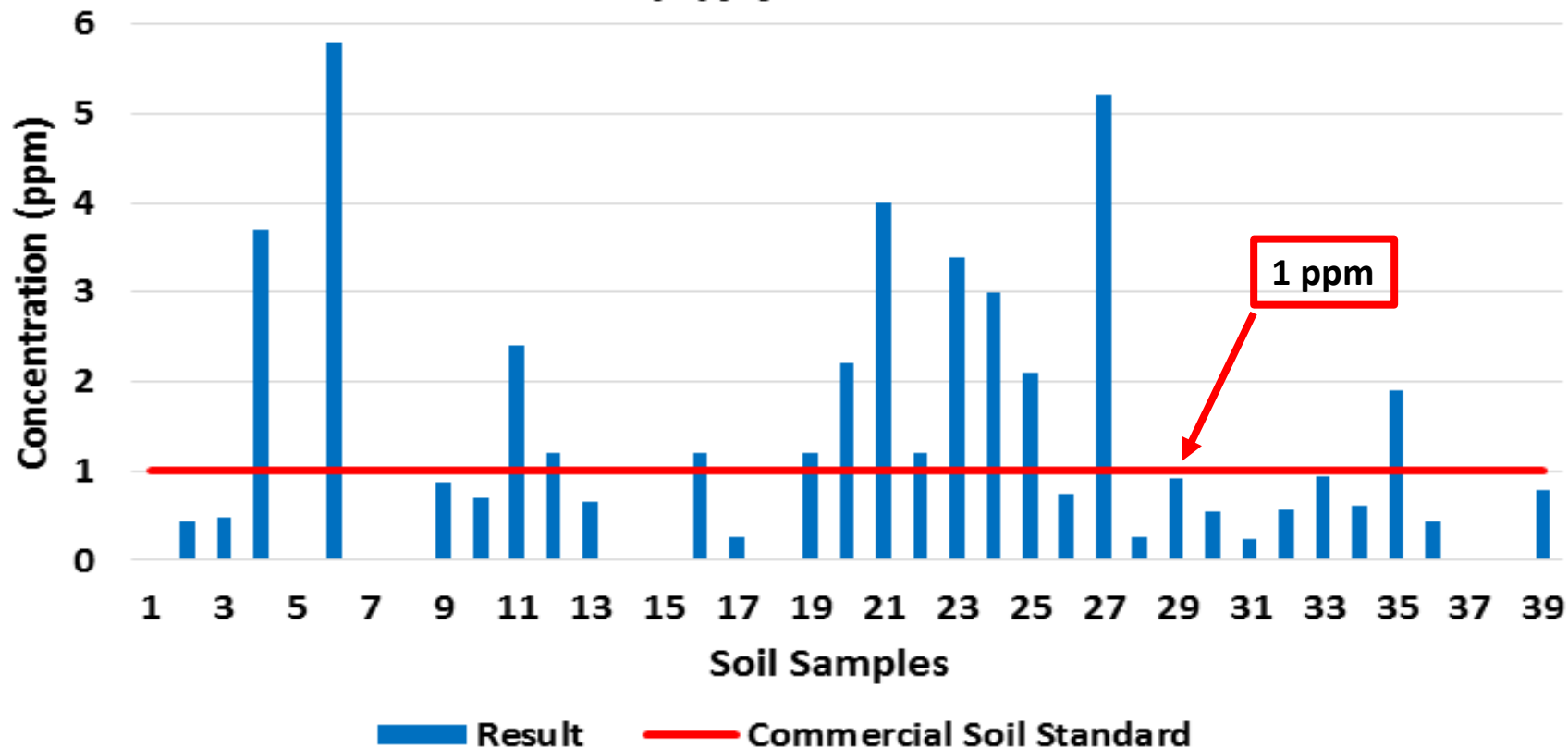
SVOCs	RCSCO	Min. Concentration	Max. Concentration	Detections	Exceed RCSCO
acenaphthylene	500	0.13	0.81	5 of 39	0 of 39
anthracene	500	0.22	0.29	11 of 39	0 of 39
benz(a)anthracene	5.6	0.27	6.4	16 of 39	2 of 39
benzo(a)pyene	1	0.26	5.8	22 of 39	10 of 39
benzo(b)fluoranthene	5.6	0.35	7.7	25 of 39	17 of 39
benzo(ghi)perylene	500	0.14	2.9	11 of 39	0 of 39
benzo(k)fluoranthene	56	0.22	6.4	16 of 39	0 of 39
chrysene	56	0.3	6.4	25 of 39	0 of 39
dibenz(a,h)anthracene	0.56	0.16	3.7	12 of 39	10 of 39
fluoranthene	500	0.25	9.1	28 of 39	0 of 39
fluorene	500	0.14	3.7	6 of 39	0 of 39
indeno(1,2,3-cd)pyrene	5.6	0.14	6.4	16 of 39	0 of 39
naphthalene	500	0.33	7.4	6 of 39	0 of 39
pentachlorophenol	6.7	0.44	6.7	9 of 39	0 of 39
phenanthrene	500	0.22	4.1	20 of 39	0 of 39
phenol	500	0.53	2.7	5 of 39	0 of 39
pyrene	500	0.39	7.4	27 of 39	0 of 39



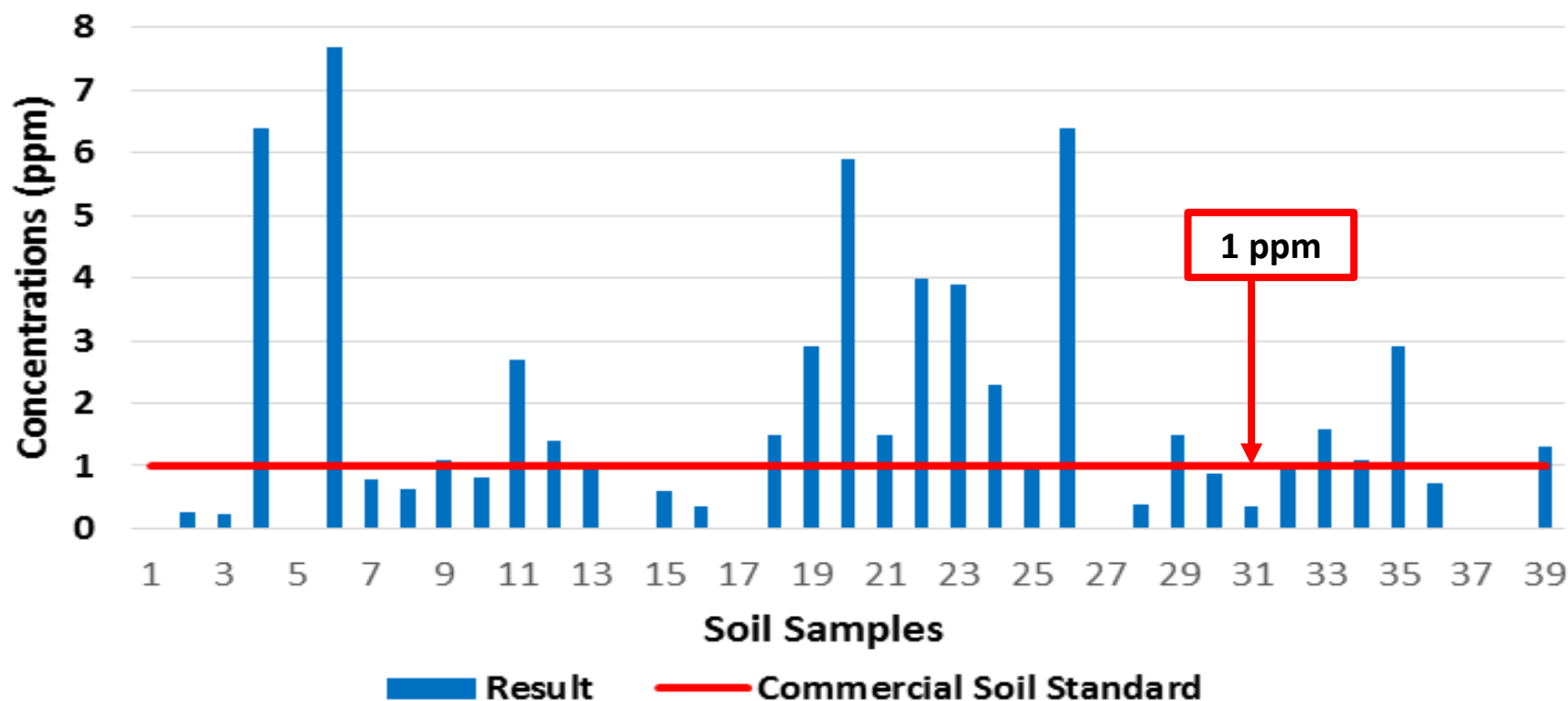
## Benzo(a)anthracene in Soil



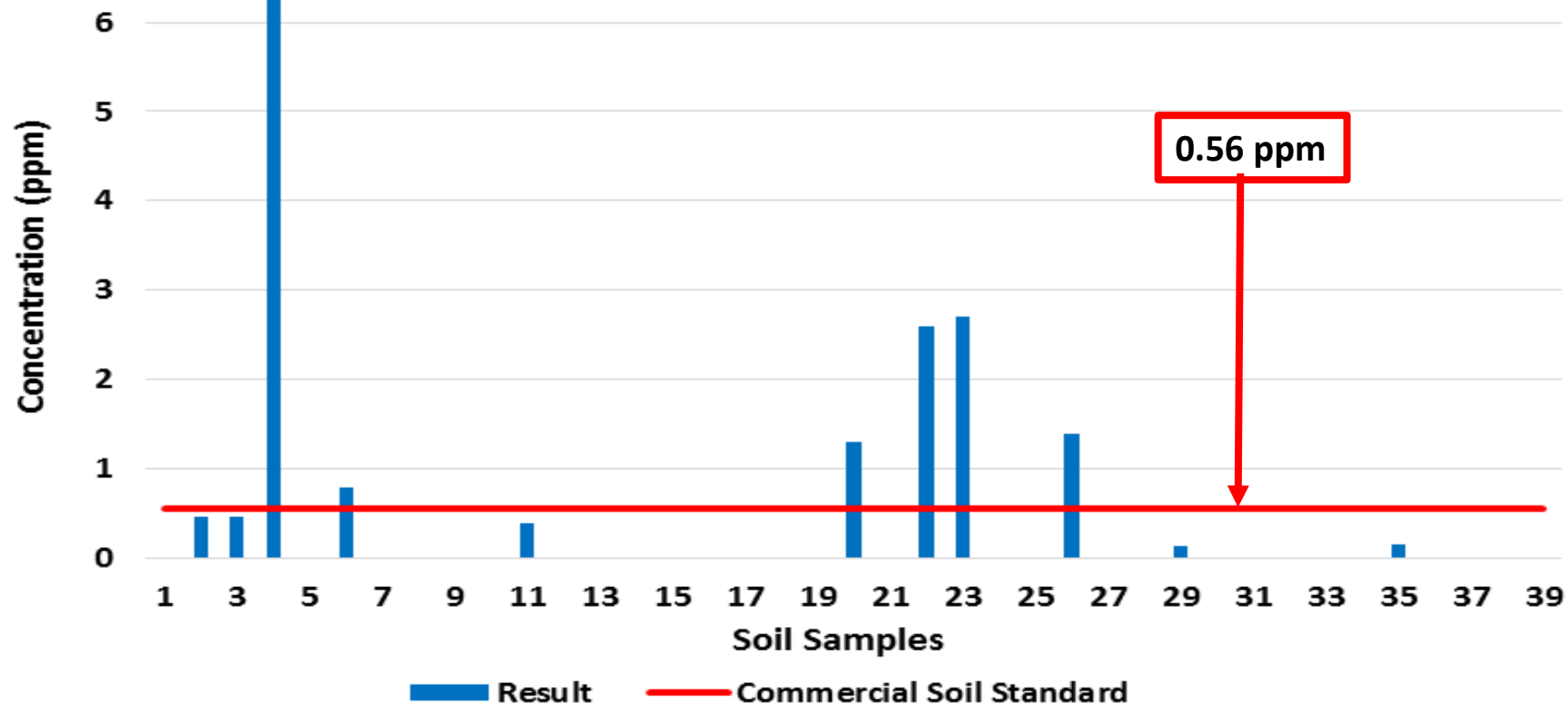
## Benzo(a)pyrene in Soil



## Benzo(b)fluoranthene in Soils



## Dibenz(a,h)anthracene in Soil



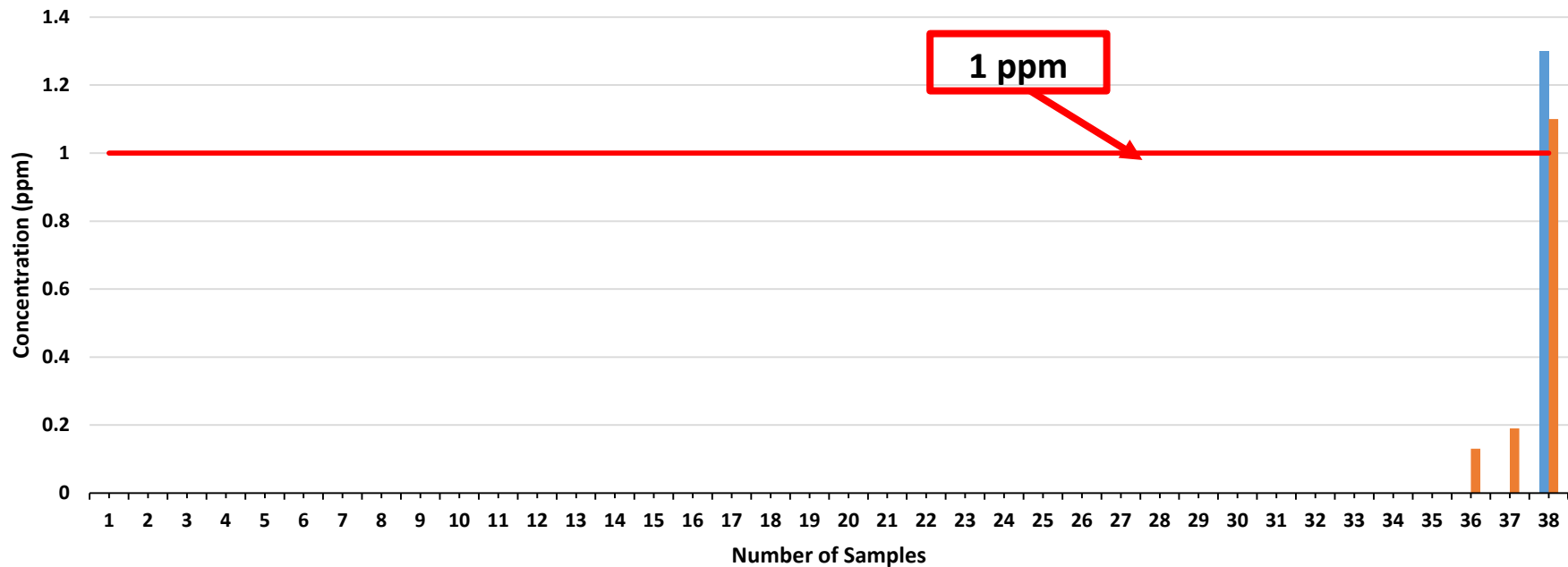
# PCBs in Soil

PCBs	RCSCO	Min. Concentration	Max. Concentration	Detections	Exceed RCSCO
PCB-1248	1	1.3	1.3	1 of 38	1 of 38
PCB-1260	1	0.13	1.1	3 of 38	1 of 38



# PCB graph

PCBs in Soil



PCB-1248

PCB-1260

RCSCO Standard for PCBs



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# Metals in Soil

Metals	RCSCO	Min. Concentration	Max. Concentration	Detections	Exceed RCSCO
arsenic	16	0.9	25.1	31 of 39	3 of 39
barium	400	4.3	1750	32 of 39	3 of 39
beryllium	590	0.22	0.61	22 of 39	0 of 39
cadmium	9.3	0.16	3.29	13 of 39	0 of 39
chromium	1500	3.9	84.7	32 of 39	0 of 39
copper	270	2.19	649	32 of 39	2 of 39
lead	1000	1.3	745	32 of 39	0 of 39
manganese	10000	28.3	721	32 of 39	0 of 39
mercury	2.8	0.03	2.5	24 of 39	0 of 39
nickel	310	5.77	62	32 of 39	0 of 39
silver	1500	0.84	6.45	8 of 39	0 of 39
zinc	10000	4.3	5500	25 of 39	0 of 39
cyanide	27	0.443	6.37	14 of 39	0 of 39

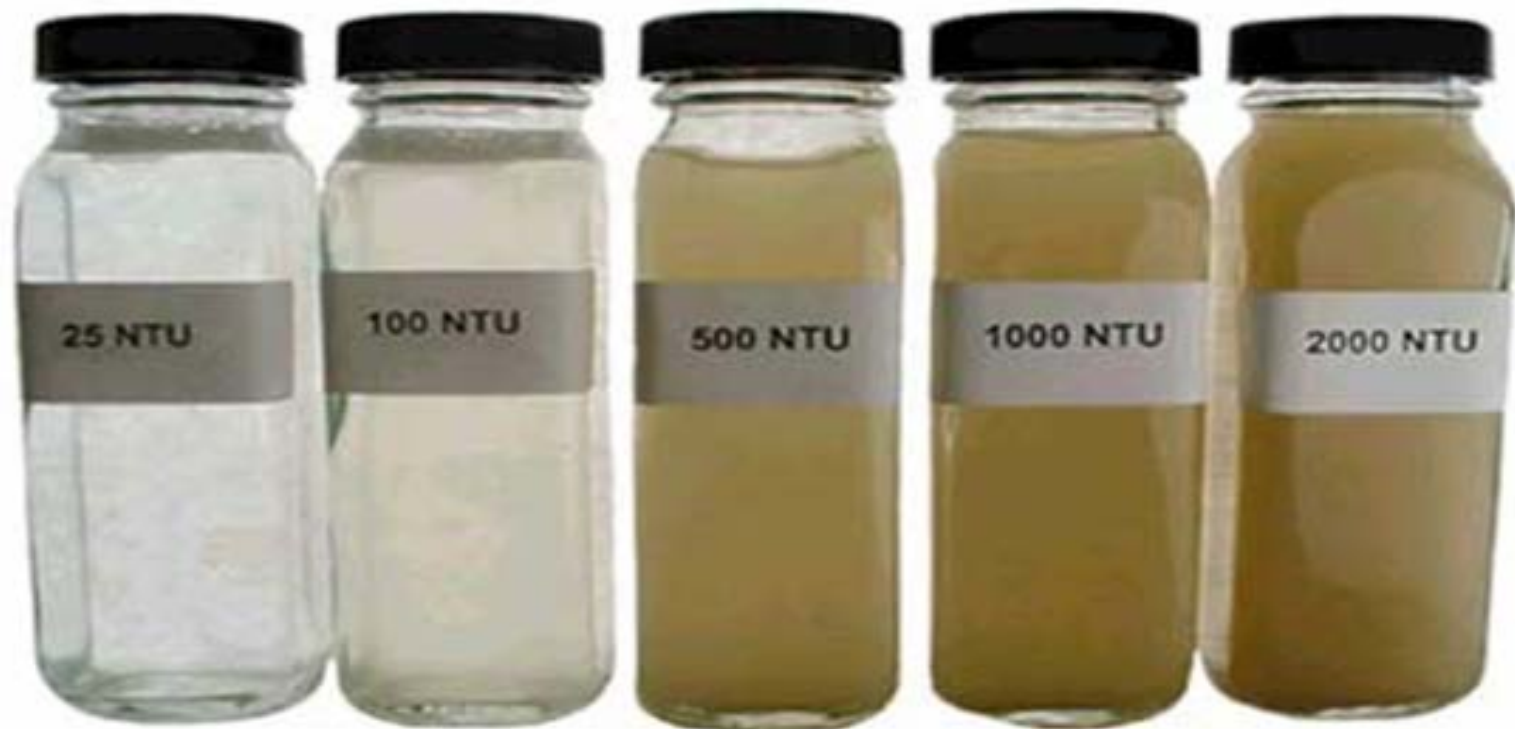
# Groundwater results

- Groundwater results are compared to Ambient Groundwater Standards
- Groundwater levels are reported in parts per billion (ppb)

# Turbidity in Groundwater

- Cloudiness or haziness of a fluid caused by large amounts of suspended particles
- DEC seeks to collect groundwater samples free of turbidity
- Samples with high turbidity readings can alter groundwater results as the particles are included with groundwater

## Turbid vs Non-Turbid





# VOCs found in Groundwater

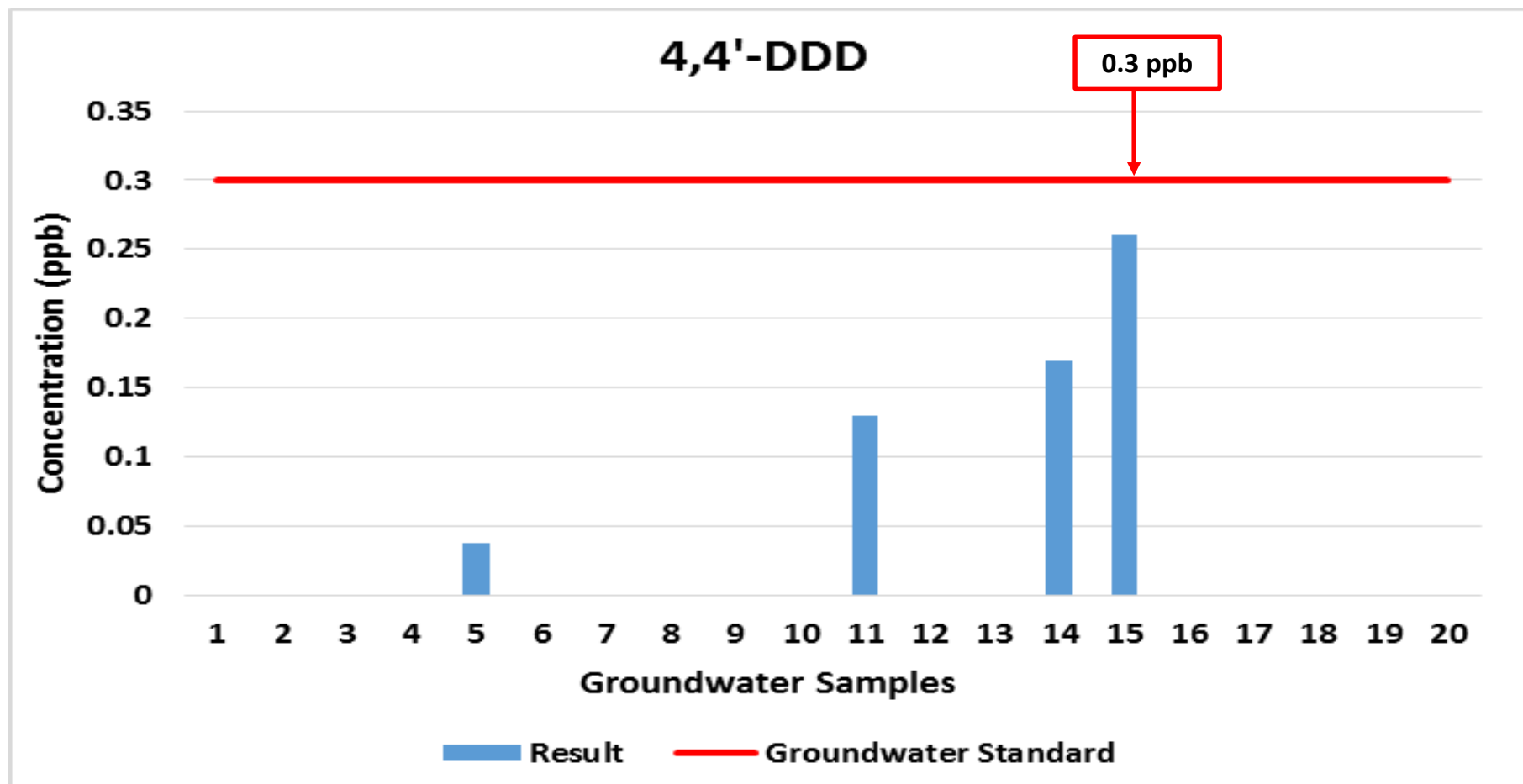
VOCs	GW Standard	Min. Concentration	Max. Concentration	Detections	Exceed GW Standard
1,1-Dichloroethane	5	0.37	0.37	1 of 20	0 of 20
Acetone	50	2.6	27	9 of 20	0 of 20
Benzene	1	1.1	12	3 of 20	3 of 20
Chloroform	7	5.5	8.6	3 of 20	2 of 20
cis-1,2-Dichloroethene	5	1.6	4.4	3 of 20	0 of 20
Dichlorodifluoromethane	5	0.92	14	3 of 20	2 of 20
Isopropylbenzene	5	5.8	5.8	1 of 20	1 of 20
Methyl ethyl ketone	50	3.2	3.2	1 of 20	0 of 20
MTBE	10	0.33	6.1	9 of 20	0 of 20
PCE	5	8.1	1900	4 of 20	4 of 20
Toluene	5	0.84	0.84	1 of 20	0 of 20
TCE	5	24	110	3 of 20	3 of 20

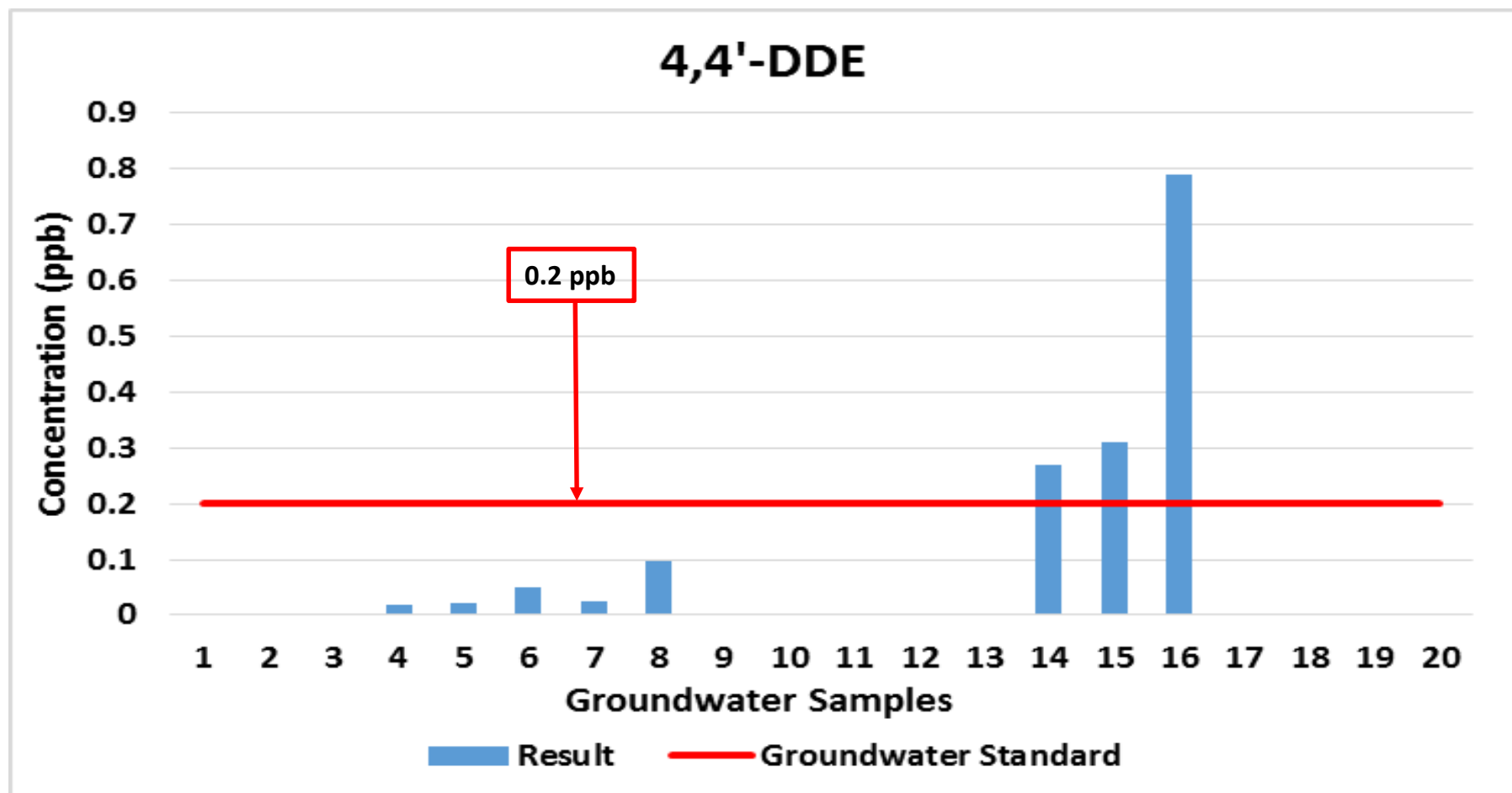
# SVOCs in Groundwater

SVOCs	GW Standard	Min. Concentration	Max. Concentration	Detections	Exceed GW Standard
2,4,5-Trichlorophenol	1	0.26	0.26	1 of 20	0 of 20
2,4-Dimethylphenol	1	1.4	1.4	1 of 20	1 of 20
O-Cresol	1	0.57	0.57	1 of 20	0 of 20
Anthracene	50	0.22	1.1	7 of 20	0 of 20
Benz(a)anthracene	0.002	0.02	1.4	13 of 20	13 of 20
Benzo(a)pyrene	0.002	0.11	1.2	9 of 20	9 of 20
Benzo(b)fluoranthene	0.002	0.06	1.7	13 of 20	13 of 20
Benzo(k)fluoranthene	0.002	0.03	0.37	8 of 20	8 of 20
Bis(2-ethylhexyl)phthalate	5	0.57	0.8	10 of 20	0 of 20
Chrysene	0.002	0.05	1.6	8 of 20	8 of 20
Fluoranthene	50	0.22	2.1	9 of 20	0 of 20
Fluorene	50	0.87	1.8	5 of 20	0 of 20
Indeno(1,2,3-cd)pyrene	0.002	0.03	0.36	6 of 20	6 of 20
Pentachlorophenol	1	0.91	0.91	1 of 20	0 of 20
Phenanthrene	50	0.12	3.5	12 of 20	0 of 20
Phenol	1	1.2	100	4 of 20	4 of 20
Pyrene	50	0.37	1.7	9 of 20	0 of 20
Diethyl phthalate	50	0.2	13	3 of 20	0 of 20
Isophorone	50	2.3	2.3	1 of 20	0 of 20
Naphthalene	10	0.99	3.6	2 of 20	0 of 20

# Pesticides in Groundwater

Pesticides	GW Standard	Min. Concentration	Max. Concentration	Detections	Exceed GW Standard
alpha-BHC	0.01	0.46	0.46	1 of 20	1 of 20
beta-BHC	0.04	0.041	0.041	1 of 20	1 of 20
delta-BHC	0.04	0.034	0.034	1 of 20	0 of 20
gamma-BHC	0.05	0.018	0.11	2 of 20	1 of 20
4,4'-DDD	0.3	0.038	0.26	4 of 20	0 of 20
4,4'-DDE	0.2	0.019	0.79	8 of 20	3 of 20
Dieldrin	0.004	0.012	0.012	1 of 20	1 of 20
Heptachlor epoxide	0.03	0.012	0.012	1 of 20	0 of 20





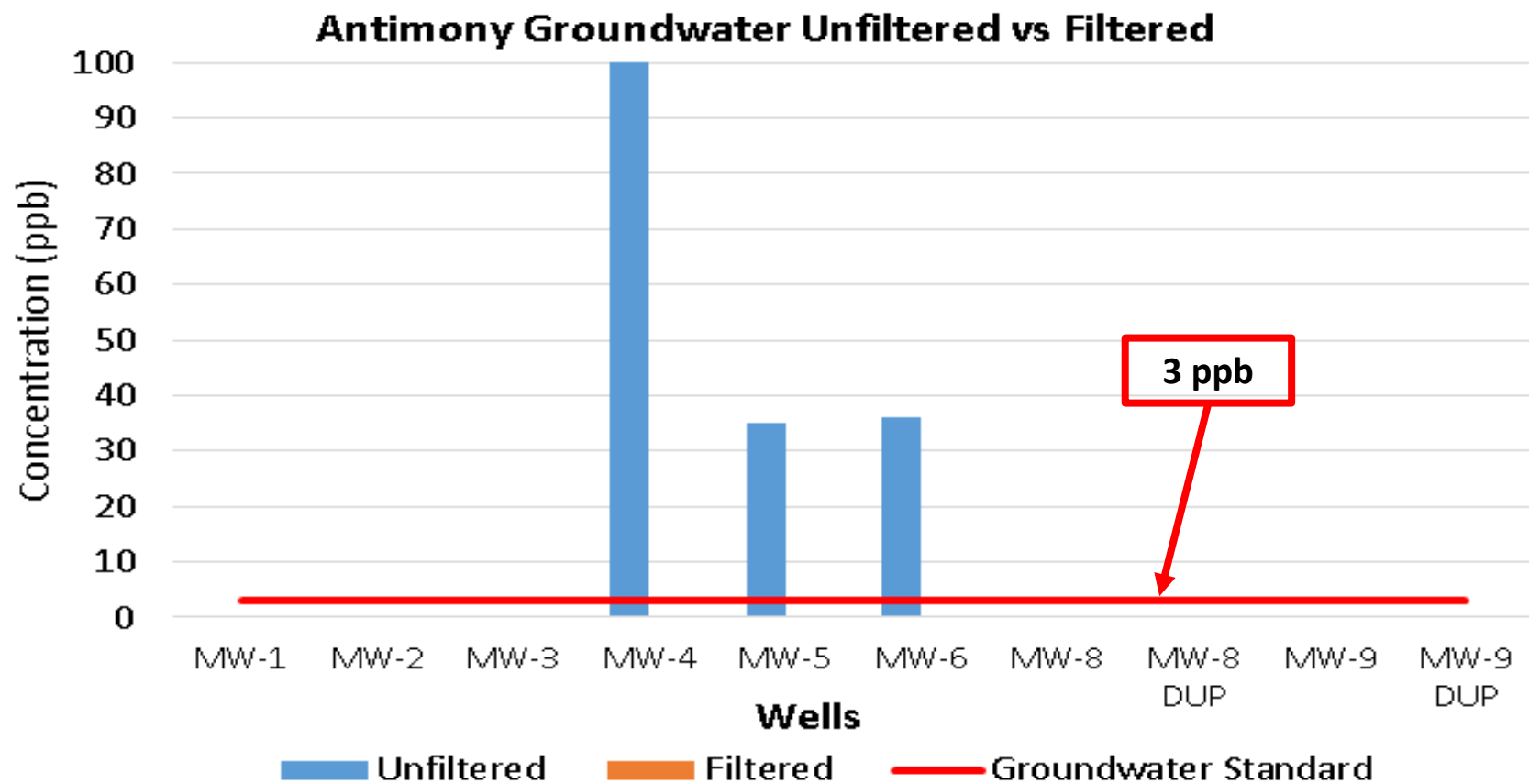
# PCBs in Groundwater

PCBs	GW Standard	Min. Concentration	Max. Concentration	Detections	Exceed GW Standard
PCB-1260	0.09	0.31	0.44	3 of 20	3 of 20
PCB-1254	0.09	0.27	0.44	2 of 20	2 of 20

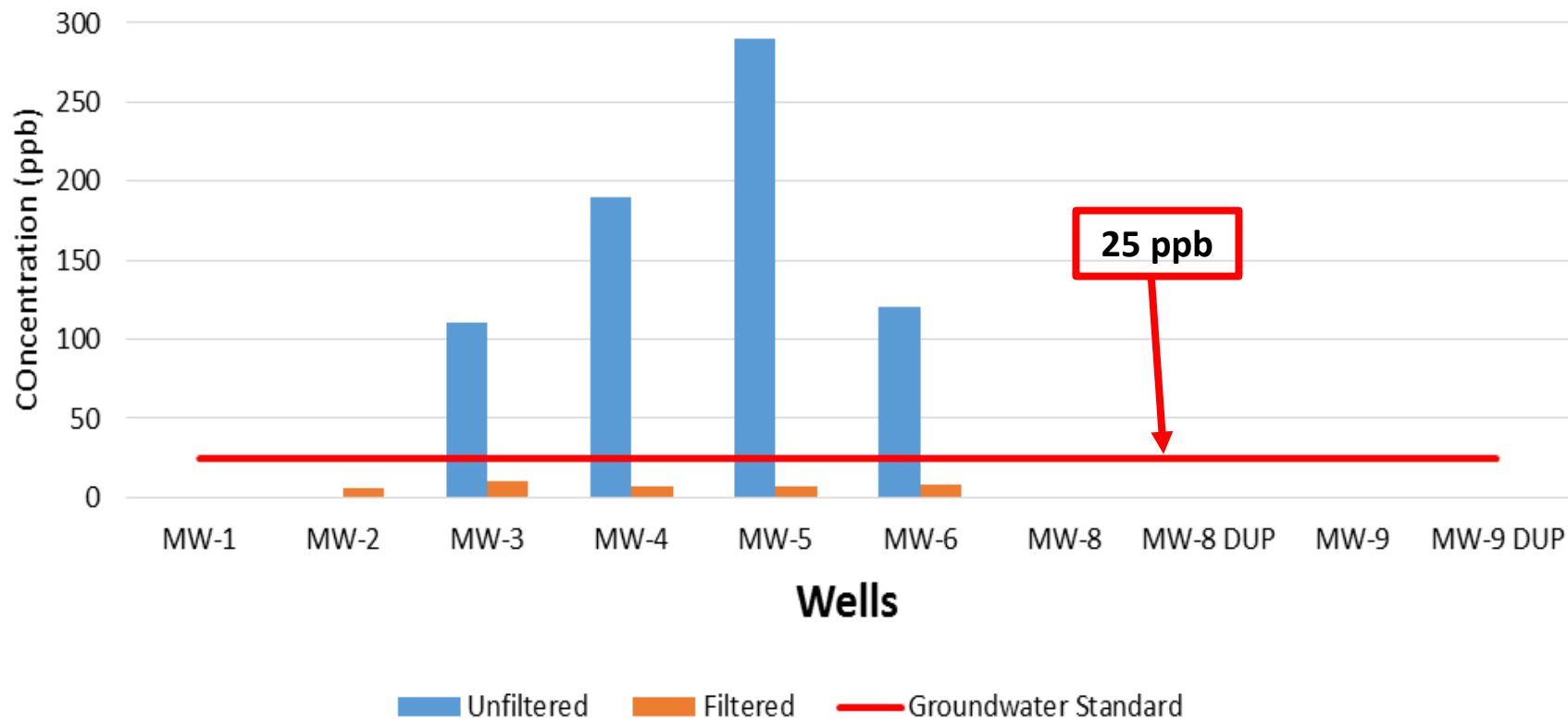


# Metals Found in Groundwater

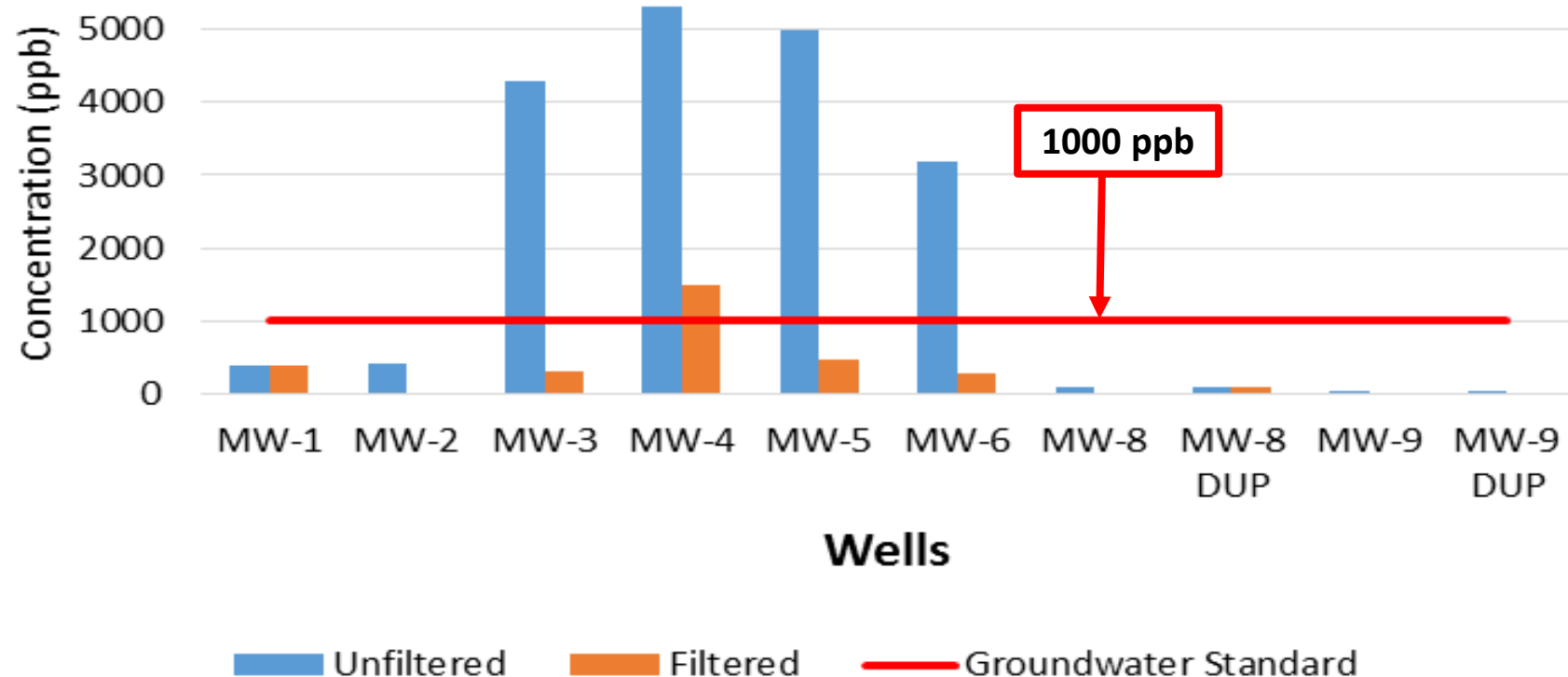
Metals	GW Standard	Min. Concentration	Max. Concentration	Detections	Exceed GW Standard
Arsenic	25	5.6	10	5 of 10	0 of 10
Barium	1000	91	1500	10 of 10	1 of 10
Cadmium	5	0.53	0.53	1 of 10	0 of 10
Chromium	50	1.7	4.8	5 of 10	0 of 10
Cobalt	5	1	4.9	8 of 10	0 of 10
Copper	200	2	3.6	2 of 10	0 of 10
Iron	300	300	21400	10 of 10	10 of 10
Lead	25	6.4	13	4 of 10	0 of 10
Manganese	300	230	1100	10 of 10	9 of 10
Nickel	100	1.7	11	10 of 10	0 of 10
Sodium	20,000	37400	1040000	10 of 10	10 of 10
Zinc	2,000	1.6	82	9 of 10	0 of 10



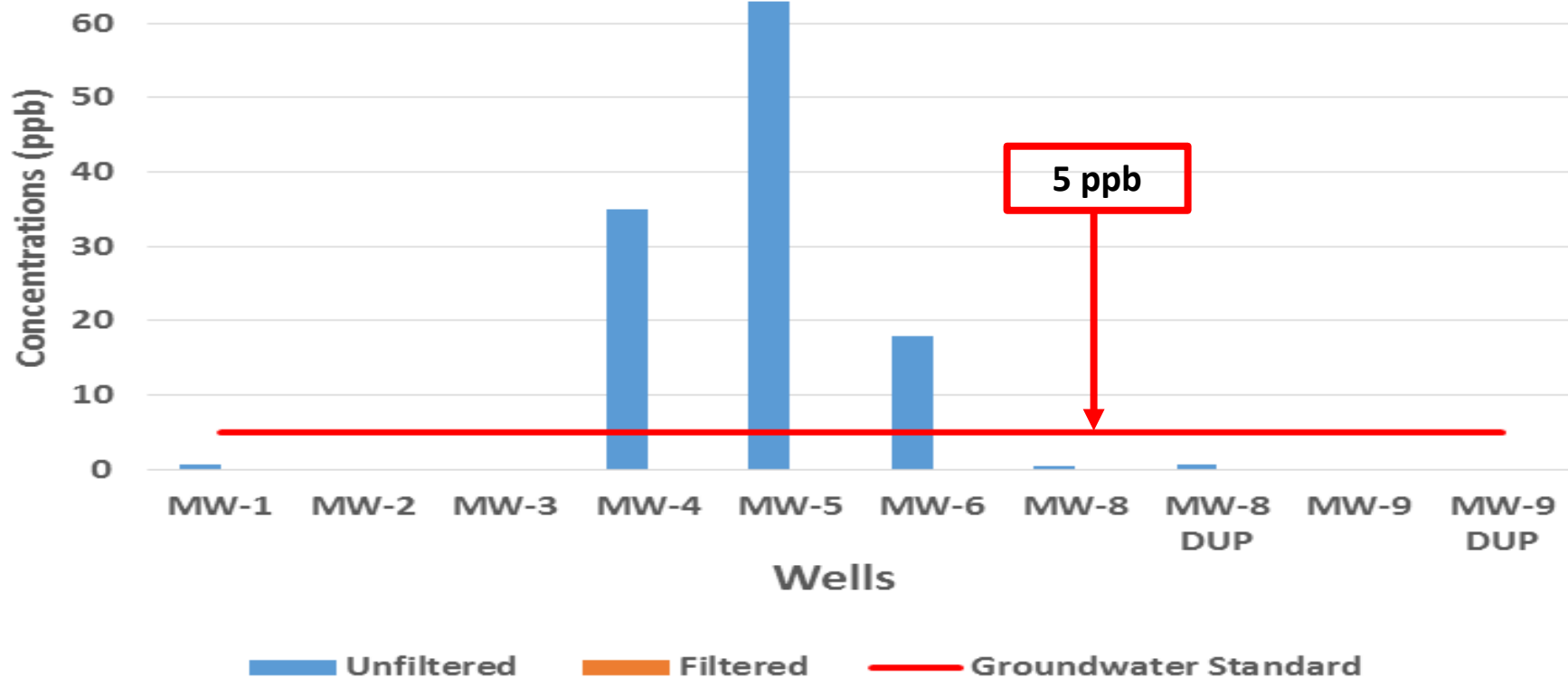
## Arsenic in Groundwater Unfiltered vs Filtered

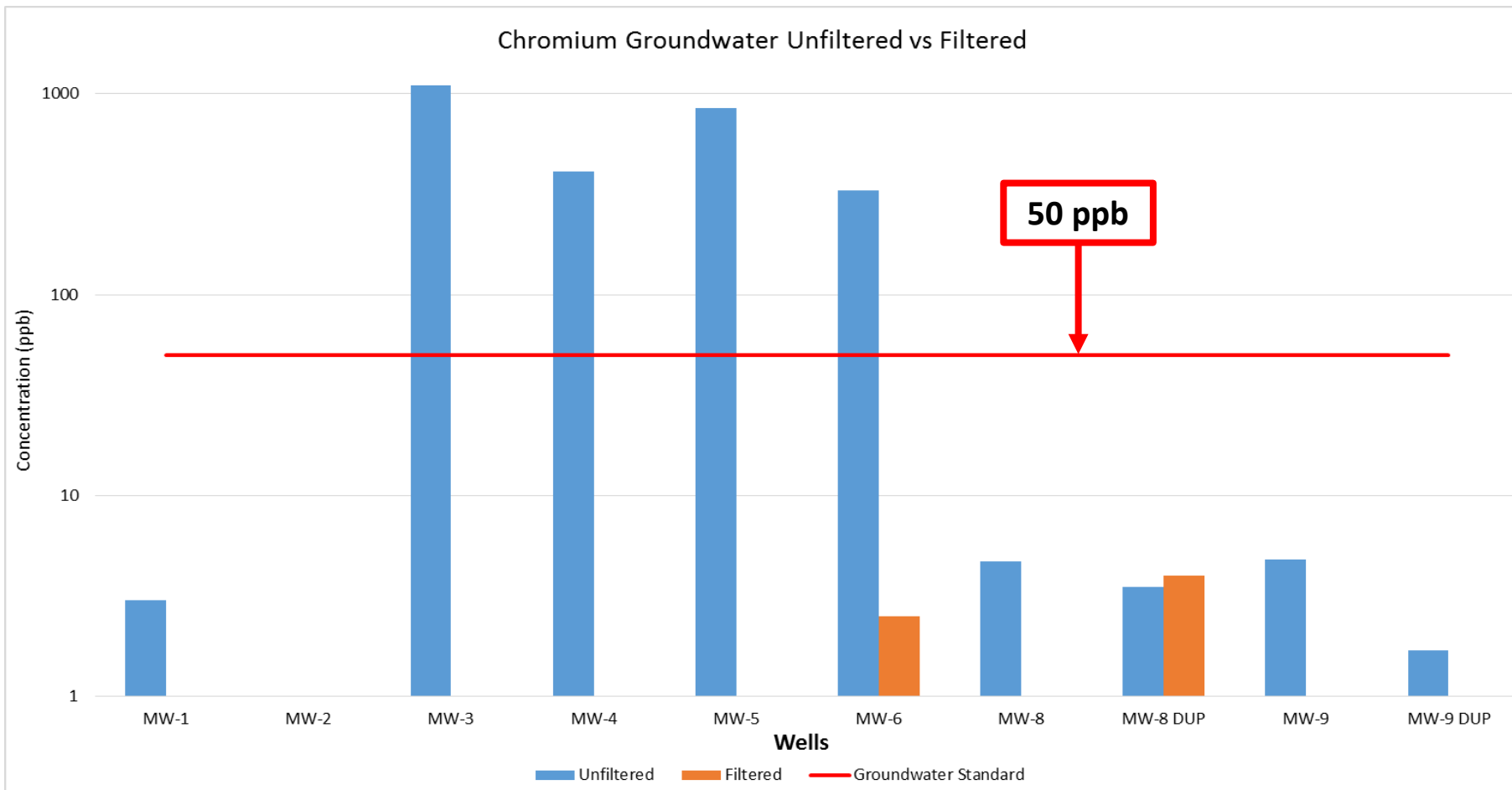


## Barium Groundwater Unfiltered vs Filtered



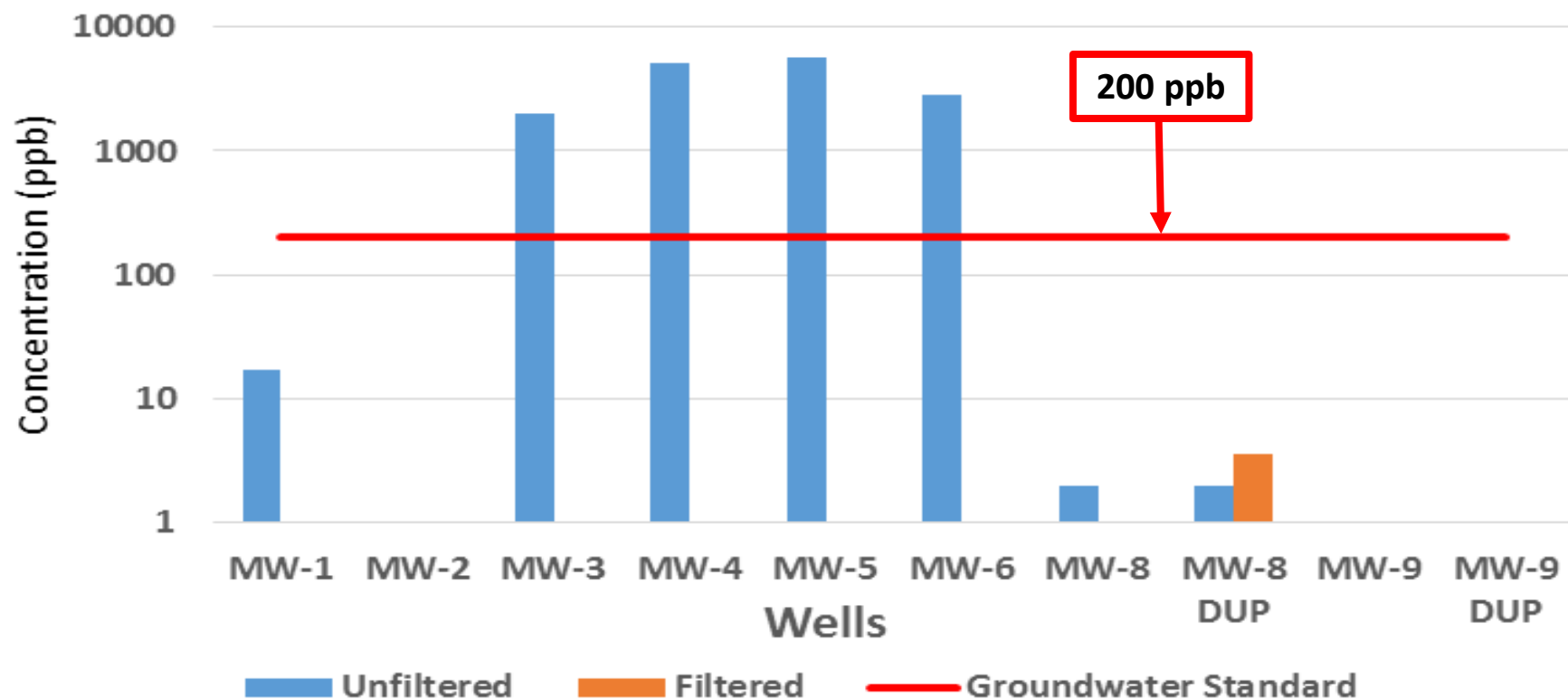
## Cadmium Groundwater Unfiltered vs Filtered



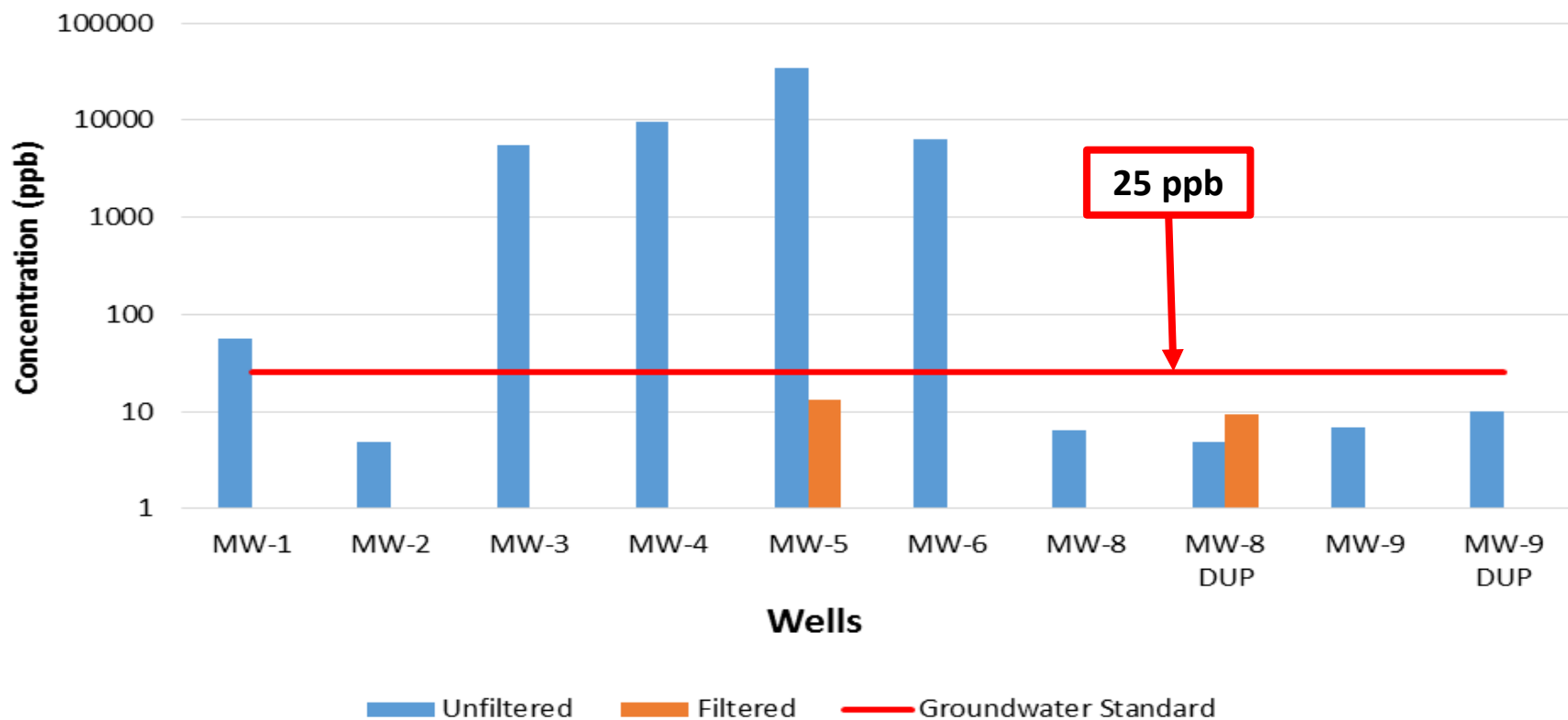




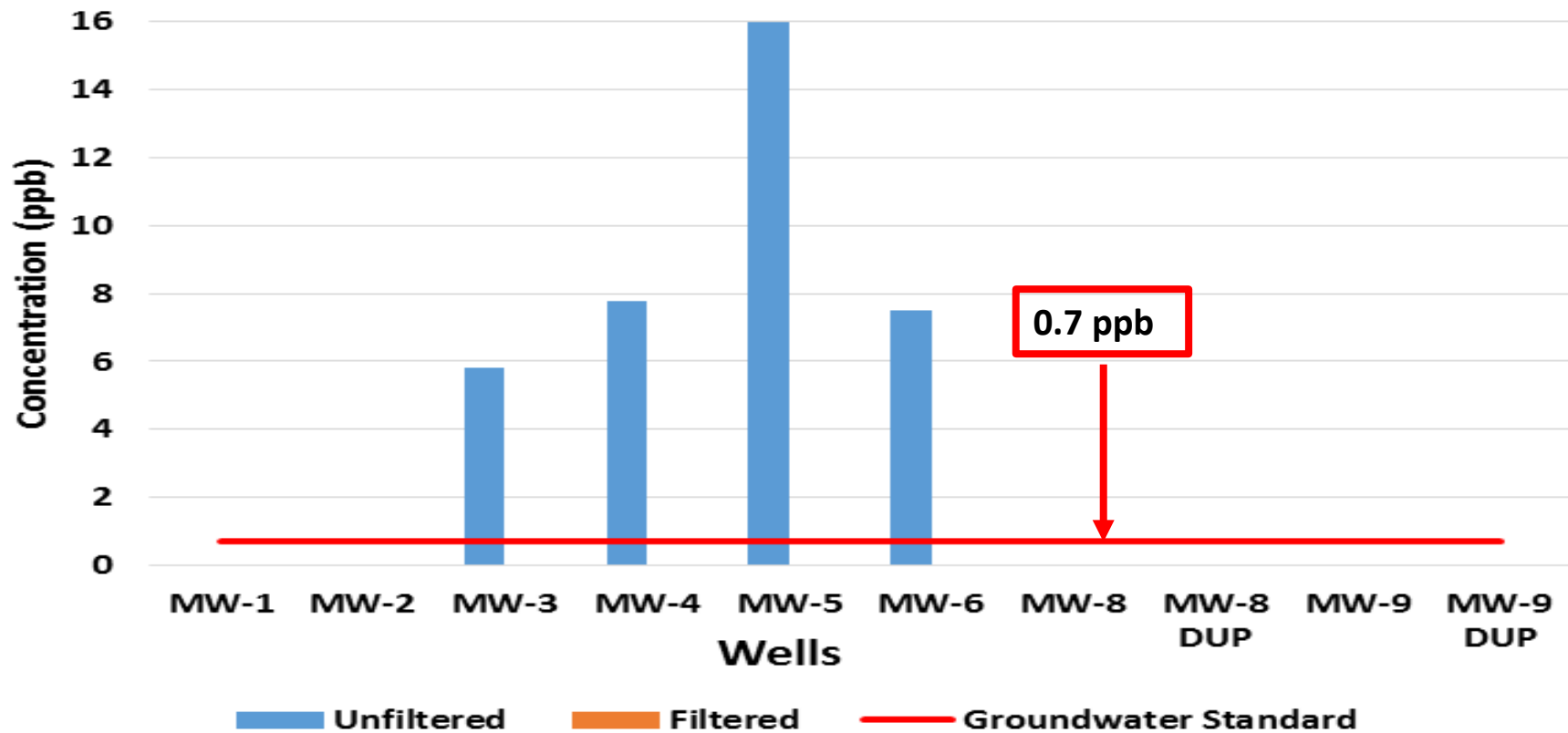
## Copper Groundwater Unfiltered vs Filtered



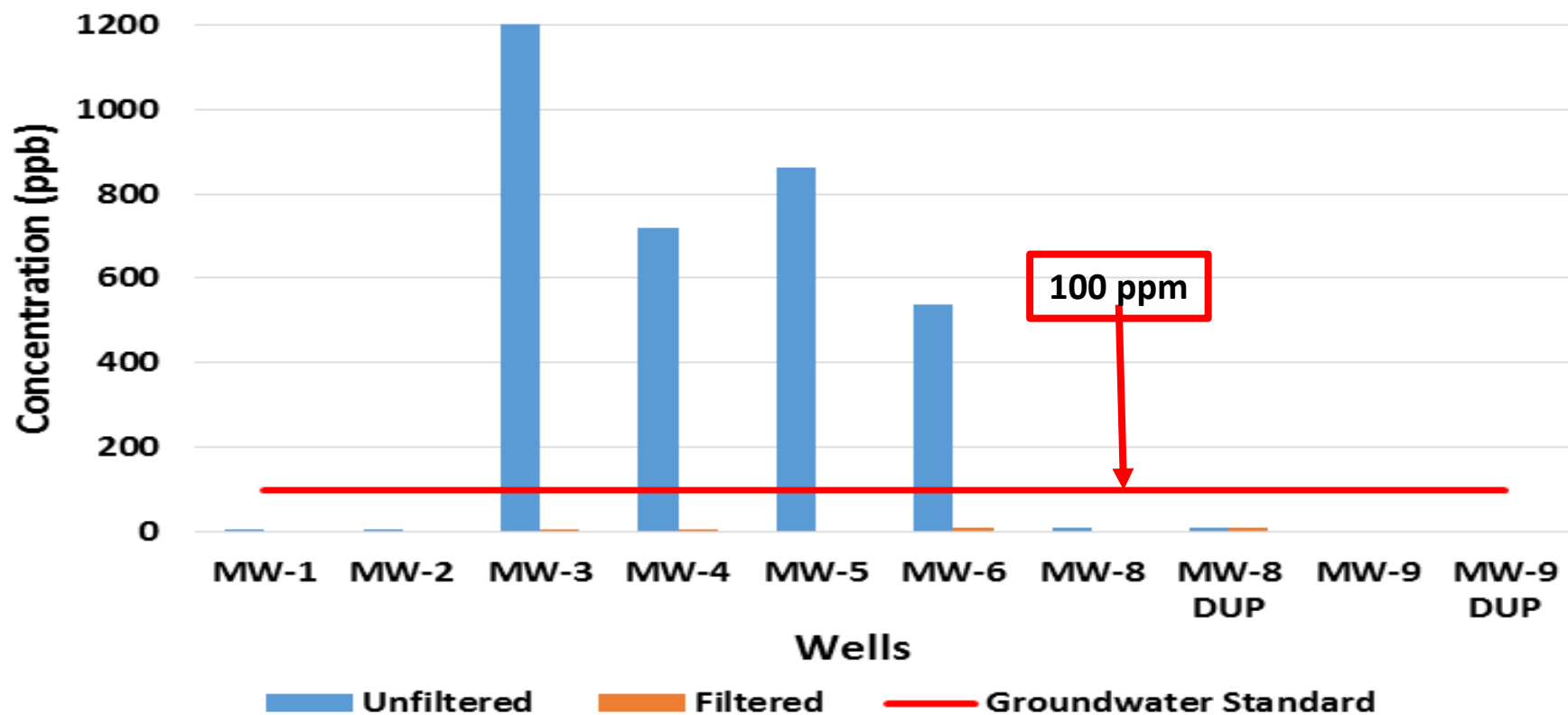
## Lead Groundwater Unfiltered vs Filtered



## Mercury Groundwater Unfiltered vs Filtered



## Nickel Groundwater Unfiltered vs Filtered



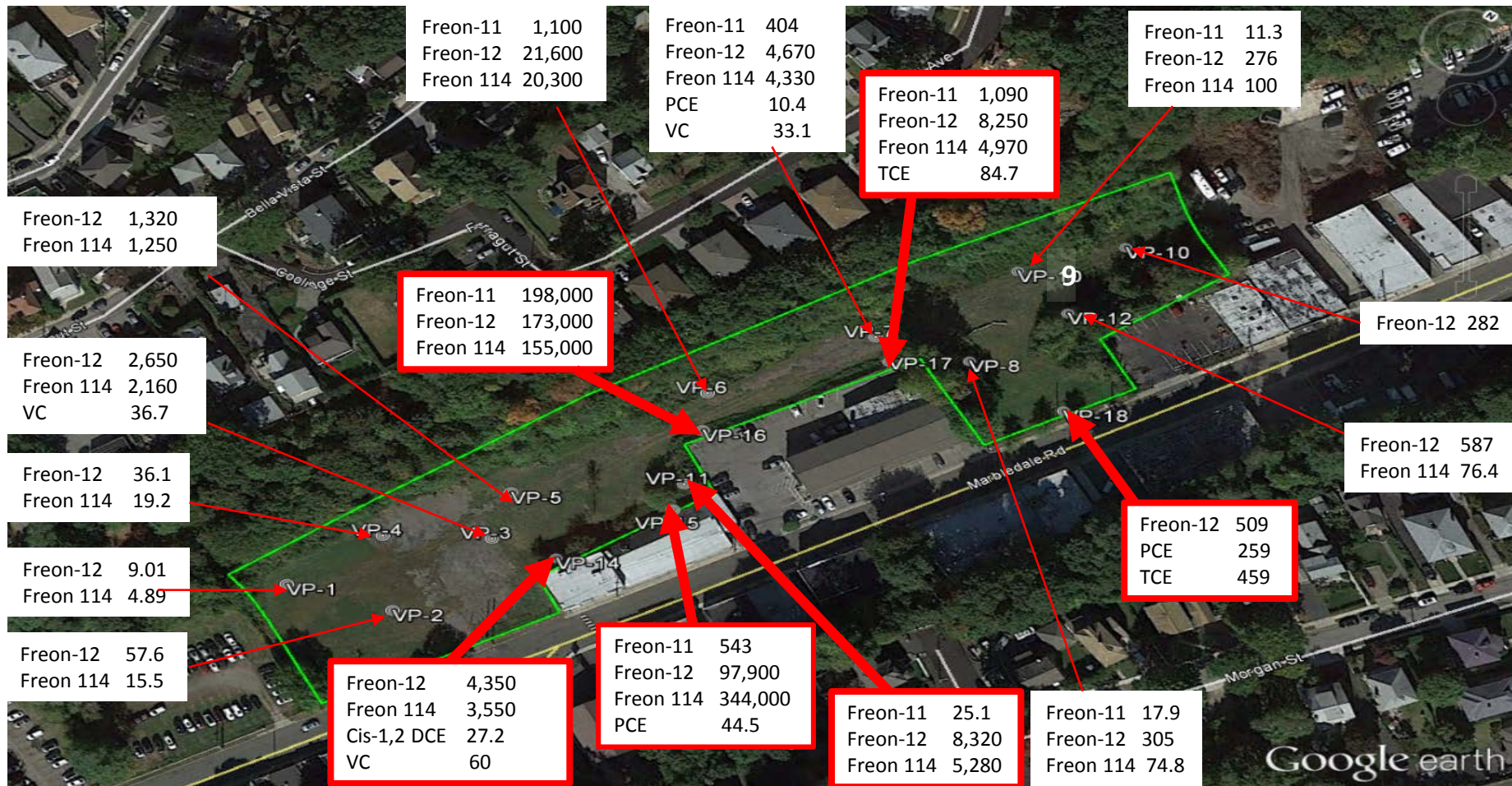
# Soil Vapor Results

- Soil Vapor results are reported in micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ )

# Significant Soil Vapor Results

Contaminant	Min. Concentration	Max. Concentration	Detections
Freon-114	4.89	344,000	18 of 19
Freon-11	0.232	198,000	17 of 19
Freon-12	7.61	173,000	19 of 19
PCE	0.075	259	19 of 19
TCE	0.048	459	17 of 19
cis-1,2-dichloroethene	0.583	27	5 of 19
Vinyl Chloride	0.131	60	8 of 19
1,1,1-Trichloroethane	2.04	23	5 of 19
Carbon Tetrachloride	0.068	6.66	9 of 19
Methylene Chloride	0.612	12.90	13 of 19





# DEC and DOH Actions

- **DEC and DOH significant threat determination**
  - Public meeting
  - Off-site soil vapor intrusion investigation
  - Final remedy will be selected by the DEC and DOH
  - The DEC may use State Superfund money to investigate contamination migrating from the BCP site

# DEC and DOH Actions

- **DEC created a potential “P” inactive hazardous waste site for areas outside the BCP site**
  - Pursue potentially responsible parties to fund Site Characterization
  - No potentially responsible parties Site Characterization will be funded by State Superfund money



# Off-Site SVI Investigation







## DEC & DOH Investigation Potential Inactive Hazardous Waste Site

- Site includes 40, 117, & 225 Marbledale Road
- Remainder of the quarry pits outside the BCP site
- Site is roughly 3.1 acres in size

# Exposure

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- The physical contact with a chemical or substance
  - **ingestion**(eating/drinking)
  - **inhalation**(breathing)
  - **direct contact** (touching)
- One or more of these physical contacts **must** occur before a chemical has the potential to cause an adverse health effect.
- Exposure does not necessarily mean an adverse health effect will occur.



# Potential Exposure Pathways

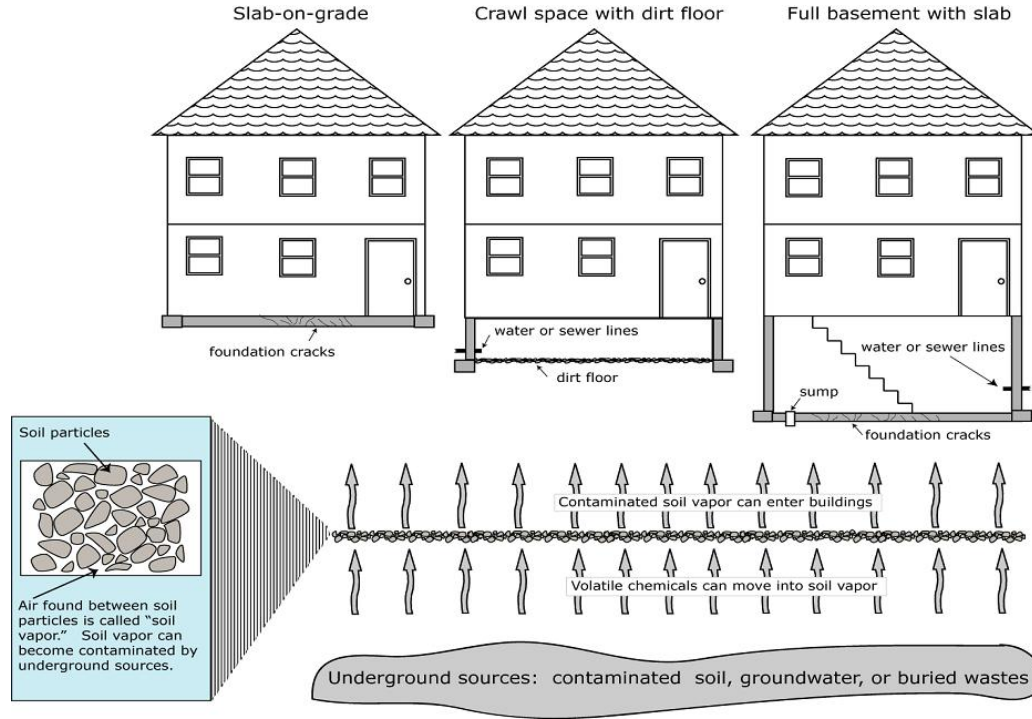
- Ingestion: consuming contaminated groundwater.
- Inhalation: breathing indoor air impacted via soil vapor intrusion.
- Contact: touching contaminated soil.

# Ingestion Pathway

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- The area is served by public water that is routinely tested to ensure that it meets drinking water standards.

# How can Indoor Air be Impacted?



# Inhalation Pathway

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- There are no buildings on the site; inhalation of site-related contaminants via soil vapor intrusion (SVI) does not represent a current concern.
- The potential for indoor air impacts via SVI in proposed on-site buildings will be addressed by the use of vapor barriers and the operation of active sub-slab depressurization systems.
- The potential for SVI is being evaluated in off-site structures.

# Direct Contact Pathway

- Access to the site is limited, however trespassers could potentially contact site contaminants.
- During and after site development, measures will be in place to prevent contact with residual soil contamination.

# Proposed Remedy

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No Ingestion = No Exposure

No Inhalation = No Exposure

No Contact = No Exposure

Protective of Human Health

# Draft Remedial Action Work Plan

Excavation and off-site disposal of contaminated targeted areas

- Post excavation sampling
- Backfill with clean soils
- Removal of grossly contaminated fill encountered during grading

# Draft Remedial Action Work Plan cont.

## Site Cover

- One foot of clean soil that meets or exceeds the Commercial SCO's;
- 6 inches of concrete or asphalt

## Vapor Mitigation

- Any on-site building will require a sub-slab depressurization system installed; and
- Continued operation and maintenance of the system



# Site Cap



# Draft Remedial Action Work Plan cont.

## Institutional Control/Environmental Easement

- Requires periodic certification of the vapor mitigation systems and site cover;
- Restricts the site to commercial use;
- Prohibits the use of site groundwater; and
- Requires compliance with the Site Management Plan.



# Draft Remedial Action Work Plan cont.

## Site Management Plan

- Excavation Plan that details provisions for any future excavations;
- Operation and Maintenance of vapor mitigation systems and site cover;
- A groundwater monitoring plan to assess groundwater quality; and
- A requirement for the continued inspection and certification of the vapor mitigation systems and cover.

# Thank You

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- 518-402-7860

Written comments must be postmarked by April 24, 2016 and sent to Randy Whitcher



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