



Fort Detrick

Installation Restoration

Arsenic Sampling Data Review

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Arsenic

- Arsenic (As) is a natural component of the earth's crust and can be released to the environment from natural sources (e.g., erosion of sulfide mineral deposits) as well as from human activities.



Maryland's Natural Occurrence

- From the State Of Maryland, Department of the Environment reference document: Cleanup Standards For Soil And Groundwater. The Anticipated Typical Concentration (ATC) for arsenic for Central Maryland is 4.9 parts per million (ppm) (or 4900 ppb) due to naturally occurring sources.
- Local soils can have differing background levels for arsenic.
- Testing for each soil type is needed to determine true background.

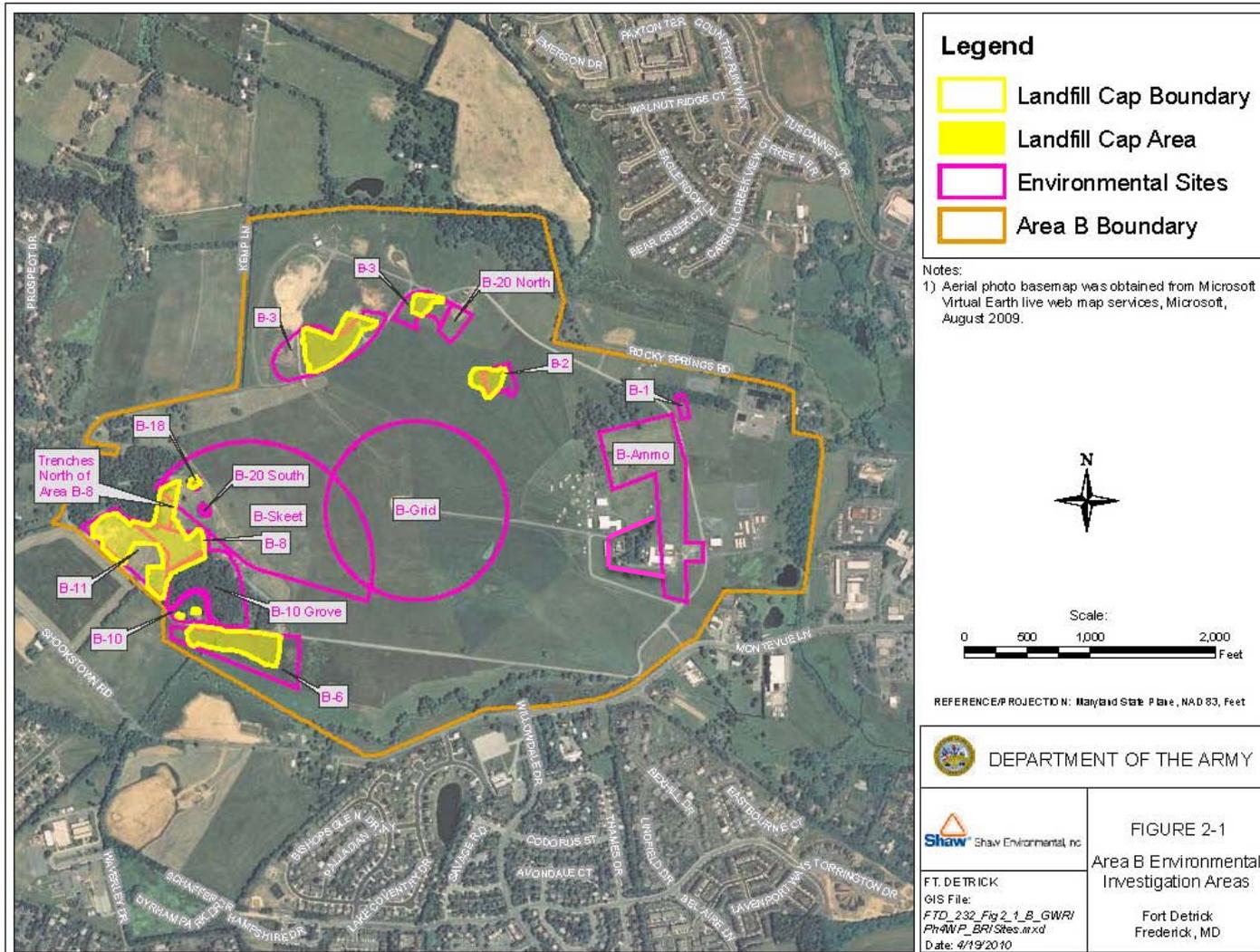


Available Arsenic Data for Area B

- Soil data analyzed for all restoration sites.
 - Multiple soil types exist on Area B.
 - Surface and subsurface also evaluated.
- Groundwater Data.
 - Well data and surface water data.



Area B Restoration Sites





No Further Action Sites (Soil)

- Data can be found in the Remedial Investigation documents in the Administrative Record.
- These non-disposal sites were evaluated through a risk assessment process and were determined to not pose a risk under current and anticipated future land use.
- The Maryland Department of the Environment's Federal Facilities Division reviewed and concurred with the risk assessments.
- Results were presented to the RAB and made available for public review and comment.



No Further Action Sites (Soil)

- **Area B-Ammo Original** - Arsenic was determined to be within background concentrations of 5.77 mg/kg.
- **Area B-Ammo Outside** - Arsenic was detected at concentrations ranging from 6.1 to 8.9 mg/kg, which exceed the 95% UCL for background (5.77 mg/kg).
 - Arsenic is evenly distributed in Area B-Ammo areas (no evidence of a source area).
 - A Human Health Risk Assessment determined that the risks are within the USEPA's target risk range.



No further Action Sites (Soil)

- **Area B-20 South** - Arsenic was detected in 8 samples at concentrations ranging from 5.55 to 21.6 mg/kg. Three samples exceeded the background screening value (13.0 mg/kg)
 - A Human Health Risk Assessment determined that health risks are within the USEPA's target risk range.
- **Area B-20 North** – Arsenic has been determined to be within the background 95% Upper Tolerance Limit (UTL) of 6.79 mg/kg.



No further Action Sites (Soil)

- **Area B-Grid** - Arsenic was detected at concentrations ranging from 2.7 to 5.7 mg/kg - all concentrations are below the background screening levels.
- **Area B-Skeet** – Arsenic was determined to be within background.



Close-out site

- **Area B-1** – Partnering team with MDE and EPA determined that disposal activities did not occur.
 - MDE and EPA concur with closure
 - Areas of buried waste material could not be located using geophysical equipment, and no waste material was encountered in soil borings in the B-1 area.
 - Areas located north east and south of Area B-1 were surveyed using geophysical techniques. No buried materials were detected in these areas either.
 - Arsenic detected in 11 of 12 samples at concentrations up to 33 mg/kg. (Used field XRF field meter- over estimates results)



Area B Disposal Areas (Soil)

- The Area B disposal sites were found to have arsenic concentrations above background. The highest level of 114 mg/kg was in a sub-surface soil sample at the B-11 disposal site prior to the B-11 removal action.
- Remedial Action Taken:
 - B-11 IRA removed surface and sub-surface soils/wastes.
 - All of the disposal sites were capped in 2010 to prevent potential dermal exposure and percolation of rain water through the waste (EPA presumptive remedy for landfills.)
 - Potential pathway for direct dermal exposure was removed.



Area B Disposal Areas Arsenic Test Results

Site	Highest Surface (mg/kg)	Note	Highest Sub-Surface (mg/kg)	Note
B-2	18	XRF Data	8.9	
B-3	18	9 Flag	7.21	
B-6	17	XRF Data	17	XRF Data
B-8	27		45.1	
B-10	21	XRF Data	18	
B-11	16		114 (pre removal) 44.3 (post removal)	

9 -NON-DEMONSTRATED/VALIDATED METHOD PERFORMED.



Area B Groundwater

- EPA drinking water standard of 10 ppb.
- Maryland Department of Environment Federal Facilities Division provided:
 - Raw groundwater in the county, regardless of aquifer source, ranges from < 1 ppb to as much as 26 ppb. (Finished municipal water is below the MCL)



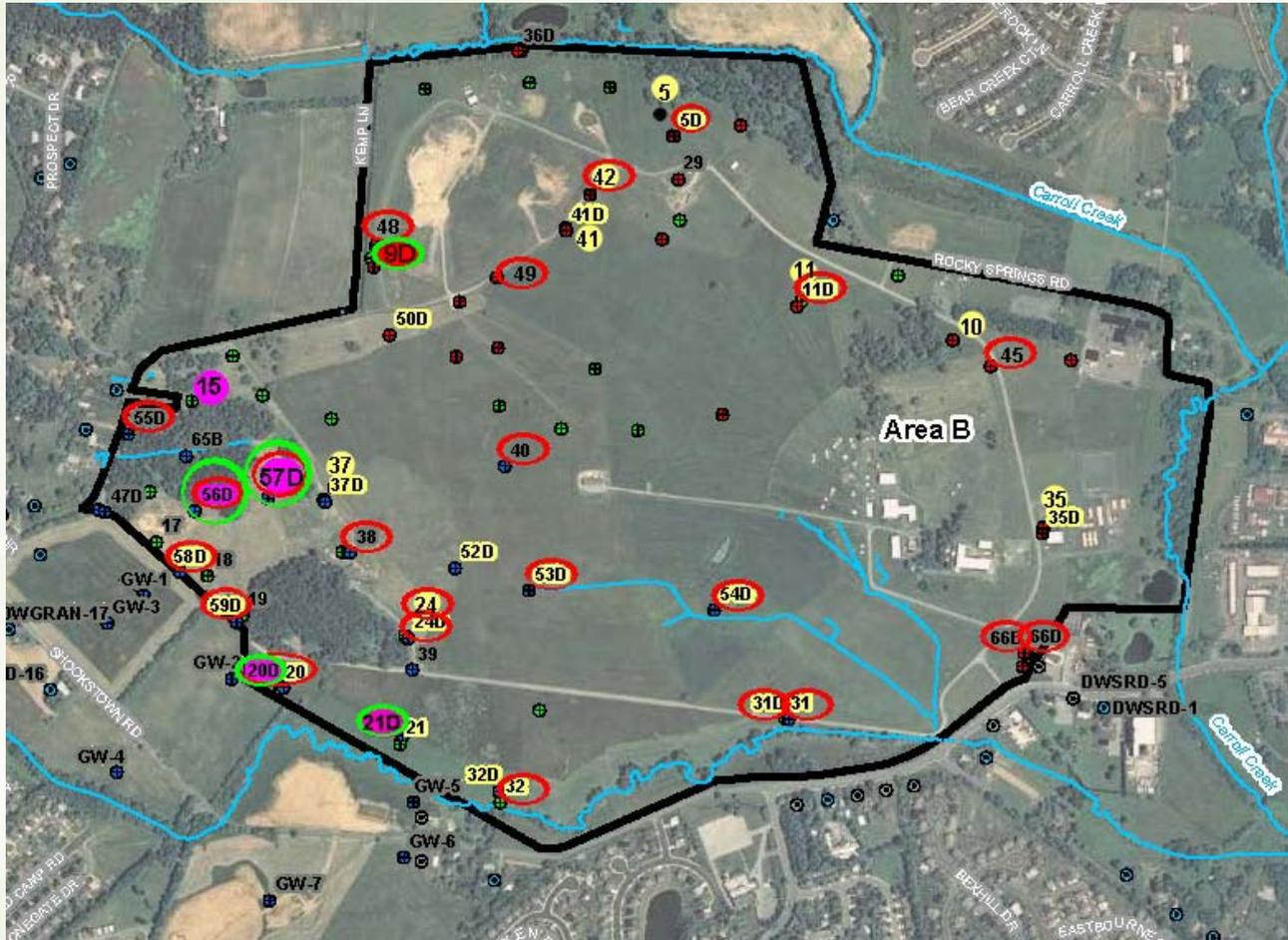
Area B Groundwater – Arsenic Detection Results

Well	Detection (ppb)	Date
MW9D	~5.5 (graph)	1995
MW9D	15	2005
MW15	1.79	1995
MW20D	7.9 JB	2005
MW20D	5.3 J	2010
MW21D	5.3 JB	2005
MW 56D	1.29	1997
MW56D	0.88 J	2005
MW57D	2.26	1997
MW57D	1.1 J	2005
All other sample results were non-detect		



Arsenic Detections in Groundwater Wells

-  Sampled in 1995 or 1997
-  Sampled in 2005
-  Sampled in September 2010
-  Detection of Arsenic below MCL of 10 ppb
-  Detection of Arsenic above MCL of 10 ppb





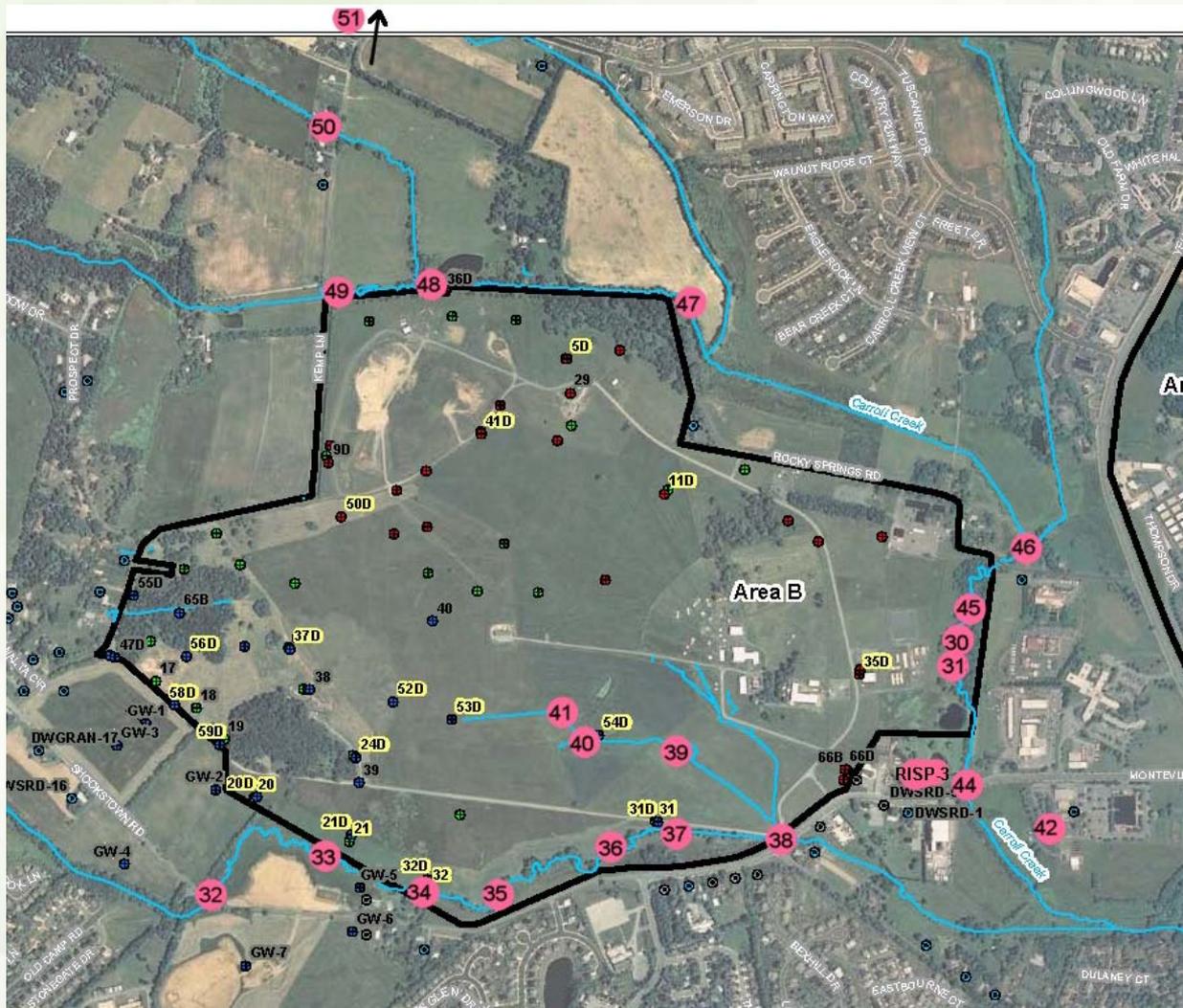
Groundwater Wells Summary

- The highest single estimated detection of 15 ppb is below the observed highest level of arsenic found in raw groundwater for Frederick County.
- Metals, including arsenic, will also be tested again during the ongoing Area B groundwater investigation in 2011.



Surface water and Sediment Sampling Locations

● Surface Water and Sediment Sampling Location



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Surface Water -Arsenic Results

- Surface water was sampled in 1993, 1995, 1997 and in 2010.
- Two detections of Arsenic:
 - STR4SW-40 47.5 ppb
 - (Data suspect due to a turbid sample.)
 - STR4SW-41 5.12 ppb
 - All other surface water samples were non-detect.
- All samples downstream from sample 40 and 41 were non-detect.



Sediment -Arsenic Results

- Results would include arsenic in the deposited soils and silts.
- Sediment in streams and springs was sampled in 1993, 1995.
- Maximum Background: 20 mg/kg
- Sample detections:
 - STR2SED-34 5.5 mg/kg
 - STR2SED-38 1.19 mg/kg
 - STR4SED-39 16 mg/kg 9 Flag
 - 9 -NON-DEMONSTRATED/VALIDATED METHOD PERFORMED.
 - STR5SED-44 2.15 mg/kg
 - STR5SED 46A 1.55 mg/kg B Flag
 - B- NOT DETECTED SUBSTANTIALLY ABOVE THE LEVEL REPORTED IN LABORATORY OR FIELD BLANKS.



Surface Water and Sediment Summary

- Arsenic levels in groundwater in Carroll Creek and tributaries below are MCLs.
- No detections in sediment above maximum background.
- Metals, including arsenic, will also be tested again during the ongoing Area B groundwater investigation in 2011.



Future Surface Water Sampling Locations

