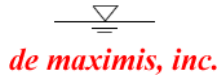


Nuclear Metals, Inc. Site

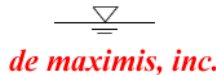
Public Information Meeting

May 25, 2017



Presentation Outline

- Project Team / Introductions
- Site History / CERCLA Timeline
- Investigations and Removal Actions
 - Non-Time-Critical Removal Actions (NTCRA) for Removal of Buildings and Contents
 - Record of Decision
 - NTCRA - Groundwater
- Remedial Design / Remedial Action (RD/RA)



Project Team

EPA Remedial Project Manager: Elaine Stanley

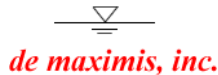
EPA Community Involvement Coordinator: Sarah White

MassDEP Project Manager: Garry Waldeck

de maximis, inc. - General Contractor for Respondents (former NMI owners) - Project Coordinator: Bruce Thompson

Project Websites:

www.epa.gov/superfund/nmi and www.nmisite.org




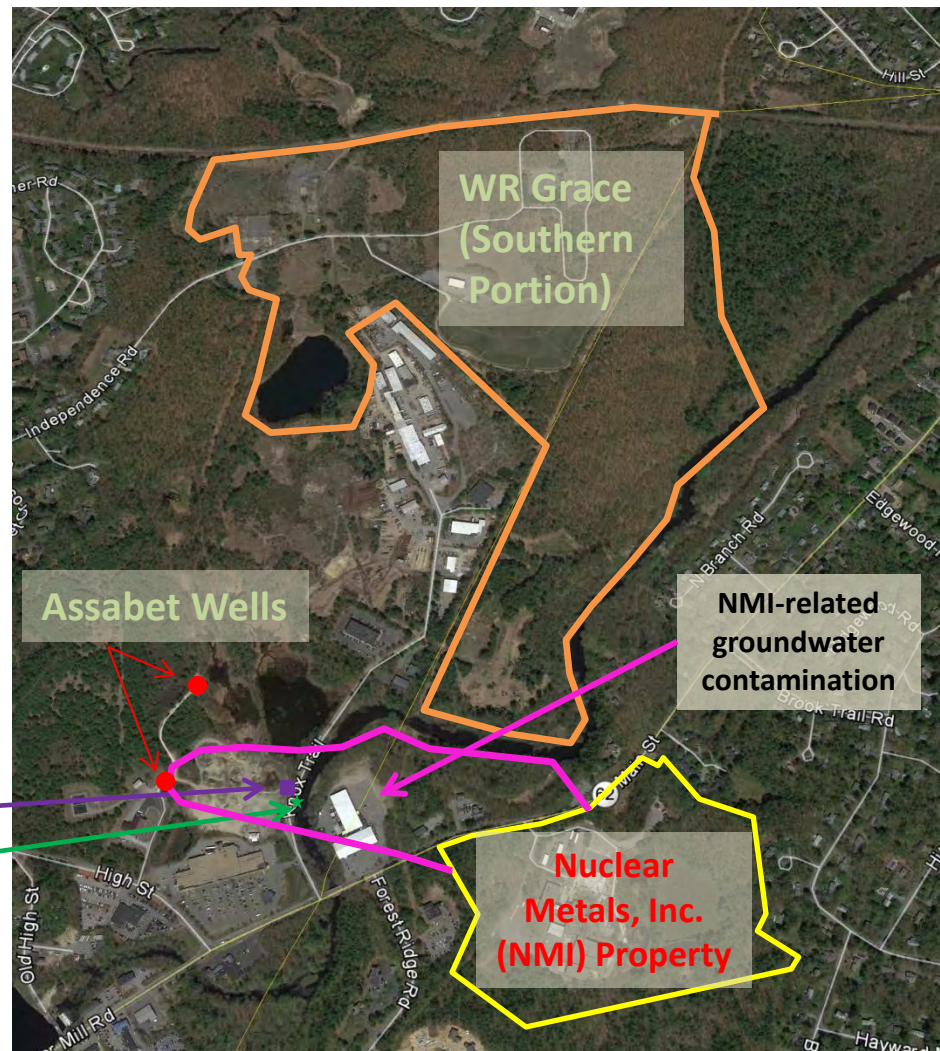
Project Area



Treatment System
Discharge to River

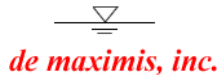



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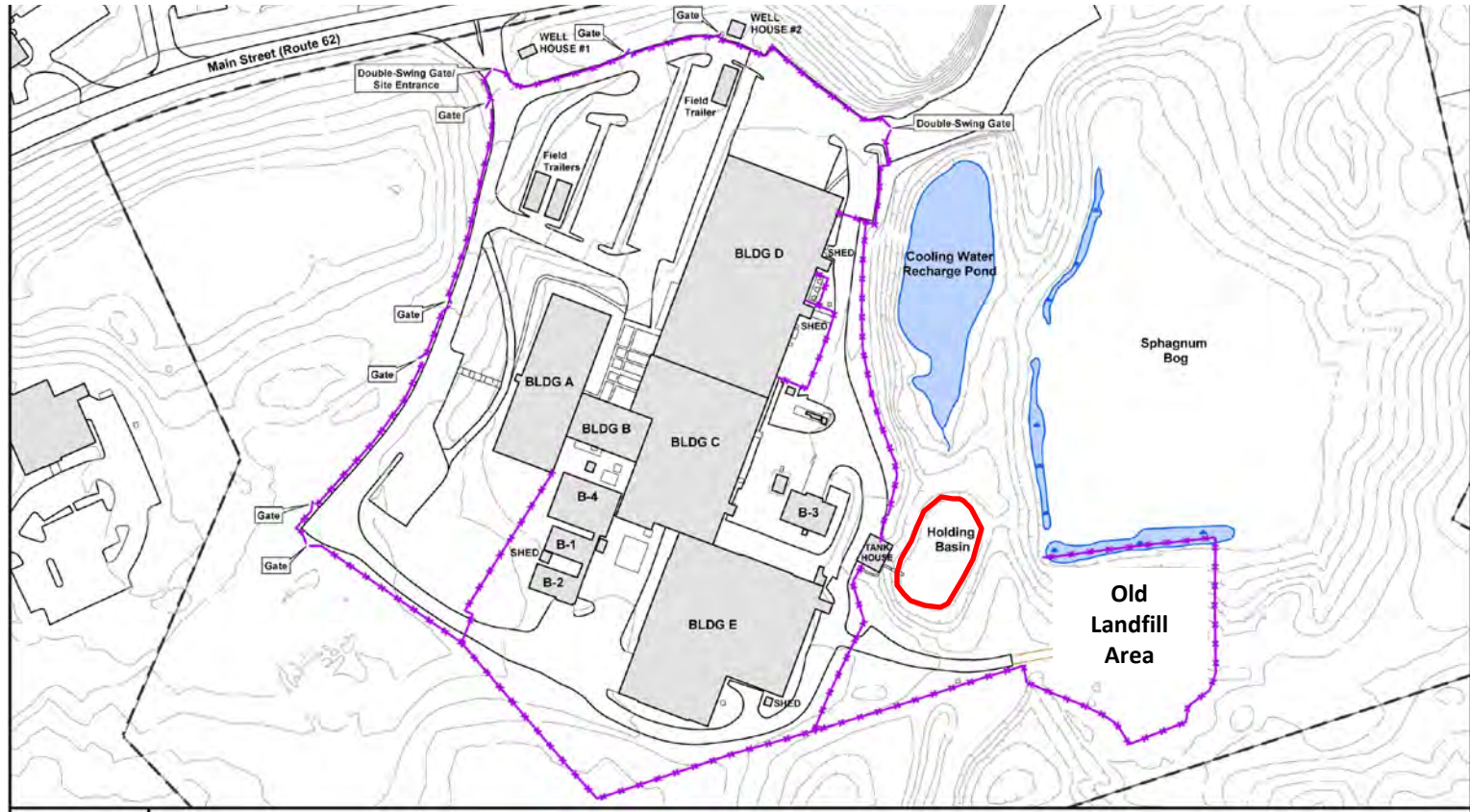



The Superfund Process

- Site Discovery & Superfund Listing
- Remedial Investigation (RI)
- Feasibility Study (FS)
- Proposed Plan
- Record of Decision (ROD)
- Remedial Design (RD)
- Remedial Action (RA)
- Long Term Monitoring
- Operation & Maintenance (O&M)
- Institutional Controls
- Future Use

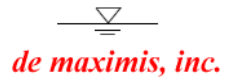


NMI Location– 2229 Main Street, Concord, MA




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NMI Site History



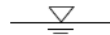
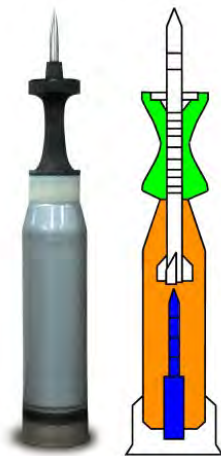
NMI History

- In 1957 Nuclear Metals, Inc. (NMI) purchased undeveloped property in Concord, MA and built original facility buildings in 1958. Owners:
 - 1958 – 1972: Textron Inc. and Whittaker Corp. sequentially own NMI, and perform specialty metals research and development, primarily for US AEC and DOD.
 - 1972: Employees purchase company. Expand and principally produce depleted uranium (DU) penetrators under contract with US Army



Armor-Piercing Fin-Stabilized
Discarding-Sabot (APFSDS)
for 120mm gun on M1A1 Abrams
Tank

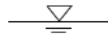
The 26.9 in-long penetrator together
with its sabot weighs ~20 pounds.
The penetrator is ~10 pounds of DU.



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NMI History (continued)

- 1997: NMI changes name to Starmet Corporation. Starmet stops DU penetrator production and focuses on other manufacturing (metal powders, beryllium-aluminum alloys) through affiliated businesses located on the property.
- 1998: Starmet (with Army funding) conducts a partial cleanup of the Holding Basin with oversight by Commonwealth of Massachusetts.
- 2003: Massachusetts Department of Public Health Radiation Control Program modifies Starmet's Radioactive Materials License to "possess only."



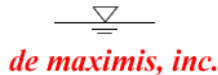
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NMI History (continued)

- 2005 - 2007: MassDEP conducts a removal action (with Army funding) that results in removal of ~3,800 drums of waste materials and 322 tons of DU from the facility.



- November 2011: Starmet and affiliated businesses abandon Site and Massachusetts Department of Public Health -Radiation Control Program terminates Starmet's Radioactive Materials License.



CERCLA Timeline

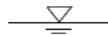
June 2001: Site listed on National Priorities List.

March 2002-April 2003: EPA conducts time-critical removal actions to line the Holding Basin and cap the “Old Landfill”.

Old Landfill cap and Sphagnum Bog



Holding Basin – Before and After



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CERCLA Timeline (continued)

June 2003: Administrative Order on Consent (AOC) for Remedial Investigation / Feasibility Study (RI/FS) becomes effective – the study that defined the nature and extent of contamination, the risks to human health and environment, and remedial alternatives and associated costs to address those risks.

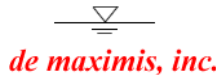
May 2004: RI field work begins.

June 2007: Small fire occurs within buildings.

January 2008: EPA conducts time-critical removal action to remove certain hazardous and/or flammable substances from buildings.

September 2008: EPA issues Action Memorandum authorizing NTCRA to empty and demolish site buildings.

August 2011: AOC for Building NTCRA becomes effective (~\$70 MM project).



CERCLA Timeline (continued)

November 2011: Building NTCRA work starts upon Starmet abandoning site.

October 2014: RI/FS completed (\$16 MM project), Proposed Plan issued for public comment.

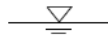
August 2015 – present: Additional groundwater investigation.

September 2015: EPA issues Record of Decision (ROD) that includes Action Memorandum to accelerate 1,4-dioxane groundwater remedy as a NTCRA. ROD remedy estimated as \$125 MM project.

August 2016: Building demolition complete and slab cover in place.

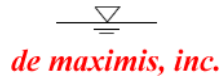
September 2016: EPA issues “special notice letters,” triggering start of negotiation of Remedial Design / Remedial Action (RD/RA) Consent Decree.

July 2016: AOC for Groundwater NTCRA becomes effective (~\$5.7 MM project).



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Investigations and Removal Actions

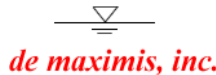


Building NTCRA

Work Performed: November 2011 – August 2016

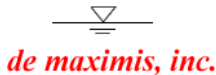
Project goals:

1. Prevent releases of hazardous materials to the environment
2. Prevent direct exposure to radionuclides and other contaminants
3. Contribute to the efficient performance of long-term remedial activities




Building NTCRA - Project Scope

- Provide monitoring, access controls and site security
- Stabilize buildings, then remove, package, and dispose of hazardous, flammable and combustible materials
- Remove and dispose of asbestos, universal waste, and building contents
- Demolish ~180,000 feet² of buildings down to slabs
- Fill voids and place a temporary cap over foundations
- Dispose of debris off-site at appropriately licensed facilities
- Perform post-removal site control (security and monitoring)

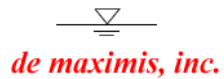
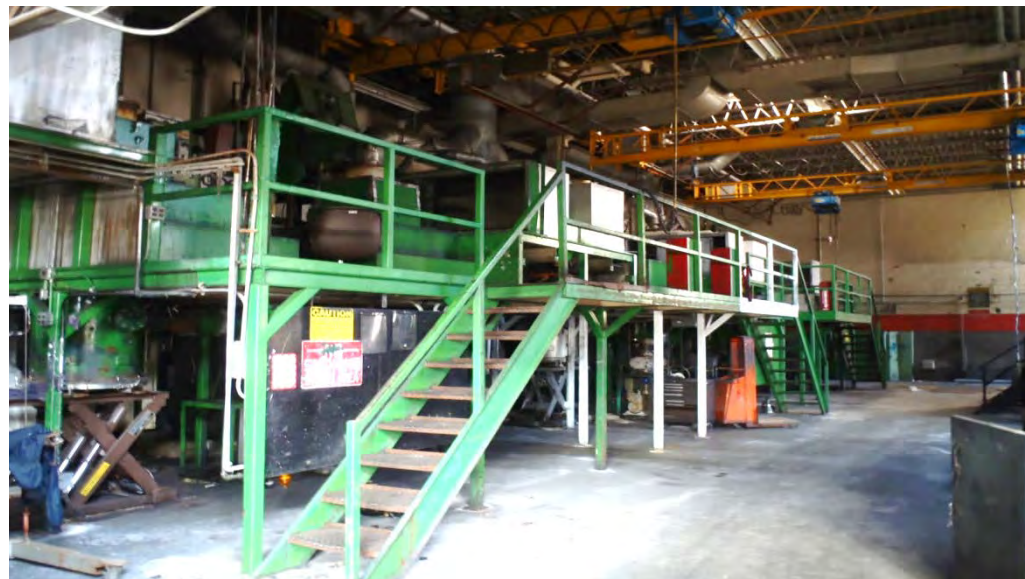


Building C – debris and equipment

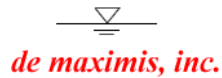



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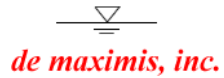
Building D Foundry Area



Building D Pickling Area – Before and During Clean Up




Rooftop Systems Removal



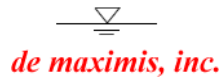
5/20/16




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8/12/16

Cover
Complete

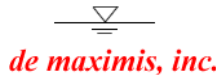


Building NTCRA Waste Volumes

912 thirty-two cubic yard
intermodal containers totaling
23.5 million pounds (**11,738
tons**) shipped for disposal at US
Ecology, Idaho.

Of the total, building structure
accounted for 479 containers
(7,495 tons)

Waste Streams and Volumes	
Bulk Lead Waste (Solids)	7 Intermodals; 203 cy.
Bulk RCRA Liquids	4 Tankers; 14,943 gals.
Bulk Non-RCRA Liquids (Low Activity)	3 Tankers; 11,930 gals.
Waste Oils/Fuel/sludge	5,300gal / 36,978 lbs.
UST Waste Fuel Oil	1 Tanker; 2,800 gals.
Low-level Radioactive Waste (LLRW)	24 Drums; 7,991 lbs.
RCRA Caustic Waste	11 Containers; 4,603 lbs.
RCRA Acidic Waste	31 Containers; 13,777 lbs.
Labpacks (Multiple)	Various Containers; 4,875 lbs.
Compressed Gases	52 Gas Cylinders
Liquids with PCBs > 50 ppm	22 gals; 617 lbs.
Debris / Solid PCBs > 50 ppm	305 gals; 2,096 lbs.
PCB/Suspect PCB Light Ballast	7 drums; 5,036 lbs.
Non-PCB Light Ballast	17 drums, 10,567 lbs.
Crushed Fluorescent Bulbs	12 drums; 5,137 lbs.
Mercury Containing Articles	1 drum; 52 lbs. (5 lbs. Hg items)
Recycled Bulbs (Hg and Na Lamps)	5 uline Bags; 35 lbs.
Tungsten-Thorium Welding Rods & Tips	2 drums; 384 lbs.
Ni-cad, NiMH, and Lithium Ion Batteries	Various; 534 lbs.
RCRA Metal Solids	Drums/Sacks; 3,940 lbs.
RCRA VOC and SVOC Wastes	11 Units; 580 lbs
Non-PCB Transformers	24 Units; 5,549 lbs.
Asbestos Containing Materials	360 Units; 11,520 cy.



Remedial Investigation Sampling Locations



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.....

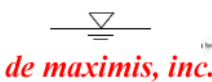
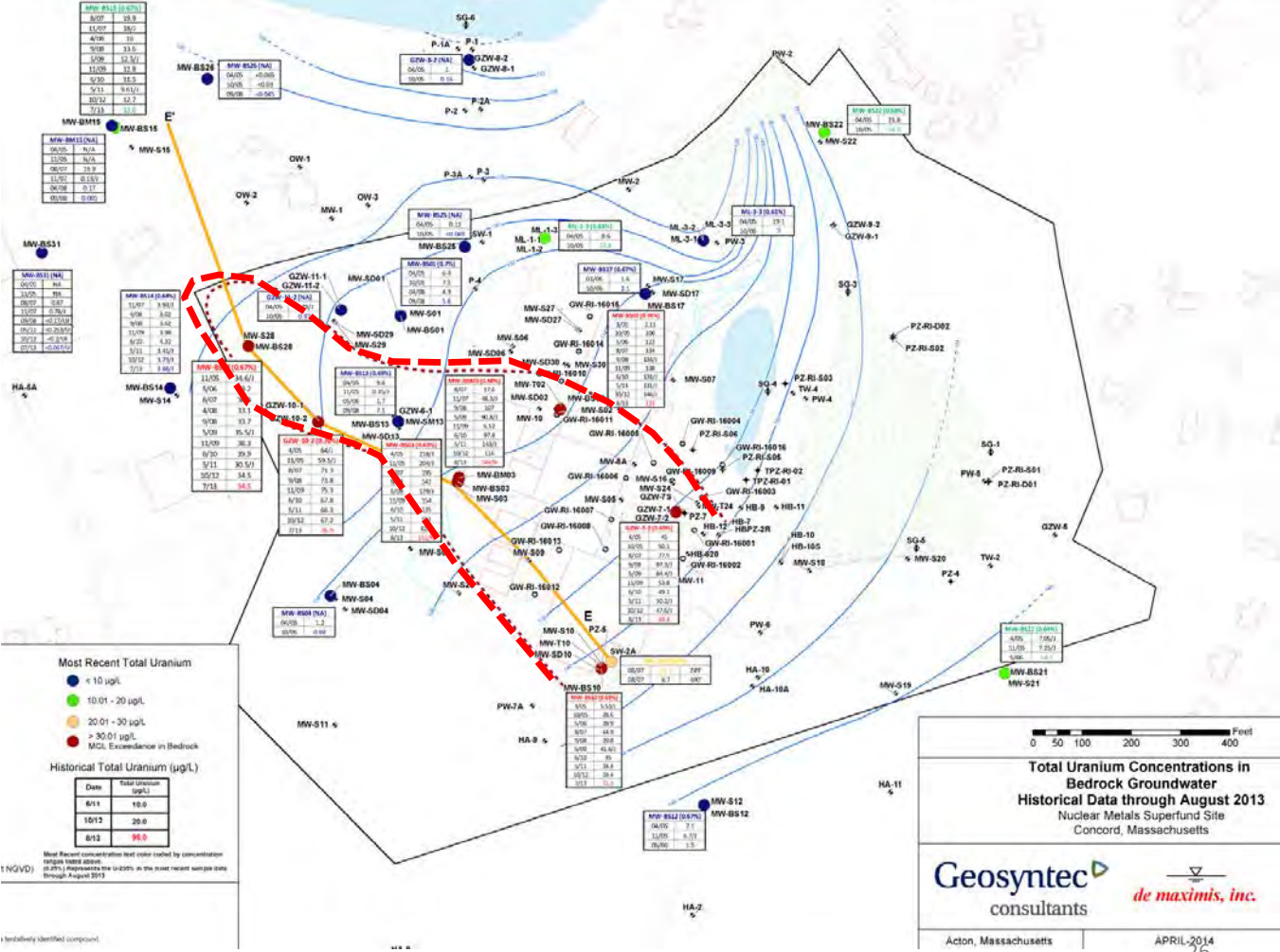
A diagram of a pin support, consisting of a horizontal line with a vertical line segment extending downwards from its center, ending in a small horizontal bar.

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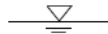
Extent of Naturally Occurring Uranium in Bedrock Groundwater over clean up level of 30 ug/L

Plume extent



Record of Decision (ROD) issued September 2015

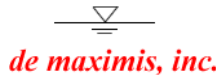
- Selected a remedial action necessary to protect human health and the environment and address all current and potential future risks caused by soil, sediment, and groundwater contamination.
- Comprehensive remedy addressed as two major components:
 - Soil / Sediment and Groundwater
- ROD included an “Action Memorandum” authorizing Groundwater NTCRA to accelerate process to capture and treat groundwater containing VOCs and 1,4-dioxane.



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Clean Up Levels for Key Contaminants

- **Soil** clean up levels developed for Polycyclic Aromatic Hydrocarbons (PAHs), Polychlorinated Biphenyls (PCBs), Arsenic (As), Uranium (U), and Thorium (Th).
 - As and Th clean up levels based on background levels, U (2.3 mg/kg) and PCBs (1 mg/kg) will control scope of soil remediation.
- **Sediment** ecological risk-based clean up levels developed for PCBs, Copper, Lead, and Mercury.
 - PCBs (1 mg/kg) will control scope of sediment remediation in Cooling Water Pond and bog.
- **Groundwater** clean up levels based on federal and state MCLs for VOCs and metals, and risk-based level for 1,4-dioxane.
 - Trichloroethene, Vinyl Chloride, U, and 1,4-dioxane will control extent and duration of groundwater remediation.

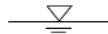


Soil/Sediment Remedy - Scope Summary

- Excavate ~82,500 yards³ of soils and sediments. Dispose off-site. Backfill excavations with clean soil.
- Holding Basin (HB)
 - Perform hydraulic containment during construction to control potential for further DU migration
 - In-situ stabilize unsaturated and saturated HB soils
 - Install vertical containment wall around HB and low-permeability below grade cap, then backfill to bring basin up to grade.
- Restore site, control future use of HB area, and perform long-term O&M.

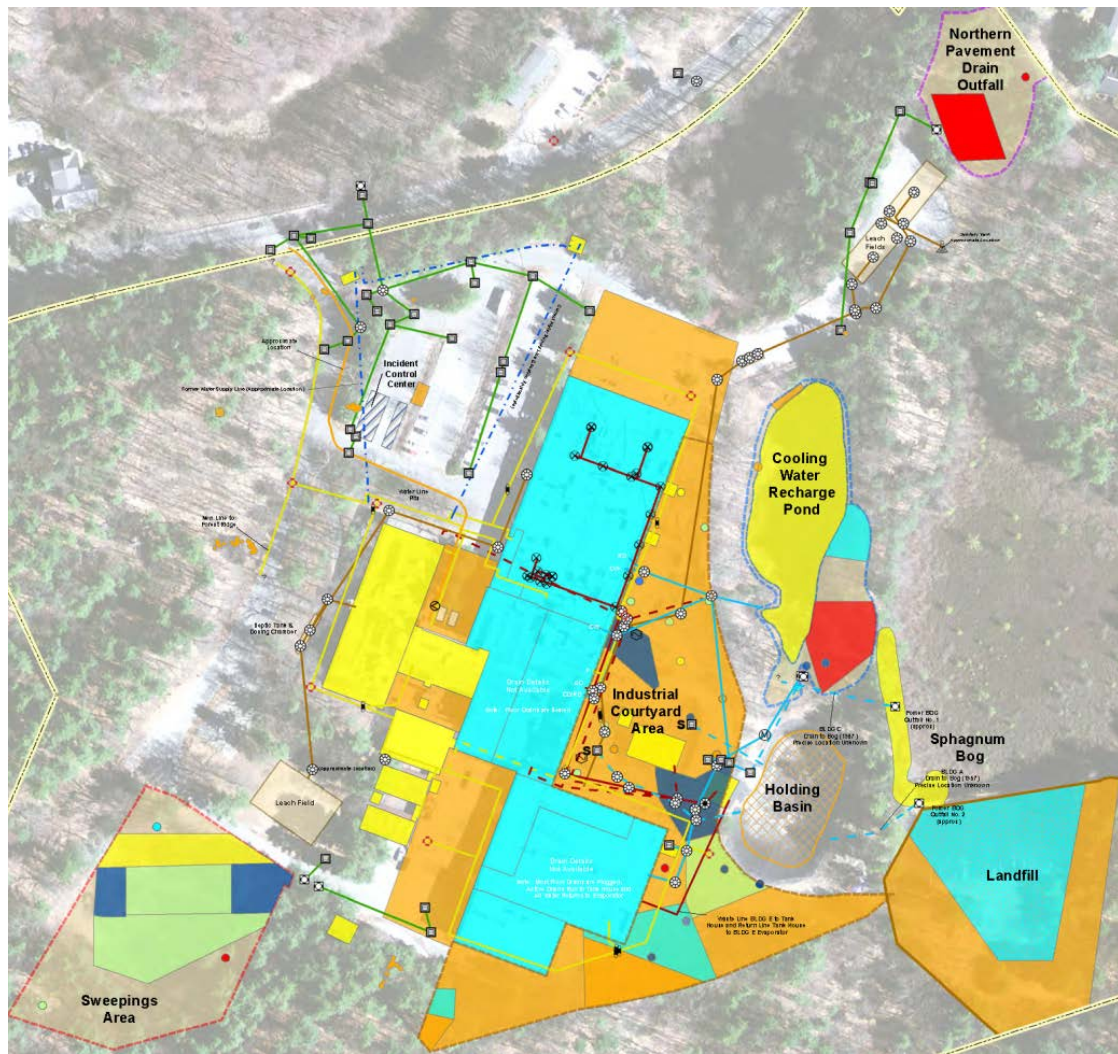
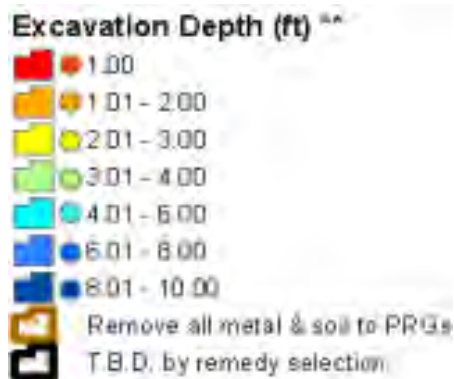
Estimated Costs:

Capital:	\$103,188,000
O&M (NPV, 200 years, 7%):	<u>\$ 1,566,000</u>
Total:	\$104,754,000

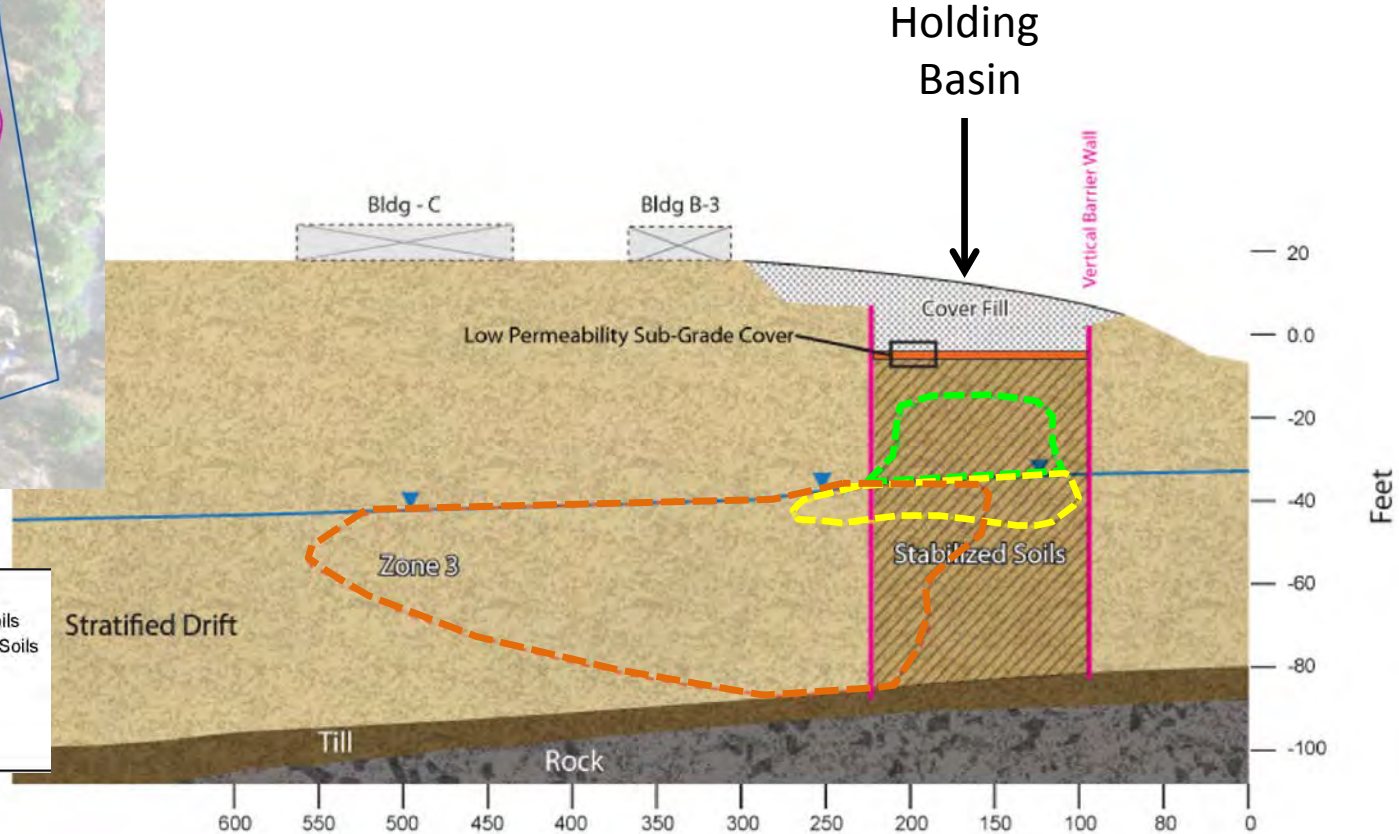


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Soil / Sediment Remediation Areas

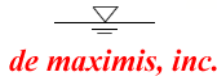


Holding Basin Containment and Stabilization



LEGEND

- Zone 1 - Uranium > 30 mg/kg in Vadose Zone Soils
 - Zone 2 - Uranium > 30 mg/kg in Saturated Zone Soils
 - Zone 3 - Uranium > 30 ug/l in Groundwater
 - Building to be demolished
 - Groundwater
- Units depicted are feet (ft)

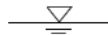


Groundwater Remedy – Scope Summary

- In-situ treatment of overburden DU and bedrock U plumes.
- Extraction of groundwater and ex-situ treatment to control 1,4-dioxane and VOCs in overburden and bedrock.
- “Five-Year Reviews” to assess on-going protectiveness.
- Institutional controls to prohibit use of affected groundwater until clean up levels achieved
- Monitor COC concentrations in groundwater to assess treatment effectiveness.

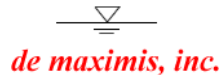
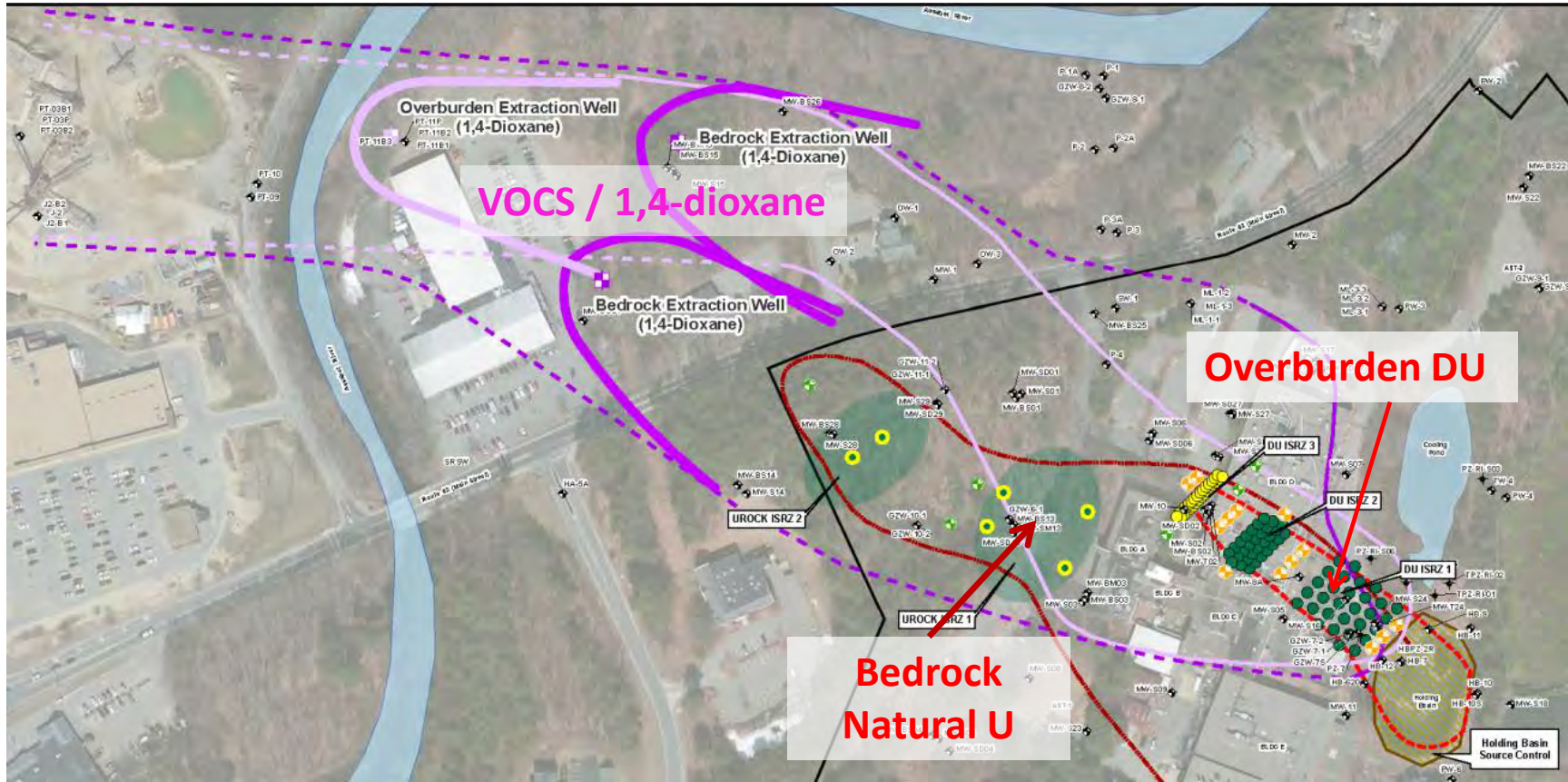
Estimated Costs:

Capital:	\$ 9,669,000
O&M (NPV, 200 years, 7%):	<u>\$10,573,000</u>
Total:	\$20,242,000



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Groundwater Remedy Scope (at time of ROD)

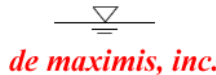


Groundwater NTCRA

Work Performed: October 2015 – present

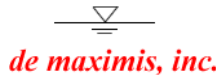
Project Goals:

1. Control migration of contaminated groundwater to Acton's Assabet Production Wells
2. Provide for a timely response (e.g., prior to the site-wide RD/RA) to efficiently minimize threats to human health and the environment which may result from the releases from the site.



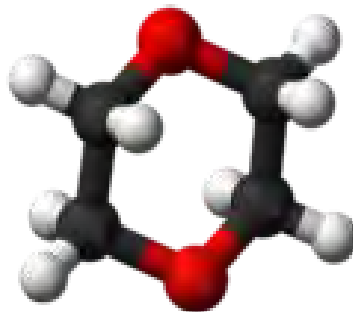
Groundwater NTCRA Scope

- Design and construct a system to extract and treat (ex-situ) overburden and bedrock groundwater for VOCs and 1,4-dioxane. Design incorporates a “Treatability Study” to identify best long-term option for 1,4-dioxane treatment
- Approach incorporates installation and operation of a “Temporary Treatment System” to accelerate process
- Discharge of treated water to surface water, and;
- Operate and maintain (O&M) the final system and monitor groundwater



1,4-Dioxane:

- Is an oxygenated cyclic ether, molecular formula $C_4H_8O_2$. It is considered a “semi-volatile” compound. Is an “emerging contaminant”, meaning methods needed to be developed and improved to measure it in the environment and evaluate associated risks.
- Was used as a stabilizer for the solvent 1,1,1-trichloroethane. Also found in shampoos, cosmetics, and moisturizers (at 100s of mg/L (ppm) levels in these products prior to 2005)
- Is miscible in water, sorbs poorly to soil organic carbon, and has limited biodegradation. These characteristics make it more mobile in groundwater than other contaminants.



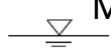
1,4-Dioxane in Groundwater at NMI - Regulatory / Analytical Limits (ug/L)

Timeline	Phase	PRG	RBV	MA ORSGL	MDL
Dec-03	Draft RI/FS WP	1,4-dioxane not in draft, EPA's 5/2004 comments address.			
Jun-04	Rev RI/FS WP		6.1	50*	50
Apr-05	Final RI/FS WP		6.1	3*	5
Feb-04	RI Delineation	12 sampling rounds, 3 investigation phases, ~95 wells			
Nov-09					0.5
Oct-12	change in analytical method, 2012 - 2013 sampling.				0.15
Nov-14	FS	0.67	0.67	0.3	
Sep-15	ROD	0.46**	0.46	0.3	
Aug-15	Further RI Delineation	New wells (8 locations), sampling at 16 existing and 21 new wells			
Mar-16					
Jul-16	GW NTCRA PDI	Profiling, well installation and sampling at 7 locations			
Dec-16					

PRG - Preliminary Remediation Goal / **Clean Up Level, RBV – “Risk Based Value” – screening value for RI

* MassDEP "Drinking Water Guidance Value", ORSGL - MassDEP Office of Research and Standards Guideline of 3 ug/L promulgated 2/2008, reduced to 0.3 ug/L 5/2011.

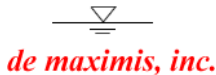
MDL - Method Detection Limit (for laboratory analysis)



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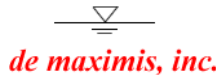
Groundwater NTCRA Work Completed

- August 2015 Groundwater Investigation Work Plan
 - 30 new monitoring wells installed and tested (13 locations) between October 2015 and August 2016
- February 2016 Shutdown Test Work Plan
 - Monitoring of groundwater levels during shut down of Assabet 1A and 2A from March 14 – 23, 2016
- June 2016 Extraction Well Installation and Pump Test Work Plan and Modeling Work Plan
- July 2016 – Groundwater NTCRA AOC becomes effective (funded in August 2016)
- August 2016 – Pilot drilling for extraction well, results trigger relocation from planned location

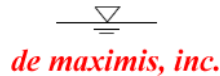
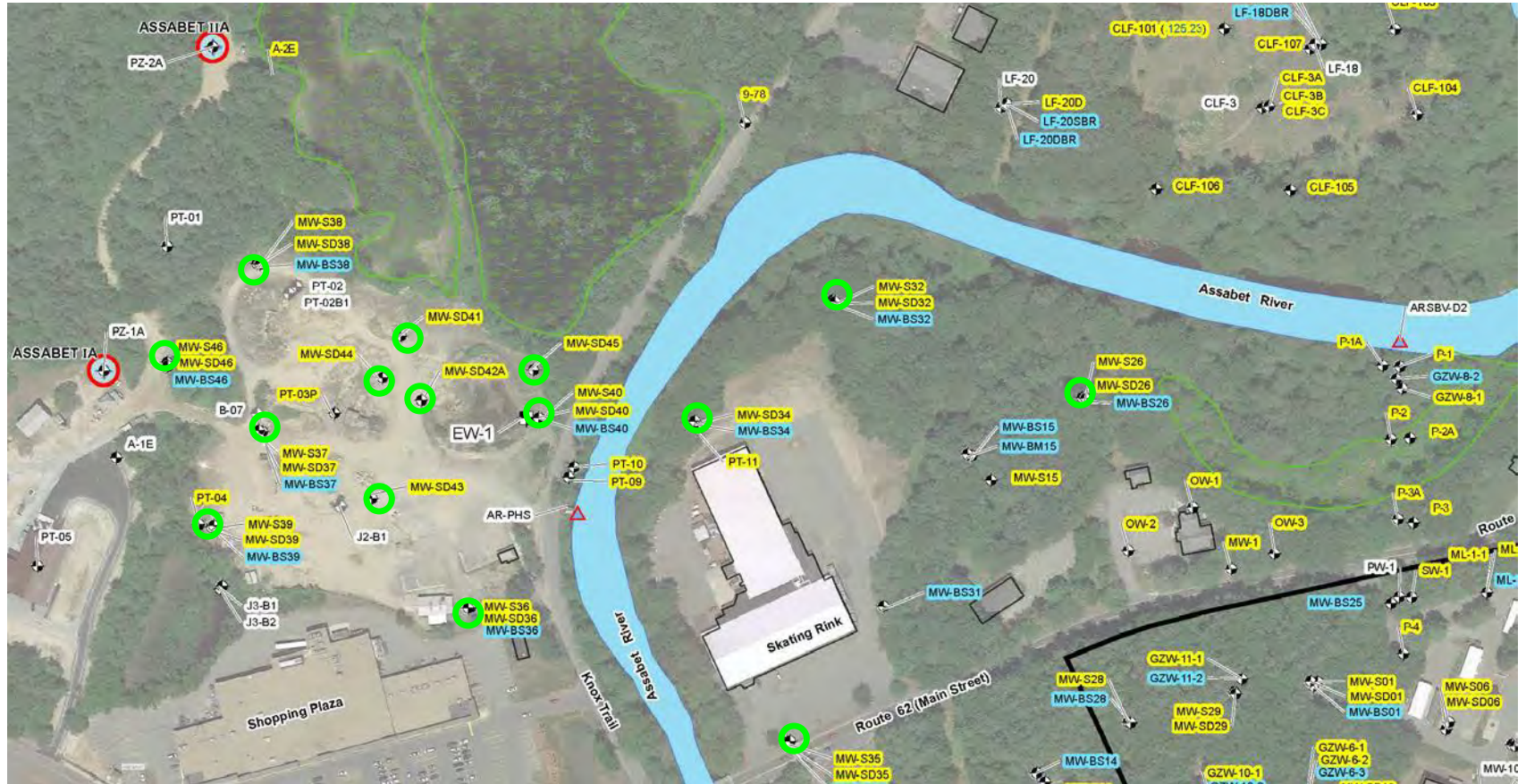


Groundwater NTCRA Work Completed (continued)

- September – October 2016 – installed extraction well and additional monitoring well
- October 2016 – conducted pump test
- December 2016 - PDI Report (Pump Test) submitted
- January 2017 – 100% Removal Design for Temporary Treatment System submitted
- February 2017 – Treatability Study Work Plan submitted
- April 2017 – Temporary System construction
- May 2017 – Temporary System operational

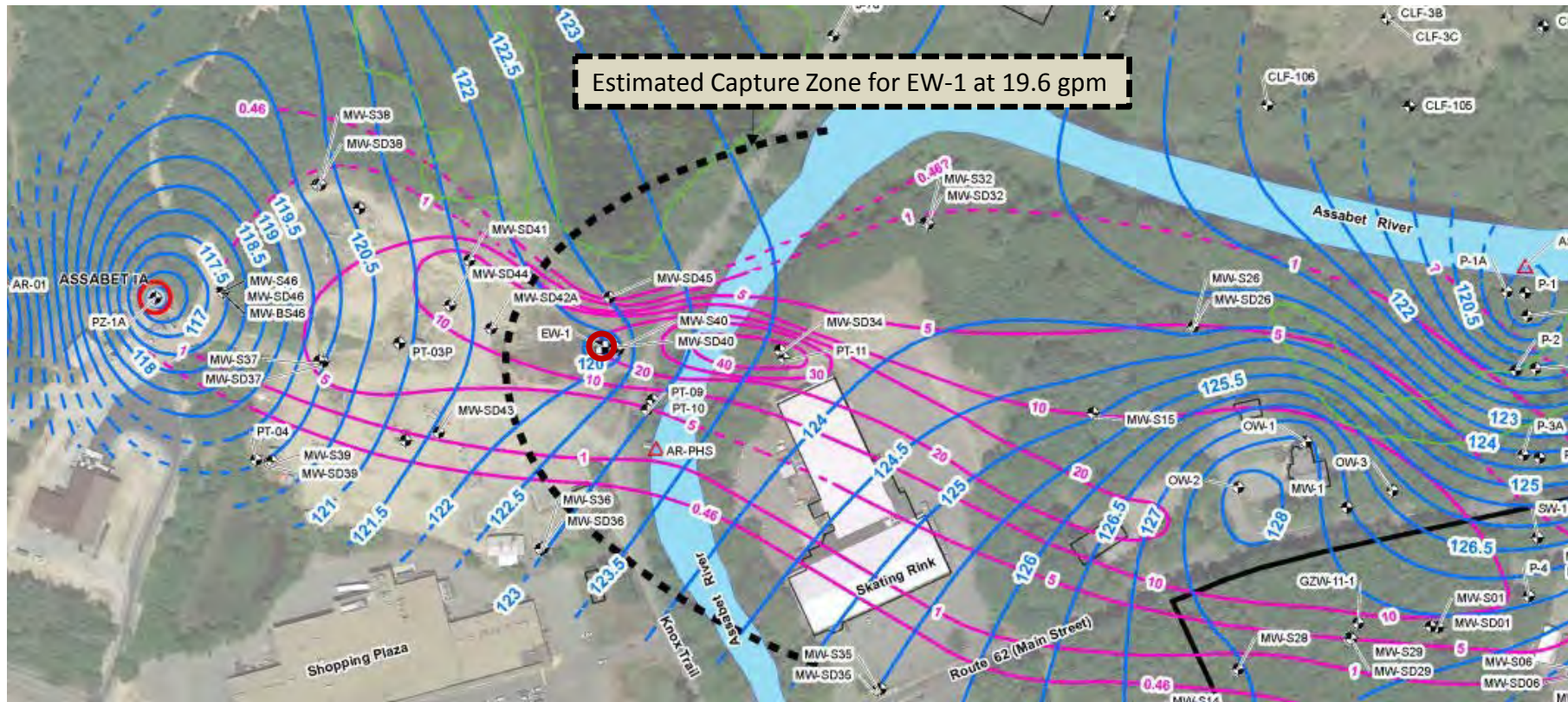



May 2017 (34 new monitoring locations since 9/2015 ROD = ○)



Overburden 1,4-Dioxane Plume

○ EW-1

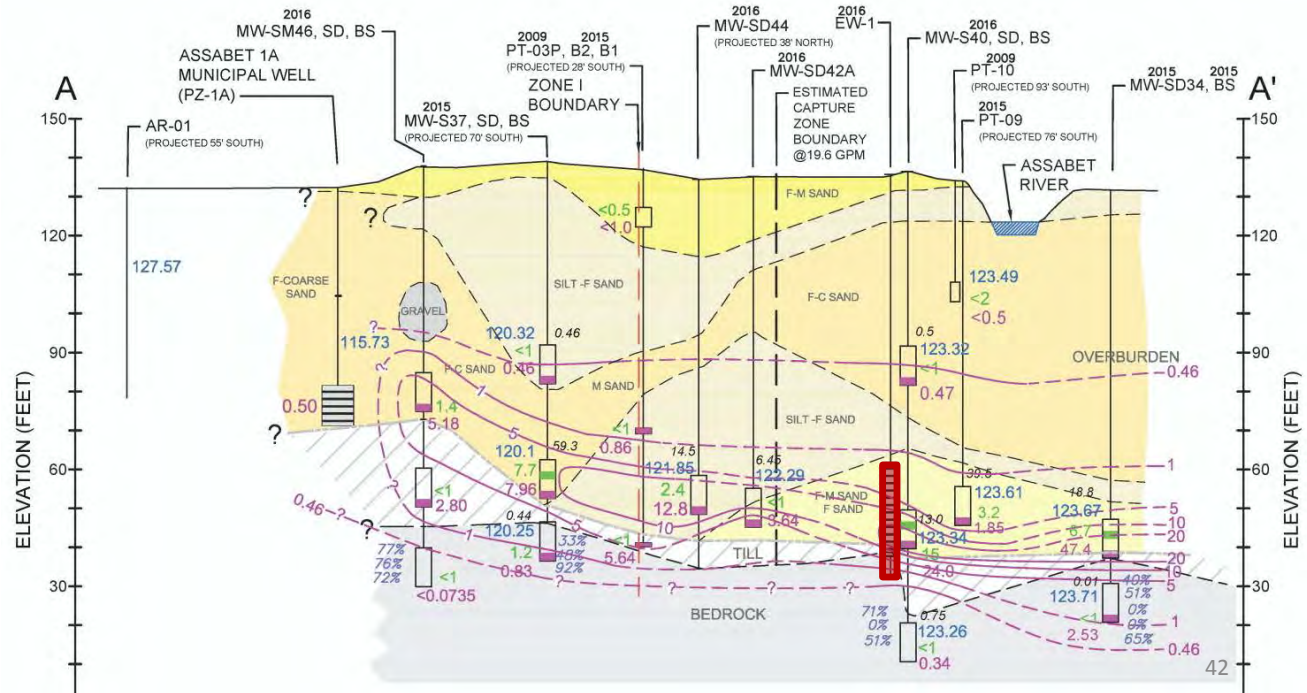
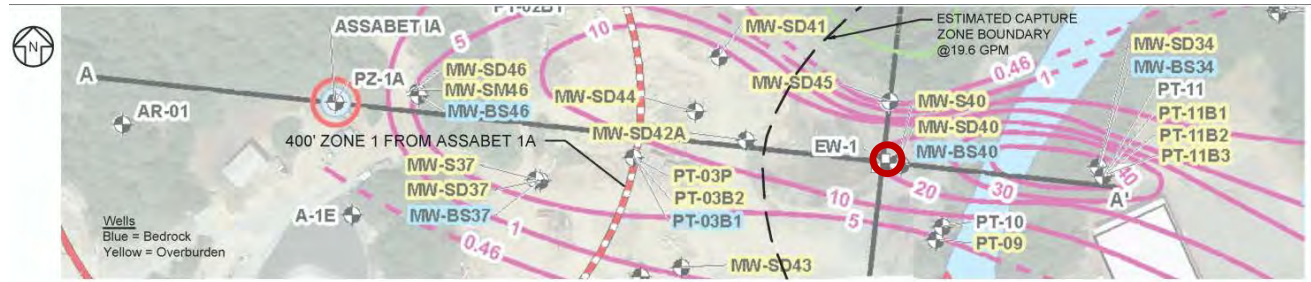



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Plume in Cross-Section

○ EW-1

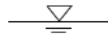
ROD CLEANUP LEVELS		
MCLs ug/L		
	TCE	5
RISK BASED ug/L		
	1,4-DIOXANE	0.46



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Next Steps

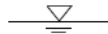
- Groundwater NTCRA
 - Operate, monitor, and evaluate Temporary System performance
 - Perform Treatability Study to identify optimum long-term approach for 1,4-dioxane treatment
 - Design, procure, and install long-term treatment system (goal is to have that system in place by end of 2017)
- Remedial Design / Remedial Action
 - Negotiations in progress. Design process will start once Consent Decree and funding are in place.



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In Closing

- The NMI site team is sensitive to the concerns of the community and is actively working to address unacceptable risks posed by the site through this cleanup.
- Over the last several years, there has been a substantial amount of work done and progress made at the site that may not be visible, but the work is active and ongoing.
- The site team has been and continues to communicate with the Acton Water District (AWD) and share information with town officials and key stakeholders. The site team wants the community to feel informed and educated about the work and progress made at the site.



de maximis, inc.

Additional Information / Contacts

Project Websites: www.epa.gov/superfund/nmi and www.nmisite.org

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