RESTORATION ADVISORY BOARD MEETING
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NWIRP), BETHPAGE
VIRTUAL MEETING
WEDNESDAY, APRIL 14, 2021

The forty-seventh (47th) meeting of the Restoration Advisory Board (RAB) was held online as a virtual meeting hosted by WebEx. Meeting attendees included representatives from the Navy (Brian Murray, Jim Watts-Gravette, Scott Sokolowski, and David Todd), United States Environmental Protection Agency (USEPA)(Carol Stein), New York State Department of Environmental Conservation (NYSDEC) (Don Hesler and Jason Pelton), New York State Department of Health (NYSDOH) (James Sullivan and Jacquelyn Nealon), Nassau County Representative from Rose Walkers office (Joanne Foley), Bethpage Water District (BWD) (Michael Boufis), Massapequa Water District (MWD) (Stan Carey), New York American Water (NYAW) (Lee Mueller, Richard Kern, Natasha Niola and John Kilpatrick), South Farmingdale Water District (SFWD)(Gary Bosnan), Tetra Tech (David Brayack, Ernie Wu, Melissa Cushing, Vin Varricchio, Beau Benfield, Will Yeung, and Lauren Donston), AGVIQ (Steve Matney) and APTIM (Monica Smeal). RAB members in attendance were Sandra D'Arcangelo, Edward Olmstead, Bill Pavone, and Ethan Irwin). There were approximately 19 additional attendees from Bethpage and neighboring communities in attendance. The meeting attendance sheet is provided in Appendix A. The Agenda and Definitions are provided in Appendix B.

WELCOME AND AGENDA REVIEW

The Tetra Tech representative Ms. Boltz began the meeting and identified call in users. The Navy representative, Mr. Murray welcomed everyone stating that the RAB meeting will be on the progress the Navy has made since the last meeting in November. Mr. Murray also reviewed the agenda and the question and answer process. Mr. Murray introduced the other Navy representatives, RAB member Mr. Pavone, Ms. Smeal (APTIM), Mr. Matney (AGVIQ) and Mr. Brayack (Tetra Tech). Mr. Pavone also welcomed everyone to the 47th RAB. Mr. Pavone stated the remedial action has been going on for 20 to 30 years at this point, and it is important that we have community participation. In addition, he introduced the RAB members present on the web meeting.

SITE 1 FORMER DRUM MARSHALLING AREA REMEDIAL ACTION CONSTRUCTION UPDATE

Ms. Smeal, APTIM, and Mr. Murray, Navy, provided an update of the NWIRP Bethpage Site 1- Former Drum Marshalling Area history and the remedial action in progress for the soil, soil vapor, and groundwater remedy. The Remedy consists of soil excavation, offsite disposal and capping, groundwater monitoring, and enhanced soil vapor

extraction that is currently being implemented. Ms. Smeal reviewed the excavation, restoration and monitoring, progress that took place. Post construction maintenance will continue for 30 months to ensure proper site restoration. Future work consists of expanding the existing Soil Vapor Extraction System and installation of new groundwater monitoring wells. The presentation is included in Appendix C.

CONSTRUCTION AND OPERATION OF ADVANCED OXIDATION PROCESS (AOP) UNIT, THE GM-38 GROUNDWATER TREATMENT SYSTEM

Mr. Matney, AGVIQ and Scott Sokolowski, Navy provided an update on the GM-38 system upgrade to include the AOP, how it works and the schedule. The AOP will be used to treat higher levels of TCE and is designed to remove 1,4-dioxane to less than 0.5 micrograms per liter (µg/L). Commissioning of the AOP unit is scheduled for April 2021, equipment testing and startup to be completed in May 2021 and the AOP Operations, Monitoring and Maintenance (OM&M) phase is to be conducted from May 2021 through May 2022. The presentation is included in Appendix C.

PHASE I RE108 AREA HOTSPOT TREATMENT SYSTEM CERCLA ACTION CONSTRUCTION UPDATE

Ms. Smeal, APTIM, reviewed the Phase I status, progress to date and provided a timeline for system design and installation. The Phase I system, which addresses the northern portion of the Volatile Organic Compound (VOC)-impacted groundwater, includes an extraction well (RW-4), installed in October 2020 and double-wall piping from the RE108 Area Hotspot to the Navy's existing GM38 Area Hotspot Treatment System. The existing Nassau County (NC) 495 Recharge Basin currently being used for GM38 discharge will also be utilized for the treated Phase I RE108 Hotspot discharge. Currently, RW-4 is pumping water to the GM-38 plant for treatment and the draft construction completion report is in progress. The presentation is included in Appendix C.

PHASE II CONSTRUCTION (RW6) AND PHASE III – SOUTHERN PLUME INTERCEPT TREATMENT SYSTEM UPDATE

Mr. Brayack, Tetra Tech and Mr. Murray, Navy, reviewed the Phase II status and provided a timeline for the Phase II and III Systems. The RE108 Area Hotspot Phase II System would intercept contaminated groundwater not captured by the Phase I System. The Phase II System will include groundwater extraction, treatment, and a discharge system to capture the RE108 Area Hotspot groundwater near the downgradient edge of the plume. Groundwater will be treated to drinking water standards then re-introduced into the aquifer through stormwater basins. The Phase II System design and construction is on schedule. Property at 11 Union Avenue has been purchased to construct a treatment plant building, recovery well installation started in March 2021 and

system completion is anticipated for late 2022 or early 2023. The Phase III – Southern Intercept Treatment System would target deeper groundwater contamination that is not captured by the Phase II System. Drilling at Twin Lane started in March 2021 and the treatment system should be in place by late 2022 or early 2023. The treatment plant construction and operation is anticipated to start in 2024. The presentation is included in Appendix C.

ONGOING ENVIRONMENTAL RESTORATION ACTIONS UPDATE

Mr. Murray, Navy, provided a summary of ongoing Environmental Restoration Activities at NWIRP Bethpage. Mr. Murray reviewed the Operable Unit (OU)2 offsite groundwater Explanation of Significant Differences (ESD) update, the drilling program to fill data gaps in the shallow and intermediate plumes, the evaluation of OU2 using groundwater flow modeling and announce the new Remedial Project Manager for Bethpage. The presentation is included in Appendix C.

QUESTIONS AND COMMENTS

Following each technical presentation, the meeting was opened for follow-up questions and discussions for the RAB members. Following the last presentation, residents' questions were discussed. The discussion questions and answers are below:

Site 1 - Former Drum Marshalling Area Remedial Action Construction Update – APTIM (Monica Smeal) and Navy (Brian Murray)

1. Mr. Pavone inquired about the hydrocarbons that were identified, can you identify what specific compounds were found, as far as was it polynuclear aromatic hydrocarbon (PAH)? Mr. Murray responded, PCBs and PAHs are relatively common and are typically associated with asphalt. The Construction Completion Report (CCR) will have all the data from all the analyses of the soil that was disposed of. All the data pre-excavation is on the Bethpage website or the administrative record in the remedial investigations and the feasibility studies. Mr. Pavone then replied if cresote could be an example of that? Mr. Murray replied he does not know if it is a PAH.

Construction and Operation of Advanced Oxidation Process (AOP) Unit, The GM-38 Groundwater Treatment System – AGVIQ (Steve Matney) and Navy (Scott Sokolowski)

2. Mr. Olmstead inquired if this is the plant just west of Route 135? Mr. Murray replied, yes. It's been there since 2009. So, we had enough space inside that building to add this additional piece of equipment. Mr. Olmstead then asked if he could have a tour of the treatment plant. Mr. Murray replied if Mr. Olmstead worked with himself or Mr.

Gravette they could coordinate a brief meeting and a tour. Mr. Pavone also commented that he would like a tour as well.

3. Mr. Pavone inquired about the AOP process and his understanding of the process explaining the Advanced Oxidation Process (AOP) combines the hydrogen peroxide with the use of ultra violet light, creating free radicals of hydroxide which then attach themselves to the 1,4-dioxane and combine and create a reaction breaking down the 1,4-dioxane. Mr. Pavone then inquired how is the water treated? Mr. Murray replied once that water leaves the AOP it is treated to remove any residual hydrogen peroxide and then it is discharged. Mr. Matney added we are on the back end of the system, so it's still going through the rest of the system that can treat for the rest of the contaminants. Mr. Murray continued, we're going collect performance sampling on the influent and effluent sides, so we know what the concentration of VOCs and other chemicals coming into the plant, like with 1,4-dioxane and what was coming out before it goes to that discharge basin. We have a pretty rigorous sampling protocol in place to make sure that the water leaving the system does not contain anything it's not supposed to in terms of the hydrogen peroxide or 1,4-dioxane. The system will have to be adjusted. If the light energy from the ultra violet light needs to be adjusted to enhance the breakdown, we can do that. Mr. Matney mentioned the resonance time, essentially the time the water enters the chamber until it exits. We want to optimize that so we're pushing water through. If we're having insufficient breakdown of the compounds, we want to have water flow through there. We ran a test using a skid-mounted unit to run concentrations on the influx we expected and see what we'd get and incorporated that information into the design.

Mr. Pavone questioned the path of the water through the treatment plant. Mr. Brayack responded, the water comes from the wells, to an equalization tank where it's blended. From there, the water is sent to an air stripping tower. The air stripping tower removes the majority of the VOCs, but some remain behind and 1,4-dioxane stays in the water. From there, hydrogen peroxide is added. It goes through the AOP reactor at that point. The contact time in the AOP reactor is in a matter of seconds, it's a quick reaction. The radicals have short half-life, typically one second or less, so those break down. There is residual hydrogen peroxide, so we run this water with the residual hydrogen peroxide through our granular activated carbon units and that removes any trace impurities that we might have, and it also breaks down the residual hydrogen peroxide. From there, it goes to our recharge basin. What Mr. Murray was mentioning is when we first start the reactors up, we need the lamps to warm up. They're kind of like a florescent bulb, they take a little time to warm up, and we need to get the peroxide stabilized. So, for the first five minutes of operation, the water recycles back to the front of the treatment plant until we get all the parameters stabilized, and once everything is stabilized, we're able to discharge the water.

Phase I RE108 Area Hotspot Treatment System CERCLA Action Construction Update – APTIM (Monica Smeal)

4. Mr. Olmstead inquired, at 400 gallons per minute (gpm) you have 400 gpm coming out, do you have a basin that can handle that much water and it is secure so kids cannot get in it? Mr. Murray, replied the plant produces 1,000 gpm per minute and it is secured with a locked fence. RW1 and RW4 water will discharge into the basin and the basin can handle it. Mr. Olmstead continued, is the basin parallel to RT.135. Mr. Murray replied, the basin is parallel to Arthur Avenue basin near the eastern end, that's where the pipeline terminates and connects with the RW3 well. Since we already had a pipeline from RW3 to the GM-38 plant, that's where we connected the new pipeline from RW4.

Phase II Construction (RW6) and Phase III – Southern Plume Intercept Treatment System Update – Tetra Tech (Dave Brayack) and Navy (Brian Murray)

Ed Olmstead was commending the team for the plan they put together and further commented the Navy was heading in the right direction.

5. Mr. Pavone inquired about the safety of the Rt.107 construction timing if it is going to be in the winter and may interfere with plowing and if it could be scheduled during warmer months? Proper staffing so disruptions will be minimalized is very important. Mr. Pavone added the new Phase III location for RW8 treatment plant should be away from Southern State Pkwy because of the high rate of motor vehicle accidents, please take that into consideration and additional safety measures like guardrails will probably be required. Mr. Murray replied that the we intend to keep the RW8 Plant near Twin Lane but shift to the east so it is not in the direct line of view of the residents. There is a concern with the impact from car accidents and we will work with the Department of Transportation about protective measures. This is not much of a concern for RW9 because it is just a well head. RW10 and RW11 will be on north side of the Southern State Pkwy to capture a different part of the plume.

Mr. Pavone added that the space on Twin Pkwy is less than 200 feet, so the more it can be tucked in the better, it will be safer. Mr. Murray replied we have not picked out a recharge basin to put this water in yet, we have to complete the drilling of the VPBs and the next phase where we identify a basin.

6. Mr. Olmstead mentioned the Navy might want to discuss this with the planning department and state Department of Transportation. Mr. Murray replied we will be

going underneath Seamen's Neck Road and Rt.135 with a directional drill and will engage with the Department of Transportation when we get closer to design.

Ongoing Environmental Restoration Actions Update - Navy (Brian Murray)

Mr. Pavone thanked Mr. Murray for the direction of the project and huge amount of change. Mr. Murry introduced Mr. Watts-Gravette as the new Navy Project Manager for Bethpage.

7. Mr. Koch inquired what is RW9 well intercepting? If you overlap the plume, it is not in that area. Why not intercept the plume more north before it contaminates more groundwater? Mr. Murray replied the intent of these wells is to intercept at the southernmost extent of the OU2 Plume. RW7 is an extension of Phase 2 System. If that is not successful, we have RW8 and RW9 to intercept the plume. RW10 and RW11 will be to the east and intercept the shallow plume that is more in the shallow and intermediate intervals at lower concentrations.

8. Mr. Koch added, in addition to that, and this is directed for New York American Water (NYAW) which has a municipal well directly to the west of that school on East Broadway. It's identified it looks like an "H" in white underneath the yellow on this graphic. That is at a depth of I believe between 600 and 900 feet. So, you know, between RW7, the municipal well, 8 and 9, hopefully we'll have some containment. Is that a good assessment? Mr. Murry replied, we don't want to depend on public water supplies as acting as remediation wells, that's not incorporated into our design. The flow fields from all the public water supplies in addition to our recovery wells will allow us to predict where our captures are being effective and/or ineffective, and then also like I mentioned with the depiction of the plume, we'll be able to understand the behavior of the plume once the systems are activated. In addition, the New York American Water municipal well already has an activated carbon and they're in the design stage of the AOP system to be implemented. The Granular Activated Carbon (GAC) currently in operation for I guess it's been about six years was, in fact, paid for by the Navy.

9. Mr. Greco inquired when did the Navy accept AOP? Are there operators trained and what sort of certifications do they have for treating AOP? Mr. Murray replied, the Navy did an evaluation of the Advanced Oxidation Process (AOP) in our engineering analysis and then we went to a prove-out using that pilot test with a skid-mounted unit. One of the industry standards currently right now for the treatment of 1,4-dioxane. We've been working with a manufacturer that provided the unit, which you saw was Trojan. That's the same manufacturer that I believe provided a much larger unit to Bethpage Water District's, and we have been working with them. They will assist us essentially on the ramp-up of that system and how it operates, and from that, we will

train operators ourselves on their systems, and that is part of the duration of AGVIQ's contract while we work the details out of it and they will train essentially the existing Plant Operator on that system. It has been integrated into our computer monitoring system for the plant. We're understanding now its inputs and outputs and how to control it. So there is a bit of a learning curve, but we do have the resource of the manufacture there to assist as we learn how to do that.

10. Mr. Olmstead inquired if the Navy could send a copy of the 3D depiction of the plume? Mr. Murry replied we can try and take a couple shots at different angles and post on the Bethpage website as a supplement to this meeting, we will also email that out to our RAB members.

11. Mr. Pavone added can you do a video or time lapse, a video progression and how the plume has traveled the last 70 years. Mr. Murray replied, the graphic program we use does not go backwards and forward in time. Essentially if we did a video, it would be of the plume as it exists today. I'm a bit reluctant to release something right now because it is in draft form. We can release some stills that show it, but I guess I'll ask Jim if he can make that a part of the next RAB. Maybe we can depict it on the screen or show it on the screen where the audience can see it being rotated. That may be beneficial to understand the plume and its shape over time.

12. Mr. Carey inquired, where does the Navy think the leading edge of the plume will be in 2024? MWD is concerned with the schedule. Are the Navy modelling efforts redundant to those of the NYSDEC, HDR and the US Geological Survey? Mr. Murray replied, I can address the first part of that. The Navy looked at essentially the indicator wells at the leading edge of the plume. We did a projection of when a concentration at 5 parts per billion or greater would arrive at the MWD wells. Currently, that timeframe is roughly 40 years. We're not going to depend upon it as a definitive answer, but it does give us a little comfort looking at the dynamics of this plume and where we are right now, that we'll have that Phase III system up and running and be able to intercept the plume in the event it's migrating at a faster rate.

Mr. Pelton addressed the second part of the question stating just like the Navy is performing groundwater flow monitoring, we've partnered with the United States Geological Survey to complete our own 3D groundwater flow modelling. In addition to the Navy's modelling work, we're going to be doing our own independent groundwater flow monitoring to evaluate the various elements of the comprehensive remedy to address the Navy Grumman groundwater plume. That would include any of the work the state performs, all the work Mr. Murray has outlined here tonight, that they'll be performing as part of their commitments to address the plume, and then we'll factor in all the work that Northrop Grumman's going to be and already performing to address the plume. Our model will also factor in, just like the Navy's, the use of all the public water

supply wells in the area. The NYSDEC model is kind of an independent check that we'll use when we go and evaluate the elements of the Navy and Grumman actions. Mr. Pelton added, there is a lot of data sharing amongst the three parties here. We share the data we collect with both Navy and Northrop Grumman and they do the same for us. There is no way that this comprehensive remedy, this complex remedy can really be implemented effectively working in isolation. You know, the three parties here, you know, really, and working with the local water districts and the communities all really need to be fully engaged in the implementation of the project to have it really be successful, I'd say, you know, from evaluating data to getting access to properties and, you know, getting thoughts and identify possible concerns associated with those that live right there in those neighborhoods and know the roads and the locations the best. And just to get back to that modelling point, you know, we have already held a kind of collaboration meeting with the Navy and Northrop Grumman about a month ago just to kind of give everyone an update on where we are with our models and kind of what our next big steps are.

13. Ms. D'Arcangelo inquired when we were discussing the AOP treatment process getting started with it from the well head to the equalization tank and then blending, and then into the treatment, what are we blending? Mr. Murray replied we have to blend water from the two recovery wells, that first tank takes the water from both and then is moved into the treatment system, RW1 and RW4. Rather than having two separate streams coming into the plant, that first tank essentially takes the water from both of those and then it's moved into the treatment system.

14. Mr. Pavone inquired about the VPB fact sheets that are usually available at the in-person meeting, hoping they are all available on the Navy website? Mr. Murray replied we can consolidate into one location and put on the website so it will be in one location.

CLOSING REMARKS

At the conclusion of the meeting, Mr. Murray thanked the attendees for their participation. The next RAB meeting was planned for Fall 2021. The meeting was then adjourned.

APPENDICES

APPENDIX A

14 APRIL 2021 RAB MEETING ATTENDEE LIST

Attendees for April 14, 2021

1	Benfield, Beau
2	Boltz, Jackie
3	Boufis, Mike
4	Brayack, Dave
5	Brosnan, Gary
6	C, Elayne
7	Carey, Stan
8	Catalano, Rich
9	Cushing, Melissa
10	D'Arcangelo, Sandra
11	Donston, Lauren
12	Foley, Joanne
13	Frantz, Aaron
14	Greco, Scott
15	Greco, Sal
16	Hesler, Donald
17	Humann, Richard
18	Irwin, Ethan
19	Kern, Richard
20	Kilpatrick, John
21	Koch, Frank
22	Lehtinen, Mike
23	McClinchy, Kelly
24	Misut, Paul
25	Mucha , Jordan
26	Mueller, Lee
27	Murray, Brian
28	Nealon, Jacquelyn
29	Niola , Natasha
30	Noss, Ann
31	Olmsted, Edward
32	O'Rourke, Dan
33	Pavone, Bill
34	Pelton (NYSDEC), Jason

35	Picunas, Amy
36	Reinhardt, John
37	Sachs, Phil
38	Smeal, Monica
39	Stein, Carol
40	Sullivan, James
41	Taylor, Mary Anne
42	Todd , David
43	Tomaselli, Travis
44	Tuohy, Christina
45	Varricchio, Vincent
46	Wu, Ernie
47	Xu, XUan
48	Yeung, William

APPENDIX B

RAB MEETING AGENDA AND DEFINITIONS

TETRA TECH

Agenda for Restoration Advisory Board

Naval Weapons Industrial Reserve Plant Bethpage

Date: April 14, 2021
By Internet: https://tinyurl.com/BPRAB414
By Telephone: +1-408-418-9388 **Access Code:** 132 403 3727

Time: 7:00 PM

Location: Virtual

RAB Presentations: 7:00 PM to approximately 8:30 PM

- Webinar Information and Ground Rules – Tetra Tech (Jackie Boltz)
- Introduction of RAB members, regulators and presentations – Navy (Brian Murray)
- Site 1 - Former Drum Marshalling Area Remedial Action Construction Update – APTIM (Monica Smeal) and Navy (Brian Murray)
- Construction and Operation of Advanced Oxidation Process (AOP) Unit, The GM-38 Groundwater Treatment System – AGVIQ (Steve Matney) and Navy (Scott Sokolowski)
- Phase I RE108 Area Hotspot Treatment System CERCLA Action Construction Update – APTIM (Monica Smeal)
- Phase II Construction (RW6) and Phase III – Southern Plume Intercept Treatment System Update – Tetra Tech (Dave Brayack) and Navy (Brian Murray)
- Ongoing Environmental Restoration Actions Update - Navy (Brian Murray)
- RPM turnover – Navy (Brian Murray and Jim Gravette)

RAB questions following presentations: 8:30 PM to approximately 9:30 PM

- Questions – Community Co-Chair
- Closing remarks – Navy

Copies of information can be found at the document repository located at the Bethpage Public Library, 47 Powell Avenue, Bethpage NY 11714 (516-931-9307) or online at https://go.usa.gov/DyXF

Tetra Tech, Inc.
5700 Lake Wright Drive, Suite 102, Norfolk, VA 23502
Tel 757.461.3768 Fax 757.461.4148 www.tetratech.com

Definitions and Clarification of Terms, Acronyms and Abbreviations For the Bethpage Restoration Advisory Board (RAB)

- **Basic:**
  - Aquifer
    - an underground layer of water-bearing permeable rock or unconsolidated materials
  - BGS - Below Ground Surface
  - BWD Plants- Bethpage Water District Plants
  - Capture Zone
    - Area of water whose flow direction is influenced by pumping
  - Down gradient
    - The direction of groundwater flow
  - Effluent
    - Is an outflow of water from a treatment source
  - Free Product
    - Substance (usually oil or gasoline) that exists in its own state-it is not dissolved in water.
  - gpm- gallons per minute
  - Ground Water
    - Water flows through open pore spaces of soil
  - HDPE - high density polyethylene (HDPE) pipe with
  - Hot spot
    - Area where trichloroethylene is at a concentration greater than 1000 parts per billion
  - MWD- Massapequa Water District
  - NC- Nassau County
  - NG- Northrop Grumman
  - No. 6 Fuel Oil- tar
  - NWIRP- Naval Weapons Industrial Reserve Plant
  - NYAW- New York American Water
  - OU- Operable Unit
  - PAH- polynuclear aromatic hydrocarbons
  - PCB- Polychlorinated Biphenols (used as transformer cooling fluid)
  - Plume
    - An area that impacts from chemicals are detected in
  - Raritan Clay Layer
    - A geologic horizon - Clay that is approximately 800-100 feet below ground surface – accepted to be the bottom of the Magothy aquifer
  - RCP – reinforced concrete pipe
  - Soil Vapors
    - Gases contained in the pore spaces of soil
  - SFWD- South Farmingdale Water District
  - Trichloroethylene (TCE)-
    - Volatile organic compound of concern (used as a degreaser in manufacturing)
  - VOC--Volatile Organic Compounds:
    - Chlorinated solvents (typically used as degreasers in manufacturing

- **Data Gathering:**
  - Delineate- define boundaries
  - Gauging- measurement of ground water levels from top of ground surface
  - In-situ – in place
  - Monitoring Well- (typically 2-6 inches in diameter) a well used to provide a "snapshot" of water quality when sampled
  - ppm – parts per million
  - VPB- Vertical Profile Boring
  - µg/L- micrograms per liter

- **Treatment Technologies:**
  - Advanced Oxidation Process (AOP)
    - AOP system is based on the combination of hydrogen peroxide and ultraviolet (UV) light, which forms a very local and short-lived oxidizer (hydrogen radical)
  - Air Stripping
    - Removal of dissolved volatile organic compounds from water by transferring it into air
  - Biodegradation
    - Reduce a chemical by changing conditions so that bacteria can break down the chemical
  - Biosparging
    - Removal of chemicals by breaking them down with bacteria
  - Equalization Tank
    - Tank for mixing
  - EX- NYSDEC Mass flux extraction wells
  - GAC- Granular Activated Carbon
  - GCL – geosynthetic clay liner
  - HC- NYSDEC Hydraulic Containment
  - Land Use Controls
    - Action that restricts what land can be used for
  - Liquid Phase Granular Activated Carbon Polishing
    - Removal of remnants of a volatile chemical by passing liquid through carbon; used to remove trichloroethylene
  - Operations, Monitoring and Maintenance (OM&M)
  - On-site Containment Treatment System (ONCT)
    - Series of wells that remove and treat groundwater at the southern edge of the former Northrop Grumman property
  - Recharge basin
    - Sandy basin that receives storm water and allows water to filter down into the ground
  - Recovery Well (RW)
    - (Typically larger diameter 12 to 36 inches) a well used to recover oil or water containing chemicals
  - Steam Injection/Free Product Recovery
    - Heating of oil that has a tar like consistency with steam to make it flowable (syrup like consistency) so that it may be removed
  - SVECS—Soil Vapor Extraction Containment System
    - Vacuum for volatile chemicals trapped in the air between soil particles; used to remove trichloroethylene
  - Vapor Phase treatment-
    - Removal of a chemical from gas; used to remove trichloroethylene from air vapor

- **Regulatory:**
  - AROD- Amended Record of Decision
  - Compliance sampling- collection of samples to demonstrate that chemicals are below regulatory levels
  - CCR- Construction Completion Report
  - CERCLA- **Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)** – the legal mechanism for cleaning up inactive hazardous waste sites at DOD (Depart of Defense) facilities, this is the defining regulation for the Navy's Environmental Restoration (ER) Program at NWIRP Bethpage under NYSDEC authority.
  - ESD- Explanation of Significant Differences
  - Feasibility Study- collection of data used to determine if a remedy will work
  - Five-Year Review (FYR)- required by CERCLA and is prepared in accordance with USEPA guidance. To evaluate the effectiveness of the remedies to determine if they continue to protect human health and the environment in accordance with the requirements set forth in the Record of Decision (ROD).
  - NYSDEC- New York State Department of Environmental Conservation (NYSDEC) provides regulatory review and approval of Navy actions at NWIRP Bethpage
  - NYSDOH- **New York State Department of Health (NYSDOH)** assists NYSDEC.
  - PDI- Pre-Design Investigation
  - Proposed Plan- Plan of action that is sent to the state for approval prior to the Final Record of Decision
  - RCRA- **Resource Conservation and Recovery Act (RCRA) Corrective Action** – a statutorily required cleanup program, similar to CERCLA, that addresses active solid waste management units and contaminated media as a condition of RCRA permits - NWIRP Bethpage has a RCRA Permit with NYSDEC
  - ROD –Record of Decision
  - SR- selected remedy
  - USEPA- **United States Environmental Protection Agency (USEPA)** Provides federal review of the Navy actions.

APPENDIX C
PRESENTATIONS

NWIRP BETHPAGE
Restoration Advisory Board

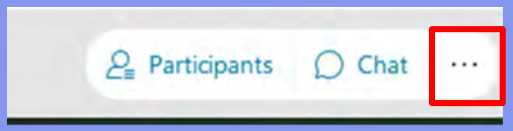
April 14, 2021 - Meeting Agenda

- **Welcome**
- **Introductions**
- **Presentations (available at https://go.usa.gov/DyXF)**
- **Q&A Session**
- **Updates**

Thank you for joining us. The meeting will begin at 7:00pm.

If you are experiencing technical difficulties, contact WebEx by telephone at 1-866-779-3239.

Closed Captioning: Select Panel Options icon (3 dots in lower right of screen) and select Multimedia Viewer.



WELCOME

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT

BETHPAGE

RESTORATION ADVISORY BOARD

VIRTUAL MEETING

APRIL 14, 2021

7:00 P.M.

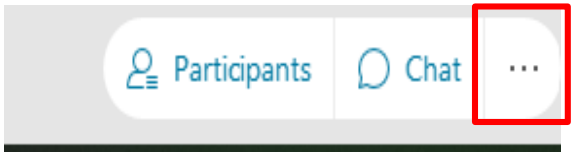
VIRTUAL MEETING INSTRUCTIONS

- Attendee cameras are not being used; no attendees will be viewed by others
- Attendee microphones will remain muted except when recognized for questions
- Webinar sign-in names will be used for the record
- RAB Members will have 10 minutes following each presentation to ask questions
- Attendees will have an opportunity to ask questions or comments after all presentations are complete
- Please be respectful of others, even if you don't agree with their comments

Q&A OPTIONS

1. **Ask a question** by typing it in the **Q&A box**.

   Click three white dots "More Options" icon in bottom right of screen to open the Q&A box.



2. **Raise your hand** to be recognized and have your microphone unmuted.

3. **Phone-only attendees** can dial *3 to raise their hand and have the opportunity to ask a question.

AGENDA

- Welcome and Virtual Meeting Instructions - Jacqueline Boltz, Tetra Tech
- Welcome and Agenda Review, Brian Murray, NAVFAC Mid-Atlantic RPM, & David Sobolow RAB Co-chair
- Community Update, David Sobolow, RAB Co-chair
- Technical Progress (RAB Members will have 10 minutes for Q&A after each presentation)

  - Site 1 - Former Drum Marshalling Area Remedial Action Construction Update– APTIM (Monica Smeal) and (Navy) Brian Murray
  - Construction and Operation of Advanced Oxidation Process (AOP) Unit, The GM-38 Groundwater Treatment System – AGVIQ (Steve Matney) and Navy (Scott Sokolowski)
  - Phase I RE108 Area Hotspot Treatment System CERCLA Action Construction Update – APTIM (Monica Smeal)
  - Phase II Construction (RW6) and Phase III – Southern Plume Intercept Treatment System Update – Tetra Tech (Dave Brayack) and Navy (Brian Murray)
  - Ongoing Environmental Restoration Actions Update - Navy (Brian Murray)
  - RPM turnover – Navy (Brian Murray and Jim Watts-Gravette)

- Attendee Questions and Answers until 10pm
- Closing Remarks, Brian Murray, NAVFAC Mid-Atlantic

RAB

RAB CO-CHAIRS

David Sobolow

Brian Murray

RAB MEMEBERS

Sandra D'Arcangelo

Robert Horan

Ethan Irwin

Jeanne O'Connor

Ed Olmsted

Bill Pavone

Irene Shapiro

Roy Tringali

Rose Walker

PANELISTS

NAVY

Brian Murray, Jim Watts-Gravette, David Todd, Melissa Forrest, Jeff Doepp, Scott Sokolowski

NYSDEC

Don Hesler and Jason Pelton

NYSDOH

James Sullivan and John Lovejoy

TETRA TECH

Kristi Francisco, David Brayack, Ernie Wu, Melissa Cushing, Lauren Donston, and Jacqueline Boltz

AGVIQ

Steve Matney

APTIM

Bill Deane and Monica Smeal

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Site 1 – Former Drum Marshalling Area
Remedial Action Construction Update

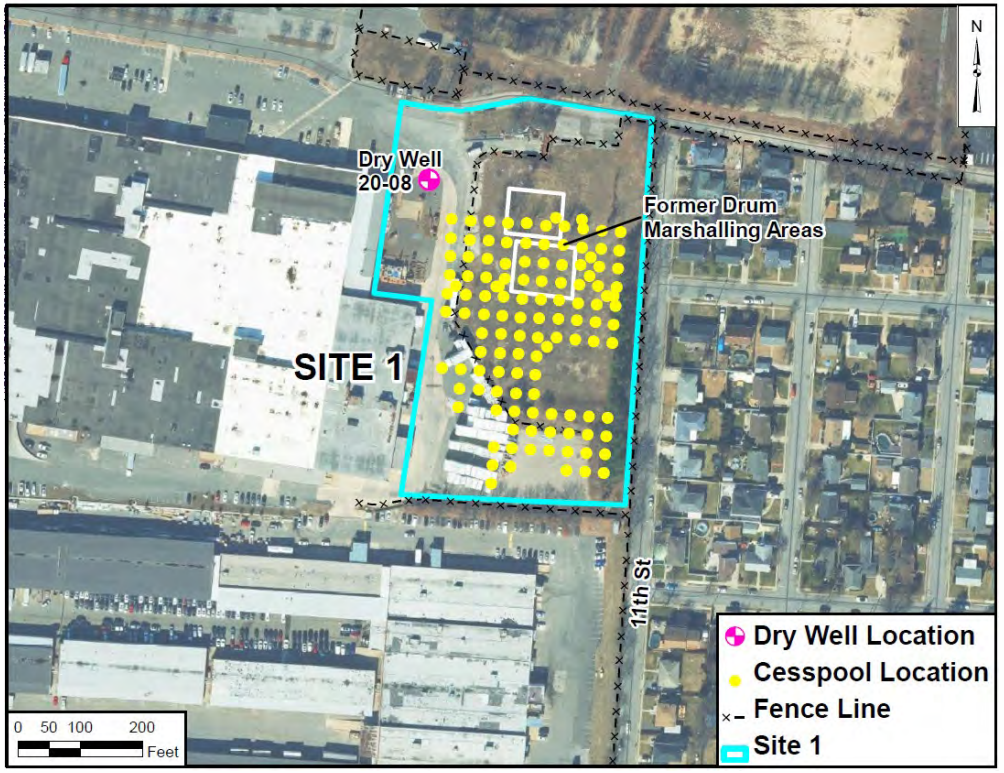
Presented by:
Monica Smeal, Project Manager
APTIM Federal Services, LLC
14 April 2021

Presentation Topics

- Site 1 History
- Remedial Action Recap
- Reporting & Follow On Action
- Site Restoration Progress Update
- Schedule

Site 1 History

- The 2018 Operable Unit 4 Record of Decision selected remedy includes a limited excavation to remove and dispose of PCB-impacted soils and install a reduced permeability cover.
  - Two former drum marshalling pads
  - 120 abandoned cesspools for sanitary waters from Plant 3
  - Former drywells used for the storm water management system is included in the Site 1 Remedial Action Construction
- Soil contaminants include: Polychlorinated biphenyls (PCBs), chlordane, polynuclear aromatic hydrocarbons (PAHs), and metals



Site 1 Remedial Action focused on soil removal

Remedial Action Recap

- 45,000 cubic yards (cyds) of contaminated soil removed
- Truckloads: 2,934 shipped off-site
- All soils were transported and disposed of off of Long Island at facilities permitted to accept each waste stream

Excavations extended as deep as 30-feet down

Remedial Action Recap

- Geosynthetic Clay Liner (GCL) was installed over the 20-feet and 30-feet deep excavation areas.
- GCL acts a barrier preventing water from infiltrating the soil beneath.

Remedial Action Recap

- Imported clean soil and reused clean Site 1 soil as fill material
- Backfilled areas were restored to pre-construction conditions; including asphalt and vegetative covers

Reporting & Follow On Action

- A Draft Completion Report was submitted in Dec 2020 for Navy review. The Report includes:
  - Sample results
  - Final construction documents with excavation depths
  - Soil disposal summaries
  - Certification of destruction/proper disposal
  - Photographic logs
- Post Construction Maintenance is continuing – 30 months to ensure establishment of plantings and grasses
  - Monthly site inspections
  - Bi-annual mowing
  - Reseeding or replanting trees as needed
  - Maintenance/removal of erosion and sediment controls

Site Restoration Progress Update – Evergreen Trees Planting

- 76 evergreen trees (green giant arborvitae) were planted, in addition to the 42 glory maple and pin oak trees planted in June 2020.
- Tree planting plan was developed in cooperation with a local ISA-certified arborist.

Schedule

- Coordination with Steel Equities (Adjacent Tenant at former NWIRP Property) is ongoing
- Progress updates to the Restoration Advisory Board is ongoing
- Draft Operation and Maintenance Plan submitted August 2020
- Draft Construction Completion Report submitted December 2020
- Restoration: Additional evergreens planted March 2021
- Post-Construction Maintenance is ongoing
- Future work includes expansion of the existing of the Soil Vapor Extraction system and installation/monitoring of new groundwater monitoring wells.

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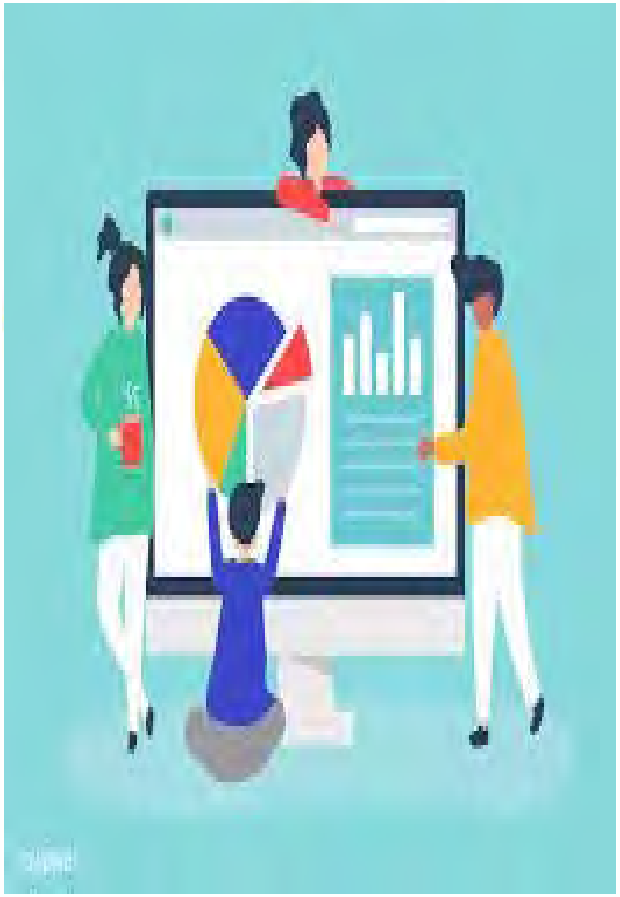
Construction & Operation of Advanced Oxidation Process Unit GM38 Groundwater Treatment System

Presented by:
Stephen Matney, Project Manager
AGVIQ
14 April 2021

Presentation Outline

- GM38 Groundwater Treatment Plant
- GM38 Treatment System Upgrade
- How it Works
- Progress to Date
- AOP Commissioning and Testing
- Schedule



GM38 Groundwater Treatment Plant

- GM38 groundwater treatment plant is located to extract groundwater from the GM38 Area Hotspot (TCE>1,000 µg/L)
- Hotspot first identified in the 1990's
  - Treatment system started operation in 2009 and continues to operate (24/7)
  - Treated over 4 billion gallons of water to drinking water standards

- Dept. of Navy identified need for 1,4 dioxane treatment and performed an Engineering Evaluation/Cost Analysis
- Selected treatment technology is Advanced Oxidation Process (AOP)
- A pilot study was completed at GM38 using a portable AOP system, providing needed data for an upgrade design

Groundwater extracted from new RW4 well is expected to contain higher concentrations of 1,4-dioxane

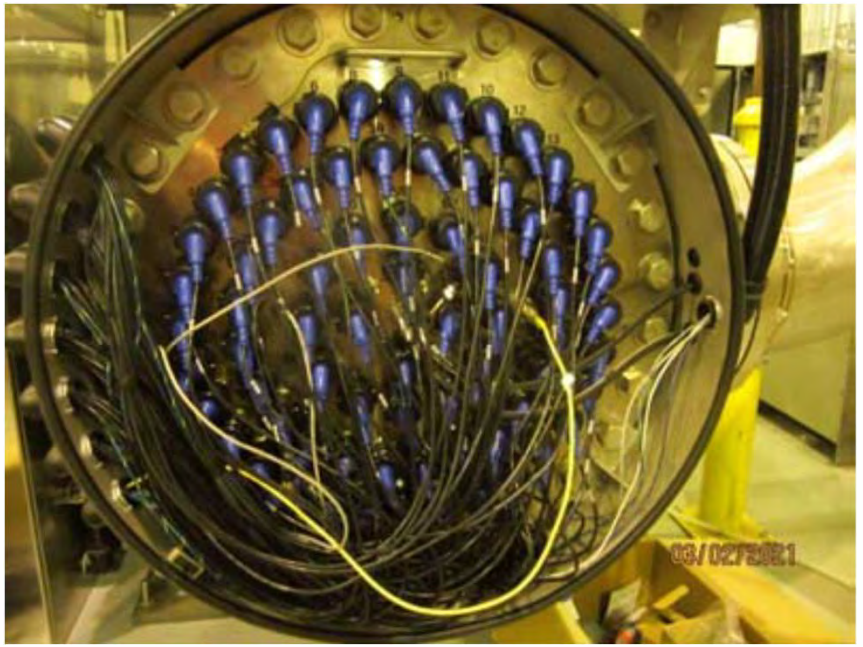
GM38 Treatment System Upgrade

- Existing GM38 Treatment System does not remove 1,4-dioxane from extracted groundwater
- GM38 Treatment System Upgrade
  - AOP will be used to treat for higher levels of trichloroethene (TCE) and 1,4–dioxane
  - System is based on the combination of hydrogen peroxide and ultraviolet (UV) light, which forms a very local and short-lived oxidizer (hydrogen radical)
- AOP will remove 1,4-dioxane to less than 0.5 micrograms per liter (µ/L) which is half of the New York State Department of Health maximum level of 1.0 µ/L
- AOP is compatible with existing treatment process and will remove VOCs – Navy will evaluate if system can be optimized to take advantage of AOP efficiency

AOP UV reactor chamber

How it Works

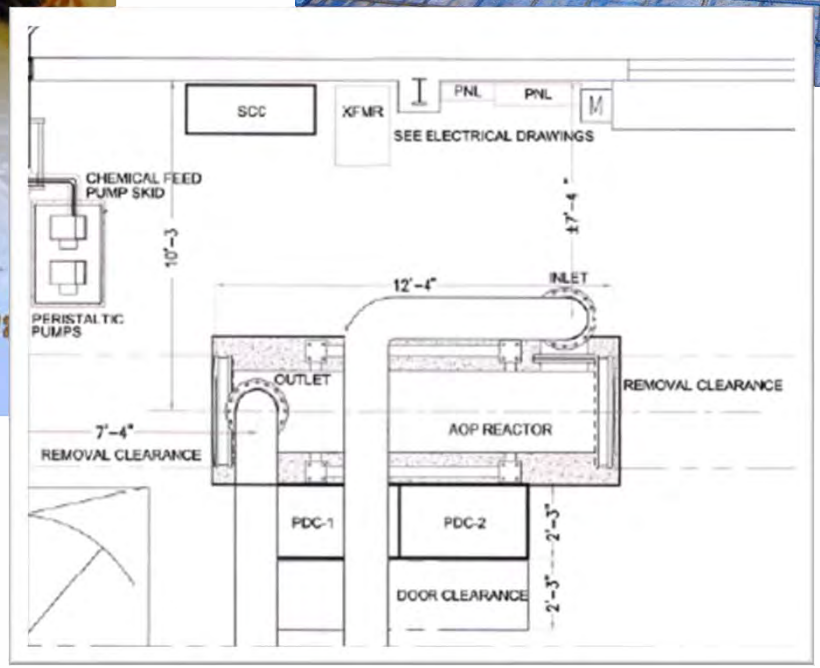
- This system utilizes a UV light and hydrogen peroxide to generate hydroxyl radicals to degrade 1,4-dioxane and VOCs
- Prior to entering the UV reactor, the untreated groundwater is dosed with hydrogen peroxide.
  - In the reactor, the UV light breaks the hydrogen peroxide into hydroxyl radicals.
  - The hydroxyl radicals then breakdown and eliminate the 1,4-dioxane from the water
- The AOP contains two reactor zones and 144 UV lamps
- The AOP is designed to treat up to 1,000 gallons of water per minute



UV light and hydrogen peroxide; Equation:
$UV + H_2O_2 \rightarrow 2HO$

Progress to Date – AOP Construction and Assembly

- A steel reinforced concrete pad was poured inside the GM-38 building to be used as the base for the AOP unit

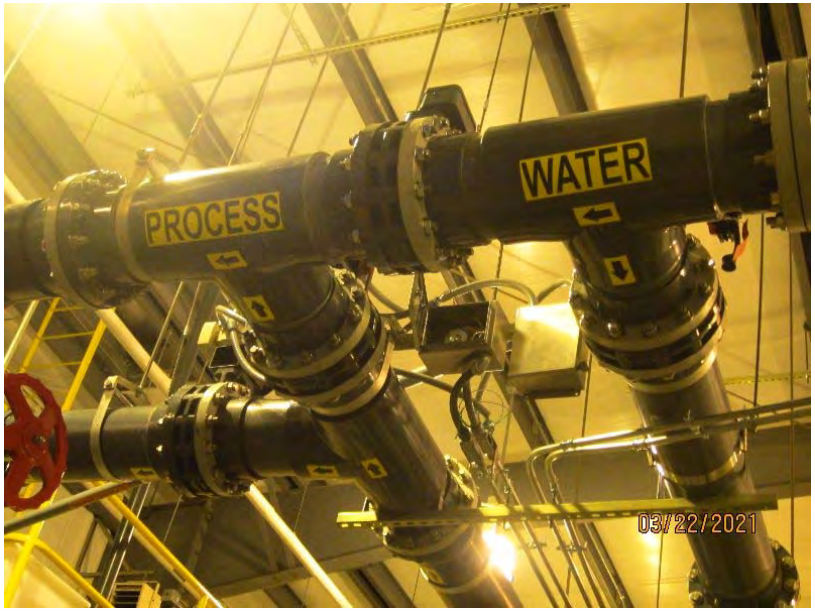


Progress to Date – AOP Unit Installation

- The AOP was installed and integrated with the existing GM38 Treatment System

Progress to Date – Process Piping and Plumbing

- Process piping was installed and labeled to integrate the AOP unit with the existing GM-38 Treatment System
- New piping connects into existing piping with valves to allow bypass of the AOP system in the future
- Emergency showers and eyewash stations were installed inside and outside the building near the chemical feed system



Progress to Date – Installation of Hydrogen Peroxide Tank

- A double-wall tank was installed to store hydrogen peroxide for use in the AOP treatment system
- A spill containment concrete pad with chemical-resistant epoxy coating and steel canopy were constructed with the tank

AOP Commissioning and Testing

- Complete Equipment Startup, Testing, and Commissioning of the AOP system.
  - Test samples will be collected and analyzed for VOCs and 1,4-dioxane
  - When results indicates AOP meets design treatment and performance requirements, AOP will be integrated into existing GM38 treatment systems
- AGVIQ is responsible for the Operation, Maintenance, and Monitoring (OM&M) of the AOP for a period of one year, which includes sampling requirements to monitor the progress of the AOP system.
  - Performance sampling will be conducted to monitor the efficiency of the AOP:
    - Weeks 1 to 4: three times per week
    - Weeks 5 to 12: one time per week
    - Weeks 13 to 39: once every other week
    - Weeks 40 to 52: once per month
  - IF treated groundwater does not meet treatment requirements (<0.5 µg/L for 1,4-dioxane), THEN the AOP dosage and residence time will be evaluated and adjusted accordingly.
- Near the conclusion of the one year OM&M period, AGVIQ will provide an OM&M Manual and training to the Navy's successive OM&M contractor.
- A Construction Completion Report will be generated to include construction narrative and as-built documentation, sample results, and photographic logs.

Schedule

- Commissioning of the AOP unit: April 2021
- Equipment Testing and Startup: to be completed in May 2021
- AOP OM&M Phase: May 2021 through May 2022.

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Phase I RE108 Area Hotspot Treatment System
CERCLA Action Construction Update

Presented by:
Monica Smeal, Project Manager
APTIM Federal Services, LLC
14 April 2021

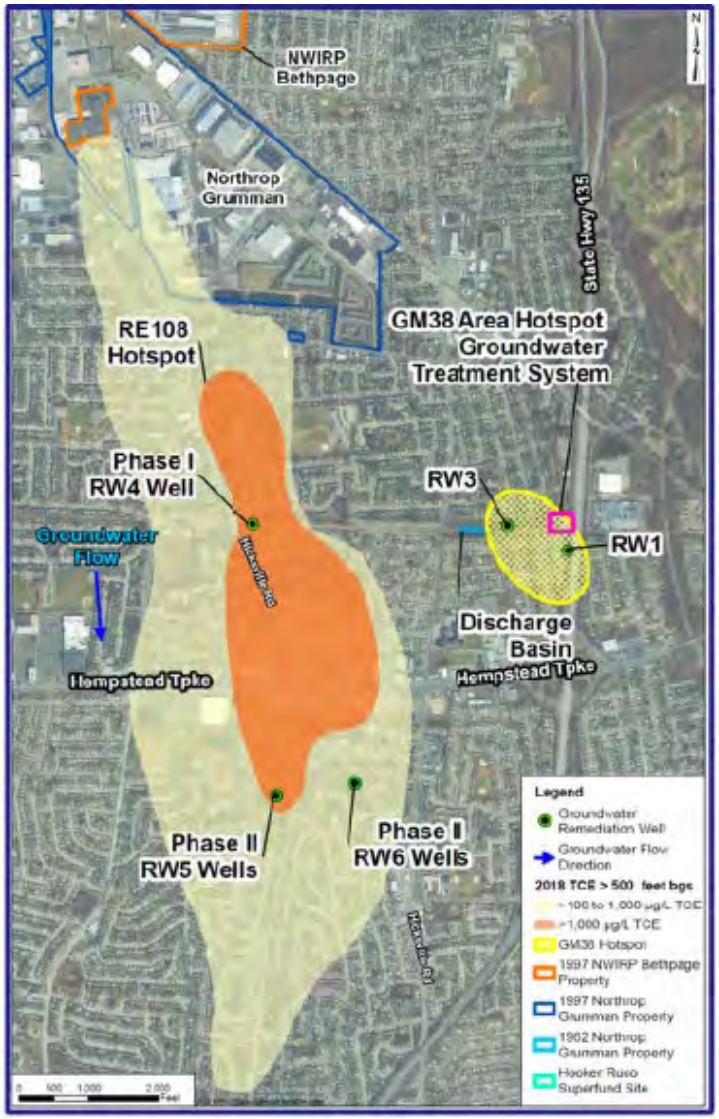
Presentation Topics

- RE108 History
- Phase I System
- Community Communication and Monitoring
- Progress to Date
- Status/Schedule

RE108 History

- RE108 Area Hotspot
  - Identified in the mid 2010s
  - Construction divided into three phases
    - Phase I
      - System Recovery Well RW4, located near Hicksville Road
      - Groundwater conveyed to the GM38 Treatment System
    - Phases II and III will be detailed in another presentation


GM-38 Area Hotspot Treatment System, looking southeast

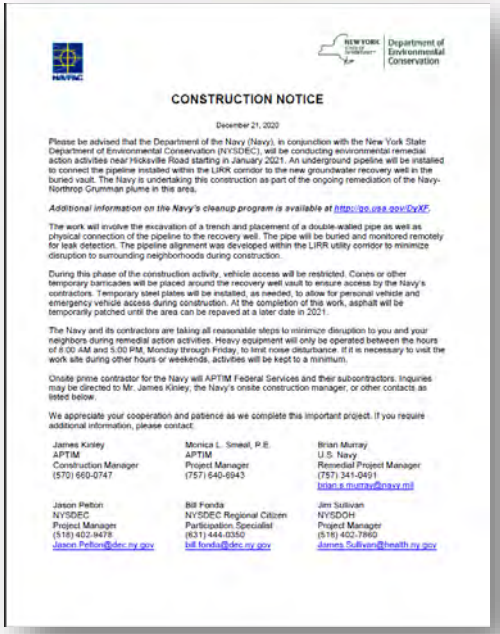


RE108 Area Hotspot Treatment System – Phase I System

- Phase I System Recover Well RW4, located near Hicksville Road
  - 12-Inch well, screened at a depth of 570 to 670 feet below ground, which is the depth at which water is extracted
  - RW 4 was constructed in October 2020, installed in a vault
  - RW4 pump is anticipated to extract 200 to 450 gallons per minute of water for the next 50 years
  - RW4 is anticipated to introduce higher 1,4-dioxane concentrations to the GM38 Treatment System
- Groundwater conveyed to the GM38 Treatment System through an underground pipeline through the utility corridor and along the Arthur Ave Basin

Community Communication and Monitoring

- Pre-construction meetings and routine progress update meetings throughout construction were conducted and attended by NYSDEC and Town of Oyster Bay representatives
- Construction Notices were hand delivered to residence in close proximity of the work prior to start of each phase of work
- The Navy and it's contractors took all reasonable steps to minimize disruption to the neighbors
  - Heavy equipment operations were limited to the hours between 8:00 AM and 5:00 PM to limit noise disturbance
  - School bus schedules were identified and work was modified to limit interruption and safety risks to the students
  - Noise and dust monitoring was conducted at the perimeter of the work zones



CONSTRUCTION NOTICE

December 21, 2020

Please be advised that the Department of the Navy (Navy), in conjunction with the New York State Department of Environmental Conservation (NYSDEC), will be conducting environmental remedial action activities near Hicksville Road starting in January 2021. An underground pipeline will be installed to connect the pipeline installed within the LIRR corridor to the new groundwater recovery well in the buried vault. The Navy is undertaking this construction as part of the ongoing remediation of the Navy-Northrop Grumman plume in this area.

Additional information on the Navy's cleanup program is available at http://go.usa.gov/DyXF.

The work will involve the excavation of a trench and placement of a double-walled pipe as well as physical connection of the pipeline to the recovery well. The pipe will be buried and monitored remotely for leak detection. The pipeline alignment was developed within the LIRR utility corridor to minimize disruption to surrounding neighborhoods during construction.

During this phase of the construction activity, vehicle access will be restricted. Cones or other temporary barricades will be placed around the recovery well vault to ensure access by the Navy's contractors. Temporary steel plates will be installed, as needed, to allow for personal vehicle and emergency vehicle access during construction. At the completion of this work, asphalt will be temporarily patched until the area can be repaved at a later date in 2021.

The Navy and its contractors are taking all reasonable steps to minimize disruption to you and your neighbors during remedial action activities. Heavy equipment will only be operated between the hours of 8:00 AM and 5:00 PM, Monday through Friday, to limit noise disturbance. If it is necessary to visit the work site during other hours or weekends, activities will be kept to a minimum.

Onsite prime contractor for the Navy will APTIM Federal Services and their subcontractors. Inquiries may be directed to Mr. James Kinley, the Navy's onsite construction manager, or other contacts as listed below.

We appreciate your cooperation and patience as we complete this important project. If you require additional information, please contact:

James Kinley APTIM Construction Manager (570) 660-0747	Monica L. Smeal, P.E. APTIM Project Manager (757) 640-6943	Brian Murray U.S. Navy Remedial Project Manager (757) 341-0491 brian.e.murray@navy.mil
Jason Pelton NYSDEC Project Manager (518) 402-9478 Jason.Pelton@dec.ny.gov	Bill Fonda NYSDEC Regional Citizen Participation Specialist (631) 444-0350 bill.fonda@dec.ny.gov	Jim Sullivan NYSDOH Project Manager (518) 402-7860 James.Sullivan@health.ny.gov

Progress to Date – Pipeline Installation Complete

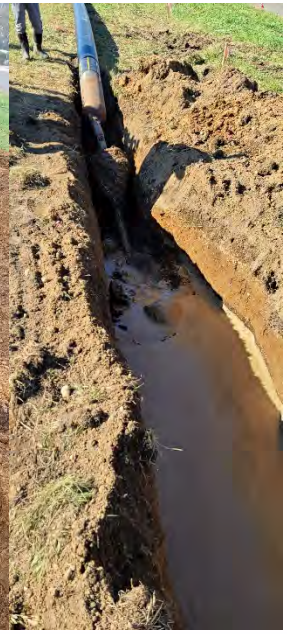
- 3,967 linear feet of dual-containment High Density Poly Ethylene (HDPE) pipe installed
- HDPE dual-containment pipe consists of 8-inch diameter interior carrier pipe with a 12-inch diameter exterior containment pipe
- Pipe assembled using butt-fusion welding technology

Progress to Date – Pipeline Installation Complete

- Pipeline installed in 4.5-ft deep trench
- Pipe surrounded in bedding sand
- Backfill compacted using walk-behind tamper

Progress to Date – Pipeline Installation Complete

- Stewart Avenue Crossing
  - ~330 feet of pipeline was installed by method of directional drilling beneath Stewart Avenue
  - Pre-welded pipe segment pulled through borehole



Progress to Date – Pipeline Installation Complete

- Dual-containment pipe integrity tested in segments and on final assembly of entire length – All Tests Passed
  - Interior carrier pipe tested using water pressure
  - Exterior containment pipe testing with air pressure

Progress to Date – Pipeline Installation Complete

- Leak detection monitored through active and passive system
  - Active sensors at each end of pipeline will detect leak
  - Passive system of inspection ports will be used to identify location of leak

Status/Schedule

- RW-4 is currently pumping water to the GM-38 plant for treatment.
- Restoration: Substantially completed March 2021; paving to be completed upon completion of maintenance work by National Grid near RW4
- Draft Operation and Maintenance Plan Submitted March 2021
- Draft Construction Completion Report is in progress

RW4 Controls and Electric Equipment

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Phase II Construction (RW6) and Phase III – Southern Plume Intercept Treatment System Update

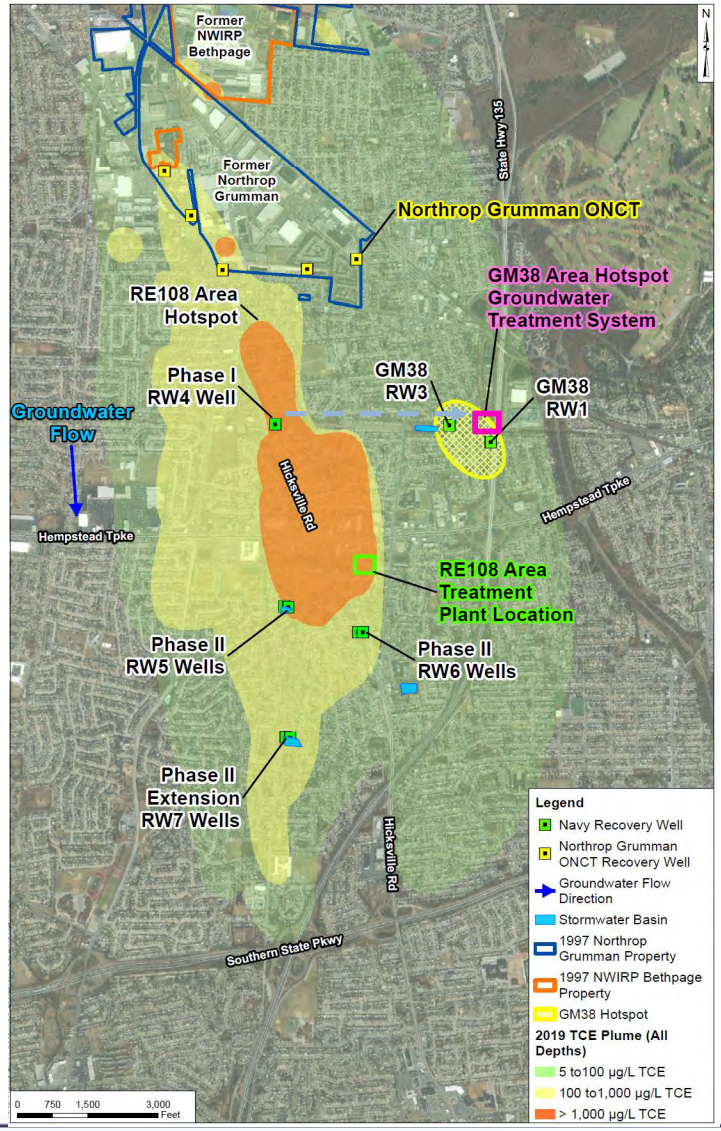
Presented by:
David Brayack, Project Manager
Tetra Tech
14 April 2021

Presentation Topics – Phase II Construction (RW6) and Phase III – Southern Plume Intercept Treatment System Update

- GM38 and RE108 Area Hotspot – Overview.
- RE108 Area Hotspot Treatment System – Phase II Overview.
- RE108 Area Hotspot Treatment System – Phase II Recovery Wells.
- RE108 Area Hotspot Treatment System – Phase II Schedule.
- 11 Union Avenue Building Demolition.
- Phase III – Southern Plume Intercept Treatment System, Boring, Wells, and Treatment Plant.

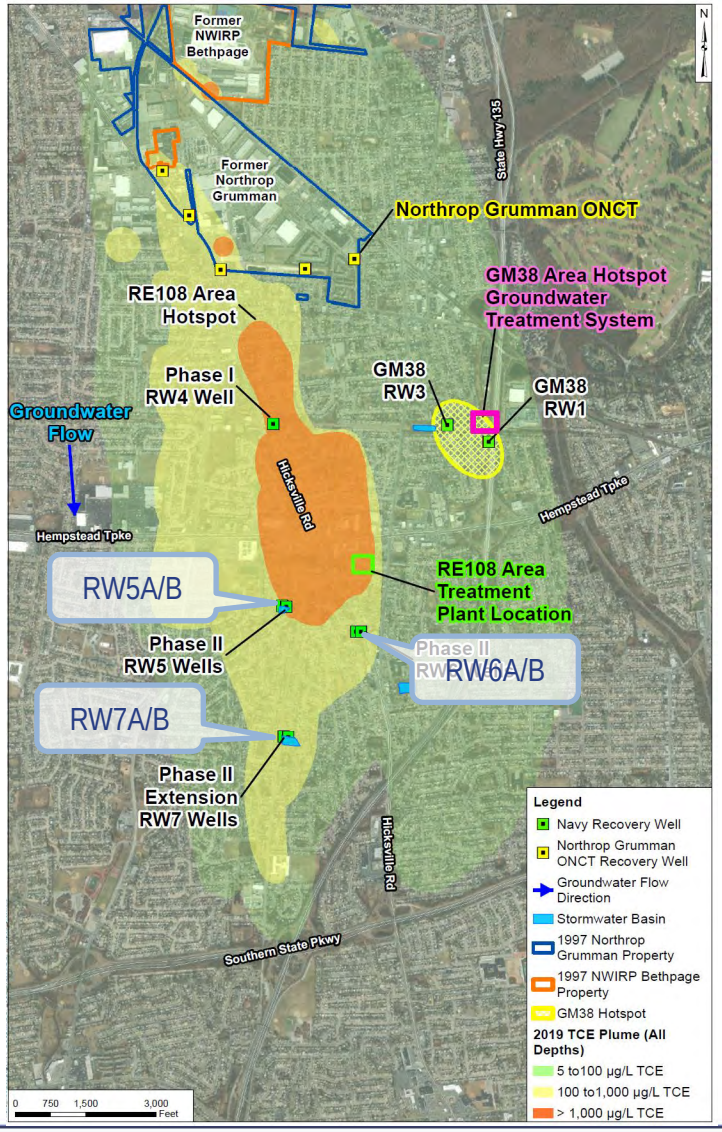
GM38 and RE108 Area Hotspot - Overview

- Record of Decision definition of a 'hotspot' - Groundwater with greater than 1 part per million (ppm) of Volatile Organic Compounds (VOCs).
- GM38 Area Hotspot first identified in the 1990s:
  - Treatment system started operation in 2009 and continues to operate,
  - Treated more than 5 billion gallons of water to drinking water standards.
- RE108 Area Hotspot:
  - Identified in the mid 2010s.
  - Construction divided into two phases.



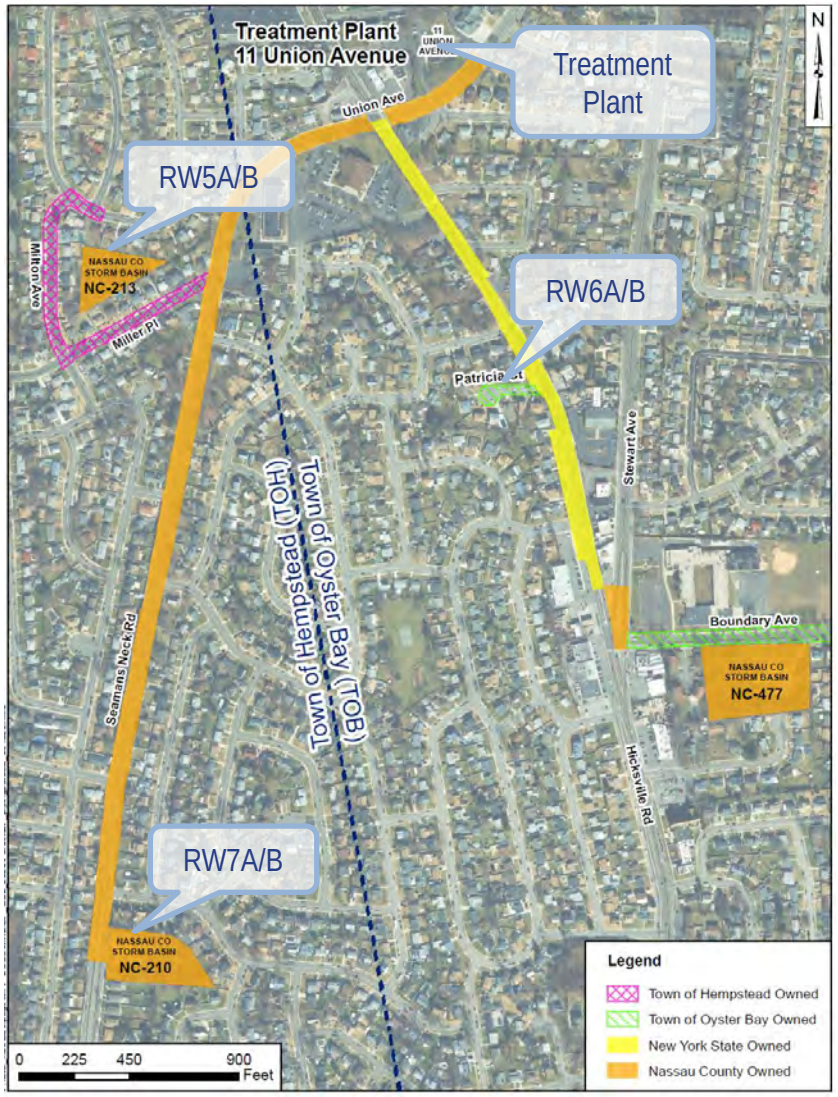
RE108 Area Hotspot Treatment System - Phase II Overview

- RE108 Area Hotspot Phase II System would intercept contaminated groundwater not captured by the Phase I System.
- Six new recovery wells (RW5A/B, RW6A/B, RW7A/7B) to be installed ahead (south) of the leading edge of the hotspot.
- Navy has purchased property at 11 Union Ave. New groundwater treatment plant will replace current building.
- New building is approximately 100 feet by 120 feet.
- Groundwater will be treated to drinking water standards and re-introduced to the aquifer through stormwater basins.
- RW6B is currently under construction.



RE108 Area Hotspot Treatment System – Phase II Recovery Wells RW5A/B, RW6A/B, and RW7A/B

- Recovery wells will be installed in underground concrete vaults:
  - Two recovery well pairs in Nassau County stormwater basins (NC-213 and NC-210).
  - One recovery well pair on Town of Oyster Bay roadway (Patricia Court).
- Recovery well installation started in March 2021.
- Untreated water from recovery wells – double wall HDPE pipe with leak detection.



RE108 Area Hotspot Treatment System – Phase II Schedule

- The Phase II System design and construction is on schedule with completion anticipated in late 2022 or early 2023.
- The 60 and 90 percent designs were distributed to local governments, NYS Dept. of Transportation, and NYS Dept. of Environmental Conservation for review and comment.
- The 100 percent complete design is being finalized.

11 Union Avenue Building Demolition

- Non-friable asbestos containing material was removed as per local, state, and federal regulations based on the work plan reviewed by the Town of Oyster Bay.
- Demolition, site grading, and seeding was completed on 7 April 2021.

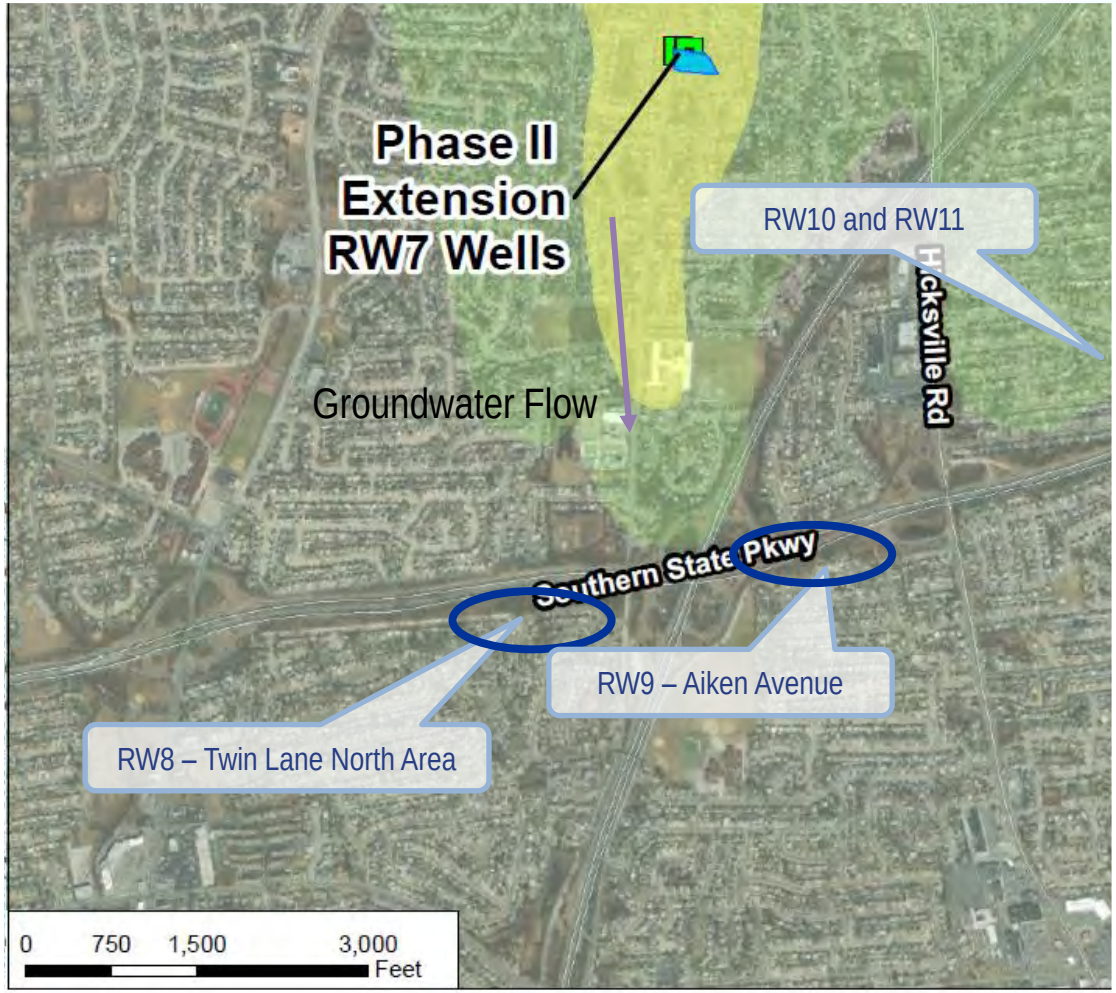
11 Union Avenue During Demolition


11 Union Avenue After Demolition

- Four shallow monitoring wells will be installed over the next few weeks.
- The site will remain secure with the security fence until the permanent fence is constructed.

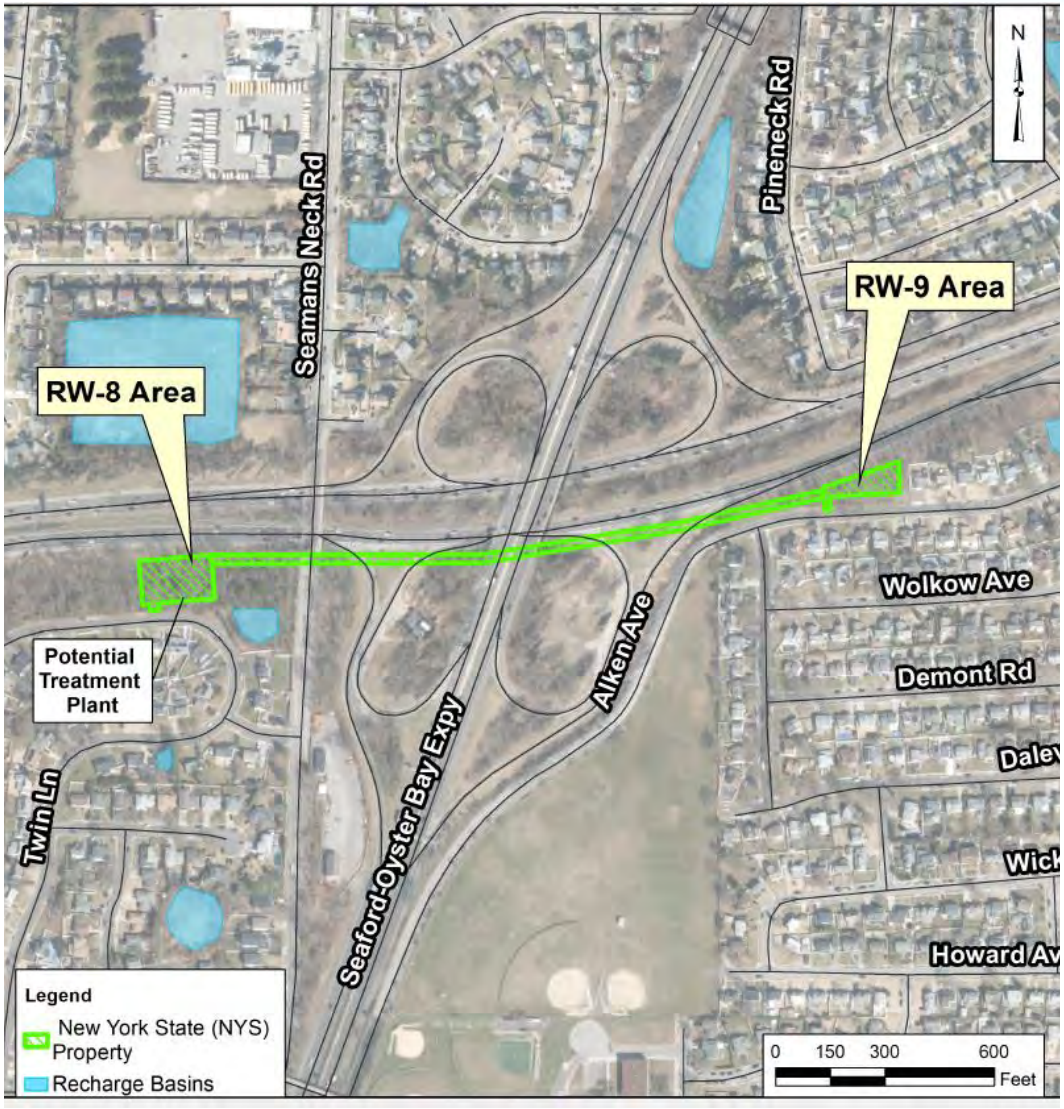
Phase III – Southern Plume Intercept Treatment System, Borings, Wells, and Treatment Plant

- Location is based on extensive monitoring of plume migration and modeling of groundwater flow.
- Additional pre-design investigations and testing are required in this area (well depth and pumping rates).
- Work is broken into Parts A and B
- Part A - RW8 and RW9 target deep groundwater that is not captured by Recovery Well RW7 – Initial focus.
- Part B – RW10 and RW11 wells possible to the northeast, with a separate treatment plant – shallow groundwater



Phase III – Southern Plume Intercept Treatment System, Borings, Wells, and Treatment Plant

- Schedule - Drilling at Twin Lane North started in March 2021 (brush clearing and fencing), with four periods of activity anticipated:
  - Vertical Profile Boring (1) and wells (3) installation - April to August 2021;
  - Recovery Well installation and aquifer testing - late 2021 to mid 2022 to support Pre-design data needs;
  - Treatment System design 2022 to 2023 – finalize treatment requirements, building size, and location, piping runs, and discharge point; and
  - Treatment Plant construction and operation to start in 2024.



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Restoration Advisory Board Meeting

Ongoing Environmental Restoration Actions Update

Presented by:
Brian Murray, Remedial Project Manager
NAVFAC Mid-Atlantic
14 April 2021

Presentation Topics – Other Ongoing Environmental Restoration Actions

- Operable Unit 2 (Offsite Groundwater) Explanation of Significant Differences Update
- Drilling Program to Fill Data Gaps in Shallow and Intermediate Plume Maps
- Evaluation of OU2 Plume Behavior Using Groundwater Flow Modeling
- NWIRP Bethpage Remedial Project Manager Transition

Operable Unit 2 (Offsite Groundwater) Explanation of Significant Differences Update

- As presented in our last RAB meeting, the Navy has described its commitments for additional remedial actions to address the OU2 plume in a CERCLA Explanation of Significant Difference (ESD) document
- CERCLA requires an ESD be provided to the public for a period of 30-days for review and comment
- OU2 ESD was posted to NWIRP Bethpage website on 03 March 2021 with the end of 30-day period on 02 April 2021
- A Notice of Availability was published in five newspapers in the Bethpage area with a hard copy provided to Bethpage Public Library
- Notifications of ESD release were provided to the RAB members, NYSDEC, and Congress

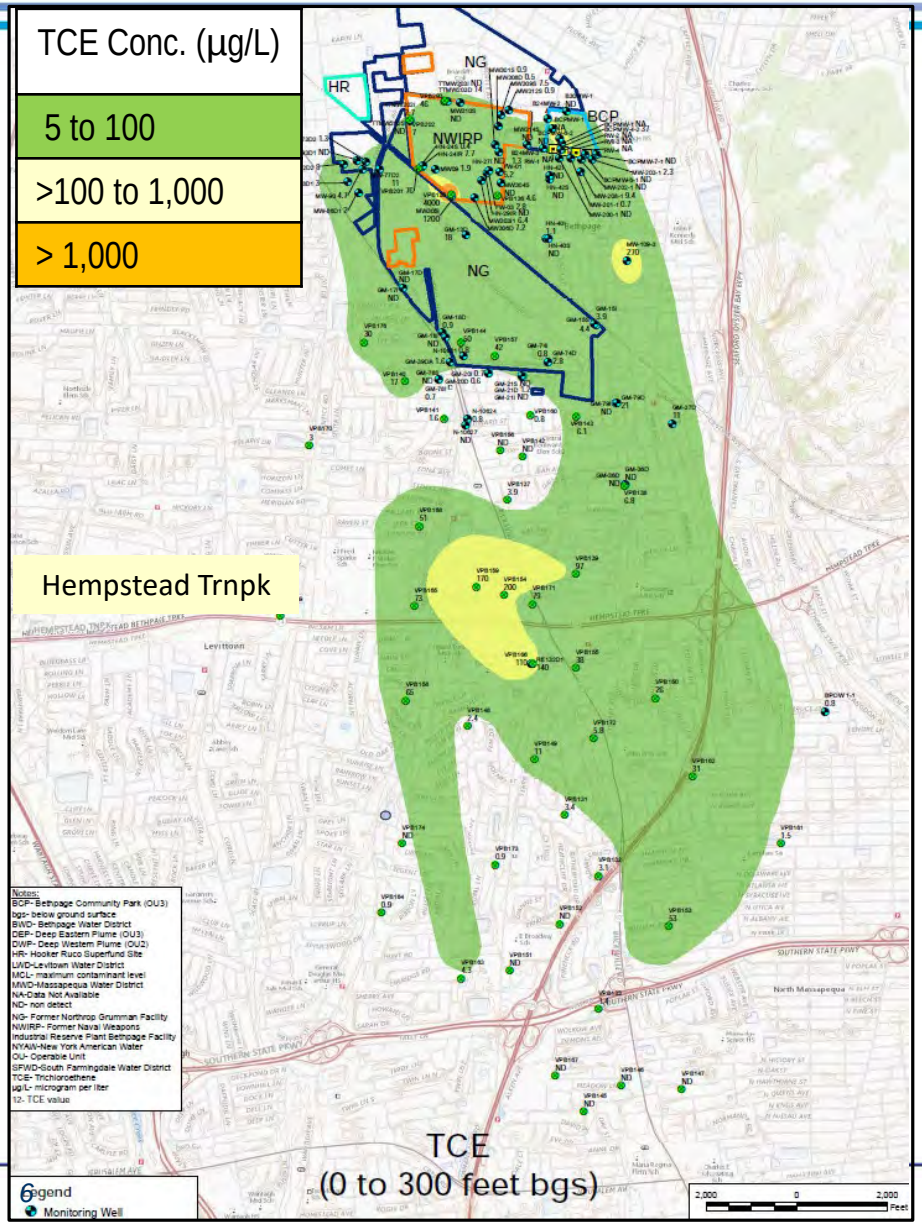
Operable Unit 2 (Offsite Groundwater) Explanation of Significant Differences Update (cont.)

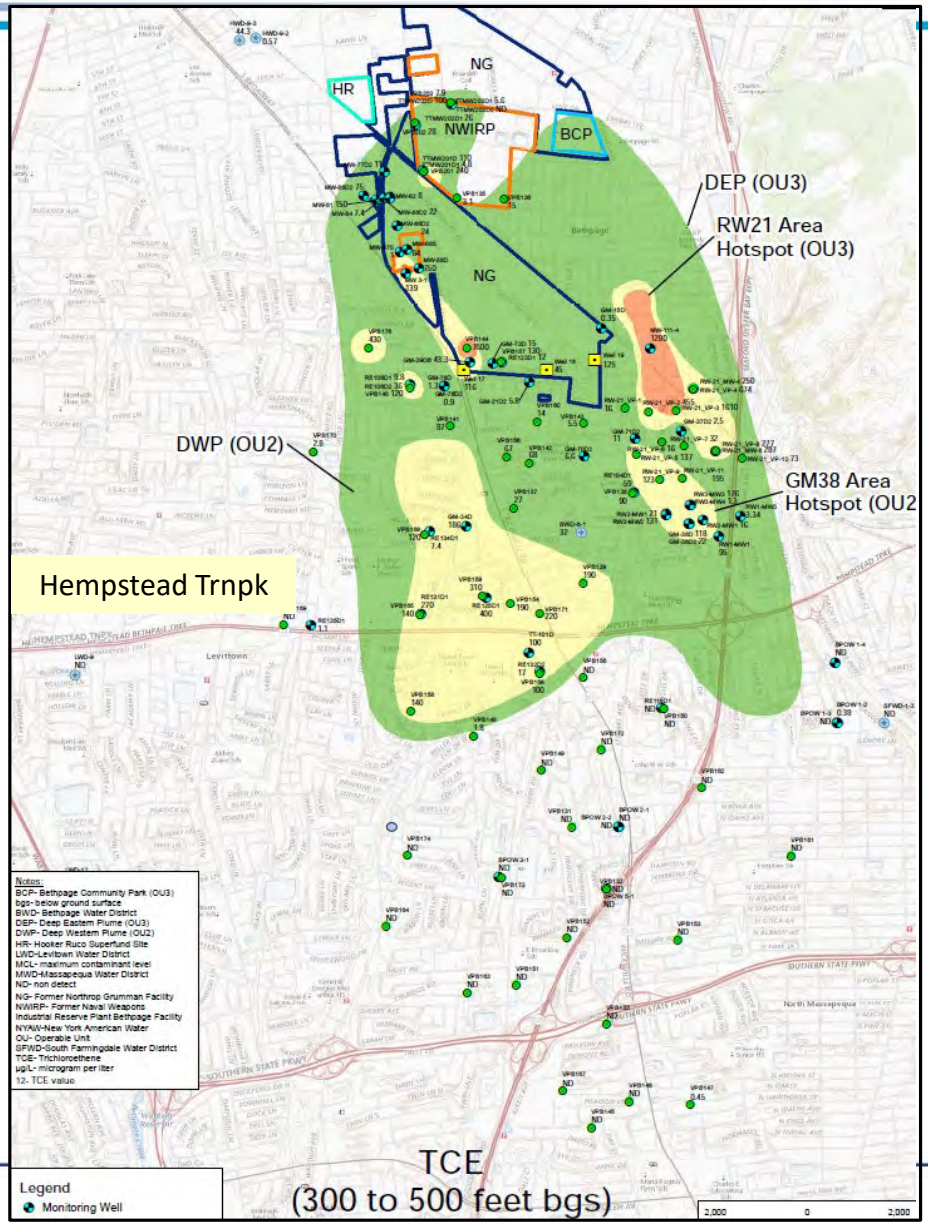
- Comments on the ESD were submitted by:
  - NYSDEC
  - Northrop Grumman Corporation
  - Schiff Harden on behalf of Town of Oyster Bay
  - H2M Architects + Engineers on behalf of Bethpage Water District
- Navy will review comments and revise the ESD if needed - comments and responses become part of the ESD document

Drilling Program to Fill Data Gaps in Shallow and Intermediate Plume Maps

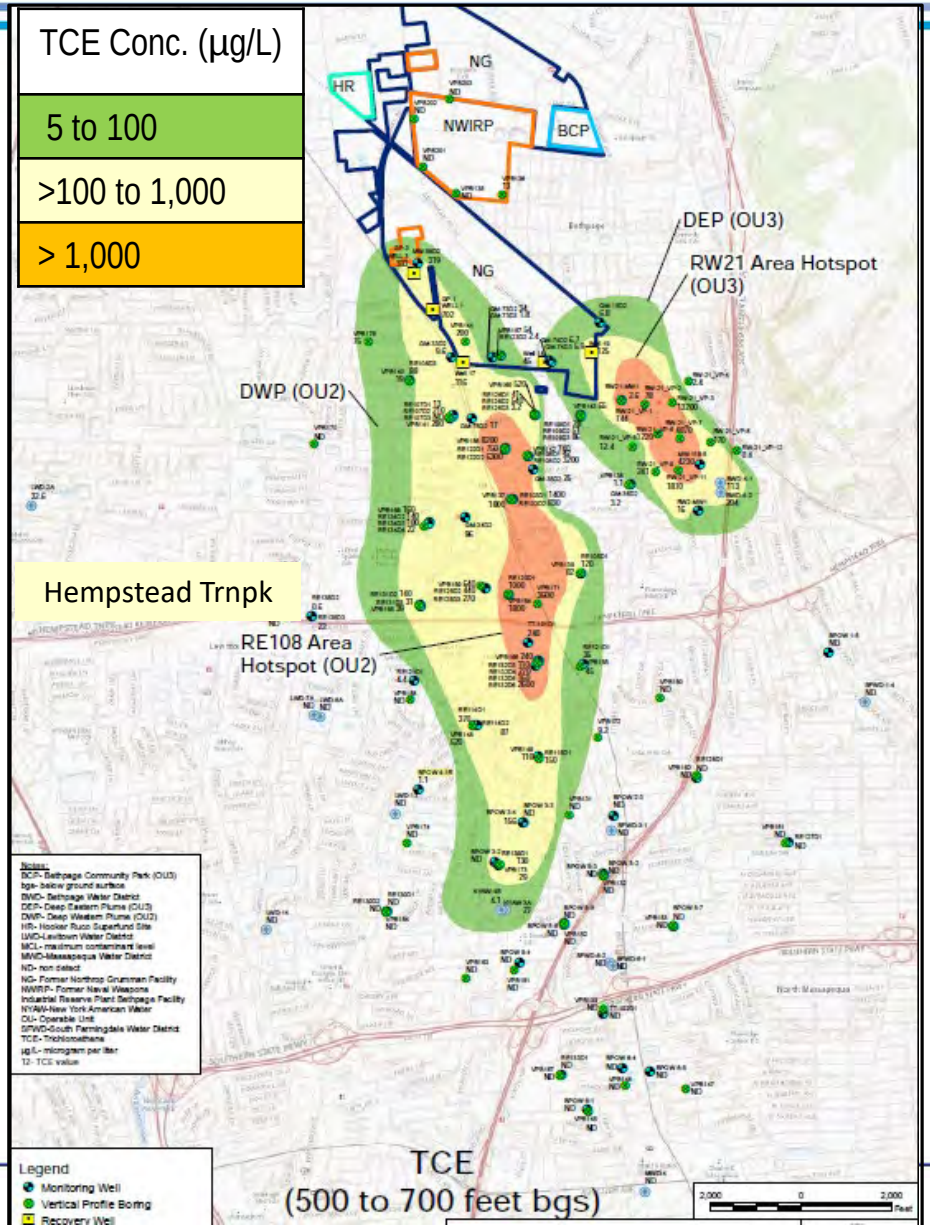
- To date, Navy's vertical profile boring and monitoring well installation program has focused on determining the extent of the deeper areas of OU2 plume
- Using data from monitoring well samples of groundwater, the plume is 'mapped' at four separate intervals:
  - ✓ ~50 to 300 feet below ground surface (termed shallow interval)
  - ✓ 300 to 500 feet below ground surface (intermediate interval)
  - ✓ 500 to 700 feet below ground surface (deep interval)
  - ✓ greater than 700 ft. below ground surface (deepest interval)
- There is less data for the shallow and intermediate intervals due to fewer monitoring wells screened within these depths
- Navy will undertake a drilling program to fill the data gaps in the shallow and intermediate intervals of the plume

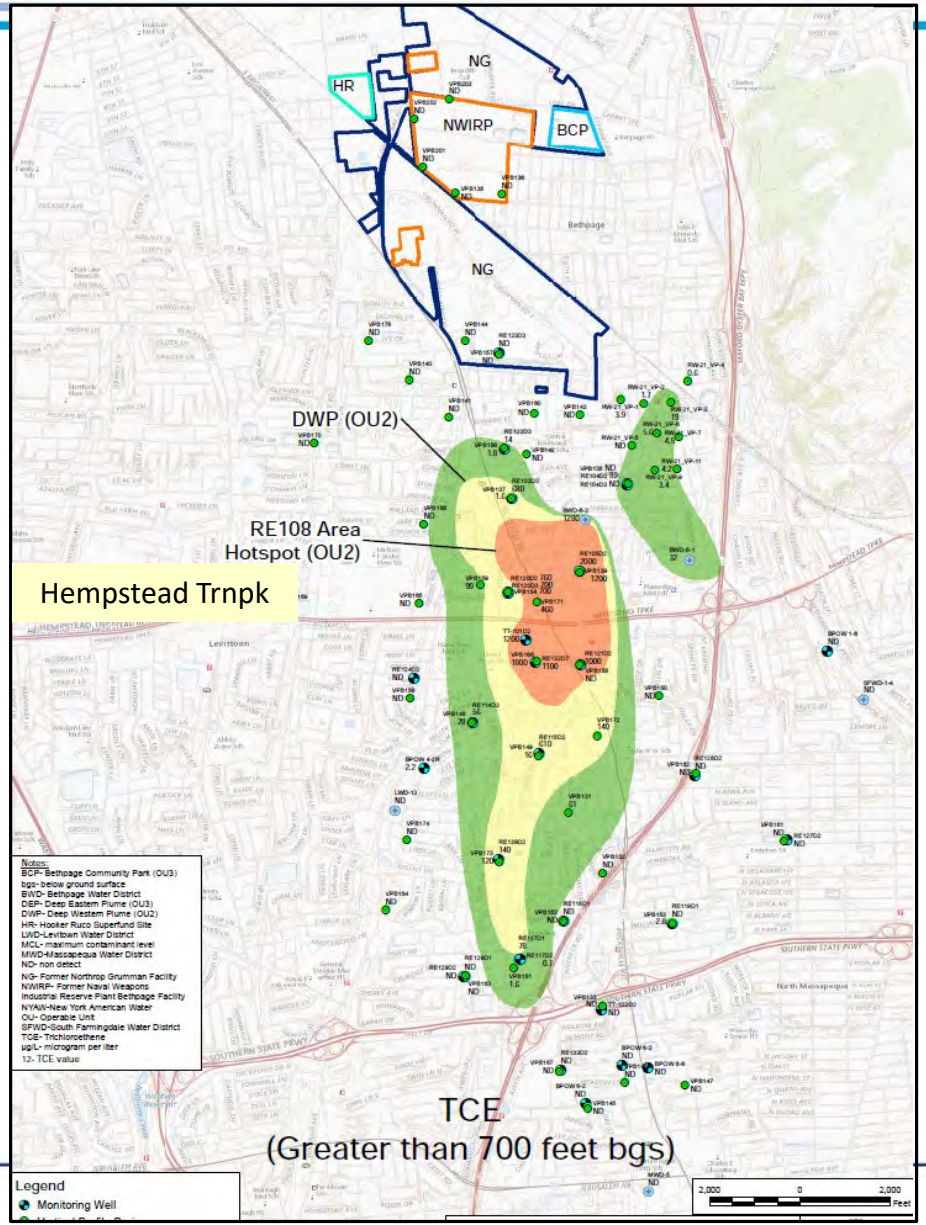
Navy-Northrop Grumman Plume – Shallow and Intermediate Depth Map of TCE





Navy-Northrop Grumman Plume – Deep Interval Maps of TCE

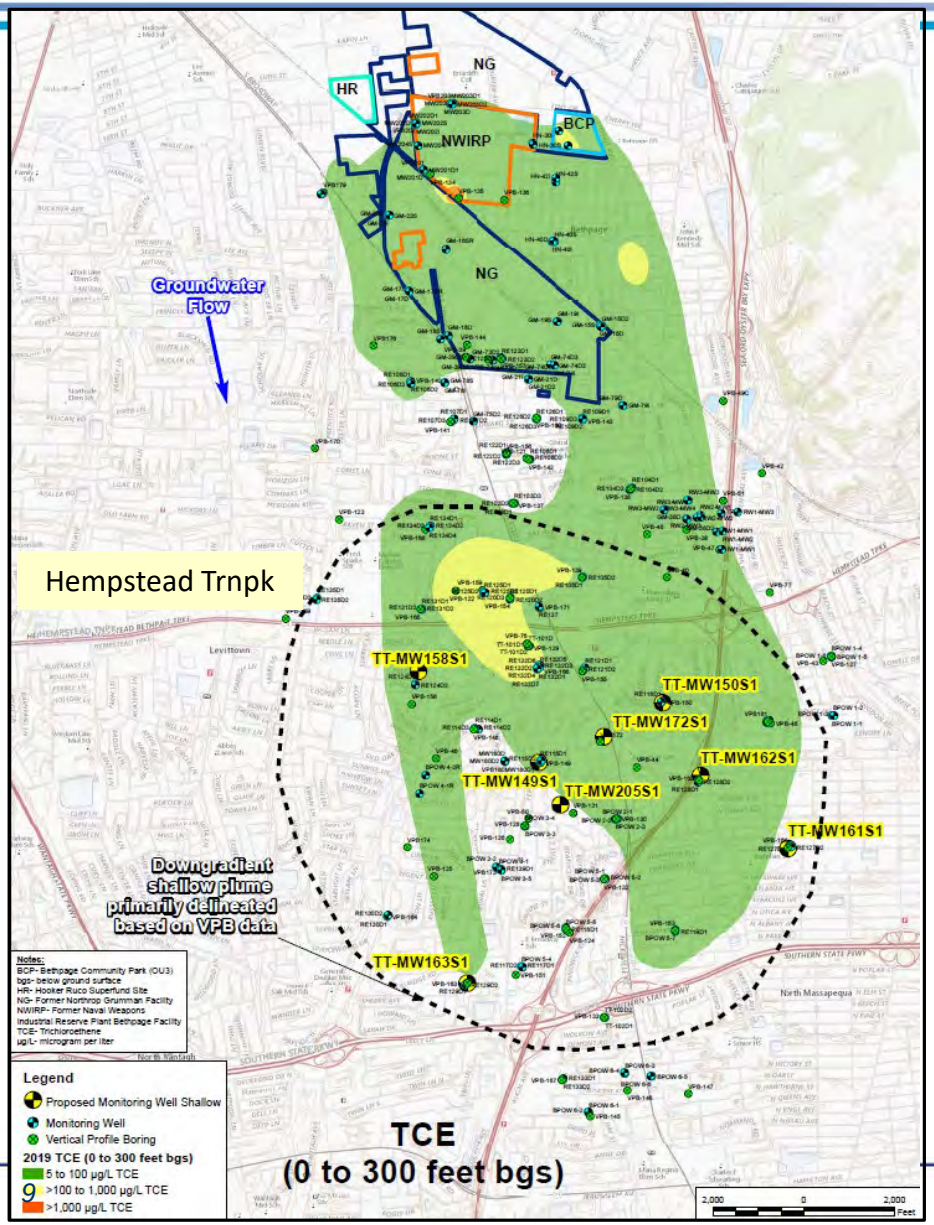


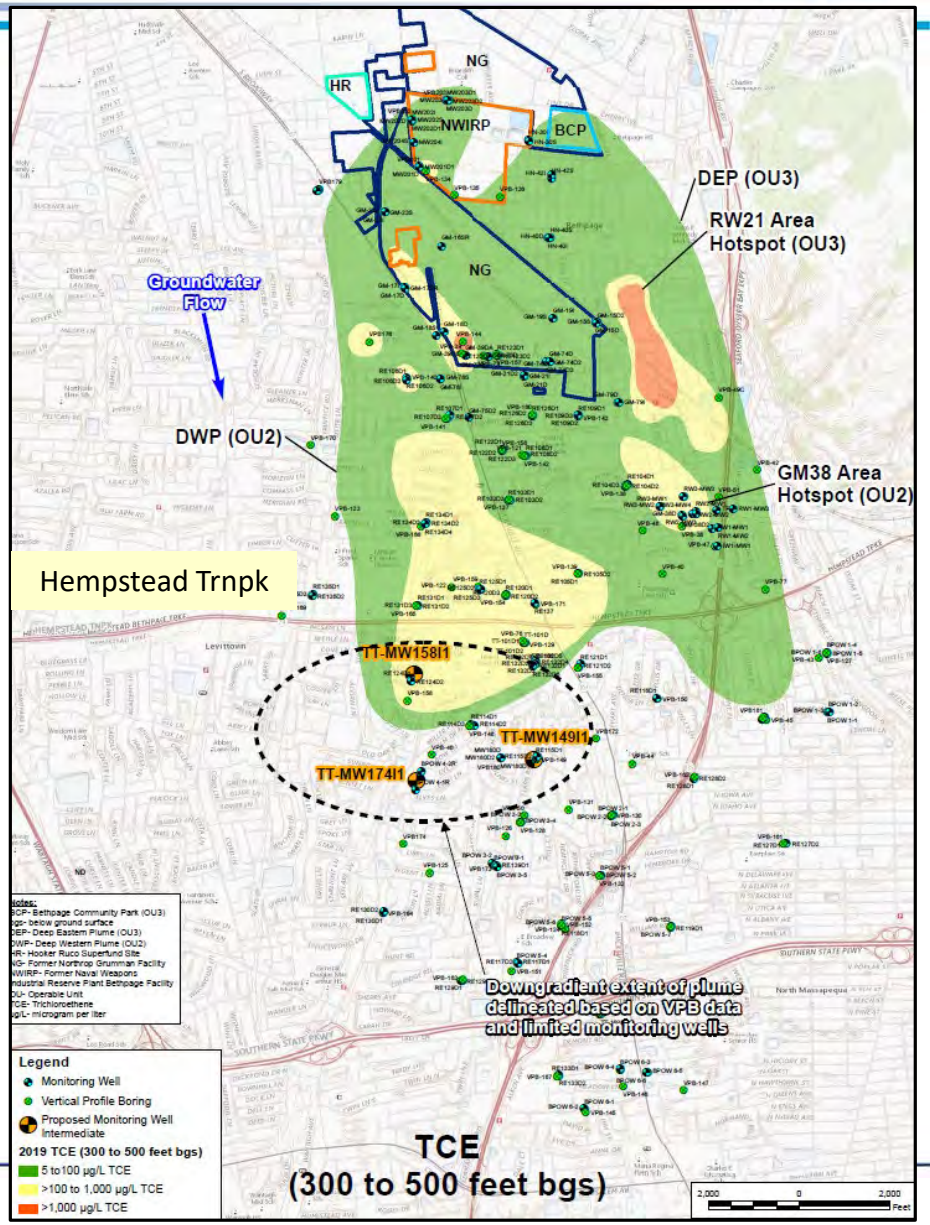


Planned Data Gap Well Drilling/Sampling Program

- Program will begin with drilling of eight new shallow wells and three new intermediate depth wells
- New wells will be co-located with existing wells to take advantage of groundwater and geology data collected during prior drilling of a nearby VPB
- Sample data from new wells will allow for improved mapping (i.e., delineation) of the plume in the shallow and intermediate intervals
- Multiple phases of drilling/sampling may be needed to fill in areas where the shallow/intermediate well density is low

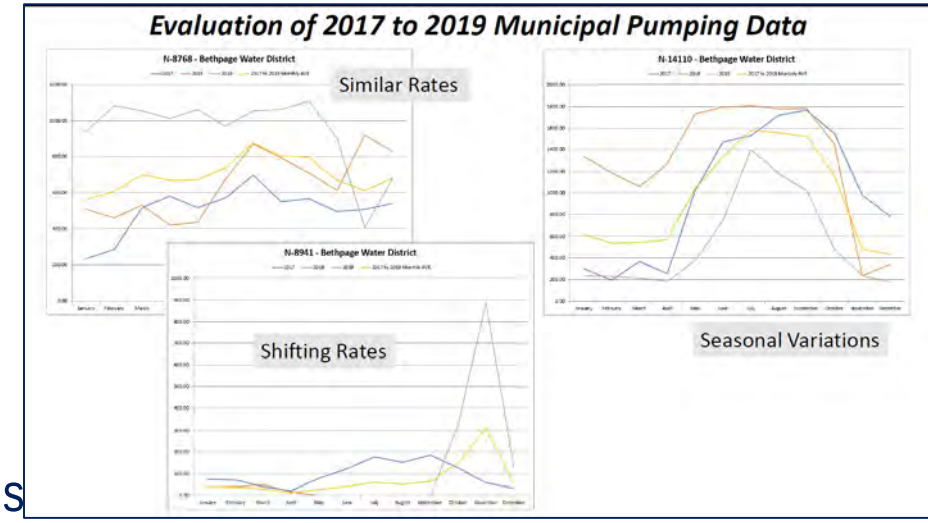
Planned Shallow and Intermediate Plume Data Gap Wells





Evaluation of OU2 Plume Behavior Using Groundwater Flow Modeling

Navy project team has constructed a groundwater flow model to use as a tool to understand and predict the OU2 plume behavior



The model is built with data collected from:

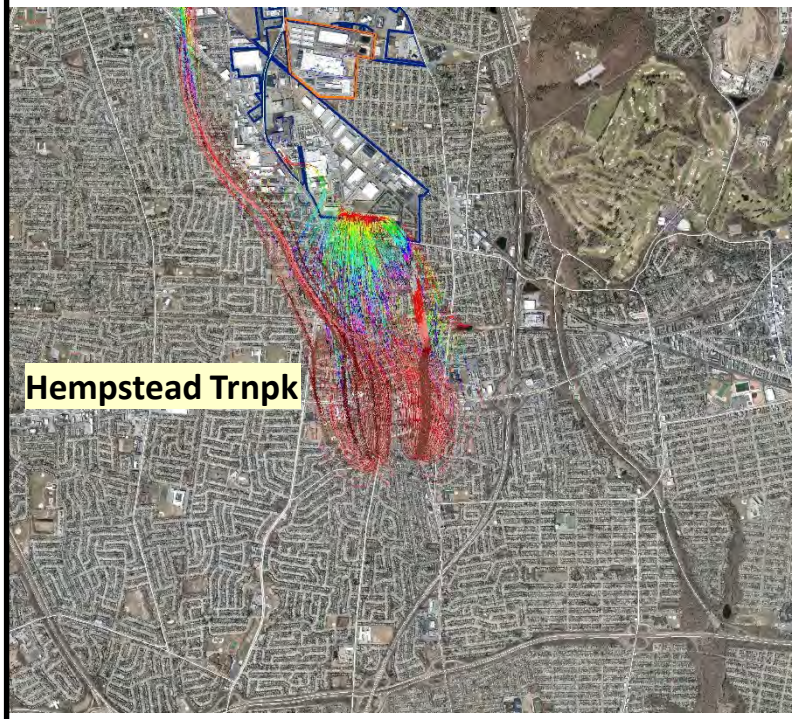
- drilling/sampling of vertical profile borings,
- groundwater sampling (wells),
- borehole gamma recordings,
- water level measurements,
- pumping data from public water supply wells
- results from RE137 plume capture test and RW4 pumping, and
- a detailed analysis of subsurface geology using concepts of environmental sequence stratigraphy

- The OU2 ESD requires ongoing evaluation of the effectiveness of Navy treatment systems
- The model will be used to evaluate the performance of the RE108 Phase I and Phase II Treatment Systems and the Phase III Plume Interception System

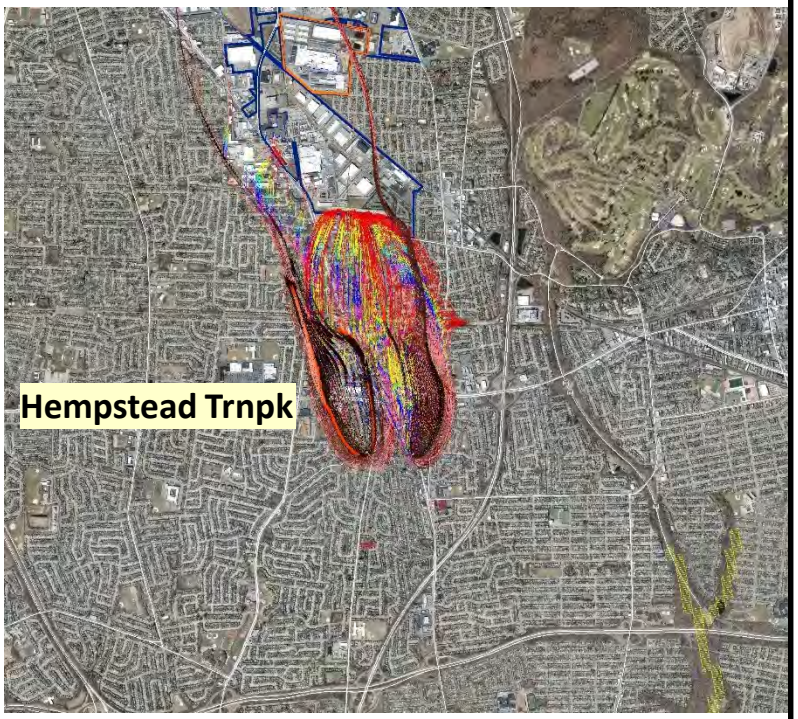
Groundwater Modeling of Phase I/II/III Effectiveness

- Flow model can track “particles” to simulate groundwater flow patterns
- New data collected during planned Phase I/II/III groundwater pumping can be used to evaluate effectiveness and predict changes in TCE concentration

Reverse Particle Tracking – FYR Scenario 1 –OU2 ROD Hotspot Evaluation



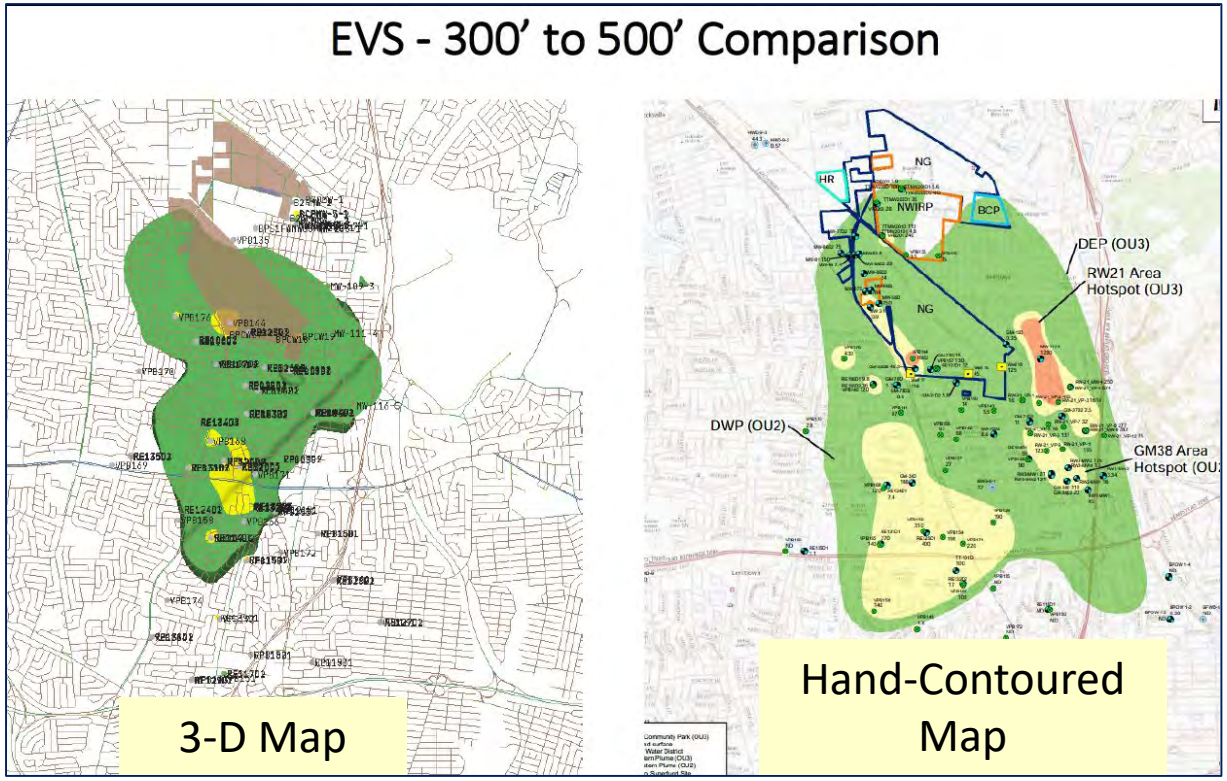
Previous Model



ESS Based Updated Model

3D Model of Plume Distribution for Use with Groundwater Flow Modeling

- NAVFAC project team is building a three-dimensional ('3-D') depiction of the OU2 plume at different depths
- With careful controls, prediction of the plume extent in more detail is possible than with hand-contoured maps
  - Once completed, the OU2 plume will be "imported" into the groundwater flow model
  - Changes in plume extent can be adjusted/predicted with new drilling program data and changes due to groundwater pumping



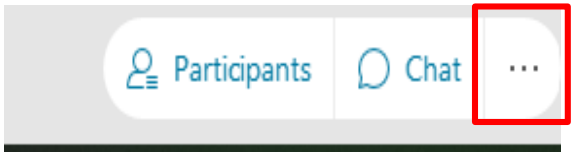
NWIRP Bethpage Remedial Project Manager Transition

- A transition to a new NAVFAC Remedial Project Manager (RPM) is necessary with the retirement of Brian Murray
- Jim Watts-Gravette will assume the RPM role effective 26 April 2021
  - ✓ Jim has been with the Department of Defense for 15 years
  - ✓ Served nine years with Maryland Dept. of Environment as a regulator
  - ✓ He worked two years as an environmental consultant with a major firm
  - ✓ Jim's environmental restoration program experience spans eight states
  - ✓ Jim has been a RPM with NAVFAC for 12 years and has successfully implemented remedial actions at some of the Dept. of Navy's most challenging sites
  - ✓ Jim is married with four girls, the youngest a newborn
  - ✓ In his free time, Jim enjoys spending time running, hiking, and camping with his wife and family

Q&A OPTIONS

1. **Ask a question** by typing it in the **Q&A box**.

   Click three white dots "More Options" icon in bottom right of screen to open the Q&A box.



2. **Raise your hand** to be recognized and have your microphone unmuted.

3. **Phone-only attendees** can dial *3 to raise their hand and have the opportunity to ask a question.

Q&A

QUESTIONS/ANSWERS

UNTIL 10:00 P.M.

POST MEETING

- Questions can be submitted after the RAB until **April** 15, 2021
- Submit question to the Navy PAO (NAVFAC_ML_PAO@navy.mil) or leave a message at 757-341-1410/11
- Similar questions will be combined
- The post meeting Q&A will be available at the Navy's website and captured in the RAB meeting minutes
- The Navy's website: **https://go.usa.gov/DyXF**