Agenda - U.S. Navy and NYSDEC Site Visit and Project Discussion
January 18, 2017

1) Introductions (5 min)

1. Lora Fly, NAVFAC
2. Joseph McCloud, NAVFAC
3. David Brayack, TetraTech
4. Don Hesler, NYSDEC
5. Jim Harrington, NYSDEC
6. John Swartwout, NYSDEC
7. Steve Scharf, NYSDEC
8. Jason Pelton, NYSDEC
9. Steve Karpinski, NYSDOH
10. Joe DeFranco, NCDOH
11. Renata Ockerby, NYSDOH (guest from evening meeting)

2) Project History/Overview (15 min) – Brief overview on some of the important historical events and activities that have led to current site status

3) Discussion on Current Conceptual Site Model (15 min) – Introduction on Navy's understanding on source/s and movement of site contaminants

4) General Discussion with On-Going Site Activities (1.5 hrs) – To discuss current status, deliverables, need for Department reviews/approvals, schedule, etc. (*can arrange for a follow-up conference call if more time is needed*).

1. RE-108 Hot Spot Area (area of BWD Plant 6)
2. GM-38 Hot Spot Area Pump and Treat System
3. Vertical Profile Boring Program
4. Water District Treatment Systems
5. Routine Monitoring
6. Sentinel/Outpost Well Monitoring
7. #6 Fuel Oil Contamination at Former Plant #3 (AOC-22-Site 4 OU3)

5) Site Tour (1 – 2 hrs)

- Can resume Thursday morning until about 10:00 if needed.

1/18/2017 MTG. W/ U.S. NAVY

RCRA + PCBs ON-SITE STARTING W/ BUILDING 4

SITE #1 VI. NOT PART OF RCRA

JIM WILL SEND FORMAL LETTER TO NAVY DESCRIBING TRANSITION

SITE 4 DONE IN 2-4 YRS.

NWIRP - RUN BY NAVAIR

- NAVFAC

GOCO - NAVY OWNED OPERATED

1942 - STARTUP

1986 1ST ENV. INVESTIGATION

NAVY CAN'T FULLY SUPPORT THE CLEAN ZONES DG OF ONCT

↳ DATA MAY NOT SUPPORT THIS. - LOOK @ GM-21 WELL

↳ CONFLICTS W/ CLEAN ZONE

1980 - HOMES HAD SEPTIC SYSTEMS

RE-108 PLANT 6 - MAY CAPTURE ~10% OF HOTSPOT

1,000 PPB IS DEFINITION OF HOTSPOT

LIQUID OXYGEN + H_2O_2 WILL NEED -- FOR 1,4 DIOXANE

THEORY AROUND POSSIBLY USING PLANT 6 WAS BASED ON HOT BEING FURTHER NORTH.

↳ PLUME IS NOW ACTUALLY FURTHER SOUTH

BPWD 4-1 SHUT DOWN DUE TO RADIUM.

RE-108 - DESIGNING FOR WHERE PLUME WILL BE IN 3-4 YRS

- GO AFTER 1,000 PPB & TO EXTENT PRACTICABLE 500 PPB

WOULD BE BETTER TO PUMP FROM MIDDLE OF PLUME @ 300 GPM

THAT O FROM BLND 6-2 @ 1,000 GPM

LATE FEB. STEP TEST @ TEST WELL LOCATION

X SEND SLIDES STEVE'S

NAVFAC
Naval Facilities Engineering Command

NWIRP BETHPAGE OVERVIEW

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT BETHPAGE
LONG ISLAND, NEW YORK

01/18/2017

Project History/Overview

NWIRP BETHPAGE HISTORY

The primary mission of the **Naval Weapons Industrial Reserve Plant (NWIRP) Bethpage** was to research, design, build and test military aircraft in support of our national defense

1942 – 1996 (GOCO Facility)

105 acre, Government Owned Contractor Operated (GOCO) Facility - NWIRP Bethpage was owned by the U.S. Navy and operated by Northrop Grumman and its predecessors

1986

Navy Environmental Restoration Program begins - initial studies identified sites on NWIRP Bethpage requiring further investigation

1998

Northrup Grumman returned NWIRP Bethpage land to the Navy

2008

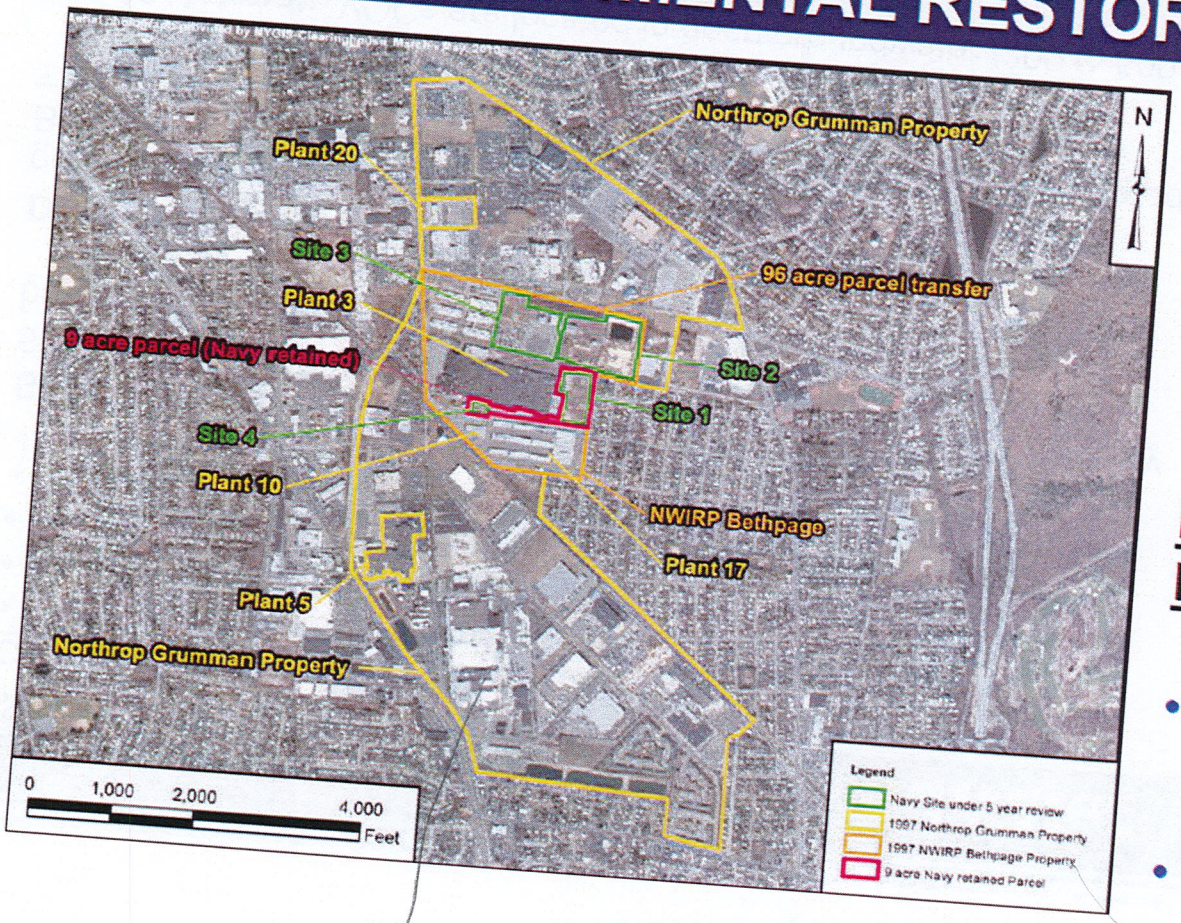
Navy transferred 96-acres of NWIRP Bethpage property to Nassau County for economic redevelopment. Remaining 9-acres were retained by the Navy to complete Environmental Restoration Program requirements.

Present

Environmental Restoration Program work continues at four sites on former NWIRP Bethpage and for off-site groundwater contamination.

Project History/Overview

ENVIRONMENTAL RESTORATION SITES



PLANT 2

Environmental Restoration Complete:

- **Site 2:** Recharge Basins
- **Site 3:** Salvage Storage Area

Environmental Restoration Occurring:

- **Site 1:** Former Drum Marshalling Area
- **Site 4:** Former Underground Storage Tanks (USTs)

109 ACRES

GRUMMAN OPERATED ALL FACILITIES

Conceptual Site Model

Groundwater

SHALLOW ~50'-300'

Complex Groundwater Plumes

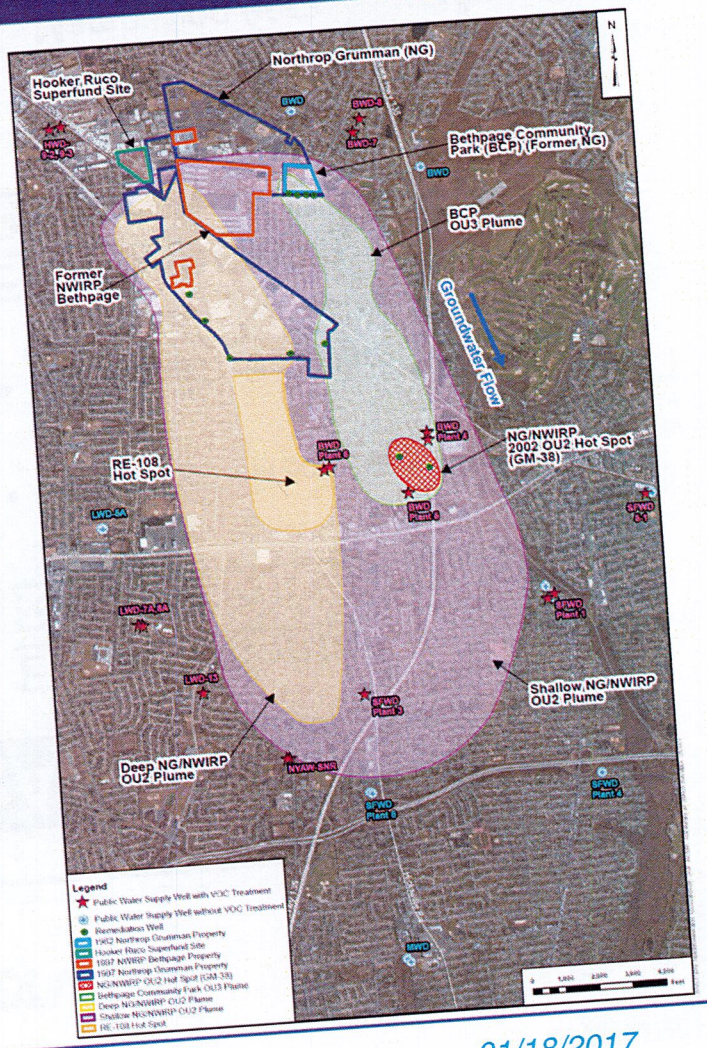
- VOC contamination over 3,000 acres
- VOCs are not distributed evenly
- Variety of concentrations at various depths in different areas
- Multiple, widely dispersed plumes, or finger throughout the area

Shallow Plume: VOCs are located in the groundwater approximately 50 to 300 feet bgs. This plume is also impacted from multiple small businesses and former septic systems

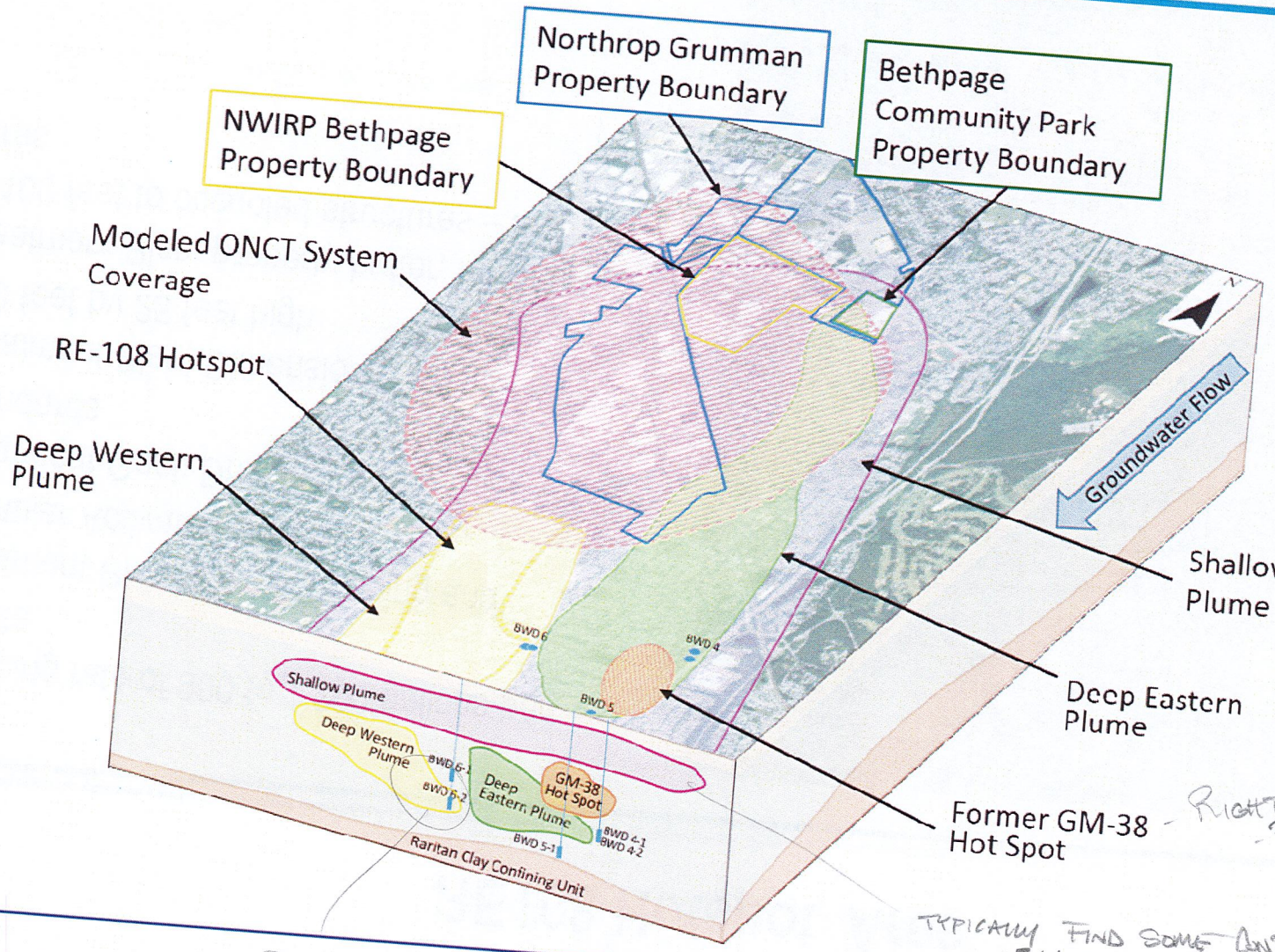
Deep Eastern Plume: VOCs are located in the deep eastern groundwater (deeper than 300 feet), east of the former NWIRP Bethpage site, starting in the BCP and continuing south of Hempstead Turnpike – ALWAYS NG OWNED

GM-38 Hotspot: VOCs are located in deep groundwater (300 to 500 feet bgs) southeast of the former NWIRP DD'D 1992 - 1993 ~10 YRS FROM WHEN DD'D TO REMEDIATION BEGINNING

YELLOW **Deep Western Plume:** VOCs are located in the deep western groundwater (deeper than 300 feet), south of the former NWIRP Bethpage site



Conceptual Site Model – Groundwater



RIGHT NOW ~ 120 PPB
- ROD HAS SOME UNIQUE LANGUAGE FOR WHEN CAN BE SHUTDOWN.

TYPICALLY FIND SOME CONTAMINANTS FROM 50'-250'

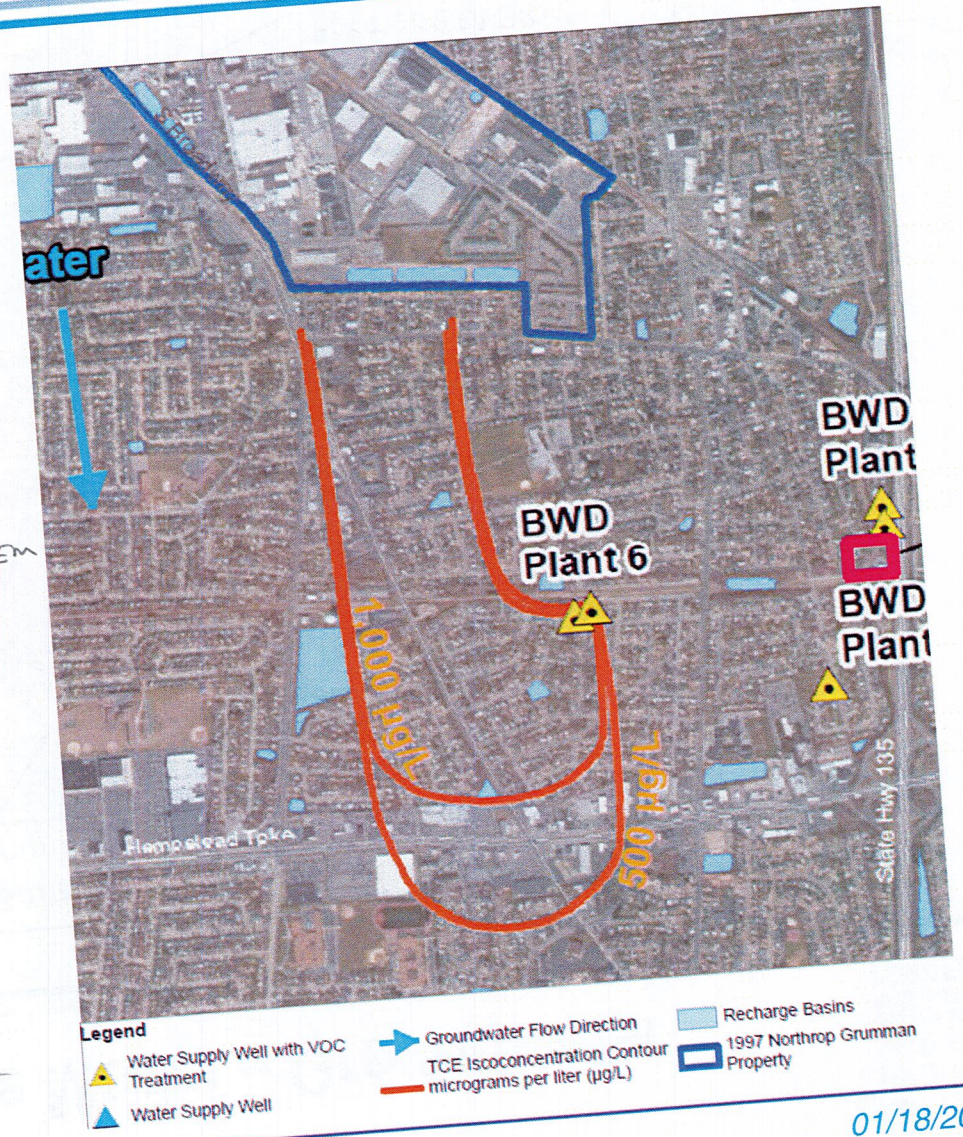
PUMPING LIKELY PULLED CONTAMINATION DOWNWARD

RE108 Hotspot Area

Design

- Pumping rate of 900 to 1,200 gallons per minute
- Treatment Process: Air Stripping and Granular Activated Carbon
- Treatment Goal: Drinking Water Standards
- Treatment Plant Dimensions: 80 feet by 100 feet by 25 feet high - SIMILAR TO GM-38 SYSTEM
- Treatment Plant property buffer, minimum of 100 feet to occupied structures – 2 acres

- BASIS OF DESIGN REPORT TO BE SUBMITTED IN ~ 2-3 MOS.
- CONSIDERING ADV. OX OR PEBIN FOR 1,4 DIOXANE
- AOP - ~3 MILLION/YR
- WATCHING WHAT SC IS DOING W/ NO TREATMENT



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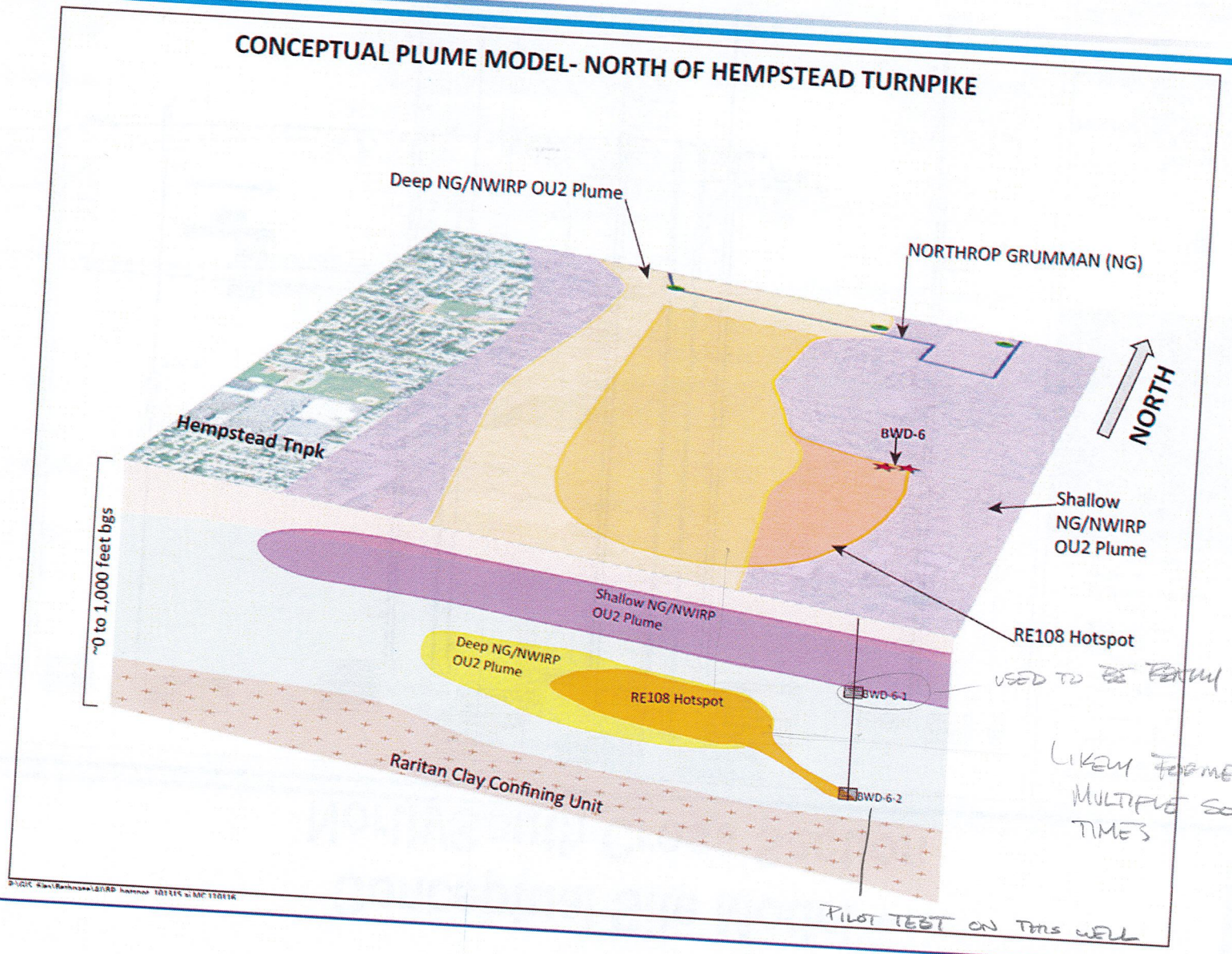
RE-108 Hot Spot CSM



Conceptual Site Model – North/South Cross Section

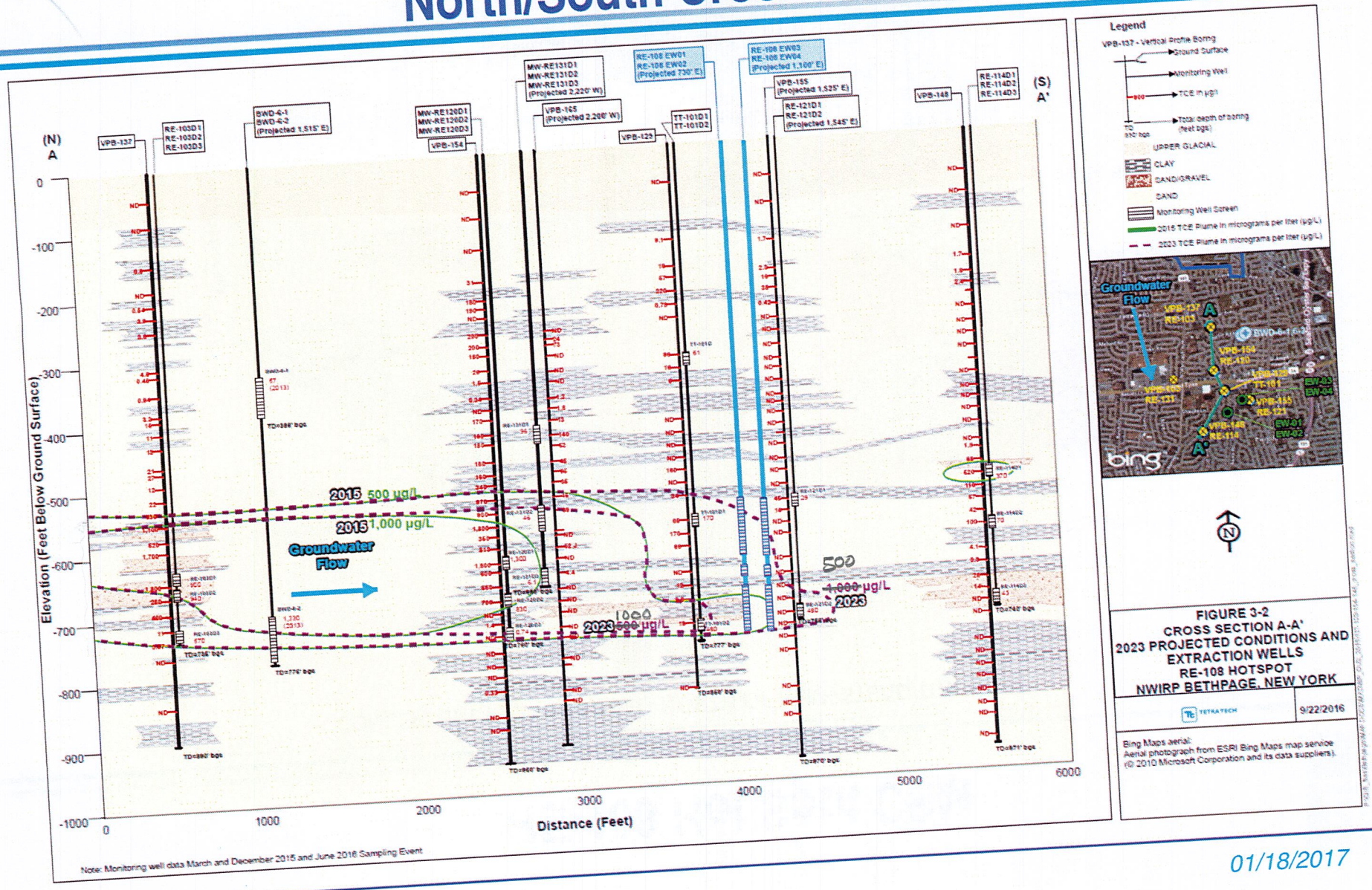


FIGURE 3-2
CROSS SECTION A-A'
2023 PROJECTED CONDITIONS AND EXTRACTION WELLS
RE-108 HOTSPOT
NWIRP BETHPAGE, NEW YORK

TETRATECH | 9/22/2016

Bing Maps Aerial:
Aerial photograph from ESRI Bing Maps map service
(© 2010 Microsoft Corporation and its data suppliers).

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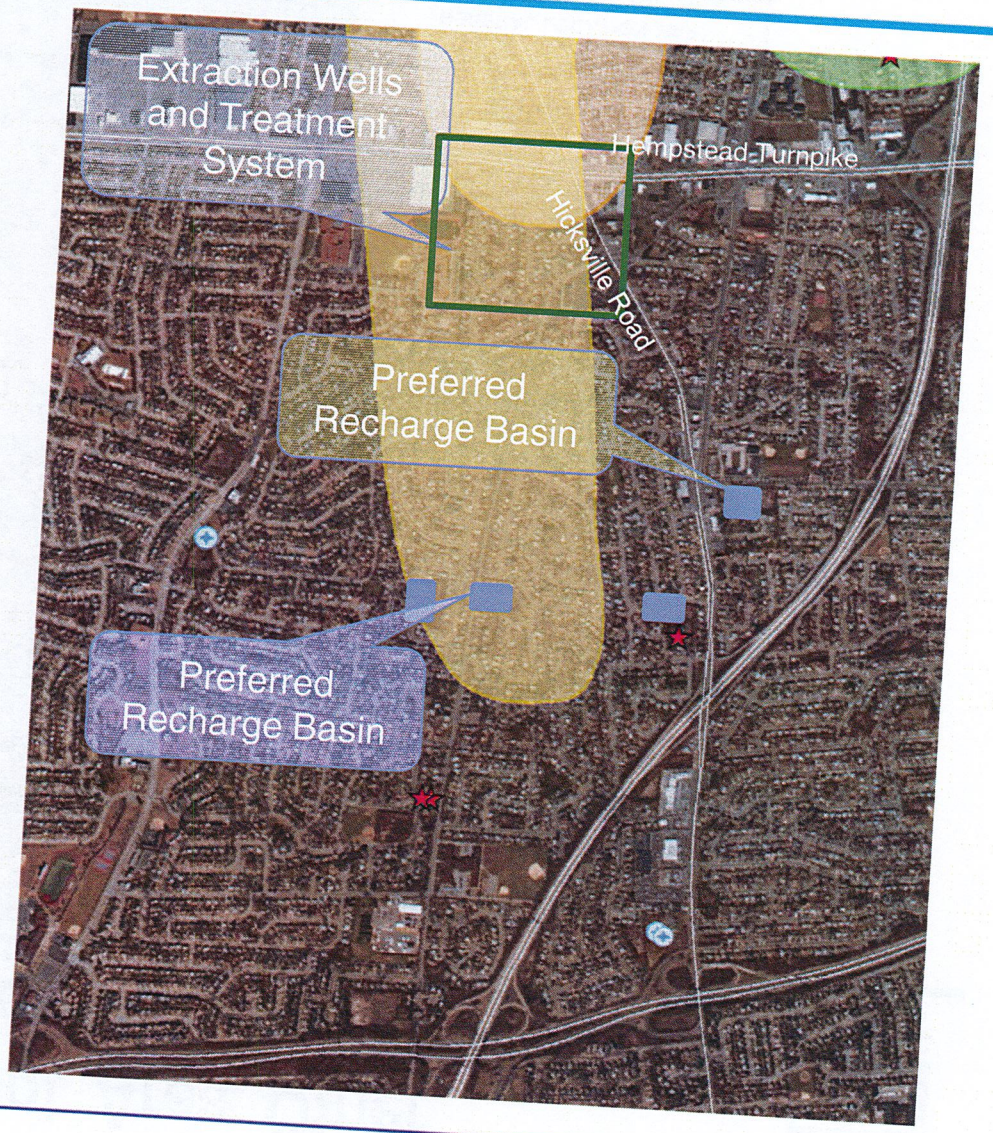
RE108 Hotspot Area

Design (Continued)

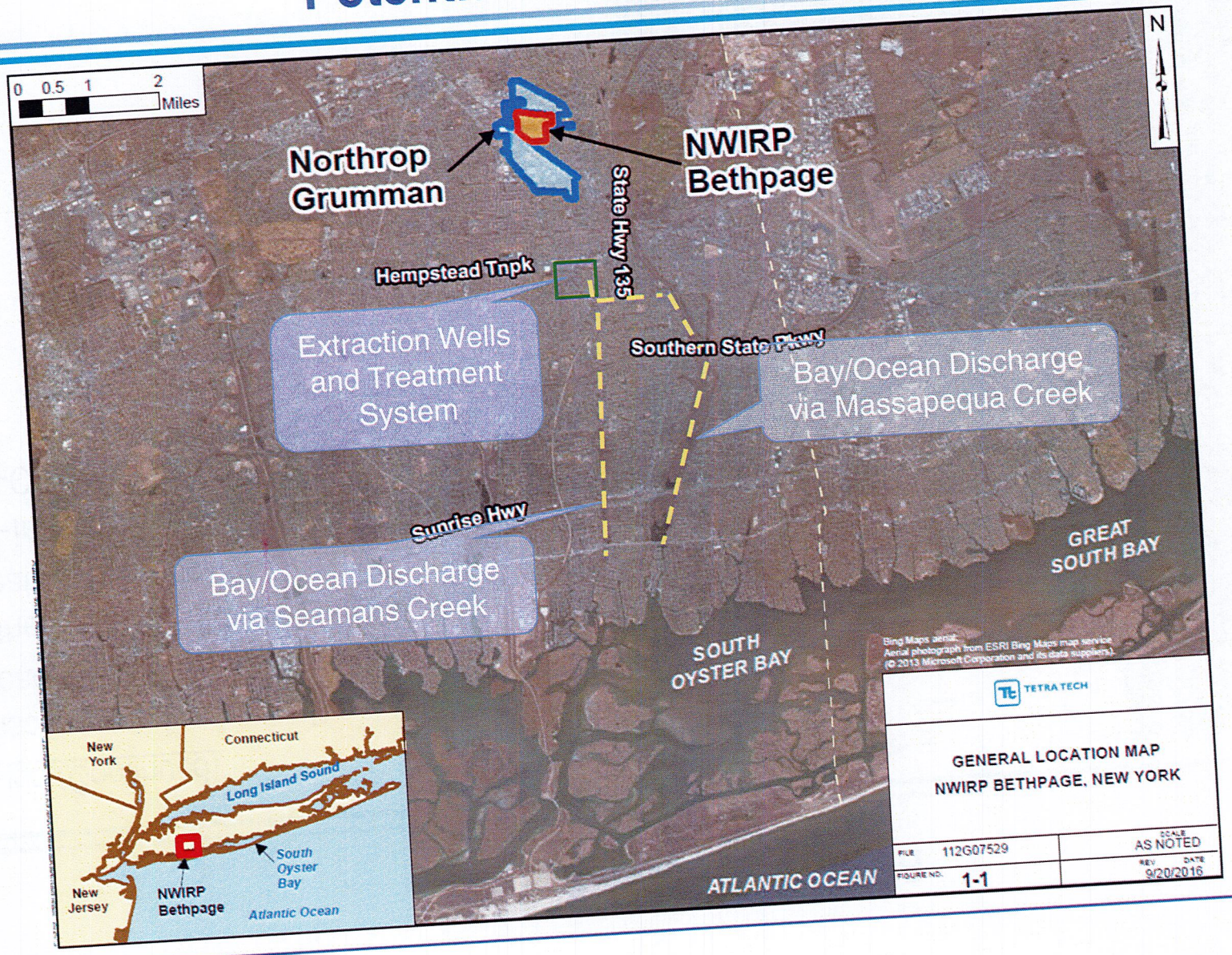
- Discharge to Recharge Basin, Hicksville Road – 3,500 feet southeast
- Other potential discharge options for treated water include:
  - –Injection Wells various locations
  - –Creeks/South Oyster Bay

– KEEP DIST. FROM EXTR. TO TRTMT. AS SHORT AS POSSIBLE,

TARGETING ~ 20 TONS OF VOC REMOVAL



RE108 Hotspot Area, Other Potential Discharge Options



RE108 Hotspot Area - Path Forward

Path Forward

- Preliminary design activities underway, including pumping and basin recharge testing planned for 2017
- Basis of Design Report – 2017
- Property Access Underway – 2016 to 2019
- Detailed Design Activities – 2019 and 2020
- Construction/Startup – 2021 and 2022

– WELLS BEING DRILLED NOW.
– BY DECEMBER.
– 6 OPTIONS
– 1,4 DIOXANE OPTIONS.
↳ REQUIRE MAJOR BUFFER ZONES.
↳ OPTIONS FOR NOT HAVING TO DEAL W 1,4 + IF IT IS TREATED.

CLIN RE-106 PLUME
AVG = 5-10 PPB

UCMR DATA (JOE DEFRANCO)
↳ 1,4 PRIMARILY ASSOCIATED W PLUMES.

1,1,1-TCA ~ 4% 1,4 DIOXANE
TCE - WAS LOWER % AGE OF 1,4 DIOXANE

GM-38 Hot Spot Area

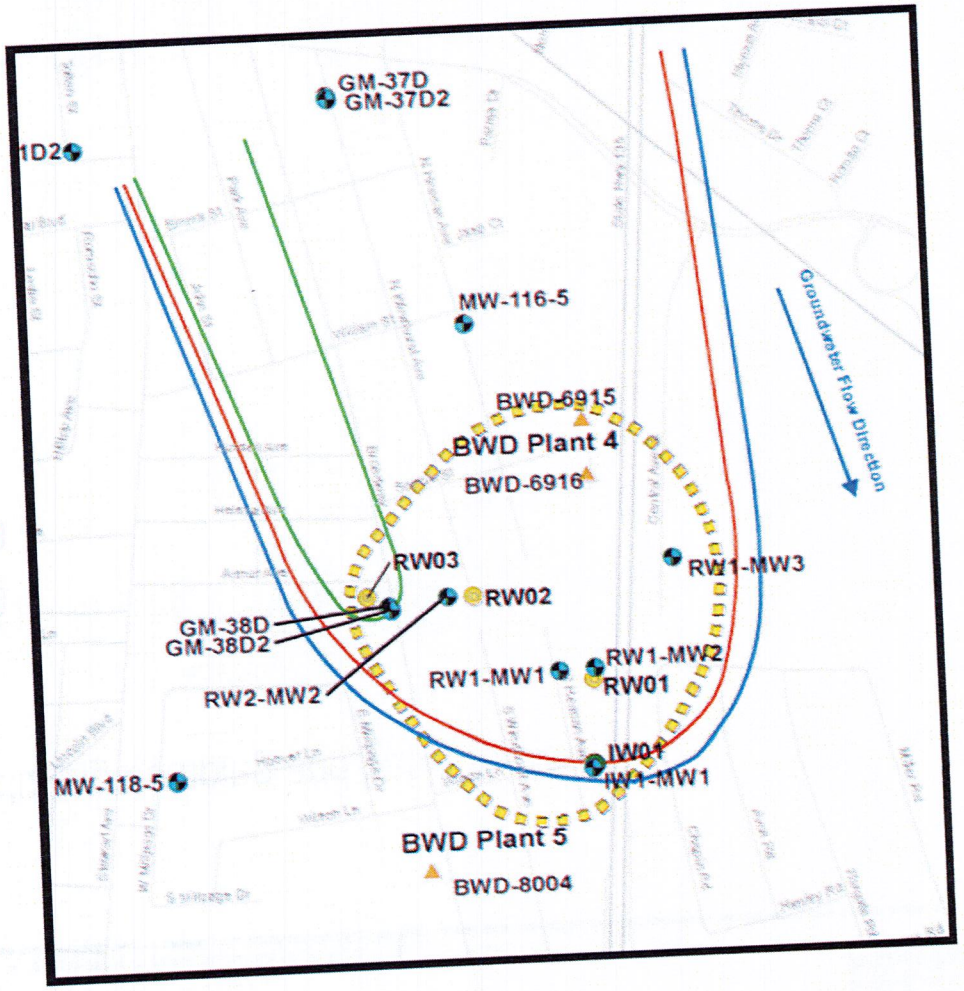
2 WELLS.

GM-38 Hot Spot

- Approximately 1.5 miles south, southeast of NWIRP Bethpage
- Groundwater flows from the NG/NWIRP facilities to the hotspot area
- Originally 38 acres in size
- Variable depths between 220 to 500 feet deep
- Now less than 1,000 ppb

GM-38 Groundwater Treatment System

- Operating since 2009 to remove VOCs in groundwater down to concentrations which meet Safe Drinking Water Standards Recovery well pull groundwater to the surface
- VOCs are then removed from the groundwater by air stripping and carbon filters
- Samples are collected from eight monitoring wells to determine the systems effectiveness
- Approximately 3.4 billion gallons of groundwater containing 5 tons of VOCs have been captured and treated
- Recovery well TCE concentration is approximately 120 ug/L (1.4 pounds per day)
- Maximum monitoring well concentration is 260 ug/L



- SEMI-ANNUAL SAMPLING

- PURSUING OPTIONS TO SHUT SYSTEM DOWN - SHOULD BE SUBMITTED BY 6-9 MONTHS. 01/18/2017
- NO CLEAR EXIT STRATEGY
- MAY NEED TO INVESTIGATE TO NORTH TO SEE HOW FAR PLUME GOES

2009 – 2016
VERTICAL PROFILE BORINGS AND WELLS

NAVFAC

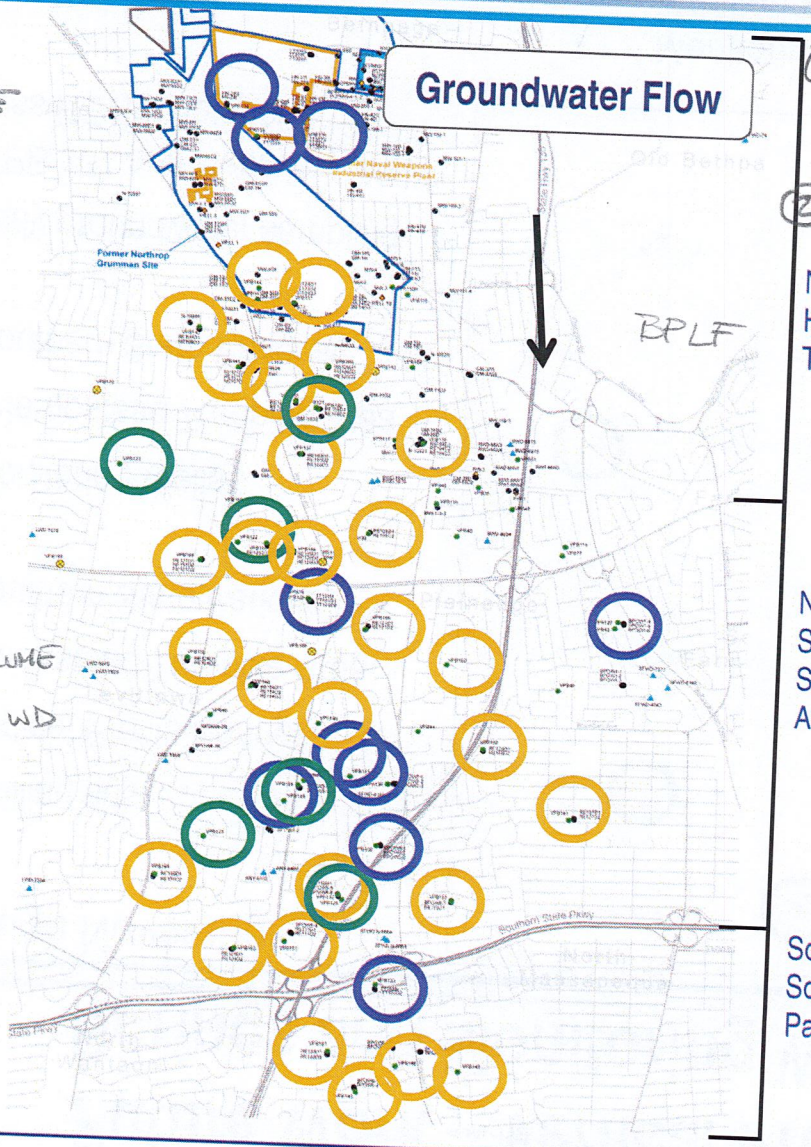
NEW CASTLE

SYLVANIA

2009 Completed (green)

2010 to 2012 Completed (blue)

2012 to 2016 Completed (orange)



BPLF

FREON PLUME

LEVITOWN WD

North of Hempstead Turnpike Area

North of Southern State Parkway Area

South of Southern State Parkway Area

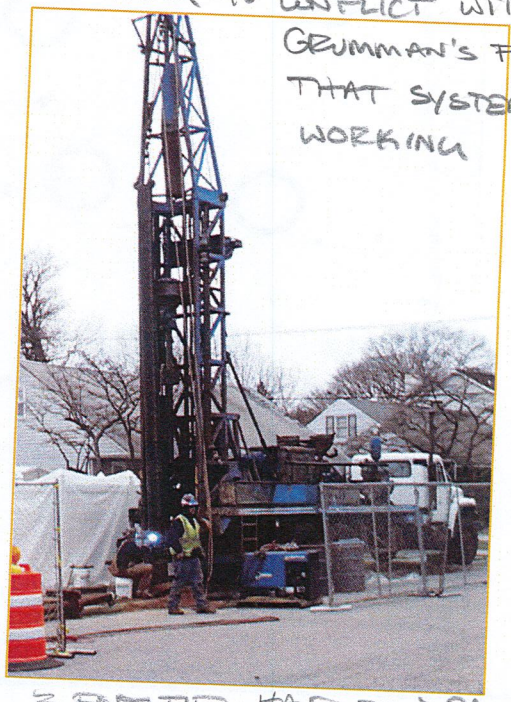
① – RE-10% INVESTIGATION

+

② – ONCT EFFECTIVENESS EVALUATION

↳ FULL CONTAINMENT

↳ NOTHING TO CONFLICT WITH GRUMMAN'S FINDING THAT SYSTEM IS WORKING



3 ENTITIES HAVE TO DEAL C

① TOWN OF OYSTER BAY

② HEMPSTEAD

③ NASSAU COUNTY

6 – 8 WKS

VPB ~$500 WITH WELLS

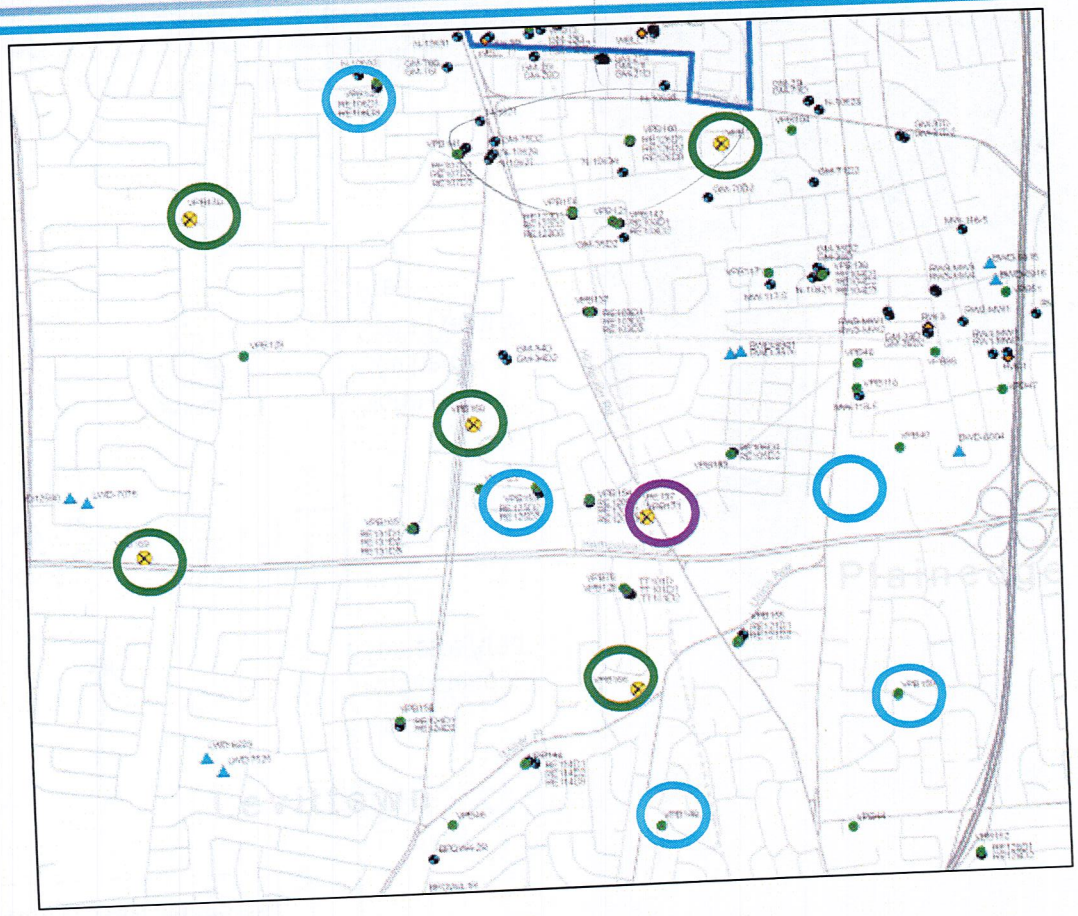
01/18/2017

Future Work – Vertical Profile Borings and Monitoring Wells

500 - 5,000 PPB TCE STILL

Planned work through November 2017:

- Operation of 3 drilling rigs
- Installation of Vertical Profile Borings
  - 4 north of Hempstead Turnpike Area,
  - 1 north of Southern State Parkway Area
- Installation of Monitoring Wells
  - 14 north of Hempstead Turnpike Area
  - 7 north of Southern State Parkway Area
- Continue quarterly groundwater sampling
- Installation of VPB 171 and Recovery Well RE137 to address RE108 hotspot



Monitoring Wells to be installed
Monitoring Wells and VPB to be installed
Recovery Well and VPB to be installed

MONTHLY UPDATES FROM NAVY

GP - GRUMMAN PRODUCTION WELLS

GP-3 FAILED & WAS REPLACED

Current Well Head Treatment

- Navy is negotiating and/or has implemented well head treatment for five public water suppliers:
  - Bethpage Water District (BWD) – Plant 5 and Plant 6 upgrade
  - South Farmingdale Water District (SFWD) – Plants 1 and 3
  - New York American Water (NYAW) – Seamans Neck Road

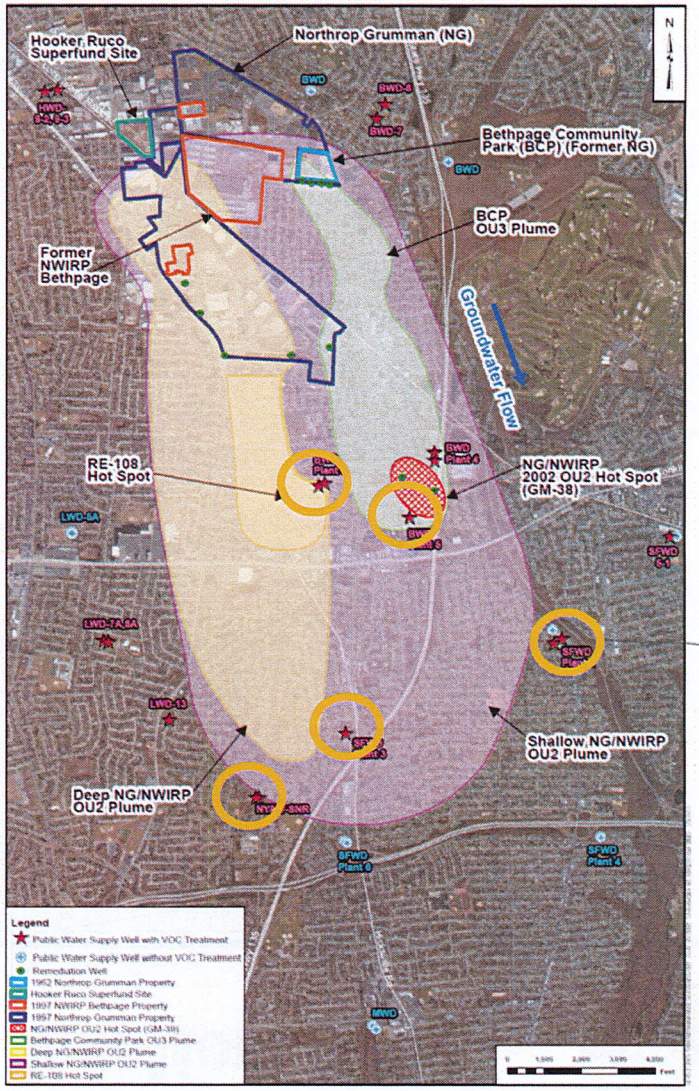
LAST ON - FIRST OFF BWD 6

1978 TCE FIRST DETECTED IN BWD 6-1

6-2 CLEAN AT FIRST BUT TCE IN DEEP

BWD 4-1 - CANNOT BE OPERATED

- 2 STAGE AS SYSTEM



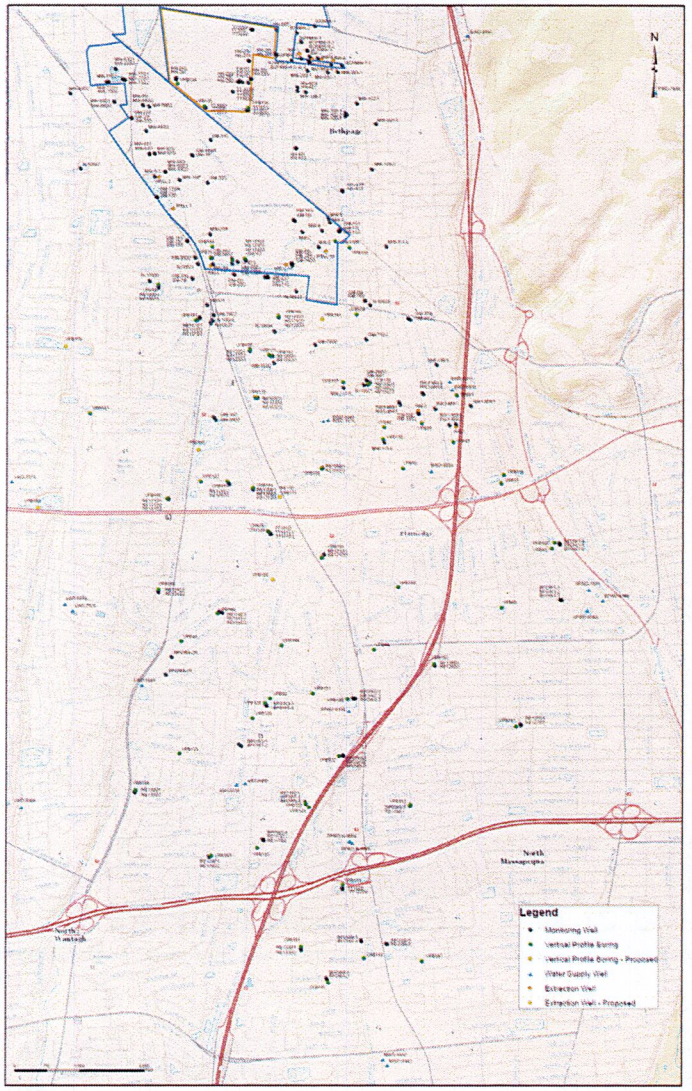
2 SHALLOW 1 DEEP

Building for Air Stripping Tower
South Farmingdale Water District Plant 1

Interim Granular Activated Carbon System
New York American Water

Routine Monitoring/Outpost Well Monitoring

- Routine Monitoring and Outpost Well Monitoring – mostly being conducted by Northrop Grumman on a quarterly, semi-annual, or annual basis
- Outpost wells provide a theoretical five-year lead time to impact



* DO NOT HAVE REPORTS

- TO SUBMIT WORK PLANS FOR WELL INSTALLATIONS

NAVY INSTALLS & NG COMPLETES SAMPLING

SAMPLING BY ARCADIS

- SOME REPORTING BY NAVY & SOME BY NG

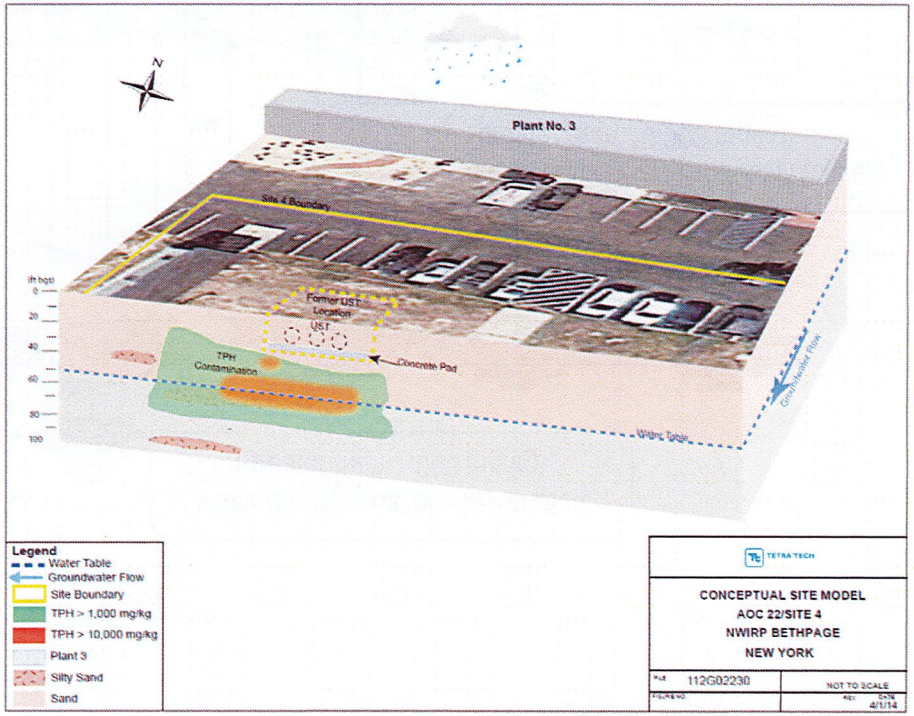
~ 50 WELLS / ¼

- OP WELLS
- RE-106
- PLUME MONITORWELLS
- GM-38 WELLS.
- BP COMM. PARK MONITORING

SITE 1 SVE
OU2 GWCT
OU3 GWCT
OU3 SVE

Site 4 (AOC 22) - Summary

- Former Underground Storage Tanks (USTs) for No. 6 Fuel Oil – Tar-like material
- Tanks were removed approximately 1980 to 1984
- Approximately 6,800 cubic yards and 47 tons of petroleum
- Petroleum found in the soils 30 to 71 feet below ground surface, near the water table
- Impacted soil covers an area of approximately 0.14 acre
- Some evidence of groundwater effects
- Groundwater ultimately captured by Containment System to south



Site 4 –AOC 22

- 2013 Feasibility Study
- 2014 Proposed Plan
- 2015 ROD
- 2015 to 2017 Design
- Remedy to consist of:
  - Steam Injection and Free Product Recovery
  - Biosparging – EVALUATING SOLAR POWER FOR OPERATING
  - Long-term Monitoring

– MOBILIZE TO SITE IN APRIL