TAC Meeting

NYSDEC / USEPA Region 2
Northrop Grumman Systems Corporation
NAVFAC

February 2, 2016

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Northrop Grumman Discussion Topics

- Status of Northrop Grumman/Navy Cooperation
  - Technical Exchange Meetings
  - Navy Wells sampled by Northrop Grumman
- Update on Northrop Grumman OU2 Activities
  - ONCT System OM&M
  - Groundwater Monitoring (TVOCs and 1,4-dioxane)
  - ONCT Effectiveness
- Update on Northrop Grumman OU3 Activities
  - Off-Site Groundwater Investigation
- NYSDEC Radiological Sampling Program

Status of Northrop Grumman/ Navy Cooperation

- Periodic Technical Exchange Meetings with Navy (August 11, 2015) – *Ongoing*
- Northrop Grumman continues sampling additional wells installed by Navy (per Navy request May 6, 2015) and provides results to Navy for reporting - *Ongoing*

Navy Wells
Sampled by Northrop Grumman

- Sampled in 4Q-2015 and part of continuing program:
  - 13 outpost wells – quarterly frequency
    (MWD Northwest Well Field, SFWD Well Field 6)
  - 4 monitoring wells – semiannual frequency
- Planned to be sampled in 1Q-2016:
  - 13 outpost wells – quarterly frequency
    (MWD Northwest Well Field, SFWD Well Field 6)

Update on Northrop Grumman OU2 Activities

- ONCT System OM&M
- Groundwater Monitoring (TVOCs and 1,4-dioxane)
- ONCT Effectiveness

Imagine the result

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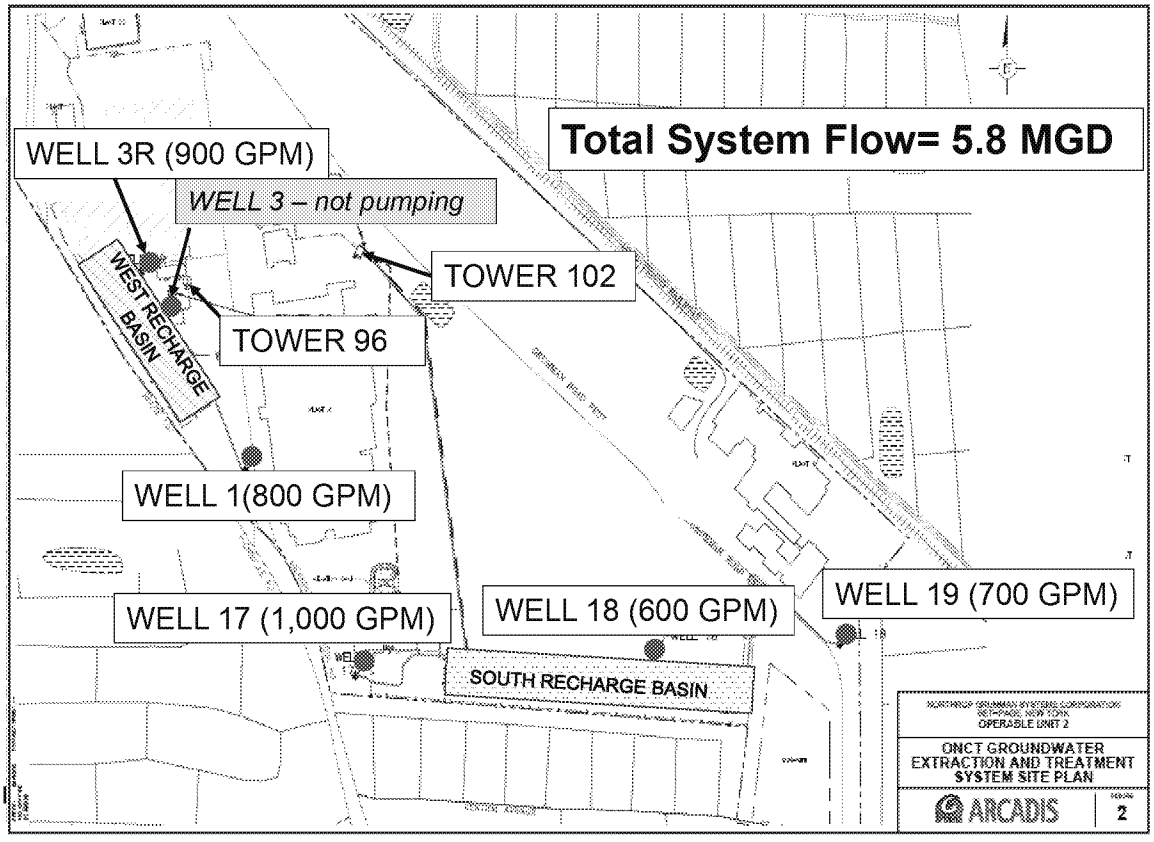
Total System Flow= 5.8 MGD
WELL 3R (900 GPM)
WELL 3 – not pumping
TOWER 102
TOWER 96
WEST RECHARGE BASIN
WELL 1(800 GPM)
WELL 17 (1,000 GPM)
WELL 18 (600 GPM)
WELL 19 (700 GPM)
SOUTH RECHARGE BASIN
OPERABLE UNIT 2
ONCT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SITE PLAN
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2

ONCT System OM&M

- Uptime & Performance (2015)
  - **T96 System: 98% uptime**

	% Uptime	% Design Flow
Well 1:	96	97
Well 3R:	98	133

  - **T102 System: 93% uptime**

	% Uptime	% Design Flow
Well 17:	93	94
Well 18:	91	94
Well 19:	93	96

ONCT System OM&M – cont'd

- Downtime due to alarm conditions, periodic system/well maintenance, and site-wide electrical and communications disruptions
  - Maintenance activities included T96 air stripper distribution tray cleaning, boiler maintenance, VFD repairs, carbon regen system repairs, meter calibration, equipment replacement, media replacement, and well head and drop pipe replacement
- ≥99% treatment efficiency, discharge is compliant
- Cumulative Mass Removal
  - 192,600 lbs VOCs removed from start up of ONCT System in 4Q 1998 through 4Q 2015

Groundwater Monitoring

- Summary of TVOCs and 1,4-dioxane results for 4Q-2015 by Hydrogeologic Zone (51 wells sampled)

Range of TVOCs and 1,4-dioxane in samples collected in Fourth Quarter 2015		
Hydrogeologic Zone	**Range of TVOCs (µg/L)**	**Range of 1,4-dioxane (µg/L)**
Shallow	ND - 6.9	ND - 5.5
Deep	ND - 150	ND - 6.6
Deep 2	ND - 450	ND - 7.8
Deep 3	ND - 86	ND - 1.3

Imagine the result

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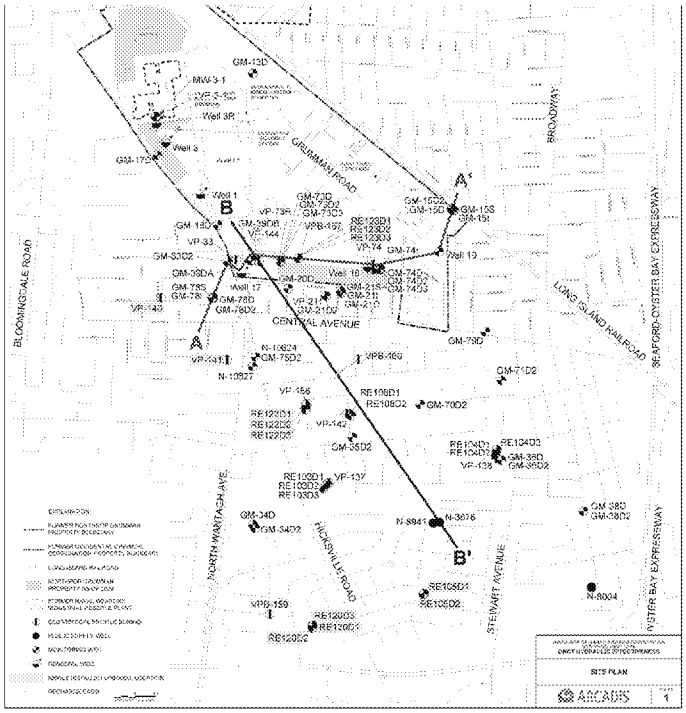
51 wells sampled in 4Q-2015 include Northrop Grumman wells and the 15 original outpost wells repurposed for plume monitoring. Does not include Navy-owned wells Arcadis samples on behalf of Navy.

ONCT Effectiveness Update (2015)

The following data was added:

- 2015 groundwater quality data (Northrop Grumman and Navy)
- Data from newly-installed Navy VPBs and monitoring wells:
  - VPBs: 140, 141, 157, 159, 160
  - Monitoring Well Clusters: RE105, RE120, RE122, RE123



Well and Cross-section Locations

Imagine the result

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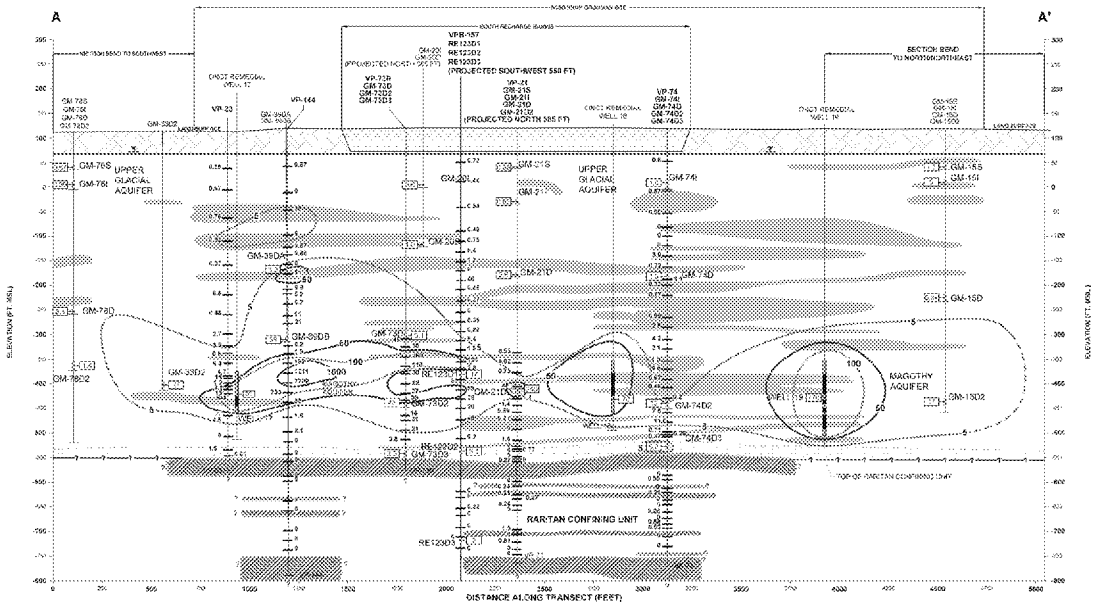

A-A' West to East TVOC Cross-Section

- Generally Groundwater has been Remediated Down to 300 ft bls

Imagine the result

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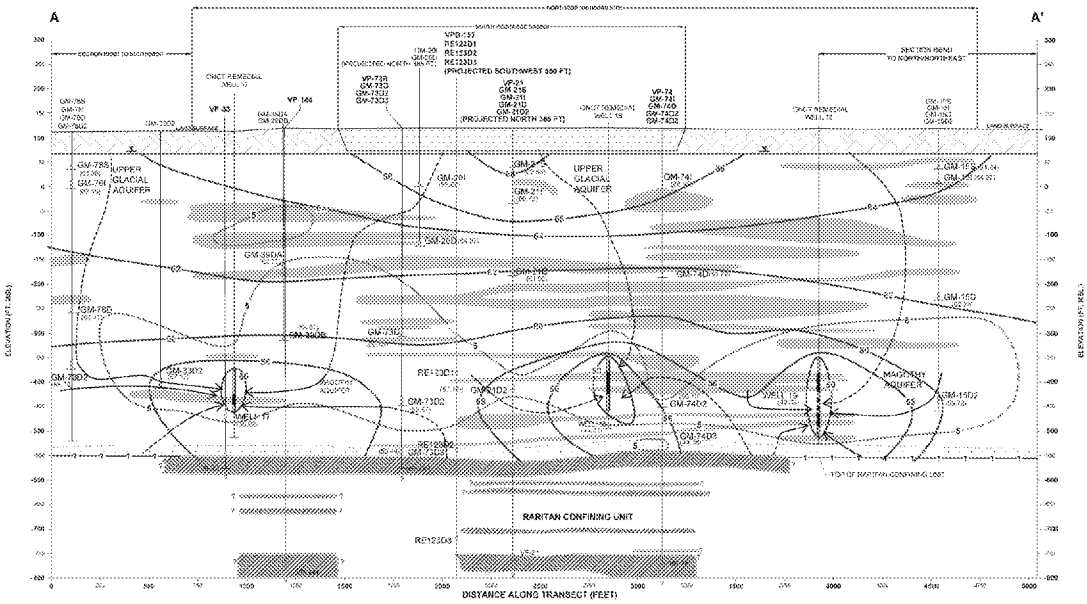

A-A' West to East Groundwater Flow Cross-Section

- ONCT System Capture Zone Extends to the "600 Foot" Clay

Imagine the result

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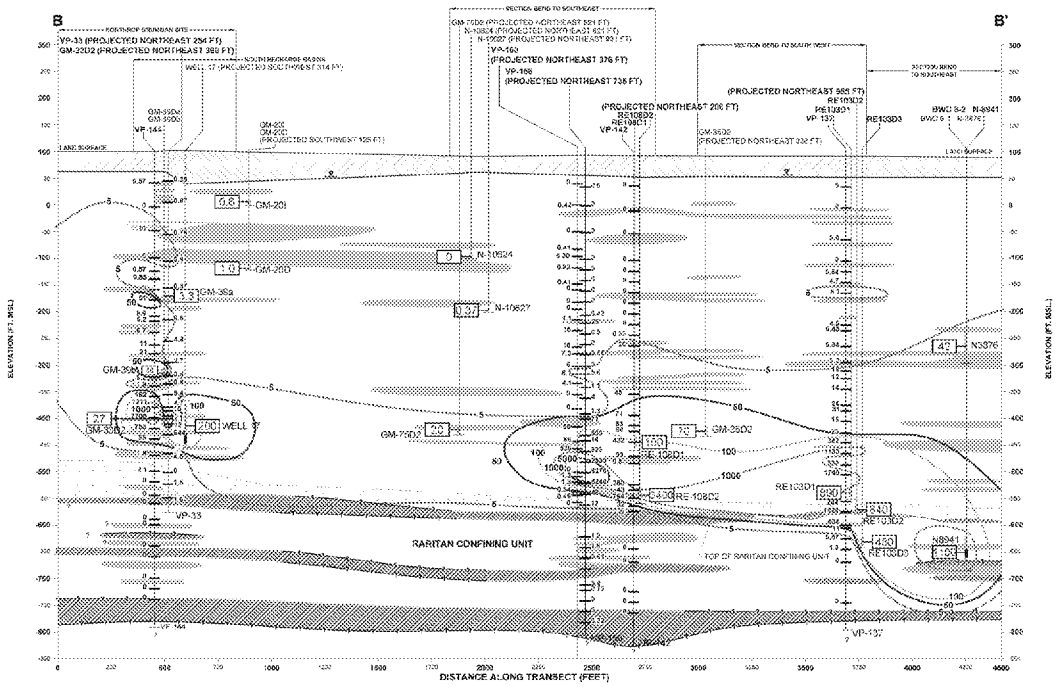

B-B' Northwest-Southeast TVOC Cross-Section

- Plume Bifurcation is Occurring which indicates ONCT System Effectiveness

Imagine the result

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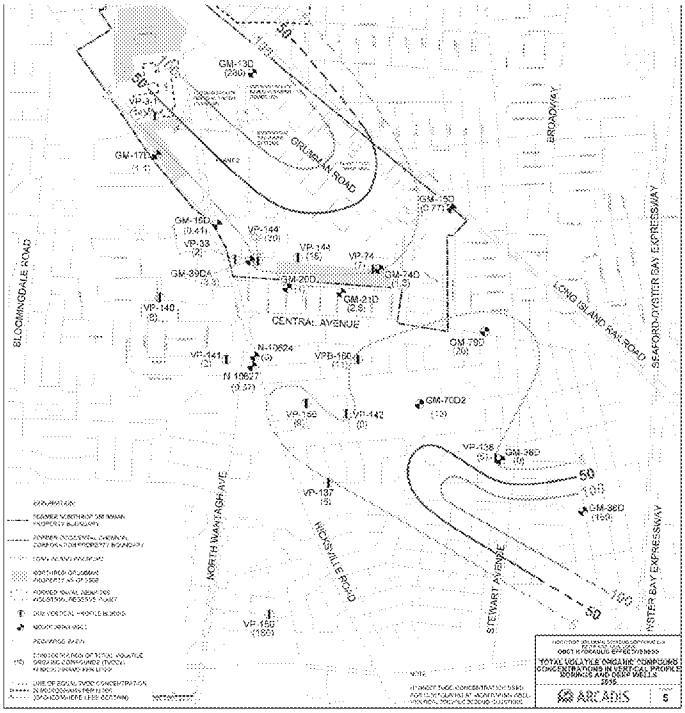
Updated draft revision – test case



PLUME BIFURCATION
IS OCCURING

TVOCs in Deep Zone

Imagine the result

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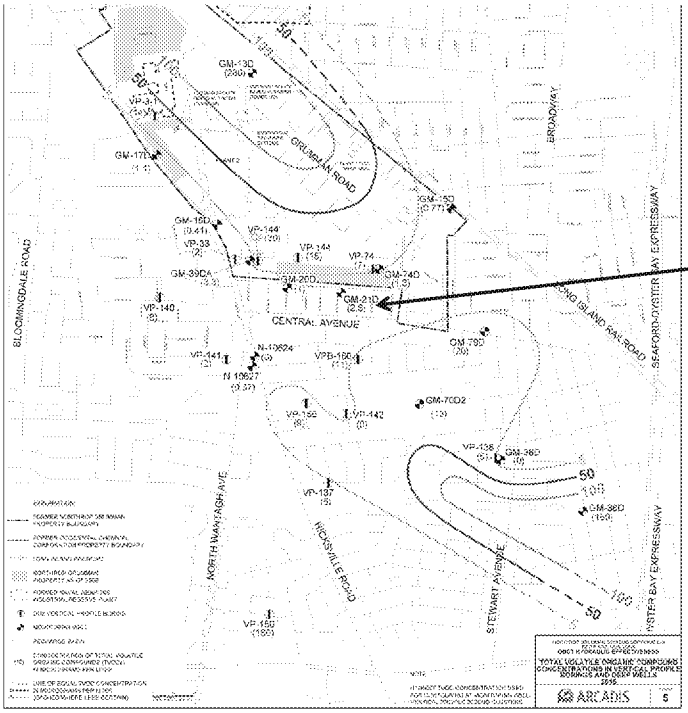

PLUME BIFURCATION IS OCCURING

GAP IN PLUME INDICATES ONCT SYSTEM EFFECTIVENESS

TVOCs in Deep Zone

Imagine the result

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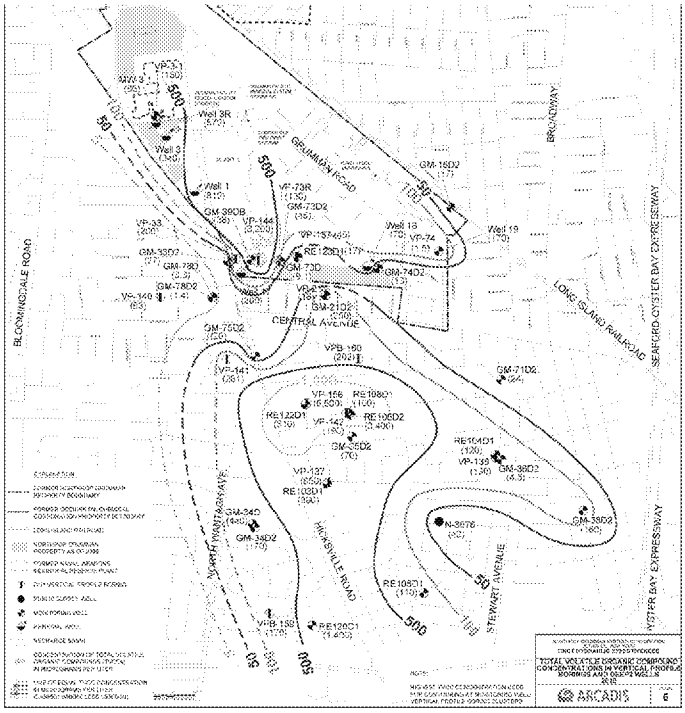

PLUME BIFURCATION
IS OCCURING

TVOCs in Deep 2 Zone

Imagine the result

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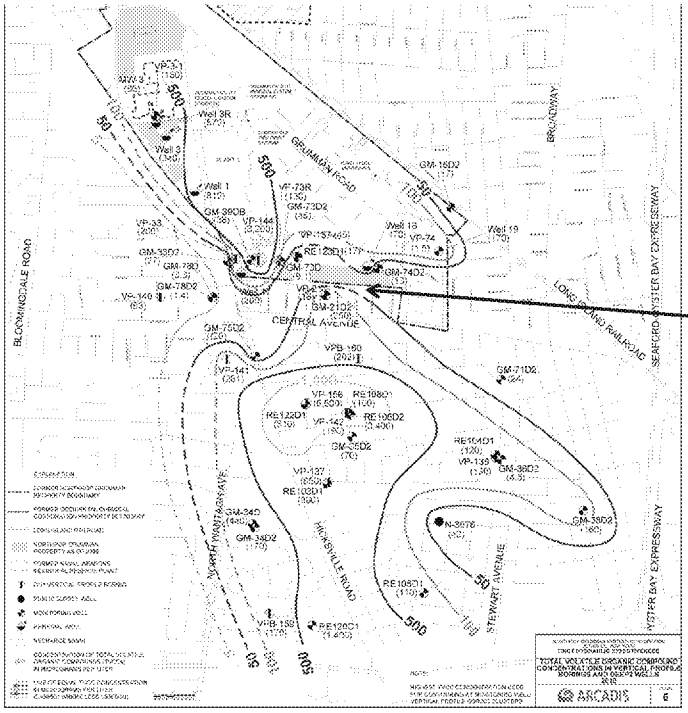

PLUME BIFURCATION IS OCCURING

GAP IN PLUME INDICATES ONCT SYSTEM EFFECTIVENESS

TVOCs in Deep 2 Zone

Imagine the result

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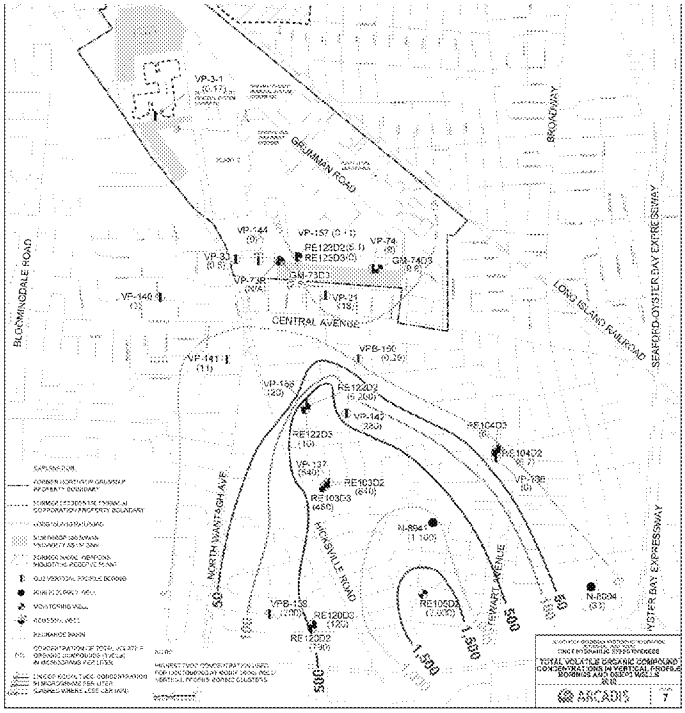

PLUME BIFURCATION
IS OCCURING

TVOCs in Deep 3 Zone

Imagine the result

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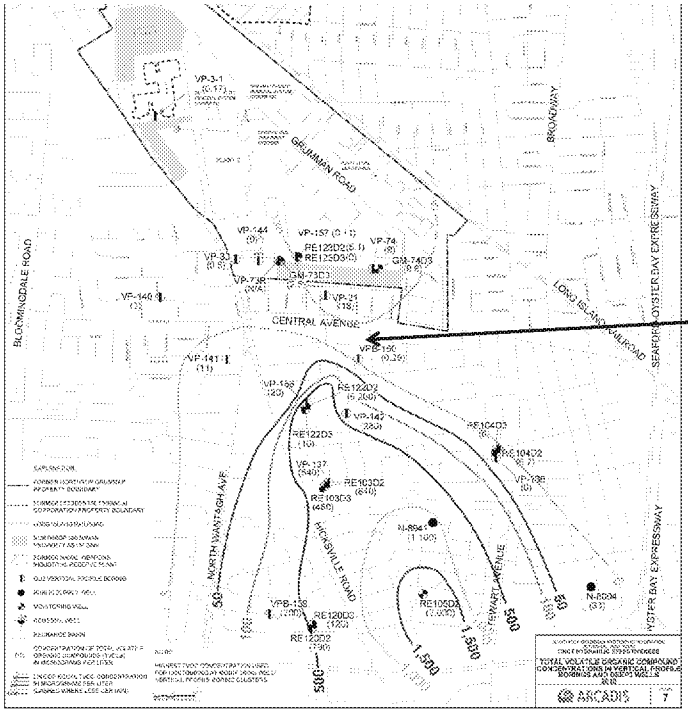

PLUME BIFURCATION IS OCCURING

GAP IN PLUME INDICATES ONCT SYSTEM EFFECTIVENESS

TVOCs in Deep 3 Zone

Imagine the result

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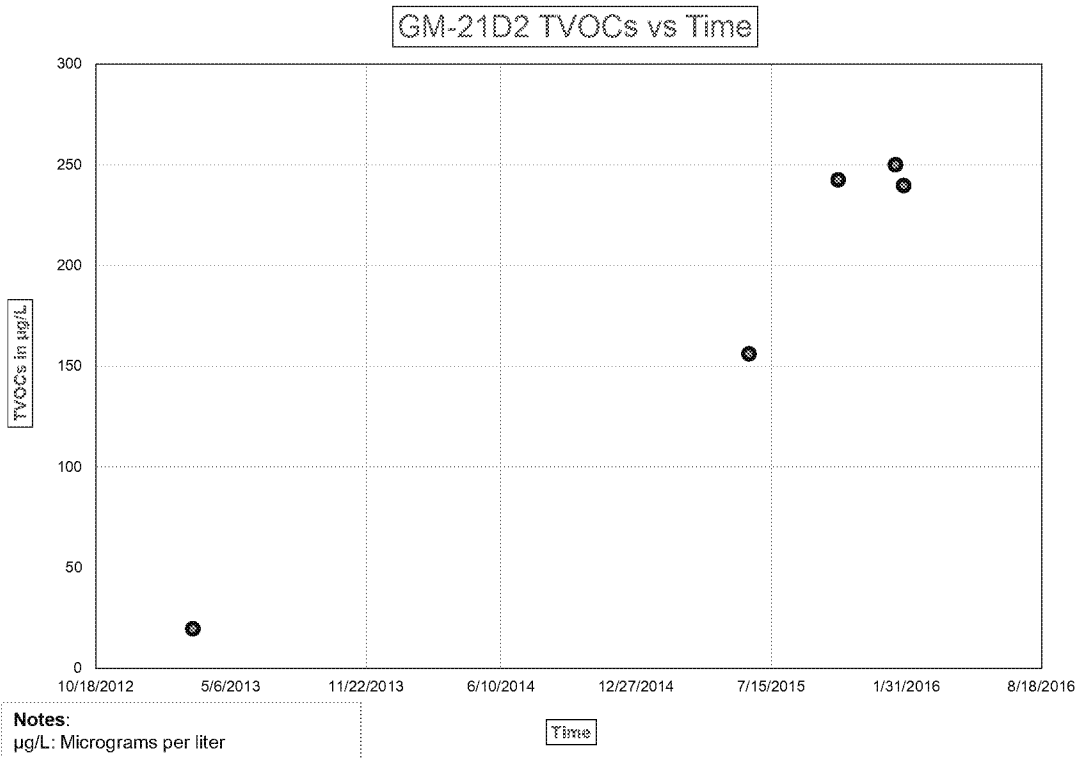
GM-21D2 Results/Related Study

- Well GM-21D2
  - Located southwest of ONCT Remedial Well 18, approximately 150 ft south of the Site
  - Located within the ONCT system capture zone (historical water level data)
- Results
  - Recent increases in TVOCs (2015) compared to previous sampling results (2013 initial sampling)



Notes:
µg/L: Micrograms per liter
TVOCs: Total Volatile Organic Compounds

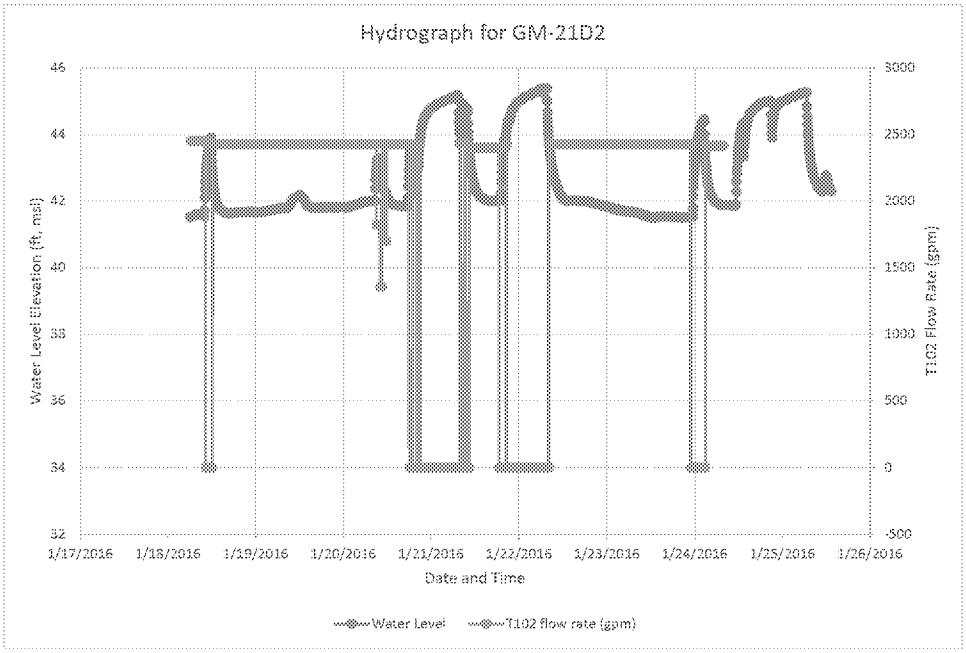
GM-21D2 Results/Related Study

- Possible scenarios causing results observed
  - Changes in groundwater conditions caused by one or more of the following:
    - Below normal precipitation/recharge in 2015 resulting in larger capture zone causing off-site impacted groundwater to be drawn back towards the ONCT system

GM-21D2 Results/Related Plan

- Plan to investigate/assess
  - Enhanced hydraulic and water quality monitoring
    - Monthly groundwater quality sampling at select wells for a period of six months
      - Monitoring Wells GM-21D2, GM-73D2, GM-74D2
      - Remedial Wells 17, 18, and 19
    - Monthly hydraulic (water-level) measurements (via direct measurement or by transducer) for a period of six months
      - Monitoring Wells GM-21D2, GM-33D2, GM-35D2, GM-71D2, GM-73D2, GM-74D2, GM-75D2 and Remedial Wells 17, 18, and 19

GM-21D2 Water-Levels



Imagine the result

Assessing hydraulic connection with remedial wells

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Update on Northrop Grumman OU3 Activities (Off-Site Groundwater Investigation)

- Locations of VPBs and Monitoring Wells
- VOC/1,4-Dioxane Results

Imagine the result

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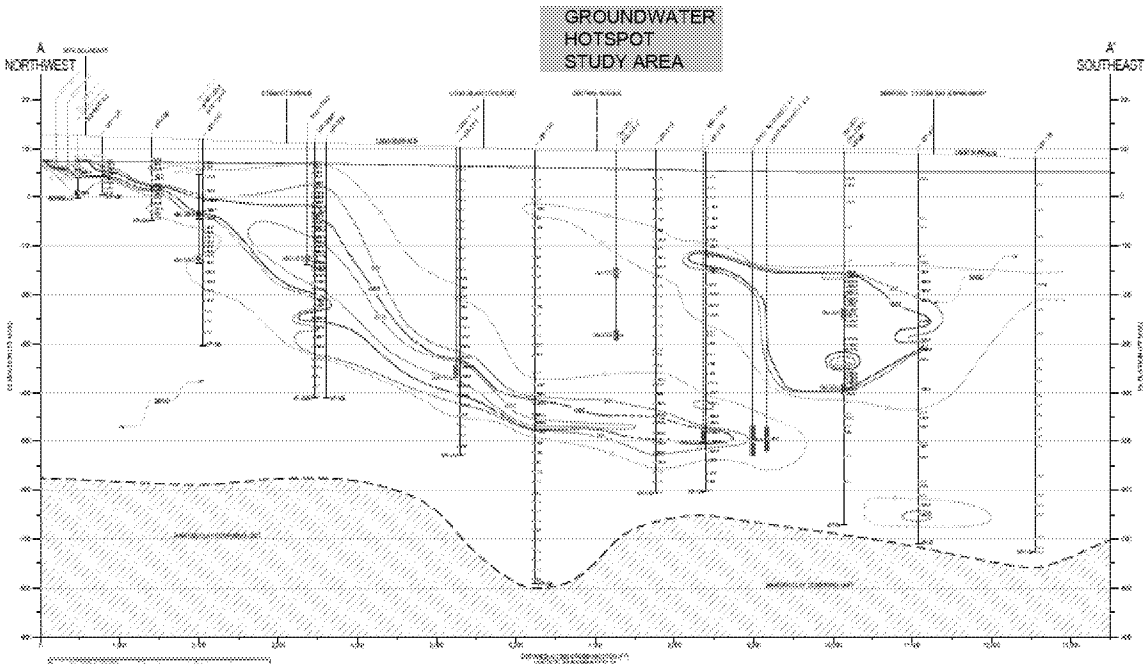
Study Area RI X-Section



Imagine the result

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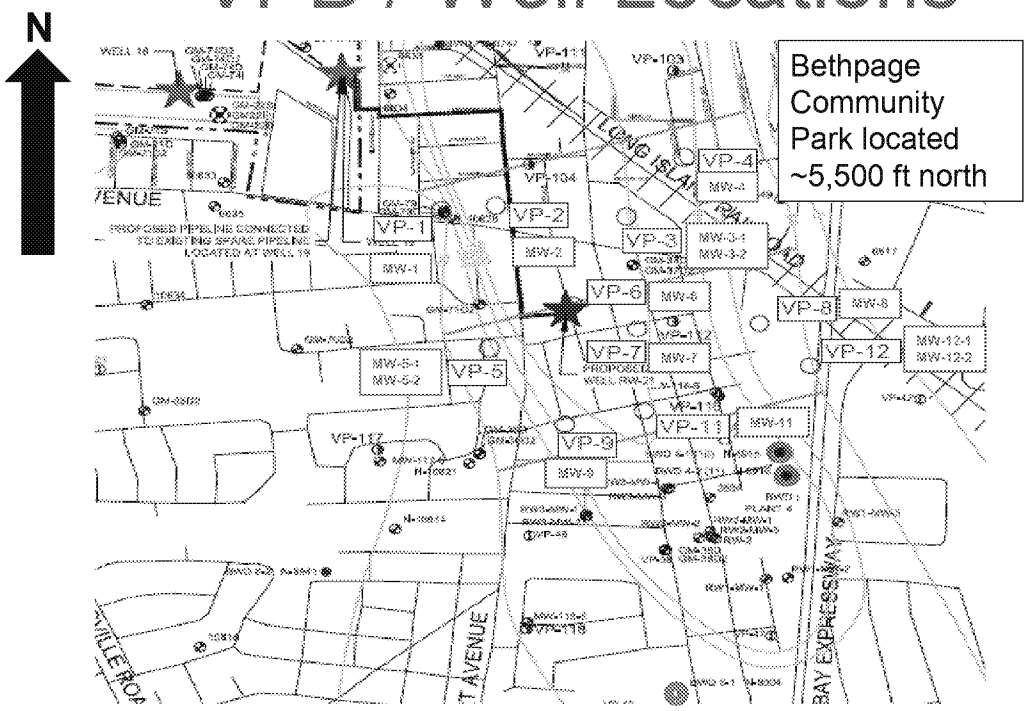
VPB / Well Locations



Imagine the result

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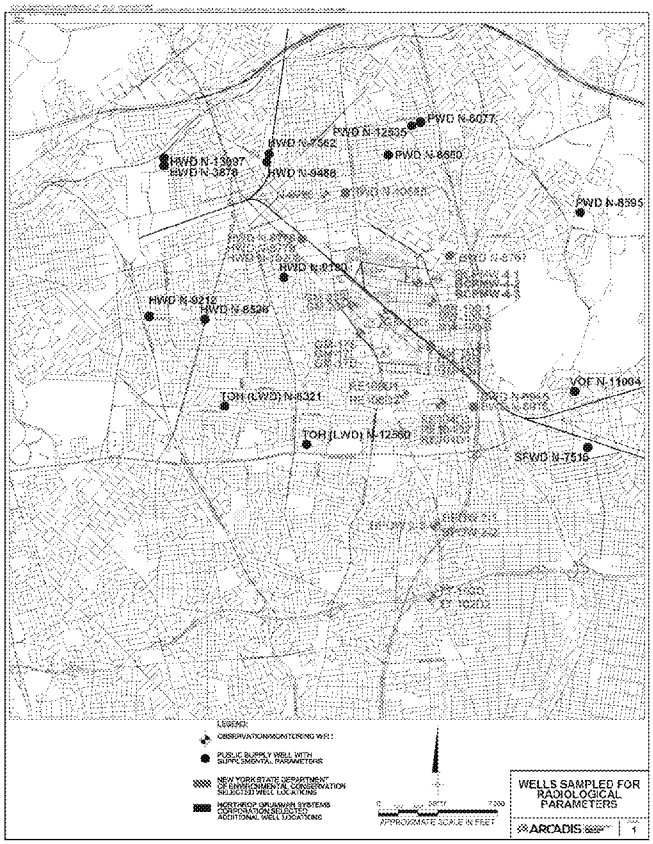
Summary of Results

VPB ID	VPB Total Depth (ft bls)	Monitoring Well ID	Screened Interval (ft bls)	Max VPB Interval TVOC (ug/L)	Post Development Mon. Well TVOC (ug/L)	Dec-2015 Mon. Well TVOC (ug/L)	Dec-2015 Mon. Well 1,4-dioxane (ug/L)
RW-21_VP-1	761	RW-21_MW-1	615 – 625	859	3,904	3,000	23
RW-21_VP-2	742	RW-21_MW-2	600 – 610	105	4,584	3,000	27
RW-21_VP-3	860	RW-21_MW-3-1 RW-21_MW-3-2	556 - 566 595 - 605	14,113 4,897	14,700 5,464	9,900 3,400	114 43
RW-21_VP-4	710	RW-21_MW-4	369 - 384	989	973	440	4.7
RW-21_VP-5	716	RW-21_MW-5-1 RW-21_MW-5-2	300 - 310 560 - 570	140 23	90 37	50 22	4.5 1.3
RW-21_VP-6	742	RW-21_MW-6	604 - 624	1,645	3,660	2,300	16
RW-21_VP-7	827	RW-21_MW-7	580 - 590	5,252	5,906	7,100	75
RW-21_VP-8	700	RW-21_MW-8	460 – 470	430	942	810	8.4
RW-21_VP-9	706	RW-21_MW-9	630 - 640	400	860	650	5.9
RW-21_VP-11	817	RW-21_MW-11	638 - 648	1,956	1,992	1,400	6.6
RW-21_VP-12	700	RW-21_MW-12-1 RW-21_MW-12-2	415 – 425 590 - 600	96 6	126 ND	130 ND	4.7 ND

NYSDEC Radiological Sampling Program

- Northrop Grumman supported sampling of 17 monitoring wells (10/1 thru 10/9/2015)
- Northrop Grumman worked with NYSDEC to coordinate sampling of public supply wells (December 2015)
  - Included 7 public supply wells sampled by NYSDEC for radiological parameters and by Northrop Grumman for other parameters of regional interest (VOCs and 1,4-dioxane)
  - Included 15 additional public supply wells sampled by Northrop Grumman for radiological parameters and other parameters of regional interest (VOCs and 1,4-dioxane)



Imagine the result

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NYSDEC Radiological Sampling Program

- Northrop Grumman's radiological, VOC, and 1,4-dioxane results to be submitted to participating water districts and NYSDEC in Feb-2016
- Water Districts:
  - Bethpage Water District
  - Plainview Water District
  - Hicksville Water District
  - TOH-Levittown Water District
  - South Farmingdale Water District
  - Village of Farmingdale