

**List of Exhibits**  
**Northrop Grumman Comments on Proposed Amended**  
**Record of Decision and Feasibility Study**

- Exhibit A**      **Figures from Modeling Memorandum (Attachment 2) Referenced in Comments on Proposed AROD and FS**
- Exhibit B**      **Figures from Community Impact Analysis (Attachment 3) Referenced in Comments on Proposed AROD and FS**
- Exhibit C**      **Tables 1 and 2 from Community Impact Analysis (Attachment 3) Referenced in Comments on Proposed AROD and FS**

**Exhibit A**

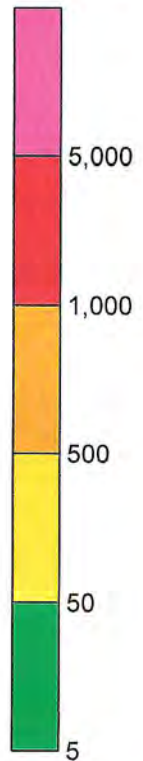
**Northrop Grumman Comments on Proposed Amended  
Record of Decision and Feasibility Study**

**Figures from Modeling Memorandum (Attachment 2)  
Referenced in Comments on Proposed AROD and FS**

Note: Figures are numbered (in red type) sequentially as they are referenced in these comments. The Figure number appearing in the Title Box is the Figure number from the original sourced document.



TVOCs  
Concentration  
(ug/L)



### LEGEND

- Site Outline
- NYSDEC SCGs Plume Extents
- Plumes assumed to be sourced from Navy and Northrop Grumman Sites for the purpose of this analysis (Attachment X)

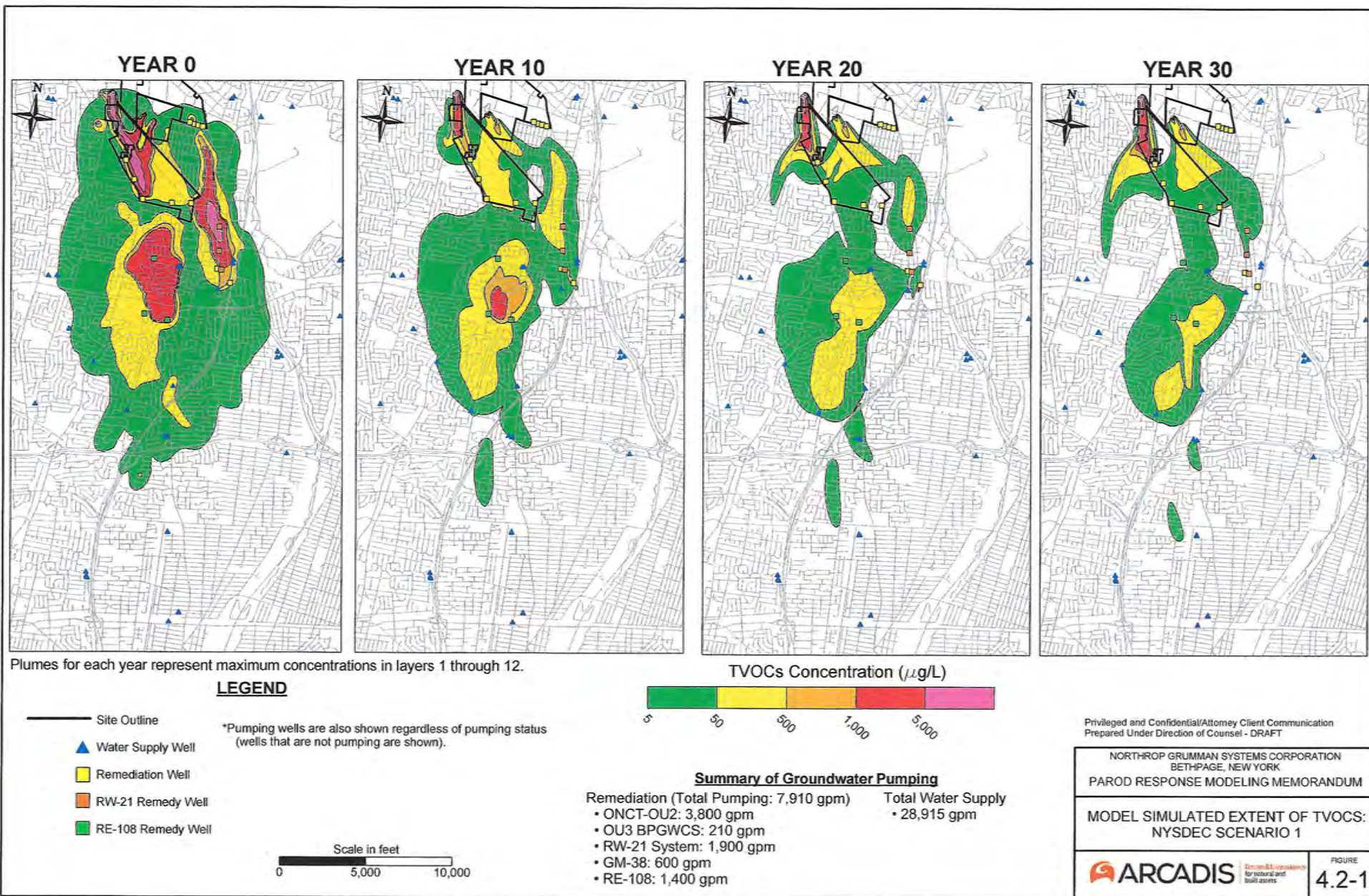
NORTHROP GRUMMAN SYSTEMS CORPORATION  
BETHPAGE, NEW YORK  
PAROD RESPONSE MODELING MEMORANDUM

NYSDEC TVOCs PLUME

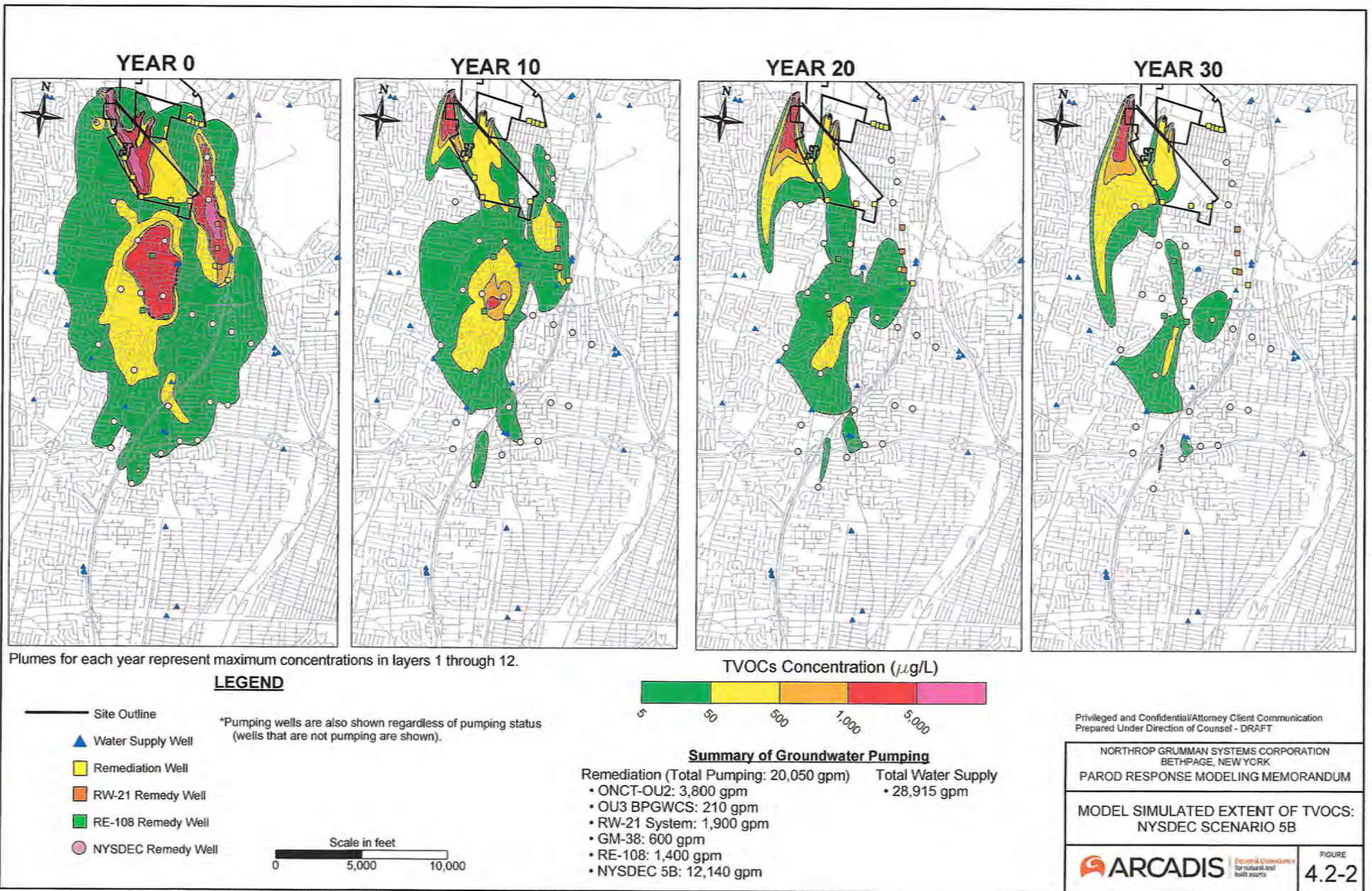
 **ARCADIS** Design & Consultancy  
for natural and  
built assets

FIGURE  
**2.1**

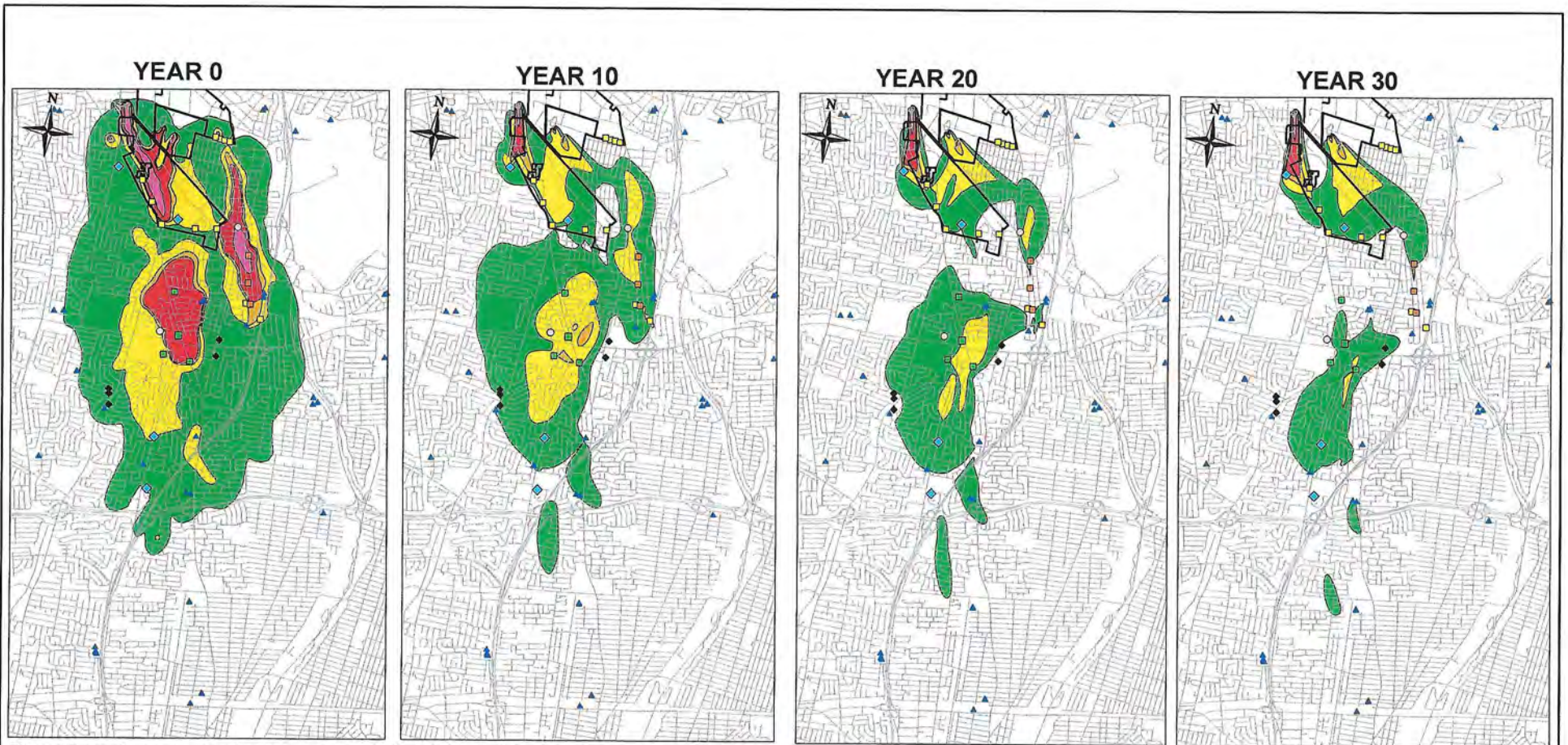
**FIGURE 1**



**FIGURE 2**



**FIGURE 3**

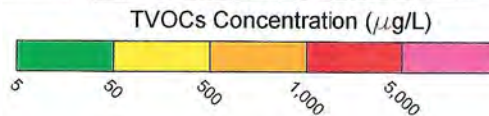
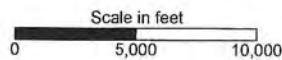


Plumes for each year represent maximum concentrations in layers 1 through 12.

**LEGEND**

- Site Outline
- ▲ Water Supply Well
- Remediation Well
- RW-21 Remedy Well
- RE-108 Remedy Well
- NYSDEC Remedy Well
- ◆ IRA Remedy Well

\*Pumping wells are also shown regardless of pumping status (wells that are not pumping are shown).



**Summary of Groundwater Pumping**

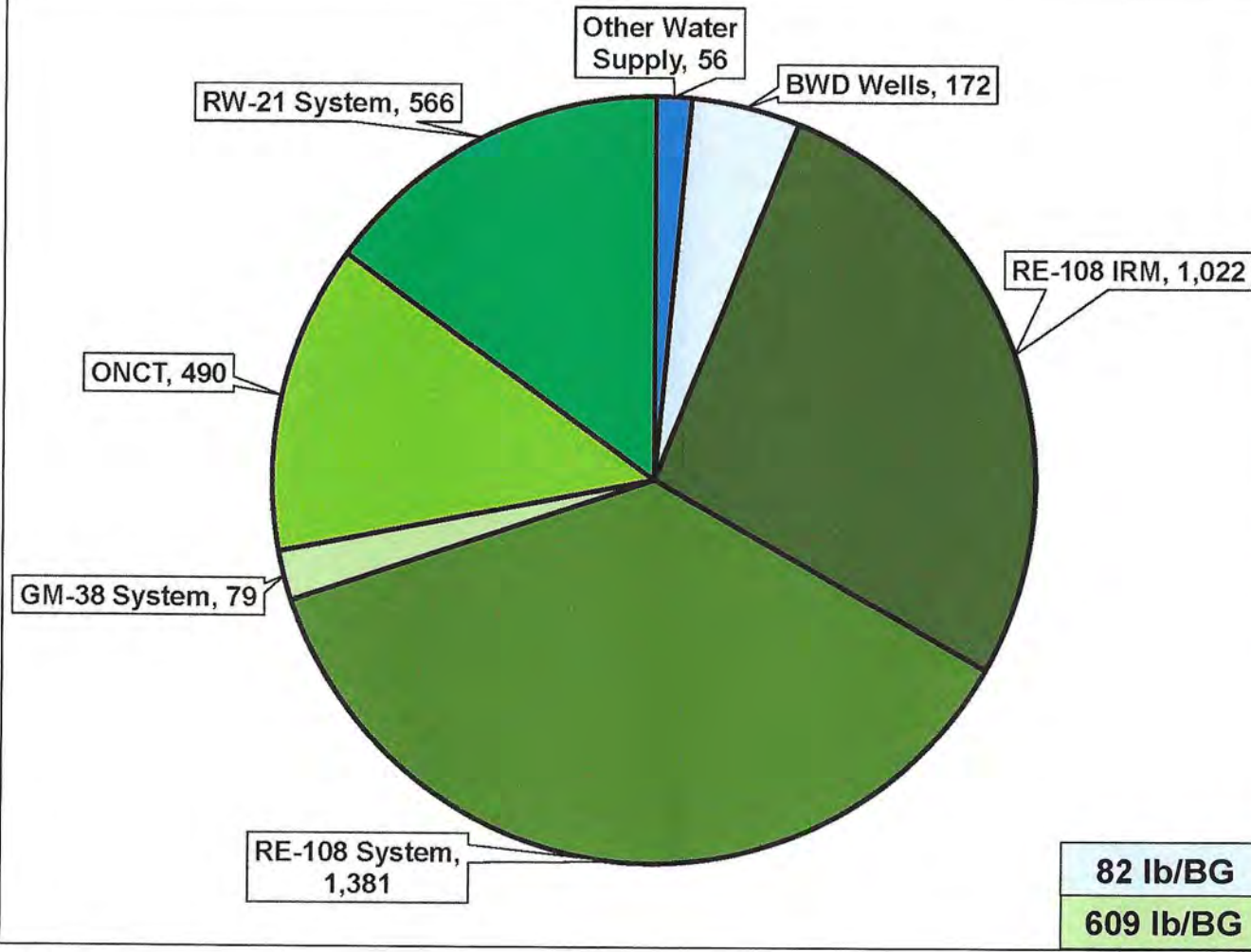
- |   |  |
|---|--|
| <p>Remediation (Total Pumping: 11,410 gpm)</p> <ul style="list-style-type: none"> <li>• ONCT-OU2: 3,800 gpm</li> <li>• OU3 BPGWCS: 210 gpm</li> <li>• RW-21 System: 1,900 gpm</li> <li>• GM-38: 600 gpm</li> <li>• RE-108: 1,400 gpm</li> <li>• IRA: 3,500 gpm</li> </ul> | <p>Total Water Supply</p> <ul style="list-style-type: none"> <li>• 28,915 gpm</li> </ul> |
|---|--|

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NORTHROP GRUMMAN SYSTEMS CORPORATION BETHPAGE, NEW YORK	
PAROD COMMENTS MODELING MEMORANDUM	
MODEL SIMULATED EXTENT OF TVOCs: IRA	
	<p>FIGURE 4.2-3</p>

**FIGURE 4**

# NYSDEC Scenario 1



## Legend

**82 lb/BG** Pounds of TVOC Removed Per Billion Gallons of Water Pumped by Water Supply Wells

**609 lb/BG** Pounds of TVOC Removed Per Billion Gallons of Water Pumped by ROD Required Remediation Wells

**82 lb/BG**  
**609 lb/BG**

### Notes

1. lb/BG = Pounds per Billion gallons
2. Time zero = January 1, 2019
3. Pounds of TVOC Removed Per Billion Gallons of Water Pumped was calculated by dividing the total mass removed over 30 years of simulation by the total amount of water pumped over 30 years of simulation.

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NORTHROP GRUMMAN SYSTEMS CORPORATION  
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PAROD RESPONSE MODELING MEMORANDUM

REMEDATION EFFICIENCY - POUNDS OF TVOC MASS REMOVED PER BILLION GALLONS OF WATER PUMPED AFTER 30 YEARS OF SIMULATION: NYSDEC SCENARIO 1



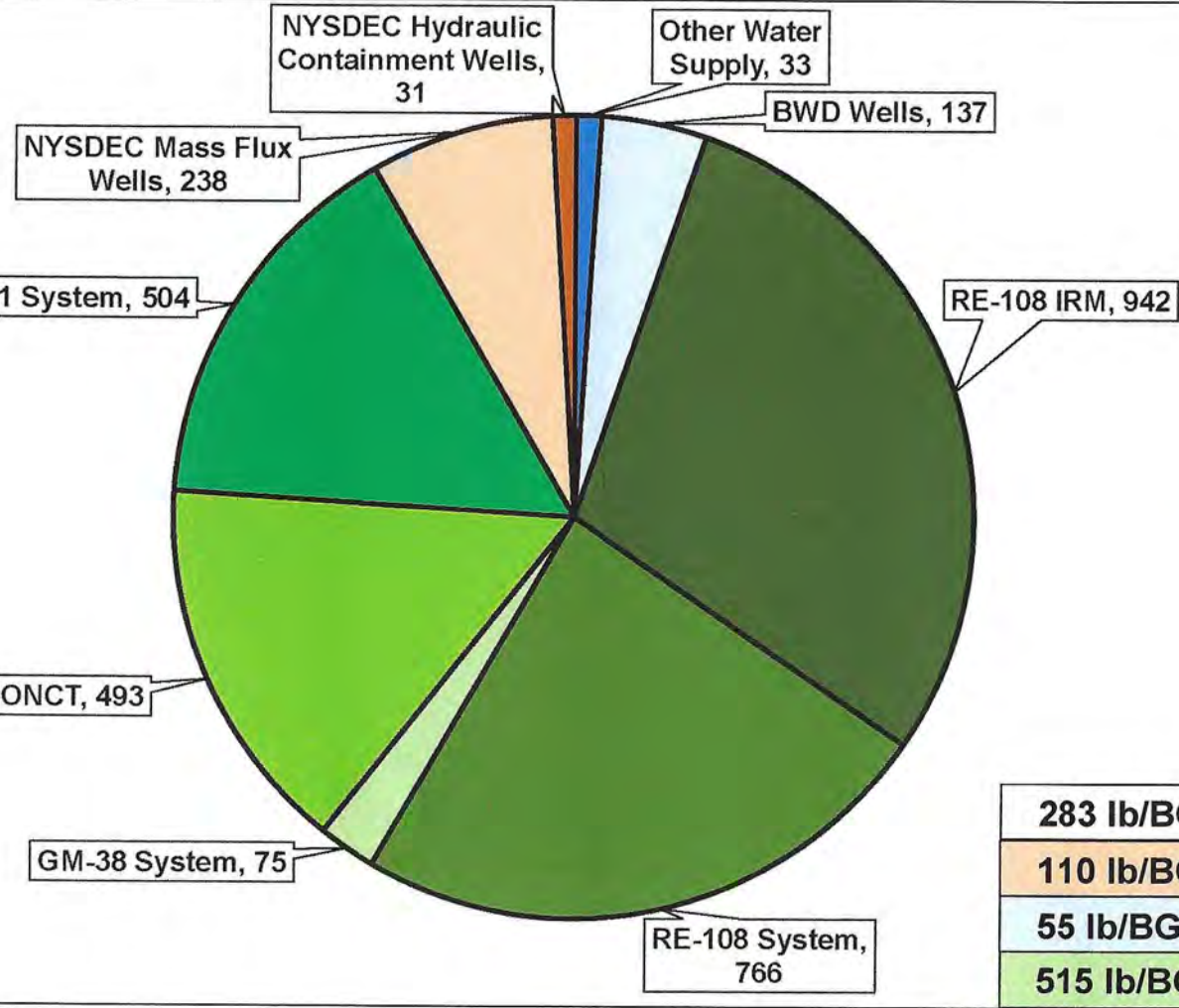
FIGURE  
**4.2-7**

**FIGURE 5**

# NYSDEC Scenario 5B

## Legend

<b>283 lb/BG</b>	Pounds of TVOC Removed Per Billion Gallons of Water Pumped by Remediation Wells
<b>110 lb/BG</b>	Pounds of TVOC Removed Per Billion Gallons of Water Pumped by NYSDEC 5B Remediation Wells
<b>55 lb/BG</b>	Pounds of TVOC Removed Per Billion Gallons of Water Pumped by Water Supply Wells
<b>515 lb/BG</b>	Pounds of TVOC Removed Per Billion Gallons of Water Pumped by ROD Required Remediation Wells



### Notes

1. lb/BG = Pounds per Billion gallons
2. Time zero = January 1, 2019
3. Pounds of TVOC Removed Per Billion Gallons of Water Pumped was calculated by dividing the total mass removed over 30 years of simulation by the total amount of water pumped over 30 years of simulation.

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PAROD COMMENTS MODELING MEMORANDUM

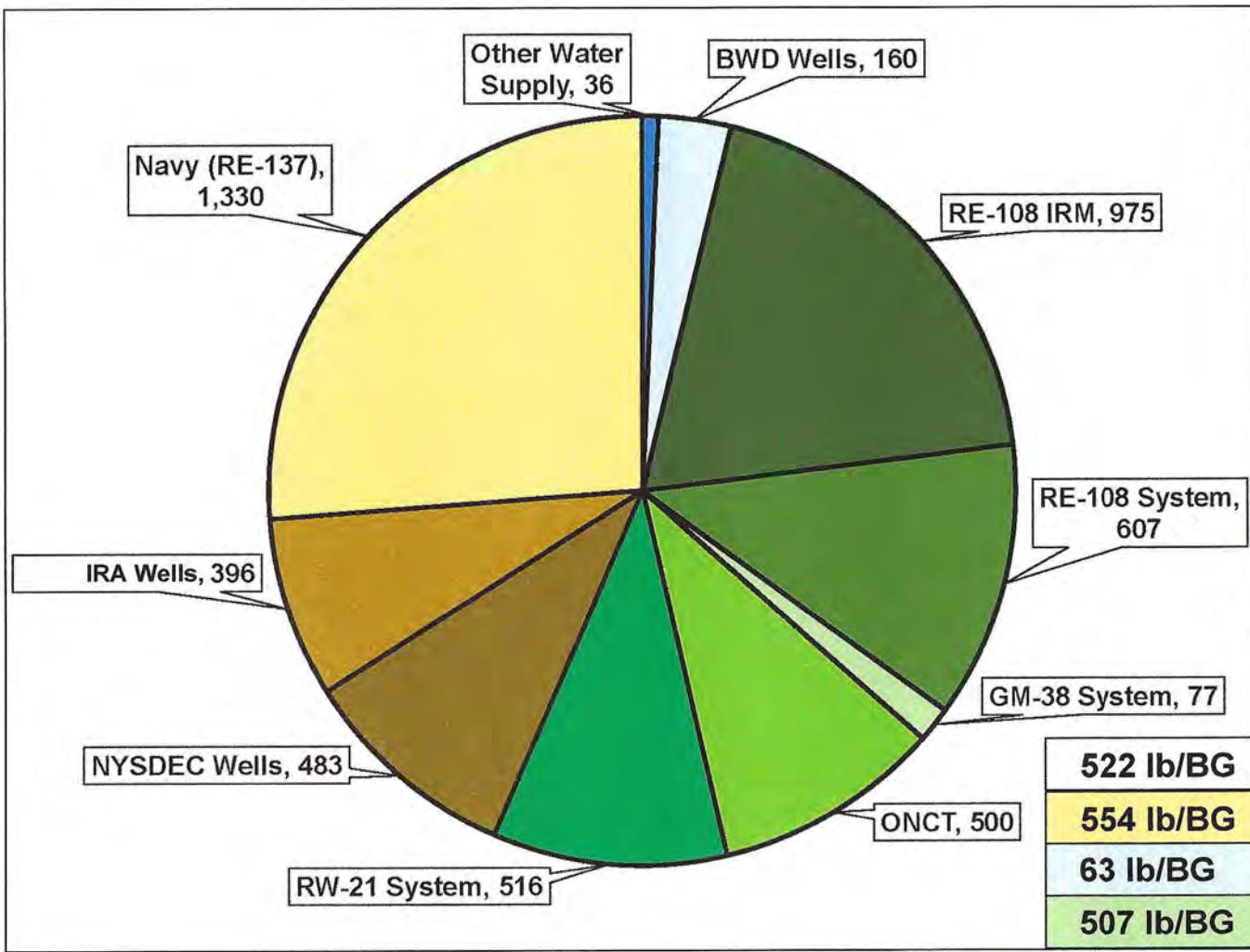
REMEDATION EFFICIENCY - POUNDS OF TVOC  
MASS REMOVED PER BILLION GALLONS  
OF WATER PUMPED AFTER 30 YEARS OF  
SIMULATION: NYSDEC SCENARIO 5B

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FIGURE  
**4.2-8**

**FIGURE 6**





### IRA

#### Legend

- 522 lb/BG** Pounds of TVOC Removed Per Billion Gallons of Water Pumped by Remediation Wells
- 554 lb/BG** Pounds of TVOC Removed Per Billion Gallons of Water Pumped by IRA Remediation Wells
- 63 lb/BG** Pounds of TVOC Removed Per Billion Gallons of Water Pumped by Water Supply Wells
- 507 lb/BG** Pounds of TVOC Removed Per Billion Gallons of Water Pumped by ROD Required Remediation Wells

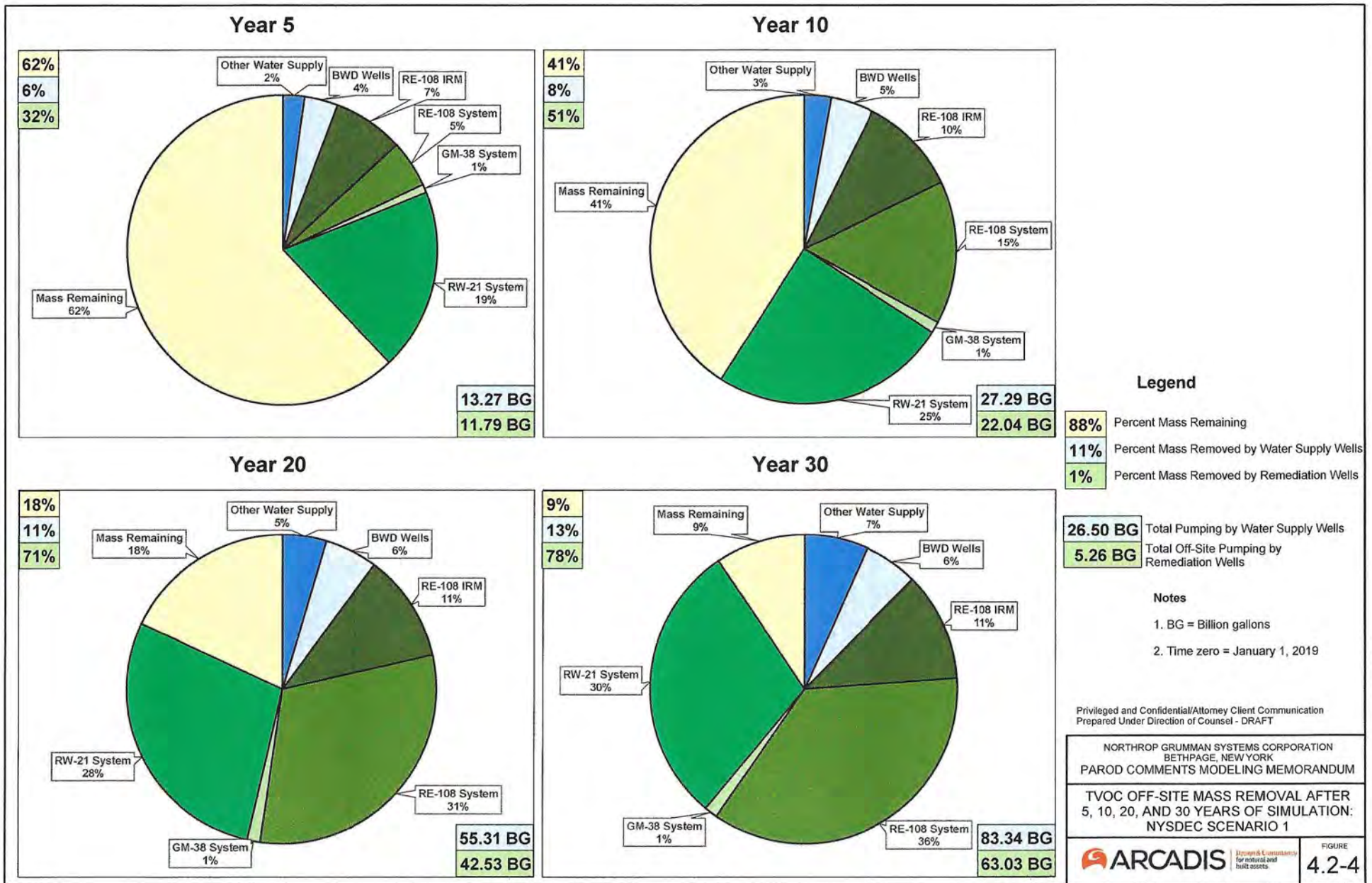
#### Notes

1. lb/BG = Pounds per Billion gallons
2. Time zero = January 1, 2019
3. Pounds of TVOC Removed Per Billion Gallons of Water Pumped was calculated by dividing the total mass removed over 30 years of simulation by the total amount of water pumped over 30 years of simulation.

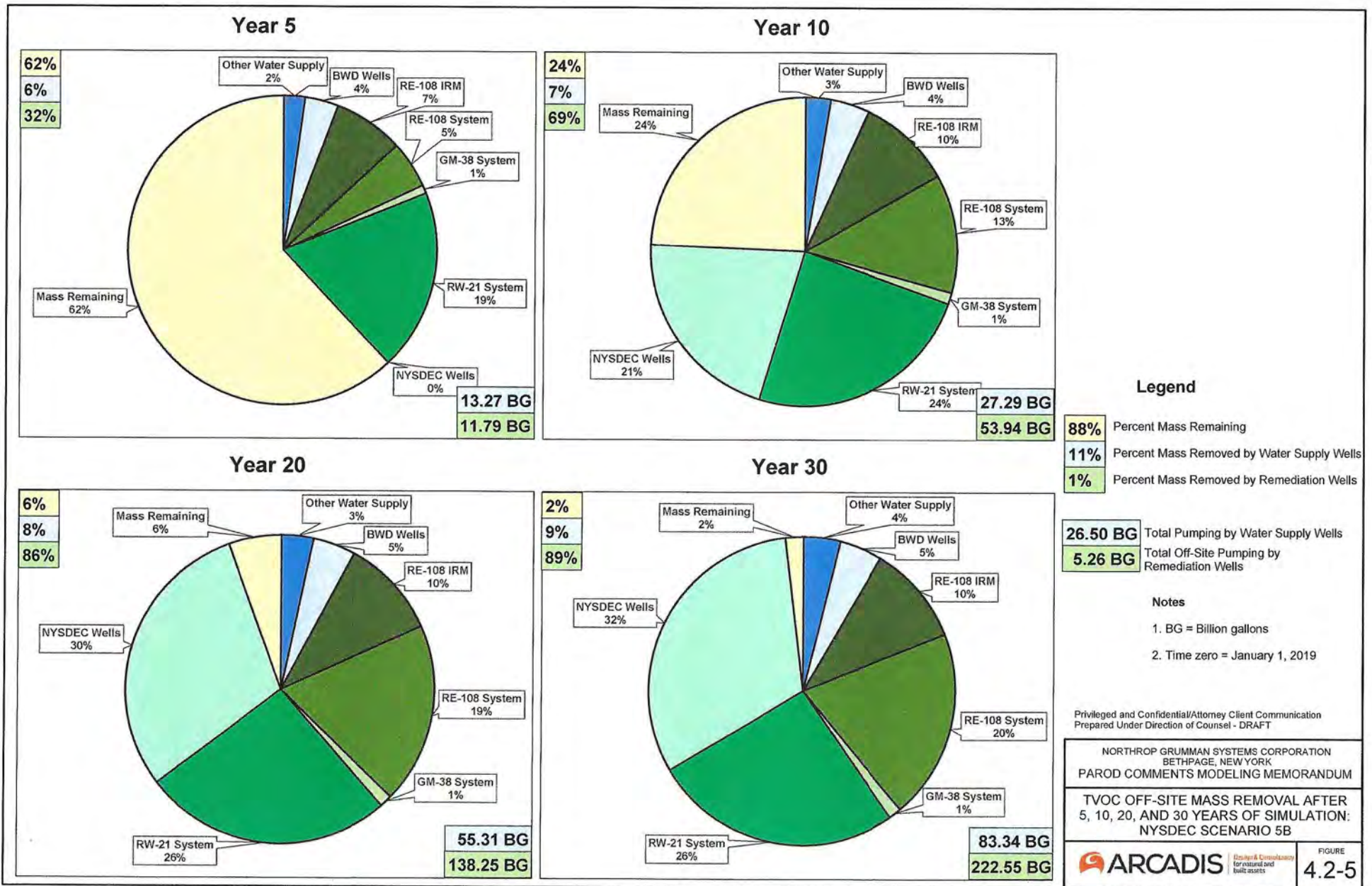
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PAROD COMMENTS MODELING MEMORANDUM	
REMEDATION EFFICIENCY - POUNDS OF TVOC MASS REMOVED PER BILLION GALLONS OF WATER PUMPED AFTER 30 YEARS OF SIMULATION: IRA	
<b>ARCADIS</b> Design & Consultancy for natural and built assets	FIGURE <b>4.2-9</b>

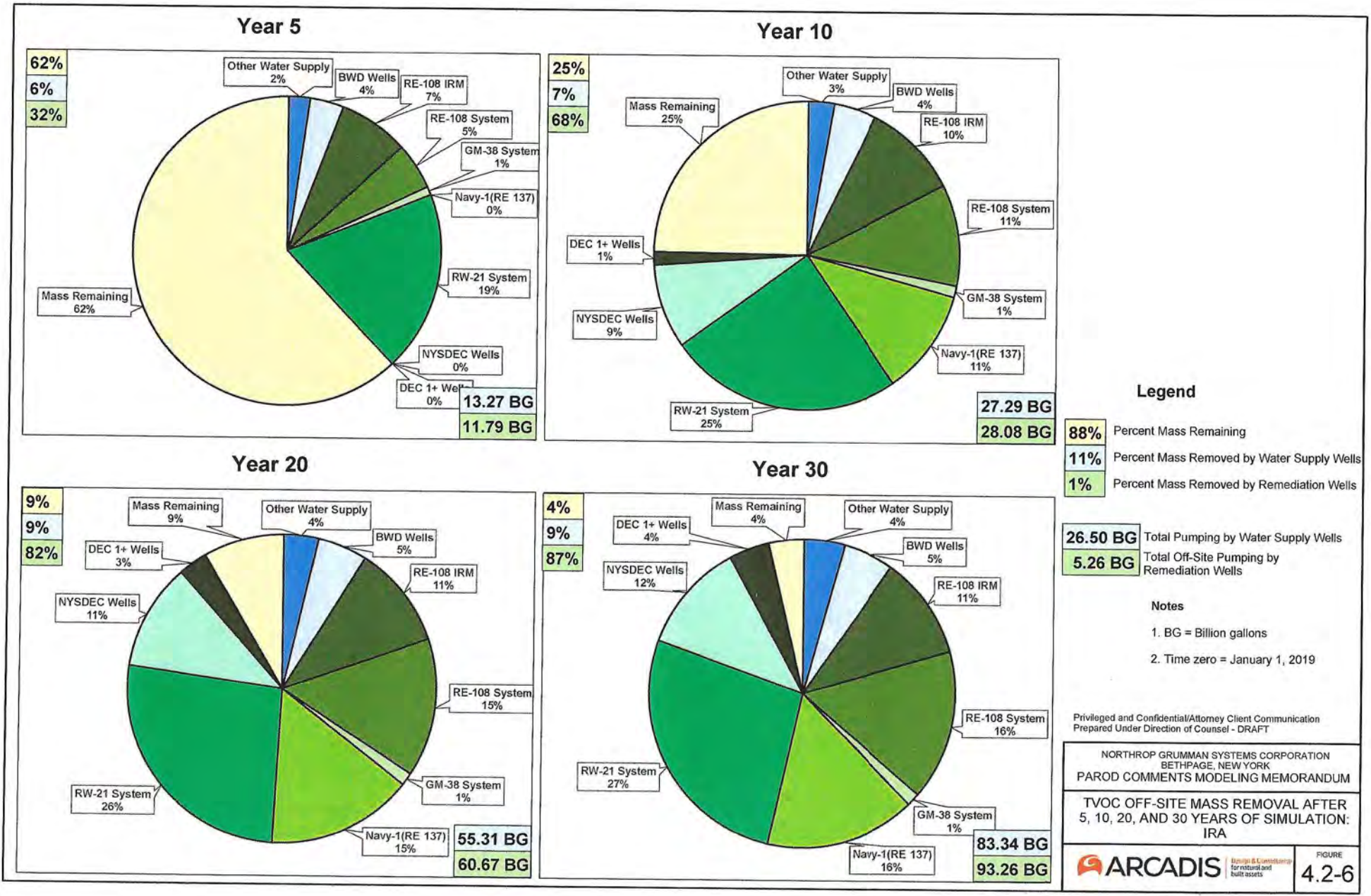
**FIGURE 7**



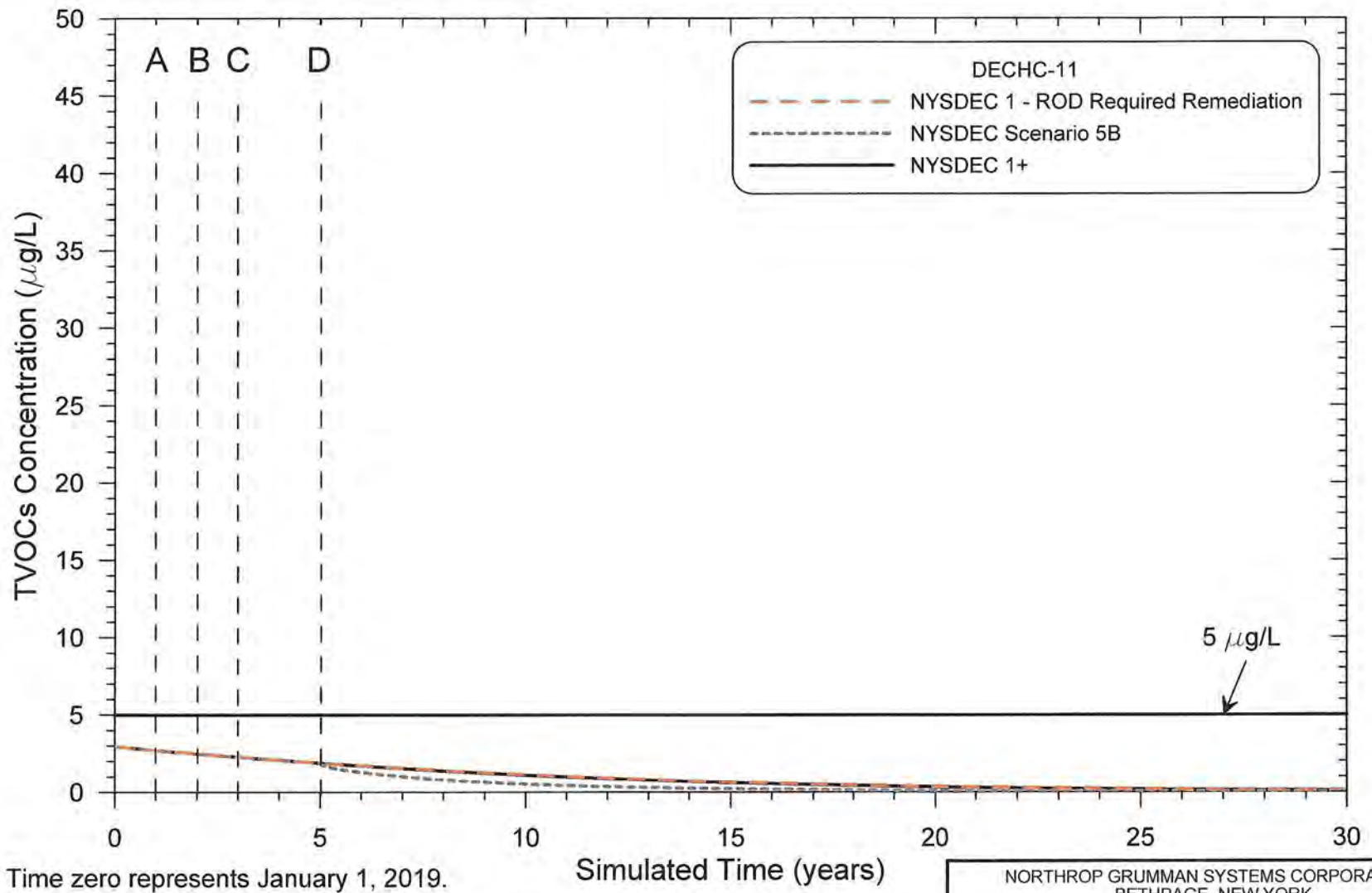
**FIGURE 8**



**FIGURE 9**




**FIGURE 10**



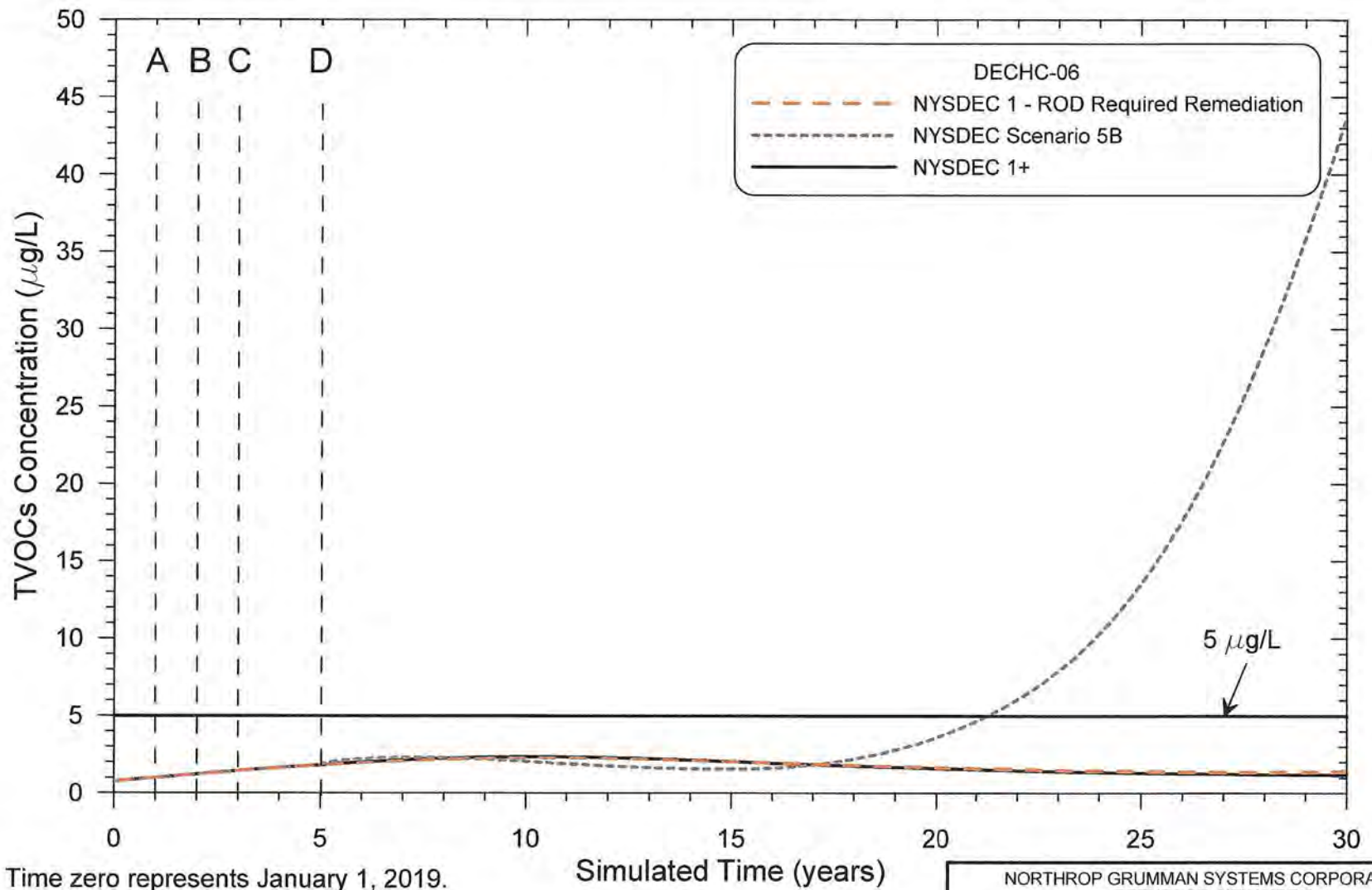
Time zero represents January 1, 2019.

- A: Year 1: RW-21 System Operational (All Scenarios)  
RE-108 IRM Well Operational (All Scenarios)
- B: Year 2: BWD Plant 6 Operational (All Scenarios)
- C: Year 3: RE-108 System Operational (All Scenarios)
- D: Year 5: NYSDEC Scenario 5B Wells Operational  
(NYSDEC Scenario 5B)  
NYSDEC 1+ Wells Operational (NYSDEC 1+)

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NORTHROP GRUMMAN SYSTEMS CORPORATION BETHPAGE, NEW YORK	
PAROD RESPONSE MODELING MEMORANDUM	
<b>PREDICTED TVOCS CONCENTRATION DECHC-11</b>	
	<small>Design &amp; Construction for natural and built assets</small>
FIGURE	<b>4.2-68</b>



**FIGURE 11**



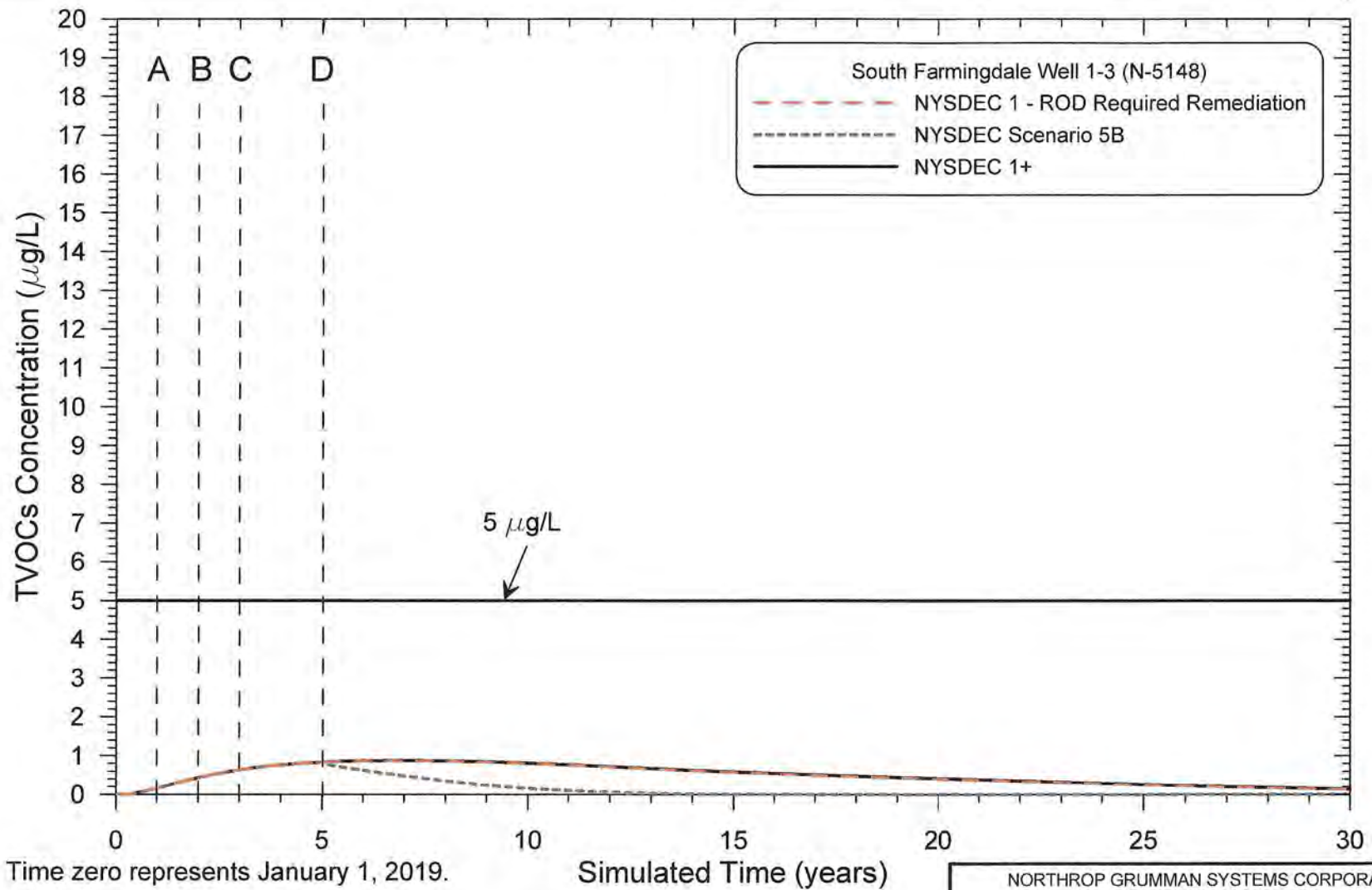
Time zero represents January 1, 2019.

- A: Year 1: RW-21 System Operational (All Scenarios)  
RE-108 IRM Well Operational (All Scenarios)
- B: Year 2: BWD Plant 6 Operational (All Scenarios)
- C: Year 3: RE-108 System Operational (All Scenarios)
- D: Year 5: NYSDEC Scenario 5B Wells Operational (NYSDEC Scenario 5B)  
NYSDEC 1+ Wells Operational (NYSDEC 1+)

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PAROD RESPONSE MODELING MEMORANDUM	
PREDICTED TVOCs CONCENTRATION DECHC-06	
	
FIGURE	4.2-63

**FIGURE 12**



Time zero represents January 1, 2019.

Simulated Time (years)

- A: Year 1: RW-21 System Operational (All Scenarios)  
RE-108 IRM Well Operational (All Scenarios)
- B: Year 2: BWD Plant 6 Operational (All Scenarios)
- C: Year 3: RE-108 System Operational (All Scenarios)
- D: Year 5: NYSDEC Scenario 5B Wells Operational (NYSDEC Scenario 5B)  
NYSDEC 1+ Wells Operational (NYSDEC 1+)

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NORTHROP GRUMMAN SYSTEMS CORPORATION  
BETHPAGE, NEW YORK

PAROD RESPONSE MODELING MEMORANDUM

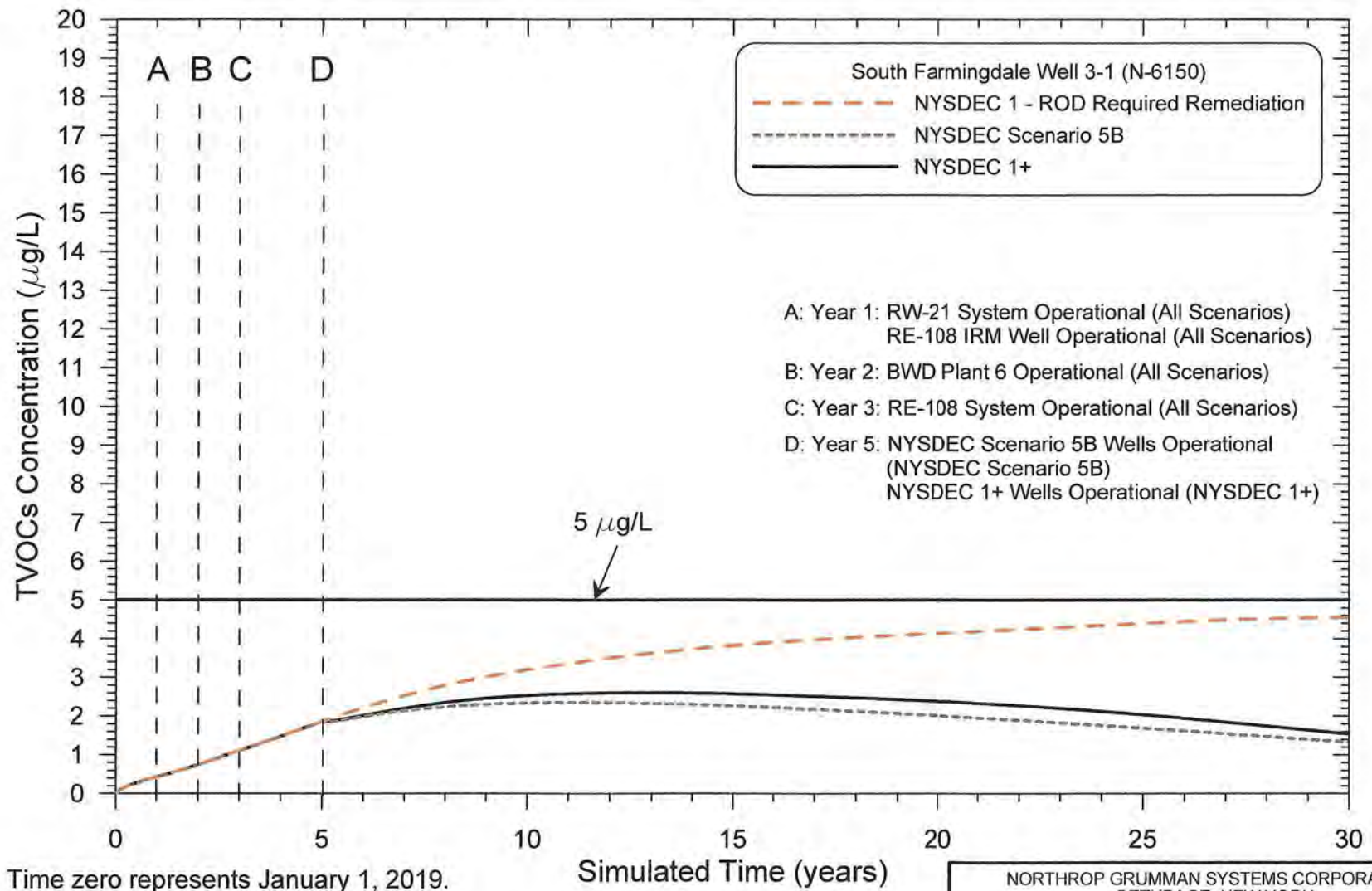
PREDICTED TVOCS CONCENTRATION  
SOUTH FARMINGDALE WELL 1-3 (N-5148)

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FIGURE

4.2-18

**FIGURE 13**



NORTHROP GRUMMAN SYSTEMS CORPORATION  
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PAROD RESPONSE MODELING MEMORANDUM

PREDICTED TVOCS CONCENTRATION  
SOUTH FARMINGDALE WELL 3-1 (N-6150)

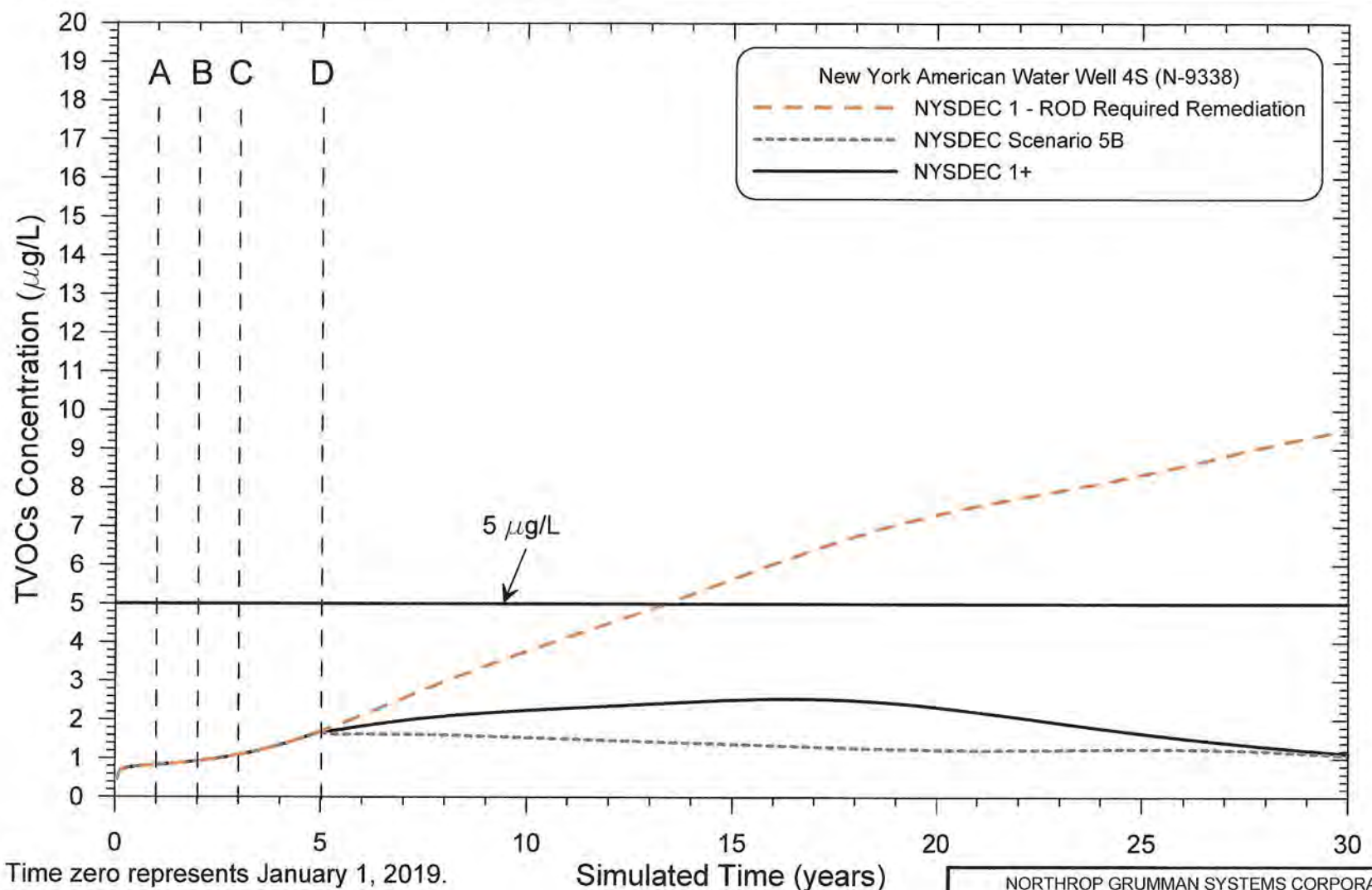
**ARCADIS** Group & Company  
for natural and built assets

FIGURE  
**4.2-15**

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**FIGURE 14**



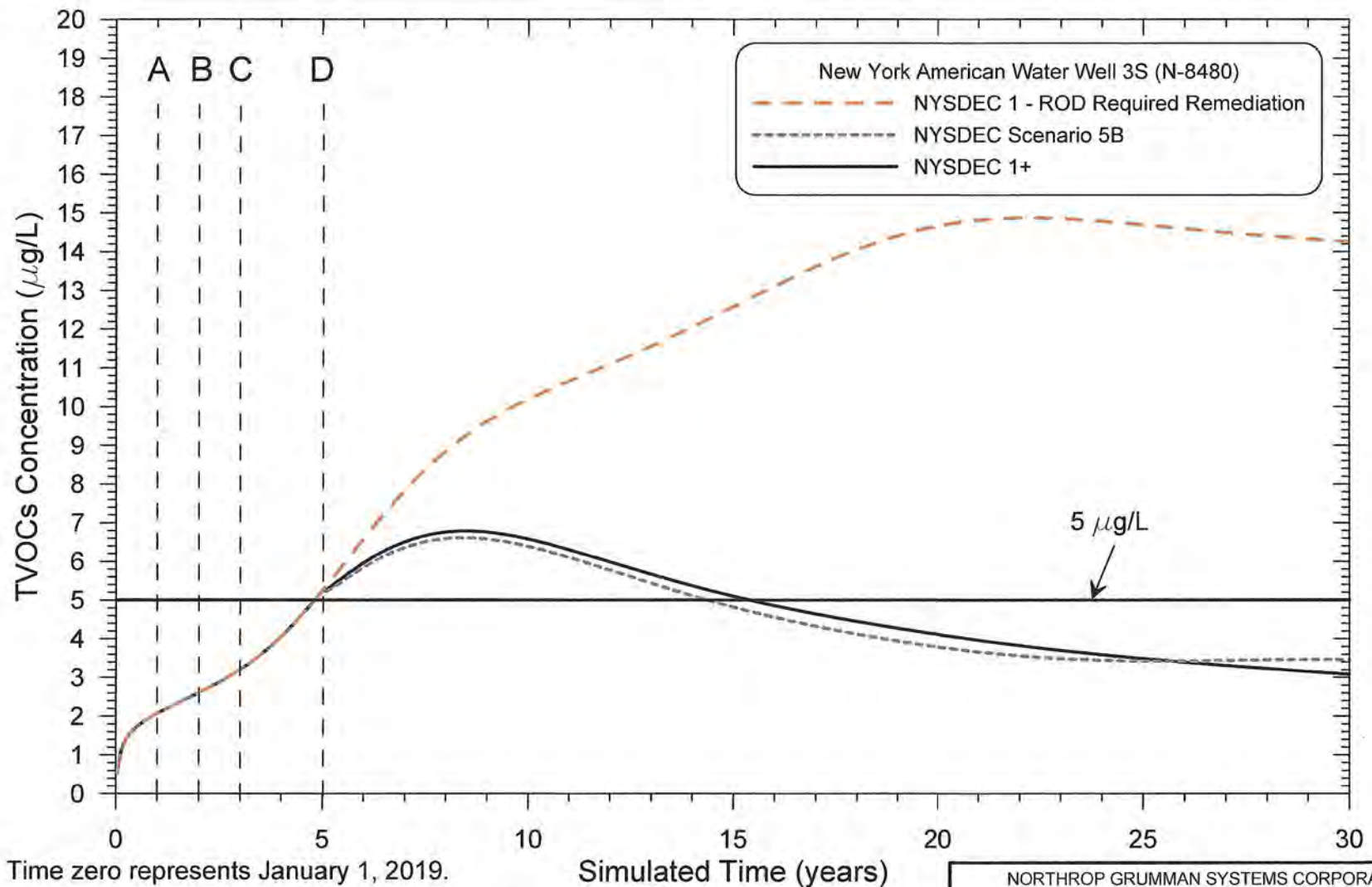


- A: Year 1: RW-21 System Operational (All Scenarios)  
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- D: Year 5: NYSDEC Scenario 5B Wells Operational (NYSDEC Scenario 5B)  
NYSDEC 1+ Wells Operational (NYSDEC 1+)

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NORTHROP GRUMMAN SYSTEMS CORPORATION BETHPAGE, NEW YORK	
PAROD RESPONSE MODELING MEMORANDUM	
PREDICTED TVOCs CONCENTRATION NEW YORK AMERICAN WATER WELL 4S (N-9338)	
	FIGURE 4.2-26

**FIGURE 15**



- A: Year 1: RW-21 System Operational (All Scenarios)  
RE-108 IRM Well Operational (All Scenarios)
- B: Year 2: BWD Plant 6 Operational (All Scenarios)
- C: Year 3: RE-108 System Operational (All Scenarios)
- D: Year 5: NYSDEC Scenario 5B Wells Operational (NYSDEC Scenario 5B)  
NYSDEC 1+ Wells Operational (NYSDEC 1+)

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Client Communication  
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NORTHROP GRUMMAN SYSTEMS CORPORATION  
BETHPAGE, NEW YORK

PAROD RESPONSE MODELING MEMORANDUM

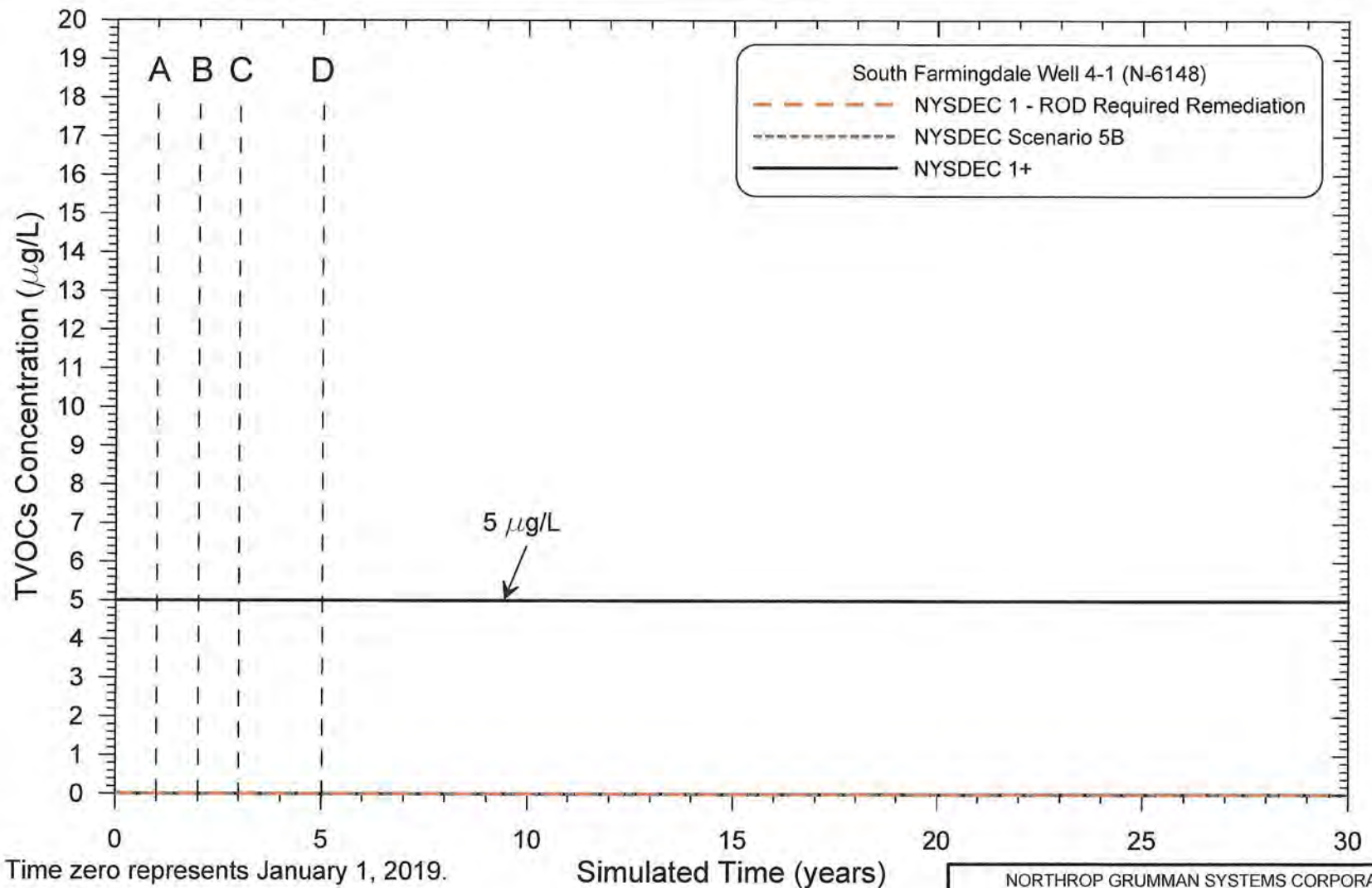
PREDICTED TVOCS CONCENTRATION  
NEW YORK AMERICAN WATER  
WELL 3S (N-8480)

**ARCADIS** Design & Environment  
for natural and  
built assets.

FIGURE

4.2-27

**FIGURE 16**



- A: Year 1: RW-21 System Operational (All Scenarios)  
RE-108 IRM Well Operational (All Scenarios)
- B: Year 2: BWD Plant 6 Operational (All Scenarios)
- C: Year 3: RE-108 System Operational (All Scenarios)
- D: Year 5: NYSDEC Scenario 5B Wells Operational  
(NYSDEC Scenario 5B)  
NYSDEC 1+ Wells Operational (NYSDEC 1+)

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NORTHROP GRUMMAN SYSTEMS CORPORATION  
BETHPAGE, NEW YORK

PAROD RESPONSE MODELING MEMORANDUM

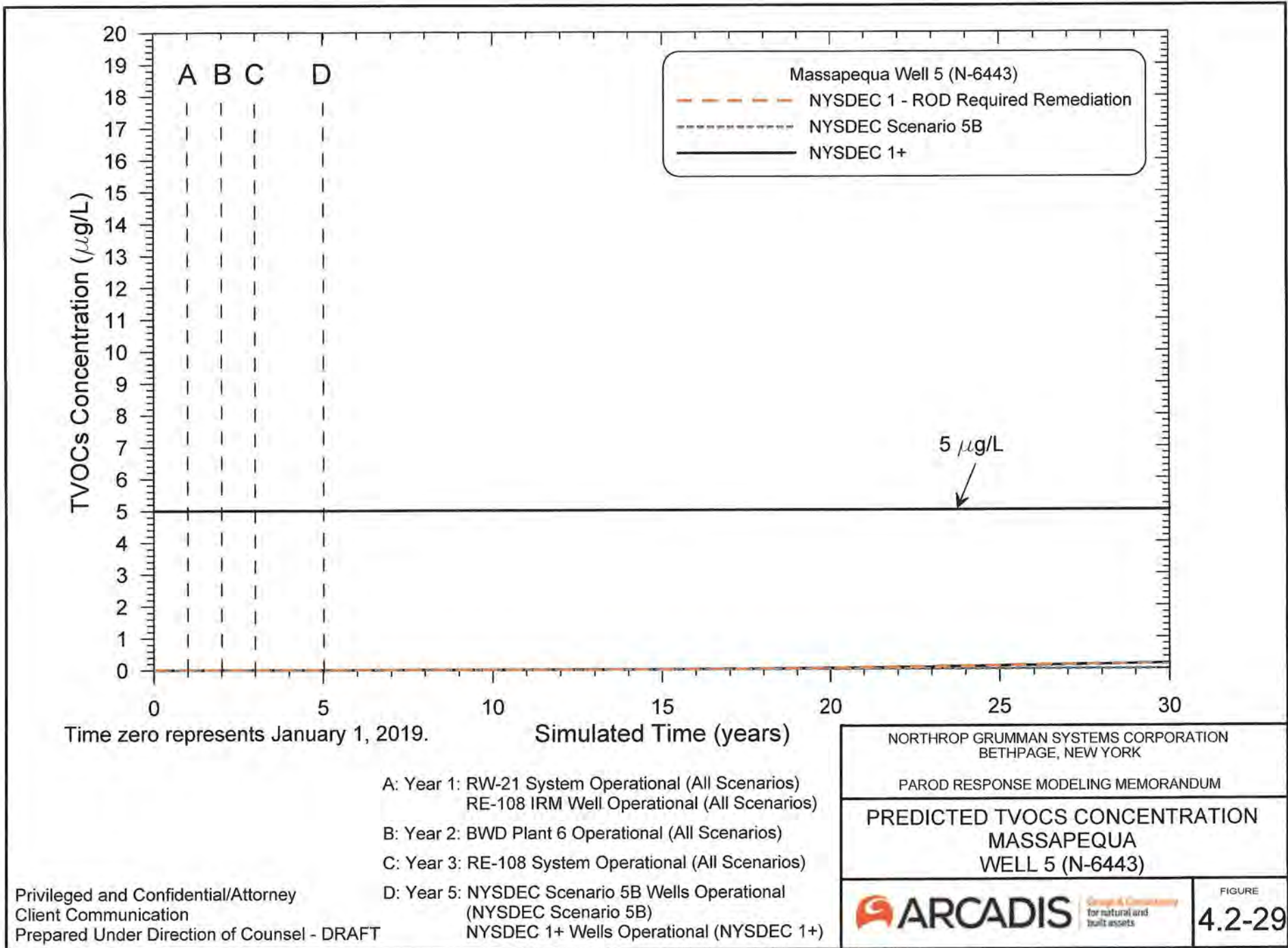
PREDICTED TVOCS CONCENTRATION  
SOUTH FARMINGDALE WELL 4-1 (N-6148)

**ARCADIS** Design & Construction  
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built assets

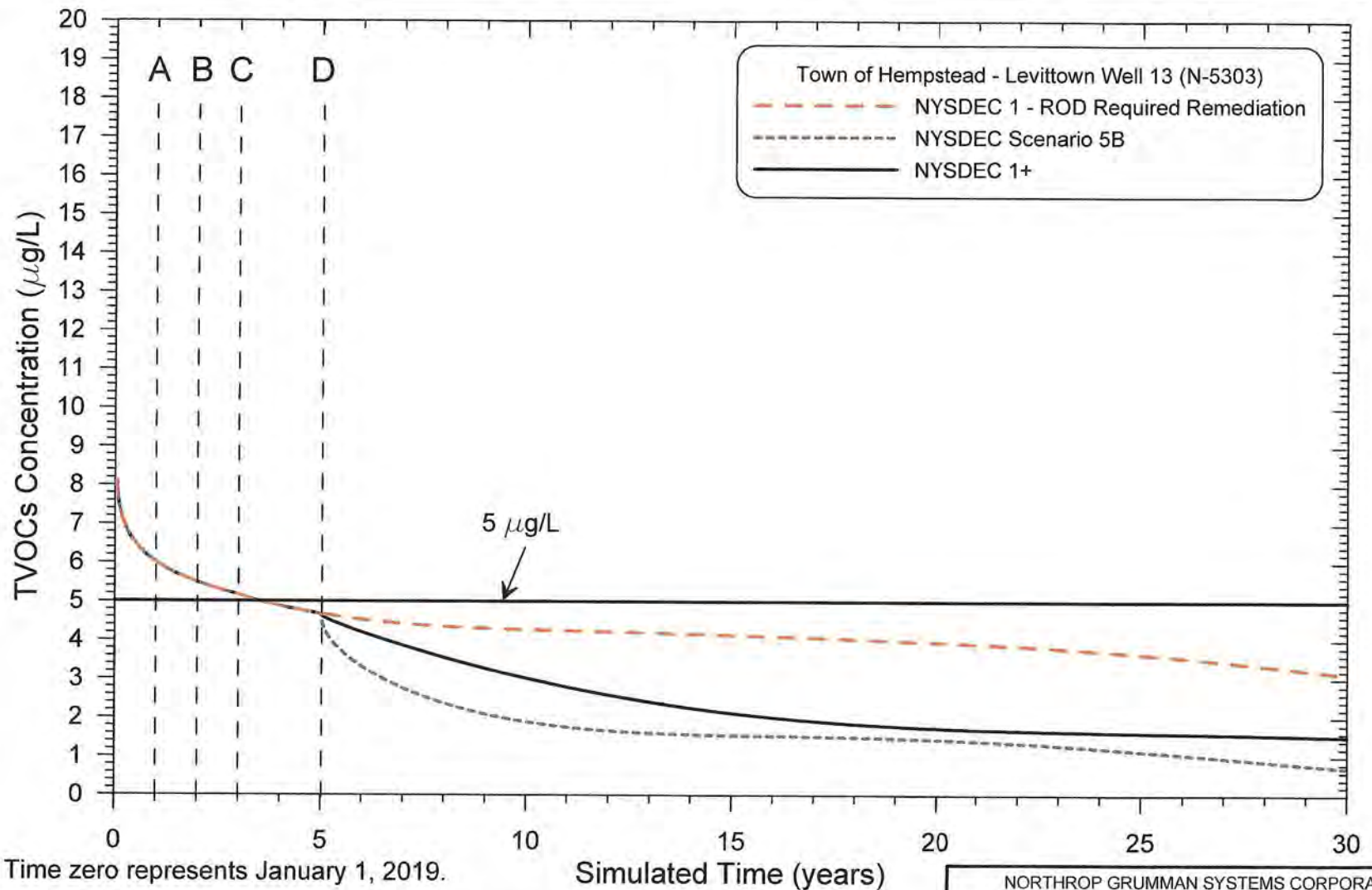
FIGURE

4.2-20

**FIGURE 17**




**FIGURE 18**



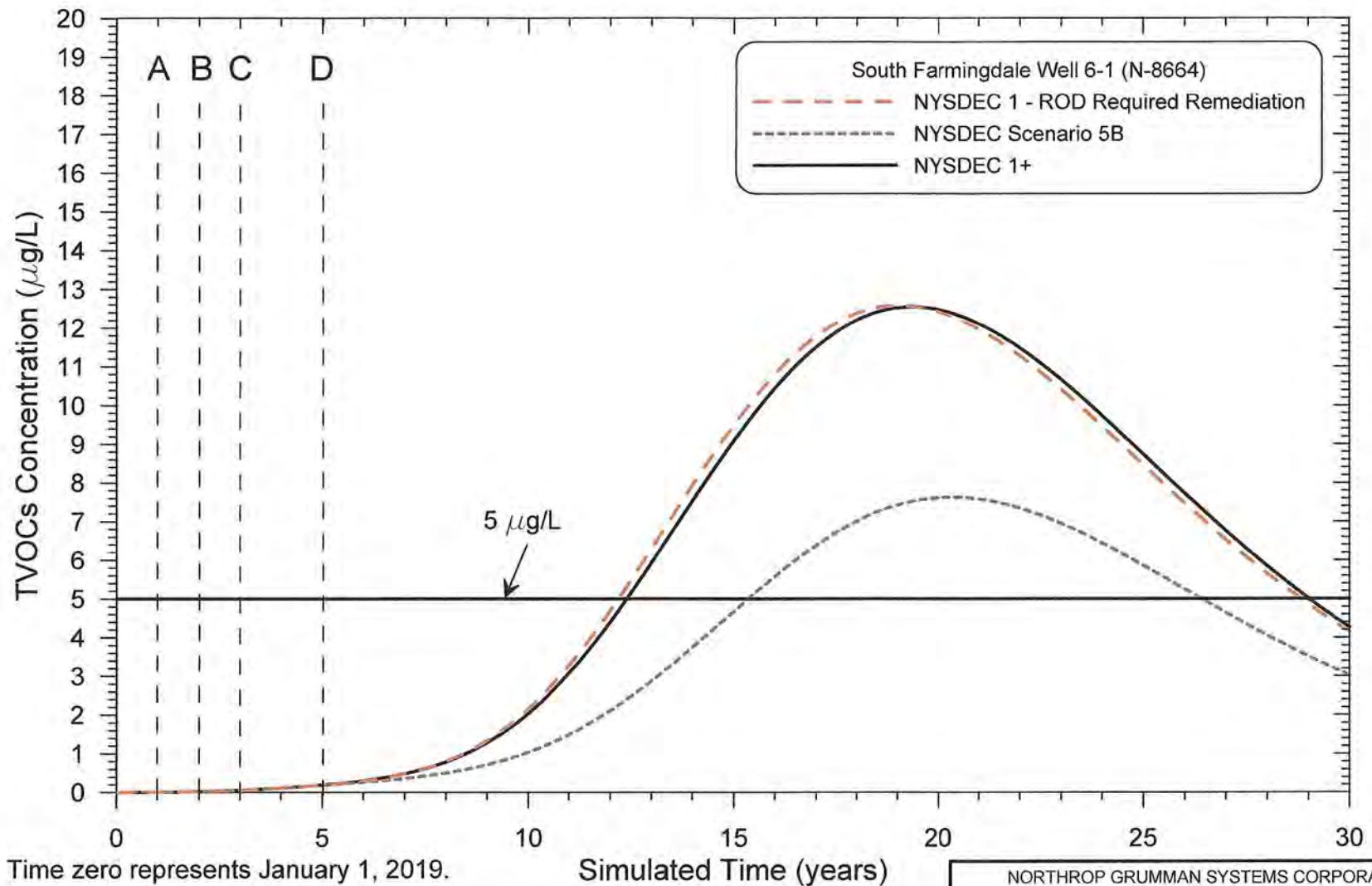
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- A: Year 1: RW-21 System Operational (All Scenarios)  
RE-108 IRM Well Operational (All Scenarios)
- B: Year 2: BWD Plant 6 Operational (All Scenarios)
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- D: Year 5: NYSDEC Scenario 5B Wells Operational (NYSDEC Scenario 5B)  
NYSDEC 1+ Wells Operational (NYSDEC 1+)

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NORTHROP GRUMMAN SYSTEMS CORPORATION BETHPAGE, NEW YORK	
PAROD RESPONSE MODELING MEMORANDUM	
PREDICTED TVOCs CONCENTRATION TOWN OF HEMPSTEAD - LEVITTOWN WELL 13 (N-5303)	
	<small>FIGURE</small> <b>4.2-25</b>

**FIGURE 19**



- A: Year 1: RW-21 System Operational (All Scenarios)  
RE-108 IRM Well Operational (All Scenarios)
- B: Year 2: BWD Plant 6 Operational (All Scenarios)
- C: Year 3: RE-108 System Operational (All Scenarios)
- D: Year 5: NYSDEC Scenario 5B Wells Operational  
(NYSDEC Scenario 5B)  
NYSDEC 1+ Wells Operational (NYSDEC 1+)

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Client Communication  
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NORTHROP GRUMMAN SYSTEMS CORPORATION  
BETHPAGE, NEW YORK

PAROD RESPONSE MODELING MEMORANDUM

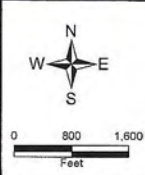
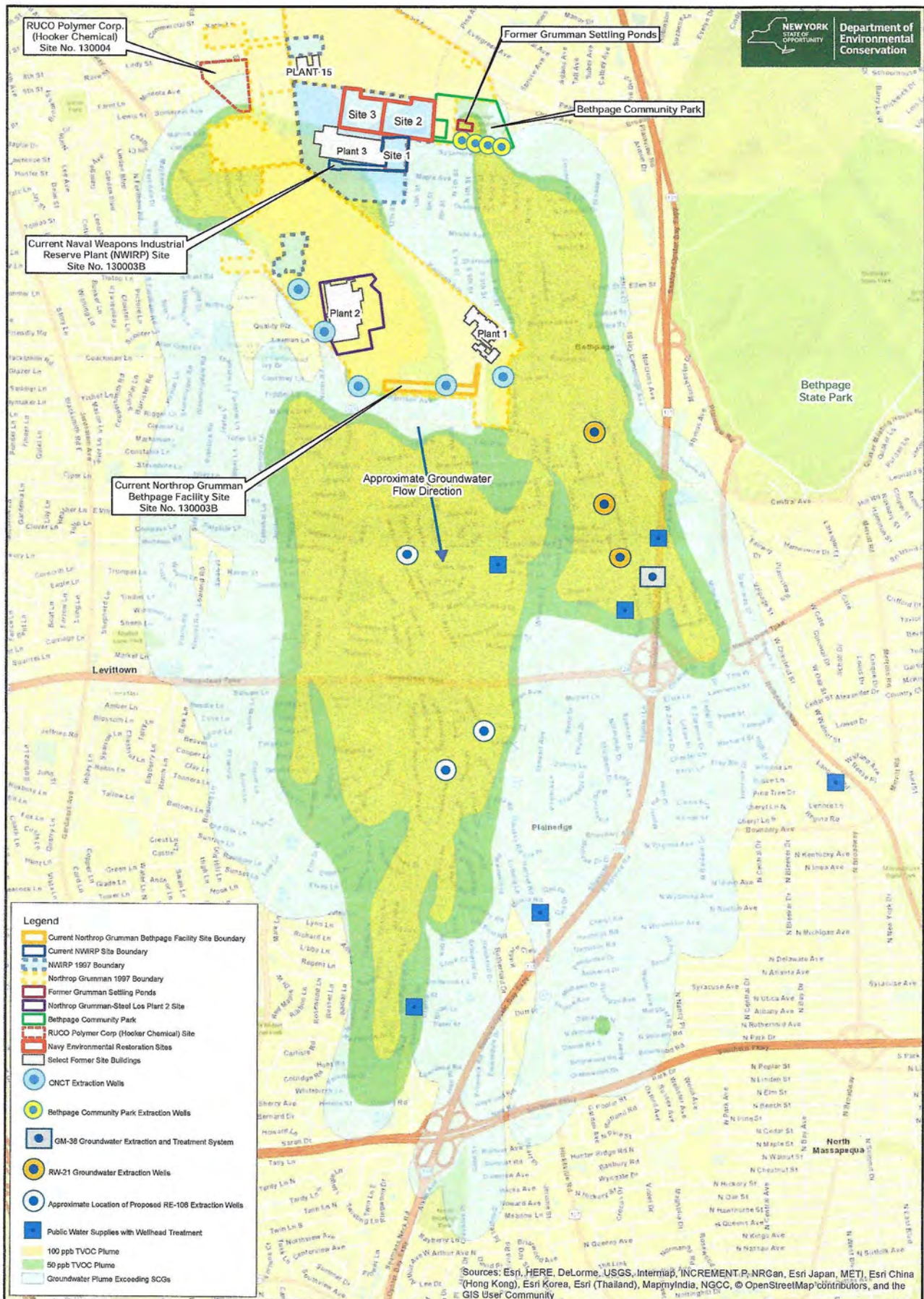
PREDICTED TVOCS CONCENTRATION  
SOUTH FARMINGDALE WELL 6-1 (N-8664)

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built assets

FIGURE

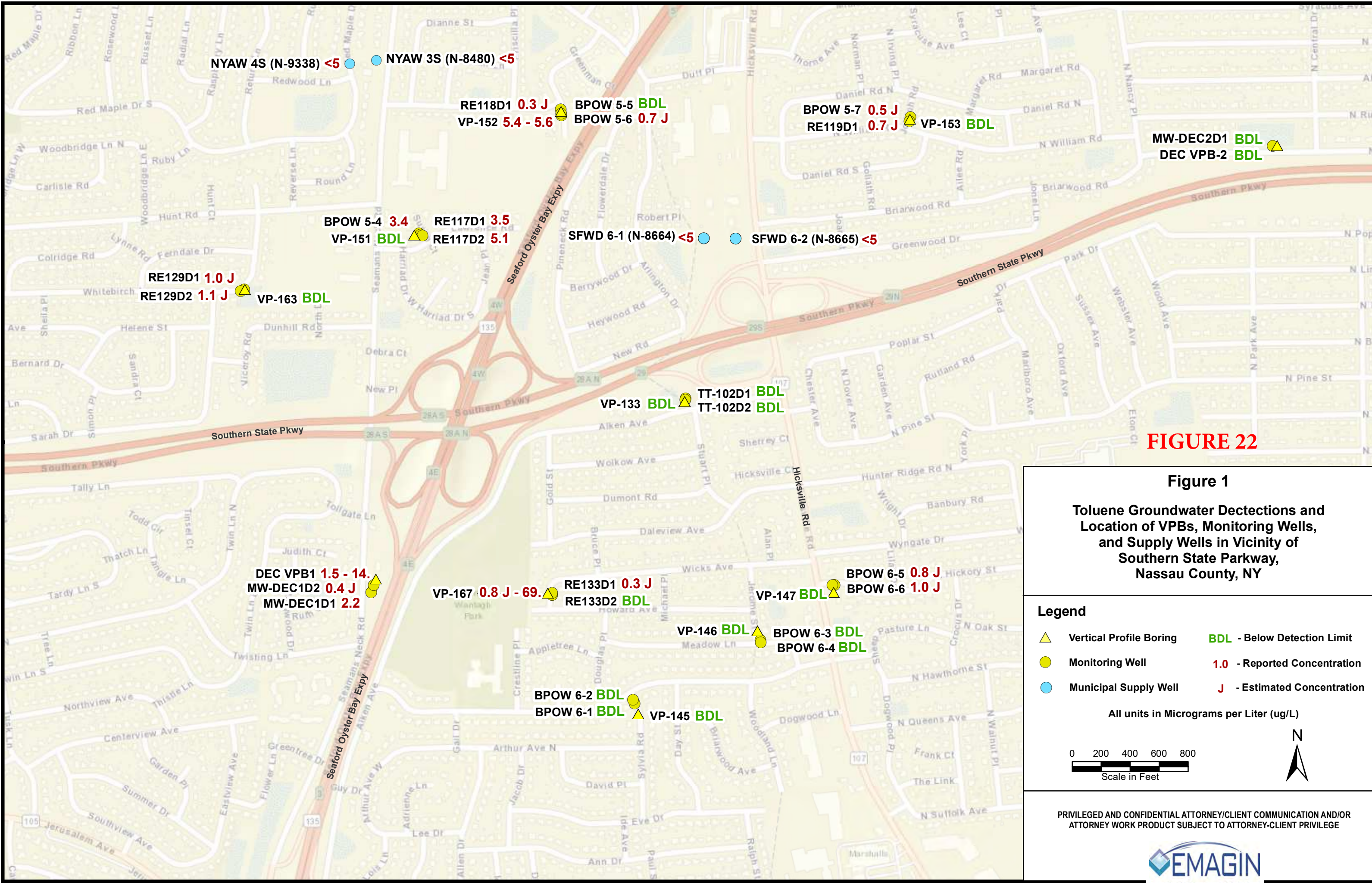
4.2-16

**FIGURE 20**



**Figure 2**  
**Site Detail Map**

Northrop Grumman and NWIRP Sites  
 Town of Oyster Bay, Nassau County  
 Site Nos. 130003A and 130003B



**FIGURE 22**

**Figure 1**

**Toluene Groundwater Detections and Location of VPBs, Monitoring Wells, and Supply Wells in Vicinity of Southern State Parkway, Nassau County, NY**

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**Legend**

	Vertical Profile Boring	<b>BDL</b> - Below Detection Limit
	Monitoring Well	<b>1.0</b> - Reported Concentration
	Municipal Supply Well	<b>J</b> - Estimated Concentration

All units in Micrograms per Liter (ug/L)

0 200 400 600 800  
Scale in Feet

N

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PRIVILEGED AND CONFIDENTIAL ATTORNEY/CLIENT COMMUNICATION AND/OR ATTORNEY WORK PRODUCT SUBJECT TO ATTORNEY-CLIENT PRIVILEGE

Creative Environmental Solutions



**Exhibit B**

**Northrop Grumman Comments on Proposed Amended  
Record of Decision and Feasibility Study**

**Figures from Community Impact Analysis (Attachment 3)  
Referenced in Comments on Proposed AROD and FS**

**Exhibit B – Figures from Community Impact Analysis**



**Typical Large-Scale Treatment Plant**



**Typical Drilling of Extraction Well**

**Exhibit C**

**Northrop Grumman Comments on Proposed Amended  
Record of Decision and Feasibility Study**

**Tables 1 and 2 from Community Impact Analysis (Attachment 3)  
Referenced in Comments on Proposed AROD and FS**

**Table 1 - Alternative 5-B Facility Summary**

<b>Principal System Component</b>	<b>Location *</b>	<b>Land Use at Component Location</b>
Bethpage CWTP	On Grumman/ NWIRP site	Industrial use in Bethpage
Massapequa CWTP	South side of Linden St, near ramp connection to SSP and BSP	Vacant land in Massapequa Preserve; proximate to residential area to the west along Linden Street and adjacent roadways.
<b>New Well DECHC-02</b>	<b>West side of Wantagh Ave</b>	<b>Adjoining residential area, to the west, along Cotton La and Old Oak La in North Wantagh</b>
<b>New Well DECHC-03</b>	<b>Northerly intersection of Whitier Ave and Mansfield Ave</b>	<b>Residential area in North Wantagh</b>
New Well DECHC-04	West side of Hicksville Rd	Recharge basin, adjacent to commercial uses in North Massapequa
<b>New Well DECHC-05, with on-site DWTP **</b>	<b>Bayberry La, between Gail Dr and Celestine Pl</b>	<b>Residential area, adjacent to Nassau BOCES Seaman Neck Middle School, in Seaford</b>
<b>New Well DECHC-06</b>	<b>Martha Blvd, south of Fiddler La intersection</b>	<b>Residential area in Bethpage</b>
New Well DECHC-07, with on-site DWTP **	North side of SSP, west of Seamans Neck Rd	Recharge basin (Nassau County), adjacent to residential area to the north along Dunhill Road in Wantagh
<b>New Well DECHC-08</b>	<b>Intersection of Hunt Rd and Reverse La</b>	<b>Residential area in Wantagh</b>
New Well DECHC-09, with on-site DWTP **	SSP-Hicksville Rd interchange ROW, southwest cloverleaf	NYS right-of-way, adjacent to residential area to the south along Alken Ave in Seaford
<b>New Well DECHC-10</b>	<b>South side of Greenwood Dr, east of Joan St</b>	<b>Residential area in Massapequa</b>
<b>New Well DECHC-11</b>	<b>South side of Greenwood Dr, west of Jonel La</b>	<b>Residential area in Massapequa</b>
<b>New Well DECHC-12</b>	<b>South side of Delaware Ave, west of Central Ave</b>	<b>Residential area, adjacent to Eastplain Elementary School, in Plainedge</b>
<b>New Well DECHC-13</b>	<b>South side of North Delaware Ave, east of Brookline Dr</b>	<b>Residential area, adjacent to Eastplain Elementary School, in Plainedge</b>
<b>New Well DECHC-14</b>	<b>Rhonda La, between Hemlock Dr and High St</b>	<b>Residential area in Plainedge</b>
<b>New Well DECHC-15</b>	<b>Lillian Pl, between Chester La and Norma La</b>	<b>Residential area in Plainedge</b>
<b>New Well DECHC-16</b>	<b>Spencer Dr, near north end at Shubert La</b>	<b>Residential area in Plainedge</b>

<b>Principal System Component</b>	<b>Location *</b>	<b>Land Use at Component Location</b>
New Well DECHC-17	East side of Stewart Ave, south of Hempstead Tpke	Recharge basin, adjacent to residential area to the east along Seitz Dr, in Plainedge
<b>New Well DECEX-01</b>	<b>West end of Windsor Dr or Dianne St</b>	<b>Residential area in Bethpage</b>
Existing Well DECEX-02	Just N of Hempstead Tpke, on/near Hicksville Rd	Commercial use in Levittown
<b>New Well DECEX-03</b>	<b>South end of Byron St dead-end</b>	<b>Residential area in Bethpage</b>
<b>New Well DECEX-04</b>	<b>Sherman Pl, to the east of Wantagh Ave</b>	<b>Residential area in Bethpage</b>
<b>New Well DECEX-05</b>	<b>Intersection of Jean Ave and Cole Pl</b>	<b>Residential area, adjacent to Central Boulevard Elementary school, in Bethpage</b>
Existing Well DECEX-06	Benkert St/ Washington Ave	Appears to be in a municipal parking lot in downtown Bethpage
<b>New Well DECEX-07</b>	<b>Iram Pl</b>	<b>Residential area in Bethpage</b>
Existing Well DECEX-08	Meade Avenue at Stewart Avenue	Stewart Avenue right-of-way, adjacent to residential area to the west along Meade Ave in Bethpage

Notes:

HC = Hydraulic Containment Extraction Well

EX = Mass Flux Extraction Well

SSP = Southern State Parkway; BSP = Bethpage State Parkway

\* Locations are approximate, based on the schematic plan in Figure 7-9 in the FS and Figure 13 in the Proposed AROD.

\*\* Location of a collocated extraction well and DWTP (total 3 locations).

**Table 2 – IRA Facility Summary**

<b>Principal System Component</b>	<b>Location *</b>	<b>Land Use at Component Location</b>
North (HR) WTP	On Grumman/ NWIRP site	Industrial use in Bethpage
New Well HR-1	East side of Bloomingdale Rd, S of South Broadway	Industrial use in Bethpage
New Well 18-1	On Grumman/ NWIRP site	Industrial use in Bethpage
<b>New Well OU2S EX-5</b>	<b>Seamans Neck Rd, near Parker Ave intersection</b>	<b>Residential area in North Wantagh</b>
<b>New Well OU2S EX-6, with adjacent carbon treatment and effluent discharge to a nearby shallow injection well</b>	<b>Seamans Neck Rd, near Hunt Rd intersection</b>	<b>Residential area in North Wantagh, adjacent to East Broadway Elementary school, as well as a school bus depot/maintenance facility</b>
Existing Well RE-137	Just N of Hempstead Tpke, on/near Hicksville Rd	Commercial use in Levittown
Existing Well DECEX-2	Just N of Hempstead Tpke, on/near Berger Ave	Commercial use in Levittown
<b>South (RE-108 South) WTP</b>	<b>E side of Emerson Av, just S of Hempstead Tpke</b>	<b>Commercial use in Levittown; potentially proximate to residential area to the south on Wadsworth Av and west on Emerson Ave.</b>

Notes:

\* Locations are approximate, based on the schematic plan prepared by Arcadis for Northrop Grumman