Proposed Amended Record of Decision

Naval Weapons Industrial Reserve Plant (U.S. Navy) and Northrop Grumman Bethpage Facility Sites

June 10, 2019
Agenda

Introduction & Meeting Ground Rules
Bill Fonda, Citizen Participation Specialist, DEC

Project Overview and Remedial Process
Martin Brand, Deputy Commissioner, DEC

Long Island Aquifer & Site History
Jason Pelton, Project Manager, DEC

Expanded Investigation, Groundwater Modeling, & Feasibility Study
Dan St. Germain, Hydrogeologist, HDR

Proposed Remedy
Jason Pelton

Exposure Assessment
Steve Karpinski, Public Health Specialist, NYSDOH

Meeting Recap
Martin Brand

Questions and Answers
Bill Fonda
Expanded Engineering Investigation

• In 2017 Governor Cuomo directed DEC to complete expanded investigation
  ▪ Supplement 2016 HDR report

• Evaluate options to hydraulically contain the Navy Grumman Plume

• Partnership with HDR and USGS
  ▪ USGS – groundwater flow modeling
  ▪ HDR – database development, plume shell development and engineering analysis
Goals of the Plume Remediation

• Full hydraulic containment of Navy Grumman Plume
• Prevent further expansion of Navy Grumman Plume
• Reduce volume and contaminant concentrations, cleanup timeframe
• Minimize impacts to public water supply wells
• Treat water to meet all standards
• Protect Long Island aquifer by returning majority of treated water back to aquifer system
• Minimize impacts to the environment
Proposed Alternative
Hydraulic Containment of Site Contaminants above Standards with Mass Flux Remediation

Extraction Wells: 24 wells pumping at 18 million gallons per day

Treatment: Centralized

Discharge:
- Recharge basin in Bethpage State Park
- Beneficial reuse:
  - Irrigation at Bethpage State Park
  - Augment flow in Massapequa Creek
- Recharge basins south of Southern State

Underground Piping: 124,000 feet (23.6 miles)

Estimated Capital Cost: $240,448,000

Present Worth: $584,650,000 (estimate to cover all costs during long term operation and monitoring)
DEC Remedy Selection Process

1. **Expanded Investigation** – collect and evaluate data

   ✓

2. **Feasibility Study** – evaluate cleanup options

   ✓

3. **Proposed Amended Record of Decision (AROD)** – presents proposed cleanup option

   Now
Long Island Aquifer

Drinking water source for about **3 Million** Long Islanders

_Equates to:_ ~270 Million Gallons Daily
Long Island Aquifer

Groundwater

Commonly occurs in pore spaces between sand and gravel

Not in Underground Lakes or Reservoirs

~300 Feet Per Year

Not Feet Per Second

Three Aquifers

1. Upper Glacial
2. Magothy
3. Lloyd
Site Location

Former Naval Weapons Industrial Reserve Plant Site (NWIRP) & Northrop Grumman Bethpage Facility
Site Location – Zoomed In

- Former NWIRP (blue)
- Former Northrop Grumman (orange)
- Groundwater Plume
  - 4 miles long
  - 2 miles wide
  - Up to 800 feet deep
- Primary Contaminant: TCE
Existing Records of Decision (RODs)

1. 1995 Navy and Northrop Grumman ROD – On-Site Soils
2. 2001 Navy and Northrop Grumman RODs – Groundwater
3. 2003 Navy ROD – Groundwater
4. 2013 Northrop Grumman ROD – Bethpage Community Park Soil and Groundwater
5. 2018 Navy ROD – Site 1 Soil and Groundwater
Location, History, and Ongoing Cleanup

- 3 related plumes
- 11 pumping wells
  - ~7 million gallons/day
  - >200,000 lbs contamination removed
- Wellhead treatment at 6 public water supplies
- 16 threatened public water supply wells
Current Plume Cleanup

- **Source Removal:**
  - On-site containment with pumping wells
  - Soil treatment and removal at former ballfield
  - Soil removal from former drum marshaling area
  - Soil vapor extraction systems

- **Northrop Grumman:** off-site hot spot

- **Navy:** off-site hot spot
Expanded Engineering Investigation

Four Major Tasks:

1) Investigation and fast track extraction wells
2) Database and plume shell development
3) Groundwater flow modeling
4) Feasibility study
Investigation Program

• Installed wells at locations along leading edge of plume

• Fill-in data gaps

• Drilled to bottom of aquifer (>1,000 ft)

• Collected groundwater samples to define plume

• Installed 3 monitoring wells
Fast-Track Extraction Wells

- Drilling began early 2018 at direction of Governor Cuomo
- Drilling at 5 locations
- 3 pumping wells installed
- 4th pumping well – site preparations underway
Database & Plume Shells

• Contaminants of Concern
  ▪ Industrial solvents used to clean parts during manufacturing - Chlorinated Volatile Organic Compounds (e.g., TCE)
  ▪ Refrigeration chemicals (e.g., Freon)
  ▪ Solvent stabilizer (e.g., 1,4-Dioxane)

• Comprehensive Database
  ▪ >200,000 individual lab results and >5,500 groundwater samples
    ▪ Navy
    ▪ Northrop Grumman
    ▪ NYSDEC
    ▪ NCDOH
SCG Plume Oblique 3-D View

Concentration: 5 ppb or greater
~150 billion gallons of water
TcVOC Plume Oblique 3-D View

Concentration:
50 ppb or greater
~40 billion gallons of water
TcVOC Plume Oblique 3-D View

Concentration:
1,000 ppb or greater (Hot Spots)
~3 billion gallons of water
Side-Views & Cross-Sections

Side View Looking East
TCE Plume – Side View (Looking East)

Approx. Bethpage Facility

Hempstead Tpke

Southern State Pkwy

Ground Surface

~ 4 Miles

~ 800 feet

Groundwater Flow

View Direction

Vertical Exaggeration 3:1
TCE Plume – Side View (Looking East)
TcVOC Plume – Cross-Section (Looking East)

Approx. Bethpage Facility
HempsteadTpke
Southern State Pkwy

Higher Contaminant Concentrations (Red Shading)

Lower Contaminant Concentrations (Blue Shading)
TcVOC Plume – Cross-Section (Looking East)

Approx. Former Grumman Settling Ponds

Hempstead Tpke

Boundary Ave

Plume Migration to South

Vertical exaggeration: 3x
USGS Groundwater Flow Model

- Island-wide model to evaluate water resources of Long Island
- Framework for defined focused model
- Focus Area Model
  - 25 layers
  - 100 x 100 foot cells (250 columns x 346 rows)
  - Physical aquifer properties and boundary conditions from regional model
  - Local model calibrated using parameter estimation techniques
  - >2,000,000 cells in model
USGS Groundwater Flow Model

- Plume Shells combined with Groundwater Model
- Particle starts within each cell
- Model calculates path from starting cell to extraction wells
- Pumping rates, well locations, and recharge basin locations iteratively adjusted to hydraulically contain the plume
- Evaluation of potential effects to environment
Groundwater Model Verification

Water levels and stream flows are observed in the field, then compared with simulated values.
Groundwater Flow Modeling Results

No Further Action (existing remediation system)

Extraction Wells:
- 16 Wells
- Pumping at 11.5 mgd
Goals of the Plume Remediation

• Full hydraulic containment of Navy Grumman Plume
• Prevent further expansion of Navy Grumman Plume
• Reduce volume and contaminant concentrations, cleanup timeframe
• Minimize impacts to public water supply wells
• Treat water to meet all standards
• Protect Long Island aquifer by returning majority of treated water back to aquifer system
• Minimize impacts to the environment
Feasibility Study

• Detailed evaluation of remedial alternatives.

• Technical basis for the DEC’s selection of the proposed site remedy.

• Supports the development of an Amendment to the Record of Decision.
Remedy Evaluation Criteria

1. Protection of Human Health & the Environment
2. Compliance with NYS Standards, Criteria, and Guidance
3. Short-term effectiveness
4. Long-term effectiveness and permanence
5. Reduction of toxicity, mobility, or volume
6. Implement-ability
7. Cost effectiveness
8. Land use
9. Community acceptance
## Remedial Alternatives

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1</td>
<td>No Further Action (existing and planned remedial systems)</td>
</tr>
<tr>
<td>Alternatives 2A &amp; 2B</td>
<td>Hydraulic containment of Site Contaminants above Standards</td>
</tr>
<tr>
<td>Alternatives 3A &amp; 3B</td>
<td>Plume Mass Flux Remediation</td>
</tr>
<tr>
<td>Alternative 4</td>
<td>Aquifer Flushing</td>
</tr>
<tr>
<td>Alternatives 5A &amp; 5B</td>
<td>Hydraulic Containment of Site Contaminants above Standards, Criteria, and Guidance Combined with Mass Flux Remediation</td>
</tr>
</tbody>
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**Note:** Evaluation of No Further Action Alternative Required by Statute.

Alternatives 2, 3, and 5 were developed with “A” and “B” variants

“A” variants utilized decentralized treatment/recharge systems close to extraction wells

“B” variants utilized larger, centralized treatment systems.
Alternative 1 – No Further Action

- Existing and planned remediation systems
  - ONCT
  - BPGWCS
  - GM-38
  - RW-21 Area System
  - RE-108 Area System

- No hydraulic containment of plume
FS Evaluated Range of Alternatives

Containment Approaches

Alternative 2A

Alternative 2B

Mass Flux Approaches

Alternative 3A

Alternative 3B

Aquifer Flushing Approach

Alternative 4

Combined Approach

Alternative 5A
Alternative 5B
Hydraulic Containment of Site Contaminants above SCGs with Mass Flux Remediation

**Extraction Wells:** 24 wells

**Extraction Rate:** 18 million gallons per day

**Treatment:** Centralized

**Discharge:**
- Recharge basin in Bethpage State Park
- Beneficial reuse:
  - Irrigation at Bethpage State Park
  - Augment flow in Massapequa Creek
- Recharge basins south of Southern State

**Hydraulic Containment Type/Time to Achieve:** Full / Immediate

**Plume Cleanup Type/Time to Achieve:** Full / 110 Years

**Minimal effects to environment**
- Stream Flow, Wetlands, Aquifer Safe Yield, Saltwater Intrusion
<table>
<thead>
<tr>
<th>Description</th>
<th>Alternative 1</th>
<th>Alternative 2A</th>
<th>Alternative 2B</th>
<th>Alternative 3A</th>
<th>Alternative 3B</th>
<th>Alternative 4</th>
<th>Alternative 5A</th>
<th>Alternative 5B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment System Location(s)</td>
<td>No Further Action (With Existing &amp; Planned Remedial Systems)</td>
<td>Hydraulic Containment of Site Contaminants above SCGs - Decentralized Treatment Plants with Various Discharge Methods</td>
<td>Hydraulic Containment of Site Contaminants above SCGs - Centralized Treatment Plants with a Centralized Recharge Basin</td>
<td>Plume Mass Flux Remediation - Decentralized Treatment Plants with Various Discharge Methods</td>
<td>Plume Mass Flux Remediation - Centralized Treatment Plant with a Centralized Recharge Basin</td>
<td>Aquifer Flushing</td>
<td>Hydraulic Containment of Site Contaminants above SCGs Combined with Mass Flux Remediation - Decentralized Treatment Plants with Various Discharge Methods</td>
<td>Hydraulic Containment of Site Contaminants Above SCGs Combined with Mass Flux Remediation - Centralized Treatment Plants with a Centralized Recharge Basin</td>
</tr>
<tr>
<td>Discharge Options</td>
<td>-</td>
<td>Decentralized</td>
<td>Centralized</td>
<td>Decentralized</td>
<td>Centralized</td>
<td>Decentralized</td>
<td>Decentralized</td>
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<tr>
<td>Number of Groundwater Extraction Wells</td>
<td>0</td>
<td>16</td>
<td>16</td>
<td>17</td>
<td>16</td>
<td>23</td>
<td>24</td>
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<tr>
<td>Estimated Groundwater Extraction Rate (MGD)</td>
<td>0</td>
<td>14.9</td>
<td>13.2</td>
<td>13.1</td>
<td>10.3</td>
<td>12.5</td>
<td>19.2</td>
<td>17.5</td>
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<td>Capital Cost</td>
<td>$210,206,000</td>
<td>$194,894,000</td>
<td>$233,987,000</td>
<td>$168,475,000</td>
<td>$313,879,000</td>
<td>$282,959,000</td>
<td>$313,879,000</td>
<td>$282,959,000</td>
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<tr>
<td>Total O&amp;M Cost (NPV)</td>
<td>$326,442,000</td>
<td>$272,890,000</td>
<td>$274,424,000</td>
<td>$151,022,000</td>
<td>$277,374,000</td>
<td>$440,803,000</td>
<td>$440,803,000</td>
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<tr>
<td>Total Present Value</td>
<td>$553,249,000</td>
<td>$484,895,000</td>
<td>$522,410,000</td>
<td>$331,712,000</td>
<td>$608,390,000</td>
<td>$747,935,000</td>
<td>$747,935,000</td>
<td>$584,650,000</td>
</tr>
</tbody>
</table>
Proposed Alternative

Alternative 5B: Hydraulic Containment of Site Contaminants above SCGs Combined with Mass Flux Remediation - Centralized Treatment Plant with a Centralized Recharge Basin remedy
Proposed: Alternative 5B
Hydraulic Containment of Site Contaminants above SCGs with Mass Flux Remediation

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- Beneficial reuse:
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Underground Piping: 124,000 feet (23.6 miles)

Estimated Capital Cost: $240,448,000

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Proposed Alternative – Southern Half Conceptual Layout

LEGEND
- Mass-Flux Extraction Well
- Hydraulic Containment Extraction
- Hydraulic Containment Extraction Well with Co-located Treatment Plant
- Navy/Grumman Existing and Planned Remediation Wells
- Centralized Treatment
- Recharge Basin used in GW Modeling (RB-XX Designation)
- Raw Groundwater
- Treated Effluent
- Raw Groundwater (Surface Water System)
- Treated Effluent (Surface Water System)
- TCVOCS 50 ug/l Plume Shell
- Groundwater Exceeding SCGs
- Northrop Grumman Bethpage Facility
- Naval Weapons Industrial Reserve Plant (NWIRP)
- Bethpage Community Park
- Recharge Basin

16 Containment Wells

Central Treatment With Massapequa Creek Discharge

Local Treatment & Discharge

Southern State Parkway

NY 35

NY 107
Role of the NYS Department Of Health

- Work with NYSDEC to identify nature and extent of contamination to evaluate potential exposures
- Evaluate data and make recommendations to address any potential exposure
- Ensure that remedy selected is protective of public health
What is exposure?

- Physical contact with a chemical or substance
  - Inhalation (breathing)
  - Direct contact (touching)
  - Ingestion (eating/drinking)

- One or more of these physical contacts **must** occur before a chemical has the *potential* to cause a health problem

- Exposure does not necessarily mean that health effects will occur
Potential Exposure Pathway

Ingestion

The ingestion exposure pathway for contaminated groundwater is not an immediate public health concern as the area is served by Public Water Systems and drinking water meets the United States Environmental Protection Agency (EPA) and New York State Department of Health (DOH) drinking water standards. Many public water systems on Long Island endeavor to remove even the lowest concentrations of trace contaminants.

The Public Water Supply Contingency Plan has been developed to help ensure that these objectives continue to be achieved.
• For further questions on the Health Consultation, health effects or to provide comments, please see New York State Department of Health representatives at the availability table.
New York State Department of Health
Contact Information

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Empire State Plaza, Corning Tower, Room 1787
Albany, NY 12237
Phone: (518) 402-7860
Email: beei@health.ny.gov
New Plan Achieves Remedial Goals

- Full Hydraulic Containment of Navy Grumman Plume
- Prevent Further Expansion of the Navy Grumman Plume
- Reduce the Volume and Contaminant Concentrations and Reduce Cleanup Timeframe
- Minimize Impacts to Public Water Supply Wells
- Treat Water To Meet All Standards
- Protect Long Island Aquifer by Returning Majority of Treated Water Back to the Aquifer System
- Minimize Impacts to the Environment
Comparison of Modeling Results

Current Remedy

Proposed Remedy

NWIRP & Northrop Grumman Sites

Particles/Contaminants Escape

Southern State Parkway

South Oyster Bay

NWIRP & Northrop Grumman Sites

Plume Containment
Take Away Points

- Full hydraulic containment is feasible
- Proposed remedy will prevent further migration
- Proposed remedy will protect water supplies
- DEC will demand the responsible parties implement the remedy
## Next Steps

<table>
<thead>
<tr>
<th>Activity</th>
<th>Estimated Time</th>
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<tbody>
<tr>
<td>1) Public Comment Period</td>
<td>May 23 – July 7, 2019</td>
</tr>
<tr>
<td>2) Issue Record of Decision (ROD)</td>
<td>July/August 2019</td>
</tr>
<tr>
<td>3) Demand Potentially Responsible Parties (PRPs) to implement</td>
<td>Immediately After ROD</td>
</tr>
<tr>
<td>4) Remedial Design</td>
<td>Immediately After ROD</td>
</tr>
<tr>
<td>5) Construction</td>
<td>Determined by Remedial Design</td>
</tr>
</tbody>
</table>
Thank You

Martin Brand
Don Hesler
Jason Pelton

Steve Karpinski

Chris Schubert
Paul Misut

Dan St. Germain
Michael Lehtinen
Erich Zimmerman
Contact Information

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