

NORTHROP GRUMMAN

**Northrop Grumman Corporation
Aerospace Systems**

Military Aircraft Systems
925 South Oyster Bay Road
Bethpage, New York 11714-3582

July 8, 2019

Jason Pelton, P.G.
Project Manager
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233
jason.pelton@dec.ny.gov

**Re: Comments on the Proposed Amended Record of Decision and Feasibility Study
Report for Northrop Grumman Bethpage Facility and Naval Weapons Industrial
Reserve Plant**

Dear Mr. Pelton:

Attached, please find Northrop Grumman Corporation's Comments on the May 2019 Proposed Amended Record of Decision and Feasibility Study: Northrop Grumman Bethpage Facility and Naval Weapons Industrial Reserve Plant. The aforementioned Comments are provided in electronic form.

We appreciate the opportunity to continue to engage with the Department in regard to this matter.

Sincerely,



Edward J. Hannon
Environmental, Safety, Health & Medical
Manager
516-575-2333
M/S: Q06305/BP15

cc: Andrew Guglielmi (andrew.guglielmi@dec.ny.gov)

**Northrop Grumman's Comments on NYSDEC's
Proposed Amended Record of Decision &
Feasibility Study Report**

July 8, 2019

EXECUTIVE SUMMARY

Northrop Grumman appreciates the opportunity to comment on the May 2019 Proposed Amended Record of Decision: Northrop Grumman Bethpage Facility and Naval Weapons Industrial Reserve Plan (“Proposed AROD”), as well as the accompanying Feasibility Study Report issued by the New York State Department of Environmental Conservation (“NYSDEC”).

The environmental remediation project in Bethpage is complex and involves numerous stakeholders and responsible parties. Since the beginning of remediation efforts in Bethpage, Northrop Grumman has worked closely and extensively with NYSDEC, the United States Navy, the New York State Department of Health (“NYSDOH”), and other regulators to develop and implement scientifically sound remediation strategies that protect human health and the environment. Northrop Grumman considers this commitment to be an important aspect of its ongoing legacy, one which honors its exemplary service to the country since before World War II, the remarkable contributions of its employees on Long Island, and the company’s historic and ongoing concern as an employer and a neighbor to the citizens of Long Island. With the benefit of the parties’ collaborative efforts, both NYSDOH and the water districts have affirmed and assured the community that the water in the Bethpage area is safe to drink.

We understand that concerns remain about whether contaminated groundwater could reach currently unaffected water districts. Those concerns have been and are being addressed by various parties and stakeholders. Every annual report submitted by the U.S. Navy, in response to federal legislation, has concluded that the current remedy is working; it is and remains protective of public health and the environment. The United States Congress in 2016 enacted such legislation requiring the Navy to report each year on the migration of groundwater contaminants within a 10-mile radius of the former Bethpage site. The annual reports describe if and how contaminants have moved, results of comprehensive drinking water sampling, and suggestions for how to continue protecting drinking water well facilities that have not yet required treatment for contaminants.

Strategies for the ongoing protection of drinking water facilities also have included – and continue to include – a robust network of outpost monitoring wells and an ongoing and extensive program of groundwater and public water supply sampling that monitor and alert nearby water districts and the Navy of the detection of any volatile organic compounds (“VOCs”) so that appropriate measures can be taken before any potential threat materializes. Indeed, this is an important component of the current remedy, and is based on the widely used and effective remedial technology – namely, wellhead treatment. Wellhead treatment is the most widely used groundwater remediation technology, not just on Long Island, but across the country. And, again, in the past few weeks, NYSDOH issued a report reaffirming that wellhead treatment is protective of human health.

As reflected in NYSDOH’s most recent report, no additional water districts are currently being threatened by contaminant movement that would require installation of treatment at their public water supply facilities. To help keep it that way, the State’s current remedial approach also includes continued efforts to remove contaminants in areas where higher concentrations have been detected. Still,

additional systems are being installed by Northrop Grumman and the Navy. Those additional systems are expected to be operational in short order with community cooperation and support.

Thus, the Navy, NYSDOH and the water districts themselves have repeatedly affirmed that the current State-ordered remedy – one that the State, the Navy, Northrop Grumman and others have been working together to implement for years – is effective and protective of human health.

While Northrop Grumman appreciates there may always be a desire to do more, it respectfully submits that the Proposed AROD has strayed from scientifically-based principles. It is unnecessary and could indeed do more harm than good, leaving the citizens of Bethpage worse off. The newly proposed remedy is premised on assumptions that concentrations of contaminants have or will reach certain levels at certain times and/or places, and yet, the State does not provide the necessary scientific support for those assumptions. Of particular note, it appears the State has not undertaken solute transport modeling – the state-of-the-art groundwater modeling methodology known to the scientific community as being able to accurately simulate the levels and locations of contaminants. We understand that NYSDEC has begun some modeling efforts, but they are not yet complete. Northrop Grumman has itself undertaken and completed solute transport modeling and, of concern, that modeling shows that the proposed remedy may actually cause contamination to spread and contaminant concentrations to increase in certain areas.

Of additional concern, the proposed remedy will result in very substantial disruption to the community. If selected, this additional remedy will require pumping millions of gallons of groundwater each day and the construction of large-scale infrastructure, which includes the installation of 24 additional recovery wells and 24 miles of underground piping, as well as the construction of 5 additional industrial-type treatment facilities to be maintained for decades in the residential community. A project of the suggested scope would increase risks and unnecessarily contribute to numerous daily challenges for local residents, including dramatically increased traffic, congestion, and noise.

In short, the science supports the previous and repeated statements by NYSDEC and NYSDOH that the now proposed ultimate remedy is unnecessary, infeasible, and impractical. As is more fully explained in our attached comments, the science does not bear out the availability of any new information to change those prior assessments. The current, approved remediation strategy and efforts are successfully protecting human health and the environment and having a positive impact on environmental conditions.

In the event, however, that additional remedial measures are required beyond the currently approved remedy, and they are required to achieve a remedy similar to the Proposed AROD remedy, then Northrop Grumman urges the State to consider alternatives that protect human health, can be implemented more quickly with less disruption to the community, and present fewer environmental risks. Based on extensive analysis performed by independent experts using state-of-the-art analytical protocols, Northrop Grumman has proposed such an alternative approach to NYSDEC. The alternative approach protects human health and the environment: it will achieve similar remedial results in a shorter period of time, without risking the increase in the spread and concentration of contaminants,

and with far less community disruption. It would avoid the practical obstacles to implementing the Proposed AROD remedy. Further, because this alternative approach is more targeted in scope and can be implemented in a shorter time period, it will allow the parties to focus our collective efforts on achieving our mutual and fundamental remedial objective – quicker implementation of a scientifically sound remedy, with less community disruption – and avoid diverting scarce regulatory and other resources from that fundamental goal.

Northrop Grumman remains committed to working with all stakeholders to provide fact-based, scientifically-sound remediation efforts that advance the cleanup expeditiously and help protect the community without unnecessary disruption and potential harm.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
TABLE OF CONTENTS.....	iv
EXHIBITS & ATTACHMENTS.....	vii
INTRODUCTION.....	1
SUMMARY OF TECHNICAL AND LEGAL ERRORS IN THE PROPOSED AROD	2
A. NYSDEC Failed to Adequately Consider the Current Approved ROD Remedy.....	2
B. NYSDEC Failed to Consider Identified Remedial Alternatives That Are More Efficient and That Would Attain Similar Results With Far Less Community Disruption.	3
C. NYSDEC’s Proposed Remedy Is Premised on an Inaccurate Depiction of the Scope and Extent of Groundwater Contamination.	5
D. NYSDEC Failed to Provide Critical Documentation to Support Its Conclusions.....	6
FACTUAL BACKGROUND	7
A. NYSDEC Repeatedly Endorsed the ROD Remedy While Rejecting “Full Plume Containment” as Unnecessary and Inconsistent with Both the Law and Science.	7
B. Discussion of “Full Plume Containment” Approach Before the ROD Amendment Process.	9
C. NYSDEC Reversed Its Long-Standing Position That the ROD Remedy Is Fully Protective of Human Health and the Environment Based on “Significant New Information” That Is Neither New Nor Significant.	11
LEGAL BACKGROUND.....	12
LEGAL FLAWS AND INADEQUACIES OF THE PROPOSED AROD & FS	13
I. NYSDEC FAILED TO ADEQUATELY CONSIDER AND EVALUATE THE EXISTING ROD REMEDY AS REQUIRED BY LAW.....	13
A. NYSDEC Dismissed the ROD Remedy as a Viable Alternative Without Adequate and Meaningful Consideration.	14
B. NYSDEC Failed to Consider that the ROD Remedy Addressed Perceived Risks Presented by Existing Contamination.....	15
C. No “Significant New Information” or Other Basis in the Proposed AROD Justifies a Fundamental Change in the ROD Remedy.	17
1. NYSDEC’s recent sampling efforts did not uncover any “new” findings.....	17
2. The groundwater database reflects no “new data.”	18

II.	NYSDEC FAILED TO CONSIDER THE SUPERIOR IRA OR VARIATIONS OF THE IRA.....	18
A.	Northrop Grumman Conducted a State-of-the-Art Groundwater Modeling Comparison of Alternatives to Evaluate the IRA.....	20
B.	The Modeling Comparison of Alternatives Shows that the IRA Is Superior to the Proposed Remedy With Respect to the First Five Remedy-Selection Criteria under the NCP.....	22
1.	The alternatives achieve similar reductions in contaminant distribution after 30 years.....	23
2.	The Proposed Remedy will cause contamination to spread.....	24
3.	The alternatives remove similar quantities of contaminant mass.....	25
4.	Many of the wells included in the Proposed Remedy capture little mass and are inefficient...	26
5.	All the alternatives protect public water supply wells.....	26
C.	The IRA Is More Cost-Effective than the Proposed Remedy, and Thus Superior With Respect to the Seventh NCP Criterion.....	28
D.	The IRA Is Far Less Disruptive and More Implementable than the Proposed Remedy, and Thus Superior With Respect to the Fifth, Sixth, and Eighth NCP Criteria.....	30
1.	NYSDEC repeatedly recognized the negative impacts of “full plume containment.”.....	31
a.	NYSDEC rejected “full plume containment” in 2001 as part of the OU2 ROD.....	31
b.	NYSDEC again rejected “full plume containment” in 2013 as part of the OU3 ROD.....	32
c.	NYSDEC decisively rejected “full plume containment” for a third time in 2014.....	32
2.	NYSDEC failed to provide adequate information about the implementability of the Proposed Remedy.....	33
3.	Northrop Grumman conducted an implementability analysis of Alternative 5B and the IRA...	34
4.	Construction impacts from the Proposed Remedy are far greater than those from the IRA...	34
5.	Long-term impacts from the Proposed Remedy are far greater than those from the IRA.....	36
E.	NYSDEC’s Is Obligated by Law to Consider the IRA.....	36
III.	THE PROPOSED REMEDY IS PREMISED ON NYSDEC’S INACCURATE AND SCIENTIFICALLY-FLAWED DEPICTION OF THE NATURE AND EXTENT OF CONTAMINATION.....	38
A.	NYSDEC Relied on Insufficient Groundwater sampling Data.....	38
B.	NYSDEC Inappropriately Relied on VPB Data.....	39
C.	NYSDEC Selected an Improper SCG for 1,4-dioxane.....	40
D.	NYSDEC Incorrectly Assumed that All COCs Originate from the Site.....	40
E.	NYSDEC Relied on an Unsophisticated and Incomplete Model.....	41

F.	NYSDEC Failed to Provide Modeling Information and Other Backup Data.	43
G.	NYSDEC’s Data and Modeling Flaws Caused It to Over-Estimate of the Nature and Extent of the Contamination, Resulting in a Remedy Inconsistent with Part 375 and the NCP.	44
IV.	NYSDEC FAILED TO CONSIDER VARIOUS KEY ISSUES AND FAILED TO INCLUDE CRITICAL SUPPORTING DOCUMENTATION IN THE ADMINISTRATIVE RECORD	46
A.	NYSDEC Failed to Provide Support for Its Conclusion of No Significant Environmental Impacts. ..	46
1.	NYSDEC conducted no evaluation of ecological impacts of the Proposed Remedy.	46
2.	NYSDEC conducted no assessment of saltwater intrusion.	47
CONCLUSION.....		Error! Bookmark not defined.

EXHIBITS & ATTACHMENTS

EXHIBITS

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

ATTACHMENTS

Attachment 1 – Groundwater Flow and Solute Transport Model Update (Model Report)

Attachment 2 – Modeling Memorandum

Attachment 3 – Community Impact Analysis

Attachment 4 – Review of Natural Resources Assessment

Attachment 5 – Compendium of Reference Documents

INTRODUCTION

Northrop Grumman appreciates the opportunity to comment on the New York State Department of Environmental Conservation (“NYSDEC”) May 2019 Proposed Amended Record of Decision: Northrop Grumman Bethpage Facility and Naval Weapons Industrial Reserve Plant (the “Proposed AROD”), as well as the accompanying April 2019 Feasibility Study Report: Northrop Grumman Bethpage Facility and Naval Weapons Industrial Reserve Plant (the “FS”).

NYSDEC issued the Proposed AROD and the FS to justify proposed changes to the current NYSDEC-approved remedy established by the Operable Unit 2 Record of Decision, the Operable Unit 3 Record of Decision, and the Department of the Navy 2001 Record of Decision (the “OU2 ROD,” the “OU3 ROD,” and the “Navy ROD,” respectively; and collectively the “ROD Remedy”).¹ The Proposed AROD purports to achieve full containment of groundwater contamination that contains contaminants of concern (“COCs”), primarily Volatile Organic Compounds (“VOCs”), allegedly derived from the former Naval Weapons Industrial Reserve Plant (“NWIRP”)/Northrop Grumman facilities in Bethpage and the Bethpage Community Park (collectively, the “Site”). The new remedy proposed by NYSDEC in the Proposed AROD is referred to herein as the “Proposed Remedy” or “Alternative 5B.”

Northrop Grumman has worked cooperatively and extensively with NYSDEC under the OU2 and OU3 RODs to address groundwater COCs allegedly derived from the Site. NYSDEC has repeatedly confirmed that the current ROD Remedy fully protects human health and the environment, and NYSDEC previously rejected as impracticable and unwarranted any remedy seeking to achieve “full plume containment.”

Contrary to those prior conclusions, NYSDEC now seeks to redefine the remedy to contain groundwater contamination it says has or will threaten other public water supplies. NYSDEC’s Proposed Remedy, however, is premised on numerous fundamental errors based on flawed science. The Proposed Remedy would impose undue community disruption without any corresponding health or environmental benefits as compared to other alternatives. NYSDEC has failed to justify such an extensive modification to the existing remedy. In addition, even if additional remedial measures are warranted, Northrop Grumman identified a superior remedial alternative to NYSDEC that the agency failed to consider.

In the Proposed AROD and FS, NYSDEC has departed from reasoned agency decision-making and has failed to comply with its legal obligations. NYSDEC’s actions do not serve the public’s best interests. The Proposed Remedy must be withdrawn because it does not comply with the New York State Environmental Conservation Law (“ECL”) and NYSDEC’s Part 375 regulations, and is inconsistent with the U.S. Environmental Protection Agency (“USEPA”) National Contingency Plan (“NCP”).

¹ Northrop Grumman has not included in this submission publicly available documents (e.g., the OU2, OU3, and Navy RODs), but incorporates them by reference.

SUMMARY OF TECHNICAL AND LEGAL ERRORS IN THE PROPOSED AROD

A. NYSDEC Failed to Adequately Consider the Current Approved ROD Remedy.

NYSDEC did not justify the need for extensive modifications to the existing remedy.

As NYSDEC, the Navy, and other entities through independent scientific studies have concluded, the current approved ROD Remedy established by the OU2, OU3 and Navy RODs has protected, and will continue to protect, public health and the environment. NYSDOH recently confirmed this in its draft Health Consultation (“NYSDOH Health Consultation”; see Attachment 5), which unequivocally states that the water supplied to residents south of the Site is safe to drink. This study corroborates prior determinations by various water districts that the water has been, and is, safe to drink.

Contrary to its prior conclusions, NYSDEC now contends that a full containment remedy is needed because groundwater contamination is threatening or will threaten downgradient public water supplies. Even assuming NYSDEC’s depiction of the nature and extent of the contamination is accurate (*but see* Section III), that contention is scientifically incorrect.² The current approved ROD Remedy is, in fact, designed to reduce the migration of VOCs and to reduce high concentrations of VOCs in impacted groundwater through mass removal south of the Site. Moreover, extensive groundwater well monitoring south of the Site through the Public Water Supply Contingency Plan (“PWSCP”)—also a component of the ROD Remedy—has successfully addressed, and will continue to address, any potential need for wellhead treatment or comparable alternative measures in downgradient water supplies.

As shown below, the current approved ROD Remedy is comparable to the Proposed Remedy in remedial efficacy (*e.g.*, removal of contaminant mass). The ROD Remedy is also far more efficient, effective, and implementable with far less community disruption. NYSDEC would have reached this conclusion if it had conducted the requisite analysis as mandated by law.

NYSDEC’s failure to adequately evaluate the current approved ROD Remedy violates the NCP’s requirement that “[t]he no-action alternative, which may be no further action if some removal or remedial action has already occurred at the site, shall be developed,” and then compared to other alternatives. 40 C.F.R. § 300.430(e)(6)-(9). As courts have explained, “[c]ursory examination and rejection of alternatives does not demonstrate ‘development’ of alternatives as called for under the NCP. In addition, [the NCP] requires that the ‘no [further] action’ alternative be given close and detailed scrutiny.” *Channel Master Satellite Sys., Inc. v. JFD Electronics Corp.*, 748 F. Supp. 373, 389 (E.D.N.C. 1990).

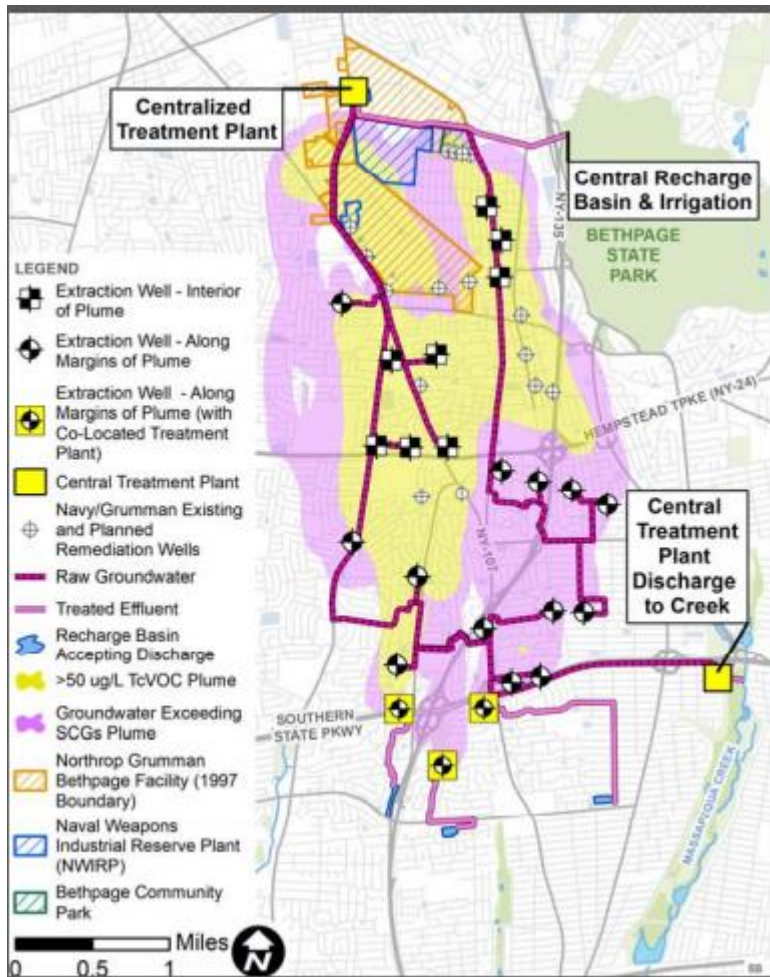
² NYSDEC’s depiction of the nature and extent of the groundwater contamination, which includes multiple plumes, is inaccurate for reasons explained herein. For ease of reference, the area of alleged contamination identified by NYSDEC is at times referred to herein as “the NYSDEC Plume.”

B. NYSDEC Failed to Consider Identified Remedial Alternatives That Are More Efficient and That Would Attain Similar Results With Far Less Community Disruption.

The current ROD Remedy is effective and protects human health and the environment. However, assuming additional remedial efforts are required (*but see* Section I), and that NYSDEC’s depiction of the extent of contamination is accurate (*but see* Section III), Northrop Grumman provided to NYSDEC an identified alternative remedy (the “Improved Remedial Alternative” or “IRA”) that protects public health and the environment, and that is superior to the Proposed Remedy. However, NYSDEC failed to consider the IRA, or any variant thereof, in the Proposed AROD or FS. That failure was contrary to law.

The Proposed Remedy would require a massive undertaking, consisting of installing 21 additional extraction wells (plus use of three existing wells, for a total of 24), constructing five treatment plants, installing 23.5 miles of underground piping, and operating the system for up to 110 years—all within a densely-populated residential community. The NYSDEC figure below illustrates the enormous scope of its Proposed Remedy:³

³ Available at https://www.dec.ny.gov/docs/remediation_hudson_pdf/130003abdraftarodfs.pdf



NYSDEC set forth its new Proposed AROD without even mentioning the IRA, and without even attempting to compare the Proposed Remedy to the IRA under the applicable criteria. That violates the requirements of Part 375 and the NCP to conduct an evaluation of alternatives.

Faced with NYSDEC's failure to consider the IRA, Northrop Grumman conducted a comparative analysis using sophisticated, state-of-the-art groundwater solute transport modeling—modeling that NYSDEC has not conducted. As explained below, the data and analyses prove that—even if NYSDEC is correct about the scope of contamination (*but see* Section III)—the IRA is still a superior remedy under the criteria NYSDEC is required by law to use to select a remedy. 6 NYCRR § 375-1.8(f); *see also* 40 C.F.R. § 300.430(e)(9). For example:

- the IRA achieves virtually identical hydraulic containment of the groundwater contamination described by NYSDEC after 30 years;
- the IRA removes virtually the same contaminant mass (96% versus 98%) after 30 years;
- the IRA achieves these results far more efficiently and effectively, as groundwater modeling shows many of the wells included in the Proposed Remedy to be highly inefficient;
- the IRA does not cause contamination *to spread* in certain areas, unlike the Proposed Remedy;

- the IRA requires only six additional extraction wells, as opposed to 24;
- the IRA could be installed in about one year versus five years;
- the IRA is easier to implement, and would avoid many of the disruptions and adverse impacts to the community that the Proposed Remedy would cause; and
- the IRA is more cost-effective for all parties. NYSDEC estimates that the Proposed Remedy would cost \$585 million; the IRA would cost far less.

In sum, NYSDEC received a viable remedial alternative—namely, the IRA—that achieves NYSDEC’s remedial goals in a materially reduced time frame, with less community disruption and in a more cost-effective manner than NYSDEC’s Proposed Remedy or any of NYSDEC’s other identified alternatives. However, NYSDEC did not consider or even mention it. The public is entitled to be informed about the IRA, and NYSDEC must consider the IRA in the same manner it considered other alternatives NYSDEC set forth in the Proposed AROD and FS. NYSDEC’s failure to do so is not only arbitrary and capricious, but also deprives the public of the opportunity to compare the Proposed Remedy with a remedy that would achieve similar results without the corollary adverse community impacts.

C. NYSDEC’s Proposed Remedy Is Premised on an Inaccurate Depiction of the Scope and Extent of Groundwater Contamination.

The nature and extent of the groundwater contamination depicted in the Proposed AROD (Figure 2) and the FS (Figures 3-8) is inaccurate because NYSDEC relied on invalid data and scientifically improper groundwater modeling. As a result of these fundamental scientific errors, NYSDEC materially overstated the potential for migration of contaminated groundwater, exaggerated perceived threats to water supply wells at the southern edge of its projected NYSDEC Plume, and proposed a remedial program that is far more extensive, but not as efficient or effective, as viable alternatives. Thus, NYSDEC’s analysis is not based on “data of sufficient quantity and quality to support the necessity for, and the proposed extent of, remediation and to support the evaluation of proposed alternatives.” 6 NYCRR § 375-1.8(e)(1)(v); *see also* 40 C.F.R. § 300.430(e)(1) (feasibility study must “reflect . . . the site problems being addressed”).

First, NYSDEC relied on insufficient and old data. For example, NYSDEC projected the existence of contamination based on initial vertical boring samples in which 79 out of 82 samples confirmed the *absence* of contamination—and the three samples suggesting contamination were later disproved by more accurate sampling results. (FS, pp. 15-17). NYSDEC also commingled recent sampling data with data from nearly 20 years ago, although such data does not validly represent existing conditions. (*See* Attachment 1, Section 3.5).⁴

⁴ Northrop Grumman offered to undertake remedial predesign sampling to demonstrate that NYSDEC’s depiction of the nature and extent of the groundwater contamination was inaccurate and excessive, and that the Proposed Remedy is unnecessary. NYSDEC did not respond to this offer.

NYSDEC further exaggerated the nature and extent of the groundwater contamination by assuming that *all* COCs south of the Site can be attributed to former Navy/Northrop Grumman activities. That assumption is demonstrably false. For example, portions of the contamination cited by NYSDEC—notably the deep toluene to the south, which drives extensive remediation—cannot plausibly be connected to the Site. (See pp. 18, 39-40, *infra*; see also Attachment 1, App. F).

NYSDEC also relied on invalid and incomplete groundwater modeling results. Because the Proposed AROD failed to provide necessary modeling assumptions and data, Northrop Grumman attempted to obtain this information through a Freedom of Information Law (“FOIL”) request. NYSDEC’s response admitted that its modeling—which was used to depict the contamination and to form the basis for its evaluation of remedial alternatives—remains an incomplete draft.⁵ NYSDEC’s reliance on an incomplete model is unreasonable on its face. Because core supporting documents for NYSDEC’s model remain in “draft” form, no commenter—whether another agency or member of the public—will be able to understand the remedial measures NYSDEC contends are needed based on that model.

Beyond being incomplete, the type of modeling NYSDEC used is inherently limited and cannot justify the Proposed Remedy. Specifically, NYSDEC relied on groundwater flow modeling and particle tracking rather than state-of-the-art solute transport modeling.⁶ Thus, even assuming it is eventually finalized, NYSDEC’s model will rest on overly simplistic assumptions that discount and ignore scientific fact. For example, groundwater flow modeling (unlike solute transport modeling) assumes that all contaminants travel at the same rate as groundwater—an assumption contrary to established science—and cannot account for changes in concentration in time and space. See *generally* Section III.

D. NYSDEC Failed to Provide Critical Documentation to Support Its Conclusions.

NYSDEC acted inconsistently with the NCP and Part 375 by failing to provide various categories of analysis, as well as underlying documentation, supporting its proposed determination in an administrative record available to the public. Among other things, NYSDEC failed to provide basic information supporting the groundwater modeling relied on in the Proposed AROD, without which commenters are unable to meaningfully assess and respond to the Proposed Remedy. NYSDEC failed to provide information supporting its conclusion that the Proposed AROD will cause no significant environmental impacts. And NYSDEC failed to provide a cost-effectiveness assessment.

⁵ (See Attachment 5) (“Records responsive to this request are draft, and subject to one or more exemptions to disclosure. A USGS [U.S. Geological Survey] modeling report is currently being finalized, and once finalized, those documents can be provided.”).

⁶ Pollock, D.W., 1989, Documentation of computer programs to compute and display pathlines using results from the U.S. Geological Survey modular three-dimensional finite difference ground-water flow model, U.S. Geological Survey Open-File Report 89-381, 188p; Zheng, C. 1990. MT3D: A Modular Three-Dimensional Transport Model for Simulation of Advection, Dispersion, and Chemical Reactions of Contaminants in Groundwater Systems. Prepared for the U.S. Environmental Protection Agency. Robert S. Kerr Environmental Research Laboratory, Ada, Oklahoma. Developed by S.S. Papadopoulos & Associates, Inc., Rockville, Maryland.

FACTUAL BACKGROUND

A. NYSDEC Repeatedly Endorsed the ROD Remedy While Rejecting “Full Plume Containment” as Unnecessary and Inconsistent with Both the Law and Science.

The ROD Remedy is documented in the OU2, OU3, and Navy RODs, which were collectively issued over a multi-year period after extensive groundwater investigations and evaluations. The ROD Remedy seeks to address areas of elevated VOC groundwater contamination (referred to as “hot spots”) so as to prevent contaminant migration. It also requires regular sampling of numerous downgradient outpost groundwater monitoring wells (referred to as the “Public Water Supply Contingency Plan” or “PWSCP”) so as to identify whether public water supplies will be (or have been) impacted and, if so, to provide wellhead treatment or comparable alternatives to protect public health. (*See, e.g.*, OU3 ROD, p. 17).

Specifically, the existing, comprehensive NYSDEC-approved ROD Remedy includes the following:

- On-Site Containment Systems (“ONCTs”) that prevent VOC contamination from migrating from the former NWIRP/Northrop Grumman Facility (the “OU2 ONCT”) and from the Bethpage Community Park (the “OU3 ONCT”);⁷
- the GM-38 Area Groundwater, Extraction and Treatment System south of the Park (consisting of two groundwater extraction wells);
- an extensive array of groundwater monitoring wells south of the Site, which Northrop Grumman and the Navy regularly sample and whose sampling results they report to NYSDEC;
- the RW-21 Area Groundwater, Extraction and Treatment System currently under construction, which includes three groundwater extraction wells and is expected to be operative in 2020;
- the RE-108 Area Groundwater, Extraction and Treatment System, which includes five groundwater extraction wells and is expected to be operative in 2022;
- ongoing wellhead treatment in six public water supply wellfields; and
- the PWSCP, pursuant to which numerous outpost groundwater monitoring wells have been established so that, if a public water supplier is potentially threatened by contamination, ample time exists to implement wellhead treatment or comparable alternative measures. (*See generally* the OU2 and OU3 RODs).

The ROD Remedy was structured to be flexible enough to allow improvements, if necessary, to address changed circumstances.⁸

NYSDEC examined the existing ROD Remedy numerous times and, each time, it concluded it was protective of human health and the environment. In March 2013, NYSDEC stated in its OU3 ROD that:

⁷ This system was formerly called the Groundwater Treatment System.

⁸ Both state and federal guidance provide for situations where a change to a remedy occurs that does not constitute a fundamental alteration; these are denoted either “minor” or “significant” changes depending on the scope, and do not require a ROD amendment. (USEPA ROD Guidance at p. 7-2; NYSDEC DER-2 Section V).

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective...

Full containment of the OU2 groundwater contamination plume was evaluated as part of the OU2 remedy and was not selected. This decision set forth in the OU2 ROD, has recently been reviewed independently by a number of organizations ... [and] none have suggested that the selected remedy for OU2 was not appropriate...

There is a greater degree of difficulty of implementation for the off-site groundwater remedial program the larger the given pump and treatment system is. This includes the number of groundwater extraction wells, pipelines, treatment system(s) and points of discharge. The off-site full containment groundwater system would be constructed in a densely populated area with significant implementability [sic] due to the greater difficulty of siting and constructing the off-site groundwater remedial elements for this huge pump and treatment system. All this construction would be occurring within highly developed residential areas or highway rights of way both of which will present significant implementability issues associated with the access and siting of the large pump stations, treatment systems and required pipe lines connecting all the facilities.

(OU3 ROD, Ex. D, p. 6, 15) (emphasis added).

More than a year later, in 2014, NYSDEC's Deputy Commissioner and General Counsel stated that:

The remedy selected for the "Grumman plume" by the 2002 [sic] [OU2] ROD has been fully implemented and continues to be protective of public health and the environment. The State Department of Health (DOH) has affirmed that this remedy is protective of public health *on numerous occasions* as has NYSDEC affirmed that the remedy is protective of the environment.

(Comment Letter of Edward F. McTiernan, NYSDEC Deputy Commissioner and General Counsel, dated July 30, 2014; see Attachment 5) (emphasis added).

Indeed, NYSDEC strenuously objected to state legislation introduced in 2014 requiring it to produce a report detailing potential hydraulic containment measures intended to intercept the groundwater south of the Site, treat and reinject the groundwater, and recover the costs of doing so from the Navy—*i.e.*, achieving so-called "full plume containment." (NY Assembly Bill No. A9492.) NYSDEC stated that:

[T]his legislation would usurp the well-established administrative and technical process under Superfund in order to require DEC to substitute a political result. . . . DEC strongly opposes this legislation because the bill . . . seeks to replace an administrative, technical process prescribed by regulation with a political process without technical support The remedy selected . . . by the 2002 ROD has been fully implemented and continues to be protective of public health and the environment. . . .

(McTiernan Comment Letter; see Attachment 5).

Notably, NYSDOH also objected to the legislation, stating: "The Department is confident that the remedy selected for the site in accordance with the 2002 [sic] ROD has been fully implemented and continues to

be protective of public health and the environment. . . . [T]he bill considers only one remedial alternative, hydraulic containment, whether feasible or not, and bypasses” the administrative decisions made with respect to the Site. (Comment Letter of Sue Kelly, submitted Nov. 12, 2014; *see* Attachment 5.)

The Navy also objected to the legislation. The Navy cited the “Remedy Optimization Team Report for the Bethpage Groundwater Plume Remedy” (June 2011) (“Optimization Report”; *see* Attachment 5)—a report that impartial experts from USGS, academia, and the private sector had prepared, and that determined the ROD Remedy to be protective of human health and the environment. The Navy also cautioned that locating “full containment” facilities would be extremely difficult and that, inevitably, “[a] full containment approach would ... require condemnation of many family residences or commercial property to install wells, pipelines, treatment systems and treated groundwater disposal locations (wells and ponds) without necessarily improving human health protection.” (*citing* NAVFAC, June 2018, pp. 5-7; *see also* NAVFAC, June 2019).⁹

B. Discussion of “Full Plume Containment” Approach Before the ROD Amendment Process.

After enactment of Chapter 543 in 2014, the Massapequa Water District (“MWD”) in March 2015 submitted a “full plume containment” plan to NYSDEC, calling for the construction of 20 extraction wells. NYSDEC did not comment on the plan; nor did NYSDEC respond to Northrop Grumman’s analysis of the plan demonstrating that it would not work.

Despite NYSDEC’s objections to the proposed legislation, once it passed, NYSDEC was required to hire a contractor and produce a report. It did so by hiring the HDR Corporation (“HDR”). In August 2016, HDR, produced a report (the “Remedial Options Report”) in response to the 2014 legislation. This Report recommended the installation of numerous groundwater extraction wells and stated that such wells would achieve purported “full plume containment.”

The South Farmingdale Water District (“SFWD”) and the Nassau County Department of Health (“NCDOH”) promptly objected to the HDR Remedial Options Report. They did so due to the negative local impacts caused by “full hydraulic containment.” Northrop Grumman likewise objected to the HDR Remedial Options Report and submitted a critique to NYSDEC. (Letter from Edward Hannon to James Harrington, dated September 9, 2016; *see* Attachment 5.)

⁹ The Water Infrastructure Improvements for the Nation Act of 2016 (“WIIN Act”) requires the Navy to submit annual reports to the U.S. Congress. Pursuant to the WIIN Act, the Navy began doing so in 2017, and must continue to do so through 2021.

The State announced on December 21, 2017, that it was “fast tracking” construction of “full plume containment,” citing new analysis and modeling showing that it is possible to fully contain and treat the plume.¹⁰

The State asserted that the “full plume containment” system “will include at least 14 wells strategically located around the perimeter of the plume to prevent it from migrating . . . [i]n addition, at least four wells will be located within the plume to target hot spots of contamination.” The State also asserted that “[t]o jump-start the remediation effort, the State will fast track well construction in 2018 and will ... hold the U.S. Navy and Northrop Grumman accountable and require them to pay for construction and operational costs.”¹¹

On December 22, 2017, prior to the commencement of any public process or the issuance of an FS or Proposed AROD, NYSDEC demanded that Northrop Grumman immediately commence construction of additional extraction wells in furtherance of the State’s decision to implement “full plume containment,” because “[t]he Department has significant new information regarding the nature and extent of groundwater contamination emanating from the site.” But NYSDEC did not identify that significant new information. Referring to a study undertaken pursuant to the 2014 legislation, NYSDEC stated: “The Department has determined that the Study requires immediate response to protect public health and the environment and that this information is sufficient in scope to ultimately be the basis for a change in the OU2 ROD.” (Letter from Thomas S. Berkman to Edward Hannon, dated December 22, 2017; see Attachment 5.) But NYSDEC provided no study. Instead, it vaguely referenced “[i]nitial results” from groundwater modeling analysis, mentioned a database of existing groundwater sampling data, and then asserted that action was required. Northrop Grumman declined to undertake further remedial action at that time, because such action was unsupported by any technical analysis or public process. (Letter from Edward Hannon to Jason Pelton, dated May 23, 2018; see Attachment 5).

In early 2018, again before NYSDEC commenced any public process or issued an FS or Proposed AROD, NYSDEC announced it would require installation of three additional extraction wells south of the Bethpage Community Park as part of the new full plume containment approach.

The Briefing Book accompanying the Governor’s FY19 state budget also referred to fast tracking and full containment, but not to the additional study or to any additional analysis scientifically justifying it:

Contain and Treat the Grumman Contamination Plume. New York is fast tracking construction of a new, state-of-the-art well system to fully contain and treat the plume

¹⁰NY Press Release: <https://www.governor.ny.gov/news/governor-cuomo-unveils-14th-proposal-2018-state-state-fast-track-state-art-containment-and>; see Attachment 5. The State stated that the “fast-tracking” was based on an investigation begun by NYSDEC in February 2017, which consisted of “drilling of exploratory wells ... synthesizing more than 180,000 groundwater sample data points” and modeling the groundwater flow. *Id.* (See Attachment 5).

¹¹ *Id.*

of contamination caused by industrial waste from the U.S. Navy and Northrop Grumman Bethpage manufacturing facilities in Oyster Bay, Nassau County. The full containment and treatment system is estimated to cost at least \$150 million to construct. The Executive Budget includes sufficient appropriations to support expected outlays in FY 2019, and the State will pursue reimbursement from the U.S. Navy and Northrop Grumman.

(FY19 Executive Budget Briefing Book, p. 6; see Attachment 5).¹²

C. NYSDEC Reversed Its Long-Standing Position That the ROD Remedy Is Fully Protective of Human Health and the Environment Based on “Significant New Information” That Is Neither New Nor Significant.

In May 2019, NYSDEC issued the Proposed AROD which departs from NYSDEC’s long-standing position that the current approved ROD Remedy is protective of human health and the environment. The new Proposed Remedy involves substantial construction to purportedly achieve “full containment.” And yet, it is not based on any new information showing changed circumstances necessitating such a fundamental change in remedy.

More specifically, the Proposed Remedy includes the following:

- Installation of 21 new wells, and use of three existing wells, for a total of 24 extraction wells:
 - 16 extraction wells around the perimeter of the groundwater contamination as conceived by NYSDEC, for the stated purpose of hydraulic containment;
 - Eight extraction wells in the interior of the groundwater contamination as conceived by NYSDEC (specifically, in both the RW-21 and RE-108 areas), for the purposes of mass flux remediation;
- Construction of five new treatment plants to treat the extracted groundwater, including a centralized plant (the northern plant) to be constructed near the former NWIRP/Northrop Grumman facility, a second centralized plant to be constructed near the headwaters of Massapequa Creek, and three individual, decentralized plants to be constructed near what NYSDEC says is the southern edge of the groundwater contamination;
- Construction of a new, approximately 10-acre recharge basin (7.5 times the size of a football field) in the vicinity of Bethpage State Park to handle treated water from the northern centralized treatment plant;
- Discharge of large volumes of water from the southern centralized plant directly into Massapequa Creek;
- 23.5 miles of piping laid along local roadways to convey water from extraction wells to treatment plants, and from treatment plants to recharge basins, for irrigation (from the northern centralized plant) or for conveyance of the water into Massapequa Creek.
- Complete installation of the foregoing components over a five-year period; and

¹² Available at <https://www.budget.ny.gov/pubs/archive/fy19/exec/fy19book/BriefingBook.pdf>; see Attachment 5.

- Operation of the system for up to 110 years.

The “significant new information” NYSDEC cited as justifying reopening the ROD Remedy and replacing it with this costly and extensive new remedy seemingly derived from two sources: *first*, two borings south of the Site, whose initial 82 sampling results largely indicated an *absence* of any contamination, and whose 3 out of 82 sampling results showing where contamination was detected were later *controverted* by more reliable groundwater sampling; and *second*, the long-established and extensive amount of previously available hydrological data (most of which had been provided to NYSDEC by Northrop Grumman and the Navy) upon which NYSDEC had repeatedly based its endorsement of the current approved ROD Remedy as protective of human health and the environment.

LEGAL BACKGROUND

Before adopting remedies, NYSDEC must comply with federal and state regulations designed to ensure that the remedy selected is necessary, effective, and in the public interest, and that the public and other stakeholders have an opportunity to participate fully in the process. Specifically, NYSDEC is required to comply with the ECL and the Part 375 regulations, and may not act arbitrarily or capriciously. In addition, the pertinent Part 375 regulations require compliance with the federal NCP. Section 375-2.8(a) directs that:

At a minimum, the remedy selected shall eliminate or mitigate all significant threats to the public health and to the environment presented by contaminants disposed at the site through the proper application of scientific and engineering principles and *in a manner not inconsistent with the national oil and hazardous substances pollution contingency plan* as set forth in section 105 of CERCLA, as amended as by SARA. (emphasis added).

Both the Part 375 regulations and the NCP require following the following steps for selecting a remedy: (1) identify the risks presented by the contamination; (2) perform a remedial investigation to understand the nature and extent of those risks; (3) perform a feasibility study to assess the possible remedies (*i.e.*, identify and consider alternatives); (4) select a preferred remedy based on the results of the feasibility study, applying various criteria set forth in the regulations; and (5) subject that preferred remedy, including the factual and scientific basis for the selected remedy, to public review and comment. *See generally* 40 C.F.R. § 300.430; 6 NYCRR §§ 375-1.8, 375-2.8.

The nine legally-mandated criteria that govern remedy selection under Part 375 and the NCP are as follows:

Threshold Criteria. These criteria must be satisfied for an alternative to be eligible for selection.

1. Overall protectiveness of the public health and the environment.
2. Compliance with standards, criteria, and guidance.

Balancing Criteria. These criteria are applied to all alternatives that satisfy the two threshold criteria, with the remedy that strikes the most favorable balance selected.

3. Long-term effectiveness and permanence: a program or project that achieves a complete and permanent cleanup of the site is preferred over a program or project that does not do so.
4. Reduction in toxicity, mobility or volume of contamination through treatment: a program or project that permanently and significantly reduces the toxicity, mobility or volume of contamination is to be preferred over a program or project that does not do so.
5. Short-term impacts and effectiveness.
6. Implementability.
7. Cost-effectiveness, including capital costs and annual site maintenance plan costs.
8. Community Acceptance.
9. Land Use.

These legally-mandated procedures and criteria apply here because NYSDEC's Proposed Remedy is a fundamental change requiring an amended ROD. NYSDEC must therefore "follow the same process and level of effort, in terms of citizen participation, documentation, and approvals, as the development of the original remedy." DER-2; *see also* 40 C.F.R. § 300.435(c)(ii).

Moreover, under the ECL, authorized "remedial program[s]" are limited to "activities undertaken to eliminate, remove, abate, control or monitor health and/or environmental hazards or potential hazards." ECL § 27-1301(3). NYSDEC has made clear that any contamination must pose a hazard or potential hazard to human health or the environment in order for remedial action to be appropriate, and that it lacks authority to attempt to "require the removal of every last molecule of contaminant." NYSDEC Brief, *NY State Superfund Coal. v. NYSDEC*, 2011 WL 7452097, at *9 (N.Y. filed May 6, 2011). Accordingly, cleanup of groundwater is to be "evaluated to determine the feasibility of measures to restore groundwater quality to meet applicable standards and guidance," not simply to attempt to remove the maximum quantity of contamination without regard to whether incremental reductions are needed to address a hazard. 6 NYCRR § 375-1.8(d)(1)(ii) (emphasis added). In short, the Court of Appeals has explained that NYSDEC's authority is limited to addressing "environmental hazard concerns," not levels of contamination so low that they pose no potential hazard. *NY State Superfund Coal. v. NYSDEC*, 18 N.Y. 3d 289, 298 (2011).

These requirements are binding on NYSDEC. In addition, if NYSDEC's actions are inconsistent with the NCP, NYSDEC may not recover funds from responsible parties under CERCLA to implement those remedial actions. 42 U.S.C. § 9607(a)(4)(A).

LEGAL FLAWS AND INADEQUACIES OF THE PROPOSED AROD & FS

I. NYSDEC FAILED TO ADEQUATELY CONSIDER AND EVALUATE THE EXISTING ROD REMEDY AS REQUIRED BY LAW.

Part 375 regulations and the NCP set forth a detailed, science-based approach for NYSDEC to select a remedy. First, the relevant information is gathered and evaluated, using a fact and science-based

approach. Then, various alternatives, including “no further action” beyond current remedies are evaluated according to criteria specified in the regulations. Only then can a remedy be selected.

Here, the NYSDEC procedure was backward: the remedy of “full plume containment” was the only remedy given serious consideration. NYSDEC did not meaningfully compare the existing ROD Remedy to the Proposed Remedy or justify its failure to do so. NYSDEC also did not establish that the threshold criteria necessary to reopen a remedy were met. Thus, NYSDEC did not follow the law.

A. NYSDEC Dismissed the ROD Remedy as a Viable Alternative Without Adequate and Meaningful Consideration.

NYSDEC has examined the existing ROD Remedy on numerous occasions and each time concluded that it is protective of human health and the environment. (See Factual Background). Despite this, in the Proposed AROD, NYSDEC did not meaningfully consider the decades-long, extensive ROD Remedy (referred to as Alternative 1 – No Further Action (“NFA”) in the FS). NYSDEC did not undertake a detailed evaluation or side-by-side comparison of the ROD Remedy to the Proposed AROD remedy with respect to each of the nine criteria required to be used for remedy selection.

Rather than conducting a meaningful analysis, NYSDEC dismissed the ROD Remedy without substantiating its conclusion, asserting: “Alternative 1 (No Further Action) relies on the existing remedial actions and allows for continued migration of areas of the plume with high concentrations of site contaminants. As such, Alternative 1 does not provide added protection to public health and the environment and will not be evaluated further.” (Proposed AROD, p. 17). No authority is cited for the need to provide “added” protection. Moreover, the relevant question is not whether Alternative 1 provides *additional* protection, but whether it provides “overall protectiveness of public health and the environment.” 6 NYCRR § 375-1.8(f)(1). NYSDEC’s approach of only considering remedies that “add protection” necessarily requires rejection of an existing remedy. That is not the legal standard governing remedy-selection decisions or amending RODs.

Significantly, NYSDEC also failed to conduct modeling sufficient to compare the influence of the ROD Remedy on groundwater and contaminant migration to the Proposed Remedy. NYSDEC conducted comparisons for all other alternatives (albeit under the deficient NYSDEC modeling approach, as described below).

As noted, the NCP requires the “*development and evaluation of alternatives ... such that the relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy selected.*” 40 C.F.R. § 300.430(e)(1).¹³ Likewise, Part 375 requires “evaluation of proposed alternatives in the remedy selection process.” 6 NYCRR § 375-1.8(e)(2)(iv). Moreover, the NCP *specifically requires* a comparison to a no-further-action alternative: “The no-action alternative,

¹³ The NCP also requires that potential remedial alternatives be included in the administrative record. 40 C.F.R. § 300.805.

which may be no further action if some removal or remedial action has already occurred at the site, shall be developed.” 40 C.F.R. § 300.430(e)(6). As courts have explained, “[c]ursory examination and rejection of alternatives does not demonstrate “development” of alternatives as called for under the NCP. In addition, [the NCP] requires that the ‘no [further] action’ alternative be given close and detailed scrutiny.” *Channel Master Satellite Sys., Inc. v. JFD Electronics Corp.*, 748 F. Supp. 373, 389 (E.D.N.C. 1990).

Consistent with the foregoing, USEPA’s *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents* (ROD guidance, 1999, p. 7-5) calls for the lead agency to do the following to address fundamental changes to a ROD remedy in an Amended ROD:

- Develop and document the change consistent with the ROD process;
- Describe the nature of the changes using a side-by-side comparison of the original and proposed remedy components to clearly display the differences; and
- Use the nine remedy selection criteria to compare the original and the new proposed remedies.

NYSDEC disregarded these provisions: the Proposed AROD did not weigh the Proposed Remedy against the ROD Remedy in a side-by-side comparison, using the nine remedy selection criteria specified in the NCP (listed above). Indeed, the insufficiency of the comparison is evident when comparing the assessment of the ROD Remedy to the assessment of the seven other alternatives. (Proposed AROD Ex. B, p. 6). In effect, the FS and the Proposed AROD rejected the ROD Remedy without any comparison to the Department’s proposed alternative. Thus, the ROD Remedy was not evaluated in such a way as to provide relevant information to the public to determine if an appropriate remedy (*i.e.*, Alternative 5B) was selected.¹⁴

B. NYSDEC Failed to Consider that the ROD Remedy Addresses Perceived Risks Presented by Existing Contamination.

The NCP requires an examination of the risks presented by the contamination before selection of a remedy. The NCP states that the “purpose of the remedy selection process is to implement remedies that eliminate, reduce or control risks to human health and the environment.” 40 C.F.R. § 300.430(a)(1); *see also id.* § 300.430(d)(4) (“the lead agency shall conduct a site-specific baseline risk assessment to characterize the current and future threats to human health and the environment”). NYSDEC omitted this essential step, resulting in a remedy that is not aimed at the required goals to “eliminate, reduce or control risks to human health and the environment.” *Id.*¹⁵

¹⁴ NYSDEC’s failure to adequately evaluate the ROD remedy is particularly problematic given that NYSDEC lacks authority to require cleanup of residual contamination that does not pose a threat to human health or the environment.

¹⁵ Likewise the ECL and Part 375 both emphasize that in determining whether a site present a significant risk, the mere presence of contamination is insufficient to constitute a significant risk to public health and the environment. (See ECL § 1305.2.b and 6 NYCRR § 375-2.7(a)(4)).

Rather than determine the need for a new remedy to address a meaningful “threat” to public health and the environment, the Department instead established “full plume containment” as the goal, without regard to risk. The Proposed AROD’s assertion that “NYSDEC has determined that the existing remedies are not fully effective in ... addressing the threats to public health and the environment” (Proposed AROD, p. 12), and its references to alleged threats to human health and the environment throughout the document, are conclusory and unsupported by the record.

The Proposed AROD’s complete omission of any discussion of the recent draft NYSDOH Health Consultation is particularly striking evidence that NYSDEC is not reacting to actual risks to human health. In that report, NYSDOH concluded that “drinking water or other uses of water from the public water supplies affected by the Northrop Grumman/NWIRP facility in Bethpage, Nassau County are not expected to harm people’s health.” (NYSDOH draft Health Consultation, p. 1; see Attachment 5). The stated basis for this conclusion was that “treatment to remove VOC contaminants from the public water supplies is being implemented when necessary prior to distribution to consumers.” (*Id.*, p. 2).

The ROD remedy is further protective of public health because the incorporated PWSCP provides for wellhead treatment or comparable actions for threatened public water supply wells. Wellhead treatment systems are relatively simple to design and install, and routine monitoring by the water districts and NYSDOH ensures the continued safety of the treated drinking water. Those facts were made clear during a March 2012 presentation to the USEPA on the Fulton Avenue Superfund Site in Garden City, in which H2M (the consultant for several area water districts) introduced a map showing 185 municipal supply wells throughout Nassau County that are currently being treated at the wellhead for VOCs. H2M’s presentation offered the following points:

- The “evolving realities” of delivering potable water on Long Island include use of public water supply wells to restore aquifers contaminated with VOCs and at the same time delivering safe drinking water to customers.
- “Water suppliers cannot and will not rely on remedies [*e.g.*, plume remediation technologies] to provide wellhead protection” and that “wellhead protection [*is*] required regardless”.
- Community disturbance during construction of a groundwater remedy is a major concern. Removal of mass using public supply wells and providing safe drinking water was characterized as outweighing the community impacts of constructing and operating a groundwater remediation system.

(H2M Presentation to USEPA, dated March 29, 2012; see Attachment 5). As acknowledged in the Proposed AROD by its retention of the PWSCP in the Proposed Remedy, wellhead treatment or comparable alternative measures would be required under any remedial alternative to ensure protection of public health.

Nor is there risk to the environment from the extant groundwater contamination. As noted, NYSDEC has repeatedly concluded that the ROD Remedy is fully protective of the environment. (*See Factual Background*). The fact that NYSDEC has not conducted a Fish and Wildlife Resources Impact Analysis (“FWRIA”) in connection with the Proposed AROD indicates that this remains NYSDEC’s view. Section 7.5 (Summary of Environmental Assessment) of the Proposed AROD states that “[e]nvironmental

impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water.” (Proposed AROD, p. 19). Section 7.5 goes on to state: “Based upon the resources and pathways identified and the toxicity of the contaminants of ecological concern at this site, a [FWRIA] was deemed not necessary for OU2 and OU3.” (*Id.*) The FWRIA is a site-specific analysis to determine if protection of biotic resources associated with contamination is required. The fact that the Proposed AROD waives the need for a FWRIA indicates that the extant groundwater contamination does not pose a threat to fish, wildlife, wetlands, or surface water. Therefore, the ROD Remedy is protective of the environment.

C. No “Significant New Information” or Other Basis in the Proposed AROD Justifies a Fundamental Change in the ROD Remedy.

Under NYSDEC’s policy, “DER-2 / Making Changes To Selected Remedies” (2008), if “significant new information” that substantially supports the need to change a remedy comes to the agency’s attention, an approved remedy may be changed (following the procedures in DER-2). Here, NYSDEC asserts that “significant new information” led to the Department’s proposed change to the ROD Remedy. However, no such information exists, and thus the Department erred in reopening the ROD Remedy.

Beginning in 1998, Northrop Grumman prepared and submitted to NYSDEC quarterly and annual reports on site-specific and regional groundwater quality and remedial system performance. As late as 2014, based on this and other data, NYSDEC confirmed its earlier findings that the ROD Remedy remained effective, and that it would be impracticable to implement “full plume containment.” (See Factual Background; Section II.D.1). As a result, any “significant new information” cited by NYSDEC to support a reversal of those conclusions should logically postdate the agency’s 2014 determinations.

In the Proposed AROD, NYSDEC contends that the “significant new information” arose from the following activities: (1) Drilling and sampling of two vertical borings and three co-located monitoring wells south of the contaminated area; and (2) Compiling a database of previously available hydrological data. (Proposed AROD, pp. 11-12). Neither of these constitutes “significant new information.”

1. NYSDEC’s recent sampling efforts did not uncover any “new” findings.

For the stated purpose of assisting its understanding of the southern extent of the NYSDEC Plume, NYSDEC conducted the following investigation:

- Drilling and collection of VOC samples in two vertical profile borings (“VPBs”) in summer through fall of 2017. DEC-VPB1 was located south of the Southern State Parkway (SSP) and just west of the Seaford Oyster Bay Expressway; DEC-VPB2 is located on the north side of the SSP approximately 6,500 feet east of DEC-VPB1.
- Of the 82 VOC samples collected in the two VPBs, toluene was reported in three samples above the groundwater quality criterion of 5 µg/L (5.5, 5.5, 14 µg/L). No other VOCs exceeded groundwater criteria in the VPB samples.
- Two permanent monitoring wells (MW-DEC1D1 and MW-DEC1D2) were installed at the DEC-VPB1 location and one well (MW-DEC2D1) was installed at the DEC-VPB2 location to verify the VPB sampling results. The wells were sampled in February 2018 and the toluene results were 2.2 µg/L and 0.37J µg/L, substantially lower than the associated VPB samples and well below the

toluene water quality criterion of 5 µg/L. MW-DEC2D1 sampling results confirmed the earlier results from DEC-VPB2 that no VOCs exceeded groundwater criteria.¹⁶

The only apparent “new information” provided was that VOCs were *not* found above groundwater criteria in the area that NYSDEC considers to represent southern extent of the NYSDEC Plume. This negative “new data” would undercut, not support, NYSDEC’s proposal to change the remedy, especially in this portion of the NYSDEC Plume.

2. The groundwater database reflects no “new data.”

The Department compiled a database consisting primarily of groundwater quality data from previous investigations and routine long-term monitoring. Northrop Grumman and the Navy provided most of these data to NYSDEC, over a 20-year period (since 1998). The data have been available for the Department’s review for years, and are by no means new. Although the database was reportedly used to evaluate the nature and extent of the contamination and to prepare three-dimensional (3D) figures of the NYSDEC Plume, the data in the compiled database do not constitute “significant new information.”

II. NYSDEC FAILED TO CONSIDER THE SUPERIOR IRA OR VARIATIONS OF THE IRA.

During NYSDEC’s development of its “full plume containment” plan, Northrop Grumman conveyed its position that amending the existing ROD Remedy was unnecessary and unwarranted because the ROD Remedy is protective of human health and the environment. However, Northrop Grumman provided the Department with the IRA in the event NYSDEC concluded additional remediation was necessary. As shown in more detail below, the IRA is based on sound science and relevant facts. NYSDEC failed to consider the IRA, contrary to its obligations under law.

In developing the IRA, Northrop Grumman assumed the accuracy of the NYSDEC-depicted plume. Northrop Grumman then built on the basic concepts of the ROD Remedy (as reflected in the OU2, OU3, and Navy RODs), and augmented the ROD Remedy by adding three containment wells—two of which would be at the distal edge of the NYSDEC Plume—and three wells (already installed) to further remove mass contaminants. Specifically, the IRA proposes the following elements:

- Utilization of an installed remedial well (denominated as NYSDEC EX6 north of the RW-21 system), which is now under construction as well as utilization of two other installed remedial wells in the Hempstead Turnpike Area for mass removal (NYSDEC well DEC-EX-2 and the Navy RE-108 Pumping Test Well, RE-137) to provide additional contaminant mass removal;
- Installation of two additional containment wells in the RE-108;
- Installation of a well south of the former RUCO Polymer Corp Occidental Chemical/Bayer (“RUCO”) facility to the northwest of the Site, for source control of contaminants from this site;

¹⁶ As explained in Appendix E to Attachment 1, when groundwater analytical results are available from permanent monitoring wells and a VPB that are co-located and screened at the same elevation, the monitoring well results are considered more reliable than the VPB screening results.

- Utilization of existing recharge basins and installation of new injection wells for the discharge of treated groundwater and recharge of the aquifer; and
- Treatment of water at a new treatment plant to be built at the Site and possibly a second new treatment plant to be built offsite in the Hempstead Turnpike area.

At the NYSDEC/Northrop Grumman meeting on October 15, 2018, Northrop Grumman explained that the IRA¹⁷ would achieve results similar to the alternatives NYSDEC presented at the time, but without the string of wells around what NYSDEC was saying was the perimeter of the contamination (a perimeter akin to the NYSDEC Plume depicted in the Proposed AROD).¹⁸ Northrop Grumman's IRA presentation showed through data and modeling results that containment of the plume as depicted by NYSDEC at the time, as well as reduction of contaminant mass, would be similar to what could be achieved by Alternative 5B, without the extensive piping, additional facilities, and attendant community disruption.

On March 13, 2019, Northrop Grumman wrote to NYSDEC and again requested that NYSDEC consider the IRA in the forthcoming FS.¹⁹ Northrop Grumman "put forth specific suggested improvements to augment the existing remedial program through the installation of additional containment wells, including wells at the distal edge of the OU2 plume." (Russo Letter at 1.) These improvements "would allow achievement of the Department's basic goals without the concomitant adverse effects of disruption to the community and harmful environmental impacts" of NYSDEC's proposal. (*Id.*) This submission included the data and modeling results that would have allowed NYSDEC to replicate the results.²⁰ NYSDEC again failed to consider the IRA. It proffered no reason for doing so.

If NYSDEC had considered the IRA and properly applied the Part 375/NCP criteria for selection of a remedial alternative, NYSDEC would have reached two conclusions: first, the existing ROD Remedy satisfies each of the requisite criteria and is in many ways superior to the Proposed Remedy; and second, even if additional remediation was warranted, the IRA is superior to the Proposed Remedy. See 6 NYCRR § 375-1.8(f); 40 C.F.R. § 300.430(e). The relevant criteria and their application are summarized below, and explained in more detail in the following sections:

¹⁷ Referred to at that time and during discussions with the Department as "DEC+1".

¹⁸ The IRA presentation was later provided to the agency on November 2, 2018 (Email from Mark A. Chertok to Andrew Guglielmi, dated November 2, 2018; see Attachment 5).

¹⁹ Letter from Steven C. Russo to Thomas S. Berkman, dated March 13, 2019 ("Russo Letter"); see Attachment 5.

²⁰ Because the prior Northrop Grumman submission had been made under a Confidentiality Agreement, Northrop Grumman specifically released NYSDEC from that agreement with respect to the IRA. However, the existence of the Confidentiality Agreement did not prevent NYSDEC from considering the IRA or variants thereof and including one or more in the FS. In any event, there was no such possible impediment after the March 13, 2019 letter, which was submitted more than two months prior to release of the Proposed AROD.

- Overall protection of human health and the environment: All three alternatives—the Proposed Remedy, the IRA, and the ROD Remedy—²¹ meet these two criteria, although per the FS it could take Alternative 5B much longer to reach its objectives than the other alternatives.
- Compliance with standards, criteria, and guidance: All three alternatives meet this criterion.
- Long-term effectiveness and permanence: All three alternatives meet this criterion.
- Reduction of toxicity, mobility, or volume: All three alternatives meet this criterion, except that Alternative 5B does redistribute high concentrations of contaminants from upgradient sources, expanding their distribution within the NYSDEC Plume.
- Short-term impacts and effectiveness: The ROD Remedy and the IRA meet this criterion, but Alternative 5B would take longer to construct and to commence operation, and would have adverse short-term impacts on the community and environment.
- Implementability: The ROD Remedy is the most implementable; the IRA is more difficult to implement than the ROD Remedy but plausible; Alternative 5B would be very difficult or impossible to implement.
- Cost/cost effectiveness: The ROD Remedy is already approved, so it has been determined to be cost-effective. The IRA is far more cost effective than Alternative 5B, which, even assuming NYSDEC’s depiction of the contamination is accurate (*but see* Section III), has a number of useless wells, pumps more than twice as much groundwater as the IRA, would drag contaminants to groundwater that is relatively clean, would interfere with elements of the approved ROD Remedy, would be quite expensive and, per the FS, could operate for up to 110 years.
- Community acceptance: NYSDEC’s failure to assess numerous impacts, including the impacts of Alternative 5B on the community, and to disclose the information and modeling underlying its selection of Alternative 5B, has effectively prevented meaningful public comments.

A. Northrop Grumman Conducted a State-of-the-Art Groundwater Modeling Comparison of Alternatives to Evaluate the IRA.

In order to evaluate the Part 375/NCP Criteria, Northrop Grumman’s experts²² performed the following assessments for each alternative:

- Groundwater movement and TVOC²³ contaminant distribution over 30 years

²¹ As explained below, Northrop Grumman conducted a comparative analysis of the ROD Remedy, the IRA, and the Proposed Remedy. References to “three alternatives” in this Section refer to these three remedial options. This Section primarily focuses on and explains why, under the legally-mandated criteria, the IRA is a superior remedy to the Proposed Remedy. However, in the course of doing so, this Section also further notes that the ROD Remedy also satisfies the criteria and is likewise superior to the Proposed Remedy in a number of ways, thus reinforcing NYSDEC’s failure to consider the ROD Remedy adequately (*see supra* Section I).

²² The technical experts who provided assistance in preparing these comments include: Arcadis (environmental engineering), EMAGIN (environmental engineering), Ramboll (ecological impacts), Roux (environmental engineering) and VHB Engineering, Surveying, Landscape Architecture and Geology, P.C. (land use and traffic). More detailed information about the expertise of each of these firms is available on their respective websites.

- Contaminant mass removal
- Remedial well effectiveness
- Public supply well protection
- Remedy efficiency

Northrop Grumman used a groundwater model²⁴ to evaluate the relative effectiveness of the three remedial alternatives: the existing ROD Remedy, the Proposed Remedy, and the IRA.²⁵

This groundwater model was then used as the basis for three-dimensional solute transport modeling, and utilized to simulate future changes in VOC concentrations under various remedial scenarios.²⁶ Importantly, the Northrop Grumman modeling used NYSDEC's own assumptions regarding the nature and extent of the contamination as the starting point for its model simulations comparing the three remedial alternatives. The model was used to estimate and evaluate VOC concentration levels within the aquifer and at remedial wells and supply wells, and to provide estimates of the VOC mass removed from the aquifer by such wells. The transport model tracked cleanup levels during the 30-year simulated timeframe, thereby providing an estimate of how various remedial components performed in time and space. This tool allowed for thorough evaluation and comparison of the overall effects of implementing various remedies in southern Nassau County. The modeling report is attached (Arcadis, 2019; see Attachment 1, as is the Model Memorandum containing the comparison of the three remedial alternatives; see Attachment 2).

Northrop Grumman's modeling provides a significant benefit in its ability to simulate contaminant concentrations at points in the aquifer over time. This capability provides critical information regarding water quality at pumping wells (both remedial and supply), the effects of aquifer recharge on plume concentrations, and potential effects on the saltwater-freshwater interface. It also supports accurate evaluation of the effectiveness and efficiency of each remedial alternative.

²³ These Comments sometimes refer to Total VOCs, or "TVOCs," which is the aggregate concentration of all VOCs.

²⁴ See The Arcadis Model Report and Model Memorandum (Attachments 1 and 2, respectively).

²⁵ Properly applied tools, such as the three-dimensional groundwater models used by the Northrop Grumman team, are regularly used to assist water suppliers, engineers, scientists and regional planners, among other professionals, in assessing the impacts of proposed groundwater stresses both regionally and locally. The groundwater model was updated and expanded from earlier models to include the southeastern shoreline area of Nassau County, recent hydrologic information including pumping and recharge rates, water quality data used to represent the distribution of VOCs in groundwater, and hydrogeologic information from recently drilled borings and wells. The model was successfully calibrated and validated using the process of comparison of simulated and observed water levels as summarized in ASTM Standard D-5490-30 (ASTM 1994).

²⁶ The model code known as MT3D (originally developed for the Kerr Environmental Research Laboratory of the USEPA), updated with additional simulation capabilities (MT3DMS).

As explained further in Section III, *infra*, the NYSDEC modeling did not address these important considerations. The Department relied on groundwater flow modeling and particle tracking, which assume—contrary to established science—both that all contaminants travel at the same rate as groundwater, and that no contaminants are diluted by mixing with or dispersing into existing groundwater in the aquifer system. Further, flow modeling and particle tracking cannot track changes in concentration in time and space. The result is NYSDEC’s overstated depiction of the extent of VOC contamination, the potential for future migration, and the levels of contamination in the distal edges of the NYSDEC Plume.

B. The Modeling Comparison of Alternatives Shows that the IRA Is Superior to the Proposed Remedy With Respect to the First Five Remedy-Selection Criteria under the NCP.

The modeling demonstrates that the IRA is fully protective of human health and the environment, and conforms to pertinent standards, criteria, and guidance, satisfying the two threshold criteria. In addition, the modeling demonstrates that the IRA is equivalent or superior to the Proposed Remedy with respect to long-term effectiveness and permanence, reduction in toxicity, mobility, or volume of contamination, and short-term effectiveness.

As explained in more detail below, and set forth in Attachment 2, Northrop Grumman’s comparative analysis of the Proposed Remedy to the IRA and the ROD Remedy showed the following:

- All three alternatives significantly reduce the extent of the contamination described by NYSDEC after 30 years.
- For all alternatives, the core of the offsite portion of the contamination described by NYSDEC (south of the Site) would be reduced in extent as well as concentration.
- Two small areas of TVOCs greater than 5 µg/L are depicted at or just south of SSP for the ROD Remedy, IRA and, to a lesser extent, Alternative 5B; however, time versus concentration graphs indicate that any wells south of the SSP that had been deemed “threatened” by the Department are simulated not to be impacted.²⁷ Further, the far southern distal edge of the purported contamination is based on the presence of toluene, which as discussed below is not plausibly linked to the Site and in fact is isolated from the remainder of the NYSDEC Plume.
- The ROD Remedy supplemented with several strategically sited remedial wells can achieve the NYSDEC goal of mass flux remediation in the greater than 50 µg/L plume area; thus, eight additional extraction wells contemplated in Alternative 5B are not necessary.
- Alternative 5B causes the undesirable consequence of the northwestern portion of the plume spreading to the south due to the substantial hydraulic effect of the new basin to be constructed in Bethpage State Park and the absence of any remedial extraction south of the former RUCO site.
- The remediation efficiency for remedial wells in the ROD Remedy and Alternative 5B are different (609 pounds TVOCs per billion gallons pumped [lbs/BG] versus 283 lbs/BG). This

²⁷ As noted, NYSDEC could not address this issue because it did not conduct solute transport modeling.

indicates that the ROD Remedy wells efficiently extract mass while many of the wells in Alternative 5B ultimately compete with the ROD Remedy wells (and other Alternative 5B wells) for mass to extract.

- The remedial wells operated under the ROD Remedy and the IRA are significantly more efficient for remediation purposes than the wells operated for Alternative 5B. The low remediation efficiency rate of Alternative 5B results from implementing more than is necessary to achieve a performance level and ultimately results in inefficient remediation (*e.g.*, pumping excessive groundwater, installing unnecessary wells).
- Removal of offsite mass in the aquifer is similar; 91%, 98%, and 96% of the mass is removed after 30 years for the ROD Remedy, Alternative 5B, and the IRA, respectively.
- More than half of the remedial wells of Alternative 5B are nonproductive. Nonproductive wells capture little mass and are inefficient in limiting migration as the wells are sited in extremely low TVOC concentration areas.
- For SFWD Well 4-1 and all MWD wells, there is virtually no difference between any of the three alternatives, with all being equally protective of the supply wells.
- Protectiveness of alleged “threatened” public supply wells is equivalent under the three alternatives, with SFWD Well 6-1 being the only well simulated to potentially exceed 5 µg/L.
- Regarding SFWD Plants 1 and 3 (Well 1-3 and 3-1), there is no substantive difference between the three alternatives in impacts projected over 30 years with all impacts predicted to be less than 5 µg/L. Thus, none of the alternatives indicate concentration levels exceeding the MCL and there is little substantive difference between the alternatives in terms of impact.
- NYAW Well 3S is estimated to exceed the maximum contaminant level (“MCL”) for all three alternatives.
- Overall, protectiveness of alleged “impacted” public supply wells is equivalent under Alternative 5B and the IRA, and both show slight benefits over the ROD Remedy. However, all of these wells are already equipped with treatment systems and any current or future impacts to raw pumped water is not representative of water in the distribution system.²⁸

1. The alternatives achieve similar reductions in contaminant distribution after 30 years.

For the purpose of making a valid comparison, Northrop Grumman simulated all three alternatives to track concentrations of TVOCs in the NYSDEC Plume and its movement, and *all three alternatives were simulated using the NYSDEC-depicted plume configuration as initial conditions* (notwithstanding the

²⁸ It is important to emphasize that these model simulations are predicated on the NYSDEC Plume. As demonstrated in the Arcadis Model Memo (Attachment 1, Appendix O), when the groundwater plume that might be ascribed to the Site is accurately depicted, there would be no “threatened” wells—even under NYSDEC’s erroneous application of that term.

Northrop Grumman's Expert Team's disagreement with NYSDEC's interpretation of the water quality data and representation of the NYSDEC Plume and its extent).²⁹ Each simulation was run for 30 years.

The initial TVOC concentration distribution of the NYSDEC Plume is shown in Exhibit A, Figure 1 (from Attachment 2, Figure 2.1). The concentration distributions of TVOCs after 30 years for each of the three alternatives is also shown in Exhibit A, Figures 2, 3 and 4 (from Attachment 2, Figures 4.2-1 through 4.2-3) and described below.

All three alternatives significantly reduce the extent of the NYSDEC Plume after 30 years. The core of the offsite portion of the NYSDEC Plume, south of the Site where TVOCs are greater than 50 µg/L, would be reduced in extent as well as concentration. Onsite portions of the NYSDEC Plume remain, but are essentially contained by the existing ONCTs. Two small areas of TVOCs greater than 5 µg/L are shown at and just south of SSP for the ROD Remedy, IRA, and to a lesser degree, Alternative 5B; however, time versus concentration graphs (presented later in this subsection) indicate that any wells south of the SSP that had been deemed "threatened" by the Department are actually not impacted in the simulations.³⁰

Simulation results for Alternative 5B and the IRA show that after 30 years, the reduction of concentration levels to below 50 µg/L in the core of the offsite NYSDEC Plume is almost identical between the two alternatives, albeit with fewer extraction wells and less pumpage with the IRA. This indicates that the ROD Remedy, though protective, if supplemented with several strategically-sited remedial wells (*e.g.*, by the IRA), can achieve the NYSDEC goal of mass flux remediation in the greater than 50 µg/L NYSDEC Plume area and that the eight additional extraction wells discussed in the FS are not necessary.

2. The Proposed Remedy will cause contamination to spread.

Alternative 5B also would result in a significant negative consequence: the spreading of the northwestern portion of the plume from the former RUCO site towards the south. This unfortunate result is caused by the substantial hydraulic effect of the new basin to be constructed in Bethpage State Park and the lack of any remedial extraction south of the former RUCO site. (*See* Ex. A, Figure 3). The large-scale discharge of treated water to the basin (and hence to the groundwater system) has the profound effect of pushing water away from it in a radial pattern. Under Alternative 5B, TVOCs in the northeastern portion of the plume are either captured by pumping wells or are hydraulically pushed to the west and southwest. A similarly shaped expansion is noted for the ROD Remedy; however, the expansion is much less severe than that noted for Alternative 5B, as the ROD Remedy does not include

²⁹ Natural groundwater flow conditions from the Site are to the south/southeast and are locally influenced by pumping wells and wellfields, as well as surficial recharge structures (basins). Regional plume movement follows the flow of the groundwater, but is also influenced by pumping, natural dilution, variations in aquifer permeability and porosity, and time.

³⁰ In addition, as discussed below in Section III, *infra*, the southern extremity of the NYSDEC Plume is comprised of toluene, which cannot plausibly be linked to the Site and is isolated from the remainder of the NYSDEC Plume.

the new recharge basin in Bethpage State Park. This expansion does not occur in the IRA, primarily due to the placement of a new remedial well just south of the former RUCO site as well as the absence of the need to construct the basin in Bethpage State Park.

3. The alternatives remove similar quantities of contaminant mass.

Along with the simulation of concentration changes over time, the Northrop Grumman team performed calculations to quantify the mass of contaminants removed from the aquifer via pumping wells. The remediation efficiency (pounds of TVOC mass removed per volume [billion gallons] of groundwater pumped from the NYSDEC Plume) for each alternative is shown in Exhibit A, Figures 5, 6, and 7 (from Attachment 2, Figures 4.2-7 through 4.2-9). Each of these pie charts indicate the remediation efficiency of a well or group of wells (number appears next to each well or well system label) over the 30-year period.³¹

The ROD Remedy removes mass much more efficiently than Alternative 5B (609 lbs/BG of groundwater extracted versus 283 lbs/BG). This comparison indicates that the ROD Remedy wells efficiently extract mass while many of the wells in Alternative 5B ultimately compete with the ROD Remedy wells (and would also do so with other 5B wells) for mass to extract. The remedial efficiency for remedial wells in the IRA is 522 lbs/BG. It is clear that the remedial wells operated under the ROD Remedy and the IRA are significantly more efficient than the wells operated for Alternative 5B. This is indicative of a properly designed and sited recovery well network in which the recovery wells are in accord with each other and the natural groundwater flow direction. The low remediation efficiency rate of Alternative 5B is a result of trying to implement more than is necessary.

Three pie charts indicating the percent of mass (offsite mass only) removed by the various well systems are shown in Exhibit A, Figures 8, 9, and 10 (from Attachment 2, Figures 4.2-4 through 4.2-6). With the pie chart representing 100% of the starting offsite mass in the aquifer, 91%, 98%, and 96% of the mass is removed after 30 years for the ROD Remedy, Alternative 5B, and IRA, respectively. The effort required to achieve these results is significantly disparate, with Alternative 5B pumping far greater amounts of raw water. Below each pie chart is the quantity of water (in billions of gallons that is needed to be pumped to remove the percent mass shown. Given the volumes pumped (63, 223, and 93 BG for the ROD Remedy, Alternative 5B, and IRA, respectively), there are significant diminishing returns to simply pumping higher and higher amounts of groundwater. This is reflected by the fact that 96% of the mass is removed by pumping 93 BG (IRA), while the percent removed only increases to 98% for more than a doubling (up to 223 BG) of the water pumped in Alternative 5B. Pumping an additional 130 BG

³¹ The sections of the pie are also divided (color coded) to better compare mass removal efficiency rates. Green shades and blue shades relate to ROD Remedy wells (existing and planned) and supply wells, respectively. Rose colors (Figure 6) relate to new 5B remedial wells, and tan/brown shading (Figure 7Z) relate to new remedial well proposed for IRA. The rate of pounds (“lbs”) removed per billion gallons pumped (“lbs/BG”) (for the color coded well groups) are provided on each figure. (See Ex. A).

(Alternative 5B versus IRA) yielded only an additional 2% mass removal, indicating a negligible improvement for a significantly greater effort expended.

The “mass removed” pie charts also provide insight into which groups of wells (remedial systems) remove the most mass and do it efficiently. The chart for Alternative 5B indicates that the 24 new NYSDEC remedial wells remove a total of 32% of the offsite mass while the six new wells in the IRA (represented as NYSDEC wells, Navy-1 RE-137 well, and IRA wells) also remove a total of 32% of the mass. This comparison clearly shows that properly siting only six new remedial wells (IRA) can be as successful in removing mass as 24 new remedial wells proposed for Alternative 5B. This efficient level of mass recovery is realized through the IRA because its well locations and pumping rates are designed to target specific areas of the NYSDEC Plume and not interfere with the design and performance of the ROD Remedy systems (whose targeted areas for capture and expected performance levels have already been set).

4. Many of the wells included in the Proposed Remedy capture little mass and are inefficient.

The TVOC concentration levels of impacted groundwater removed by remedial wells provides an indication of how valuable a remedial well may be in terms of its remedial performance. Time versus concentration graphs for each of the remedial wells are included in Attachment 2 (Figures 4.2-37 through 4.2-79). For alternatives that do not include a well at the location of the named recovery well, the curves represent the concentrations simulated to be in the aquifer at that named well location. Several are presented here to demonstrate ineffective performance of Alternative 5B wells. (Ex. A, Figures 11 and 12 (from Attachment 2, Figures 4.2-68 and 4.2-63)).

Nonproductive remedial wells capture little mass and are inefficient in limiting any potential migration as the wells are sited in extremely low TVOC concentration areas. Proposed well DECHC-11 (Ex. A, Figure 11) is one example. Under all three alternatives, this well is not expected to remove any groundwater exceeding Standards, Criteria, and Guidance (“SCGs”) over the 30-year period. Such a “remedial” well will be pumping water that may not even require remediation. In fact, as shown in Attachment 2 (Figures 4.2-61 through 4.2-74), the groundwater concentrations in 14 of the 16 proposed Alternative 5B hydraulic containment wells will not be above 5 µg/L TVOC at system startup (5 years) and 13 wells will remain below 5 µg/L TVOC for the 30-year simulated period, essentially rendering these wells useless and superfluous. Another nonproductive well is proposed well DECHC-06 (Ex. A, Figure 12), located just southwest of the Site and just south of the former RUCO site. For approximately 20 years, this well is expected to only capture groundwater below SCG levels. Notably, under Alternative 5B, concentrations rise in response to the growing plume emanating from the vicinity of former RUCO site.

5. All the alternatives protect public water supply wells.

A valuable measure of the success of a remedy is the extent to which it minimizes or eliminates impacts to public supply wells. The Proposed AROD states that “[t]here are 11 public supply wells that have been impacted by the groundwater contamination that has originated from the Northrop Grumman and

NWIRP sites, and 16 public water supply wells that are threatened by the Navy Grumman groundwater plume.” (Proposed AROD, p. 5).

Already Impacted Wells. Of the 11 wells already impacted, six are located to the south and east of the Bethpage Water District (“BWD”) wells; SFWD Plants 1 and 3, and the NYAW Seamans Neck Road Plant. Concentration versus time graphs for four of the six wells are shown on in Exhibit A, Figures 13, 14, 15, 16 (from Attachment 2, Figures 4.2-18, 4.2-15, 4.2-26, and 4.2-27, respectively). These wells were chosen because although the Proposed AROD states that these wells are impacted, the impacts are less than MCL levels and treatment facilities have already been installed at the wellfields. Concern regarding higher pumped (raw) water VOC concentrations in the future led to installation of the treatment systems.

The results demonstrate equivalent performance of the Proposed Remedy and IRA. Regarding SFWD Plant 1 (Well 1-3) (Ex. A, Figure 13), there is no substantive difference between the three alternatives in impacts projected over 30 years and TVOCs are predicted to remain below 5 µg/L for the 30-year simulation period. SFWD Plant 3 (Well 3-1) (Ex. A, Figure 14) projected impacts are somewhat similar to SFWD Plant 1: that is none of the alternatives indicate concentration levels exceeding the MCL and there is little substantive difference between the alternatives in terms of impact. Projected impacts at NYAW Well 4S (Ex. A, Figure 15) are substantively similar between Alternative 5B and the IRA over the 30-year period, with raw water concentration levels not exceeding the MLC. Long term impacts from implementation of the ROD Remedy, however, indicate levels exceeding the 5 µg/L MCL from years 14 through 30, but remaining less than 10 µg/L throughout. Following full system implementation, NYAW Well 3S (Ex. A, Figure 16) is estimated to exceed the MCL for all three alternatives. Alternative 5B and IRA concentrations remain slightly above the MCL from years 5 to 15, while the ROD Remedy concentrations increase to a high of approximately 15 µg/L and do not drop below the MCL by the end of the 30-year simulation.

Thus, overall, protectiveness of alleged “impacted” public supply wells is equivalent under Alternative 5B and the IRA, and both show slight benefits over the ROD Remedy. It is important to recall that all of these wells are already equipped with treatment systems and that any current or future impacts to raw pumped water are not representative of water quality in the distribution system. Similar graphs for other public supply wells are included in Attachment 2 (Figures 4.2-10 through 4.2-36).

“Threatened” Wells. A comparison of the three remedial “alternatives” relative to potential impacts to public supply wells (NYSDEC’s “threatened” wells) indicates that all three have approximately the same degree of protection; the IRA and Alternative 5B are quite similar in this regard.

Using the NYSDEC Plume extent for initial conditions, simulation of the TVOC concentration levels predicted to potentially impact supply wells are shown as concentration versus time graphs (Attachment 2, Figures 4.2-10 through 4.2-36). Graphs for four wells or well fields that are allegedly threatened are shown in Exhibit A, Figures 17, 18, 19, and 20. If the individual well shown is part of a well field that is simulated to be impacted, the well with the highest projected impact is shown. These wells were selected as they are all proximate or downgradient from the distal edge of the NYSDEC Plume. NYSDEC

apparently justifies its selection of Alternate 5B to protect these wells because “under the existing remedies, not only does groundwater contamination continue to migrate south toward currently unimpacted public water supplies and unimpacted portions of the Long Island Sole Source Aquifer, but this southward migration is causing contaminant concentrations to increase in off-site groundwater.” (Proposed AROD, p. 2).

This statement, as applied to these wells, is not supported by data or modeling as indicated in the attached graphs. The graphs show the predicted concentration in each well for each of the three alternatives over the 30-year simulation period. An MCL of 5 µg/L is shown on the graphs (as many VOCs have an MLC of 5 µg/L; since the plots are of TVOCs, this is considered to be conservative, as MCLs for individual VOCs may not be exceeded), as well as key remedial system start-up events during the first five years. The graphs allow for relative comparisons of the alternatives and for assessment of the alternative in addressing potential impacts to individual wells.

Again using the NYSDEC Plume extent for initial conditions, simulation results indicate that for SFWD Well 4-1 (Ex. A, Figure 17) (Attachment 2, Figure 4.2-20) and all MWD wells, including Well 5 (Ex. A, Figure 18) (Attachment 2, Figures 4.2-28 through 4.2-36), there is virtually no difference between any of the three alternatives, with all being equally protective of the supply wells. Continuing to use NYSDEC Plume parameters, once the remedial alternatives are implemented (5 years), concentrations in Town of Hempstead – Levittown (“TOH”) Well 13 (Ex. A, Figure 19) (Attachment 2, Figure 4.2-25) are expected to be below the 5 µg/L MCL for all three alternatives. Alternative 5B and the IRA result in similar concentration levels, both slightly improved over the ROD Remedy. SFWD Well 6-1 (Ex. A, Figure 20) (Attachment 2, Figure 4.2-16) projections show that by approximately 12 to 16 years, the concentration levels for each of the alternatives may exceed the MCL. This exceedance is estimated to continue until approximately the 26 to 29 year mark. The shape of the curves is similar for the alternatives; however, Alternative 5B is shown to have slightly lower peak concentration levels, and it exceeds the MCL for a slightly shorter period of time.

Thus, protectiveness of alleged threatened public supply wells is equivalent under the three alternatives.

C. The IRA Is More Cost-Effective than the Proposed Remedy, and Thus Superior With Respect to the Seventh NCP Criterion.

Cost effectiveness is determined by comparing the cost of the remedy to its "overall effectiveness." Accordingly, a cost-effective remedy is one whose "costs are proportional to its overall effectiveness." 40 C.F.R. § 300.430(f)(1)(ii)(D); *see also* 6 NYCRR § 375-1.8(f). “Cost-effectiveness is determined by evaluating the following three of the five balancing criteria noted in § 300.430(f)(1)(i)(B) to determine overall effectiveness: long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, and short-term effectiveness. Overall effectiveness is then compared to cost.” *Orange Cnty. Water Dist. v. Alcoa Glob. Fasteners, Inc.*, 12 Cal. App. 5th 252, 335 (2017).

As is discussed above, those three criteria all favor the IRA (and the ROD Remedy) over the Proposed Remedy:

- Long-term Effectiveness. The ROD Remedy and IRA, which both include source area remediation and wellhead protection, would achieve long-term effectiveness by stopping plume movement, reducing mass loading to downgradient supply wells and by treating any impacted drinking water at the wellhead to meet health-based standards, thereby eliminating long-term risk. The Proposed Remedy would not reduce VOC mass in the plume significantly more than the ROD Remedy or IRA, as described above, and the effectiveness in meeting health-based standards would not improve because the Proposed Remedy contains the same wellhead protection as the ROD remedy and the IRA.
- Reduction in toxicity, mobility, or volume (“TMV”). Substantial reductions of TMV in the plume would continue to occur under the ROD Remedy, through groundwater extraction and treatment in VOC source areas.³² The IRA would add groundwater extraction wells in 6 offsite locations for removal of additional VOC mass. Based on solute transport modeling results, only small reductions of TMV would be realized under Alternative 5B compared to the ROD Remedy and the IRA (7% more VOC mass than the ROD remedy and 2% more mass than the IRA). However, these minimal improvements would be due to inefficient extraction of large quantities of mostly clean groundwater (more than double the volume extracted by the IRA). In fact, the groundwater concentrations in 13 of the 24 proposed extraction wells in the Proposed Remedy are not expected to exceed 5 µg/L TVOCs at system startup or over the next 30 years of pumping, essentially making these wells useless and thus superfluous.
- Short-term Effectiveness. The ROD Remedy is either in place or is under design (RE-108 system) or construction (RW-21 system), and thus would achieve short-term effectiveness. The IRA would achieve short-term effectiveness by implementing any necessary, additional wellhead treatment or alternative measures, consistent with the PSWCP, in about one year and, because construction would occur on the existing water plant properties, short-term risks to the community and environment are not anticipated. Further, construction of additional remedial systems for source remediation under the IRA would present fewer disruptions and short-term risks than Alternative 5B (*e.g.*, increased dust, noise, and traffic) to the community over a shorter period than the much more expansive Proposed Remedy, as well as fewer ecological impacts.

The Department is required to select the most cost-effective remedy from amongst similarly effective remedial actions. Indeed, “[c]ost is a critical factor in the process of identifying a preferred remedy. In fact, CERCLA and the NCP require that every remedy selected must be cost-effective.” EPA, *The Role of Cost in the Superfund Remedy Selection Process*, at 5.³³

Accordingly, even if the Alternative 5B remedy would protect the public to the same extent as the ROD Remedy, it would fail the cost-effectiveness test because other less costly remedies would be at least as effective. (See DER-10 at 133; 40 C.F.R. § 300.430(e)(9)(iii)(G)). That failure is even more pronounced

³² The OU2 and OU3 ONCTs, and the GM-38, RW-21, and RE-108 systems.

³³ Available at <https://semspub.epa.gov/work/HQ/174446.pdf>

when Alternative 5B is compared to the IRA. NYSDEC estimates that the Proposed Remedy would cost \$585 million; the IRA would cost far less.³⁴

D. The IRA Is Far Less Disruptive and More Implementable than the Proposed Remedy, and Thus Superior With Respect to the Fifth, Sixth, and Eighth NCP Criteria.

NYSDEC’s regulations and the NCP both disfavor remedial alternatives that have “[i]mplementability” problems, negative “[s]hort-term impacts,” or lack “[c]ommunity acceptance.” 6 NYCRR § 375-1.8(f); 40 C.F.R. § 300.430(e)(9). EPA has made clear that short-term impacts and effectiveness must include an evaluation of “impacts during implementation on the neighboring community.” 53 Fed. Reg. 51,394, 51,428 (Dec. 21, 1988). Here, NYSDEC failed to properly evaluate and consider the well-documented, serious implementability problems posed by the Proposed Remedy.

The IRA entails far fewer wells, less infrastructure and operational activity than Alternative 5B (or any other alternatives identified in the Proposed AROD and FS, other than the no further action alternative). It thus faces far fewer implementation hurdles and would impose significantly reduced burdens on local communities. The following comparison makes the much less disruptive impact of the IRA clear:

Remedy Component	Proposed Remedy	The IRA
New Wells	Installation of 21 new extraction wells, 16 of which are for containment and the other eight for mass removal, and use of three already installed wells for mass removal	Installation of three new extraction wells for containment and the use of three already installed wells for mass removal
Piping	22.2 miles of trenching for the installation of 23.6 miles of new piping along local roads, in largely residential areas, to transport treated water to one new large-scale treatment plant, one moderate-scale treatment plants, and three smaller plants, and then to discharge locations	3.85 miles of trenching for 4.7 miles of new pipes along local roads to transport treated water to treatment plants on site then to discharge location
Pumping	Pumping of an additional approximately 223 billion gallons of groundwater over 30 years	Pumping of an additional approximately 93 billion gallons—or less than 50% of the volume for Alternative 5B—over the same period

³⁴ Moreover, NYSDEC’s attempt to provide support for cost estimates is inadequate. NYSDEC set forth typical costs for construction or installation (e.g., the cost of a new well, piping per linear foot, etc.), but NYSDEC did not cite any facts or specific evidence to substantiate these estimates

Discharge	Construction of a 10-acre recharge basin in Bethpage State Park	Use of existing basins
Treatment Plants	Five new plants, including one near Bethpage State Park and another near Massapequa Creek	One new plant on the existing Site

1. NYSDEC repeatedly recognized the negative impacts of “full plume containment.”

NYSDEC has considered the concept of “full plume containment” on multiple occasions but repeatedly rejected the concept because, according to NYSDEC, a remedial option involving “full plume containment” was unnecessary, impracticable and overly disruptive to implement, and not cost effective. In the May 2019 Proposed AROD, NYSDEC did not explain how the Department’s historical concerns about short-term impacts and implementation problems and excessive costs will be addressed by the Proposed Remedy. Nor did NYSDEC explain why those significant disruptions and costs are warranted in light of the Department’s repeated confirmation that the ROD Remedy is protective of public health and the environment.

In fact, NYSDEC’s historic concerns not only remain valid but also are heightened due to the increased size and complexity of the Proposed Remedy. NYSDEC acted arbitrarily and capriciously by failing to confront and grapple with its prior repeated conclusions. *See generally FCC v. Fox Tele. Stations, Inc.*, 556 U.S. 502, 515 (2009) (agency must acknowledge that it is changing its position and provide “a more detailed justification” when its new decision “rests upon factual findings that contradict those which underlay” its original position); *Knight v. Amelkin*, 68 N.Y.2d 975, 977 (1986) (“A decision of an administrative agency which neither adheres to its own prior precedent nor indicates its reason for reaching a different result on essentially the same facts is arbitrary and capricious.” (citation omitted)).

a. NYSDEC rejected “full plume containment” in 2001 as part of the OU2 ROD.

Full plume containment was first evaluated in the Department’s 2001 OU2 ROD for consistency with the NCP and Part 375. It was not selected because of the “...technical infeasibility of implementing such a program in the extensive and diffuse offsite plume.” (OU2 ROD, p. 58). The Department further explained that “[i]n addition, the area is densely developed and finding the necessary locations to implement total plume containment would be difficult at best and more likely, infeasible to implement.” (*Id.*) NYSDEC also stated: “Alternatives 5, 6, 7, and 8 [the “full plume containment” alternatives] would be substantially more difficult to implement administratively with respect to the OFCT system. Private property would have to be purchased or accessed and potentially, zoning changes would be required in order to construct the off-site extraction wells and treatment plants. The permit-related tasks would be difficult to implement.” (OU2 at 26-27).

NYSDEC concluded: “Based on the extent of the Northrop Grumman contamination, full plume containment is not a technically feasible nor cost effective option.” (*Id.* at 61).

- b. NYSDEC again rejected “full plume containment” in 2013 as part of the OU3 ROD.

Twelve years later, NYSDEC reiterated, in the 2013 OU3 ROD, that “full plume containment” was even less realistic than in 2001, when the plume was characterized as less extensive and diffuse:

Full containment of the OU2 groundwater contamination plume was evaluated as part of the OU2 remedy and was not selected. This decision set forth in the OU2 ROD, has recently been reviewed independently by a number of organizations including the United States Environmental Protection Agency (USEPA), the United States Geological Survey (USGS), the United States Army Corps of Engineers (USACOE) and the Battelle Institute. The Naval Facilities Engineering Command (NAVFAC) finalized this review into the Optimization Report. While these four reviewing groups have offered suggestions regarding the need for further evaluation, none have suggested that the selected remedy for OU2 was not appropriate.

(NYSDEC, 2013, OU3 ROD Responsiveness Summary, introduction, p. A-2.) NYSDEC also explained:

There is a greater degree of difficulty of implementation for the off-site groundwater remedial program the larger the given pump and treatment system is. This includes the number of groundwater extraction wells, pipelines, treatment system(s) and points of discharge. The off-site full containment groundwater system would be constructed in a densely populated area with significant implementability [sic] due to the greater difficulty of siting and constructing the off-site groundwater remedial elements for this huge pump and treatment system. All this construction would be occurring within highly developed residential areas or highway rights of way both of which will present significant implementability issues associated with the access and siting of the large pump stations, treatment systems and required pipe lines connecting all the facilities.

(OU3 ROD, Ex. D, p. 15).

Nothing has changed since 2013 that should alter NYSDEC’s rejection of “full plume containment” due to “significant implementability” issues, and neither the FS nor Proposed AROD suggests otherwise.

- c. NYSDEC decisively rejected “full plume containment” for a third time in 2014.

After legislation was introduced in 2014, NYSDEC again strenuously objected to the concept of “full plume containment,” stating that it “seeks to replace an administrative technical process prescribed by regulation with the political process without technical support.”³⁵ The Department described the proposed legislative plan as “extremely costly and technically infeasible,” and stated that its costs would be “inconsistent” with the NCP and therefore unrecoverable by the State. (*Id.*) NYSDEC characterized the legislation as a technically deficient “political solution.” (*Id.*) Those comments also noted that the

³⁵ (Comment Letter of Edward F. McTiernan, NYSDEC Deputy Commissioner and General Counsel, dated July 30, 2014; see Attachment 5.)

bill “[s]eeks an extensive and expensive evaluation of full hydraulic containment despite it having already been evaluated several times.” (*Id.*)

NYSDEC also commented on the disruption associated with implementing the full plume remedy, noting: “[T]he acquisition, lease or condemnation of land for the siting of extraction wells would substantially increase the cost and require and [sic] disruption of many homes and neighborhoods.”³⁶

2. NYSDEC failed to provide adequate information about the implementability of the Proposed Remedy.

The Proposed AROD and FS contain virtually no data or information supporting NYSDEC’s assertion that it could develop measures to prevent significant impacts during the construction of the numerous large-scale components of Alternative 5B. Those documents simply assert that these measures would be successful.

Such projections are in sharp contrast to NYSDEC’s prior statements. Nowhere does NYSDEC explain how Alternative 5B would be designed, installed, and operational in five years, given all of these difficulties. Simply put, NYSDEC summarily concluded that the Proposed Remedy is technically implementable, without supporting analysis. (*See* Proposed AROD, pp. 20-21 and FS, p. 126-27).

With regard to impacts on the community, NYSDEC identified impacts in general terms but concluded, without explanation, that these impacts can be mitigated by proper measures. NYSDEC did not provide any details regarding the extent of any impacts or the contents or efficacy of those supposed mitigation measures. (*Id.*) Further, NYSDEC said nothing about the long-term land use impacts of the myriad wells and treatment plants in residential areas and near schools. (*See* Proposed AROD, p. 21 and FS, p. 126). Finally, because NYSDEC never analyzed the IRA, neither the Proposed AROD nor FS compare that alternative to Alternative 5B.

Instead, NYSDEC states that Alternative 5B is less disruptive than some of the alternatives it considered. (Proposed AROD, p. 20). That comparison is of no consequence, as it does not address the actual impacts of the proposed Alternative 5B, or how they would compare to the IRA or ROD Remedy. Thus, NYSDEC did not perform the analysis that is necessary to decide whether the harm associated with the proposal outweighs the benefits (*i.e.*, the analysis required by the NCP).

³⁶ (Comment Letter of Edward F. McTiernan, NYSDEC Deputy Commissioner and General Counsel, dated July 30, 2014; *see* Attachment 5.)

Similar negative findings about the implementability of “full plume containment” were also voiced in the Optimization Report, p. 10 and the 2012 “Study of Alternatives for Management of Impacted Groundwater at Bethpage” (“Alternatives Report”), TetraTech, 2012), pp. 2-20–2-22 (“full plume containment” not recommended because it would present negative short-term and long-term impacts, would be difficult to implement, would not be cost effective, and would require wellhead treatment). (*See* Attachment 5).

3. Northrop Grumman conducted an implementability analysis of Alternative 5B and the IRA.

Given this lack of meaningful analysis, Northrop Grumman retained VHB Engineering, Surveying, Landscape Architecture and Geology, P.C. (“VHB”) to conduct a detailed comparison of the impacts that would result from Alternative 5B as compared to the IRA.³⁷ The analysis, detailed in Attachment 3, demonstrates that implementation of Alternative 5B would result in significant adverse impacts, both short-term and long-term, to the primarily residential neighborhoods in which the extensive facilities would be located. In contrast, the IRA would have far lesser

impact on the community, as it entails far fewer wells, fewer treatment and discharge facilities, and has only 17% of the trenching for piping along local roads as compared to Alternative 5B.

4. Construction impacts from the Proposed Remedy are far greater than those from the IRA.

VHB’s investigation showed that Alternative 5B would result in substantial community impacts that were not adequately addressed in the Proposed AROD and FS. Disruptions would occur during construction as a result of the substantial project scope, which includes five new water treatment plants (“WTP”), well drilling operations at 21 locations for the installation of a total of 24 wells (3 proposed wells are installed), 22.2 miles of trenching for the installation of 23.5 miles of piping, and construction of pump stations at approximately 13 different locations. (*See generally* Attachment 3, pp. 24-32, 40-42, and Ex. C).

WTPs. Alternative 5B entails five new WTPs.³⁸ Four of the WTPs would be installed within, or in the vicinity of, residential neighborhoods.³⁹ In contrast, the IRA would involve the installation of only one or two new WTPs, which would be in industrial-commercial areas. An example of a typical large-scale water treatment plant (the one on Grumman Road in Bethpage) is provided in Exhibit B. (*See also* Attachment 3, p. 27).

³⁷ VHB’s initial step involved translating the components of Alternative 5B and the IRA onto working maps, which were the used as the basis of a field survey that occurred during May and June 2019, during which time the network of proposed facility locations for both alternatives was visually inspected and documented with representative photographs and descriptions.

³⁸ One Centralized WTP (“CWTP”) in Massapequa near the Massapequa Preserve, the other CWTP in Bethpage, on the Grumman/Navy site, and three Decentralized WTPs (“DWTP”) at the southerly limits of the NYSDEC Plume. (Figure 7-9 of the FS and Figure 13 in the Proposed AROD).

³⁹ (1) Residences at the easterly end of North Linden Street and Elm Street in Massapequa are to the immediate west of the location identified for the Massapequa CWTP; (2) Residences along Dunhill Road and Viceroy Road in North Massapequa are to the north and west of the westernmost DWTP (at location DECHC 07); (3) Residences along Alken Avenue in North Massapequa are to the south of the easternmost DWTP (at location DECHC 09); and (4) The southernmost (central) DWTP (at location DECHC 05) would be located within a residential neighborhood on Berry Lane, between Gail Drive and Celestine Place, in North Massapequa, and is also adjacent to the Nassau County Board of Cooperative Educational Services (BOCES) Seaman Neck Middle School.

Extraction Wells. Seventeen of the 21 new extraction wells to be installed under Alternative 5B would be in residential neighborhoods; 4 of these wells would be installed proximate to schools. For example, a proposed Hydraulic Containment Extraction Well, DECHC-12, would be constructed directly adjacent to the Eastplain Elementary School. (VHB Report, Photograph Nos. 79-78 in Appendix A; *see* Attachment 3.) A figure depicting a typical drilling rig for an extraction well is in Exhibit B hereto. (*See also* Attachment 3, p. 28). Although the pump station locations have not been defined yet, they also are likely to be largely within or adjacent to residential neighborhoods given the layout of the proposed piping network.

In contrast, new extraction wells for the IRA, with associated drilling operations, would occur at only four locations (two existing wells could be used). There would also be six new injection wells for the IRA; these would be located in existing recharge basins and thus would not be intrusive.

Well installation would entail a range of potential impacts, including noise and vibration resulting from the operation of the drill rigs, which would typically last for several weeks at each location. Many of the Alternative 5B wells would be installed in roadway rights-of-way, where physical constraints may result in temporary closures or partial closures of roadways and sidewalks, which would invariably disrupt traffic patterns and other activities (e.g., school bus stops) and potentially create safety concerns. (*See* Attachment 3, p. 27).

Trenching. Alternative 5B requires 22.2 miles of trenching for installing the 23.5 miles of new piping. Although this trenching would primarily adjoin residential properties, it would also impact schools, recreational uses, and businesses, and would disrupt typical traffic patterns and roadway transportation systems for an estimated period of five years according to the Proposed AROD. In contrast, the IRA only requires 3.85 miles of trenching for 4.7 miles of new piping. (*See* Attachment 3, pp. 28-29).

The construction impacts of trenching would generally be proportional to the length of trenching. Potential impacts during pipe trenching installation include noise, dust, traffic detours and other disruptions of daily life. Alternative 5B also entails more significant special challenges associated with (1) railroad crossings, including one in the vicinity of Bethpage train station on Stewart Avenue and one on South Oyster Bay Road; and (2) major roadway crossings, including two on the Seaford-Oyster Bay Expressway, two on Hempstead Turnpike (NYS Route 24), two on Southern State Parkway, and one on Hicksville Road (NYS Route 107). This work is likely to disrupt traffic. The IRA avoids such crossings, except for one on Hempstead Turnpike and one on South Broadway (NYS Route 107). (*See generally* Attachment 3, pp. 25-31, 40-42).

Ecological Resources. Alternative 5B includes a water treatment plant near Massapequa Preserve, with discharge to Massapequa Creek, and a 10-acre recharge basin in Bethpage State Park. No facilities associated with the IRA would be constructed in or near these important ecological resources. (*See* Attachment 3, pp. 39-40).

Other Impacts. Alternative 5B—unlike the IRA—affects numerous sensitive receptors such as schools and the Massapequa Creek Preserve and Bethpage State Park. *See generally* Ex. C, Tables 1 and 2 from

Attachment 3, for a summary of the locations of the community settings and the principal components of Alternative 5B and the IRA, respectively.

5. Long-term impacts from the Proposed Remedy are far greater than those from the IRA.

Alternative 5B would place four WTPs within and adjacent to residential communities, whereas the IRA would not place any new WTP in a residential area. Thus, Alternative 5B would have a substantially greater long-term impact on the community than the IRA. (See generally Attachment 3, pp. 25-31, 42).

E. NYSDEC Is Obligated by Law to Consider the IRA.

Between October 2018, when Northrop Grumman first identified potential enhancements to the ROD Remedy to NYSDEC, and the issuance of the Proposed AROD/FS in late May 2019, there was ample time for NYSDEC to further consider the IRA. The agency's failure to do so placed the burden on Northrop Grumman to conduct a full-blown analysis of the IRA and a comparison to Alternative 5B.⁴⁰ This shifting of the burden is itself a violation of the ECL, Part 375 and the NCP, which impose the obligation of developing and comparing alternatives on NYSDEC.

NYSDEC was obligated to (1) include the IRA in the FS, which is the predicate for the Proposed AROD and the recommended remedial program, and (2) further develop the IRA for purposes of comparing it to other alternatives. As explained above, the NCP requires the "*development and evaluation of alternatives* ... such that the relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy selected." 40 C.F.R. § 300.430(e)(1). As noted, "[c]ursory examination and rejection of alternatives does not demonstrate 'development' of alternatives as called for under the NCP." *Channel Master Satellite Sys., Inc. v. JFD Electronics Corp.*, 748 F. Supp. 373, 389 (E.D.N.C. 1990). Likewise, NYSDEC's guidance indicates that the FS should develop a range of alternatives. DER-10 § 4.4(b)(3). NYSDEC's failure to consider the IRA, or any variants of the IRA, violates the NCP.⁴¹

Most of the alternatives considered by NYSDEC in the Proposed AROD and FS are *less* protective of public health and the environment, and have *greater* adverse impacts, than the IRA. Three of the alternatives considered in depth included only mass reduction. Alternatives 3A and 3B involve only

⁴⁰ As noted, the IRA reflects an approach that could be essentially replicated by other variants, any of which would achieve results similar to Alternative 5B with far less remedial facilities, without the attendant community disruption of Alternative 5B, and in a more cost-effective manner. The IRA is thus a surrogate for a number of alternatives that could have been, but were not, considered by NYSDEC.

⁴¹ See, e.g., *Washington State Dep't of Transp. v. Wash. Nat. Gas Co., Pacificorp*, 59 F.3d 793, 804 (9th Cir. 1995) (affirming judgment for the defendant on a CERCLA claim for recovery of response costs because the State "failed to satisfy [the NCP's] requirements [to evaluate alternatives] The record does not indicate that [the State] subjected [informally-considered] alternatives to the kind of thorough analysis that the NCP requires."); *United States v. Rohm & Haas Co.*, 669 F. Supp. 672, 683, 683-84 (D.N.J. 1987) (court found USEPA had not complied with CERCLA's public participation requirements because the agency had not made available for review a report submitted by potentially responsible parties that discussed a potential alternative remedy).

mass flux and Alternative 4 involves only aquifer flushing. These three alternatives were rejected because they did not provide hydraulic control (*i.e.*, containment) of the entire depicted NYSDEC Plume. (Proposed Amended AROD, p. 17). Alternatives 2A and 2B involve hydraulic control of the depicted NYSDEC Plume, but little mass flux removal, such that these approaches would take at least thirty years longer than Alternative 5B to achieve the remedial goals. Thus, these alternatives were also rejected. *Id.* In contrast, the IRA would provide both hydraulic control *and* mass flux reduction; it is therefore more protective of public health and the environment than any of these five alternatives that were studied in detail in the FS but rejected in the Proposed AROD. It is illogical for NYSDEC to have failed to consider the IRA, while it considered less effective and more disruptive and costly alternatives.

A comparison to analogous legal requirements reinforces the arbitrary nature of NYSDEC's decision not to consider the IRA as an alternative. Although case law provides that there is no need for CERCLA remedial actions to conduct an analysis of alternatives under the National Environmental Policy Act,⁴² such activities are "generally exempt from the NEPA requirement" to prepare an environmental impact statement only because the agency "carries out the functional equivalent of a NEPA review in its permitting and regulatory activities." USEPA, *Guidance on Feasibility Studies Under CERCLA* at 4-9 (1985). The exemption applies so long as there is compliance with CERCLA's "substantive and procedural standards to ensure full and adequate consideration of environmental issues and alternatives" and the public is "afforded an opportunity to participate in evaluating environmental factors and alternatives before a final decision is made." *Id.* Here, these requirements were not met.⁴³

The Department cannot "cure" the defects of the Proposed AROD and FS by addressing the IRA in a responsiveness summary generated after the current round of public commenting, because that would deprive the public of an opportunity to review this option in juxtaposition to Alternative 5B and compare their respective benefits and detriments. Moreover, the ROD Remedy and the IRA must be fully addressed and evaluated in a FS, and subject to public review and comment. In comparable circumstances, the court's remedy for USEPA's violation of the NCP was to invalidate and remand the ROD to enable the agency and interested parties "to develop the record with the full panoply of procedures afforded by [CERCLA]."⁴⁴ Without access to such information, interested parties would be prejudiced in their ability to "provide meaningful comments" about NYSDEC's analysis of the IRA.⁴⁵

⁴² See *Oil, Chem. & Atomic Workers Int'l Union v. Dep't of Energy*, 62 F. Supp. 2d 1 (D.D.C. 1999), *aff'd*, 214 F.3d 1379 (D.C. Cir. 2000).

⁴³ Similarly, remedy evaluation and selection are exempt from EIS requirements under New York's State Environmental Quality Review Act, ECL Article 8, which requires a project proponent to consider a range of alternatives and which, like Part 375, contains robust public participation requirements. See 6 NYCRR §§ 375-2.11; 375-1.1(g); 375-2.10.

⁴⁴ *Rohm & Haas Co.*, 669 F. Supp. at 685. As explained in another case, commenters "are entitled to review and comment on significant new additions to the record." *Texas v. EPA*, No. 3:15-cv-00162, 2019 WL 2272464, at *12. (S.D. Tex. May 28, 2019) (failure of agency to reopen a proposed rule for public review, after revisions were made

Finally, the IRA is superior to the Proposed Remedy under NYSDEC's binding remedy-selection criteria. 6 NYCRR § 375-1.8(f); *see also* 40 C.F.R. § 300.430(e)(9). Accordingly, at a minimum NYSDEC is required to revise the remedy to reflect the IRA and re-propose it for public comment. The NCP requires an additional public comment period where the "lead agency determines the change could not have been reasonably anticipated by the public based on the information available in the proposed plan or the supporting analysis and information in the administrative record." 40 C.F.R. § 300.430(f)(3)(ii)(B). Here, the public could not reasonably anticipate the IRA because NYSDEC failed to include it in the FS or Proposed AROD, and so a new FS and an additional public comment period are required.

III. THE PROPOSED REMEDY IS PREMISED ON NYSDEC'S INACCURATE AND SCIENTIFICALLY-FLAWED DEPICTION OF THE NATURE AND EXTENT OF CONTAMINATION.

NYSDEC's Proposed AROD and FS inaccurately depict the nature and extent of the contamination, which, in turn, has led NYSDEC to select an inappropriate Proposed Remedy. NYSDEC's depiction of the contamination to be addressed by its Proposed Remedy is inaccurate because, among other things, NYSDEC has relied on insufficient and/or unreliable and contradicted groundwater sampling results; an incorrect SCG for 1,4-dioxane; an erroneous assumption that all COCs came from the Site; and a flawed groundwater model.

This constitutes a three-fold violation of the NCP. First, NYSDEC did not properly tailor its "investigative and analytical studies . . . to site circumstances so that the scope and detail of the analysis is appropriate to the complexity of site problems being addressed." 40 C.F.R. § 300.430(b). Second, NYSDEC ignored the stated purpose of remedial investigation in the NCP, which is "to collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives." *Id.* § 300.430(d)(1). Third, NYSDEC's analysis does not "reflect the site problems being addressed." *Id.* § 300.430(e)(1). Moreover, it is arbitrary and capricious for NYSDEC to rely on a flawed understanding of the nature and extent of the contamination to be addressed given the critical importance of that information to NYSDEC's remedy-selection decision.

A. NYSDEC Relied on Insufficient Groundwater Sampling Data.

NYSDEC contends that the contamination or "plume" area it seeks to address by the Proposed Remedy is characterized by contaminants exceeding their respective SCGs. (Ex. A, Figure 21). The "plume" area is greatly overestimated, however, because NYSDEC depicts new areas of contamination based on data (i) *not* from reliable and repeatable sources (*i.e.*, permanent monitoring wells); (ii) *not* collected from a

to a critical component of the record, violated the notice and comment provisions of the Administrative Procedure Act).

⁴⁵ *Rohm & Haas Co.*, 669 F. Supp. at 685 (failure to disclose unredacted versions of staff studies on which agency partially relied in promulgating a new rule violated the notice and comment provisions of the APA) (citing *Am. Radio Relay League, Inc. v. FCC*, 524 F.3d 227, 237-38 (D.C. Cir. 2008)).

representative number of wells; and (iii) *not* collected consistently over a similar, limited time period. Moreover, the locations and depths of observed impacts used to define the extent of contamination do not correlate with sample results from nearby wells and/or with the location of the suspected source areas. (See Attachment 1, Appendices E through K).

Examples of NYSDEC's specific failures to provide reliable sampling data to support its depiction of the nature and extent of contamination include:

- NYSDEC based a one-square-mile area of its plume depiction⁴⁶ on decades-old VPB data from 2000-2001 that cannot be relied upon to reflect current conditions for remedy selection purposes. Groundwater sampling results generated decades ago do not reliably depict current conditions, because groundwater quality changes over time due a variety of factors such as groundwater movement, precipitation, and contaminant degradation and attenuation. (See Attachment 1, Section 3.5). The FS incorrectly states that the database NYSDEC used for plume delineation was designed to extract “the most recent available groundwater sample data.” (FS, p. 19).
- NYSDEC relied on one sampling result from one permanent monitoring well (BPOW1-3) to delineate its plume depiction in this one-square mile area, even though the sampling result did not exceed the applicable SCG. The sampling result detected 1,4-dioxane at levels barely exceeding 0.35 µg/L, which is well below the current SCG of 50 µg/L and the recommended SCG of 1 µg/L.
- NYSDEC depicted its plume area as extending south of the SSP; and yet, none of the 12 permanent monitoring wells south of the SSP have shown exceedances of SCGs. (Ex. A, Figure 22). Only one sample at one well (TT-102D) exceeded the 0.35 µg/L concentration that NYSDEC erroneously used an SCG for 1,4-dioxane with a sample result of 0.54 µg/L. Moreover, two VPB samples showed exceedances of the SCG for toluene only, and even those results were controverted by subsequent, more reliable groundwater well monitoring. Those results were never verified or replicated with permanent well results to establish the interpreted extent of the contamination near the SSP.

B. NYSDEC Inappropriately Relied on VPB Data.

Although VPBs can be a useful screening tool in groundwater investigations to guide investigative decision making, VPBs are not permanent and repeat samples cannot be collected at the boring at later times, and thus, replication of sampling results cannot be achieved. This is a limitation of VPB technology and why VPB drilling frequently leads to one or more permanent monitoring wells being installed at the same location. Permanent monitoring wells allow for continued sampling over time, and thus provide more reliable and higher quality data than the “screening level” data collected from VPBs. When VPB sample results cannot be verified using permanent wells, but conform with a defined, understood, and verified conceptual flow model, transport model, or contaminant distribution, then—

⁴⁶ East of Seaford Oyster Bay Expressway, south of Hempstead Turnpike, and north of the SSP. (Ex. A, Figure 2).

and only then—is it scientifically acceptable and consistent with practice in the environmental remediation field, to rely on the VPB results. When the VPB results differ meaningfully from the established understanding of hydrogeologic and transport conditions, it is critical to verify the VPB results. Where data is available from both permanent well samples and VPBs, the permanent well analytical results should be given preference. (See Appendix F to Attachment 1).⁴⁷

As indicated above, NYSDEC’s reliance on VPB data for its conclusion that toluene is found (and hence the NYSDEC Plume extends) south of the SSP is in error. Sampling in a VPB installed in late 2017 by NYSDEC south of the SSP (DEC-VPB1) indicated a toluene detection of 14 µg/L at 700 feet below land surface (ft bls). A permanent monitoring well, MW-DECD1, was subsequently installed in February 2018 at the same location and screened at 695 to 715 ft bls. The sampling result for toluene from this well was 2.2 µg/L, substantially lower than reported for the associated VPB sample and well below the toluene water quality criterion of 5 µg/L. NYSDEC failed to acknowledge this discrepancy in the two sets of sampling results, and instead used the less reliable VPB data rather than the permanent well data to incorrectly depict the NYSDEC Plume extending south of the SSP.

C. NYSDEC Selected an Improper SCG for 1,4-dioxane.

NYSDEC inappropriately applied an SCG of 0.35 µg/L for 1,4-dioxane in depicting the extent of the NYSDEC Plume. The current New York State MCL for 1,4-dioxane is 50 µg/L. In December 2018, the New York State Drinking Water Council recommended that NYSDOH adopt an MCL of 1.0 µg/L. NYSDEC’s use of a screening level guidance of 0.35 µg/L—at least an order of magnitude lower than the level applicable through potential or existing regulation—is improper given the actual MCL of 50 µg/L and the 1 µg/L recommendation. This has led NYSDEC to overestimate the extent of the NYSDEC Plume.

D. NYSDEC Incorrectly Assumed that All COCs Originate from the Site.

The Proposed AROD states that the potentially responsible parties (“PRPs”) for the off-site groundwater contamination are Northrop Grumman, the Navy, and Covestro (current owner of the RUCO site) (Proposed AROD, p. 8), yet it does not appear that the impacts from the RUCO site are addressed by the Proposed Remedy.⁴⁸ This is particularly troubling given that the contamination mapping in the Proposed AROD clearly shows that activities at the RUCO site have substantially impacted the groundwater. (Ex.

⁴⁷ An example of the relative unreliability of VPB data is reflected in the results of a recent investigation conducted at OU3. The earlier VPB results indicated the presence of toluene in groundwater in excess of 100 µg/L, so a follow-up effort was undertaken to verify the VPB results, including installation and sampling of permanent monitoring wells screened within the same vertical aquifer horizon from which the VPB sampling was conducted. Analytical results from all permanent well samples indicated there were no detections of toluene above the SCG of 5 µg/L, thereby discrediting the earlier VPB results. Accordingly, after reviewing this data, NYSDEC concluded that “... no further characterization is needed to assess toluene in groundwater.” (See Email from J. Pelton, May 14, 2019 to Edward Hannon; see Attachment 5).

⁴⁸ Separately, the Town of Oyster Bay is documented as a PRP in the OU3 ROD (at 10), and thus would need to be included in any ROD changing the remedy to assure that they will cooperate with the remediation.

A, Figure 21). It is also likely that other contributors to groundwater impacts in the area exist or had existed, as several local impacts cannot be hydrologically explained or correlated to the Site. For example, groundwater data indicate that the source of Freon-113 on the western side of the NYSDEC Plume is not from the Site, but from industrial sources to the northwest of the Site. (See Appendix H to Attachment 1).

Despite all this, NYSDEC states: “The database was then used to analyze and evaluate the nature and extent of the Navy Grumman groundwater plume and to prepare three-dimensional (3D) visualizations of the groundwater contamination.” (Proposed AROD, p. 9). NYSDEC has failed to evaluate the actual source of such impacts or rule out other potential contributors. Instead, NYSDEC arbitrarily assigns responsibility for any and all contamination to Northrop Grumman and the Navy.

Northrop Grumman conducted an assessment to determine what contaminants could easily and readily be ruled out as not coming from the Site. Using the water quality data contained in the FS and Proposed AROD, Northrop Grumman developed a groundwater VOC plume representation for the area. (See Attachment 1, Figure 3.5-2). Preparation of the plume representation involved consideration of various factors, including (i) groundwater flow directions, (ii) depth and locations of the on-site contamination and (iii) comparison of contaminant ratios at the Site to contaminant ratios in various parts of the off-site plume. Northrop Grumman then excluded those areas of impacted groundwater that were determined not to be sourced from the Site. The excluded areas, and the resulting delineated contamination area, are shown in Figure 3.5-2 in Attachment 1. Importantly, this delineation does not account for other sources of VOCs and 1,4-dioxane in the vicinity of or down gradient from the Site. The delineation was developed solely for the purpose of these Comments.

Additional reasons for excluding certain areas for toluene, other BTEX compounds, and Freon-113, are provided in Attachment 1, Appendices F, G and H, respectively. These materials explain why certain contaminants in certain locations did not originate from the Site and should not be part of the NYSDEC-depicted plume.

E. NYSDEC Relied on an Unsophisticated and Incomplete Model.

NYSDEC relied on a groundwater model developed by the USGS “to evaluate how various groundwater extraction and discharge scenarios influence plume migration and groundwater containment and was a critical component of the Feasibility Study and ultimately in the development of a preferred remedy for addressing the Navy Grumman groundwater plume.” (Proposed AROD, p. 10). The USGS used MODFLOW, a modeling program that simulates groundwater flow, and MODPATH, which is a particle tracking program that utilizes MODFLOW results to project the path that a groundwater particle might travel along within the aquifer system.

The groundwater model used in the FS and Proposed AROD to select the preferred remedy does not include a contaminant transport element. MODPATH only simulates advective transport (the process of the bulk motion of the flowing groundwater). Advective transport simulation is the simplest form of groundwater transport analysis: it makes multiple simplifying assumptions, each of which can discount or ignore a real-world process that may influence how a dissolved solute actually moves within the

aquifer system. MODPATH cannot provide any concentration information regarding dissolved solutes. It cannot account for or track how much contaminant mass impacts supply wells or is removed by remedial wells. It cannot account for dispersion, retardation, degradation, and other processes. It cannot simulate when an aquifer or portion thereof, or a pumping well, has reached a clean-up level or specified cleanup goal.⁴⁹

Unlike advective transport modeling, solute transport modeling can simulate these processes.⁵⁰ Site-specific data and information dictate how many of the real-world processes can confidently be simulated. Solute transport modeling should have been performed to assess the validity of the Proposed Remedy, compare Alternative 5B to the ROD Remedy and alternatives such as the IRA, particularly given the volume and type of available data, the complex hydrogeological conditions, the challenges associated with developing a “full plume containment” alternative, and the enormous scale of the Proposed Remedy.

For similar sites on Long Island, solute transport modeling has proven to be a key component in the remedy evaluation:

- Both groundwater flow and solute transport models were employed by NYSDEC for the Unisys Corporation Operable Unit 2: Offsite Groundwater, NY State Superfund Project in Nassau County (NYSDEC, 2014). A VOC plume exceeding one mile in length had migrated through the upper Glacial and Magothy aquifers. Public supply wells had been impacted and there was concern over potential impacts to other supply wells. A solute transport model was used to compare the alternatives; the result was a ROD that was supported by model evaluations that successfully compared the positive and negative aspects of each remedial alternative being considered.
- At the Brookhaven National Laboratory Site in Suffolk County, solute transport modeling was used to evaluate and compare remedial alternatives for a three-mile long VOC plume migrating through the upper Glacial and Magothy aquifers. The Operable Unit III Record of Decision (USDOE, 2000) and associated Feasibility Study (IT, 1996b) relied on the model to compare the alternatives, including consideration to timeframes to meet clean-up targets and plume migration minimization. NYSDEC concurred with the June 2000 ROD.

By not developing a solute transport model, the Department has not utilized an important tool available to comprehensively evaluate, compare, and ultimately propose a sound remedial alternative.

⁴⁹ Pollock, D.W., 1989, Documentation of computer programs to compute and display pathlines using results from the U.S. Geological Survey modular three-dimensional finite difference ground-water flow model, U.S. Geological Survey Open-File Report 89-381, 188p.

⁵⁰ Zheng, C. 1990. MT3D: A Modular Three-Dimensional Transport Model for Simulation of Advection, Dispersion, and Chemical Reactions of Contaminants in Groundwater Systems. Prepared for the U.S. Environmental Protection Agency. Robert S. Kerr Environmental Research Laboratory, Ada, Oklahoma. Developed by S.S. Papadopoulos & Associates, Inc., Rockville, Maryland.

F. NYSDEC Failed to Provide Modeling Information and Other Backup Data.

The USGS model was a key component of the alternative evaluation process, yet it has not been made available for public review. A full model report was requested by Northrop Grumman on repeated occasions,⁵¹ yet none has been made public, and NYSDEC has informed Northrop Grumman that the model could not have been made public because it is still in draft form. Similarly, other significant data—data that is necessary for the public to be able to fully evaluate and comment on the model and NYSDEC’s depiction of the nature and extent of the contamination—has not been provided for public review, including:

- Other information pertaining to the USGS model, including any model inputs/outputs, boundary conditions, and hydraulic parameters;
- The information provided to USGS by NYSDEC/HDR to facilitate performance of the Alternatives simulations;
- Detailed descriptions of the methods used to create the plume shells shown in the FS, including input parameters, interpolation methods, and all assumptions;
- Detailed description of the method used to estimate the volume and mass of groundwater, including input parameters and assumptions;
- Shape files for all figures presented in the FS, as well as for supporting figures created but not displayed in the document; and
- Detailed descriptions for the basis of unit costs and quantities, as well as key assumptions related to quantities (*e.g.*, feet of piping in lieu of lump sum cost for piping).

Courts have routinely held that “[t]he ‘critical factual material’ that the agency must disclose and ‘expose[] to refutation’ includes the models and methodology used by an agency to support its action.” *Shands Jacksonville Med. Ctr. v. Burwell*, 139 F. Supp. 3d 240, 262 (D.D.C. 2015) (quoting *Owner–Operator Indep. Drivers v. FMCSA*, 494 F.3d 188, 201 (D.C. Cir. 2007)). Thus, by failing to provide a complete set of data, including all data relating to the model, NYSDEC has failed to “[m]ake the proposed plan and supporting analysis and information available in the administrative record” for public comment, in violation of the NCP. 40 C.F.R. §§ 300.430(f)(3)(i), 300.435(c)(2)(ii)(B).

On July 1 and 2, 2019 (only two business days before the deadline NYSDEC had set for submitting comments), NYSDEC sent Northrop Grumman some, but not all, of the information and documents relating to the modeling NYSDEC had conducted to support the FS and Proposed AROD. The information was incomplete and/or in draft form and included the following categories of documents:

- **Draft USGS modeling report** summarizing (but only in draft form) the groundwater model NYSDEC had used to develop and evaluate the remediation scenarios in the Proposed AROD.

⁵¹ These requests were made to NYSDEC several times, including in previously cited correspondence between Northrop Grumman and the Department in November 2018 and March 2019, and most recently in a FOIL request submitted to the Department in May 2019 (see Attachment 5).

- **Plume construction information** containing files of input data NYSDEC had used to develop a three-dimensional representation of what it contends is the nature and extent of groundwater contamination. These files contain massive quantities of data that are necessary to understand what assumptions and extrapolations NYSDEC made, including what groundwater data it relied on or excluded, in order to depict the nature and extent of the contamination, and hence, to justify the Proposed Remedy.
- **Model archive** containing all inputs and outputs from the USGS modeling analyses.
- **Central Basin-Related Documents for Proposed Remedy** showing various location and some, but not all, construction details.

Collectively, these files contain millions of documents and more than 70 gigabytes of data—far more than the public or any party could feasibly review and analyze in a few days.

NYSDEC’s belated provision of partial, draft information about the modeling used to support the Proposed Remedy does not come close to satisfying its obligations under the NCP. As a threshold matter, NYSDEC has not satisfied the NCP’s requirement to provide “the supporting analysis and information” to the public for review “not less than 30 calendar days” before comments are due. 40 C.F.R. §§ 300.430(f)(3)(i)(C); 300.435(c)(2)(ii)(C). Indeed, Northrop Grumman was forced to use a FOIL request to obtain this disclosure. Moreover, given the complexity and volume of the information, Northrop Grumman indisputably did not have a “reasonable opportunity” to analyze it and provide comment with less than a week left in the comment period, which is also inconsistent with the NCP. *Id.* Finally, NYSDEC precluded Northrop Grumman’s use or disclosure of these documents, including the draft model report, under the Confidentiality Agreement between the parties, including use in these comments; however, there is no bar to identifying the documents provided or using information obtained through oral discussions.⁵²

G. NYSDEC’s Data and Modeling Flaws Caused It to Overestimate the Nature and Extent of the Contamination, Resulting in a Remedy Inconsistent with Part 375 and the NCP.

Because NYSDEC relied on an inaccurate depiction of the nature and extent of groundwater contamination, the agency effectively misdiagnosed the problem that the Proposed Remedy is designed to address. As a result, the Proposed Remedy is excessive and inefficient because it is designed to contain and eliminate contamination that does not actually exist and/or does not exist in concentrations or areas that NYSDEC incorrectly assumes exist.

⁵² These documents should have been disclosed with the issuance of the Proposed AROD and FS, so that Northrop Grumman (and the public) would have had an opportunity to comment on the plumes and the modeling that are critical components of NYSDEC’s selected remedy. Accordingly, Northrop Grumman reserves its right to submit further comments if and when NYSDEC allows the draft modeling information and model report to be disclosed and when that modeling and draft model report are completed and disclosed to the public.

Exhibit A includes a map that illustrates the difference between the inaccurate NYSDEC Plume and a corrected depiction of the scope of contamination (adjusting to account for the numerous errors in NYSDEC's depiction described above). (See Exhibit A, Figure 1). Environmental visualization software used to compare the two areas shows that the NYSDEC Plume is approximately 91% larger than the corrected area. Calculation of plume mass indicates that the NYSDEC Plume contains only approximately 10% more mass, despite its approximately 91% larger size. The extent of the NYSDEC Plume is overestimated in areas where there are "alleged" low-level concentrations that do not exceed SCGs, that are extrapolated based on limited or no data, or that are unconfirmed (not based on permanent well samples). Thus, the NYSDEC Plume contains large areas of groundwater—particularly in the southern and southeast distal edges—that contain no contaminant that exceeds SCGs.

Northrop Grumman previously informed NYSDEC that its plume depiction was exaggerated and offered to perform specific sampling to assess the actual scope of any contamination.⁵³ NYSDEC declined the offer, but commented in the Proposed AROD that the number of extraction wells in the remedy could change "after pre-design sampling." (Proposed AROD, p. 21). That is too late; obtaining an accurate picture of the nature and extent of the contamination *before* selecting the remedy is what NCP and Part 375 require. Obtaining this data should not be left to pre-design sampling, which is supposed to focus on refining, not determining, the remedy.

On the current record, NYSDEC's errors have clearly skewed the Proposed Remedy. However, it is impossible to identify precisely how NYSDEC's overestimation of the nature and extent of the contamination affected the constituent elements of the Proposed Remedy, because that would require one to replicate NYSDEC's modeling, which cannot now be done given that NYSDEC failed to release certain key information relating to its modeling until last week, as discussed above.⁵⁴

The flaws in NYSDEC's depiction of the NYSDEC Plume nevertheless indisputably matter to its remedy-selection decision. A depicted plume that shows a 91% greater area as being contaminated will obviously result in a different, more expansive remedy. This is demonstrated by the fact that the remedy results in, among other things, wells that are extremely inefficient, that drag contamination into relatively clean areas of groundwater, and that cause expansion of the contamination coming from the RUCO site, as noted above.

⁵³ (Letter from Steven C. Russo to Thomas S. Berkman, dated January 7, 2019; see Attachment 5).

⁵⁴ Any technical evaluation of the relationship between misguided NYSDEC Plume mapping and siting of remedial wells would be an extensive and time-consuming effort. Since multi-well pumping systems function in part as a whole unit, what happens at one well affects how the groundwater system responds at another well. For example, if two wells are generally viewed as unnecessary, turning one well off may change groundwater flow such that the second well is now needed. For a proposed remedy that includes 20+ wells, the evaluation would require an extensive effort to complete.

IV. NYSDEC FAILED TO CONSIDER VARIOUS KEY ISSUES AND FAILED TO INCLUDE CRITICAL SUPPORTING DOCUMENTATION IN THE ADMINISTRATIVE RECORD.

With any complex FS, stakeholders can only have confidence in the results and conclusions when the evaluation and process have been transparent and open to review and comment. That is why the NCP requires NYSDEC to place the documentation supporting its proposed determination in an administrative record available to the public. However, NYSDEC failed to include documentation that supports its proposed remedy in the administrative record that would have allowed other agencies and the public a meaningful opportunity to review and comment.

A number of instances where NYSDEC failed to comply with the NCP and Part 375 by including sufficient documentation and analysis are described above. Two more are discussed below: (1) failure to evaluate ecological impacts, including saltwater intrusion, and (2) failure to provide supporting information relating to costs.

A. NYSDEC Failed to Provide Support for Its Conclusion of No Significant Environmental Impacts.

1. NYSDEC conducted no evaluation of ecological impacts of the Proposed Remedy.

Expert analysis of NYSDEC's Proposed AROD makes plain that NYSDEC lacks support for its conclusory assertion that the Proposed Remedy would have no significant ecological impacts. Northrop Grumman retained Ramboll to assess the impacts on ecological resources that would result from Alternative 5B. Ramboll concluded:

Our review found that the current FS does not provide sufficient analysis to substantiate comparisons among alternatives and conclusions regarding mitigation of potential impacts on the environment. The qualitative conclusions provided do not represent a sufficient characterization of this required element in an FS. Further, because the Proposed AROD relies upon the current FS to identify Alternative 5B as the preferred remedy, the failure of the FS to provide an appropriate level of evaluation of environmental impacts also means that the recommendation in the Proposed AROD is not adequately supported with regard to this element.

(See Attachment 4, p. 1).

Several specific ecological impacts catalogued by Ramboll warrant emphasis:

- There is no assessment of the effect of consistent, year-round discharges to Massapequa Creek, which is now subject to seasonal fluctuation, on habitat usage. (See Attachment 4, pp. 1, 3-4).
- There is no consideration of the changes in flow regime relating to Bellmore Creek (approximately 10-fold per the range provided), which would be expected to result in substantial changes in the shoreline and near shore depths, affecting foraging areas for birds and mammals. (See Attachment 4, p. 2).
- There is no consideration of the effect on the changes in surface water flow to the wetland systems south of the SSP along Massapequa, Seaford Creek, and Bellmore Creek, which Section 8 of the FS repeatedly asserts are ponded and fed by surface water; consequently, changes in

surface water flow regime could substantially reduce the values of wetland habitat. (See Attachment 4, p. 3).

To appropriately evaluate the impacts of Alternative 5B and reach technically-substantiated ecological conclusions, a comprehensive, quantitative analysis should have been undertaken, pursuant to a FWRIA per NYSEDEC guidance (DER-10, Technical Guidance for Site Investigation and Remediation, May 2010). (See Attachment 4, p. 2).

2. NYSDEC conducted no assessment of saltwater intrusion.

The FS asserts that the each of the evaluated alternatives, including Alternative 5B, would produce only minor impacts with regard to saltwater intrusion. However, no quantitative basis or parameters are provided to characterize “minor” impacts and the information presented in the FS only addresses overall areawide averaged conditions.

As discussed in the Arcadis Modeling Memorandum (Attachment 2), Alternative 5B could cause the saltwater-freshwater interface to move north approximately 5,000 feet in the vicinity of the NYAWC’s Well 7M. (See Attachment 4, p.52). Pumping could therefore pull in saltwater, leaving the supplier with the option of closing down the well or reducing pumping sufficiently to avoid drawing in saltwater, if that is possible. NYSDEC failed to acknowledge or consider this impact of Alternative 5B.

* * *

The failure to consider adverse environmental impacts of the Proposed Remedy impacts violates the NCP and the Part 375 regulations. The “short-term effectiveness” that NYSDEC is required to evaluate under Part 375 and the NPC includes an evaluation of “environmental impacts,” including “potential adverse environmental impacts that may results from the construction and implementation of an alternative.” EPA, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*, at 6-9 (Oct. 1988); see also DER-10 at 133 (short-term effectiveness requires consideration of “adverse environmental impacts”).

CONCLUSION

The ROD Remedy is working and remains fully protective of human health and the environment. As the NYSDOH and the water districts have affirmed, the water in the Bethpage area is safe to drink. If contamination were to potentially threaten any additional water districts, the ROD Remedy provides for appropriate additional measures and ensures continued protection of human health. The ROD Remedy accomplishes this critical objective without the construction of a massive new groundwater treatment system (with all the necessary industrial infrastructure) that will disrupt densely-populated, residential communities and operate for more than a century. In the Proposed AROD, NYSDEC failed to justify its departure from the current ROD Remedy.

If additional remedial measures are required beyond the current ROD Remedy, NYSDEC failed to consider identified, superior alternatives to the Proposed Remedy that will achieve similar goals. As set forth in detail above, Northrop Grumman presented the IRA as an alternative. The IRA achieves similar remedial results as compared to the Proposed Remedy, but can be implemented faster, with far less

disruption to the community, and fewer environmental risks. And, whereas the Proposed Remedy is based on invalid data and flawed and incomplete groundwater modeling, the IRA is based on state-of-the-art modeling that accurately depicts current and future groundwater conditions. Although legally required to do so, NYSDEC did not evaluate this alternative option and compare it to the Proposed Remedy or make it available for public comment.

For the foregoing reasons, NYSDEC should withdraw the Proposed AROD and accompanying FS. Should NYSDEC wish to proceed with evaluating potential remedial actions in addition to the ROD Remedy, NYSDEC must conduct a revised and accurate feasibility study that evaluates all viable alternatives and is based on sound science, prepare a new Proposed AROD based on that FS, and issue both documents and all supporting information for public comment.

As it has since the beginning of Bethpage remediation efforts, Northrop Grumman remains committed to working with all stakeholders to provide fact-based, scientifically-sound remediation efforts that advance the cleanup expeditiously and continue to protect the community without unnecessary disruption and potential harm.