Public Water Supply Contingency Plan

Prepared for:
Engineering Field Activities Northeast (EFANE)

Naval Facilities Engineering Command

Reference:
Tetra Tech NUS Contract No. GCMP-02-011-0888

ARCADIS

Infrastructure, buildings, environment, communications

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Introduction

The March 2001 Record of Decision (ROD) issued by the New York State Department of Environmental Conservation (NYSDEC) for Operable Unit 2 (OU2) (Groundwater) for the Northrop Grumman Corporation (NGC) and Naval Weapons Industrial Reserve Plant (NWIRP) Sites in Bethpage, Nassau County, New York (NYSDEC Site Numbers 1-30-003A and B, respectively) requires that as part of the selected remedy (i.e., Remedial Alternative 3), that a public water supply contingency plan for the design, construction, operation and maintenance of wellhead treatment systems and/or the evaluation of comparable alternative measures, if necessary, be developed. The April 2003 ROD issued by the Navy for OU2 contains similar language in this regard. This plan was prepared to satisfy this ROD requirement.

Public Water Supply Contingency Plan Elements

This Public Water Supply Contingency Plan (PWSCP) consists of five main elements, as follows:

- Groundwater Modeling
- Trigger Values
- Outpost (Early Warning) Monitoring Wells
- Groundwater Monitoring of Outpost Monitoring Wells
- Wellhead Treatment/Comparable Alternative Measures

These plan elements are discussed in detail below.

Groundwater Modeling

A groundwater flow and solute transport model was constructed and used by ARCADIS G&M, Inc. (ARCADIS) to estimate the future migration of the groundwater contaminant plume attributable to the NGC and NWIRP sites. Specifically, the model was used to: (1) evaluate the approximate timing of plume arrival at public supply wells that are located downgradient of the lower portion of the plume's leading edge that is anticipated to impact the public supply wells, (2) determine the approximate total volatile organic compound (TVOC) concentrations

anticipated to impact the public supply wells, (3) establish trigger values for initiating remedial measures, and (4) establish the horizontal location of each proposed outpost monitoring well along with its' screen setting. The model was developed using hydrogeologic and water quality data collected from existing monitoring wells and vertical profile borings (VPBs) drilled in the vicinity, and also accounts for the effects of public supply well pumpage in evaluating plume migration. Appendix A summarizes the methodologies used and results of the groundwater modeling performed.

Pumpage data and information related to the future plans of the water districts for expansion or modification of wellfield pumping rates (if any) will be requested from the potentially affected water districts and will be evaluated on an annual basis. This evaluation will determine whether an update to the existing model to reflect the modified pumping scheme and an additional modeling run(s) is required to assess the effect, if any, of the modified pumping scheme on contaminant flow paths. If such modeling efforts suggest that a water supply well may be impacted within five years and it has been further determined that the projected contaminant flow path will not intercept an existing outpost monitoring well, then an additional outpost monitoring well(s) would be designed, installed, and monitored. The evaluation of the future pumpage plans, decision on remodeling, and any remodeling results will be presented in the annual groundwater monitoring report submitted to the NYSDEC and TAC group.

Trigger Values

Based on the groundwater modeling conducted, trigger values have been established for each outpost (early warning) monitoring well (see Table A-3 in Appendix A). A trigger value is defined as a specific, site-related VOC concentration detected in a groundwater sample collected from an outpost monitoring well (the list of site-related VOCs are provided in Table 1 of this plan). If groundwater sampling indicates that a trigger value has been reached (and this result is confirmed, as defined in this plan), this signifies that wellhead treatment, or comparable alternative measures, is required and it is time to begin planning wellhead treatment or comparable alternative measures to address the potential for a specific public supply well or well field to be impacted. This process would not preclude the water district(s) from taking any action they deem appropriate. Trigger values have been developed to provide for approximately five years early warning prior to VOCs being detected in the downgradient supply well.

Outpost (Early Warning) Monitoring Wells

Outpost (early warning) monitoring wells will be installed generally south (downgradient) of the delineated lower portion of the TVOC groundwater plume attributable to the NGC and NWIRP sites that is anticipated to impact public supply wells. Ideally these wells, when first installed, will have non-detect results for site related VOCs in groundwater samples collected from them.

By locating the outpost wells between the leading edge of the lower portion of the plume that is anticipated to impact public supply wells and the downgradient public supply wells, regular sampling and analysis of these wells for VOCs will provide early warning of plume migration toward one or more of the public supply wells. The outpost wells will be clustered at specific locations (i.e., several wells of different depths at essentially the same location) to account for the plume thickness, and to be sure that plume migration will be detected. Table A-2 of Appendix A provides details on the screen zones of the proposed outpost monitoring wells and the screen zones of the associated public supply wells. The modeling discussed in Appendix A focused on developing outpost monitoring well locations and trigger values for the first public supply well in each well field to be potentially affected by the plume and, therefore, as shown in Table A-2 of Appendix A, the proposed outpost monitoring well cluster for each well field is intended to monitor potential impacts to one public supply well in each well field. Review of this table shows that some of the outpost monitoring well screens are shallower than the screens of the public supply wells they are intended to monitor. Because the VOC plume is relatively thick and different vertical plume segments are migrating at different velocities, the modeling discussed in Appendix A focused on the fastest moving plume segment near each potentially impacted public supply well field that could result in VOC detections in the public supply well(s).

The fastest moving plume segment near each public supply well field, at a five-year groundwater travel time distance upgradient from each potentially affected public supply well field, was selected as the proposed screen zone for one of the outpost monitoring wells for each wellfield as it would provide the earliest warning of the advancement of the plume. As a conservative measure, an outpost well was also proposed for the second fastest moving segment of the plume. Because of the complexities of the three-dimensional migration of the plume and the five-year groundwater travel time distance of the outpost monitoring wells from the public supply wells, it does not necessarily hold that an outpost monitoring well would be screened at the same depth horizon as the corresponding public supply well, and as can

be seen from Table 2 of Appendix A; only some of the outpost well screens overlap the same screen zone depth horizon as the public supply wells they will monitor.

Figures A-2 through A-5 of Appendix A provide the locations of the proposed outpost monitoring wells and the associated public supply wells. The outpost wells are to be located generally north of the public supply well fields to be monitored, which is intuitive as the lower portion of the plume's leading edge that is anticipated to impact public supply wells is currently located north of the well fields and is migrating generally to the south/southeast (the regional groundwater flow direction). However, as shown on Figure A-2, Outpost Well Cluster 1 is proposed to be located due west of the South Farmingdale Water District (SFWD) Well Field 1 and specifically, west/northwest of Well 4043, the first well expected to be impacted in the well field. At this location, modeling indicates that the relative position of the plume and local stresses imposed on the groundwater flow field by pumping the SFWD Well Field 1 supply wells will result in plume impacts to the well field from the west.

Currently, outpost monitoring wells are planned for SFWD Well Fields 1 and 3, New York Water Service (NYWS) Wells 3S and 4S, and Town of Hempstead (TOH) Water District Well 13 (total of 4 outpost well locations; total of 9 outpost wells). Modeling does not predict an impact to occur at Well 5303, however as a conservative measure an outpost well cluster will be installed for this well. Water quality data collected from the proposed outpost wells, as well as data collected from public supply wells they specifically monitor, will also provide very early warning of the advancement of the plume toward the supply wells operated by the Massapequa Water District (MWD); although groundwater modeling does not predict an impact to the MWD wells within the next 30 years. If the outpost monitoring wells and the wells/well fields they will monitor become impacted by site-related VOCs, the need for MWD specific outpost monitoring wells will then be assessed. This assessment will be carried out by entering water quality data from the impacted outpost wells and public supply wells into the model and then carrying out model runs to determine if the MWD wells will be impacted. If an impact is predicted then locations and screen intervals for MWD specific outpost wells will be developed and the timing of outpost well installation will be determined.

Appendix B contains the work plan that covers installation of the proposed outpost monitoring wells.

Groundwater Monitoring of Outpost Monitoring Wells

The nine proposed outpost monitoring wells (see Table A-2 of Appendix A) will be sampled on a quarterly basis as part of the NYSDEC-approved OU2 Groundwater Monitoring Plan, Northrop Grumman Corporation, Bethpage, New York (ARCADIS, 2001). The nine wells will be sampled for VOCs using dedicated submersible pumps and inflatable packers. The groundwater samples will be analyzed in the laboratory for the Target Compound List (TCL) of VOCs using United States Environmental Protection Agency (USEPA) Method 502.2. In addition to the outpost monitoring well data, VOC water quality information from the four public supply well fields being monitored will be requested from the water districts, and these data will be reviewed and used to complement the outpost monitoring well data developed.

Wellhead Treatment/Comparable Alternative Measures

Wellhead treatment, or comparable alternative measures, for a public supply well or well field will be required and provided if trigger values for individual site specific compounds (see Table 1) are reached (and confirmed as described in this plan – see Figure 1).

Plan Implementation

Some of the tasks that comprise this plan have already been completed (i.e., groundwater modeling to determine outpost well locations, screen settings, and trigger values) while others have yet to occur (i.e., installation and monitoring of outpost wells).

Once this plan has been reviewed and approved by the NYSDEC, the following steps will occur:

- Installation of the nine proposed outpost monitoring wells (see Figures A-2 through A-5 of Appendix A for proposed outpost well locations).

- Initiation of quarterly sampling of the outpost wells and obtain public supply well VOC data.

- The sequence of sampling, data review, and wellhead treatment will proceed as detailed on Figure 1.

- If a trigger value(s) is met or exceeded in one or more outpost wells then the well(s) where the trigger value has been reached will be resampled two additional times for confirmation, as the trigger values are very close to the analytical method detection limit and there is an approximate five-year travel time between the outpost well and the public supply well. The first re-sampling will occur within approximately one week of the determination that the trigger value was reached. The second resampling will occur approximately one week after the first re-sampling.

- Based on the analytical results of the initial and confirmation samples described above, if all three samples indicate that the trigger value(s) has been reached for site specific compounds, (as described below) then negotiations with the potentially affected water district(s) will commence.

Reaching or exceeding a trigger value is defined as follows:

- Only validated analytical results for site specific compounds (see Table 1) will be considered in the determination as to whether a trigger value has been reached or exceeded.

- Estimated values (i.e., "J" qualified data) will not be counted toward the trigger value. Site specific VOCs that individually equal or exceed a trigger value, will be confirmed to have met/exceeded the trigger value if, after two resamplings, site specific compounds individually equal/exceed the trigger value.

- The same compound must meet/exceed the trigger value in all three samples for the result to be confirmed.

Reporting

All analytical testing results will be provided on a two-week turnaround following submission of the samples to the laboratory. Following receipt of analytical results from the lab, the data will be validated. If, following data validation, it is determined that the trigger value(s) is reached, then re-sampling will be carried out as discussed above and notification will be provided to NGC, the Navy, and the NYSDEC. Subsequently, within two weeks of receipt of complete sample results for all sampling rounds, if it has been confirmed that a trigger value(s) has been reached than a data report (validated data) will be prepared and submitted to NGC, the Navy, the NYSDEC and the potentially affected water district(s) informing them of the results.

If the quarterly sampling of the outpost wells does not indicate that a trigger value has been reached, then the data will be reported in the regular quarterly reports and not as a special data report.

Discussions/Negotiations with Potentially Affected Water District(s)

As indicated on Figure 1, once the trigger value(s) has been reached and confirmed (from three consecutive samples as described above), wellhead treatment or comparable alternative measures, will be required and pre-design discussions/negotiations will commence between NAVY/Northrop Grumman and the potentially affected water district(s) so that funding for wellhead treatment or comparable alternative measures can be negotiated and provided to the water district(s).

Design, Construction, Operation and Maintenance of Wellhead Treatment/Comparable Alternative Measures

Once the negotiations are complete and a financial agreement has been reached by the parties, the potentially affected water district(s) will be responsible for the design, construction, operation and maintenance of wellhead treatment or a comparable alternative measure.

Table 1. List of Volatile Organic Compounds Associated with the Northrop Grumman Corporation and U.S. Navy/NWIRP Facilities, Bethpage, New York.

CAS Number	Compound Name	Common Abbreviation
75-15-0	Carbon disulfide	--
56-23-5	Carbon tetrachloride	--
108-90-7	Chlorobenzene	--
67-66-3	Chloroform	--
79-01-6	Trichloroethene	TCE
156-59-2	cis-1,2-Dichloroethene	cis-1,2-DCE
156-60-5	trans-1,2-Dichloroethene	trans-1,2-DCE
127-18-4	Tetrachloroethene	PCE
76-13-1	1,1,1-Trichloro-2,2,2-trifluoroethane	Freon 113
540-59-0	1,2-Dichloroethene	1,2-DCE
107-06-2	1,2-Dichloroethane	1,2-DCA
75-35-4	1,1-Dichloroethene	1,1-DCE
75-34-3	1,1-Dichloroethane	1,1-DCA
79-00-5	1,1,2-Trichloroethane	--
79-34-5	1,1,2,2-Tetrachloroethane	--
71-55-6	1,1,1-Trichloroethane	1,1,1-TCA

Footnotes:

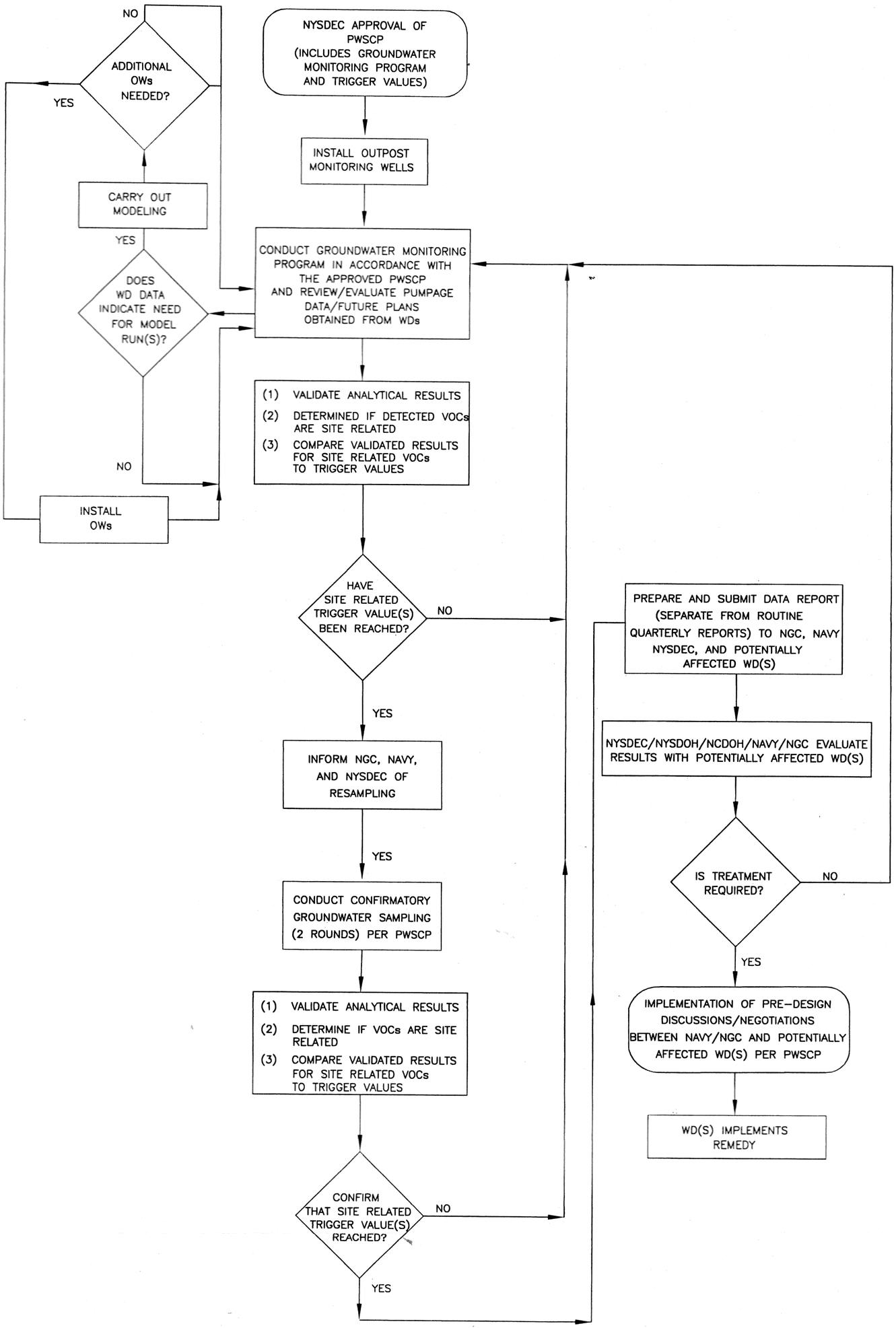
1.) The complete Target Compound List of VOCs will be analyzed during each sampling event.

2.) Compounds identified based on ARCADIS G&M, Inc. GIS/Key database updated through April 11, 2003.

3.) The compounds listed above were selected for inclusion in the list of site-related VOCs based on the following criteria:
- Frequency of detection in valid groundwater samples
- Location of detection (i.e., on-site, off-site, upgradient)
- Known source areas
- Observed biotransformation processes

4.) For the purposes of this table, the term site refers to the Northrop Grumman Corporation and Navy/NWIRP Facilities, Bethpage, New York.

NWIRP Naval Weapons Industrial Reserve Plant
VOC Volatile Organic Compound
CAS Chemical Abstract Service
-- Not Applicable



PWSCP	PUBLIC WATER SUPPLY CONTINGENCY PLAN
NYSDEC	NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
VOCs	VOLATILE ORGANIC COMPOUNDS
NGC	NORTHROP GRUMMAN CORPORATION
NYSDOH	NEW YORK STATE DEPARTMENT OF HEALTH
NCDOH	NASSAU COUNTY DEPARTMENT OF HEALTH
WD	WATER DISTRICT
OW	OUTPOST WELL

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