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LETTER AND COMMENTS REGARDING DRAFT REMEDY OPTIMIZATION TEAM REPORT FOR GROUNDWATER PLUME REMEDY OU 3 NWIRP BETHPAGE NY
05/16/2011
NORTHROP GRUMMAN

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NORTHROP GRUMMAN

May 16, 2011

Ms. Karla J. Harre, PE
Supervisory Environmental Engineer
Technology Applications Branch
Environmental Restoration Department
NAVFAC Engineering Service Center
1100 23rd Avenue
Port Hueneme, California 93043

Re: Northrop Grumman Systems Corporation Comments on the Draft Remedy Optimization Team Report for the Bethpage Groundwater Plume Remedy, dated April 29, 2011

Dear Ms. Harre:

The purpose of this letter is to provide comments on the "Draft Remedy Optimization Team Report for the Bethpage Groundwater Plume Remedy" (hereinafter "Optimization Report"), dated April 29, 2011. We have summarized conclusions and recommendations presented in the Optimization Report (***bold italicized font***), followed by Northrop Grumman's comments (normal font).

1. ***Evaluation of Effectiveness of Monitoring Network for Off-Site Plume***

   - ***Better definition of the western boundary of the regional plume ("Bethpage plume") is needed.***

     We agree that better definition of the western boundary of the regional plume is needed. The impacts of the former Hooker/RUCO site, a known significant source of groundwater contamination located on the far western plume boundary, have not been adequately characterized in this area and should be the focus of any additional investigations. Please revise the Optimization Report to reflect this information.

   - ***Better definition of the eastern boundary of the regional plume is needed.***

     Regarding the investigations conducted by Northrop Grumman, we disagree that the plume is not well defined along its eastern boundary. Northrop Grumman delineated the horizontal and vertical extent of impacted groundwater on and downgradient of the Bethpage Community Park (Park) during the OU3 remedial investigation (RI), as shown in Figure 5-7 in the Site Area RI Report and Figure 4 in the Study Area RI Report. During the RI, five vertical profile borings (VPBs) were drilled along the eastern boundary of the plume and groundwater was sampled from multiple discrete intervals (110 to 804 feet below land surface) for analysis of volatile organic compounds (VOCs). Data from two VPBs drilled by the Navy were also used. We request that the referenced data be further evaluated and that the Optimization Report be revised to reflect that: 1) Northrop Grumman has adequately delineated the eastern portion of the regional plume and 2) any additional definition of contamination along the eastern boundary should be directed at known sources of groundwater contamination in that area, such as those identified in Figure B7 in the Optimization Report.

- ***Better definition of the impacts to the regional plume by parties other than the Navy and Northrop Grumman is needed.***

  We agree that the impacts from sources other than the Navy and Northrop Grumman need to be fully characterized. This broader evaluation of potential sources is crucial to an understanding of the nature of the regional plume and to developing a comprehensive area-wide approach to groundwater remediation. The Optimization Report identifies a number of neighboring CERCLA and RCRA sites whose impacts on regional groundwater should be better characterized. Northrop Grumman has also undertaken an effort to identify potential sources of impacts to the regional plume and will provide that information to the Remedy Optimization Team in the future.

- ***Data collection should be coordinated among the various parties involved in evaluating the regional plume.***

  Northrop Grumman agrees that coordinated data collection and data sharing with other parties should be exercised to the extent practicable. We have historically shared, and continue to share, data collection and the resulting environmental data with the Navy, regulatory agencies, and water districts.

2. ***Evaluation of On-Site Remedy***

- ***Better definition of vertical groundwater capture in deeper groundwater is needed downgradient of the On-site Containment System (ONCT) and Park Groundwater Interim Remedial Measure (IRM) recovery wells to determine whether on-site sources are being contained.***

  The performance of the Park Groundwater IRM does not need to be established in deeper portions of the aquifer. As demonstrated during the Site Area RI, the groundwater impacts at the Park are shallow. The vertical distribution of VOCs along the southern boundary of the Park (and adjacent Plant 24 Access Road) was defined using 15 VPBs, as presented in Figure 5-16 in the Site Area RI Report. The VPB data show that the vertical extent of the Park VOC plume is limited to shallow groundwater (a maximum depth of approximately 80 feet below the water table). Based on the results of the VPB drilling, the Park IRM was designed to hydraulically contain VOCs in shallow groundwater. Please revise the Optimization Report to reflect these facts and that there is no need to establish the IRM's performance in deeper portions of the aquifer.

  The response to the next comment addresses definition of vertical capture at the ONCT system.

- ***Better definition of horizontal groundwater capture is needed near the ONCT and IRM recovery wells.***

  Northrop Grumman is presently evaluating the sufficiency of the monitoring well networks for the ONCT and Park Groundwater IRM to demonstrate horizontal and vertical capture. The results of those evaluations will be reported in forthcoming operation, monitoring, and maintenance (OM&M) reports for both systems. Please revise the Optimization Report to reflect this information.

- ***Do not reduce the pumping rate of RW-19 in the near term to allow a higher pumping rate in proposed RW-21 (unless concentrations drop significantly) because the tradeoff in VOC mass recovery is not clear.***

  The current pumping rate for Well 19 was determined during design of the ONCT system to capture the eastern portion of the identified on-site OU2 plume. During design, it was determined

that the Well 19 capture zone extended well beyond what was needed to capture the eastern portion of the OU2 plume. Addition of Well RW-21 discharge to the OU2 treatment plant will require a reduction in Well 19's pumping rate (from 700 gallons per minute [gpm] to 200 gpm). However, groundwater modeling conducted during the Study Area FS indicated that the combination of RW-21 pumping at 1,000 gpm and Well 19 pumping at a reduced rate to 200 gpm will result in effective capture of the eastern portion of the OU2 plume, without loss of on-site containment. In terms of tradeoffs in VOC mass recovery, RW-21 is designed to capture the highest VOC concentrations observed anywhere in the offsite regional groundwater plume. RW-21's contribution to the overall VOC mass recovery from groundwater is expected to far exceed that associated with Well 19. Please revise the Optimization Report to reflect these facts.

3. ***Conceptual Site Model (CSM)***

- ***Develop an area-wide CSM to identify multiple sources of contamination and use it as a tool to guide future work.***

  We agree that developing an area-wide CSM would provide a valuable tool for use in identifying and characterizing multiple sources of contamination and supporting a regional groundwater solution.

4. ***Evaluation of Remedy for Off-Site Hot Spot and Plume***

- ***Multiple sources contribute to the composite off-site plume, which makes tracking the plume and evaluating off-site remedies challenging.***

  We agree that multiple sources contributing to the regional plume create significant challenges to effective characterization of impacted groundwater and development of remedial approaches. As discussed in our previous comments, better characterization of these multiple sources and use of a well conceived area-wide CSM should make these tasks more manageable and yield improved results.

- ***Treatment or containment of the OU3 "hotspot" should reduce 90 percent of the mass discharge moving through a vertical aquifer cross section downgradient of the recovery system.***

  The OU3 "hot spot" is recognized as a portion of the regional groundwater plume characterized by high VOC concentrations (over 5,000 parts per billion [ppb]) and located upgradient of Bethpage Water District's Plants 4, 5 and 6. The location (both horizontally and vertically) and pumping rate associated with proposed remedial well RW-21 were developed to maximize containment and cleanup of this "hot spot". A rigorous data evaluation and groundwater capture zone analysis were conducted when developing the proposed RW-21 remedy. Based on the current plume configuration and the results of the capture zone analysis, we estimate that proposed RW-21 will contain at least 90 percent of the mass flux through a plume cross section in the RW-21 area. This estimate is based on the fact that the proposed remedy was designed to capture not only the plume core (i.e., the "hotspot") but also a substantial portion of the plume upgradient of the proposed RW-21 location. Work conducted as part of the final RW-21 design will include additional aquifer characterization (e.g., vertical profile borings, well and piezometer installation) and additional flow modeling and particle tracking to optimize plume containment and mass removal (estimated to be greater than 90 percent). Please revise the Optimization Report to reflect the information provided above. It would also be helpful if the Optimization Report provided an understanding of the basis for the recommended 90 percent reduction in mass discharge.

- ***Delineate water levels and water quality near the recovery system.***

  Additional aquifer characterization (via vertical profile borings, well and piezometer installation) will be conducted as part of the final RW-21 design. After system start up, water levels and water quality will be monitored routinely as part of the system effectiveness monitoring program. Please revise the Optimization Report to reflect this information.

- ***Conduct routine flow modeling and particle tracking, with regular model recalibration and reporting, to confirm the effectiveness of the recovery system.***

  As described above, the final RW-21 design will include additional flow modeling and particle tracking. However, once Well RW-21 is operational, the effectiveness of the recovery system will be based primarily on collection and graphical evaluation of field data (e.g., water level contouring to evaluate the capture zone, water quality trends in key monitoring wells, evaluation of vertical gradients). Please revise the Optimization Report to reflect this information and to acknowledge that routine modeling and particle tracking are not the only means of confirming the effectiveness of the recovery system.

5. ***Role of Models and Modeling***

- ***There is a need for realistic modeling expectations and recognition of the inherent limitations of using solute transport modeling to predict plume travel time, arrival concentrations, and cleanup times at such a large and complex site.***

  Northrop Grumman agrees with the conclusion that there are inherent limitations in any modeling effort at such a large and complex site, particularly solute transport modeling. Solute transport modeling has played a limited role in Northrop Grumman's remedial activities; however, as acknowledged in the Optimization Report, certain water districts and local politicians have used the findings of the recently issued USGS report on the Bethpage model to argue that the model is under-predicting travel times and contaminant concentrations. The Bethpage model represents state-of-the-art groundwater computer modeling for such a complex site and has served as a valuable tool (along with empirical data) to design and implement remedies to protect groundwater; the Optimization Report should reflect this information.

- ***Flow modeling and particle tracking should be used to determine the capture zones of the ONCT and IRM systems and new remedial well(s).***

  Northrop Grumman used groundwater flow modeling and particle tracking to determine the capture zones of the ONCT and IRM systems during their design. For the ONCT system, particle tracking was used to determine the target capture zones of various recovery well remedial scenarios (using existing Northrop Grumman production wells and proposed new recovery wells). Particle tracking was also used to determine the location, depth, pumping rates, and resulting capture zones of the Park Groundwater IRM recovery wells. The modeling results, capture zone determinations, and resulting remedial system designs for the ONCT and IRM were submitted to, and approved by, NYSDEC. Flow modeling and particle tracking were also used to determine the location, depth, and pumping rate for proposed new recovery well RW-21. Prior to recommending RW-21 in the Study Area FS as the off-site plume remedy, various other pumping well configurations were also evaluated using flow modeling and particle tracking. The conceptual design for RW-21 was approved by NYSDEC in the Study Area FS. Please revise the Optimization Report to reflect these facts.

6. Other

- **Lithological Cross Sections (Appendix B)**

  A number of the interpretations of low-permeability units appear to be inaccurate and not consistent with the depositional environment of the Magothy formation or the findings of the USGS and others that zones of low permeability are, for the most part, laterally discontinuous. For example: 1) some low permeability units show no dip; 2) other units show a steep dip; 3) other units arch upward; 4) various lithologic descriptions are correlated as one continuous low-permeability unit; and 5) relatively thin units are interpreted to be continuous over considerable distances. Also, the cross sections present an overly-simplified plume depiction. More detailed contouring of VOC concentrations may lead to a better understanding of plume stratification and potential sources, especially on Section B-B'. The Study Area RI Report provides a detailed analysis of VOC concentrations along a line of section similar to Section B-B' (Figure 5). Also, as stated in the Navy Work Plans, the objective of drilling to depth and mapping the upper surface of the Raritan Confining unit does not appear to have been achieved.

Please contact us if you have any questions or need any additional information.

Sincerely,

Kent Smith,
EHS&M Manager
Northrop Grumman Systems Corporation

cc: Nicole Bujalski, EPA
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