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ENGINEERING & CONSULTING SERVICES

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Tina M. O'Rourke, Business Manager  
Horsham Water & Sewer Authority  
617 Horsham Road  
Horsham, PA 19044

Reference: 14-08015 – Review of Remedial Investigation Report Per and Polyfluoroalkyl Substances Investigation Activities for NASJRB, Draft Version: 1

Dear Ms. O'Rourke:

On behalf of the Horsham Water and Sewer Authority (HWSA), we have reviewed the following:

- Remedial Investigation Report (RIR), Per and Polyfluoroalkyl Substances (PFAS) Investigation Activities for NASJRB Willow Grove, PA, DRAFT, Version: 1, by Resolution Consultants, dated December 20, 2018.

### **Summary**

The Remedial Investigation (RI) of NASJRB Willow Grove on behalf of the Naval Facilities Engineering Command (Navy) began in 2014. Previous remedial investigation documentation was provided by Resolution Consultants (Resolution), in the report "Remedial Investigation Data Summary Report" (2016). Within the 2016 report, Resolution recommended additional remedial investigative work be performed in 2017, including installation of additional wells, collection of groundwater, soil boring, sediment and surface water samples. The December 20, 2018 Draft report discusses all of the remedial investigation activities performed to date, with particular focus on the recent work performed in 2017 and 2018. The purpose of our review was to evaluate the information relevant to HWSA.

### **Investigation Process**

The Navy has been following the CERCLA process in their investigation of PFAS. The current Draft RIR is an intermediate step of this process. Following the completion of this report, additional remedial investigations are planned.

During the ongoing investigations, the Navy has completed several "removal actions," including:

- Reduction of the volume of stormwater discharging off base to local surface waters.
- Completion of a Time Critical Removal Action (TCRA) to provide treatment to HWSA public water supply wells, and connect residents with impacted private wells.
- Completion of a TCRA to excavate the most highly contaminated soils (concentrations above 1,027 ug/kg) on the NASJRB site.

### Onsite Groundwater Well Installation and Sampling

For the purposes of the Remedial Investigation, thirty-eight (38) monitoring wells have been installed onsite in clusters of one to three on Navy Willow Grove property. During installation of the monitoring wells, soil and rock samples were collected and lithology observed in samples was generally consistent with mapped formations. Subsurface geology of the Willow Grove site is dominated by siltstone, siltstone/shale and sandstone. Geologic investigation confirmed the bedding orientations previously described by others. Additional evaluation of fracture orientations is presented within the report and generally indicated shallow dipping fractures with a few vertical fractures identified.

Groundwater elevation was evaluated via screened intervals in groundwater wells onsite. Intervals included shallow zones (0-100 ft bgs), intermediate zones (100-200 ft bgs) and deep zones (>200 ft bgs). When mapped, these zones show very similar groundwater flow direction and gradient magnitude while remaining generally parallel with the ground surface. Resolution concludes that this indicates direct communication between all aquifer zones.

A total of 77 groundwater samples was collected and analyzed for 14 individual compounds identified in USEPA Method 537 modified. The EPA 537 method was originally for drinking water and the "modified" method is for environmental media.

### Resolution Consultants Evaluation of Results

To aid in the investigative process, Resolution established Project Screening Levels (PSLs) which provide a reasonable concentration for comparing sampling analytical results and performing human health risk assessments. Groundwater PSLs for this Remedial Investigation were based upon the currently available guidance. These include USEPA's Lifetime Drinking Water Health Advisory Levels of 0.07 ug/l (equivalent to 70 ppt) for PFOS and PFOA and the EPA's Risk Based Tap Water Screening Levels. PFBS was also assigned a screening level based on EPA 2018 guidance.

Results of groundwater analysis indicated PFBS was not detected in groundwater above the human health groundwater PSL while PFOS and PFOA exceeded PSLs across the site.

The highest concentration of PFOA was detected in monitoring well 05MW01S in the vicinity of Site 5 Fire Training Area, including concentrations of 30.2 ug/L (equivalent to 30,200 ppt) and 37.7 ug/L (equivalent to 37,700 ppt) in 2016 and 2017, respectively.

The highest concentrations of PFOS were found at monitoring well BWM15-42 in the area north of Building 680 in the Hangar Area, including concentrations of 86.1 ug/L (equivalent to 86,100 ppt) and 99.5 ug/L (equivalent to 99,500 ppt) in 2016 and 2017, respectively.

Resolution performed various human health risk assessments to convey the risk of potential exposure to different materials contaminated with PFAS. The following have been listed as receptors and potential complete exposure pathways involving groundwater:

- Future On-Site Worker - exposure to groundwater through ingestion of drinking water (provided groundwater returns to being a source of drinking water);
- Current/Future Construction/Utility Worker – exposure to groundwater in an excavation trench through incidental ingestion within the trench;
- Hypothetical Future On-Site Resident – exposure to groundwater through ingestion of groundwater (hypothetically assuming groundwater returns to being a source of drinking water).

Resolution did not perform human health assessments for off-site users of public drinking water supply.

### Conceptual Site Model

The conceptual site model provided identifies potential source areas, secondary source areas, a summary of PFOS and PFOA distribution, migration pathways and potential exposure routes for human and ecological receptors.

Of interest to HWSA, the primary potential source areas include the Hangar Area, Site 5 (Fire Training Area), Building 177 and Site 4 (the North End Landfill). Secondary source areas include stormwater sewers and stormwater basins, and the Site 7 abandoned rifle range. All sitewide media sampled has been found to be impacted by PFAS contamination. These media include surface soil, subsurface soil, groundwater and surface water.

PFAS are considered easily transported via water, unlikely to volatilize, do not readily sorb to soil and do not readily degrade by most natural processes.

### Additional Investigations

Resolution recommends the following additional investigations that are relevant to HWSA groundwater supplies:

1. Evaluation of the soil to groundwater pathway.
2. Installation of additional monitoring on-site and off-site.
3. Aquifer testing in coordination with USGS.
4. Further groundwater sampling including evaluation of seasonal trends.
5. Further evaluation of the storm sewer system on the Navy property, to identify possible groundwater inputs.
6. Further evaluation of surface water trends in tributaries with flow originating from the Navy property.

### G&A Comments (provided for consideration by the Navy):

1. The Draft Remedial Investigation Report repeats earlier reporting that indicated that offsite drinking water receptor pathways were incomplete due to the installation of treatment systems at public water supply wells. We note that public water supply treatment systems are interim remedial actions, and do not provide final remedies to the impacts to the public water supply.
2. The Draft Remedial Investigation Report lists the Draft study prepared by the Agency for Toxic Substances and Disease Registry (ATSDR), dated June, 2018 as a source of human health toxicity information. The ATSDR study provides lower toxicity levels for PFOS and PFOA in drinking water than were used in the EPA Health Advisory Levels (2016). Will the Navy be obligated under CERCLA to consider the ATSDR toxicity information when considering goals for remediation of groundwater?
3. It is possible that HWSA supply wells have been impacted by PFAS that traveled through multiple pathways, including soil-to-groundwater, surface water-to-groundwater, and pathways involving

sediments near stream channels. We recognize and support the recommendation made in the Draft RIR, for further investigation into these pathways.

4. The Draft RIR discusses fracture orientations and notes that vertical fractures were mostly absent in the monitoring well boreholes. We recommend consideration of fracture trace analysis and surface geophysical methods to locate potential areas of increased groundwater flow, including vertical or near vertical fractures.
5. We request that HWSA be added to the list of organizations receiving updates regarding aquifer testing.
6. Due to the multiple reports and multiple agencies performing reports, we recommend some guidance to the nontechnical public as part of the report about where the report stands in the remediation process. For example, at some of the quarterly Restoration Advisory Board Meetings, the Navy has presented a slide that outlines the CERCLA process; perhaps a simple figure or table could be added to the beginning of the document to aid in understanding of the public.

We note that the Navy remedial investigations are ongoing and will further evaluate the extent of contamination and long-term solutions. We appreciate the ongoing communication.

Should you have any questions please do not hesitate to contact me.

Sincerely,



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