RESTORATION ADVISORY BOARD MEETING
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NWIRP), CALVERTON
CALVERTON COMMUNITY CENTER, CALVERTON, NEW YORK
TUESDAY, NOVEMBER 14, 2017

The forty-seventh meeting of the Restoration Advisory Board (RAB) was held at the Riverhead Senior Center. Meeting attendees included representatives from the Navy (Joseph McCloud), New York State Department of Environmental Conservation (NYSDEC) (Karen Gomez, Stephen Malsan, Henry Wilkie), Suffolk County Department of Health Services (SCDHS) (Andrew Rapiejko), Town of Riverhead (Dawn Thomas, Drew Dillingham), Suffolk County Legislature (Al Krupski), RAB Community Members (Lou Cork, Vincent Racaniello, Sid Bail [representing the Wading River Civic Organization]), the public (Andrew Freleng, Elaine & Mark McDuffie, Jane Todd), Arcadis (Robert Porsche), Resolution Consultants (Robert Forstner, Michael Zobel), Tetra Tech (David Brayack, Melissa Cushing, Kristi Francisco), and KOMAN Government Solutions (Stephane Roy). The sign-in sheet is included as Attachment 1.

WELCOME AND AGENDA REVIEW

The Navy representative, Mr. Joseph McCloud, welcomed everyone to the RAB meeting and introduced the meeting agenda. The agenda for the meeting is included as Attachment 2. The Navy presentations are included in Attachment 3.

DISTRIBUTION AND APPROVAL OF MINUTES

Mr. McCloud asked whether the RAB members received the RAB meeting minutes from the April 2017 meeting, and if there were questions or comments on the minutes. There were no comments, and the minutes for the April 2017 RAB meeting were approved.

COMMUNITY UPDATE

Mr. Vincent Racaniello (RAB co-chair) opened the floor to community members for topics of general discussion, but there were no general updates or questions posed and the technical presentations began.

TECHNICAL PROGRESS – GENERAL OVERVIEW OF INSTALLATION RESTORATION SITES

Mr. McCloud then introduced the technical portion of the meeting, which consisted of presentations on the Interim Action Record of Decision (ROD) and supplemental investigations at Site 2, and current activities at Sites 6A/10, 7 and the Southern Area.

TECHNICAL PROGRESS – SITE 2 INTERIM ACTION ROD

Ms. Kristi Francisco (Tetra Tech) provided an overview of the interim action ROD for Site 2. The presentation is included in Attachment 3. The presentation began with a summary history of the site. Site 2 is located on property that remains under Navy ownership, and was an active Fire Training Area from

the 1950s until 1996. As a result, soil and groundwater have been impacted by petroleum, chlorinated solvents, and other chemicals. In addition, potential residual munitions and explosives of concern (MEC), which likely originated at the cannon test area, are present at Site 2.

A conceptual site model for the site was presented, for purposes of identifying the types and locations of potential contaminants, and potential receptors. Contaminants included two plumes of volatile organic compounds (VOCs) designated as the western and eastern plumes, xylene-contaminated soil, and MEC-impacted soils; however, it was noted that most of the site had been cleared to a depth of 18 inches as a result of prior MEC removal actions. Potential receptors include construction workers that will be onsite during remedial work, and recreational users or trespassers traversing the site.

The selected interim remedy was presented in the Proposed Plan, which was released in March 2017 and followed by a public comment period from March 16 through June 14, 2017. Several comments were received regarding the alternatives for VOC remediation, including:

- More data should be collected to further define the nature and extent of VOC, 1,4-dioxane and perfluoroalkyl substances (PFAS);
- A need to assess potential for vapor intrusion into off-property structures; and
- A need for land use controls (LUCs) for VOCs in off-property areas.

The Navy agreed that more information was needed for 1,4-dioxane and PFAS characterization, and that implementation of a remedy to address VOCs in groundwater would be delayed while these data gaps were addressed. The supplemental investigations planned to address these data gaps are the subject of separate presentations made later in the meeting. However, potential MEC is still present and a risk to human health and the environment, and as such the Navy would proceed with an Interim Action ROD to address this specific issue.

The proposed remedy was then described in detail. The remedy consists of: consolidation of off-property material; regrading, clearance and surface stabilization; LUCs; and maintenance as required for erosion control. The capital cost of the remedy was estimated at $2.6 million, with annual costs of $26,000 to $56,000 and a 30-year cost of $3.6 million. The location and nature of the off-property consolidation was then described to consist of excavation of MEC-impacted areas outside of the Navy property line until native soils were reached, and relocation of that material to the Navy parcel. A MEC technician would survey excavated areas to confirm removal of MEC, and then backfill would be placed to restore the grade. A typical cross-section of the on-property remedy, showing the relationship of potential residual MEC, previously-excavated areas, a minimum 18-inch depth of MEC-cleared soil over the potential residual MEC soils, and installation of top soil and vegetative cover was then presented.

The path forward was described to consist of a ROD to be issued in December 2017, a Remedial Action Work Plan to be issued in January 2018, and construction to begin in spring 2018. Mr. Andrew Rapiejko

(SCDHS) inquired about the depth of removal for off-property areas. Ms. Francisco confirmed that the depth of removal of potentially MEC-impacted soils in off-property areas will not be only 18 inches, but that removal would be completed until native materials are observed. There is a noticeable difference in the placed material that may be impacted by MEC as opposed to the underlying native soil, and that this is probably on the order of five to six feet below existing grade for the off-property area based on historic data.

Mr. Rapiejko then inquired about the ROD specifically, and what would be done about VOCs since they were not addressed. Mr. David Brayack (Tetra Tech) responding, clarifying that the subject ROD is only an interim ROD specifically to address MEC, and that the issuance of an interim ROD is a necessary step in order to allow the Navy to spend money on the remedy. Mr. McCloud further noted that the interim remedy for the MEC only comprise its own operable unit (OU), OU4. Mr. Al Krupski (Suffolk County Legislature) asked about the size of the screen that will be used to clear excavated material for placement; Ms. Francisco indicated that this was undetermined, but would be small enough to catch the 20mm ammunition fragments that are the primary cause for the MEC designation.

TECHNICAL PROGRESS – SITE 2 SUPPLEMENTAL VOC AND 1,4-DIOXANE INVESTIGATION

Ms. Francisco continued with a description of the supplemental investigation at Site 2 to evaluate VOCs and 1,4-dioxane. The presentation is included in Attachment 3. Plan views showing the areal extent of the VOC plumes from Site 2, namely the western plume (consisting of trichloroethene [TCE]) and the eastern plume (consisting of TCE and xylenes). The western plume was shown extending off-property, beneath Swan Pond towards the “TCE anomaly” area near the Peconic River Sportsman’s Club (PRSC) property southeast of Site 2.

A summary of 1,4-dioxane, and emerging contaminant which has a variety of uses in consumer and industrial products, was also given. Relevant to Site 2, 1,4-dioxane was used as a stabilizer for chlorinated solvents – including 1,1,1-trichloroethane (TCA), which is known to have been used at NWIRP Calverton. 1,4-dioxane is of concern because it moves rapidly through soil and then into and with groundwater; long-term exposure may cause kidney and liver damage. The New York State Department of Health (NYSDOH) does not specifically regulate 1,4-dioxane at the current time, and as such the maximum contaminant level (MCL) for unspecified contaminants of 50 micrograms per liter (µg/L) applies; the United States Environmental Protection Agency (EPA) regional screening level (RSL) is 0.46 µg/L. A screening program for 1,4-dioxane was implemented as part of the 2015 basewide sampling event and it was not detected at the two on-property locations sampled.

In order to further evaluate VOC and 1,4-dioxane in Site 2 groundwater, a supplemental sampling program was implemented in 2017 that included water level measurement at all Site 2 monitoring wells (to establish groundwater flow patterns), VOC testing at 11 monitoring wells, and 1,4-dioxane testing at

31 monitoring wells to evaluate whether 1,4-dioxane is associated with the Site 2 VOC plumes. Data from this program will be analyzed, and next steps determined after the data has been reviewed.

Mr. Rapiejko noted that 1,4-dioxane was detected in several off-property wells when SCDHS collected split samples during prior investigations. Regarding the depiction of the western plume and its proximity to Donahue Pond, Mr. Rapiejko inquired as to whether there are wells between the inferred end of the plume and the pond. Ms. Francisco indicated there was not; Mr. Rapiejko noted the distances involved, and that this depiction suggests 1,4-dioxane is reaching the pond. Mr. Brayack noted that we know TCE does show up in the Peconic River and the PRSC property, so it is possible that it enters Donahue Pond but sampling results indicate that the plume is at a depth of about 50 feet below ground surface.

Mr. Racaniello asked if this means groundwater does not discharge to the pond; Mr. Brayack noted that the pond is in fact caused by an impoundment of the Peconic River and that it is likely flowing out into groundwater, and “forcing” the plume around the pond. Mr. Racaniello asked if sampling could be done in Donahue Pond; Mr. Brayack noted this is possible, but noted that if the plume is discharging directly into the pond it would be doing so at great depth in the middle of the pond, causing dilution.

Mr. Rapiejko noted that not sampling proactively in Donahue Pond seems to convey a different tact than that employed on Site 2, as evidenced by the supplemental sampling program. Mr. Brayack noted that the Navy wants to work with SCDHS on this issue, but there are many questions about how to do this properly. If this was a free-flowing river it would be a simpler question, but the impoundment complicates the site model. Mr. Rapiejko asked if it is then fair to say the Navy agrees further investigation is needed to address 1,4-dioxane, PFAS and VOC migration. Mr. Brayack concurred but noted that differences in the physical properties between the classes of contaminants means the investigation may be different for each class of contaminant.

Mr. Krupski asked how different sources can be differentiated. Mr. Brayack noted that it is very difficult, especially for 1,4-dioxane since it is ubiquitous in consumer products. Anyone with a septic system that used shampoo or deodorant is a potential source; however, because the Navy used solvents and 1,4-dioxane was linked by its use as a stabilizer, evaluation of both contaminants can provide evidence that of the source.

Mr. Rapiejko asked for clarification on what the EPA RSL is. Ms. Francisco noted that it takes into account exposure over a 26-year timeline, and its actual use should be as a jumping-off point for a risk assessment as opposed to a regulatory standard. Asked about next steps by Mr. Rapiejko, Mr. Brayack indicated a risk assessment would be needed to evaluate the risks. The main question is what the state will do in regards to establishing a standard, and that the investigation was completed with low detection limits to maximize the likelihood of the data remaining usable once the state (or EPA) promulgates enforceable standards.

TECHNICAL PROGRESS – SITES 2 & 6A PFAS INVESTIGATION

Ms. Francisco continued with a description of the Site Inspection and facility-wide Preliminary Assessment (PA) begun to evaluate the presence of PFAS in relation to Sites 2 and 6A. The presentation is included in Attachment 3. A description of PFAS, including their uses in various applications for their fire resistance and oil, stain and water repellency, was provided. They are used in a variety of consumer products, including carpets, clothing, upholstery, food packaging and cookware. Industrial applications included firefighting foam and use as coatings and cleaning additives. The EPA is especially concerned about two "long-chain" PFAS, namely perfluoroctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), which are persistent in the environment, mobile, bioaccumulative, and toxic to laboratory animals. The NYSDEC have identified PFOS and PFOA as hazardous substances. The current EPA drinking water health advisory recommends PFOS and PFOA should each be less than 70 nanograms per liter (ng/L), and that when both are present their combined concentration should also be less than 70 ng/L. For reference purposes, a nanogram is one-thousandth of a part per billion (or 1 µg/L), so 1 mg/L is equivalent to 1,000 µg/L or 1,000,000 ng/L.

At NWIRP Calverton, PFAS had applications at multiple locations. Site 2 was used as an active fire training area and aqueous film forming foam (AFFF) was used to extinguish fires. PFAS were used to manufacture AFFF from the 1960s through 2001. In 2016, five on-property and two off-property wells were sampled for PFOS and PFOA as part of a screening program, and PFOS, PFOA or both were detected at each location, with the health advisory exceeded at four of these locations.

In response, a further investigation was planned, with implementation scheduled for November and December 2017. Phase I will include well redevelopment, collection of soil, groundwater and surface water samples, and evaluation and reporting. A Phase II investigation will be planned based on results from the Phase I investigation.

The Phase I program will include five surface soil, ten subsurface soil, four temporary well, 27 monitoring well, one residential well and three surface water samples. Of particular import regarding the soil sampling locations, the difficulty in finding surface soils that hadn't already been disturbed by prior removal actions for MEC and petroleum-impacted soils was noted; this impacted the clustering of soil samples. Asked for clarification regarding symbology on the maps provided, Ms. Francisco noted that the green circles on the sampling plan indicate surface soil sample locations, yellow squares indicate subsurface sample locations and red triangles denote temporary well sampling locations.

Mr. Rapiejko inquired about which PFAS will be analyzed for, and about transformation of PFAS between forms. Ms. Francisco indicated that the EPA Method 537 list of 14 compounds will be used. Mr. Brayack elaborated, noting that it isn't clear there is a good answer at the moment and that multiple rounds of data will be needed. If a continuing source is identified then the question of whether that source is degrading or if the PFAS have adhered to petroleum becomes an issue. Mr. Rapiejko clarified that he was looking for a

broader approach and recognition that a lack of PFOS or PFOA specifically does not mean there is no PFAS issue, but the expanded data from the list of 14 compounds should address that concern. Mr. Brayack noted that the site was known to be used as a fire training area so this is understood. But there is also an issue of PFAS having so many sources (e.g., Teflon) and with so much sampling equipment using Teflon components, sourcing Teflon-free equipment has been an issue. Mr. Krupski asked about the depth to groundwater at Site 2; Ms. Francisco indicated it is between 10 and 20 feet below ground surface.

Regarding Site 6A, aircraft hangars with fire suppression systems utilizing AFFF were located to the north and west, and in the 1980s a “full-dump” test of the AFFF system was performed. The hangars were equipped with trough drains that would have routed impacted water to an industrial waste treatment plant, and AFFF could have also flowed via drainage swales or via the drainage system to McKay Lake. Screening at four wells in 2016 found PFOS, PFOA or both in all four wells, with concentrations exceeding the health advisory at three of these locations.

The Phase I program for Site 6A will include well redevelopment, collection of groundwater and surface water samples, and evaluation and reporting. On-property, 17 monitoring wells and two extraction wells associated with the Fence Line Treatment System (FLTS) will be sampled; off-property, nine monitoring wells and five surface water locations will be samples. An upstream surface water sampling location is included to evaluate off-site sources of PFAS. A Phase II investigation will be planned based on results from the Phase I investigation.

Mr. Krupski inquired as to the screen depths for the wells. Ms. Francisco and Mr. Brayack responded, indicating that the shallow screens are generally at the water table, and the intermediate well screens are generally 30 to 60 feet deeper but that the exact screen placement is based on geology at each specific location.

As part of the PA process, background research including literature searches, interviews of site personnel and site reconnaissance are underway to evaluate potential PFAS release points. Release points may include runways and flight lines, fire training areas, hangars and crash sites, among others. Regarding crashes, the project team is aware of several crashes over the years.

Mr. Sid Bail (Wading River Civic) asked if any of the PFAS investigations might cover lands already conveyed to the town. Mr. Brayack and Mr. McCloud both responded in the affirmative, noting that the hangars are now on town property, and crash sites are located off-property. Since it is known when the use of AFFF started, investigations will start with crashes and training events starting in the early 1960s. Mr. Brayack asked Mr. Rapiejko if SCDHS was interested in split samples; Mr. Rapiejko indicated they were interested in splits only for 1,4-dioxane at the current time.

TECHNICAL PROGRESS –SITE 7 REMEDIAL ACTION UPDATE

Mr. Stephane Roy (KOMAN Government Solutions) then provided an update on the status of Site 7 (the former Fuel Depot). The presentation is included in Attachment 3. A summary of the site history was provided first, noting that an air sparge/soil vapor extraction (AS/SVE) system started operation on a pilot scale in 2005 and at full scale in 2006, and was operated seasonally (April to December) through November 2013. Modifications were made over time to improve performance, but the system reached the end of its functional life, with a major blower overhaul required to continue operation. The system was shut down in November 2013 and routine monitoring began according to the "Performance and Shutdown Evaluation" plan.

A summary of the historic underground storage tank (UST) areas, the layout of injection, monitoring and extraction wells, and system performance was then shown, including a figure depicting the extent of the contaminant plume shrinking over time. Routine sampling activities conducted since system shutdown (including quarterly sampling of seven wells) were then summarized, and contaminant trends were shown. It was noted that four downgradient sentinel wells were added to the network beginning in September 2015, and that groundwater sampling was done on a quarterly basis through December 2015 and on a semi-annual basis beginning March 2016. Groundwater monitoring data was then summarized, including trend charts showing concentrations over time of the contaminants of concern at the seven locations included in the routine monitoring program.

Regarding recent activities, Mr. Roy noted that free product was observed in MW-17S during the semiannual groundwater sampling event in October 2016. At that point, routine gauging of several Site 7 wells began, and free product was bailed when and where observed. The thickness of the free product layer was approximately 1.12 feet when first observed at MW-17S in October 2016; over time, the thickness of this layer decreased to 0.14 feet by February 2017 and 0.21 feet in March 2017. Free product was also observed at a thickness of 1.05 feet at MW-19S beginning in November 2017, then not encountered by February and March of 2017. Similarly, 0.60 feet of free product was observed in MW-16S in January 2017, but none was encountered in February or March of 2017. Three 55-gallon drums (two containing recovered product and one containing used personal protective equipment) were removed from the site in September 2017.

Mr. Robert Forstner (Resolution Consultants) then discussed a subsurface investigation of the free product observations that was conducted in March 2017 as an add-on to a separate Site 6A temporary well program. An in-situ chemical oxidation (ISCO) pilot to address dissolved-phase VOC contamination in site groundwater that was in the planning stages was deferred in favor of further investigation of the free product observations. Five borings were completed in this area, one penetrating the buried slab beneath the former USTs and three borings completed around the apparent edge of the buried slab. No free product was observed at that time, consistent with contemporaneous observations at the permanent

monitoring wells. However, staining, odors and photoionization detector peaks were observed to a depth of about five feet below the buried slab.

A review of historic groundwater and product observation data indicates that the appearance of free product might be tied to decreasing groundwater elevations; when depths to groundwater exceed 20 feet (corresponding to roughly 36 to 36.5 feet in elevation), product begins to appear. This was described as a typical behavior at sites where free product remains adhered to the soil particles within the “smear zone” (the typical range of groundwater table excursion), but when groundwater falls atypically below this range gravity forces the product to de-adhere from the matrix, and the product layer appears. As groundwater rises again, the product layer disappears as it re-adheres to the matrix.

In the near term it was indicated that gauging and recovery (if necessary) would continue, and that further investigation would be needed to design a remedial response. Remedial options under consideration include excavation, source removal via ISCO or targeted AS/SVE, containment via a permeable reactive barrier, or no action. A summary report and recommendations for steps forward would be provided to the Navy at a future date. Mr. Racaniello inquired as to the type of oxidant that would be injected if ISCO were to go forward; Mr. Forstner responded, indicating that it could be any one of several options, including proprietary products, but that permanganate or Fenton’s reagent were the most likely generic options.

TECHNICAL PROGRESS – FENCE-LINE TREATMENT SYSTEM UPDATE

Mr. Roy continued, providing an update on the operation of the FLTS. The presentation is included in Attachment 3. The FLTS was constructed pursuant to the OU3 ROD for Site 6A/10B that was completed in May 2012. The selected remedy calls for LUCs and a system to extract, treat and infiltrate groundwater in order to achieve the remedial goal of containing the spread of a plume of VOCs leaving the site in groundwater.

The FLTS system employs two extraction wells, air stripping equipment, and two infiltration galleries in order to control the VOC plume. Construction started in October 2012 and was completed in October 2013, and system start-up occurred on October 8, 2013. In order to address declining productivity extraction well EW-2, which was installed as part of the original FLTS, was taken off-line and replacement well EW-3 was brought on-line in February 2016. In order to address persistent VOC concentrations observed in the vicinity of SA-MW127I, the FLTS was temporarily connected to an existing, adjacent pump test well (SA-PTW1) beginning in July 2017, and pumping at EW-1 and EW-3 was suspended since VOC concentrations at those wells were below MCLs.

Operating statistics and sampling data were then presented, covering a 46-month period from system startup through September 2017. System uptime and flow rates were lower in the first four months due to issues associated with system startup; following the initial shakeout period, average influent flowrates

exceeded 78 gallons per minute (gpm) over the next year. The system operated at a reduced rate beginning in March 2015, initially due to a seasonally-elevated groundwater table and subsequently due to reduced output from extraction well EW-2. More recently, influent flowrates were decreased to below 70 gpm because of issues with the infiltration galleries, which have limited system throughput.

Influent contaminant concentration trends were then presented. Generally, a downward trend has been observed from system startup until the temporary connection to SA-PTW1 was made in July 2017. Based on the influent data, it is estimated that the system was removing less than a tenth of a pound of VOCs on a monthly basis prior to making the connection to SA-PTW1, and the cumulative removal through June 2017 was estimated at 50.08 pounds. After connection of the FLTS to SA-PTW1, the VOC influent concentration increased to nearly 60 µg/L and VOC removal rates increased to in excess of a half-pound per month. By September 2017, the cumulative removal was estimated at 51.93 pounds.

As noted previously, throughput had recently been reduced due to issues with infiltration gallery capacity. Test pits to investigate subsurface conditions near the infiltration galleries were completed in April 2017, and rehabilitation of the eastern infiltration gallery was conducted in August 2017. Groundwater discharge rates increased after the rehabilitation efforts, and the FLTS currently discharges to the east gallery only.

In summary, the overall decreasing trend of VOCs in influent from EW-1 and EW-3 continued, and influent concentrations had been below 5 µg/L since August 2016. In order to evaluate the presence of VOCs other than those included in the site ROD, analysis of influent for the full list of VOCs began in May 2016; perchloroethylene concentrations have ranged as high as 8.9 µg/L in May 2016 but decreased to 0.72 µg/L by September 2017. The connection of the FLTS to SA-PTW1 in July 2017 led to an increase in influent VOC concentrations, with concentrations of 1,1-dichloroethane (DCA) ranging from 41 µg/L in July 2017 to 23 µg/L in October 2017. The FLTS maintains continued compliance with all discharge goals, including effluent levels less than the relevant NYSDOH MCLs, and VOC removal efficiency is in excess of 99 percent.

TECHNICAL PROGRESS – 2017 SITE 6A AND OU3 ANNUAL SAMPLING PROGRAMS

Mr. Forstner then provided a presentation on results from an investigation of the Site 6A source area and the status of the 2017 OU3 annual sampling events. The presentation is included in Attachment 3.

The Site 6A sampling program was initiated to evaluate increasing groundwater VOC concentrations that had been observed at two wells within the limits of the 2009/2010 removal action, specifically FC-MW02SR1 and FC-MW03SR1. The primary objectives were to determine if these VOCs were the result of upwelling from below the excavation, or represented evidence of another source. The program was implemented pursuant to a NYSDEC-approved Work Plan and employed a direct-push technology (DPT) rig to evaluate shallow, intermediate and deep groundwater quality within, upgradient and downgradient

of the removal area using five vertical profile borings and 12 temporary wells. Four existing monitoring wells not normally part of the OU3 basewide sampling event were also included.

The temporary well groundwater data was not suggestive of an external source. Although VOCs were detected in upgradient samples, these were low-level detections generally below MCLs. Results from within the historic removal area confirmed observations at FC-MW02SR1 and FC-MW03SR1, and also further indicated that the VOCs are limited to the shallow groundwater. VOC concentrations in intermediate and deep samples were generally below MCLs, with limited exception.

Concurrent with the Site 6A investigation and as part of the same Work Plan, additional monitoring wells were also installed on the PRSC property to address a data gap that existed between locations SA-MW132 and SA-PZ123. This included the installation of five new wells – two clusters with shallow and intermediate wells at SA-MW184 and SA-MW185, and one location (SA-MW186S) with a shallow well only. The purpose of these wells was to provide better delineation of the VOC plume in the vicinity of the northern shore of Donahue Pond. The wells were installed in March 2017, and sampled in April and September 2017. Analytical results from these first rounds of sampling indicated that DCA was the only VOC to exceed its MCL, at SA-MW184I only (6.1 µg/L in April and 5.9 µg/L in September).

The main OU3 sampling events for 2017 were also summarized. This sampling is a continuation of the annual basewide program begun in 2011, and included surface water and groundwater sampling at four locations along the Peconic River in April and September, and a full round of groundwater sampling at 62 locations (including the four Peconic River piezometers) in September. Groundwater samples were collected from locations at Site 6A/10B (12 locations) and the Southern Area (15 locations onsite and 35 locations offsite, including seven offsite locations in the Peconic River area). In addition to the routine sampling described in the basewide program Sampling and Analysis Plan, twelve locations in the Fence Line Area were also sampled in May 2017 for purposes of monitoring performance of the FLTS, and samples of the SA-MW127 cluster were also collected in August to evaluate the effect of the temporary connection of SA-PTW1 to the FLTS on VOC concentrations in this area.

All samples (groundwater and surface water) were analyzed for VOCs; three groundwater samples were also analyzed for iron, manganese and arsenic in the September sampling event. In addition, an expanded 1,4-dioxane screening program was included as part of the main sampling event in September that included ten locations along the fence line and 11 locations along Connecticut Avenue.

The interim (validated) 1,4-dioxane results from September were presented. Analytical results indicated 1,4-dioxane was not detected at ten locations, and was detected at concentrations no higher than 6.3 µg/L at 11 locations; at seven of these locations, the detected concentration was less than 1 µg/L.

Mr. Forstner concluded with a summary of sampling data related to the Fence Line Area, and in particular near SA-MW127I, where elevated concentrations over successive rounds of sampling dating back to May

2016 showed exceedances of MCLs, with DCA concentrations ranging as high as 220 µg/L (in May and December 2016). SA-MW127I is located between extraction wells EW-2 and EW-3 to the northeast and the eastern infiltration gallery to the east; it was suspected that the persistent VOCs in this area might be stagnated by hydraulic conditions, and that a temporary connection of SA-PTW1 might alleviate the VOC concentrations in this area. As a result, the temporary connection was installed and began operation in July 2017. Interim (validated) data for SA-MW127I indicated that DCA remained in excess of MCLs (58 µg/L in August and 120 µg/L in September), and a recommendation to continue operation of the temporary connection for as long as feasible was made.

GENERAL DISCUSSION AND CLOSING REMARKS

At the conclusion of the meeting, an opportunity to ask general questions about the site was provided. Mr. Rapiejko inquired as to whether the temporary FLTS connection to SA-PTW1 would be winterized. Mr. Roy responded, indicating that the pipe was routed along the surface and staked in place so there are limits to what can be done, but hay and sand bags would be placed to provide as much insulation as possible. Mr. Brayack elaborated, noting that freezing is not a concern during routine operation given the flow rates in question, but if power is lost and flow stops then freezing of the pipe becomes a possibility.

Mr. Rapiejko asked if there would be sampling for PFAS on town property, and in particular the sky diving school's well. Mr. Brayack noted that he was unaware of a well there, but would investigate and asked for any available documentation. Mr. Rapiejko noted that the SCDHS only learned of this well when the sky dive school themselves called SCDHS.

No further questions were posed. Mr. McCloud thanked the attendees for their participation. The next RAB meeting was planned for spring 2018, with a final date and location to be confirmed. The meeting was then adjourned.

LIST OF ACRONYMS AND ABBREVIATIONS

AFFF	Aqueous Film Forming Foam
AS/SVE	Air Sparge/Soil Vapor Extraction
DCA	1,1-Dichloroethane
EPA	Environmental Protection Agency
FLTS	Fence Line Treatment System
gpm	Gallons per Minute
ISCO	In-Situ Chemical Oxidation
LTM	Long Term Monitoring
LUC	Land Use Control
MCL	Maximum Contaminant Level
MEC	Munitions and Explosives of Concern
ng/L	Nanograms per Liter
NWIRP	Naval Weapons Industrial Reserve Plant
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OU	Operable Unit
PA	Preliminary Assessment
PFAS	Pefluoroalkyl Substance
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PRSC	Peconic River Sportsman's Club
RAB	Restoration Advisory Board
ROD	Record of Decision
RSL	Regional Screening Level
SCDHS	Suffolk County Department of Health Services
TCA	1,1,1-Trichloroethane
TCE	Trichloroethene
µg/L	Micrograms per Liter
UST	Underground Storage Tank
VOC	Volatile Organic Compound

ATTACHMENT 1

NOVEMBER 14, 2017 RAB MEETING SIGN-IN SHEET

47th RAB Meeting for NWIRP Calverton
November 14, 2017
Sign-in List

Name (Print)	Address and/or email if interested in being on mailing list	Affiliation	How did you hear about the meeting?
Melissa Cushing		TT	
Kristi Francisco		TT	
Dave Brayack		TT	
Bob Forstner		Res	
Joe McCloud		NavSec	
Stephen Malgan		NYS DEC	
HENRY WILKE		NYSDEC	
DawnThomas		Riverhead CDA	email
Andy Freleng			email
Lou Cork		R.A.B.	
Andy Radiejko		Scotts	
Karen Gomez		NYSDEC	
Mike Zobel		Resolution	
Al Krupski	Al.Krupski@Suffolkcountyny.gov	S.C. Legislature	
Jane Todd			
Elaine & Mark McDuffie			paper

47th RAB Meeting for NWIRP Calverton
November 14, 2017
Sign-in List

Name (Print)	Address and/or email if interested in being on mailing list	Affiliation	How did you hear about the meeting?
Gina Bail	WRCIVIC@optonline.net	Wading River Civic	
Vincent Romaniello	312 Starr Blvd Calverton	RAB	
ROBERT PORSCHE	RPORSCHE@ARCADIS.COM	ARCADIS	
Drew Dillingham	dillingham@townofriverhead.gov	Town of Riverhead	
Stephanie Roy	KCS	KCS	

ATTACHMENT 2

NOVEMBER 14, 2017 RAB MEETING AGENDA

Agenda

Restoration Advisory Board
Naval Weapons Industrial Reserve Plant Calverton

November 14, 2017
Riverhead Seniors Center, Calverton NY
7:00 p.m.

Welcome and Agenda Review
Joseph McCloud, NAVFAC Mid-Atlantic

Distribution of Minutes
All Members

Community Update
Vincent Racaniello, RAB Co-chair

Technical Progress

General Overview of ER Sites
Joseph McCloud, NAVFAC Mid-Atlantic

Site 2 Interim Action ROD to Address Potential MEC
Kristi Francisco, Tetra Tech

Site 2 Supplemental VOC and 1,4-Dioxane Investigation
Kristi Francisco, Tetra Tech

PFAS Site 2 and 6A Site Inspection and Preliminary Assessment
Kristi Francisco, Tetra Tech

Site 7 Remedial Action Update
Stephane Roy, KOMAN Government Solutions
Robert Forstner PE, Resolution Consultants

Fence Line Treatment System Update
Stephane Roy, KOMAN Government Solutions

2017 Site 6A, Southern Area and OU3 Annual Sampling Programs
Robert Forstner PE, Resolution Consultants

Closing Remarks
Joseph McCloud, NAVFAC Mid-Atlantic

Presenters will be available after the program for questions.

ATTACHMENT 3

NAVY PRESENTATIONS – NOVEMBER 14, 2017 RAB MEETING

RESTORATION ADVISORY BOARD MEETING

NAVAL WEAPONS INDUSTRIAL RESERVE PLANT (NWIRP) CALVERTON, NEW YORK

November 14, 2017

General Overview of ER Sites

- Sitewide
  - 2017 sampling events completed
- Site 2
  - Proposed Plan published in April 2017
- Site 6A/10B/Southern Area
  - Fence-line system construction completed and online October 2013
    - Replacement extraction well installed and online as of March 2016
    - Temporary connection to well near SA-MW127I online since July 2017
  - Operable Unit 3 (OU3) Record of Decision (ROD) and Remedial Design completed
- Site 7
  - Air sparge/soil vapor extraction (AS/SVE) system shutdown after 2013 operating season; monitoring ongoing
  - Free product discovered prior to implementation of planned remedial pilot
  - Initial investigation of free product completed March 2017

SITE 2 – FORMER FIRE TRAINING AREA INTERIM ACTION ROD TO ADDRESS POTENTIAL MUNITIONS AND EXPLOSIVES OF CONCERN (MEC)

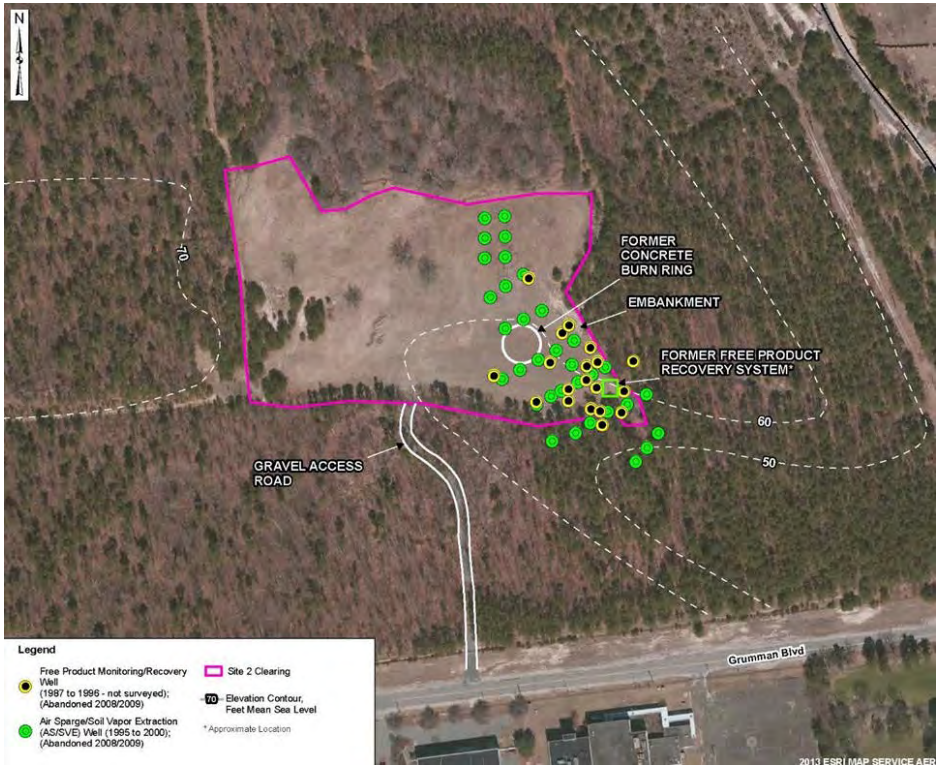
November 2017 Restoration Advisory Board

NWIRP CALVERTON, NEW YORK

November 14, 2017

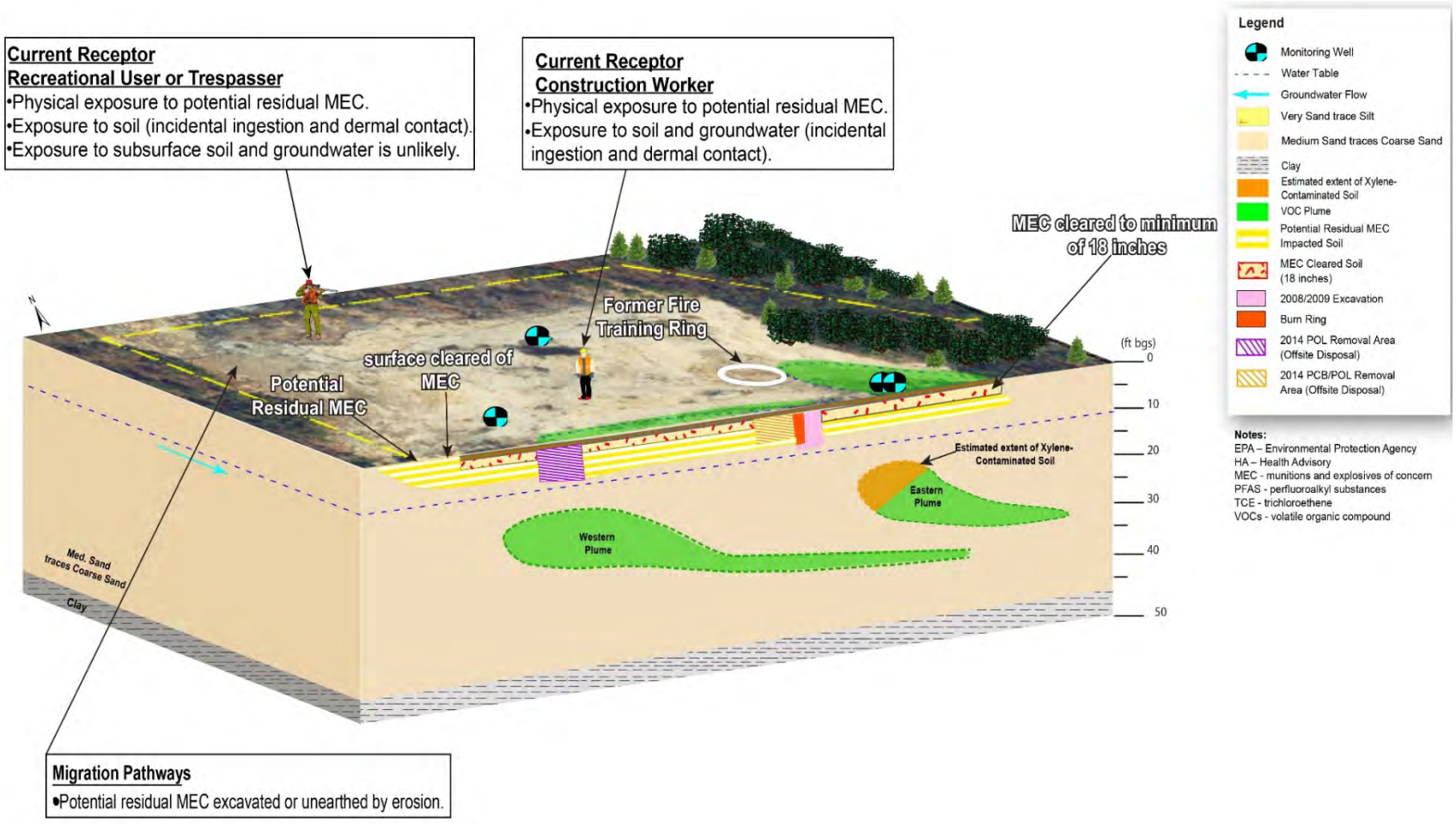
Site 2 - History

- Site 2 is located on the remaining 209 acres retained by the Navy to continue Environmental Restoration Program activities
- Site 2 was used as an active Fire Training Area from the 1950's until 1996
- As a result of fire training activities, soil and groundwater at the site have been impacted by petroleum, chlorinated solvents, and other chemicals
- Potential Munitions and Explosives of Concern (MEC) are present and likely originated at another location at the NWIRP (firing stop butt area)



Former Site Layout and Initial Response Actions (Pre-2008)

Site 2 – Conceptual Site Model



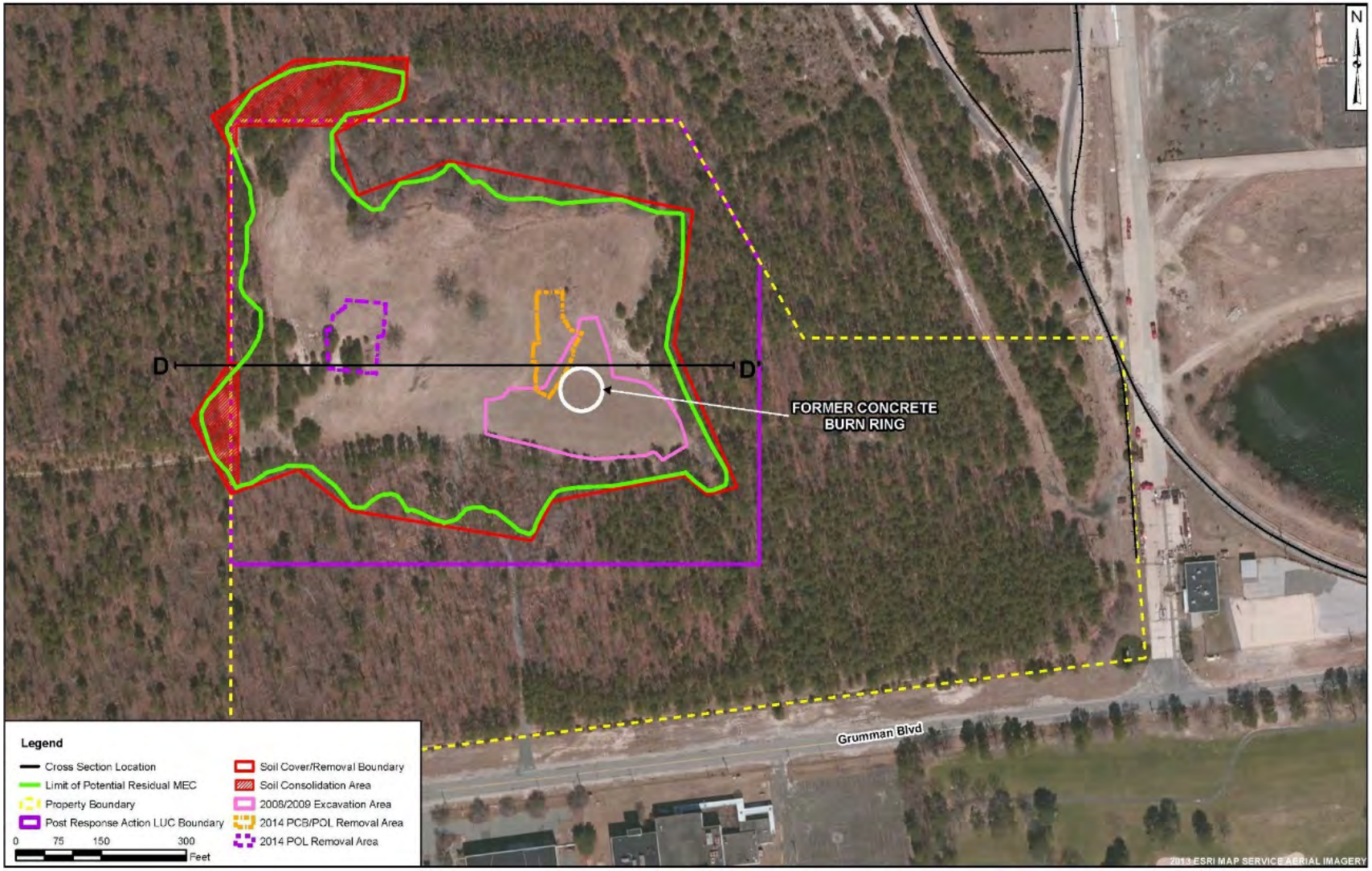
Site 2 - Proposed Plan (March 2017)

- Interim Remedy for Soil, Groundwater, and Potential MEC
  - Public Comment Period (March 16 to June 14, 2017)
  - Several comments made regarding alternatives for VOCs:
    - Collecting more data to further define the nature and extent of volatile organic compounds (VOCs), 1,4-dioxane, and perfluoroalkyl substances (PFAS) prior to making a decision
    - Assessing the potential for vapor intrusion of VOCs into off-property structures
    - Implementing Land Use Controls (LUCs) for VOCs in off-property areas
  - Navy agrees that more data is needed for 1,4-dioxane and PFAS
    - Because of data gaps and concerns expressed in the Proposed Plan comments, the remedy selection for VOCs in groundwater has been delayed
    - Planned investigations for 1,4-dioxane and PFAS will be presented later this evening
  - Potential MEC present is a risk to human health and the environment
  - Currently proceeding with an Interim Action ROD to address Potential MEC

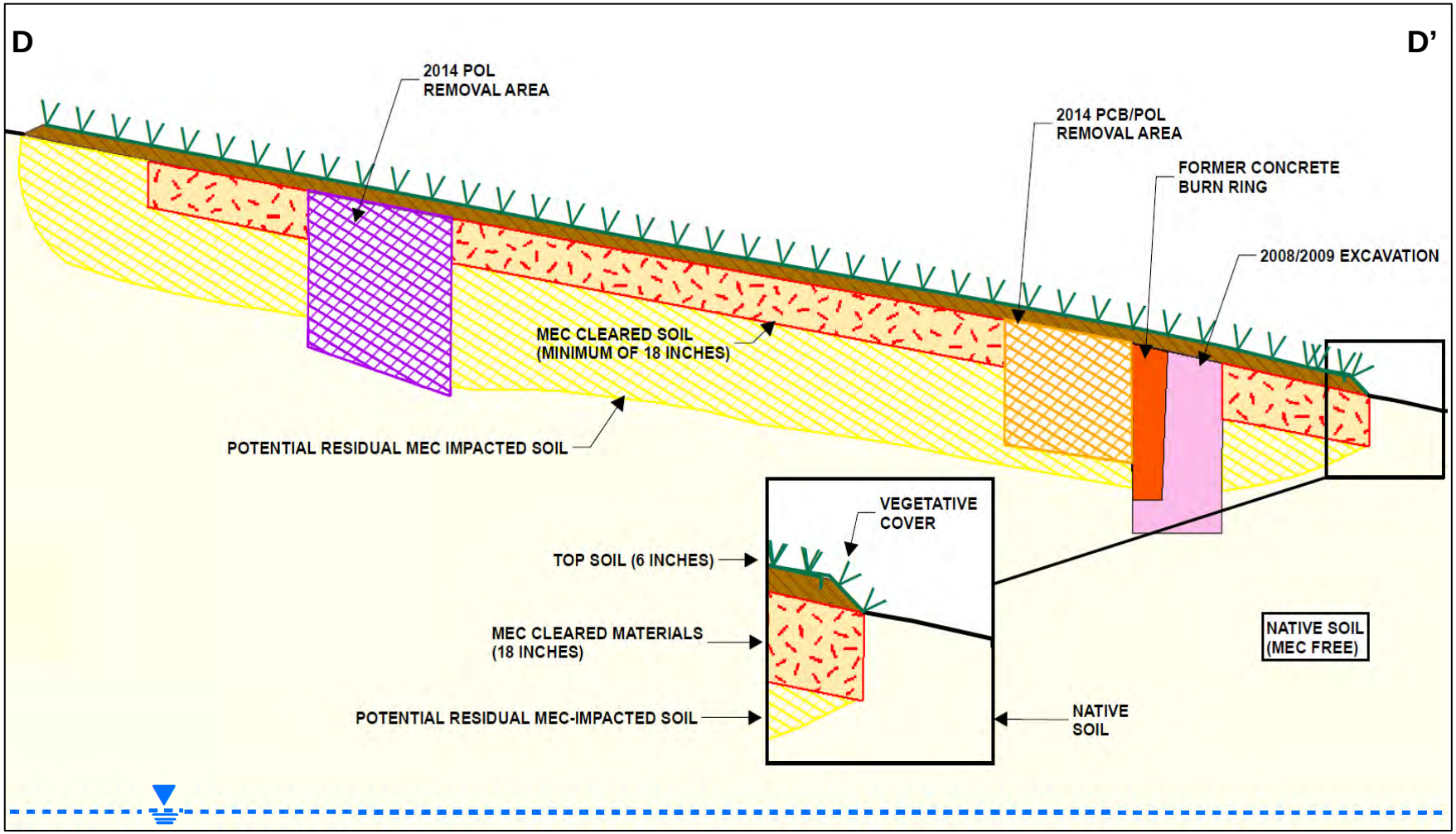
Site 2 – Proposed Plan
Remedy for Potential MEC

- Proposed Remedy:
  - Consolidation of off-property material
  - Regrading, surface clearance, and addition of top soil and vegetation to stabilize the surface
  - LUCs to restrict future use of the site
  - Maintenance as required for erosion control
  - Capital Cost: $2,600,000
  - Annual Cost: $26,000 to $56,000
  - 30-year cost of $3,600,000

Site 2 – Remedy for Potential MEC



Site 2 – Remedy for Potential MEC



Site 2 – Path Forward

- Record of Decision (December 2017)
- Remedial Action Work Plan (January 2018)
- Construction start Spring 2018

SITE 2 – FORMER FIRE TRAINING AREA SUPPLEMENTAL VOLATILE ORGANIC COMPOUNDS AND 1,4-DIOXANE INVESTIGATION

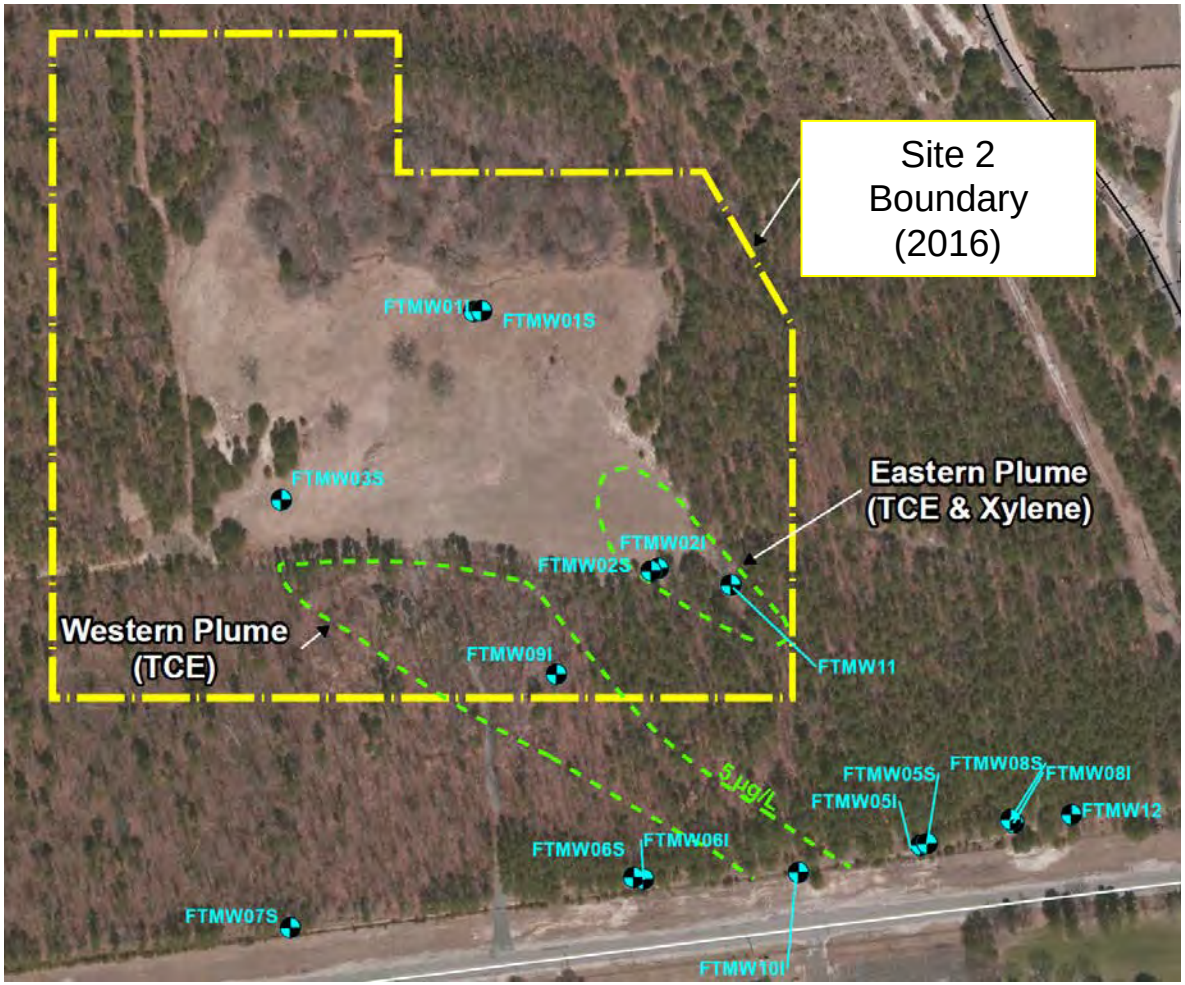
November 2017 Restoration Advisory Board

NWIRP CALVERTON, NEW YORK

November 14, 2017

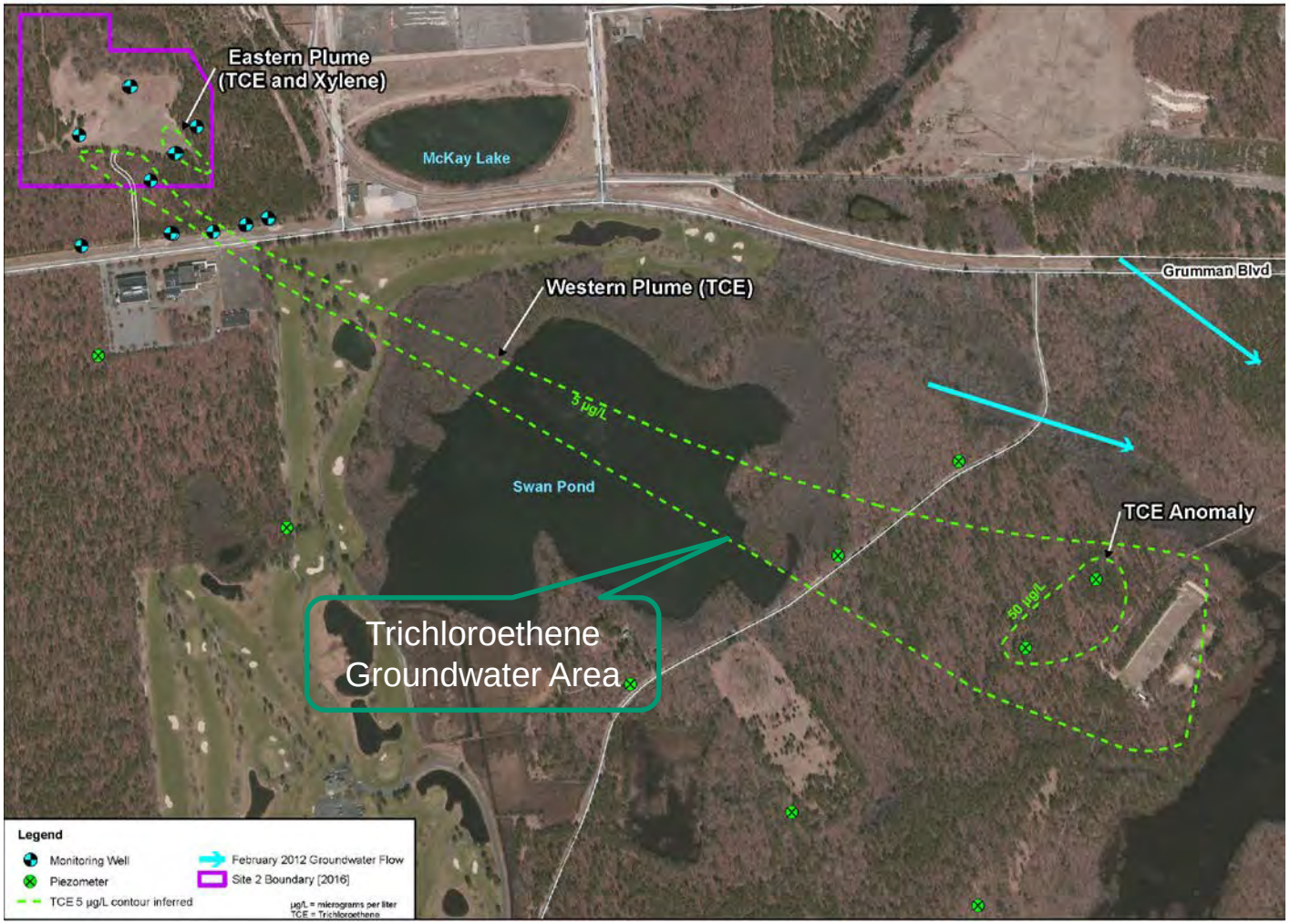
Site 2 – On-Property Groundwater

- Two VOC-contaminated groundwater plumes
- Trichloroethene (TCE) and xylene are the primary contaminants
- Remedy for VOCs delayed while the Navy investigates 1,4-dioxane and PFAS



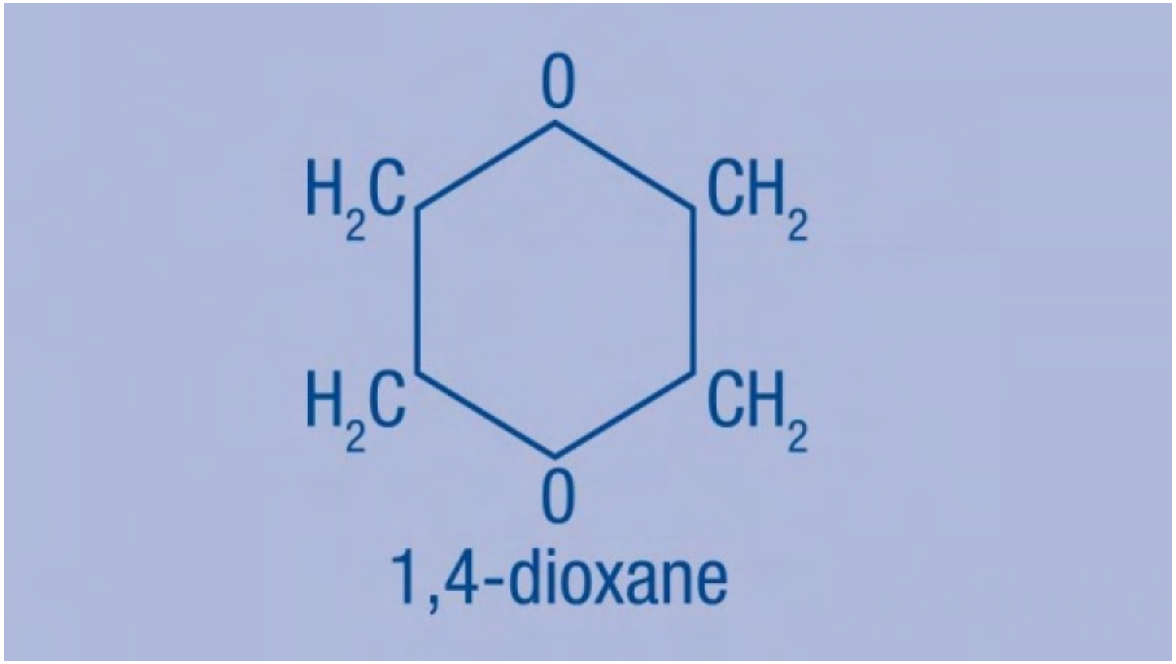
Site 2 – Off-Property Groundwater

- TCE plume extends off-property



1,4-Dioxane

- 1,4-Dioxane:
  - Synthetic industrial chemical
  - Consumer products: deodorants, shampoo, and cosmetics
  - Industrial uses: paint strippers, dyes, greases, varnishes, and waxes
  - Useful properties: stabilizer for chlorinated solvents such as 1,1,1-trichloroethane (TCA)



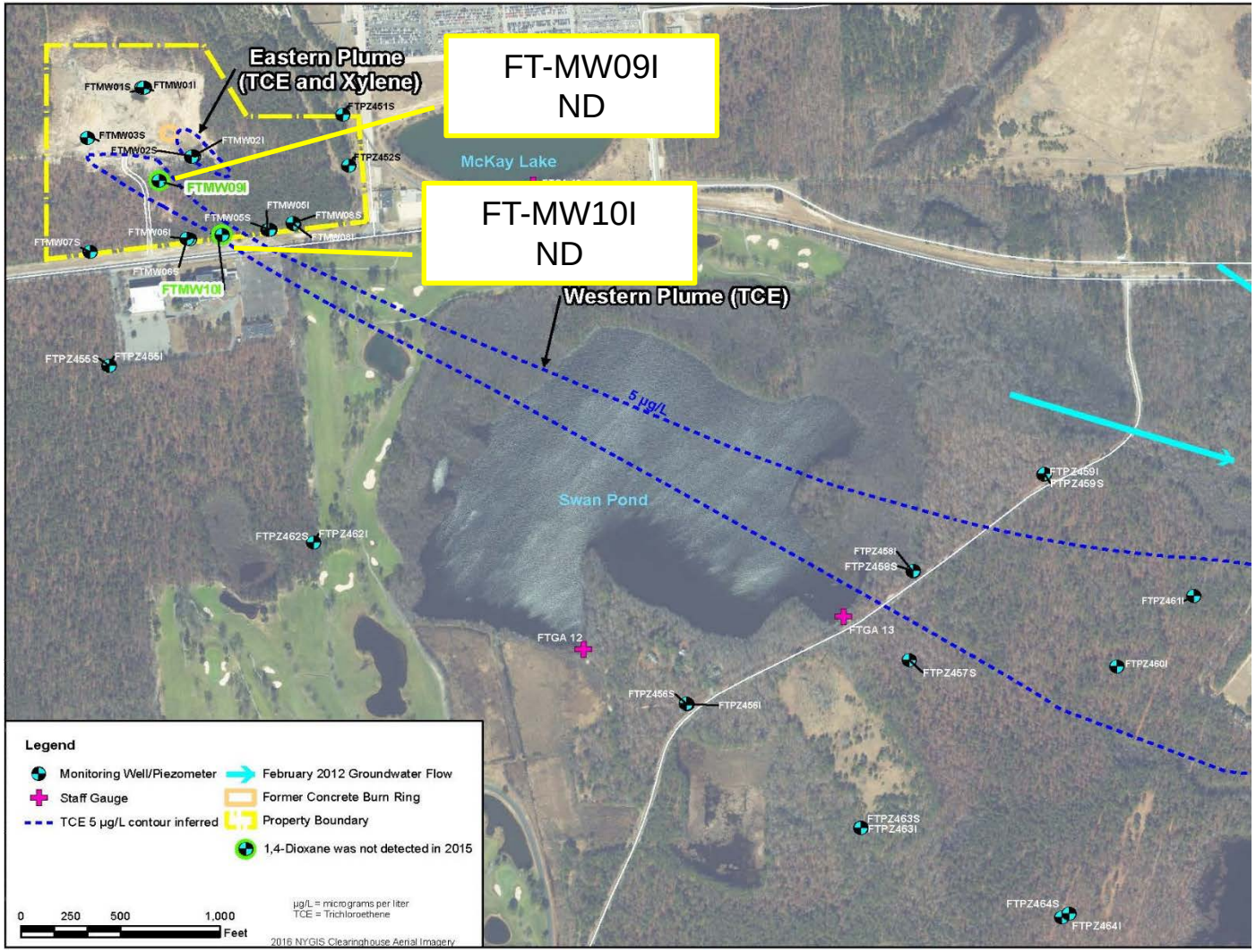
1,4-Dioxane Concerns and Criteria

- 1,4-Dioxane Concerns
  - Expected to move rapidly through soil to groundwater
  - Moves with groundwater
  - Long-term exposure may cause kidney and liver damage

- 1,4-Dioxane Criteria
  - New York State Department of Health (NYSDOH) Maximum Contaminant Level (MCL) defaults to the Unspecified Contaminant Level of 50 micrograms per liter (µg/L)
  - Environmental Protection Agency (EPA) Regional Screening Level (RSL) = 0.46 µg/L

Site 2 – 2015 1,4-Dioxane Results

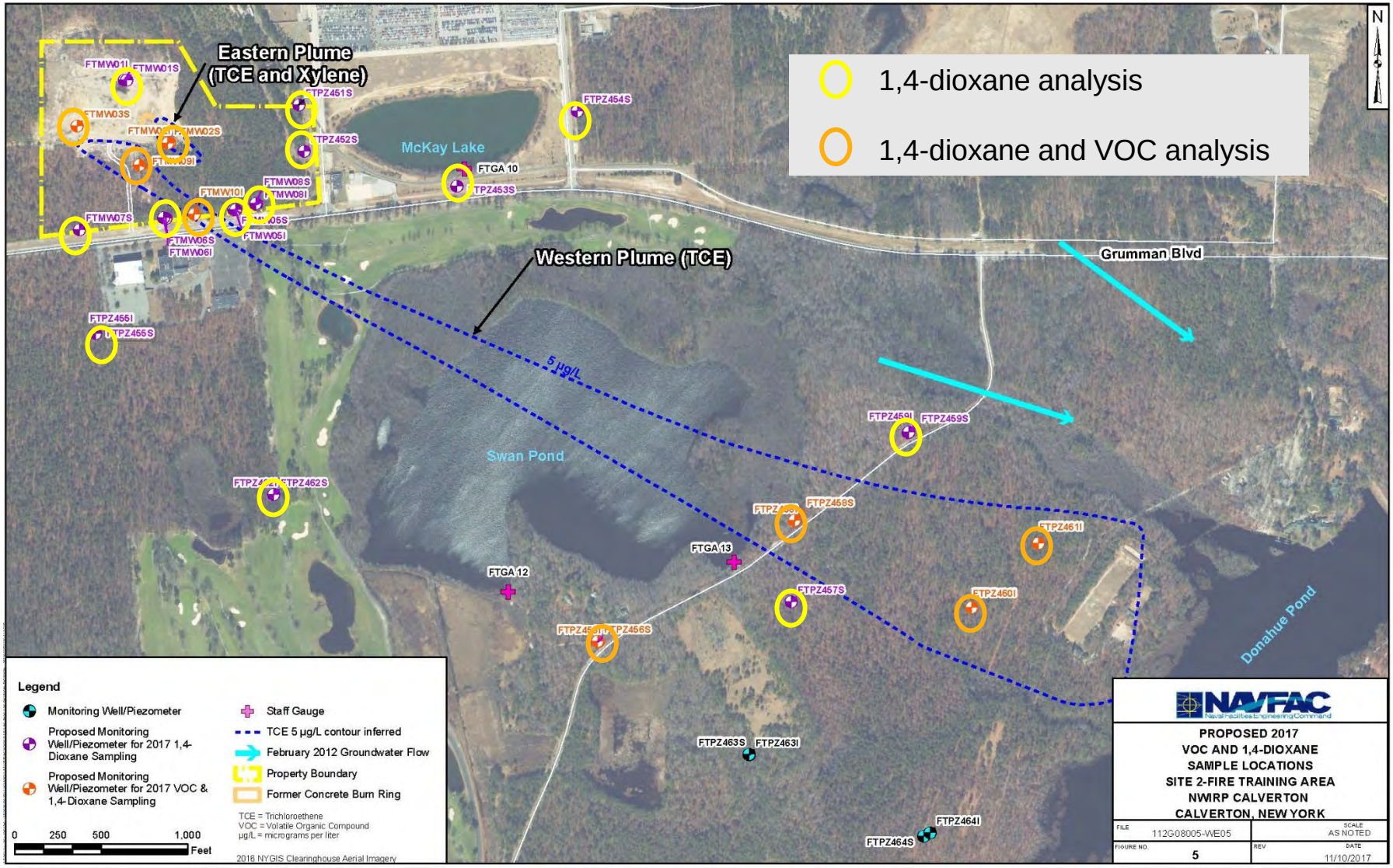
- 1,4-dioxane was not detected on-property



Site 2 – 2017 VOC and 1,4-Dioxane Program

- Water Level Measurements
  - All Site 2 monitoring wells to evaluate groundwater flow direction
- VOC Testing:
  - 11 monitoring wells to monitor migration and attenuation of VOCs
- 1,4-Dioxane Testing:
  - 31 monitoring wells to evaluate whether 1,4-dioxane is associated with the Site 2 VOC plumes

Site 2 – 2017 VOC and 1,4-Dioxane Program



Site 2 – Path Forward

- Analyze data
- Determine next step for 1,4-dioxane and VOCs

PERFLUOROALKYL SUBSTANCES (PFAS)
SITE 2 AND SITE 6A SITE INSPECTION (SI)
FACILITY WIDE PRELIMINARY ASSESSMENT (PA)

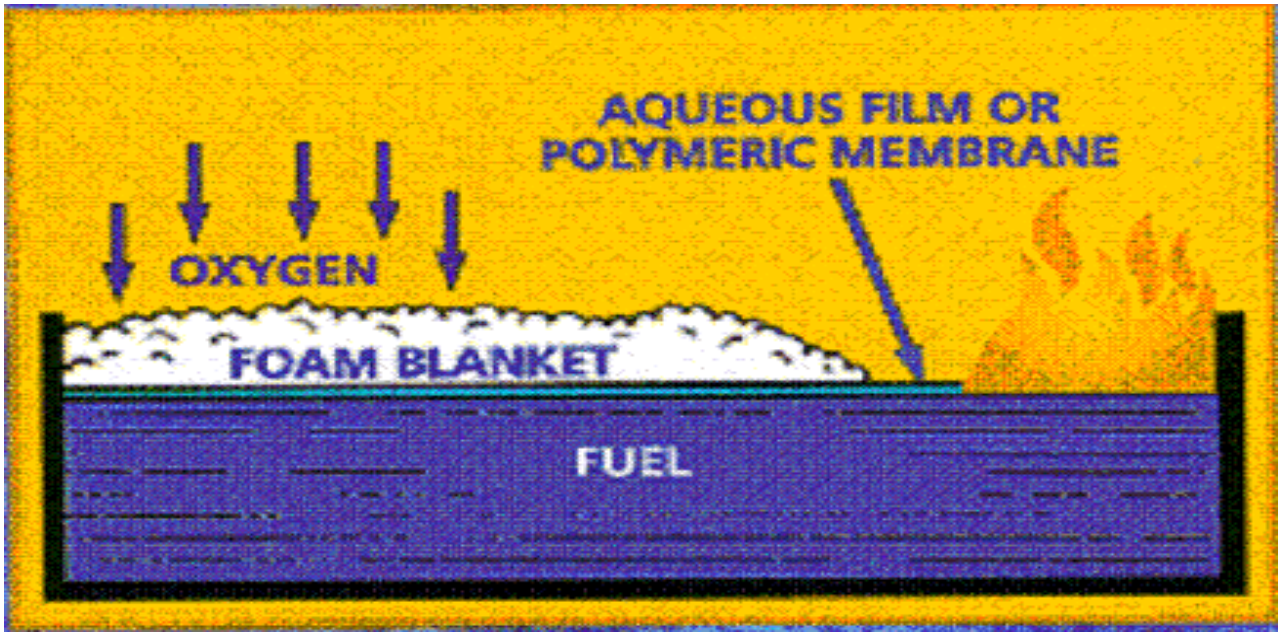
November 2017 Restoration Advisory Board

NWIRP CALVERTON, NEW YORK

November 14, 2017

Perfluoroalkyl Substances (PFAS)

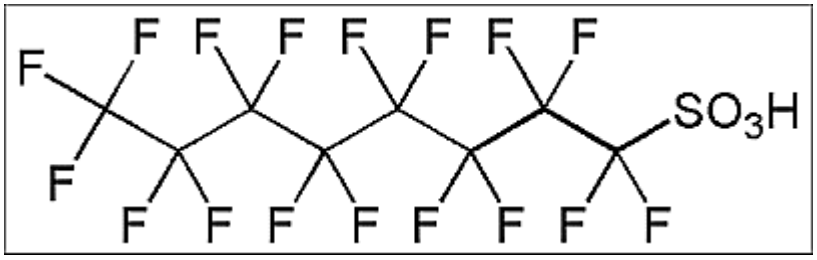
- Substances used in manufacturing, industrial, and commercial applications
- Useful properties: fire resistance and oil, stain, grease, and water repellency
- Ubiquitous in consumer products: carpets, clothing, fabric for furniture, paper packaging for food and other materials (e.g., cookware)
- Industrial uses: Firefighting foam and industrial process (e.g., coatings and cleaning additives)



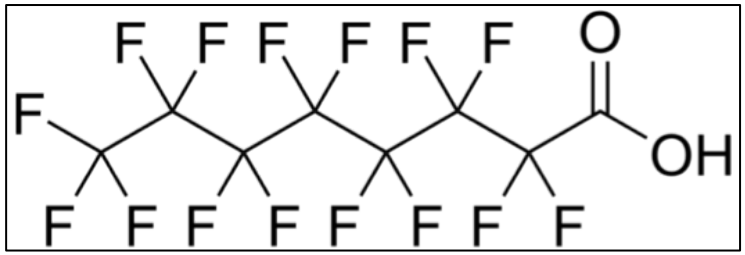
PFAS CONCERNS

- EPA is particularly concerned about two long-chain PFAS

Perfluoroctane Sulfonate (PFOS)



Perfloroocatanoic Acid (PFOA)



- Persistent in the Environment
- Mobile in groundwater
- Bioccumulative in wildlife and humans
- Toxic to laboratory animals
- Produces reproductive, developmental, and systemic effects in laboratory tests
- Toxicity values is also available for perfluorobutane sulfonic acid (PFBS)

PFAS GUIDELINES

- Guidelines
  - EPA Drinking Water Health Advisories
    - PFOS: 70 nanograms per liter (ng/L)
    - PFOA: 70 ng/L
    - If both are present: PFOS and PFOA should not exceed 70 ng/L
  - EPA Regional Screening Level (RSL):
    - One PFAS with an EPA RSL
    - PFBS: 400,000 ng/L

- New York State Department of Environmental Conservation (NYSDEC) identified PFOA and PFOS as a hazardous substance

What is a ng/L?

1 milligram per liter (mg/L) = 1,000 micrograms per liter (µg/L)

= 1,000,000 ng/L

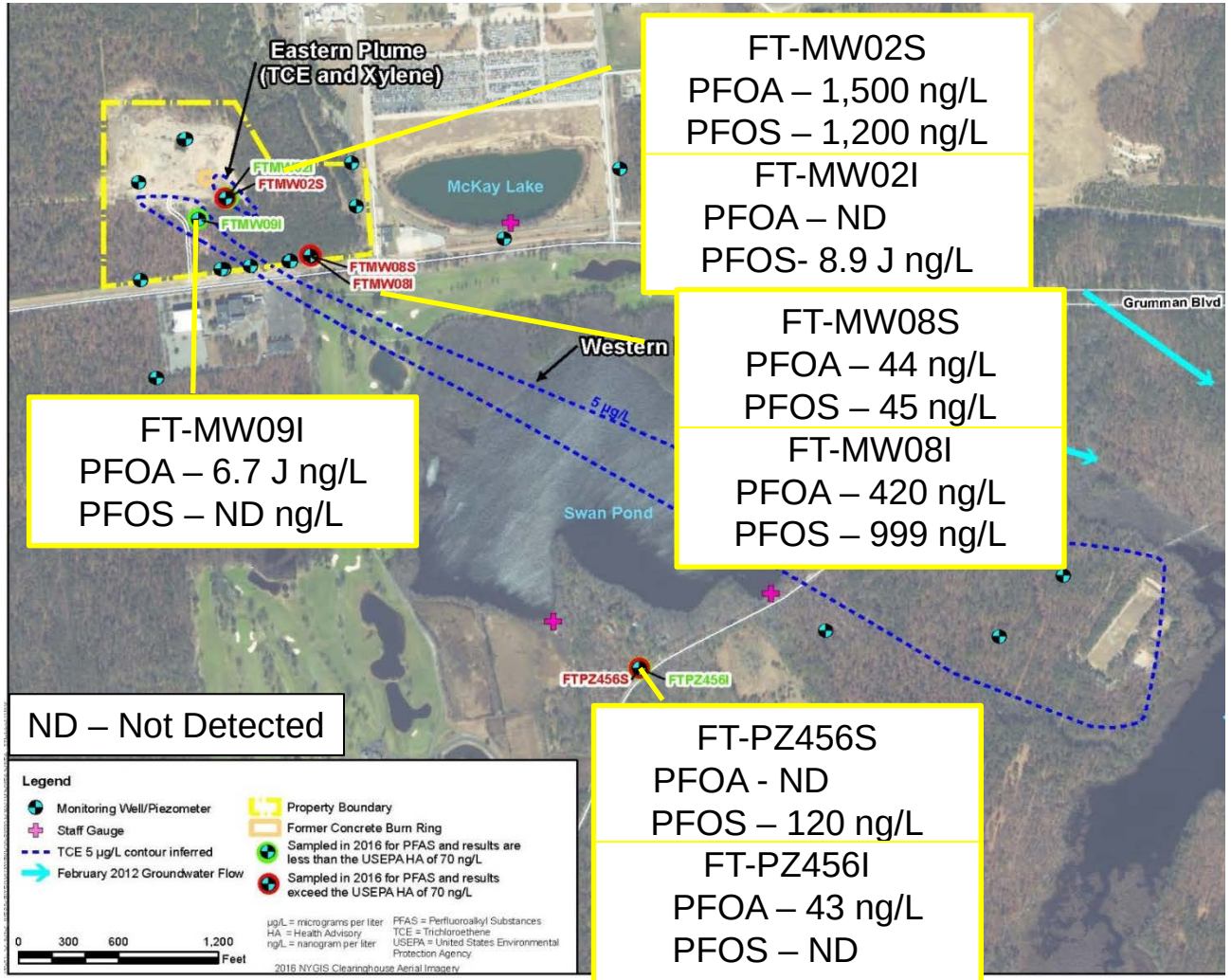
Site 2 – Former Fire Training Area

- Site 2 was used as an active Fire Training Area from the 1950's until 1996
- Aqueous Film Forming Foams (AFFF) used to extinguish fires at Site 2
- PFAS was used to manufacture AFFF from the 1960's to 2001
- 2016: selected wells sampled and analyzed for PFOA and PFOS

Site 2, looking west northwest

Site 2 – Former Fire Training Area
2016 PFAS Results

- 2016 sampling and analysis for PFAS: five on-property wells and two off-property wells
- At least one of these compounds were detected in each of the samples
- 4 of 7 results exceeded the EPA HA



Site 2 – Former Fire Training Area
PFAS Investigation

Phase I – November / December 2017

- Well redevelopment
- Soil, groundwater, and surface water sampling and analysis
- Evaluation and reporting

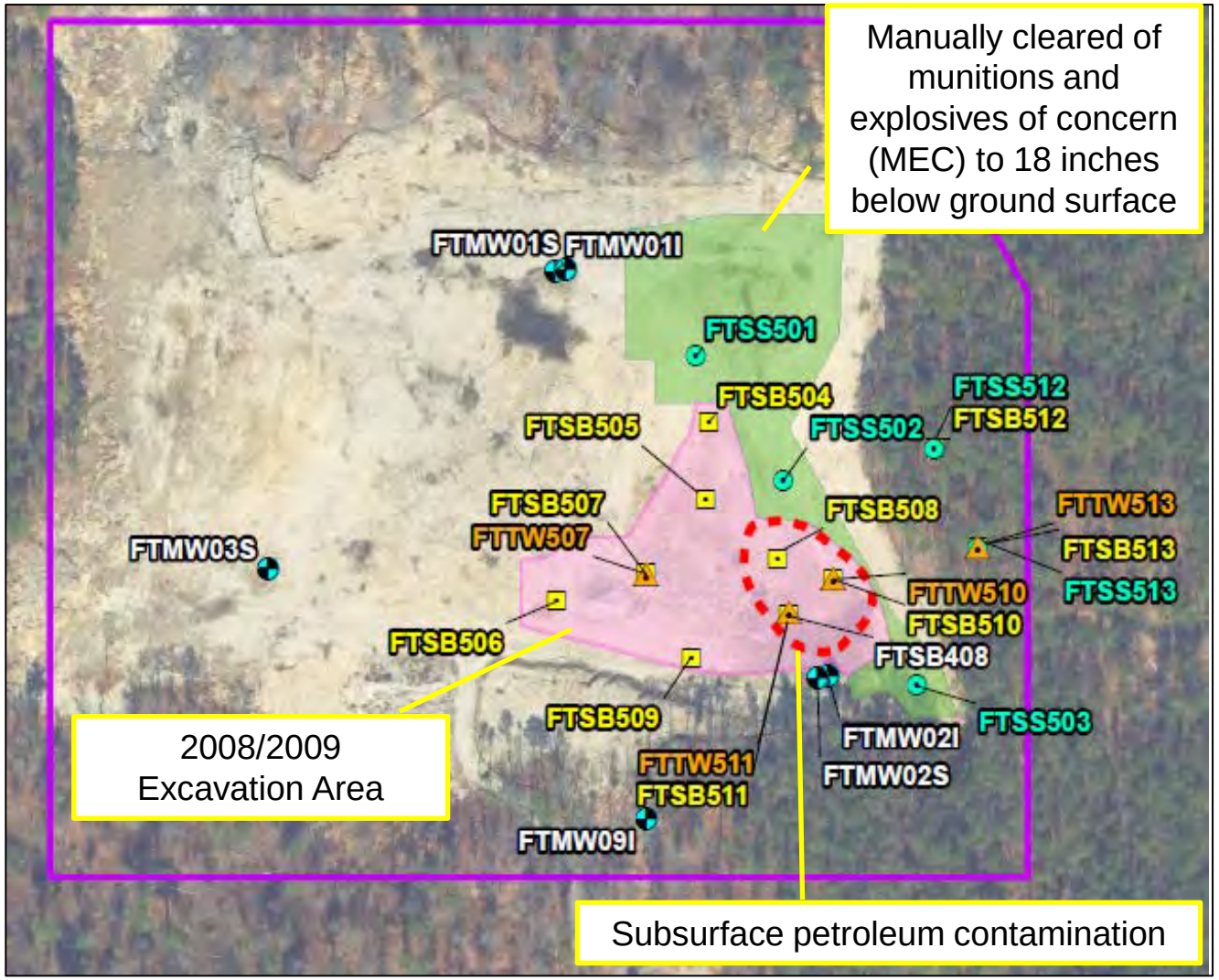
Phase II

- Further investigation will be planned based on results from Phase I

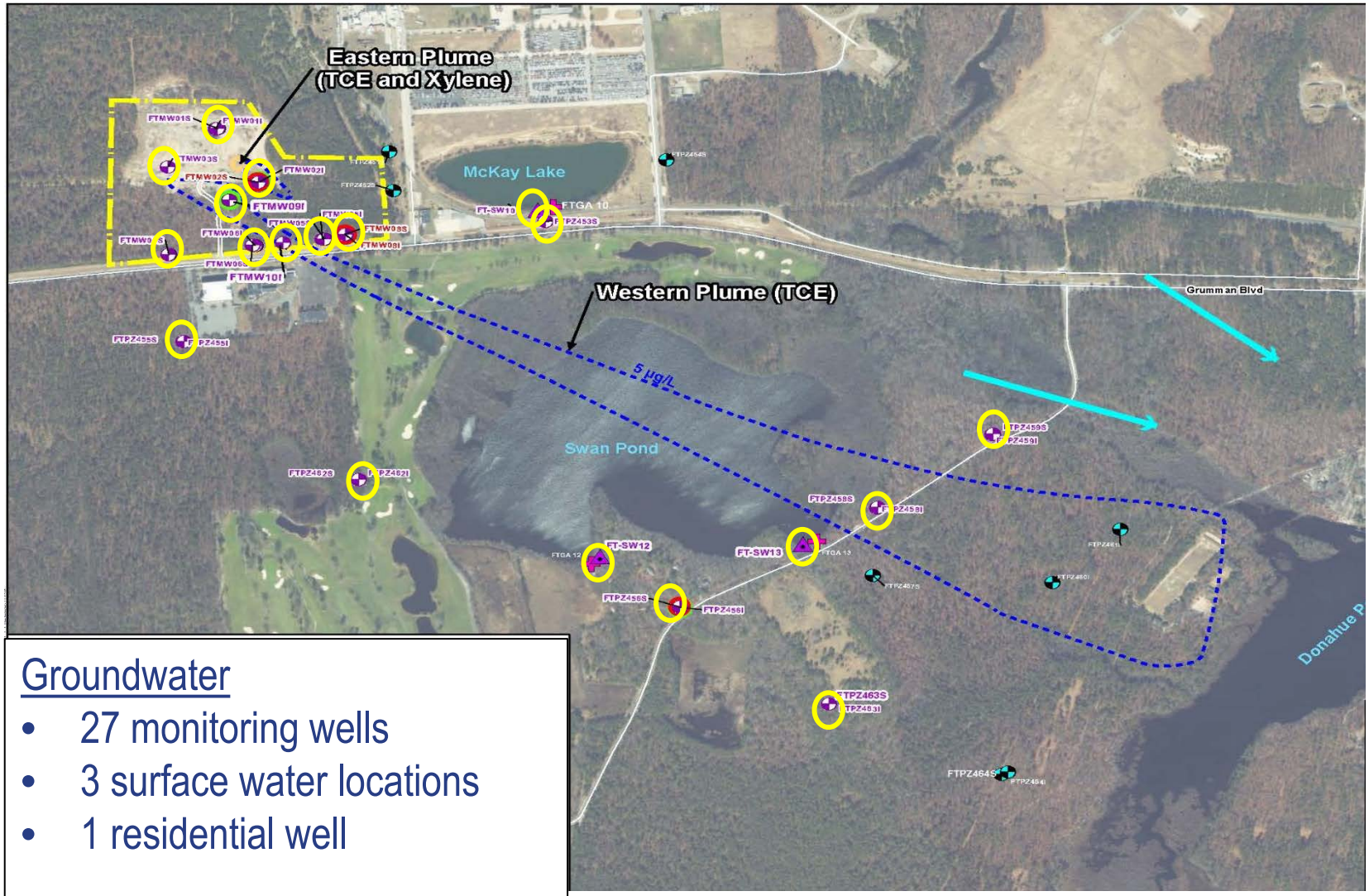
Site 2 – Former Fire Training Area
PFAS Investigation

Soil
- 5 surface soil
- 10 subsurface soil

Temporary Wells
- 4 groundwater grab samples



Site 2 – Former Fire Training Area
PFAS Investigation



Groundwater

- 27 monitoring wells
- 3 surface water locations
- 1 residential well

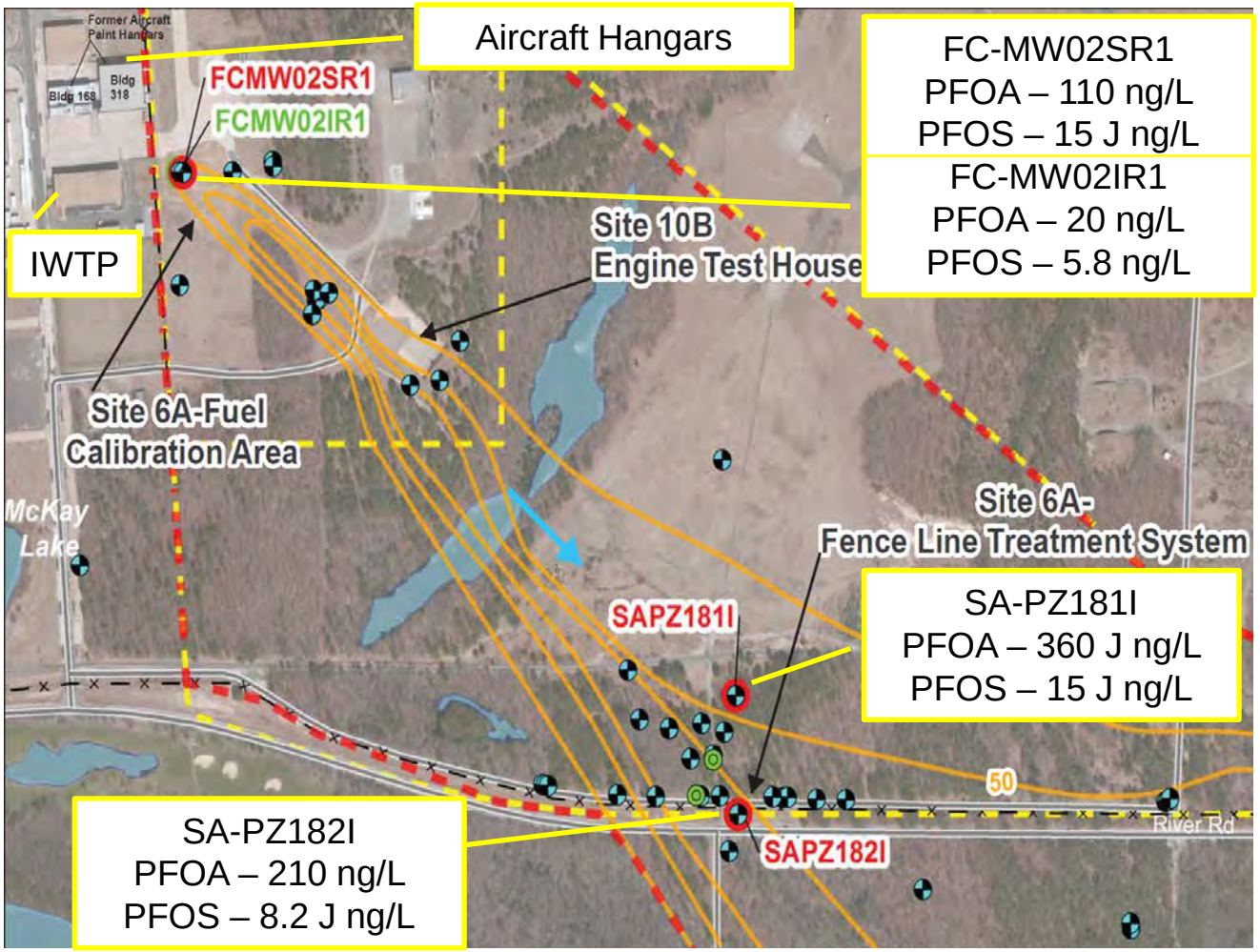
Site 6A – Aircraft Hangars and Fuel Testing Facilities

- Aircraft hangars north and west of Site 6A were identified as containing fire suppression systems that contained AFFF
- 1980's: A full dump of the AFFF deluge system was initiated to test the system
- Hangars were equipped with trough drains, which routed water / material to an Industrial Waste Treatment Plant (IWTP)
- AFFF could have flowed through drainage swales at Site 6A or the drainage system that discharges to McKay Lake

Site 6A and Aircraft Hangars, looking north west

Site 6A – Aircraft Hangars and Fuel Testing Facilities – 2016 PFAS Results

- 2016 sampling and analysis for PFAS: four on-property wells
- PFOA and PFOS was detected in all four wells
- 3 of 4 results exceeded the EPA HA



Site 6A – Aircraft Hangars and Fuel Testing Facilities – PFAS Investigation

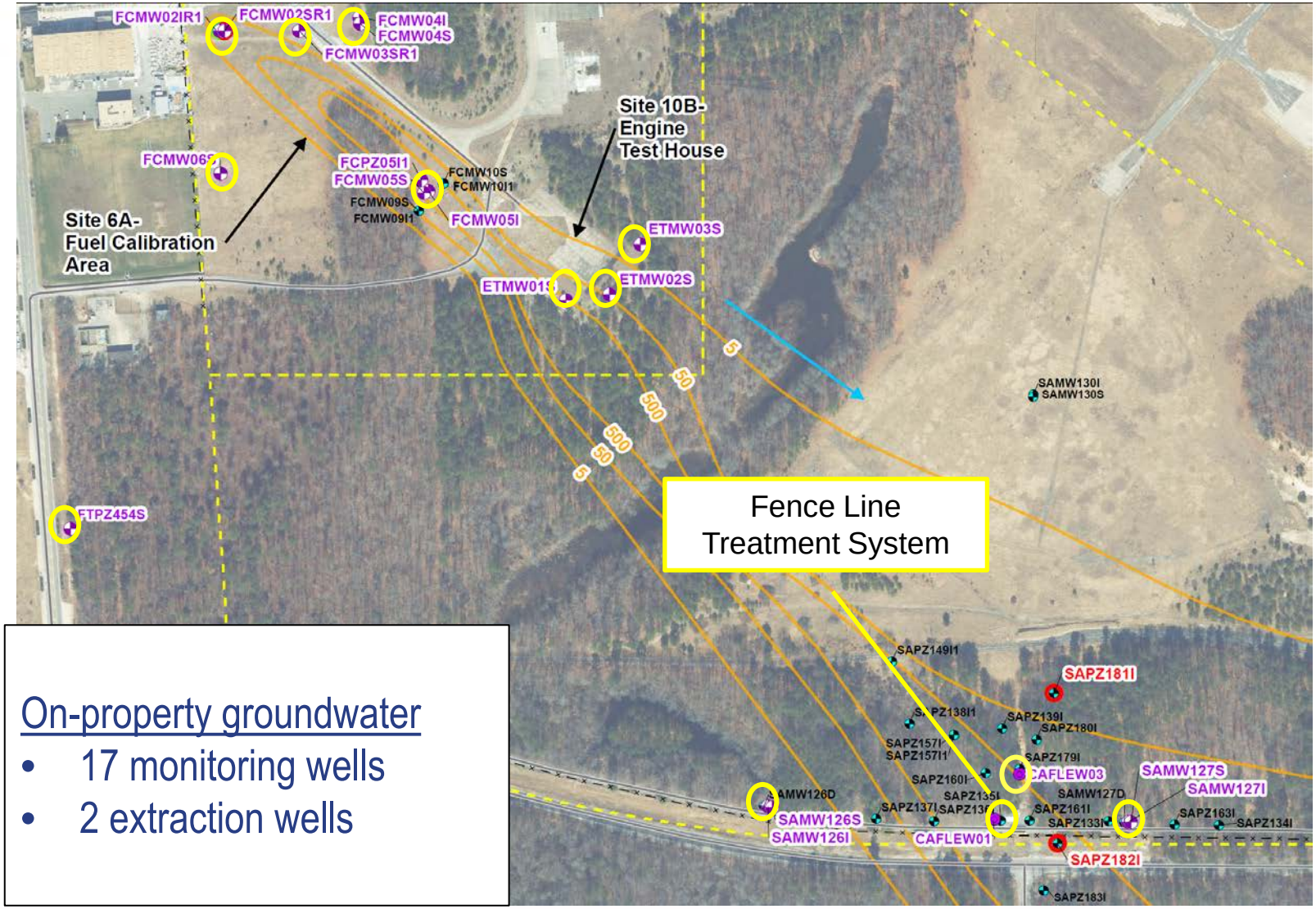
Phase I – November / December 2017

- Well redevelopment
- Groundwater and surface water sampling and analysis
- Evaluation and Reporting

Phase II

- Further investigation will be planned based on results from Phase I

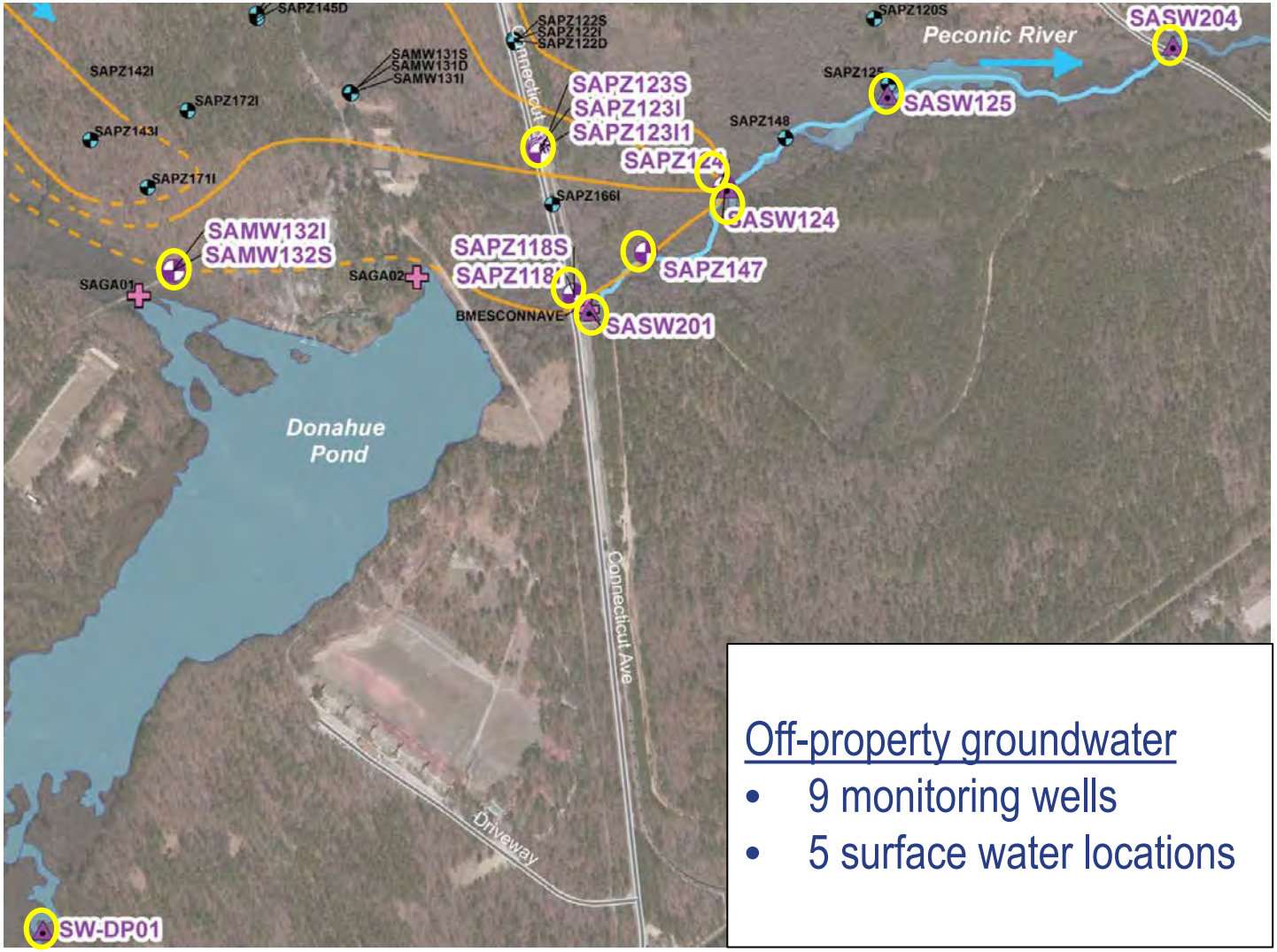
Site 6A – Aircraft Hangars and Fuel Testing Facilities – On-Property PFAS Investigation



On-property groundwater

- 17 monitoring wells
- 2 extraction wells

Site 6A – Aircraft Hangars and Fuel Testing Facilities – Off-Property PFAS Investigation



Off-property groundwater

- 9 monitoring wells
- 5 surface water locations

Facility Wide
Preliminary Assessment (PA)

PA is currently in progress for NWIRP CALVERTON

- Literature Searches
  - Naval Information Restoration Information Solution (NIRIS)
  - Public Databases (EPA and State of New York)
- Site Interviews and Site Reconnaissance
- Potential PFAS sites
  - Runways/Flight Lines
  - Fire Department Training Areas
  - Industrial Fire Fighting Systems
  - Hangars
  - Crash Sites
  - Oil/water Separators
  - Plating Shops
  - Sludge Disposal Areas
- PA Report: Summarizes findings and recommendations for Site Inspections

Path Forward

- Facility Wide PFAS PA (Spring 2018)
- Phase I Results for Site 2 and Site 6A (Spring 2018)
- Phase II Field work (Summer 2018)

SITE 7 – FUEL DEPOT AIR SPARGING/SOIL VAPOR EXTRACTION SYSTEM UPDATE

November 2017 Restoration Advisory Board

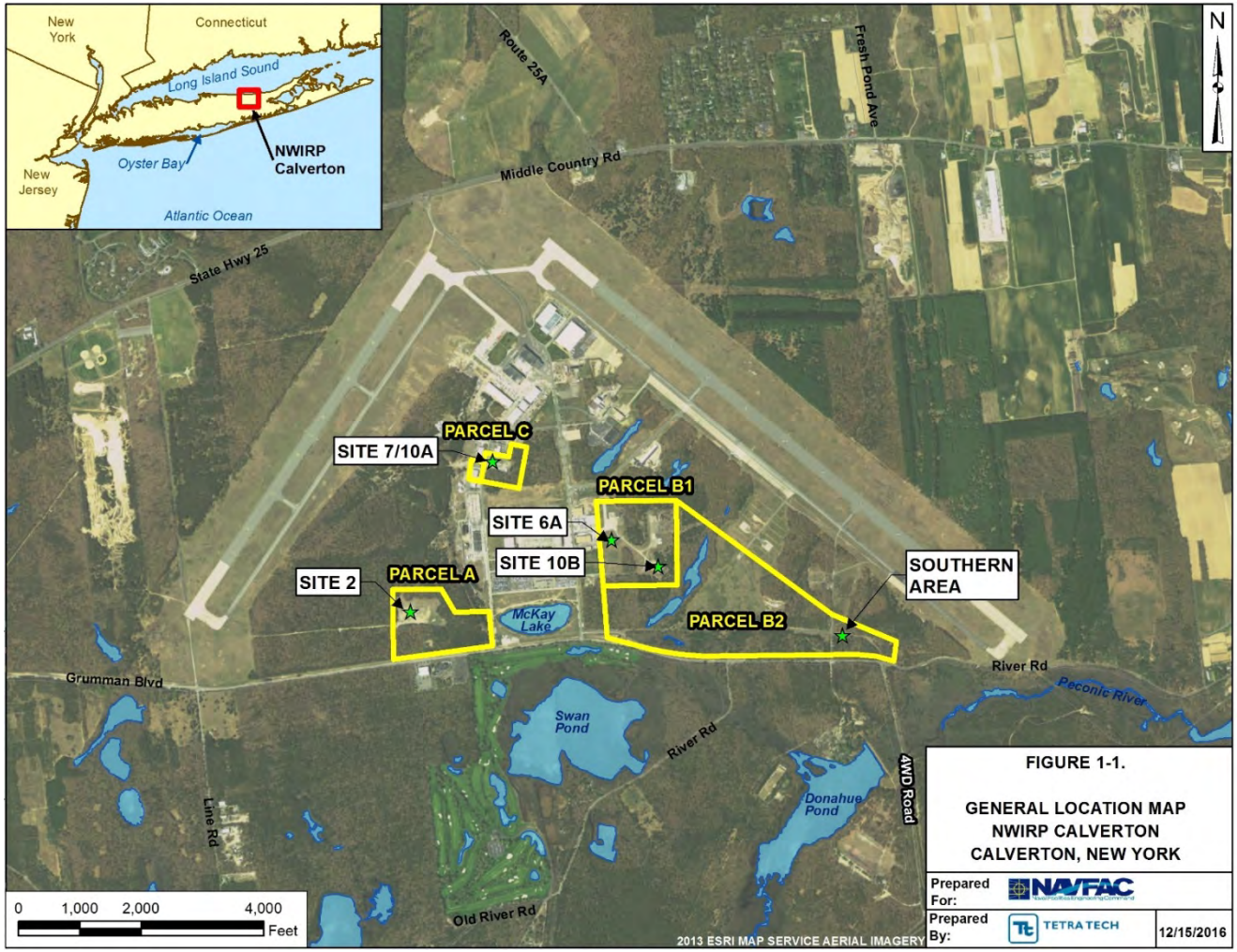
NWIRP CALVERTON, NEW YORK

November 14, 2017

Outline of Presentation

- Introduction
- System Performance / Background Information
  - Decommissioning of Full-scale AS/SVE System
- Monitoring Requirements
  - Groundwater Monitoring Requirements / Results
- Recent Events
- Summary and Path Forward

Introduction

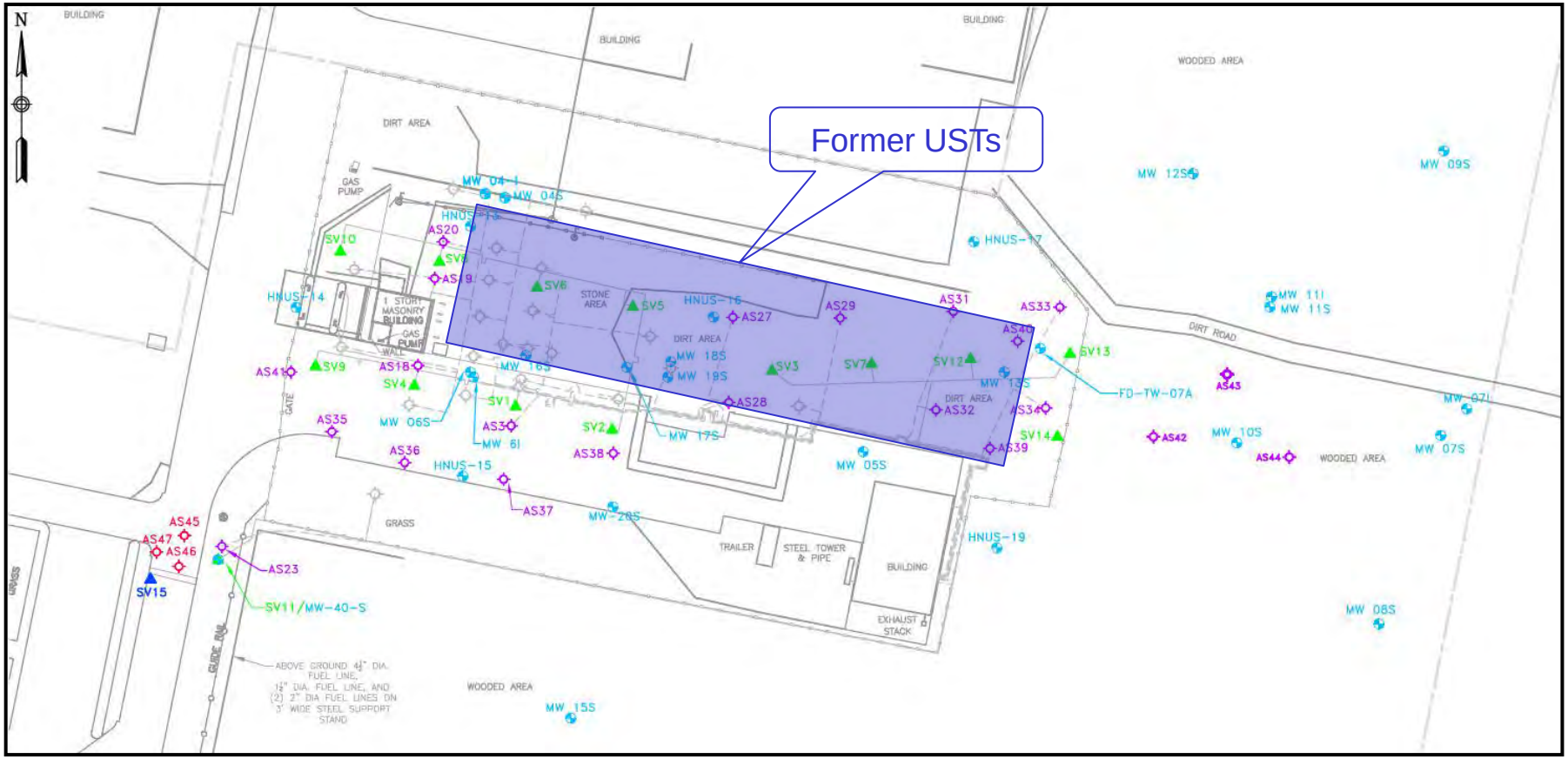


Introduction

- AS/SVE system started operation in 2005 (pilot)/2006 (full scale)
- Operated seasonally (April to December)
- Three modifications were made to the system to improve performance
- System reached end of its functional life November 2013
- System was shut down in November 2013 and monitoring began per the Performance and Shutdown Evaluation document (Nov 2013)

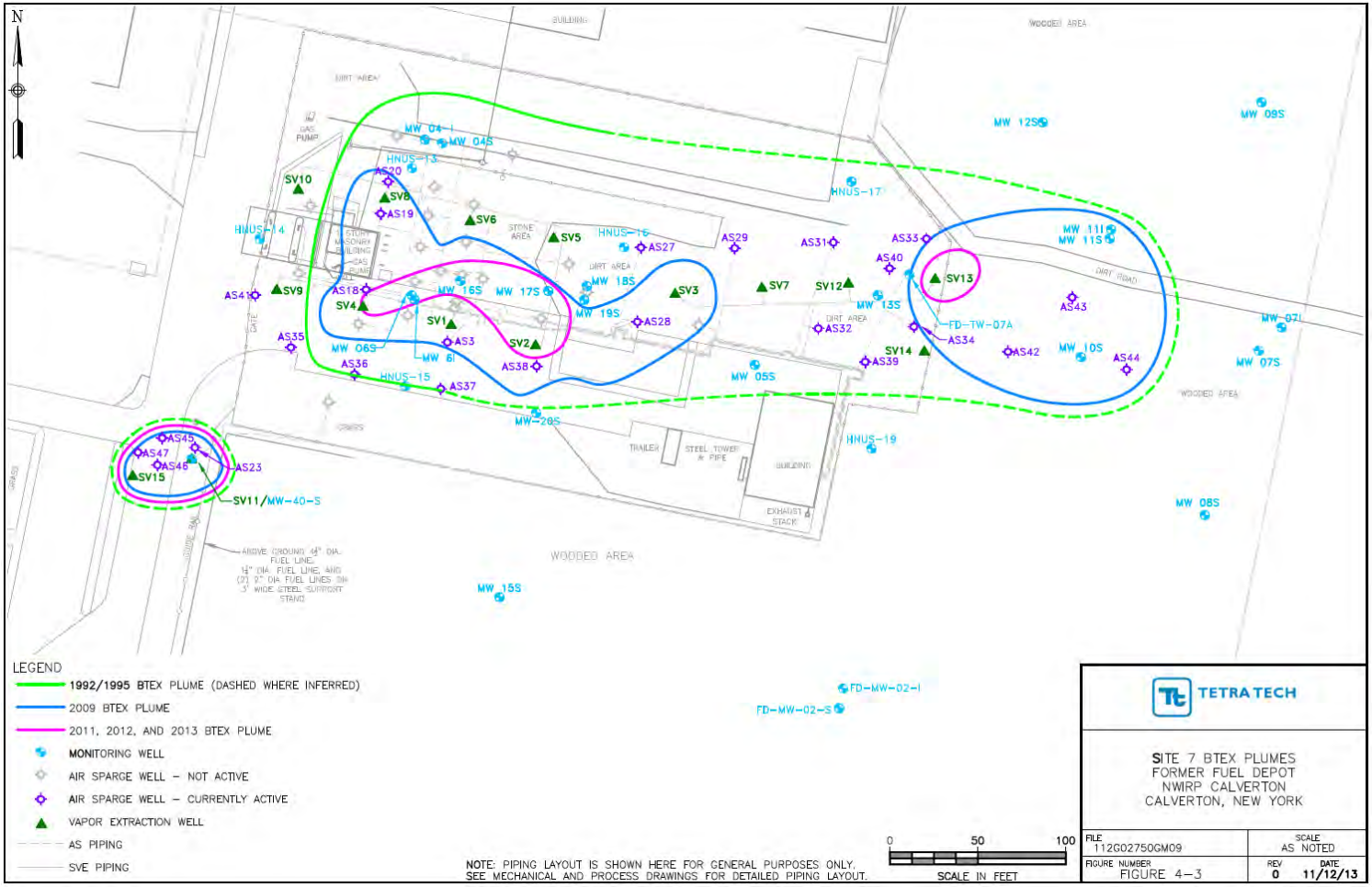
Introduction

Injection, Extraction, and Monitoring Wells



System Performance

1992/1995, 2009, and 2011 to 2013 Plume Boundaries



Monitoring Requirements

- Semiannual Groundwater Sampling
  - Select VOCs, 2-methylnaphthalene, and lead
  - Currently 11 monitoring wells are sampled each Spring and Fall
    - 7 wells which previously had exceedances of 2003 ROD Remediation Goals and;
    - 4 on-site monitoring wells located downgradient of contaminated groundwater
- Annual Monitoring Report
- Institutional controls restricting the use of groundwater as a source of potable or process water
- Five Year Reviews

Quarterly/Semiannual Groundwater Sampling

MW16S	12/9/2013	3/26/2014	6/18/2014 (SAMPLE/DUP)	9/24/2014	12/16/2014	3/18/2015	6/24/2015	9/17/2015	12/3/2015 (SAMPLE/DUP)	3/24/2016	10/6/2016	4/6/2017	10/11/2017 (SAMPLE/DUP)
Benzene	ND	ND	ND / ND	ND	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND / ND
Toluene	0.25 J	ND	0.22 J / ND	ND	ND	ND	ND	ND	0.21 J / 0.20 J	ND	ND	ND	ND / ND
Ethylbenzene	16.9	9.8	17 / 14	6.6	12	5.8	14	5.4	12 / 9.6	22	36	13	15 / 17
Total Xylenes	64.1	9.4	26 /23	15	4.3 J	13	36	14	23 J / 16 J	23	42	5.0 J	9.2 J / 10.68 J
Freon 113	ND	ND	ND / ND	1.1 J	5.2	0.83 J	ND	0.41 J	ND / 0.51 J	ND	2.3 J	1.2 J	ND / ND
Naphthalene	14.3 J	8.7	14 / 13	7.0	2.2 J	5.6	12	5.1	12 / 12	13	55	6.1	9.0 / 10
2-Methylnaphthalene	ND	1.2 J	7.3 J / 3.6 J	6.7 J	1.2 J	4.4 J	9.1 J	9.6	11 / 11	3.0 J	16	ND	ND / 3.2 J
Total Lead	41	ND	1.8 J / 1.1 J	ND	3.3 J	ND	ND	ND	ND / ND	ND	1.1 J	2.2 J	ND / ND

MW09S	9/16/2015	12/2/2015	3/24/2016	10/5/2016	4/5/2017	10/10/2017
Benzene	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	ND	ND
Freon 113	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND
Total Lead	ND	ND	ND	ND	ND	ND

MW07I	9/16/2015	12/2/2015	3/23/2016	10/5/2016	4/5/2017	10/12/2017
Benzene	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	3.3	ND
Freon 113	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	5.5	ND
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND
Total Lead	ND	ND	ND	ND	ND	ND

MW07S	9/16/2015	12/2/2015	3/23/2016	10/5/2014	4/5/2017	10/10/2017
Benzene	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	ND	ND
Freon 113	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND
Total Lead	ND	ND	ND	ND	ND	ND

MW08S	9/16/2015	12/2/2015	3/24/2016	10/8/2016	4/5/2017	10/10/2017
Benzene	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	ND	ND
Freon 113	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND
Total Lead	ND	ND	ND	ND	ND	ND

2013 Proposed Closeout Goals (ug/L)	
Benzene	5
Toluene	5
Ethylbenzene	5
Total Xylenes	5
Freon 113	5
Naphthalene	50
2-Methylnaphthalene	50
Total Lead	15

MW17S	12/10/2013	3/26/2014	6/18/2014	9/24/2014 (SAMPLE/DUP)	12/16/2014	3/18/2015	6/24/2015	9/17/2015	12/3/2015	3/24/2016	Oct. 2016	4/6/2017	10/10/2017
Benzene	ND	ND	ND	ND / ND	ND	ND	ND	ND	ND	ND	NS	ND	ND
Toluene	0.25 J	0.20 J	0.21 J	0.20 J / 0.21 J	ND	ND	ND	ND	0.20 J	ND	NS	ND	ND
Ethylbenzene	7.1	17	22	12 / 12	22	11	9.5	17	24	50	NS	44	77
Total Xylenes	10.3	36	38	30 / 37	69	23	30	50	31 J	52	NS	100	211 J
Freon 113	ND	ND	ND	ND / ND	ND	0.38 J	0.83 J	2.0 J	ND	ND	NS	ND	ND
Naphthalene	22.7 J	41	40	28 J / 32	36	17	38	27	55	41	NS	67	30
2-Methylnaphthalene	ND	5.0 J	9.4 J	23 / 22	8.3 J	ND	23	27	23	24	NS	32	5.1 J
Total Lead	18	13.1	10.8	6.0 / 6.3	3.7 J	2.6 J	2.8 J	ND	ND	ND	NS	2.4 J	ND

mplied)

*Gray shading - value exceeds 2013 Proposed Closeout Goal

Quarterly/Semi-Annual Groundwater Sampling

SV4	12/12/2013	3/27/2014	6/18/2014	9/24/2014	12/16/2014	3/18/2015	6/24/2015 (SAMPLE/DUP)	9/17/2015	12/3/2015	3/23/2016	10/6/2016 (SAMPLE/DUP)	4/6/2017	10/11/2017
Benzene	ND	ND	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND / ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND /ND	ND	ND	ND	ND / ND	ND	ND
Ethylbenzene	ND	1.9	1.7 J	4.6 J	5.2	8.2	8.7 / 8.8	11	6.9	4.9 J	12 / 12	6.1	7.6
Total Xylenes	5.0	2.5	1.6 J	11	14	29	43 / 43	83	41	25	103 / 99	46	76
Freon 113	ND	ND	0.45 J	2.6 J	0.41 J	0.77 J	1.6 J / 1.4 J	1.0 J	0.44 J	ND	5.8 / 6.4	0.84 J	2.10 J
Naphthalene	17.4 J	7.0	7.1	14	11	7.4	9.3 / 11	12	5.3	ND	10 J / 5.9 J	19	16
2-Methylnaphthalene	ND	6.7 J	4.3 J	11	4.3 J	5.9 J	7.7 J / 7.5 J	11	6.6 J	ND	4.6 J / 4.2J	ND	9.7
Total Lead	2.5	ND	1.1 J	ND	0.906 J	ND	ND / ND	ND	ND	ND	5.0 J / ND	3.6 J	ND

2013 Proposed Closeout Goals (ug/L)	
Benzene	5
Toluene	5
Ethylbenzene	5
Total Xylenes	5
Freon 113	5
Naphthalene	50
2-Methylnaphthalene	50
Total Lead	15

SV13	12/11/2013	3/26/2014	6/18/2014	9/24/2014	12/16/2014 (SAMPLE/DUP	3/17/2015	6/24/2015	9/16/2015	12/2/2015	3/23/2016	10/5/2016	4/5/2017 (SAMPLE/DUP)	10/11/2017
Benzene	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND	ND	ND	ND / ND	ND
Toluene	ND	1.4	0.89 J	1.1 J	0.25 J / 0.21 J	1.0 J	0.72 J	0.30 J	ND	0.33 J	ND	ND / ND	ND
Ethylbenzene	0.40 J	8.7	8.5	9.2	6.2 / 6.2	15	7.9	6.1	1.8 J	12	3.2 J	3.9 J / 4.4 J	12
Total Xylenes	2.7 J	23	18	25	13 / 13	28	18	17	2.7 J	22	4.2 J	11 / 12	56
Freon 113	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND	ND	ND	ND / ND	ND
Naphthalene	ND	4.4	6.6	7.0	4.0 J / 4.8 J	7.5	6.6	4.9 J	ND	ND	0.70 J	5.0 J / 5.8	15
2-Methylnaphthalene	ND	ND	1.0 J	9.7	ND / ND	ND	ND	ND	ND	ND	ND	1.2 J / 15 J	ND
Total Lead	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND	ND	ND	ND / ND	ND

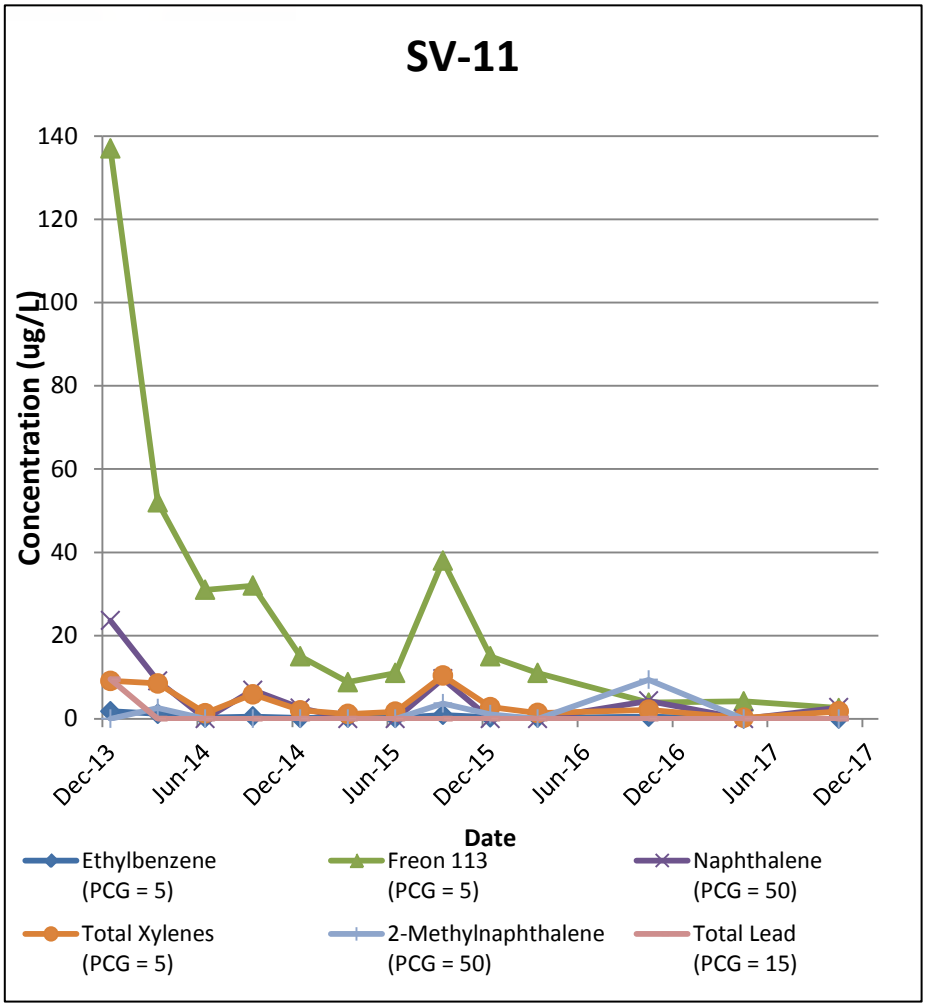
SV2	12/12/2013 (SAMPLE/DUP)	3/27/2014	6/18/2014	9/24/2014	12/16/2014	3/18/2015 (SAMPLE/DUP)	6/24/2015	9/17/2015	12/3/2015	3/24/2016 (SAMPLE/DUP)	10/6/2016	4/6/2017	10/10/2017
Benzene	ND / ND	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND / ND	ND	ND	ND
Toluene	1.4 / 1.4	0.77 J	1.0 J	1.6 J	1.2 J	0.98 J / 0.88 J	1.4 J	1.4 J	ND	ND / 0.38 J	ND	ND	ND
Ethylbenzene	98.9 / 102	140	130	140	160	160 / 170	210	220	310	210 / 170	390	98	120
Total Xylenes	645 J / 626	275	392	726	838	921 / 866	1282	1630	1443	510 J / 339 J	1,949	356	785
Freon 113	ND / ND	ND	ND	ND	ND	ND / ND	ND	ND	ND	3.4 J / 3.5 J	ND	ND	ND
Naphthalene	28.2 J / 29.6 J	24	26	37	33	33 / 37	36	51	71	38 / 41	66	23	33
2-Methylnaphthalene	20.2 / 20.4	42	58	83	70	60 / 62	56	69	ND	40 / 45	52	ND	21.0
Total Lead	26 / 33	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND / ND	ND	3.0 J	ND

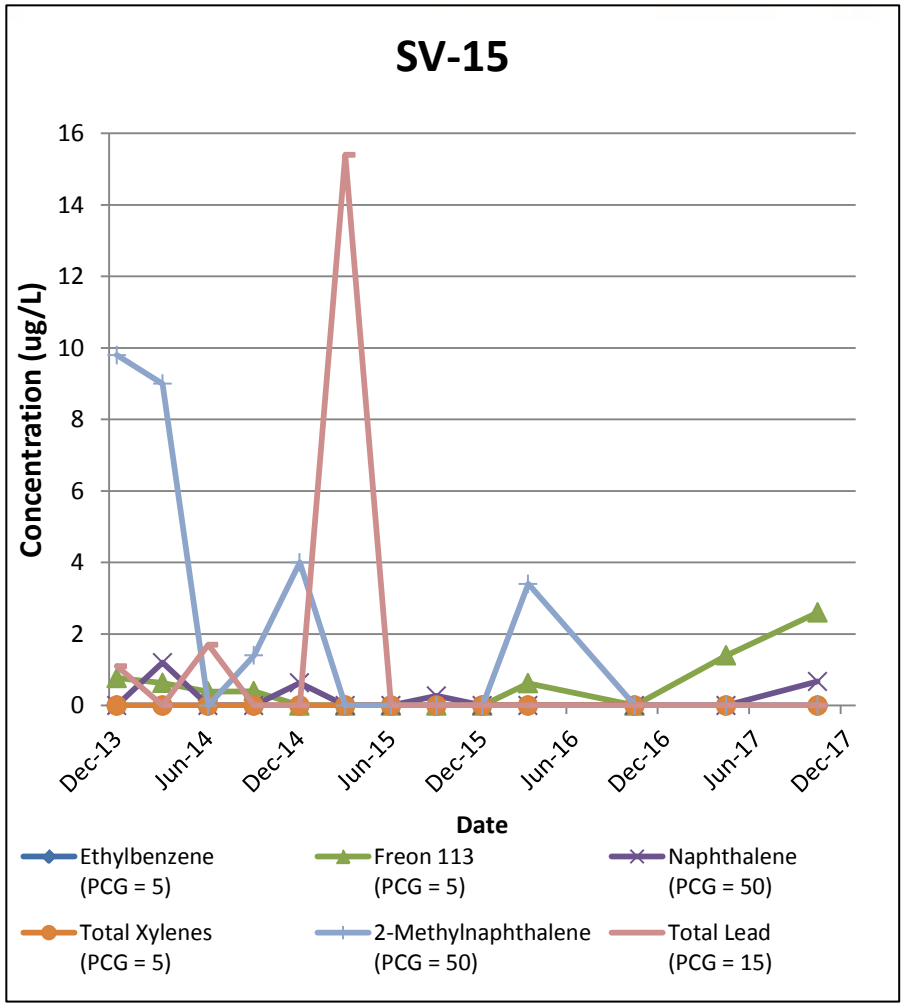
SV15	12/12/2013	3/27/2014	6/18/2014	9/24/2014	12/16/2014	3/18/2015	6/24/2015	9/17/2015	12/2/2015	3/23/2016	10/5/2016	4/6/2017	10/11/2017
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Freon 113	0.77 J	0.63 J	0.39 J	0.40 J	ND	ND	ND	ND	0.62 J	ND	1.4 J	2.6 J	
Naphthalene	ND	1.2	ND	ND	0.63 J	ND	ND	0.27 J	ND	ND	ND	ND	0.67
2-Methylnaphthalene	9.8	9.0 J	ND	1.4	4.0 J	ND	ND	ND	ND	3.4 J	ND	ND	ND
Total Lead	1.1 J	ND	1.7 J	ND	ND	15.4	ND	ND	ND	ND	ND	ND	ND

SV11/MW405	12/12/2013	3/27/2014 (SAMPLE/DUP	6/18/2014	9/24/2014	12/16/2014	3/18/2015	6/24/2015	9/17/2015 (SAMPLE/DUP)	12/2/2015	3/23/2016	10/5/2016	4/6/2017	10/11/2017
Benzene	ND	ND / ND	ND	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND	ND
Toluene	3.2 J	0.64 J / 0.48 J	0.28 J	0.78 J	ND	ND	0.27 J	0.47 J / 0.33 J	0.21 J	0.24 J	ND	ND	ND
Ethylbenzene	1.8 J	1.2 / 0.86 J	0.27 J	0.54 J	0.21 J	0.27 J	0.20 J	0.93 J / 0.68 J	0.36 J	0.24 J	0.50 J	ND	ND
Total Xylenes	9.1 J	8.5 / 6.8	1.4 J	5.9 J	2.0 J	1.2 J	1.7 J	10.4 J / 7.5 J	2.8 J	1.4 J	2.2 J	0.24 J	1.77 J
Freon 113	137	52 J / 36 J	31	32	15	8.8	11	38 J / 28 J	15	11	3.9 J	4.2 J	2.6 J
Naphthalene	23.6 J	9.1 / 7.9	ND	6.9	2.6 J	ND	ND	9.6 / 7.3	ND	ND	4.3 J	ND	2.7 J
2-Methylnaphthalene	ND	2.6 J / 2.5 J	ND	ND	ND	ND	ND	3.7 J / 3.6 J	1.1 J	ND	ND	ND	ND
Total Lead	9.5	ND / ND	ND	ND	ND	ND	ND	ND /ND	ND	ND	ND	ND	ND

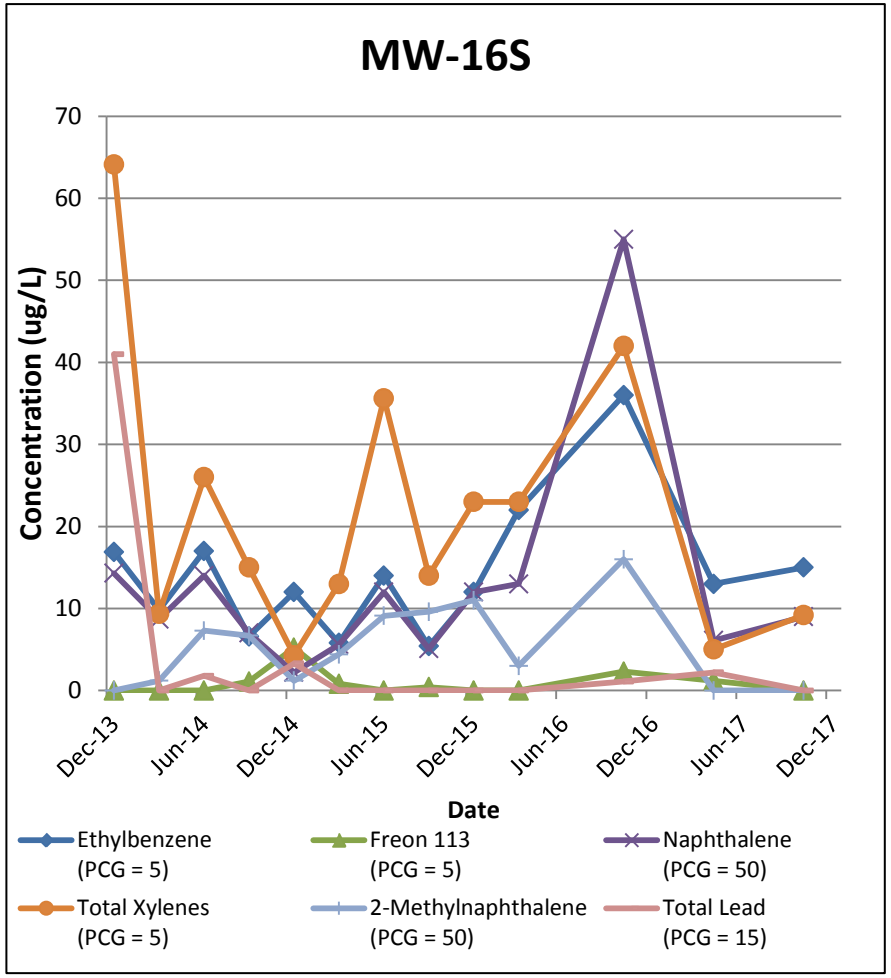
*Gray shading - value exceeds 2013 Proposed Closeout Goal

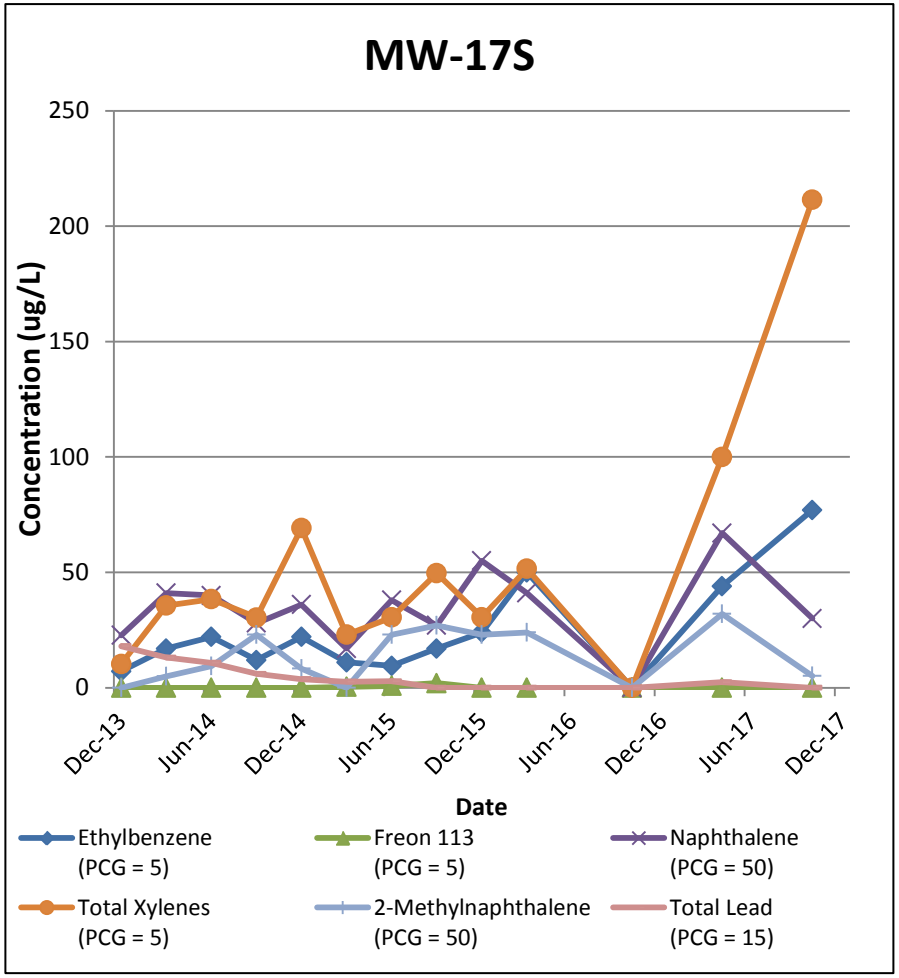
Quarterly/Semiannual Groundwater Sampling



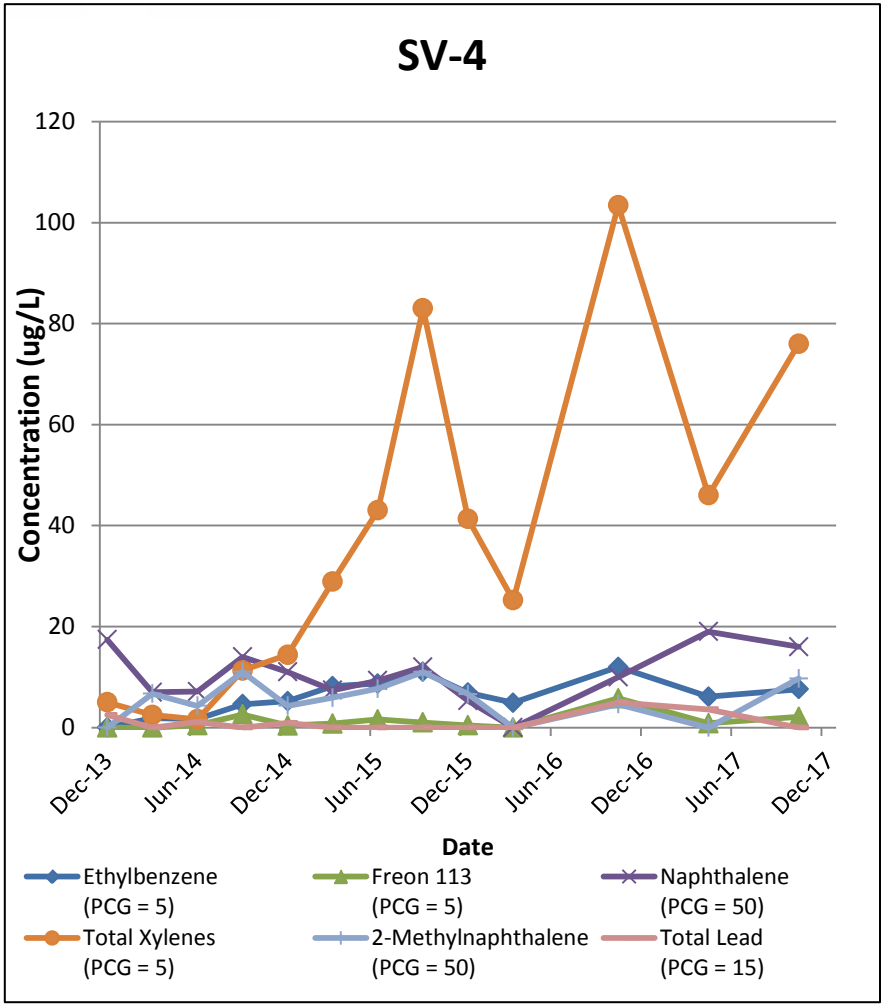


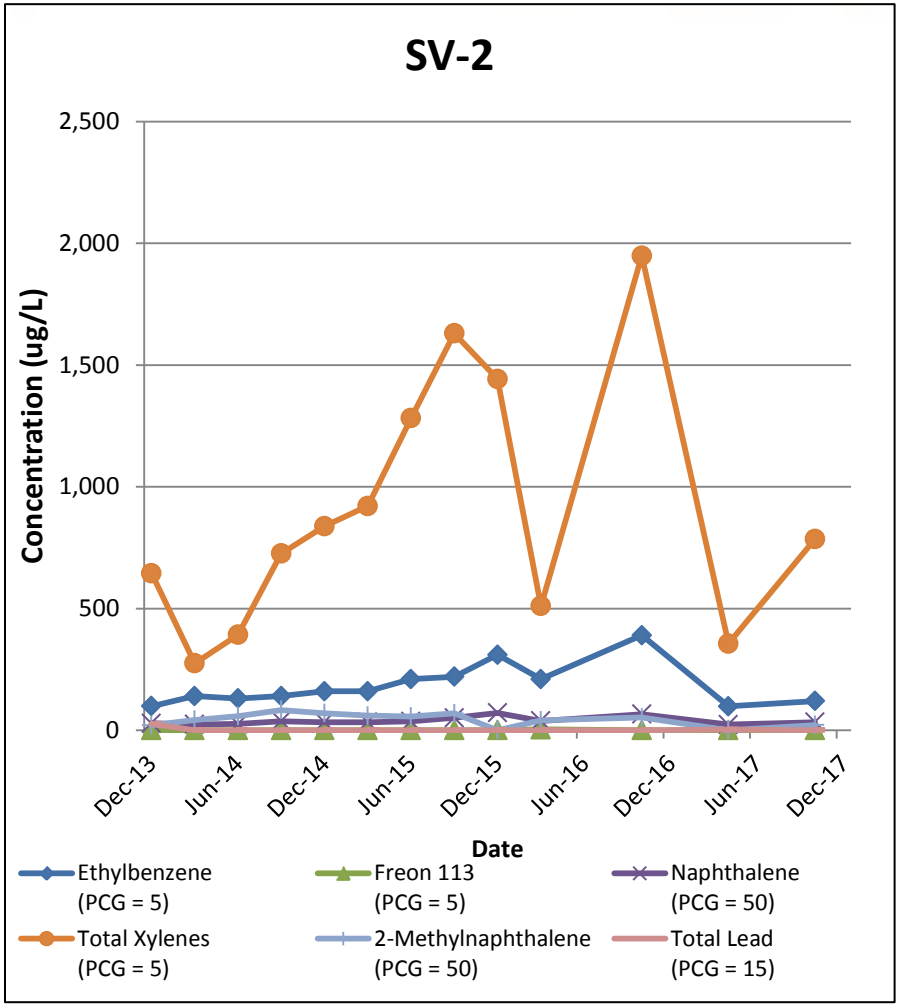
Quarterly/Semiannual Groundwater Sampling



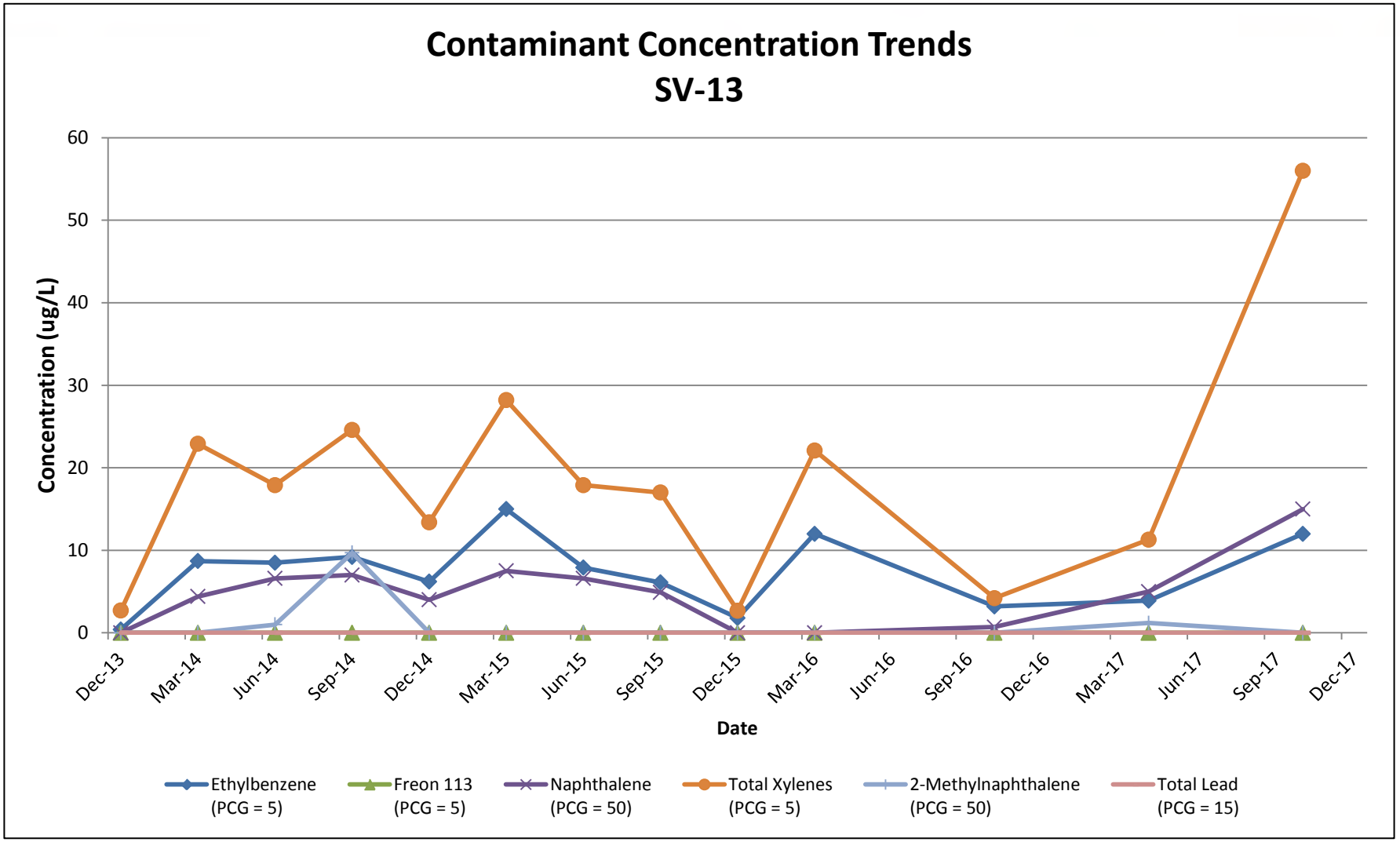


Quarterly/Semi-Annual Groundwater Sampling





Quarterly/Semiannual Groundwater Sampling



Recent Activities – October 2017

- Semiannual Groundwater Monitoring Performed in October 2017
  - No free product observed at any wells during the Annual LTM groundwater sampling event collected in October 2017
- Periodic gauging and bailing of monitoring wells during 2017
  - MW-17S – 1.12 ft. observed in October 2016. Decreased to 0.14 ft. in February 2017, and 0.21 ft. in March 2017
  - MW-19S – 1.05 ft. observed in November 2016. Not encountered in February/March 2017
  - MW-16S – 0.60 ft. observed in January 2017. Not encountered in February/March 2017
  - No additional product observed in any wells since 3/20/17
  - Three 55-gal drums of IDW (2 drums of bailed product, and 1 drum of PPE) were characterized and disposed off Site in September 2017

Summary and Path Forward

- Planned in-situ chemical oxidation (ISCO) pilot study deferred to investigate extent of free product

- Direct-push technology (DPT) rig used to investigate in-situ conditions in late March 2017 – 5 borings
  - No free product observed in any boring
  - Fuel odors at depth in 4 of 5 borings (all except FD-SB303)
  - Petroleum staining in FD-SB304 and FD-SB305 at depth

- Review of gauging data
  - Appearance of free product tied to groundwater depths exceeding 20 ft bgs (about elevation 36 to 36.5 ft NAVD88)

Summary and Path Forward (cont'd)

- Near-term response
  - Continue gauging, recovery as needed
  - Further investigation needed to define limits of impacted area to target with potential remedial measures

- Remedial Options
  - Buried slab complicates remediation options
  - Source removal options
    - Targeted air sparging (with or without soil vapor extraction)
    - ISCO (possible if done while GW levels are high)
    - Excavation
  - Containment options
    - Permeable reactive barrier
  - No action (if free product is shown to be immobile)

SITE 6A - SOUTHERN AREA FENCE LINE GROUNDWATER EXTRACTION TREATMENT SYSTEM

November 2017 Restoration Advisory Board

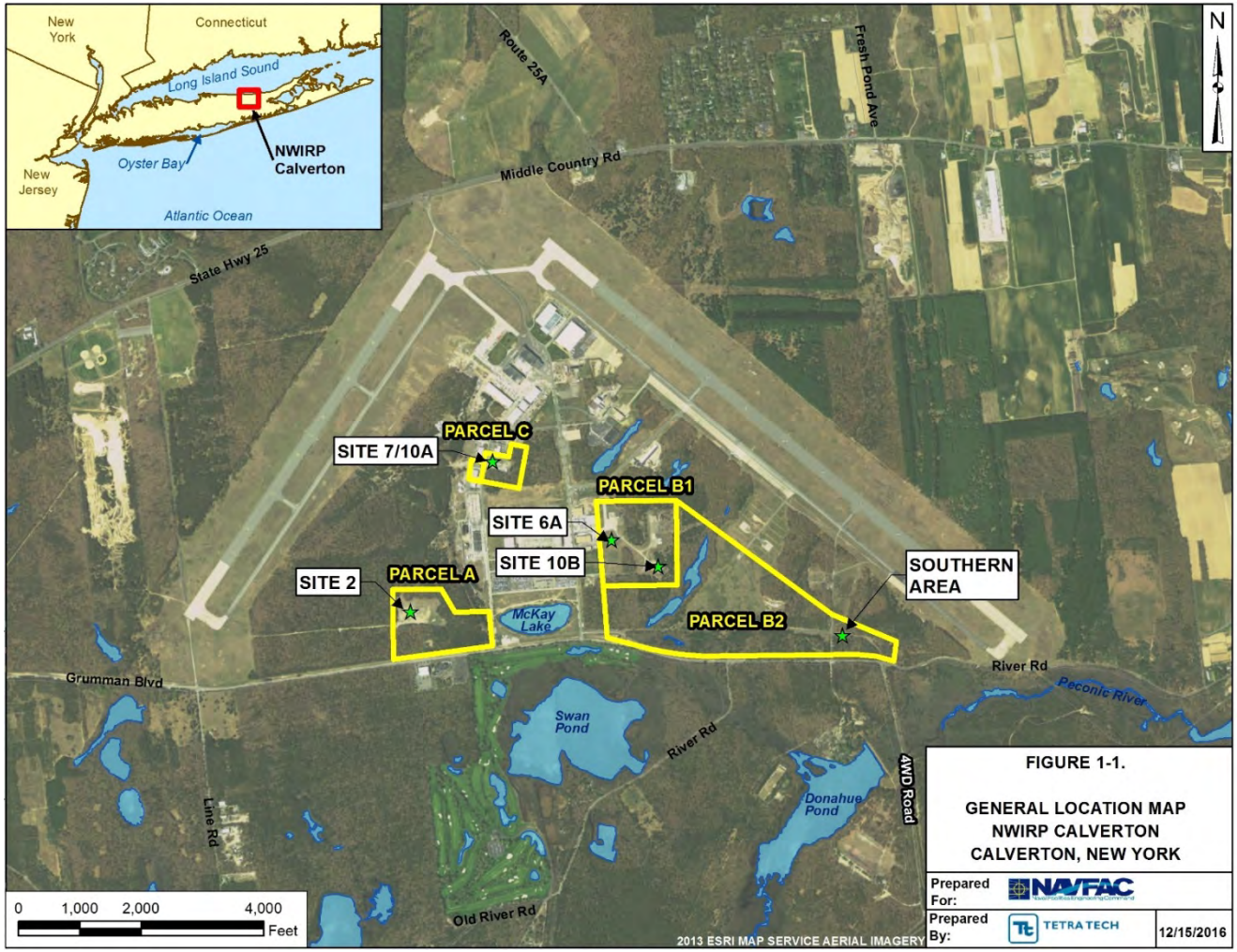
NWIRP CALVERTON, NEW YORK

November 14, 2017

Presentation Agenda

- Introduction
- System Overview
- System Operation
- System Performance / Recent Activities
- System Performance Summary / Future Activities

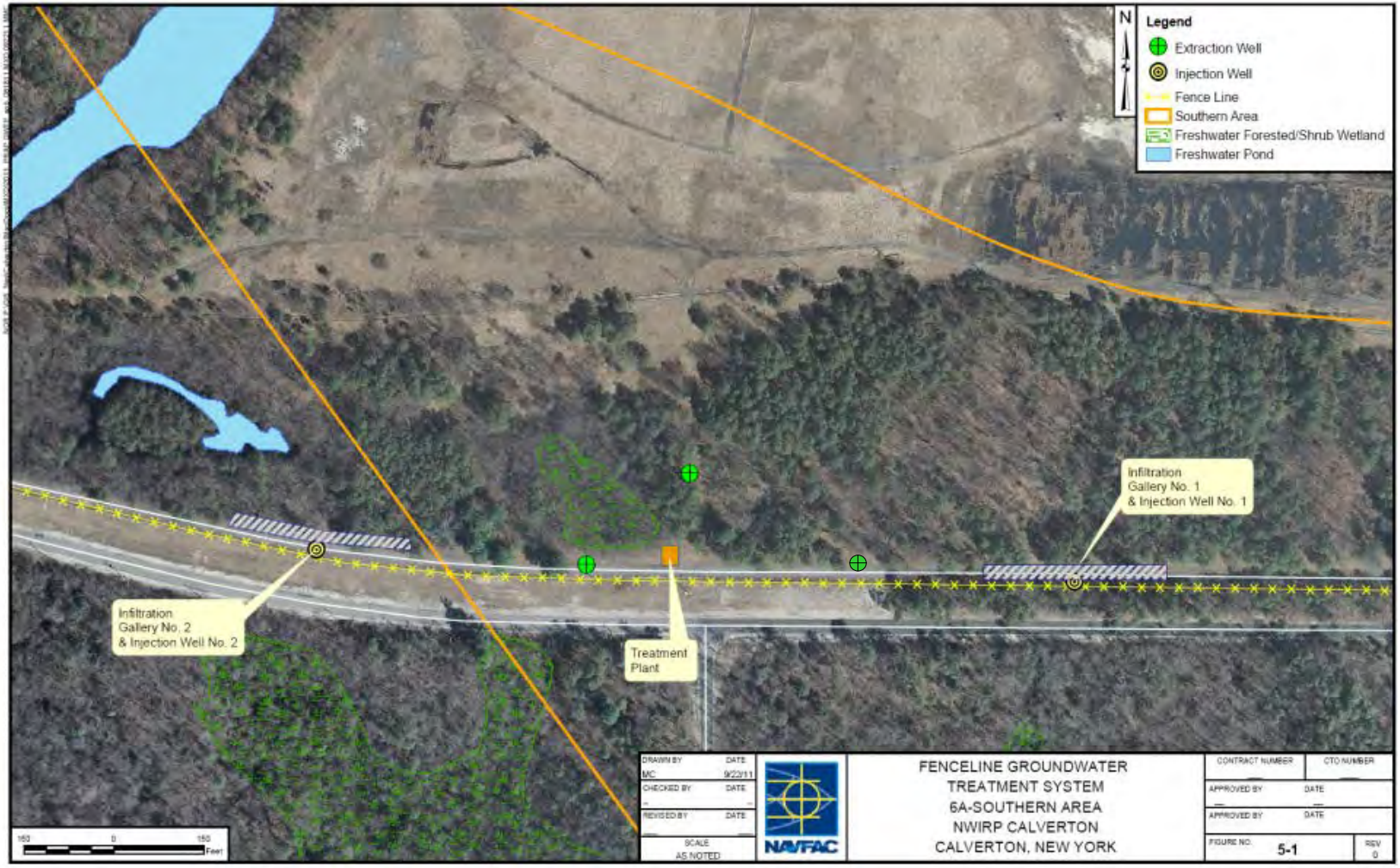
Site Layout


New York
Connecticut
Long Island Sound
NWIRP Calverton
Oyster Bay
New Jersey
Atlantic Ocean
Route 25A
Fresh Pond Ave
Middle Country Rd
State Hwy 25
N
PARCEL C
SITE 7/10A
PARCEL B1
SITE 6A
SITE 10B
SITE 2
PARCEL A
SOUTHERN AREA
McKay Lake
PARCEL B2
Grumman Blvd
River Rd
Peconic River
Swan Pond
River Rd
4WD Road
Donahue Pond
Line Rd
Old River Rd
0 1,000 2,000 4,000 Feet
2013 ESRI MAP SERVICE AERIAL IMAGERY
FIGURE 1-1.
GENERAL LOCATION MAP
NWIRP CALVERTON
CALVERTON, NEW YORK
Prepared For: NAVFAC
Prepared By: TETRA TECH
12/15/2016

Fence Line Treatment System Overview

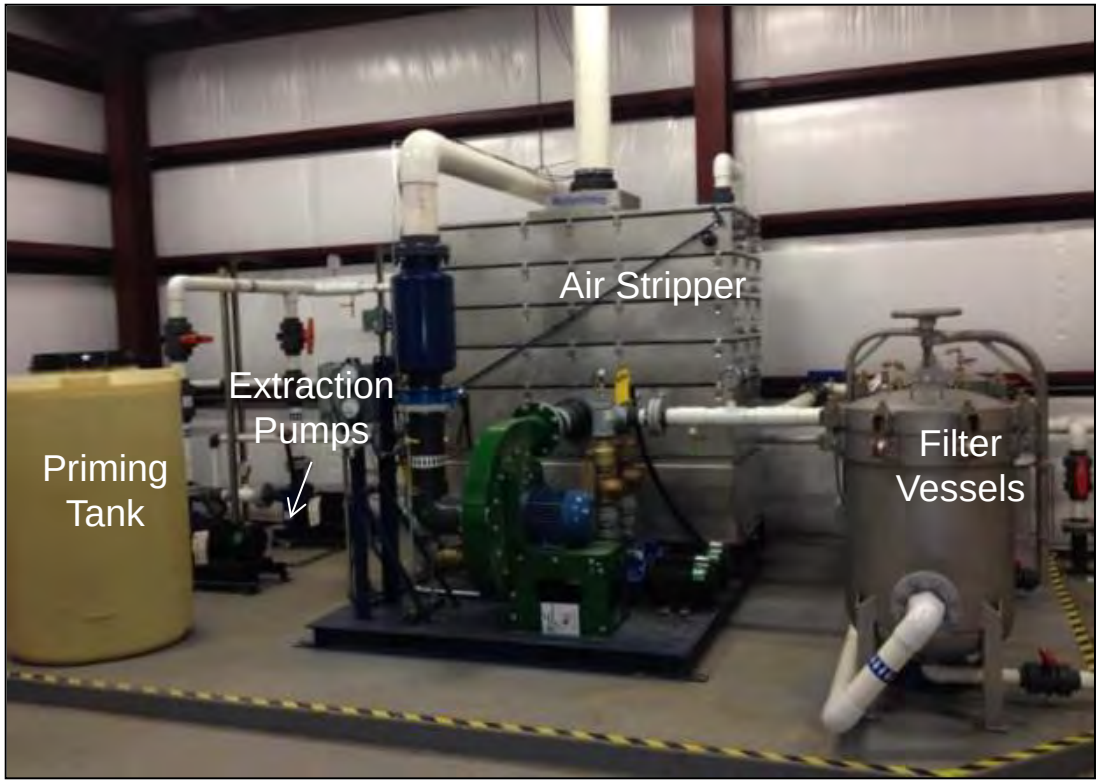
- Record of Decision (ROD) in May 2012
- Selected remedy for Fence Line Area – LUCs and monitoring with extraction, treatment, and infiltration
- Remedial Design for Fence Line Treatment System (FLTS) in May 2012
- FLTS overview:
    - Three extraction wells (EW-1, EW-3 and SA-PTW1), up to 100 gallons per minute
    - VOCs removed via air stripping
    - Treated groundwater re-injected through infiltration galleries, meeting MCLs
- Construction began in October 2012, and system start-up occurred 8 October 2013
- EW-2 taken off-line and well EW-3 brought on-line in February 2016 to increase flow recovery
- SA-PTW1 temporary connection to FLTS in July 2017 to treat persisting VOCs in the vicinity of nearby well SA-MW127I
- Pumping at EW-2/EW-3 suspended as VOC concentrations are below MCLs

Fence Line Treatment System Overview



Fence Line Treatment System Overview

Treatment Plant Building



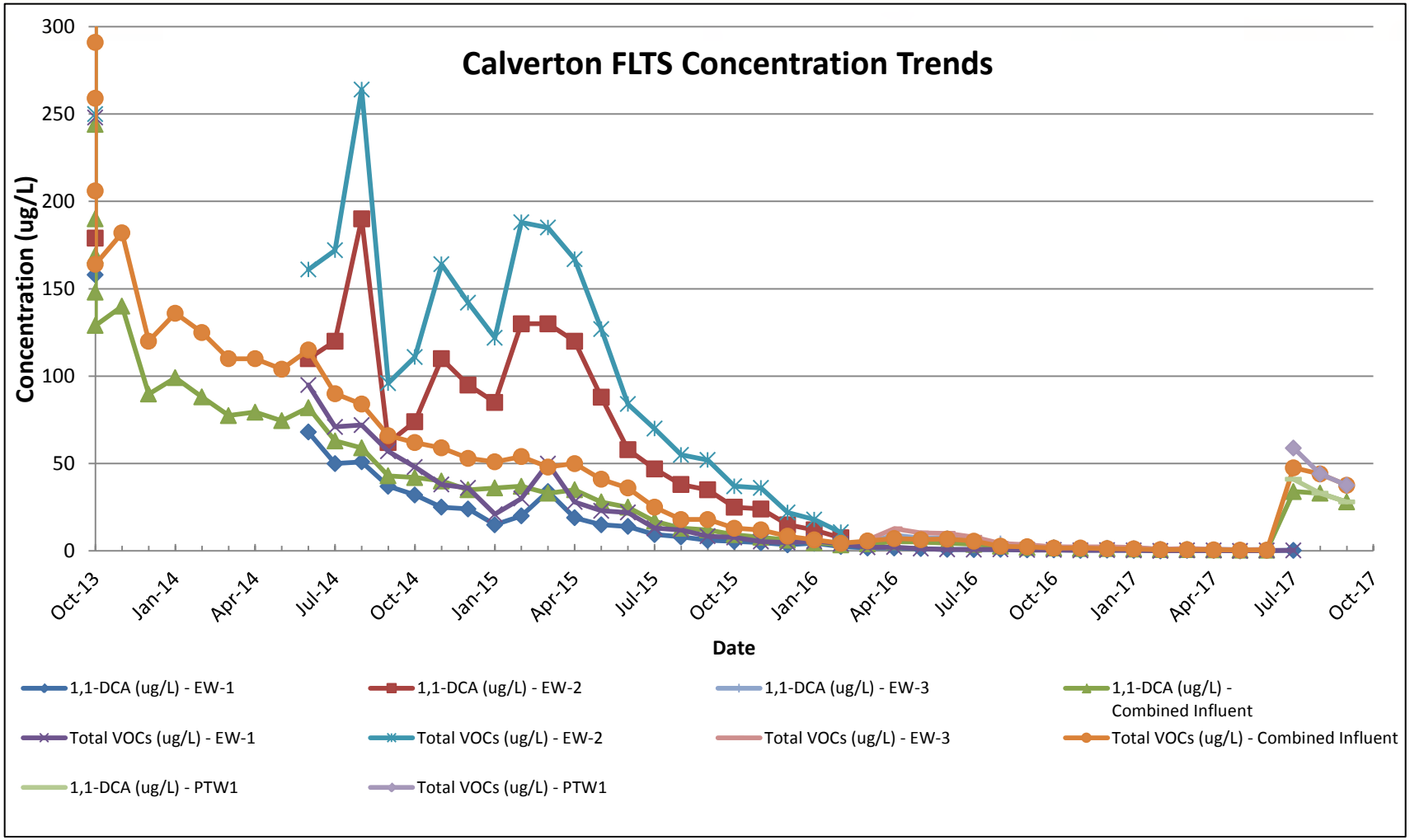
System Components

Fence Line Treatment System Operation

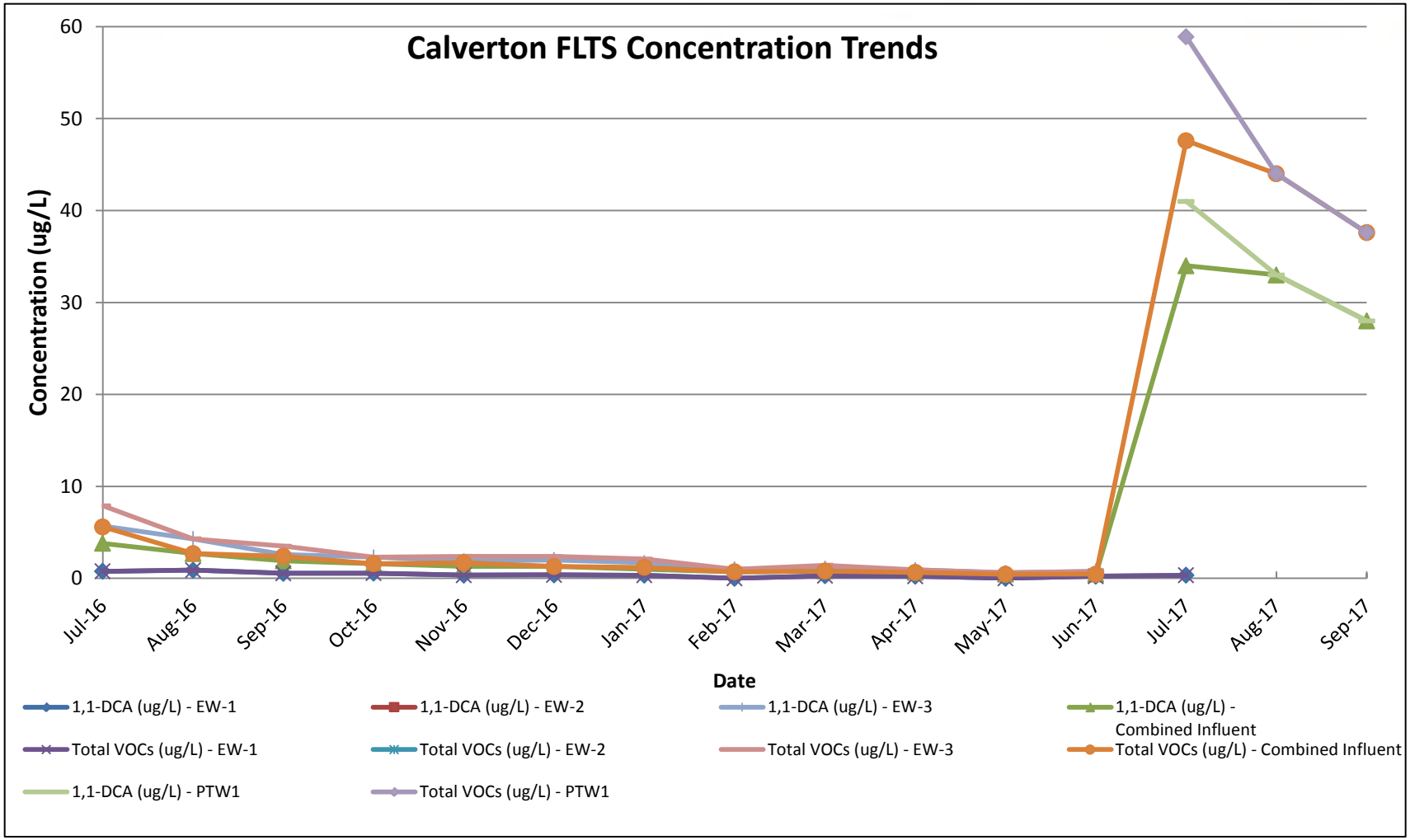
FLOW DATA			
Date	Total Monthly Flow (gal)	Total Cumulative Flow (gal)	Average Influent Flowrate (gpm)
13-Dec	1,715,264	6,980,790	61.5
14-Jan	2,358,016	9,338,806	77
14-Feb	3,814,953	13,153,759	96.2
14-Mar	3,794,639	16,948,398	91.3
14-Apr	3,683,505	20,631,903	91
14-May	3,658,145	24,290,048	87.9
14-Jun	3,149,276	27,439,324	85
14-Jul	3,113,492	30,552,816	79.4
14-Aug	3,113,492	33,666,308	81.7
14-Sep	1,949,358	35,615,666	78.8
14-Oct	3,744,800	39,360,466	87
14-Nov	2,325,171	41,685,637	88.4
14-Dec	3,791,812	45,477,450	91
15-Jan	3,711,714	49,189,164	87.1
15-Feb	3,331,398	52,520,562	87
15-Mar	2,435,158	54,955,720	77.3
15-Apr	3,152,581	58,108,301	76.1
15-May	3,020,310	61,128,611	77.2
15-Jun	2,700,213	63,828,824	73.1
15-Jul	3,167,585	66,996,409	71.1
15-Aug	2,660,132	69,656,541	64.5
15-Sep	2,849,371	72,505,912	68.6
15-Oct	2,725,555	75,231,467	65.1

FLOW DATA			
Date	Total Monthly Flow (gal)	Total Cumulative Flow (gal)	Average Influent Flowrate (gpm)
15-Nov	2,506,673	77,738,140	68.8
15-Dec	2,642,380	80,380,520	67.5
16-Jan	2,160,582	82,541,102	69.8
16-Feb	2,832,957	85,374,059	73.4
16-Mar	3,931,870	89,305,929	94.5
16-Apr	2,960,041	92,265,970	76.4
16-May	2,761,171	95,027,141	70.8
16-Jun	3,418,214	98,445,355	79.5
16-Jul	3,372,265	101,817,620	79.6
16-Aug	3,336,255	105,153,875	79.2
16-Sep	2,481,681	107,635,556	71.8
16-Oct	3,011,578	110,647,134	76.8
16-Nov	2,979,584	113,626,718	75.2
16-Dec	3,198,070	116,824,788	71.6
17-Jan	3,142,197	119,966,985	73.8
17-Feb	2,265,949	122,232,934	64.9
17-Mar	2,991,087	125,224,021	69.0
17-Apr	2,270,301	127,494,322	58.1
17-May	2,735,653	130,229,975	66.2
17-Jun	2,201,678	132,431,653	58.5
17-Jul	2,431,572	134,863,225	55.7
17-Aug	2,103,035	136,966,260	47.1
17-Sep	1,954,037	138,920,297	45.2

Fence Line Treatment System Operation



Fence Line Treatment System Operation



Fence Line Treatment System Operation

Target VOC Mass Removal		
Date	Monthly VOC Mass Removal (lb)	Cumulative VOC Mass Removal (lb)
13-Oct	4.04	4.04
13-Nov	3.46	7.5
13-Dec	1.7	9.2
14-Jan	2.66	11.86
14-Feb	3.95	15.81
14-Mar	3.45	19.26
14-Apr	3.35	22.61
14-May	3.16	25.77
14-Jun	3	28.77
14-Jul	2.32	31.09
14-Aug	2.35	33.44
14-Sep	1.06	34.5
14-Oct	1.94	36.44
14-Nov	1.14	37.58
14-Dec	1.64	39.22
15-Jan	1.59	40.81
15-Feb	1.49	42.3
15-Mar	0.98	43.28
15-Apr	1.31	44.59
15-May	1.02	45.61
15-Jun	0.81	46.42
15-Jul	0.67	47.09
15-Aug	0.41	47.5
15-Sep	0.43	47.93

Target VOC Mass Removal		
Date	Monthly VOC Mass Removal (lb)	Cumulative VOC Mass Removal (lb)
15-Oct	0.3	48.23
15-Nov	0.25	48.48
15-Dec	0.18	48.66
16-Jan	0.12	48.78
16-Feb	0.1	48.88
16-Mar	0.19	49.07
16-Apr	0.18	49.25
16-May	0.15	49.4
16-Jun	0.19	49.59
16-Jul	0.16	49.75
16-Aug	0.08	49.83
16-Sep	0.05	49.88
16-Oct	0.04	49.92
16-Nov	0.04	49.96
16-Dec	0.03	49.99
17-Jan	0.03	50.02
17-Feb	0.01	50.03
17-Mar	0.02	50.05
17-Apr	0.01	50.06
17-May	0.01	50.07
17-Jun	0.01	50.08
17-Jul	0.49	50.57
17-Aug	0.76	51.33
17-Sep	0.6	51.93

Fence Line Treatment System Performance / Recent Activities

- Flow rates have been adjusted down due to reduced ability of infiltration galleries to accept flow
- Letter work plan to connect test well SA-PTW1 to perform groundwater extraction and treatment via the FLTS was approved in May 2017
  - Groundwater extraction at test well SA-PTW1 started in July 2017
- Infiltration gallery optimization activities initiated in March 2017
  - Video camera survey of the infiltration gallery and injection wells conducted in March 2017
  - Test pits along the infiltration galleries conducted in April 2017; Test pits confirmed discharge pipping was fouled with apparent iron sludge
  - Rehabilitation of the eastern infiltration gallery was conducted in August 2017; Groundwater discharge flow and distribution significantly increased
  - The FLTS effluent discharge is now going to the east gallery only; Currently, no discharge flow is going to the west infiltration gallery

Fence Line Treatment System Performance / Recent Activities

FLTS effluent discharge pipe prior to rehabilitation. Build up of iron precipitate inside discharge line. Effluent line was cleaned, resulting in increase discharge capacity.

East infiltration gallery rehabilitation activities. Existing 6-inch discharge pipe was cleaned, increased diameter of perorated discharge holes, and coarser gravel was installed. The old wrap-around fabric was removed, and new fabric laid overtop of the new gravel was installed.

Fence Line Treatment System Performance / Recent Activities

- Overall decreasing trend observed in combined influent VOC concentrations from October 2013 through June 2017
  - Target VOC concentrations in EW1 and EW3 have remained below 5 µg/L since August 2016
  - Began analyzing for full-list VOCs in May 2016 due to tetrachloroethene (PCE) detections in Site monitoring wells
    - PCE concentrations in combined influent ranged from 8.9 µg/L in May 2016 to 0.72 J µg/L in September 2017
- Groundwater extraction at SA-PTW1 began in July 2017 resulting in overall increase of VOC detections at the influent
  - Influent concentrations of 1,1-DCA in SA-PTW1 ranged from 41 µg/L (July 2017) to 23 µg/L (October 2017)

SA-PTW1 Wellhead

SA-PTW1 connection to the FLTS

Fence Line Treatment System Performance Summary / Future Activities

- Continued compliance with all discharge goals
- Continued VOC removal efficiencies of >99%
- Influent analytical results above MCLs at SA-PTW1 only
- Continue evaluating groundwater concentrations in Area / shut-down criteria
- Continue evaluating infiltration gallery capacity and perform system modifications if needed
- Continue to perform monthly compliance sampling and submit monthly compliance reports

2017 SITE 6A, SOUTHERN AREA AND OU3 ANNUAL SAMPLING PROGRAMS

November 2017 Restoration Advisory Board

NWIRP CALVERTON, NEW YORK

November 14, 2017

Site Location

Site 6A Source Area Investigation

- Temporary Well Program
  - Driven by recent VOC concentrations at FC-MW02SR1 and FC-MW03SR1
  - Primary objectives:
    - Determine if source is upwelling from below excavation, or from upgradient
    - Determine if there is a plume existing the source area to the east
  - Implemented in March 2017 per approved Work Plan
  - DPT drill rig used to investigate multiple locations within historic source area and upgradient, sidegradient and downgradient
    - Four vertical profile borings (VPBs) to define stratigraphy
    - 12 temporary well (TW) points installed
      - VOC samples collected from three intervals in each TW (shallow, intermediate and deep)
  - Four existing monitoring wells also sampled for VOCs

Site 6A Source Area Investigation

- Temporary Well Program Results
  - Upgradient data not suggestive of an external source
    - Low detections of VOCs observed upgradient (FC-TW101 through 105) – all below MCLs
    - FC-TW106 did exhibit some fuel-related compounds in deep (52 to 54 ft bgs) sample only (10 µg/L benzene exceeded MCL; naphthalene, toluene, isopropylbenzene and ethylbenzene also present)
  - Source area data confirms observations at FC-MW02SR1 and FC-MW03SR1
    - Fuel-related compounds exceeded MCL in shallow samples at FC-TW107, FC-TW108 and FC-TW109
    - Intermediate and deep samples generally below MCLs, except for minor exceedance of 1,2,4-trichlorobenzene in deep sample at FC-TW107
  - Downgradient locations within ~100 ft of source area (FC-TW110 through 112) below MCLs
- Conclusions
  - Fuel-related contamination appears to be confined to shallow groundwater in former source area
  - Does not appear to be very mobile based on downgradient results

PRSC Monitoring Wells

- Data gap between SA-MW132 and SA-PZ123 identified
  - 5 additional wells on PRSC property
    - Two clusters (SA-MW184 and SA-MW185) with shallow and intermediate wells
    - One location (SA-MW186) with shallow well only
  - Provide better definition of plume along northern shore of Donahue Pond
  - Installed March 2017, sampled April and September 2017

- Analytical results
  - 1,1-Dichloroethane only VOC to exceed an MCL, at SA-MW184I in April (6.1 µg/L) and September (5.9 µg/L)
  - No MCL exceedances at SA-MW184S, SA-MW185S/I or SA-MW186S

OU3 Monitoring Program - Summary

- Water Elevation Gauging – September 2017
  - 106 wells/piezometers planned (5 not measured due to damage/access)
  - 7 staff gauges planned (4 locations measured as “dry” – no reading)
- Well & Piezometer Sampling
  - 62 locations, all sampled for VOCS in September 2017
    - Subset of 21 locations also sampled for 1,4-dioxane, all in Southern Area
  - Site 6A (Fuel Calibration Area)
    - 12 locations
  - Southern Area
    - 15 on-site locations, 35 off-site locations
    - 12 Fence Line Area locations also sampled in May, 3 in August
- Peconic River Surface Water, Groundwater and Porewater
  - 4 surface water and porewater locations sampled in April and September
  - 3 upland piezometers sampled in September

OU3 Monitoring Program – Summary (cont'd)

- 1,4-Dioxane Sampling
  - Expansion of 2015 screening that evaluated 1,4-dioxane at six locations (only one detection, SA-MW131D – 1.9 µg/L)
  - Purpose is to evaluate whether a 1,4-dioxane plume is leaving the site and/or approaching the Peconic River
  - Sampling targeted crossections along Fenceline Area and Connecticut Ave.
    - 10 locations along border of Fenceline Area
    - 11 locations along Connecticut Avenue
- 1,4-Dioxane Results
  - Not detected at 10 locations
  - Detected at 11 locations
    - 6.3 µg/L at SA-MW118S, 3.4 µg/L at SA-PZ166I, 3.4 µg/L at SA-PZ123I, 1.0 µg/L at SA-PZ122D
    - Detected below 1 µg/L at seven other locations

OU3 Monitoring Program – Summary (cont'd)

- SA-MW127I / Temporary FLTS Connection
  - 1,1-DCA levels in excess of MCL observed beginning in May 2016
    - May 2016 – 220 µg/L; Sept. 2016 – 190 µg/L; Dec. 2016 – 220 µg/L; April 2017 – 89 µg/L
    - Other target VOC compounds also detected
  - SA-MW127 cluster is in between extraction wells and east infiltration gallery
  - FLTS temporarily connected to existing pump test well near SA-MW127 cluster
    - Connection began operation in July 2017
    - Target influent VOC concentrations increased from <0.5 µg/L to range of 31 – 44 µg/L since connection
  - Post-connection data at SA-MW127I shows 1,1-DCA still in excess of MCL
    - August 2017 – 58 µg/L; Sept. 2017 – 120 µg/L
  - Temporary connection to be left in place and operated while feasible and target VOC levels are elevated

- Remaining OU3 monitoring data to be reported in coming months

Eastern Plume
(TCE and Xylene)

Western Plume (TCE)

FTMW01S
FTMW01I
FTMW03S
FTMW02S
FTMW02I
FTMW09I
FTMW05I
FTMW05S
FTMW08S
FTMW08I
FTMW06I
FTMW07S
FTMW06S
FTMW10I
FTPZ451S
FTPZ452S
FTPZ454S
McKay Lake
FTGA 10
FTPZ453S
FTPZ455S
FTPZ455I
5 µg/L
Grumman Blvd
FTPZ459I
FTPZ459S
Swan Pond
FTPZ462S
FTPZ462I
FTPZ458S
FTPZ458I
FTPZ461I
FTGA 13
FTGA 12
FTPZ460I
FTPZ457S
FTPZ456S
FTPZ456I
Donahue Pond
FTPZ463S
FTPZ463I
FTPZ464S
FTPZ464I
N

Legend

- Monitoring Well/Piezometer
- Staff Gauge
- TCE 5 µg/L contour inferred
- February 2012 Groundwater Flow
- Former Concrete Burn Ring
- Property Boundary
- 1,4-Dioxane was not detected in 2015
- 1,4-Dioxane was detected in 2015

µg/L = micrograms per liter
TCE = Trichloroethene

0 250 500 1,000 Feet

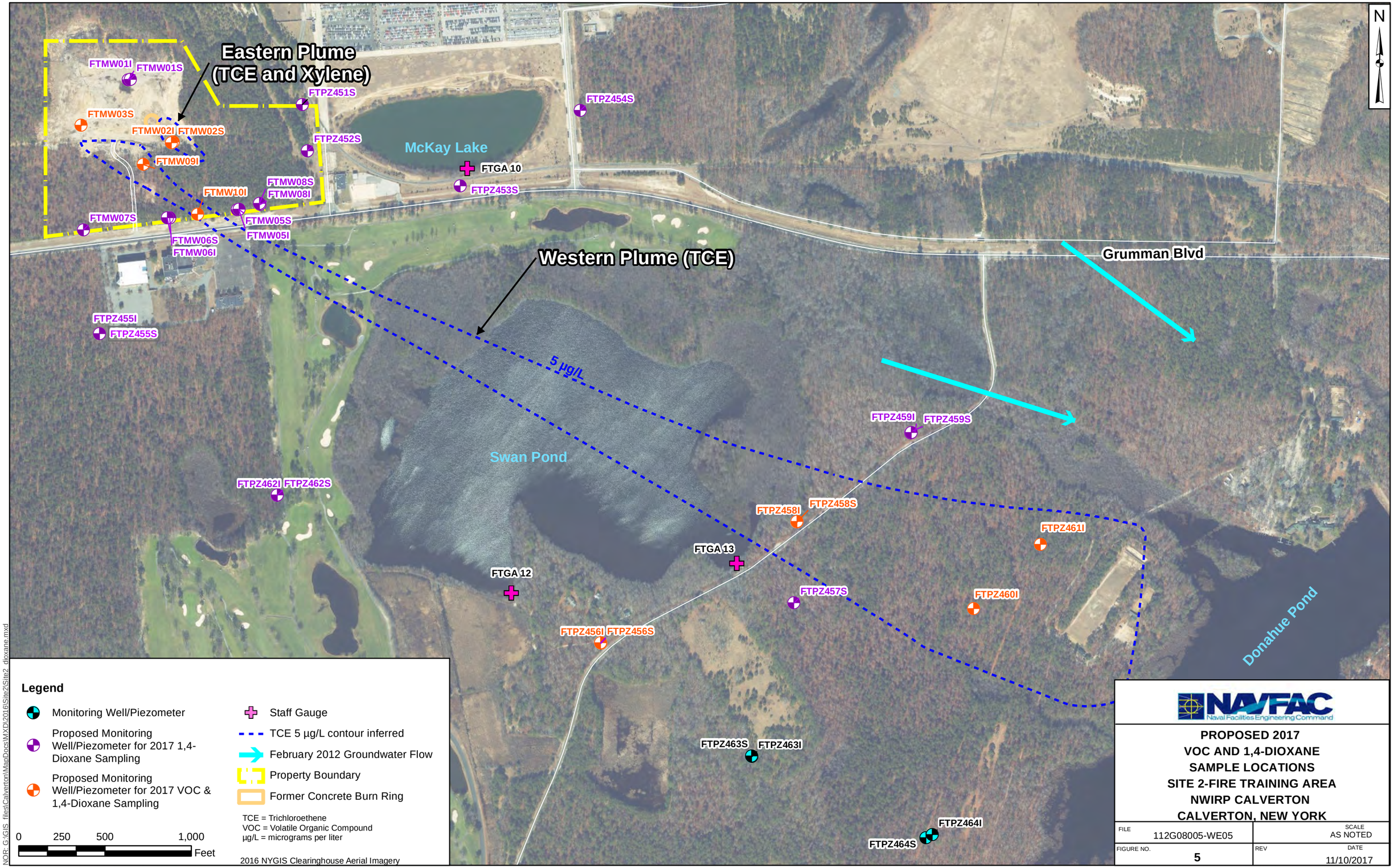
2016 NYGIS Clearinghouse Aerial Imagery

NOR: G:\GIS_files\Calverton\MapDocs\MXD\2016\Site2\Site2_dioxane_offproperty.mxd

NAVFAC Naval Facilities Engineering Command

**MONITORING WELL NETWORK,
VOC PLUME LOCATION, AND
2015 1,4-DIOXANE SAMPLE LOCATIONS
SITE 2-FIRE TRAINING AREA
NWIRP CALVERTON
CALVERTON, NEW YORK**

FILE	SCALE
112G08005-WE05	AS NOTED
FIGURE NO. 2	REV / DATE 11/10/2017



Legend

- Monitoring Well/Piezometer
- Proposed Monitoring Well/Piezometer for 2017 1,4-Dioxane Sampling
- Proposed Monitoring Well/Piezometer for 2017 VOC & 1,4-Dioxane Sampling
- Staff Gauge
- TCE 5 µg/L contour inferred
- February 2012 Groundwater Flow
- Property Boundary
- Former Concrete Burn Ring

TCE = Trichloroethene
VOC = Volatile Organic Compound
µg/L = micrograms per liter

0 250 500 1,000 Feet

2016 NYGIS Clearinghouse Aerial Imagery

NOR: G:\GIS_files\Calverton\MapDocs\MXD\2016\Site2\Site2_dioxane.mxd

NAVFAC Naval Facilities Engineering Command

PROPOSED 2017 VOC AND 1,4-DIOXANE SAMPLE LOCATIONS SITE 2-FIRE TRAINING AREA NWIRP CALVERTON CALVERTON, NEW YORK

FILE	SCALE
112G08005-WE05	AS NOTED
FIGURE NO.	REV / DATE
5	11/10/2017

Legend

- Monitoring Well/Piezometer
- Staff Gauge
- TCE 5 µg/L contour inferred
- February 2012 Groundwater Flow
- Property Boundary
- Former Concrete Burn Ring
- Sampled in 2016 for PFAS and results are less than the USEPA HA of 70 ng/L
- Sampled in 2016 for PFAS and results exceed the USEPA HA of 70 ng/L

0 300 600 1,200 Feet

µg/L = micrograms per liter
HA = Health Advisory
ng/L = nanogram per liter

PFAS = Perfluoroalkyl Substances
TCE = Trichloroethene
USEPA = United States Environmental Protection Agency

2016 NYGIS Clearinghouse Aerial Imagery

NAVFAC Naval Facilities Engineering Command

SITE LAYOUT, VOC PLUMES, AND 2016 PFAS SAMPLE LOCATIONS
SITE 2-FIRE TRAINING AREA
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE
112G08005-WE05	AS NOTED
FIGURE NO.	REV / DATE
2	11/10/2017

NOP: G:\GIS_files\Calverton\MapDocs\MXD\2016\Site2\Site2_WELLS.mxd

Eastern Plume
(TCE and Xylene)

Western Plume (TCE)

McKay Lake

Swan Pond

Donahue Pond

Peconic River

Grumman Blvd

4WD Road

FTMW01S
FTMW01I
FTMW03S
FTMW02S
FTMW02I
FTMW09I
FTMW05S
FTMW05I
FTMW08S
FTMW08I
FTMW06I
FTMW07S
FTMW06S
FTMW10I
FTPZ451S
FTPZ452S
FTPZ454S
FT-SW10
FTGA 10
FTPZ453S
FTPZ455S
FTPZ455I
5 µg/L
FTPZ459S
FTPZ459I
FTPZ462S
FTPZ462I
FTPZ458S
FTPZ458I
FT-SW12
FTGA 12
FT-SW13
FTGA 13
FTPZ461I
FTPZ457S
FTPZ460I
FTPZ456S
FTPZ456I
FTPZ463S
FTPZ463I
FTPZ464S
FTPZ464I

N

Legend

- Monitoring Well/Piezometer
- Staff Gauge
- Proposed Monitoring Well/Piezometer for 2017 PFC Sampling
- Proposed Surface Water for 2017 PFAS Sampling
- TCE 5 µg/L contour inferred
- February 2012 Groundwater Flow
- Former Concrete Burn Ring
- Property Boundary
- Sampled in 2016 for PFAS and results are less than the USEPA HA of 70 ng/L
- Sampled in 2016 for PFAS and results exceed the USEPA HA of 70 ng/L

µg/L = micrograms per liter
HA = Health Advisory
ng/L = nanogram per liter
PFAS = Perfluoroalkyl Substances
TCE = Trichloroethene
USEPA = United States Environmental Protection Agency

0 300 600 1,200
Feet

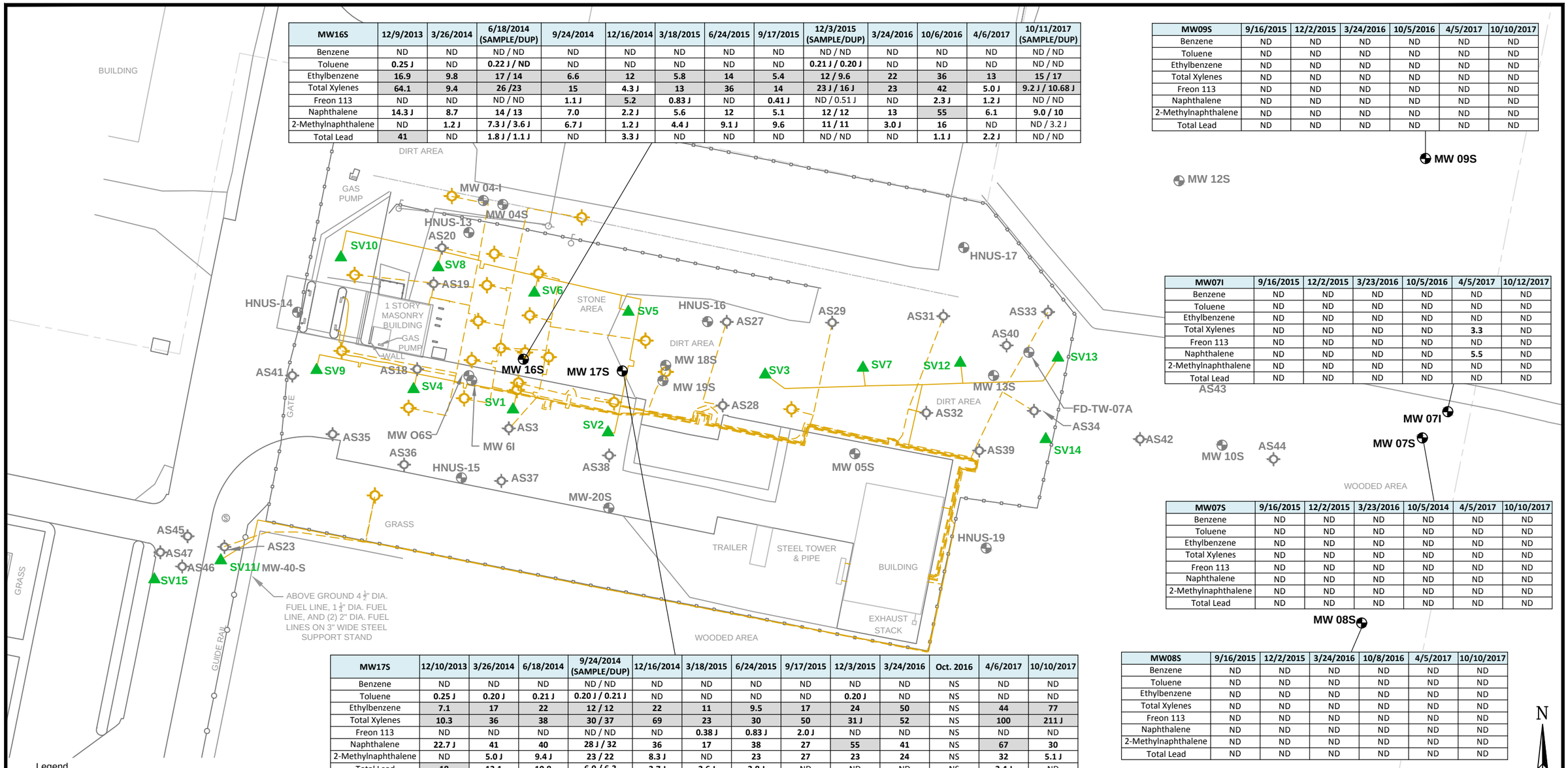
2016 NYGIS Clearinghouse Aerial Imagery

NOR: G:\GIS_files\Calverton\MapDocs\MXD\2016\Site2\Site2_OFFPROPERTYWELLS.mxd

NAVFAC Naval Facilities Engineering Command

PROPOSED 2017
MONITORING WELL SAMPLE LOCATIONS
PFAS INVESTIGATION
SITE 2-FIRE TRAINING AREA
NWIRP CALVERTON
CALVERTON, NEW YORK

FILE	SCALE
112G08005-WE05	AS NOTED
FIGURE NO. 4	REV / DATE 11/9/2017



MW16S	12/9/2013	3/26/2014	6/18/2014 (SAMPLE/DUP)	9/24/2014	12/16/2014	3/18/2015	6/24/2015	9/17/2015	12/3/2015 (SAMPLE/DUP)	3/24/2016	10/6/2016	4/6/2017	10/11/2017 (SAMPLE/DUP)
Benzene	ND	ND	ND / ND	ND	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND / ND
Toluene	**0.25 J**	ND	**0.22 J / ND**	ND	ND	ND	ND	ND	**0.21 J / 0.20 J**	ND	ND	ND	ND / ND
Ethylbenzene	**16.9**	**9.8**	**17 / 14**	**6.6**	**12**	**5.8**	**14**	**5.4**	**12 / 9.6**	**22**	**36**	**13**	**15 / 17**
Total Xylenes	**64.1**	**9.4**	**26 /23**	**15**	**4.3 J**	**13**	**36**	**14**	**23 J / 16 J**	**23**	**42**	**5.0 J**	**9.2 J / 10.68 J**
Freon 113	ND	ND	ND / ND	**1.1 J**	**5.2**	**0.83 J**	ND	**0.41 J**	ND / 0.51 J	ND	**2.3 J**	**1.2 J**	ND / ND
Naphthalene	**14.3 J**	**8.7**	**14 / 13**	**7.0**	**2.2 J**	**5.6**	**12**	**5.1**	**12 / 12**	**13**	**55**	**6.1**	**9.0 / 10**
2-Methylnaphthalene	ND	**1.2 J**	**7.3 J / 3.6 J**	**6.7 J**	**1.2 J**	**4.4 J**	**9.1 J**	**9.6**	**11 / 11**	**3.0 J**	**16**	ND	ND / 3.2 J
Total Lead	**41**	ND	**1.8 J / 1.1 J**	ND	**3.3 J**	ND	ND	ND	ND / ND	ND	**1.1 J**	**2.2 J**	ND / ND

MW09S	9/16/2015	12/2/2015	3/24/2016	10/5/2016	4/5/2017	10/10/2017
Benzene	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	ND	ND
Freon 113	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND
Total Lead	ND	ND	ND	ND	ND	ND

MW07I	9/16/2015	12/2/2015	3/23/2016	10/5/2016	4/5/2017	10/12/2017
Benzene	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	**3.3**	ND
Freon 113	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	**5.5**	ND
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND
Total Lead	ND	ND	ND	ND	ND	ND

MW07S	9/16/2015	12/2/2015	3/23/2016	10/5/2014	4/5/2017	10/10/2017
Benzene	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	ND	ND
Freon 113	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND
Total Lead	ND	ND	ND	ND	ND	ND

MW08S	9/16/2015	12/2/2015	3/24/2016	10/8/2016	4/5/2017	10/10/2017
Benzene	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	ND	ND
Freon 113	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND
2-Methylnaphthalene	ND	ND	ND	ND	ND	ND
Total Lead	ND	ND	ND	ND	ND	ND

MW17S	12/10/2013	3/26/2014	6/18/2014	9/24/2014 (SAMPLE/DUP)	12/16/2014	3/18/2015	6/24/2015	9/17/2015	12/3/2015	3/24/2016	Oct. 2016	4/6/2017	10/10/2017
Benzene	ND	ND	ND	ND / ND	ND	ND	ND	ND	ND	ND	NS	ND	ND
Toluene	**0.25 J**	**0.20 J**	**0.21 J**	**0.20 J / 0.21 J**	ND	ND	ND	ND	**0.20 J**	ND	NS	ND	ND
Ethylbenzene	**7.1**	**17**	**22**	**12 / 12**	**22**	**11**	**9.5**	**17**	**24**	**50**	NS	**44**	**77**
Total Xylenes	**10.3**	**36**	**38**	**30 / 37**	**69**	**23**	**30**	**50**	**31 J**	**52**	NS	**100**	**211 J**
Freon 113	ND	ND	ND	ND / ND	ND	**0.38 J**	**0.83 J**	**2.0 J**	ND	ND	NS	ND	ND
Naphthalene	**22.7 J**	**41**	**40**	**28 J / 32**	**36**	**17**	**38**	**27**	**55**	**41**	NS	**67**	**30**
2-Methylnaphthalene	ND	**5.0 J**	**9.4 J**	**23 / 22**	**8.3 J**	ND	**23**	**27**	**23**	**24**	NS	**32**	**5.1 J**
Total Lead	**18**	**13.1**	**10.8**	**6.0 / 6.3**	**3.7 J**	**2.6 J**	**2.8 J**	ND	ND	ND	NS	**2.4 J**	ND

Legend

- Monitoring Well (Gray Not Currently Sampled)
- Air Sparge Well - Not Active As Of December 2011
- Air Sparge Well - Not Active As Of November 2013
- Vapor Extraction Well - Not Active As Of November 2013
- Former AS Piping
- Former SVE Piping

Notes:

DUP - Duplicate Sample

NS - Not sampled due to the presence of LNAPL

ND - Not detected above laboratory detection limit (DL).

J - Estimated value

All values presented in micrograms per liter (ug/L).

Bold values indicate detections. Shading indicates detections in exceedance of the 2013 Proposed Closeout Goal.

2013 Proposed Closeout Goals (ug/L)	
Benzene	5
Toluene	5
Ethylbenzene	5
Total Xylenes	5
Freon 113	5
Naphthalene	50
2-Methylnaphthalene	50
Total Lead	15

Note: Piping layout is shown here for general purposes only. See mechanical and process drawings for detailed piping layout. Piping was removed in August 2015.

KGS
180 Gordon Dr. Suite 110
Exton, PA 19341

SCALE IN FEET
0 50

File: CV-2017.dwg
Date: 11/2/2017

FIGURE 4
GROUNDWATER CONCENTRATION MAP
MONITORING WELLS - OCT 2017 SEMI-ANNUAL
DECEMBER 2013 - OCTOBER 2017

NWIRP CALVERTON -
FORMER FUEL DEPOT - SITE 7
CALVERTON, NEW YORK

SV4	12/12/2013	3/27/2014	6/18/2014	9/24/2014	12/16/2014	3/18/2015	6/24/2015 (SAMPLE/DUP)	9/17/2015	12/3/2015	3/23/2016	10/6/2016 (SAMPLE/DUP)	4/6/2017	10/11/2017
Benzene	ND	ND	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND / ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND /ND	ND	ND	ND	ND / ND	ND	ND
Ethylbenzene	ND	1.9	1.7 J	4.6 J	5.2	8.2	8.7 / 8.8	11	6.9	4.9 J	12 / 12	6.1	7.6
Total Xylenes	5.0	2.5	1.6 J	11	14	29	43 / 43	83	41	25	103 / 99	46	76
Freon 113	ND	ND	0.45 J	2.6 J	0.41 J	0.77 J	1.6 J / 1.4 J	1.0 J	0.44 J	ND	5.8 / 6.4	0.84 J	2.10 J
Naphthalene	17.4 J	7.0	7.1	14	11	7.4	9.3 / 11	12	5.3	ND	10 J / 5.9 J	19	16
2-Methylnaphthalene	ND	6.7 J	4.3 J	11	4.3 J	5.9 J	7.7 J / 7.5 J	11	6.6 J	ND	4.6 J / 4.2J	ND	9.7
Total Lead	2.5	ND	1.1 J	ND	0.906 J	ND	ND / ND	ND	ND	ND	5.0 J / ND	3.6 J	ND

SV13	12/11/2013	3/26/2014	6/18/2014	9/24/2014	12/16/2014 (SAMPLE/DUP	3/17/2015	6/24/2015	9/16/2015	12/2/2015	3/23/2016	10/5/2016	4/5/2017 (SAMPLE/DUP)	10/11/2017
Benzene	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND	ND	ND	ND / ND	ND
Toluene	ND	1.4	0.89 J	1.1 J	0.25 J / 0.21 J	1.0 J	0.72 J	0.30 J	ND	0.33 J	ND	ND / ND	ND
Ethylbenzene	0.40 J	8.7	8.5	9.2	6.2 / 6.2	15	7.9	6.1	1.8 J	12	3.2 J	3.9 J / 4.4 J	12
Total Xylenes	2.7 J	23	18	25	13 / 13	28	18	17	2.7 J	22	4.2 J	11 / 12	56
Freon 113	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND	ND	ND	ND / ND	ND
Naphthalene	ND	4.4	6.6	7.0	4.0 J / 4.8 J	7.5	6.6	4.9 J	ND	ND	0.70 J	5.0 J / 5.8	15
2-Methylnaphthalene	ND	ND	1.0 J	9.7	ND / ND	ND	ND	ND	ND	ND	ND	1.2 J / 15 J	ND
Total Lead	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND	ND	ND	ND / ND	ND

SV2	12/12/2013 (SAMPLE/DUP)	3/27/2014	6/18/2014	9/24/2014	12/16/2014	3/18/2015 (SAMPLE/DUP)	6/24/2015	9/17/2015	12/3/2015	3/24/2016 (SAMPLE/DUP)	10/6/2016	4/6/2017	10/10/2017
Benzene	ND / ND	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND / ND	ND	ND	ND
Toluene	1.4 / 1.4	0.77 J	1.0 J	1.6 J	1.2 J	0.98 J / 0.88 J	1.4 J	1.4 J	ND	ND / 0.38 J	ND	ND	ND
Ethylbenzene	98.9 / 102	140	130	140	160	160 / 170	210	220	310	210 / 170	390	98	120
Total Xylenes	645 J / 626	275	392	726	838	921 / 866	1282	1630	1443	510 J / 339 J	1,949	356	785
Freon 113	ND / ND	ND	ND	ND	ND	ND / ND	ND	ND	ND	3.4 J / 3.5 J	ND	ND	ND
Naphthalene	28.2 J / 29.6 J	24	26	37	33	33 / 37	36	51	71	38 / 41	66	23	33
2-Methylnaphthalene	20.2 / 20.4	42	58	83	70	60 / 62	56	69	ND	40 / 45	52	ND	21.0
Total Lead	26 / 33	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND / ND	ND	3.0 J	ND

SV15	12/12/2013	3/27/2014	6/18/2014	9/24/2014	12/16/2014	3/18/2015	6/24/2015	9/17/2015	12/2/2015	3/23/2016	10/5/2016	4/6/2017	10/11/2017
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Freon 113	0.77 J	0.63 J	0.39 J	0.40 J	ND	ND	ND	ND	ND	0.62 J	ND	1.4 J	2.6 J
Naphthalene	ND	1.2	ND	ND	0.63 J	ND	ND	0.27 J	ND	ND	ND	ND	0.67
2-Methylnaphthalene	9.8	9.0 J	ND	1.4	4.0 J	ND	ND	ND	ND	3.4 J	ND	ND	ND
Total Lead	1.1 J	ND	1.7 J	ND	ND	15.4	ND	ND	ND	ND	ND	ND	ND

SV11/MW40S	12/12/2013	3/27/2014 (SAMPLE/DUP	6/18/2014	9/24/2014	12/16/2014	3/18/2015	6/24/2015	9/17/2015 (SAMPLE/DUP)	12/2/2015	3/23/2016	10/5/2016	4/6/2017	10/11/2017
Benzene	ND	ND / ND	ND	ND	ND	ND	ND	ND / ND	ND	ND	ND	ND	ND
Toluene	3.2 J	0.64 J / 0.48 J	0.28 J	0.78 J	ND	ND	0.27 J	0.47 J / 0.33 J	0.21 J	0.24 J	ND	ND	ND
Ethylbenzene	1.8 J	1.2 / 0.86 J	0.27 J	0.54 J	0.21 J	0.27 J	0.20 J	0.93 J / 0.68 J	0.36 J	0.24 J	0.50 J	ND	ND
Total Xylenes	9.1 J	8.5 / 6.8	1.4 J	5.9 J	2.0 J	1.2 J	1.7 J	10.4 J / 7.5 J	2.8 J	1.4 J	2.2 J	0.24 J	1.77 J
Freon 113	137	52 J / 36 J	31	32	15	8.8	11	38 J / 28 J	15	11	3.9 J	4.2 J	2.6 J
Naphthalene	23.6 J	9.1 / 7.9	ND	6.9	2.6 J	ND	ND	9.6 / 7.3	ND	ND	4.3 J	ND	2.7 J
2-Methylnaphthalene	ND	2.6 J / 2.5 J	ND	ND	ND	ND	ND	3.7 J / 3.6 J	1.1 J	ND	ND	ND	ND
Total Lead	9.5	ND / ND	ND	ND	ND	ND	ND	ND /ND	ND	ND	ND	ND	ND

Legend

- Monitoring Well (Gray Not Currently Sampled)
- Air Sparge Well - Not Active As Of December 2011
- Air Sparge Well - Not Active As Of November 2013
- Vapor Extraction Well - Not Active As Of November 2013
- Former AS Piping
- Former SVE Piping

Notes:

DUP - Duplicate Sample
ND - Not detected above laboratory detection limit (DL).
J - Estimated value
All values presented in micrograms per liter (ug/L).
Bold values indicate detections. Shading indicates detections in exceedance of the 2013 Proposed Closeout Goal.

2013 Proposed Closeout Goals (ug/L)	
Benzene	5
Toluene	5
Ethylbenzene	5
Total Xylenes	5
Freon 113	5
Naphthalene	50
2-Methylnaphthalene	50
Total Lead	15

Note: Piping layout is shown here for general purposes only. See mechanical and process drawings for detailed piping layout. Piping was removed in August 2015.

KGS
180 Gordon Dr. Suite 110
Exton, PA 19341

SCALE IN FEET
0 50

File: CV-2017.dwg
Date: 11/2/2017

FIGURE 5
GROUNDWATER CONCENTRATION MAP
SVE WELLS - OCT 2017 SEMI-ANNUAL
DECEMBER 2013 - OCTOBER 2017

NWIRP CALVERTON -
FORMER FUEL DEPOT - SITE 7
CALVERTON, NEW YORK

Ortho-Imagery provided by ESRI Online NAIP 2015.05.07

FD-SB302
FD-SB304
FD-SB301
FD-MW18S
FD-MW16S
FD-SB305
FD-SB303
FD-SV2
FD-MW19S
FD-MW17S
FD-MW05S
FD-MW20

Legend

- Monitoing Well
- 2017 DPT Boring
- Soil Vapor Extraction Well
- Fence Line
- Boundary

NAVFAC

DRAFT

N W E S

50 25 0 Feet

2017 Site 7 Investigation Locations
NWIRP Calverton
Calverton, New York

Date: 11/10/2017

Project #: 60264489

File: P:\Govt\Projects\Navy\CLEAN AECOM-EnSafe JV\Calverton\GIS\Projects\Figures\Fig_X_2017_Site_7_Investigation_Loc.mxd

Ortho-Imagery provided by ESRI Online NAIP 2015.05.07

FC-TW101	(13 to 15 ft bgs)
	(31.5 to 29.5 ft msl)
	3/28/2017
1,1-DICHLOROETHANE	0.92 J
ACETONE	4.4 J
CARBON DISULFIDE	0.37 J+
TOTAL VOCS	5.7
FC-TW101	(32 to 34 ft bgs)
	(12.5 to 10.5 ft msl)
	3/28/2017
ACETONE	3.8 J
CARBON DISULFIDE	0.36 J+
TOTAL VOCS	4.2
FC-TW101	(51 to 53 ft bgs)
	(-6.5 to -8.5 ft msl)
	3/28/2017
1,1-DICHLOROETHANE	1.8
ACETONE	8.9 J
BENZENE	0.28 J
CARBON DISULFIDE	0.56 J+
TOLUENE	0.27 J
TOTAL VOCS	12

FC-TW105	(9 to 11 ft bgs)
	(36.8 to 34.8 ft msl)
	3/30/2017
1,2-DICHLOROBENZENE	0.85 J
ACETONE	5.9 J
CARBON DISULFIDE	1.7
CHLOROETHANE	0.63 J
ISOPROPYLBENZENE	3.2
M- AND P-XYLENE	0.89 J
METHYL CYCLOHEXANE	11
O-XYLENE	0.60 J
TOTAL VOCS	25
XYLENES, TOTAL	1.5 J
FC-TW105	(32 to 34 ft bgs)
	(13.8 to 11.8 ft msl)
	3/30/2017
1,2-DICHLOROBENZENE	0.24 J
ACETONE	6.0 J
CARBON DISULFIDE	0.42 J
TOTAL VOCS	6.7
FC-TW105	(54 to 56 ft bgs)
	(-8.2 to -10.2 ft msl)
	3/30/2017
ACETONE	16 J
CARBON DISULFIDE	0.29 J
TOTAL VOCS	16

FC-TW108	(10 to 12 ft bgs)	
	(33.6 to 31.6 ft msl)	
	3/27/2017	3/27/2017
		(Dup)
1,1-DICHLOROETHANE	6.2	6.5
1,1-DICHLOROETHENE	2.1	2.3
1,2-DICHLOROBENZENE	6.5	6.7
1,2-DICHLOROETHENE, TOTAL	2.0	2.1
1,4-DICHLOROBENZENE	ND	0.33 J
ACETONE	8.6 J	5.1 J
BENZENE	1.4	1.4
CARBON DISULFIDE	1.8 J+	1.5 J+
CHLOROETHANE	5.6	5.7
CIS-1,2-DICHLOROETHENE	2.0	2.1
CYCLOHEXANE	8.0	9.6
ETHYLBENZENE	150	160
ISOPROPYLBENZENE	56	61
METHYL CYCLOHEXANE	25	30
NAPHTHALENE	140	150
O-XYLENE	0.27 J	ND
TOTAL VOCS	410	440
TRICHLOROETHENE	0.38 J	ND
VINYL CHLORIDE	ND	0.38 J
XYLENES, TOTAL	0.27 J	ND
FC-TW108	(30 to 32 ft bgs)	
	(13.6 to 11.6 ft msl)	
	3/28/2017	
1,1-DICHLOROETHANE	0.60 J	
ACETONE	6.8 J	
CARBON DISULFIDE	0.43 J+	
ETHYLBENZENE	1.4	
ISOPROPYLBENZENE	0.72 J	
M- AND P-XYLENE	0.88 J	
NAPHTHALENE	5.5	
TOTAL VOCS	16	
XYLENES, TOTAL	0.88 J	
FC-TW108	(50 to 52 ft bgs)	
	(-6.4 to -8.4 ft msl)	
	3/28/2017	
ACETONE	2.9 J	
CARBON DISULFIDE	0.74 J+	
CYCLOHEXANE	0.33 J	
ETHYLBENZENE	0.22 J	
NAPHTHALENE	0.36 J	
TOTAL VOCS	4.6	

FC-MW04I	(40 to 50 ft bgs)	
	(4.4 to -5.6 ft msl)	
	3/29/2017	3/29/2017
		(Dup)
VOCs	ND	ND

FC-TW106	(9 to 11 ft bgs)
	(36.2 to 34.2 ft msl)
	3/30/2017
ACETONE	12 J
CARBON DISULFIDE	0.43 J
METHYL CYCLOHEXANE	0.41 J
TOTAL VOCS	13
FC-TW106	(31 to 33 ft bgs)
	(14.2 to 12.2 ft msl)
	3/30/2017
CARBON DISULFIDE	0.35 J
TOTAL VOCS	0.35
FC-TW106	(52 to 54 ft bgs)
	(-6.8 to -8.8 ft msl)
	3/30/2017
ACETONE	3.1 J
BENZENE	10
CARBON DISULFIDE	0.51 J
CYCLOHEXANE	0.40 J
ETHYLBENZENE	1.9
ISOPROPYLBENZENE	1.5
M- AND P-XYLENE	0.60 J
NAPHTHALENE	18
O-XYLENE	0.36 J
STYRENE	4.8
TOLUENE	4.5
TOTAL VOCS	46
XYLENES, TOTAL	0.97 J

FC-MW07S	(5 to 15 ft bgs)
	(41.4 to 31.4 ft msl)
	4/3/2017
ACETONE	28 J
TOTAL VOCS	28
FC-MW07I	(48 to 58 ft bgs)
	(-1.9 to -11.9 ft msl)
	4/3/2017
ACETONE	2.9 J
TOTAL VOCS	2.9

FC-TW107	(10 to 12 ft bgs)
	(33.5 to 31.5 ft msl)
	4/3/2017
1,2-DICHLOROBENZENE	14
1,3-DICHLOROBENZENE	9.7
1,4-DICHLOROBENZENE	40
ACETONE	22 J
CARBON DISULFIDE	1.2
CHLOROBENZENE	1.7
CYCLOHEXANE	0.57 J
ETHYLBENZENE	34
ISOPROPYLBENZENE	7.2
M- AND P-XYLENE	3.8
METHYL CYCLOHEXANE	3.9
NAPHTHALENE	91
TOTAL VOCS	230
XYLENES, TOTAL	3.8
FC-TW107	(30 to 32 ft bgs)
	(13.5 to 11.5 ft msl)
	4/3/2017
1,2,3-TRICHLOROBENZENE	1.0
1,2,4-TRICHLOROBENZENE	3.3
1,2-DICHLOROBENZENE	0.40 J
1,3-DICHLOROBENZENE	0.37 J
1,4-DICHLOROBENZENE	1.4
ACETONE	32 J
CARBON DISULFIDE	0.81 J
ETHYLBENZENE	0.23 J
NAPHTHALENE	2.7
TOTAL VOCS	42
FC-TW107	(48 to 50 ft bgs)
	(-4.5 to -6.5 ft msl)
	4/3/2017
1,2,3-TRICHLOROBENZENE	1.5
1,2,4-TRICHLOROBENZENE	6.4
1,2-DICHLOROBENZENE	0.38 J
1,3-DICHLOROBENZENE	0.34 J
1,4-DICHLOROBENZENE	1.6
ACETONE	24 J
CARBON DISULFIDE	0.38 J
NAPHTHALENE	0.76 J
TOTAL VOCS	35

FC-TW109	(8 to 10 ft bgs)	
	(35.7 to 33.7 ft msl)	
	3/30/2017	
1,2-DICHLOROBENZENE	0.91 J	
ACETONE	4.5 J	
CARBON DISULFIDE	2.1	
CYCLOHEXANE	4.7	
ETHYLBENZENE	67	
ISOPROPYLBENZENE	30	
METHYL CYCLOHEXANE	6.9	
NAPHTHALENE	170	
TOTAL VOCS	290	
FC-TW109	(29 to 30 ft bgs)	
	(14.7 to 13.7 ft msl)	
	3/30/2017	
BENZENE	0.42 J	
CARBON DISULFIDE	2.0	
CYCLOHEXANE	1.3	
ETHYLBENZENE	1.7	
ISOPROPYLBENZENE	2.6	
METHYL CYCLOHEXANE	2.5	
NAPHTHALENE	13	
STYRENE	0.50 J	
TOLUENE	0.36 J	
TOTAL VOCS	24	
FC-TW109	(46 to 48 ft bgs)	
	(-2.3 to -4.3 ft msl)	
	3/30/2017	3/30/2017
		(Dup)
ACETONE	ND	13 J
CARBON DISULFIDE	0.59 J	0.47 J
METHYL CYCLOHEXANE	ND	0.65 J
NAPHTHALENE	0.56 J	ND
TOTAL VOCS	1.2	14

FC-MW06S	(9 to 19 ft bgs)
	(40.7 to 30.7 ft bgs)
	4/3/2017
ACETONE	17 J
CHLOROMETHANE	0.78 J
TOTAL VOCS	18

FC-TW112	(13 to 15 ft bgs)
	(33.7 to 31.7 ft msl)
	3/27/2017
ACETONE	3.4 J
CARBON DISULFIDE	0.47 J+
TOTAL VOCS	3.9
FC-TW112	(32 to 34 ft bgs)
	(14.7 to 12.7 ft msl)
	3/27/2017
ACETONE	7.0
TOTAL VOCS	7.0
FC-TW112	(50 to 52 ft bgs)
	(-3.3 to -6.3 ft msl)
	3/27/2017
ACETONE	7.0
CARBON DISULFIDE	0.54 J+
TOTAL VOCS	7.5

FC-TW111	(11 to 13 ft bgs)
	(34.5 to 32.5 ft msl)
	4/3/2017
ACETONE	18 J
CARBON DISULFIDE	0.57 J
CHLOROMETHANE	0.90 J
TOTAL VOCS	19
FC-TW111	(31 to 33 ft bgs)
	(14.5 to 12.5 ft msl)
	4/3/2017
ACETONE	15 J
TOTAL VOCS	15
FC-TW111	(49 to 51 ft bgs)
	(-3.5 to -5.5 ft msl)
	4/3/2017 4/3/2017
	(Dup)
ACETONE	27 J 12 J
CARBON DISULFIDE	0.53 J 0.38 J
CHLOROMETHANE	ND 1.1 J
NAPHTHALENE	ND 0.69 J
TOTAL VOCS	28 14

FC-TW110	(11 to 13 ft bgs)
	(34.1 to 32.1 ft msl)
	4/3/2017
1,2,4-TRICHLOROBENZENE	0.73 J
ACETONE	35 J
CARBON DISULFIDE	0.68 J
NAPHTHALENE	0.46 J
TOTAL VOCS	37
FC-TW110	(31 to 33 ft bgs)
	(14.1 to 12.1 ft msl)
	4/3/2017
1,2,4-TRICHLOROBENZENE	0.40 J
ACETONE	32 J
CARBON DISULFIDE	0.44 J
TOTAL VOCS	33
FC-TW110	(49 to 51 ft bgs)
	(-3.9 to -5.9 ft msl)
	4/3/2017
1,2,4-TRICHLOROBENZENE	0.99 J
ACETONE	32 J
BENZENE	0.31 J
CARBON DISULFIDE	0.54 J
CYCLOHEXANE	0.62 J
TOLUENE	0.36 J
TOTAL VOCS	35

Area

Legend

- Permanent Wells
- Temporary Wells
- 1,1 - DCA Contour ug/L
- Fence Line
- Boundary

DRAFT

360 180 0 Feet

2017 Site 6A Investigation
NWIRP Calverton
Calverton, New York

Date: 10/27/2017

Project #: 60264489

File: P:\Projects\Govt\Projects\NavyCLEAN AECOM-EnSafe JV\Calverton\GIS\Projects\Figures\Figure X 2017 TW.mxd

Ortho-Imagery provided by ESRI Online NAIP 2015.05.07

Notes:
1. ft bgs – Feet below ground surface.
2. All results are in µg/L (µg/L – micrograms per liter).
3. DCA – 1,1-Dichloroethane
4. (Dup) – Duplicate
5. J – Estimated value.

Site 2
Fire Training Area

Swan Pond

McKay lake

Donahue Pond

Grumman Blvd

River Rd

River Rd

Connecticut Ave

Peconic River

Groundwater Treatment Building

FT-MW09I	(28 to 38 ft bgs) (37 to 27 ft msl) 9/23/2015
1,4-DIOXANE	< 2.3 U

FT-MW10I	(20 to 30 ft bgs) (35 to 25 ft msl) 9/24/2015
1,4-DIOXANE	< 2.4 U

FC-PZ05I1	(20 to 30 ft bgs) (25 to 15 ft msl) 9/16/2015
1,4-DIOXANE	< 2.5 U

SA-MW126S	(5 to 15 ft bgs) (32 to 22 ft msl) 9/26/2017
1,4-DIOXANE	< 0.18 U

SA-MW126I	(40 to 50 ft bgs) (-2 to -12 ft msl) 9/26/2017
1,4-DIOXANE	< 0.19 U

SA-MW126D	(74 to 84 ft bgs) (-37 to -47 ft msl) 9/26/2017
1,4-DIOXANE	< 0.19 U

ET-MW01S	(7 to 17 ft bgs) (28 to 38 ft msl) 9/18/2017
1,4-DIOXANE	< 0.18 U

ET-MW03S	(20 to 30 ft bgs) (28 to 38 ft msl) 9/18/2017
1,4-DIOXANE	< 0.18 U

SA-PZ157I1	(33 to 38 ft bgs) (4 to -1 ft msl) 9/21/205
1,4-DIOXANE	< 2.3 UJ

SA-PZ135I	(41.5 to 46.5 ft bgs) (-5 to -10 ft msl) 9/27/2017
1,4-DIOXANE	0.17 J

SA-MW127I	(36 to 46 ft bgs) (2 to -8 ft msl) 9/20/2017
1,4-DIOXANE	< 0.17 U

SA-PZ163I	(32 to 42 ft bgs) (6 to -4 ft msl) 9/27/2017
1,4-DIOXANE	< 0.17 U

SA-PZ134I	(39 to 44 ft bgs) (-2 to -7 ft msl) 9/27/2017
1,4-DIOXANE	0.12 J

SA-MW129S	(19.5 to 29.5 ft bgs) (30 to 20 ft msl) 9/20/2017
1,4-DIOXANE	< 0.18 U

SA-MW129I	(50 to 60 ft bgs) (0 to -10 ft msl) 9/20/2017
1,4-DIOXANE	0.55

SA-MW129D	(80 to 90 ft bgs) (-30 to -40 ft msl) 9/20/2017
1,4-DIOXANE	0.096 J

SA-MW128I	(30 to 40 ft bgs) (9 to -1 ft msl) 9/27/2017	9/27/2017 (Dup)
1,4-DIOXANE	0.20 J	0.12 J

SA-MW128D	(58 to 68 ft bgs) (-20 to -30 ft msl) 9/27/2017
1,4-DIOXANE	0.27

SA-PZ122I	(39 to 49 ft bgs) (2 to -8 ft msl) 9/25/2017
1,4-DIOXANE	< 0.17 U

SA-PZ122D	(122 to 132 ft bgs) (-81 to -91 ft msl) 9/25/2017
1,4-DIOXANE	1.0

SA-PZ182I	(41 to 46 ft bgs) (-2 to -7 ft msl) 9/20/2017	9/20/2017 (Dup)
1,4-DIOXANE	0.27	0.25

SA-PZ123S	(7 to 17 ft bgs) (27 to 17 ft msl) 9/25/2017
1,4-DIOXANE	< 0.17 U

SA-PZ123I1	(32 to 42 ft bgs) (3 to -7 ft msl) 9/25/2017
1,4-DIOXANE	< 0.17 U

SA-PZ123I	(70 to 80 ft bgs) (-35 to -45 ft msl) 9/25/2017
1,4-DIOXANE	3.4

SA-PZ166I	(60 to 80 ft bgs) (-30 to -50 ft msl) 9/25/2017
1,4-DIOXANE	3.4

SA-PZ143I	(41 to 46 ft bgs) (3 to -2 ft msl) 9/15/2015
1,4-DIOXANE	< 2.3 U

SA-MW131D	(60 to 70 ft bgs) (-24 to -34 ft msl) 9/16/2015
1,4-DIOXANE	1.9 J

SA-PZ118S	(6 to 16 ft bgs) (23 to 13 ft msl) 9/25/2017	9/25/2017 (Dup)
1,4-DIOXANE	6.3	10

SA-PZ118I	(50 to 60 ft bgs) (-21 to -31 ft msl) 9/25/2017
1,4-DIOXANE	< 0.17 U

Legend

- Extraction Well
- Injection Well
- Monitoring Well/Piezometer
- Fence Line Area
- Offsite High Concentration Area
- Offsite Low Concentration Area
- Peconic River Area
- Water
- 1,1 - DCA Contour ug/L
- 1,1 - DCA Contour ug/L (Inferred)
- Fence Line
- Infiltration Gallery

DRAFT

700 350 0 Feet

1,4-Dioxane in Groundwater Southern Area

NWIRP Calverton
Calverton, New York

Date: 11/13/2017

Project #: 60264489

File: \\USCHL1FP001\Data\Projects\Govt\Projects\Navy\CLEAN AECOM-EnSafe JV\Calverton\GIS\Projects\DioxaneMXD\Figure_X_Dioxane_in_Groundwater_Southern_Offsite_Low_Concentration_Area.mxd