St. Juliens Creek Annex Partnering Team Meeting Minutes: November 1 and 2, 2017

ATTENDEES:	Walt Bell/NAVFAC Mid-Atlantic Bob Stroud/EPA Region 3 William (Weel) Lindsay/VDEQ Adrienne Jones/CH2M Kathryn Smith/CH2M
TIER II LINK:	Krista Parra/NAVFAC
GUESTS:	Karen Doran/VDEQ (Day 1 topics) Justin Williams/VDEQ (Day 1 topics) Krista Parra/NAVFAC (Select Day 2 topics) Jarrett Bose/Meadows (Site 2 and 21 RA-O Monitoring Topics) David Cohn/Meadows (Site 2 and 21 RA-O Monitoring Topics)
LOCATION:	CH2M Office, Virginia Beach, Virginia
FROM:	Kathryn Smith/CH2M
DATE:	March 29, 2018

Wednesday, November 1, 2017

I. Welcome/Check-In

II. Agenda, Meeting Roles and Responsibilities, and Partnering Guidelines

Agenda and Meeting Roles and Responsibilities: The agenda and meeting roles and responsibilities were reviewed.

Partnering Guidelines: The St. Juliens Creek Annex (SJCA) Partnering Team (Team) reviewed the Partnering Guidelines and provided a brief explanation to the meeting guests.

III. Previous Meeting Minutes, Parking Lot, and Action Items

Previous Meeting Minutes: Prior to the meeting, Weel Lindsay indicated he had no comments on the draft August 2017 partnering meeting minutes. Walt Bell and Bob Stroud requested additional time to review the minutes.

Parking Lot: The following parking lot items from the previous meeting were reviewed:

- Installation of additional monitoring well southwest of SJS21-MW21S (discussion planned for Site 21 topic)
- Parking for Restoration Advisory Board (RAB) site visit meeting in May 2018 (discussion planned for November 2017 RAB meeting)

Action Items: The action items from the previous partnering meeting were reviewed and tracked separately.

IV. Site 21 Remedial Action Operation

David Cohn and Jarrett Bose joined the meeting.

Objectives: Discuss Remedial Action Operations (RA-O) Event 11 Groundwater and Storm Water Monitoring Technical Memorandum (TM) recommendations and the RA-O path forward.

Overview of Discussion: David led the discussion and projected a presentation (attached; titled "Post-Injection Monitoring Sampling – Site 21").

David reviewed the conclusions and recommendations from the report.

The Team discussed the recommendation to install a monitoring well to the southwest of monitoring wells SJS21-MW21S and SJS21-MW13S. David stated that the additional well would help determine whether there are constituents of concern in the area and would help minimize uncertainty regarding groundwater flow direction in the area. Weel asked if additional information or data has been collected since the initial recommendation was made, that would change the recommendation. Adrienne Jones stated that historically the stormwater system at the site and the Site 2 inlet south of the site drove the direction of groundwater flow. However, after the inlet was filled in and the detention basin was built southwest of Site 21 the direction of groundwater flow appears to have changed, which is why the initial recommendation was made. She explained that since there is still some uncertainty with groundwater flow direction, and resultantly the plume boundary in the southwest portion of the site, the recommendation is still valid. Weel stated if there is still uncertainty, then he agreed with the recommendation. The Team agreed with the recommendation to install a monitoring well southwest of SJS21-MW21S and SJS21-MW13S.

David stated that the path forward for the RA-O groundwater monitoring is to conduct Event 12 the week of November 13, 2017. Adrienne noted that although the current RA-O Event 11 Groundwater and Stormwater TM is currently out for Team review, in order for Meadows to conduct Event 12 as planned, the Team needed to discuss and agree on the monitoring wells to be sampled. She noted the only change in the monitoring network recommended in the Event 11 TM is to discontinue sampling at SJS21-MW01S. The Team reviewed the data for SJS21-MW01S from the last four events in association with the decision tree for the monitoring. Walt asked if Meadows was planning to sample SJS21-MW31S during Event 12, and David confirmed they were. The Team agreed to discontinue sampling at SJS21-MW01S, in association with the decision tree. Walt asked if the sampling and analysis plan (SAP) needed to be updated to document the decision. Adrienne stated that since the change will be documented in the TM and is in association with the decision tree in the SAP, a SAP revision is probably not needed. The Team agreed a SAP revision/addendum was not warranted.

The Team discussed the recommendation in the Event 11 TM to conduct additional injections in the vicinity of monitoring wells SJS21-MW13S and SJS21-MW04S. Weel asked if contaminant breakdown had stalled at the site. David responded that based on the data trends and project indicator level data it appears that breakdown has stalled in the vicinity of SJS21-MW13S and SJS21-MW04S. The Team reviewed the plume figures and concentrations from the baseline event to Event 11. Weel stated that if it is not anticipated the site will achieve the project action levels (PALs) within a reasonable amount of time, then the additional injections should be conducted. Walt asked if any additional areas or specific wells at the site needed to be considered for additional injections. Adrienne responded that looking back through the construction completion report for Site 21 injections, it was difficult to get injection locations close to SJS21-MW04S due to how many utilities are in the vicinity. She explained there are several options for targeting this area including conducting injections upgradient and allowing the substrate to migrate downgradient; injecting downgradient and treating the contaminants as they migrate downgradient; or potentially installing injection wells inside Building 54. Adrienne noted the different options regarding how to address the area around SJS21-MW04S will need to be considered. Weel asked what the groundwater flow velocity is at the site. Adrienne replied she did not know without looking for that information in reports.

Walt asked if any additional areas of the site need to be considered for additional injections besides in the vicinities of monitoring wells SJS21-MW13S and SJS21-MW04S. Adrienne replied the additional injections are currently only recommended for those two areas but that it was recommended to install and sample the monitoring well southwest of SJS21-MW21S/MW13S and then conduct the additional injections, so the information obtained from that well can be factored into the additional injection approach. She noted the additional injections approach will need to be evaluated and documented in a work plan addendum, but that she was not sure if a design addendum would be necessary.

Walt asked for clarification if only emulsified vegetable oil was being considered for the additional injections or if zero valent iron was also being considered. Adrienne replied that since the treatment train for the site has transitioned from zero valent iron to emulsified vegetable oil, the likely recommendation will be to inject emulsified vegetable oil.

David asked if the Team would consider injecting directly into SJS21-MW04S. Although the injection rate may be significantly slower, it could be feasible and would target that area. The Team noted that was a potential option.

The Team agreed to conduct additional injections in the vicinity of monitoring wells SJS21-MW13S and SJS21-MW04S, after the monitoring well southwest of SJS21-MW21S/MW13S has been installed and sampled.

Path Forward: Bob and Weel will review, and provide any comments on, the RA-O groundwater and storm water Event 11 TM. Meadows will conduct RA-O groundwater and stormwater monitoring Event 12 at Site 21 in November 2017.

V. Site 2 Remedial Action-Operation Monitoring

Objectives: Resolve Virginia Department of Environmental Quality (VDEQ) comments on the draft RA-O Monitoring Event 4 TM, and discuss the conclusions and recommendations made in the TM.

Overview of Discussion: David led the discussion and projected a presentation (attached).

David reviewed Weel's comments on the TM and the proposed responses to the comments. Concerning VDEQ Comment 2 about the significance or lack thereof of the oil sheen at injection well E-11 during Event 11, David stated there used to be measurable free product in the wells but it appears that the measurable free product has been decreasing. Weel asked if how the oil sheen at E-11 was removed. David replied that a sorbent sock was put down the well and then taken out and disposed of. Weel asked for clarification on whether the absorbent was left in the well for a few days or removed immediately. David stated he believed it was placed down the well for a few minutes and then removed and disposed of. Concerning VDEQ Comment 3 about data qualifiers appied to the data in association with sample analysis exceeding the holding time, Weel asked if that was a common occurrence the lab or if the lab was just busy at the time. David replied that several of the lab's instruments went down at the same time which was an unforeseen circumstance that caused the issue, and that the lab was typically good at meeting holding times.

Adrienne reminded the Team that Meadows is planning on mobilizing to the site the following Monday (November 6, 2017) to conduct RA-O monitoring Event 5. Therefore, the recommendations in the RA-O Event 4 TM needed to be discussed and the Team needed to reach consensus for which wells needed to be sampled during Event 5.

David reviewed the recommendation in the TM to reduce monitoring at well SJS02-MW16 from semi-annual to annual or biennial sampling. The Team reviewed the location and data collected from MW16 in association with the decision logic in the SAP and agreed to sample it on less frequent basis. David noted that the TM recommends collection of samples for dehalococcoides (DHC) and indicator parameters to help plan for additional injections at the site so the Team may want to consider reducing the frequency of the sampling at MW16S after Event 5 to keep MW16S on schedule with specialty parameter sampling if those parameters need to be collected at that well in the future. The Team agreed.

David reviewed the recommendation in the TM to continue semi-annual sampling for naphthalene and include monitoring well SJS02-MW27S in the well network for naphthalene. The Team reviewed the current wells that are being sampled for naphthalene and the historical data for those wells. Concentrations of naphthalene at MW07S has been below the PAL for three consecutive rounds, therefore the Team agreed to discontinue monitoring for naphthalene at MW07S in accordance with the decision tree. The Team agreed to continue sampling monitoring wells SJS02-MW10S and SJS02-MW28S for naphthalene, and start sampling MW27S for naphthalene.

David discussed the recommendation in the TM to monitor exceedances at monitoring well SJS02-MW17S after the next monitoring event to determine if the exceedances are the result of the injections or plume migration towards St. Juliens Creek. Weel asked if all the wells installed to the south of St. Juliens Road were installed at the

same depth interval. David replied they are not installed at the same interval; MW17S is installed shallower than several of the surrounding wells. The Team agreed waiting until after the next round of data to evaluate trends at MW17S.

David asked if there were any additional questions or comments. Adrienne noted that the TM recommends collecting samples for DHC and indicator parameters during Event 5 to help plan for the additional injections that wll likely be needed. The Team agreed with collection of the specialty parameters.

While Meadows was present at the meeting, Adrienne asked David for an update on the Site 4 Vegetation Maintenance Work Plan that they were preparing. David stated the preliminary draft was with Walt for review. Since vegetation maintenance needs to be conducted at the site to complete the 2017 annual inspections, Adrienne asked what the timeline for beginning the vegetation clearance is. Walt asked Bob and Weel if they needed to review the plan since they had already reviewed the overall vegetation management plan the Navy had prepared for the site. Weel and Bob agreed they did not need to review Meadows's work plan for vegetation maintenance at Site 4. The Team also agreed to finalize the Maintenance and Performance Plan for Post Closure at Site 4 that was prepared by the Navy. Meadows stated they anticipate the work take approximately three weeks to complete, and they will try to have some of the vegetation clearance conducted by the end of the calendar year ito aid in completing the 2017 annual inspections.

Path Forward: Bob will review, and submit any comments on, the RA-O monitoring Event 4 TM. Meadows will conduct RA-O groundwater and stormwater Event 5 at Site 2 in November 2017.

David and Jarrett left the meeting.

VI. Site 21 Vapor Intrusion

Objectives: Summarize the objectives and approach for, present the results of, and discuss any preliminary comments on the draft TM for the Site 21 RA-O Vapor Intrusion (VI) Monitoring Event 11. Summarize the objectives and approach for, review the results of, and discuss any preliminary comments on the draft TM for the Building 54 VI Investigation.

Overview of Discussion: Adrienne led the discussion and projected a presentation (attached).

Adrienne reviewed the RA-O monitoring Event 11 objectives, approach, and results. Weel asked why monitoring was not being conducted in Building 47. Walt replied that from the beginning of the RA-O VI monitoring phase, Building 47 has been rundown and it has been deemed structurally unsafe to enter by the facility He noted that the building is not occupied by Base employees. Adrienne asked if there were any additional comments or questions regarding the Site 21 RA-O Event 11 TM. No additional comments or questions were received.

Adrienne reviewed the Building 54 VI investigation objectives, approach, and results. Weel asked what the difference is between the limit of detection (LOD) and detection limit (DL). Adrienne replied that there is a difference between what the lab instrument can detect down too with high confidence and what is actually reported as the U-qualified value. Weel asked if that meant that based on the DL of 1.5 and the LOD of 7, anything detected between 1.5 and 7 would have been reported at the concentration detected and J-qualified as estimated. Adrienne replied yes.

The Team discussed the elevated detections of hydrogen sulfide at Building 54. Hydrogen sulfide was detected in both indoor and outdoor air at elevated concentrations. It is not clear where the hydrogen sulfide is coming from; however, it does not appear to be a result of vapor intrusion from the site. There are several utilities including the steam pipes and sewer lines nearby, which could be the source. Weel stated that although it would be very interesting to find out where the hydrogen sulfide is coming from, it is not part of the Team's plan or in the decision tree to try and determine where outdoor sources are coming from; the Team agreed.

Weel asked who works in Building 54. Walt stated that the building is used for storage, and employees go into the building to store and retrieve items and to conduct inventory.

Adrienne reviewed the conclusions and recommendations of the Building 54 VI investigation TM. Weel asked why no further action or investigation was recommended when continued monitoring as part of ongoing RA-O is

recommended. Adrienne responded that it was an attempt to differentiate between the investigation phase and monitoring phase, and the building will continue to be monitored with the other buildings included in RA-O phase monitoring. Weel asked if VI is evaluated after every groundwater sampling event. Adrienne replied that it is. Adrienne asked if there were any additional comments or questions regarding the Building 54 VI investigation TM. There were No additional questions or comments were received.

Path Forward: Bob and Weel will review, and submit any comments on, the Site 21 RA-O VI Monitoring Event 11 TM and the Building 54 VI Investigation TM.

VII. Per- and Polyfluroalkyl Substances Scoping

Objectives: Begin scoping the Per- and Polyfluoroalkyl Substances (PFAS) Preliminary Assessment (PA) by discussing the purpose of, sources of information for, and the contents of the PA report.

Overview of Discussion: Walt led the discussion and projected a presentation (attached).

Walt explained that NAVFAC Headquarters is requiring all Remedial Project Managers (RPMs) to conduct a comprehensive compilation of existing information about known or potential PFAS releases and potential migration pathways at their assigned facilities. Bob stated he thought the historical review and research to determine if PFAS investigation was needed was addressed in the Five-Year Review, which concluded sampling for PFAS was not warranted. Walt responded that although that is true, based on Navy Guidance a facilitywide PFAS PA, and Site Inspection (SI) if warranted, needs to be conducted to reevaluate the potential for PFAS based on current knowledge regarding PFAS. If explained that since the last Five-Year Review was conducted, NAVFAC conducted a review of spill records and discovered a record that stated a perfluorinated chemicals (PFCs) spill occurred at Building M-5. Walt noted that although the term PFCs was used to describe the spill, the term PFAS is now the Navy's preferred terminology to discuss the group of compounds.

Walt explained that if the PA results in no sites moving forward to the SI stage, then the PA will document the results and conclusions, the PA will be included in the administrative record, and no further investigation would be required. However, since M-5 was listed as a PFCs spill, it will likely need to be investigated unless the PA can prove the record was incorrect.

Weel asked if the next step was to prepare the PA work plan and when that would be sent to the Team for review. Walt replied that funding for the project is currently in progress Karen Doran asked if there are any drinking water wells in the vicinity of the facility. Walt responded that would be determined during the PA process.

Path Forward: Pending funding, CH2M HILL, Inc. (CH2M) will develop a PFAS PA Work Plan.

VIII. Partnering Activity

The Team conducted a partnering activity to improve Team performance.

Thursday, November 2, 2017

IX. Land Use Control Site Inspections

The Team conducted the annual land use control (LUC) site inspections at Site 2 and Site 21. The annual LUC inspection for Site 4 site was deferred until vegetation management is conducted to facilitate site access.

X. Agenda, Meeting Role and Responsibilities, and Partnering Ground Rules Review

Krista Parra joined the meeting.

Agenda and Meeting Roles and Responsibilities: The agenda and meeting roles and responsibilities were reviewed.

Partnering Guidelines: The Team agreed the Partnering Guidelines did not need to be reviewed.

XI. Land Use Control Tracker

Objective: Complete the LUC Tracker forms for the annual site inspections.

Overview of Discussion: Walt led the discussion and projected the LUC tracker forms on the NIRIS Website.

Krista asked Walt if he knew whether there were property cards for any of the sites at SJCA. Walt replied he was not sure. Krista stated she had recently found out that the base requires property cards for any property that the base is responsible for maintaining. She provided the stormwater basin constructed as part of the remedy at Site 2 as an example; although the Environmental Restoration Program installed it as part of the remedial action, the base is in charge of maintaining it but if they do not have a property card specifying that, they will not provide maintenance. She explained that the process that should be followed is that after a construction project is completed, the construction contractor and the Navy should sign off on a property card that gets sent to the asset management division to put into their system. She indicated that normally the construction office is responsible for ensuring the property card is filled out and sent to asset management but since the Environmental Restoration Program has been receiving less support from the construction group, she is not sure this step is being completed. The form that needs to be completed is the DD1354 Form.

Action Walt – Look into potential deed requirements and property cards for the Sites 2 and 4 landfills and the enhanced extended detention basin.

The Team completed the Site 2 annual inspection form. Adrienne asked what the next step was. Walt responded that the forms will get printed and included in the LUC report that will be submitted to the Team for review and included in the administrative record.

The Team completed the Site 21 annual inspection form. Krista noted that minor issues, such as bolts missing from flush mount well casings, do not need to be flagged as a deficiency for the annual inspection. Walt indicated that a monitoring well is going to be installed at Site 21, and maintenance of existing wells can be completed at the same time.

Path Forward: Walt will complete his action item. CH2M will conduct the annual site inspection for Site 4 after Meadows conducts vegetation management at the site. CH2M will draft the annual LUC inspection reports for Team review.

XII. Emerging Contaminants Investigation

Objective: Present the contents of the emerging contaminants TM and discuss any preliminary comments on the TM.

Overview of Discussion: Kathryn Smith led the discussion and projected a presentation (attached).

Kathryn reviewed the rationale, sampling approach, field activities, and results of the emerging contaminants investigation. Kathryn discussed instances where the LOD was above the PALs for perchlorate. She explained what the LOD and DL are, and how data are reported. Weel asked what the limit of quantitation is. Kathryn explained it is the lowest point on the calibration curve. Kathryn reviewed the specific instances where the LODs were above the PALs for both sites and explained why they result in very limited uncertainty and do not affect the outcome of the data evaluation. Adrienne explained that the wells targeted for perchlorate sampling at Site 2 were within the disposal area and downgradient of that area, and the wells targeted for perchlorate sampling at Site 21 were those near buildings in which explosives were handled and downgradient of those areas.

Kathryn reviewed the conclusions and recommendations from the report.

Path Forward: Bob and Weel will review, and submit any comments on, the draft emerging contaminants report.

Action Walt – Discuss variations in Site 2 and 21 groundwater contours with Meadows.

XIII. Roundtable

- **Navy RPM** – Krista indicated Robert Bray will be taking over as RPM for SJCA, and will likely be attending the next SJCA partnering meeting along with Walt to transition the role.
- **Facility Planning** – Walt indicated that he had recently reviewed the following projects from an environmental standpoint based on environmental checklists that had been submitted: ballfield license renewal, storm debris, survey monument installation, herbicide application, boiler system replacement at Site 15 (petroleum, oil, and lubricants site Building 271), and an update to the water project to separate the fire system and portable water system.

XIV. Tier II Update

Krista relayed the following updates from the most recent Tier II meeting:

- **Goals /Schedules** – Teams should be uploading their goals and schedule files to the Tier II Website. The U.S. Environmental Protection Agency (EPA) would like dates for Explanation of Significant Differences documents and Five-Year Reviews to be highlighted green in the file. Teams should make sure the operable unit numbers are included for each site in the file. Any remedy in place or response complete dates should be highlighted blue in the file. Response complete dates for each site should correspond to what is in NORM and should be in the file on the same line as the site name.
- **Operation Cleanup –** Tier II is planning to get the Operation Cleanup whitepaper out to the Tier I teams by the end of the calendar year. Krista noted the communication matrix tool has significantly changed since it was provided to the teams for input. Because a concern had been raised that it was requiring significantly more than Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires. The revised matrix only requires completion of the items CERCLA requires; however, there are several additional options for teams to consider. All public notices will need to have an accompanying factsheet. EPA has a template for public notices and fact sheets that will be distributed to the teams. Overall the goal is to help get the public affairs officers more involved with the teams and the processes. Tier II would like for teams to make sure their public Websites are being updated so that when the public is directed to the Website, the website is up to date. Team metrics will be recorded based on how many times the public Website is visited, or the fact sheet is downloaded; the metrics can be included in the team's success stories at the end of the year.
- **Success Story Templates** – A template for Tier I teams to use for their Fiscal Year (FY) 2017 success stories has been distributed to the teams. Teams should graphically format it to look similar to a factsheet.
- **Public Websites** – Each Tier I team needs to keep their public Website updated, so that when the links are provided to the community the website has current information. Navy RPMs need to include public website updates in their contracts for basewide support.
- **PFAS Investigations** – Tier II reviewed PFAS regional screening levels and discussed them with the EPA Technical Support Supervisor. The PFAS regional screening levels are still under review at EPA headquarters. EPA indicated that since PFAS are emerging contaminants, they are not being required to be included in any sites where full suite analysis is being conducted; that PFAS samples will only need to be collected if site history indicates it is warranted.

  Kathryn asked if EPA headquarters had a policy or suggestion on whether or not landfills had to be sampled for PFAS. Krista stated that EPA headquarters would like all landfills to be sampled because there is usually not 100 percent certainty as to what was disposed of in landfills. However, if for example, a landfill ceased operation before AFFF started to be used at facilities, then that would be a line of evidence to not sample at that landfill. If the landfill was still operating during the timeframe AFFF was being used, then it will likely need to be sampled for PFAS.
- **Lead Contamination in Soil** - Based on guidance issued by EPA, the cleanup level for lead may decrease and sites may have to be reevaluated in Five-Year Reviews if lead in soil was identified as an issue. EPA is considering adopting the 5 micrograms per deciliter in blood level based on research; which equates to an

approximately 200 parts per million residential lead screening value for soil. The associated draft document is undergoing EPA review and Tier II is hoping to have something to the Tier I teams for review by the end of the calendar year. Adrienne asked if it would impact sites that have been closed. Krista responded, only if the EPA request that a site be reopened and evaluated.

- **Elevating Issues to Tier II** –It is valuable to elevate items to Tier II when teams cannot come to an agreement. Recently one of the teams had a disagreement over whether groundwater data had to be compared to surface water criteria. There was a misunderstanding between team members, associated with what the Biological Technical Assistance Group was asking the team to do, and that resulted in a delay to a project for over a year.

Adrienne asked Krista if the Navy had decided whether or not Site 4 groundwater had to be sampled in association with the Five-Year Review. Krista stated that she talked to Deborah Goldblum/EPA, who had indicated that the EPA needed to look into it and review the information presented in the 2015 Five-Year Review. Krista stated that Bob was tasked with discussing the issue with Deborah and EPA technical support to determine their stance; the Navy is deferring to EPA's decision.

Action Bob – Discuss Site 4 with EPA technical support/Deborah Goldblum to determine if groundwater sampling in association with the Five-Year Review is required

Krista asked whether there were any additional questions or issues for Tier II. The Team responded that there were not.

XV. Team Goals, Schedules, Successes, and Lessons Learned

Team Schedule: The Team schedule was updated in a separate file. The file will be sent to the Team.

FY 2018 Team Goals: The FY 2018 Team goals were reviewed and updated in a separate file. The file will be sent to the Team and posted on the Virginia/Maryland Joint Installation Remediation Team's website.

FY 2018 Tier II Goals/Schedule Report: The FY 2018 Tier II Goals/Schedule Report was updated in a separate file. The file will be sent to the Team and posted on the Virginia/Maryland Joint Installation Remediation Team's website.

FY 2018 Successes, Green and Sustainable Accomplishments, and Lessons Learned: Successes, green and sustainable accomplishments, and lessons learned were tracked and updated in a separate file.

Action Walt – Confirm dates of Meadows deliverables in Team schedule with Meadows

XVI. Partnering Meeting Agenda Building and Scheduling

January 2018 Partnering Meeting Agenda and Logistics

Agenda Topic	Goal	Lead	Time
Partnering Activity	Improve Team performance	Facilitator	30 minutes
Chemistry/Data Validation 101	Provide an overview of analytical and data validation procedures and terminology	Naval Sea Systems Command/CH2M	1 hour
SJCA Environmental Restoration Program Overview	Provide an overview of active sites	Walt	1 hour
Site 2 Operations and Maintenance Repairs	Discuss Operations and Maintenance repairs needed and requirements for Site 2	Walt	45 minutes
SJCA Website	Review the SJCA website with the Team	CH2M	30 minutes
Partnering Team Introduction	Discuss partnering process and review and revise Team guidelines with new NAVFAC RPM	CH2M	45 minutes

Date:	January 24 and 25, 2018
Location:	Virginia Beach, Virginia (CH2M office)
Start time:	To be determined (TBD)
Finish time:	TBD
Chair:	Walt Bell
Host:	Walt Bell
Timekeeper/Gatekeeper:	Bob Stroud
Facilitator:	Weel Lindsay
Goal Keeper:	Walt Bell
Recorder:	Kathryn Smith
Tier II Link:	TBD
Potential Guests:	TBD
Agenda Conference Call:	January 17, 2018, at 10:30 a.m.

Future Calls/Meetings/Site Visits

Partnering Meeting (Virginia Beach, Virginia) January 24 and 25, 2018, time TBD

XVII. Parking Lot and Action Item Review, and Tier II Issue Identification

Parking Lot: The Team reviewed the items that were in the parking lot.

The following items were removed from the parking lot because they were discussed and resolved during the partnering or RAB meetings:

- ~~Installation of additional monitoring well southwest of SJS21-MW21S~~
- ~~Parking for Restoration Advisory Board (RAB) site visit meeting in May 2018~~

The following item was added to the parking lot:

- Site 2 monitoring well settlement and potential resurveying

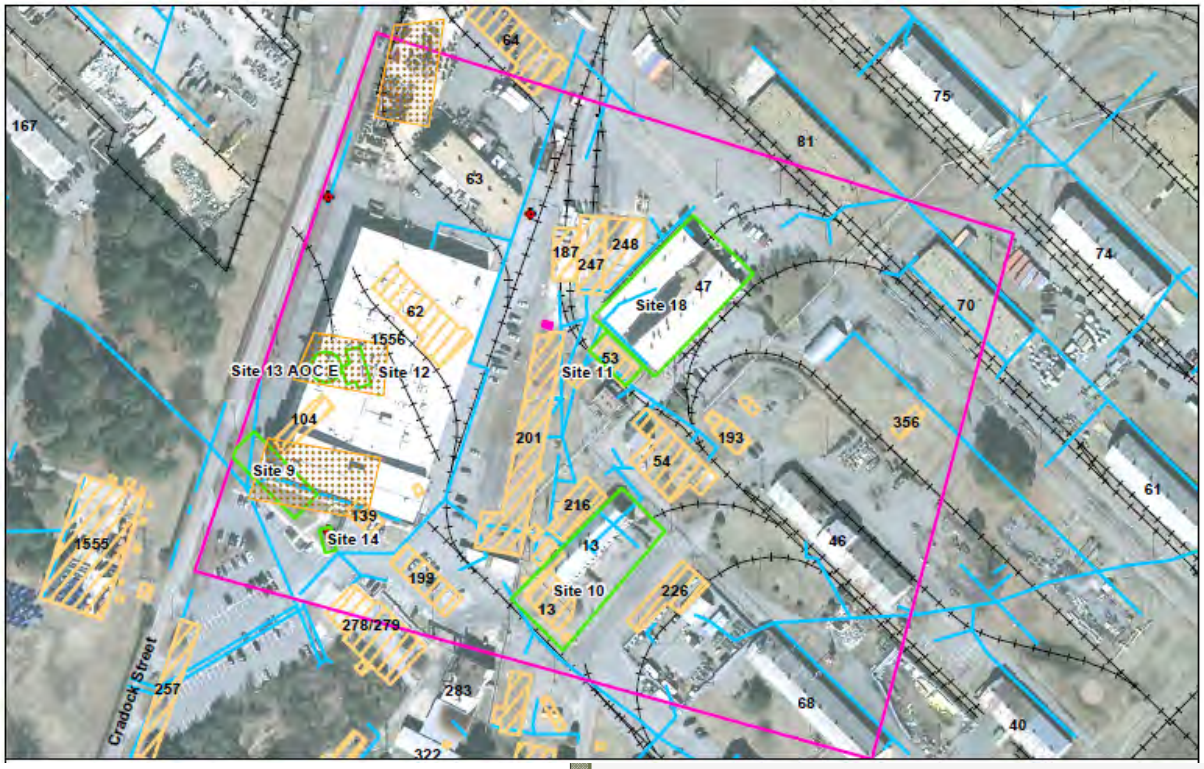
Action Items: The action items identified during the meeting were reviewed. The updated action items file will be sent to the Team.

Tier II Issue Identification: No issues were identified to elevate to Tier II.

XVIII. Facilitator Feedback

Adrienne provided facilitator feedback. The Team filled in "+" and "Δ" to list the positives and negatives of the meeting.

Post-Injection Monitoring Sampling – Site 21



Saint Juliens Creek Annex Chesapeake, Virginia

11th Monitoring Event May 2017

Objectives

- Present Event 11 Groundwater and Stormwater Technical Memorandum conclusions.
- Discuss Event 11 Groundwater and Stormwater Technical Memorandum recommendations and Remedial Action-Operations (RA-O) path forward.

Conclusions

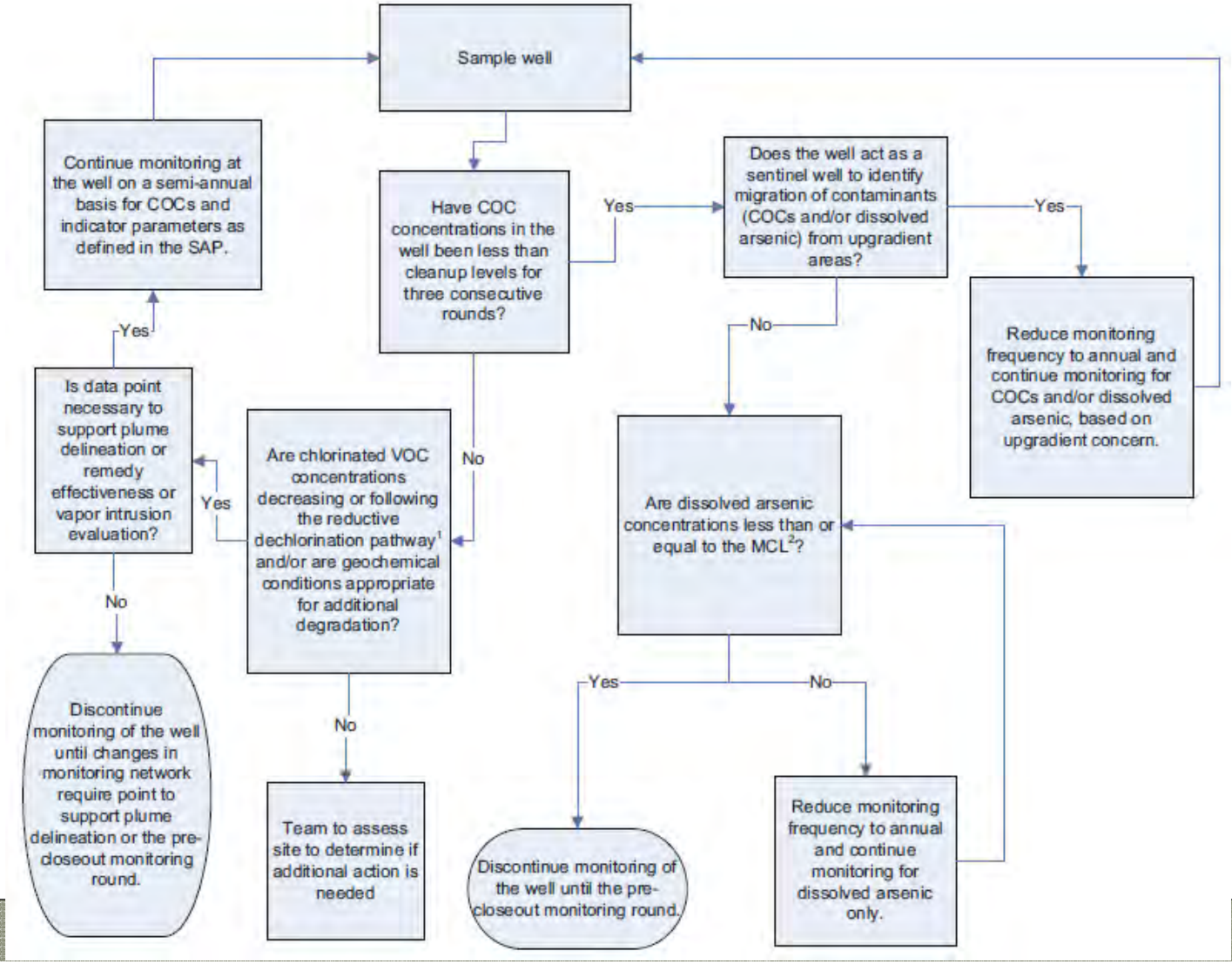
Overall, COC concentrations have decreased at Site 21 when compared to baseline concentrations, indicating that ISCR and ERD have been effective in reducing COC concentrations at the site. TCE PAL exceedances have been reduced to a few localized areas. The cis-1,2-DCE exceedance plume is broader, including portions along the southeast side of Building 1556 and in the central part of the site. The VC PAL exceedance plume is larger still, encompassing the entire center of the site and there are also exceedances in the northern part of the site. Some areas, such as monitoring wells SJS21-MW04S and SJS21-MW13S, remain with COC exceedances well above their respective PAL. There is a short and long term increasing VC concentration trend at monitoring well SJS21-MW04S.

Stormwater sampling was conducted to determine if offsite contaminant migration was occurring through subsurface preferential pathways. No VOCs were detected in either primary sample above their respective PALs. Dissolved arsenic was not detected in either primary sample above the PIL. These results indicate that offsite migration of COCs at levels of concern through the storm drain system is not occurring.

Recommendations

Of the wells that were sampled this round, only monitoring well SJS21-MW01S has had chemical of concern (COC) concentrations below project action limits (PALs) for three consecutive rounds. COC concentrations at this location have been below PALs for four consecutive rounds. As indicated in the *Final Monitoring Report November 2016 (10th Sampling Event) Site 21 Post-Injection Monitoring Sampling* , monitoring well SJS21-MW01S is not used as a sentinel well to identify migration of contaminants from upgradient areas, and dissolved arsenic is below the MCL. Furthermore, the data point does not appear to be necessary for plume delineation. Finally, other monitoring wells are currently utilized for vapor intrusion monitoring at Building 47; therefore, groundwater monitoring at SJS21-MW01S should be discontinued until the pre-closeout monitoring round. No other monitoring wells currently meet the criteria for reclassification.

Recommendations – ctd.



Recommendations – ctd.

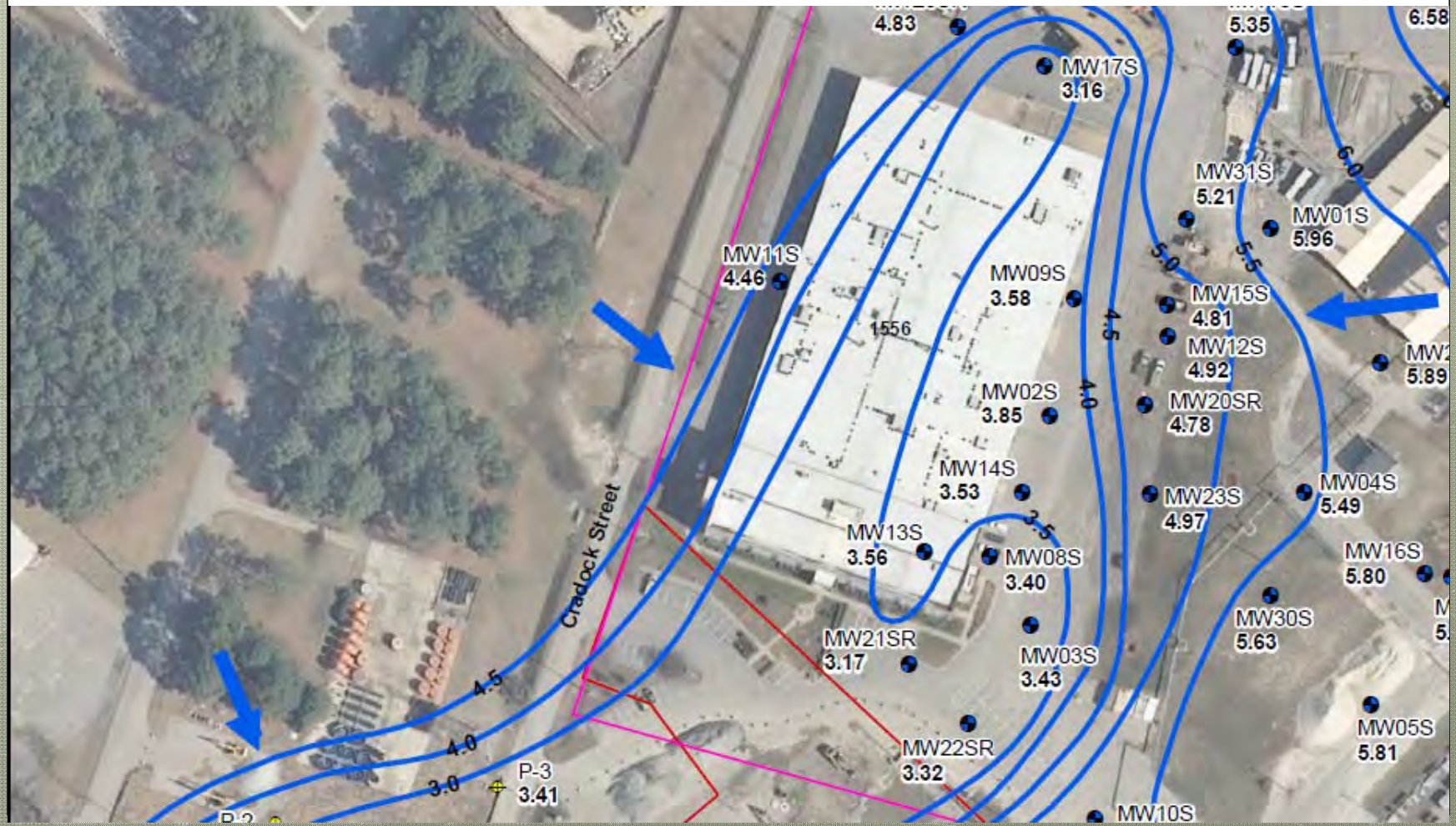
Sample ID			SJS21-MW01S-1114		SJS21-MW01S-0515		SJS21-MW01S-1115		SJS21-MW01S-1116		SJS21-MW01S-0517	
Sample Date			11/4/2014		5/15/2015		11/10/2015		11/29/2016		5/9/2017	
Sample Event			7th SEMI-ANNUAL		8th SEMI-ANNUAL		9th SEMI-ANNUAL		10th SEMI-ANNUAL		11th SEMI-ANNUAL	
COCs	PAL[1]	units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Trichloroethylene	5.0	µg/L	5.4		3.6		3.5		3.4		4.3	
cis-1,2-Dichloroethylene	70.0	µg/L	4		2.1		2.1		3.1		3.4	
1,1-Dichloroethylene	7.0	µg/L	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Vinyl chloride	2.0	µg/L	2.4		1.2	J	0.5	U	1.5	J	0.86	J
Indicator Parameters	PIL[2]	units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Methane	>500	µg/L	230	K	222	K	199		480		380	
Ethane	>500	µg/L	2	U	5	U	5	U	5	U	5	U
Ethene	>500	µg/L	2	U	5	U	5	U	5	U	5	U
Dissolved Iron	>1000	µg/L	3950		2200		1360		3210	N	2820	
Dissolved Arsenic	≤ Baseline or MCL (10µg/L), whichever is higher	µg/L	3	U	2	U	2	U	5	U	1.9	J
Sulfate	<20	mg/L	6.3		7.8		5.3		6.7		7.4	
Sulfide	>1.0	mg/L	1.3	U	1.0	U	1.0	U	0.8	U	0.8	U
Total Organic Carbon	>20	mg/L	2.3		3.1		2.1		2.3		1.6	
Alkalinity, Total as CaC03	>50	mg/L	49.2		48.9		41.2		64.0		48	
1,2-Dichloroethene (total)	increasing or decreasing	µg/L	4		3.3		2.1		3.1		3.4	

Recommendations – ctd.

Recommendations – ctd.

In the *Ninth Semi-Annual Sampling Event Results Site 21 Technical Memorandum* , a recommendation was made to install an additional monitoring well to the southwest of monitoring well SJS21-MW21SR due in part to elevated TCE concentration in monitoring well SJS21-MW13S and elevated dissolved arsenic in monitoring well SJS21-MW21SR. During the 10th round of monitoring, TCE in monitoring well SJS21-MW13S decreased significantly from 220 µg/L to 28 µg/L. The TCE concentration at this location increased to 72 µg/L during the 11th round. Additionally, the cis-1,2-DCE concentration increased from to 1,100 µg/L to 1,400 µg/L between the 10th and 11th monitoring events. Dissolved arsenic has decreased from 90 µg/L to 60 µg/L to 56.4 µg/L at monitoring well SJS21-MW21SR during the last three monitoring events. There are no short-term trends indicated for any of the COCs at this location. The additional monitoring well was also recommended to help clarify groundwater flow direction in the southwestern portion of the site. The May 2017 groundwater flow contour map indicates a south and southeasterly flow from monitoring well SJS21-MW13S toward monitoring wells SJS21-MW21SR and SJS21-MW08S. An additional monitoring well located to the southwest of monitoring well SJS21-MW13S could be utilized to assess groundwater flow direction in this area and determine if any COC PAL exceedances exist. The Partnering Team should consider the addition of a new monitoring well to the southwest of monitoring wells SJS21-MW13S and SJS21-MW21R.

Recommendations – ctd.



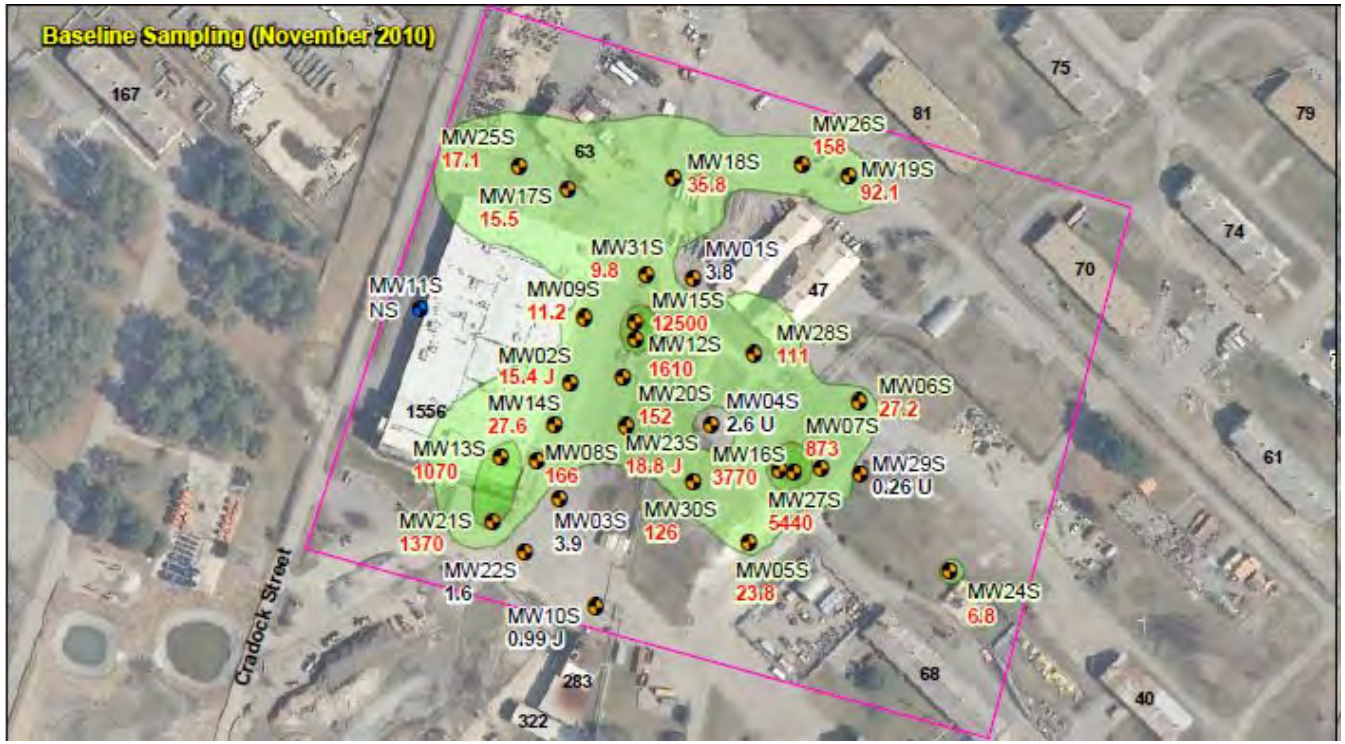
Recommendations – ctd.

Recommendations – ctd.

In the *Final Monitoring Report November 2016 (10th Sampling Event) Site 21 Post-Injection Monitoring Sampling* , it was recommended that the Partnering Team should consider if additional action is needed to address persistently high concentrations of cis-1,2-DCE and VC present in monitoring well SJS21-MW04S. While there was a decrease in cis-1,2-DCE concentration at this location in the 11th round of sampling, the VC concentration increased. Statistical analysis indicated a short-term increasing trend in VC concentration.

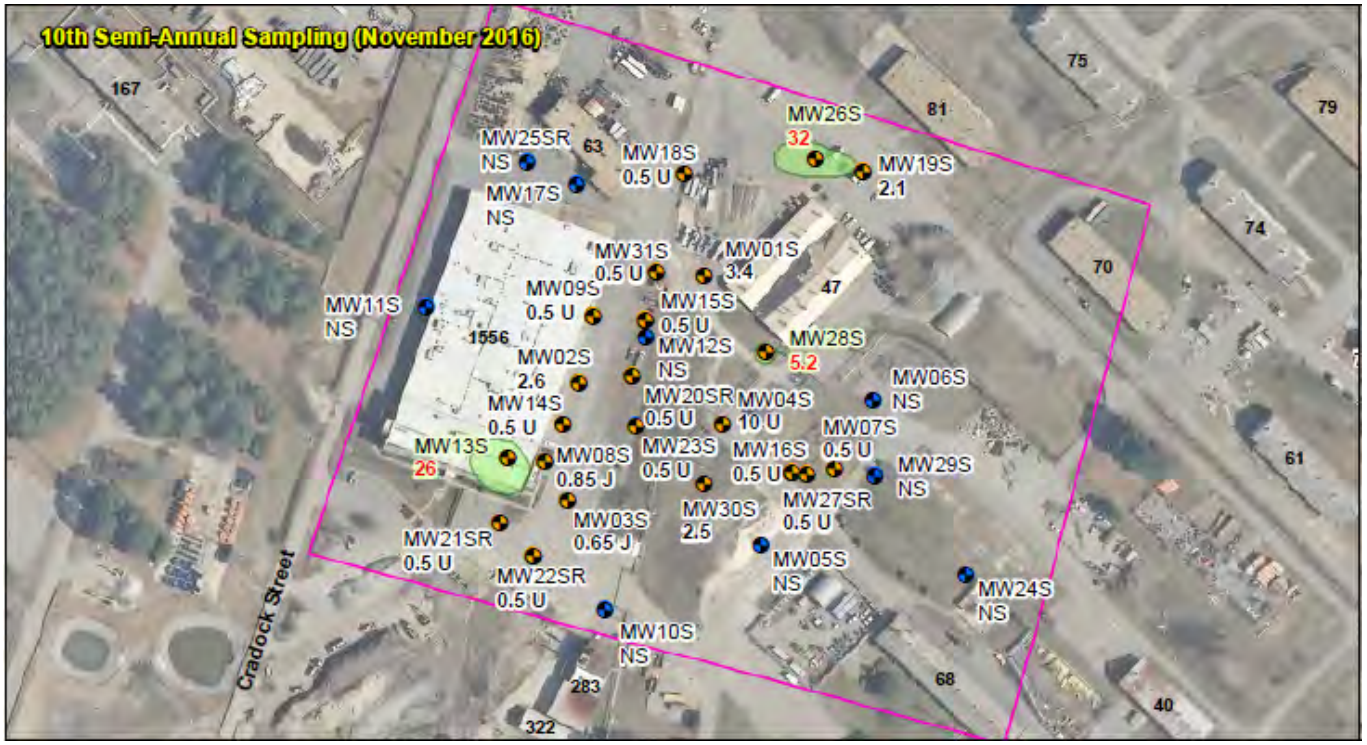
Continued evaluation of monitoring well SJS21-MW13S is recommended due to slow degradation of COCs. Although there is a long term decreasing trend in TCE and cis-1,2-DCE concentration, there is no short-term trend indicated for any of the COCs and COC concentrations remain well above PALs. TCE concentrations at this location increased from 26 µg/L to 56 µg/L over the last two rounds of groundwater sampling. Cis-1,2-DCE concentrations also increased from 1,100 µg/L to 1,400 µg/L over the last two rounds. Additional treatment may be required at the location of monitoring wells SJS21-MW04S and SJS21-MW13S to meet PALs. If a monitoring well is constructed to the southwest of monitoring well SJS21-MW13S, the baseline data at the new well location should be collected and considered prior to taking any additional action, if required, at monitoring well SJS21-MW13S.

Progressive TCE

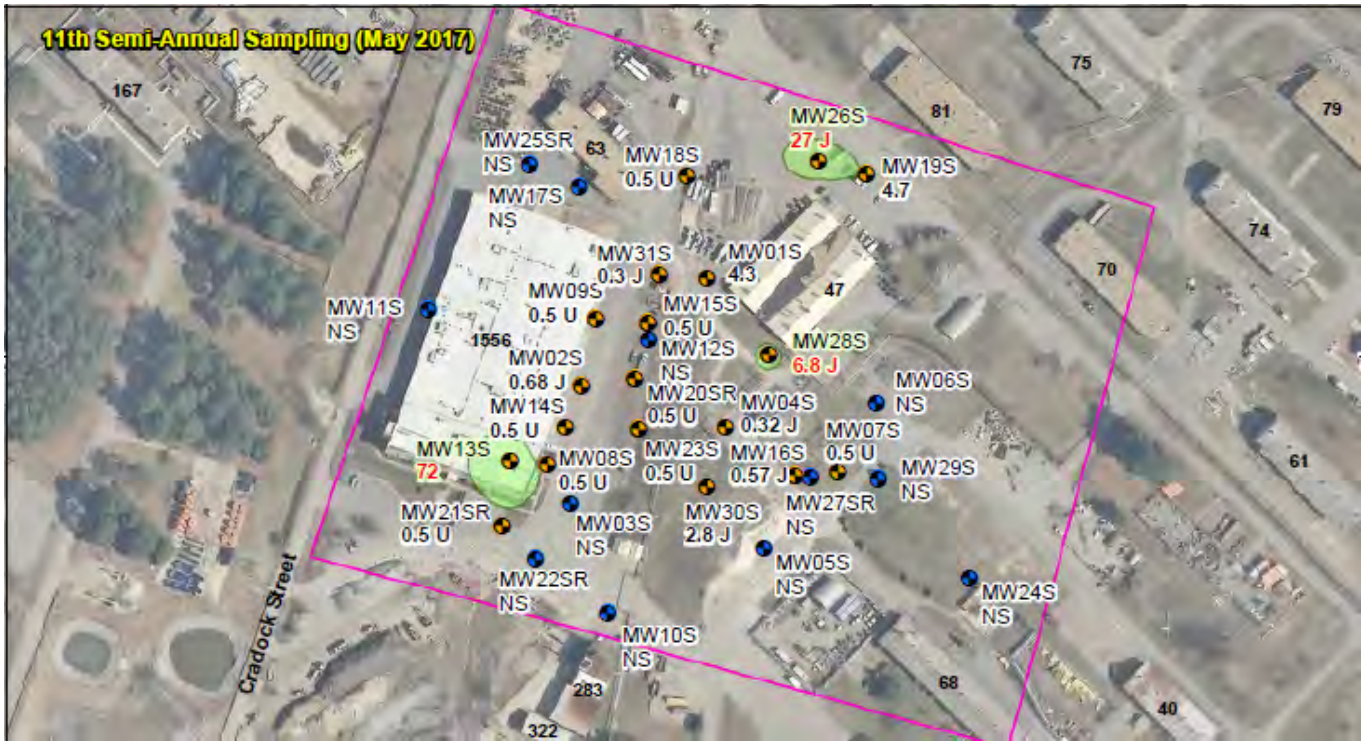


Progressive TCE – ctd.

Progressive TCE – ctd.



Progressive TCE – ctd.



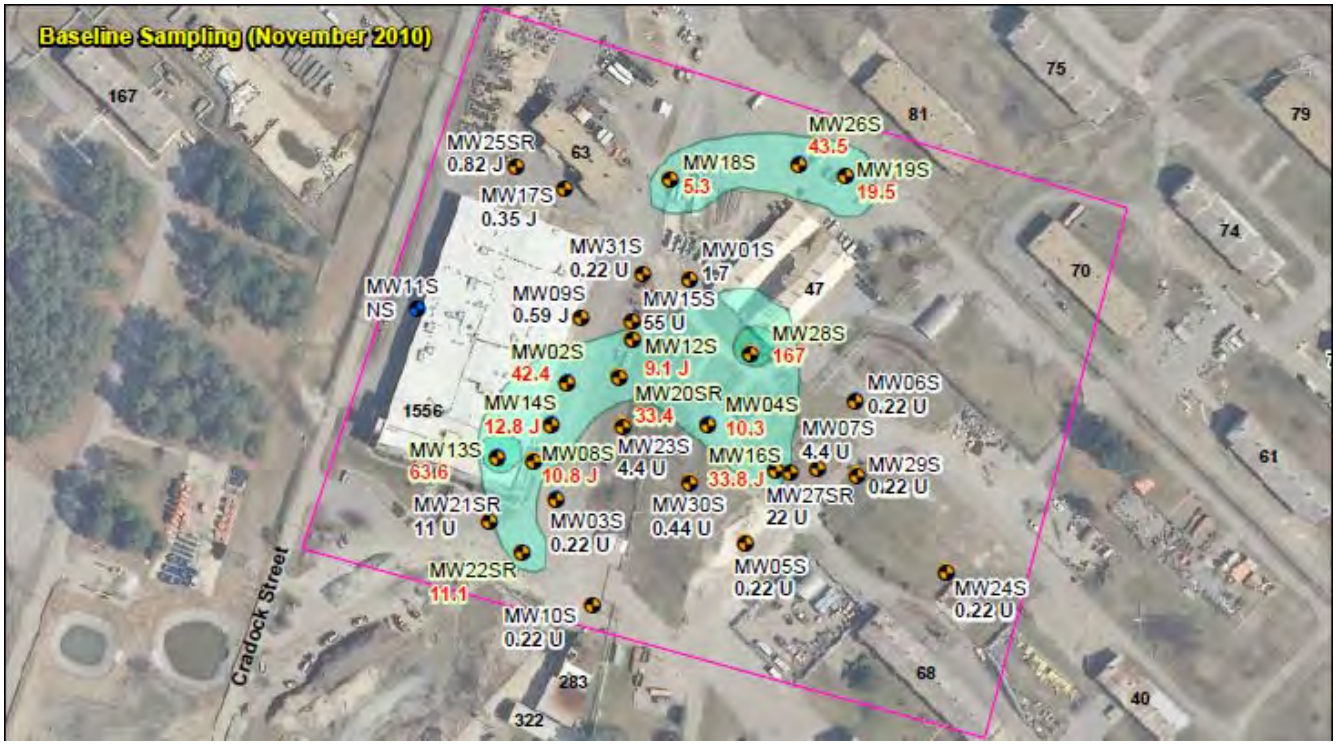
Progressive Cis-1,2-DCE

Progressive Cis-1,2-DCE – ctd.

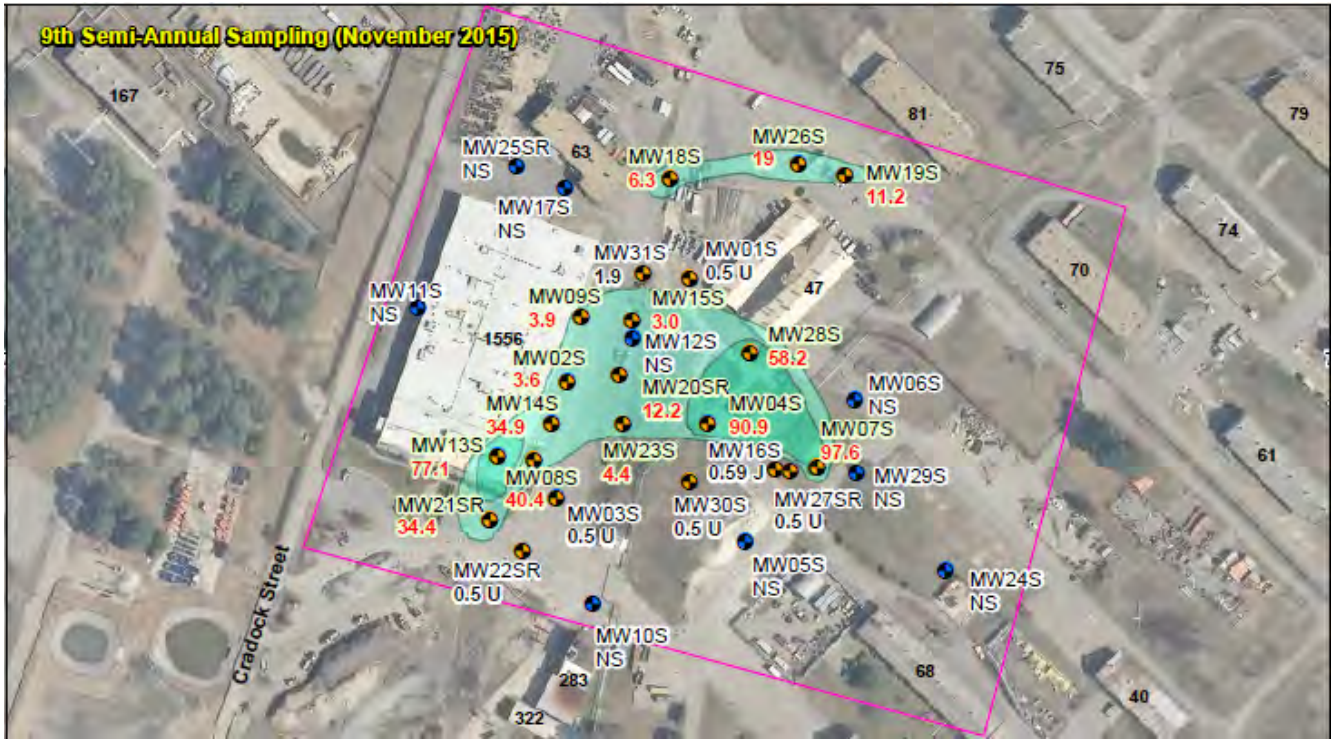
Progressive Cis-1,2-DCE – ctd.

Progressive Cis-1,2-DCE – ctd.

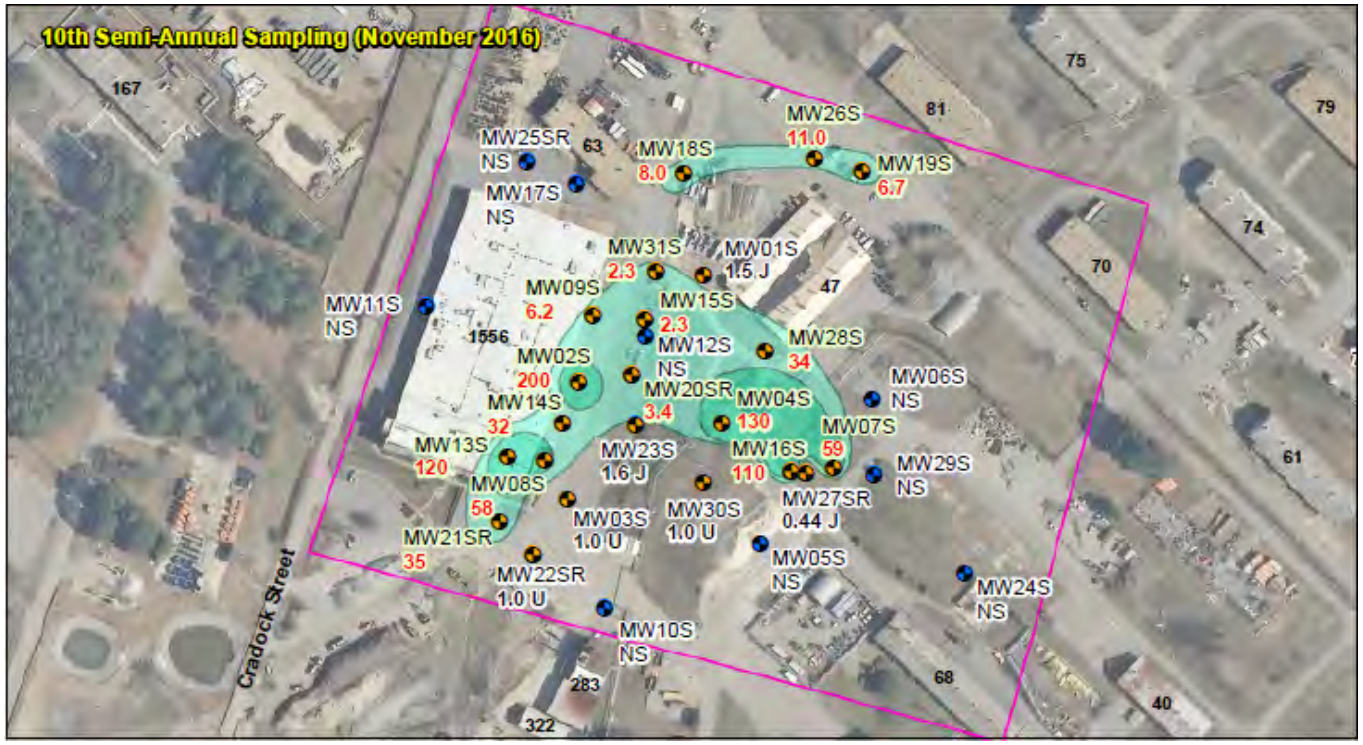
Progressive VC



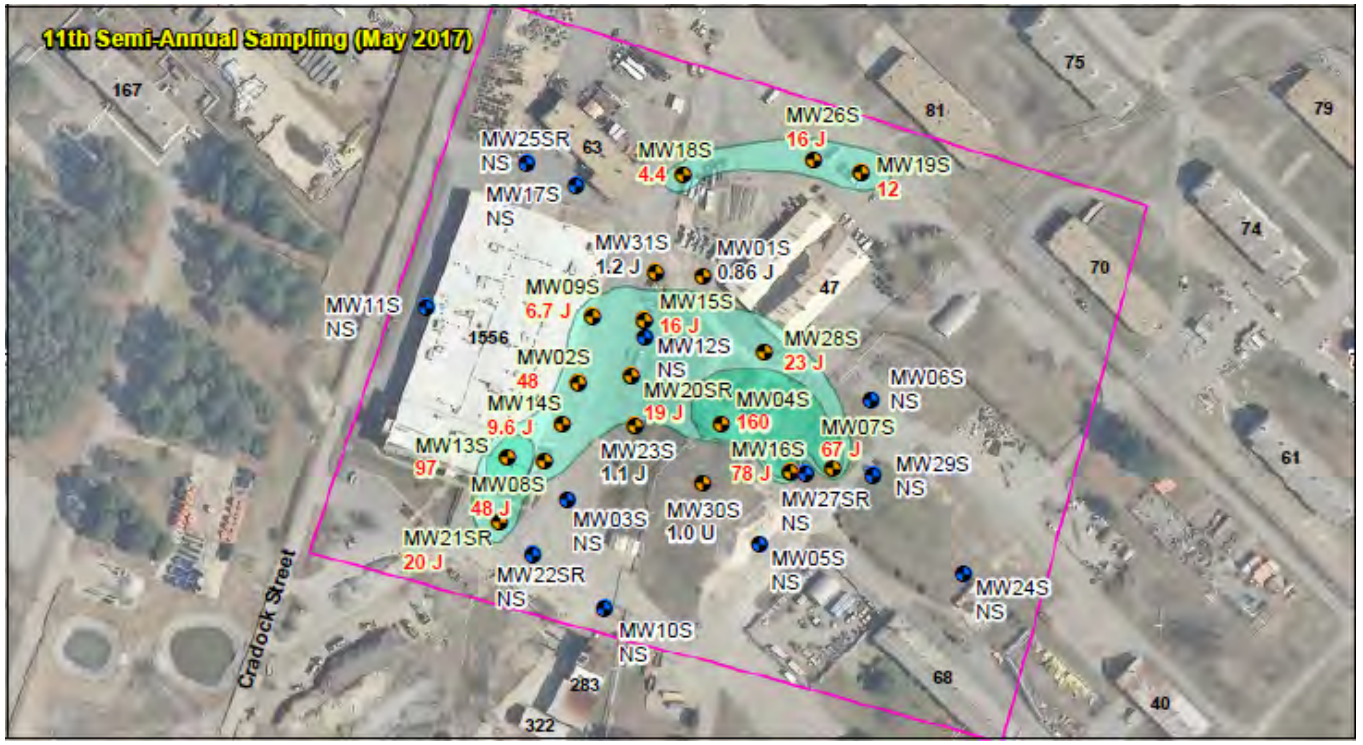
Progressive VC – ctd.



Progressive VC – ctd.



Progressive VC – ctd.



Monitoring

The next groundwater and stormwater monitoring event (12th sampling event) is tentatively scheduled for the week of November 13th.

Questions and Comments

Remedial Action Operations Performance Monitoring Site 2

Saint Juliens Creek Annex Chesapeake, Virginia

Fourth Monitoring Event April 2017

Objectives

- Resolve comments on the Event 4 Technical Memorandum.
- Present Event 4 Technical Memorandum recommendations for further discussion, where required.

Comments (VDEQ)

1. Section 3.1 - The first sentence of the second paragraph should list E-39, not E-30. Revised as suggested.

2. Section 3.1 - The Partnering Team may want to discuss the significance (or lack thereof) of the observation of a Non-Aqueous Phase Liquid (NAPL) sheen at E-11. No revisions required.

3. Section 3.3 (last two sentences) - The data that is biased low due to the analyses of the dilutions after the hold time should be specifically noted in Table 5, since it appears that not all of the J qualified data shown on Table 5 is biased low. The following comment is also related. The table has been annotated to differentiate samples that were biased low due to analyses of dilutions after the hold time.

4. Table 5 - There are two different definitions provided for the estimated data qualifier (J Qualifier), one in the table and one in the data validation summary reports in Appendix B. The table should somehow differentiate or note which definition applies to which data. The table has been annotated to differentiate samples that were biased low due to analyses of dilutions after the hold time.

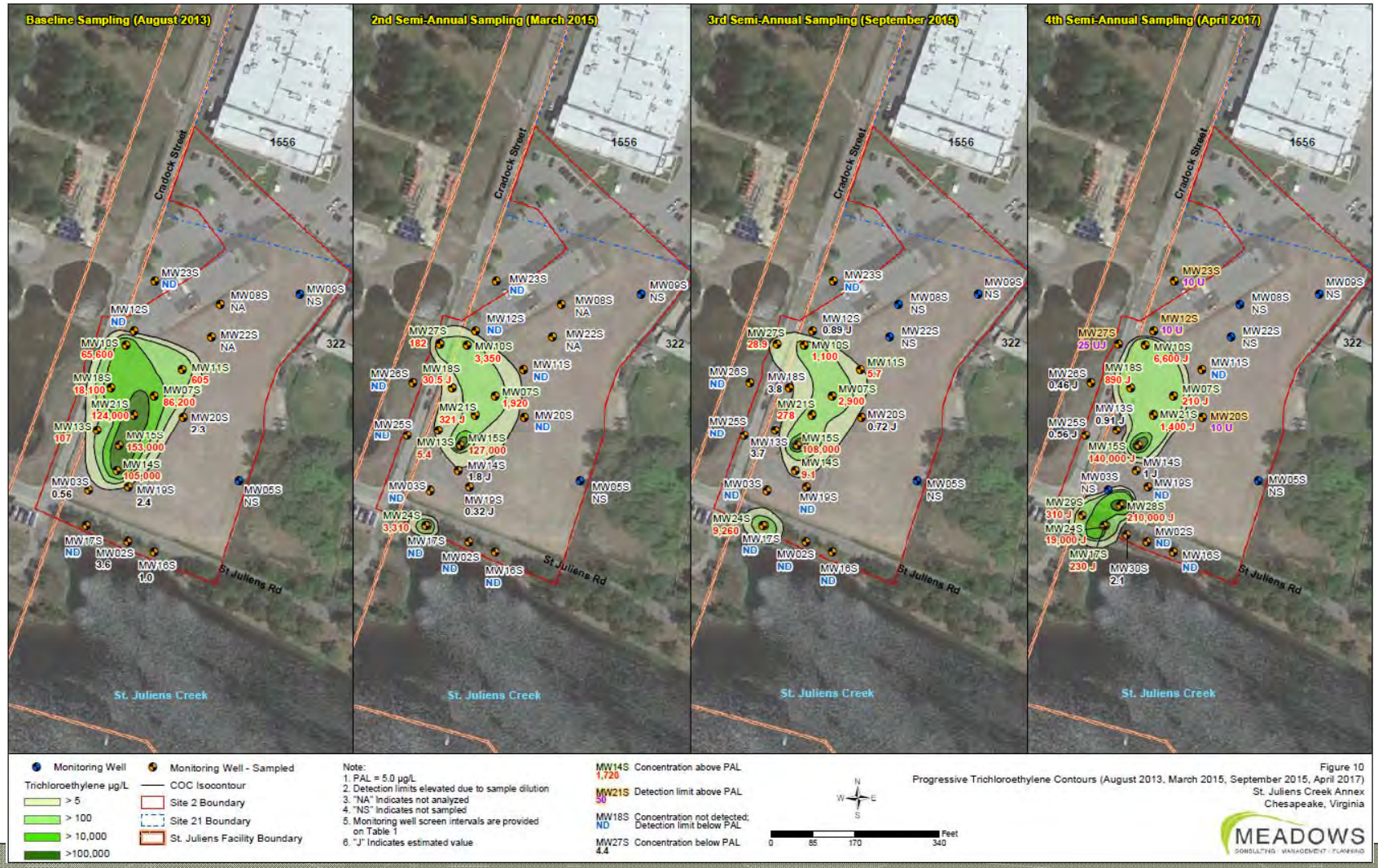
5. Table 6 - It may be worth noting in the table how many of the non-detects had detection limits above the Project Action Limit (PAL). For example, the 'Detection Frequency above PAL' for Tetrachloroethylene (PCE) in the 4th event is 0 out of 22 wells, however, 12 out of 22 wells (per Section 4.2.1) had detection limits for PCE above the PAL. Table 6 was updated to include a non-detection locations above PAL column.

6. VDEQ agrees with the recommendations provided in Section 5.2. If the SJCA Partnering Team also agrees with the recommendations, then follow-up discussion may be needed for some items such as frequency of monitoring for MW 16S. No revisions required.

Recommendations

COC concentrations at monitoring wells SJS2-MW02S, SJS2-MW16S, SJS2-MW19S, and SJS2-MW25S have been below PALs for three consecutive rounds and dissolved arsenic concentrations have not exceeded the MCL (10 µg/L) at these locations. There was no dissolved arsenic data collected for monitoring wells SJS2-MW19S and SJS2-MW25S during the most recent groundwater sampling event; however, dissolved arsenic levels at these locations have historically been below the MCL. Monitoring wells SJS2-MW02S, SJS2-MW19S, and SJS2-MW25S are utilized for plume delineation and should continue to be monitored at their current frequencies. Monitoring well SJS2-MW16S is monitored semiannually. A reduction of sampling frequency for this well is proposed based on the decision logic. COC and dissolved arsenic concentrations in the well have been less than remedial goals for three consecutive rounds. The data point is not currently used for upgradient or crossgradient plume delineation. The well is used to monitor the migration of contaminants towards Saint Juliens Creek; however, the overall COC plume appears to be stable. As such, the SJCA Partnering Team should consider reducing monitoring of this well location to an annual or biennial frequency for CVOCs.

Recommendations – ctd.



Recommendations – ctd.

Recommendations – ctd.

Monitoring Well			MW16S											
Sample ID			SJS2-MW16S-07B		SJS2-MW16S-0813-B		SJS2-MW16S-0914		SJS2-MW16S-0315		SJS2-MW16S-0915		SJS2-MW16S-0417	
Sample Date			6/5/2007		8/9/2013		9/11/2014		3/16/2015		9/17/2015		4/26/2017	
Sample Event			PRIOR[4]		BASELINE		1ST SEMI-ANNUAL		2ND SEMI-ANNUAL		3RD SEMI-ANNUAL		4TH SEMI-ANNUAL	
COCs	**PAL[2]**	**units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Chloroform	80	µg/L	10	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
1,1-Dichloroethylene	7	µg/L	10	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
cis-1,2-Dichloroethylene	70	µg/L	9	J	0.50	U	28.8		0.50	U	0.97	J	0.50	U
trans-1,2-Dichloroethylene	100	µg/L	10	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Methylene Chloride	5	µg/L	10	U	4.0	U	4.0	U	4.0	U	4.0	U	2.5	U
Naphthalene[5]	19	µg/L	NA		NR		NR		NR		NR		NR	
1,1,2-Trichloroethane	5	µg/L	10	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Tetrachloroethylene	5	µg/L	10	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U
Trichloroethylene	5	µg/L	62		1.0		37.4		0.50	U	0.50	U	0.50	U
Vinyl Chloride	2	µg/L	0.7	J	0.50	U	4.1		0.50	U	0.50	U	1.0	U
Heptachlor Epoxide[6]	0.2	µg/L	NA		NR		NR		NR		NR			
Indicator Parameters	**PIL[2]**	**units**	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Methane	>500	µg/L	6,800		6,430		3,570		11,800		6,970		22,000	
Ethane	>100	µg/L	0.01	U	0.50	U	0.50	U	0.50	U	0.50	U	100	U
Ethene	>10	µg/L	0.047		0.50	U	0.50	U	0.50	U	0.50	U	100	U
Dissolved Iron	>1000	µg/L	NA		42,300		50,300		45,900		8,260		62,000	
Dissolved Arsenic	≤ Baseline or MCL (10µg/L), whichever is higher	µg/L	NA		5.0	U	5.0	U	4.4	J	5.0	U	5.0	U
Sulfate	<20	mg/L	28.2		25	U	25	U	25	U	50	U	0.50	U
Sulfide	>1.0	mg/L	2.3	U	0.24	U	2.3		0.25	U	0.24	U	0.80	U
Total Organic Carbon	>20	mg/L	6.4	K	8.4		8.4		7.4		6.5		7.7	
Alkalinity, Total as CaC03	>50	mg/L	281		335		335		286		292		340	
1,2-Dichloroethene (total)	increasing or decreasing	µg/L	NA		1.0	U	29.2		1.0	U	0.97	J	1.0	U
Dehalococcoides	>105DHC/L	cells/ml	NA		NR		NR		NR		NR		NR	

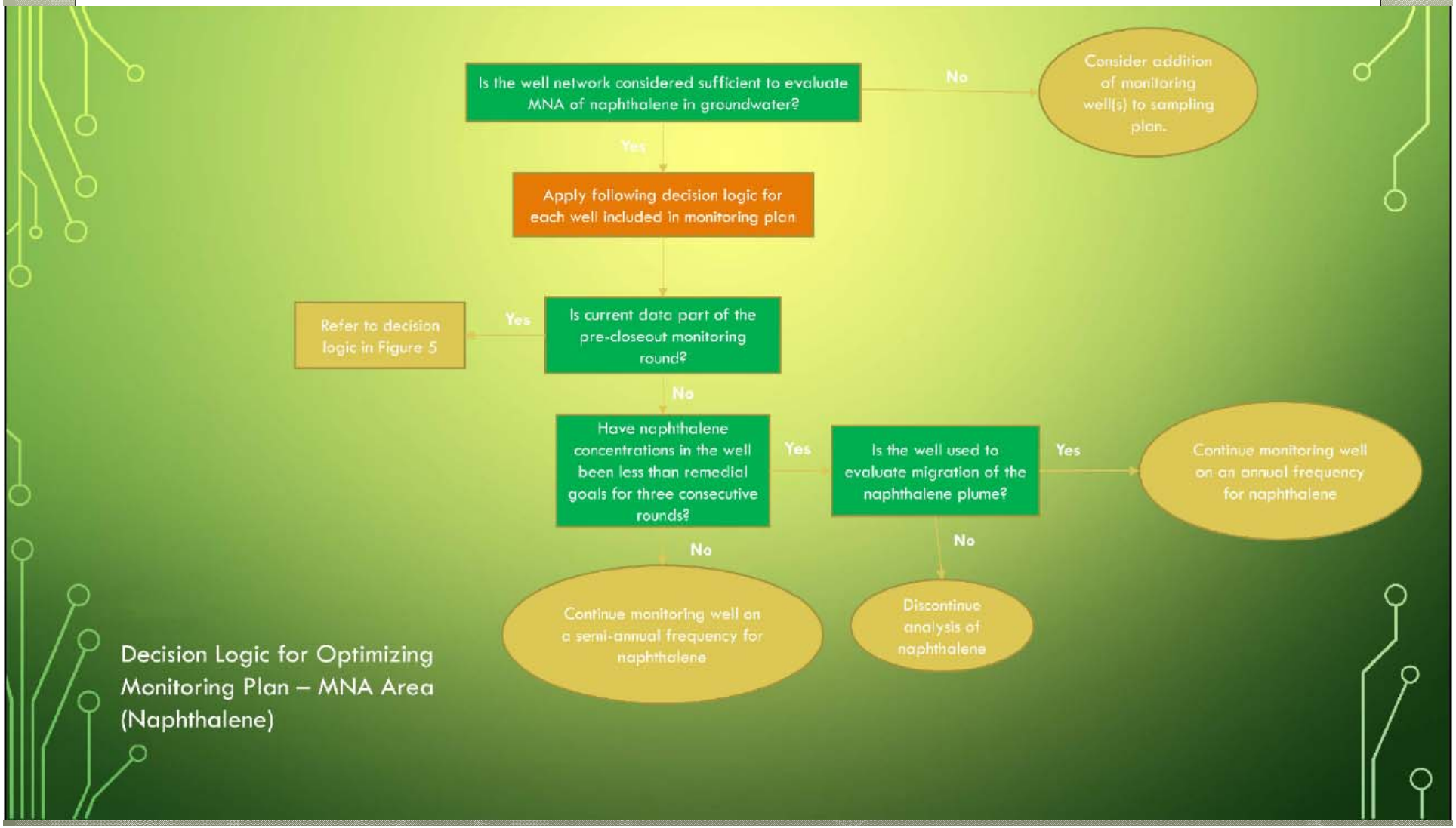
Recommendations – ctd.

Recommendations – ctd.

Continued semiannual sampling for naphthalene is recommended based upon the decision logic. Additionally, monitoring for naphthalene at monitoring well SJS2-MW27S, which is located downgradient of SJS2-MW10S, should be added to evaluate MNA of naphthalene in groundwater.

Recommendations – ctd.

Recommendations – ctd.



Recommendations – ctd.

Based on findings observed during the Pre-Remedial Investigation, the SJCA Partnering team determined that a second round (Phase II) of EVO injections should be conducted at Site 2. The team determined that since most of the high levels of contamination were observed in the deeper intervals and bounded between two low permeability layers it is unlikely that the COCs at this depth would impact the surface water of Saint Juliens Creek. Monitoring well location SJS2-MW17S, which has a screen interval from 5-15 feet below grade and is positioned just on the upgradient side of Saint Juliens Creek, had exceedances of the TCE, cis-1,2-DCE, 1,1-DCE, and VC PALs. After the next monitoring event, the SJCA Partnering team should evaluate data at this location to determine whether the elevated concentrations are the result of the injections or plume migration towards Saint Juliens Creek.

Recommendations – ctd.

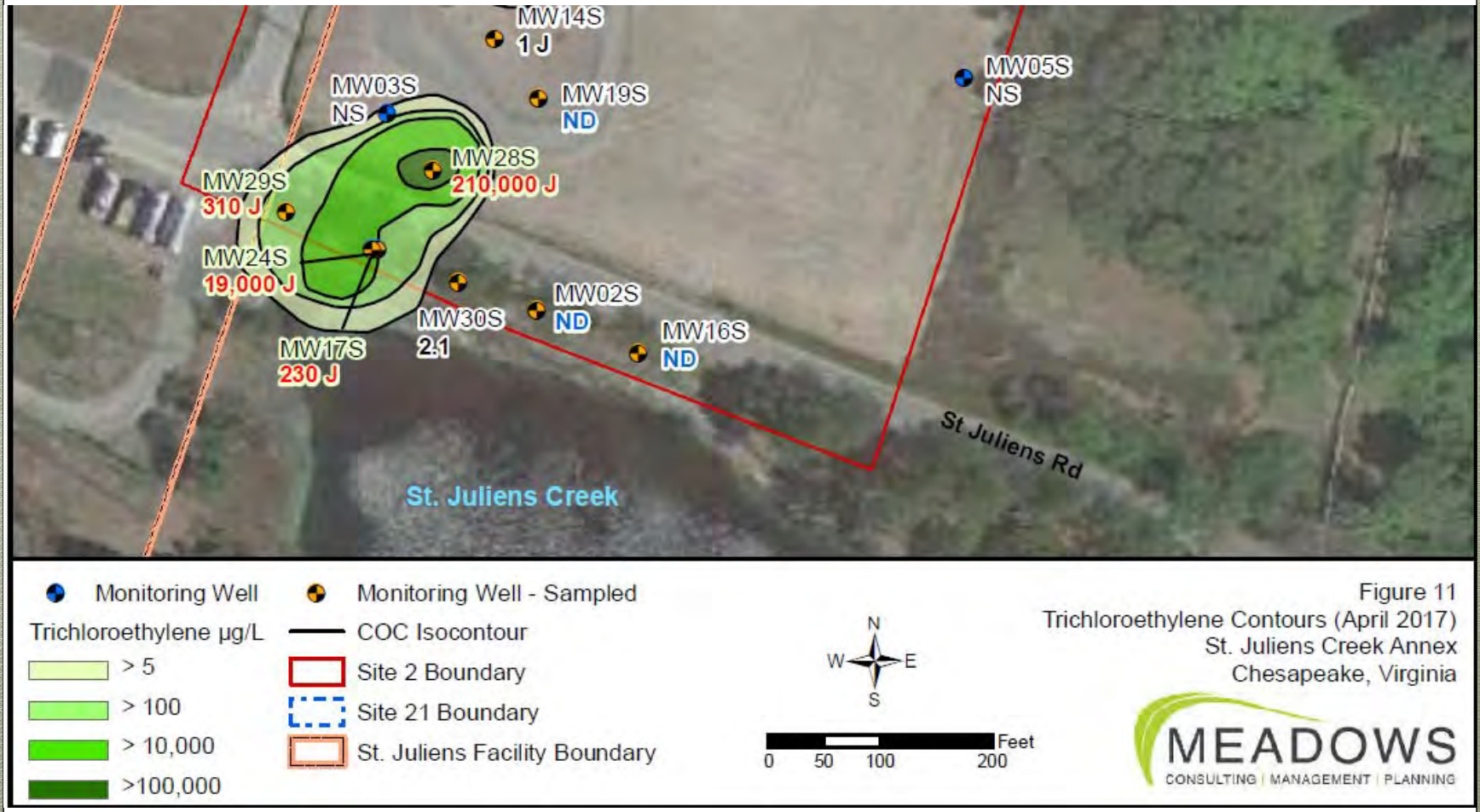
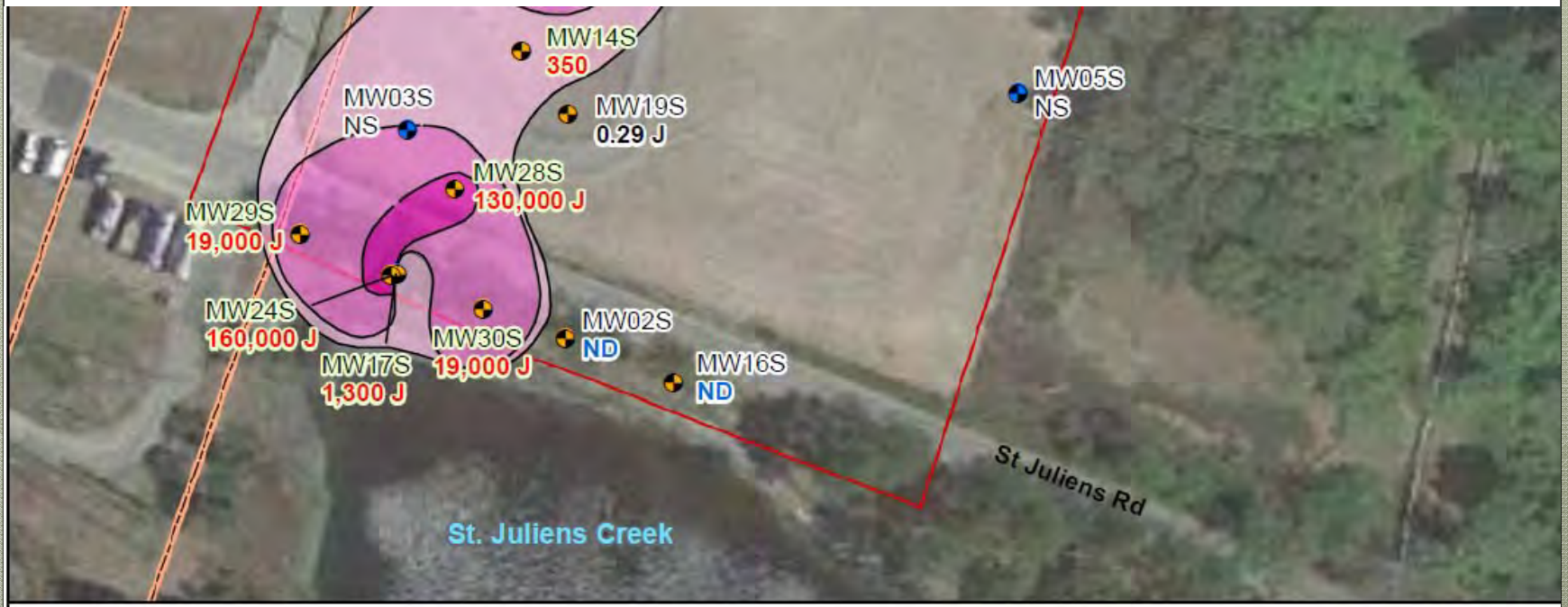


Figure 11
Trichloroethylene Contours (April 2017)
St. Juliens Creek Annex
Chesapeake, Virginia

MEADOWS
CONSULTING | MANAGEMENT | PLANNING

Recommendations – ctd.



Recommendations – ctd.

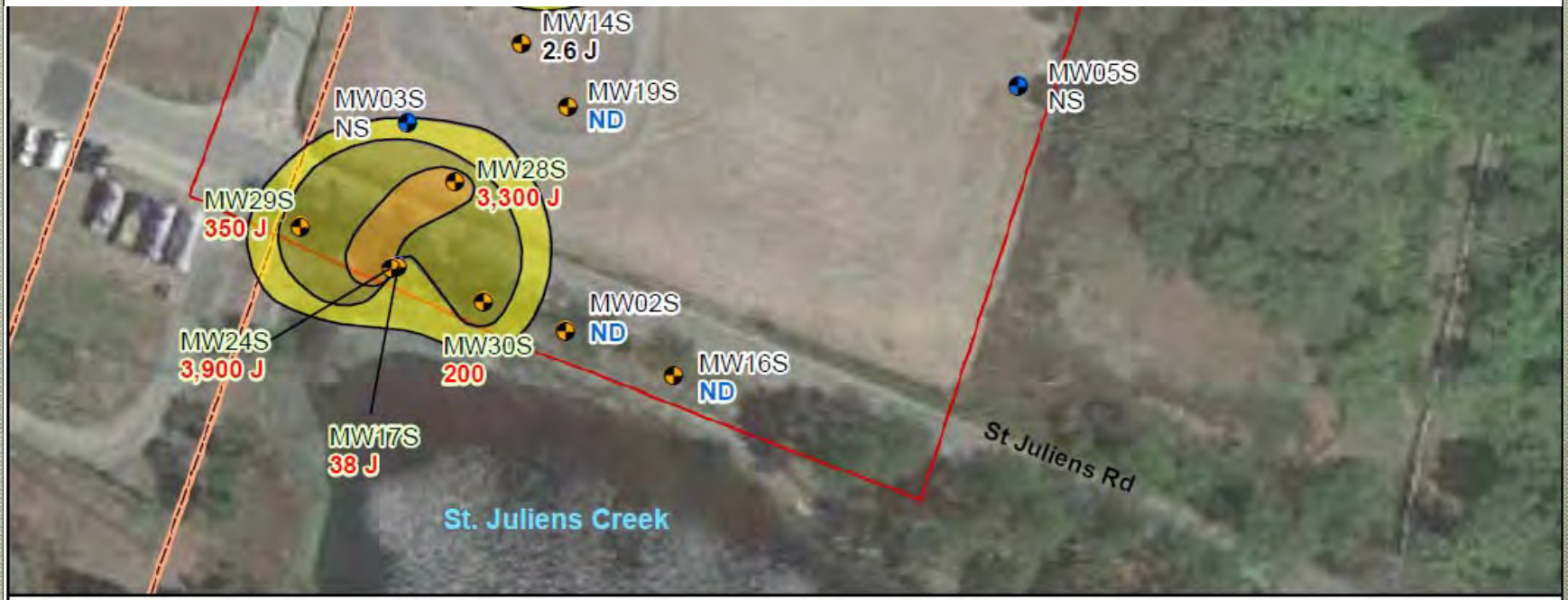


Figure 16
1,1 - Dichloroethylene Contours (April 2017)
St. Juliens Creek Annex
Chesapeake, Virginia

MEADOWS
CONSULTING | MANAGEMENT | PLANNING

Recommendations – ctd.

Figure 18
Vinyl Chloride Contours (April 2017)
St. Juliens Creek Annex
Chesapeake, Virginia

MEADOWS
CONSULTING | MANAGEMENT | PLANNING

Recommendations – ctd.

The decision logic for the high concentration target area at Site 2 includes several conditions to evaluate whether additional treatment at the site is warranted. One of the primary factors is to determine if COC concentrations and mass is continuing to decrease at rates indicative of enhanced degradation. Trends in COC concentration can be evaluated through statistical analysis such as the Mann-Kendall test.

A downward or decreasing trend was identified at monitoring well SJS2-MW07S for TCE, cis 1,2-DCE, and 1,1-DCE. A downward trend was also indicated at monitoring well SJS2-MW27S for TCE. Upward or increasing trends were identified at monitoring wells SJS2-MW07S and SJS2-MW10S for VC, SJS2-MW15S for 1,1-DCE, and SJS2-MW24S for TCE. There were no other trends identified for the remaining data that was analyzed.

At many locations, there were not sufficient data to conduct the analysis. In several cases, although COC concentrations have decreased dramatically when compared to the baseline levels, a trend was not identified due to an outlier in the small data set. Additional data from continued RA-O performance monitoring will allow for further trend identification.

Although reductive dechlorination of TCE still appears to be proceeding within the high concentration area, data indicates increases in TCE concentration in isolated areas and that reductive degradation products, such as VC, are accumulating. Therefore, not all CVOCs are continuing to degrade at rates indicative of enhanced degradation.

Recommendations – ctd.

Additionally, some plume migration may also be occurring. COC concentrations increased in exterior monitoring wells SJS2-MW26S and -MW27S during the fourth RA-O monitoring event. However, the increase at SJS2-MW27S may be associated with injection activities moving the plume. This "pushing" of the plume also occurred after the Phase I injection near SJS2-MW23S; concentrations subsequently decreased in that well.

Because of this possible plume migration, is it likely another round of ERD injections in the phase I treatment area is warranted. Therefore, in accordance with the decision tree, the specialty indicator parameters should be analyzed for during the next monitoring event and the results used to confirm another round of ERD injections should be conducted in the phase I treatment area and to optimize the design for the re-injection.

The next RA-O performance monitoring event is scheduled for November 2017. Specialty indicators (volatile fatty acids and Dehalococcoides and functional genes) were last sampled during the baseline event in August 2015. They are scheduled to be collected from monitoring wells SJS2-MW07S, SJS2-MW10S, SJS2-MW14S, SJS2-MW15S, SJS2-MW18S, SJS2-MW21S, SJS2-MW24S, SJS2-MW28S, and SJS2-MW29S during the next monitoring event.

Monitoring

The next groundwater monitoring event (5th sampling event) is tentatively scheduled for the week of November 6th.

Questions and Comments

SITE 21 VAPOR INTRUSION MONITORING

ST. JULIENS CREEK ANNEX PARTNERING MEETING

NOVEMBER 1 & 2, 2017

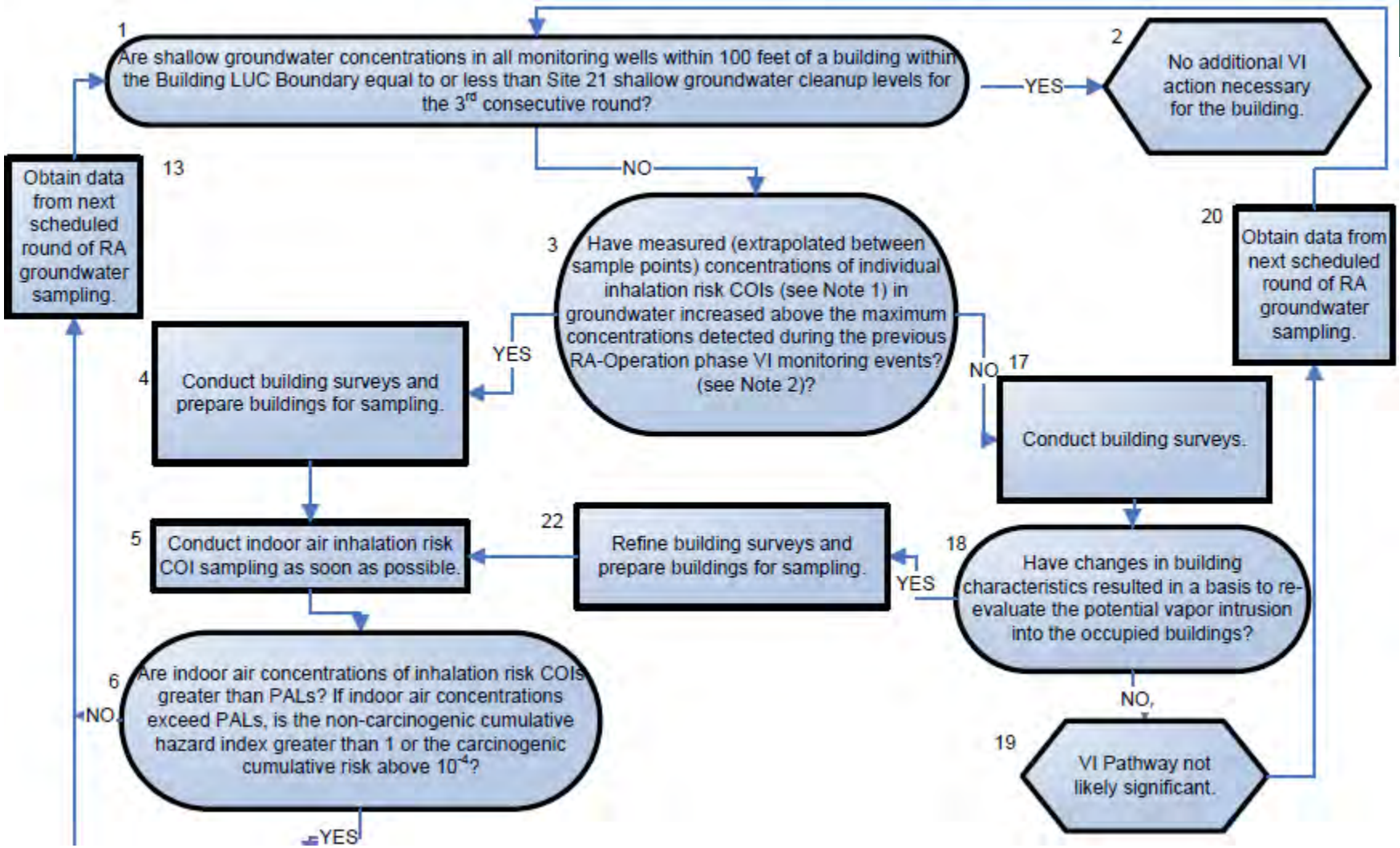
OBJECTIVES

- Site 21 Remedial Action-Operation (RA-O) Phase VI Monitoring
  - Summarize objectives and approach
  - Present RA-O phase VI monitoring event 11 results, conclusions, and recommendations
  - Discuss any preliminary comments on the draft report
- Building 54 VI Investigation
  - Summarize objectives and approach
  - Review results, conclusions, and recommendations
  - Discuss any preliminary comments on the draft report

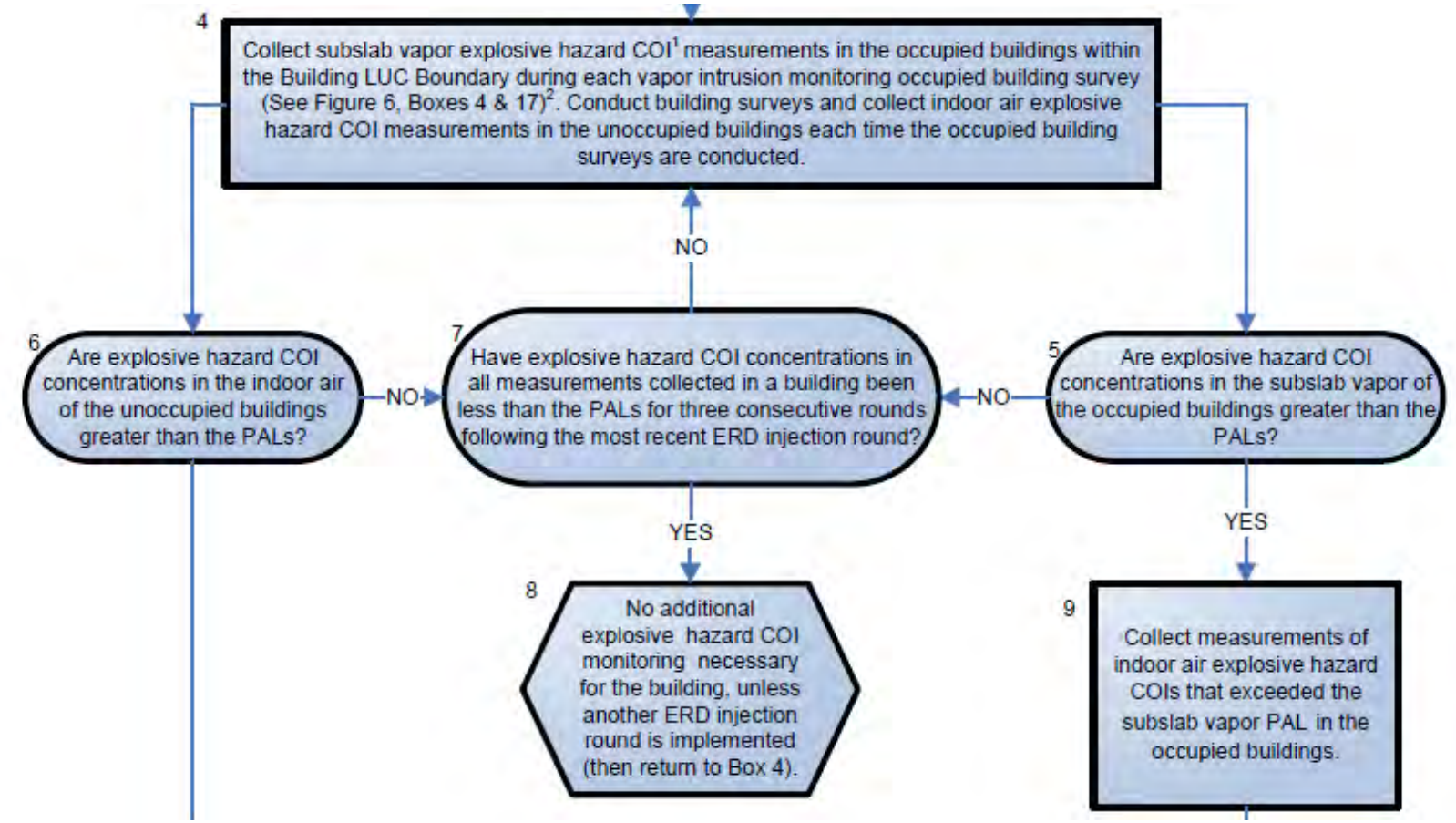
RA-O PHASE VI MONITORING: OBJECTIVES

- Determine if changes in site conditions resulting from the groundwater RA or changes in building characteristics have resulted in a basis to re-evaluate potential inhalation risks from VI into the occupied buildings
- Determine if changes in site conditions resulting from the groundwater RA resulted in explosive hazards at the site buildings

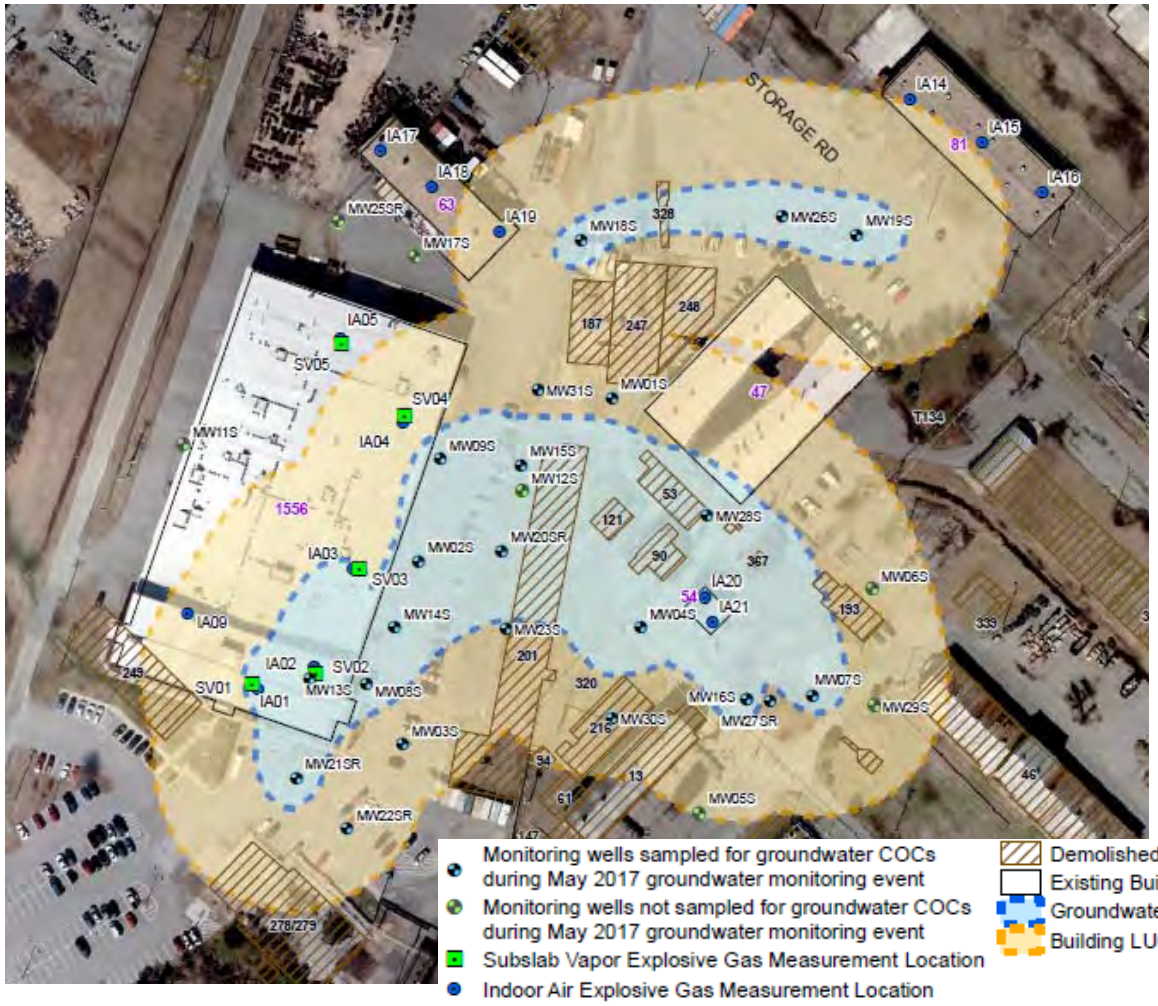
RA-O PHASE VI MONITORING APPROACH: INHALATION RISK DECISION TREE



RA-O PHASE VI MONITORING APPROACH: EXPLOSIVE HAZARD DECISION TREE



RA-O PHASE VI MONITORING: EVENT 11 ACTIVITIES & RESULTS



- Updated Building LUC Boundary based on May 2017 groundwater plume to identify buildings to include in VI monitoring event 11
  - Same buildings as during previous monitoring event – Buildings 47, 54, 63, 81, 1556
    - Facility confirmed Building 47 is still unsafe to enter and was therefore excluded from monitoring event 11

RA-O PHASE VI MONITORING: EVENT 11 ACTIVITIES & RESULTS (CONT.)

- Compared May 2017 groundwater data within 100 ft of occupied Building 1556 to max groundwater concentrations previously detected during Events 1 through 5 to determine whether indoor air samples were warranted based on groundwater concentrations
  - No VI constituents of interest (COI) groundwater concentrations were above their previous max

	Max Concentrations within 100 ft of Building 1556 during RA-O VI Monitoring Events 1 - 5	Monitoring Wells within 100 feet of Building 1556														
Station Name		MW02S	MW03S	MW08S	MW09S	MW11S	MW12S	MW13S	MW14S	MW15S	MW17S	MW20SR	MW21SR	MW22SR	MW25S	MW31S
Event Number		Event 11	Event 11	Event 11	Event 11	Event 11	Event 11	Event 11	Event 11	Event 11	Event 11	Event 11	Event 11	Event 11	Event 11	Event 11
Sample Date		May-17	May-17	May-17	May-17	May-17	May-17	May-17	May-17	May-17	May-17	May-17	May-17	May-17	May-17	May-17
VOCs (µg/L)																
1,1-DCE	11.1	0.5 U	NS	0.5 U	0.5 U	NS	NS	3	0.5 U	0.5 U	NS	0.5 U	0.5 U	NS	NS	0.4 J
cis-1,2-DCE	4,210	96	NS	18	7.2	NS	NS	1,400	3.4	6.3	NS	2.9	2.2	NS	NS	12
TCE	557	0.68 J	NS	0.5 U	0.5 U	NS	NS	72	0.5 U	0.5 U	NS	0.5 U	0.5 U	NS	NS	0.3 J
VC	1,440	48	NS	40	6.7	NS	NS	97	9.6	16	NS	19	20	NS	NS	1.5 J

RA-O PHASE VI MONITORING: EVENT 11 ACTIVITIES & RESULTS (CONT.)

- Building surveys and explosive hazard COI measurement conducted for buildings within the building LUC boundary (except Building 47) on July 12, 2017
  - No changes in building occupancy observed and no new VI pathways identified
  - No detections of methane or hydrogen sulfide in the subslab vapor or indoor air
- Building 81 remained unoccupied; however, info was evaluated to determine if a VI investigation was needed since the facility has indicated future occupation is being considered. Based on the following lines of evidence, VI investigation of the building is not needed at this time:
  - Building is on the edge of the current building LUC boundary
  - Groundwater COC concentrations in the monitoring well located within 100 ft of the building (MW19S) are low
    - TCE (4.2 µg/L) is below the cleanup goal (5 µg/L) and the industrial vapor intrusion screening level (7.4 µg/L)
    - Although VC (12 µg/L) is above the cleanup goal (2 µg/L) and the industrial vapor intrusion screening level (2.5 µg/L), it is aerobically degradable and rarely detected in indoor air samples
  - There have been no VI COI inhalation risk exceedances in Building 1556, which has had much higher groundwater COC concentrations underneath it
  - There is pervious ground cover around most of the building, providing a preferential pathway for VI COIs to off-gas through, as opposed to accumulating under nonpervious ground cover and building slab and penetrating the slab

RA-O PHASE VI MONITORING: EVENT 11 CONCLUSIONS & RECOMMENDATIONS

- Conclusion: There have not been any changes in the site conditions or building characteristics that would result in a significant inhalation risk; therefore, re-evaluation of potential inhalation risks from VI into occupied buildings not warranted through sample collection at this time
  - Recommendation: Continue RA-O phase VI monitoring (building surveys, at a minimum) for the buildings within the building LUC boundary since shallow groundwater COC concentrations in monitoring wells within 100 ft of buildings within the building LUC boundary were above the shallow groundwater cleanup levels during the most recent (May 2017) RA-O phase groundwater monitoring event and 3 consecutive events with no cleanup goal exceedances needed to discontinue monitoring
- Conclusion: The potential for a significant and complete VI pathway at Building 81 is minimal
  - Recommendations:
    - Do not conduct a VI investigation for the building at this time
    - Continue to evaluate the need for a VI investigation for the building since it is on the edge of the building LUC boundary and may be occupied in the future
- Conclusion: There have not been any changes in site conditions that have resulted in an explosive hazard
  - Recommendations:
    - Discontinue explosive hazard monitoring since there have been 3 consecutive rounds with no PAL exceedances
    - Reinitiate explosive hazard monitoring if another round of EVO injections are conducted

RA-O PHASE VI MONITORING: PATH FORWARD

- Finalize report documenting field activities, data, conclusions, and recommendations
  - Draft submitted to Team – October 20
  - Comments due – November 20
    - 30-day expedited review to resolve any comments prior to event 12
- Conduct RA-O phase VI monitoring Event 12 in mid/late January (following review of RA-O phase groundwater monitoring Event 12 data)

BUILDING 54 VI INVESTIGATION: OBJECTIVES

Problem Definition/Objective	Environmental Question	PQOs
VOCs are present in the shallow aquifer groundwater within 100 feet of Building 54 and the building is proposed for occupancy. It is not known whether VOCs in the groundwater are entering the building via the VI pathway at concentrations that could pose a potential risk to building occupants. Therefore, a VI investigation at Building 54 is needed.	Are VI COIs present in indoor air at concentrations that exceed PALs and if so, are they the result of VI?	If indoor air concentrations exceed PALs and MLE evaluation indicates the concentrations are the result of VI, then mitigation measures will be implemented. If indoor air concentrations do not exceed the PALs or exceed the PALs and MLE evaluation indicates the concentrations are not the result of VI, then the building will continued to be monitored in accordance with the existing RA-O phase VI monitoring SAP to determine whether changes in site/building conditions warrant additional sampling/action.

BUILDING 54 VI INVESTIGATION APPROACH

- Conduct building surveys and collect indoor air, outdoor air (near-building and upwind), and subslab vapor data during two events to account for temporal and seasonal variability
- Analyze the samples for site-specific VI COIs
- Compare the indoor air data to project action limits (PALs) to determine whether VI constituents of interest were present in the indoor air at concentrations that indicate a potential regulatory defined unacceptable risk to current industrial workers
- If indoor air concentrations exceed PALs, evaluate multiple lines of evidence to assess whether the indoor air concentrations were the result of a complete and significant VI pathway

BUILDING 54 VI INVESTIGATION: ACTIVITIES

- Sampling conducted in December 2016 and May 2017 to account for seasonal variability
  - Each event consisted of updating building surveys and collecting 2 indoor air samples, 2 outdoor air samples (near-building and upwind), and 2 subslab vapor samples
    - Samples analyzed for the Site 21 VI COIs (groundwater COCs and their daughter products, and the potential secondary ERD by-product methane)
    - Indoor and outdoor air CVOC samples collected over 24 hrs in 6-L SUMMA canisters
    - Subslab vapor CVOC samples collected over 24 hrs in 6-L SUMMA canisters from vapor pins installed in building slab
    - Hydrogen sulfide samples collected over 5 mins in 1-L Tedlar bags
    - Samples sent to an offsite analytical laboratory for analysis

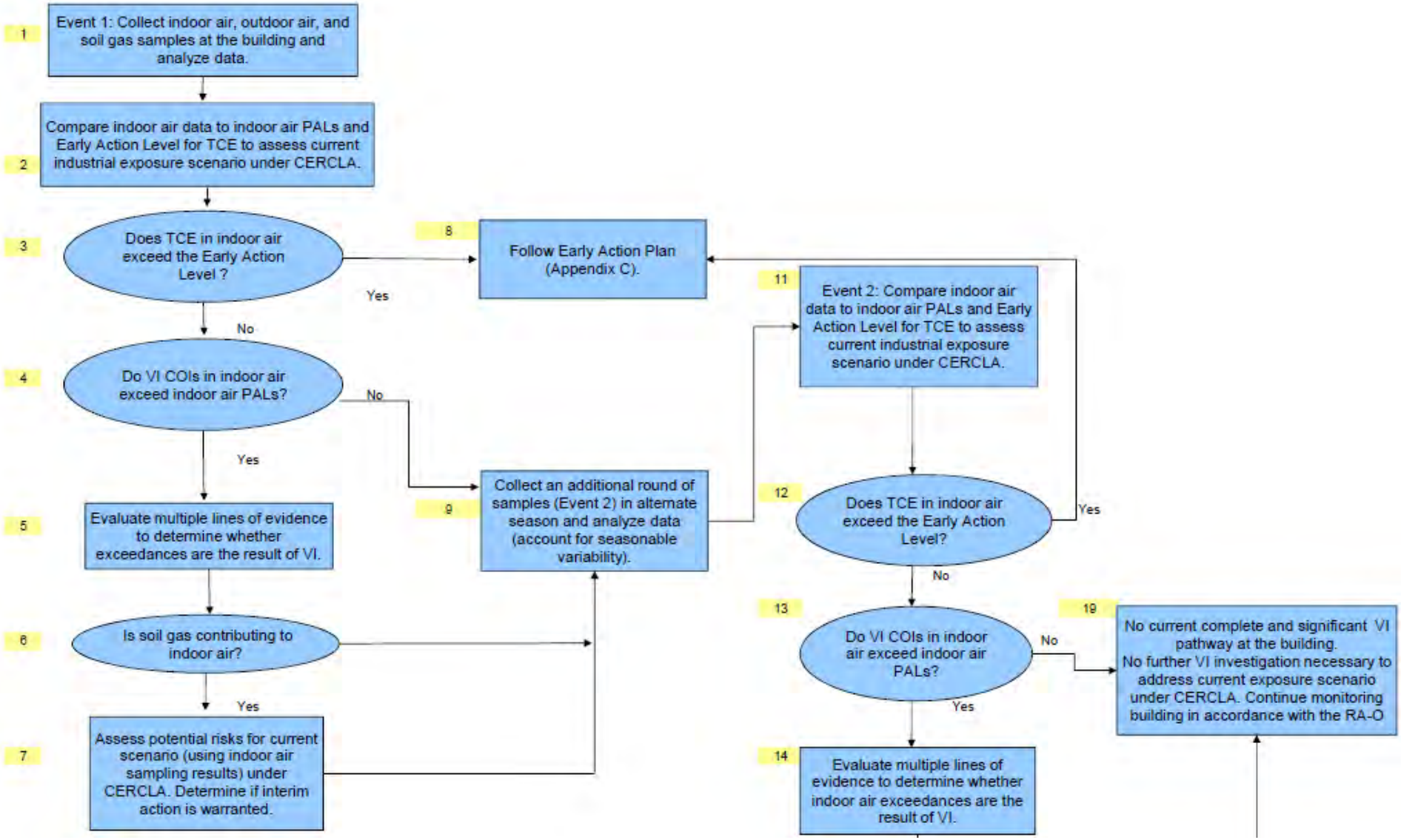
BUILDING 54 VI INVESTIGATION: PHOTOS

Subslab Vapor Sampling

Office Space

Near-Building Outdoor Air Sampling

BUILDING 54 VI INVESTIGATION APPROACH: DECISION TREE



BUILDING 54 VI INVESTIGATION: RESULTS

- Early Action Level only applies to TCE in indoor air – not exceeded during either event
- Indoor Air: H2S exceeded PAL in indoor air during Event 1 but not Event 2
  - Although H2S limit of detection (7 µg/m^3) is above the PAL, the detection limit is below (1.5 µg/m^3)
- Subslab Vapor: TCE exceeded PAL during both events

BUILDING 54 VI INVESTIGATION: DETECTIONS AND EXCEEDANCES

Legend
- Indoor Air Sample Location
- Outdoor Air Sample Location
- Subslab Vapor Sample Location
- Demolished Building
- Existing Building
- Groundwater LUC Boundary
- Building LUC Boundary

Note:
LUC boundaries based on May 2017 data.
Shaded text indicates exceedance of respective screening criteria
Bold indicates detections
NA - Not analyzed
J - Analyte present, value may or may not be accurate or precise
U - Analyte analyzed for, but not detected
µg/m³ - Micrograms per cubic meter

0

Screening Criteria	Indoor Air-Inhalation Risk PAL	Early Action Level	Subslab Vapor Inhalation Risk PAL
Volatile Organic Compounds (µg/m³)			
1,2-Dichloroethane (1,2-DCA)	0.47	--	14
cis-1,2-Dichloroethene (cis-1,2-DCE)	--	--	--
trans-1,2-Dichloroethene (cis-1,2-DCE)	--	--	--
Trichloroethene (TCE)	2.9	24	87
Vinyl Chloride (VC)	2.8	--	84
Hydrogen sulfide	2.9	--	88

Station ID	SJS21-AA05	
Sample ID	SJS21-AA05-16D	SJS21-AA05-17B
Sample Date	December 2016	May 2017
1,2-DCA	0.1 U	**0.061 J**
TCE	**0.097 J**	**0.11 J**
Hydrogen sulfide	**5.2 J**	7 UJ

Station ID	SJS21-SV10	
Sample ID	SJS21-SV10-16D	SJS21-SV10-17B
Sample Date	December 2016	May 2017
cis-1,2-DCE	**20**	**19**
trans-1,2-DCE	**1.7**	**1.6**
TCE	**8,200**	**9,400 J**
VC	**0.22**	0.064 U
Hydrogen sulfide	**8.1**	7 U

Station ID	SJS21-IA11	
Sample ID	SJS21-IA11-16D	SJS21-IA11-17B
Sample Date	December 2016	May 2017
1,2-DCA	0.1 U	**0.061 J**
cis-1,2-DCE	**0.55**	0.099 U
TCE	**0.08 J**	**0.033 J**
Hydrogen sulfide	**5.2 J**	7 U

Station ID	SJS21-IA12	
Sample ID	SJS21-IA12-16D	SJS21-IA12-17B
Sample Date	December 2016	May 2017
1,2-DCA	**0.077 J**	**0.14 J**
cis-1,2-DCE	**0.75**	**0.095 J**
TCE	**0.17 J**	**0.52**
Hydrogen sulfide	**7.9**	7 U

Station ID	SJS21-SV11	
Sample ID	SJS21-SV11-16D	SJS21-SV11-17B
Sample Date	December 2016	May 2017
cis-1,2-DCE	**0.13 J**	**0.091 J**
TCE	**360**	**330**
VC	**0.13 J**	0.064 U
Hydrogen sulfide	**15**	7 U

Station ID	SJS21-AA04	
Sample ID	SJS21-AA04-16D	SJS21-AA04-17B
Sample Date	December 2016	May 2017
1,2-DCA	0.1 U	**0.057 J**
TCE	**0.059 J**	**0.97**
Hydrogen sulfide	**6.6 J**	7 UJ

BUILDING 54 VI INVESTIGATION: MULTIPLE LINES OF EVIDENCE EVALUATION

- Because H2S exceeded it's PAL in the indoor air during Event 1, multiple lines of evidence evaluated to determine whether the indoor air concentrations were the result of a complete and significant VI pathway
  - Review of evidence indicates indoor air concentrations impacted by outdoor air/background source as opposed to subslab vapor/VI
    - H2S detected in both outdoor air samples at concentrations similar (≤ 1.5X) to indoor air concentrations
      - H2S indoor air detection of 7.9 µg/m^3 and near-building and upwind outdoor air detections of 6.5 & 5.2 µg/m^3, respectively
    - H2S detected during Event 1 in the subslab vapor (8.1 and 15 µg/m^3) at similar concentrations (< 3X) to the indoor air concentrations, while TCE was detected during Event 1 in subslab vapor (8,200 and 360 µg/m^3) at concentrations several orders of magnitude higher than detected in indoor air
      - Based on the subslab vapor and indoor air concentrations, the Event 1 attenuation factor calculation for TCE (0.0002) is significantly different than the attenuation factor calculation for H2S (0.98)
      - If VI was the primary source of the H2S concentrations in the indoor air, then TCE would have been detected in the indoor air at higher concentrations than it was detected (the attenuation factor for TCE would have been similar to that of H2S)
    - Although TCE in subslab vapor exceeded it's PAL, it was below the indoor PAL and similar to (≤ 3X) outdoor air
      - TCE indoor air detections of 0.08 and 0.17 J µg/m^3 and near-building and upwind outdoor air detections of 0.059 J & 0.097 J µg/m^3, respectively
    - Based on observations made during the building surveys and the similarity between the indoor air and outdoor air concentrations during Event 1, there do not appear to be any significant or atypical preferential pathways to the building

BUILDING 54 VI INVESTIGATION: CONCLUSIONS AND RECOMMENDATIONS

- Conclusions:
  - Hydrogen sulfide was the only VI COI that exceeded an indoor air PAL
    - The exceedances were limited to Event 1
  - The multiple lines of evidence evaluation concluded that an outdoor air source was the likely cause of the indoor air hydrogen sulfide concentrations; therefore, it is unlikely the VI pathway is currently complete and significant at Building 54
- Recommendations:
  - Because it is unlikely the VI pathway is not currently complete and significant at Building 54, no further VI investigation or action is recommended at this time
  - Because there is a potential for concentrations of the VI COIs to increase during implementation of the ongoing RA to address unacceptable risks associated with future potable use of shallow groundwater, monitoring at the building should continue in accordance with the ongoing RA-O phase VI monitoring

BUILDING 54 VI INVESTIGATION: PATH FORWARD

- Finalize report documenting field activities, data, conclusions and recommendations
  - Draft submitted to regulators for 60-day review on October 19
    - Comments due December 21

BUILDING 54 VI INVESTIGATION: ANY PRELIMINARY COMMENTS?

FACILITY-WIDE PFAS PA/SI OVERVIEW

PA SCOPING

Walter Bell, RPM,
NAVFAC MIDLANT

10/24/2017

CONTENTS

- PFAS PA/SI OVERVIEW
- PA PURPOSE
- SOURCES OF INFORMATION
- CONTENTS OF THE PA REPORT
- FINDINGS AND CONCLUSIONS

PFAS PA/SI OVERVIEW

- **NAVFAC HQ requires all RPMs conduct a comprehensive compilation of existing information about known or potential PFAS releases and potential migration pathways at their assigned facilities.**

- **The objective of the PA is to identify potential PFAS areas of concern (AOCs).**

- **The objective of the SI is to verify the presence or absence of PFAS impacts at those AOCs that exceed screening levels.**
  - **(Not delineate the vertical and lateral extent of contamination.)**

NOTE: Previous DoN policy and guidance used the term “PFCs” which are a subset of PFAS; the term PFAS will be used.

PA PURPOSE

- **A "work plan" will outline the following so the team can document agreement on the scope of the PA before starting.**
  - purpose,
  - technical approach,
  - list of sources of information,
  - information presented in the PA,
  - findings and conclusions to be evaluated,

- **The purpose of the PA is to:**
  - Eliminate sites/areas from further consideration where there is no historical evidence of a release or a suspected release of PFAS;
  - Determine if there is a potential need for further investigation; and
  - Set priorities for an SI for sites/areas identified for further investigation.

- **The contractor shall:**
  - identify any potential areas where a PFAS release may have occurred due to use, storage, or disposal of PFAS.
  - identify the land use surrounding the installation (1-mile from the property boundary) and
  - identify all drinking waters sources, by parcel, within this identified area.

SOURCES OF INFORMATION

- Maps and aerial photographs;
- Environmental surveys, studies, or assessments;
- Reports of accidental encounters;
- Real estate records;
- Records from the Public Works Office, command histories, etc.;
- Records of emergency response personnel;
- Records of crashes and/or emergency response actions where firefighting foams may have been used;
- Federal archives and DON libraries;
- Incident reports and aircraft crash records;
- Environmental cleanup records;
- Environmental spill records;
- Historical records/internet search;
- Newspaper accounts (past and present);
- Photo-documentation;
- Interviews with active and retired civilian, military, and government personnel;
- Any on-site physical investigations and identification of potential pathways and receptors;
- Laboratory analytical reports;
- Results from previous investigations;
- Descriptions of environmental, cultural, and historical conditions; and
- Other relevant and applicable documents, including purchase orders and/or other records detailing the acquisition of PFAS containing materials.

- *** A site reconnaissance may be warranted to confirm information.**

CONTENTS OF THE PA REPORT

- **The PA report will identify**
  - potential source/release areas
  - potential for current human health exposure to PFAS,
  - including high risk areas, defined as having any potential drinking water sources (on-base or off-base) within an area 1-mile downgradient of any, and all, known/suspected PFAS releases to the environment

- **Key types of information and resources**
  - Installation description (physical inspection, interviews, maps);
  - Evidence of a release or potential release (physical inspection, interviews of current and former on-base personnel, record searches);
  - Site description and characterization (physical inspection, record searches, photo analysis, previous sampling or studies);
  - Identification of potential receptors (e.g., drinking water wells and intakes, sensitive environments, populations);
  - Identification of all on-base and off-base drinking water sources;
  - Description of hazardous waste generation, storage, and disposal, both past and present (interviews and record searches);
  - Known or suspected contaminants or classes of contaminants;
  - Primary release mechanism;
  - Secondary contaminant migration;
  - Hydrology (literature searches, previous studies, Federal Emergency Management Agency flood maps);
  - Hydrogeology (literature searches, previous studies);
  - Soil characteristics (United States Department of Agriculture soil survey, previous boring records);
  - Prior regulatory actions such as permits, inspections, violations, removals (interviews, record searches);
  - History of on-site and adjacent land use/ownership (interviews, record and literature searches);
  - Emergency response, fire-fighting training records, and fire-fighting equipment and material storage and maintenance records;
  - Future land use considerations; and
  - Current interpretation of nature and extent of contamination to the extent that it will influence project-specific decision-making.

FINDINGS AND CONCLUSIONS

- **The report shall document:**
  - Comprehensive catalogue of potential source and nature of a release;
  - Periods of use, estimates of volumes/masses of potential PFAS-containing materials;
  - Potential contaminant migration via four pathways (surface water, groundwater, air, and soil);
  - Potential receptors (humans and ecological resources) that could be affected by the release or contaminant migration;
  - Potential for current human health exposure to PFAS, defined as any potential drinking water sources (on-base or off-base) within an area 1-mile downgradient of any, and all, known/suspected PFAS releases to the environment.
  - All references and information sources used in the PA will be cited appropriately and included in their entirety in electronic form as an appendix to the PA report.
- **The results of the evaluation shall clearly and defensibly support recommendations for:**
  - No Further Action,
  - additional investigation, and/or
  - immediate action.
- **The PA will also identify** what additional data must be collected to make informed decisions regarding future response actions.
- **A supplemental Technical Memorandum** will document
  - all sites that were initially identified/considered and then screened from further evaluation/research in the PA.
  - Including a brief summary of the site/area and the rationale used to screen the site/area from further evaluation/research.

Sites 2 and 21 Emerging Contaminants Investigation for 1,4-Dioxane and Perchlorate

St. Juliens Creek Annex Partnering Meeting

November 1 and 2, 2017

Objectives

- Summarize the purpose and activities of the Investigation
- Review and Discuss the Results and Data Evaluation
- Review and Discuss the Path Forward

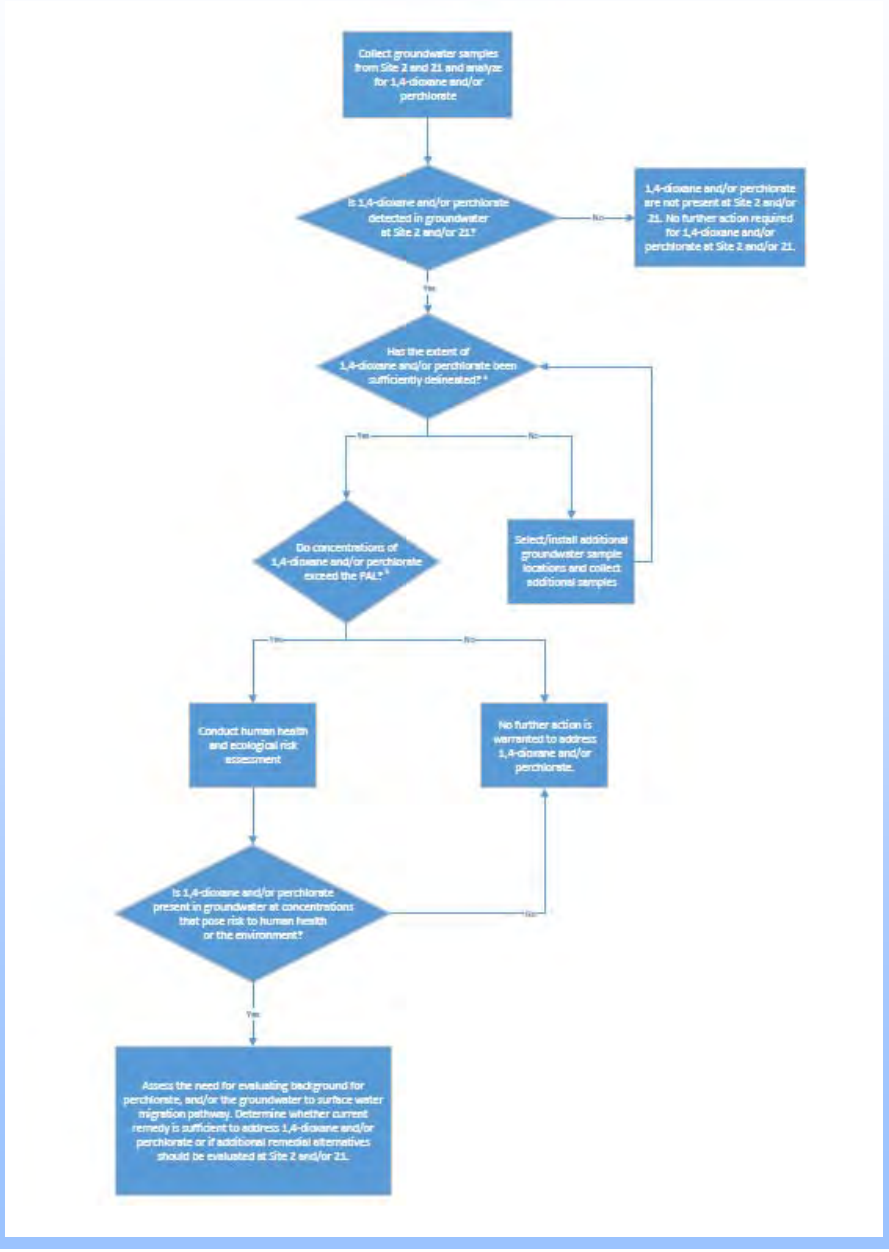
Background: Five-Year Review Findings

- Sites 2 and 21 remedies protective of human health and the environment in the short term; unacceptable risks controlled by LUCs
- Long-term protectiveness unknown due to potential for 1,4-dioxane and perchlorate to be present in the groundwater at the sites
  - 1,4-dioxane - solvent disposal
  - Perchlorate - explosives handling and/or disposal
- Groundwater evaluations needed to determine if 1,4-dioxane and perchlorate should be considered COCs and if the site remedies, LUC boundaries, and/or treatment systems should be revised

Sampling Approach

- Collect groundwater samples for 1,4-dioxane and perchlorate from Site 2 and Site 21 at the following areas:
  - 1,4-dioxane
    - Potential source areas based on high CVOC concentrations (historically or present) and 1,1-DCE and/or 1,1-DCA detections at the well or in the vicinity
    - Downgradient of potential source areas and/or 1,1-DCE and/or 1,1-DCA detections
  - Perchlorate
    - Potential source areas based on historical site use and/or presence of other explosives residues
    - Downgradient of potential source areas and/or presence of other explosives residue detections

Decision Tree: See Handout

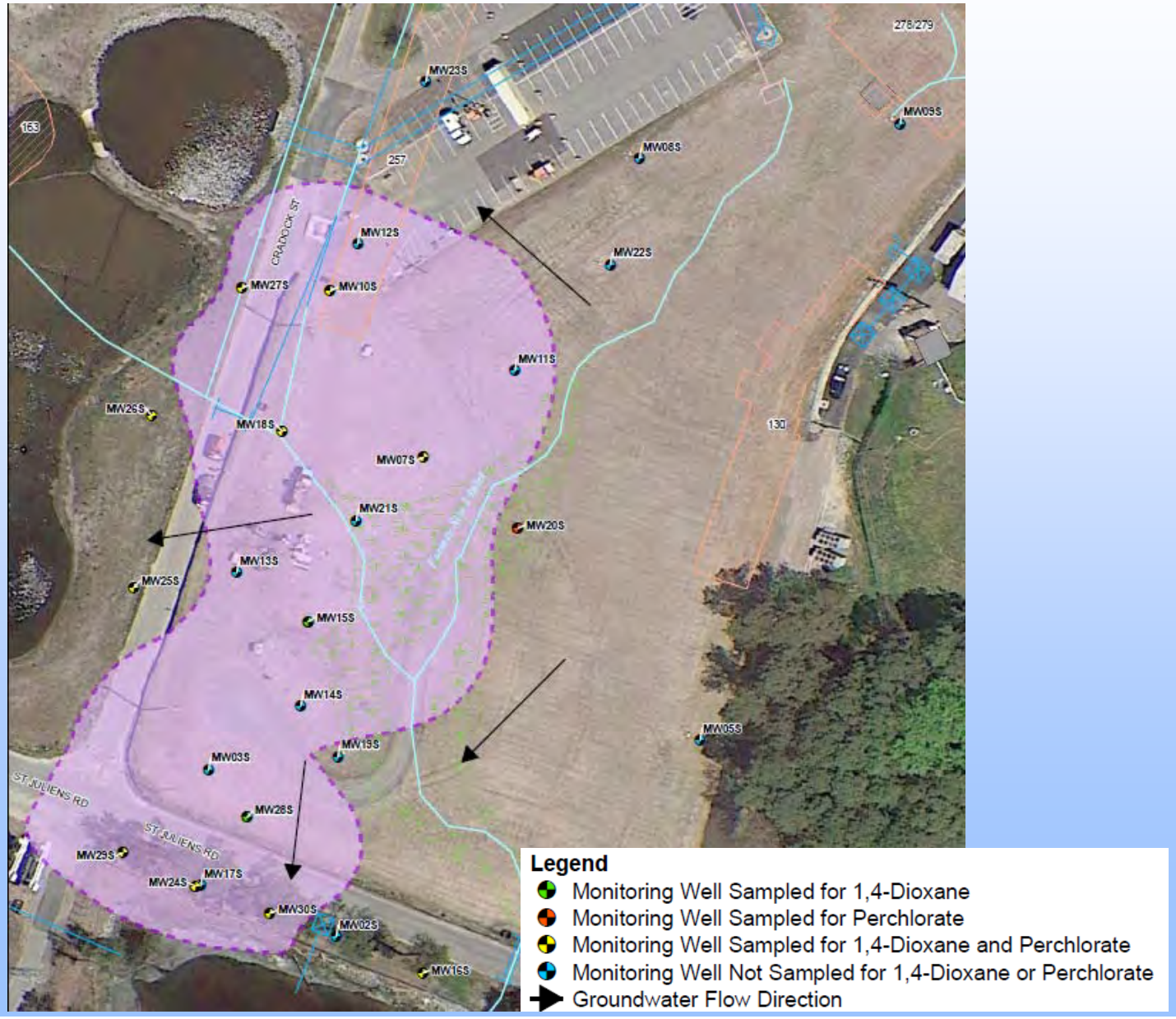


Summary of Field Activities

- Groundwater samples collected in accordance with the SAP from April 17 to April 24, 2017
  - Site 2:
    - 12 monitoring wells for 1,4-dioxane
    - 11 monitoring wells for perchlorate
  - Site 21:
    - 15 monitoring wells for 1,4-dioxane
    - 10 monitoring wells for perchlorate

Summary of Field Activities

Site 2 Sample Locations



Summary of Field Activities

Site 21 Sample Locations

Site 2 Results

- 1,4-Dioxane was not detected (see **Table 3** handout)
- Perchlorate was not detected (see **Table 3** handout)
- Samples collected from the suspected source locations and downgradient areas of those source locations
  - Data provides adequate spatial coverage for delineation purposes

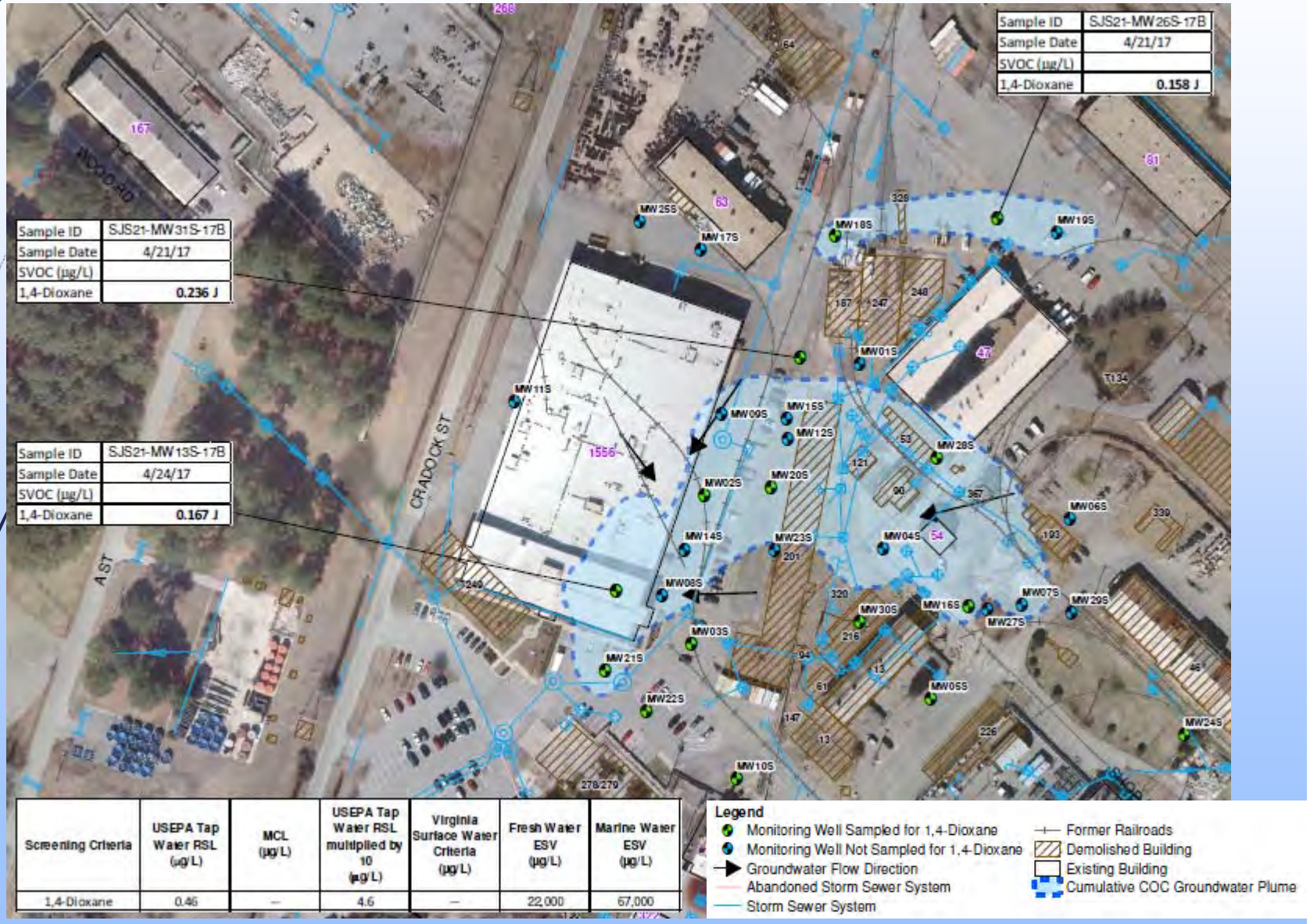
Site 21 Results

- 1,4-dioxane (See **Table 4** handout)
  - Detected in 3 monitoring wells at the following concentrations (**Figure 3** handout):
    - MW26S – 0.158 J µg/L
    - MW31S – 0.236 J µg/L
    - MW13S – 0.167 J µg/L
  - All detections were below the PALs:

Screening Criteria	USEPA Tap Water RSL (µg/L)	MCL (µg/L)	USEPA Tap Water RSL multiplied by 10 (µg/L)	Virginia Surface Water Criteria (µg/L)	Fresh Water ESV (µg/L)	Marine Water ESV (µg/L)
1,4-Dioxane	0.46	--	4.6	--	22,000	67,000

- Perchlorate not detected (See **Table 4** handout)
- Samples collected from the suspected source locations and downgradient areas of those source locations
  - Data provides adequate spatial coverage for delineation purposes

Site 21 Detections



LODs above PALs

- Limit of Detection (LOD) for several perchlorate results at Sites 2 and 21 were above the PALs (**Table 3** and **4** handouts)
  - LOD is the level at which a laboratory reports non-detected (U-qualified) constituents
  - Detection Limit (DL) is a statistically derived level that represents the lowest level the lab instrument can detect with 99% confidence there are no false negatives
    - ½ of the LOD
    - Analytical results are not reported below the DL
    - Results above the DL but less than the Limit of Quantitation (LOQ) (lowest point of the calibration curve) are J-qualified as estimated
  - Lab performed dilutions on several samples due to the appearance and/or conductivity of the samples, in accordance with the lab method used to analyze the samples
    - Resulted in LODs that are elevated above some of the PALs

Site 2 LODs above PALs

- LODs for all perchlorate results are above the Tap Water RSL (1.4 µg/L)
- DLs for all but 4 of the perchlorate results are below or less than twice the Tap Water RSL (1 µg/L and 2.5 µg/L)
- Tap water RSL of 1.4 µg/L is used for screening based on hazard quotient (HQ) of 0.1 to protect against exposure to more than 1 constituent with the same target organ
  - Since none of the other COCs at Site 2 have the same target organ as perchlorate (thyroid), it would be appropriate to compare to the tap water RSL based on an HQ of 1 (14 µg/L)
  - DLs for all but 1 perchlorate result are below 14 µg/L
- Limited uncertainty does not affect the outcome of the data evaluation

Site 21 LODs above PALs

- LODs for 4 of the perchlorate results are above the Tap water RSL (1.4 µg/L)
- DLs for those results are below or less than twice the Tap Water RSL(1 µg/L and 2.5 µg/L)
- Tap water RSL of 1.4 µg/L is used for screening based on hazard quotient (HQ) of 0.1 to protect against exposure to more than 1 constituent with the same target organ
  - Since none of the other COCs at Site 2 have the same target organ as perchlorate (thyroid), it would be appropriate to compare to the tap water RSL based on an HQ of 1 (14 µg/L)
  - DLs for all perchlorate results are below 14 µg/L
- Limited uncertainty does not affect the outcome of the data evaluation

Site 2 Conclusions and Recommendations

- Neither 1,4-dioxane or perchlorate were detected
- Although there is uncertainty associated with presence of perchlorate as a result of elevated LODs, uncertainty is limited and not expected to change outcome of the investigation
- Based on the decision tree in the SAP, no further investigation or action is warranted or recommended for 1,4-dioxane or perchlorate

Site 21 Conclusions and Recommendations

- 1,4-dioxane was detected; however, detections were below the PALs
- Perchlorate was not detected
- Although there is uncertainty associated with presence of perchlorate as a result of elevated LODs, uncertainty is limited and not expected to change outcome of the investigation
- Based on the decision tree in the SAP, no further investigation or action is warranted or recommended for for 1,4-dioxane or perchlorate

Path Forward

- Finalize Technical Memorandum documenting field activities, results, evaluation, conclusion, and recommendations
  - Draft submitted to Team for 60-day review October 19, 2017
    - Comments due by December 21, 2017

Questions/Discussion