

**Travis Air Force Base  
Environmental Restoration Program  
Restoration Program Manager's  
Meeting Minutes  
21 August 2019, 0930 Hours**

Mr. Lonnie Duke of the Air Force Civil Engineer Center (AFCEC) Restoration Installation Support Section (ISS) conducted the Restoration Program Manager's (RPM) meeting on 21 August 2019 at 0930 hours in Building 248 at Travis AFB, California. Attendees included:

|  |                  |
|--|------------------|
| Lonnie Duke                            | AFCEC/CZOW       |
| Glenn Anderson                         | AFCEC/CZOW       |
| Monika O'Sullivan                      | AFCEC/CZOW       |
| Gene Clare                             | AFCEC/CZOW       |
| Angel Santiago                         | AFCEC/CZOW       |
| Merrie Schilter-Lowe                   | Travis AFB/PA    |
| Kurt Grunawalt                         | Travis AFB/Legal |
| Haekyung Kim<br>(via telephone)        | AFCEC/CZRW       |
| Sarah Miller                           | USACE-Omaha      |
| Paul Gedbaw<br>(via telephone)         | USACE-Omaha      |
| Brian Boccellato<br>(via telephone)    | USACE-Omaha      |
| Dominique Forrester<br>(via telephone) | DTSC             |
| Adriana Constantinescu                 | RWQCB            |
| Nadia Hollan Burke                     | EPA              |
| Amanda Rohrbaugh<br>(via telephone)    | TechLaw, Inc.    |
| Mike Wray                              | CH2M/Jacobs      |
| Leslie Royer                           | CH2M/Jacobs      |
| Levi Pratt                             | CH2M/Jacobs      |
| Jill Dunphy<br>(via telephone)         | CH2M/Jacobs      |

Handouts distributed prior to or at the meeting, discussions, and presentations included:

|              |   |
|--------------|---|
| Attachment 1 | Meeting Agenda                          |
| Attachment 2 | Master Meeting and Document Schedule    |
| Attachment 3 | SBBGWTP Monthly Data Sheet (July 2019)  |
| Attachment 4 | CGWTP Monthly Data Sheet (July 2019)    |
| Attachment 5 | LF007C Monthly Data Sheet (July 2019)   |
| Attachment 6 | ST018 Monthly Data Sheet (July 2019)    |
| Attachment 7 | Site SD043 Site Closure Report Overview |
| Attachment 8 | Program Update                          |
| Attachment 9 | DP039 Monitoring Results Overview       |

## **1. ADMINISTRATIVE**

### **A. Previous Meeting Minutes**

There were no regulatory agency comments on the draft July 2019 Meeting Minutes. The meeting minutes will be finalized with no changes.

### **B. Action Item Review**

Action items from July 2019 were reviewed.

Action Item 1 is ongoing: Ms. O’Sullivan to provide updates on perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). August 2019 update: Ms. O’Sullivan informed the team that the Quality Assurance Project Plan (QAPP) has been submitted and will be reviewed within the next few weeks. Sampling will likely begin in December 2019.

Action Item 2 is ongoing: Mr. Duke will continue to provide design and construction information for the new KC-46 Hangar construction project. August 2019 update: Mr. Duke said that we are still working on the document that will allow the soil excavation. The contract for hangar construction will be awarded in December 2019. He stressed the importance of finalizing the Amendment to the NEWIOU Soil, Sediment and Surface Water Record of Decision, which has been delayed for almost a year.

Action Item 3: The PMs for all agencies will elevate to their management any suggestions for keeping document reviews on schedule going forward. August 2019 update: Mr. Duke acknowledged everyone's response to this action item, thanking everyone for the suggestions as well as efforts to keep document reviews on schedule. This action item is now closed.

Action Item 4: Air Force or Jacobs to send Outlook invitations to the regulators for future meetings. August 2019 Update: Mr. Wray will send an Outlook invitation for the remainder of the 2019 meetings to the Water Board, DTSC, and EPA. Once ready, the Air Force will attach the agenda and all meeting materials to the Outlook invitation ahead of the September meeting, as well as via regular email in the event that there are issues receiving or opening those attached to the invitation. This action item is now closed.

Action Item 5: Air Force to determine appropriate path forward for Site LF008 Remedial Action Completion Report (RACR) proposing discontinuation of the monitoring aspect of the monitored natural attenuation remedy. August 2019 Update: Ms Royer explained that a "RACR" is the appropriate document because the site has achieved the remedial action objectives (RAOs). The Air Force will continue with a RACR as planned, which is discussed further in the MMDS. This action item is now closed.

Action Item 6: Ms. O'Sullivan to request a base pass for Mr. Forrester. August 2019 Update: This action item is still open.

### **C. Master Meeting and Document Schedule Review (see Attachment 2)**

The Travis AFB Master Meeting and Document Schedule (MMDS) was discussed during this meeting (see Attachment 2).

#### **Travis AFB Annual Meeting and Teleconference Schedule**

The next RPM meeting will be a teleconference held on Wednesday, 18 September 2019, at 0930.

The 2020 Meeting Schedule has been provided so that attendees can start planning ahead for next year.

#### **Travis AFB Master Document Schedule**

- Community Relations Plan Update (CRP): There was no change to the schedule. This document will be finished as soon as the other higher-priority documents are completed, but not likely in 2019.

- Amendment to the NEWIOU Soil, Sediment, and Surface Water Record of Decision (ROD) for the Travis AFB ERP Sites SS016 and SD033: The Response to Comments and Draft Final due dates were changed to 29 August 2019; the Final due date was changed to 30 September 2019. EPA requested that the new toxicity criteria rule (TCR) language be placed in the ARARs table, and also asked that the document indicate if residential cleanup levels aren't achieved, that land use controls (LUCs) will be imposed. The Water Board requested that regulatory project managers be included in the email communications. **This is a super-critical document** due to site work supporting planned KC-46 hangar construction, and it has been **delayed for almost a year**.
- No Further Action (NFA) ROD for Old Skeet Range (TS060 and TS060A Munitions Response Sites): There has been no change to the schedule. Signatures from state agencies have been received. The signature page continues to make its way through the Air Force Civil Engineer Center. The EPA and Air Force have tentatively agreed to address the EPA's Community Relations concerns in the document submittal cover letter; and include the transcript from the public meeting in the Administrative Record. Mr. Anderson will draft up language to this end, and send to Ms. Burke to forward to her legal counsel for approval. The agencies were asked if they will want a paper copy of the final document or an electronic copy (pdf). All agencies said they wanted an electronic copy. **This is becoming a critical document, because it affects two site closures, and MUST be finalized by the end of the fiscal year.**
- Site SS016 Remedial Design/Remedial Action Work Plan: There was no change to the schedule. Due to recent changes to the amendment to the NEWIOU Soil ROD, this document will need to be revised in accordance with those changes. The EPA, DTSC, and Water Board agreed to the Air Force submitting a redline strikeout work plan that includes the changes to the revised ROD amendment. This excavation project is located within the footprint of the future new KC-46 hangar, so **this document is critical and is delayed due to excessive delays on the Amendment to the NEWIOU Soil, Sediment and Surface Water ROD.**
- Site SD031 Soil Remedial Investigation/Feasibility Study (RI/FS): The Draft to Agencies date was changed to 12 September 2019; the rest of the schedule was changed accordingly. **This document is important and although not time-critical, must be completed during the current contract.**
- Fourth Five-Year Review Report for Multiple Groundwater, Soil, and Sediment Sites: No change was made to the schedule; the Responses to Comments, Draft Final, and Final due dates remain TBD. The Air Force and EPA will schedule a teleconference to discuss EPA's comments and the Air Force's proposed responses. **This document is very important but not critical.**
- Addendum to the Site SS016 Groundwater Remedial Design/Remedial Action (RD/RA) Work Plan (WP): this document was finalized on 2 August 2019.
- Potrero Hills Annex (FS, PP, and ROD): No change was made to the schedule; Mr. Anderson noted that the contractor is waiting on Water Board responses to their

proposal to close the groundwater component of the site using the Water Board Low-Threat Closure Policy.

- Quarterly Newsletter (October 2019): The schedule for the October 2019 version was set up. The Predraft to Air Force/Service Center date is 18 September 2019. The final October newsletter is due on 18 October 2019.
- 2018 Annual Groundwater Remediation Implementation Status Report (GRISR): The Response to Comment and Final due dates were changed to 30 August 2019. Comments from all agencies have been received; however, the EPA has asked for additional information for some comments. Mr. Anderson expressed appreciation to the agencies for expediting their reviews to the extent possible for such a large document. The Air Force is looking for ways to make review of the GRISR more efficient; Ms. Royer took the action to discuss this with the Jacobs team. The Final document must be submitted by the end of the fiscal year (September 2019).
- Site SD043 Remedial Action Completion Report: The Response to Comments due date and Final due date were changed to 23 July 2019 to reflect actual submittal dates. The EPA indicated they will send a letter to the AF confirming closure of the soil component of this site. This document is complete and will be moved to the History section next month.
- Site SS046 Remedial Action Completion Report and Well Decommissioning Work Plan: The Response to Comments and Final due dates were changed to 13 September 2019. The Water Board had no comments. Air Force responses to DTSC comments have been accepted. The Air Force is waiting on EPA's acceptance of Air Force responses to their comments. Management at the US Army Corps of Engineers and the Air Force are closely monitoring the progress of this document due to expiring funds.
- 2018 Annual Site LF007 Corrective Action Management Unit Inspection, Monitoring, and Maintenance Report: The Draft to Agencies due date was changed to 15 August 2019 to reflect actual submittal date; the rest of the schedule was changed accordingly. EPA and Water Board indicated they will defer to DTSC to review this document; Mr. Forrester informed the team that he has sent the report to their engineering services unit for review.
- Site SD043 Site Closure Report: The Draft to Agencies due date was changed to 6 August 2019 to reflect actual submittal; the rest of the schedule was changed accordingly. EPA requested an additional 30 days due to timing with the end of the Federal Fiscal Year; Mr. Duke and Mr. Anderson agreed to extend the RTC date to October 7. The rest of the schedule will be changed accordingly on next month's MMDS. Mr. Pratt will provide an overview of the report in a presentation later in this meeting
- Site LF008 Remedial Action Completion Report: The Draft to Agencies due date was changed to 9 September 2019; the rest of the schedule was changed accordingly based on discussions regarding changes to the remedy.

- Site SS046 Well Decommissioning and Site Closeout Tech Memo: This is a new document; the Predraft to Air Force/Service Center due date was set at 29 August 2019. The Travis AFB document lead will be Mr. Anderson; the CH2M task lead will be Mr. Berwick; and the CAPE task lead will be Ms. Greenwald. Ms. Burke stressed that these documents are important in their signing off on site closures.
- Site SS046 Site Closure Report: This is a new document; all dates are TBD. Doug Berwick will be the task manager responsible for this document. This report will include removal of infrastructure and decommissioning of piezometers and will justify that no media of concern remain at the site.
- Site SS014 POCO Subsites 2, 4, and 5 Closure Report: The Response to Comments and Final due dates were changed to 23 July 2019 to reflect actual submittal. This document will not close the entire SS014 site (that can't be done until all subsites are closed), but will provide the information necessary when the site is ready for closure of the various subsites. The Water Board will consider issuing NFA letters for subsites 4 and 5.

MOVED TO HISTORY:

- None

## 2. CURRENT PROJECTS

### Treatment Plant Operation and Maintenance Update

#### **South Base Boundary Groundwater Treatment Plant, July 2019 (see Attachment 3)**

The South Base Boundary Groundwater Treatment Plant (SBBGWTP) performed at 98.7% uptime, and 7.3 million gallons of groundwater were extracted and treated in July 2019. All treated water was discharged to Union Creek. The average flow rate for the SBBGWTP was 165.5 gallons per minute (gpm). Electrical power usage was 18,321 kilowatt hours (kWh), and approximately 15,158 pounds of CO<sub>2</sub> were created (based on DOE calculation). Approximately 1.1 pounds of volatile organic compounds (VOCs) was removed in July. The total mass of VOCs removed since startup of the system is 518.6 pounds.

In July 2019, troubleshooting was performed several extraction wells. Details can be found in Attachment 3.

Optimization activities conducted in July 2019 include:

- Plumbing in new influent holding tank
- Installation of a new transfer pump
- Plumbing in four (4) additional 2,000-pound granulated activated carbon (GAC) vessels

#### **Central Groundwater Treatment Plant, July 2019 (see Attachment 4)**

The Central Groundwater Treatment Plant (CGWTP) performed at 100% uptime with approximately 1,201,980 gallons of groundwater extracted and treated in July 2019. All treated water was discharged to the storm sewer system which discharges to Union Creek. The average flow rate for the CGWTP was 27.0 gpm. Electrical power usage was 2,382 kWh for all equipment connected to the Central Plant, and approximately 2,651 pounds of CO<sub>2</sub> were generated. Approximately 2.4 pounds of VOCs were removed from groundwater by the treatment plant in July. The total mass of VOCs removed since the startup of the system is 11,526 pounds.

Optimization Activities for CGWTP: The DP039 bioreactor continues to operate in July 2019. No other optimization activities are reported for the month of July 2019.

#### **LF007C Groundwater Treatment Plant, July 2019 (Attachment 5)**

The Subarea LF007C Groundwater Treatment Plant (LF007C GWTP) performed at 100% uptime with approximately 220,196 gallons of groundwater extracted and treated in July 2018. All treated water was discharged to the Duck Pond for beneficial reuse. The average flow rate was 4.9 gpm. Approximately  $7.2 \times 10^{-4}$  pound of VOCs was removed from groundwater by the treatment plant in July 2019. The total mass of VOCs removed since the startup of the system is 174.4 pounds. There was no electrical power usage statistics, because this plant operates on solar power only.

No optimization activities are reported for the month of July 2019.

#### **ST018 Groundwater (MTBE) Treatment Plant, July 2019 (see Attachment 6)**

Site ST018 (MTBE) Treatment Plant (ST018 GWTP) performed at 100% uptime with approximately 168,780 gallons of groundwater extracted in July 2019. All groundwater was discharged to the Fairfield – Suisun Sewer District. The average flow rate for the ST018 GWTP was 3.8 gpm. Electrical power usage for the month was 91 kWh for all equipment connected to the ST018 GWTP. The total CO<sub>2</sub> discharge equivalent equates to approximately 67 pounds. Approximately 0.06 pound of MTBE, BTEX, VOCs, and TPH was removed in July by the treatment plant, and approximately 0.02 pound of MTBE-only was removed from groundwater. The total BTEX, MTBE and TPH mass removed since the startup of the system is 48.3 pounds, and the total MTBE mass removed since startup of the system is 11.8 pounds.

Note: Electrical power use at the ST018 GWTP is only for the alarm system and a pump that pushes influent tank water to the Fairfield-Suisun Sanitary Sewer line. The four groundwater extraction pumps in the system are all solar powered.

On 25 July, extraction well EW2014x18 was shut down and the pump was removed so the well could be redeveloped. The pump was then taken apart, cleaned, reassembled, reinstalled, and restarted on 9 July.

No optimization activities are reported for the month of July 2019.

### **3. Presentations:**

#### **A) Site SD043 Site Closure Report (see Attachment 7)**

Mr. Pratt presented an overview of the Site SD043 Site Closure Report, providing results of the groundwater closure monitoring, demonstrating that closure requirements specified in the Groundwater ROD have been attained, and documenting site closure for the site. Please refer to Attachment 7 for the full briefing.

#### **B) Program Update: Activities Completed, In Progress, and Upcoming (see Attachment 8)**

Mr. Wray reported on the status of fieldwork and documents that have been completed, are in progress, or upcoming. Please refer to Attachment 8 for the full briefing.

#### **A) Site DP039 Bioreactor Monitoring Update (see Attachment 9)**

Ms. Royer presented the Site DP039 bioreactor monitoring results and future short-term monitoring plans. Please refer to Attachment 9 for the full briefing.

### **4. New Action Item Review**

1. Ms. Royer to look into ways to make the GRISR a smaller, more easily reviewable document.
2. Mr. Duke and Ms. O'Sullivan to include PFAS in the DSMOA funding.
3. The Water Board will issue an NFA letter for Site ST032 before the end of August.

### **5. PROGRAM ISSUES/UPDATE**



None

## 6. Action Items

| Item # | Responsible             | Action Item Description  | Due Date          | Status |
|--------|-------------------------|--|-------------------|--------|
| 1.     | Monika O'Sullivan       | Ms. O'Sullivan to provide updates on PFOS and PFOA as she becomes aware of them.   | Ongoing           | Open   |
| 2.     | Lonnie Duke             | Mr. Duke will continue to provide design and construction information for the KC-46 Hangar for agency input ahead of the Air Force/Civil Engineering awarding the construction contract. | Ongoing           | Open   |
| 3.     | Mr. Wray/Ms. Dunphy     | Air Force or Jacobs to send Outlook invitations to the regulators for future meetings.   | 18 September 2019 | Closed |
| 4.     | Ms. O'Sullivan          | Ms. O'Sullivan to request base pass for Mr. Forrester.   | 18 September 2019 | Open   |
| 5.     | Ms. Royer               | Ms. Royer to look into ways to make the GRISR a smaller, more easily reviewable document.  | 18 September 2019 | Open   |
| 6.     | Mr. Duke/Ms. O'Sullivan | Mr. Duke and Ms. O'Sullivan to include PFAS in the DSMOA funding.  | 18 September 2019 | Open   |
| 7.     | Ms. Constantinescu      | The Water Board will issue an NFA letter for Site ST032 before the end of August   | 18 September 2019 | Open   |

TRAVIS AIR FORCE BASE  
ENVIRONMENTAL RESTORATION PROGRAM  
RESTORATION PROGRAM MANAGER'S MEETING

The RPM face-to-face meeting is scheduled for 9:30 AM PST on 21 August 2019.  
**The call-in number is 1-866-203-7023. Enter the Participation code 5978-75-9736 then enter #.**

AGENDA

1. ADMINISTRATIVE

- A. INTRODUCTIONS
- B. PREVIOUS MEETING MINUTES
- C. ACTION ITEM REVIEW
- D. MASTER MEETING AND DOCUMENT SCHEDULE REVIEW

2. CURRENT PROJECTS

TREATMENT PLANT OPERATION AND MAINTENANCE UPDATE

3. PRESENTATIONS

- A. SD043 SITE CLOSURE REPORT
- B. PROGRAM UPDATE:  
DOCUMENTS & ACTIVITIES COMPLETED, IN PROGRESS AND PLANNED

4. NEW ACTION ITEM REVIEW

5. PROGRAM/ISSUES/UPDATE

DISCUSSION/UPDATE ON DP039 BIOREACTOR SAMPLING RESULTS

NOTES: AFTER THE RPM MEETING, BASED ON THE DISCUSSION DURING THE REVIEW OF THE MASTER MEETING AND DOCUMENT SCHEDULE, WE ALLOW TIME TO HOLD A SEPARATE SPLINTER MEETING TO DISCUSS RESPONSES TO AGENCY COMMENTS ON THOSE DOCUMENTS THAT ARE IN PROGRESS, OR OTHER ISSUES IF NEEDED. ALL PARTICIPANTS ARE WELCOME TO PARTICIPATE.

**(2019)**  
**Annual Meeting and Teleconference Schedule**

| <b>Monthly RPM Meeting<sup>1</sup></b><br><b>(Begins at time noted)</b> | <b>RPM Teleconference</b><br><b>(Begins at time noted)</b> | <b>Restoration Advisory Board Meeting</b><br><b>(Begins at 7:00 p.m.)</b><br><b>(Poster Session at 6:30 p.m.)</b> |
|---|--|---|
| —   | 01-16-19   | —   |
| 02-13-19  | —  | —   |
| —   | 03-20-19   | —   |
| 04-18-19 (Thursday 2:00 PM)   | —  | 04-18-19  |
| —   | 05-15-19   | —   |
| 06-19-19  | —  | —   |
| —   | 07-17-19   | —   |
| 08-21-19  | —  | —   |
| —   | 09-18-19   | —   |
| 10-16-19  | —  | May through October <sup>2</sup>  |
| —   | 11-20-19   | —   |
| —   | —  | —   |

<sup>1</sup> Note: Meetings and teleconferences will be held at 09:30 AM on the third Wednesday of each month unless otherwise noted.

<sup>2</sup> Note: Tentative RAB tour(s) during construction season.

**(2020)**  
**Annual Meeting and Teleconference Schedule**

| <b>Monthly RPM Meeting<sup>1</sup></b><br><b>(Begins at time noted)</b> | <b>RPM Teleconference</b><br><b>(Begins at time noted)</b> | <b>Restoration Advisory Board</b><br><b>Meeting</b><br><b>(Begins at 7:00 p.m.)</b><br><b>(Poster Session at 6:30 p.m.)</b> |
|---|--|---|
| —   | 01-15-20   | —   |
| 02-19-20  | —  | —   |
| —   | 03-18-20   | —   |
| 04-16-20 (Thursday 2:00 PM)   | —  | 04-16-20  |
| —   | 05-20-20   | —   |
| 06-17-20  | —  | —   |
| —   | 07-15-20   | —   |
| 08-19-20  | —  | —   |
| —   | 09-16-20   | —   |
| 10-21-20  | —  | May through October <sup>2</sup>  |
| —   | 11-18-20   | —   |
| —   | —  | —   |

<sup>1</sup> Note: Meetings and teleconferences will be held at 09:30 AM on the third Wednesday of each month unless otherwise noted.

<sup>2</sup> Note: Tentative RAB tour(s) during construction season.

## Travis AFB Master Meeting and Document Schedule

| PRIMARY DOCUMENTS                   |  |  |  |
|-------------------------------------|--|--|--|
| Life Cycle                          | Community Relations Plan Update<br>Travis AFB, Glenn Anderson<br>CH2M, Jill Dunphy | Amendment to the NEWIOU<br>Soil ROD for the Travis AFB<br>ERP Sites SS016 and SD033<br>Travis AFB, Glenn Anderson<br>CH2M, Latonya Coleman | No Further Action Soil ROD for<br>Old Skeet Range<br>(TS060 MRA)<br>Travis AFB, Glenn Anderson |
| <b>Scoping Meeting</b>              | NA   | NA   | NA   |
| Predraft to AF/Service Center       | 08-23-16   | 02-28-18   | 05-18-18   |
| AF/Service Center Comments Due      | 09-07-16   | 03-30-18   | 06-01-18   |
| Draft to Agencies                   | 09-28-16 (03-22-18)  | 06-22-18   | 6-25-18  |
| Draft to RAB                        | 09-28-16 (03-22-18)  | 06-22-18   | 6-25-18  |
| Agency Comments Due                 | 10-28-16 (04-27-18)  | 08-22-18   | 11-30-18   |
| <b>Response to Comments Meeting</b> | <b>TBD</b>   | <b>09-06-18</b>  | <b>01-16-19</b>  |
| Agency Concurrence with Remedy      | NA   | NA   | NA   |
| Public Comment Period               | NA   | NA   | NA   |
| <b>Public Meeting</b>               | <b>NA</b>  | <b>NA</b>  | <b>NA</b>  |
| Response to Comments Due            | TBD  | (08-29-19)   | 06-13-19   |
| Draft Final Due                     | TBD  | (08-29-19)   | 06-13-19   |
| Final Due                           | TBD  | (09-30-19)   | 08-21-19   |

| PRIMARY DOCUMENTS                   |  |   |
|-------------------------------------|--|---|
| Life Cycle                          | Site SS016 Remedial Design/Remedial<br>Action Work Plan<br>Travis AFB, Glenn Anderson<br>CH2M, Doug Berwick<br>CAPE, Meg Greenwald | Site SD031 Soil Remedial<br>Investigation/Feasibility Study<br>Travis AFB, Glenn Anderson<br>CH2M, Rick Sturm |
| <b>Scoping Meeting</b>              | NA   | NA  |
| Predraft to AF/Service Center       | 06-04-18   | 05-24-19  |
| AF/Service Center Comments Due      | 06-18-18   | 06-10-19  |
| Draft to Agencies                   | 07-31-18   | 09-12-19  |
| Draft to RAB                        | 07-31-18   | 09-12-19  |
| Agency Comments Due                 | 08-30-18   | 11-11-19  |
| <b>Response to Comments Meeting</b> | 09-19-18   | 11-20-19  |
| Agency Concurrence with Remedy      | NA   | NA  |
| Public Comment Period               | NA   | NA  |
| <b>Public Meeting</b>               | NA   | NA  |
| Response to Comments Due            | 10-24-18   | 12-05-19  |
| Draft Final Due                     | 10-24-18   | 12-05-19  |
| Final Due                           | TBD  | 01-06-19  |

| PRIMARY DOCUMENTS                   |  |  |
|-------------------------------------|--|--|
| Life Cycle                          | Fourth Five-Year Review Report for Multiple<br>Groundwater, Soil, and Sediment Sites<br>Travis AFB, Glenn Anderson<br>Tetra Tech, Joachim Eberharter | Addendum to the Site SS016 Groundwater<br>Remedial Design/Remedial Action Work Plan<br>Travis AFB, Lonnie Duke<br>CH2M, Levi Pratt |
| <b>Scoping Meeting</b>              | NA   | NA   |
| Predraft to AF/Service Center       | 03-14-18   | 12-12-18   |
| AF/Service Center Comments Due      | 05-22-18   | 01-02-19   |
| Draft to Agencies                   | 06-05-18   | 02-22-19   |
| Draft to RAB                        | 06-05-18   | 02-22-19   |
| Agency Comments Due                 | 07-20-18   | 03-25-19   |
| <b>Response to Comments Meeting</b> | <b>TBD</b>   | <b>04-18-19</b>  |
| Agency Concurrence with Remedy      | NA   | NA   |
| Public Comment Period               | NA   | NA   |
| <b>Public Meeting</b>               | <b>NA</b>  | <b>NA</b>  |
| Response to Comments Due            | TBD  | 06-12-19 (07-02-19)  |
| Draft Final Due                     | TBD  | 06-12-19 (07-02-19)  |
| Final Due                           | TBD  | 07-17-19 (08-02-19)  |

| PRIMARY DOCUMENTS                   |   |                  |                    |
|-------------------------------------|---|------------------|--------------------|
| Life Cycle                          | Potrero Hills Annex<br>Travis, Glenn Anderson         |                  |                    |
|                                     | FS  | Proposed Plan    | ROD                |
| <b>Scoping Meeting</b>              | <b>180 days after Water Board<br/>Order Rescinded</b> | <b>+470 days</b> | <b>+735 days</b>   |
| Predraft to AF/Service Center       | + 270 days  | +530 days        | + 915 days         |
| AF/Service Center Comments Due      | + 300 days  | +560 days        | + 975 days         |
| Draft to Agencies                   | +330 days   | +590 days        | + 1035 days        |
| Draft to RAB                        | + 330 days  | +590 days        | + 1035 days        |
| Agency Comments Due                 | +390 days   | +650 days        | + 1095 days        |
| <b>Response to Comments Meeting</b> | <b>+ 405 days</b>                                     | <b>+665 days</b> | <b>+ 1110 days</b> |
| Agency Concurrence with Remedy      | NA  | NA               | + 1130 days        |
| Public Comment Period               | NA  | +735 to 765 days | NA                 |
| <b>Public Meeting</b>               | <b>NA</b>   | <b>+745 days</b> | <b>NA</b>          |
| Response to Comments Due            | +430 days   | +695days         | + 1190 days        |
| Draft Final Due                     | +430 days   | +695 days        | + 1190 days        |
| Final Due                           | +460 days   | +725 days        | + 1250 days        |



| INFORMATIONAL DOCUMENTS             |  |   |
|-------------------------------------|--|---|
| Life Cycle                          | Quarterly Newsletter<br>(October 2019)<br>Travis, Glenn Anderson | 2018 Annual GRISR<br>Travis AFB, Glenn Anderson<br>CH2M, Leslie Royer |
| <b>Scoping Meeting</b>              | NA   | NA  |
| Predraft to AF/Service Center       | 09-18-19   | 05-06-19  |
| AF/Service Center Comments Due      | NA   | 05-20-19  |
| Draft to Agencies                   | 09-25-19   | 06-05-19  |
| Draft to RAB                        | NA   | 06-05-19  |
| Agency Comments Due                 | 10-10-19   | 07-08-19  |
| <b>Response to Comments Meeting</b> | 10-17-19   | 07-17-19  |
| Response to Comments Due            | 10-17-19   | 08-30-19  |
| Draft Final Due                     | NA   | NA  |
| Final Due                           | 10-18-19   | 08-30-19  |
| Public Comment Period               | NA   | NA  |
| <b>Public Meeting</b>               | NA   | NA  |

| INFORMATIONAL DOCUMENTS             |   |   |  |
|-------------------------------------|---|---|--|
| Life Cycle                          | Site SD043 Remedial Action<br>Completion Report<br>Travis AFB, Glenn Anderson<br>CH2M, Levi Pratt | Site SS046 Remedial Action<br>Completion Report and Well<br>Decommissioning<br>Work Plan<br>Travis AFB, Glenn Anderson<br>CH2M, Doug Berwick<br>CAPE, Meg Greenwald | 2018 Annual Site LF007 Corrective<br>Action Management Unit<br>Inspection, Monitoring, and<br>Maintenance Report<br>Travis AFB, Milton Clare<br>CH2M, Levi Pratt |
| <b>Scoping Meeting</b>              | NA  | NA  | NA   |
| Predraft to AF/Service Center       | 03-29-19  | 04-15-19  | 05-31-19   |
| AF/Service Center Comments Due      | 04-12-19  | 04-22-19  | 06-14-19   |
| Draft to Agencies                   | 05-08-19  | 05-09-19  | 08-15-19   |
| Draft to RAB                        | 05-08-19  | 05-09-19  | 08-15-19   |
| Agency Comments Due                 | 06-07-19  | 06-10-19  | 09-16-19   |
| <b>Response to Comments Meeting</b> | <b>06-19-19</b>   | <b>06-19-19</b>   | <b>10-02-18</b>  |
| Response to Comments Due            | 07-24-19 (07-23-19)   | 07-12-19 (09-13-19)   | 10-16-19   |
| Draft Final Due                     | NA  | NA  | NA   |
| Final Due                           | 07-24-19 (07-23-19)   | 07-12-19 (09-13-19)   | 10-16-19   |
| Public Comment Period               | NA  | NA  | NA   |
| <b>Public Meeting</b>               | <b>NA</b>   | <b>NA</b>   | <b>NA</b>  |

| INFORMATIONAL DOCUMENTS             |   |   |   |
|-------------------------------------|---|---|---|
| Life Cycle                          | Site SD043<br>Site Closure Report<br>Travis AFB, Glenn Anderson<br>CH2M, Levi Pratt | Site LF008<br>Remedial Action Completion<br>Report<br>Travis AFB, Glenn Anderson<br>CH2M, Latonya Coleman | Site SS046 Well Decommissioning<br>and Site Closeout Tech Memo<br>Travis AFB, Glenn Anderson<br>CH2M, Doug Berwick<br>CAPE, Meg Greenwald |
| <b>Scoping Meeting</b>              | NA  | NA  | NA  |
| Predraft to AF/Service Center       | 06-12-19  | 07-10-19  | 08-29-19  |
| AF/Service Center Comments Due      | 06-28-19  | 07-24-19  | 09-13-19  |
| Draft to Agencies                   | 08-06-19  | 09-09-19  | 10-02-19  |
| Draft to RAB                        | 08-06-19  | 09-09-19  | 10-02-19  |
| Agency Comments Due                 | 09-06-19  | 10-09-19  | 11-01-19  |
| <b>Response to Comments Meeting</b> | <b>09-18-19</b>   | <b>10-16-19</b>   | <b>11-20-19</b>   |
| Response to Comments Due            | 10-04-19  | 10-30-19  | 12-06-19  |
| Draft Final Due                     | NA  | NA  | NA  |
| Final Due                           | 10-04-19  | 10-30-19  | 12-06-19  |
| Public Comment Period               | NA  | NA  | NA  |
| <b>Public Meeting</b>               | NA  | NA  | NA  |

| INFORMATIONAL DOCUMENTS             |  |
|-------------------------------------|--|
| Life Cycle                          | Site SS014 Subsites 2, 4, and 5 POCO Site<br>Closure Evaluation Report<br>Travis AFB, Glenn Anderson<br>CH2M, Tony Chakurian |
| <b>Scoping Meeting</b>              | NA   |
| Predraft to AF/Service Center       | 04-10-19   |
| AF/Service Center Comments Due      | 04-24-19   |
| Draft to Agencies                   | 05-02-19   |
| Draft to RAB                        | 05-02-19   |
| Agency Comments Due                 | 06-03-19   |
| <b>Response to Comments Meeting</b> | <b>06-19-19</b>  |
| Response to Comments Due            | 07-11-19 (07-23-19)  |
| Draft Final Due                     | NA   |
| Final Due                           | 07-11-19 (07-23-19)  |
| Public Comment Period               | NA   |
| <b>Public Meeting</b>               | NA   |

# South Base Boundary Groundwater Treatment Plant Monthly Data Sheet

Report Number: 225

Reporting Period: 1 July 2019 – 1 August 2019

Date Submitted: 16 August 2019

This monthly data sheet presents information regarding the South Base Boundary Groundwater Treatment Plant (SBBGWTP) and associated remedial process optimization (RPO) activities.

## System Metrics

Table 1 presents operational data from the July 2019 reporting period.

| Table 1 – Operations Summary – July 2019  |           |   |                                       |
|---|-----------|---|---------------------------------------|
| Initial Data Collection:  |           | 7/1/2019 11:00  | Final Data Collection: 8/1/2019 12:50 |
| Operating Time:   |           | Percent Uptime:   | Electrical Power Usage:               |
| SBBGWTP:  | 736 hours | SBBGWTP:  | 98.7%                                 |
| SBBGWTP:  |           | 18,321 kWh (15,158 lbs CO <sub>2</sub> generated <sup>a</sup> ) |                                       |
| Gallons Treated: 7.3 million gallons  |           | Gallons Treated Since July 1998: 1,130 million gallons          |                                       |
| Volume Discharged to Union Creek: 7.3 million gallons   |           | Gallons Treated from Other Sources: 0 gallons                   |                                       |
| VOC Mass Removed: 1.1 lbs <sup>b</sup>  |           | VOC Mass Removed Since July 1998: 518.6 lbs                     |                                       |
| Rolling 12-Month Cost per Pound of Mass Removed: \$14,414 <sup>c</sup>  |           |   |                                       |
| Monthly Cost per Pound of Mass Removed: \$17,141 <sup>c</sup>   |           |   |                                       |
| lbs = pounds  |           |   |                                       |
| <sup>a</sup> SiteWise™ estimate that 1 kilowatt hour generated produces 0.74 pounds of GHG. Value also includes approximately 1,600 pounds of GHG from GAC change out services averaged to a per month basis. |           |   |                                       |
| <sup>b</sup> Calculated using July 2019 EPA Method SW8260C analytical results.  |           |   |                                       |
| <sup>c</sup> Costs include operations and maintenance, carbon change out, reporting, analytical laboratory, project management, and utility costs related to operation of the system.                         |           |   |                                       |

Table 2 presents individual extraction well flow rates along with the average system flow during the monthly reporting period.

| Table 2 – SBBGWTP Average Flow Rate (gpm) <sup>a</sup> – July 2019  |         |           |                  |                   |                      |                   |                  |
|---|---------|-----------|------------------|-------------------|----------------------|-------------------|------------------|
| FT005 <sup>b</sup>  |         |           |                  | SS029             |                      | SS030             |                  |
| EW01x05   | Offline | EW743x05  | Offline          | EW01x29           | Offline <sup>c</sup> | EW01x30           | 15.6             |
| EW02x05   | Offline | EW744x05  | 3.2              | EW02x29           | Offline <sup>c</sup> | EW02x30           | 0.0 <sup>d</sup> |
| EW03x05   | Offline | EW745x05  | 12.5             | EW03x29           | 4.6                  | EW03x30           | 10.2             |
| EW731x05  | 6.4     | EW746x05  | Offline          | EW04x29           | 7.6                  | EW04x30           | 24.1             |
| EW732x05  | Offline | EW2291x05 | 3.8              | EW05x29           | 0.0 <sup>d</sup>     | EW05x30           | 17.9             |
| EW733x05  | Offline | EW2782x05 | 4.9              | EW06x29           | 7.4                  | EW2174x30         | 8.3              |
| EW734x05  | 1.4     | EW2783x05 | 7.5              | EW07x29           | 12.6                 | EW711x30          | 8.4              |
| EW735x05  | 11.1    | EW2784x05 | 0.0 <sup>d</sup> |                   |                      | MW269x30          | 0.5              |
| EW736x05  | Offline | EW2785x05 | 4.9              |                   |                      |                   |                  |
| EW737x05  | Offline | EW2786x05 | 13.8             |                   |                      |                   |                  |
| EW742x05  | Offline |           |                  |                   |                      |                   |                  |
| FT005 Total: 69.5   |         |           |                  | SS029 Total: 32.2 |                      | SS030 Total: 85.0 |                  |
| SBBGWTP Average Monthly Flow <sup>e</sup> : 165.5 gpm   |         |           |                  |                   |                      |                   |                  |
| <sup>a</sup> Flow rates presented are instantaneous measurements taken at the end of the reporting period.  |         |           |                  |                   |                      |                   |                  |
| <sup>b</sup> Most extraction wells at FT005 were taken offline in accordance with the 2008 Annual Remedial Process Optimization Report for the Central Groundwater Treatment Plant, North Groundwater Treatment Plant, and South Base Boundary Groundwater Treatment Plant. |         |           |                  |                   |                      |                   |                  |
| <sup>c</sup> Extraction wells taken off line because of persistent fouling of the well pumps and associated discharge piping.   |         |           |                  |                   |                      |                   |                  |
| <sup>d</sup> Extraction wells are operational; however, well was recharging.  |         |           |                  |                   |                      |                   |                  |
| <sup>e</sup> The average SBBGWTP groundwater flow rate was calculated using the Union Creek Discharge Totalizer and dividing it by the total time the system was operational.   |         |           |                  |                   |                      |                   |                  |
| gpm – gallons per minute  |         |           |                  |                   |                      |                   |                  |
| SBBGWTP – South Base Boundary Groundwater Treatment Plant   |         |           |                  |                   |                      |                   |                  |

Table 3 presents a summary of system shutdowns during the monthly reporting period.

| Table 3 – Summary of System Shutdowns   |                       |       |                      |       |   |
|---|-----------------------|-------|----------------------|-------|---|
| Location  | Shutdown <sup>a</sup> |       | Restart <sup>a</sup> |       | Cause   |
|   | Date                  | Time  | Date                 | Time  |   |
| SBBGWTP   | 29 July 2019          | 10:00 | 29 July 2019         | 16:30 | Install a bypass between the main GAC vessels and the new 2,000-lb GAC vessels. |
| SBBGWTP   | 30 July 2019          | 9:00  | 30 July 2019         | 12:00 | Repair leak on new bypass.  |
| <sup>a</sup> Shutdown and restart times estimated based on field notes<br>SBBGWTP = South Base Boundary Groundwater Treatment Plant |                       |       |                      |       |   |

## Summary of O&M Activities

Monthly groundwater treatment samples were collected at the SBBGWTP on 1 July 2019. Sample results are presented in Table 4. In addition, the metals sample results from the June 2019 sampling event (these results were received too late to include in the June Monthly Data Sheet) are presented in Table 5.

The total VOC concentration (18.75 µg/L) in the influent sample increased from the June 2019 sample results (17.16 µg/L). TCE was the primary VOC detected in the influent sample at a concentration of 17 µg/L. TCE, cis-1,2-DCE, chloroform, and 1,2-DCA were detected in the midpoint sampling location. No VOCs or TPH were detected in the effluent sample. A carbon change out is scheduled for 19 August 2019 for the lead GAC vessel at the SBBGWTP.

From the June metals analysis, chromium, selenium, silver, and zinc were detected in the influent sample. Arsenic, chromium, selenium, silver, and zinc were detected in the system effluent sample (Table 5). All reported concentrations were less than the daily maximum effluent limitations.

In July 2019, optimization activities continued at SBBGWTP, including plumbing in the new influent holding tank, installing a new transfer pump, and plumbing in four (4) additional 2,000-pound GAC vessels.

In July 2019, troubleshooting was performed on several extraction wells. The following list presents the maintenance activities and status of those extraction wells:

- EW735x05 – Replaced motor and flow meter. Well is currently on line.
- EW734x05, EW735x05, EW2783x05, EW2784x05, EW2785x05, EW03x29, EW04x29, EW2174x30 – Pumps were removed to redevelop wells. The pumps were cleaned prior to reinstallation. Wells are currently on line.

Figure 1 presents the influent 1,2-DCA and TCE concentrations since January 2017. The 1,2-DCA and TCE concentrations have been sporadic and appear to be dependent on seasonal variation and which wells are actively being extracted during the time of sampling. TCE concentrations have generally been increasing since March 2018, and 1,2-DCA concentrations were elevated between December 2017 and June 2018 and mostly non-detect from July through November 2018. 1,2-DCA concentrations were sporadic between December 2018 and July 2019.

Figure 2 presents a plot of influent VOC concentrations and average flow at the SBBGWTP over the past twelve (12) months. An overall decreasing trend was observed for the VOC influent concentrations in the past 12 months. An overall increasing flow rate trend was observed in the past 12 months, which continued through July 2019.

## Optimization Activities

Optimization activities at the SBBGWTP continued in July 2019 and will be completed in August 2019. These optimizations include installation of a new influent tank, replacing the existing effluent tank, removing the air stripper, replacing the bag filters with a centrifugal particulate filter, and installing four (4) 2,000-pound GAC vessels.

As a result of the installation of the new features and equipment, the plant was shut down twice. Once on July 29, 2019 for 4 hrs 10 mins and again on July 30, 2019 for 3 hrs.

## Sustainability

Travis AFB is committed to decreasing the amount of GHG produced directly (waste streams discharging GHG) or indirectly (GHG produced as related to electrical energy consumption) from all systems across Travis AFB. Travis AFB continues to optimize each treatment plant to reduce the amount of electrical energy

consumed, and to implement sustainable treatment plant optimization programs, such as taking extraction pumps off line that are no longer necessary for contaminant plume capture.

Figure 3 presents the historical GHG production from the SBBGWTP. In July 2019, the SBBGWTP produced approximately 15,158 pounds of GHG, which includes approximately 1,600 pounds of GHG generated from GAC change out services averaged to a per month basis.



TABLE 4

Summary of Groundwater Analytical Data for July 2019 – South Base Boundary Groundwater Treatment Plant

| Constituent                                 | Instantaneous<br>Maximum*<br>(µg/L) | Detection<br>Limit<br>(µg/L) | N/C | 1 July 2019<br>(µg/L) |          |          |
|---|-------------------------------------|------------------------------|-----|-----------------------|----------|----------|
|   |                                     |                              |     | Influent              | Midpoint | Effluent |
| Halogenated Volatile Organics               |                                     |                              |     |                       |          |          |
| Bromodichloromethane                        | NA                                  | 0.29                         | 0   | ND                    | ND       | ND       |
| Chloroform                                  | 1.9                                 | 0.12                         | 0   | 0.20 J                | 0.29 J   | ND       |
| 1,1-Dichloroethane                          | 0.50                                | 0.15                         | 0   | 0.55 J                | 0.55 J   | ND       |
| 1,2-Dichloroethane                          | 0.50                                | 0.22                         | 0   | ND                    | ND       | ND       |
| 1,1-Dichloroethene                          | 0.50                                | 0.14                         | 0   | ND                    | ND       | ND       |
| cis-1,2-Dichloroethene                      | 0.50                                | 0.15                         | 0   | 1.0                   | 1.8      | ND       |
| trans-1,2-Dichloroethene                    | 0.50                                | 0.11                         | 0   | ND                    | ND       | ND       |
| Tetrachloroethene                           | 0.50                                | 0.15                         | 0   | ND                    | ND       | ND       |
| 1,1,1-Trichloroethane                       | 0.50                                | 0.19                         | 0   | ND                    | ND       | ND       |
| 1,1,2-Trichloroethane                       | 0.50                                | 0.31                         | 0   | ND                    | ND       | ND       |
| Trichloroethene                             | 0.65                                | 0.13                         | 0   | 17                    | 2.2      | ND       |
| Vinyl Chloride                              | 0.90                                | 0.22                         | 0   | ND                    | ND       | ND       |
| Non-Halogenated Volatile Organics           |                                     |                              |     |                       |          |          |
| Benzene                                     | 0.50                                | 0.13                         | 0   | ND                    | ND       | ND       |
| Ethylbenzene                                | 0.50                                | 0.15                         | 0   | ND                    | ND       | ND       |
| Toluene                                     | 0.50                                | 0.25                         | 0   | ND                    | ND       | ND       |
| Xylenes                                     | 0.50                                | 0.10 – 0.18                  | 0   | ND                    | ND       | ND       |
| Methyl Tert Butyl Alcohol                   | 0.50                                | 0.17                         | 0   | ND                    | ND       | ND       |
| Other                                       |                                     |                              |     |                       |          |          |
| Total Petroleum<br>Hydrocarbons – Gasoline  | 50                                  | 10                           | 0   | NM                    | NM       | ND       |
| Total Petroleum<br>Hydrocarbons – Diesel    | 50                                  | 5.5                          | 0   | NM                    | NM       | ND       |
| Total Petroleum Hydrocarbons –<br>Motor Oil | 100                                 | 32                           | 0   | NM                    | NM       | ND       |

\* In accordance with current National Pollutant Discharge Elimination System permit number CAG912002, Order number R2-2017-0048.

## Notes:

J = analyte concentration is considered an estimated value due to a detected concentration value between the reporting limit and method detection limit for the contaminant.

NA = not applicable

N/C = number of samples out of compliance with discharge limits.

ND = not detected

NM = not measured

µg/L = micrograms per liter

TABLE 5

Summary of Metals Groundwater Analytical Data for June 2019– South Base Boundary Groundwater Treatment Plant

| Constituent | Daily Maximum<br>Effluent Limitation*<br>(µg/L) | Detection Limit<br>(µg/L) | 4 June 2019<br>(µg/L) |                 |
|-------------|---|---------------------------|-----------------------|-----------------|
|             |   |                           | Influent              | System Effluent |
| Metals      |   |                           |                       |                 |
| Antimony    | 8,600   | 5.2                       | ND                    | ND              |
| Arsenic     | 59  | 4.4                       | ND                    | 4.8 J           |
| Beryllium   | NA  | 0.17                      | ND                    | ND              |
| Cadmium     | 1.8   | 0.45                      | ND                    | ND              |
| Chromium    | 340   | 0.66                      | 3.1 J                 | 4.0 J           |
| Copper      | 5.8   | 4.2                       | ND                    | ND              |
| Lead        | 5.2   | 2.7                       | ND                    | ND              |
| Nickel      | 14  | 2.6                       | ND                    | ND              |
| Selenium    | 8.2   | 6.3                       | 9.3 J                 | 6.9 J           |
| Silver      | 2.2   | 0.93                      | 1.4 J                 | 1.1 J           |
| Thallium    | 13  | 4.9                       | ND                    | ND              |
| Zinc        | 95  | 4.5                       | 27 J                  | 13 J            |

\* In accordance with current National Pollutant Discharge Elimination System permit number CAG912002, Order number R2-2017-0048.

Notes:

J = analyte concentration is considered an estimated value due to a detected concentration value between the reporting limit and method detection limit for the contaminant.

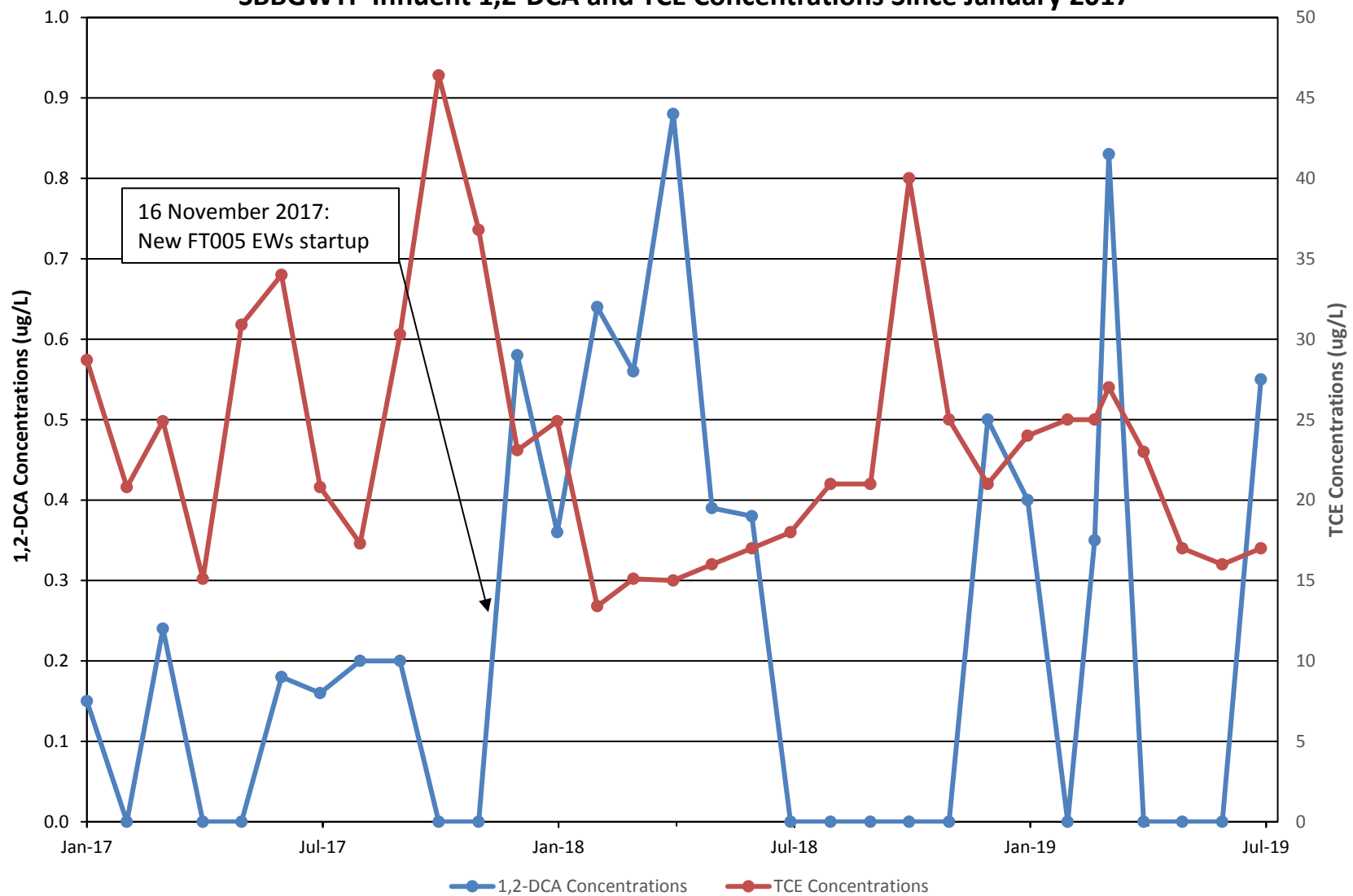
NA = not applicable

ND = not detected

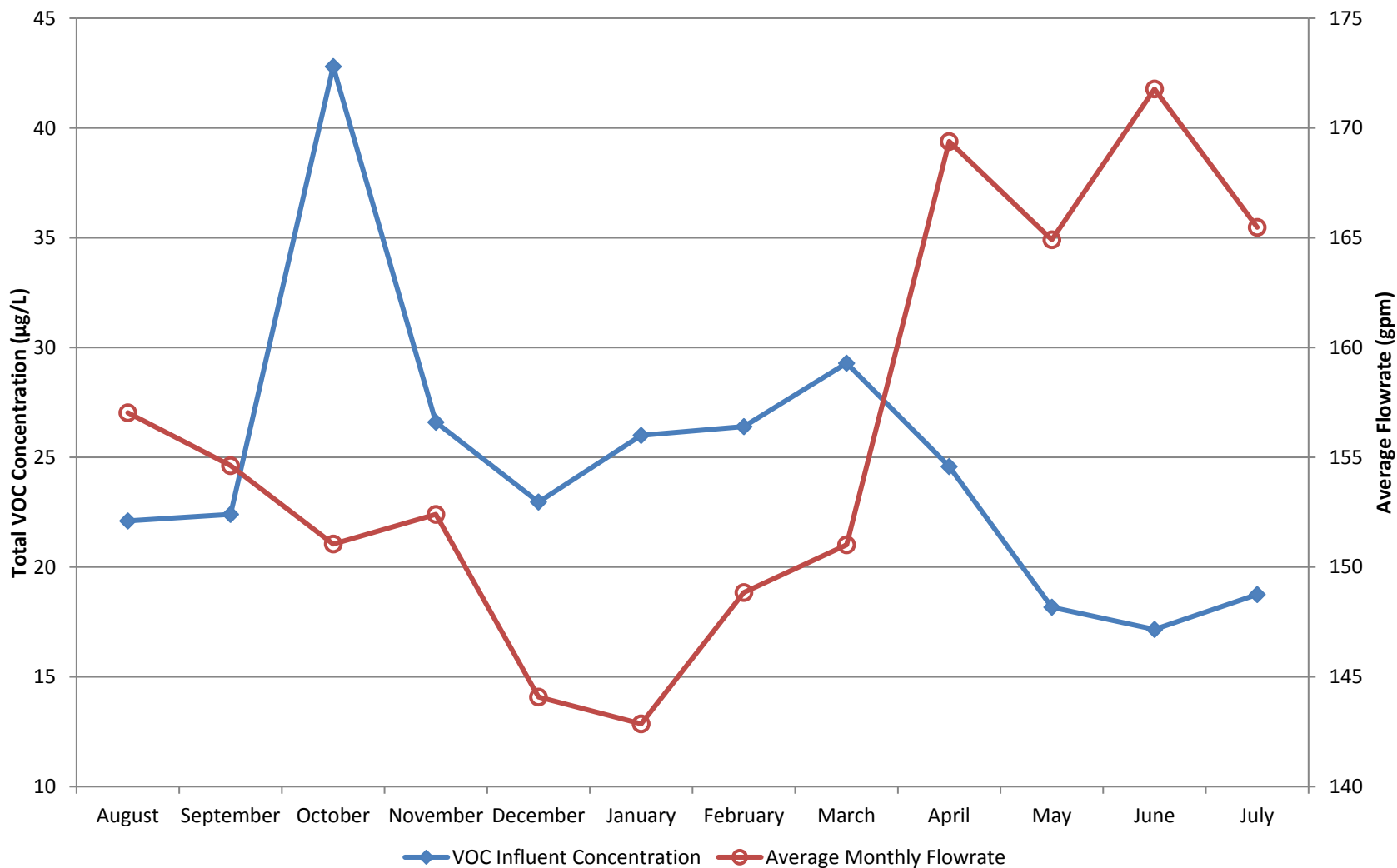
µg/L = micrograms per liter

# Figure 1

## SBBGWTP Influent 1,2-DCA and TCE Concentrations Since January 2017

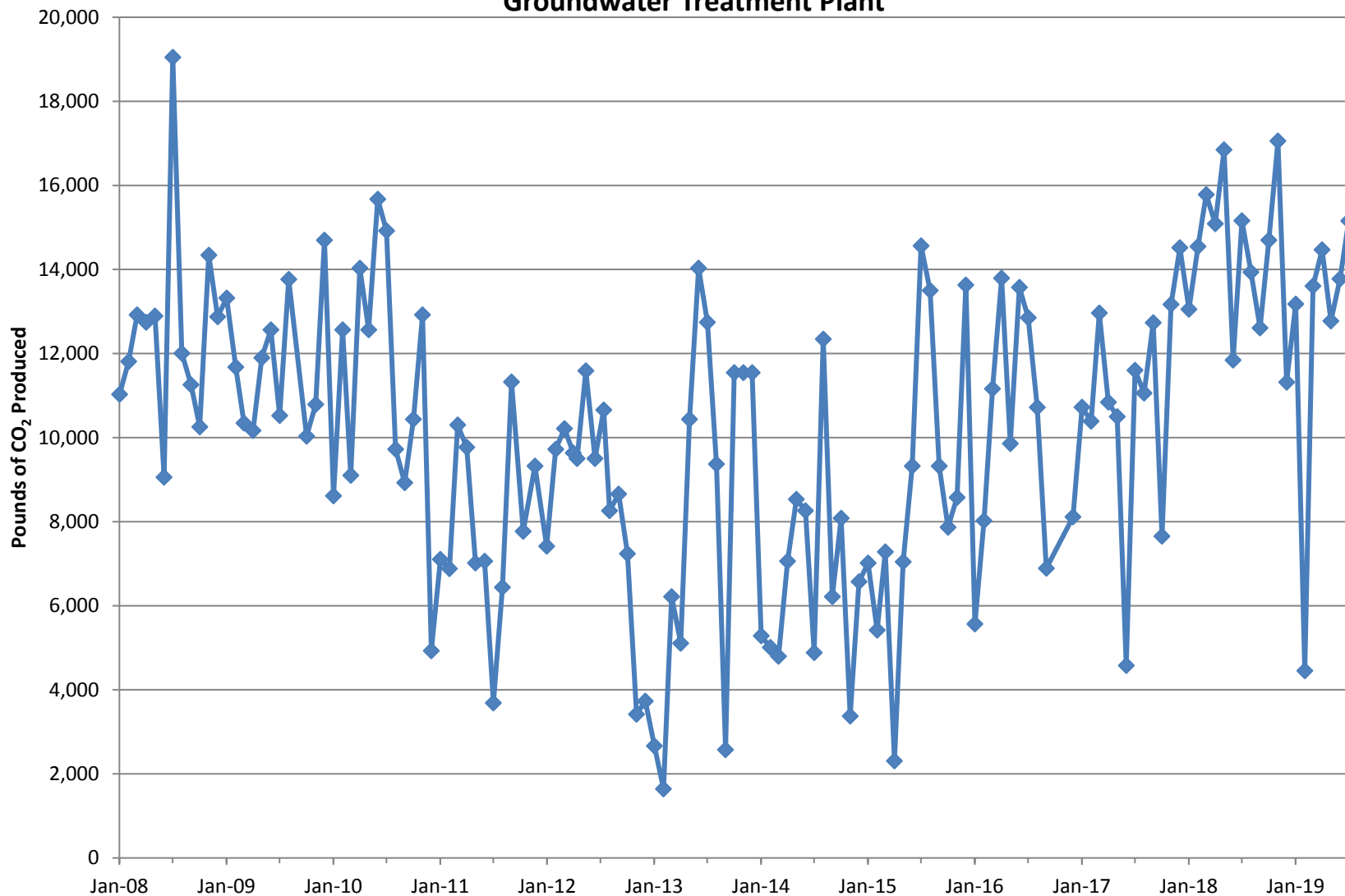


**Figure 2**  
**SBBGWTP Total VOC Influent Concentrations and Average Flowrate Twelve Month History**



**Figure 3**

**Equivalent Pounds of Carbon Dioxide Produced by the South Base Boundary  
Groundwater Treatment Plant**



# Central Groundwater Treatment Plant Monthly Data Sheet

Report Number: 240

Reporting Period: 1 July 2019 – 1 August 2019

Date Submitted: 16 August 2019

This monthly data sheet presents information regarding the Central Groundwater Treatment Plant (CGWTP) and its associated technology demonstrations. The ongoing technology demonstrations related to the CGWTP include various emulsified vegetable oil (EVO) injections and two (2) bioreactor treatability studies.

## System Metrics

Table 1 presents operational data from the July 2019 reporting period.

| Table 1 – Operations Summary – July 2019  |           |  |                         |  |
|---|-----------|--|-------------------------|--|
| Initial Data Collection:  |           | 7/1/2019 9:15  | Final Data Collection:  | 8/1/2019 9:25  |
| Operating Time:   |           | Percent Uptime:  | Electrical Power Usage: |  |
| CGWTP:  | 744 hours | CGWTP:   | 100%                    | CGWTP: 2,382 kWh (2,651 lbs CO <sub>2</sub> generated <sup>a</sup> ) |
| Gallons Treated (discharge to storm sewer):   |           | Gallons Treated Since January 1996: <b>572.1 million gallons</b> |                         |  |
| <b>1,201,980 gallons</b>  |           |  |                         |  |
| VOC Mass Removed from groundwater:  |           | VOC Mass Removed Since January 1996:                             |                         |  |
| <b>2.4 lbs<sup>b</sup></b>  |           | <b>2,840 lbs from groundwater</b>                                |                         |  |
|   |           | <b>8,686 lbs from vapor</b>                                      |                         |  |
| Rolling 12-Month Cost per Pound of Mass Removed: \$4,532 <sup>c</sup>   |           |  |                         |  |
| Monthly Cost per Pound of Mass Removed: \$2,314 <sup>c</sup>  |           |  |                         |  |
| <sup>a</sup> SiteWise™ estimate that 1 kilowatt hour generated produces 0.74 pounds of GHG. Value also includes approximately 888 pounds of GHG from GAC change out services averaged to a per month basis. |           |  |                         |  |
| <sup>b</sup> Calculated using July 2019 EPA Method SW8260C analytical results.  |           |  |                         |  |
| <sup>c</sup> Costs include operations and maintenance, carbon change out, reporting, analytical laboratory, project management, and utility costs related to operation of the system.                       |           |  |                         |  |

Table 2 presents individual extraction well flow rates during the monthly reporting period.

| Table 2 – CGWTP Average Flow Rates <sup>a</sup> – July 2019   |                                     |
|---|-------------------------------------|
| Location  | Average Flow Rate Groundwater (gpm) |
| EW001x16  | 12.4                                |
| EW002x16  | 7.3                                 |
| EW003x16  | 0.0                                 |
| EW605x16  | 5.3                                 |
| EW610x16  | 2.1                                 |
| CGWTP   | 27.0                                |
| <sup>a</sup> Flow rates calculated by dividing total gallons processed by system operating time for the month or the average of the instantaneous readings.<br>gpm = gallons per minute |                                     |

Table 3 presents a summary of shutdowns during the monthly reporting period.

| <b>Table 3 – Summary of System Shutdowns</b>   |                             |             |                |             |              |
|--|-----------------------------|-------------|----------------|-------------|--------------|
| <b>Location</b>  | <b>Shutdown<sup>a</sup></b> |             | <b>Restart</b> |             | <b>Cause</b> |
|  | <b>Date</b>                 | <b>Time</b> | <b>Date</b>    | <b>Time</b> |              |
| CGWTP  | None.                       | --          |                | --          |              |
| -- = Date/Time not recorded<br><sup>a</sup> Shutdown and restart times estimated based on field notes<br>CGWTP = Central Groundwater Treatment Plant |                             |             |                |             |              |

## Summary of O&M Activities

Monthly groundwater treatment samples were collected at the CGWTP on 1 July 2019. Sample results are presented in Table 4. In addition, the metals sample results from the June 2019 sampling event (these results were received too late to include in the June Monthly Data Sheet) are presented in Table 5.

The total VOC concentration (243.62 µg/L) in the July 2019 influent sample has decreased from the June 2019 sample (262.1 µg/L). TCE was the primary VOC detected in the influent sample at a concentration of 200 µg/L. No VOCs were detected in the samples collected after the first and second carbon vessels or in the effluent sample. Travis AFB will continue to monitor influent, midpoint, and effluent concentrations at the CGWTP for carbon breakthrough, though the carbon treatment remained effective in July 2019.

From the June metals analysis, chromium and silver were detected in the influent sample, and silver and zinc were detected in the system effluent sample (Table 5). All reported concentrations were less than the daily maximum effluent limitations.

Figure 1 presents a plot of influent concentrations (total VOCs) and the influent flow rate at the CGWTP versus time for the past twelve (12) months. The influent concentrations show an increasing trend over the past 12 months along with a decreasing trend for the flow rate through the treatment plant.

The Site DP039 subgrade biogeochemical reactor (SBGR), also known as a bioreactor, continued operating in July 2019.

## Optimization Activities

No optimization activities occurred at the CGWTP in July 2019.

## Sustainability

Travis AFB is committed to decreasing the amount of GHG produced directly (waste streams discharging GHG) or indirectly (GHG produced as related to electrical energy consumption) from all systems across Travis AFB. Travis AFB continues to optimize each treatment plant to reduce the amount of electrical energy consumed, and to implement sustainable treatment plant optimization programs, such as bioreactors and EVO injection well networks.

Figure 2 presents the historical GHG production from the systems associated with the CGWTP. The CGWTP produced approximately 2,651 pounds of GHG during July 2019.

TABLE 4

Summary of Groundwater Analytical Data for July 2019 – Central Groundwater Treatment Plant

|   |                                     |                              |     | 1 July 2019<br>(µg/L) |                               |                               |                    |
|---|-------------------------------------|------------------------------|-----|-----------------------|-------------------------------|-------------------------------|--------------------|
| Constituent   | Instantaneous<br>Maximum*<br>(µg/L) | Detection<br>Limit<br>(µg/L) | N/C | Influent              | After<br>Carbon 1<br>Effluent | After<br>Carbon 2<br>Effluent | System<br>Effluent |
| Halogenated Volatile Organics                           |                                     |                              |     |                       |                               |                               |                    |
| Acetone   | NA                                  | 1.9 – 3.8                    | 0   | ND                    | ND                            | ND                            | ND                 |
| Bromomethane  | NA                                  | 0.21 – 0.42                  | 0   | ND                    | ND                            | ND                            | ND                 |
| Chloroform  | 1.9                                 | 0.16 – 0.32                  | 0   | ND                    | ND                            | ND                            | ND                 |
| 1,2-Dichlorobenzene                                     | NA                                  | 0.15 – 0.30                  | 0   | 0.43 J                | ND                            | ND                            | ND                 |
| 1,3-Dichlorobenzene                                     | NA                                  | 0.13 – 0.26                  | 0   | 0.47 J                | ND                            | ND                            | ND                 |
| 1,4-Dichlorobenzene                                     | NA                                  | 0.16 – 0.32                  | 0   | ND                    | ND                            | ND                            | ND                 |
| Bromodichloromethane                                    | NA                                  | 0.17 – 0.34                  | 0   | ND                    | ND                            | ND                            | ND                 |
| 1,1-Dichloroethane                                      | 0.50                                | 0.22 – 0.44                  | 0   | ND                    | ND                            | ND                            | ND                 |
| 1,2-Dichloroethane                                      | 0.50                                | 0.13 – 0.26                  | 0   | ND                    | ND                            | ND                            | ND                 |
| 1,1-Dichloroethene                                      | 0.50                                | 0.23 – 0.46                  | 0   | 0.68 J                | ND                            | ND                            | ND                 |
| cis-1,2-Dichloroethene                                  | 0.50                                | 0.15 – 0.30                  | 0   | 39                    | ND                            | ND                            | ND                 |
| trans-1,2-Dichloroethene                                | 0.50                                | 0.15 – 0.30                  | 0   | 2.5                   | ND                            | ND                            | ND                 |
| Tetrachloroethene                                       | 0.50                                | 0.20 – 0.40                  | 0   | 0.54 J                | ND                            | ND                            | ND                 |
| 1,1,1-Trichloroethane                                   | 0.50                                | 0.16 – 0.32                  | 0   | ND                    | ND                            | ND                            | ND                 |
| 1,1,2-Trichloroethane                                   | 0.50                                | 0.27 – 0.54                  | 0   | ND                    | ND                            | ND                            | ND                 |
| Trichloroethene   | 0.65                                | 0.16 – 0.32                  | 0   | 200                   | ND                            | ND                            | ND                 |
| Vinyl Chloride  | 0.90                                | 0.10 – 0.20                  | 0   | ND                    | ND                            | ND                            | ND                 |
| Non-Halogenated Volatile Organics                       |                                     |                              |     |                       |                               |                               |                    |
| Benzene   | 0.50                                | 0.16 – 0.32                  | 0   | ND                    | ND                            | ND                            | ND                 |
| Ethylbenzene  | 0.50                                | 0.16 – 0.32                  | 0   | ND                    | ND                            | ND                            | ND                 |
| Toluene   | 0.50                                | 0.17 – 0.34                  | 0   | ND                    | ND                            | ND                            | ND                 |
| Total Xylenes   | 0.50                                | 0.15 – 0.38                  | 0   | ND                    | ND                            | ND                            | ND                 |
| Methyl Tertiary Butyl Ether                             | 0.50                                | 0.25 – 0.50                  | 0   | ND                    | ND                            | ND                            | ND                 |
| Other   |                                     |                              |     |                       |                               |                               |                    |
| Total Petroleum Hydrocarbons<br>– Gasoline (C6 – C10)   | 50                                  | 10                           | 0   | NM                    | NM                            | NM                            | ND                 |
| Total Petroleum Hydrocarbons<br>– Diesel (C10 – C28)    | 50                                  | 5.5                          | 0   | NM                    | NM                            | NM                            | ND                 |
| Total Petroleum Hydrocarbons<br>– Motor Oil (C28 – C40) | 100                                 | 32                           | 0   | NM                    | NM                            | NM                            | ND                 |

\* In accordance with current National Pollutant Discharge Elimination System permit number CAG912002, Order number R2-2017-0048.

Notes:

J = analyte concentration is considered an estimated value due to a detected concentration value between the reporting limit and method detection limit for the contaminant.

NA = not applicable

N/C = number of samples out of compliance with discharge limits.

ND = not detected

NM = not measured

µg/L = micrograms per liter

mg/L = milligrams per liter



TABLE 5

Summary of Metals Groundwater Analytical Data for June 2019– Central Groundwater Treatment Plant

| Summary of Metals Groundwater Analytical Data for June 2019 - Central Groundwater Treatment Plant |   |                        |                    |                 |
|---|---|------------------------|--------------------|-----------------|
| Constituent   | Daily Maximum Effluent Limitation* (µg/L) | Detection Limit (µg/L) | 4 June 2019 (µg/L) |                 |
|   |   |                        | Influent           | System Effluent |
| Metals  |   |                        |                    |                 |
| Antimony  | 8,600                                     | 5.2                    | ND                 | ND              |
| Arsenic   | 59  | 4.4                    | ND                 | ND              |
| Beryllium   | NA  | 0.17                   | ND                 | ND              |
| Cadmium   | 1.8                                       | 0.45                   | ND                 | ND              |
| Chromium  | 340                                       | 0.66                   | 1.6 J              | ND              |
| Copper  | 5.8                                       | 4.2                    | ND                 | ND              |
| Lead  | 5.2                                       | 2.7                    | ND                 | ND              |
| Nickel  | 14  | 2.6                    | ND                 | ND              |
| Selenium  | 8.2                                       | 6.3                    | ND                 | ND              |
| Silver  | 2.2                                       | 0.93                   | 1.1 J              | 1.4 J           |
| Thallium  | 13  | 4.9                    | ND                 | ND              |
| Zinc  | 95  | 4.5                    | ND                 | 13 J            |

\* In accordance with current National Pollutant Discharge Elimination System permit number CAG912002, Order number R2-2017-0048.

Notes:

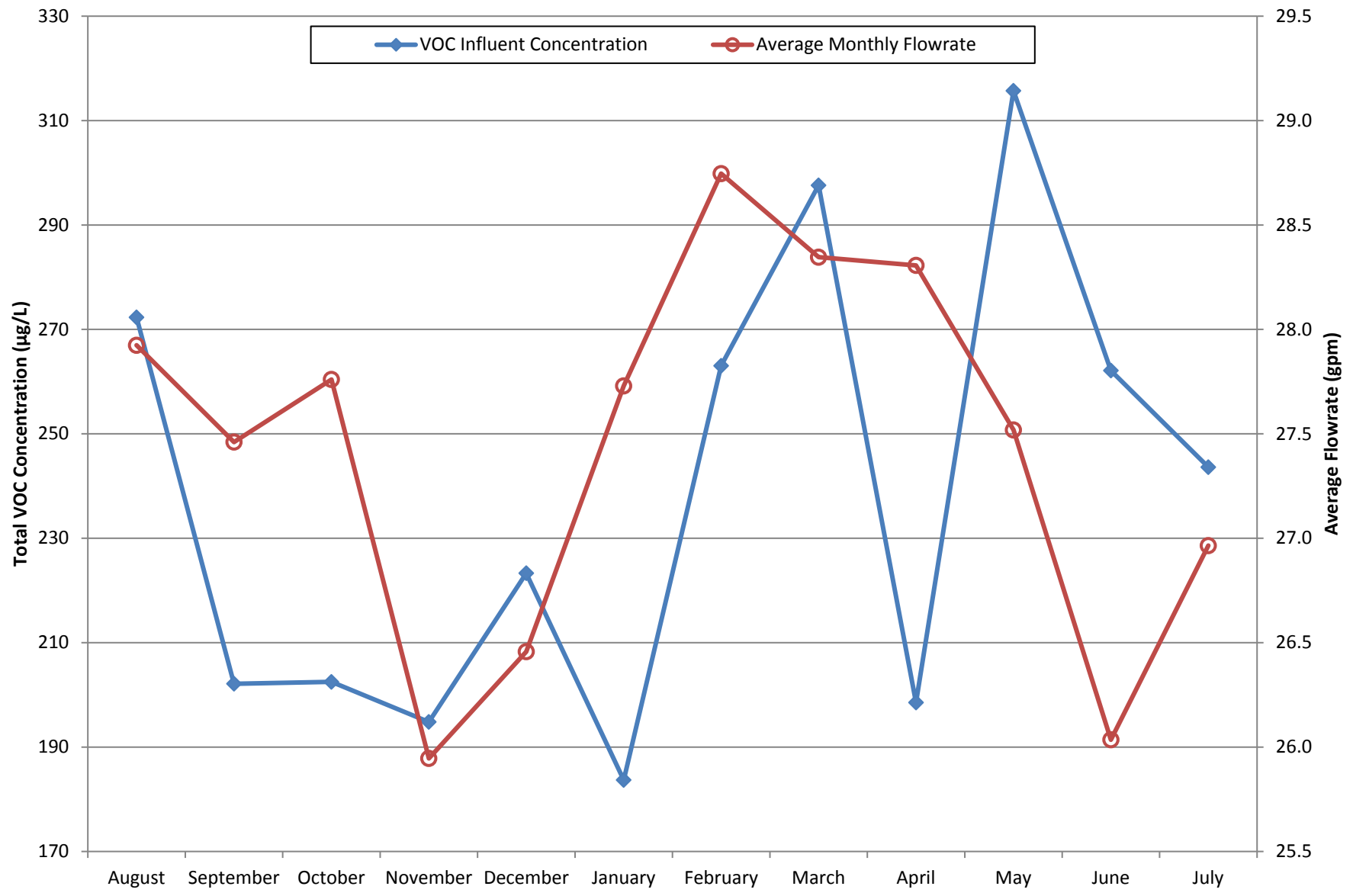
J = analyte concentration is considered an estimated value due to a detected concentration value between the reporting limit and method detection limit for the contaminant.

NA = not applicable

µg/L = micrograms per liter

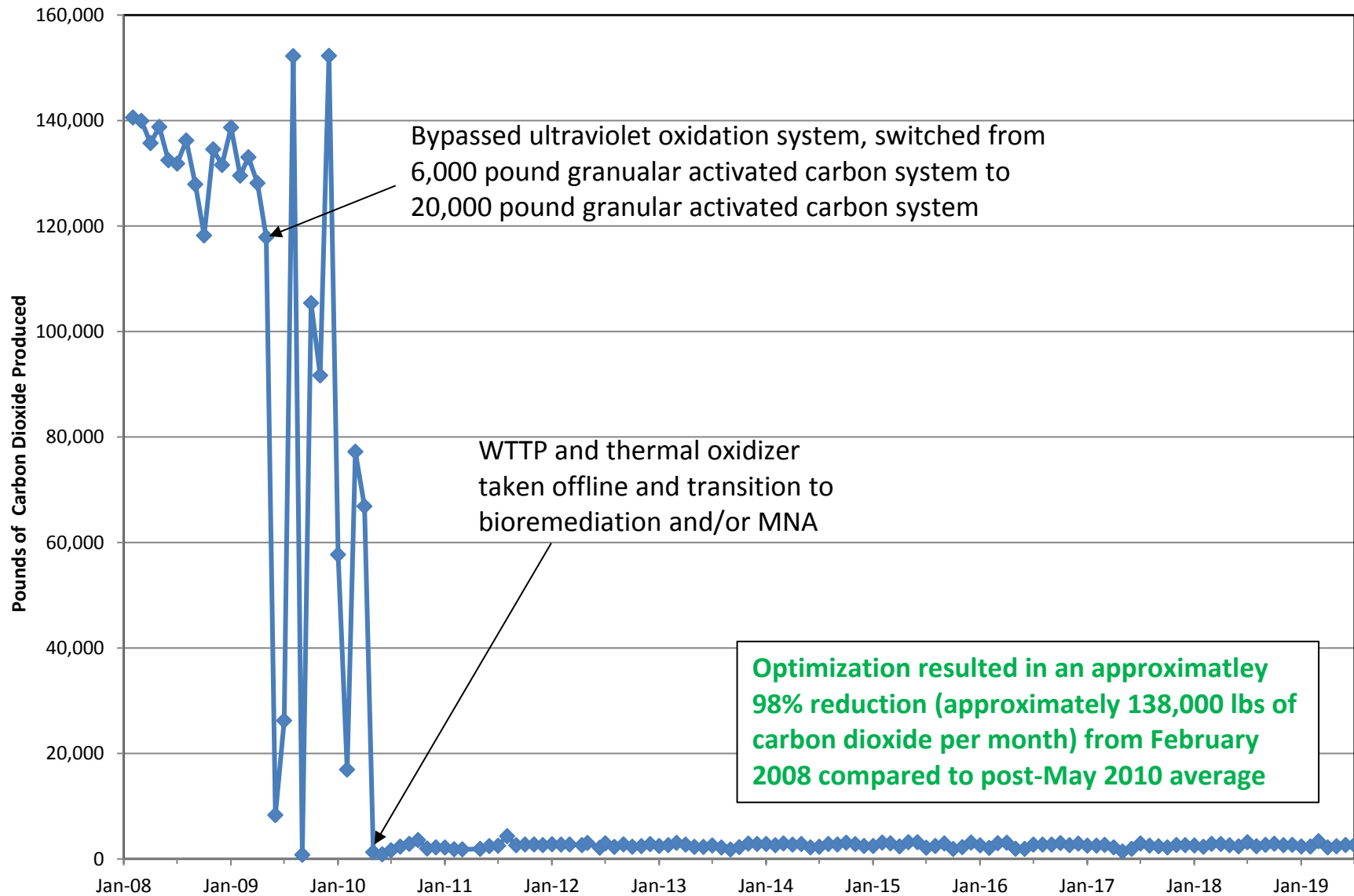
ND = not detected

**Figure 1**  
**CGWTP Total VOC Influent Concentrations and Average Flowrate Twelve Month History**



**Figure 2**

**Equivalent Pounds of Carbon Dioxide Produced by the Central Groundwater Treatment Plant**



# Subarea LF007C Groundwater Treatment Plant

## Monthly Data Sheet

Report Number: 179

Reporting Period: 1 July 2019 – 1 August 2019

Date Submitted: 16 August 2019

This monthly data sheet presents information regarding the Subarea LF007C Groundwater Treatment Plant (LF007C GWTP) and associated remedial process optimization (RPO) activities.

### System Metrics

Table 1 presents operational data from the July 2019 reporting period:

| Table 1 – Operations Summary – July 2019  |           |   |                                       |
|---|-----------|---|---------------------------------------|
| Initial Data Collection:  |           | 7/1/2019 14:15  | Final Data Collection: 8/1/2019 12:00 |
| Operating Time:   |           | Percent Uptime:   | Electrical Power Usage <sup>a</sup> : |
| LF007C GWTP:  | 742 hours | LF007C GWTP   | 100% LF007C GWTP: 0 kWh               |
| Gallons Treated: 220,196 gallons  |           | Gallons Treated Since March 2000: 88.9 million gallons        |                                       |
| Volume Discharged to Duck Pond: 220,196 gallons   |           |   |                                       |
| VOC Mass Removed: 7.2 x 10 <sup>-4</sup> pounds <sup>b</sup>  |           | VOC Mass Removed Since March 2000: 174.4 pounds (Groundwater) |                                       |
| Rolling 12-Month Cost per Pound of Mass Removed: Not Measured <sup>c</sup>  |           |   |                                       |
| Monthly Cost per Pound of Mass Removed: Not Measured <sup>c</sup>   |           |   |                                       |
| <sup>a</sup> The LF007C GWTP operates on solar power only.  |           |   |                                       |
| <sup>b</sup> VOCs from July 2019 influent sample detected by EPA Method SW8260C.  |           |   |                                       |
| <sup>c</sup> Value not calculated since measurement does not accurately represent the cost effectiveness of the system. |           |   |                                       |

Table 2 presents individual extraction well flow rates during the monthly reporting period.

| Table 2 – LF007C GWTP Average and Total Flow Rates – July 2019  |                                      |                                   |
|---|--------------------------------------|-----------------------------------|
| Location  | Average Flow Rate (gpm) <sup>a</sup> | Total Gallons Processed (gallons) |
| EW614x07  | 4.6                                  | 203,464                           |
| EW615x07  | 0.6                                  | 26,901                            |
| <b>LF007C GWTP</b>  | <b>4.9</b>                           | <b>220,196</b>                    |
| <sup>a</sup> Flow rates calculated by dividing total gallons processed by system operating time for the month or the average of the instantaneous readings.<br>gpm = gallons per minute |                                      |                                   |

Table 3 presents a summary of shutdowns during the monthly reporting period.

| Table 3 – Summary of System Shutdowns  |                       |      |                      |      |       |
|--|-----------------------|------|----------------------|------|-------|
| Location   | Shutdown <sup>a</sup> |      | Restart <sup>a</sup> |      | Cause |
|  | Date                  | Time | Date                 | Time |       |
| LF007C GWTP  | None.                 | --   |                      | --   |       |
| -- = Time not recorded<br><sup>a</sup> Shutdown and restart times estimated based on field notes<br>LF007C GWTP = Subarea LF007C Groundwater Treatment Plant |                       |      |                      |      |       |

## Summary of O&M Activities

Monthly groundwater samples were collected at the LF007C GWTP on 1 July 2019. Sample results are presented in Table 4. In addition, the metals sample results from the June 2019 sampling event (these results were received too late to include in the June Monthly Data Sheet) are presented in Table 5.

TCE (0.39 J µg/L) was detected at the influent sample location. TCE (0.24 J µg/L) and cis-1,2-DCE (0.17 J µg/L) were detected in the midpoint sample location. No VOCs were detected in the effluent sample location. However, TPH-d (49 J- µg/L) and TPH-mo (48 J- µg/L) were detected in the effluent sample location at concentrations less than the effluent limitations. A change out of both carbon vessels is scheduled for 12 August 2019.

From the June metals analysis, chromium, nickel, silver, and zinc were detected in the influent sample. Arsenic, chromium, silver, and zinc were detected in the system effluent sample (Table 5). All reported concentrations were less than the daily maximum effluent limitations.

Figure 1 presents a chart of influent concentrations (total VOCs) at the LF007C GWTP versus time for the past twelve (12) months. VOC concentrations, primarily TCE, have been seasonally variable; however, over the last 12 months the trend has been decreasing. The average flow rate through the LF007C GWTP has increased over the last 12 months.

## Optimization Activities

No optimization activities occurred at the LF007C GWTP in July 2019.

## Sustainability

Travis AFB is committed to decreasing the amount of GHG produced directly (waste streams discharging GHG) or indirectly (GHG produced as related to electrical energy consumption) from all systems across Travis AFB. Travis AFB continues to optimize each treatment plant to reduce the amount of electrical energy consumed, and to implement sustainable treatment plant optimization programs, such as the solar arrays employed to power the system.

Figure 2 presents the historical GHG production from the systems associated with the NGWTP and LF007C GWTP. The LF007C GWTP is a solar-only operated treatment system and does not generate GHG, with exception of a small amount of GHG generated from changing out the GAC averaged to a per month basis.

TABLE 4

Summary of Groundwater Analytical Data for July 2019 – Subarea LF007C Groundwater Treatment Plant

| Constituent                              | Instantaneous<br>Maximum*<br>(µg/L) | Detection<br>Limit<br>(µg/L) | N/C | 1 July 2019<br>(µg/L) |                |          |
|--|-------------------------------------|------------------------------|-----|-----------------------|----------------|----------|
|  |                                     |                              |     | Influent              | After Carbon 1 | Effluent |
| Halogenated Volatile Organics            |                                     |                              |     |                       |                |          |
| Acetone                                  | NA                                  | 2.1                          | 0   | ND                    | ND             | ND       |
| Bromodichloromethane                     | 5.0                                 | 0.29                         | 0   | ND                    | ND             | ND       |
| Bromoform                                | 5.0                                 | 0.10                         | 0   | ND                    | ND             | ND       |
| 2-Butanone                               | 5.0                                 | 0.35                         | 0   | ND                    | ND             | ND       |
| Carbon Tetrachloride                     | 0.5                                 | 0.15                         | 0   | ND                    | ND             | ND       |
| Chloroform                               | 5.0                                 | 0.12                         | 0   | ND                    | ND             | ND       |
| Dibromochloromethane                     | 5.0                                 | 0.13                         | 0   | ND                    | ND             | ND       |
| 1,3-Dichlorobenzene                      | 5.0                                 | 0.11                         | 0   | ND                    | ND             | ND       |
| 1,4-Dichlorobenzene                      | 5.0                                 | 0.13                         | 0   | ND                    | ND             | ND       |
| 1,1-Dichloroethane                       | 5.0                                 | 0.15                         | 0   | ND                    | ND             | ND       |
| 1,2-Dichloroethane                       | 0.5                                 | 0.22                         | 0   | ND                    | ND             | ND       |
| 1,1-Dichloroethene                       | 5.0                                 | 0.14                         | 0   | ND                    | ND             | ND       |
| cis-1,2-Dichloroethene                   | 5.0                                 | 0.10                         | 0   | ND                    | 0.17 J         | ND       |
| trans-1,2-Dichloroethene                 | 5.0                                 | 0.11                         | 0   | ND                    | ND             | ND       |
| Methylene Chloride                       | 5.0                                 | 0.35                         | 0   | ND                    | ND             | ND       |
| Tetrachloroethene                        | 5.0                                 | 0.15                         | 0   | ND                    | ND             | ND       |
| 1,1,1-Trichloroethane                    | 5.0                                 | 0.19                         | 0   | ND                    | ND             | ND       |
| 1,1,2-Trichloroethane                    | 5.0                                 | 0.31                         | 0   | ND                    | ND             | ND       |
| Trichloroethene                          | 5.0                                 | 0.13                         | 0   | 0.39 J                | 0.24 J         | ND       |
| Vinyl Chloride                           | 0.5                                 | 0.22                         | 0   | ND                    | ND             | ND       |
| Non-Halogenated Volatile Organics        |                                     |                              |     |                       |                |          |
| Benzene                                  | 1.0                                 | 0.13                         | 0   | ND                    | ND             | ND       |
| Ethylbenzene                             | 5.0                                 | 0.15                         | 0   | ND                    | ND             | ND       |
| Toluene                                  | 5.0                                 | 0.25                         | 0   | ND                    | ND             | ND       |
| Xylenes                                  | 5.0                                 | 0.10 – 0.18                  | 0   | ND                    | ND             | ND       |
| Other                                    |                                     |                              |     |                       |                |          |
| Total Petroleum Hydrocarbons – Gasoline  | 50                                  | 10                           | 0   | NM                    | NM             | ND       |
| Total Petroleum Hydrocarbons – Diesel    | 50                                  | 5.5                          | 0   | NM                    | NM             | 49 J-    |
| Total Petroleum Hydrocarbons – Motor Oil | 100                                 | 32                           | 0   | NM                    | NM             | 48 J-    |

\* In accordance with current National Pollutant Discharge Elimination System permit number CAG912002, Order number R2-2017-0048.

## Notes:

J = analyte concentration is considered an estimated value due to a detected concentration value between the reporting limit and method detection limit for the contaminant.

J- = analyte concentration is considered an estimated value, biased low.

NA = not applicable

N/C = number of samples out of compliance with discharge limits.

ND = not detected

NM = not measured

µg/L = micrograms per liter

TABLE 5

Summary of Metals Groundwater Analytical Data for June 2019– Subarea LF007C Groundwater Treatment Plant

| Constituent | Daily Maximum<br>Effluent Limitation*<br>(µg/L) | Detection Limit<br>(µg/L) | 4 June 2019<br>(µg/L) |                 |
|-------------|---|---------------------------|-----------------------|-----------------|
|             |   |                           | Influent              | System Effluent |
| Metals      |   |                           |                       |                 |
| Antimony    | 8,600   | 5.2                       | ND                    | ND              |
| Arsenic     | 59  | 4.4                       | ND                    | 5.3 J           |
| Beryllium   | NA  | 0.17                      | ND                    | ND              |
| Cadmium     | 1.8   | 0.45                      | ND                    | ND              |
| Chromium    | 340   | 0.66                      | 1.4 J                 | 0.67 J          |
| Copper      | 5.8   | 4.2                       | ND                    | ND              |
| Lead        | 5.2   | 2.7                       | ND                    | ND              |
| Nickel      | 14  | 2.6                       | 3.0 J                 | ND              |
| Selenium    | 8.2   | 6.3                       | ND                    | ND              |
| Silver      | 2.2   | 0.93                      | 1.4 J                 | 1.6 J           |
| Thallium    | 13  | 4.9                       | ND                    | ND              |
| Zinc        | 95  | 4.5                       | 65 J                  | 48 J            |

\* In accordance with current National Pollutant Discharge Elimination System permit number CAG912002, Order number R2-2017-0048.

Notes:

J = analyte concentration is considered an estimated value due to a detected concentration value between the reporting limit and method detection limit for the contaminant.

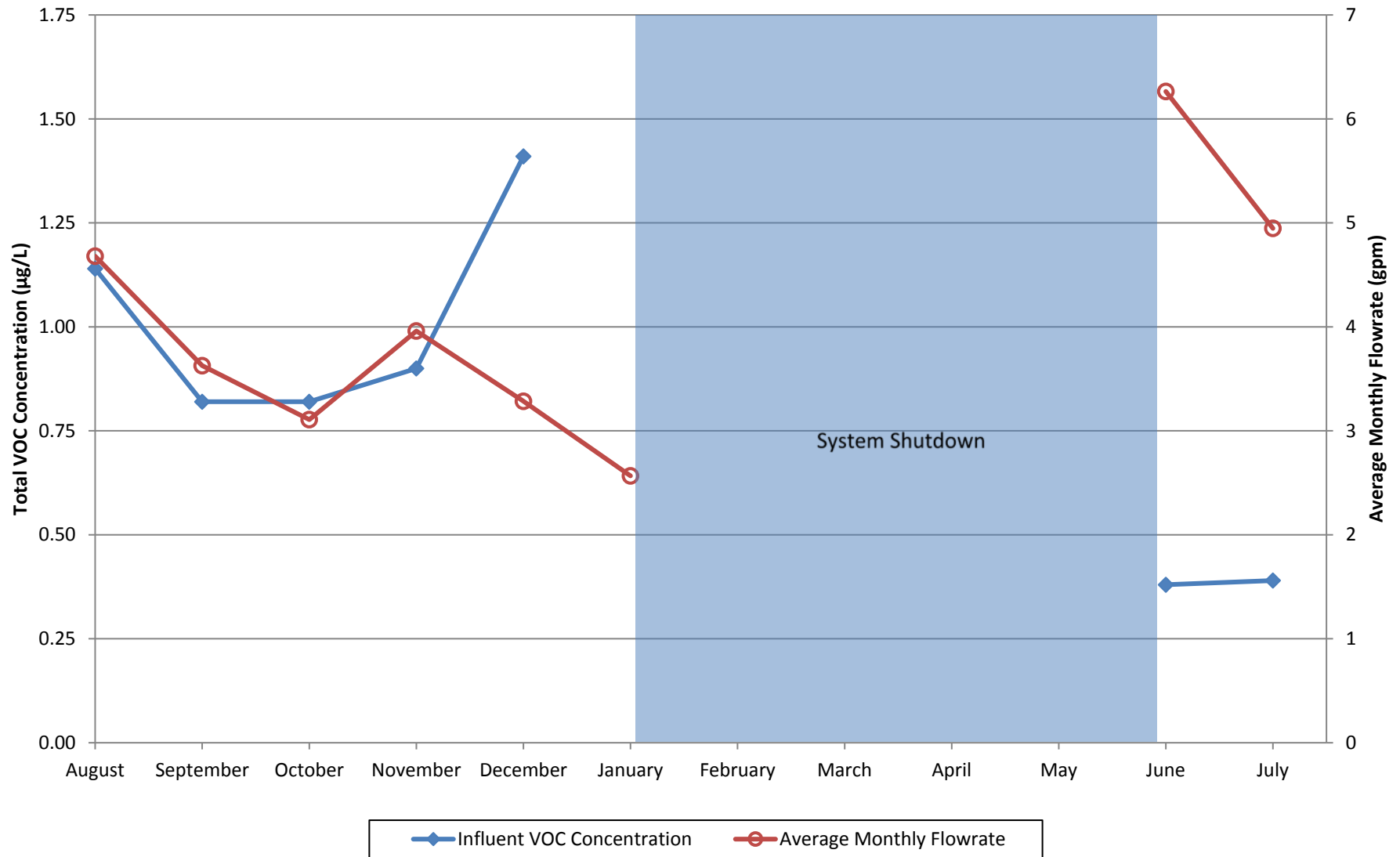
NA = not applicable

ND = not detected

µg/L = micrograms per liter

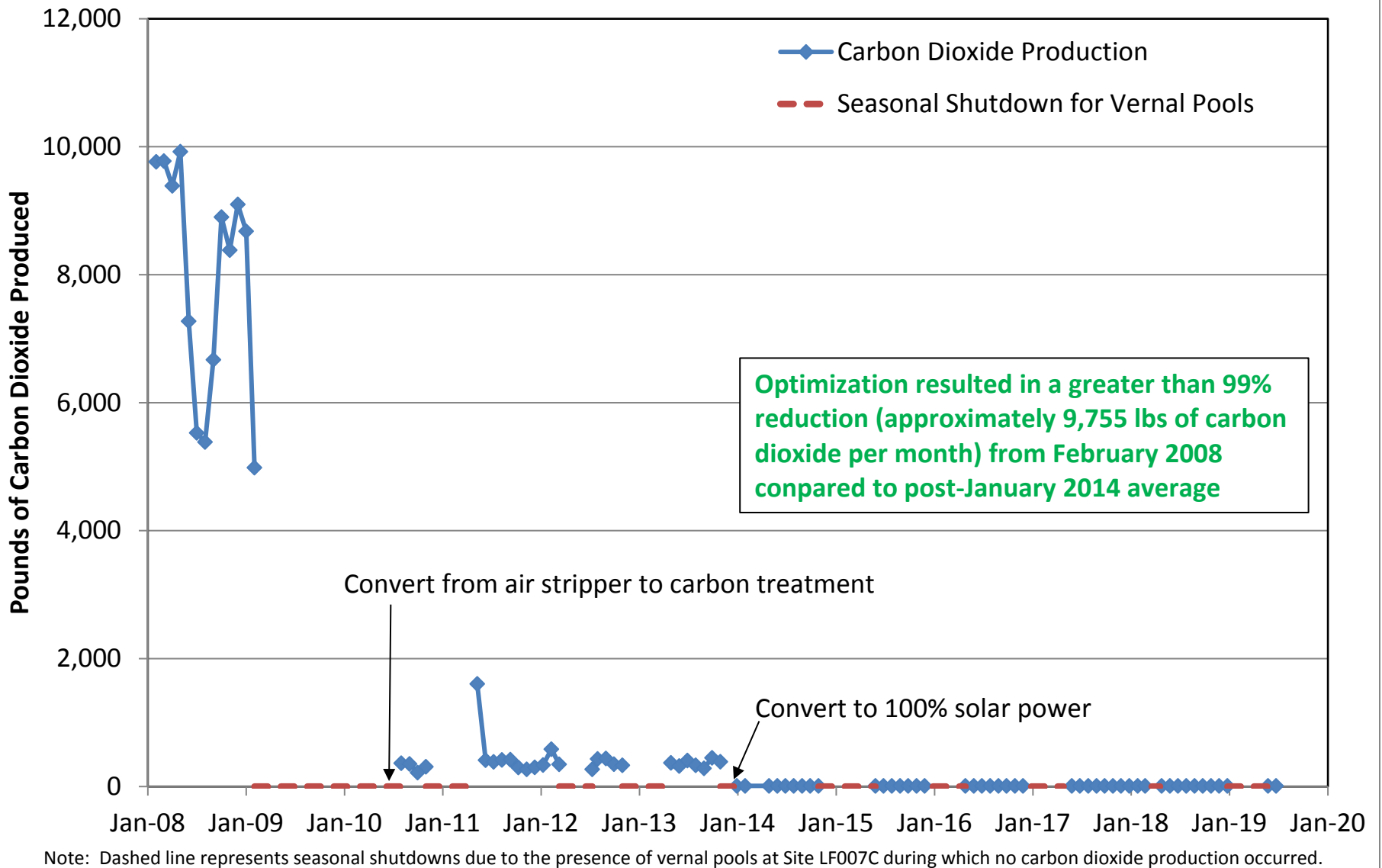
**Figure 1**

**LF007CGWTP Total VOC Influent Concentrations and Average Flowrate Twelve Month History**





**Figure 2**  
**Equivalent Pounds of Carbon Dioxide Produced by the NGWTP/LF007C GWTP**



# Site ST018 Groundwater Treatment Plant

## Monthly Data Sheet

Report Number: 101

Reporting Period: 1 July 2019 – 1 August 2019

Date Submitted: 16 August 2019

This monthly data sheet presents information regarding the Site ST018 Groundwater Treatment Plant (ST018GWTP).

### System Metrics

Table 1 presents operation data from the July 2019 reporting period.

| Table 1 – Operations Summary – July 2019   |  |  |  |
|--|--|--|--|
| Initial Data Collection: 7/1/2019 12:50  |  | Final Data Collection: 8/1/2019 10:45                              |  |
| Operating Time:  |  | Percent Uptime:  |  |
| ST018GWTP: 742 hours   |  | ST018GWTP: 100%  |  |
|  |  | ST018GWTP: 91 kWh (67 lbs CO <sub>2</sub> generated <sup>a</sup> ) |  |
| Gallons Extracted: 168,780 gallons   |  | Gallons Extracted Since March 2011: 17.7 million gallons           |  |
| Volume Discharged to Sanitary Sewer: 168,780 gallons   |  | Final Totalizer Reading: 17,694,899 gallons                        |  |
| Cumulative Volume Discharged to Sanitary Sewer since 1 November 2014: 11,198,725 gallons   |  |  |  |
| MTBE, BTEX, VOC, TPH Mass Removed: 0.06 lbs <sup>b</sup>   |  | MTBE, BTEX, VOC, TPH Mass Removed Since March 2011: 48.3 lbs       |  |
| MTBE (Only) Removed: 0.02 lbs <sup>b</sup>   |  | MTBE (Only) Mass Removed Since March 2011: 11.8 lbs                |  |
| Rolling 12-Month Cost per Total Pounds of Mass Removed: \$15,586 <sup>bc</sup>   |  |  |  |
| Monthly Cost per Pound of Mass Removed: \$87,865 <sup>bc</sup>   |  |  |  |
| <sup>a</sup> SiteWise™ estimate that 1 kilowatt hour generated produces 0.74 pounds of GHG.  |  |  |  |
| <sup>b</sup> Calculated using July 2019 EPA Method SW8260C and SW8015B analytical results.   |  |  |  |
| <sup>c</sup> Costs include operations and maintenance, reporting, analytical laboratory, project management, and utility costs related to operation of the system. |  |  |  |
| kWh = kilowatt hour  |  |  |  |
| lbs = pounds   |  |  |  |

Table 2 presents individual extraction well flow rates along with the average system flow during the monthly reporting period.

| <b>Table 2 – ST018GWTP Average Flow Rates – July 2019</b>  |  |                           |
|--|--|---------------------------|
| <b>Location</b>  | <b>Average Flow Rate Groundwater (gpm)<sup>a</sup></b> | <b>Hours of Operation</b> |
| EW2014x18  | 0.2  | 553                       |
| EW2016x18  | 0.6  | 742                       |
| EW2019x18  | 1.3  | 742                       |
| EW2333x18  | 1.5  | 742                       |
| ST018GWTP  | 3.8  | 742                       |
| <sup>a</sup> Flow rates calculated by dividing total gallons processed by amount of operating time of the pump/system.<br>gpm = gallons per minute<br>ST018GWTP = Site ST018 Groundwater Treatment Plant |  |                           |

Table 3 presents a summary of shutdowns during the monthly reporting period.

| <b>Table 3 – Summary of System Shutdowns</b>   |                             |             |                            |             |              |
|--|-----------------------------|-------------|----------------------------|-------------|--------------|
| <b>Location</b>  | <b>Shutdown<sup>a</sup></b> |             | <b>Restart<sup>a</sup></b> |             | <b>Cause</b> |
|  | <b>Date</b>                 | <b>Time</b> | <b>Date</b>                | <b>Time</b> |              |
| ST018GWTP  | None.                       | --          |                            | --          |              |
| -- = Time not recorded<br><sup>a</sup> Shutdown and restart times estimated based on field notes<br>ST018GWTP = Site ST018 Groundwater Treatment Plant |                             |             |                            |             |              |

## Summary of O&M Activities

Monthly groundwater discharge samples were collected at the ST018GWTP on 1 July 2019. Because the extracted groundwater is no longer treated with carbon prior to discharge to the sanitary sewer, only discharge samples are now collected, rather than influent and effluent samples. Results are presented in Table 4. The complete July 2019 laboratory data report is available upon request. The MTBE discharge concentration during the July 2019 sampling event was 13 µg/L, which is a decrease from the June 2019 sample result of 65 µg/L. TPH-d and 1,2-DCA were also detected in the system discharge sample.

The Fairfield-Suisun Sewer District does not currently have a discharge limit for MTBE, but a limit of 6,400 µg/L is advised based on worker health and safety. Travis AFB will continue to monitor discharge contaminant concentrations to maintain compliance with the Fairfield-Suisun Sewer District discharge permit.

On 25 June, EW2014x18 was shutdown and the pump was removed so that the well could be redeveloped. Following well development, the pump was taken apart, cleaned, reassembled, reinstalled, and restarted on 9 July. EW2014x18 is currently operational.

Figure 1 presents plots of the average flow rate and total extracted contaminant (MTBE, TPH-g, TPH-d, TPH-mo, BTEX, and VOCs) and extracted MTBE concentrations at the ST018GWTP over the past twelve (12) months. The average flow rate through the ST018GWTP has been cyclical with flow rates decreasing during the dry season (summer and fall) and increasing during the rainy season (winter and spring). The overall average flow rates in the past 12 months show an increasing trend with a fairly steadily decreasing trend since

April 2019 as expected. The extracted MTBE concentrations and extracted total concentrations have generally been fluctuating over the past 12 months with an overall increasing trend.

## Optimization Activities

No optimization activities occurred at the ST018GWTP in July 2019.

## Sustainability

Travis AFB is committed to decreasing the amount of GHG produced directly (waste streams discharging GHG) or indirectly (GHG produced as related to electrical energy consumption) from all systems across Travis AFB. Travis AFB continues to optimize each treatment plant to reduce the amount of electrical energy consumed, and to implement sustainable treatment plant optimization programs, such as the solar arrays employed to power the ST018GWTP system.

Figure 2 presents the historical GHG production from the ST018GWTP. The ST018GWTP produced 67 pounds of GHG during July 2019 and removed 168,780 gallons of water. The amount of GHG produced is directly attributed to the amount of water removed through the system because the only line-power electrical use is for a transfer pump to push the water from the system to the sanitary sewer.

TABLE 4

Summary of Groundwater Analytical Data for July 2019– Site ST018 Groundwater Treatment Plant

| Summary of Groundwater Analytical Data for July 2019 - Site ST-10 Groundwater Treatment Plant |                                     |                           |     |                       |
|---|-------------------------------------|---------------------------|-----|-----------------------|
| Constituent   | Instantaneous<br>Maximum*<br>(µg/L) | Detection Limit<br>(µg/L) | N/C | 1 July 2019<br>(µg/L) |
|   |                                     |                           |     | System Discharge      |
| Fuel Related Constituents   |                                     |                           |     |                       |
| Methyl tert-Butyl Ether   | 6,400                               | 0.25                      | 0   | 13                    |
| Benzene   | 25,000 <sup>a</sup>                 | 0.16                      | 0   | ND                    |
| Ethylbenzene  | 25,000 <sup>a</sup>                 | 0.16                      | 0   | ND                    |
| Toluene   | 25,000 <sup>a</sup>                 | 0.17                      | 0   | ND                    |
| Total Xylenes   | 25,000 <sup>a</sup>                 | 0.19 – 0.34               | 0   | ND                    |
| Total Petroleum Hydrocarbons<br>– Gasoline  | 50,000 <sup>b</sup>                 | 10                        | 0   | ND                    |
| Total Petroleum Hydrocarbons<br>– Diesel  | 50,000 <sup>b</sup>                 | 15                        | 0   | 31 J                  |
| Total Petroleum Hydrocarbons<br>– Motor Oil   | 100,000                             | 160                       | 0   | ND                    |
| Other   |                                     |                           |     |                       |
| 1,2-Dichloroethane  | 20                                  | 0.13                      | 0   | 0.47 J                |

\* In accordance with the Fairfield-Suisun Sewer District Discharge Limitations  
Laboratory data available on request.

a – The limit of 25,000 µg/L is a combined limit for BTEX.

b – The limit of 50,000 µg/L is a combined limit for TPH-g and TPH-d.

µg/L = micrograms per liter

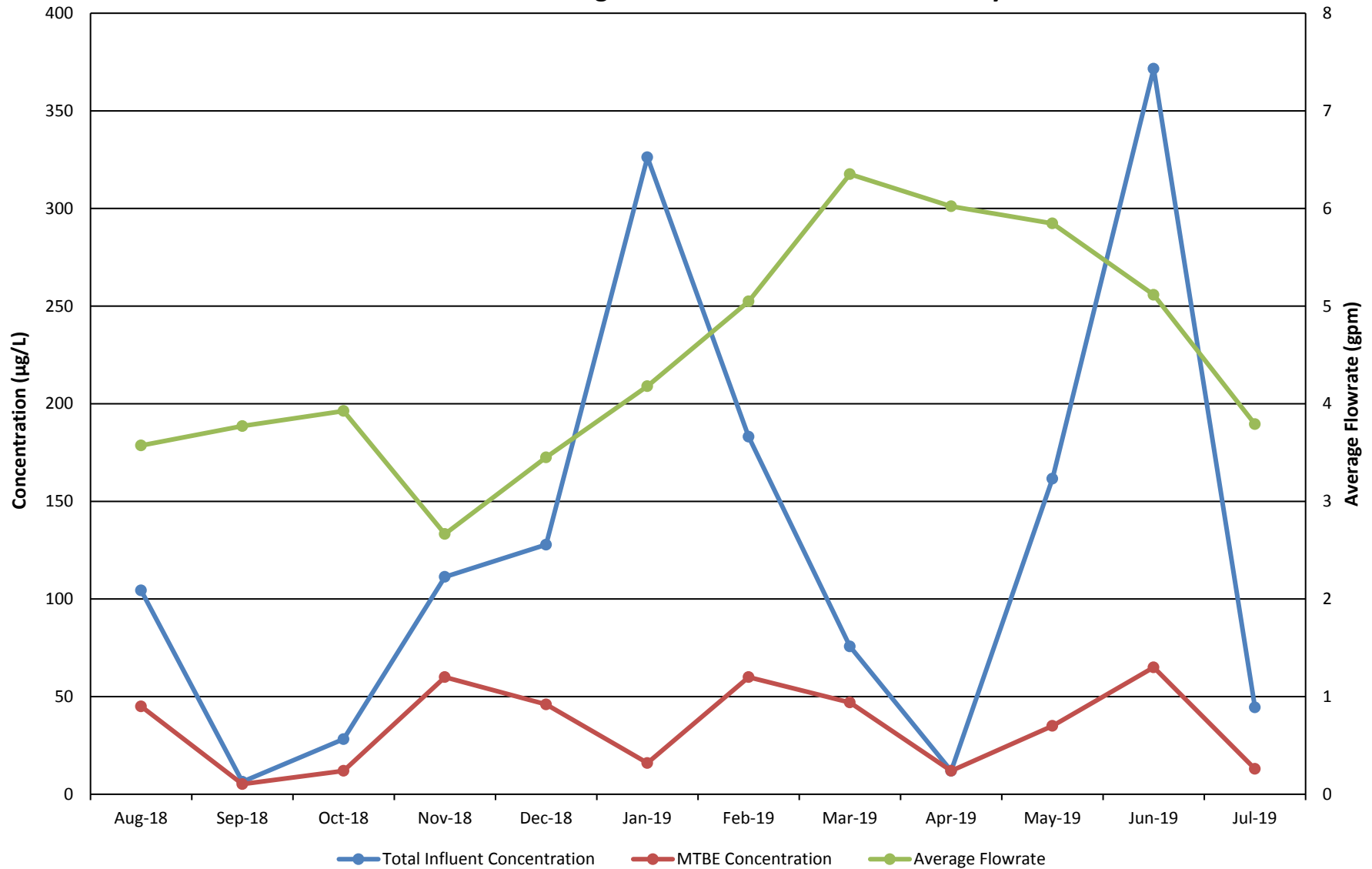
J = analyte concentration is considered an estimated value due to a detected concentration value between the reporting limit and method detection limit for the contaminant.

NA = not applicable

N/C = number of samples out of compliance with discharge limits.

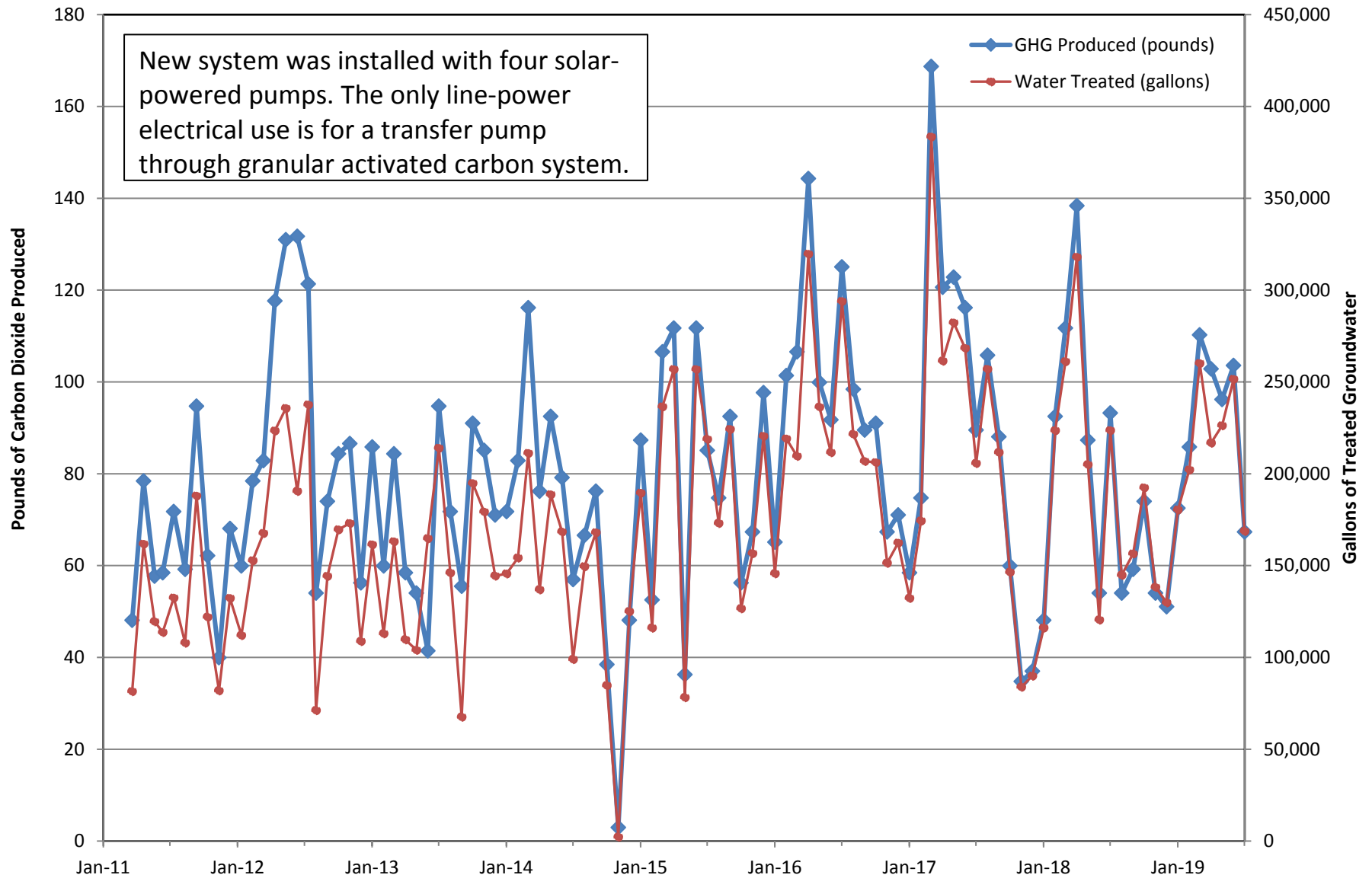
ND = not detected above method detection limit.

**Figure 1**  
**ST018GWTP Total VOC and MTBE Concentrations**  
**and Average Flowrate Twelve Month History**



**Figure 2**

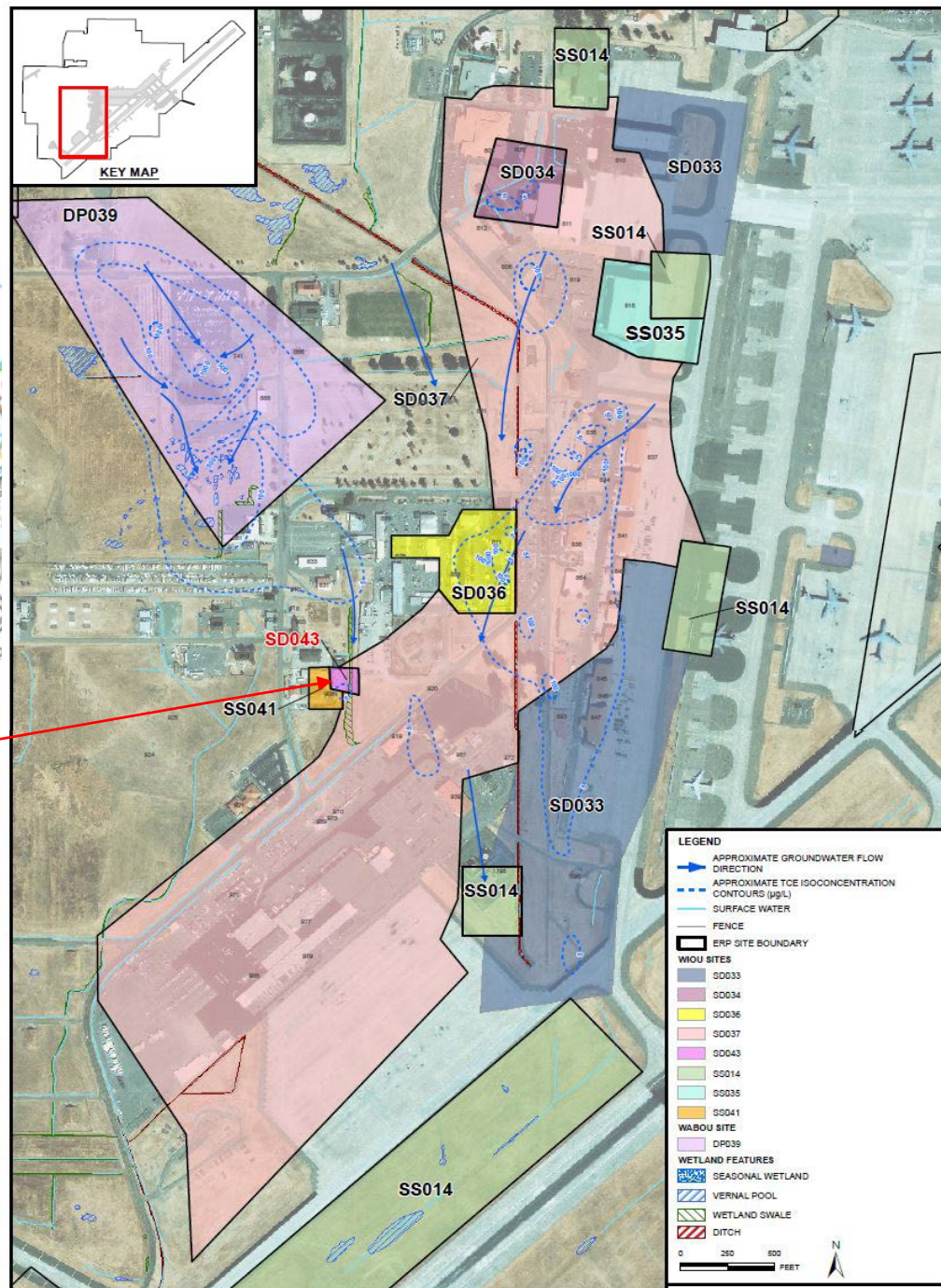
**Equivalent Pounds of Carbon Dioxide Produced by the Site ST018 Groundwater Treatment Plant**



RPM Meeting  
August 21, 2019

# Site SD043 Site Closure Report





# Objectives

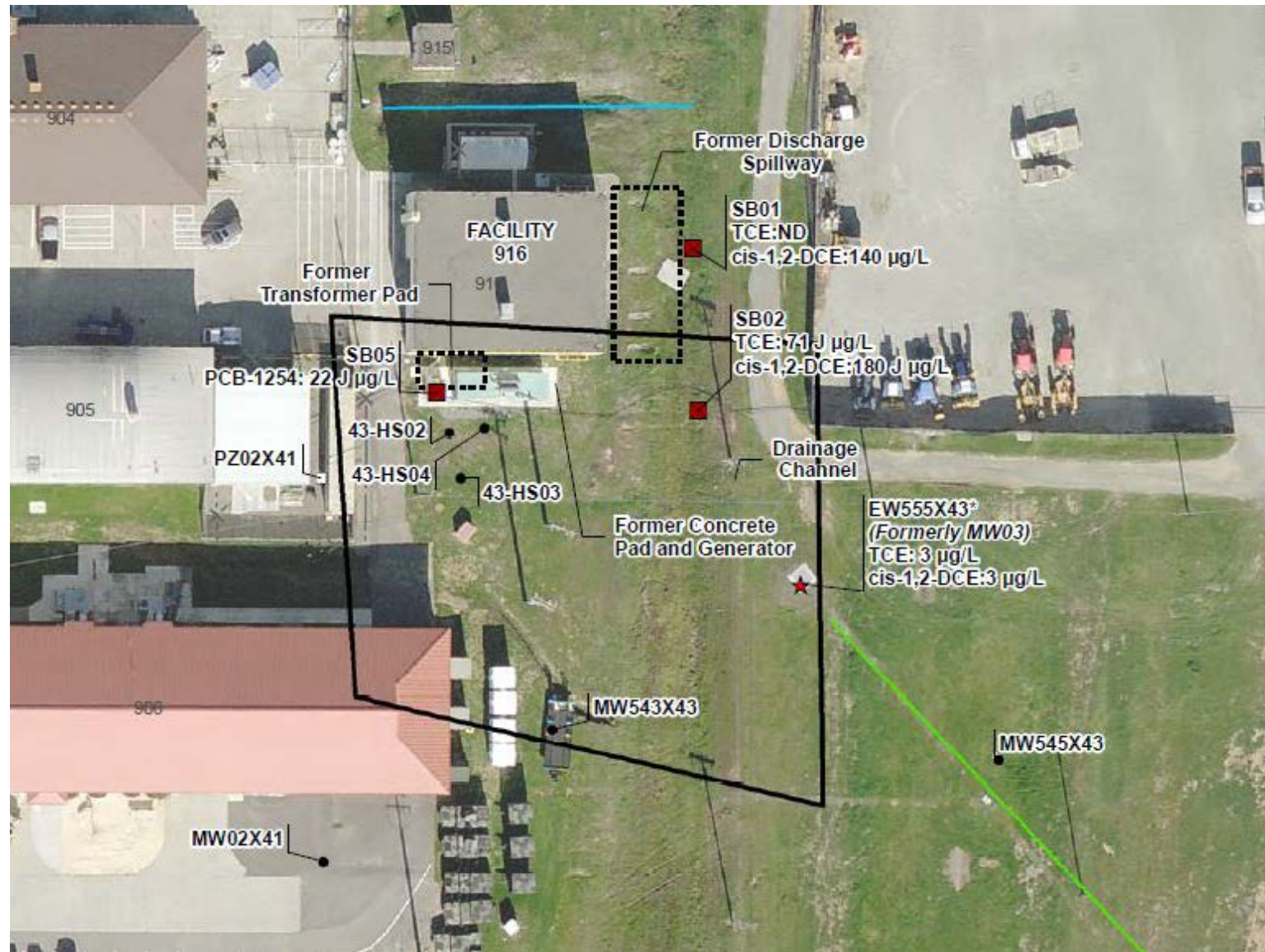
To provide the results of the groundwater closure monitoring

To demonstrate that closure requirements specified in the Groundwater ROD have been attained

To document site closure for Site SD043.

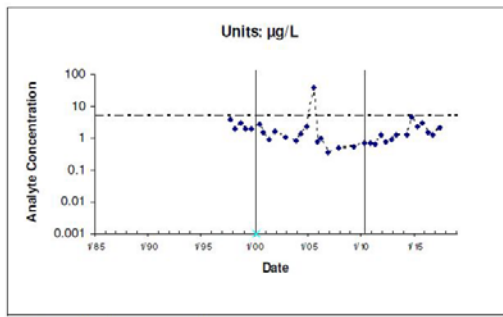
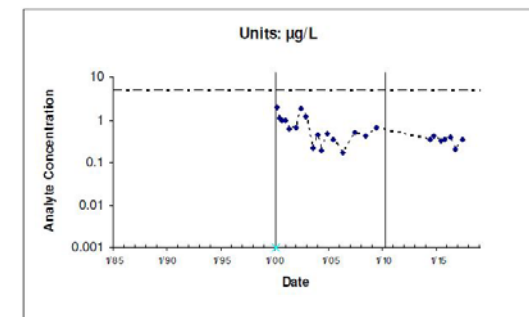
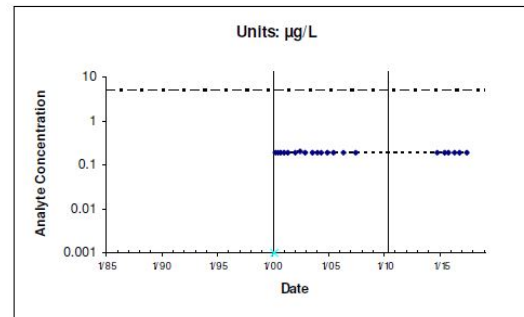
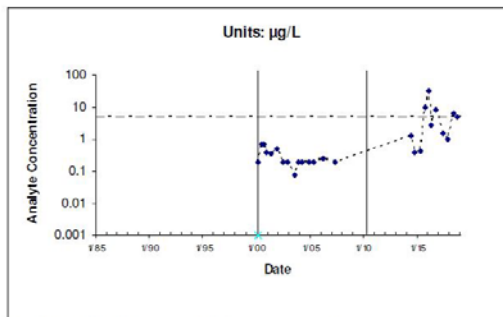
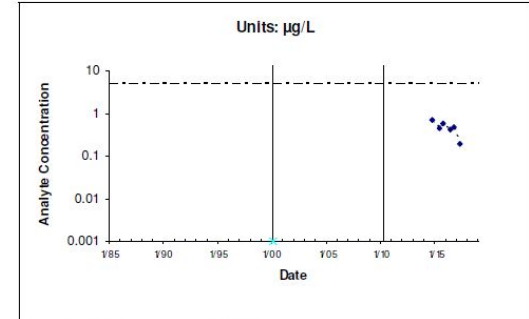
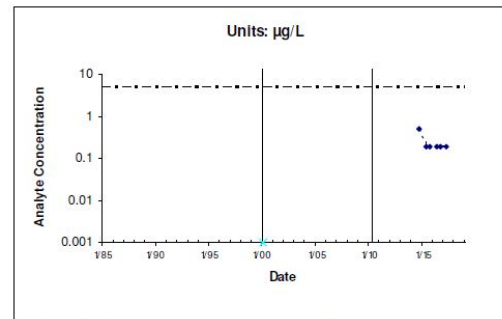
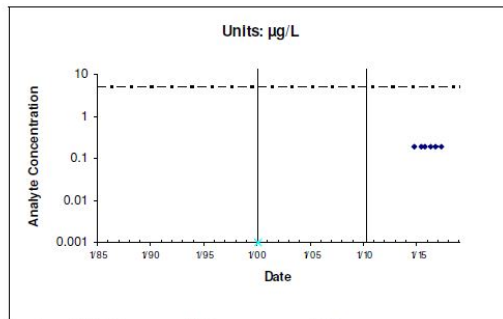


# Contaminant Sources



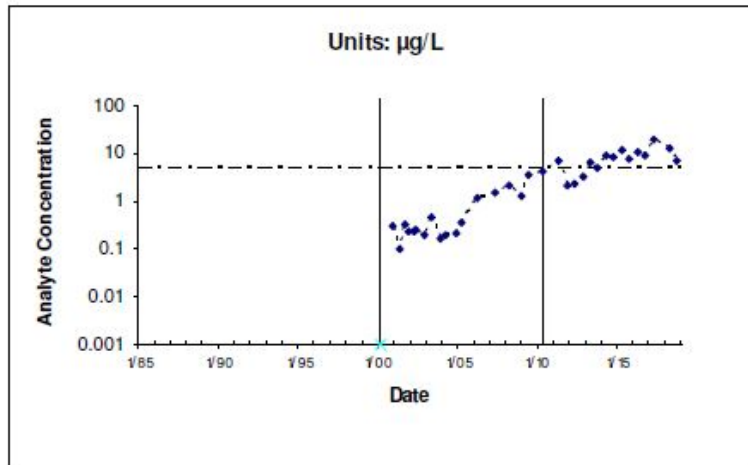
# The evidence...

- The lack of VOC soil or sediment contamination indicates a VOC source is not present at Site SD043;
- Consistently low (below the cleanup level) historical VOC concentrations in groundwater at Site SD043 indicate that a source is not present at Site SD043:

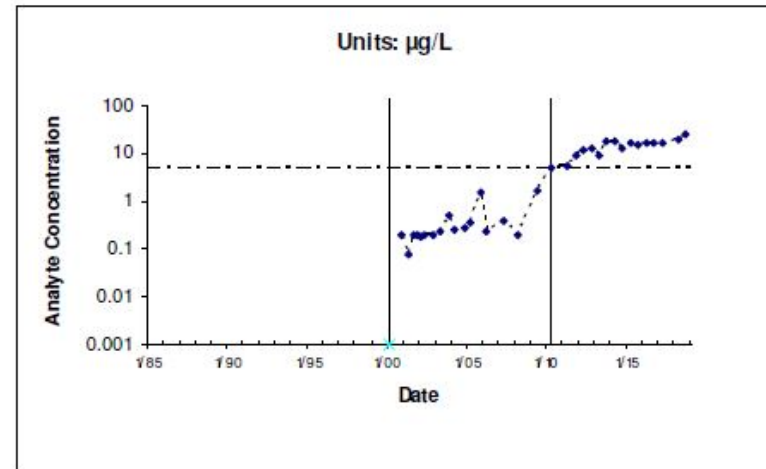


# The evidence continued...

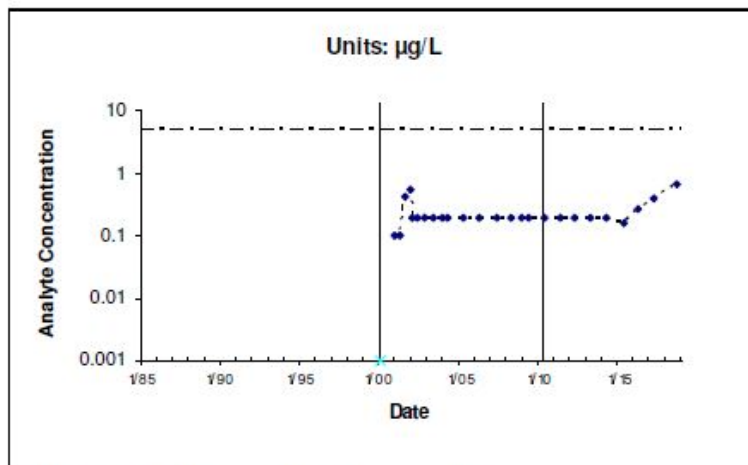
- Increasing TCE concentrations at several of the distal Site DP039 wells that precede the increase in TCE concentrations detected at MW543x43 indicate that the contamination could be coming from upgradient Site DP039;



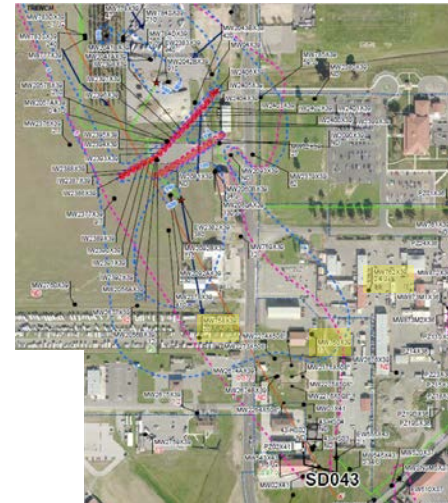
Location: MW758X39 Maximum: 20



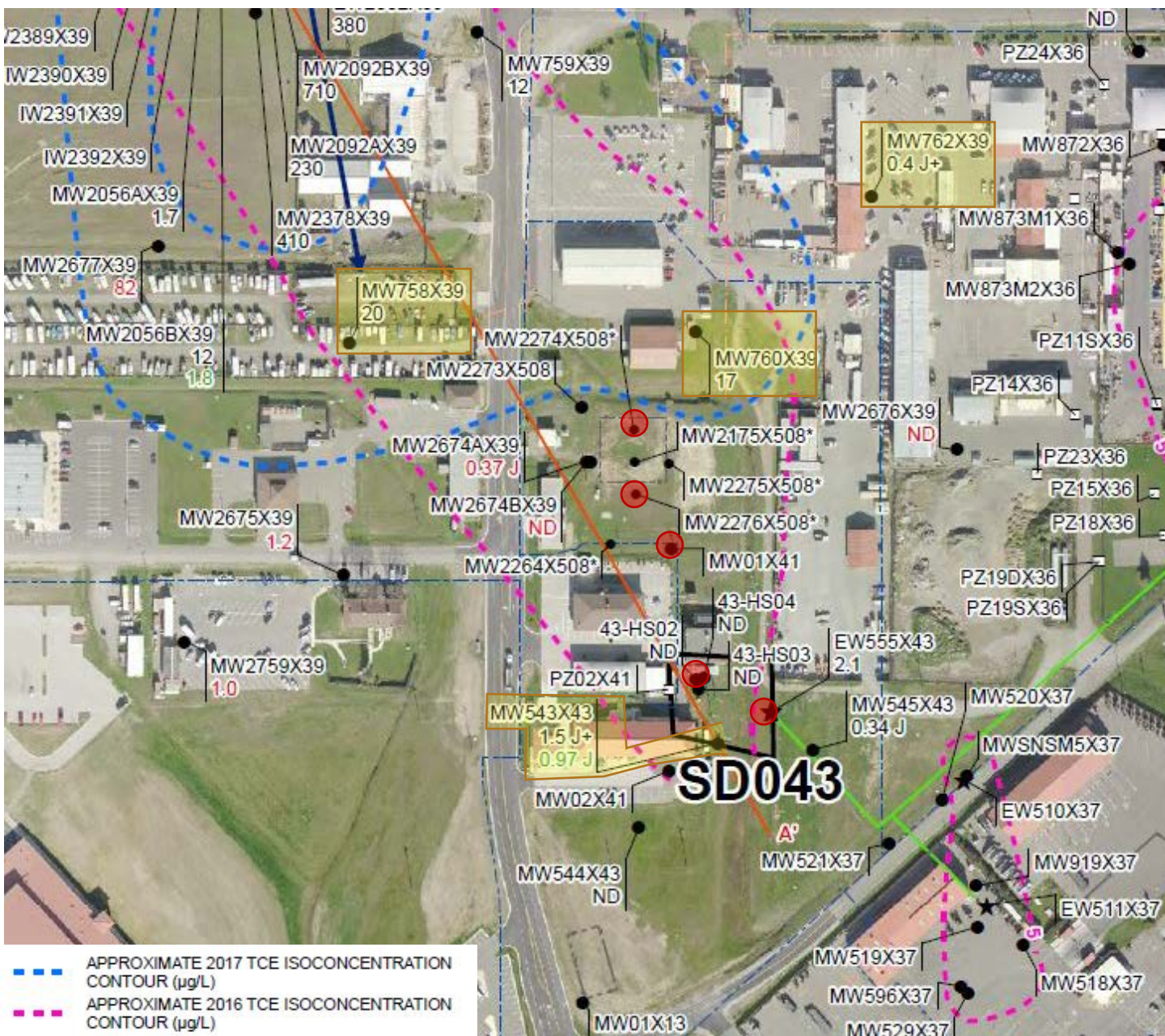
Location: MW760X39 Maximum: 26



Location: MW762X39 Maximum: 0.67

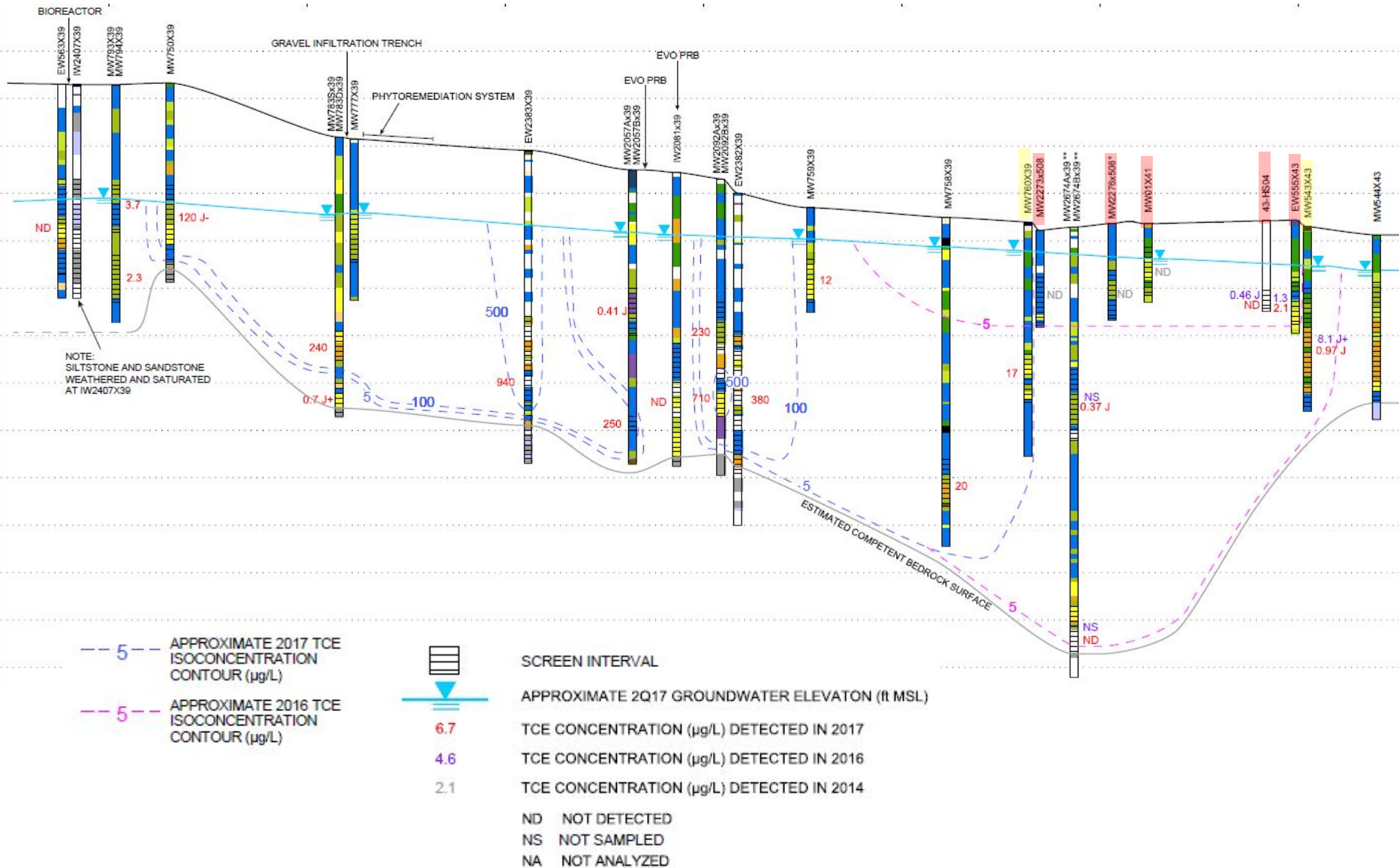




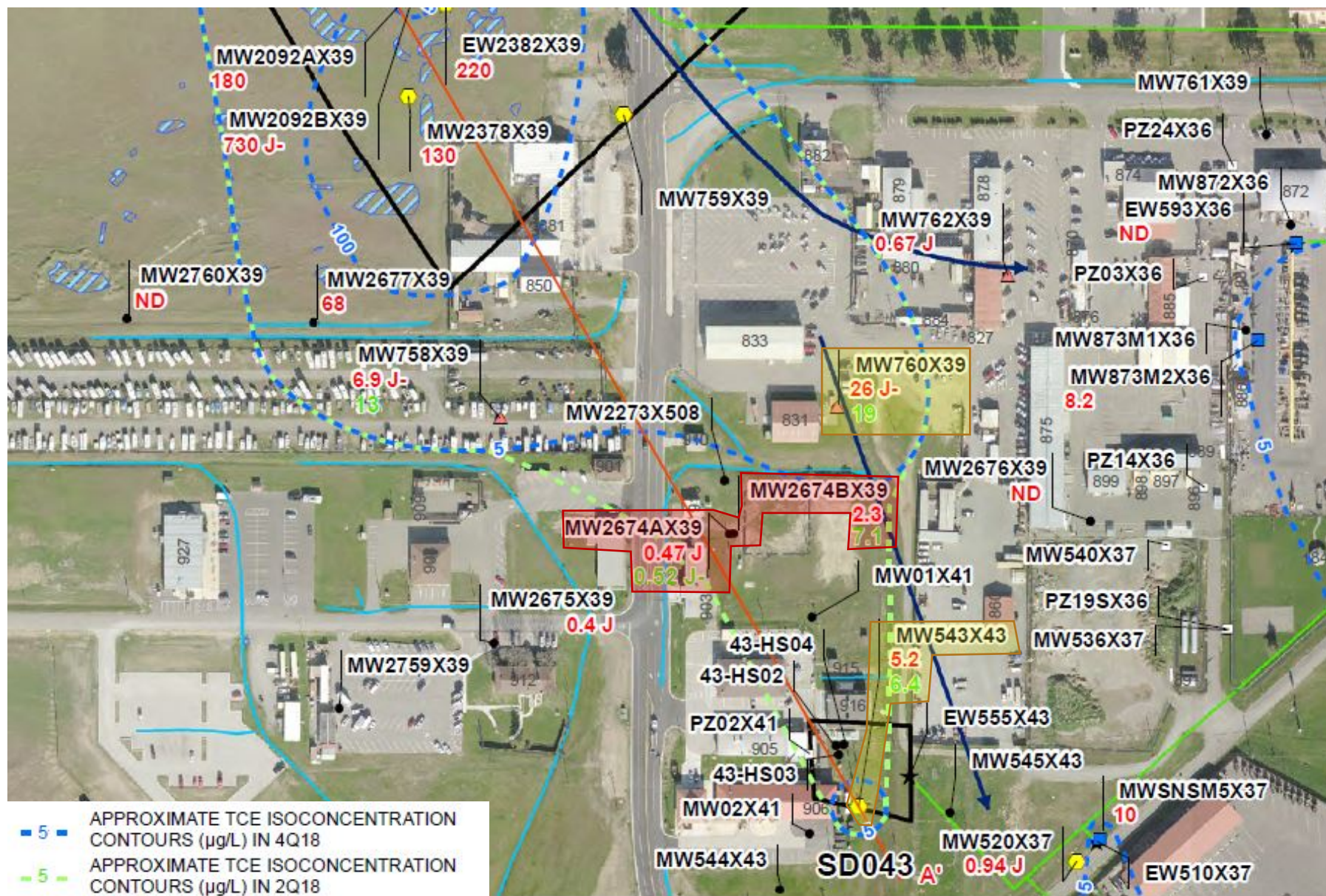


In 2016, the Site DP039 plume encroached on Site SD043 beneath the shallow wells located between MW760x39 and MW543x43; in 2017, the Site DP039 TCE plume retracted from Site SD043.

MW543x43 is a deep well, screened over the same interval as Site DP039 well MW760x39. Until 2017, when well pair MW2674x39A/Bx39 was installed, the monitoring wells located between MW760x39 and MW543x43 were all shallow. TCE was not detected in these shallow wells because the plume was migrating beneath them.



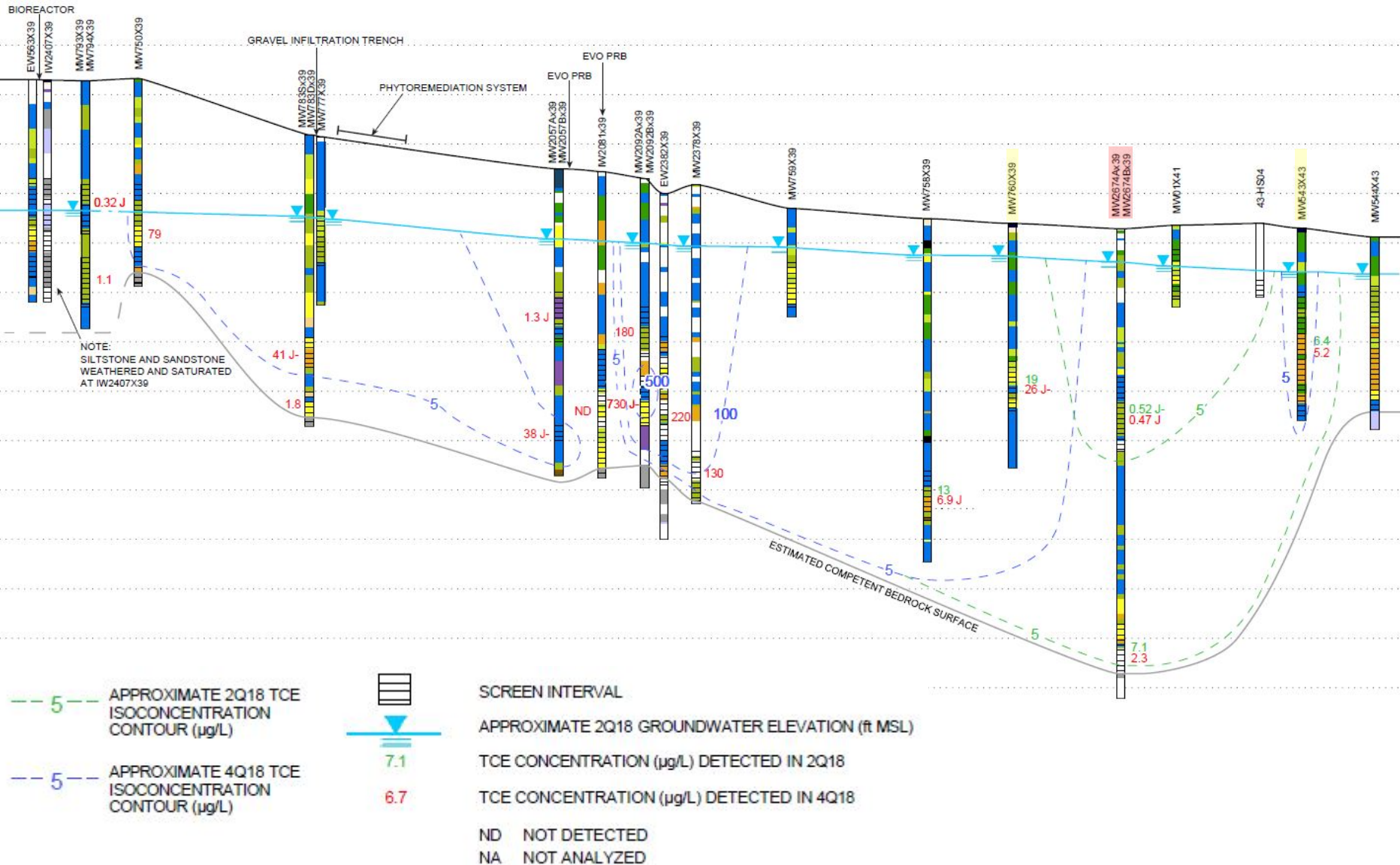




In 2Q18, TCE was detected at  $7.1 \mu\text{g/L}$  at MW2674Bx39, indicating that the Site DP039 plume again encroached beneath the shallow wells on Site SD043.



The downgradient edge of the Site DP039 TCE plume has migrated in the higher permeability sediments along the bedrock interface to Site SD043.



# Closure Monitoring Results

Site SD043 Closure Monitoring Results  
Site SD043 Site Closure Report, Travis Air Force Base, California

| Well   | Cleanup Level<br>(µg/L) | 2Q14   | 4Q14       | 2Q15       | 4Q15       | 1Q16 | 2Q16       | 4Q16       | 2Q17       | 4Q17   | 2Q18 | 4Q18 |
|--|-------------------------|--------|------------|------------|------------|------|------------|------------|------------|--------|------|------|
| EW555x43 (Site SD043 historical source area well [previously MW03])                |                         |        |            |            |            |      |            |            |            |        |      |      |
| TCE  | 5                       | 1.3    | 4.7        | 2.4        | 3          | NS   | 1.5        | 1.3        | 2.1        | NS     | NS   | NS   |
| MW543x43 (downgradient Site SD043 well – impacted by Site DP039 TCE plume)         |                         |        |            |            |            |      |            |            |            |        |      |      |
| TCE  | 5                       | 1.3    | 0.4 J      | 0.44 J     | 10         | 32   | 2.9        | 8.1 J+     | 1.5 J+     | 0.97 J | 6.4  | 5.2  |
| MW544x43 (downgradient Site SD043 well)  |                         |        |            |            |            |      |            |            |            |        |      |      |
| TCE  | 5                       | NS     | ND (< 0.2) | ND (< 0.4) | ND (< 0.4) | NS   | ND (< 0.4) | 0.19 J     | ND (< 0.4) | NS     | NS   | NS   |
| MW545x43 (downgradient Site SD043 well – downgradient from historical source area) |                         |        |            |            |            |      |            |            |            |        |      |      |
| TCE  | 5                       | 0.34 J | 0.41 J     | 0.32 J     | 0.34 J     | NS   | 0.38 J     | 0.21 J     | 0.34 J     | NS     | NS   | NS   |
| 43-HS02 (upgradient SCAPS piezometer)  |                         |        |            |            |            |      |            |            |            |        |      |      |
| TCE  | 5                       | NS     | ND (< 0.2) | ND (< 0.4) | ND (< 0.4) | NS   | ND (< 0.4) | ND (< 0.4) | ND (< 0.4) | NS     | NS   | NS   |
| 43-HS03 (upgradient SCAPS piezometer)  |                         |        |            |            |            |      |            |            |            |        |      |      |
| TCE  | 5                       | NS     | 0.16 J     | ND (< 0.4) | ND (< 0.4) | NS   | ND (< 0.4) | ND (< 0.4) | ND (< 0.4) | NS     | NS   | NS   |
| 43-HS04 (upgradient SCAPS piezometer)  |                         |        |            |            |            |      |            |            |            |        |      |      |
| TCE  | 5                       | NS     | 0.16 J     | 0.45 J     | 0.58 J     | NS   | 0.43 J     | 0.46 J     | ND (< 0.4) | NS     | NS   | NS   |

## Notes:

Cleanup level exceedances are bolded.

Detections that are a result of upgradient site contamination are *italicized*.

J+ = estimated value, biased high (data flag)

ND = not detected

NS = not sampled

# Mann-Kendall Trend Analysis Results

## Mann-Kendall Trend Analysis Results

*Site SD043 Site Closure Report, Travis Air Force Base, California*

| Well     | Mann-Kendall TCE Trend |
|----------|------------------------|
| 43-HS02  | No trend               |
| 43-HS03  | No trend               |
| 43-HS04  | No trend               |
| EW555x43 | No trend               |
| MW543x43 | Increasing             |
| MW544x43 | No trend               |
| MW545x43 | Decreasing             |

# 95 percent UCL TCE concentrations over the closure monitoring period calculated using ProUCL 5.1 software.

## 95 Percent UCL Results

*Site SD043 Site Closure Report, Travis Air Force Base, California*

| Well     | TCE (µg/L)      |
|----------|-----------------|
| 43-HS02  | NA <sup>a</sup> |
| 43-HS03  | NA <sup>a</sup> |
| 43-HS04  | 0.6             |
| EW555x43 | 3.2             |
| MW543x43 | 15.8            |
| MW544x43 | NA <sup>b</sup> |
| MW545x43 | 0.38            |

<sup>a</sup> All results were nondetect; consequently, a 95 percent UCL could not be estimated.

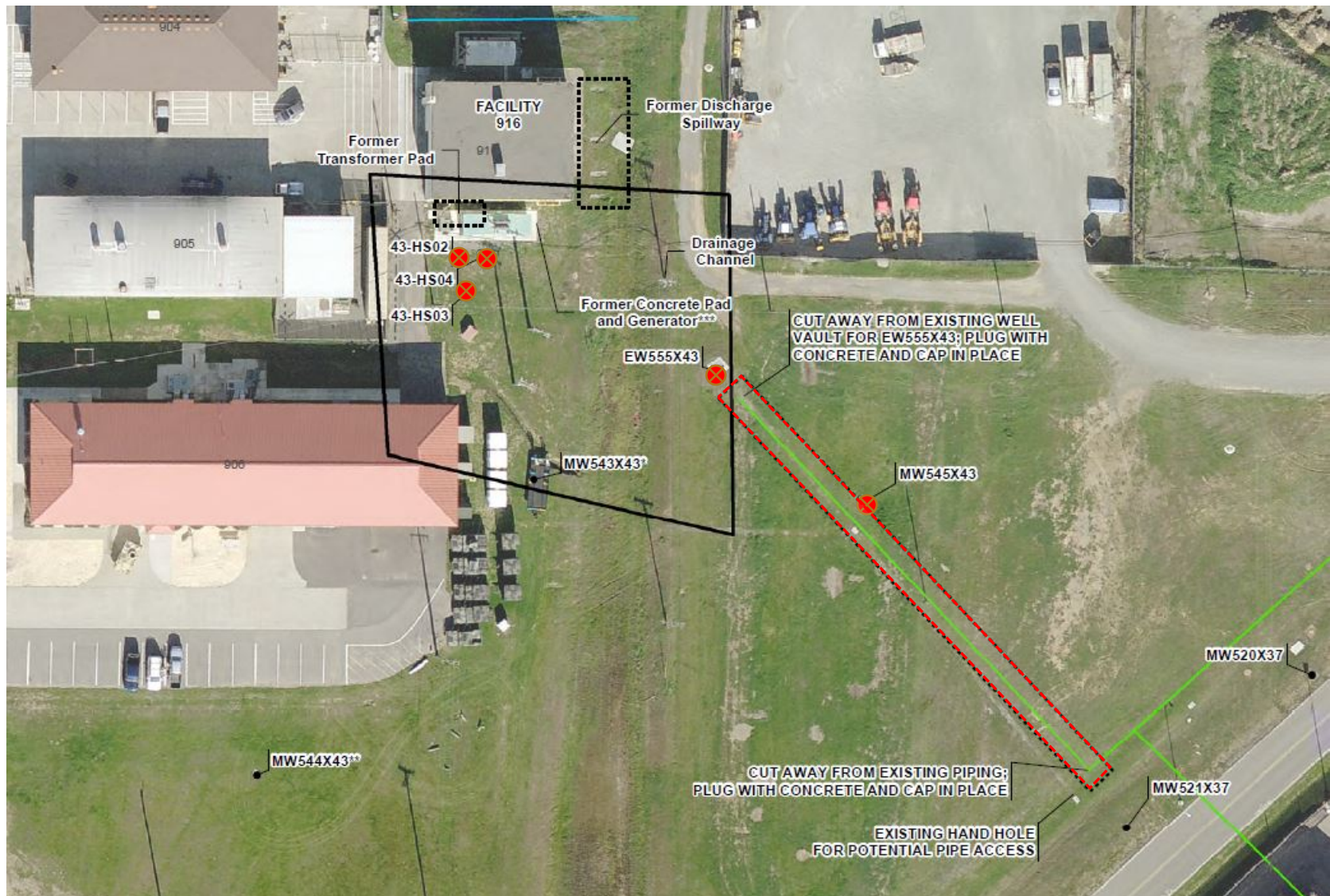
<sup>b</sup> Five (5) results were nondetect, and there was only one (1) positive detection in the data set. There were too few detections to calculate meaningful or reliable statistics or estimates, according to ProUCL.

# Cleanup Level Achievement and Site Closure

- Two (2) years of semiannual closure monitoring have been completed as required by the Groundwater ROD.
- Closure monitoring demonstrates that site-related groundwater contamination has achieved cleanup levels through GET and natural attenuation, and the site does not pose an unacceptable risk to human health or the environment; therefore, closure is appropriate for Site SD043.
- Wells MW543x43 and MW544x43 have been administratively transferred to the Site DP039 EA monitoring network as downgradient wells.
- Site SD043 is not located within the groundwater-to-indoor-air LUC boundaries because there are no exceedances of groundwater-to-indoor-air risk-based screening levels at the site.
- Groundwater monitoring and LUC enforcement will continue to be administered as part of the Site DP039 remedial action.



# Conveyance Pipeline and Well Decommissioning





Questions?



# Travis AFB Restoration Program

## Program Update

*RPM Meeting*  
*August 21, 2019*



# Completed Documents (1)

- Vapor Intrusion Assessment Update Technical Memorandum
- 2012 CAMU Annual Report
- Old Skeet Range Action Memorandum
- 3<sup>rd</sup> Five-Year Review
- 2012 Annual Groundwater Remediation Implementation Status Report (GRISR)
- Subarea LF007C and Site SS030 Remedial Process Optimization Work Plan
- Pre-Design Site Characterization of SS029 Report
- Old Skeet Range Removal Action Work Plan
- 2013 CAMU Inspection Annual Report
- Groundwater Record of Decision (ROD)
- CG508 POCO Work Plan
- 2013 Annual GRISR
- FT004 Technology Demonstration Work Plan
- Kinder Morgan LF044 Land Use Control Report
- SD031 Technology Demonstration Work Plan
- TA500 Data Gap Investigation Work Plan
- ST018 POCO Work Plan Addendum
- SD037 GW RD/RA Work Plan
- Travis AFB UFP-QAPP
- DP039 Lead Excavation Technical Memo

# Completed Documents (2)

- Proposed Plan for ROD Amendment to WABOU Soil ROD
- Proposed Plan for ROD Amendment to NEWIOU Soil, Sediment, & Surface Water ROD
- SD034 Data Gap Investigation Work Plan
- POCO Investigation Work Plan for Oil-Water Separators
- ST032 POCO Soil Excavation Work Plan
- SD036 GW RD/RA Work Plan
- SS016 GW RD/RA Work Plan
- SS015 GW RD/RA Work Plan
- FT005 Technology Demonstration Work Plan
- 2014 Annual CAMU Monitoring Report
- Old Skeet Range PAH Delineation Report
- ST028 POCO Work Plan
- SS014 POCO TD Work Plan
- CG508 Site Investigation/Site Closure Request Report
- 2014 Annual CAMU Monitoring Report
- DP039 GW RD/RA Work Plan
- SD031 TDCCR
- ST018 POCO CCR
- Site SS030 Groundwater RA CCR
- Sites SD036 and SD037 Groundwater RACCR
- Site SS016 Groundwater RACCR
- Site SS015 Groundwater RACCR
- 2014 Annual GRISR
- Site CG508 Well Decommissioning Work Plan

# Completed Documents (3)

- Data Gap Investigation TM for Soil Sites SD033, SD043, & SS046
- Site FT004 Technology Demonstration Construction Completion Report
- Site SD031 Soil Remedial Investigation Work Plan
- Corrective Action Plan for DERA-Funded Oil Water Separators
- Site ST032 POCO Completion Report
- Site ST028 POCO Completion Report
- 2015 Annual CAMU Monitoring Report
- Site SD031 Remedial Investigation Work Plan
- Site SD034 Technology Demonstration Work Plan
- Site SS016 Soil Data Gaps Investigation Work Plan
- Multi-Site Bioaugmentation Technology Demonstration Work Plan
- Sites ST028 and ST032 POCO Well Decommissioning Work Plan
- Site TS060 Action Memorandum
- 2015 Annual GRISR
- FT005 Technology Demonstration Construction Completion Report
- Site CG508 POCO Well Decommissioning and Site Closeout Technical Memorandum
- Site DP039 Remedial Action Construction Completion Report
- ST028 POCO Well Decommissioning/Site Closeout Technical Memorandum
- Site TS060 Removal Action Work Plan

# Completed Documents (4)

- Multisite Technology Demonstration Construction Completion Report
- SS014 POCO Technology Demonstration Construction Completion Report
- Site LF044 Investigation Work Plan
- Site FT004 POCO Soil Data Gap Investigation Work Plan
- SD034 Technology Demonstration Construction Completion Report
- POCO Evaluation/Closeout Report for DERA-funded oil/water separators OW051, OW053, and OW054
- ST032 POCO Well Decommissioning and Site Closeout Technical Memorandum
- 2016 Annual CAMU Monitoring Report
- Work Plan for Fourth Five-year Review
- 2016 Annual GRISR
- Data Gap Investigation Results, Technical Memorandum for Soil, Sites SD033, SD043, SS046
- TS060 Removal Action Completion Report
- SS035 Site Closure Report
- AOC TA500 Data Gaps Investigation and Closure Report
- Site TS060 No Further Action Proposed Plan
- POCO Evaluation/Closure Report for DERA-funded Oil/Water Separators OW040, OW047, OW048, OW049, OW050, OW052, OW055, OW056, and OW057

# Completed Documents (5)

- Data Gap Investigation Results, Technical Memorandum for Soil Site SS016
- LF006, SS030, SD031 Aquifer Test Activities Technical Memorandum
- SS015 Soil Sampling Plan
- Monitoring Well Installation Tech Memo for Site DP039, Addendum to the RACCR
- FT005 Extraction System Optimization Tech Memo
- 2017 Annual CAMU Monitoring Report
- LF044 Sediment Sampling Report
- SD043 RD/RA Work Plan
- SS046 RD/RA Work Plan
- Amendment to the WABOU Soil ROD for sites DP039, SD043, and SS046
- EVO Sites FT004, SS015, SD031, & SD036 Optimization Injections Tech Memo
- LF006 Technology Demonstration Work Plan
- AOC TA500 Well Decommissioning and Site Closeout Tech Memo
- SS015 Soil Sampling Results Tech Memo
- LF006 Technology Demonstration Construction Completion Report
- Subarea LF007C TPH Chromatogram Review TM
- 2017 Annual GRISR
- ***SS014 POCO Subsites 2, 4, and 5 Closure Evaluation Report***
- ***Addendum to the Site SS016 Groundwater RD/RA Work Plan***

# Completed Documents (6)

- *SD043 Remedial Action Completion Report*

# Completed Field Work (1)

- Replace battery banks at ST018 Groundwater Treatment Plant
- Annual Groundwater Remediation Implementation Program (GRIP) Sampling event
- Well Decommissioning (9 Wells)
- Electrical repairs to FT005 extraction system (well EW01x05)
- Electrical repairs to Site SS029 extraction system
- Site ST018 carbon vessels upgrade
- 2014 GRIP Semiannual Sampling Event
- Pump repairs to Site SS016 well (EW610x16)
- Subsite LF007C optimization upgrades
- 2014 Annual GRIP Sampling Event
- Biological Resource Assessment
- Site CG508 Site Investigation
- Old Skeet Range Characterization Sampling
- 4Q Semiannual GRIP Sampling Event
- SD031 Technology Demonstration Well Installation
- SD037 Well Installation
- SD031 Trench/Conveyance/Power Installation
- SD031 EVO Injection
- ST018 Well Installation
- SS015 Well Installation
- SS016 Well Installation
- Well Development (SD036, SD037)
- ST018 Trench/Conveyance/Power Installation
- SD036 EVO Injection
- Well Development (SS015, SS016)
- Baseline Sampling (SS015, SS016)
- SS014 Data Gap Investigation
- SS016 EVO Injection
- TA500 Data Gaps Investigation

# Completed Field Work (2)

- 2015 Annual GRIP Sampling
- SD037 EVO Injection
- SD034 Data Gaps Investigation
- SS015 EVO Injection
- FT005 Injection Well Installation
- OWS 47, 48, 49 Site Investigations
- SS030 Trench/Conveyance/Power Installation
- FT005 Trench Installation
- FT005 Well Development
- FT004 Well Installation, Well Development, Baseline Sampling
- FT005 Baseline Sampling
- DP039 Well Installation, Well Development, Baseline Sampling
- FT004 EVO Injection
- FT004 Trench/Conveyance/Power Installation
- DP039 Infiltration Trench Installation
- TA500 Groundwater Sampling
- FT005 EVO Injection
- 2016 Q2 GRIP Sampling
- Data Gap Inv. for Soil Sites (SD043, SS046)
- SD031 Remedial Investigation Step-out Sampling (2<sup>nd</sup> round)
- DP039 EVO Injection
- CG508 Well Decommissioning
- SD033 Soil Sampling
- Multi-site Bioaugmentation Well Installation
- SD034 Technology Demonstration Well Installation
- SS014 Bioreactor Installation
- ST028 & ST032 Well Decommissioning



# Completed Field Work (3)

- SS016 Soil Data Gaps Investigation
- SD031 Remedial Investigation Soil Sampling (3<sup>rd</sup> round)
- Oil Water Separators Step-out Drilling
- OW055 Close-in-place
- Q4 2016 GRIP Sampling
- OW040 Soil Excavation/Surface Restoration
- OW057 Soil Excavation/Surface Restoration
- Multi-site Bioaugmentation & EVO Injection
- SD034 Technology Demonstration Bioreactor Installation
- OW050 Soil Sampling at Former Location of OWS
- OW055 Sidewalk Repairs
- SD031 Finish Soil Delineation (NE portion of site)
- Q2 2017 GRIP Sampling Event
- SS015 Optimization: Injection Well Installation
- DP039 Down-gradient Monitoring Well Installation (1<sup>st</sup> round)
- SD036 Optimization: Injection Well Installation
- SD031 Optimization: Injection Well Installation
- OW056 Site Excavation/Closure
- Well Re-development
- TS060 Removal Action

# Completed Field Work (4)

- FT004 POCO Soil Data Gaps Investigation
- LF044 Sediment Sampling
- FT004 EVO Optimization
- DP039 Install downgradient monitoring wells (2<sup>nd</sup> round)
- FT005 – Install Extraction Wells
- DP039 Repair SBGR distribution headers
- Q4 2017 GRIP Sampling
- SD036 EVO Optimization
- SS015 EVO Optimization
- SD031 EVO Optimization
- FT005 Installation of Pumps and Controls in 5 New Extraction Wells
- Q1 2018 GRIP Sampling
- SD037 EVO reinjection
- Q2 2018 GRIP Sampling
- SS015 Soil sampling
- TA500 Well Decommissioning
- FT005 EVO injection
- FT004 POCO Soil Investigation
- 3Q 2018 GRIP Sampling
- LF006 Well Installations and Injections
- 4Q 2018 GRIP Sampling
- SD043 Soil excavation
- 1Q 2019 GRIP Sampling
- 2019 Annual LUC Inspections
- SS046 Soil excavation
- 2Q 2019 GRIP Sampling Event
- Well Re-development (11 wells)
- ***SD037 Injection Well Installation***
- ***SS046 Well Decommissioning***

# Completed Field Work (5)

- ***3<sup>rd</sup> Quarter 2019 GRIP Sampling***

# Documents In-Progress

## CERCLA

- Amendment to the NEWIOU Soil ROD for Sites SS016 and SD033
- Community Relations Plan Update (revised draft)
- 4<sup>th</sup> Five Year Review Report for Multiple Groundwater, Soil, and Sediment Sites
- SS016 RD/RA Work Plan
- SS046 Remedial Action Completion Report and Well Decommissioning Work Plan
- 2018 Annual GRISR
- ***SD043 Site Closure Report***
- ***2018 LF007 CAMU Inspection, Monitoring, and Maintenance Report***

# Documents In-Progress

## MMRP

- NFA ROD for Old Skeet Range (TS060/TS060A MRA)

## POCO

- None

# Field Work In-Progress

CERCLA

- SD034 O<sub>2</sub> Enhancement

POCO

- None

# Documents Planned

## CERCLA

- SD031 Soil RI/FS Sep
- LF008 Remedial Action Completion Report Sep
- ***SS046 Well Decommissioning and Site Closeout  
Tech Memo*** Oct

## POCO

- None

# Field Work Planned

## CERCLA

- |  |     |
|--|-----|
| • SS016 SBGR Repairs                               | Sep |
| • SD037 EVO Re-injection                           | Sep |
| • SD043 Well and GETS Decommissioning              | Sep |
| • 4 <sup>th</sup> Quarter 2019 GRIP Sampling       | Oct |
| • SS016 Soil excavation (waiting on ROD amendment) | TBD |

## POCO

- None

Note: Contact Lonnie Duke if you  
would like to observe planned field  
work events



# Petroleum Technology Demonstration Projects (1)

- SS014: Recycled Drywall Subgrade Biogeochemical Reactor (SBGR)
  - Evaluate the effectiveness of sulfate (gypsum from crushed drywall) to enhance anaerobic biodegradation of petroleum in groundwater
  - Installation was completed November 2016
  - Results through ~2.5 years
    - TPH-G: 99% reduction in source area (1,900 to <25 mg/L [non-detect])
    - TPH-D: 99% reduction in source area (5,500 to 76 mg/L)
    - Benzene: 99% reduction in source area (90 to <0.4 mg/L [non-detect])
    - Plume as a whole continues to shrink, so this TD has been quite successful

SBGR = Subgrade Biogeochemical Reactor

**Updates in Green Font**

# Petroleum Technology Demonstration Projects (2)

- SD034: Aerobic “Washboard” Subgrade Biogeochemical Reactor (SBGR)
  - Installed six (6) SBGR trenches in November 2016 to evaluate the effectiveness of an oxygen-enhanced aerobic SBGR on reducing TPH as diesel (TPH-D) in groundwater
  - Below SBGR trench (MW811x34/PZSSAx34) through first 2 years
    - TPH-D baseline 9,600 ug/L was reduced to 40 J ug/L after 15 months, with increase to 890 ug/L at 20 months, then decreased to 100 ug/L at 2 years (decreased to 90 ug/L at 2.5 years). Concentration fluctuations are to be expected as higher concentration areas are flushed as part of the washboard effect. We are evaluating enhancements to the SBGR trenches to maintain treatment efficiency.)
    - TPH-MO baseline 2,300 ug/L was reduced to 89 J ug/L after 15 months, with increase to 760 ug/L at 20 months, then decreased to non-detect at 2 years (remained non-detect at 2.5 years)
  - Plume hot spot monitoring well (MW02x34) through first 2 years
    - TPH-D baseline 8,300 ug/L was reduced to 6,800 ug/L after 15 months, with increase to 13,000 ug/L at 20 months, then decreased to 6,700 ug/L at 2 years and further decreased to 5,500 ug/L at 2.5 years (Concentration fluctuations are to be expected as higher concentration areas are flushed as part of the washboard effect. We are evaluating enhancements to the extraction network to help reductions in this area.)
    - TPH-MO baseline 1,500 ug/L was reduced to 660 J ug/L after 15 months, with non-detect at elevated detection limit at 20 months, then 1,100 ug/L at 2 years and remained 1,100 J ug/L at 2.5 years (Was 72% reduction after 9 months, seeing some fluctuations)
- Aerobic treatment process for this TD has been successful, but additional enhancements are warranted to maintain treatment efficiency (optimization activities are in progress)

Updates in Green Font

# CVOC Technology Demonstration Projects (3)

- **Multisite Bioaugmentation: EVO and KB-1 Plus (No new information)**
  - Evaluate if addition of bioaugmentation substrate to an EVO injection will increase the rate of CVOC degradation
  - Initial injections were completed (Nov 2016)
  - Limited TOC dispersal at SD036, so installed additional injection wells and reinjected with nanoEVO in 2017
  - Too early to evaluate degradation rates; however:
    - ~50-70% TCE reductions at ST027B, but still too early to evaluate if bioaugmentation was beneficial
    - TCE fluctuations at SD036 bioaugmentation area and 99% decrease in the EVO-only area, reinjections and additional injection wells have supported significant reductions to the east of the site (in MW2064Ax36, TCE reduced from 6,400 to 11 ug/L), northeast (in MW2063x36, TCE reduced from 1,000 to 1.8 ug/L), and to the north (in MW2187x36, TCE reduced from 1,400 to 84 ug/L). Still too early to evaluate if bioaugmentation was beneficial
- **FT005: Distribution of EVO and KB-1 Plus**
  - Evaluate total organic carbon (TOC) dispersion distances and rates for optimizing the remediation of 1,2-dichloroethane (DCA) in groundwater. TD installation completed May 2016. Optimized the GETs in 2017
    - FT005 north area: Slightly elevated TOC and reduced COC concentrations (below MCLs);
    - FT005 central area: Limited TOC increase observed to date in most areas, as injected EVO may be adsorbed to sediments or being consumed faster than spread can be observed. However, MW2292x05 (south of Base boundary) had TOC increase from 1.2 to 20 mg/L between May and October 2018, likely the result of the newly installed extraction wells and the 2018 reinjection in this area.
    - FT005 south area: No TOC increase observed in this control area: Newly installed extraction wells are effectively capturing the remaining 1,2-DCA hot spots, with concentrations now beginning to decrease in these areas
    - New extraction wells are decreasing 1,2-DCA (e.g., 3.6 to 0.91 ug/L; 1.4 to 0.54 ug/L; 5.9 to 3.3; 3.0 to 1.9 ug/L)
    - We don't think distribution of TOC through the aquifer via extraction will be viable, although it is still expected to have had a benefit to remediation as a whole

# CVOC Technology Demonstration Projects (4)

- FT004: Distribution of EVO via SBGR and/or Groundwater Extraction
  - Determine effectiveness of TOC distribution through two different enhanced reductive dechlorination (ERD) approaches: (1) groundwater TOC recirculation using a combination EVO injection, infiltration SBGR trenches, and groundwater extraction; and (2) EVO injection with groundwater extraction
  - Installation completed April 2016
  - COC concentrations declined through year 1
    - ~50% total molar reduction plume-wide through first year
    - Max baseline monitoring well TCE concentration reduced from 560 to 140 µg/L (now decreased to 63 ug/L)
  - Limited TOC dispersal, additional EVO injection conducted with nanoEVO in 2017 to determine if this can enhance TOC dispersal (too early to evaluate results of reinjection)
    - Slight TOC increase (3.5 to 5.4 mg/L) and TCE decrease (previous max well rebounded from 140 to 330 ug/L, and then decreased to 63 ug/L following reinjection)
    - Variable TOC increase and TCE decrease in main plume area monitoring wells
    - In some extraction wells, TCE concentrations are increasing. This indicates additional TCE mass below the vernal pools that is now being pulled to the extraction wells (recirculation is working, but we are fighting additional TCE mass below the vernal pools, so it will take additional time to see concentration reductions)
    - MW2330x04 maxed out at 640 ug/L in April 2018 and now 49 ug/L in May 2019

**Updates in Green Font**

# CVOC Technology Demonstration Projects (5)

- SD031: EVO distribution via Gravel Chimneys (No new information)
  - Determine if EVO injection and recirculation of groundwater through gravel chimneys can effectively distribute TOC horizontally in the subsurface to support ERD of 1,1-dichloroethene (DCE)
  - Installation completed in April 2015
  - Early indications:
    - Recirculation through chimneys has been successful relative to our design assumptions, TOC increased to >10 mg/L within majority of target area and COCs decreased to below MCLs (most wells ND, max 1,1-DCE reduced from 390 ug/L to ND)
    - 1,1-DCE (primary COC) concentrations have reduced by 99% (was 93%) (sum of key wells within TD area, excluding 2 wells to SW that increased)
    - Total molar concentration (sum of CVOCs) has reduced by 99% (was 84%) (sum of key wells within TD area, excluding 2 wells to SW that increased)
    - Four (4) new EVO wells installed to SW to enhance TOC in problem areas (plume being pulled back towards extraction well causing increasing concentrations in this cross-gradient area), conducted reinjection of EVO in 2017
      - 1,1-DCE in SW area where we reinjected: MW568x31 decreased from max of 48 ug/L to ND, MW572x31 decreased from max of 200 to 13 ug/L, and MW574x31 decreased from max of 33 to 8.9 ug/L

**Updates in Green Font**

# Completed Documents (Historical1)

- Basewide Health & Safety Plan (HSP)
- Action Plan
- 2007/2008 GSAP Annual Report
- LF007C RPO Work Plan
- LF008 Rebound Study Work Plan
- SS014 Tier 1 POCO Evaluation Work Plan
- ST027B Site Characterization Work Plan
- SS030 RPO Work Plan
- ST032 POCO Technical Memo
- DP039 Bioreactor Work Plan
- 2008 Annual GWTP RPO Report
- Passive Diffusion Bag (PDB) Technical Memo
- RD/RA QAPP Update
- ST032 Tier 1 POCO Evaluation Work Plan
- Phytostabilization Demonstration Technical Memo
- Model QAPP
- LF008 Rebound Test Technical Memo
- Comprehensive Site Evaluation Phase II Work Plan
- Field Sampling Plan (FSP)
- SS016 RPO Work Plan
- ST018 POCO RA Work Plan
- Vapor Intrusion Assessment Report
- GSAP 2008/2009 Annual Report
- FT005 Data Gap Work Plan
- First, Second, & Third Site DP039 Sustainable Bioreactor Demonstration Progress Reports
- DP039 RPO Work Plan
- SD036/SD037 RPO Work Plan
- ST027B Site Characterization Report
- 2009 GWTP RPO Annual Report
- Natural Attenuation Assessment Report (NAAR)
- Union Creek Sites SD001 & SD033 Remedial Action Report
- CAMU 2008-2009 Monitoring Annual Report

# Completed Documents (Historical 2)

- Phytostabilization Study Report
- 2009/2010 Annual GSAP Report
- SS015 Remedy Optimization Field Implementation Plan
- Sites SS014 and ST032 Tier 1 POCO Evaluation Report
- SD036 Remedy Optimization Field Implementation Plan
- 2010 Annual CAMU Inspection Report
- Site ST018 POCO Baseline Implementation Report
- FT005 Data Gaps Investigation Report
- Comprehensive Site Evaluation Phase II Report
- 2010 Groundwater RPO Annual Report
- Focused Feasibility Study (FFS)
- Site ST027-Area B Human Health Risk Assessment
- Site ST027-Area B Ecological Risk Assessment
- Work Plan for Assessment of Aerobic Chlorinated Cometabolism Enzymes
- 2010/2011 Annual GSAP Report
- Baseline Implementation Report (Sites SS015, SS016, SD036, SD037, and DP039)
- 2011 CAMU Annual Report
- Technical and Economic Feasibility Analysis (TEFA)
- Work Plan for RPO of Sites SS016 and SS029
- Site LF007C Data Gaps Investigation Technical Memorandum
- Technical Memorandum for Assessment of Aerobic Chlorinated Cometabolism Enzymes
- Old Skeet Range Engineering Evaluation/Cost Analysis
- 2011 Groundwater Treatment RPO Annual Report
- Groundwater Proposed Plan (PP)
- FT005 Remedial Action Completion Report
- 2012 GSAP Technical Memorandum<sup>24</sup>

# Completed Field Work (Historical1)

- ST027B Gore Sorber Survey–Phase 1
- ST027B Field Sampling – Phase 2
- GSAP 2008 Semi-annual Event
- ST027B Installation of Wells – Phase 3
- SS014 Site Characterization
- LF008 Rebound Study
- GSAP Annual Sampling Event - 2009
- SS030 Site Characterization–Phase 1
- ST027 Site Characterization -Phase 3
- ST014 Monitor Well Install - Subsite 3
- SD001/SD033 Sediment RA
- SS016 Site Characterization (OSA source area)
- ST018 Site Characterization
- SS030 Site Characterization (Off-base VOC Plume)
- DP039 Site Characterization (for Biobarrier Placement)
- SS014 & ST032 Q1 2010 MNA Sampling (2<sup>nd</sup> of 4 quarterly events)
- SD036 Additional Site Characterization (north & east)
- Therm/Ox System Removal
- SS016 Monitoring Well Installation
- SD037 EVO Injection Well Installation
- DP039 Monitoring Well & Injection Well Installation
- DP039 EVO Injection
- SD037 Monitoring Well Installation
- GSAP 2010 Annual Sampling Event
- SD037 EVO Injection
- SS015 Site Characterization
- South Plant GAC Change-out
- FT005 Data Gap Investigation
- SS016 Position Survey of EW03
- SS016 Bioreactor Installation
- SS016 Bioreactor Baseline Sampling
- DP039 Biobarrier Quarterly Performance Sampling



# Completed Field Work (Historical 2)

- DP039 Bioreactor Quarterly Performance Sampling
- SD037 EVO Quarterly Performance Sampling
- SS015 EVO Baseline Sampling
- SD036 EVO Baseline Sampling
- SS016 Bioreactor Startup
- SD036 Injection Wells Installation
- SS015 Injection Wells Installation
- ST018 GETS Installation
- SD036 EVO Injection
- 2010 Semiannual GSAP
- SS015 EVO Injection
- Quarterly RPO Performance Monitoring (Feb 2011)
- ST018 GETS Startup
- Quarterly RPO Performance Monitoring (May 2011)
- 2011 Annual GSAP Sampling
- SS029 GET Shutdown Test (System Optimization analysis)
- Quarterly RPO Performance Monitoring (Aug 2011)
- Quarterly RPO Performance Monitoring (Nov 2011)
- 2011 Semiannual GSAP Sampling
- LF007C Site Characterization (Wetlands)
- FT005 Soil Remedial Action
- Performance Monitoring SS015 (4<sup>th</sup> Quarterly event)
- Sampling for Assessment of Aerobic Chlorinated Cometabolism Enzymes (Feb 21-22)
- 2012 Annual GSAP Sampling
- CAMU Lysimeter Removal
- LF007C GET System Optimization
- SS029/SS016 System Optimization Analysis
- GSAP Semiannual Sampling Event
- Replace electrical wiring for well field at Site SS030

# Site DP039 Bioreactor Monitoring Update

# DP039 Bioreactor Monitoring Results

- 2Q19 GRIP bioreactor sampling results:
  - PZ102x39 (in bioreactor): TCE = ND;  
cis-1,2-DCE = ND, VC = 250 µg/L
  - VC higher in bioreactor than in recent monitoring events
- Resampled PZ102x39 (July 2019):
  - TCE = ND, cis-1,2-DCE = ND, VC = 190 µg/L



| Date      | Vinyl Chloride in Bioreactor |
|-----------|------------------------------|
| 2012-2018 | Up to 42 µg/L                |
| June 2019 | 250 µg/L                     |
| July 2019 | 190 µg/L                     |

# Downgradient of DP039 Bioreactor

- No increase in VC in well pair downgradient of the bioreactor (MW793x39/MW794x39)
- 0.95 J  $\mu\text{g/L}$  and 1.1 J  $\mu\text{g/L}$ , consistent with historical data
- VC degrades quickly in aerobic conditions



# Evaluate Vinyl Chloride within Bioreactor

- New water source to bioreactor
  - Expected to have slightly different geochemistry and microbial population
  - Expected to be short-term issue as bacteria become acclimated to new conditions
- Inject EVO into bioreactor to recharge TOC
- Sample monthly until concentrations return to normal range