

**Travis Air Force Base  
Environmental Restoration Program  
Restoration Program Manager's  
Meeting Minutes  
20 March 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) teleconference on 20 March 2019 at 0930 hours in Building 248 at Travis AFB, California. Attendees included:

Lonnie Duke	AFCEC/CZOW
Glenn Anderson	AFCEC/CZOW
Milton 'Gene' Clare	AFCEC/CZOW
Haekyung Kim	AFCEC/CZRW
(via telephone)	
Sarah Miller	USACE
(via telephone)	
Paul Gedbaw	USACE
(via telephone)	
Merrie Schilter-Lowe	Travis AFB/PA
Ben Fries	DTSC
(via telephone)	
Adriana Constantinescu	RWQCB
(via telephone)	
Nadia Hollan Burke	EPA
(via telephone)	
Indira Balkissoon	TechLaw, Inc.
(via telephone)	
Mike Wray	CH2M/JACOBS
Leslie Royer	CH2M/JACOBS
Jeff Gamlin	CH2M/JACOBS
(via telephone)	
Jill Dunphy	CH2M/JACOBS
(via telephone)	

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 (February 2019)
Attachment 4	CGWTP Monthly Data Sheet (February 2019)

Attachment 5	ST018 Monthly Data Sheet (February 2019)
Attachment 6	Presentation: Enhancement Plan for Site SD034 Technology Demonstration
Attachment 7	Presentation: Program Update

## 1. ADMINISTRATIVE

### A. Previous Meeting Minutes

Ms. Constantinescu asked that Action Item 1 on page 2 be changed to say "...the Water Board can accept the work plan and proposed work may be phased based on findings" rather than "accept the work plan in phases."

Ms. Burke from EPA noted that Action Item 4 on page 3 should say "LUCs will remain in place" rather than "LUCs will be put in place."

### B. Action Item Review

Action items from January 2019 were reviewed.

Action item 1 is ongoing: Ms. O'Sullivan to provide updates on perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). March 2019 update: Mr. Duke had no updates, but indicated that the letter received from the Water Board was somewhat confusing, so the Air Force is having follow-up conversations with Ms. Constantinescu and David Elias. The Water Board will be sending a new letter requesting offbase sampling of private drinking water wells to comply with CERCLA.

Action Item 2 is ongoing: Mr. Duke will continue to provide design and construction information for the new KC-46 Hangar construction project. March 2019 update: The design is complete, and the remedial design/remedial action supplemental work plan has gone out for review. The Air Force cannot start related soil work yet due to ongoing issues with finalizing the NEWIOU Record of Decision Amendment, which has been out for review for an extended period of time.

Action Item 3: Ms. Royer will let EPA know which of the Site ST027B wells showed rebound and led to planned reinjections. March 2019 update: Ms. Royer provided the necessary information. This action item is now closed.

**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).

Mr. Duke stated that there is a very serious issue with getting documents through the review process and finished on time, and that there are consequences. The topic was brought up at the recent Tier 2 meeting and must be addressed. If documents aren't finished on time, the Air Force's response-complete goals, and the promises made therein to taxpayers and Congress, will not be met by the contract deadline. As a result, the funding is jeopardized; the Air Force will need to return funds if the work is not done and goals are not met.

Mr. Duke reminded the team that the Federal Facilities Agreement allows 60 days for all teams within an agency to review: RPM, specialists, and legal departments. Air Force responses to those comments are to be reviewed and resolved quickly. If multiple iterations of the comment/response process are necessary, it is to occur within these 60 days; the clock does not reset for additional iterations once the Air Force responses are submitted. Time is allowed after each RPM meeting to discuss any concerns, and this should be taken advantage of. He added that the Air Force cannot respond to comments until comments from all agencies are received (to assess and address any conflicting or overlapping comments); therefore, a delayed response by one agency holds up the progress of a document.

Mr. Duke stated that at this time, several documents are multiple months behind schedule. Release of a new Toxicity Criteria Regulation during this delayed timeframe is causing additional, now excessive, delays. The new regulation would not have caused issues had the documents been finalized as scheduled. Unfortunately, there are conflicting messages between and among agency RPMs, agency management, review teams, and legal counsel regarding how and when to proceed. Mr. Duke suggested that the regulators check to see if the new regulation impacts the COCs at Travis AFB and let him know as soon as possible. If a meeting with all agencies' attorneys will resolve the issue, he is willing to schedule it.

Mr. Duke noted that the agencies as well as the Air Force share the responsibility for the delays, as well as actions to keep documents on schedule or get delayed documents finalized as soon as possible. He assigned the action item that everyone do what they can within their own organizations to elevate and resolve this situation as soon as possible.

**Travis AFB Annual Meeting and Teleconference Schedule**

The next RPM meeting will be an in-person meeting held on Thursday, 18 April 2019 at 1400. The annual Restoration Advisory Board meeting is scheduled for that evening at 1900.

## Travis AFB Master Document Schedule

Mr. Anderson reinforced Mr. Duke's position regarding document review delays, noting that there are several more documents forthcoming throughout 2019.

Mr. Duke added that there have been issues with the Travis AFB email system since 12 March; any comments sent since then may not have been received. The situation is expected to be resolved within the next 24 hours or so.

- Community Relations Plan Update (CRP): There was no change to the schedule. This document is a low priority until some others are completed.
- Amendment to the NEWIOU Soil ROD for the Travis AFB ERP Sites SS016 and SD033: There was no change to the schedule. The Air Force continues to work on additional follow-on comments from the regulatory agencies as well as the ARAR table amendments that affect State water regulations. **This is a super-critical document** due to site work supporting planned KC-46 hangar construction, and it has been **delayed excessively**. Ms. Burke noted that she was instructed not to review any more RTCs until the request to add the new DTSC Toxicity Rule as an ARAR has been resolved. The Water Board is also resolving ARARs issues with the Air Force attorney.
- No Further Action ROD for Old Skeet Range (TS060 and TS060A MRA): There is no change in the schedule. Responses to comments were sent to the acting Air Force Legal staff in early February and were resent two weeks ago. **This is becoming a critical document, because it affects two site closures.**
- Site SS016 Remedial Design/Remedial Action Work Plan: There was no change in the schedule. This document won't go final until the final Amendment to the NEWIOU Soil ROD is published. 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 extensive delays on the Amendment to the NEWIOU Soil, Sediment and Surface Water ROD.**
- Site SD031 Soil Remedial Investigation/Feasibility Study: No change was made to the schedule. The document lead was changed to Rick Sturm. **This document is important but not time-critical.**
- Fourth Five-Year Review Report for Multiple Groundwater, Soil, and Sediment Sites: No change was made to the schedule. Responses to comments are with Air Force Legal for review. **This document is very important but not critical.**
- Addendum to the Site SS016 Groundwater Remedial Design/Remedial Action Work Plan: The Draft to Agencies and Draft to RAB due dates were changed to 22 February 2019. Ms. Burke indicated that the EPA is hoping to respond before 25 March. Mr. Fries said that he provided DTSC's comments on 7 March. Ms. Constantinescu added that Water Board comments would be submitted by the due date.

- Potrero Hills Annex (FS, PP, and ROD): No change was made to the schedule; Ms. Constantinescu had no additional updates.
- Quarterly Newsletters (April 2019): No change was made to the schedule. DTSC, EPA, and Travis AFB Public Affairs provided comments, the Water Board will not be submitting comments. This newsletter announces the April RAB Meeting so must be delivered a few weeks prior to that.
- 2017 Annual Groundwater Remediation Implementation Status Report (GRISR): No change was made to the schedule. EPA will review Air Force responses to comments by 8 April. Ms. Constantinescu will confirm that the Water Board responded to the Air Force responses to their comments.
- 2018 Annual GRISR: This is a new document. The Pre-Draft to Air Force Service Center was set at 9 May 2019, all other dates were set accordingly. Mr. Duke and Ms. Miller noted that this document must be ready to be finalized before August so that funds are not jeopardized. Ms. Miller added that her team will expedite their review turnaround time, and added that she is concerned about the manpower issue at DTSC discussed earlier. With Mr. Fries retiring in early July, she would like the process for DTSC review in place by the April RPM meeting. Mr. Duke added that vacation season is approaching and requested that everyone have their backup plan for reviews in place well before the summer.
- Site SS015 Soil Sampling Results Technical Memorandum. The Response to Comments meeting date was changed to 13 February 2019; all other dates were changed accordingly. This document is still on schedule.
- Site LF006 Technology Demonstration Construction Completion Report: The Draft to Agencies due date was changed to 5 March 2019 based on actual submittals.
- Site SD043 Remedial Action Completion Report: This is a new document. The Predraft to Air Force Service Center was set at 29 March 2019. All other dates were set accordingly.
- Site SS046 Remedial Action Completion Report: This is a new document. The Predraft to Air Force Service Center was set at 5 April 2019. All other dates were set accordingly.
- 2018 Annual Site LF007 Corrective Action Management Unit Inspection, Monitoring, and Maintenance Report. This is a new document and, at present, all due dates are TBD.
- Subarea LF007C Total Petroleum Hydrocarbon Chromatogram Review Technical Memorandum: The Response to Comments and Final due dates were changed to TBD, because the Water Board is still waiting for laboratory information. Ms. Constantinescu indicated she would send correspondence to the Air Force by 28 March.

- Site SS014 POCO Subsites 4 and 5 Closure Report. This is a new document. The Predraft to Air Force Service Center due date was set at 4 April 2019; all other dates were set accordingly.
- No documents were moved to History this month.

## **2. CURRENT PROJECTS**

### **Treatment Plant Operation and Maintenance Update**

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

The South Base Boundary Groundwater Treatment Plant (SBBGWTP) performed at 23.1% uptime, and 1.3 million gallons of groundwater were extracted and treated in February 2019. All treated water was discharged to Union Creek. The average flow rate for the SBBGWTP was 148.8 gallons per minute (gpm). Electrical power usage was 3,856 kilowatt hours (kWh), and approximately 4,453 pounds of CO<sub>2</sub> were created (based on DOE calculation). Approximately 0.3 pound of volatile organic compounds (VOCs) was removed in February. The total mass of volatile organic compounds (VOCs) removed since startup of the system is 512.4 pounds.

Several sampling events were conducted following the exceedance of 1,2-DCA in the effluent noted in January 2019. As a result, the SBBGWTP was taken offline on 6 February 2019. The carbon from the lead GAC vessel was changed out and the system tested again. Results from this sampling event showed no detections of VOCs in the effluent sample. Full details can be found in Attachment 3.

Troubleshooting activities were performed on several extraction wells in February 2019. Details can be found in Attachment 3.

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

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

The Central Groundwater Treatment Plant (CGWTP) performed at 96.7% uptime with approximately 997,776 gallons of groundwater extracted and treated in February 2019. All treated water was discharged to the storm sewer system which discharges to Union Creek. The average flow rate for the CGWTP was 28.7 gpm. Electrical power usage was 1,980 kWh for all equipment connected to the Central Plant, and approximately 2,353 pounds of CO<sub>2</sub> were generated. Approximately 2.2 pounds of VOCs were removed from groundwater by the treatment plant in February. The total mass of VOCs removed since the startup of the system is 11,512 pounds.

Optimization Activities for CGWTP: The DP039 bioreactor continues to operate in a four-week “pulsed mode.” No other optimization activities are reported for the month of February 2019.

### **LF007C Groundwater Treatment Plant, February 2019**

The Subarea LF007C Groundwater Treatment Plant (LF007C GWTP) has been shut down due to the presence of vernal pools above the treatment area. There is no report for February 2019.

### **ST018 Groundwater (MTBE) Treatment Plant, February 2019 (see Attachment 5)**

Site ST018 (MTBE) Treatment Plant (ST018 GWTP) performed at 100% uptime with approximately 202,220 gallons of groundwater extracted in February 2019. All groundwater was discharged to the Fairfield – Suisun Sewer District. The average flow rate for the ST018 GWTP was 5.0 gpm. Electrical power usage for the month was 116 kWh for all equipment connected to the ST018 GWTP. The total CO<sub>2</sub> equivalent, including an estimate for the carbon change-out, equates to approximately 86 pounds. Approximately 0.31 pound of MTBE, BTEX, VOCs, and TPH was removed in January by the treatment plant, and approximately 0.10 pound of MTBE-only was removed from groundwater. The total BTEX, MTBE and TPH mass removed since the startup of the system is 46.9 pounds, and the total MTBE mass removed since startup of the system is 11.4 pounds.

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

There were no shutdowns of the ST018 GWTP in January 2019; however, because of consecutive cloudy, foggy, and/or rainy days, the extraction wells experienced decreased production throughout the monitoring period.

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

## **3. Presentations:**

### **A) Enhancement Plan for Site SD034 Technology Demonstration (see Attachment 6)**

Mr. Gamlin discussed the planned enhancements to the aerobic “washboard” subgrade biogeochemical reactor (SBGR) technology demonstration at Site SD034. Full details of the presentation can be found in Attachment 6. Highlights include:

- Currently the system pumps on a variable frequency throughout the week and relaxes over the weekend, essentially raising and lowering the water table across the light non-aqueous phase liquid (LNAPL) source area and site. This helps with oxygenation; it stirs things up and promotes biodegradation.
- The extraction wells currently employ iSOCs (oxygen infusion devices) to add more oxygen plus vitamins and nutrients in a slurry of calcium peroxide into the ground then into the aquifer.
- The technology demonstration currently includes two extraction groups; one which operates 3 days per week, and another that operates 2 days per week. The system rests over the weekend (with no groundwater extraction).
- Currently, the system is generating dissolved oxygen (DO), but it is consumed by the bacteria in the SBGR trenches. The calcium peroxide added to the SBGR trenches in the original construction should work for about 2 years to increase DO levels. Indications are that the calcium peroxide is spent; however, perforated pipe was installed during construction of the SBGR trenches so that a biosparge system could be added later.
- The planned enhancement includes addition of a small blower to add additional oxygen to maintain treatment efficiency, since the current supply of calcium peroxide is almost at its end of design life cycle.
- The extraction rate at extraction well EW01x34 is almost zero. It is in an important location and we would like to extract more water from that area, so it will be decommissioned and replaced with a replacement well. The new flow rates will hopefully be more comparable to other wells.
- Monitoring well MW02x34 is in the plume hot spot; it has a steady concentration of VOCs and low dissolved oxygen. A more aggressive plan is needed here in order to capture contaminants before they get to the well. The plan is to add a new extraction well upgradient of this well.
- We would like to keep the technology demonstration moving forward in a slightly more aggressive manner to demonstrate that the site can be cleaned up faster than the original selected remedy.
- The nearby hangar is undergoing a big construction project that will maybe take a year or more. Mr. Wray added that they have met with the contractors there to develop a plan for accomplishing the technology demonstration enhancements.
- Ms. Burke asked if there will be any documentation, such as an addendum to the work plan, to show the location of the new extraction well upgradient of MW02x34. Ms. Royer said that the 2018 GRISR will recommend enhancement and include the details just presented. The way the work is done will be consistent with the work plan. The 2019 GRISR will document the work, including surveyed locations, and sampling data.



## **B) Program Update: Activities Completed, In Progress, and Upcoming (see Attachment 7)**

Mr. Wray reported on the status of fieldwork and documents which are completed, in progress, and upcoming. Mr. Gamlin reported on the progress of the ongoing technology demonstrations. Please refer to Attachment 7 for the full briefing.

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

1. All PMs for all agencies will elevate to their management any suggestions for keeping document reviews on schedule going forward.
2. Ms. Constantinescu will provide Mr. Duke with a list of information needed to match the list of underground storage tanks to current sites.

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

Mr. Fries/DTSC noted that he is retiring in early July 2019. He can review documents received by late May. After that, Mr. Duke will include a note on cover letters sent to DTSC to ensure all reviews stay on track while a replacement is determined. Dominique Forrester will work with the Air Force to ensure all documents are reviewed on time.

Mr. Duke noted that vacation season is approaching and requested that, in light of the document scheduling and delay issues, that everyone have their backup plan for reviews in place well before the summer.

### **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.	All	All PMs for all agencies will elevate to their management any suggestions for keeping document reviews on schedule going forward.	Ongoing	Open
4.	Adriana Constantinescu	Ms. Constantinescu will provide Mr. Duke with a list of information needed to match the list of underground storage tanks to current sites.	March 29, 2019	Open

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

The RPM Teleconference is scheduled for 9:30 AM PST on 20 March 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

- A. TREATMENT PLANT OPERATION AND MAINTENANCE UPDATE

3. PRESENTATIONS

- A. ENHANCEMENT PLAN FOR SD034 TECH DEMO
- B. PROGRAM UPDATE:  
DOCUMENTS & ACTIVITIES COMPLETED, IN PROGRESS AND PLANNED

4. NEW ACTION ITEM REVIEW

5. PROGRAM/ISSUES/UPDATE

- A. MEETING SCHEDULE

NOTES: AFTER THE RPM TELECONFERENCE, 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> <b>(Begins at time noted)</b>	<b>RPM Teleconference</b> <b>(Begins at time noted)</b>	<b>Restoration Advisory Board</b> <b>Meeting</b> <b>(Begins at 7:00 p.m.)</b> <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.

## Travis AFB Master Meeting and Document Schedule

PRIMARY DOCUMENTS			
Life Cycle	Community Relations Plan Update Travis AFB, Glenn Anderson CH2M, Jill Dunphy	Amendment to the NEWIOU Soil ROD for the Travis AFB ERP Sites SS016 and SD033 Travis AFB, Glenn Anderson CH2M, Latonya Coleman	No Further Action ROD for Old Skeet Range (TS060 MRA) 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	TBD	TBD
Draft Final Due	TBD	TBD	TBD
Final Due	TBD	TBD	TBD

## Travis AFB Master Meeting and Document Schedule

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

## Travis AFB Master Meeting and Document Schedule

PRIMARY DOCUMENTS		
Life Cycle	Fourth Five-Year Review Report for Multiple Groundwater, Soil, and Sediment Sites Travis AFB, Glenn Anderson Tetra Tech, Joachim Eberharter	Addendum to the Site SS016 Groundwater Remedial Design/Remedial Action Work Plan Travis AFB, Lonnie Duke 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>	TBD	04-18-19
Agency Concurrence with Remedy	NA	NA
Public Comment Period	NA	NA
<b>Public Meeting</b>	NA	NA
Response to Comments Due	TBD	05-03-19
Draft Final Due	TBD	05-03-19
Final Due	TBD	06-03-19

## Travis AFB Master Meeting and Document Schedule

PRIMARY DOCUMENTS			
Life Cycle	Potrero Hills Annex Travis, Glenn Anderson		
	FS	Proposed Plan	ROD
<b>Scoping Meeting</b>	<b>180 days after Water Board 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



## Travis AFB Master Meeting and Document Schedule

INFORMATIONAL DOCUMENTS				
Life Cycle	Quarterly Newsletter (April 2019) Travis, Glenn Anderson	2017 Annual GRISR Travis AFB, Glenn Anderson CH2M, Leslie Royer	2018 Annual GRISR Travis AFB, Glenn Anderson CH2M, Leslie Royer	Site SS015 Soil Sampling Results Technical Memorandum Travis AFB, Glenn Anderson CH2M HILL, Levi Pratt
<b>Scoping Meeting</b>	NA	NA	NA	NA
Predraft to AF/Service Center	02-26-19	05-09-18	05-09-19	10-17-18
AF/Service Center Comments Due	NA	06-11-18	06-10-19	10-31-18
Draft to Agencies	03-05-19	07-19-18	07-02-19	11-20-18
Draft to RAB	NA	07-19-18	07-02-19	11-20-18
Agency Comments Due	03-19-19	11-19-18 (01-31-19) (02-08-19)	08-02-19	12-21-18
<b>Response to Comments Meeting</b>	<b>03-20-19</b>	<b>01-16-19 (02-13-19)</b>	08-21-19	02-13-19
Response to Comments Due	4-03-19	TBD	09-06-19	03-13-19
Draft Final Due	NA	NA	NA	NA
Final Due	4-04-19	TBD	09-06-19	03-13-19
Public Comment Period	NA	NA	NA	NA
<b>Public Meeting</b>	NA	NA	NA	NA

## Travis AFB Master Meeting and Document Schedule

INFORMATIONAL DOCUMENTS				
Life Cycle	Site LF006 Technology Demonstration Construction Completion Report Travis AFB, Glenn Anderson CH2M HILL, Levi Pratt	Site SD043 Remedial Action Completion Report Travis AFB, Glenn Anderson CH2M, Levi Pratt	Site SS046 Remedial Action Completion Report Travis AFB, Glenn Anderson CH2M, Doug Berwick CAPE, Meg Greenwald	2018 Annual Site LF007 Corrective Action Management Unit Inspection, Monitoring, and Maintenance Report Travis AFB, Milton Clare CH2M, Levi Pratt
<b>Scoping Meeting</b>	NA	NA	NA	NA
Predraft to AF/Service Center	12-19-18	03-29-19	04-05-19	TBD
AF/Service Center Comments Due	01-09-19	04-12-19	04-19-19	TBD
Draft to Agencies	03-05-19	04-29-19	05-06-19	TBD
Draft to RAB	03-05-19	04-29-19	05-06-19	TBD
Agency Comments Due	04-04-19	05-30-19	06-06-19	TBD
<b>Response to Comments Meeting</b>	04-18-19	06-19-19	06-19-19	TBD
Response to Comments Due	05-15-19	07-09-19	07-15-19	TBD
Draft Final Due	NA	NA	NA	NA
Final Due	05-15-19	07-09-19	07-15-19	TBD
Public Comment Period	NA	NA	NA	NA
<b>Public Meeting</b>	NA	NA	NA	NA

## Travis AFB Master Meeting and Document Schedule

INFORMATIONAL DOCUMENTS		
Life Cycle	Subarea LF007C Total Petroleum Hydrocarbon Chromatogram Review Technical Memorandum Travis AFB, Glenn Anderson CH2M HILL, Leslie Royer	Site SS014 POCO Subsites 4 and 5 Closure Report Travis AFB, Glenn Anderson CH2M, Tony Chakurian
<b>Scoping Meeting</b>	NA	NA
Predraft to AF/Service Center	09-05-18	04-04-19
AF/Service Center Comments Due	09-19-18	04-18-19
Draft to Agencies	09-24-18	05-03-19
Draft to RAB	09-24-18	05-03-19
Agency Comments Due	10-24-18 (12-19-18)	06-03-19
<b>Response to Comments Meeting</b>	<b>01-16-19</b>	06-19-19
Response to Comments Due	TBD	07-11-19
Draft Final Due	NA	NA
Final Due	TBD	07-11-19
Public Comment Period	NA	NA
<b>Public Meeting</b>	NA	NA

# South Base Boundary Groundwater Treatment Plant Monthly Data Sheet

Report Number: 220

Reporting Period: 1 February 2019 – 28 February 2018

Date Submitted: 14 March 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 February 2019 reporting period.

Table 1 – Operations Summary – February 2019					
Initial Data Collection:		2/1/2019 12:00	Final Data Collection:	2/28/2019 14:00	
Operating Time:		Percent Uptime:	Electrical Power Usage:		
SBBGWTP:	150 hours	SBBGWTP:	23.1%	SBBGWTP:	3,856 kWh (4,453 lbs CO <sub>2</sub> generated <sup>a</sup> )
Gallons Treated: 1.3 million gallons			Gallons Treated Since July 1998: 1,096 million gallons		
Volume Discharged to Union Creek: 1.3 million gallons			Gallons Treated from Other Sources: 0 gallons		
VOC Mass Removed: 0.3 lbs <sup>b</sup>			VOC Mass Removed Since July 1998: 512.4 lbs		
Rolling 12-Month Cost per Pound of Mass Removed: \$12,512 <sup>c</sup>					
Monthly Cost per Pound of Mass Removed: \$57,251 <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 February 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> – February 2019							
FT005 <sup>b</sup>				SS029		SS030	
EW01x05	Offline	EW743x05	Offline	EW01x29	Offline <sup>c</sup>	EW01x30	17.9
EW02x05	Offline	EW744x05	3.3	EW02x29	Offline <sup>c</sup>	EW02x30	3.7
EW03x05	Offline	EW745x05	12.9	EW03x29	3.7	EW03x30	15.9
EW731x05	7.1	EW746x05	Offline	EW04x29	7.2	EW04x30	25.0
EW732x05	Offline	EW2291x05	2.5	EW05x29	8.7	EW05x30	1.1
EW733x05	Offline	EW2782x05	6.1	EW06x29	8.1	EW2174x30	8.5
EW734x05	2.8	EW2783x05	6.8	EW07x29	13.0	EW711x30	1.5
EW735x05	12.0	EW2784x05	12.0			MW269x30	1.0
EW736x05	Offline	EW2785x05	5.0				
EW737x05	Offline	EW2786x05	14.0				
EW742x05	Offline						
FT005 Total: 84.5				SS029 Total: 40.7		SS030 Total: 74.6	
SBBGWTP Average Monthly Flow <sup>d</sup> : 148.8 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> 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	4 February 2019	12:00	4 February 2019	12:30	Collect a GAC sample for waste disposal profile.
SBBGWTP	6 February 2019	13:45	27 February 2019	13:30	Preparations for carbon change out.
<sup>a</sup> Shutdown and restart times estimated based on field notes SBBGWTP = South Base Boundary Groundwater Treatment Plant					

## Summary of O&M Activities

Monthly groundwater treatment samples were collected at the SBBGWTP on 4 February 2019. Sample results are presented in Table 4. The total VOC concentration (26.40 µg/L) in the influent sample increased slightly from the January 2019 sample results (26.00 µg/L). TCE was the primary VOC detected in the influent sample at a concentration of 25 µg/L. TCE, cis-1,2-DCE, and chloroform were detected in the midpoint sampling location at low concentrations. Cis-1,2-DCE and chloroform were detected in the effluent sample, and these concentrations were less than the instantaneous maximum effluent discharge limit of 5.0 µg/L.

As presented in the January 2019 Monthly Data Sheet, the concentration of 1,2-DCA in the January 2019 effluent sample (0.63 µg/L) slightly exceeded its effluent limitation of 0.5 µg/L. In accordance with the VOC and Fuel General NPDES permit (Order No. R2-2017-0048, effective January 1, 2019), confirmation samples from the effluent and receiving water locations were collected on 1 February 2019. The samples were sent for laboratory analysis with an expedited turnaround time on 1 February 2019.

The February monthly O&M samples were collected after the confirmation samples were collected but before confirmation results were reported by the laboratory. Monthly O&M samples for February 2019 were collected on 4 February, and analytical results from the confirmation samples were received on 6 February 2019. A sample of the spent GAC from the lead vessel was collected after monthly O&M samples had been collected on 4 February 2019. This sample was collected in order to obtain a waste disposal profile. The SBBGWTP was off line for approximately 30 minutes to collect the GAC sample.

Sample results from the confirmation samples again showed an exceedance for 1,2-DCA (0.66 µg/L) in the effluent sample location. As a result of the confirmed effluent exceedance, the SBBGWTP was taken off line at approximately 13:45 on 6 February 2019. Table 5 presents analytical results from the confirmation sampling event on 1 February 2019.

On 21 February 2019, the carbon was changed out from the lead GAC vessel. On 22 February 2019, the treatment plant was restarted for approximately 4 hours to collect treatment plant samples. Following this sampling event, the SBBGWTP was taken off line again while awaiting analytical results. These results were received on 27 February 2019 and showed no detections of VOCs in the effluent sample. Therefore, on 27 February, the SBBGWTP was brought back online. Analytical data from the 22 February sampling event are presented in Table 6.

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

- EW735x05 – Replaced flow totalizer; however, the well has repeated flow meter fouling. Well is currently operating.
- MW269x30 – Replaced the pump. Well is currently off line.

Figure 1 presents the influent 1,2-DCA and TCE concentrations since January 2017. The 1,2-DCA and TCE concentration have been sporadic and are dependent on 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 mostly non-detect since July through November 2018. Analytical results from the December 2018 and January 2019 monthly sampling events, along with results from confirmation and post-carbon-change sampling events showed concentrations of 1,2-DCA at various locations in the process train (influent, midpoint, effluent). 1,2-DCA was not detected at any location based on results from the February 2019 monthly sampling event on 4 February 2019.

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

## Optimization Activities

No optimization activities occurred at the SBBGWTP in February 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 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 February 2019, the SBBGWTP produced approximately 4,453 pounds of GHG, which includes approximately 1,600 pounds of GHG generated from GAC change out services averaged to a per month basis. The low GHG production is a result of the SBBGWTP being off line for the majority of the reporting period.

TABLE 4

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

Constituent	Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	4 February 2019 (µg/L)		
				Influent	Midpoint	Effluent
Halogenated Volatile Organics						
Acetone	NA	2.1	0	ND	ND	ND
Bromodichloromethane	NA	0.29	0	ND	ND	ND
Carbon Tetrachloride	0.5	0.15	0	ND	ND	ND
Chloroform	5.0	0.12	0	ND	0.16 J	0.18 J
Chloromethane	NA	0.25	0	ND	ND	ND
1,1-Dichloroethane	5.0	0.15	0	ND	ND	ND
1,2-Dichloroethane	0.5	0.22	1	ND	ND	ND
1,1-Dichloroethene	5.0	0.14	0	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.15	0	1.4	1.7	0.29 J
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	25	7.6	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	16	0	NM	NM	ND
Total Petroleum Hydrocarbons – Motor Oil	50	160	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 Confirmation Groundwater Analytical Data for January 2019 – South Base Boundary Groundwater Treatment Plant

Constituent	Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	1 February 2019 (µg/L)		
				Effluent	Receiving Water Upstream	Receiving Water Downstream
Halogenated Volatile Organics						
Acetone	NA	2.1	0	3 J+	ND	2.3 J
Bromodichloromethane	NA	0.29	0	ND	ND	ND
Carbon Tetrachloride	0.5	0.15	0	ND	ND	ND
Chloroform	5.0	0.12	0	0.20 J+	ND	ND
Chloromethane	NA	0.25	0	ND	ND	ND
1,1-Dichloroethane	5.0	0.15	0	ND	ND	ND
1,2-Dichloroethane	0.5	0.22	1	0.66 J+	ND	0.25 J
1,1-Dichloroethene	5.0	0.14	0	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.15	0	0.36 J+	ND	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	ND	ND	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						
Hardness, as CaCO <sub>3</sub> (mg/L)	NA	1.3	0	NM	450	420
Salinity (ppth)	NA	0.1	0	NM	1.0	1.1

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

Notes:

CaCO<sub>3</sub> = calcium carbonate

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 high

mg/L = milligrams per liter

NA = not applicable

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

ND = not detected

NM = not measured

ppth = parts per thousand

µg/L = micrograms per liter

TABLE 6

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

				22 February 2019 (µg/L)		
Constituent	Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	Influent	Midpoint	Effluent
Halogenated Volatile Organics						
Acetone	NA	2.1	0	ND	ND	ND
Bromodichloromethane	NA	0.29	0	ND	ND	ND
Carbon Tetrachloride	0.5	0.15	0	ND	ND	ND
Chloroform	5.0	0.12	0	ND	ND	ND
Chloromethane	NA	0.25	0	ND	ND	ND
1,1-Dichloroethane	5.0	0.15	0	ND	ND	ND
1,2-Dichloroethane	0.5	0.22	1	0.35 J	0.63 J	ND
1,1-Dichloroethene	5.0	0.14	0	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.15	0	1.6	0.52 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	25	ND	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	NM
Total Petroleum Hydrocarbons – Diesel	50	16	0	NM	NM	NM
Total Petroleum Hydrocarbons – Motor Oil	50	160	0	NM	NM	NM

\* 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

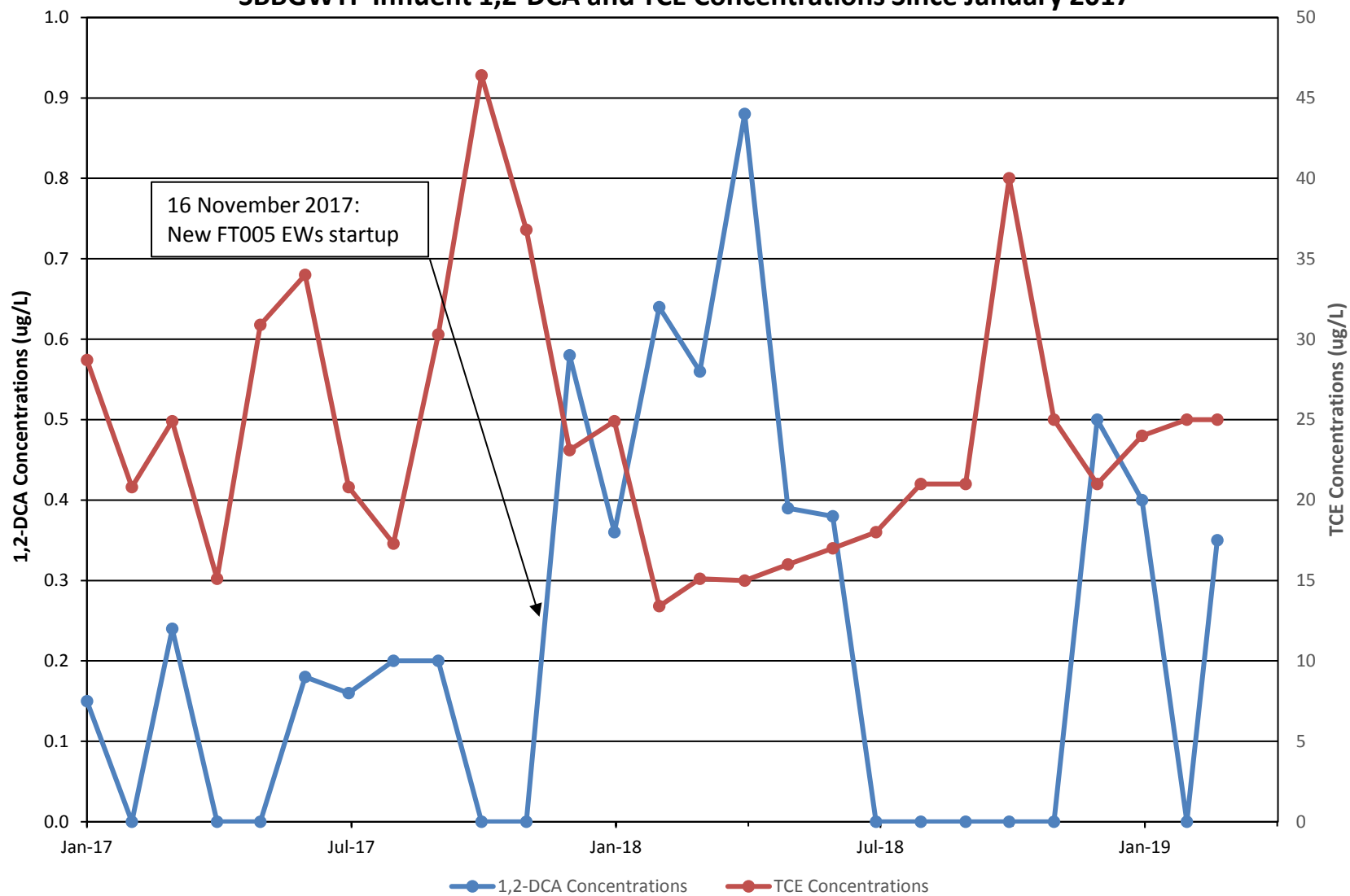
ND = not detected

NM = not measured

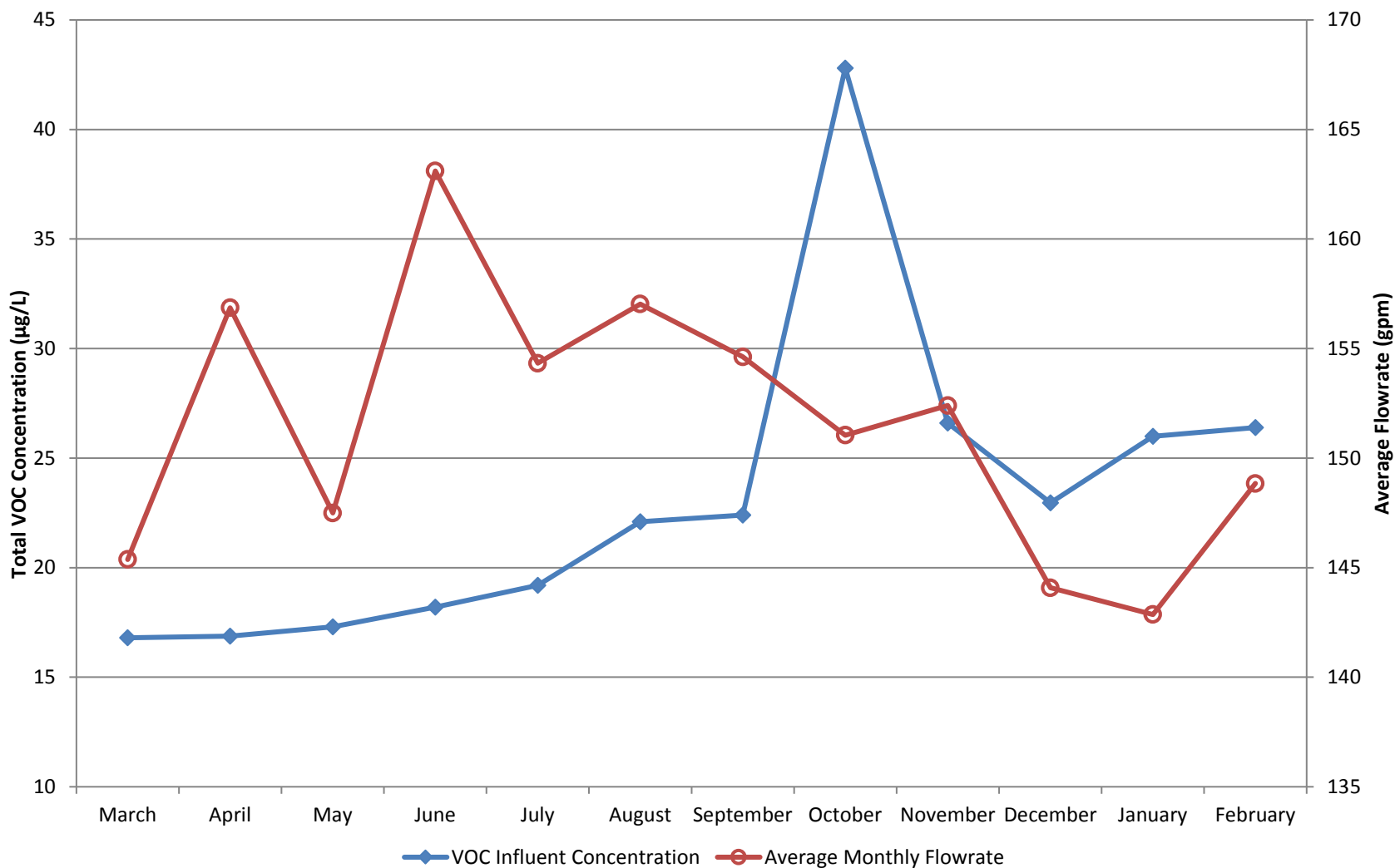
µg/L = micrograms per liter

**Figure 1**

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

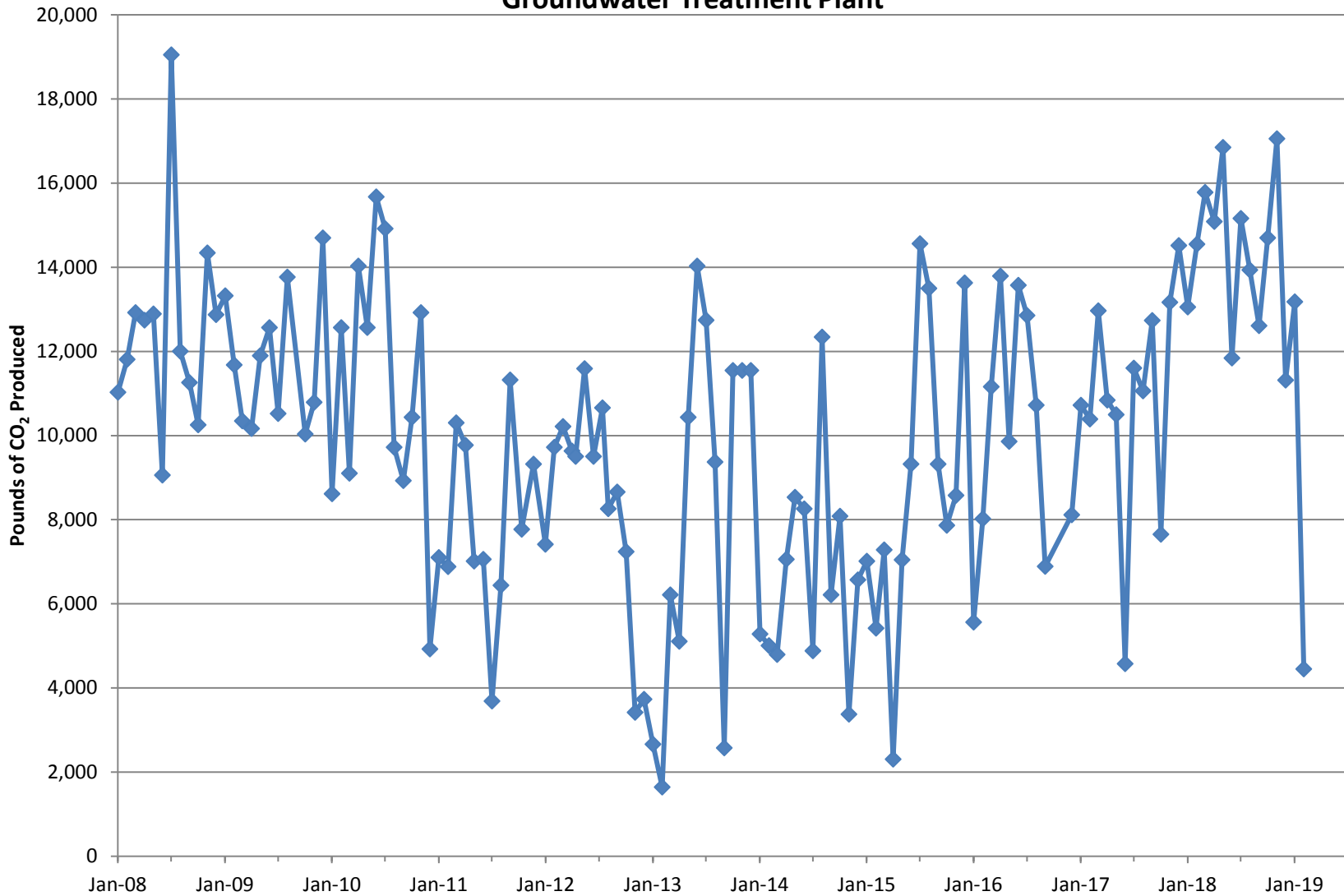


**Figure 2**  
**SBBGWTP Total VOC Influent Concentrations and Average Flowrate Twelve Month History**



**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: 235

Reporting Period: 1 February 2019 – 26 February 2019

Date Submitted: 14 March 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 February 2019 reporting period.

Table 1 – Operations Summary – February 2019			
Initial Data Collection:		2/1/2019 12:00	
Final Data Collection:		2/26/2019 10:00	
Operating Time:		Percent Uptime:	
CGWTP: 578 hours		CGWTP: 96.7%	
		Electrical Power Usage:	
		CGWTP: 1,980 kWh (2,353 lbs CO <sub>2</sub> generated <sup>a</sup> )	
Gallons Treated (discharge to storm sewer): 997,776 gallons		Gallons Treated Since January 1996: 566.0 million gallons	
VOC Mass Removed from groundwater: 2.2 lbs <sup>b</sup>		VOC Mass Removed Since January 1996:	
		2,826 lbs from groundwater	
		8,686 lbs from vapor	
Rolling 12-Month Cost per Pound of Mass Removed: \$3,958 <sup>c</sup>			
Monthly Cost per Pound of Mass Removed: \$4,283 <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 February 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> – February 2019	
Location	Average Flow Rate Groundwater (gpm)
EW001x16	12.7
EW002x16	9.1
EW003x16	0.2
EW605x16	5.9
EW610x16	2.6
CGWTP	28.7
<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. 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	5 February 2019	13:25	6 February 2019	09:00	High influent tank alarm.
-- = Date/Time not recorded					
<sup>a</sup> Shutdown and restart times estimated based on field notes					
CGWTP = Central Groundwater Treatment Plant					

Table 4 presents a twelve-month summary of the Site DP039 bioreactor recirculation well pulsing dates.

<b>Table 4 – Summary of DP039 Bioreactor “Pulsed Mode” Operations</b>		
<b>Location</b>	<b>Pulse-on Date</b>	<b>Pulse-off Date</b>
MW750x39	19 February 2018	21 March 2018
	16 April 2018	14 May 2018
	12 June 2018	9 July 2018
	7 August 2018	6 September 2018
	1 October 2018	30 October 2018
	27 November 2018	24 December 2018
	23 January 2019	26 February 2019
MW = Monitoring Well		

## Summary of O&M Activities

Monthly groundwater treatment samples were collected at the CGWTP on 4 February 2019. Sample results are presented in Table 5. The total VOC concentration (263.04 µg/L) in the February 2019 influent sample has increased from the January 2019 sample (183.68 µg/L). TCE was the primary VOC detected in the influent sample at a concentration of 220 µg/L. Vinyl chloride (0.15 J µg/L) was detected in the sample after the first carbon vessel. No VOCs were detected in the sample collected after the second carbon vessel 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 February 2019.

On 5 February, the CGWTP shut down because of high level alarm in the influent holding tank. On 6 February, the influent holding tank was drained down to approximately 6 feet before the alarms were reset.

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 a decreasing trend over the past 12 months along with a decreasing trend for the flow rate through the treatment plant. Flow rates have been gradually increasing since November 2018.

The Site DP039 subgrade biogeochemical reactor (SBGR), also known as a bioreactor, continued to operate in a four-week “pulsed mode” to optimize distribution of total organic carbon (TOC). The bioreactor was taken off line on 26 February 2019.

## Optimization Activities

No optimization activities occurred at the CGWTP in February 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 2,353 pounds of GHG during February 2019.



TABLE 5  
Summary of Groundwater Analytical Data for February 2019 – Central Groundwater Treatment Plant

				4 February 2019 (µg/L)			
Constituent	Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	Influent	After Carbon 1 Effluent	After Carbon 2 Effluent	System Effluent
Halogenated Volatile Organics							
Acetone	NA	2.1 – 11	0	ND	ND	ND	ND
Chloroform	5.0	0.12 – 0.60	0	ND	ND	ND	ND
Chloromethane	NA	0.25 – 1.3	0	ND	ND	ND	ND
1,2-Dichlorobenzene	5.0	0.14 – 0.70	0	0.31 J	ND	ND	ND
1,3-Dichlorobenzene	5.0	0.11 – 0.55	0	0.31 J	ND	ND	ND
1,4-Dichlorobenzene	5.0	0.13 – 0.65	0	ND	ND	ND	ND
1,1-Dichloroethane	5.0	0.15 – 0.75	0	ND	ND	ND	ND
1,2-Dichloroethane	0.5	0.22 – 1.1	0	ND	ND	ND	ND
1,1-Dichloroethene	5.0	0.14 – 0.70	0	0.51 J	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.15 – 0.50	0	39	ND	ND	ND
trans-1,2-Dichloroethene	5.0	0.15 – 0.55	0	2.3	ND	ND	ND
Methylene Chloride	5.0	0.35 – 1.8	0	ND	ND	ND	ND
Tetrachloroethene	5.0	0.15 – 0.75	0	0.44 J	ND	ND	ND
1,2,3-Trichlorobenzene	5.0	0.14 – 0.70	0	ND	ND	ND	ND
1,1,1-Trichloroethane	5.0	0.19 – 0.95	0	ND	ND	ND	ND
1,1,2-Trichloroethane	5.0	0.31 – 1.6	0	ND	ND	ND	ND
Trichloroethene	5.0	0.16 – 1.6	0	220	ND	ND	ND
Vinyl Chloride	0.5	0.22 – 1.1	0	0.17 J	0.15 J	ND	ND
Non-Halogenated Volatile Organics							
Benzene	1.0	0.13 – 0.65	0	ND	ND	ND	ND
Ethylbenzene	5.0	0.15 – 0.75	0	ND	ND	ND	ND
Toluene	5.0	0.25 – 1.3	0	ND	ND	ND	ND
Total Xylenes	5.0	0.18 – 0.90	0	ND	ND	ND	ND
Other							
Total Petroleum Hydrocarbons – Gasoline (C6 – C10)	50	10	0	NM	NM	NM	ND
Total Petroleum Hydrocarbons – Diesel (C10 – C28)	50	15 – 17	0	NM	NM	NM	ND
Total Petroleum Hydrocarbons – Motor Oil (C28 – C40)	50 (trigger)	160 - 180	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

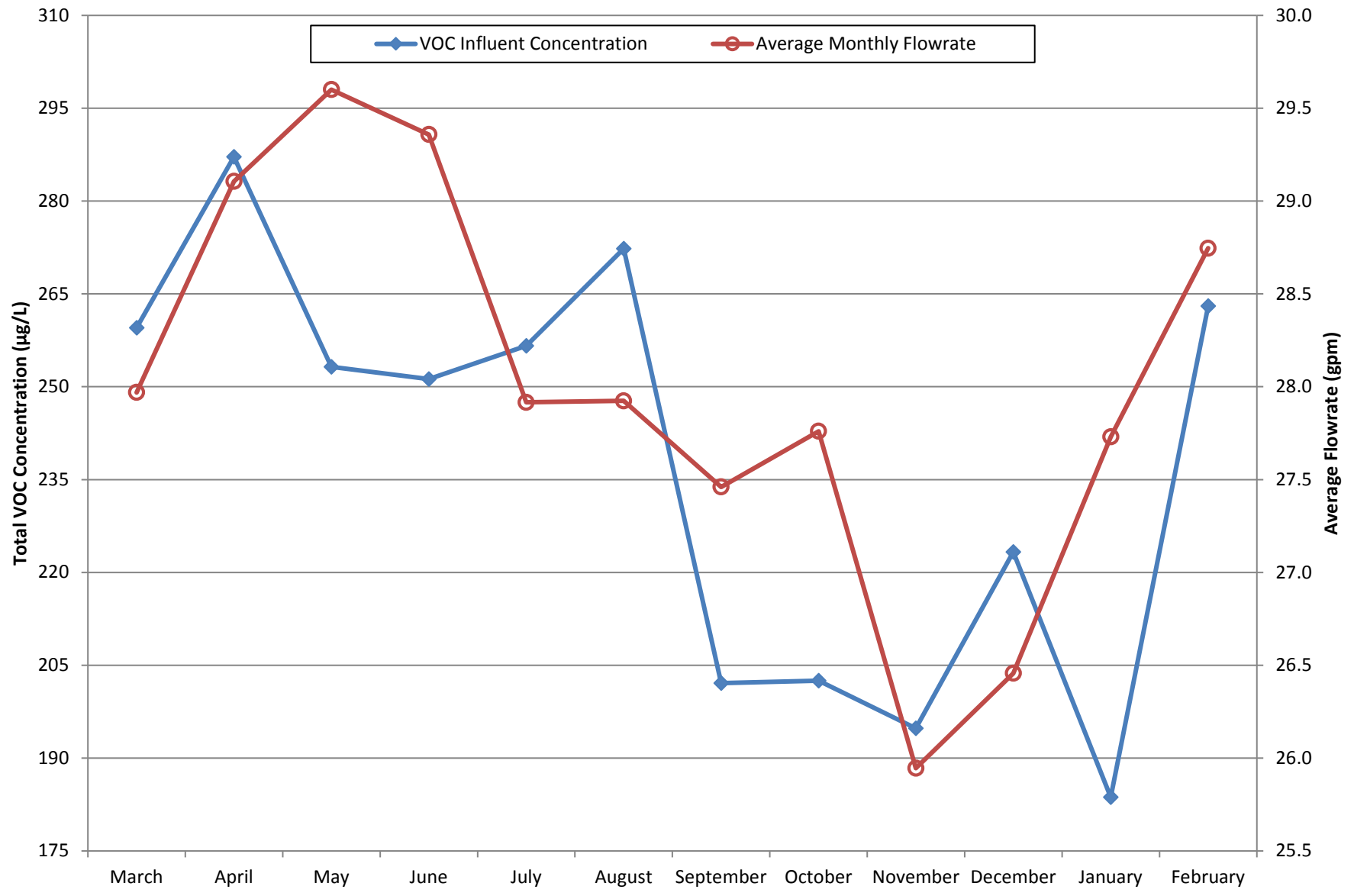
NM = not measured

µg/L = micrograms per liter

mg/L = milligrams per liter

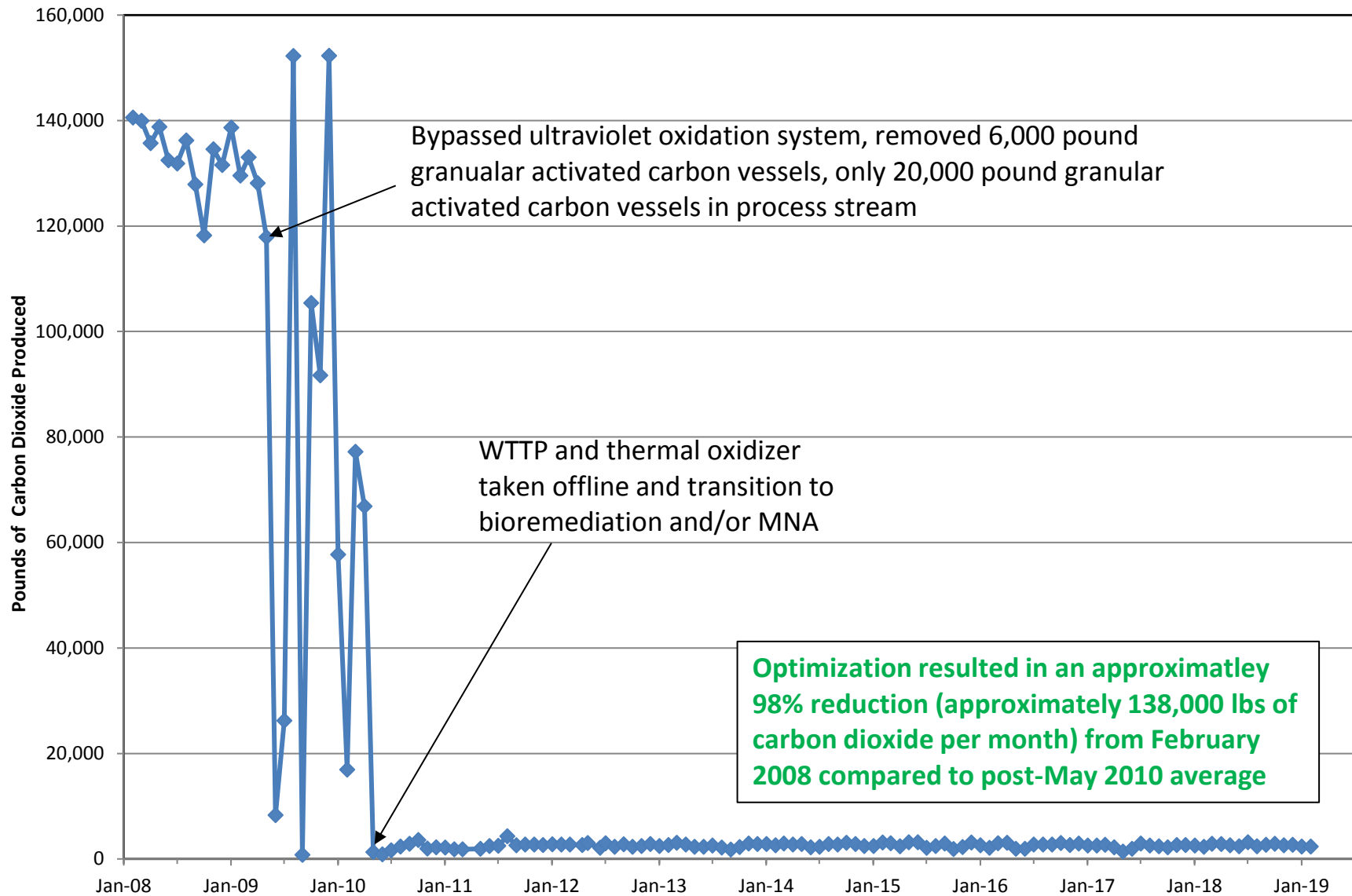
**Figure 1**

**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**



# Site ST018 Groundwater Treatment Plant

## Monthly Data Sheet

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Report Number: 096

Reporting Period: 1 February 2019 – 1 March 2019

Date Submitted: 14 March 2019

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

### System Metrics

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

Table 1 – Operations Summary – February 2019			
Initial Data Collection:	2/1/2019 13:45	Final Data Collection:	3/1/2019 09:00
Operating Time:		Percent Uptime:	Electrical Power Usage:
ST018GWTP: 668 hours		ST018GWTP: 100%	ST018GWTP: 116 kWh (86 lbs CO <sub>2</sub> generated <sup>a</sup> )
Gallons Extracted: 202,220 gallons		Gallons Extracted Since March 2011: 16.6 million gallons	
Volume Discharged to Sanitary Sewer: 202,220 gallons		Final Totalizer Reading: 16,571,349 gallons	
Cumulative Volume Discharged to Sanitary Sewer since 1 November 2014: 10,075,175 gallons			
MTBE, BTEX, VOC, TPH Mass Removed: 0.31 lbs <sup>b</sup>		MTBE, BTEX, VOC, TPH Mass Removed Since March 2011: 46.9 lbs	
MTBE (Only) Removed: 0.10 lbs <sup>b</sup>		MTBE (Only) Mass Removed Since March 2011: 11.4 lbs	
Rolling 12-Month Cost per Total Pounds of Mass Removed: \$10,033 <sup>bc</sup>			
Monthly Cost per Pound of Mass Removed: \$11,990 <sup>bc</sup>			
<sup>a</sup> SiteWise™ estimate that 1 kilowatt hour generated produces 0.74 pounds of GHG.			
<sup>b</sup> Calculated using February 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 – February 2019</b>		
<b>Location</b>	<b>Average Flow Rate Groundwater (gpm)<sup>a</sup></b>	<b>Hours of Operation</b>
EW2014x18	1.0	668
EW2016x18	1.0	668
EW2019x18	1.3	668
EW2333x18	1.2	668
ST018GWTP	5.0	668
<sup>a</sup> Flow rates calculated by dividing total gallons processed by amount of operating time of the pump/system. gpm = gallons per minute 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 <sup>a</sup> Shutdown and restart times estimated based on field notes ST018GWTP = Site ST018 Groundwater Treatment Plant					

## Summary of O&M Activities

Monthly groundwater discharge samples were collected at the ST018GWTP on 4 February 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 February 2019 laboratory data report is available upon request. The MTBE discharge concentration during the February 2019 sampling event was 60 µg/L, which is an increase from the January 2019 sample result of 16 µg/L. TPH-g (100 J+ µg/L), benzene (7.7 µg/L), ethylbenzene (5.4 J µg/L), toluene (0.27 J µg/L), and total xylenes (0.62 J µg/L) were also detected in the system discharge sample.

There were no shutdowns of the ST018GWTP in February 2019; however, because of consecutive cloudy, foggy, and/or rainy days, the extraction wells experienced decreased production throughout the monitoring period.

The Fairfield-Suisun Sewer District does not currently have a local 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.

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 a decreasing trend; however, flow rates have been steadily increasing since December 2018. The extracted MTBE concentrations and extracted total concentrations have generally been fluctuating over the past 12 months with overall flat and decreasing trend, respectively.

## Optimization Activities

No optimization activities occurred at the ST018GWTP in February 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 86 pounds of GHG during February 2019 and removed 202,220 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. Since the GAC vessels were bypassed, a slightly less amount of electricity is required.

TABLE 4

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

Constituent	Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	4 February 2019 (µg/L)
				System Discharge
Fuel Related Constituents				
Methyl tert-Butyl Ether	6,400	0.25	0	60
Benzene	25,000 <sup>a</sup>	0.16	0	7.7
Ethylbenzene	25,000 <sup>a</sup>	0.16	0	5.4
Toluene	25,000 <sup>a</sup>	0.17	0	0.27 J
Total Xylenes	25,000 <sup>a</sup>	0.19 – 0.34	0	0.62 J
Total Petroleum Hydrocarbons – Gasoline	50,000 <sup>b</sup>	10	0	100 J+
Total Petroleum Hydrocarbons – Diesel	50,000 <sup>b</sup>	15	0	ND
Total Petroleum Hydrocarbons – Motor Oil	100,000	160	0	ND
Other				
1,2-Dichloroethane	20	0.13	0	ND
1,2,4-Trimethylbenzene	NA	0.15	0	1.8
1,3,5-Trimethylbenzene	NA	0.16	0	1.1
Carbon Tetrachloride	NA	0.19	0	ND
Isopropylbenzene	NA	0.19	0	0.41 J
Methylene chloride	NA	0.32	0	ND
Naphthalene	NA	0.22	0	4.7
N-Propylbenzene	NA	0.16	0	1.1

\* 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

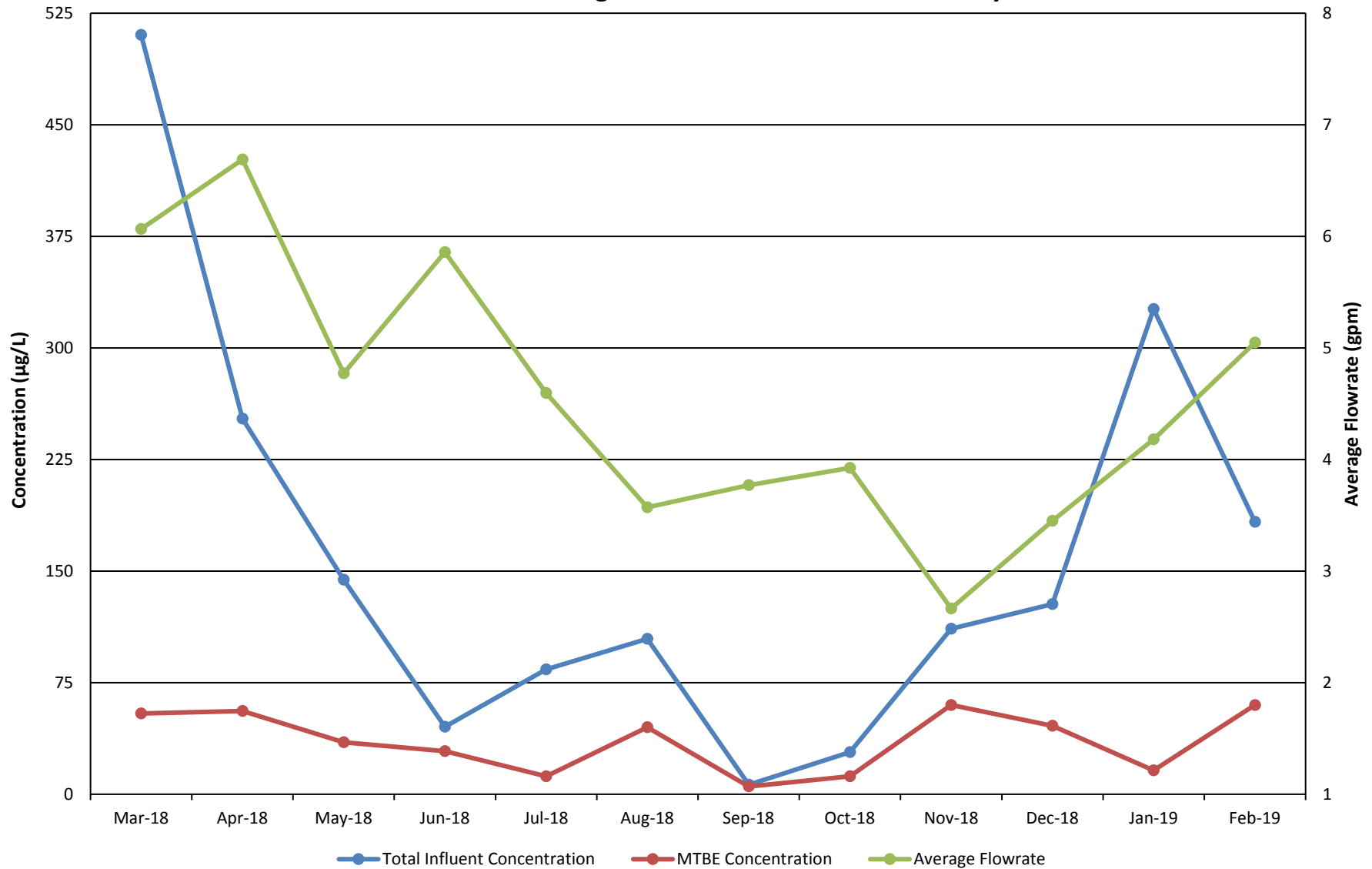
J+ = analyte concentration is considered an estimated value, biased high

NA = not applicable

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

ND = not detected above method detection limit

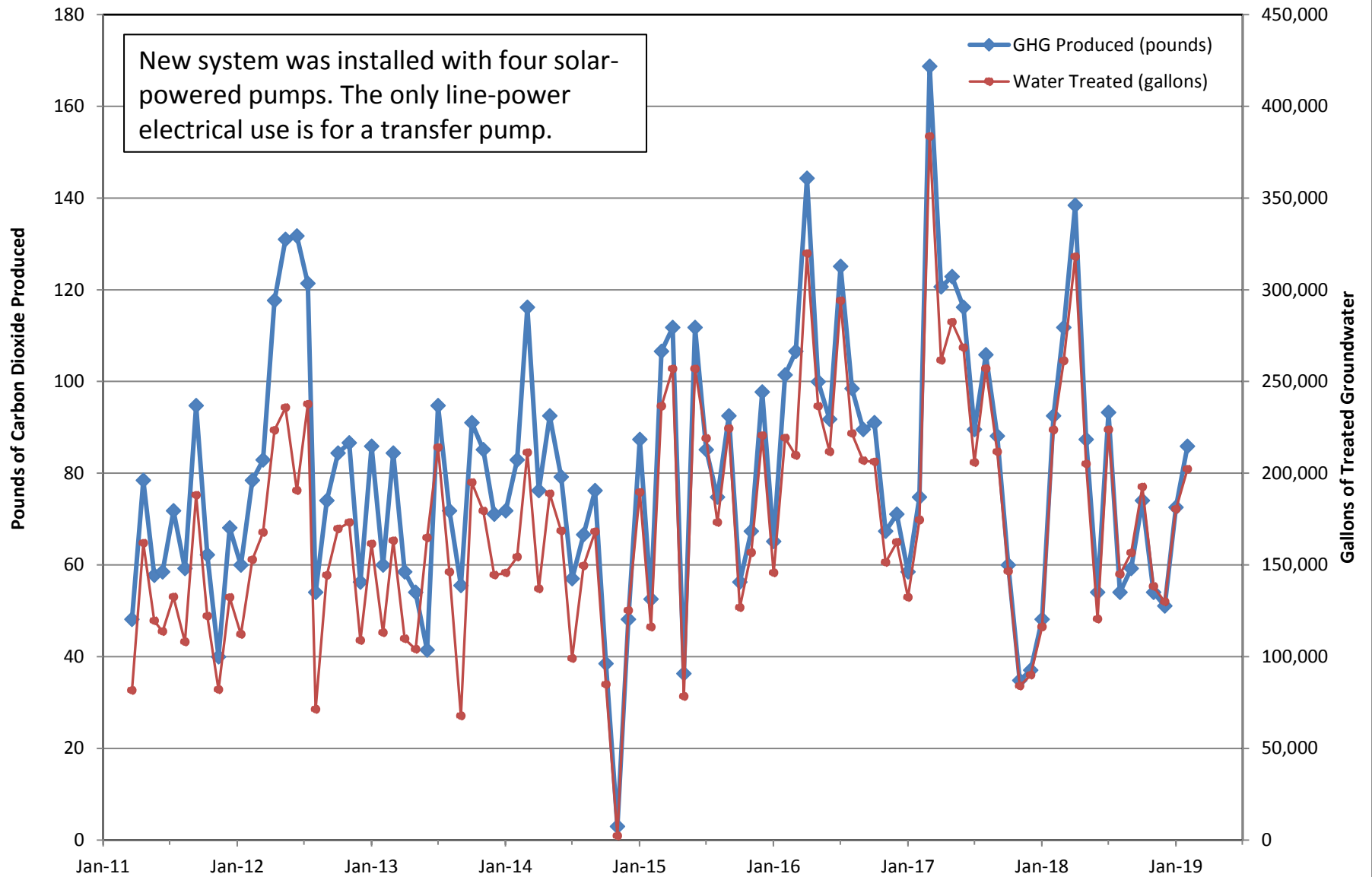
**Figure 1**  
**ST018GWTP Total VOC and MTBE Concentrations**  
**and Average Flowrate Twelve Month History**





## Figure 2

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



# Enhancement Plan for Site SD034 Technology Demonstration

March 20, 2019



**JACOBS®**

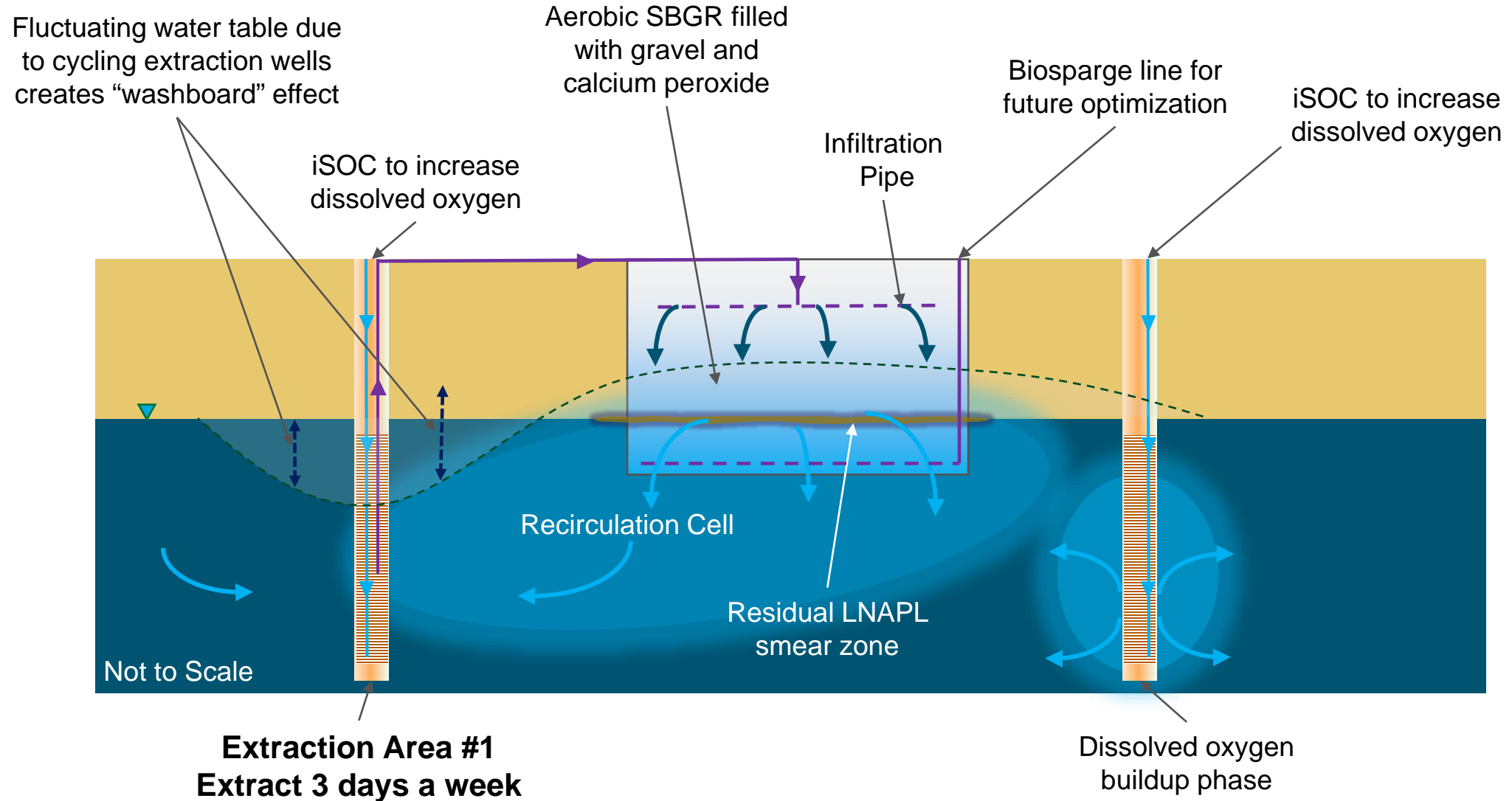
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# Travis AFB Site SD034 Technology Demonstration

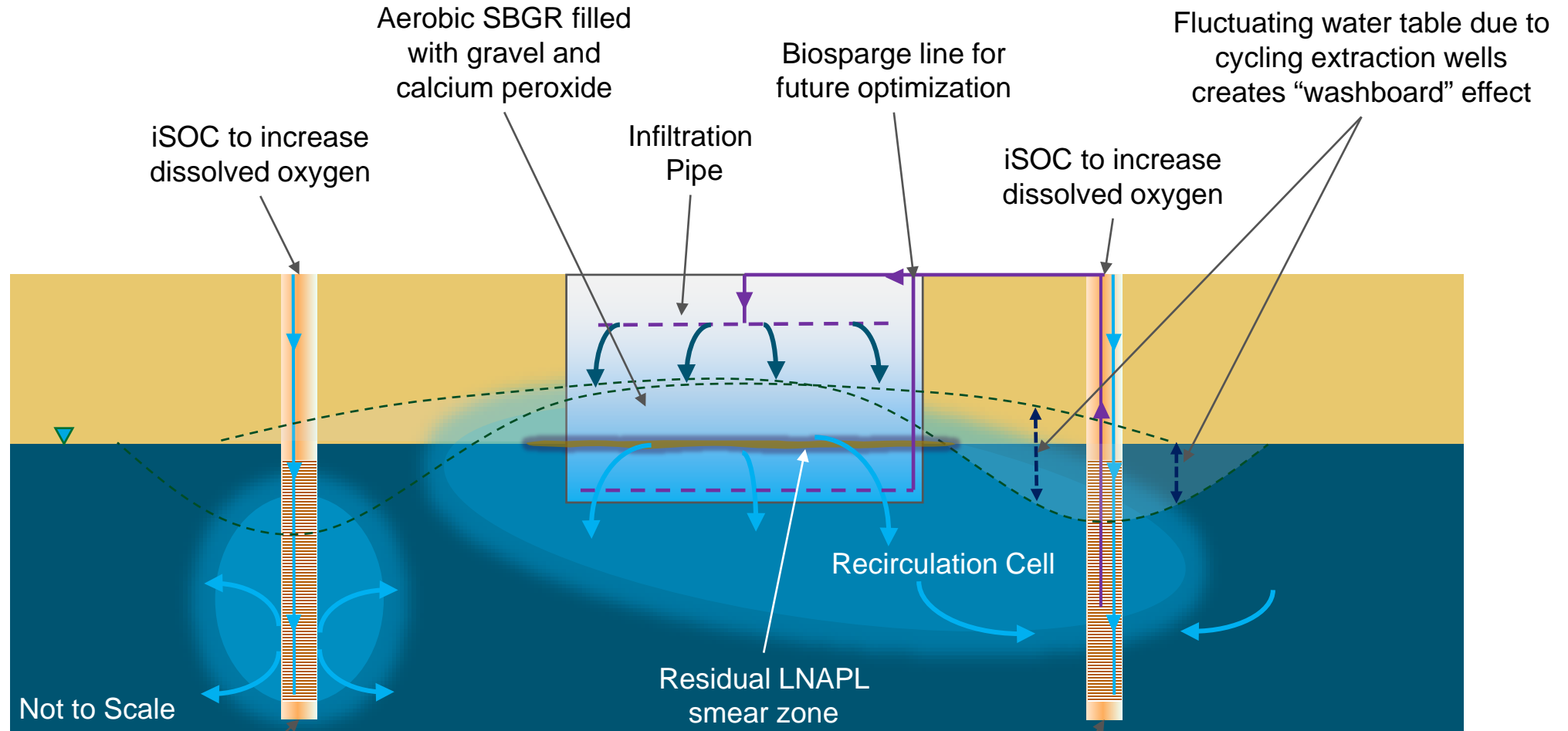
- Aerobic “Washboard” Subgrade Biogeochemical Reactor (SBGR)
  - Incorporated several aerobic processes to treat hydrocarbon source area and plume
  - Adjacent to large hanger with complicated utilities



# Aerobic “Washboard” SBGR (Phase 1 Pumping)



# Aerobic “Washboard” SBGR (Phase 2 Pumping)

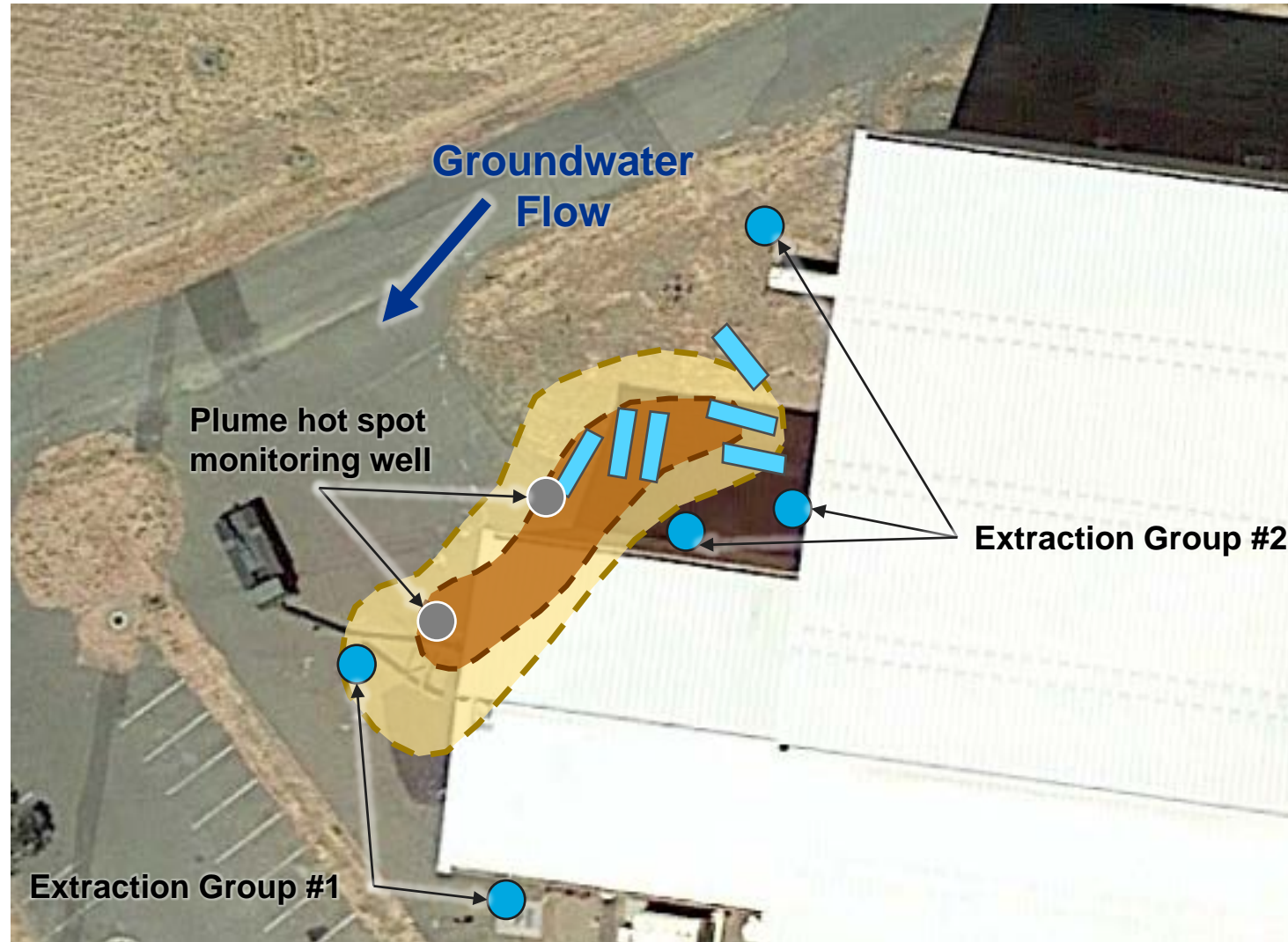
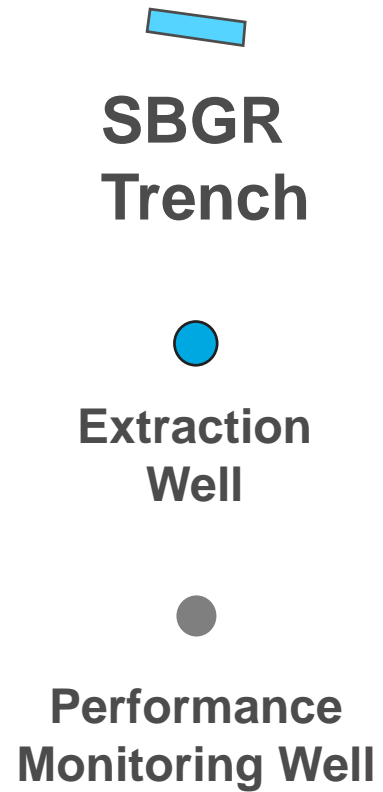


Dissolved oxygen  
buildup phase

**Extraction Area #2**  
**Extract 2 days a week**

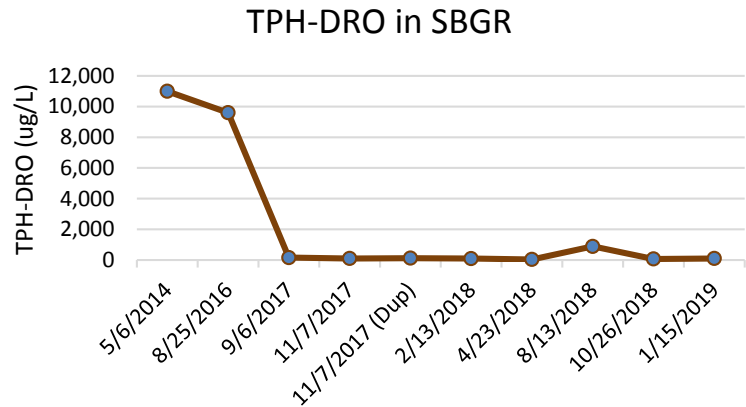


# Aerobic “Washboard” SBGR Layout

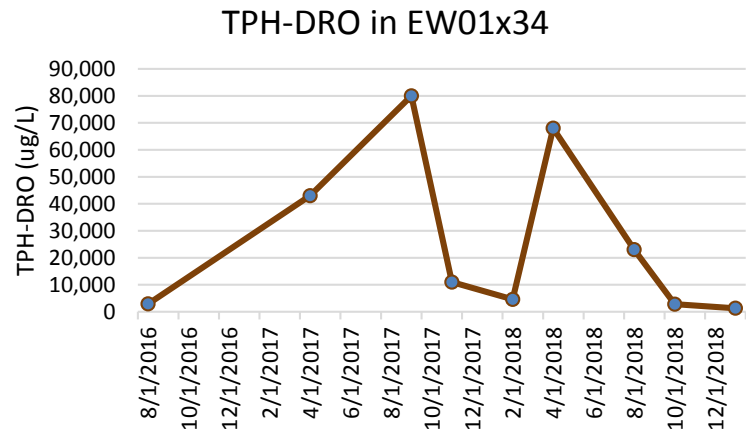


# Performance Overview

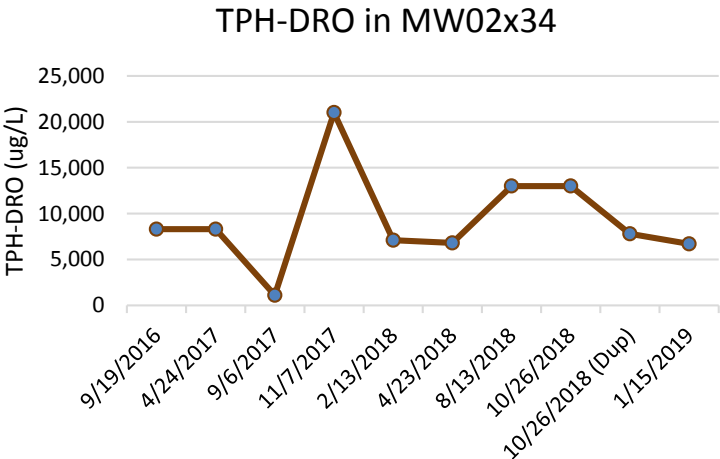
## SBGR Trench



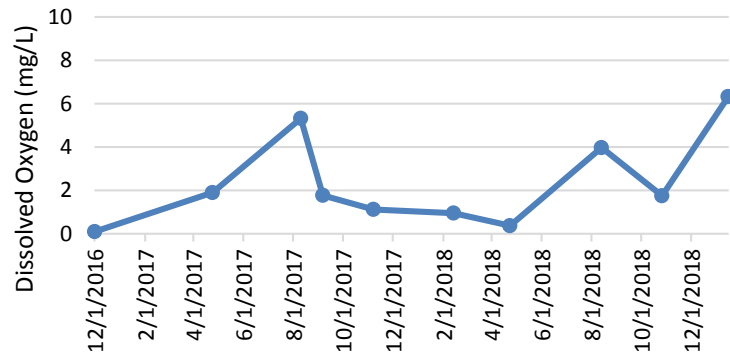
## EW01x34



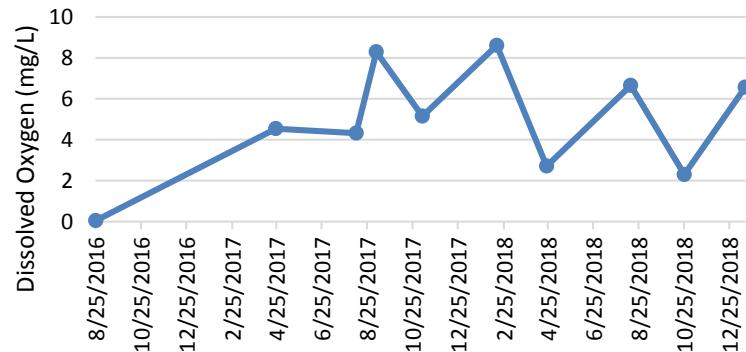
## MW02x34



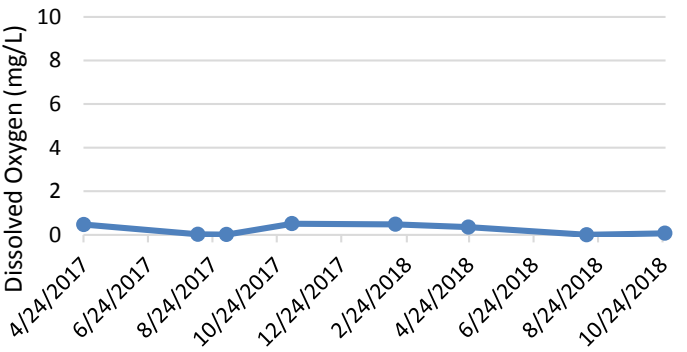
## Dissolved Oxygen in SBGR



## Dissolved Oxygen in EW01x34



## Dissolved Oxygen in MW02x34



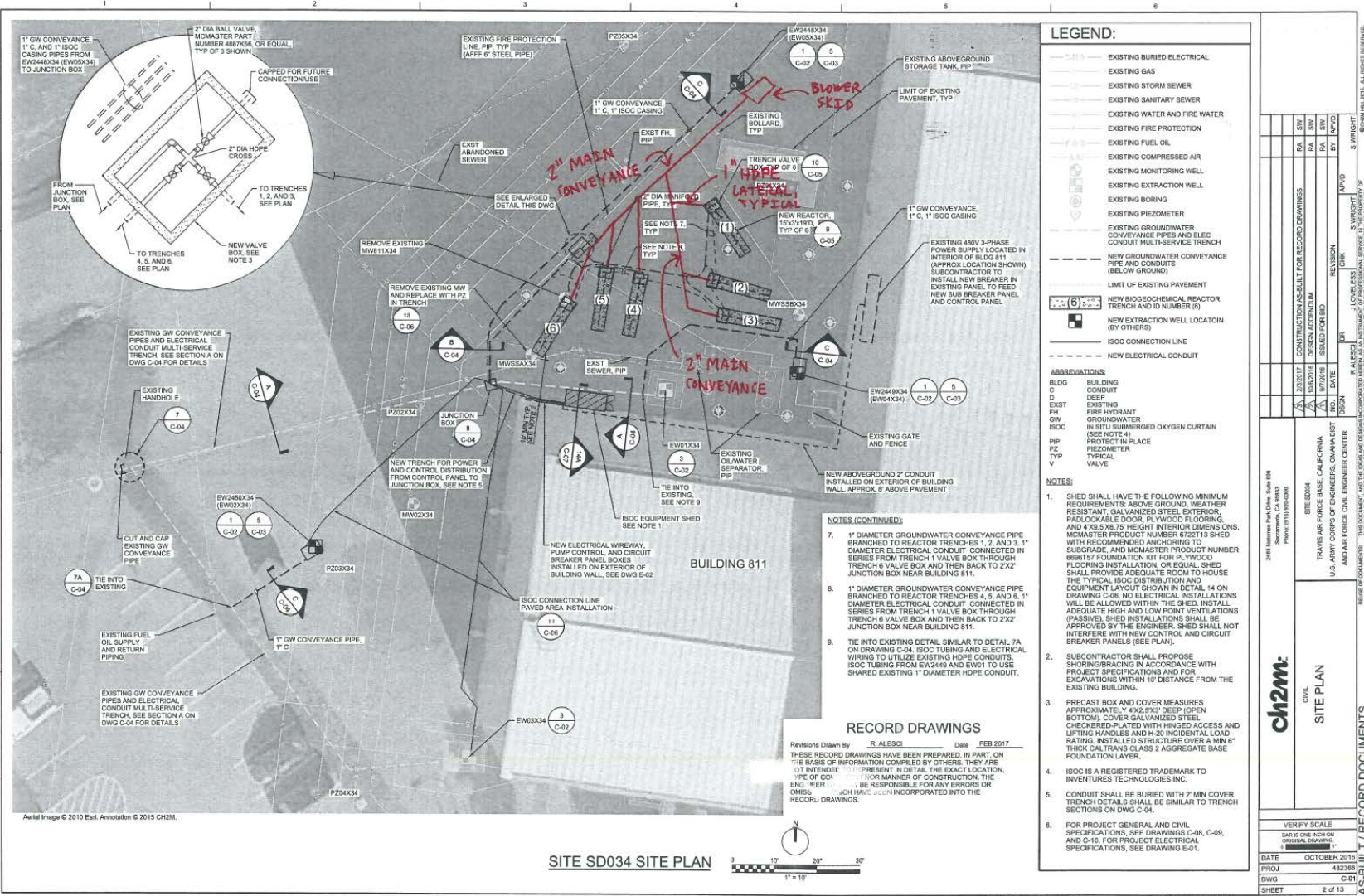
# Performance Summary

- Calcium Peroxide in SBGR is nearing end of design life-cycle
  - Increase oxygenation to maintain treatment efficiency
- MW02x34 concentration is steady and low dissolved oxygen
  - Need additional extraction in this area
- EW01x34 extraction rate is near zero
  - Need to replace this well with a new one

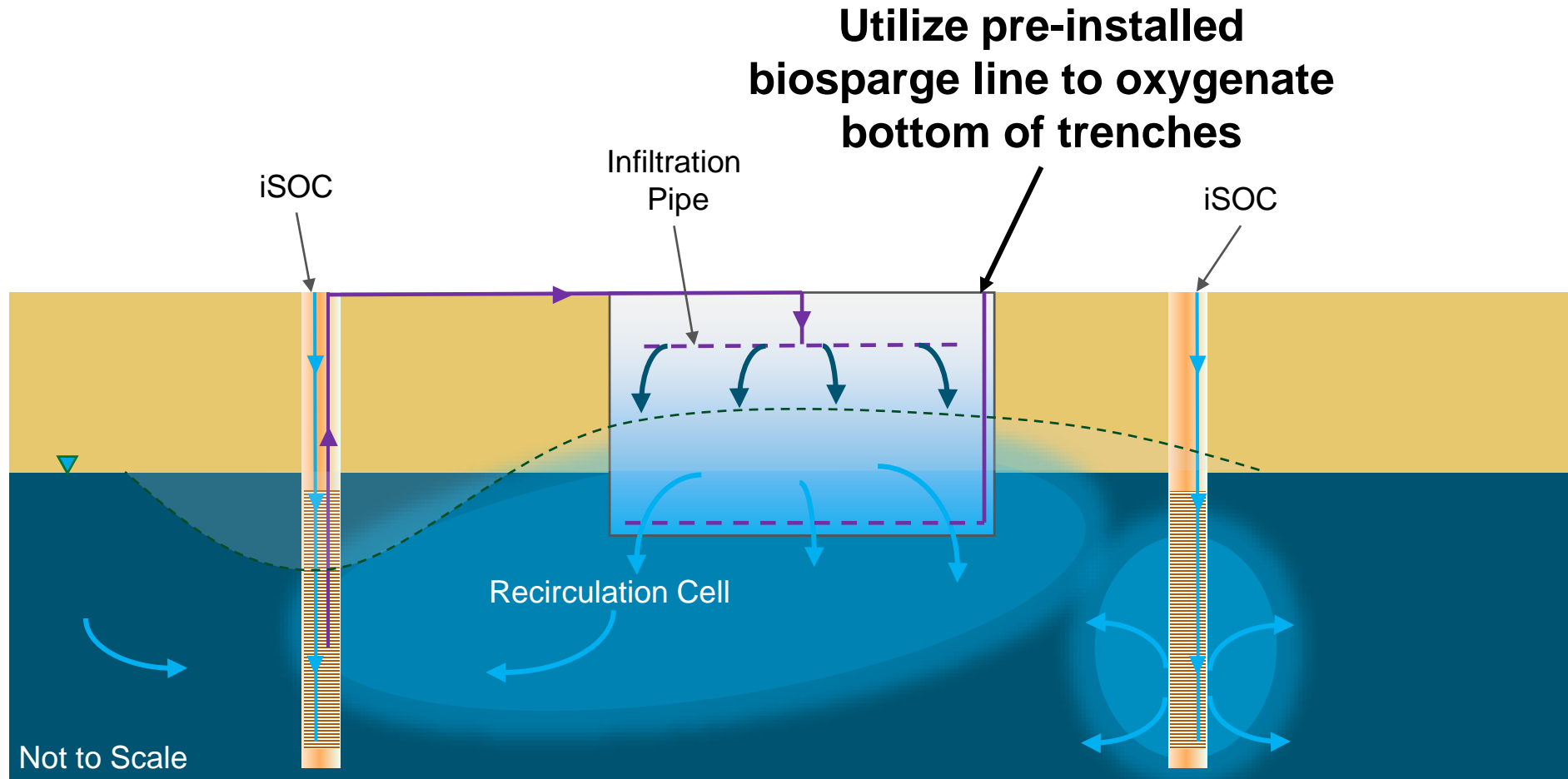


# Site SD034 Enhancement Plan – Part 1

- SBGR Oxygen Enhancement
  - Increase oxygen through use of existing SBGR biosparge lines
  - Connect blower in low-flow biosparge configuration



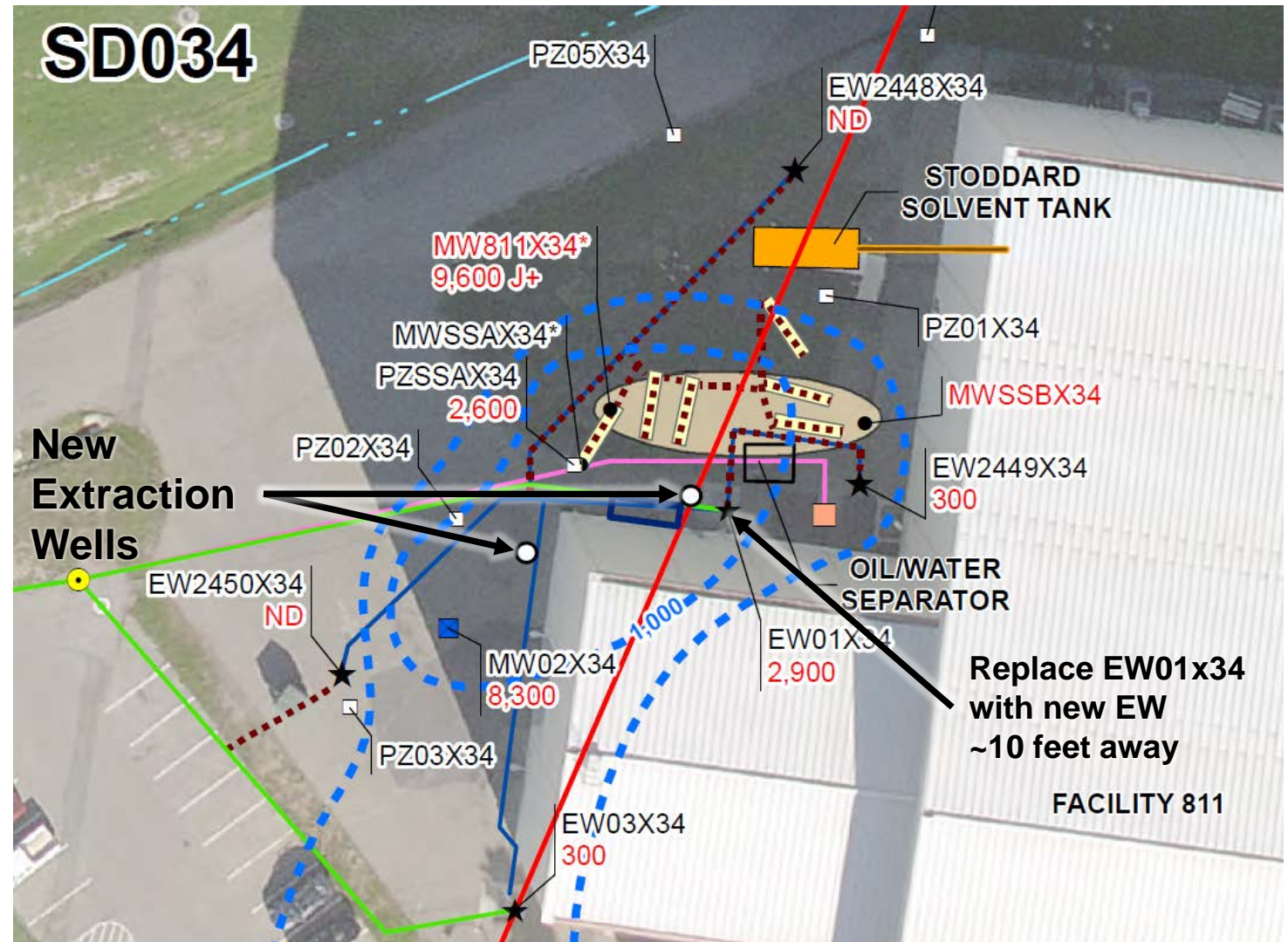
# Aerobic “Washboard” SBGR Optimization





# Site SD034 Enhancement Plan – Part 2

- Extraction Enhancement
  - Add new EW upgradient of MW02x34
  - Replace poor performing EW01x34



# Discussion

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# Travis AFB Restoration Program

## Program Update

*RPM Teleconference*

*March 20, 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***

# 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***

# 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
- 2017 Annual GRISR
- ***LF006 Technology Demonstration Construction Completion Report***
- ***Addendum to the Site SS016 Groundwater RD/RA Work Plan***

# Documents In-Progress

## MMRP

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

## POCO

- Subarea LF007C TPH Chromatogram Review TM



# Field Work In-Progress

CERCLA

- None

POCO

- None

# Documents Planned

## CERCLA

- ***SD043 Remedial Action Completion Report*** ***Apr***
- ***SS046 Remedial Action Completion Report*** ***May***
- ***2018 Annual GRISR*** ***Jul***
- **SD031 Soil RI/FS** **TBD**
- ***2018 LF007 CAMU Inspection, Monitoring,  
and Maintenance Report*** ***TBD***

## MMRP

- **None**

## POCO

- ***SS014 POCO Subsites 4 and 5 Closure Report*** ***May***

# Field Work Planned

## CERCLA

- 2Q 2019 GRIP Sampling Event Apr
- SS016 Soil excavation (waiting on NEWIOU  
ROD amendment) TBD
- ST027B EVO/Bioaugmentation Reinjection 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 first 22 months
    - 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 54 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. 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
  - 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 (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 (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 (to be discussed in separate presentation)

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 J 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 0.8 J, 1.4, to 0.85 J, 5.9 to 4.4, 3.0 to 1.9 ug/L)
    - Expecting the TD premise to be able to distribute observable TOC increases by extraction to not 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 monitoring well TCE concentration reduced from 560 to 140 µg/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)

**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
    - While the demonstration has treated the originally defined groundwater plume area to below MCLs, we are waiting on 2Q19 data to evaluate effects of reinjections, since there is additional mass being pulled in from cross-gradient that we are continuing to evaluate

**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>22</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