Final

Travis Air Force Base
Environmental Restoration Program
Restoration Program Manager's
Meeting Minutes
18 March, 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 18 March 2020 at 0930 hours. Effective 12 March 2020, the 60 AMW/CC at Travis AFB had directed Health Protection Condition (HPCON) BRAVO in response to the evolving COVID-19 public health situation in the local area. **All attendees participated via telephone due to increased teleworking measures meant to reduce the number of employees on the base at one time. Attendees included:**

Lonnie Duke	AFCEC/CZOW
Glenn Anderson	AFCEC/CZOW
Monika O'Sullivan	AFCEC/CZOW
Angel Santiago	AFCEC/CZOW
Gene Clare	AFCEC/CZOW
Haekyung Kim	AFCEC/CZRW
Sarah Miller	USACE-Omaha
Paul Gedbaw	USACE-Omaha
Nadia Hollan Burke	EPA
Amanda Rohrbaugh	TechLaw, Inc.
Adriana Constantinescu	RWQCB
Dominique Forrester	DTSC
Kimiye Touchi	DTSC
Meg Greenwald	CAPE
Mike Wray	CH2M/Jacobs
Leslie Royer	CH2M/Jacobs
Jill Dunphy	CH2M/Jacobs

Handouts distributed prior to the meeting included:

Attachment 1	Meeting Agenda
Attachment 2	Master Meeting and Document Schedule
Attachment 3	SBBGWTP Monthly Data Sheet (February 2020)
Attachment 4	CGWTP Monthly Data Sheet (February 2020)

Attachment 5	LF007C Monthly Data Sheet (February 2020)
Attachment 6	ST018 Monthly Data Sheet (February 2020)
Attachment 7	Program Update

1. ADMINISTRATIVE

A. Previous Meeting Minutes

The following comments were made regarding the February 2020 Draft Meeting Minutes:

Kimiye Touchi of DTSC noted that a subject header was needed to introduce the passive vent sampling discussion that occurred during the Program Update. The discussion will be updated so that the following header precedes the summary of the discussion:

"- Field Work Planned (CERCLA): Passive Vent Systems Sampling (March 2020):"

Ms. Touchi also had questions about the Passive Vent System Sampling Work Plan and related comments on the Fourth Five Year Review regarding the passive vent system sampling. Mr. Duke noted that the Air Force is still planning on scheduling a separate call to discuss the Five-Year Review so that the appropriate subject matter experts can participate.

The Water Board and EPA approved the meeting minutes with no comments.

B. Action Item Review

Action items from February 2020 were reviewed.

Action Item 1 is ongoing: Ms. O'Sullivan to provide updates on perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). March 2020 update: Ms. O'Sullivan stated that the Air Force is working on responses to comments on the QAPP. Regarding the sampling effort, the letters requesting off-base property access must be signed by the wing commander. The wing is aware of the high priority of the sampling, but the continuing response to the COVID-19 situation is taking priority and will dictate when the sampling can occur; likely not before the end of March. The residents are not aware of the upcoming sampling. One of the property owners whose property will be sampled is on the Restoration Advisory Board. The Air Force asked everyone to continue to prioritize this document.

Action Item 2 is ongoing: Mr. Duke will continue to provide design and construction information for the new KC-46 Hangar construction project. March 2020 update: Mr. Duke stated that the construction contractor has begun setting up the work area. This project is still a priority and they were told that the work can continue. Right now it is the only construction project that is authorized to continue. This may change as the COVID-19 situation evolves, because there will likely be travel impacts and worker impacts resulting from forthcoming government mandates. The soil excavation project on Site SS016 is complete and removal of the PAH-contaminated soil has been confirmed. . The Air Force will be attending the weekly hangar construction meetings to keep up with progress.

Action Item 3 is ongoing: Include the progress of the optimized Emulsified Vegetable Oil (EVO) delivery via solar-powered organic carbon (SPOC) injection system pilot test at Site SS015 during future monthly program updates. March 2020 update: Ms. Royer said after a few adjustments, the system is running at the expected rate, but it will be a while before there is analytical data to determine if it is operating as designed.

Action Item 4: Ms. Burke, Ms. Constantinescu, Mr. Forrester, and Ms. Touchi will confirm if their schedules allow for the August RPM Meeting to be rescheduled for August 26, 2020. March 2020 update: This meeting has been moved to the proposed date. This action item is closed.

Action Item 5: Ms. Constantinescu will confer with Water Board Subject Matter Experts on whether the Air Force should proceed with collecting total bacteria samples along with TPH samples on the LF007C system influent and effluent during O&M sampling of the groundwater extraction treatment system. March 2020 update: Ms. Constantinescu has not yet had a chance to have this conversation, and it is unlikely to happen in the near future due to the COVID-19 situation. Mr. Duke noted that they plan to keep all groundwater extraction and treatment systems operational as much as possible during this time. Due to minimal staffing during the COVID-19 shelter-in-place orders, Travis staff are checking on all systems on a limited basis throughout this time. There are contingency plans in place in the event that the treatment systems need to be shut down during the pandemic response. This action item remains 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

Mr. Duke noted that the Restoration Advisory Board is scheduled for 16 April. In light of the current health situation and potential for additional shelter-in-place

measures, limit on gatherings of 10 people and more, and in consideration of RAB members' age, Mr. Duke asked if we want to postpone the RAB meeting to a later date. All agreed to cancel the 16 April date. Mr. Duke rescheduled the RAB meeting for 22 October 2020.

The next RPM meeting is supposed to be an in-person meeting scheduled for 16 April 2020 at 1400 PDT. Mr. Duke noted that this will be converted to a teleconference and the time has been moved to 1300 to accommodate people in other time zones.

Travis AFB Master Document Schedule

Mr. Anderson noted that reviews are expected to proceed more slowly than usual due to the majority of folks working from home during the COVID-19 pandemic isolations, and requested everyone do the best they can given the limitations.

— 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.

— Site SD031 Soil Remedial Investigation/Feasibility Study (RI/FS): The Response to Comments, Draft Final, and Final due dates have been changed to TBD due to uncertainty with scheduling response-to-comments reviews.

— Potrero Hills Annex (FS, PP, and ROD): No change was made to the schedule. Due to the nature of the work occurring at this site and the current direction for social distancing, work may slow down or temporarily stop. Ms. Constantinescu had no additional updates.

— Site FT004 POCO Corrective Action Plan: This is the new title for the Site FT004 POCO Excavation Work Plan Technical Memorandum. Glenn Anderson is the Air Force document lead; Doug Berwick (CH2M/Jacobs) and Meg Greenwald (CAPE) are the contractor document leads. The Predraft to Air Force/Service Center was assigned a due date of 20 March 2020; the rest of the dates were assigned accordingly.

— Quarterly Newsletter (April 2020): The Draft to Agencies date was changed to 6 March 2020 to reflect the actual submittal date. The Agency Comments due date was changed to 20 March 2020. The remainder of the dates did not change. This newsletter will announce the postponement of the Restoration Advisory Board meeting from 16 April 2020 to 22 October 2020. The newsletter distribution was changed to a semi-annual schedule in 2020 due to a ramping down of project activities. The newsletter may return to a quarterly schedule when the follow-on ORC is in place (FY2022). Mr. Duke took the action to email the RAB members

regarding the rescheduled date of the April RAB meeting ahead of sending out the newsletter.

- Initial Passive Vent Systems Evaluation Work Plan Technical Memorandum: The Response to Comments and Final due dates were changed to 16 April 2020. Mr. Duke reported that the potential for a winter sampling event was discussed during the most recent quarterly meeting, but because of review delays, the first event will occur in Summer 2020. A winter sample is scheduled to be collected in winter 2020/21. A report summarizing the sampling data is planned for early 2021.
- Optimization Activities Technical Memorandum for Sites SD034 and SD037: The Draft to Agencies due date was changed to 30 March 2020; the rest of the dates were changed accordingly.
- Site SD043 Well Decommissioning and Site Closeout Technical Memorandum: The Response to Comments and Final due dates were changed to 8 July 2020. Ms. Burke asked why the due date for the Draft was changed last month, Ms. Royer replied that it has been delayed because of a delay in removing a drum of soil from the Base. It is necessary to include documentation of the drum removal in the Draft. Once the drum is removed, the Draft will be submitted.
- 2019 Annual Groundwater Remedy Implementation Status Report (GRISR): This is a new document; the Travis AFB document lead is Glenn Anderson, and the CH2M/Jacobs document lead is Levi Pratt. The Predraft to Air Force/Service Center was assigned a due date of 4 May 2020, the rest of the dates were assigned accordingly.
- 2019 Annual Corrective Action Management Unit Monitoring Report: This is a new document. The Air Force document lead is Gene Clare, the CH2M document lead is Levi Pratt. All dates are currently TBD.
- Site SD031B POCO Additional Site Work Plan: The Draft to Agencies and RAB Due date was changed to 3 March 2020 to reflect the actual submittal date. The Agency Comments Due date was changed to 1 April 2020. The rest of the schedule was not changed.

- MOVED TO HISTORY:
  - Site LF008 Remedial Action Evaluation Report
  - Site SS046 Well Decommissioning and Site Closeout Tech Memo

2. CURRENT PROJECTS

Treatment Plant Operation and Maintenance Update

South Base Boundary Groundwater Treatment Plant, February 2020 (see Attachment 3)

The South Base Boundary Groundwater Treatment Plant (SBBGWTP) performed at 100% uptime, and 6.0 million gallons of groundwater were extracted and treated in February 2020. All treated water was discharged to Union Creek. The average flow rate for the SBBGWTP was 149.2 gallons per minute (gpm). Electrical power usage was 17,478 kilowatt hours (kWh), and approximately 14,534 pounds of CO_2 were created (based on DOE calculation). Approximately 0.67 of a pound of volatile organic compounds (VOCs) was removed in February. The total mass of VOCs removed since startup of the system is 524.7 pounds.

In February 2020, the totalizer cartridge was replaced twice at EW735x05. The well is currently online. A carbon changeout on the lead granulated activated carbon (GAC) vessel is scheduled for March 2020.

No optimization activities were conducted in February 2020.

Central Groundwater Treatment Plant, February 2020 (see Attachment 4)

The Central Groundwater Treatment Plant (CGWTP) performed at 100% uptime with approximately 1,050,750 gallons of groundwater extracted and treated in February 2020. All treated water was discharged to the storm sewer system which discharges to Union Creek. The average flow rate for the CGWTP was 26.1 gpm. Electrical power usage was 2,199 kWh for all equipment connected to the Central Plant, and approximately 2,515 pounds of CO_2 were generated. Approximately 2.4 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 11,542 pounds.

The Site SS016 subgrade biogeochemical reactor (SBGR), also known as the bioreactor and the Site DP039 bioreactor, continued operating in February 2020.

No optimization activities occurred at the CGWTP in February 2020.

LF007C Groundwater Treatment Plant, February 2020 (Attachment 5)

The Subarea LF007C Groundwater Treatment Plant (LF007C GWTP) performed at 100% uptime with approximately 161,997 gallons of groundwater extracted and treated

in February 2020. All treated water was discharged to the Duck Pond for beneficial reuse. The average flow rate was 4.0 gpm. Approximately 1.0 x 10^{-3} of a pound of VOCs was removed from groundwater by the treatment plant in February 2020. 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.

TPH-diesel (TPH-d) and TPH-motor oil (TPH-mo) were detected in December 2019 effluent samples. Confirmation samples were collected on 9 January 2020 from the influent and effluent sampling locations, as well as the Duck Pond. Effluent samples collected in February 2020 did not exceed effluent limitations; samples were not collected from the influent. Mr. Wray noted later in the meeting that the samples collected this month were part of monthly samples collected per the NPDES permit, which only requires effluent sampling. The NPDES only requires quarterly sampling of the influent. The permit does not require midpoint sampling. but the Air Force collects them on a quarterly basis to monitor for breakthrough. Since TPH was not detected in the effluent, follow-up influent samples were not necessary.

No optimization activities are reported for the month of February 2020.

NOTE: While the LF007C GWTP and extraction systems are still accessible for O&M, the monitoring wells located offbase are not currently accessible, because the Air Force's LF007C off-base easement has expired. The Air Force is working on getting a new easement, which has been complicated by a change of land ownership. Ms. Burke and Ms. Constantinescu offered regulatory agency support for getting access to the sites for sampling and groundwater elevation measurements if the Air Force continues to encounter difficulties in obtaining an access agreement.

ST018 Groundwater (MTBE) Treatment Plant, February 2020 (see Attachment 6)

Site ST018 (MTBE) Treatment Plant (ST018 GWTP) performed at 100% uptime with approximately 150,120 gallons of groundwater extracted in February 2020. All groundwater was discharged to the Fairfield – Suisun Sewer District. The average flow rate for the ST018 GWTP was 3.7 gpm. Electrical power usage for the month was 82 kWh for all equipment connected to the ST018 GWTP. The total CO_2 discharge equivalent equates to approximately 61 pounds. Approximately 0.10 of a pound of MTBE, BTEX, VOCs, and TPH was removed in February by the treatment plant, and approximately 0.01 of a pound of MTBE-only was removed from groundwater. The total BTEX, MTBE and TPH mass removed since the startup of the system is 49.0 pounds, and the total MTBE mass removed since startup of the system is 12.0 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.

No optimization activities are reported for the month of February 2020.

3. Presentations:

A) Program Update: Activities Completed, In Progress, and Upcoming (see Attachment 7)

Ms. Royer reported on the status of fieldwork and documents that have been completed, are in progress, or upcoming. Please refer to Attachment 7 for the full briefing.

Completed field work - Site SD031B POCO Additional Investigation (Gore Sorber Round 2): Jacobs has the laboratory data from the recent GoreSorber field effort, and will use it to propose boring locations for the next round of field work. Mr. Duke agreed to send the data from the two rounds of Gore Sorber data and associated maps to the Water Board to assist in their review of the Site SD031B POCO Additional Site Investigation Work Plan.

4. New Action Item Review

1. Mr. Duke to send an email to the RAB members announcing the rescheduled RAB meeting.

2. Mr. Duke to update the MMDS with the new April RPM Meeting time (1300 PDT) and new RAB Meeting date (22 October 2020).

2. Mr. Duke to send Site SD031B GoreSorber data and associated maps to Ms. Constantinescu to assist with Water Board review of the SD031B POCO Additional Site Investigation Work Plan.

5. PROGRAM ISSUES/UPDATE

Mr. Duke discussed the Travis AFB response to the COVID-19 pandemic. He stated that only essential personnel are allowed on-base for the next several weeks, possibly longer. All other personnel are teleworking, and it is anticipated that there will be quite a burden on the Air Force computer network. There are currently two confirmed cases among base personnel – one active

duty airman and one dependent. Additionally, approximately 900 people from the Princess cruise ship are being quarantined on-base.

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. New subaction: Ms. O'Sullivan to facilitate communication between the EPA and Air Force chemists, and update the Air Force chemist regarding yesterday's call and the outcome.	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 and Ms. Royer	Mr. Wray or Ms. Royer to include the progress of the optimized EVO delivery via solar-powered organic carbon injection system pilot test at Site SS015 during future monthly program updates.	Ongoing	Open
4.	Ms. Constantinescu	Ms. Constantinescu will confer with Water Board SMEs on whether the Air Force should proceed with collecting total bacteria samples along with TPH	18 March 2020	Open

		samples on the system influent and effluent during O&M sampling at LF007C groundwater extraction treatment system.		
5.	Mr. Duke	Mr. Duke to send an email to the RAB members announcing the rescheduled RAB meeting.	16 April 2020	Open
6.	Mr. Duke	Mr. Duke to update the MMDS with the new April RPM Meeting time (1300 PDT) and new RAB Meeting date (22 October 2020).	16 April 2020	Open
7.	Mr. Duke	Mr. Duke to send Site SD031B GoreSorber data and maps to Ms. Constantinescu to assist with Water Board review of the SD031B POCO Additional Investigation Work Plan	16 April 2020	Open

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

The RPM Teleconference is scheduled for 9:30 AM PST on 18 March 2020. **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

   PROGRAM UPDATE:
   DOCUMENTS & ACTIVITIES COMPLETED, IN PROGRESS & PLANNED

4. NEW ACTION ITEM REVIEW

5. PROGRAM/ISSUES/UPDATE

   TRIAD DISCUSSION ON POCO SITE FT004

NOTES: AFTER THE RPM TELECONFERENCE, BASED ON THE DISCUSSION DURING THE REVIEW OF THE MASTER MEETING AND DOCUMENT SCHEDULE, WE WILL 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.

(2020)

Annual Meeting and Teleconference Schedule

Monthly RPM Meeting[1] (Begins at time noted)	RPM Teleconference (Begins at time noted)	Restoration Advisory Board Meeting (Begins at 7:00 p.m.) (Poster Session at 6:30 p.m.)
—	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	—
08-26-20	—	—
—	09-16-20	—
10-21-20	—	May through October[2]
—	11-18-20	—
—	—	—

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

[2] 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**	**Site SD031 Soil Remedial Investigation/Feasibility Study Travis AFB, Glenn Anderson CH2M, Rick Sturm**
Scoping Meeting	**NA**	**NA**
Predraft to AF/Service Center	08-23-16	05-24-19
AF/Service Center Comments Due	09-07-16	06-10-19
Draft to Agencies / RAB	09-28-16 (03-22-18)	09-12-19
Agency Comments Due	10-28-16 (04-27-18)	11-12-19 (01-14-20)
Agency Concurrence with Remedy	NA	NA
Public Comment Period	NA	NA
Public Meeting	**NA**	**NA**
Response to Comments Due	TBD	TBD
Draft Final Due	TBD	TBD
Final Due	TBD	TBD

Travis AFB Master Meeting and Document Schedule

PRIMARY DOCUMENTS			
	Potrero Hills Annex Travis, Glenn Anderson		
Life Cycle	**FS**	**Proposed Plan**	**ROD**
Scoping Meeting	**180 days after Water Board Order Rescinded**	**+470 days**	**+735 days**
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
Response to Comments Meeting	**+ 405 days**	**+665 days**	**+ 1110 days**
Agency Concurrence with Remedy	NA	NA	+ 1130 days
Public Comment Period	NA	+735 to 765 days	NA
Public Meeting	**NA**	**+745 days**	**NA**
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

SECONDARY DOCUMENTS	
Life Cycle	Site FT004 POCO Corrective Action Plan Travis AFB, Glenn Anderson CH2M, Doug Berwick CAPE, Meg Greenwald
Scoping Meeting	**NA**
Predraft to AF/Service Center	03-20-20
AF/Service Center Comments Due	04-20-20
Draft to Agencies / RAB	05-07-20
Agency Comments Due	06-08-20
Response to Comments Meeting	06-17-20
Response to Comments Due	07-01-20
Draft Final Due	NA
Final Due	07-01-20
Public Comment Period	NA
Public Meeting	**NA**

Travis AFB Master Meeting and Document Schedule

INFORMATIONAL DOCUMENTS			
Life Cycle	**Quarterly Newsletter (April 2020)** **Travis, Glenn Anderson**	**Initial Passive Vent Systems Sampling Work Plan Tech Memo** **Travis AFB, Glenn Anderson** **CH2M, Leslie Royer**	**Optimization Activities Technical Memorandum for Sites SD034 and SD037** **Travis AFB, Glenn Anderson** **CH2M, Levi Pratt**
Scoping Meeting	**NA**	**NA**	**NA**
Predraft to AF/Service Center	03-05-20	12-16-19	01-20-20
AF/Service Center Comments Due	NA	12-31-19	02-20-20
Draft to Agencies / RAB	03-06-20	01-09-20	03-30-20
Agency Comments Due	03-20-20	02-10-20	04-29-20
Response to Comments Meeting	**03-27-20**	**02-19-20**	**05-20-20**
Response to Comments Due	04-01-20	03-04-20 (04-16-20)	06-01-20
Draft Final Due	NA	NA	NA
Final Due	04-01-20	03-04-20 (04-16-20)	06-01-20
Public Comment Period	NA	NA	NA
Public Meeting	**NA**	**NA**	**NA**

Travis AFB Master Meeting and Document Schedule

INFORMATIONAL DOCUMENTS			
Life Cycle	**Site SD043 Well Decommissioning and Site Closeout Technical Memorandum** **Travis AFB, Glenn Anderson** **CH2M, Levi Pratt**	**2019 Annual GRISR** **Travis AFB, Glenn Anderson** **CH2M, Levi Pratt**	**2019 Annual CAMU Monitoring Report** **Travis AFB, Gene Clare** **CH2M HILL, Levi Pratt**
Scoping Meeting	**NA**	**NA**	**NA**
Predraft to AF/Service Center	03-25-20	05-04-20	TBD
AF/Service Center Comments Due	04-24-20	06-04-20	TBD
Draft to Agencies / RAB	05-11-20	06-22-20	TBD
Agency Comments Due	06-11-20	07-23-20	TBD
Response to Comments Meeting	**06-17-20**	08-05-20	TBD
Response to Comments Due	07-08-20	08-21-20	TBD
Draft Final Due	NA	NA	NA
Final Due	07-08-20	08-21-20	TBD
Public Comment Period	NA	NA	NA
Public Meeting	**NA**	NA	NA

Travis AFB Master Meeting and Document Schedule

INFORMATIONAL DOCUMENTS	
Life Cycle	**Site SD031B POCO Additional Site Investigation Work Plan** **Travis, Glenn Anderson** **CH2M, Tony Chakurian**
Scoping Meeting	**NA**
Predraft to AF/Service Center	12-18-19
AF/Service Center Comments Due	01-20-20
Draft to Agencies / RAB	03-02-20
Agency Comments Due	04-01-20
Response to Comments Meeting	**04-16-20**
Response to Comments Due	04-30-20
Draft Final Due	NA
Final Due	04-30-20
Public Comment Period	NA
Public Meeting	**NA**

Travis AFB Master Meeting and Document Schedule

HISTORY - INFORMATIONAL DOCUMENTS		
Life Cycle	**Site LF008** **Remedial Action Evaluation Report** **Travis AFB, Glenn Anderson** **CH2M, Latonya Coleman**	**Site SS046 Well Decommissioning and Site Closeout Tech Memo** **Travis AFB, Glenn Anderson** **CH2M, Doug Berwick** **CAPE, Meg Greenwald**
Scoping Meeting	**NA**	**NA**
Predraft to AF/Service Center	07-10-19	09-04-19
AF/Service Center Comments Due	07-24-19	09-18-19
Draft to Agencies / RAB	10-07-19	10-15-19
Agency Comments Due	11-06-19	11-15-19
Response to Comments Meeting	**02-19-20**	**11-20-19**
Response to Comments Due	03-06-20 (02-19-20)	12-06-19 (01-22-20)
Draft Final Due	NA	NA
Final Due	03-06-20 (02-19-20)	12-06-19 (01-22-20)
Public Comment Period	NA	NA
Public Meeting	**NA**	**NA**

South Base Boundary Groundwater Treatment Plant Monthly Data Sheet

Report Number: 232 **Reporting Period: 3 February 2020 – 2 March 2020** **Date Submitted: 13 March 2020**

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 2020 reporting period.

Table 1 – Operations Summary – February 2020

Initial Data Collection:	2/3/2020 12:00	**Final Data Collection:**	3/2/2020 12:50
Operating Time:	Percent Uptime:	Electrical Power Usage:	
SBBGWTP: 673 hours	**SBBGWTP:** 100%	**SBBGWTP:**	17,478 kWh (14,534 lbs CO_2 generated[a])
Gallons Treated: **6.0 million gallons**		Gallons Treated Since July 1998: **1,178 million gallons**	
Volume Discharged to Union Creek: **6.0 million gallons**		Gallons Treated from Other Sources: **0 gallons**	
VOC Mass Removed: **0.67 lbs**[b]		VOC Mass Removed Since July 1998: **524.7 lbs**	
Rolling 12-Month Cost per Pound of Mass Removed: **$20,426**[c]			
Monthly Cost per Pound of Mass Removed: **$22,391**[c]			

lbs = pounds
[a] 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.
[b] Calculated using February 2020 EPA Method SW8260C analytical results.
[c] 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)[a] – February 2020

FT005[b]				SS029		SS030	
EW01x05	Offline	EW743x05	Offline	EW01x29	Offline[c]	EW01x30	16.0
EW02x05	Offline	EW744x05	3.5	EW02x29	Offline[c]	EW02x30	Offline[d]
EW03x05	Offline	EW745x05	9.9	EW03x29	2.8	EW03x30	12.8
EW731x05	7.0	EW746x05	Offline	EW04x29	6.2	EW04x30	16.5
EW732x05	Offline	EW2291x05	2.6	EW05x29	8.2	EW05x30	6.5
EW733x05	Offline	EW2782x05	4.9	EW06x29	7.9	EW2174x30	8.1
EW734x05	4.7	EW2783x05	3.5	EW07x29	13.9	EW711x30	3.6
EW735x05	7.8	EW2784x05	10.6			MW269x30	0.5
EW736x05	Offline	EW2785x05	7.9				
EW737x05	Offline	EW2786x05	13.1				
EW742x05	Offline						
FT005 Total: 75.5				**SS029 Total: 39.0**		**SS030 Total: 64.0**	

SBBGWTP Average Monthly Flow[e]: 149.2 gpm

[a] Flow rates presented are instantaneous measurements taken at the end of the reporting period.
[b] 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.*
[c] Extraction wells taken off line because of persistent fouling of the well pumps and associated discharge piping.
[d] Extraction wells were operational; however, well was recharging.
[e] 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[a]		Restart[a]		Cause
	Date	Time	Date	Time	
SBBGWTP	None.	--		--	

[a] 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 3 February 2020. Sample results are presented in Table 4. The total VOC concentration (13.33 µg/L) in the influent sample decreased from the January 2020 sample results (17.10 µg/L). TCE was the primary VOC detected in the influent sample at a concentration of 12 µg/L. TCE, cis-1,2-DCE, and 1,2-DCA were detected in the midpoint sampling location. In addition, 1,2-DCA (0.61 J µg/L) was detected in the effluent sample at a concentration greater than the effluent limitation.

On 4 March 2020, confirmation samples were collected at the effluent sample location as well as upstream and downstream of the outfall at Union Creek. Sample results are presented in Table 5. Chloroform (0.16 J µg/L) was detected in the effluent sample at a concentration less than the effluent limitation. 1,2-DCA was not detected in the effluent sample nor the upstream and downstream samples of the SBBGWTP outfall. A carbon change out on the lead GAC vessel is scheduled for March 2020. The SBBGWTP remained on line during the entire reporting period.

In February 2020, the totalizer cartridge was replaced twice at EW735x05. The well is currently on line.

Figure 1 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 decreasing flow rate trend was observed in the past 12 months.

Optimization Activities

No optimization activities occurred at the SBBGWTP in February 2020.

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 2 presents the historical GHG production from the SBBGWTP. In February 2020, the SBBGWTP produced approximately 14,534 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 February 2020 – South Base Boundary Groundwater Treatment Plant

Constituent	Instantaneous Maximum[a] (µg/L)	Detection Limit (µg/L)	N/C	3 February 2020 (µg/L)		
				Influent	Midpoint	Effluent[b]
Halogenated Volatile Organics						
Acetone	NA	1.9	0	ND	ND	ND
Bromodichloromethane	NA	0.17	0	ND	ND	ND
Chloroform	1.9	0.16	0	ND	ND	ND
Chloromethane	NA	0.30	0	ND	ND	ND
1,1-Dichloroethane	0.50	0.22	0	ND	ND	ND
1,2-Dichloroethane	0.50	0.13	1	0.45 J	0.59 J	**0.61 J**
1,1-Dichloroethene	0.50	0.23	0	ND	ND	ND
cis-1,2-Dichloroethene	0.50	0.15	0	0.88 J	1.7	ND
trans-1,2-Dichloroethene	0.50	0.11	0	ND	ND	ND
Dichlorodifluoromethane	NA	0.31	0	ND	ND	ND
Tetrachloroethene	0.50	0.20	0	ND	ND	ND
1,1,1-Trichloroethane	0.50	0.16	0	ND	ND	ND
1,1,2-Trichloroethane	0.50	0.27	0	ND	ND	ND
Trichloroethene	0.65	0.16	0	12	4.8	ND
Vinyl Chloride	0.90	0.10	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
Other						
Total Petroleum Hydrocarbons – Gasoline	50	10	0	NM	NM	ND
Total Petroleum Hydrocarbons – Diesel	50	5.5	0	NM	NM	ND
Total Petroleum Hydrocarbons – Motor Oil	100	32	0	NM	NM	ND

[a] In accordance with current National Pollutant Discharge Elimination System permit number CAG912002, Order number R2-2017-0048.

[b] Concentrations in **bold** exceeded discharge limits.

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 February 2020 – South Base Boundary Groundwater Treatment Plant

Constituent	Instantaneous Maximum[a] (µg/L)	Detection Limit (µg/L)	N/C	4 March 2020 (µg/L)		
				Effluent[b]	Upstream	Downstream
Halogenated Volatile Organics						
Acetone	NA	1.9	0	ND	ND	ND
Bromodichloromethane	NA	0.17	0	ND	ND	ND
Chloroform	1.9	0.16	0	0.16 J	ND	ND
Chloromethane	NA	0.30	0	ND	ND	ND
1,1-Dichloroethane	0.50	0.22	0	ND	ND	ND
1,2-Dichloroethane	0.50	0.13	0	ND	ND	ND
1,1-Dichloroethene	0.50	0.23	0	ND	ND	ND
cis-1,2-Dichloroethene	0.50	0.15	0	ND	ND	ND
trans-1,2-Dichloroethene	0.50	0.11	0	ND	ND	ND
Dichlorodifluoromethane	NA	0.31	0	ND	ND	ND
Tetrachloroethene	0.50	0.20	0	ND	ND	ND
1,1,1-Trichloroethane	0.50	0.16	0	ND	ND	ND
1,1,2-Trichloroethane	0.50	0.27	0	ND	ND	ND
Trichloroethene	0.65	0.16	0	ND	ND	ND
Vinyl Chloride	0.90	0.10	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

[a] In accordance with current National Pollutant Discharge Elimination System permit number CAG912002, Order number R2-2017-0048.

[b] Concentrations in **bold** exceeded discharge limits.

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
µg/L = micrograms per liter

Figure 1

SBBGWTP Total VOC Influent Concentrations and Average Flowrate Twelve Month History

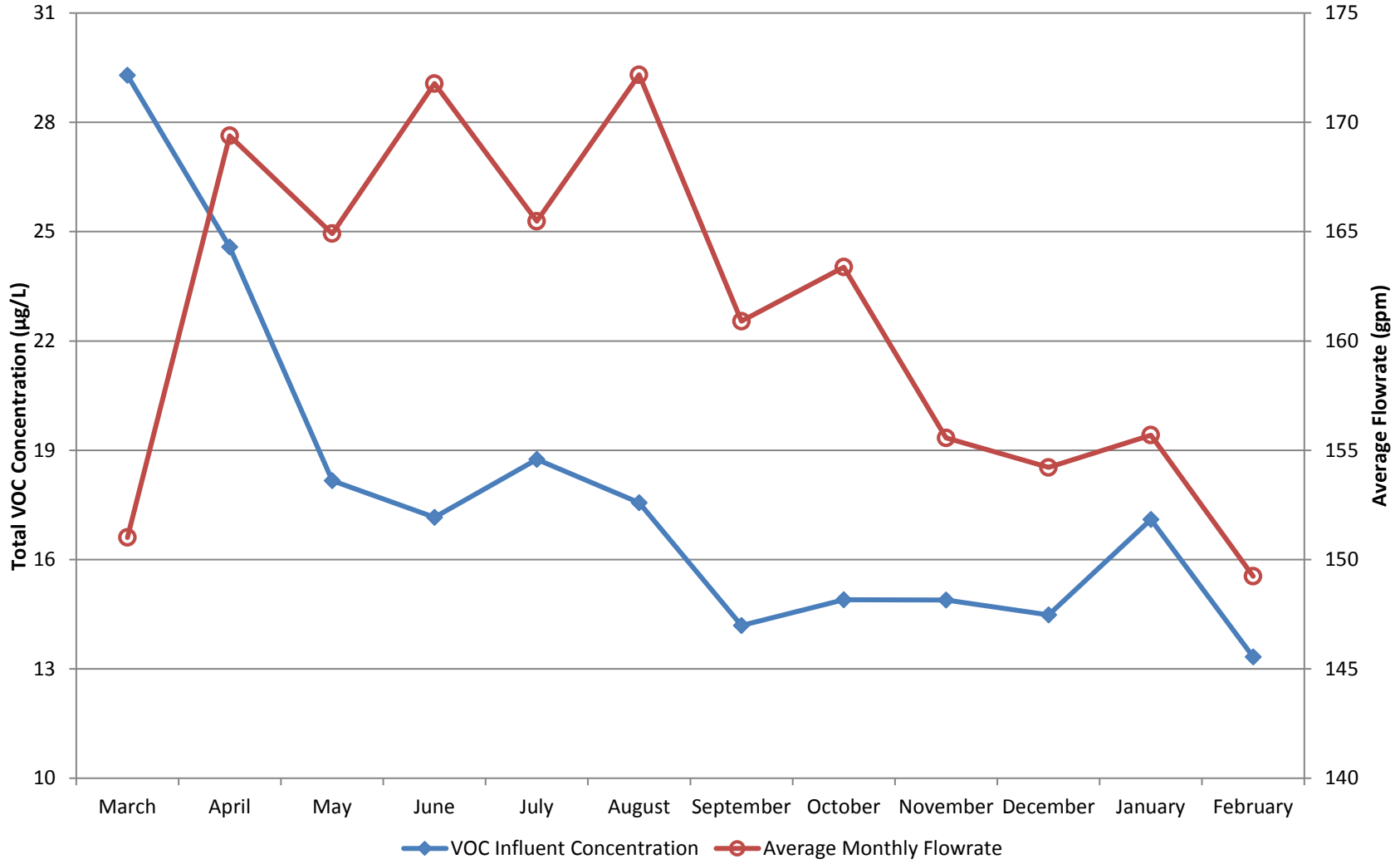
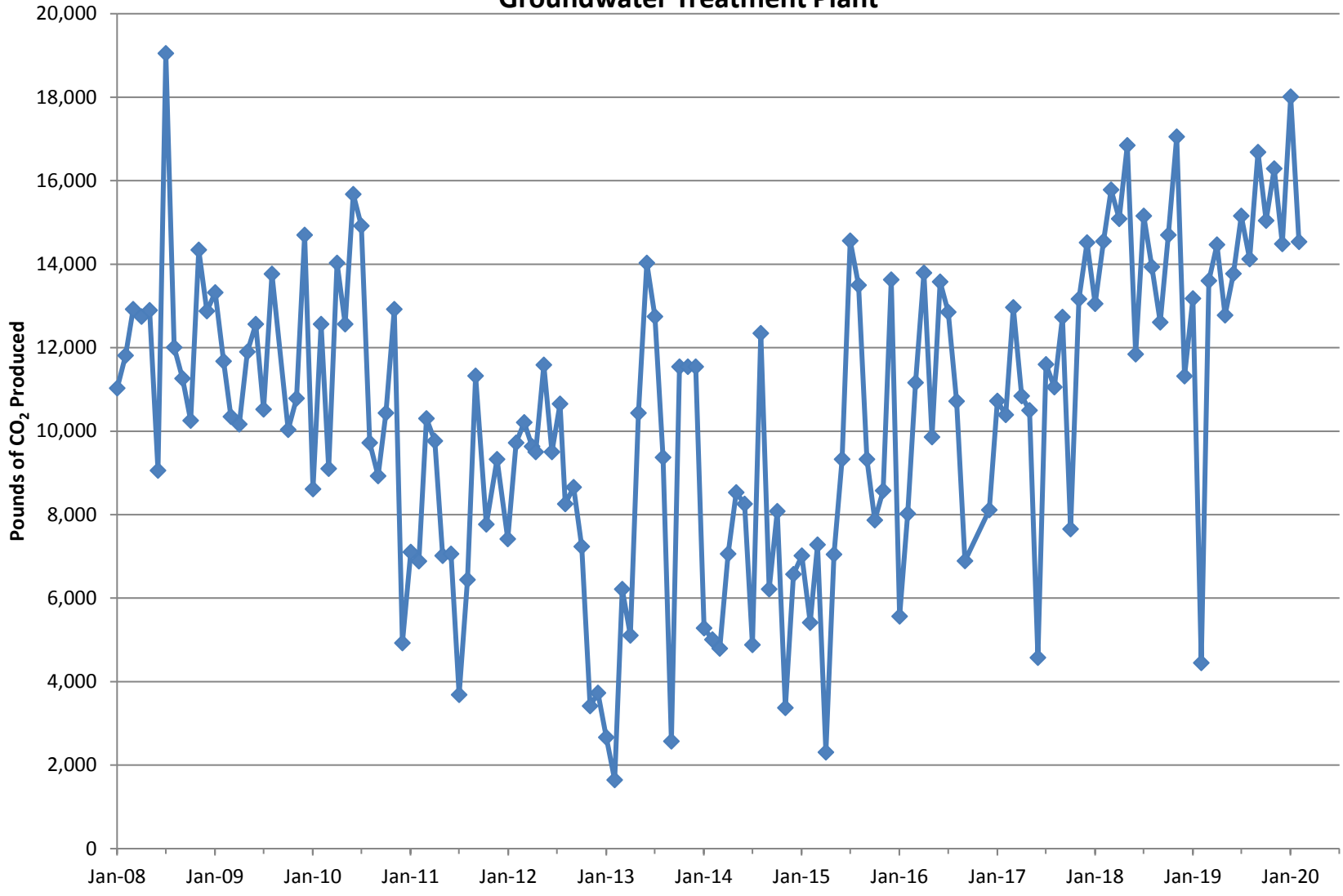


Figure 2

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



Central Groundwater Treatment Plant Monthly Data Sheet

Report Number: 247 **Reporting Period: 3 February 2020 – 2 March 2020** **Date Submitted: 13 March 2020**

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 2020 reporting period.

Table 1 – Operations Summary – February 2020

Initial Data Collection:	2/3/2020 10:45	**Final Data Collection:**	3/2/2020 9:30		
Operating Time:		Percent Uptime:		Electrical Power Usage:	
CGWTP:	671 hours	**CGWTP:**	100%	**CGWTP:**	2,199 kWh (2,515 lbs CO_2 generated[a])

Gallons Treated (discharge to storm sewer): **1,050,750 gallons**

Gallons Treated Since January 1996: **579.8 million gallons**

VOC Mass Removed from groundwater: **2.4 lbs**[b]

VOC Mass Removed Since January 1996: **2,856 lbs from groundwater**; **8,686 lbs from vapor**

Rolling 12-Month Cost per Pound of Mass Removed: $2,738[c]

Monthly Cost per Pound of Mass Removed: $1,749[c]

[a] 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.
[b] Calculated using February 2020 EPA Method SW8260C analytical results.
[c] 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[a] – February 2020

Location	Average Flow Rate Groundwater (gpm)
EW001x16	12.0
EW002x16	7.1
EW003x16[b]	0.5
EW605x16	5.4
EW610x16	1.8
CGWTP	26.1

[a] Flow rates calculated by dividing total gallons processed by system operating time for the month or the average of the instantaneous readings.
[b] Extracted groundwater from EW003x16 is treated in Site SS016 bioreactor.
gpm = gallons per minute

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

Table 3 – Summary of System Shutdowns

Location	Shutdown[a]		Restart		Cause
	Date	Time	Date	Time	
CGWTP	None.	--		--	

-- = Date/Time not recorded
[a] Shutdown and restart times estimated based on field notes
CGWTP = Central Groundwater Treatment Plant

Summary of O&M Activities

Monthly groundwater treatment samples were collected at the CGWTP on 3 February 2020. Sample results are presented in Table 4. The total VOC concentration (279.69 µg/L) in the February 2020 influent sample has increased from the January 2020 sample (269.13 µg/L). TCE was the primary VOC detected in the influent sample at a concentration of 230 µg/L. No VOCs were detected in the samples collected after the first and second carbon vessels or 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 2020.

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 slightly decreasing trend over the past 12 months along with a decreasing trend for the flow rate through the treatment plant.

The Site SS016 subgrade biogeochemical reactor (SBGR), also known as the bioreactor and the Site DP039 bioreactor, continued operating in February 2020.

Optimization Activities

No optimization activities occurred at the CGWTP in February 2020.

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 2,515 pounds of GHG during February 2020.

TABLE 4
Summary of Groundwater Analytical Data for February 2020 – Central Groundwater Treatment Plant

Constituent	Instantaneous Maximum[a] (µg/L)	Detection Limit (µg/L)	N/C	3 February 2020 (µg/L) Influent	After Carbon 1 Effluent	After Carbon 2 Effluent	System Effluent[b]
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
Chloromethane	NA	0.30 – 0.60	0	ND	ND	ND	ND
1,2-Dichlorobenzene	NA	0.15 – 0.30	0	0.56 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	0.96 J	ND	ND	ND
cis-1,2-Dichloroethene	0.50	0.15 – 0.30	0	44	ND	ND	ND
trans-1,2-Dichloroethene	0.50	0.15 – 0.30	0	3.0	ND	ND	ND
Tetrachloroethene	0.50	0.20 – 0.40	0	0.70 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	230	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
Other							
Total Petroleum Hydrocarbons – Gasoline (C6 – C10)	50	10	0	NM	NM	NM	ND
Total Petroleum Hydrocarbons – Diesel (C10 – C28)	50	5.5	0	NM	NM	NM	ND
Total Petroleum Hydrocarbons – Motor Oil (C28 – C40)	100	32	0	NM	NM	NM	ND

[a] In accordance with current National Pollutant Discharge Elimination System permit number CAG912002, Order number R2-2017-0048.

[b] Concentrations in **bold** exceeded discharge limits

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

NM = not measured

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

µg/L = micrograms per liter

ND = not detected

Figure 1

CGWTP Total VOC Influent Concentrations and Average Flowrate Twelve Month History

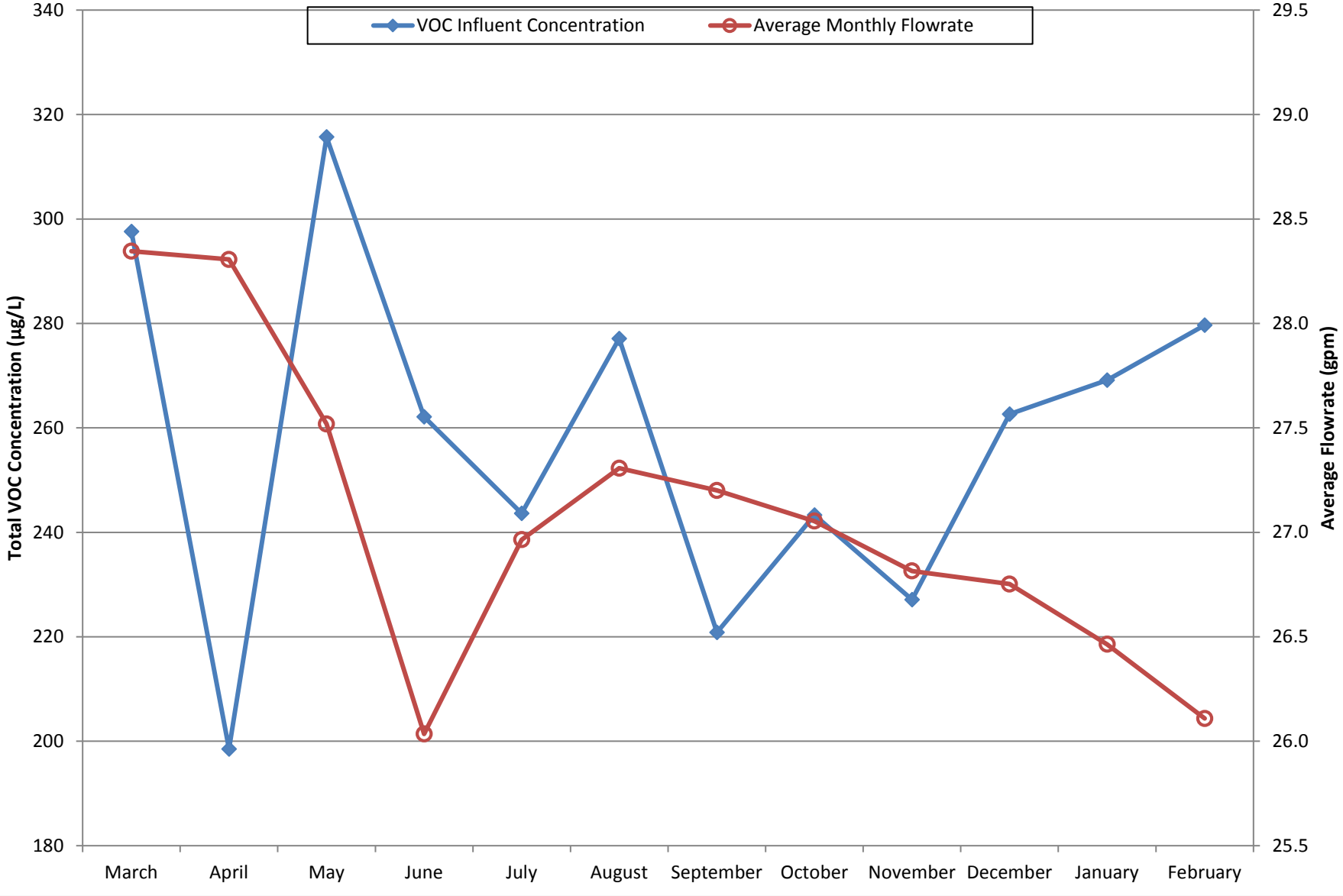
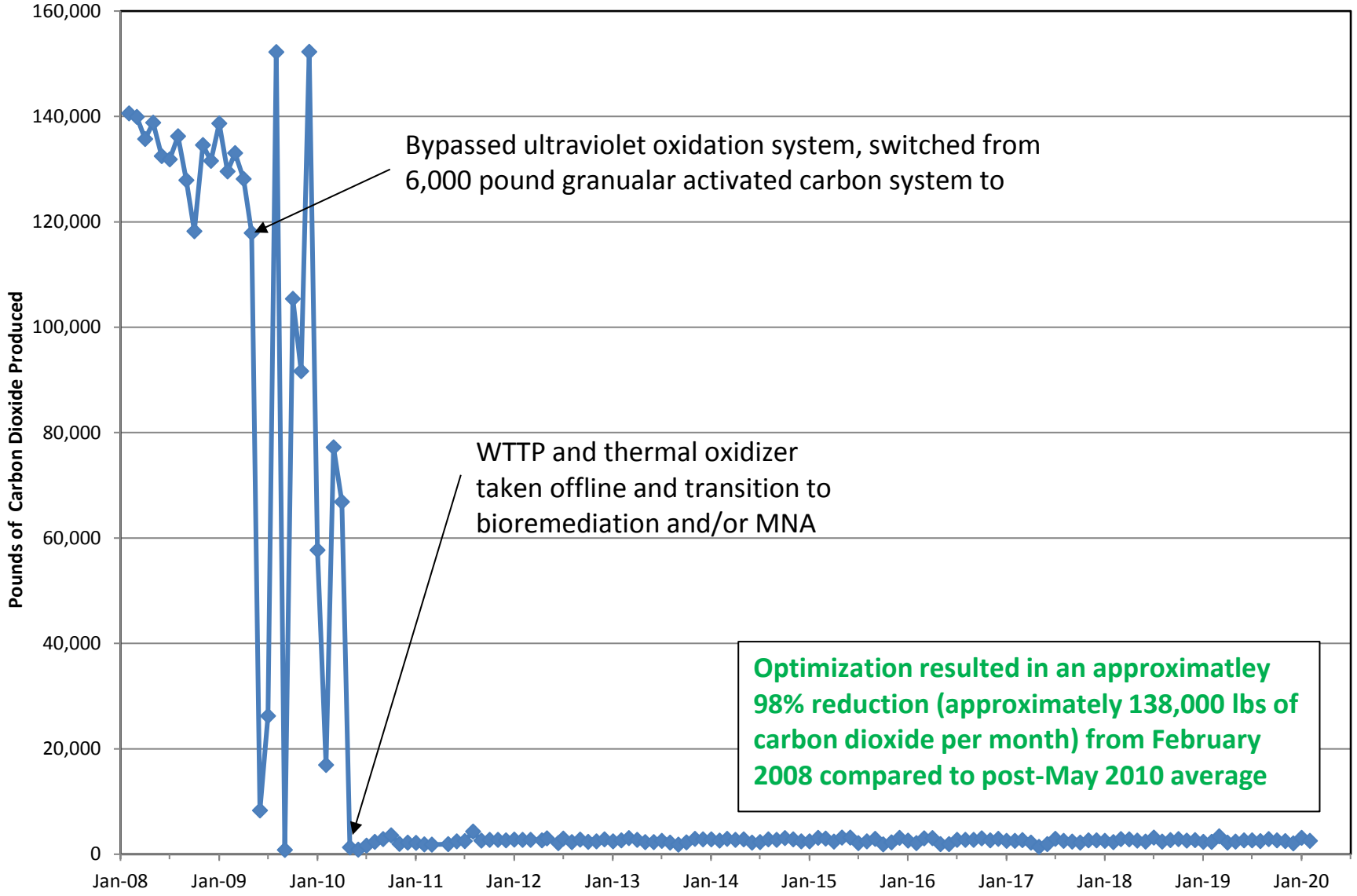


Figure 2

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



Subarea LF007C Groundwater Treatment Plant Monthly Data Sheet

Report Number: 186 **Reporting Period: 3 February 2020 – 2 March 2020** **Date Submitted: 13 March 2020**

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 February 2020 reporting period:

Table 1 – Operations Summary – February 2020

Initial Data Collection:	2/3/2020 13:30		**Final Data Collection:**	3/2/2020 10:45	
Operating Time:		Percent Uptime:	Electrical Power Usage[a]:		
LF007C GWTP:	669 hours	**LF007C GWTP**	100%	**LF007C GWTP:**	0 kWh
Gallons Treated: **161,997 gallons**			Gallons Treated Since March 2000: **89.9 million gallons**		
Volume Discharged to Duck Pond: **161,997 gallons**					
VOC Mass Removed: **1.0 x 10^{-3} pounds[b]**			VOC Mass Removed Since March 2000: **174.4 pounds (Groundwater)**		
Rolling 12-Month Cost per Pound of Mass Removed: **Not Measured[c]**					
Monthly Cost per Pound of Mass Removed: **Not Measured[c]**					

[a] The LF007C GWTP operates on solar power only.
[b] VOCs from February 2020 influent sample detected by EPA Method SW8260C.
[c] 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 – February 2020

Location	Average Flow Rate (gpm)[a]	Total Gallons Processed (gallons)
EW614x07	3.8	153,543[b]
EW615x07	0.3	10,762
LF007C GWTP	**4.0**	**161,997**

[a] Flow rates calculated by dividing total gallons processed by system operating time for the month or the average of the instantaneous readings.
[b] The extraction pump takes in air from the subsurface, which alters the flow and totalizer. An air-release valve was installed on 12 November 2019 to help minimize the effects on the system.
gpm = gallons per minute

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

Table 3 – Summary of System Shutdowns

Location	Shutdown[a]		Restart[a]		Cause
	Date	Time	Date	Time	
LF007C GWTP	None.	--		--	

-- = Time not recorded

[a] Shutdown and restart times estimated based on field notes

LF007C GWTP = Subarea LF007C Groundwater Treatment Plant

Summary of O&M Activities

Monthly groundwater samples were collected at the LF007C GWTP on 3 February 2020. Sample results are presented in Table 4. The total VOC concentration in the February 2020 influent sample was 0.76 J µg/L, not including the detection of acetone, which is a common lab contaminant. TCE was detected at the influent sample location. Except for acetone, no other VOCs were detected in the midpoint and effluent sample locations.

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 increasing. The average flow rate through the LF007C GWTP has decreased over the last 12 months.

Optimization Activities

No optimization activities occurred at the LF007C GWTP in February 2020.

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 generates 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 February 2020 – Subarea LF007C Groundwater Treatment Plant

Constituent	Instantaneous Maximum[a] (µg/L)	Detection Limit (µg/L)	N/C	3 February 2020 (µg/L)		
				Influent	After Carbon 1	Effluent[b]
Halogenated Volatile Organics						
Acetone	NA	2.1	0	2.7 J	ND	2.7 J
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
Chloromethane	NA	0.30	0	ND	ND	ND
Dibromochloromethane	5.0	0.13	0	ND	ND	ND
Dichlorodifluoromethane	NA	0.31	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	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	0.76 J	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	ND
Total Petroleum Hydrocarbons – Diesel	50	5.5	0	NM	NM	ND
Total Petroleum Hydrocarbons – Motor Oil	100	32	0	NM	NM	ND

[a] In accordance with current National Pollutant Discharge Elimination System permit number CAG912002, Order number R2-2017-0048.
[b] Concentrations in **bold** exceeded discharge limits

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

LF007CGWTP Total VOC Influent Concentrations and Average Flowrate Twelve Month History

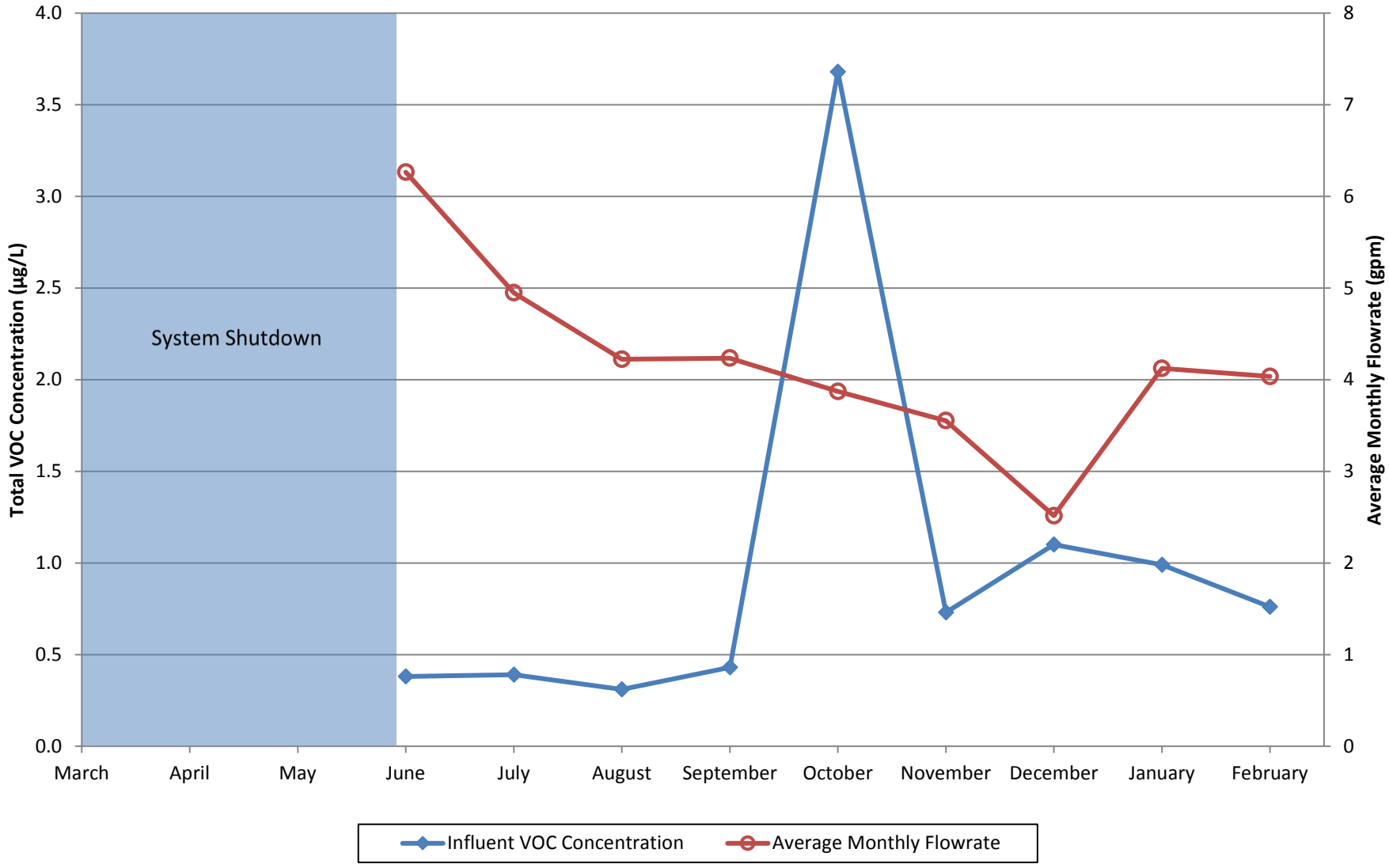
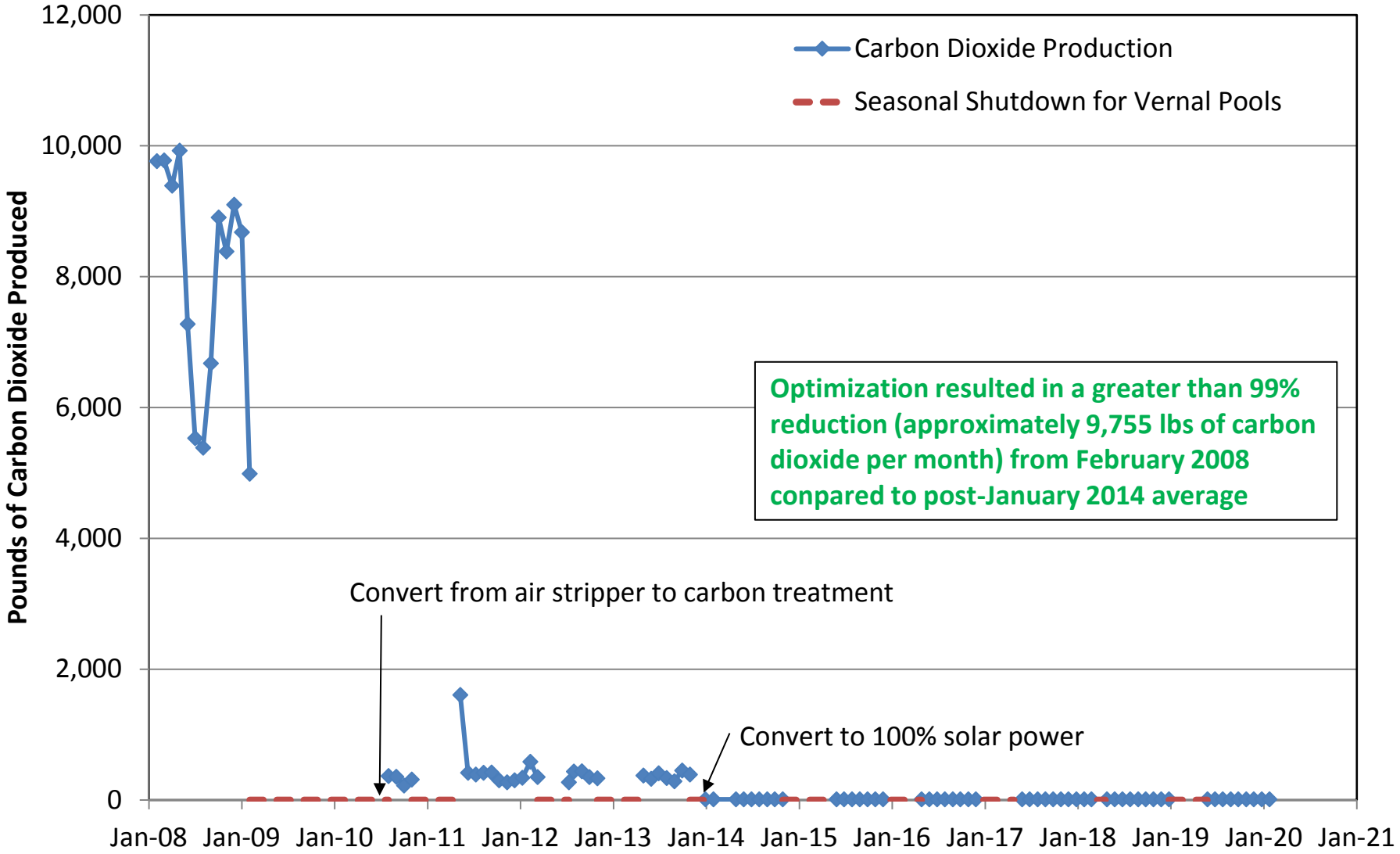


Figure 2

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



Note: Dashed line represents seasonal shutdowns due to the presence of vernal pools at Site LF007C during which no carbon dioxide production occurred.

Site ST018 Groundwater Treatment Plant Monthly Data Sheet

Report Number: 108 **Reporting Period: 3 February 2020 – 2 March 2020** **Date Submitted: 13 March 2020**

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

System Metrics

Table 1 presents operation data from the February 2020 reporting period.

Table 1 – Operations Summary – February 2020

Initial Data Collection:	2/3/2020 12:30	**Final Data Collection:**	3/2/2020 10:10
Operating Time:		Percent Uptime:	Electrical Power Usage:
ST018GWTP: 670 hours		**ST018GWTP: 100%**	**ST018GWTP:** 82 kWh (61 lbs CO_2 generated[a])
Gallons Extracted: **150,120 gallons**		Gallons Extracted Since March 2011: **18.7 million gallons**	
Volume Discharged to Sanitary Sewer: **150,120 gallons**		Final Totalizer Reading: **18,748,029 gallons**	
Cumulative Volume Discharged to Sanitary Sewer since 1 November 2014: **12.3 million gallons**			
MTBE, BTEX, VOC, TPH Mass Removed: **0.10 lbs**[b]		MTBE, BTEX, VOC, TPH Mass Removed Since March 2011: **49.0 lbs**	
MTBE (Only) Removed: **0.01 lbs**[b]		MTBE (Only) Mass Removed Since March 2011: **12.0 lbs**	
Rolling 12-Month Cost per Total Pounds of Mass Removed: $30,377[bc]			
Monthly Cost per Pound of Mass Removed: $41,134[bc]			

[a] SiteWise™ estimate that 1 kilowatt hour generated produces 0.74 pounds of GHG.
[b] Calculated using February 2020 EPA Method SW8260C and SW8015B analytical results.
[c] 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.

Table 2 – ST018GWTP Average Flow Rates – February 2020

Location	Average Flow Rate Groundwater (gpm)[a]	Hours of Operation
EW2014x18	1.9	670
EW2016x18	0.4	670
EW2019x18	0.0	Offline[b]
EW2333x18	2.4	670
ST018GWTP	3.7	670

[a] Flow rates calculated by dividing total gallons processed by amount of operating time of the pump/system.
[b] Extraction well was turned off because of low MTBE concentrations with regulatory approval on 25 November 2019.

gpm = gallons per minute
ST018GWTP = Site ST018 Groundwater Treatment Plant

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

Table 3 – Summary of System Shutdowns

Location	Shutdown[a]		Restart[a]		Cause
	Date	Time	Date	Time	
CGWTP	None.	--		--	

-- = Time not recorded
[a] 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 3 February 2020. 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 2020 laboratory data report is available upon request. The MTBE discharge concentration during the February 2020 sampling event was 10 µg/L, which is a decrease from the January 2020 sample result of 33 µg/L. A number of other fuel-related constituents were also detected in the system discharge sample, and are listed in Table 4.

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.

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 typical 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, which is partially attributed to the shutdown of EW2019x18 in November 2019. The extracted MTBE concentrations and extracted total

concentrations have generally been fluctuating over the past 12 months with an overall stable flat trend and slightly decreasing trend, respectively.

Optimization Activities

No optimization activities occurred at the ST018GWTP in February 2020.

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 a majority of the ST018GWTP system.

Figure 2 presents the historical GHG production from the ST018GWTP. The ST018GWTP produced 61 pounds of GHG during February 2020 and removed 150,120 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 February 2020 – Site ST018 Groundwater Treatment Plant

Constituent	Instantaneous Maximum[a] (µg/L)	Detection Limit (µg/L)	N/C	3 February 2020 (µg/L)
				System Discharge[b]
Fuel Related Constituents				
Methyl tert-Butyl Ether	6,400	0.25	0	10
Benzene	25,000[c]	0.16	0	3.0
Ethylbenzene	25,000[c]	0.16	0	0.69 J
Toluene	25,000[c]	0.17	0	ND
Total Xylenes	25,000[c]	0.19 – 0.34	0	ND
Total Petroleum Hydrocarbons – Gasoline	50,000[d]	10	0	40
Total Petroleum Hydrocarbons – Diesel	50,000[d]	15	0	25 J
Total Petroleum Hydrocarbons – Motor Oil	100,000	160	0	ND
Other				
Acetone	NA	1.9	0	3.8 J
1,2-Dichloroethane	20	0.13	0	ND
Isopropylbenzene	NA	0.19	0	0.44 J
Naphthalene	NA	0.22	0	0.57 J
N-Propylbenzene	NA	0.16	0	0.59 J

[a] In accordance with the Fairfield-Suisun Sewer District Discharge Limitations

[b] Concentrations in **bold** exceeded discharge limits

Laboratory data available on request.

[c] The limit of 25,000 µg/L is a combined limit for BTEX.

[d] 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

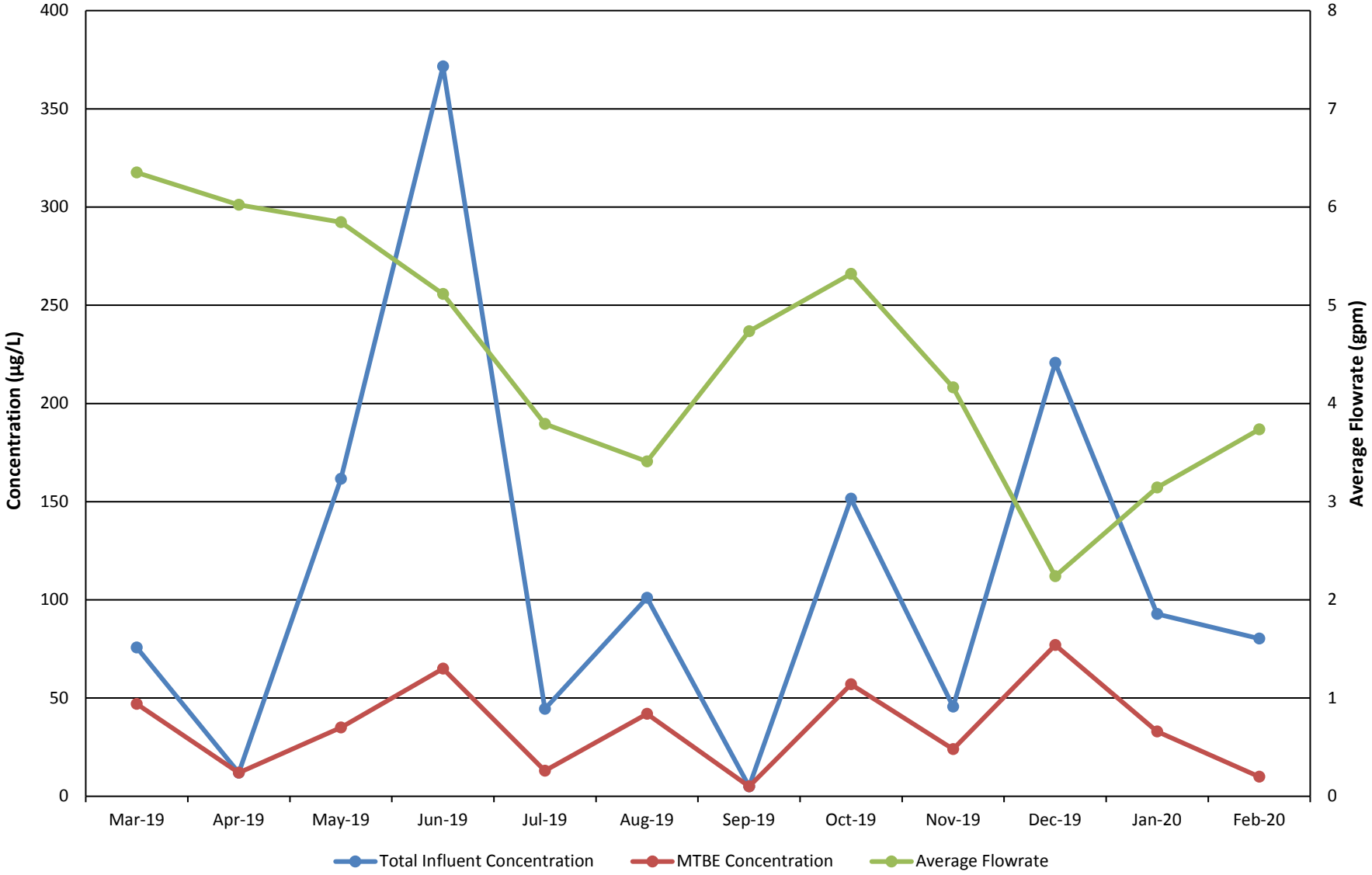
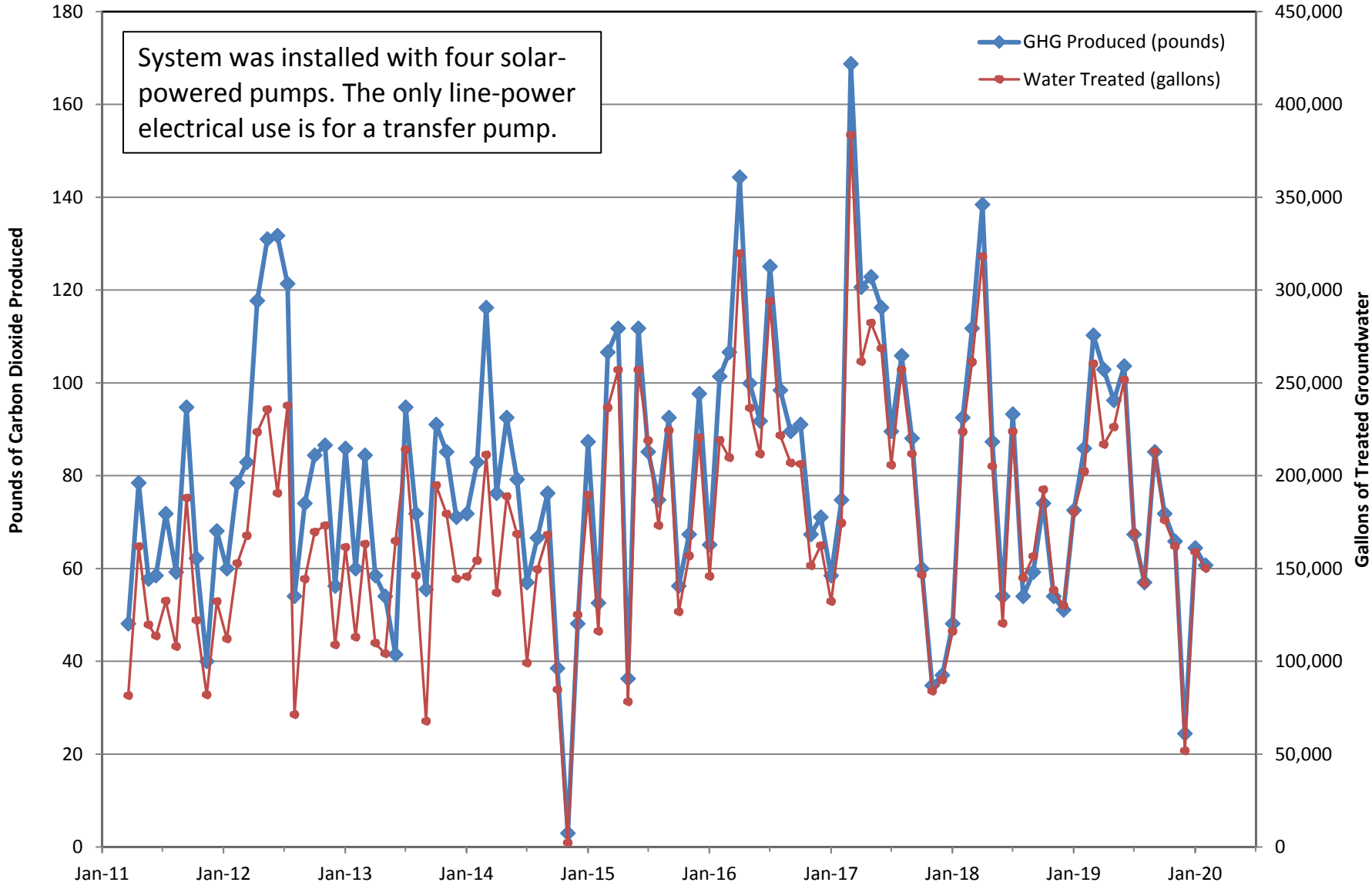


Figure 2

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



Travis AFB
Restoration Program

Program Update

RPM Meeting

March 18, 2020

Completed Documents (1)

- Vapor Intrusion Assessment Update Technical Memorandum
- 2012 CAMU Annual Report
- Old Skeet Range Action Memorandum
- 3rd 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
- NFA ROD for Old Skeet Range (TS060/TS060A MRA)
- 2018 Annual GRISR
- SS046 Remedial Action Completion Report and Well Decommissioning Work Plan
- 2018 LF007 CAMU Inspection, Monitoring, and Maintenance Report
- Amendment to the NEWIOU Soil ROD for Sites SS016 and SD033
- SS016 RD/RA Work Plan
- 4th Five Year Review Report for Multiple Groundwater, Soil, and Sediment Sites
- SD043 Site Closure Report
- SS046 Well Decommissioning and Site Closeout Tech Memo
- LF008 Remedial Action Evaluation 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 (2nd 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 (3rd 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 (1st 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 (2nd 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)

- 3rd Quarter 2019 GRIP Sampling
- SD034 O_2 Enhancement
- SS016 SBGR Repairs
- SD037 EVO Re-injection
- 4th Quarter 2019 GRIP Sampling
- SD031B POCO Additional Investigation (Gore Sorber Round 1)
- SD043 Well and GETS Decommissioning
- ***SS016 Soil excavation***
- ***SS015 SPOC system installation***
- ***SD031B POCO Additional Investigation (Gore Sorber Round 2)***

Documents In-Progress

CERCLA

- Community Relations Plan Update (revised draft)
- SD031 Soil RI/FS
- Initial Passive Vent Systems Sampling Work Plan Tech Memo

POCO

- ***SD031B POCO Additional Site Investigation Work Plan***

Field Work In-Progress

CERCLA

None

POCO

None

Documents Planned

CERCLA

- SD043 Well Decommissioning and Site Closeout Tech Memo — May
- Optimization Activities Tech Memo for SD034 and SD037 — Mar
- ***2019 GRISR*** — ***June***

POCO

- FT004 POCO Corrective Action Plan — Apr

Field Work Planned

CERCLA

- 2Q20 GRIP Sampling — Apr
- Passive Vent Systems Sampling — Aug
- Annual CAMU Gas Monitoring — Mar

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

No new data since the last update

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)
    - TPH-D baseline of 9,600 ug/L decreased to 90 ug/L at 2.5 years in May 2019 and 77 ug/L by October 2019). Concentration fluctuations are to be expected as higher concentration areas are flushed as part of the washboard effect. Recently completed enhancements to the SBGR trenches to maintain treatment efficiency.)
    - TPH-MO baseline of 2,300 ug/L decreased to non-detect at 2 years and remained non-detect at through latest sampling event in October 2019
  - Plume hot spot monitoring well (MW02x34)
    - TPH-D baseline of 8,300 ug/L decreased to 5,500 ug/L at 2.5 years in May 2019, 430 ug/L in August 2019, and 4,300 ug/L in October 2019 (Concentration fluctuations are to be expected as higher concentration areas are flushed as part of the washboard effect. Recently completed enhancements to the extraction network to help reductions in this area.)
    - TPH-MO baseline of 1,500 ug/L decreased to 1,100 J ug/L at 2.5 years in May 2019, 210 J ug/L in August 2019, and 520 ug/L in October 2019
- Aerobic treatment process for this TD has been successful, but additional enhancements were recently completed to maintain treatment efficiency (replacement extraction well, new extraction well, and biosparging inside the SBGR trenches)

No new data since the last update

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)
  - Summary:
    - It is inconclusive if bioaugmentation provided a noticeable increase in degradation rates compared to EVO only for Site ST027B.
    - 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). Inconclusive if bioaugmentation was beneficial, ultimately performance was dictated by the additional injection wells installed to treat upgradient source mass.
- 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 0.81 J; 1.4 to <0.4; 5.9 to 4.2; 3.0 to 1.8 ug/L)
    - Distribution of TOC through the aquifer via extraction was not able to be demonstrated via sampling data, although it is still expected to have had a benefit to remediation as a whole

    No new data since the last update

Updates in Green Font

CVOC Technology Demonstration Projects (4)

- F**T004: 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
  - Max monitoring well TCE concentration of 560 μg/L (baseline) was reduced to 63 ug/L in October 2018 and 94 ug/L in October 2019
  - Limited TOC dispersal, additional EVO injection conducted with nanoEVO in 2017 to determine if this can enhance TOC dispersal
    - 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 present below the vernal pools, so it will take additional time to see concentration reductions)
    - MW2330x04 maxed out at 640 ug/L in April 2018, decreased to 49 ug/L in May 2019, and rebounded to 600 ug/L in October 2019. Need to further evaluate what is causing these fluctuations

    No new data since the last update

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
  - Summary:
    - TD 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% (sum of key wells within TD area, excluding 2 wells to SW that increased expected to be caused by previously unknown downgradient mass)
    - Total molar concentration (sum of CVOCs) has reduced by 99% (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

No new data since the last update

Updates in Green Font

Completed Documents (Historical 1)

- 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

Completed Field Work (Historical 1)

- 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 (2nd 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^{th} 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